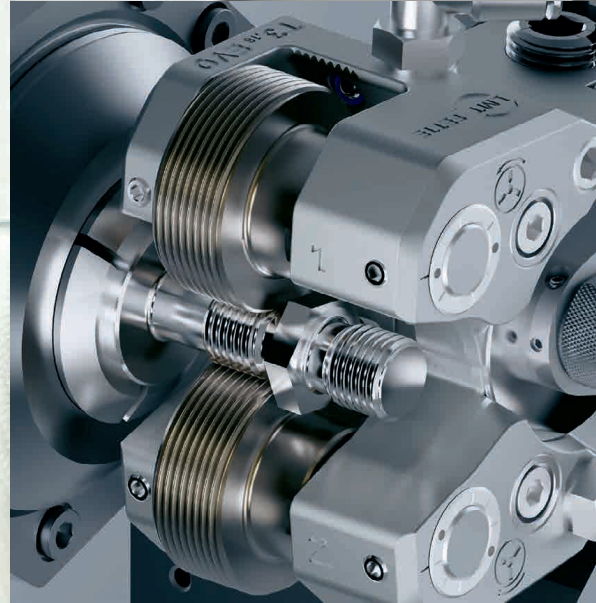




Metalworking

Solid Milling, Indexable Milling,
Threading, Rolling Systems

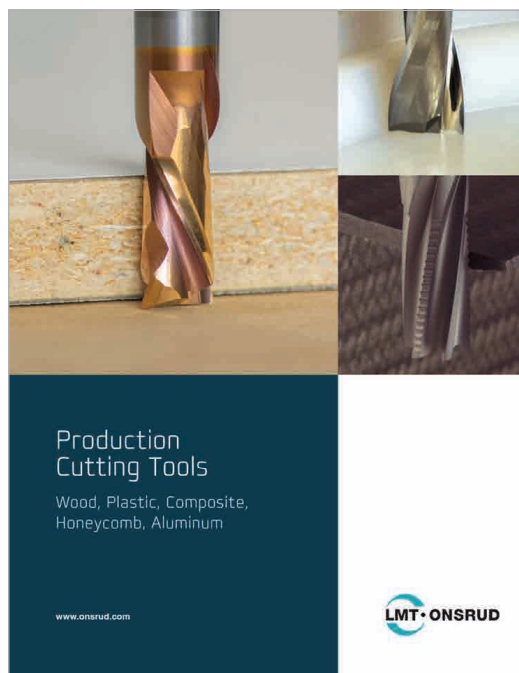


The key element of the services at LMT Tools is our eye for detail and passion for precision to help our customers implement their visions, ideas and needs.

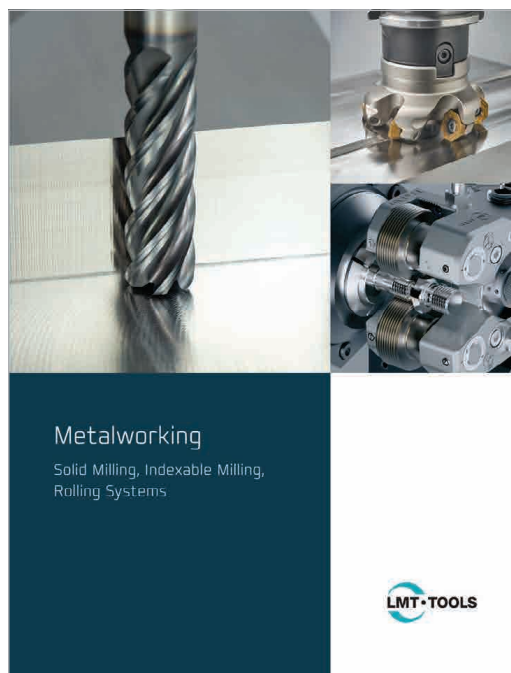
We see precision tools as the key to bringing ideas to life. These ideas then go on to become market successes, driven forward by efficiency and innovative power.

The extensive product range combines the competence of the LMT Fette, LMT Kieninger and LMT Onsrud brands. It offers perfect solutions for various applications in different industries:

- Transportation & Transmission: automotive, trucks, ships, railway, aerospace industry
- Stationary: cranes, wind energy, gear boxes and drives
- Mould & Die
- Pump and Valve
- General machining



LMT Onsrud
Production Cutting Tools



LMT Tools
Metalworking

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4	Solid Milling	Solid Milling Solid carbide metalworking solutions		4	Solid Milling
111	Indexable Milling	Indexable Milling Shoulder milling, face milling, high feed milling, and copy milling		111	Indexable Milling
212	Threading	Threading Modular taps		212	Threading
238	Rolling Systems	Rolling Systems Axial, tangential, and radial rolling heads		238	Rolling Systems

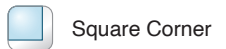


Solid Milling

Solid Milling Tools

7	End Mills for Aluminum (ISO N)
7	Aluminum Ultra (ALU) Series
	Aluminum Ultra (ALU) 2 Flute
	Aluminum Ultra (ALU) 3 Flute
	Aluminum Ultra (ALU) 3 Flute Coolant Through
23	Aluminum Finisher (AF) Series
	Aluminum Finisher (AF) 2 Flute
	Aluminum Finisher (AF) 3 Flute
	Aluminum Finisher (AF) 3 Flute Coolant Through
48	Aluminum Rougher (AR) Series
	Aluminum Rougher (AR) 3 Flute
	Aluminum Rougher (AR) 3 Flute Coolant Through
53	Universal End Mills for ISO P, K, M, S
53	Maximum Velocity (MXV) Series
	Maximum Velocity (MXV) 4 Flute
	Maximum Velocity (MXV) 5 Flute
	Maximum Velocity (MXV) 4 Flute Ballnose
	Maximum Velocity (MXV) 5 Flute Ballnose
64	TV-7 Series
70	End Mills for Nickel-Based Alloys (ISO S)
70	MXR Series
	MXR 4 Flute
	MXR 5 Flute
73	HXR Series
	HXR 7, 9, 11 Flute
75	RXR Series
77	End Mills for Titanium (ISO S)
77	TXR Series
	TRX 5 Flute
	TRX 7 Flute
	TRX 4, 6, 8 Flute
87	End Mills for 5-Axis Milling
87	Radial Milling Cutter (RMC) Series
93	End Mills for Hardened Steel (ISO-H)
93	MDR Ballnose Series
95	Technical Information

Point Geometry



Square Corner



Corner Radius



Ballnose



Corner Chamfer

Helix Angle



36-38 degree dual helix angle



40 degree helix angle



38 degree helix angle



36 degree helix angle



30 degree helix angle



38-39 degree dual helix angle



35-36 degree dual helix angle



35 degree helix angle

Shank Tolerance



h6 Shank Tolerance

Application



Trochoidal milling



Slotting



Copying

Tool Material



Solid Carbide

Coating



ZRN



ESG



ESR



X



DLC



NanoMax

Flutes



2 flute



3 flute



4 flute



5 flute



6 flute



7 flute



8 flute



9 flute



11 flute

Coolant



Coolant Through

NEW Aluminum Ultra (ALU) Series

The ALU Series is the next generation of end mills for slotting and finishing non-ferrous materials.

Features and Benefits

- 2 flute tools with open flute geometry optimized for slotting applications.
- 3 flute tools for chatter free machining at high RPM and heavy cuts.
- Reduced chatter will increase tool life, produce a higher quality part and optimize cutting efficiencies.
- Polished flutes for better chip removal and low HP requirements.
- Coolant through 3 flute design to direct coolant at the cutting edge.
- Chip breaker design enhances chip removal in longer lengths of cut.
- Industry's largest selection of corner radii and neck and flute lengths in a standard program.
- Available uncoated with high polished flutes and a specialty DLC coating for Aluminum.

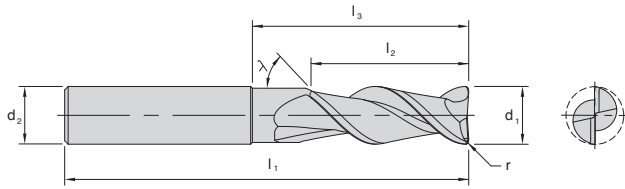
Applications

- Slotting
- Pocketing
- Profiling
- High Material Removal

Usage

- ISO N Non-Ferrous
- Aluminum
- Brass
- Bronze
- Copper

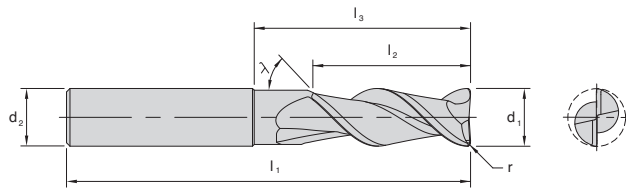




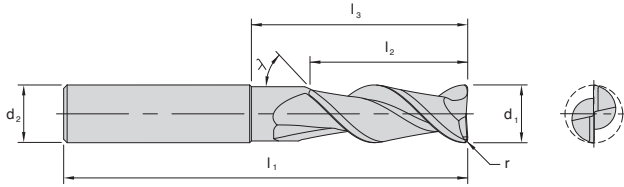
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H												
Series	Cutting Dia d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shk Dia d ₂	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUS-2	1/8	1/4	2	—	1/8	2	Square	—	ALU400002	2662174	ALU400003	2662175
AUM-2	1/8	1/2	2	—	1/8	2	Square	—	ALU400020	2662176	ALU400021	2662177
AUM-2	1/8	1/2	2	—	1/8	2	Ball	—	ALU400024	2662178	ALU400025	2662179
AUS-2	1/4	3/8	2	—	1/4	2	Square	—	ALU700102	2662180	ALU700103	2662181
AUS-2	1/4	3/8	2	—	1/4	2	0.015	—	ALU700106	2662182	ALU700107	2662183
AUS-2	1/4	3/8	2	—	1/4	2	0.030	—	ALU700110	2662184	ALU700111	2662185
AUS-2	1/4	3/8	2	—	1/4	2	0.060	—	ALU700114	2662186	ALU700115	2662187
AUS-2	1/4	3/8	2	—	1/4	2	Ball	—	ALU700138	2662188	ALU700139	2662189
AUM-2	1/4	3/4	2	—	1/4	2	Square	—	ALU700752	2662190	ALU700753	2662191
AUM-2	1/4	3/4	2	—	1/4	2	0.015	—	ALU700756	2662192	ALU700757	2662193
AUM-2	1/4	3/4	2	—	1/4	2	0.030	—	ALU700760	2662194	ALU700761	2662195
AUM-2	1/4	3/4	2	—	1/4	2	0.060	—	ALU700764	2662196	ALU700765	2662197
AUM-2	1/4	3/4	2	—	1/4	2	Ball	—	ALU700788	2662198	ALU700789	2662199
AUL-2	1/4	1 1/4	2 1/2	—	1/4	2	Square	—	ALU701402	2662200	ALU701403	2662201
AUL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.015	—	ALU701406	2662202	ALU701407	2662203
AUL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.030	—	ALU701410	2662204	ALU701411	2662205
AUL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.060	—	ALU701414	2662206	ALU701415	2662207
AUL-2	1/4	1 1/4	2 1/2	—	1/4	2	Ball	—	ALU701438	2662208	ALU701439	2662209
AUNS-2	1/4	3/8	4	1 1/2	1/4	2	Square	—	ALU706102	2662210	ALU706103	2662211
AUNS-2	1/4	3/8	4	1 1/2	1/4	2	0.015	—	ALU706106	2662212	ALU706107	2662213
AUNS-2	1/4	3/8	4	1 1/2	1/4	2	0.030	—	ALU706110	2662214	ALU706111	2662215
AUNS-2	1/4	3/8	4	1 1/2	1/4	2	Ball	—	ALU706138	2662216	ALU706139	2662217
AUNM-2	1/4	3/8	4	1 3/4	1/4	2	Square	—	ALU706752	2662218	ALU706753	2662219
AUNM-2	1/4	3/8	4	1 3/4	1/4	2	0.015	—	ALU706756	2662220	ALU706757	2662221
AUNM-2	1/4	3/8	4	1 3/4	1/4	2	0.030	—	ALU706760	2662222	ALU706761	2662223
AUNM-2	1/4	3/8	4	1 3/4	1/4	2	Ball	—	ALU706788	2662224	ALU706789	2662225
AUS-2	3/8	1/2	2 1/2	—	3/8	2	Square	—	ALU700202	2662226	ALU700203	2662227
AUS-2	3/8	1/2	2 1/2	—	3/8	2	0.015	—	ALU700206	2662228	ALU700207	2662229
AUS-2	3/8	1/2	2 1/2	—	3/8	2	0.030	—	ALU700210	2662230	ALU700211	2662231
AUS-2	3/8	1/2	2 1/2	—	3/8	2	Ball	—	ALU700238	2662232	ALU700239	2662233
AUM-2	3/8	1	2 1/2	—	3/8	2	Square	—	ALU700852	2662234	ALU700853	2662235

Cutting data recommendations on page 96

■ = First Choice □ = Second Choice



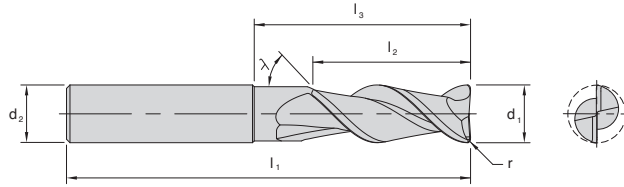
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Series	Cutting Dia d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shk Dia d ₂	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUM-2	3/8	1	2 1/2	—	3/8	2	0.015	—	ALU700856	2662236	ALU700857	2662237
AUM-2	3/8	1	2 1/2	—	3/8	2	0.030	—	ALU700860	2662238	ALU700861	2662239
AUM-2	3/8	1	2 1/2	—	3/8	2	Ball	—	ALU700888	2662240	ALU700889	2662241
AUL-2	3/8	1 1/2	4	—	3/8	2	Square	—	ALU701502	2662242	ALU701503	2662243
AUL-2	3/8	1 1/2	4	—	3/8	2	Square	Yes	ALU711001	2662244	ALU711002	2662245
AUL-2	3/8	1 1/2	4	—	3/8	2	0.015	—	ALU701506	2662246	ALU701507	2662247
AUL-2	3/8	1 1/2	4	—	3/8	2	0.015	Yes	ALU711003	2662248	ALU711004	2662249
AUL-2	3/8	1 1/2	4	—	3/8	2	0.030	—	ALU701510	2662250	ALU701511	2662251
AUL-2	3/8	1 1/2	4	—	3/8	2	Ball	—	ALU701538	2662252	ALU701539	2662253
AUNS-2	3/8	1/2	4	1 3/4	3/8	2	Square	—	ALU706202	2662254	ALU706203	2662255
AUNS-2	3/8	1/2	4	1 3/4	3/8	2	0.015	—	ALU706206	2662256	ALU706207	2662257
AUNS-2	3/8	1/2	4	1 3/4	3/8	2	0.030	—	ALU706210	2662258	ALU706211	2662259
AUNS-2	3/8	1/2	4	1 3/4	3/8	2	0.060	—	ALU706214	2662260	ALU706215	2662261
AUNS-2	3/8	1/2	4	1 3/4	3/8	2	Ball	—	ALU706238	2662262	ALU706239	2662263
AUNM-2	3/8	1/2	4	2 1/4	3/8	2	Square	—	ALU706852	2662264	ALU706853	2662265
AUNM-2	3/8	1/2	4	2 1/4	3/8	2	0.015	—	ALU706856	2662266	ALU706857	2662267
AUNM-2	3/8	1/2	4	2 1/4	3/8	2	0.030	—	ALU706860	2662268	ALU706861	2662269
AUNM-2	3/8	1/2	4	2 1/4	3/8	2	0.060	—	ALU706864	2662270	ALU706865	2662271
AUNM-2	3/8	1/2	4	2 1/4	3/8	2	Ball	—	ALU706888	2662272	ALU706889	2662273
AUNL-2	3/8	1/2	5	2 3/4	3/8	2	Square	—	ALU707502	2662274	ALU707503	2662275
AUNL-2	3/8	1/2	5	2 3/4	3/8	2	0.015	—	ALU707506	2662276	ALU707507	2662277
AUNL-2	3/8	1/2	5	2 3/4	3/8	2	0.030	—	ALU707510	2662278	ALU707511	2662279
AUNL-2	3/8	1/2	5	2 3/4	3/8	2	Ball	—	ALU707538	2662280	ALU707539	2662281
AUS-2	1/2	5/8	3	—	1/2	2	Square	—	ALU700302	2662282	ALU700303	2662283
AUS-2	1/2	5/8	3	—	1/2	2	0.015	—	ALU700306	2662284	ALU700307	2662285
AUS-2	1/2	5/8	3	—	1/2	2	0.030	—	ALU700310	2662286	ALU700311	2662287
AUS-2	1/2	5/8	3	—	1/2	2	0.060	—	ALU700314	2662288	ALU700315	2662289
AUS-2	1/2	5/8	3	—	1/2	2	Ball	—	ALU700338	2662290	ALU700339	2662291
AUM-2	1/2	1 1/4	3	—	1/2	2	Square	—	ALU700952	2662292	ALU700953	2662293
AUM-2	1/2	1 1/4	3	—	1/2	2	0.015	—	ALU700956	2662294	ALU700957	2662295
AUM-2	1/2	1 1/4	3	—	1/2	2	0.030	—	ALU700960	2662296	ALU700961	2662297



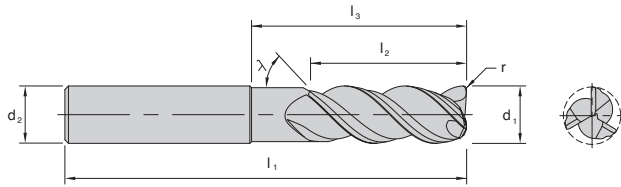
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Series	Cutting Dia d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shk Dia d ₂	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUM-2	1/2	1 1/4	3	—	1/2	2	0.060	—	ALU700964	2662298	ALU700965	2662299
AUM-2	1/2	1 1/4	3	—	1/2	2	Ball	—	ALU700988	2662300	ALU700989	2662301
AUL-2	1/2	2	4	—	1/2	2	Square	—	ALU701602	2662302	ALU701603	2662303
AUL-2	1/2	2	4	—	1/2	2	Square	Yes	ALU711005	2662304	ALU711006	2662305
AUL-2	1/2	2	4	—	1/2	2	0.015	—	ALU701606	2662306	ALU701607	2662307
AUL-2	1/2	2	4	—	1/2	2	0.015	Yes	ALU711007	2662308	ALU711008	2662309
AUL-2	1/2	2	4	—	1/2	2	0.030	—	ALU701610	2662310	ALU701611	2662311
AUL-2	1/2	2	4	—	1/2	2	0.030	Yes	ALU711009	2662312	ALU711010	2662313
AUL-2	1/2	2	4	—	1/2	2	0.060	—	ALU701614	2662314	ALU701615	2662315
AUL-2	1/2	2	4	—	1/2	2	Ball	—	ALU701638	2662316	ALU701639	2662317
AUNS-2	1/2	5/8	4	2 1/8	1/2	2	Square	—	ALU706302	2662318	ALU706303	2662319
AUNS-2	1/2	5/8	4	2 1/8	1/2	2	0.015	—	ALU706306	2662320	ALU706307	2662321
AUNS-2	1/2	5/8	4	2 1/8	1/2	2	0.030	—	ALU706310	2662322	ALU706311	2662323
AUNS-2	1/2	5/8	4	2 1/8	1/2	2	0.060	—	ALU706314	2662324	ALU706315	2662325
AUNS-2	1/2	5/8	4	2 1/8	1/2	2	Ball	—	ALU706338	2662326	ALU706339	2662327
AUNM-2	1/2	5/8	5	3 1/8	1/2	2	Square	—	ALU706952	2662328	ALU706953	2662329
AUNM-2	1/2	5/8	5	3 1/8	1/2	2	0.015	—	ALU706956	2662330	ALU706957	2662331
AUNM-2	1/2	5/8	5	3 1/8	1/2	2	0.030	—	ALU706960	2662332	ALU706961	2662333
AUNM-2	1/2	5/8	5	3 1/8	1/2	2	Ball	—	ALU706988	2662334	ALU706989	2662335
AUS-2	3/4	1	3	—	3/4	2	Square	—	ALU700502	2662336	ALU700503	2662337
AUS-2	3/4	1	3	—	3/4	2	0.030	—	ALU700510	2662338	ALU700511	2662339
AUS-2	3/4	1	3	—	3/4	2	0.060	—	ALU700514	2662340	ALU700515	2662341
AUS-2	3/4	1	3	—	3/4	2	Ball	—	ALU700538	2662342	ALU700539	2662343
AUM-2	3/4	1 5/8	4	—	3/4	2	Square	—	ALU701152	2662344	ALU701153	2662345
AUM-2	3/4	1 5/8	4	—	3/4	2	0.030	—	ALU701160	2662346	ALU701161	2662347
AUM-2	3/4	1 5/8	4	—	3/4	2	0.060	—	ALU701164	2662348	ALU701165	2662349
AUM-2	3/4	1 5/8	4	—	3/4	2	Ball	—	ALU701188	2662350	ALU701189	2662351
AUL-2	3/4	2 1/2	5	—	3/4	2	Square	—	ALU701802	2662352	ALU701803	2662353
AUL-2	3/4	2 1/2	5	—	3/4	2	Square	Yes	ALU711011	2662354	ALU711012	2662355
AUL-2	3/4	2 1/2	5	—	3/4	2	0.030	—	ALU701810	2662356	ALU701811	2662357
AUL-2	3/4	2 1/2	5	—	3/4	2	0.030	Yes	ALU711013	2662358	ALU711014	2662359

Cutting data recommendations on page 96

■ = First Choice □ = Second Choice



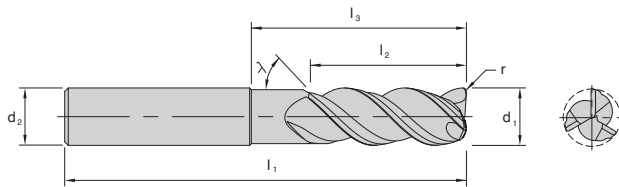
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Series	Cutting Dia d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUL-2	3/4	2 1/2	5	—	3/4	2	0.060	—	ALU701814	2662360	ALU701815	2662361
AUL-2	3/4	2 1/2	5	—	3/4	2	Ball	—	ALU701838	2662362	ALU701839	2662363
AUNS-2	3/4	1	4	2 1/8	3/4	2	Square	—	ALU706508	2662364	ALU706509	2662365
AUNS-2	3/4	1	4	2 1/8	3/4	2	0.030	—	ALU706510	2662366	ALU706511	2662367
AUNS-2	3/4	1	4	2 1/8	3/4	2	0.060	—	ALU706514	2662368	ALU706515	2662369
AUNS-2	3/4	1	4	2 1/8	3/4	2	0.120	—	ALU706522	2662370	ALU706523	2662371
AUNM-2	3/4	1	5	3 1/8	3/4	2	Square	—	ALU707152	2662372	ALU707153	2662373
AUNM-2	3/4	1	5	3 1/8	3/4	2	0.030	—	ALU707160	2662374	ALU707161	2662375
AUNM-2	3/4	1	5	3 1/8	3/4	2	0.060	—	ALU707164	2662376	ALU707165	2662377
AUNM-2	3/4	1	5	3 1/8	3/4	2	0.120	—	ALU707172	2662378	ALU707173	2662379
AUNL-2	3/4	1	6	4 1/8	3/4	2	Square	—	ALU707802	2662380	ALU707803	2662381
AUNL-2	3/4	1	6	4 1/8	3/4	2	0.030	—	ALU707810	2662382	ALU707811	2662383
AUNL-2	3/4	1	6	4 1/8	3/4	2	0.060	—	ALU707814	2662384	ALU707815	2662385
AUNL-2	3/4	1	6	4 1/8	3/4	2	0.120	—	ALU707822	2662386	ALU707823	2662387



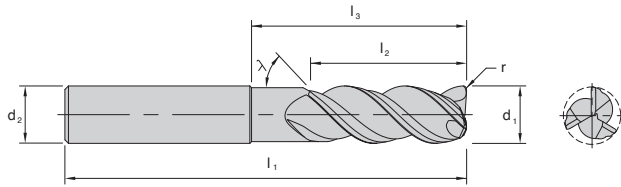
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Series	Cutting Dia d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUS-3	1/8	1/4	2	—	1/8	3	Square	—	ALU400038	2662388	ALU400039	2662389
AUS-3	1/8	1/4	2	—	1/8	3	0.010	—	ALU400040	2662390	ALU400041	2662391
AUS-3	1/8	1/4	2	—	1/8	3	Ball	—	ALU400042	2662392	ALU400043	2662393
AUM-3	1/8	1/2	2	—	1/8	3	Square	—	ALU400056	2662394	ALU400057	2662395
AUM-3	1/8	1/2	2	—	1/8	3	0.010	—	ALU400058	2662396	ALU400059	2662397
AUM-3	1/8	1/2	2	—	1/8	3	Ball	—	ALU400060	2662398	ALU400061	2662399
AUS-3	3/16	5/16	2	—	3/16	3	Square	—	ALU400044	2662400	ALU400045	2662401
AUS-3	3/16	5/16	2	—	3/16	3	0.010	—	ALU400046	2662402	ALU400047	2662403
AUS-3	3/16	5/16	2	—	3/16	3	Ball	—	ALU400048	2662404	ALU400049	2662405
AUM-3	3/16	9/16	2 1/2	—	3/16	3	Square	—	ALU400062	2662406	ALU400063	2662407
AUM-3	3/16	9/16	2 1/2	—	3/16	3	0.010	—	ALU400064	2662408	ALU400065	2662409
AUM-3	3/16	9/16	2 1/2	—	3/16	3	Ball	—	ALU400066	2662410	ALU400067	2662411
AUL-3	3/16	7/8	2 1/2	—	3/16	3	Square	—	ALU400078	2662412	ALU400079	2662413
AUS-3	1/4	3/8	2	—	1/4	3	Square	—	ALU703102	2662414	ALU703103	2662415
AUS-3	1/4	3/8	2	—	1/4	3	0.015	—	ALU703106	2662416	ALU703107	2662417
AUS-3	1/4	3/8	2	—	1/4	3	0.030	—	ALU703110	2662418	ALU703111	2662419
AUS-3	1/4	3/8	2	—	1/4	3	0.060	—	ALU703114	2662420	ALU703115	2662421
AUS-3	1/4	3/8	2	—	1/4	3	Ball	—	ALU703138	2662422	ALU703139	2662423
AUM-3	1/4	3/4	2	—	1/4	3	Square	—	ALU703752	2662424	ALU703753	2662425
AUM-3	1/4	3/4	2	—	1/4	3	0.015	—	ALU703756	2662426	ALU703757	2662427
AUM-3	1/4	3/4	2	—	1/4	3	0.030	—	ALU703760	2662428	ALU703761	2662429
AUM-3	1/4	3/4	2	—	1/4	3	0.060	—	ALU703764	2662430	ALU703765	2662431
AUM-3	1/4	3/4	2	—	1/4	3	0.090	—	ALU703768	2662432	ALU703769	2662433
AUM-3	1/4	3/4	2	—	1/4	3	Ball	—	ALU703788	2662434	ALU703789	2662435
AUL-3	1/4	1 1/4	2 1/2	—	1/4	3	Square	—	ALU704402	2662436	ALU704403	2662437
AUL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.015	—	ALU704406	2662438	ALU704407	2662439
AUL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.030	—	ALU704410	2662440	ALU704411	2662441
AUL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.060	—	ALU704414	2662442	ALU704415	2662443
AUL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.090	—	ALU704418	2662444	ALU704419	2662445
AUL-3	1/4	1 1/4	2 1/2	—	1/4	3	Ball	—	ALU704438	2662446	ALU704439	2662447
AUNS-3	1/4	3/8	4	1 1/2	1/4	3	Square	—	ALU709102	2662448	ALU709103	2662449

Cutting data recommendations on page 96

■ = First Choice □ = Second Choice



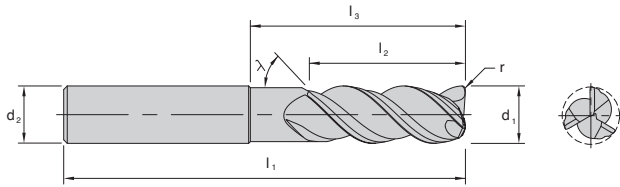
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Series	Cutting Dia d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUNS-3	1/4	3/8	4	1 1/2	1/4	3	0.015	—	ALU709106	2662450	ALU709107	2662451
AUNS-3	1/4	3/8	4	1 1/2	1/4	3	0.030	—	ALU709110	2662452	ALU709111	2662453
AUNS-3	1/4	3/8	4	1 1/2	1/4	3	0.060	—	ALU709114	2662454	ALU709115	2662455
AUNS-3	1/4	3/8	4	1 1/2	1/4	3	0.090	—	ALU709118	2662456	ALU709119	2662457
AUNS-3	1/4	3/8	4	1 1/2	1/4	3	Ball	—	ALU709138	2662458	ALU709139	2662459
AUNM-3	1/4	3/8	4	1 3/4	1/4	3	Square	—	ALU709752	2662460	ALU709753	2662461
AUNM-3	1/4	3/8	4	1 3/4	1/4	3	0.015	—	ALU709756	2662462	ALU709757	2662463
AUNM-3	1/4	3/8	4	1 3/4	1/4	3	0.030	—	ALU709760	2662464	ALU709761	2662465
AUNM-3	1/4	3/8	4	1 3/4	1/4	3	0.060	—	ALU709764	2662466	ALU709765	2662467
AUNM-3	1/4	3/8	4	1 3/4	1/4	3	0.090	—	ALU709768	2662468	ALU709769	2662469
AUNM-3	1/4	3/8	4	1 3/4	1/4	3	Ball	—	ALU709788	2662470	ALU709789	2662471
AUNL-3	1/4	3/8	4	2 1/8	1/4	3	Square	—	ALU710402	2662472	ALU710403	2662473
AUNL-3	1/4	3/8	4	2 1/8	1/4	3	0.015	—	ALU710406	2662474	ALU710407	2662475
AUNL-3	1/4	3/8	4	2 1/8	1/4	3	0.030	—	ALU710410	2662476	ALU710411	2662477
AUNL-3	1/4	3/8	4	2 1/8	1/4	3	0.060	—	ALU710414	2662478	ALU710415	2662479
AUNL-3	1/4	3/8	4	2 1/8	1/4	3	0.090	—	ALU710418	2662480	ALU710419	2662481
AUNL-3	1/4	3/8	4	2 1/8	1/4	3	Ball	—	ALU710438	2662482	ALU710439	2662483
AUS-3	5/16	9/16	2 1/2	—	5/16	3	Square	—	ALU400050	2662484	ALU400051	2662485
AUS-3	5/16	9/16	2 1/2	—	5/16	3	0.015	—	ALU400052	2662486	ALU400053	2662487
AUS-3	5/16	9/16	2 1/2	—	5/16	3	Ball	—	ALU400054	2662488	ALU400055	2662489
AUM-3	5/16	13/16	2 1/2	—	5/16	3	Square	—	ALU400068	2662490	ALU400069	2662491
AUM-3	5/16	13/16	2 1/2	—	5/16	3	0.015	—	ALU400070	2662492	ALU400071	2662493
AUM-3	5/16	13/16	2 1/2	—	5/16	3	Ball	—	ALU400074	2662494	ALU400075	2662495
AUL-3	5/16	1 1/4	3	—	5/16	3	Square	—	ALU400080	2662496	ALU400081	2662497
AUS-3	3/8	1/2	2 1/2	—	3/8	3	Square	—	ALU703202	2662498	ALU703203	2662499
AUS-3	3/8	1/2	2 1/2	—	3/8	3	0.015	—	ALU703206	2662500	ALU703207	2662501
AUS-3	3/8	1/2	2 1/2	—	3/8	3	0.030	—	ALU703210	2662502	ALU703211	2662503
AUS-3	3/8	1/2	2 1/2	—	3/8	3	0.060	—	ALU703214	2662504	ALU703215	2662505
AUS-3	3/8	1/2	2 1/2	—	3/8	3	0.090	—	ALU703218	2662506	ALU703219	2662507
AUS-3	3/8	1/2	2 1/2	—	3/8	3	0.120	—	ALU703222	2662508	ALU703223	2662509
AUS-3	3/8	1/2	2 1/2	—	3/8	3	Ball	—	ALU703238	2662510	ALU703239	2662511



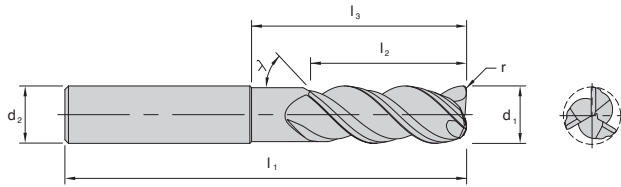
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Series	Cutting Dia d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUM-3	3/8	1	2 1/2	—	3/8	3	Square	—	ALU703852	2662512	ALU703853	2662513
AUM-3	3/8	1	2 1/2	—	3/8	3	0.015	—	ALU703856	2662514	ALU703857	2662515
AUM-3	3/8	1	2 1/2	—	3/8	3	0.030	—	ALU703860	2662516	ALU703861	2662517
AUM-3	3/8	1	2 1/2	—	3/8	3	0.060	—	ALU703864	2662518	ALU703865	2662519
AUM-3	3/8	1	2 1/2	—	3/8	3	0.090	—	ALU703868	2662520	ALU703869	2662521
AUM-3	3/8	1	2 1/2	—	3/8	3	0.120	—	ALU703872	2662522	ALU703873	2662523
AUM-3	3/8	1	2 1/2	—	3/8	3	Ball	—	ALU703888	2662524	ALU703889	2662525
AUL-3	3/8	1 1/2	4	—	3/8	3	Square	—	ALU704502	2662526	ALU704503	2662527
AUL-3	3/8	1 1/2	4	—	3/8	3	Square	Yes	ALU711015	2662528	ALU711016	2662529
AUL-3	3/8	1 1/2	4	—	3/8	3	0.015	—	ALU704506	2662530	ALU704507	2662531
AUL-3	3/8	1 1/2	4	—	3/8	3	0.015	Yes	ALU711017	2662532	ALU711018	2662533
AUL-3	3/8	1 1/2	4	—	3/8	3	0.030	—	ALU704510	2662534	ALU704511	2662535
AUL-3	3/8	1 1/2	4	—	3/8	3	0.030	Yes	ALU711019	2662536	ALU711020	2662537
AUL-3	3/8	1 1/2	4	—	3/8	3	0.060	—	ALU704514	2662538	ALU704515	2662539
AUL-3	3/8	1 1/2	4	—	3/8	3	0.090	—	ALU704518	2662540	ALU704519	2662541
AUL-3	3/8	1 1/2	4	—	3/8	3	0.120	—	ALU704522	2662542	ALU704523	2662543
AUL-3	3/8	1 1/2	4	—	3/8	3	Ball	—	ALU704538	2662544	ALU704539	2662545
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	Square	—	ALU709202	2662546	ALU709203	2662547
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	0.015	—	ALU709206	2662548	ALU709207	2662549
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	0.030	—	ALU709210	2662550	ALU709211	2662551
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	0.060	—	ALU709214	2662552	ALU709215	2662553
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	0.090	—	ALU709218	2662554	ALU709219	2662555
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	0.120	—	ALU709222	2662556	ALU709223	2662557
AUNS-3	3/8	1/2	4	1 3/4	3/8	3	Ball	—	ALU709238	2662558	ALU709239	2662559
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	Square	—	ALU709852	2662560	ALU709853	2662561
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	0.015	—	ALU709856	2662562	ALU709857	2662563
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	0.030	—	ALU709860	2662564	ALU709861	2662565
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	0.060	—	ALU709864	2662566	ALU709865	2662567
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	0.090	—	ALU709868	2662568	ALU709869	2662569
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	0.120	—	ALU709872	2662570	ALU709873	2662571
AUNM-3	3/8	1/2	4	2 1/4	3/8	3	Ball	—	ALU709888	2662572	ALU709889	2662573

Cutting data recommendations on page 96

■ = First Choice □ = Second Choice



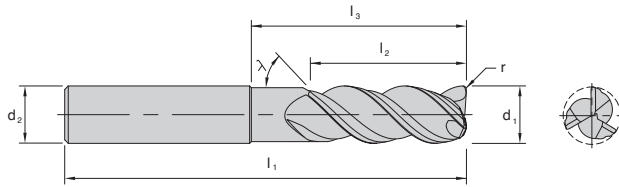
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Series	Cutting Dia d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	Square	–	ALU710502	2662574	ALU710503	2662575
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	0.015	–	ALU710506	2662576	ALU710507	2662577
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	0.030	–	ALU710510	2662578	ALU710511	2662579
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	0.060	–	ALU710514	2662580	ALU710515	2662581
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	0.090	–	ALU710518	2662582	ALU710519	2662583
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	0.120	–	ALU710522	2662584	ALU710523	2662585
AUNL-3	3/8	1/2	5	2 3/4	3/8	3	Ball	–	ALU710538	2662586	ALU710539	2662587
AUS-3	1/2	5/8	3	–	1/2	3	Square	–	ALU703302	2662588	ALU703303	2662589
AUS-3	1/2	5/8	3	–	1/2	3	0.015	–	ALU703306	2662590	ALU703307	2662591
AUS-3	1/2	5/8	3	–	1/2	3	0.030	–	ALU703310	2662592	ALU703311	2662593
AUS-3	1/2	5/8	3	–	1/2	3	0.060	–	ALU703314	2662594	ALU703315	2662595
AUS-3	1/2	5/8	3	–	1/2	3	0.090	–	ALU703318	2662596	ALU703319	2662597
AUS-3	1/2	5/8	3	–	1/2	3	0.120	–	ALU703322	2662598	ALU703323	2662599
AUS-3	1/2	5/8	3	–	1/2	3	0.190	–	ALU703330	2662600	ALU703331	2662601
AUS-3	1/2	5/8	3	–	1/2	3	Ball	–	ALU703338	2662602	ALU703339	2662603
AUM-3	1/2	1 1/4	3	–	1/2	3	Square	–	ALU703952	2662604	ALU703953	2662605
AUM-3	1/2	1 1/4	3	–	1/2	3	0.015	–	ALU703956	2662606	ALU703957	2662607
AUM-3	1/2	1 1/4	3	–	1/2	3	0.030	–	ALU703960	2662608	ALU703961	2662609
AUM-3	1/2	1 1/4	3	–	1/2	3	0.060	–	ALU703964	2662610	ALU703965	2662611
AUM-3	1/2	1 1/4	3	–	1/2	3	0.090	–	ALU703968	2662612	ALU703969	2662613
AUM-3	1/2	1 1/4	3	–	1/2	3	0.120	–	ALU703972	2662614	ALU703973	2662615
AUM-3	1/2	1 1/4	3	–	1/2	3	0.190	–	ALU703980	2662616	ALU703981	2662617
AUM-3	1/2	1 1/4	3	–	1/2	3	Ball	–	ALU703988	2662618	ALU703989	2662619
AUL-3	1/2	2	4	–	1/2	3	Square	–	ALU704602	2662620	ALU704603	2662621
AUL-3	1/2	2	4	–	1/2	3	Square	Yes	ALU711021	2662622	ALU711022	2662623
AUL-3	1/2	2	4	–	1/2	3	0.015	–	ALU704606	2662624	ALU704607	2662625
AUL-3	1/2	2	4	–	1/2	3	0.015	Yes	ALU711023	2662626	ALU711024	2662627
AUL-3	1/2	2	4	–	1/2	3	0.030	–	ALU704610	2662628	ALU704611	2662629
AUL-3	1/2	2	4	–	1/2	3	0.030	Yes	ALU711025	2662630	ALU711026	2662631
AUL-3	1/2	2	4	–	1/2	3	0.060	–	ALU704614	2662632	ALU704615	2662633
AUL-3	1/2	2	4	–	1/2	3	0.060	Yes	ALU711027	2662634	ALU711028	2662635



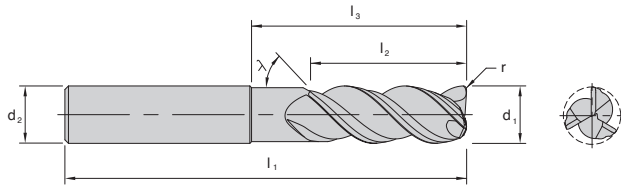
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Series	Cutting Dia d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUL-3	1/2	2	4	—	1/2	3	0.090	—	ALU704618	2662636	ALU704619	2662637
AUL-3	1/2	2	4	—	1/2	3	0.090	Yes	ALU711029	2662638	ALU711030	2662639
AUL-3	1/2	2	4	—	1/2	3	0.120	—	ALU704622	2662640	ALU704623	2662641
AUL-3	1/2	2	4	—	1/2	3	0.120	Yes	ALU711031	2662642	ALU711032	2662643
AUL-3	1/2	2	4	—	1/2	3	0.190	—	ALU704630	2662644	ALU704631	2662645
AUL-3	1/2	2	4	—	1/2	3	Ball	—	ALU704638	2662646	ALU704639	2662647
AUX-3	1/2	3 1/8	6	—	1/2	3	Square	—	ALU705252	2662648	ALU705253	2662649
AUX-3	1/2	3 1/8	6	—	1/2	3	Square	Yes	ALU711033	2662650	ALU711034	2662651
AUX-3	1/2	3 1/8	6	—	1/2	3	0.015	—	ALU705256	2662652	ALU705257	2662653
AUX-3	1/2	3 1/8	6	—	1/2	3	0.015	Yes	ALU711035	2662654	ALU711036	2662655
AUX-3	1/2	3 1/8	6	—	1/2	3	0.030	—	ALU705260	2662656	ALU705261	2662657
AUX-3	1/2	3 1/8	6	—	1/2	3	0.030	Yes	ALU711037	2662658	ALU711038	2662659
AUX-3	1/2	3 1/8	6	—	1/2	3	0.060	—	ALU705264	2662660	ALU705265	2662661
AUX-3	1/2	3 1/8	6	—	1/2	3	0.060	Yes	ALU711039	2662662	ALU711040	2662663
AUX-3	1/2	3 1/8	6	—	1/2	3	0.090	—	ALU705268	2662664	ALU705269	2662665
AUX-3	1/2	3 1/8	6	—	1/2	3	0.120	—	ALU705272	2662666	ALU705273	2662667
AUX-3	1/2	3 1/8	6	—	1/2	3	0.190	—	ALU705280	2662668	ALU705281	2662669
AUX-3	1/2	3 1/8	6	—	1/2	3	Ball	—	ALU705288	2662670	ALU705289	2662671
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	Square	—	ALU709302	2662672	ALU709303	2662673
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	0.015	—	ALU709306	2662674	ALU709307	2662675
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	0.030	—	ALU709310	2662676	ALU709311	2662677
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	0.060	—	ALU709314	2662678	ALU709315	2662679
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	0.090	—	ALU709318	2662680	ALU709319	2662681
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	0.120	—	ALU709322	2662682	ALU709323	2662683
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	0.190	—	ALU709330	2662684	ALU709331	2662685
AUNS-3	1/2	5/8	4	2 1/8	1/2	3	Ball	—	ALU709338	2662686	ALU709339	2662687
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	Square	—	ALU709952	2662688	ALU709953	2662689
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	0.015	—	ALU709956	2662690	ALU709957	2662691
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	0.030	—	ALU709960	2662692	ALU709961	2662693
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	0.060	—	ALU709964	2662694	ALU709965	2662695
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	0.090	—	ALU709968	2662696	ALU709969	2662697

Cutting data recommendations on page 96

■ = First Choice □ = Second Choice



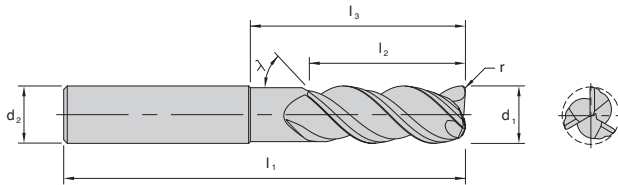
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Series	Cutting Dia d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	0.120	—	ALU709972	2662698	ALU709973	2662699
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	0.190	—	ALU709980	2662700	ALU709981	2662701
AUNM-3	1/2	5/8	5	3 1/8	1/2	3	Ball	—	ALU709988	2662702	ALU709989	2662703
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	Square	—	ALU710602	2662704	ALU710603	2662705
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	0.015	—	ALU710606	2662706	ALU710607	2662707
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	0.030	—	ALU710610	2662708	ALU710611	2662709
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	0.060	—	ALU710614	2662710	ALU710615	2662711
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	0.090	—	ALU710618	2662712	ALU710619	2662713
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	0.120	—	ALU710622	2662714	ALU710623	2662715
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	0.190	—	ALU710630	2662716	ALU710631	2662717
AUNL-3	1/2	5/8	6	4 1/8	1/2	3	Ball	—	ALU710638	2662718	ALU710639	2662719
AUS-3	5/8	3/4	3	—	5/8	3	Square	—	ALU703402	2662720	ALU703403	2662721
AUS-3	5/8	3/4	3	—	5/8	3	0.030	—	ALU703410	2662722	ALU703411	2662723
AUS-3	5/8	3/4	3	—	5/8	3	0.060	—	ALU703414	2662724	ALU703415	2662725
AUM-3	5/8	1 5/8	4	—	5/8	3	Square	—	ALU704052	2662726	ALU704053	2662727
AUM-3	5/8	1 5/8	4	—	5/8	3	0.030	—	ALU704060	2662728	ALU704061	2662729
AUM-3	5/8	1 5/8	4	—	5/8	3	0.060	—	ALU704064	2662730	ALU704065	2662731
AUL-3	5/8	2 1/4	5	—	5/8	3	Square	—	ALU704702	2662732	ALU704703	2662733
AUL-3	5/8	2 1/4	5	—	5/8	3	Square	Yes	ALU711041	2662734	ALU711042	2662735
AUL-3	5/8	2 1/4	5	—	5/8	3	0.030	—	ALU704710	2662736	ALU704711	2662737
AUL-3	5/8	2 1/4	5	—	5/8	3	0.030	Yes	ALU711043	2662738	ALU711044	2662739
AUL-3	5/8	2 1/4	5	—	5/8	3	0.060	—	ALU704714	2662740	ALU704715	2662741
AUL-3	5/8	2 1/4	5	—	5/8	3	0.060	Yes	ALU711045	2662742	ALU711046	2662743
AUX-3	5/8	3 1/4	6	—	5/8	3	Square	—	ALU705352	2662744	ALU705353	2662745
AUX-3	5/8	3 1/4	6	—	5/8	3	Square	Yes	ALU711047	2662746	ALU711048	2662747
AUX-3	5/8	3 1/4	6	—	5/8	3	0.030	—	ALU705360	2662748	ALU705361	2662749
AUX-3	5/8	3 1/4	6	—	5/8	3	0.030	Yes	ALU711049	2662750	ALU711050	2662751
AUS-3	3/4	1	3	—	3/4	3	Square	—	ALU703502	2662752	ALU703503	2662753
AUS-3	3/4	1	3	—	3/4	3	0.030	—	ALU703510	2662754	ALU703511	2662755
AUS-3	3/4	1	3	—	3/4	3	0.060	—	ALU703514	2662756	ALU703515	2662757
AUS-3	3/4	1	3	—	3/4	3	0.090	—	ALU703518	2662758	ALU703519	2662759



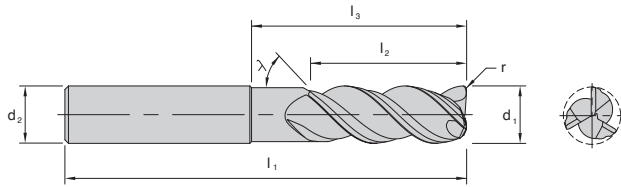
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Series	Cutting Dia d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUS-3	3/4	1	3	—	3/4	3	0.120	—	ALU703522	2662760	ALU703523	2662761
AUS-3	3/4	1	3	—	3/4	3	0.190	—	ALU703530	2662762	ALU703531	2662763
AUS-3	3/4	1	3	—	3/4	3	0.250	—	ALU703534	2662764	ALU703535	2662765
AUS-3	3/4	1	3	—	3/4	3	Ball	—	ALU703538	2662766	ALU703539	2662767
AUM-3	3/4	1 5/8	4	—	3/4	3	Square	—	ALU704152	2662768	ALU704153	2662769
AUM-3	3/4	1 5/8	4	—	3/4	3	0.030	—	ALU704160	2662770	ALU704161	2662771
AUM-3	3/4	1 5/8	4	—	3/4	3	0.060	—	ALU704164	2662772	ALU704165	2662773
AUM-3	3/4	1 5/8	4	—	3/4	3	0.090	—	ALU704168	2662774	ALU704169	2662775
AUM-3	3/4	1 5/8	4	—	3/4	3	0.120	—	ALU704172	2662776	ALU704173	2662777
AUM-3	3/4	1 5/8	4	—	3/4	3	0.190	—	ALU704180	2662778	ALU704181	2662779
AUM-3	3/4	1 5/8	4	—	3/4	3	0.250	—	ALU704184	2662780	ALU704185	2662781
AUM-3	3/4	1 5/8	4	—	3/4	3	Ball	—	ALU704188	2662782	ALU704189	2662783
AUL-3	3/4	2 1/2	5	—	3/4	3	Square	—	ALU704802	2662784	ALU704803	2662785
AUL-3	3/4	2 1/2	5	—	3/4	3	Square	Yes	ALU711051	2662786	ALU711052	2662787
AUL-3	3/4	2 1/2	5	—	3/4	3	0.030	—	ALU704810	2662788	ALU704811	2662789
AUL-3	3/4	2 1/2	5	—	3/4	3	0.030	Yes	ALU711053	2662790	ALU711054	2662791
AUL-3	3/4	2 1/2	5	—	3/4	3	0.060	—	ALU704814	2662792	ALU704815	2662793
AUL-3	3/4	2 1/2	5	—	3/4	3	0.060	Yes	ALU711055	2662794	ALU711056	2662795
AUL-3	3/4	2 1/2	5	—	3/4	3	0.090	—	ALU704818	2662796	ALU704819	2662797
AUL-3	3/4	2 1/2	5	—	3/4	3	0.120	—	ALU704822	2662798	ALU704823	2662799
AUL-3	3/4	2 1/2	5	—	3/4	3	0.190	—	ALU704830	2662800	ALU704831	2662801
AUL-3	3/4	2 1/2	5	—	3/4	3	0.250	—	ALU704834	2662802	ALU704835	2662803
AUL-3	3/4	2 1/2	5	—	3/4	3	Ball	—	ALU704838	2662804	ALU704839	2662805
AUX-3	3/4	3 1/4	6	—	3/4	3	Square	—	ALU705452	2662806	ALU705453	2662807
AUX-3	3/4	3 1/4	6	—	3/4	3	Square	Yes	ALU711057	2662808	ALU711058	2662809
AUX-3	3/4	3 1/4	6	—	3/4	3	0.030	—	ALU705460	2662810	ALU705461	2662811
AUX-3	3/4	3 1/4	6	—	3/4	3	0.030	Yes	ALU711059	2662812	ALU711060	2662813
AUX-3	3/4	3 1/4	6	—	3/4	3	0.060	—	ALU705464	2662814	ALU705465	2662815
AUX-3	3/4	3 1/4	6	—	3/4	3	0.060	Yes	ALU711061	2662816	ALU711062	2662817
AUX-3	3/4	3 1/4	6	—	3/4	3	0.090	—	ALU705468	2662818	ALU705469	2662819
AUX-3	3/4	3 1/4	6	—	3/4	3	0.120	—	ALU705472	2662820	ALU705473	2662821

Cutting data recommendations on page 96

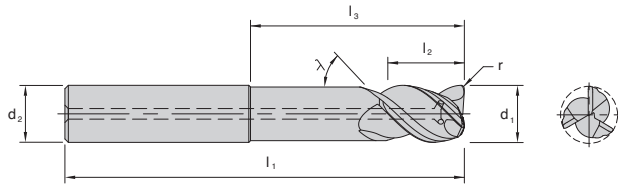
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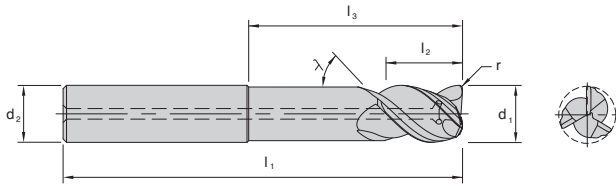
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Series	Cutting Dia d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shk Dia d ₂	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUX-3	3/4	3 1/4	6	—	3/4	3	0.190	—	ALU705480	2662822	ALU705481	2662823
AUX-3	3/4	3 1/4	6	—	3/4	3	0.250	—	ALU705484	2662824	ALU705485	2662825
AUX-3	3/4	3 1/4	6	—	3/4	3	Ball	—	ALU705488	2662826	ALU705489	2662827
AUNS-3	3/4	1	4	2 1/8	3/4	3	Square	—	ALU709502	2662828	ALU709503	2662829
AUNS-3	3/4	1	4	2 1/8	3/4	3	0.030	—	ALU709510	2662830	ALU709511	2662831
AUNS-3	3/4	1	4	2 1/8	3/4	3	0.060	—	ALU709514	2662832	ALU709515	2662833
AUNS-3	3/4	1	4	2 1/8	3/4	3	0.090	—	ALU709518	2662834	ALU709519	2662835
AUNS-3	3/4	1	4	2 1/8	3/4	3	0.120	—	ALU709522	2662836	ALU709523	2662837
AUNS-3	3/4	1	4	2 1/8	3/4	3	0.190	—	ALU709530	2662838	ALU709531	2662839
AUNS-3	3/4	1	4	2 1/8	3/4	3	0.250	—	ALU709534	2662840	ALU709535	2662841
AUNS-3	3/4	1	4	2 1/8	3/4	3	Ball	—	ALU709538	2662842	ALU709539	2662843
AUNM-3	3/4	1	5	3 1/8	3/4	3	Square	—	ALU710152	2662844	ALU710153	2662845
AUNM-3	3/4	1	5	3 1/8	3/4	3	0.030	—	ALU710160	2662846	ALU710161	2662847
AUNM-3	3/4	1	5	3 1/8	3/4	3	0.060	—	ALU710164	2662848	ALU710165	2662849
AUNM-3	3/4	1	5	3 1/8	3/4	3	0.090	—	ALU710168	2662850	ALU710169	2662851
AUNM-3	3/4	1	5	3 1/8	3/4	3	0.120	—	ALU710172	2662852	ALU710173	2662853
AUNM-3	3/4	1	5	3 1/8	3/4	3	0.190	—	ALU710180	2662854	ALU710181	2662855
AUNM-3	3/4	1	5	3 1/8	3/4	3	0.250	—	ALU710184	2662856	ALU710185	2662857
AUNM-3	3/4	1	5	3 1/8	3/4	3	Ball	—	ALU710188	2662858	ALU710189	2662859
AUNL-3	3/4	1	6	4 1/8	3/4	3	Square	—	ALU710802	2662860	ALU710803	2662861
AUNL-3	3/4	1	6	4 1/8	3/4	3	0.030	—	ALU710810	2662862	ALU710811	2662863
AUNL-3	3/4	1	6	4 1/8	3/4	3	0.060	—	ALU710814	2662864	ALU710815	2662865
AUNL-3	3/4	1	6	4 1/8	3/4	3	0.090	—	ALU710818	2662866	ALU710819	2662867
AUNL-3	3/4	1	6	4 1/8	3/4	3	0.120	—	ALU710822	2662868	ALU710823	2662869
AUNL-3	3/4	1	6	4 1/8	3/4	3	0.190	—	ALU710830	2662870	ALU710831	2662871
AUNL-3	3/4	1	6	4 1/8	3/4	3	0.250	—	ALU710834	2662872	ALU710835	2662873
AUNL-3	3/4	1	6	4 1/8	3/4	3	Ball	—	ALU710838	2662874	ALU710839	2662875
AUS-3	1	1 1/4	4	—	1	3	Square	—	ALU703602	2662876	ALU703603	2662877
AUS-3	1	1 1/4	4	—	1	3	0.030	—	ALU703610	2662878	ALU703611	2662879
AUS-3	1	1 1/4	4	—	1	3	0.060	—	ALU703614	2662880	ALU703615	2662881
AUS-3	1	1 1/4	4	—	1	3	0.250	—	ALU703634	2662882	ALU703635	2662883



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Series	Cutting Dia d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUS-3	1	1 1/4	4	—	1	3	Ball	—	ALU703638	2662884	ALU703639	2662885
AUM-3	1	2 1/2	5	—	1	3	Square	—	ALU704252	2662886	ALU704253	2662887
AUM-3	1	2 1/2	5	—	1	3	0.030	—	ALU704260	2662888	ALU704261	2662889
AUM-3	1	2 1/2	5	—	1	3	0.060	—	ALU704264	2662890	ALU704265	2662891
AUL-3	1	3 1/4	6	—	1	3	Square	—	ALU704902	2662892	ALU704903	2662893
AUL-3	1	3 1/4	6	—	1	3	Square	Yes	ALU711063	2662894	ALU711064	2662895
AUL-3	1	3 1/4	6	—	1	3	0.030	—	ALU704910	2662896	ALU704911	2662897
AUL-3	1	3 1/4	6	—	1	3	0.030	Yes	ALU711065	2662898	ALU711066	2662899
AUL-3	1	3 1/4	6	—	1	3	0.060	—	ALU704914	2662900	ALU704915	2662901
AUL-3	1	3 1/4	6	—	1	3	Ball	—	ALU704938	2662902	ALU704939	2662903
AUX-3	1	4 1/8	7	—	1	3	Square	—	ALU705552	2662904	ALU705553	2662905
AUX-3	1	4 1/8	7	—	1	3	Square	Yes	ALU711067	2662906	ALU711068	2662907
AUX-3	1	4 1/8	7	—	1	3	0.030	—	ALU705560	2662908	ALU705561	2662909
AUX-3	1	4 1/8	7	—	1	3	0.030	Yes	ALU711069	2662910	ALU711070	2662911
AUX-3	1	4 1/8	7	—	1	3	0.060	—	ALU705564	2662912	ALU705565	2662913
AUX-3	1	4 1/8	7	—	1	3	0.060	Yes	ALU711071	2662914	ALU711072	2662915
AUNS-3	1	1 1/4	5	2 1/8	1	3	Square	—	ALU709602	2662916	ALU709603	2662917
AUNS-3	1	1 1/4	5	2 1/8	1	3	0.030	—	ALU709610	2662918	ALU709611	2662919
AUNS-3	1	1 1/4	5	2 1/8	1	3	0.060	—	ALU709614	2662920	ALU709615	2662921
AUNM-3	1	1 1/4	6	3 1/8	1	3	Square	—	ALU710252	2662922	ALU710253	2662923
AUNM-3	1	1 1/4	6	3 1/8	1	3	0.030	—	ALU710260	2662924	ALU710261	2662925
AUNM-3	1	1 1/4	6	3 1/8	1	3	0.060	—	ALU710264	2662926	ALU710265	2662927
AUNM-3	1	1 1/4	6	3 1/8	1	3	0.120	—	ALU710272	2662928	ALU710273	2662929
AUNL-3	1	1 1/4	7	4 1/8	1	3	Square	—	ALU710902	2662930	ALU710903	2662931
AUNL-3	1	1 1/4	7	4 1/8	1	3	0.030	—	ALU710910	2662932	ALU710911	2662933
AUNL-3	1	1 1/4	7	4 1/8	1	3	0.060	—	ALU710914	2662934	ALU710915	2662935



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Series	Cutting Dia d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUCM-3	1/4	3/4	3	—	1/4	3	Square	—	ALU717042	2662936	ALU717043	2662937
AUCM-3	1/4	3/4	3	—	1/4	3	Square	Yes	ALU711073	2662938	ALU711074	2662939
AUCM-3	1/4	3/4	3	—	1/4	3	0.015	—	ALU717044	2662940	ALU717045	2662941
AUCM-3	1/4	3/4	3	—	1/4	3	0.015	Yes	ALU711075	2662942	ALU711076	2662943
AUCNS-3	1/4	3/8	4	1 1/2	1/4	3	Square	—	ALU715102	2662944	ALU715103	2662945
AUCNS-3	1/4	3/8	4	1 1/2	1/4	3	0.015	—	ALU715106	2662946	ALU715107	2662947
AUCNL-3	1/4	3/8	4	2 1/8	1/4	3	Square	—	ALU716402	2662948	ALU716403	2662949
AUCNL-3	1/4	3/8	4	2 1/8	1/4	3	0.015	—	ALU716406	2662950	ALU716407	2662951
AUCM-3	3/8	1	3	—	3/8	3	Square	—	ALU717018	2662952	ALU717019	2662953
AUCM-3	3/8	1	3	—	3/8	3	Square	Yes	ALU711077	2662954	ALU711078	2662955
AUCM-3	3/8	1	3	—	3/8	3	0.015	—	ALU717020	2662956	ALU717021	2662957
AUCM-3	3/8	1	3	—	3/8	3	0.015	Yes	ALU711079	2662958	ALU711080	2662959
AUCNS-3	3/8	1/2	4	1 3/4	3/8	3	Square	—	ALU715202	2662960	ALU715203	2662961
AUCNS-3	3/8	1/2	4	1 3/4	3/8	3	0.015	—	ALU715206	2662962	ALU715207	2662963
AUCNL-3	3/8	1/2	5	2 3/4	3/8	3	Square	—	ALU716502	2662964	ALU716503	2662965
AUCNL-3	3/8	1/2	5	2 3/4	3/8	3	0.015	—	ALU716506	2662966	ALU716507	2662967
AUCM-3	1/2	1 1/2	3 1/2	—	1/2	3	Square	—	ALU717022	2662968	ALU717023	2662969
AUCM-3	1/2	1 1/2	3 1/2	—	1/2	3	Square	Yes	ALU711081	2662970	ALU711082	2662971
AUCM-3	1/2	1 1/2	3 1/2	—	1/2	3	0.030	—	ALU717026	2662972	ALU717027	2662973
AUCM-3	1/2	1 1/2	3 1/2	—	1/2	3	0.030	Yes	ALU711083	2662974	ALU711084	2662975
AUCNS-3	1/2	5/8	4	2 1/8	1/2	3	Square	—	ALU715302	2662976	ALU715303	2662977
AUCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.030	—	ALU715310	2662978	ALU715311	2662979
AUCNM-3	1/2	5/8	5	3 1/8	1/2	3	Square	—	ALU715952	2662980	ALU715953	2662981
AUCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.030	—	ALU715960	2662982	ALU715961	2662983



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Series	Cutting Dia d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shk Dia d_2	Flutes z	Corner Radius r	Chip Breaker	Uncoated Ident No.	Uncoated SAP No.	DLC Coated Ident No.	DLC Coated SAP No.
AUCL-3	3/4	2 1/4	5	—	3/4	3	Square	—	ALU717034	2662984	ALU717035	2662985
AUCL-3	3/4	2 1/4	5	—	3/4	3	Square	Yes	ALU711085	2662986	ALU711086	2662987
AUCL-3	3/4	2 1/4	5	—	3/4	3	0.030	—	ALU717036	2662988	ALU717037	2662989
AUCL-3	3/4	2 1/4	5	—	3/4	3	0.030	Yes	ALU711087	2662990	ALU711088	2662991
AUCNS-3	3/4	1	4	2 1/8	3/4	3	Square	—	ALU715502	2662992	ALU715503	2662993
AUCNS-3	3/4	1	4	2 1/8	3/4	3	0.030	—	ALU715510	2662994	ALU715511	2662995
AUCNL-3	3/4	1	6	4 1/8	3/4	3	Square	—	ALU716802	2662996	ALU716803	2662997
AUCNL-3	3/4	1	6	4 1/8	3/4	3	0.030	—	ALU716810	2662998	ALU716811	2662999
AUCL-3	1	3	6	—	1	3	Square	—	ALU717038	2663000	ALU717039	2663001
AUCL-3	1	3	6	—	1	3	Square	Yes	ALU711089	2663002	ALU711090	2663003
AUCL-3	1	3	6	—	1	3	0.030	—	ALU717040	2663004	ALU717041	2663005
AUCL-3	1	3	6	—	1	3	0.030	Yes	ALU711091	2663006	ALU711092	2663007
AUCNS-3	1	1 1/4	5	2 1/8	1	3	Square	—	ALU715602	2663008	ALU715603	2663009
AUCNS-3	1	1 1/4	5	2 1/8	1	3	0.030	—	ALU715610	2663010	ALU715611	2663011
AUCNL-3	1	1 1/4	7	4 1/8	1	3	Square	—	ALU716902	2663012	ALU716903	2663013
AUCNL-3	1	1 1/4	7	4 1/8	1	3	0.030	—	ALU716910	2663014	ALU716911	2663015

Aluminum Finisher (AF) Series

The AF Series of end mills are optimized for slotting and finishing non-ferrous materials.

Features and Benefits

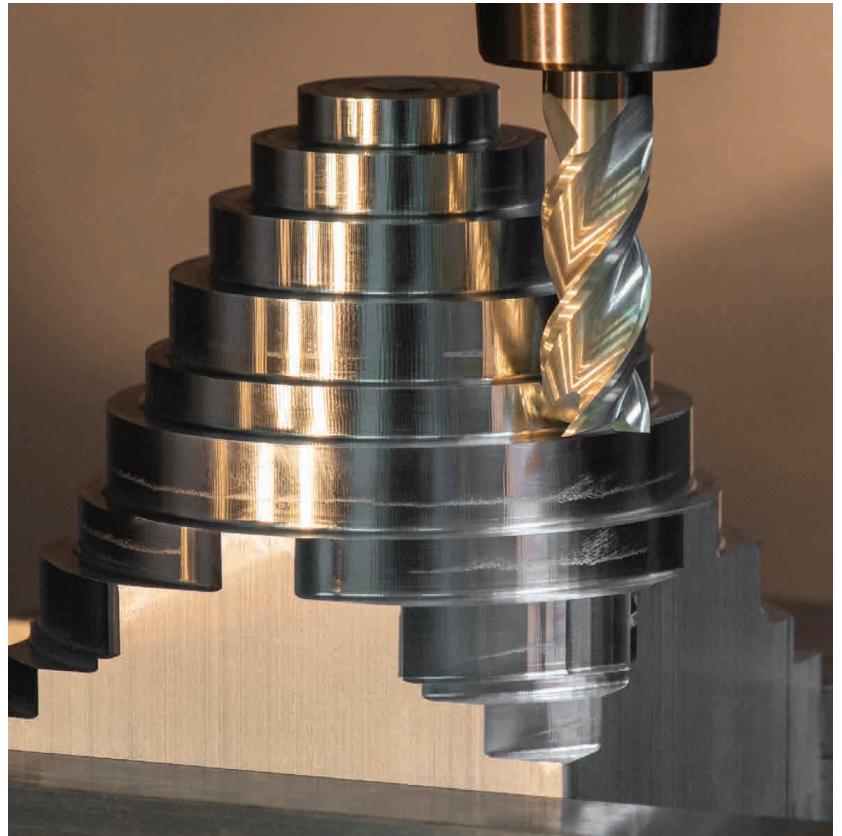
- 2 flute tools with open flute geometry optimized for slotting applications.
- 3 flute tools with large “sweet spot” for chatter free machining at high RPM and heavy cuts.
- Chip former on flute face for optimal chip removal. Heat and chips on deep pocket applications.
- Reduced chatter will increase tool life, produce a higher quality part and optimize cutting efficiencies.
- Polished flutes for better chip removal and low HP requirements.
- Industry’s largest selection of corner radii and neck and flute lengths in a standard program.
- Available uncoated with high polished flutes and specialty ZRN coatings for aluminum.
- Collant thru options that contribute to superior finishes and prevent chips from adhering between the flutes.

Applications

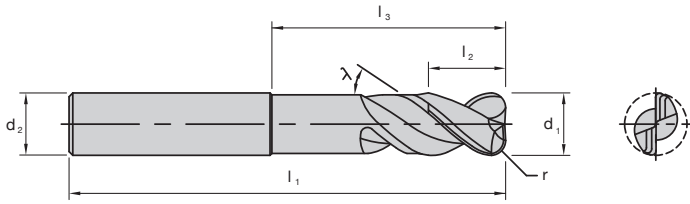
- Slotting
- Pocketing
- Profiling
- High Material Removal

Usage

- ISO N Non-Ferrous
- Aluminum
- Brass
- Bronze
- Copper



Aluminum Finisher Series 2 Flute

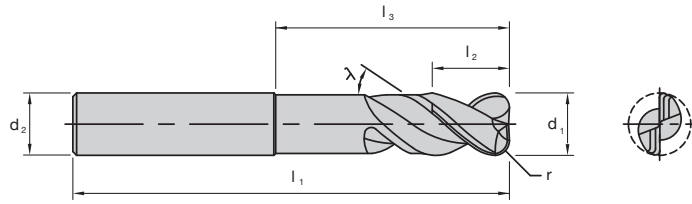


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFS-2	1/8	1/4	2	—	1/8	2	Square	AMC400002	7088758	AMC400003	2607633
AFS-2	1/8	1/4	2	—	1/8	2	0.010	AMC400004	2601592	AMC400005	2607634
AFS-2	1/8	1/4	2	—	1/8	2	Ball	AMC400006	2601593	AMC400007	2607635
AFM-2	1/8	1/2	2	—	1/8	2	Square	AMC400020	7088759	AMC400021	2607642
AFM-2	1/8	1/2	2	—	1/8	2	0.010	AMC400022	2601600	AMC400023	2607643
AFM-2	1/8	1/2	2	—	1/8	2	Ball	AMC400024	2601601	AMC400025	2607644
AFS-2	3/16	5/16	2	—	3/16	2	Square	AMC400008	2601594	AMC400009	2607636
AFS-2	3/16	5/16	2	—	3/16	2	0.010	AMC400010	2601595	AMC400011	2607637
AFS-2	3/16	5/16	2	—	3/16	2	Ball	AMC400012	2601596	AMC400013	2607638
AFM-2	3/16	9/16	2 1/2	—	3/16	2	Square	AMC400026	2601602	AMC400027	2607645
AFM-2	3/16	9/16	2 1/2	—	3/16	2	0.010	AMC400028	2601603	AMC400029	2607646
AFM-2	3/16	9/16	2 1/2	—	3/16	2	Ball	AMC400030	2601604	AMC400031	2607647
AFS-2	1/4	3/8	2	—	1/4	2	Square	AMC700102	2826586	AMC700103	2601626
AFS-2	1/4	3/8	2	—	1/4	2	0.015	AMC700106	2601627	AMC700107	2601628
AFS-2	1/4	3/8	2	—	1/4	2	0.030	AMC700110	2601629	AMC700111	2601630
AFS-2	1/4	3/8	2	—	1/4	2	0.060	AMC700114	2601631	AMC700115	2601632
AFS-2	1/4	3/8	2	—	1/4	2	0.090	AMC700118	2601633	AMC700119	2601634
AFS-2	1/4	3/8	2	—	1/4	2	Ball	AMC700138	2601635	AMC700139	2601636
AFM-2	1/4	3/4	2	—	1/4	2	Square	AMC700752	2826587	AMC700753	2601722
AFM-2	1/4	3/4	2	—	1/4	2	0.015	AMC700756	2601723	AMC700757	2601724
AFM-2	1/4	3/4	2	—	1/4	2	0.030	AMC700760	2823368	AMC700761	2601725
AFM-2	1/4	3/4	2	—	1/4	2	0.060	AMC700764	2601726	AMC700765	2601727
AFM-2	1/4	3/4	2	—	1/4	2	0.090	AMC700768	2601728	AMC700769	2601729
AFM-2	1/4	3/4	2	—	1/4	2	Ball	AMC700788	2601730	AMC700789	2601731
AFL-2	1/4	1 1/4	2 1/2	—	1/4	2	Square	AMC701402	2601818	AMC701403	2601819
AFL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.015	AMC701406	2601820	AMC701407	2601821
AFL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.030	AMC701410	2601822	AMC701411	2601823
AFL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.060	AMC701414	2601824	AMC701415	2601825
AFL-2	1/4	1 1/4	2 1/2	—	1/4	2	0.090	AMC701418	2601826	AMC701419	2601827
AFL-2	1/4	1 1/4	2 1/2	—	1/4	2	Ball	AMC701438	2601828	AMC701439	2601829
AFNS-2	1/4	3/8	4	1 1/2	1/4	2	Square	AMC706102	7088749	AMC706103	2602362

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series 2 Flute



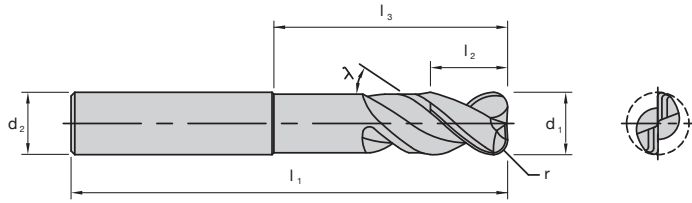
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNS-2	1/4	3/8	4	1 1/2	1/4	2	0.015	AMC706106	2602363	AMC706107	2602364
AFNS-2	1/4	3/8	4	1 1/2	1/4	2	0.030	AMC706110	2602365	AMC706111	2602366
AFNS-2	1/4	3/8	4	1 1/2	1/4	2	0.060	AMC706114	2602367	AMC706115	2602368
AFNS-2	1/4	3/8	4	1 1/2	1/4	2	Ball	AMC706138	2602371	AMC706139	2602372
AFNM-2	1/4	3/8	4	1 3/4	1/4	2	Square	AMC706752	7088752	AMC706753	2602459
AFNM-2	1/4	3/8	4	1 3/4	1/4	2	0.015	AMC706756	2602460	AMC706757	2602461
AFNM-2	1/4	3/8	4	1 3/4	1/4	2	0.030	AMC706760	2602462	AMC706761	2602463
AFNM-2	1/4	3/8	4	1 3/4	1/4	2	0.060	AMC706764	2602464	AMC706765	2602465
AFNM-2	1/4	3/8	4	1 3/4	1/4	2	Ball	AMC706788	2602468	AMC706789	2602469
AFNL-2	1/4	3/8	4	2 1/8	1/4	2	Square	AMC707402	2602556	AMC707403	2602557
AFNL-2	1/4	3/8	4	2 1/8	1/4	2	0.015	AMC707406	2602558	AMC707407	2602559
AFNL-2	1/4	3/8	4	2 1/8	1/4	2	0.030	AMC707410	2602560	AMC707411	2602561
AFNL-2	1/4	3/8	4	2 1/8	1/4	2	0.060	AMC707414	2602562	AMC707415	2602563
AFNL-2	1/4	3/8	4	2 1/8	1/4	2	Ball	AMC707438	2602566	AMC707439	2602567
AFS-2	5/16	9/16	2 1/2	–	5/16	2	Square	AMC400014	2601597	AMC400015	2607639
AFS-2	5/16	9/16	2 1/2	–	5/16	2	0.015	AMC400016	2601598	AMC400017	2607640
AFS-2	5/16	9/16	2 1/2	–	5/16	2	Ball	AMC400018	2601599	AMC400019	2607641
AFM-2	5/16	13/16	2 1/2	–	5/16	2	Square	AMC400032	2601605	AMC400033	2607648
AFM-2	5/16	13/16	2 1/2	–	5/16	2	0.015	AMC400034	2601606	AMC400035	2607649
AFM-2	5/16	13/16	2 1/2	–	5/16	2	Ball	AMC400036	2601607	AMC400037	2607650
AFS-2	3/8	1/2	2 1/2	–	3/8	2	Square	AMC700202	2826588	AMC700203	2601637
AFS-2	3/8	1/2	2 1/2	–	3/8	2	0.015	AMC700206	2601638	AMC700207	2601639
AFS-2	3/8	1/2	2 1/2	–	3/8	2	0.030	AMC700210	2601640	AMC700211	2601641
AFS-2	3/8	1/2	2 1/2	–	3/8	2	0.060	AMC700214	2601642	AMC700215	2601643
AFS-2	3/8	1/2	2 1/2	–	3/8	2	0.090	AMC700218	2601644	AMC700219	2601645
AFS-2	3/8	1/2	2 1/2	–	3/8	2	0.120	AMC700222	2601646	AMC700223	2601647
AFS-2	3/8	1/2	2 1/2	–	3/8	2	Ball	AMC700238	2601650	AMC700239	2601651
AFM-2	3/8	1	2 1/2	–	3/8	2	Square	AMC700852	2601732	AMC700853	2826589
AFM-2	3/8	1	2 1/2	–	3/8	2	0.015	AMC700856	2601733	AMC700857	2601734
AFM-2	3/8	1	2 1/2	–	3/8	2	0.030	AMC700860	2601735	AMC700861	2601736
AFM-2	3/8	1	2 1/2	–	3/8	2	0.060	AMC700864	2601737	AMC700865	2601738

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series

2 Flute

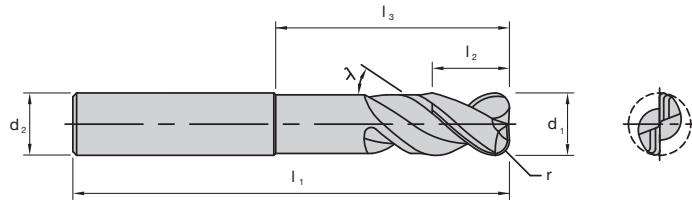


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFM-2	3/8	1	2 1/2	—	3/8	2	0.090	AMC700868	2601739	AMC700869	2601740
AFM-2	3/8	1	2 1/2	—	3/8	2	0.120	AMC700872	2601741	AMC700873	2601742
AFM-2	3/8	1	2 1/2	—	3/8	2	Ball	AMC700888	2601745	AMC700889	2601746
AFL-2	3/8	1 1/2	4	—	3/8	2	Square	AMC701502	2601830	AMC701503	2601831
AFL-2	3/8	1 1/2	4	—	3/8	2	0.015	AMC701506	7116084	AMC701507	2601833
AFL-2	3/8	1 1/2	4	—	3/8	2	0.030	AMC701510	2601834	AMC701511	2601835
AFL-2	3/8	1 1/2	4	—	3/8	2	0.060	AMC701514	2601836	AMC701515	2601837
AFL-2	3/8	1 1/2	4	—	3/8	2	0.090	AMC701518	2601838	AMC701519	2601839
AFL-2	3/8	1 1/2	4	—	3/8	2	0.120	AMC701522	2601840	AMC701523	2601841
AFL-2	3/8	1 1/2	4	—	3/8	2	Ball	AMC701538	2601844	AMC701539	2601845
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	Square	AMC706202	7088750	AMC706203	7088751
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	0.015	AMC706206	2602373	AMC706207	2602374
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	0.030	AMC706210	2602375	AMC706211	2602376
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	0.060	AMC706214	2602377	AMC706215	2602378
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	0.090	AMC706218	2602379	AMC706219	2602380
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	0.120	AMC706222	2602381	AMC706223	2602382
AFNS-2	3/8	1/2	4	1 3/4	3/8	2	Ball	AMC706238	2602385	AMC706239	2602386
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	Square	AMC706852	7088753	AMC706853	2602470
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	0.015	AMC706856	2602471	AMC706857	2602472
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	0.030	AMC706860	2602473	AMC706861	2602474
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	0.060	AMC706864	2602475	AMC706865	2602476
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	0.090	AMC706868	2602477	AMC706869	2602478
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	0.120	AMC706872	2602479	AMC706873	2602480
AFNM-2	3/8	1/2	4	2 1/4	3/8	2	Ball	AMC706888	2602483	AMC706889	2602484
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	Square	AMC707502	2602568	AMC707503	2602569
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	0.015	AMC707506	2602570	AMC707507	2602571
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	0.030	AMC707510	2602572	AMC707511	2602573
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	0.060	AMC707514	2602574	AMC707515	2602575
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	0.090	AMC707518	2602576	AMC707519	2602577
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	0.120	AMC707522	2602578	AMC707523	2602579

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series 2 Flute



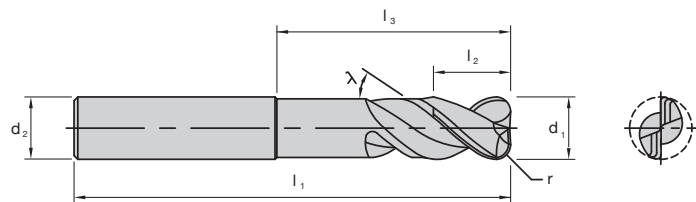
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNL-2	3/8	1/2	5	2 3/4	3/8	2	Ball	AMC707538	2602582	AMC707539	2602583
AFS-2	1/2	5/8	3	—	1/2	2	Square	AMC700302	2826590	AMC700303	2601652
AFS-2	1/2	5/8	3	—	1/2	2	0.015	AMC700306	7057543	AMC700307	2601653
AFS-2	1/2	5/8	3	—	1/2	2	0.030	AMC700310	2601654	AMC700311	2601655
AFS-2	1/2	5/8	3	—	1/2	2	0.060	AMC700314	2601656	AMC700315	2601657
AFS-2	1/2	5/8	3	—	1/2	2	0.090	AMC700318	2601658	AMC700319	2601659
AFS-2	1/2	5/8	3	—	1/2	2	0.120	AMC700322	2601660	AMC700323	2601661
AFS-2	1/2	5/8	3	—	1/2	2	0.190	AMC700330	2601664	AMC700331	2601665
AFS-2	1/2	5/8	3	—	1/2	2	Ball	AMC700338	2601666	AMC700339	2601667
AFM-2	1/2	1 1/4	3	—	1/2	2	Square	AMC700952	2826591	AMC700953	2601747
AFM-2	1/2	1 1/4	3	—	1/2	2	0.015	AMC700956	2601748	AMC700957	2601749
AFM-2	1/2	1 1/4	3	—	1/2	2	0.030	AMC700960	2601750	AMC700961	2601751
AFM-2	1/2	1 1/4	3	—	1/2	2	0.060	AMC700964	2601752	AMC700965	2601753
AFM-2	1/2	1 1/4	3	—	1/2	2	0.090	AMC700968	2601754	AMC700969	2601755
AFM-2	1/2	1 1/4	3	—	1/2	2	0.120	AMC700972	2601756	AMC700973	2601757
AFM-2	1/2	1 1/4	3	—	1/2	2	0.190	AMC700980	2601760	AMC700981	2601761
AFM-2	1/2	1 1/4	3	—	1/2	2	Ball	AMC700988	2601762	AMC700989	2601763
AFL-2	1/2	2	4	—	1/2	2	Square	AMC701602	2601846	AMC701603	2601847
AFL-2	1/2	2	4	—	1/2	2	0.015	AMC701606	2601848	AMC701607	2601849
AFL-2	1/2	2	4	—	1/2	2	0.030	AMC701610	2601850	AMC701611	2601851
AFL-2	1/2	2	4	—	1/2	2	0.060	AMC701614	2601852	AMC701615	2601853
AFL-2	1/2	2	4	—	1/2	2	0.090	AMC701618	2601854	AMC701619	2601855
AFL-2	1/2	2	4	—	1/2	2	0.120	AMC701622	2601856	AMC701623	2601857
AFL-2	1/2	2	4	—	1/2	2	0.190	AMC701630	2601860	AMC701631	2601861
AFL-2	1/2	2	4	—	1/2	2	Ball	AMC701638	2601862	AMC701639	2601863
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	Square	AMC706302	2602387	AMC706303	2602388
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	0.015	AMC706306	2602389	AMC706307	2602390
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	0.030	AMC706310	2602391	AMC706311	2602392
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	0.060	AMC706314	2602393	AMC706315	2602394
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	0.090	AMC706318	2602395	AMC706319	2602396
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	0.120	AMC706322	2602397	AMC706323	2602398

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series

2 Flute

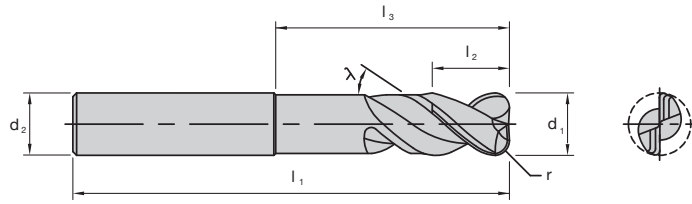


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	0.190	AMC706330	2602401	AMC706331	2602402
AFNS-2	1/2	5/8	4	2 1/8	1/2	2	Ball	AMC706338	2602403	AMC706339	2602404
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	Square	AMC706952	7088754	AMC706953	2602485
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	0.015	AMC706956	2602486	AMC706957	2602487
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	0.030	AMC706960	2602488	AMC706961	2602489
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	0.060	AMC706964	2602490	AMC706965	2602491
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	0.090	AMC706968	2602492	AMC706969	2602493
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	0.120	AMC706972	2602494	AMC706973	2602495
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	0.190	AMC706980	2602498	AMC706981	2602499
AFNM-2	1/2	5/8	5	3 1/8	1/2	2	Ball	AMC706988	2602500	AMC706989	2602501
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	Square	AMC707602	2602584	AMC707603	2602585
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	0.015	AMC707606	2602586	AMC707607	2602587
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	0.030	AMC707610	2602588	AMC707611	2602589
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	0.060	AMC707614	2602590	AMC707615	2602591
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	0.090	AMC707618	2602592	AMC707619	2602593
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	0.120	AMC707622	2602594	AMC707623	2602595
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	0.190	AMC707630	2602598	AMC707631	2602599
AFNL-2	1/2	5/8	6	4 1/8	1/2	2	Ball	AMC707638	2602600	AMC707639	2602601
AFS-2	5/8	3/4	3	—	5/8	2	Square	AMC700402	2601668	AMC700403	2601669
AFS-2	5/8	3/4	3	—	5/8	2	0.030	AMC700410	2601670	AMC700411	2601671
AFS-2	5/8	3/4	3	—	5/8	2	0.060	AMC700414	2601672	AMC700415	2601673
AFS-2	5/8	3/4	3	—	5/8	2	0.120	AMC700422	2601676	AMC700423	2601677
AFS-2	5/8	3/4	3	—	5/8	2	0.250	AMC700434	2601682	AMC700435	2601683
AFS-2	5/8	3/4	3	—	5/8	2	Ball	AMC700438	2601684	AMC700439	2601685
AFM-2	5/8	1 5/8	4	—	5/8	2	Square	AMC701052	2601764	AMC701053	2601765
AFM-2	5/8	1 5/8	4	—	5/8	2	0.030	AMC701060	2601766	AMC701061	2601767
AFM-2	5/8	1 5/8	4	—	5/8	2	0.060	AMC701064	2601768	AMC701065	2601769
AFM-2	5/8	1 5/8	4	—	5/8	2	0.120	AMC701072	2601772	AMC701073	2601773
AFM-2	5/8	1 5/8	4	—	5/8	2	0.250	AMC701084	2601778	AMC701085	2601779
AFM-2	5/8	1 5/8	4	—	5/8	2	Ball	AMC701088	2601780	AMC701089	2601781
AFL-2	5/8	2 1/4	5	—	5/8	2	Square	AMC701702	2601864	AMC701703	2601865

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series 2 Flute

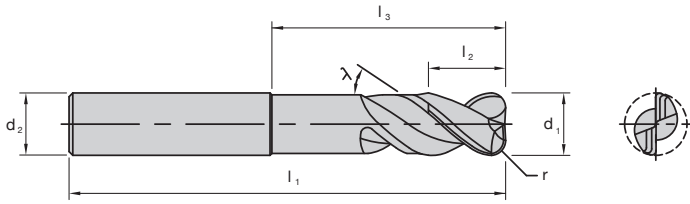


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFL-2	5/8	2 1/4	5	—	5/8	2	0.030	AMC701710	2601866	AMC701711	2601867
AFL-2	5/8	2 1/4	5	—	5/8	2	0.060	AMC701714	2601868	AMC701715	2601869
AFL-2	5/8	2 1/4	5	—	5/8	2	0.120	AMC701722	2601872	AMC701723	2601873
AFL-2	5/8	2 1/4	5	—	5/8	2	0.250	AMC701734	2601878	AMC701735	2601879
AFL-2	5/8	2 1/4	5	—	5/8	2	Ball	AMC701738	2601880	AMC701739	2601881
AFNS-2	5/8	3/4	4	2 1/8	5/8	2	Square	AMC706402	2602405	AMC706403	2602406
AFNS-2	5/8	3/4	4	2 1/8	5/8	2	0.030	AMC706410	2602407	AMC706411	2602408
AFNS-2	5/8	3/4	4	2 1/8	5/8	2	0.060	AMC706414	2602409	AMC706415	2602410
AFNS-2	5/8	3/4	4	2 1/8	5/8	2	0.120	AMC706422	2602413	AMC706423	2602414
AFNS-2	5/8	3/4	4	2 1/8	5/8	2	0.250	AMC706434	2602419	AMC706435	2602420
AFNS-2	5/8	3/4	4	2 1/8	5/8	2	Ball	AMC706438	2602421	AMC706439	2602422
AFNM-2	5/8	3/4	5	3 1/8	5/8	2	Square	AMC707052	2602502	AMC707053	2602503
AFNM-2	5/8	3/4	5	3 1/8	5/8	2	0.030	AMC707060	2602504	AMC707061	2602505
AFNM-2	5/8	3/4	5	3 1/8	5/8	2	0.060	AMC707064	2602506	AMC707065	2602507
AFNM-2	5/8	3/4	5	3 1/8	5/8	2	0.120	AMC707072	2602510	AMC707073	2602511
AFNM-2	5/8	3/4	5	3 1/8	5/8	2	0.250	AMC707084	2602516	AMC707085	2602517
AFNM-2	5/8	3/4	5	3 1/8	5/8	2	Ball	AMC707088	2602518	AMC707089	2602519
AFNL-2	5/8	3/4	6	4 1/8	5/8	2	Square	AMC707702	2602602	AMC707703	2602603
AFNL-2	5/8	3/4	6	4 1/8	5/8	2	0.030	AMC707710	2602604	AMC707711	2602605
AFNL-2	5/8	3/4	6	4 1/8	5/8	2	0.060	AMC707714	2602606	AMC707715	2602607
AFNL-2	5/8	3/4	6	4 1/8	5/8	2	0.120	AMC707722	2602610	AMC707723	2602611
AFNL-2	5/8	3/4	6	4 1/8	5/8	2	0.250	AMC707734	2602616	AMC707735	2602617
AFNL-2	5/8	3/4	6	4 1/8	5/8	2	Ball	AMC707738	2602618	AMC707739	2602619
AFS-2	3/4	1	3	—	3/4	2	Square	AMC700502	2601686	AMC700503	2601687
AFS-2	3/4	1	3	—	3/4	2	0.030	AMC700510	2601688	AMC700511	2601689
AFS-2	3/4	1	3	—	3/4	2	0.060	AMC700514	2601690	AMC700515	2601691
AFS-2	3/4	1	3	—	3/4	2	0.090	AMC700518	2601692	AMC700519	2601693
AFS-2	3/4	1	3	—	3/4	2	0.120	AMC700522	2601694	AMC700523	2601695
AFS-2	3/4	1	3	—	3/4	2	0.190	AMC700530	2601698	AMC700531	2601699
AFS-2	3/4	1	3	—	3/4	2	0.250	AMC700534	2601700	AMC700535	2601701
AFS-2	3/4	1	3	—	3/4	2	Ball	AMC700538	2601702	AMC700539	2601703

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series 2 Flute

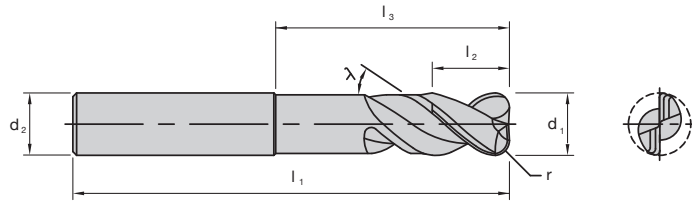


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFM-2	3/4	1 5/8	4	—	3/4	2	Square	AMC701152	2601782	AMC701153	2601783
AFM-2	3/4	1 5/8	4	—	3/4	2	0.030	AMC701160	2601784	AMC701161	2601785
AFM-2	3/4	1 5/8	4	—	3/4	2	0.060	AMC701164	2601786	AMC701165	2601787
AFM-2	3/4	1 5/8	4	—	3/4	2	0.090	AMC701168	2601788	AMC701169	2601789
AFM-2	3/4	1 5/8	4	—	3/4	2	0.120	AMC701172	2601790	AMC701173	2601791
AFM-2	3/4	1 5/8	4	—	3/4	2	0.190	AMC701180	2601794	AMC701181	2601795
AFM-2	3/4	1 5/8	4	—	3/4	2	0.250	AMC701184	2601796	AMC701185	2601797
AFM-2	3/4	1 5/8	4	—	3/4	2	Ball	AMC701188	2601798	AMC701189	2601799
AFL-2	3/4	2 1/2	5	—	3/4	2	Square	AMC701802	2601882	AMC701803	2601883
AFL-2	3/4	2 1/2	5	—	3/4	2	0.030	AMC701810	2601884	AMC701811	2601885
AFL-2	3/4	2 1/2	5	—	3/4	2	0.060	AMC701814	2601886	AMC701815	2601887
AFL-2	3/4	2 1/2	5	—	3/4	2	0.090	AMC701818	2601888	AMC701819	2601889
AFL-2	3/4	2 1/2	5	—	3/4	2	0.120	AMC701822	2601890	AMC701823	2601891
AFL-2	3/4	2 1/2	5	—	3/4	2	0.190	AMC701830	2601894	AMC701831	2601895
AFL-2	3/4	2 1/2	5	—	3/4	2	0.250	AMC701834	2601896	AMC701835	2601897
AFL-2	3/4	2 1/2	5	—	3/4	2	Ball	AMC701838	2601898	AMC701839	2601899
AFNS-2	3/4	1	4	2 1/8	3/4	2	Square	AMC706502	2602423	AMC706503	2602424
AFNS-2	3/4	1	4	2 1/8	3/4	2	0.030	AMC706510	2602425	AMC706511	2602426
AFNS-2	3/4	1	4	2 1/8	3/4	2	0.060	AMC706514	2602427	AMC706515	2602428
AFNS-2	3/4	1	4	2 1/8	3/4	2	0.090	AMC706518	2602429	AMC706519	2602430
AFNS-2	3/4	1	4	2 1/8	3/4	2	0.120	AMC706522	2602431	AMC706523	2602432
AFNS-2	3/4	1	4	2 1/8	3/4	2	0.190	AMC706530	2602435	AMC706531	2602436
AFNS-2	3/4	1	4	2 1/8	3/4	2	0.250	AMC706534	2602437	AMC706535	2602438
AFNS-2	3/4	1	4	2 1/8	3/4	2	Ball	AMC706538	2602439	AMC706539	2602440
AFNM-2	3/4	1	5	3 1/8	3/4	2	Square	AMC707152	2602520	AMC707153	2602521
AFNM-2	3/4	1	5	3 1/8	3/4	2	0.030	AMC707160	2602522	AMC707161	2602523
AFNM-2	3/4	1	5	3 1/8	3/4	2	0.060	AMC707164	2602524	AMC707165	2602525
AFNM-2	3/4	1	5	3 1/8	3/4	2	0.090	AMC707168	2602526	AMC707169	2602527
AFNM-2	3/4	1	5	3 1/8	3/4	2	0.120	AMC707172	2602528	AMC707173	2602529
AFNM-2	3/4	1	5	3 1/8	3/4	2	0.190	AMC707180	2602532	AMC707181	2602533
AFNM-2	3/4	1	5	3 1/8	3/4	2	0.250	AMC707184	2602534	AMC707185	2602535

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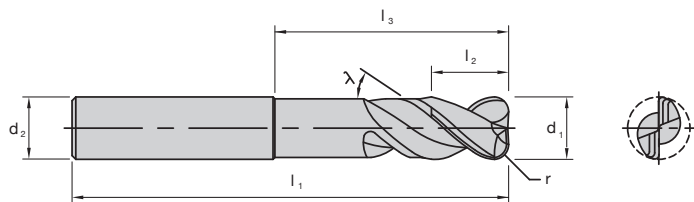
Aluminum Finisher Series 2 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNM-2	3/4	1	5	3 1/8	3/4	2	Ball	AMC707188	2602536	AMC707189	2602537
AFNL-2	3/4	1	6	4 1/8	3/4	2	Square	AMC707802	2602620	AMC707803	2602621
AFNL-2	3/4	1	6	4 1/8	3/4	2	0.030	AMC707810	2602622	AMC707811	2602623
AFNL-2	3/4	1	6	4 1/8	3/4	2	0.060	AMC707814	2602624	AMC707815	2602625
AFNL-2	3/4	1	6	4 1/8	3/4	2	0.090	AMC707818	2602626	AMC707819	2602627
AFNL-2	3/4	1	6	4 1/8	3/4	2	0.120	AMC707822	2602628	AMC707823	2602629
AFNL-2	3/4	1	6	4 1/8	3/4	2	0.190	AMC707830	2602632	AMC707831	2602633
AFNL-2	3/4	1	6	4 1/8	3/4	2	0.250	AMC707834	2602634	AMC707835	2602635
AFNL-2	3/4	1	6	4 1/8	3/4	2	Ball	AMC707838	2602636	AMC707839	2602637
AFS-2	1	1 1/4	4	—	1	2	Square	AMC700602	2601704	AMC700603	2601705
AFS-2	1	1 1/4	4	—	1	2	0.030	AMC700610	2601706	AMC700611	2601707
AFS-2	1	1 1/4	4	—	1	2	0.060	AMC700614	2601708	AMC700615	2601709
AFS-2	1	1 1/4	4	—	1	2	0.120	AMC700622	2601712	AMC700623	2601713
AFS-2	1	1 1/4	4	—	1	2	0.190	AMC700630	2601716	AMC700631	2601717
AFS-2	1	1 1/4	4	—	1	2	0.250	AMC700634	2601718	AMC700635	2601719
AFS-2	1	1 1/4	4	—	1	2	Ball	AMC700638	2601720	AMC700639	2601721
AFM-2	1	2 1/2	5	—	1	2	Square	AMC701252	2601800	AMC701253	2601801
AFM-2	1	2 1/2	5	—	1	2	0.030	AMC701260	2601802	AMC701261	2601803
AFM-2	1	2 1/2	5	—	1	2	0.060	AMC701264	2601804	AMC701265	2601805
AFM-2	1	2 1/2	5	—	1	2	0.120	AMC701272	2601808	AMC701273	2601809
AFM-2	1	2 1/2	5	—	1	2	0.190	AMC701280	2601812	AMC701281	2601813
AFM-2	1	2 1/2	5	—	1	2	0.250	AMC701284	2601814	AMC701285	2601815
AFM-2	1	2 1/2	5	—	1	2	Ball	AMC701288	2601816	AMC701289	2601817
AFL-2	1	3 1/4	6	—	1	2	Square	AMC701902	2601900	AMC701903	2601901
AFL-2	1	3 1/4	6	—	1	2	0.030	AMC701910	2601902	AMC701911	2601903
AFL-2	1	3 1/4	6	—	1	2	0.060	AMC701914	2601904	AMC701915	2601905
AFL-2	1	3 1/4	6	—	1	2	0.120	AMC701922	2601908	AMC701923	2601909
AFL-2	1	3 1/4	6	—	1	2	0.190	AMC701930	2601912	AMC701931	2601913
AFL-2	1	3 1/4	6	—	1	2	0.250	AMC701934	2601914	AMC701935	2601915
AFL-2	1	3 1/4	6	—	1	2	Ball	AMC701938	2601916	AMC701939	2601917
AFNS-2	1	1 1/4	5	2 1/8	1	2	Square	AMC706602	2602441	AMC706603	2602442

Aluminum Finisher Series

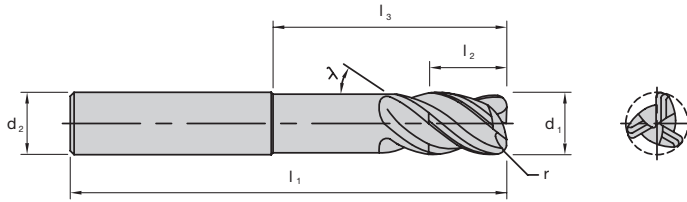
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNS-2	1	1 1/4	5	2 1/8	1	2	0.030	AMC706610	2602443	AMC706611	2602444
AFNS-2	1	1 1/4	5	2 1/8	1	2	0.060	AMC706614	2602445	AMC706615	2602446
AFNS-2	1	1 1/4	5	2 1/8	1	2	0.120	AMC706622	2602449	AMC706623	2602450
AFNS-2	1	1 1/4	5	2 1/8	1	2	0.190	AMC706630	2602453	AMC706631	2602454
AFNS-2	1	1 1/4	5	2 1/8	1	2	0.250	AMC706634	2602455	AMC706635	2602456
AFNS-2	1	1 1/4	5	2 1/8	1	2	Ball	AMC706638	2602457	AMC706639	2602458
AFNM-2	1	1 1/4	6	3 1/8	1	2	Square	AMC707252	2602538	AMC707253	2602539
AFNM-2	1	1 1/4	6	3 1/8	1	2	0.030	AMC707260	2602540	AMC707261	2602541
AFNM-2	1	1 1/4	6	3 1/8	1	2	0.060	AMC707264	2602542	AMC707265	2602543
AFNM-2	1	1 1/4	6	3 1/8	1	2	0.120	AMC707272	2602546	AMC707273	2602547
AFNM-2	1	1 1/4	6	3 1/8	1	2	0.190	AMC707280	2602550	AMC707281	2602551
AFNM-2	1	1 1/4	6	3 1/8	1	2	0.250	AMC707284	2602552	AMC707285	2602553
AFNM-2	1	1 1/4	6	3 1/8	1	2	Ball	AMC707288	2602554	AMC707289	2602555
AFNL-2	1	1 1/4	7	4 1/8	1	2	Square	AMC707902	2602638	AMC707903	2602639
AFNL-2	1	1 1/4	7	4 1/8	1	2	0.030	AMC707910	2602640	AMC707911	2602641
AFNL-2	1	1 1/4	7	4 1/8	1	2	0.060	AMC707914	2602642	AMC707915	2602643
AFNL-2	1	1 1/4	7	4 1/8	1	2	0.120	AMC707922	2602646	AMC707923	2602647
AFNL-2	1	1 1/4	7	4 1/8	1	2	0.190	AMC707930	2602650	AMC707931	2602651
AFNL-2	1	1 1/4	7	4 1/8	1	2	0.250	AMC707934	2602652	AMC707935	2602653
AFNL-2	1	1 1/4	7	4 1/8	1	2	Ball	AMC707938	2602654	AMC707939	2602655

Aluminum Finisher Series

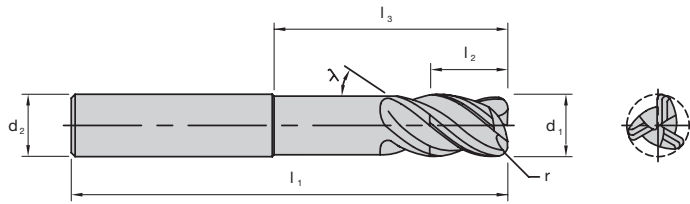
3 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFS-3	1/8	1/4	2	—	1/8	3	Square	AMC400038	2601608	AMC400039	2607651
AFS-3	1/8	1/4	2	—	1/8	3	0.010	AMC400040	2601609	AMC400041	2607652
AFS-3	1/8	1/4	2	—	1/8	3	Ball	AMC400042	2601610	AMC400043	2607653
AFM-3	1/8	1/2	2	—	1/8	3	Square	AMC400056	2601617	AMC400057	2608226
AFM-3	1/8	1/2	2	—	1/8	3	0.010	AMC400058	2601618	AMC400059	2608227
AFM-3	1/8	1/2	2	—	1/8	3	Ball	AMC400060	2601619	AMC400061	2608228
AFS-3	3/16	5/16	2	—	3/16	3	Square	AMC400044	2601611	AMC400045	2607654
AFS-3	3/16	5/16	2	—	3/16	3	0.010	AMC400046	2601612	AMC400047	2608221
AFS-3	3/16	5/16	2	—	3/16	3	Ball	AMC400048	2601613	AMC400049	2608222
AFM-3	3/16	9/16	2 1/2	—	3/16	3	Square	AMC400062	2601620	AMC400063	2608229
AFM-3	3/16	9/16	2 1/2	—	3/16	3	0.010	AMC400064	2601621	AMC400065	2608230
AFM-3	3/16	9/16	2 1/2	—	3/16	3	Ball	AMC400066	2601622	AMC400067	2608231
AFL-3	3/16	7/8	2 1/2	—	3/16	3	Square	AMC400078	2641947	AMC400079	2641948
AFS-3	1/4	3/8	2	—	1/4	3	Square	AMC703102	2601990	AMC703103	2601991
AFS-3	1/4	3/8	2	—	1/4	3	0.015	AMC703106	2601992	AMC703107	2601993
AFS-3	1/4	3/8	2	—	1/4	3	0.030	AMC703110	2601994	AMC703111	2601995
AFS-3	1/4	3/8	2	—	1/4	3	0.060	AMC703114	2601996	AMC703115	2601997
AFS-3	1/4	3/8	2	—	1/4	3	0.090	AMC703118	2601998	AMC703119	2601999
AFS-3	1/4	3/8	2	—	1/4	3	Ball	AMC703138	2602000	AMC703139	2602001
AFM-3	1/4	3/4	2	—	1/4	3	Square	AMC703752	2602090	AMC703753	2602091
AFM-3	1/4	3/4	2	—	1/4	3	0.015	AMC703756	2602092	AMC703757	2602093
AFM-3	1/4	3/4	2	—	1/4	3	0.030	AMC703760	2602094	AMC703761	2602095
AFM-3	1/4	3/4	2	—	1/4	3	0.060	AMC703764	2602096	AMC703765	2602097
AFM-3	1/4	3/4	2	—	1/4	3	0.090	AMC703768	2602098	AMC703769	2602099
AFM-3	1/4	3/4	2	—	1/4	3	Ball	AMC703788	2602100	AMC703789	2602101
AFL-3	1/4	1 1/4	2 1/2	—	1/4	3	Square	AMC704402	2602190	AMC704403	2602191
AFL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.015	AMC704406	2602192	AMC704407	2602193
AFL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.030	AMC704410	2602194	AMC704411	2602195
AFL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.060	AMC704414	2602196	AMC704415	2602197
AFL-3	1/4	1 1/4	2 1/2	—	1/4	3	0.090	AMC704418	2602198	AMC704419	2602199

Aluminum Finisher Series

3 Flute

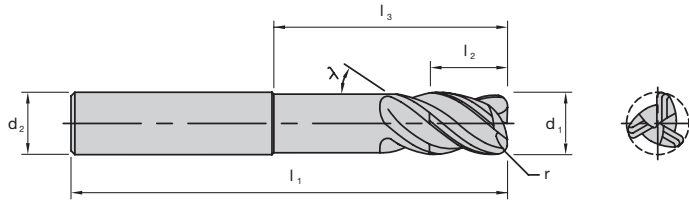


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFL-3	1/4	1 1/4	2 1/2	—	1/4	3	Ball	AMC704438	2602200	AMC704439	2602201
AFNS-3	1/4	3/8	4	1 1/2	1/4	3	Square	AMC709102	2602674	AMC709103	2602675
AFNS-3	1/4	3/8	4	1 1/2	1/4	3	0.015	AMC709106	2602676	AMC709107	2602677
AFNS-3	1/4	3/8	4	1 1/2	1/4	3	0.030	AMC709110	2602678	AMC709111	2602679
AFNS-3	1/4	3/8	4	1 1/2	1/4	3	0.060	AMC709114	2602680	AMC709115	2602681
AFNS-3	1/4	3/8	4	1 1/2	1/4	3	0.090	AMC709118	2602682	AMC709119	2602683
AFNS-3	1/4	3/8	4	1 1/2	1/4	3	Ball	AMC709138	2602684	AMC709139	2602685
AFNM-3	1/4	3/8	4	1 3/4	1/4	3	Square	AMC709752	2602774	AMC709753	2602775
AFNM-3	1/4	3/8	4	1 3/4	1/4	3	0.015	AMC709756	2602776	AMC709757	2602777
AFNM-3	1/4	3/8	4	1 3/4	1/4	3	0.030	AMC709760	2602778	AMC709761	2602779
AFNM-3	1/4	3/8	4	1 3/4	1/4	3	0.060	AMC709764	2602780	AMC709765	2602781
AFNM-3	1/4	3/8	4	1 3/4	1/4	3	0.090	AMC709768	2602782	AMC709769	2602783
AFNM-3	1/4	3/8	4	1 3/4	1/4	3	Ball	AMC709788	2602784	AMC709789	2602785
AFNL-3	1/4	3/8	4	2 1/8	1/4	3	Square	AMC710402	2602874	AMC710403	2602875
AFNL-3	1/4	3/8	4	2 1/8	1/4	3	0.015	AMC710406	2602876	AMC710407	2602877
AFNL-3	1/4	3/8	4	2 1/8	1/4	3	0.030	AMC710410	2602878	AMC710411	2602879
AFNL-3	1/4	3/8	4	2 1/8	1/4	3	0.060	AMC710414	2602880	AMC710415	2602881
AFNL-3	1/4	3/8	4	2 1/8	1/4	3	0.090	AMC710418	2602882	AMC710419	2602883
AFNL-3	1/4	3/8	4	2 1/8	1/4	3	Ball	AMC710438	2602884	AMC710439	2602885
AFS-3	5/16	9/16	2 1/2	—	5/16	3	Square	AMC400050	2601614	AMC400051	2608223
AFS-3	5/16	9/16	2 1/2	—	5/16	3	0.015	AMC400052	2601615	AMC400053	2608224
AFS-3	5/16	9/16	2 1/2	—	5/16	3	Ball	AMC400054	2601616	AMC400055	2608225
AFM-3	5/16	13/16	2 1/2	—	5/16	3	Square	AMC400068	2601623	AMC400069	2608232
AFM-3	5/16	13/16	2 1/2	—	5/16	3	0.015	AMC400070	2601624	AMC400071	2608233
AFM-3	5/16	13/16	2 1/2	—	5/16	3	Ball	AMC400074	2601625	AMC400075	2608234
AFL-3	5/16	1 1/4	3	—	5/16	3	Square	AMC400080	2641949	AMC400081	2641950
AFS-3	3/8	1/2	2 1/2	—	3/8	3	Square	AMC703202	2602002	AMC703203	2602003
AFS-3	3/8	1/2	2 1/2	—	3/8	3	0.015	AMC703206	2602004	AMC703207	2602005
AFS-3	3/8	1/2	2 1/2	—	3/8	3	0.030	AMC703210	2602006	AMC703211	2602007
AFS-3	3/8	1/2	2 1/2	—	3/8	3	0.060	AMC703214	2602008	AMC703215	2602009

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

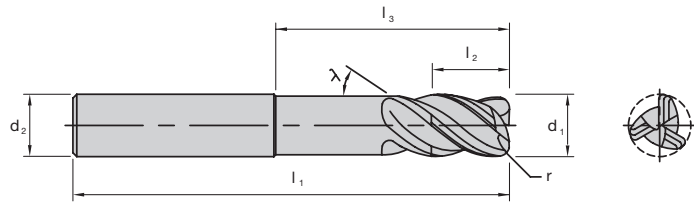
Aluminum Finisher Series 3 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFS-3	3/8	1/2	2 1/2	—	3/8	3	0.090	AMC703218	2602010	AMC703219	2602011
AFS-3	3/8	1/2	2 1/2	—	3/8	3	0.120	AMC703222	2602012	AMC703223	2602013
AFS-3	3/8	1/2	2 1/2	—	3/8	3	Ball	AMC703238	2602016	AMC703239	2602017
AFM-3	3/8	1	2 1/2	—	3/8	3	Square	AMC703852	2602102	AMC703853	2602103
AFM-3	3/8	1	2 1/2	—	3/8	3	0.015	AMC703856	2602104	AMC703857	2602105
AFM-3	3/8	1	2 1/2	—	3/8	3	0.030	AMC703860	2602106	AMC703861	2602107
AFM-3	3/8	1	2 1/2	—	3/8	3	0.060	AMC703864	2602108	AMC703865	2602109
AFM-3	3/8	1	2 1/2	—	3/8	3	0.090	AMC703868	2602110	AMC703869	2602111
AFM-3	3/8	1	2 1/2	—	3/8	3	0.120	AMC703872	2602112	AMC703873	2602113
AFM-3	3/8	1	2 1/2	—	3/8	3	Ball	AMC703888	2602116	AMC703889	2602117
AFL-3	3/8	1 1/2	4	—	3/8	3	Square	AMC704502	2602202	AMC704503	2602203
AFL-3	3/8	1 1/2	4	—	3/8	3	0.015	AMC704506	2602204	AMC704507	2602205
AFL-3	3/8	1 1/2	4	—	3/8	3	0.030	AMC704510	2602206	AMC704511	2602207
AFL-3	3/8	1 1/2	4	—	3/8	3	0.060	AMC704514	2602208	AMC704515	2602209
AFL-3	3/8	1 1/2	4	—	3/8	3	0.090	AMC704518	2602210	AMC704519	2602211
AFL-3	3/8	1 1/2	4	—	3/8	3	0.120	AMC704522	2602212	AMC704523	2602213
AFL-3	3/8	1 1/2	4	—	3/8	3	Ball	AMC704538	2602216	AMC704539	2602217
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	Square	AMC709202	2602686	AMC709203	2602687
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	0.015	AMC709206	2602688	AMC709207	2602689
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	0.030	AMC709210	2602690	AMC709211	2602691
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	0.060	AMC709214	2602692	AMC709215	2602693
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	0.090	AMC709218	2602694	AMC709219	2602695
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	0.120	AMC709222	2602696	AMC709223	2602697
AFNS-3	3/8	1/2	4	1 3/4	3/8	3	Ball	AMC709238	2602700	AMC709239	2602701
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	Square	AMC709852	2602786	AMC709853	2602787
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	0.015	AMC709856	2602788	AMC709857	2602789
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	0.030	AMC709860	2602790	AMC709861	2602791
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	0.060	AMC709864	2602792	AMC709865	2602793
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	0.090	AMC709868	2602794	AMC709869	2602795
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	0.120	AMC709872	2602796	AMC709873	2602797

Aluminum Finisher Series

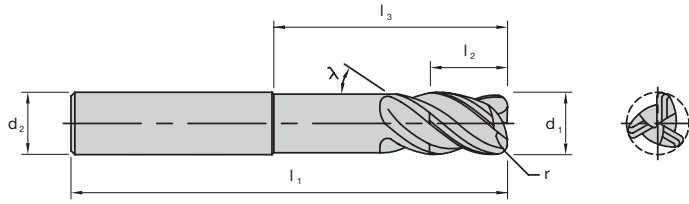
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNM-3	3/8	1/2	4	2 1/4	3/8	3	Ball	AMC709888	2602800	AMC709889	2602801
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	Square	AMC710502	2602886	AMC710503	2602887
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	0.015	AMC710506	2602888	AMC710507	2602889
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	0.030	AMC710510	2602890	AMC710511	2602891
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	0.060	AMC710514	2602892	AMC710515	2602893
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	0.090	AMC710518	2602894	AMC710519	2602895
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	0.120	AMC710522	2602896	AMC710523	2602897
AFNL-3	3/8	1/2	5	2 3/4	3/8	3	Ball	AMC710538	2602900	AMC710539	2602901
AFS-3	1/2	5/8	3	—	1/2	3	Square	AMC703302	2602018	AMC703303	2602019
AFS-3	1/2	5/8	3	—	1/2	3	0.015	AMC703306	2602020	AMC703307	2602021
AFS-3	1/2	5/8	3	—	1/2	3	0.030	AMC703310	2602022	AMC703311	2602023
AFS-3	1/2	5/8	3	—	1/2	3	0.060	AMC703314	2602024	AMC703315	2602025
AFS-3	1/2	5/8	3	—	1/2	3	0.090	AMC703318	2602026	AMC703319	2602027
AFS-3	1/2	5/8	3	—	1/2	3	0.120	AMC703322	2602028	AMC703323	2602029
AFS-3	1/2	5/8	3	—	1/2	3	0.190	AMC703330	2602032	AMC703331	2602033
AFS-3	1/2	5/8	3	—	1/2	3	Ball	AMC703338	2602034	AMC703339	2602035
AFM-3	1/2	1 1/4	3	—	1/2	3	Square	AMC703952	2602118	AMC703953	2602119
AFM-3	1/2	1 1/4	3	—	1/2	3	0.015	AMC703956	2602120	AMC703957	2602121
AFM-3	1/2	1 1/4	3	—	1/2	3	0.030	AMC703960	2602122	AMC703961	2602123
AFM-3	1/2	1 1/4	3	—	1/2	3	0.060	AMC703964	2602124	AMC703965	2602125
AFM-3	1/2	1 1/4	3	—	1/2	3	0.090	AMC703968	2602126	AMC703969	2602127
AFM-3	1/2	1 1/4	3	—	1/2	3	0.120	AMC703972	2602128	AMC703973	2602129
AFM-3	1/2	1 1/4	3	—	1/2	3	0.190	AMC703980	2602132	AMC703981	2602133
AFM-3	1/2	1 1/4	3	—	1/2	3	Ball	AMC703988	2602134	AMC703989	2602135
AFL-3	1/2	2	4	—	1/2	3	Square	AMC704602	2602218	AMC704603	2602219
AFL-3	1/2	2	4	—	1/2	3	0.015	AMC704606	2602220	AMC704607	2602221
AFL-3	1/2	2	4	—	1/2	3	0.030	AMC704610	2602222	AMC704611	2602223
AFL-3	1/2	2	4	—	1/2	3	0.060	AMC704614	2602224	AMC704615	2602225
AFL-3	1/2	2	4	—	1/2	3	0.090	AMC704618	2602226	AMC704619	2602227
AFL-3	1/2	2	4	—	1/2	3	0.120	AMC704622	2602228	AMC704623	2602229

Aluminum Finisher Series

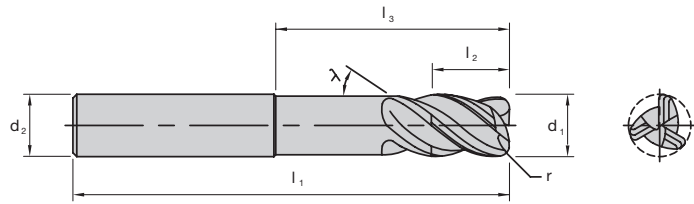
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFL-3	1/2	2	4	—	1/2	3	0.190	AMC704630	2602232	AMC704631	2602233
AFL-3	1/2	2	4	—	1/2	3	Ball	AMC704638	2602234	AMC704639	2602235
AFX-3	1/2	3 1/8	6	—	1/2	3	Square	AMC705252	2602290	AMC705253	2602291
AFX-3	1/2	3 1/8	6	—	1/2	3	0.015	AMC705256	2602292	AMC705257	2602293
AFX-3	1/2	3 1/8	6	—	1/2	3	0.030	AMC705260	2602294	AMC705261	2602295
AFX-3	1/2	3 1/8	6	—	1/2	3	0.060	AMC705264	2602296	AMC705265	2602297
AFX-3	1/2	3 1/8	6	—	1/2	3	0.090	AMC705268	2602298	AMC705269	2602299
AFX-3	1/2	3 1/8	6	—	1/2	3	0.120	AMC705272	2602300	AMC705273	2602301
AFX-3	1/2	3 1/8	6	—	1/2	3	0.190	AMC705280	2602304	AMC705281	2602305
AFX-3	1/2	3 1/8	6	—	1/2	3	Ball	AMC705288	2602306	AMC705289	2602307
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	Square	AMC709302	2602702	AMC709303	2602703
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	0.015	AMC709306	2602704	AMC709307	2602705
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	0.030	AMC709310	2602706	AMC709311	2602707
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	0.060	AMC709314	2602708	AMC709315	2602709
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	0.090	AMC709318	2602710	AMC709319	2602711
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	0.120	AMC709322	2602712	AMC709323	2602713
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	0.190	AMC709330	2602716	AMC709331	2602717
AFNS-3	1/2	5/8	4	2 1/8	1/2	3	Ball	AMC709338	2602718	AMC709339	2602719
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	Square	AMC709952	2602802	AMC709953	2602803
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	0.015	AMC709956	2602804	AMC709957	2602805
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	0.030	AMC709960	2602806	AMC709961	2602807
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	0.060	AMC709964	2602808	AMC709965	2602809
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	0.090	AMC709968	2602810	AMC709969	2602811
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	0.120	AMC709972	2602812	AMC709973	2602813
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	0.190	AMC709980	2602816	AMC709981	2602817
AFNM-3	1/2	5/8	5	3 1/8	1/2	3	Ball	AMC709988	2602818	AMC709989	2602819
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	Square	AMC710602	2602902	AMC710603	2602903
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	0.015	AMC710606	2602904	AMC710607	2602905
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	0.030	AMC710610	2602906	AMC710611	2602907
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	0.060	AMC710614	2602908	AMC710615	2602909

Aluminum Finisher Series

3 Flute



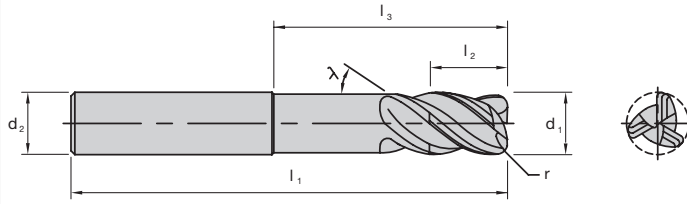
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	0.090	AMC710618	2602910	AMC710619	2602911
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	0.120	AMC710622	2602912	AMC710623	2602913
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	0.190	AMC710630	2602916	AMC710631	2602917
AFNL-3	1/2	5/8	6	4 1/8	1/2	3	Ball	AMC710638	2602918	AMC710639	2602919
AFS-3	5/8	3/4	3	—	5/8	3	Square	AMC703402	2602036	AMC703403	2602037
AFS-3	5/8	3/4	3	—	5/8	3	0.030	AMC703410	2602038	AMC703411	2602039
AFS-3	5/8	3/4	3	—	5/8	3	0.060	AMC703414	2602040	AMC703415	2602041
AFS-3	5/8	3/4	3	—	5/8	3	0.090	AMC703418	2602042	AMC703419	2602043
AFS-3	5/8	3/4	3	—	5/8	3	0.120	AMC703422	2602044	AMC703423	2602045
AFS-3	5/8	3/4	3	—	5/8	3	0.190	AMC703430	2602048	AMC703431	2602049
AFS-3	5/8	3/4	3	—	5/8	3	0.250	AMC703434	2602050	AMC703435	2602051
AFS-3	5/8	3/4	3	—	5/8	3	Ball	AMC703438	2602052	AMC703439	2602053
AFM-3	5/8	1 5/8	4	—	5/8	3	Square	AMC704052	2602136	AMC704053	2602137
AFM-3	5/8	1 5/8	4	—	5/8	3	0.030	AMC704060	2602138	AMC704061	2602139
AFM-3	5/8	1 5/8	4	—	5/8	3	0.060	AMC704064	2602140	AMC704065	2602141
AFM-3	5/8	1 5/8	4	—	5/8	3	0.090	AMC704068	2602142	AMC704069	2602143
AFM-3	5/8	1 5/8	4	—	5/8	3	0.120	AMC704072	2602144	AMC704073	2602145
AFM-3	5/8	1 5/8	4	—	5/8	3	0.190	AMC704080	2602148	AMC704081	2602149
AFM-3	5/8	1 5/8	4	—	5/8	3	0.250	AMC704084	2602150	AMC704085	2602151
AFM-3	5/8	1 5/8	4	—	5/8	3	Ball	AMC704088	2602152	AMC704089	2602153
AFL-3	5/8	2 1/4	5	—	5/8	3	Square	AMC704702	2602236	AMC704703	2602237
AFL-3	5/8	2 1/4	5	—	5/8	3	0.030	AMC704710	2602238	AMC704711	2602239
AFL-3	5/8	2 1/4	5	—	5/8	3	0.060	AMC704714	2602240	AMC704715	2602241
AFL-3	5/8	2 1/4	5	—	5/8	3	0.090	AMC704718	2602242	AMC704719	2602243
AFL-3	5/8	2 1/4	5	—	5/8	3	0.120	AMC704722	2602244	AMC704723	2602245
AFL-3	5/8	2 1/4	5	—	5/8	3	0.190	AMC704730	2602248	AMC704731	2602249
AFL-3	5/8	2 1/4	5	—	5/8	3	0.250	AMC704734	2602250	AMC704735	2602251
AFL-3	5/8	2 1/4	5	—	5/8	3	Ball	AMC704738	2602252	AMC704739	2602253
AFX-3	5/8	3 1/4	6	—	5/8	3	Square	AMC705352	2602308	AMC705353	2602309
AFX-3	5/8	3 1/4	6	—	5/8	3	0.030	AMC705360	2602310	AMC705361	2602311

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series

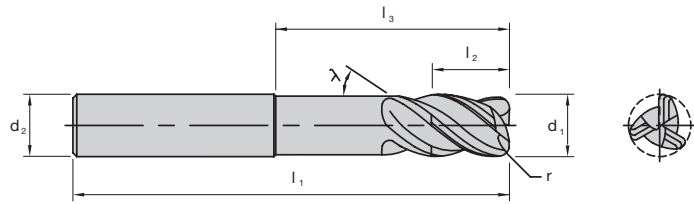
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	Square	AMC709402	2602720	AMC709403	2602721
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	0.030	AMC709410	2602722	AMC709411	2602723
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	0.060	AMC709414	2602724	AMC709415	2602725
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	0.090	AMC709418	2602726	AMC709419	2602727
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	0.120	AMC709422	2602728	AMC709423	2602729
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	0.190	AMC709430	2602732	AMC709431	2602733
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	0.250	AMC709434	2602734	AMC709435	2602735
AFNS-3	5/8	3/4	4	2 1/8	5/8	3	Ball	AMC709438	2602736	AMC709439	2602737
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	Square	AMC710052	2602820	AMC710053	2602821
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	0.030	AMC710060	2602822	AMC710061	2602823
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	0.060	AMC710064	2602824	AMC710065	2602825
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	0.090	AMC710068	2602826	AMC710069	2602827
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	0.120	AMC710072	2602828	AMC710073	2602829
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	0.190	AMC710080	2602832	AMC710081	2602833
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	0.250	AMC710084	2602834	AMC710085	2602835
AFNM-3	5/8	3/4	5	3 1/8	5/8	3	Ball	AMC710088	2602836	AMC710089	2602837
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	Square	AMC710702	2602920	AMC710703	2602921
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	0.030	AMC710710	2602922	AMC710711	2602923
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	0.060	AMC710714	2602924	AMC710715	2602925
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	0.090	AMC710718	2602926	AMC710719	2602927
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	0.120	AMC710722	2602928	AMC710723	2602929
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	0.190	AMC710730	2602932	AMC710731	2602933
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	0.250	AMC710734	2602934	AMC710735	2602935
AFNL-3	5/8	3/4	6	4 1/8	5/8	3	Ball	AMC710738	2602936	AMC710739	2602937
AFS-3	3/4	1	3	—	3/4	3	Square	AMC703502	2602054	AMC703503	2602055
AFS-3	3/4	1	3	—	3/4	3	0.030	AMC703510	2602056	AMC703511	2602057
AFS-3	3/4	1	3	—	3/4	3	0.060	AMC703514	2602058	AMC703515	2602059
AFS-3	3/4	1	3	—	3/4	3	0.090	AMC703518	2602060	AMC703519	2602061
AFS-3	3/4	1	3	—	3/4	3	0.120	AMC703522	2602062	AMC703523	2602063
AFS-3	3/4	1	3	—	3/4	3	0.190	AMC703530	2602066	AMC703531	2602067

Aluminum Finisher Series

3 Flute



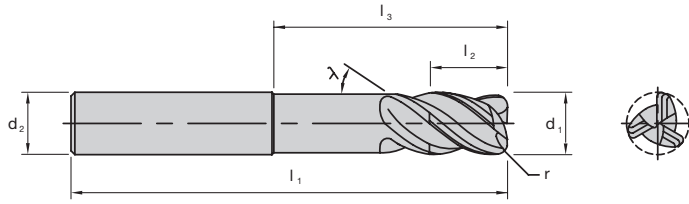
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFS-3	3/4	1	3	—	3/4	3	0.250	AMC703534	2602068	AMC703535	2602069
AFS-3	3/4	1	3	—	3/4	3	Ball	AMC703538	2602070	AMC703539	2602071
AFM-3	3/4	1 5/8	4	—	3/4	3	Square	AMC704152	2602154	AMC704153	2602155
AFM-3	3/4	1 5/8	4	—	3/4	3	0.030	AMC704160	2602156	AMC704161	2602157
AFM-3	3/4	1 5/8	4	—	3/4	3	0.060	AMC704164	2602158	AMC704165	2602159
AFM-3	3/4	1 5/8	4	—	3/4	3	0.090	AMC704168	2602160	AMC704169	2602161
AFM-3	3/4	1 5/8	4	—	3/4	3	0.120	AMC704172	2602162	AMC704173	2602163
AFM-3	3/4	1 5/8	4	—	3/4	3	0.190	AMC704180	2602166	AMC704181	2602167
AFM-3	3/4	1 5/8	4	—	3/4	3	0.250	AMC704184	2602168	AMC704185	2602169
AFM-3	3/4	1 5/8	4	—	3/4	3	Ball	AMC704188	2602170	AMC704189	2602171
AFL-3	3/4	2 1/2	5	—	3/4	3	Square	AMC704802	2602254	AMC704803	2602255
AFL-3	3/4	2 1/2	5	—	3/4	3	0.030	AMC704810	2602256	AMC704811	2602257
AFL-3	3/4	2 1/2	5	—	3/4	3	0.060	AMC704814	2602258	AMC704815	2602259
AFL-3	3/4	2 1/2	5	—	3/4	3	0.090	AMC704818	2602260	AMC704819	2602261
AFL-3	3/4	2 1/2	5	—	3/4	3	0.120	AMC704822	2602262	AMC704823	2602263
AFL-3	3/4	2 1/2	5	—	3/4	3	0.190	AMC704830	2602266	AMC704831	2602267
AFL-3	3/4	2 1/2	5	—	3/4	3	0.250	AMC704834	2602268	AMC704835	2602269
AFL-3	3/4	2 1/2	5	—	3/4	3	Ball	AMC704838	2602270	AMC704839	2602271
AFX-3	3/4	3 1/4	6	—	3/4	3	Square	AMC705452	2602326	AMC705453	2602327
AFX-3	3/4	3 1/4	6	—	3/4	3	0.030	AMC705460	2602328	AMC705461	2602329
AFX-3	3/4	3 1/4	6	—	3/4	3	0.060	AMC705464	2602330	AMC705465	2602331
AFX-3	3/4	3 1/4	6	—	3/4	3	0.090	AMC705468	2602332	AMC705469	2602333
AFX-3	3/4	3 1/4	6	—	3/4	3	0.120	AMC705472	2602334	AMC705473	2602335
AFX-3	3/4	3 1/4	6	—	3/4	3	0.190	AMC705480	2602338	AMC705481	2602339
AFX-3	3/4	3 1/4	6	—	3/4	3	0.250	AMC705484	2602340	AMC705485	2602341
AFX-3	3/4	3 1/4	6	—	3/4	3	Ball	AMC705488	2602342	AMC705489	2602343
AFNS-3	3/4	1	4	2 1/8	3/4	3	Square	AMC709502	2602738	AMC709503	2602739
AFNS-3	3/4	1	4	2 1/8	3/4	3	0.030	AMC709510	2602740	AMC709511	2602741
AFNS-3	3/4	1	4	2 1/8	3/4	3	0.060	AMC709514	2602742	AMC709515	2602743
AFNS-3	3/4	1	4	2 1/8	3/4	3	0.090	AMC709518	2602744	AMC709519	2602745

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series

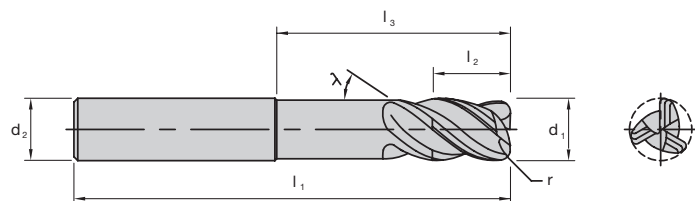
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNS-3	3/4	1	4	2 1/8	3/4	3	0.120	AMC709522	2602746	AMC709523	2602747
AFNS-3	3/4	1	4	2 1/8	3/4	3	0.190	AMC709530	2602750	AMC709531	2602751
AFNS-3	3/4	1	4	2 1/8	3/4	3	0.250	AMC709534	2602752	AMC709535	2602753
AFNS-3	3/4	1	4	2 1/8	3/4	3	Ball	AMC709538	2602754	AMC709539	2602755
AFNM-3	3/4	1	5	3 1/8	3/4	3	Square	AMC710152	2602838	AMC710153	2602839
AFNM-3	3/4	1	5	3 1/8	3/4	3	0.030	AMC710160	2602840	AMC710161	2602841
AFNM-3	3/4	1	5	3 1/8	3/4	3	0.060	AMC710164	2602842	AMC710165	2602843
AFNM-3	3/4	1	5	3 1/8	3/4	3	0.090	AMC710168	2602844	AMC710169	2602845
AFNM-3	3/4	1	5	3 1/8	3/4	3	0.120	AMC710172	2602846	AMC710173	2602847
AFNM-3	3/4	1	5	3 1/8	3/4	3	0.190	AMC710180	2602850	AMC710181	2602851
AFNM-3	3/4	1	5	3 1/8	3/4	3	0.250	AMC710184	2602852	AMC710185	2602853
AFNM-3	3/4	1	5	3 1/8	3/4	3	Ball	AMC710188	2602854	AMC710189	2602855
AFNL-3	3/4	1	6	4 1/8	3/4	3	Square	AMC710802	2602938	AMC710803	2602939
AFNL-3	3/4	1	6	4 1/8	3/4	3	0.030	AMC710810	2602940	AMC710811	2602941
AFNL-3	3/4	1	6	4 1/8	3/4	3	0.060	AMC710814	2602942	AMC710815	2602943
AFNL-3	3/4	1	6	4 1/8	3/4	3	0.090	AMC710818	2602944	AMC710819	2602945
AFNL-3	3/4	1	6	4 1/8	3/4	3	0.120	AMC710822	2602946	AMC710823	2602947
AFNL-3	3/4	1	6	4 1/8	3/4	3	0.190	AMC710830	2602950	AMC710831	2602951
AFNL-3	3/4	1	6	4 1/8	3/4	3	0.250	AMC710834	2602952	AMC710835	2602953
AFNL-3	3/4	1	6	4 1/8	3/4	3	Ball	AMC710838	2602954	AMC710839	2602955
AFS-3	1	1 1/4	4	—	1	3	Square	AMC703602	2602072	AMC703603	2602073
AFS-3	1	1 1/4	4	—	1	3	0.030	AMC703610	2602074	AMC703611	2602075
AFS-3	1	1 1/4	4	—	1	3	0.060	AMC703614	2602076	AMC703615	2602077
AFS-3	1	1 1/4	4	—	1	3	0.120	AMC703622	2602080	AMC703623	2602081
AFS-3	1	1 1/4	4	—	1	3	0.190	AMC703630	2602084	AMC703631	2602085
AFS-3	1	1 1/4	4	—	1	3	0.250	AMC703634	2602086	AMC703635	2602087
AFS-3	1	1 1/4	4	—	1	3	Ball	AMC703638	2602088	AMC703639	2602089
AFM-3	1	2 1/2	5	—	1	3	Square	AMC704252	2602172	AMC704253	2602173
AFM-3	1	2 1/2	5	—	1	3	0.030	AMC704260	2602174	AMC704261	2602175
AFM-3	1	2 1/2	5	—	1	3	0.060	AMC704264	2602176	AMC704265	2602177

Aluminum Finisher Series

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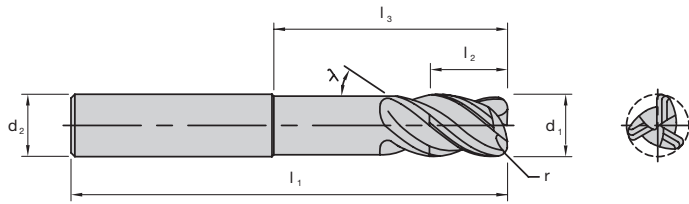
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFM-3	1	2 1/2	5	—	1	3	0.120	AMC704272	2602180	AMC704273	2602181
AFM-3	1	2 1/2	5	—	1	3	0.190	AMC704280	2602184	AMC704281	2602185
AFM-3	1	2 1/2	5	—	1	3	0.250	AMC704284	2602186	AMC704285	2602187
AFM-3	1	2 1/2	5	—	1	3	Ball	AMC704288	2602188	AMC704289	2602189
AFL-3	1	3 1/4	6	—	1	3	Square	AMC704902	2602272	AMC704903	2602273
AFL-3	1	3 1/4	6	—	1	3	0.030	AMC704910	2602274	AMC704911	2602275
AFL-3	1	3 1/4	6	—	1	3	0.060	AMC704914	2602276	AMC704915	2602277
AFL-3	1	3 1/4	6	—	1	3	0.120	AMC704922	2602280	AMC704923	2602281
AFL-3	1	3 1/4	6	—	1	3	0.190	AMC704930	2602284	AMC704931	2602285
AFL-3	1	3 1/4	6	—	1	3	0.250	AMC704934	2602286	AMC704935	2602287
AFL-3	1	3 1/4	6	—	1	3	Ball	AMC704938	2602288	AMC704939	2602289
AFX-3	1	4 1/8	7	—	1	3	Square	AMC705552	2602344	AMC705553	2602345
AFX-3	1	4 1/8	7	—	1	3	0.030	AMC705560	2602346	AMC705561	2602347
AFX-3	1	4 1/8	7	—	1	3	0.060	AMC705564	2602348	AMC705565	2602349
AFX-3	1	4 1/8	7	—	1	3	0.120	AMC705572	2602352	AMC705573	2602353
AFX-3	1	4 1/8	7	—	1	3	0.190	AMC705580	2602356	AMC705581	2602357
AFX-3	1	4 1/8	7	—	1	3	0.250	AMC705584	2602358	AMC705585	2602359
AFX-3	1	4 1/8	7	—	1	3	Ball	AMC705588	2602360	AMC705589	2602361
AFNS-3	1	1 1/4	5	2 1/8	1	3	Square	AMC709602	2602756	AMC709603	2602757
AFNS-3	1	1 1/4	5	2 1/8	1	3	0.030	AMC709610	2602758	AMC709611	2602759
AFNS-3	1	1 1/4	5	2 1/8	1	3	0.060	AMC709614	2602760	AMC709615	2602761
AFNS-3	1	1 1/4	5	2 1/8	1	3	0.120	AMC709622	2602764	AMC709623	2602765
AFNS-3	1	1 1/4	5	2 1/8	1	3	0.190	AMC709630	2602768	AMC709631	2602769
AFNS-3	1	1 1/4	5	2 1/8	1	3	0.250	AMC709634	2602770	AMC709635	2602771
AFNS-3	1	1 1/4	5	2 1/8	1	3	Ball	AMC709638	2602772	AMC709639	2602773
AFNM-3	1	1 1/4	6	3 1/8	1	3	Square	AMC710252	2602856	AMC710253	2602857
AFNM-3	1	1 1/4	6	3 1/8	1	3	0.030	AMC710260	2602858	AMC710261	2602859
AFNM-3	1	1 1/4	6	3 1/8	1	3	0.060	AMC710264	2602860	AMC710265	2602861
AFNM-3	1	1 1/4	6	3 1/8	1	3	0.120	AMC710272	2602864	AMC710273	2602865
AFNM-3	1	1 1/4	6	3 1/8	1	3	0.190	AMC710280	2602868	AMC710281	2602869

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series

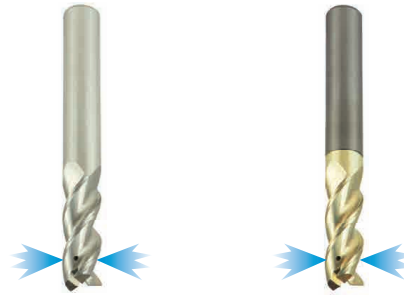
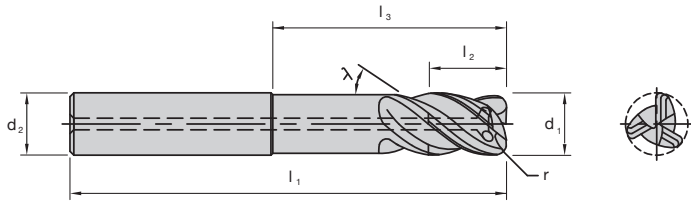
3 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFNM-3	1	1 1/4	6	3 1/8	1	3	0.250	AMC710284	2602870	AMC710285	2602871
AFNM-3	1	1 1/4	6	3 1/8	1	3	Ball	AMC710288	2602872	AMC710289	2602873
AFNL-3	1	1 1/4	7	4 1/8	1	3	Square	AMC710902	2602956	AMC710903	2602957
AFNL-3	1	1 1/4	7	4 1/8	1	3	0.030	AMC710910	2602958	AMC710911	2602959
AFNL-3	1	1 1/4	7	4 1/8	1	3	0.060	AMC710914	2602960	AMC710915	2602961
AFNL-3	1	1 1/4	7	4 1/8	1	3	0.120	AMC710922	2602964	AMC710923	2602965
AFNL-3	1	1 1/4	7	4 1/8	1	3	0.190	AMC710930	2602968	AMC710931	2602969
AFNL-3	1	1 1/4	7	4 1/8	1	3	0.250	AMC710934	2602970	AMC710935	2602971
AFNL-3	1	1 1/4	7	4 1/8	1	3	Ball	AMC710938	2602972	AMC710939	2602973
AFNX-3	1	1 1/4	7	4 5/8	1	3	Square	AMC710952	2602974	AMC710953	2602975
AFNX-3	1	1 1/4	7	4 5/8	1	3	0.030	AMC710960	2602976	AMC710961	2602977

Aluminum Finisher Series

3 Flute Coolant Through

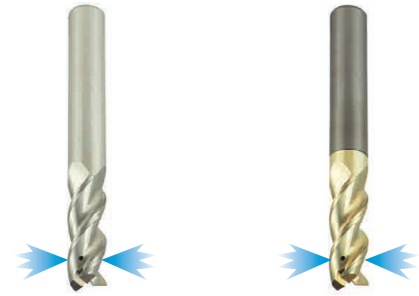
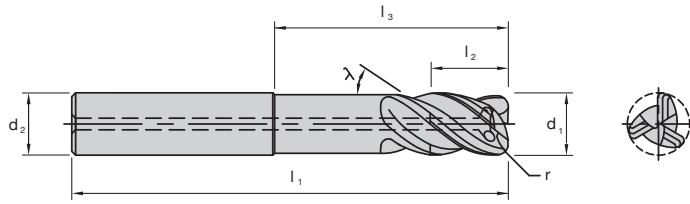


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Series	Cutting Diameter d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shank Diameter d ₂	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFCNS-3	1/4	3/8	4	1 1/2	1/4	3	Square	AMC715102	2603309	AMC715103	2603310
AFCNS-3	1/4	3/8	4	1 1/2	1/4	3	0.015	AMC715106	2828189	AMC715107	2603311
AFCNS-3	1/4	3/8	4	1 1/2	1/4	3	0.030	AMC715110	2603312	AMC715111	2823370
AFCNS-3	1/4	3/8	4	1 1/2	1/4	3	0.060	AMC715114	2603313	AMC715115	2603314
AFCNS-3	1/4	3/8	4	1 1/2	1/4	3	Ball	AMC715138	2603317	AMC715139	2603318
AFCNM-3	1/4	3/8	4	1 3/4	1/4	3	Square	AMC715752	2603407	AMC715753	2603408
AFCNM-3	1/4	3/8	4	1 3/4	1/4	3	0.015	AMC715756	2603409	AMC715757	2603410
AFCNM-3	1/4	3/8	4	1 3/4	1/4	3	0.030	AMC715760	2603411	AMC715761	2603412
AFCNM-3	1/4	3/8	4	1 3/4	1/4	3	0.060	AMC715764	2603413	AMC715765	2603414
AFCNM-3	1/4	3/8	4	1 3/4	1/4	3	Ball	AMC715788	2603417	AMC715789	2603418
AFCNL-3	1/4	3/8	4	2 1/8	1/4	3	Square	AMC716402	2603507	AMC716403	2603508
AFCNL-3	1/4	3/8	4	2 1/8	1/4	3	0.015	AMC716406	2603509	AMC716407	2603510
AFCNL-3	1/4	3/8	4	2 1/8	1/4	3	0.030	AMC716410	2603511	AMC716411	2603512
AFCNL-3	1/4	3/8	4	2 1/8	1/4	3	0.060	AMC716414	2603513	AMC716415	2603514
AFCNL-3	1/4	3/8	4	2 1/8	1/4	3	Ball	AMC716438	2603517	AMC716439	2603518
AFCM-3	3/8	1	3	—	3/8	3	Square	AMC717018	2641930	AMC717019	2641938
AFCM-3	3/8	1	3	—	3/8	3	0.015	AMC717020	2641931	AMC717021	2641939
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	Square	AMC715202	2603319	AMC715203	2603320
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	0.015	AMC715206	2603321	AMC715207	2603322
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	0.030	AMC715210	2603323	AMC715211	2603324
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	0.060	AMC715214	2603325	AMC715215	2603326
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	0.090	AMC715218	2603327	AMC715219	2603328
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	0.120	AMC715222	2603329	AMC715223	2603330
AFCNS-3	3/8	1/2	4	1 3/4	3/8	3	Ball	AMC715238	2603333	AMC715239	2603334
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	Square	AMC715852	2603419	AMC715853	2603420
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	0.015	AMC715856	2603421	AMC715857	2603422
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	0.030	AMC715860	2603423	AMC715861	2603424
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	0.060	AMC715864	2603425	AMC715865	2603426
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	0.090	AMC715868	2603427	AMC715869	2603428
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	0.120	AMC715872	2603429	AMC715873	2603430
AFCNM-3	3/8	1/2	4	2 1/4	3/8	3	Ball	AMC715888	2603433	AMC715889	2603434

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

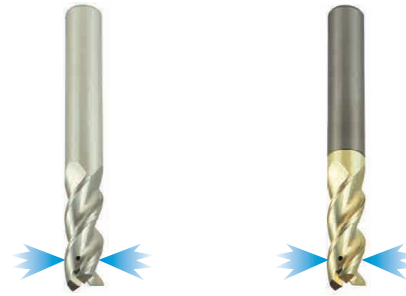
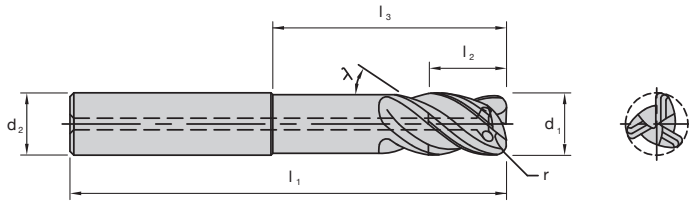
Aluminum Finisher Series 3 Flute Coolant Through



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	Square	AMC716502	2603519	AMC716503	2603520
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	0.015	AMC716506	2603521	AMC716507	2603522
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	0.030	AMC716510	2603523	AMC716511	2603524
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	0.060	AMC716514	2603525	AMC716515	2603526
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	0.090	AMC716518	2603527	AMC716519	2603528
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	0.120	AMC716522	2603529	AMC716523	2603530
AFCNL-3	3/8	1/2	5	2 3/4	3/8	3	Ball	AMC716538	2603533	AMC716539	2603534
AFCM-3	1/2	1 1/4	3	—	1/2	3	Square	AMC717022	2641932	AMC717023	2641940
AFCM-3	1/2	1 1/4	3	—	1/2	3	0.015	AMC717024	2641933	AMC717025	2641941
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	Square	AMC715302	2603335	AMC715303	2603336
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.015	AMC715306	2603337	AMC715307	2603338
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.030	AMC715310	2603339	AMC715311	2603340
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.060	AMC715314	2603341	AMC715315	2603342
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.090	AMC715318	2603343	AMC715319	2603344
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.120	AMC715322	2603345	AMC715323	2603346
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.190	AMC715330	2603349	AMC715331	2603350
AFCNS-3	1/2	5/8	4	2 1/8	1/2	3	Ball	AMC715338	2603351	AMC715339	2603352
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	Square	AMC715952	2603435	AMC715953	2603436
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.015	AMC715956	2603437	AMC715957	2603438
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.030	AMC715960	2603439	AMC715961	2603440
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.060	AMC715964	2603441	AMC715965	2603442
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.090	AMC715968	2603443	AMC715969	2603444
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.120	AMC715972	2603445	AMC715973	2603446
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.190	AMC715980	2603449	AMC715981	2603450
AFCNM-3	1/2	5/8	5	3 1/8	1/2	3	Ball	AMC715988	2603451	AMC715989	2603452
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	Square	AMC716602	2603535	AMC716603	2603536
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.015	AMC716606	2603537	AMC716607	2603538
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.030	AMC716610	2603539	AMC716611	2603540
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.060	AMC716614	2603541	AMC716615	2603542
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.090	AMC716618	2603543	AMC716619	2603544
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.120	AMC716622	2603545	AMC716623	2603546

Aluminum Finisher Series

3 Flute Coolant Through

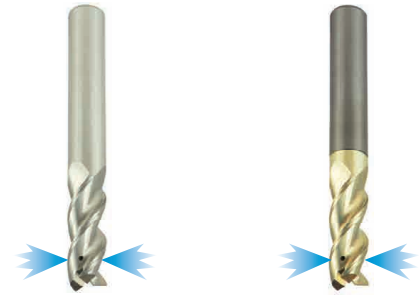
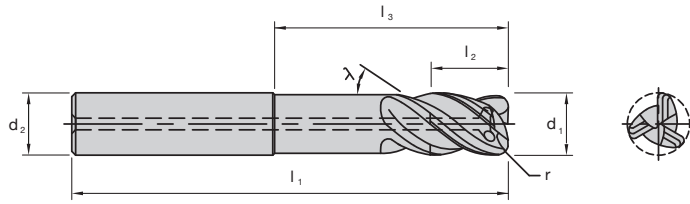


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Series	Cutting Diameter d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shank Diameter d ₂	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.190	AMC716630	2603549	AMC716631	2603550
AFCNL-3	1/2	5/8	6	4 1/8	1/2	3	Ball	AMC716638	2603551	AMC716639	2603552
AFCNS-3	5/8	3/4	4	2 1/8	5/8	3	Square	AMC715402	2603353	AMC715403	2603354
AFCNS-3	5/8	3/4	4	2 1/8	5/8	3	0.030	AMC715410	2603355	AMC715411	2603356
AFCNM-3	5/8	3/4	6	3 1/8	5/8	3	Square	AMC716052	2603453	AMC716053	2603454
AFCNM-3	5/8	3/4	6	3 1/8	5/8	3	0.030	AMC716060	2603455	AMC716061	2603456
AFCNL-3	5/8	3/4	6	4 1/8	5/8	3	Square	AMC713702	2603237	AMC716703	2603554
AFCNL-3	5/8	3/4	6	4 1/8	5/8	3	0.030	AMC716710	2603555	AMC716711	2603556
AFCM-3	3/4	1 5/8	4	—	3/4	3	Square	AMC717026	2641934	AMC717027	2641942
AFCM-3	3/4	1 5/8	4	—	3/4	3	0.030	AMC717028	2641935	AMC717029	2641943
AFCNS-3	3/4	1	4	2 1/8	3/4	3	Square	AMC715502	2603371	AMC715503	2603372
AFCNS-3	3/4	1	4	2 1/8	3/4	3	0.030	AMC715510	2603373	AMC715511	2603374
AFCNS-3	3/4	1	4	2 1/8	3/4	3	0.060	AMC715514	2603375	AMC715515	2603376
AFCNS-3	3/4	1	4	2 1/8	3/4	3	0.090	AMC715518	2603377	AMC715519	2603378
AFCNS-3	3/4	1	4	2 1/8	3/4	3	0.120	AMC715522	2603379	AMC715523	2603380
AFCNS-3	3/4	1	4	2 1/8	3/4	3	0.190	AMC715530	2603383	AMC715531	2603384
AFCNS-3	3/4	1	4	2 1/8	3/4	3	0.250	AMC715534	2603385	AMC715535	2603386
AFCNS-3	3/4	1	4	2 1/8	3/4	3	Ball	AMC715538	2603387	AMC715539	2603388
AFCNM-3	3/4	1	6	3 1/8	3/4	3	Square	AMC716152	2603471	AMC716153	2603472
AFCNM-3	3/4	1	6	3 1/8	3/4	3	0.030	AMC716160	2603473	AMC716161	2603474
AFCNM-3	3/4	1	6	3 1/8	3/4	3	0.060	AMC716164	2603475	AMC716165	2603476
AFCNM-3	3/4	1	6	3 1/8	3/4	3	0.090	AMC716168	2603477	AMC716169	2603478
AFCNM-3	3/4	1	6	3 1/8	3/4	3	0.120	AMC716172	2603479	AMC716173	2603480
AFCNM-3	3/4	1	6	3 1/8	3/4	3	0.190	AMC716180	2603483	AMC716181	2603484
AFCNM-3	3/4	1	6	3 1/8	3/4	3	0.250	AMC716184	2603485	AMC716185	2603486
AFCNM-3	3/4	1	6	3 1/8	3/4	3	Ball	AMC716188	2603487	AMC716189	2603488
AFCNL-3	3/4	1	6	4 1/8	3/4	3	Square	AMC716802	2603571	AMC716803	2603572
AFCNL-3	3/4	1	6	4 1/8	3/4	3	0.030	AMC716810	2603573	AMC716811	2603574
AFCNL-3	3/4	1	6	4 1/8	3/4	3	0.060	AMC716814	2603575	AMC716815	2603576
AFCNL-3	3/4	1	6	4 1/8	3/4	3	0.090	AMC716818	2603577	AMC716819	2603578
AFCNL-3	3/4	1	6	4 1/8	3/4	3	0.120	AMC716822	2603579	AMC716823	2603580

Cutting data recommendations on page 97

■ = First Choice □ = Second Choice

Aluminum Finisher Series 3 Flute Coolant Through



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Uncoated Ident No.	Uncoated SAP No.	ZRN Coated Ident No.	ZRN Coated SAP No.
AFCNL-3	3/4	1	6	4 1/8	3/4	3	0.190	AMC716830	2603583	AMC716831	2603584
AFCNL-3	3/4	1	6	4 1/8	3/4	3	0.250	AMC716834	2603585	AMC716835	2603586
AFCNL-3	3/4	1	6	4 1/8	3/4	3	Ball	AMC716838	2603587	AMC716839	2603588
AFCM-3	1	2 1/2	5	—	1	3	Square	AMC717030	2641936	AMC717031	2641944
AFCM-3	1	2 1/2	5	—	1	3	0.030	AMC717032	2641937	AMC717033	2641945
AFCNS-3	1	1 1/4	5	2 1/8	1	3	Square	AMC715602	2603389	AMC715603	2603390
AFCNS-3	1	1 1/4	5	2 1/8	1	3	0.030	AMC715610	2603391	AMC715611	2603392
AFCNS-3	1	1 1/4	5	2 1/8	1	3	0.060	AMC715614	2603393	AMC715615	2603394
AFCNS-3	1	1 1/4	5	2 1/8	1	3	0.120	AMC715622	2603397	AMC715623	2603398
AFCNS-3	1	1 1/4	5	2 1/8	1	3	0.190	AMC715630	2603401	AMC715631	2603402
AFCNS-3	1	1 1/4	5	2 1/8	1	3	0.250	AMC715634	2603403	AMC715635	2603404
AFCNS-3	1	1 1/4	5	2 1/8	1	3	Ball	AMC715638	2603405	AMC715639	2603406
AFCNM-3	1	1 1/4	6	3 1/8	1	3	Square	AMC716252	2603489	AMC716253	2603490
AFCNM-3	1	1 1/4	6	3 1/8	1	3	0.030	AMC716260	2603491	AMC716261	2603492
AFCNM-3	1	1 1/4	6	3 1/8	1	3	0.060	AMC716264	2603493	AMC716265	2603494
AFCNM-3	1	1 1/4	6	3 1/8	1	3	0.120	AMC716272	2603497	AMC716273	2603498
AFCNM-3	1	1 1/4	6	3 1/8	1	3	0.190	AMC716280	2603501	AMC716281	2603502
AFCNM-3	1	1 1/4	6	3 1/8	1	3	0.250	AMC716284	2603503	AMC716285	2603504
AFCNM-3	1	1 1/4	6	3 1/8	1	3	Ball	AMC716288	2603505	AMC716289	2603506
AFCNL-3	1	1 1/4	7	4 1/8	1	3	Square	AMC716902	2603589	AMC716903	2603590
AFCNL-3	1	1 1/4	7	4 1/8	1	3	0.030	AMC716910	2603591	AMC716911	2603592
AFCNL-3	1	1 1/4	7	4 1/8	1	3	0.060	AMC716914	2603593	AMC716915	2603594
AFCNL-3	1	1 1/4	7	4 1/8	1	3	0.120	AMC716922	2603597	AMC716923	2603598
AFCNL-3	1	1 1/4	7	4 1/8	1	3	0.190	AMC716930	2603601	AMC716931	2603602
AFCNL-3	1	1 1/4	7	4 1/8	1	3	0.250	AMC716934	2603603	AMC716935	2603604
AFCNL-3	1	1 1/4	7	4 1/8	1	3	Ball	AMC716938	2603605	AMC716939	2603606

Aluminum Rougher (AR) Series

LMT Onsrud has a complete line of AR end mills designed to provide exceptional performance and tool life within non-ferrous roughing applications. Available 3 flute configurations, coolant or non-coolant through, these tools provide high material removal rates and are optimized to slot 30% faster than our standard AF Series tooling. The coolant through design directs coolant at the cutting edge, removing chips and heat, even during the deepest pocketing applications.

Features and Benefits

- 3 flute, coolant or non-coolant through designs.
- Achieve high material removal rates.
- Sinusoidal chipbreaker pattern with open flute design.
- Slot 30% faster than standard AF Series tooling.
- Radial coolant holes directs coolant to cutting edge removing heat and chips on deep pocket applications.
- ZRN coated for increased tool life.

Applications

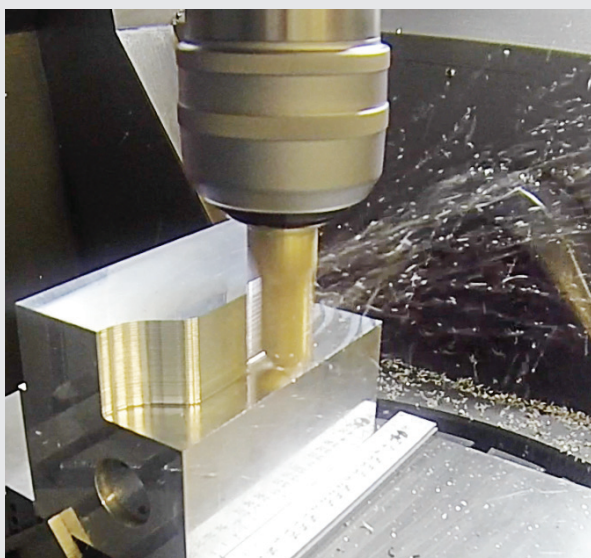
- Slotting
- Pocketing
- Profiling
- High material removal

Usage

- ISO N Non-ferrous
- Aluminum
- Non-ferrous materials



ZRN coating enhances tool life and chip evacuation.



Aluminum Milling: Roughing

Tool:

Aluminum Roughing Tool (Ident No. AMC800129)
Cutting Diameter (d_1) = 3/4" No. of Flutes (z) = 3

Cutting Material: Solid Carbide

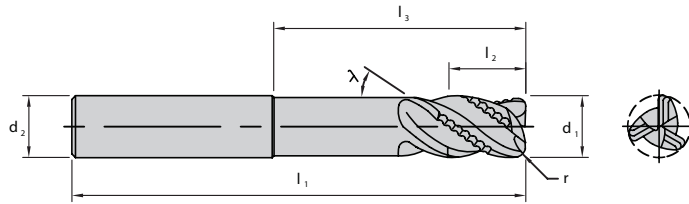
Material: 6061-T6 Aluminum

Cutting Data:

SFM (v_c) = 884
RPM (n) = 4,500
Feed (v_f) = 60 - 100 in/min
Chipload (f_z) = .004 - .007 in
RDoC (a_g) = .016 - .213 in
ADoC (a_p) = 1.2 - 1.3 in

Aluminum Rougher Series

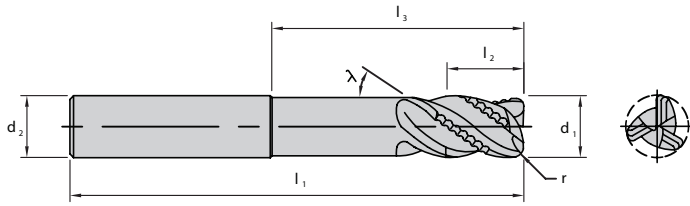
3 Flute



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Series	Cutting Diameter d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shank Diameter d_2	Flutes Z	Corner Radius r	Ident No.	SAP No.
ARS-3	3/8	1/2	3	-	3/8	3	0.030	AMC800103	2609637
ARM-3	3/8	7/8	2 1/2	-	3/8	3	0.030	AMC800393	2647546
ARNS-3	3/8	1/2	4	1 5/8	3/8	3	0.030	AMC800111	2609641
ARS-3	1/2	5/8	3	-	1/2	3	0.030	AMC800105	2609638
ARS-3	1/2	5/8	3	-	1/2	3	0.060	AMC800397	2647547
ARM-3	1/2	1 1/4	3	-	1/2	3	0.030	AMC800399	2647548
ARM-3	1/2	1 1/4	3	-	1/2	3	0.060	AMC800401	2647549
ARNS-3	1/2	5/8	4	2 1/8	1/2	3	0.030	AMC800113	2609642
ARNS-3	1/2	5/8	4	2 1/8	1/2	3	0.060	AMC800115	2609643
ARNM-3	1/2	5/8	5	3 1/8	1/2	3	0.030	AMC800125	2609648
ARNM-3	1/2	5/8	5	3 1/8	1/2	3	0.060	AMC800127	2609649
ARNL-3	1/2	5/8	6	4 1/8	1/2	3	0.030	AMC800135	2609653
ARNL-3	1/2	5/8	6	4 1/8	1/2	3	0.060	AMC800137	2609654
ARS-3	5/8	3/4	3	-	5/8	3	0.030	AMC800407	2647550
ARS-3	5/8	3/4	3	-	5/8	3	0.060	AMC800409	2647551
ARM-3	5/8	1 3/8	3 1/2	-	5/8	3	0.030	AMC800411	2647552
ARM-3	5/8	1 3/8	3 1/2	-	5/8	3	0.060	AMC800413	2647553
ARNS-3	5/8	3/4	4	2 1/8	5/8	3	0.030	AMC800419	2647554
ARNS-3	5/8	3/4	4	2 1/8	5/8	3	0.060	AMC800421	2647555
ARNM-3	5/8	3/4	5	3 1/8	5/8	3	0.030	AMC800423	2647556
ARNM-3	5/8	3/4	5	3 1/8	5/8	3	0.060	AMC800425	2647557
ARNL-3	5/8	3/4	6	4 1/8	5/8	3	0.030	AMC800427	2647558
ARNL-3	5/8	3/4	6	4 1/8	5/8	3	0.060	AMC800429	2647559
ARS-3	3/4	1	4	-	3/4	3	0.030	AMC800217	2641645
ARS-3	3/4	1	4	-	3/4	3	0.060	AMC800107	2609639
ARS-3	3/4	1	3	-	3/4	3	0.120	AMC800431	2647560
ARM-3	3/4	1 3/4	4	-	3/4	3	0.030	AMC800433	2647561
ARM-3	3/4	1 3/4	4	-	3/4	3	0.060	AMC800435	2647562
ARM-3	3/4	1 3/4	4	-	3/4	3	0.120	AMC800437	2647563
ARNS-3	3/4	1	4	2 1/8	3/4	3	0.030	AMC800219	2641646
ARNS-3	3/4	1	4	2 1/8	3/4	3	0.060	AMC800117	2609644

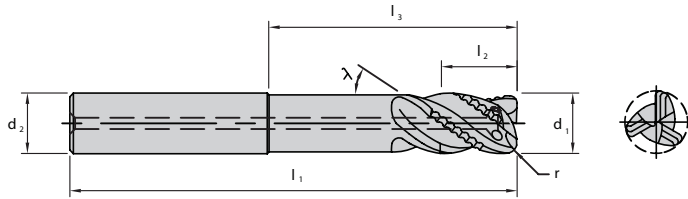
Aluminum Rougher Series

3 Flute



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Series	Cutting Diameter d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shank Diameter d_2	Flutes Z	Corner Radius r	Ident No.	SAP No.
ARNS-3	3/4	1	4	2 1/8	3/4	3	0.120	AMC800119	2609645
ARNM-3	3/4	1	6	3 1/8	3/4	3	0.030	AMC800221	2641647
ARNM-3	3/4	1	6	3 1/8	3/4	3	0.060	AMC800129	2609650
ARNM-3	3/4	1	6	3 1/8	3/4	3	0.120	AMC800131	2609651
ARNL-3	3/4	1	6	4 1/8	3/4	3	0.030	AMC800223	2641648
ARNL-3	3/4	1	6	4 1/8	3/4	3	0.060	AMC800139	2609655
ARNL-3	3/4	1	6	4 1/8	3/4	3	0.120	AMC800141	2609656
ARS-3	1	1 1/4	4	-	1	3	0.030	AMC800225	2641649
ARS-3	1	1 1/4	4	-	1	3	0.060	AMC800109	2609640
ARS-3	1	1 1/4	4	-	1	3	0.120	AMC800445	2647564
ARM-3	1	2 3/8	5	-	1	3	0.030	AMC800447	2647565
ARM-3	1	2 3/8	5	-	1	3	0.060	AMC800449	2647566
ARM-3	1	2 3/8	5	-	1	3	0.120	AMC800451	2647567
ARNS-3	1	1 1/4	5	2 1/8	1	3	0.030	AMC800227	2641650
ARNS-3	1	1 1/4	5	2 1/8	1	3	0.060	AMC800121	2609646
ARNS-3	1	1 1/4	5	2 1/8	1	3	0.120	AMC800123	2609647
ARNM-3	1	1 1/4	6	3 1/8	1	3	0.030	AMC800229	2641651
ARNM-3	1	1 1/4	6	3 1/8	1	3	0.060	AMC800459	2647568
ARNM-3	1	1 1/4	6	3 1/8	1	3	0.120	AMC800133	2609652
ARNL-3	1	1 1/4	7	4 1/8	1	3	0.030	AMC800231	2641652
ARNL-3	1	1 1/4	7	4 1/8	1	3	0.060	AMC800461	2647569
ARNL-3	1	1 1/4	7	4 1/8	1	3	0.120	AMC800143	2609657

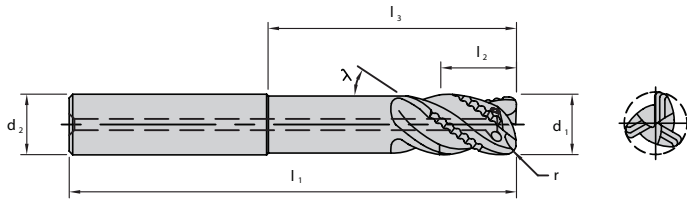
Aluminum Rougher Series 3 Flute Coolant Through



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
ARCS-3	3/8	1/2	3	-	3/8	3	0.030	AMC800145	2609658
ARCM-3	3/8	7/8	2 1/2	-	3/8	3	0.030	AMC800463	2647570
ARCNS-3	3/8	1/2	4	1 5/8	3/8	3	0.030	AMC800467	2647571
ARCS-3	1/2	5/8	3	-	1/2	3	0.030	AMC800147	2609659
ARCS-3	1/2	5/8	3	-	1/2	3	0.060	AMC800469	2647572
ARCM-3	1/2	1 1/4	3	-	1/2	3	0.030	AMC800471	2647573
ARCM-3	1/2	1 1/4	3	-	1/2	3	0.060	AMC800473	2647574
ARCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.030	AMC800153	2609662
ARCNS-3	1/2	5/8	4	2 1/8	1/2	3	0.060	AMC800155	2609663
ARCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.030	AMC800165	2609668
ARCNM-3	1/2	5/8	5	3 1/8	1/2	3	0.060	AMC800167	2609669
ARCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.030	AMC800175	2607755
ARCNL-3	1/2	5/8	6	4 1/8	1/2	3	0.060	AMC800177	2607756
ARCS-3	5/8	3/4	3	-	5/8	3	0.030	AMC800479	2647575
ARCS-3	5/8	3/4	3	-	5/8	3	0.060	AMC800481	2647576
ARCM-3	5/8	1 3/8	3 1/2	-	5/8	3	0.030	AMC800483	2647577
ARCM-3	5/8	1 3/8	3 1/2	-	5/8	3	0.060	AMC800485	2647578
ARCNS-3	5/8	3/4	4	2 1/8	5/8	3	0.030	AMC800491	2647579
ARCNS-3	5/8	3/4	4	2 1/8	5/8	3	0.060	AMC800493	2647580
ARCNM-3	5/8	3/4	5	3 1/8	5/8	3	0.030	AMC800495	2647581
ARCNM-3	5/8	3/4	5	3 1/8	5/8	3	0.060	AMC800497	2647582
ARCNL-3	5/8	3/4	6	4 1/8	5/8	3	0.030	AMC800499	2647583
ARCNL-3	5/8	3/4	6	4 1/8	5/8	3	0.060	AMC800501	2647584
ARCS-3	3/4	1	4	-	3/4	3	0.030	AMC800233	2641653
ARCS-3	3/4	1	4	-	3/4	3	0.060	AMC800149	2609660
ARCS-3	3/4	1	4	-	3/4	3	0.120	AMC800503	2647585
ARCM-3	3/4	1 3/4	4	-	3/4	3	0.030	AMC800505	2647586
ARCM-3	3/4	1 3/4	4	-	3/4	3	0.060	AMC800507	2647587

Aluminum Rougher Series

3 Flute Coolant Through



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Series	Cutting Diameter d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
ARCM-3	3/4	1 3/4	4	-	3/4	3	0.120	AMC800509	2647588
ARCNS-3	3/4	1	4	2 1/8	3/4	3	0.030	AMC800235	2641654
ARCNS-3	3/4	1	4	2 1/8	3/4	3	0.060	AMC800157	2609664
ARCNS-3	3/4	1	4	2 1/8	3/4	3	0.120	AMC800159	2609665
ARCNM-3	3/4	1	6	3 1/8	3/4	3	0.030	AMC800237	2641655
ARCNM-3	3/4	1	6	3 1/8	3/4	3	0.060	AMC800169	2607752
ARCNM-3	3/4	1	6	3 1/8	3/4	3	0.120	AMC800171	2607753
ARCNL-3	3/4	1	6	4 1/8	3/4	3	0.030	AMC800239	2641656
ARCNL-3	3/4	1	6	4 1/8	3/4	3	0.060	AMC800179	2607757
ARCNL-3	3/4	1	6	4 1/8	3/4	3	0.120	AMC800181	2607758
ARCS-3	1	1 1/4	4	-	1	3	0.030	AMC800241	2641657
ARCS-3	1	1 1/4	4	-	1	3	0.060	AMC800151	2609661
ARCS-3	1	1 1/4	4	-	1	3	0.120	AMC800517	2647589
ARCM-3	1	2 3/8	5	-	1	3	0.030	AMC800519	2647590
ARCM-3	1	2 3/8	5	-	1	3	0.060	AMC800521	2647591
ARCM-3	1	2 3/8	5	-	1	3	0.120	AMC800523	2647592
ARCNS-3	1	1 1/4	5	2 1/8	1	3	0.030	AMC800243	2641658
ARCNS-3	1	1 1/4	5	2 1/8	1	3	0.060	AMC800161	2609666
ARCNS-3	1	1 1/4	5	2 1/8	1	3	0.120	AMC800163	2609667
ARCNM-3	1	1 1/4	6	3 1/8	1	3	0.030	AMC800245	2641659
ARCNM-3	1	1 1/4	6	3 1/8	1	3	0.060	AMC800531	2647593
ARCNM-3	1	1 1/4	6	3 1/8	1	3	0.120	AMC800173	2607754
ARCNL-3	1	1 1/4	7	4 1/8	1	3	0.030	AMC800247	2641660
ARCNL-3	1	1 1/4	7	4 1/8	1	3	0.060	AMC800533	2647594
ARCNL-3	1	1 1/4	7	4 1/8	1	3	0.120	AMC800183	2607759

NEW Max Velocity (MXV) Series

The Max Velocity (MXV) Series takes milling to the next level as LMT Onsrud's next generation universal endmill. The MXV covers the largest range of milling applications from slotting to heavy profiling to finishing in a broad range of workpiece materials.

Features and Benefits

- Unique NanoMax coating for maximum heat resistance and longer tool life
- Optimized geometry for maximum material removal rates in a broad range of applications
- 4 & 5 flute offering to be utilized in a large range of workpiece materials
- Chipbreakers as standard in long lengths of cut
- Large selection of corner radii

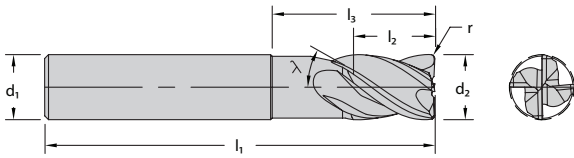
Applications

- Slotting
- Heavy Profiling
- HEM Profiling
- Semi-Finishing
- Finishing

Usage

- Steel
- Stainless Steel
- High-temp alloys
- Cast Iron

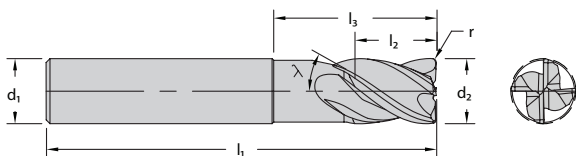




								4-Flute		4-Flute Weldon		4-Flute Chipbreaker	
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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVS-4	1/8	1/4	2	-	1/8	4	Square	MXV2650000	2660755	MXV2650000W	2660993	-	-
MXVS-4	1/8	1/4	2	-	1/8	4	0.015	MXV2650001	2660756	MXV2650001W	2660994	-	-
MXVM-4	1/8	1/2	2	-	1/8	4	Square	MXV2650002	2660757	MXV2650002W	2660995	-	-
MXVM-4	1/8	1/2	2	-	1/8	4	0.015	MXV2650003	2660758	MXV2650003W	2660996	-	-
MXVS-4	3/16	5/16	2	-	3/16	4	Square	MXV2650004	2660759	MXV2650004W	2660997	-	-
MXVS-4	3/16	5/16	2	-	3/16	4	0.015	MXV2650005	2660760	MXV2650005W	2660998	-	-
MXVM-4	3/16	9/16	2 1/2	-	3/16	4	Square	MXV2650006	2660761	MXV2650006W	2660999	-	-
MXVM-4	3/16	9/16	2 1/2	-	3/16	4	0.015	MXV2650007	2660762	MXV2650007W	2661000	-	-
MXVS-4	1/4	3/8	2 1/2	-	1/4	4	Square	MXV2650008	2660763	MXV2650008W	2661001	-	-
MXVS-4	1/4	3/8	2 1/2	-	1/4	4	0.015	MXV2650009	2660764	MXV2650009W	2661002	-	-
MXVS-4	1/4	3/8	2 1/2	-	1/4	4	0.030	MXV2650010	2660765	MXV2650010W	2661003	-	-
MXVM-4	1/4	3/4	2 1/2	-	1/4	4	Square	MXV2650011	2660766	MXV2650011W	2661004	MXV2650710	2661231
MXVM-4	1/4	3/4	2 1/2	-	1/4	4	0.015	MXV2650012	2660767	MXV2650012W	2661005	MXV2650711	2661232
MXVM-4	1/4	3/4	2 1/2	-	1/4	4	0.030	MXV2650013	2660768	MXV2650013W	2661006	-	-
MXVNS-4	1/4	3/8	3	1 1/8	1/4	4	0.015	MXV2650014	2660769	MXV2650014W	2661007	-	-
MXVNS-4	1/4	3/8	3	1 1/8	1/4	4	0.030	MXV2650015	2660770	MXV2650015W	2661008	-	-
MXVS-4	5/16	7/16	2	-	5/16	4	Square	MXV2650016	2660771	MXV2650016W	2661009	-	-
MXVS-4	5/16	7/16	2	-	5/16	4	0.015	MXV2650017	2660772	MXV2650017W	2661010	-	-
MXVM-4	5/16	1	3	-	5/16	4	Square	MXV2650018	2660773	MXV2650018W	2661011	MXV2650712	2661233
MXVM-4	5/16	1	3	-	5/16	4	0.015	MXV2650019	2660774	MXV2650019W	2661012	MXV2650713	2661234
MXVS-4	3/8	1/2	2 1/2	-	3/8	4	Square	MXV2650020	2660775	MXV2650020W	2661013	-	-
MXVS-4	3/8	1/2	2 1/2	-	3/8	4	0.015	MXV2650021	2660776	MXV2650021W	2661014	-	-
MXVS-4	3/8	1/2	2 1/2	-	3/8	4	0.030	MXV2650022	2660777	MXV2650022W	2661015	-	-
MXVS-4	3/8	1/2	2 1/2	-	3/8	4	0.060	MXV2650104	2660778	MXV2650104W	2661016	-	-
MXVS-4	3/8	1/2	2 1/2	-	3/8	4	0.090	MXV2650105	2660779	MXV2650105W	2661017	-	-
MXVS-4	3/8	1/2	2 1/2	-	3/8	4	0.120	MXV2650106	2660780	MXV2650106W	2661018	-	-
MXVM-4	3/8	1 1/8	3	-	3/8	4	Square	MXV2650023	2660781	MXV2650023W	2661019	MXV2650714	2661235
MXVM-4	3/8	1 1/8	3	-	3/8	4	0.015	MXV2650024	2660782	MXV2650024W	2661020	MXV2650715	2661236
MXVM-4	3/8	1 1/8	3	-	3/8	4	0.030	MXV2650025	2660783	MXV2650025W	2661021	-	-
MXVM-4	3/8	1 1/8	3	-	3/8	4	0.060	MXV2650107	2660784	MXV2650107W	2661022	-	-
MXVM-4	3/8	1 1/8	3	-	3/8	4	0.090	MXV2650108	2660785	MXV2650108W	2661023	-	-

Cutting data recommendations on pages 100-101

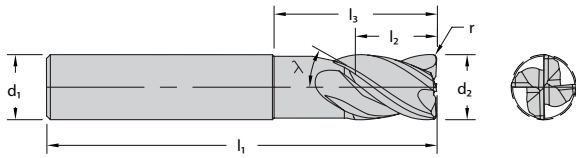
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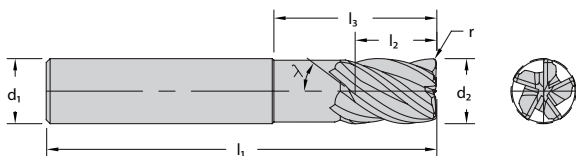
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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVM-4	3/8	1 1/8	3	-	3/8	4	0.120	MXV2650109	2660786	MXV2650109W	2661024	-	-
MXVNS-4	3/8	1/2	3 1/2	1 5/8	3/8	4	Square	MXV2650110	2660787	MXV2650110W	2661025	-	-
MXVNS-4	3/8	1/2	3 1/2	1 5/8	3/8	4	0.015	MXV2650026	2660788	MXV2650026W	2661026	-	-
MXVNS-4	3/8	1/2	3 1/2	1 5/8	3/8	4	0.030	MXV2650027	2660789	MXV2650027W	2661027	-	-
MXVNS-4	3/8	1/2	3 1/2	1 5/8	3/8	4	0.060	MXV2650111	2660790	MXV2650111W	2661028	-	-
MXVNS-4	3/8	1/2	3 1/2	1 5/8	3/8	4	0.090	MXV2650112	2660791	MXV2650112W	2661029	-	-
MXVNS-4	3/8	1/2	3 1/2	1 5/8	3/8	4	0.120	MXV2650113	2660792	MXV2650113W	2661030	-	-
MXVS-4	1/2	5/8	2 1/2	-	1/2	4	Square	MXV2650028	2660793	MXV2650028W	2661031	-	-
MXVS-4	1/2	5/8	2 1/2	-	1/2	4	0.015	MXV2650029	2660794	MXV2650029W	2661032	-	-
MXVS-4	1/2	5/8	2 1/2	-	1/2	4	0.030	MXV2650030	2660795	MXV2650030W	2661033	-	-
MXVS-4	1/2	5/8	2 1/2	-	1/2	4	0.060	MXV2650114	2660796	MXV2650114W	2661034	-	-
MXVS-4	1/2	5/8	2 1/2	-	1/2	4	0.120	MXV2650116	2660797	MXV2650116W	2661035	-	-
MXVM-4	1/2	1 1/4	3	-	1/2	4	Square	MXV2650034	2660798	MXV2650034W	2661036	MXV2650716	2661237
MXVM-4	1/2	1 1/4	3	-	1/2	4	0.015	MXV2650035	2660799	MXV2650035W	2661037	MXV2650717	2661238
MXVM-4	1/2	1 1/4	3	-	1/2	4	0.030	MXV2650036	2660800	MXV2650036W	2661038	MXV2650718	2661239
MXVM-4	1/2	1 1/4	3	-	1/2	4	0.060	MXV2650122	2660801	MXV2650122W	2661039	-	-
MXVM-4	1/2	1 1/4	3	-	1/2	4	0.120	MXV2650124	2660802	MXV2650124W	2661040	-	-
MXVL-4	1/2	1 5/8	4	-	1/2	4	Square	MXV2650627	2660803	MXV2650627W	2661041	MXV2650719	2661240
MXVL-4	1/2	1 5/8	4	-	1/2	4	0.015	MXV2650628	2660804	MXV2650628W	2661042	MXV2650720	2661241
MXVL-4	1/2	1 5/8	4	-	1/2	4	0.030	MXV2650629	2660805	MXV2650629W	2661043	MXV2650721	2661242
MXVL-4	1/2	1 5/8	4	-	1/2	4	0.060	MXV2650630	2660806	MXV2650630W	2661044	MXV2650722	2661243
MXVNS-4	1/2	5/8	4	1 3/4	1/2	4	Square	MXV2650040	2660807	MXV2650040W	2661045	-	-
MXVNS-4	1/2	5/8	4	1 3/4	1/2	4	0.030	MXV2650041	2660808	MXV2650041W	2661046	-	-
MXVNS-4	1/2	5/8	4	1 3/4	1/2	4	0.060	MXV2650042	2660809	MXV2650042W	2661047	-	-
MXVNS-4	1/2	5/8	4	1 3/4	1/2	4	0.120	MXV2650131	2660810	MXV2650131W	2661048	-	-
MXVS-4	5/8	3/4	3	-	5/8	4	Square	MXV2650046	2660811	MXV2650046W	2661049	-	-
MXVS-4	5/8	3/4	3	-	5/8	4	0.030	MXV2650047	2660812	MXV2650047W	2661050	-	-
MXVS-4	5/8	3/4	3	-	5/8	4	0.060	MXV2650136	2660813	MXV2650136W	2661051	-	-
MXVS-4	5/8	3/4	3	-	5/8	4	0.120	MXV2650137	2660814	MXV2650137W	2661052	-	-
MXVS-4	5/8	3/4	3	-	5/8	4	0.190	MXV2650138	2660815	MXV2650138W	2661053	-	-
MXVM-4	5/8	1 3/8	3 1/2	-	5/8	4	Square	MXV2650048	2660816	MXV2650048W	2661054	MXV2650723	2661244

Cutting data recommendations on pages 100-101

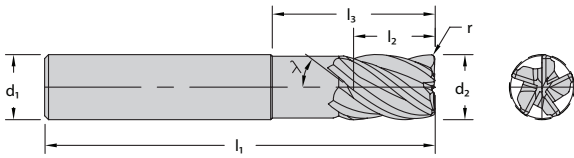
■ = First Choice □ = Second Choice



								4-Flute		4-Flute Weldon		4-Flute Chipbreaker	
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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVM-4	5/8	1 3/8	3 1/2	-	5/8	4	0.030	MXV2650049	2660817	MXV2650049W	2661055	MXV2650724	2661245
MXVM-4	5/8	1 3/8	3 1/2	-	5/8	4	0.060	MXV2650140	2660818	MXV2650140W	2661056	-	-
MXVM-4	5/8	1 3/8	3 1/2	-	5/8	4	0.120	MXV2650141	2660819	MXV2650141W	2661057	-	-
MXVM-4	5/8	1 3/8	3 1/2	-	5/8	4	0.190	MXV2650142	2660820	MXV2650142W	2661058	-	-
MXVS-4	3/4	1 1/8	3	-	3/4	4	Square	MXV2650050	2660821	MXV2650050W	2661059	-	-
MXVS-4	3/4	1 1/8	3	-	3/4	4	0.030	MXV2650051	2660822	MXV2650051W	2661060	-	-
MXVS-4	3/4	1 1/8	3	-	3/4	4	0.060	MXV2650052	2660823	MXV2650052W	2661061	-	-
MXVS-4	3/4	1 1/8	3	-	3/4	4	0.120	MXV2650053	2660824	MXV2650053W	2661062	-	-
MXVM-4	3/4	1 5/8	4	-	3/4	4	Square	MXV2650059	2660825	MXV2650059W	2661063	MXV2650725	2661246
MXVM-4	3/4	1 5/8	4	-	3/4	4	0.030	MXV2650060	2660826	MXV2650060W	2661064	MXV2650726	2661247
MXVM-4	3/4	1 5/8	4	-	3/4	4	0.060	MXV2650061	2660827	MXV2650061W	2661065	-	-
MXVM-4	3/4	1 5/8	4	-	3/4	4	0.120	MXV2650062	2660828	MXV2650062W	2661066	-	-
MXVL-4	3/4	2 1/4	5	-	3/4	4	Square	MXV2650100	2660829	MXV2650100W	2661067	MXV2650727	2661248
MXVL-4	3/4	2 1/4	5	-	3/4	4	0.030	MXV2650101	2660830	MXV2650101W	2661068	MXV2650728	2661249
MXVL-4	3/4	2 1/4	5	-	3/4	4	0.060	MXV2650162	2660831	MXV2650162W	2661069	-	-
MXVL-4	3/4	2 1/4	5	-	3/4	4	0.120	MXV2650164	2660832	MXV2650164W	2661070	-	-
MXVNS-4	3/4	1 1/8	5	2 3/8	3/4	4	Square	MXV2650172	2660833	MXV2650172W	2661071	-	-
MXVNS-4	3/4	1 1/8	5	2 3/8	3/4	4	0.030	MXV2650067	2660834	MXV2650067W	2661072	-	-
MXVNS-4	3/4	1 1/8	5	2 3/8	3/4	4	0.060	MXV2650068	2660835	MXV2650068W	2661073	-	-
MXVNS-4	3/4	1 1/8	5	2 3/8	3/4	4	0.120	MXV2650069	2660836	MXV2650069W	2661074	-	-
MXVNM-4	3/4	1 1/8	6	3 1/8	3/4	4	Square	MXV2650180	2660837	MXV2650180W	2661075	-	-
MXVNM-4	3/4	1 1/8	6	3 1/8	3/4	4	0.030	MXV2650073	2660838	MXV2650073W	2661076	-	-
MXVNM-4	3/4	1 1/8	6	3 1/8	3/4	4	0.060	MXV2650074	2660839	MXV2650074W	2661077	-	-
MXVNM-4	3/4	1 1/8	6	3 1/8	3/4	4	0.120	MXV2650075	2660840	MXV2650075W	2661078	-	-
MXVS-4	1	1 1/4	4	-	1	4	0.030	MXV2650079	2660841	MXV2650079W	2661079	-	-
MXVS-4	1	1 1/4	4	-	1	4	0.060	MXV2650189	2660842	MXV2650189W	2661080	-	-
MXVM-4	1	2	5	-	1	4	0.030	MXV2650086	2660843	MXV2650086W	2661081	MXV2650729	2661250
MXVM-4	1	2	5	-	1	4	0.060	MXV2650203	2660844	MXV2650203W	2661082	MXV2650730	2661251



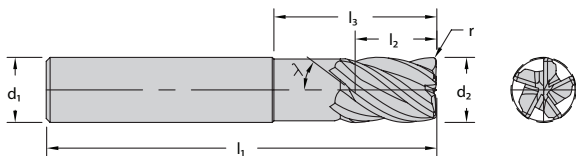
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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVS-5	1/4	3/8	2 1/2	-	1/4	5	Square	MXV2650700	2660845	MXV2650700W	2661083	-	-
MXVS-5	1/4	3/8	2 1/2	-	1/4	5	0.015	MXV2650701	2660846	MXV2650701W	2661084	-	-
MXVS-5	1/4	3/8	2 1/2	-	1/4	5	0.030	MXV2650702	2660847	MXV2650702W	2661085	-	-
MXVM-5	1/4	3/4	2 1/2	-	1/4	5	Square	MXV2650703	2660848	MXV2650703W	2661086	MXV2650731	2661252
MXVM-5	1/4	3/4	2 1/2	-	1/4	5	0.015	MXV2650704	2660849	MXV2650704W	2661087	MXV2650732	2661253
MXVM-5	1/4	3/4	2 1/2	-	1/4	5	0.030	MXV2650705	2660850	MXV2650705W	2661088	-	-
MXVNS-5	1/4	3/8	3	1 1/8	1/4	5	0.015	MXV2650706	2660851	MXV2650706W	2661089	-	-
MXVNS-5	1/4	3/8	3	1 1/8	1/4	5	0.030	MXV2650707	2660852	MXV2650707W	2661090	-	-
MXVM-5	3/8	7/8	2 1/2	-	3/8	5	Square	MXV2650573	2660853	MXV2650573W	2661091	MXV2650733	2661254
MXVM-5	3/8	7/8	2 1/2	-	3/8	5	0.015	MXV2650574	2660854	MXV2650574W	2661092	MXV2650734	2661255
MXVM-5	3/8	7/8	2 1/2	-	3/8	5	0.030	MXV2650575	2660855	MXV2650575W	2661093	-	-
MXVM-5	3/8	7/8	2 1/2	-	3/8	5	0.060	MXV2650576	2660856	MXV2650576W	2661094	-	-
MXVM-5	3/8	7/8	2 1/2	-	3/8	5	0.090	MXV2650577	2660857	MXV2650577W	2661095	-	-
MXVM-5	3/8	7/8	2 1/2	-	3/8	5	0.120	MXV2650578	2660858	MXV2650578W	2661096	-	-
MXVL-5	3/8	1 1/4	3	-	3/8	5	Square	MXV2650579	2660859	MXV2650579W	2661097	MXV2650735	2661256
MXVL-5	3/8	1 1/4	3	-	3/8	5	0.015	MXV2650580	2660860	MXV2650580W	2661098	MXV2650736	2661257
MXVL-5	3/8	1 1/4	3	-	3/8	5	0.030	MXV2650581	2660861	MXV2650581W	2661099	-	-
MXVL-5	3/8	1 1/4	3	-	3/8	5	0.060	MXV2650582	2660862	MXV2650582W	2661100	-	-
MXVL-5	3/8	1 1/4	3	-	3/8	5	0.090	MXV2650583	2660863	MXV2650583W	2661101	-	-
MXVL-5	3/8	1 1/4	3	-	3/8	5	0.120	MXV2650584	2660864	MXV2650584W	2661102	-	-
MXVNS-5	3/8	1/2	3 1/2	1 5/8	3/8	5	Square	MXV2650585	2660865	MXV2650585W	2661103	-	-
MXVNS-5	3/8	1/2	3 1/2	1 5/8	3/8	5	0.015	MXV2650586	2660866	MXV2650586W	2661104	-	-
MXVNS-5	3/8	1/2	3 1/2	1 5/8	3/8	5	0.030	MXV2650587	2660867	MXV2650587W	2661105	-	-
MXVNS-5	3/8	1/2	3 1/2	1 5/8	3/8	5	0.060	MXV2650588	2660868	MXV2650588W	2661106	-	-
MXVNS-5	3/8	1/2	3 1/2	1 5/8	3/8	5	0.090	MXV2650589	2660869	MXV2650589W	2661107	-	-
MXVNS-5	3/8	1/2	3 1/2	1 5/8	3/8	5	0.120	MXV2650590	2660870	MXV2650590W	2661108	-	-
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	Square	MXV2650031	2660871	MXV2650031W	2661109	-	-
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	0.015	MXV2650032	2660872	MXV2650032W	2661110	-	-
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	0.030	MXV2650033	2660873	MXV2650033W	2661111	-	-
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	0.060	MXV2650118	2660874	MXV2650118W	2661112	-	-



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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	0.090	MXV2650119	2660875	MXV2650119W	2661113	-	-
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	0.120	MXV2650120	2660876	MXV2650120W	2661114	-	-
MXVS-5	1/2	5/8	2 1/2	-	1/2	5	0.190	MXV2650121	2660877	MXV2650121W	2661115	-	-
MXVM-5	1/2	1 1/4	3	-	1/2	5	Square	MXV2650037	2660878	MXV2650037W	2661116	MXV2650737	2661258
MXVM-5	1/2	1 1/4	3	-	1/2	5	0.015	MXV2650038	2660879	MXV2650038W	2661117	MXV2650738	2661259
MXVM-5	1/2	1 1/4	3	-	1/2	5	0.030	MXV2650039	2660880	MXV2650039W	2661118	MXV2650739	2661260
MXVM-5	1/2	1 1/4	3	-	1/2	5	0.060	MXV2650126	2660881	MXV2650126W	2661119	-	-
MXVM-5	1/2	1 1/4	3	-	1/2	5	0.090	MXV2650127	2660882	MXV2650127W	2661120	-	-
MXVM-5	1/2	1 1/4	3	-	1/2	5	0.120	MXV2650128	2660883	MXV2650128W	2661121	-	-
MXVM-5	1/2	1 1/4	3	-	1/2	5	0.190	MXV2650129	2660884	MXV2650129W	2661122	-	-
MXVL-5	1/2	1 5/8	4	-	1/2	5	Square	MXV2650591	2660885	MXV2650591W	2661123	MXV2650740	2661261
MXVL-5	1/2	1 5/8	4	-	1/2	5	0.015	MXV2650592	2660886	MXV2650592W	2661124	MXV2650741	2661262
MXVL-5	1/2	1 5/8	4	-	1/2	5	0.030	MXV2650593	2660887	MXV2650593W	2661125	-	-
MXVL-5	1/2	1 5/8	4	-	1/2	5	0.060	MXV2650594	2660888	MXV2650594W	2661126	-	-
MXVXL-5	1/2	2 1/8	4	-	1/2	5	Square	MXV2650596	2660889	MXV2650596W	2661127	MXV2650742	2661263
MXVXL-5	1/2	2 1/8	4	-	1/2	5	0.015	MXV2650597	2660890	MXV2650597W	2661128	MXV2650743	2661264
MXVXL-5	1/2	2 1/8	4	-	1/2	5	0.030	MXV2650598	2660891	MXV2650598W	2661129	-	-
MXVXL-5	1/2	2 1/8	4	-	1/2	5	0.060	MXV2650599	2660892	MXV2650599W	2661130	-	-
MXVNS-5	1/2	5/8	4	1 3/4	1/2	5	Square	MXV2650043	2660893	MXV2650043W	2661131	-	-
MXVNS-5	1/2	5/8	4	1 3/4	1/2	5	0.030	MXV2650044	2660894	MXV2650044W	2661132	-	-
MXVNS-5	1/2	5/8	4	1 3/4	1/2	5	0.060	MXV2650045	2660895	MXV2650045W	2661133	-	-
MXVNS-5	1/2	5/8	4	1 3/4	1/2	5	0.090	MXV2650133	2660896	MXV2650133W	2661134	-	-
MXVNS-5	1/2	5/8	4	1 3/4	1/2	5	0.120	MXV2650134	2660897	MXV2650134W	2661135	-	-
MXVNS-5	1/2	5/8	4	1 3/4	1/2	5	0.190	MXV2650135	2660898	MXV2650135W	2661136	-	-
MXVS-5	5/8	3/4	3	-	5/8	5	Square	MXV2650601	2660899	MXV2650601W	2661137	-	-
MXVS-5	5/8	3/4	3	-	5/8	5	0.030	MXV2650602	2660900	MXV2650602W	2661138	-	-
MXVS-5	5/8	3/4	3	-	5/8	5	0.060	MXV2650603	2660901	MXV2650603W	2661139	-	-
MXVS-5	5/8	3/4	3	-	5/8	5	0.090	MXV2650604	2660902	MXV2650604W	2661140	-	-
MXVS-5	5/8	3/4	3	-	5/8	5	0.120	MXV2650605	2660903	MXV2650605W	2661141	-	-
MXVM-5	5/8	1 3/8	3 1/2	-	5/8	5	Square	MXV2650607	2660904	MXV2650607W	2661142	MXV2650744	2661265
MXVM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.030	MXV2650608	2660905	MXV2650608W	2661143	MXV2650745	2661266

Cutting data recommendations on pages 102-103

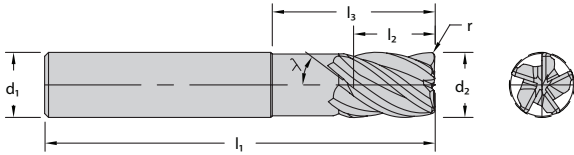
■ = First Choice □ = Second Choice



								5-Flute		5-Flute Weldon		5-Flute Chipbreaker	
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H													
Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.060	MXV2650609	2660906	MXV2650609W	2661144	-	-
MXVM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.090	MXV2650610	2660907	MXV2650610W	2661145	-	-
MXVM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.120	MXV2650611	2660908	MXV2650611W	2661146	-	-
MXVL-5	5/8	1 5/8	3 1/2	-	5/8	5	Square	MXV2650613	2660909	MXV2650613W	2661147	MXV2650746	2661267
MXVL-5	5/8	1 5/8	3 1/2	-	5/8	5	0.030	MXV2650614	2660910	MXV2650614W	2661148	MXV2650747	2661268
MXVL-5	5/8	1 5/8	3 1/2	-	5/8	5	0.060	MXV2650615	2660911	MXV2650615W	2661149	-	-
MXVL-5	5/8	2 1/4	4	-	5/8	5	Square	MXV2650616	2660912	MXV2650616W	2661150	MXV2650748	2661269
MXVL-5	5/8	2 1/4	4	-	5/8	5	0.030	MXV2650617	2660913	MXV2650617W	2661151	MXV2650749	2661270
MXVL-5	5/8	2 1/4	4	-	5/8	5	0.060	MXV2650618	2660914	MXV2650618W	2661152	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	Square	MXV2650054	2660915	MXV2650054W	2661153	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	0.030	MXV2650055	2660916	MXV2650055W	2661154	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	0.060	MXV2650056	2660917	MXV2650056W	2661155	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	0.090	MXV2650147	2660918	MXV2650147W	2661156	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	0.120	MXV2650057	2660919	MXV2650057W	2661157	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	0.190	MXV2650148	2660920	MXV2650148W	2661158	-	-
MXVS-5	3/4	1 1/8	3	-	3/4	5	0.250	MXV2650149	2660921	MXV2650149W	2661159	-	-
MXVM-5	3/4	1 1/2	4	-	3/4	5	Square	MXV2650150	2660922	MXV2650150W	2661160	MXV2650750	2661271
MXVM-5	3/4	1 1/2	4	-	3/4	5	0.030	MXV2650151	2660923	MXV2650151W	2661161	MXV2650751	2661272
MXVM-5	3/4	1 1/2	4	-	3/4	5	0.060	MXV2650152	2660924	MXV2650152W	2661162	-	-
MXVM-5	3/4	1 1/2	4	-	3/4	5	0.090	MXV2650153	2660925	MXV2650153W	2661163	-	-
MXVM-5	3/4	1 1/2	4	-	3/4	5	0.120	MXV2650058	2660926	MXV2650058W	2661164	-	-
MXVM-5	3/4	1 1/2	4	-	3/4	5	0.190	MXV2650154	2660927	MXV2650154W	2661165	-	-
MXVM-5	3/4	1 1/2	4	-	3/4	5	0.250	MXV2650155	2660928	MXV2650155W	2661166	-	-
MXVM-5	3/4	1 5/8	4	-	3/4	5	Square	MXV2650063	2660929	MXV2650063W	2661167	MXV2650752	2661273
MXVM-5	3/4	1 5/8	4	-	3/4	5	0.030	MXV2650064	2660930	MXV2650064W	2661168	MXV2650753	2661274
MXVM-5	3/4	1 5/8	4	-	3/4	5	0.060	MXV2650065	2660931	MXV2650065W	2661169	-	-
MXVM-5	3/4	1 5/8	4	-	3/4	5	0.090	MXV2650159	2660932	MXV2650159W	2661170	-	-
MXVM-5	3/4	1 5/8	4	-	3/4	5	0.120	MXV2650066	2660933	MXV2650066W	2661171	-	-
MXVM-5	3/4	1 5/8	4	-	3/4	5	0.190	MXV2650160	2660934	MXV2650160W	2661172	-	-
MXVM-5	3/4	1 5/8	4	-	3/4	5	0.250	MXV2650161	2660935	MXV2650161W	2661173	-	-
MXVM-5	3/4	2 1/4	5	-	3/4	5	Square	MXV2650102	2660936	MXV2650102W	2661174	MXV2650754	2661275

Cutting data recommendations on pages 102-103

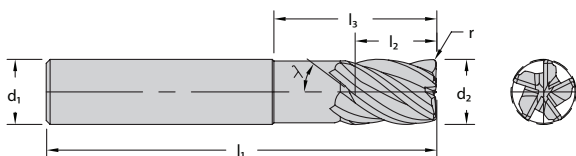
■ = First Choice □ = Second Choice



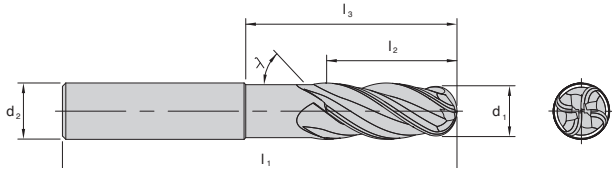
								5-Flute		5-Flute Weldon		5-Flute Chipbreaker	
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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVL-5	3/4	2 1/4	5	-	3/4	5	0.030	MXV2650103	2660937	MXV2650103W	2661175	MXV2650755	2661276
MXVL-5	3/4	2 1/4	5	-	3/4	5	0.060	MXV2650167	2660938	MXV2650167W	2661176	-	-
MXVL-5	3/4	2 1/4	5	-	3/4	5	0.090	MXV2650168	2660939	MXV2650168W	2661177	-	-
MXVL-5	3/4	2 1/4	5	-	3/4	5	0.120	MXV2650169	2660940	MXV2650169W	2661178	-	-
MXVL-5	3/4	2 1/4	5	-	3/4	5	0.190	MXV2650170	2660941	MXV2650170W	2661179	-	-
MXVL-5	3/4	2 1/4	5	-	3/4	5	0.250	MXV2650171	2660942	MXV2650171W	2661180	-	-
MXVXL-5	3/4	3 1/8	5	-	3/4	5	Square	MXV2650619	2660943	MXV2650619W	2661181	MXV2650756	2661277
MXVXL-5	3/4	3 1/8	5	-	3/4	5	0.030	MXV2650620	2660944	MXV2650620W	2661182	MXV2650757	2661278
MXVXL-5	3/4	3 1/8	5	-	3/4	5	0.060	MXV2650621	2660945	MXV2650621W	2661183	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	Square	MXV2650176	2660946	MXV2650176W	2661184	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	0.030	MXV2650070	2660947	MXV2650070W	2661185	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	0.060	MXV2650071	2660948	MXV2650071W	2661186	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	0.090	MXV2650177	2660949	MXV2650177W	2661187	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	0.120	MXV2650072	2660950	MXV2650072W	2661188	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	0.190	MXV2650178	2660951	MXV2650178W	2661189	-	-
MXVNS-5	3/4	1 1/8	5	2 3/8	3/4	5	0.250	MXV2650179	2660952	MXV2650179W	2661190	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	Square	MXV2650184	2660953	MXV2650184W	2661191	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	0.030	MXV2650076	2660954	MXV2650076W	2661192	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	0.060	MXV2650077	2660955	MXV2650077W	2661193	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	0.090	MXV2650185	2660956	MXV2650185W	2661194	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	0.120	MXV2650078	2660957	MXV2650078W	2661195	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	0.190	MXV2650186	2660958	MXV2650186W	2661196	-	-
MXVNM-5	3/4	1 1/8	6	3 1/8	3/4	5	0.250	MXV2650187	2660959	MXV2650187W	2661197	-	-
MXVS-5	1	1 1/4	4	-	1	5	Square	MXV2650193	2660960	MXV2650193W	2661198	-	-
MXVS-5	1	1 1/4	4	-	1	5	0.030	MXV2650081	2660961	MXV2650081W	2661199	-	-
MXVS-5	1	1 1/4	4	-	1	5	0.060	MXV2650194	2660962	MXV2650194W	2661200	-	-
MXVS-5	1	1 1/4	4	-	1	5	0.120	MXV2650082	2660963	MXV2650082W	2661201	-	-
MXVS-5	1	1 1/4	4	-	1	5	0.190	MXV2650083	2660964	MXV2650083W	2661202	-	-
MXVS-5	1	1 1/4	4	-	1	5	0.250	MXV2650084	2660965	MXV2650084W	2661203	-	-
MXVS-5	1	1 1/2	4	-	1	5	Square	MXV2650196	2660966	MXV2650196W	2661204	-	-
MXVS-5	1	1 1/2	4	-	1	5	0.030	MXV2650197	2660967	MXV2650197W	2661205	-	-

Cutting data recommendations on pages 102-103

■ = First Choice □ = Second Choice



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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.	Chipbreaker Ident No.	Chpbkr SAP No.
MXVS-5	1	1 1/2	4	-	1	5	0.060	MXV2650198	2660968	MXV2650198W	2661206	-	-
MXVS-5	1	1 1/2	4	-	1	5	0.120	MXV2650085	2660969	MXV2650085W	2661207	-	-
MXVS-5	1	1 1/2	4	-	1	5	0.190	MXV2650200	2660970	MXV2650200W	2661208	-	-
MXVS-5	1	1 1/2	4	-	1	5	0.250	MXV2650201	2660971	MXV2650201W	2661209	-	-
MXVM-5	1	2	5	-	1	5	Square	MXV2650205	2660972	MXV2650205W	2661210	MXV2650758	2661279
MXVM-5	1	2	5	-	1	5	0.030	MXV2650090	2660973	MXV2650090W	2661211	MXV2650759	2661280
MXVM-5	1	2	5	-	1	5	0.060	MXV2650206	2660974	MXV2650206W	2661212	-	-
MXVM-5	1	2	5	-	1	5	0.120	MXV2650091	2660975	MXV2650091W	2661213	-	-
MXVM-5	1	2	5	-	1	5	0.190	MXV2650092	2660976	MXV2650092W	2661214	-	-
MXVM-5	1	2	5	-	1	5	0.250	MXV2650093	2660977	MXV2650093W	2661215	-	-
MXVXL-5	1	3 1/8	6	-	1	5	Square	MXV2650623	2660978	MXV2650623W	2661216	MXV2650760	2661281
MXVXL-5	1	3 1/8	6	-	1	5	0.030	MXV2650624	2660979	MXV2650624W	2661217	MXV2650761	2661282
MXVXL-5	1	3 1/8	6	-	1	5	0.060	MXV2650625	2660980	MXV2650625W	2661218	-	-
MXVNM-5	1	1 1/4	6	3 1/8	1	5	Square	MXV2650208	2660981	MXV2650208W	2661219	-	-
MXVNM-5	1	1 1/4	6	3 1/8	1	5	0.030	MXV2650209	2660982	MXV2650209W	2661220	-	-
MXVNM-5	1	1 1/4	6	3 1/8	1	5	0.060	MXV2650094	2660983	MXV2650094W	2661221	-	-
MXVNM-5	1	1 1/4	6	3 1/8	1	5	0.120	MXV2650095	2660984	MXV2650095W	2661222	-	-
MXVNM-5	1	1 1/4	6	3 1/8	1	5	0.190	MXV2650211	2660985	MXV2650211W	2661223	-	-
MXVNM-5	1	1 1/4	6	3 1/8	1	5	0.250	MXV2650096	2660986	MXV2650096W	2661224	-	-
MXVNL-5	1	1 1/4	7	4 1/8	1	5	Square	MXV2650212	2660987	MXV2650212W	2661225	-	-
MXVNL-5	1	1 1/4	7	4 1/8	1	5	0.030	MXV2650213	2660988	MXV2650213W	2661226	-	-
MXVNL-5	1	1 1/4	7	4 1/8	1	5	0.060	MXV2650097	2660989	MXV2650097W	2661227	-	-
MXVNL-5	1	1 1/4	7	4 1/8	1	5	0.120	MXV2650098	2660990	MXV2650098W	2661228	-	-
MXVNL-5	1	1 1/4	7	4 1/8	1	5	0.190	MXV2650215	2660991	MXV2650215W	2661229	-	-
MXVNL-5	1	1 1/4	7	4 1/8	1	5	0.250	MXV2650099	2660992	MXV2650099W	2661230	-	-

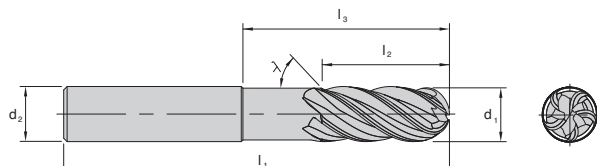


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Series	Cutting Dia. d_1	LOC l_2	OAL l_1	Neck Length l_3	Shank Dia. d_2	Flutes z	Corner Rad r	Ident Number	SAP Number	4-Flute Weldon	SAP Number
MXVS-4	1/8	1/4	2	—	1/8	4	Ball	MXV2650500	2662082	MXV2650500W	2662083
MXVM-4	1/8	1/2	2 1/2	—	1/8	4	Ball	MXV2650501	2662084	MXV2650501W	2662085
MXVL-4	1/8	3/4	2 1/2	—	1/8	4	Ball	MXV2650502	2662086	MXV2650502W	2662087
MXVNS-4	1/8	3/16	3	1/2	1/8	4	Ball	MXV2650503	2662080	MXV2650503W	2662081
MXVS-4	3/16	5/16	2	—	3/16	4	Ball	MXV2650504	2662088	MXV2650504W	2662089
MXVM-4	3/16	5/8	2 1/2	—	3/16	4	Ball	MXV2650505	2662090	MXV2650505W	2662091
MXVS-4	1/4	3/8	2	—	1/4	4	Ball	MXV2650508	2662092	MXV2650508W	2662093
MXVM-4	1/4	3/4	2 1/2	—	1/4	4	Ball	MXV2650509	2662094	MXV2650509W	2662095
MXVNM-4	1/4	3/8	4	1 1/8	1/4	4	Ball	MXV2650512	2662096	MXV2650512W	2662097
MXVNL-4	1/4	3/8	4	1 5/8	1/4	4	Ball	MXV2650513	2662098	MXV2650513W	2662099
MXVS-4	5/16	1/2	2 1/2	—	5/16	4	Ball	MXV2650514	2662100	MXV2650514W	2662101
MXVM-4	5/16	3/4	2 1/2	—	5/16	4	Ball	MXV2650515	2662102	MXV2650515W	2662103
MXVS-4	3/8	1/2	2	—	3/8	4	Ball	MXV2650518	2662104	MXV2650518W	2662105
MXVM-4	3/8	7/8	3	—	3/8	4	Ball	MXV2650519	2662106	MXV2650519W	2662107
MXVL-4	3/8	1 1/4	3	—	3/8	4	Ball	MXV2650520	2662108	MXV2650520W	2662109
MXVNM-4	3/8	1/2	4	2 1/8	3/8	4	Ball	MXV2650522	2662110	MXV2650522W	2662111
MXVS-4	1/2	5/8	2 1/2	—	1/2	4	Ball	MXV2650524	2662112	MXV2650524W	2662113
MXVM-4	1/2	1 1/8	3	—	1/2	4	Ball	MXV2650525	2662114	MXV2650525W	2662115
MXVL-4	1/2	1 5/8	4	—	1/2	4	Ball	MXV2650526	2662116	MXV2650526W	2662117
MXVNS-4	1/2	5/8	4	2 1/8	1/2	4	Ball	MXV2650527	2662118	MXV2650527W	2662119
MXVS-4	3/4	1 1/8	4	—	3/4	4	Ball	MXV2650536	2662120	MXV2650536W	2662121
MXVM-4	3/4	1 5/8	4	—	3/4	4	Ball	MXV2650537	2662122	MXV2650537W	2662123
MXVL-4	3/4	2 1/4	5	—	3/4	4	Ball	MXV2650538	2662124	MXV2650538W	2662125
MXVNS-4	3/4	1 1/8	4	2 1/2	3/4	4	Ball	MXV2650539	2662126	MXV2650539W	2662127
MXVNM-4	3/4	1 1/8	6	3 1/2	3/4	4	Ball	MXV2650540	2662128	MXV2650540W	2662129
MXVNL-4	3/4	1 1/8	6	4 1/8	3/4	4	Ball	MXV2650541	2662130	MXV2650541W	2662131
MXVS-4	1	1 1/4	4	—	1	4	Ball	MXV2650542	2662132	MXV2650542W	2662133
MXVM-4	1	2 1/4	5	—	1	4	Ball	MXV2650543	2662134	MXV2650543W	2662135
MXVL-4	1	3 1/4	6	—	1	4	Ball	MXV2650544	2662136	MXV2650544W	2662137
MXVNS-4	1	1 1/4	5	2 1/2	1	4	Ball	MXV2650545	2662138	MXV2650545W	2662139
MXVNM-4	1	1 1/4	7	3 5/8	1	4	Ball	MXV2650546	2662140	MXV2650546W	2662141

Cutting data recommendations on pages 100-101

■ = First Choice □ = Second Choice

NEW Max Velocity Series
5 Flute Ballnose



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Series	Cutting Dia. d ₁	LOC l ₂	OAL l ₁	Neck Length l ₃	Shank Dia. d ₂	Flutes z	Corner Rad r	Ident Number	SAP Number	5-Flute Weldon	SAP Number
MXVS-5	1/4	3/8	2	—	1/4	5	Ball	MXV2650567	2662142	MXV2650567W	2662143
MXVM-5	1/4	3/4	2 1/2	—	1/4	5	Ball	MXV2650568	2662144	MXV2650568W	2662145
MXVNM-5	1/4	3/8	4	1 1/8	1/4	5	Ball	MXV2650569	2662146	MXV2650569W	2662147
MXVNL-5	1/4	3/8	4	1 5/8	1/4	5	Ball	MXV2650570	2662148	MXV2650570W	2662149
MXVS-5	3/8	7/8	3	—	3/8	5	Ball	MXV2650548	2662150	MXV2650548W	2662151
MXVM-5	3/8	1 1/4	3	—	3/8	5	Ball	MXV2650549	2662152	MXV2650549W	2662153
MXVNM-5	3/8	1/2	4	2 1/8	3/8	5	Ball	MXV2650550	2662154	MXV2650550W	2662155
MXVS-5	1/2	1 1/8	3	—	1/2	5	Ball	MXV2650552	2662156	MXV2650552W	2662157
MXVM-5	1/2	1 5/8	4	—	1/2	5	Ball	MXV2650553	2662158	MXV2650553W	2662159
MXVXL-5	1/2	2 1/8	4	—	1/2	5	Ball	MXV2650600	2662160	MXV2650600W	2662161
MXVS-5	3/4	1 5/8	4	—	3/4	5	Ball	MXV2650560	2662162	MXV2650560W	2662163
MXVM-5	3/4	2 1/4	5	—	3/4	5	Ball	MXV2650561	2662164	MXV2650561W	2662165
MXVNM-5	3/4	1 1/8	6	3 1/2	3/4	5	Ball	MXV2650562	2662166	MXV2650562W	2662167
MXVS-5	1	2 1/4	5	—	1	5	Ball	MXV2650564	2662168	MXV2650564W	2662169
MXVM-5	1	3 1/4	6	—	1	5	Ball	MXV2650565	2662170	MXV2650565W	2662171
MXVNM-5	1	1 1/4	7	3 5/8	1	5	Ball	MXV2650566	2662172	MXV2650566W	2662173

TV-7 Series

TV-7 Series 7 flute endmills for high efficiency machining in exotic metals and stainless steel.

Features and Benefits

- Optimized for high speed machining techniques with low radial engagement.
- Produce accurate and superior workpiece finishes.
- The unique geometry and large core diameter prevents deflections.
- Industry's largest selection of corner radii and neck and flute lengths in a standard program.
- ENDURASpeed coating features high heat resistance which leads to increased wear resistance and tool life.

Applications

- High Efficiency Machining (HEM) profile (7%-10%)
- Finishing

Usage

- High-temp alloys
- Stainless Steel
- Steel
- Cast Iron



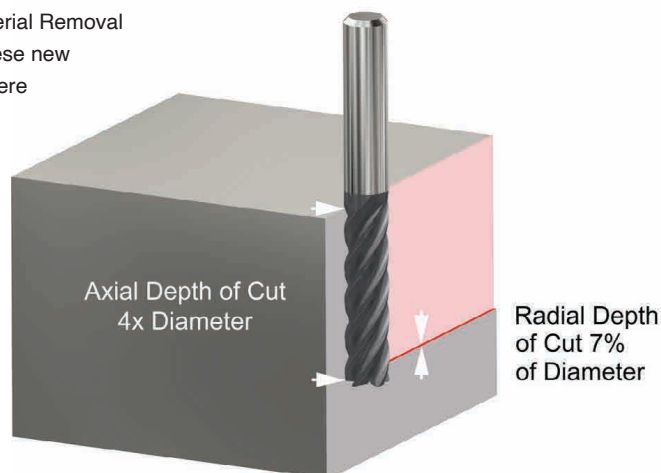
Finishing operation in titanium

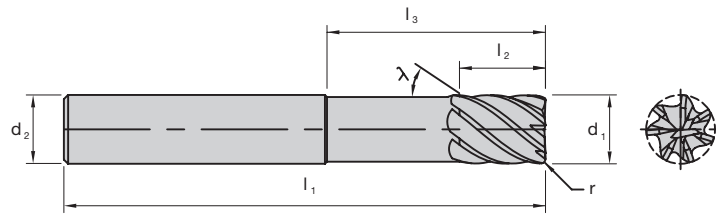
High Efficiency Machining (HEM) Tech Tips

HEM tool path strategies offer dramatic improvements in the Material Removal Rate (MRR) and reduced roughing cycle time. Correctly used, these new roughing tool path strategies will reduce overall cycle time anywhere from 20 to 60% on the average.

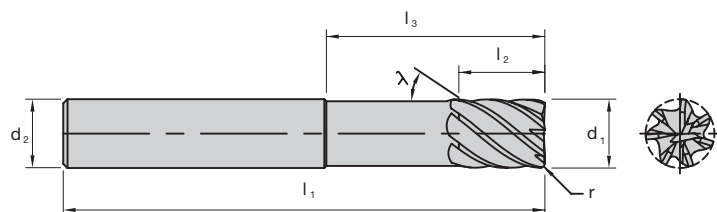
Below are some elements of what the HEM tool path looks like.

- 1) Deep Axial Depths. Axial cut depths increase up to 4 times the tool diameter. This distributes the tool wear over the length of the tool.
- 2) Light Radial Engagement. Using light radial engagements reduces the cutting pressure on the end mill.
- 3) Increased Flute Count. The light radial engagement allows for a higher flute count on the end mill. This will increase MRR while utilizing a higher core strength to minimize end mill deflection.
- 4) Higher Spindle Speeds. With only a small percentage that the end mill is engaged in the material, the spindle RPM is increased. This will maintain the necessary heat for proper chip plasticization and preventing built up edge.
- 5) Higher Feed Rates. The light radial engagement allows the use of chip thinning calculations to help maintain the correct chip load a 7% radial engagement, typically allows a doubling of the normal feed rate used in slotting.



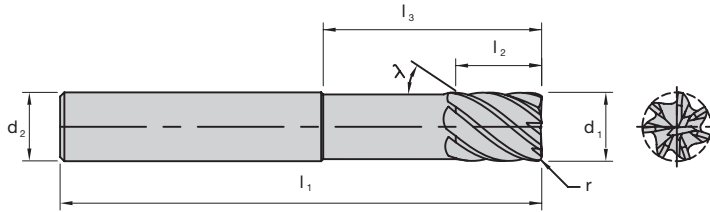


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TVS-7	1/2	5/8	2 1/2	—	1/2	7	Square	EMC700051	2611932
TVS-7	1/2	5/8	2 1/2	—	1/2	7	0.015	EMC700053	2611934
TVS-7	1/2	5/8	2 1/2	—	1/2	7	0.030	EMC700055	2611936
TVS-7	1/2	5/8	2 1/2	—	1/2	7	0.060	EMC700057	2611938
TVS-7	1/2	5/8	2 1/2	—	1/2	7	0.090	EMC700059	2611939
TVS-7	1/2	5/8	2 1/2	—	1/2	7	0.120	EMC700061	2611940
TVM-7	1/2	1 1/4	3	—	1/2	7	Square	EMC700107	2605655
TVM-7	1/2	1 1/4	3	—	1/2	7	0.015	EMC700109	2605656
TVM-7	1/2	1 1/4	3	—	1/2	7	0.030	EMC700111	2605657
TVM-7	1/2	1 1/4	3	—	1/2	7	0.060	EMC700113	2605658
TVM-7	1/2	1 1/4	3	—	1/2	7	0.090	EMC700115	2605659
TVM-7	1/2	1 1/4	3	—	1/2	7	0.120	EMC700117	2605660
TVL-7	1/2	2	4	—	1/2	7	Square	EMC700163	2611302
TVL-7	1/2	2	4	—	1/2	7	0.015	EMC700165	2611303
TVL-7	1/2	2	4	—	1/2	7	0.030	EMC700167	2611304
TVL-7	1/2	2	4	—	1/2	7	0.060	EMC700169	2611305
TVL-7	1/2	2	4	—	1/2	7	0.090	EMC700171	2611306
TVL-7	1/2	2	4	—	1/2	7	0.120	EMC700173	2611307
TVNS-7	1/2	5/8	5	2 1/8	1/2	7	Square	EMC700219	2611328
TVNS-7	1/2	5/8	5	2 1/8	1/2	7	0.015	EMC700221	2611330
TVNS-7	1/2	5/8	5	2 1/8	1/2	7	0.030	EMC700223	2611331
TVNS-7	1/2	5/8	5	2 1/8	1/2	7	0.060	EMC700225	2611332
TVNS-7	1/2	5/8	5	2 1/8	1/2	7	0.090	EMC700227	2611333
TVNS-7	1/2	5/8	5	2 1/8	1/2	7	0.120	EMC700229	2611334
TVNM-7	1/2	5/8	5	3 1/8	1/2	7	Square	EMC700275	2611355
TVNM-7	1/2	5/8	5	3 1/8	1/2	7	0.015	EMC700277	2611356
TVNM-7	1/2	5/8	5	3 1/8	1/2	7	0.030	EMC700279	2611357
TVNM-7	1/2	5/8	5	3 1/8	1/2	7	0.060	EMC700281	2611358
TVNM-7	1/2	5/8	5	3 1/8	1/2	7	0.120	EMC700285	2611360
TVNL-7	1/2	5/8	6	4 1/8	1/2	7	Square	EMC700331	2611381

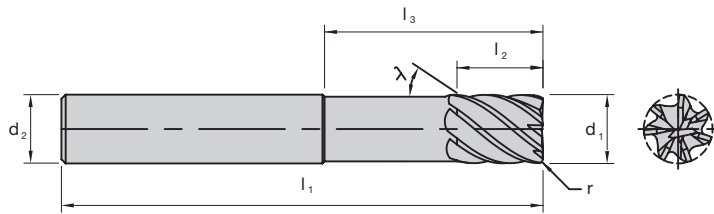


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TVNL-7	1/2	5/8	6	4 1/8	1/2	7	0.015	EMC700333	2611382
TVNL-7	1/2	5/8	6	4 1/8	1/2	7	0.030	EMC700335	2611383
TVNL-7	1/2	5/8	6	4 1/8	1/2	7	0.060	EMC700337	2611384
TVNL-7	1/2	5/8	6	4 1/8	1/2	7	0.090	EMC700339	2611385
TVNL-7	1/2	5/8	6	4 1/8	1/2	7	0.120	EMC700341	2611386
TVS-7	5/8	3/4	3	—	5/8	7	Square	EMC700065	2611942
TVS-7	5/8	3/4	3	—	5/8	7	0.030	EMC700067	2611943
TVS-7	5/8	3/4	3	—	5/8	7	0.060	EMC700069	2611944
TVS-7	5/8	3/4	3	—	5/8	7	0.120	EMC700073	2611946
TVS-7	5/8	3/4	3	—	5/8	7	0.190	EMC700075	2611947
TVM-7	5/8	1 5/8	3 1/2	—	5/8	7	Square	EMC700121	2605661
TVM-7	5/8	1 5/8	3 1/2	—	5/8	7	0.030	EMC700123	2605662
TVM-7	5/8	1 5/8	3 1/2	—	5/8	7	0.060	EMC700125	2605663
TVM-7	5/8	1 5/8	3 1/2	—	5/8	7	0.120	EMC700129	2605665
TVM-7	5/8	1 5/8	3 1/2	—	5/8	7	0.190	EMC700131	2605666
TVL-7	5/8	2 1/8	4	—	5/8	7	Square	EMC700177	2611308
TVL-7	5/8	2 1/8	4	—	5/8	7	0.030	EMC700179	2611309
TVL-7	5/8	2 1/8	4	—	5/8	7	0.060	EMC700181	2611310
TVL-7	5/8	2 1/8	4	—	5/8	7	0.120	EMC700185	2611312
TVL-7	5/8	2 1/8	4	—	5/8	7	0.190	EMC700187	2611313
TVS-7	3/4	1 1/8	3	—	3/4	7	Square	EMC700079	2611948
TVS-7	3/4	1 1/8	3	—	3/4	7	0.030	EMC700081	2611949
TVS-7	3/4	1 1/8	3	—	3/4	7	0.060	EMC700083	2611950
TVS-7	3/4	1 1/8	3	—	3/4	7	0.090	EMC700085	2611951
TVS-7	3/4	1 1/8	3	—	3/4	7	0.120	EMC700087	2611952
TVS-7	3/4	1 1/8	3	—	3/4	7	0.190	EMC700089	2611953
TVS-7	3/4	1 1/8	3	—	3/4	7	0.250	EMC700091	2611954
TVM-7	3/4	1 5/8	4	—	3/4	7	Square	EMC700135	2605667
TVM-7	3/4	1 5/8	4	—	3/4	7	0.030	EMC700137	2605668
TVM-7	3/4	1 5/8	4	—	3/4	7	0.060	EMC700139	2605669

TV-7 Series 7 Flute

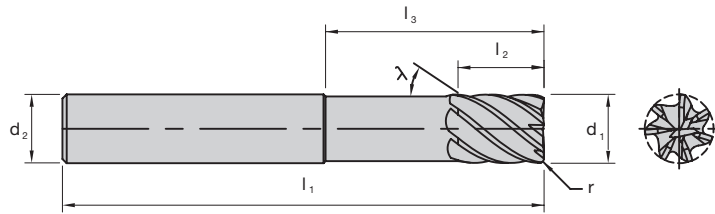


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TVM-7	3/4	1 5/8	4	—	3/4	7	0.090	EMC700141	2605670
TVM-7	3/4	1 5/8	4	—	3/4	7	0.120	EMC700143	2605671
TVM-7	3/4	1 5/8	4	—	3/4	7	0.190	EMC700145	2605672
TVM-7	3/4	1 5/8	4	—	3/4	7	0.250	EMC700147	2605673
TVL-7	3/4	2 5/8	5	—	3/4	7	Square	EMC700191	2611314
TVL-7	3/4	2 5/8	5	—	3/4	7	0.030	EMC700193	2611315
TVL-7	3/4	2 5/8	5	—	3/4	7	0.060	EMC700195	2611316
TVL-7	3/4	2 5/8	5	—	3/4	7	0.090	EMC700197	2611317
TVL-7	3/4	2 5/8	5	—	3/4	7	0.120	EMC700199	2611318
TVL-7	3/4	2 5/8	5	—	3/4	7	0.190	EMC700201	2611319
TVL-7	3/4	2 5/8	5	—	3/4	7	0.250	EMC700203	2611320
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	Square	EMC700247	2611341
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	0.030	EMC700249	2611342
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	0.060	EMC700251	2611343
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	0.090	EMC700253	2611344
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	0.120	EMC700255	2611345
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	0.190	EMC700257	2611346
TVNS-7	3/4	1 1/8	5	2 5/8	3/4	7	0.250	EMC700259	2611347
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	Square	EMC700303	2611367
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	0.030	EMC700305	2611368
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	0.060	EMC700307	2611369
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	0.090	EMC700309	2611370
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	0.120	EMC700311	2611371
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	0.190	EMC700313	2611372
TVNM-7	3/4	1 1/8	5	3 1/8	3/4	7	0.250	EMC700315	2611373
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	Square	EMC700359	2611393
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	0.030	EMC700361	2611394
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	0.060	EMC700363	2611395
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	0.090	EMC700365	2611396
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	0.120	EMC700367	2611397



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	0.190	EMC700369	2611398
TVNL-7	3/4	1 1/8	6	4 1/8	3/4	7	0.250	EMC700371	2611399
TVS-7	1	1 1/4	4	—	1	7	Square	EMC700093	2611955
TVS-7	1	1 1/4	4	—	1	7	0.030	EMC700095	2611956
TVS-7	1	1 1/4	4	—	1	7	0.060	EMC700097	2611957
TVS-7	1	1 1/4	4	—	1	7	0.120	EMC700101	2611959
TVS-7	1	1 1/4	4	—	1	7	0.190	EMC700103	2611960
TVS-7	1	1 1/4	4	—	1	7	0.250	EMC700105	2611298
TVM-7	1	2	5	—	1	7	Square	EMC700149	2605674
TVM-7	1	2	5	—	1	7	0.030	EMC700151	2605675
TVM-7	1	2	5	—	1	7	0.060	EMC700153	2605676
TVM-7	1	2	5	—	1	7	0.120	EMC700157	2605678
TVM-7	1	2	5	—	1	7	0.190	EMC700159	2605679
TVM-7	1	2	5	—	1	7	0.250	EMC700161	2605680
TVL-7	1	3	6	—	1	7	Square	EMC700205	2611321
TVL-7	1	3	6	—	1	7	0.030	EMC700207	2611322
TVL-7	1	3	6	—	1	7	0.060	EMC700209	2611323
TVL-7	1	3	6	—	1	7	0.120	EMC700213	2611325
TVL-7	1	3	6	—	1	7	0.190	EMC700215	2611326
TVL-7	1	3	6	—	1	7	0.250	EMC700217	2611327
TVNS-7	1	1 1/4	5	2 5/8	1	7	Square	EMC700261	2611348
TVNS-7	1	1 1/4	5	2 5/8	1	7	0.030	EMC700263	2611349
TVNS-7	1	1 1/4	5	2 5/8	1	7	0.060	EMC700265	2611350
TVNS-7	1	1 1/4	5	2 5/8	1	7	0.120	EMC700269	2611352
TVNS-7	1	1 1/4	5	2 5/8	1	7	0.190	EMC700271	2611353
TVNS-7	1	1 1/4	5	2 5/8	1	7	0.250	EMC700273	2611354
TVNM-7	1	1 1/4	5	3 1/8	1	7	Square	EMC700317	2611374
TVNM-7	1	1 1/4	5	3 1/8	1	7	0.030	EMC700319	2611375
TVNM-7	1	1 1/4	5	3 1/8	1	7	0.060	EMC700321	2611376
TVNM-7	1	1 1/4	5	3 1/8	1	7	0.120	EMC700325	2611378

TV-7 Series 7 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TVNM-7	1	1 1/4	5	3 1/8	1	7	0.190	EMC700327	2611379
TVNM-7	1	1 1/4	5	3 1/8	1	7	0.250	EMC700329	2611380
TVNL-7	1	1 1/4	7	4 1/8	1	7	Square	EMC700373	2611400
TVNL-7	1	1 1/4	7	4 1/8	1	7	0.030	EMC700375	2611401
TVNL-7	1	1 1/4	7	4 1/8	1	7	0.060	EMC700377	2611402
TVNL-7	1	1 1/4	7	4 1/8	1	7	0.120	EMC700381	2611404
TVNL-7	1	1 1/4	7	4 1/8	1	7	0.190	EMC700383	2611405
TVNL-7	1	1 1/4	7	4 1/8	1	7	0.250	EMC700385	2611406

MXR Series

Superalloy materials possess high mechanical strength, while resisting material deformation under higher heat applications. These materials have proven valuable and highly versatile within the aerospace and energy industries due to their resistance to corrosion under extreme conditions.

Machining superalloys presents many challenges, the reduction of tool life being the most challenging to overcome. LMT Onsrud has developed a line of cutting tools, specifically for nickel-based alloys, that have been proven to increase tool life up to 20% over other tooling options. This allows for longer run times and fewer tool changes, increasing both your in-cut time and productivity.

Features and Benefits

- 4 or 5 flute design.
- ENDURASpeed Red Coating formulated for longer tool life in nickel based alloys.
- Square, Corner Radii, Ballnose available.
- Optimized variable helix geometry for unmatched Material Removal Rate (MRR) and work piece finish.
- 4 flute ballnose for optimal contouring.
- Edge conditioning specific for nickel based alloys.

Applications

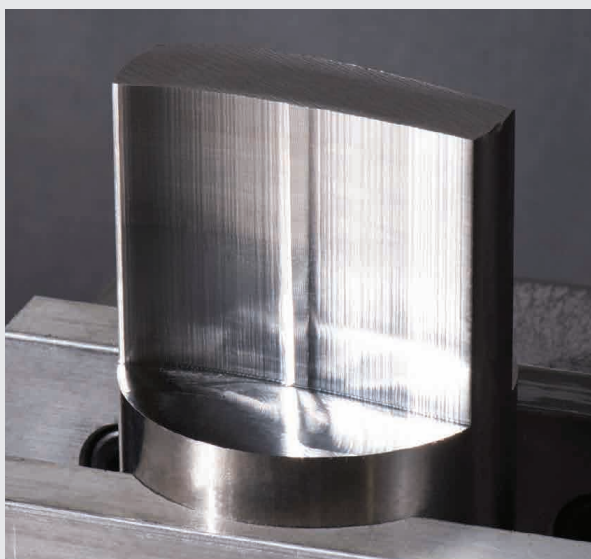
- High Efficiency Machining (HEM) heavy profiling – 15% radial engagement
- High Efficiency Machining (HEM) profile - 8-10%
- Contouring

Usage

- Nickel based alloys
- High-temp alloys



ENDURASpeed Red coated 4 or 5 flute design for High Efficiency Machining (HEM) heavy profiling.



Inconel Milling: High Efficiency Machining (*HEM)

Tool:

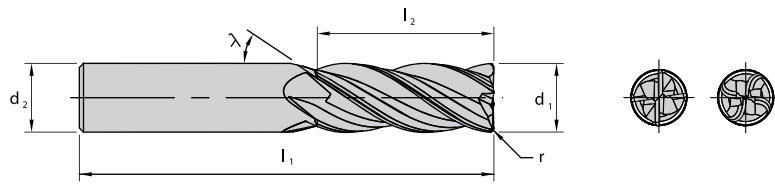
MXR Series Tool (Ident No. MXR2650167)
Cutting Diameter (d_1) = 3/4" No. of Flutes (z) = 5

Cutting Material: Solid Carbide

Material: 718 Inconel

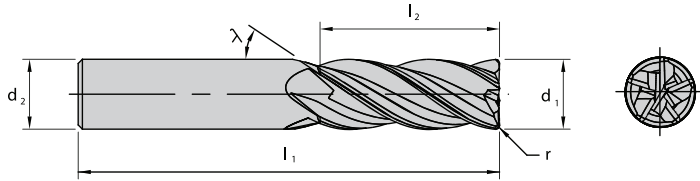
Cutting Data:

SFM (v_c)	= 63.8
RPM (n)	= 4325
Feed (v_f)	= 3.25 in/min
Chipload (f_z)	= .002 in
RDoC (a_e)	= .060 in
ADoC (a_p)	= 1.125 in



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Series	Cutting Diameter d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shank Diameter d ₂	Flutes z	Corner Radius r	Ident No.	SAP No.	Ballnose Ident No.	Ballnose SAP No.
MXRS-4	1/4	3/8	2 1/2	-	1/4	4	Square	MXR2650008	2649532	-	-
MXRS-4	1/4	3/8	2 1/2	-	1/4	4	0.015	MXR2650009	2649533	-	-
MXRS-4	1/4	3/8	2	-	1/4	4	Ball	-	-	MXR2650500	2649563
MXRM-4	1/4	3/4	2 1/2	-	1/4	4	Square	MXR2650011	2649534	-	-
MXRM-4	1/4	3/4	2 1/2	-	1/4	4	0.015	MXR2650012	2649535	-	-
MXRM-4	1/4	3/4	2 1/2	-	1/4	4	Ball	-	-	MXR2650501	2649564
MXRS-4	3/8	1/2	2	-	3/8	4	Ball	-	-	MXR2650518	2649565
MXRM-4	3/8	7/8	3	-	3/8	4	Ball	-	-	MXR2650519	2649566
MXRS-4	1/2	5/8	2 1/2	-	1/2	4	Ball	-	-	MXR2650524	2649567
MXRM-4	1/2	1 1/8	3	-	1/2	4	Ball	-	-	MXR2650525	2649568
MXRS-4	5/8	3/4	3	-	5/8	4	Ball	-	-	MXR2650530	2649569
MXRM-4	5/8	1 5/8	3 1/2	-	5/8	4	Ball	-	-	MXR2650531	2649570
MXRS-4	3/4	1 1/8	4	-	3/4	4	Ball	-	-	MXR2650536	2649571
MXRM-4	3/4	1 5/8	4	-	3/4	4	Ball	-	-	MXR2650537	2649572

MXR Series 5 Flute



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Series	Cutting Diameter d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
MXRS-5	3/8	1/2	2 1/2	-	3/8	5	Square	MXR2650567	2649536
MXRS-5	3/8	1/2	2 1/2	-	3/8	5	0.015	MXR2650568	2649537
MXRS-5	3/8	1/2	2 1/2	-	3/8	5	0.030	MXR2650569	2649538
MXRM-5	3/8	7/8	2 1/2	-	3/8	5	Square	MXR2650573	2649539
MXRM-5	3/8	7/8	2 1/2	-	3/8	5	0.015	MXR2650574	2649540
MXRM-5	3/8	7/8	2 1/2	-	3/8	5	0.030	MXR2650575	2649541
MXRS-5	1/2	5/8	2 1/2	-	1/2	5	Square	MXR2650031	2649542
MXRS-5	1/2	5/8	2 1/2	-	1/2	5	0.015	MXR2650032	2649543
MXRS-5	1/2	5/8	2 1/2	-	1/2	5	0.030	MXR2650033	2649544
MXRM-5	1/2	1 1/4	3	-	1/2	5	Square	MXR2650037	2649545
MXRM-5	1/2	1 1/4	3	-	1/2	5	0.015	MXR2650038	2649546
MXRM-5	1/2	1 1/4	3	-	1/2	5	0.030	MXR2650039	2649547
MXRS-5	5/8	3/4	3	-	5/8	5	Square	MXR2650601	2649548
MXRS-5	5/8	3/4	3	-	5/8	5	0.030	MXR2650602	2649549
MXRS-5	5/8	3/4	3	-	5/8	5	0.060	MXR2650603	2649550
MXRM-5	5/8	1 3/8	3 1/2	-	5/8	5	Square	MXR2650607	2649551
MXRM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.030	MXR2650608	2649552
MXRM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.060	MXR2650609	2649553
MXRS-5	3/4	1 1/8	3	-	3/4	5	Square	MXR2650054	2649554
MXRS-5	3/4	1 1/8	3	-	3/4	5	0.030	MXR2650055	2649555
MXRS-5	3/4	1 1/8	3	-	3/4	5	0.060	MXR2650056	2649556
MXRM-5	3/4	1 1/2	4	-	3/4	5	Square	MXR2650150	2649557
MXRM-5	3/4	1 1/2	4	-	3/4	5	0.030	MXR2650151	2649558
MXRM-5	3/4	1 1/2	4	-	3/4	5	0.060	MXR2650152	2649559
MXRL-5	3/4	2 1/4	5	-	3/4	5	Square	MXR2650102	2649560
MXRL-5	3/4	2 1/4	5	-	3/4	5	0.030	MXR2650103	2649561
MXRL-5	3/4	2 1/4	5	-	3/4	5	0.060	MXR2650167	2649562

HXR Series

In nickel-based alloys, maximizing a tool's capability by using the entire cut length is important to increasing tool life and reducing production costs. In high efficiency machining (HEM), focus is made on maintaining the proper chip load throughout the cut. This is achieved through the variation of feed rate and tool engagement. HXR end mills have been engineered for high efficiency machining (HEM) of superalloy materials. Configured in 7, 9, or 11 flute designs, these tools allow for lower radial engagement and faster machining, leading to higher material removal rates and optimal part finish.

Features and Benefits

- 7, 9, or 11 flute cutting options.
- Enhanced part finish.
- Faster material removal.
- Chipbreaker design enhances chip removal in longer lengths.
- ENDURASpeed Red Coating formulated for longer tool life in nickel based alloys.

Applications

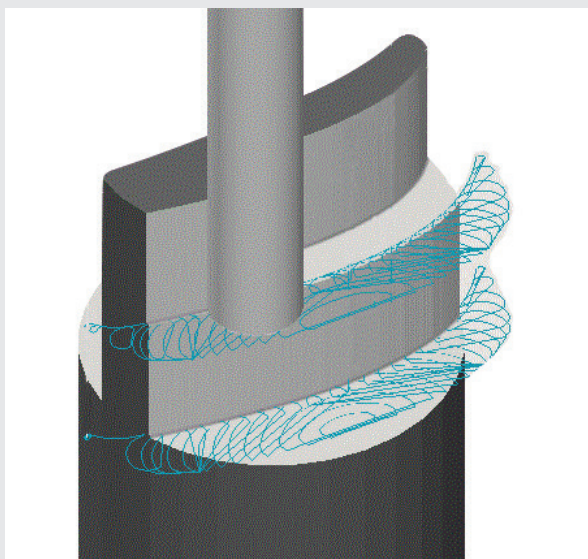
- High Efficiency Machining (HEM) profiling
- Finishing

Usage

- Nickel based alloys
- High-temp alloys



Achieve faster material removal rates while attaining improved part finish.



Inconel Milling: Finishing Pass

Tool:

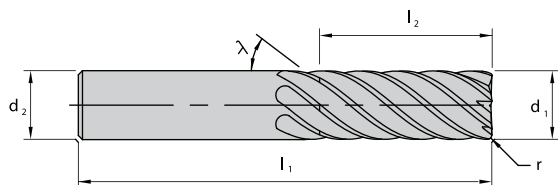
HXR Tool Series (Ident No. HXR2650030)
Cutting Diameter (d_1) = 3/4" No. of Flutes (z) = 11

Cutting Material: Solid Carbide

Material: 718 Inconel

Cutting Data:

SFM (v_c) = 72.8
RPM (n) = 371
Feed (v_f) = 3.7 in/min
Chipload (f_z) = .0009 in
RDOC (a_e) = .0225 in
ADOC (a_p) = 2.25 in



								Non Chipbreaker		Chipbreaker	
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.	Chipbreaker Ident No.	Chipbreaker SAP No.
HXRS-7	3/8	1/2	2 1/2	-	3/8	7	Square	HXR2650000	2649730	-	-
HXRS-7	3/8	1/2	2 1/2	-	3/8	7	0.015	HXR2650001	2649731	-	-
HXRM-7	3/8	7/8	2 1/2	-	3/8	7	Square	HXR2650002	2649732	-	-
HXRM-7	3/8	7/8	2 1/2	-	3/8	7	0.015	HXR2650003	2649733	-	-
HXRL-7	3/8	1 1/4	3	-	3/8	7	Square	HXR2650004	2649734	HXR2650005	2649735
HXRL-7	3/8	1 1/4	3	-	3/8	7	0.015	HXR2650006	2649736	HXR2650007	2649737
HXRS-9	1/2	5/8	2 1/2	-	1/2	9	Square	HXR2650008	2649738	-	-
HXRS-9	1/2	5/8	2 1/2	-	1/2	9	0.030	HXR2650009	2649739	-	-
HXRM-9	1/2	1 1/4	3	-	1/2	9	Square	HXR2650010	2649740	-	-
HXRM-9	1/2	1 1/4	3	-	1/2	9	0.030	HXR2650011	2649741	-	-
HXRL-9	1/2	1 5/8	4	-	1/2	9	Square	HXR2650012	2649742	HXR2650013	2649743
HXRL-9	1/2	1 5/8	4	-	1/2	9	0.030	HXR2650014	2649744	HXR2650015	2649745
HXRS-9	5/8	3/4	3	-	5/8	9	Square	HXR2650016	2649746	-	-
HXRS-9	5/8	3/4	3	-	5/8	9	0.030	HXR2650017	2649747	-	-
HXRM-9	5/8	1 3/8	3 1/2	-	5/8	9	Square	HXR2650018	2649748	-	-
HXRM-9	5/8	1 3/8	3 1/2	-	5/8	9	0.030	HXR2650019	2649749	-	-
HXRL-9	5/8	2 1/4	5	-	5/8	9	Square	HXR2650020	2649750	HXR2650021	2649751
HXRL-9	5/8	2 1/4	5	-	5/8	9	0.030	HXR2650022	2649752	HXR2650023	2649753
HXRS-11	3/4	1 1/8	3	-	3/4	11	Square	HXR2650024	2649754	-	-
HXRS-11	3/4	1 1/8	3	-	3/4	11	0.030	HXR2650025	2649755	-	-
HXRM-11	3/4	1 5/8	4	-	3/4	11	Square	HXR2650026	2649756	-	-
HXRM-11	3/4	1 5/8	4	-	3/4	11	0.030	HXR2650027	2649757	-	-
HXRL-11	3/4	2 1/4	5	-	3/4	11	Square	HXR2650028	2649758	HXR2650029	2649759
HXRL-11	3/4	2 1/4	5	-	3/4	11	0.030	HXR2650030	2649760	HXR2650031	2649761

RXR Series

Machining nickel-based alloys poses many challenges. RXR series of endmills answers the challenges of tool life and reduces tool pressure.

Features and Benefits

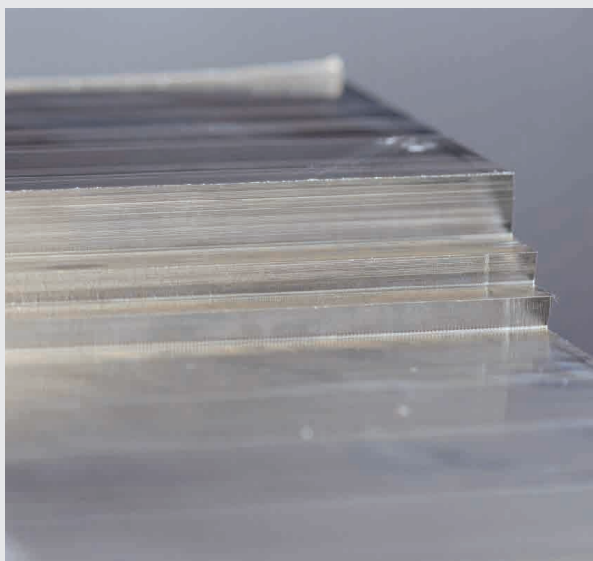
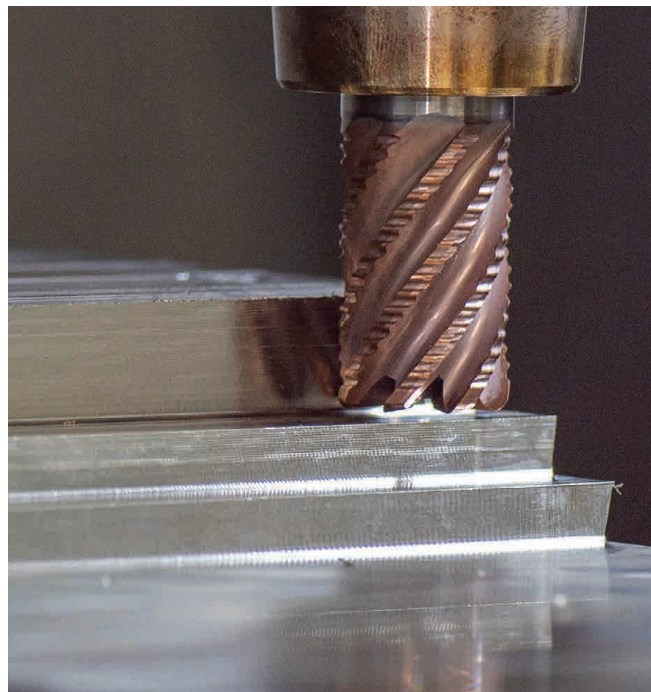
- 7 flute variable indexed geometry for unmatched material removal rates
- Fine pitch OD rougher pattern allows for reduced pressure on the cutting edge
- ENDURASpeed red coating formulated for longer tool life in nickel-based alloys

Applications

- Roughing

Usage

- Inconel
- Nickel-based alloys



Inconel Milling: Heavy Profile

Tool:

RXR Tool Series (Ident No. RXR2652258)
Cutting Diameter (d_1) = 3/4" No. of Flutes (z) = 7

Cutting Material: Solid Carbide

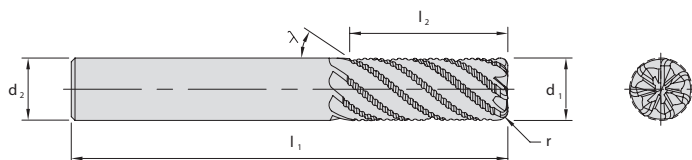
Material: 718 Inconel

Cutting Data:

SFM (v_c) = 100
RPM (n) = 509
Feed (v_f) = 11 in/min
Chipload (f_z) = .0035 in
RDoC (a_e) = .060 in
ADoC (a_p) = 1 in

RXR Series

7 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.	Weldon Ident No.	Weldon SAP No.
RXRS-7	1/2	5/8	2 1/2	-	1/2	7	0.030	RXR2652254	2652254	RXR2652254W	2652276
RXRS-7	1/2	5/8	2 1/2	-	1/2	7	0.060	RXR2652255	2652255	RXR2652255W	2652277
RXRM-7	1/2	1 1/4	3	-	1/2	7	0.030	RXR2652256	2652256	RXR2652256W	2652278
RXRM-7	1/2	1 1/4	3	-	1/2	7	0.060	RXR2652257	2652257	RXR2652257W	2652279
RXRL-7	1/2	1 5/8	4	-	1/2	7	0.030	RXR2652258	2652258	RXR2652258W	2652280
RXRL-7	1/2	1 5/8	4	-	1/2	7	0.060	RXR2652259	2652259	RXR2652259W	2652281
RXRS-7	5/8	3/4	3	-	5/8	7	0.030	RXR2652260	2652260	RXR2652260W	2652282
RXRS-7	5/8	3/4	3	-	5/8	7	0.060	RXR2652261	2652261	RXR2652261W	2652283
RXRM-7	5/8	1 3/8	3 1/2	-	5/8	7	0.030	RXR2652262	2652262	RXR2652262W	2652284
RXRM-7	5/8	1 3/8	3 1/2	-	5/8	7	0.060	RXR2652263	2652263	RXR2652263W	2652285
RXRL-7	5/8	2 1/4	4	-	5/8	7	0.030	RXR2652264	2652264	RXR2652264W	2652286
RXRL-7	5/8	2 1/4	4	-	5/8	7	0.060	RXR2652265	2652265	RXR2652265W	2652287
RXRS-7	3/4	1 1/8	3	-	3/4	7	0.030	RXR2652266	2652266	RXR2652266W	2652288
RXRS-7	3/4	1 1/8	3	-	3/4	7	0.060	RXR2652267	2652267	RXR2652267W	2652289
RXRM-7	3/4	1 5/8	4	-	3/4	7	0.030	RXR2652268	2652268	RXR2652268W	2652290
RXRM-7	3/4	1 5/8	4	-	3/4	7	0.060	RXR2652269	2652269	RXR2652269W	2652291
RXRL-7	3/4	2 1/4	5	-	3/4	7	0.030	RXR2652270	2652270	RXR2652270W	2652292
RXRL-7	3/4	2 1/4	5	-	3/4	7	0.060	RXR2652271	2652271	RXR2652271W	2652293
RXRS-7	1	1 1/4	4	-	1	7	0.030	RXR2652272	2652272	RXR2652272W	2652294
RXRS-7	1	1 1/4	4	-	1	7	0.060	RXR2652273	2652273	RXR2652273W	2652295
RXRM-7	1	2 1/4	5	-	1	7	0.030	RXR2652274	2652274	RXR2652274W	2652296
RXRM-7	1	2 1/4	5	-	1	7	0.060	RXR2652275	2652275	RXR2652275W	2652297

TRX Series

The TRX end mill range has been developed from the ground up specifically for titanium. All features from substrate to geometry and coating were evaluated and fine-tuned.

Optimum Cutting Performance

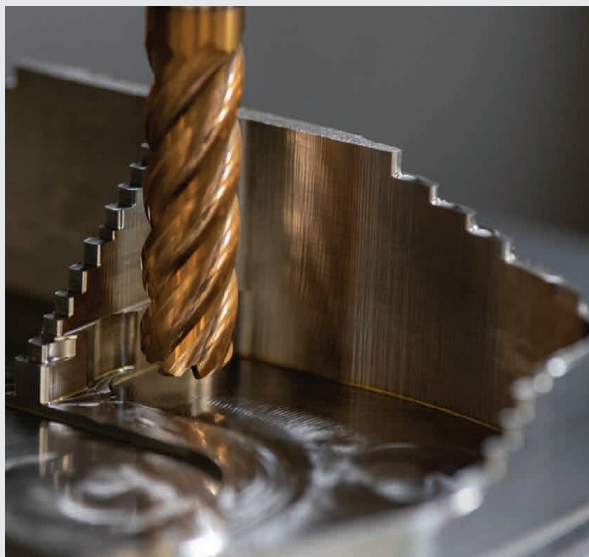
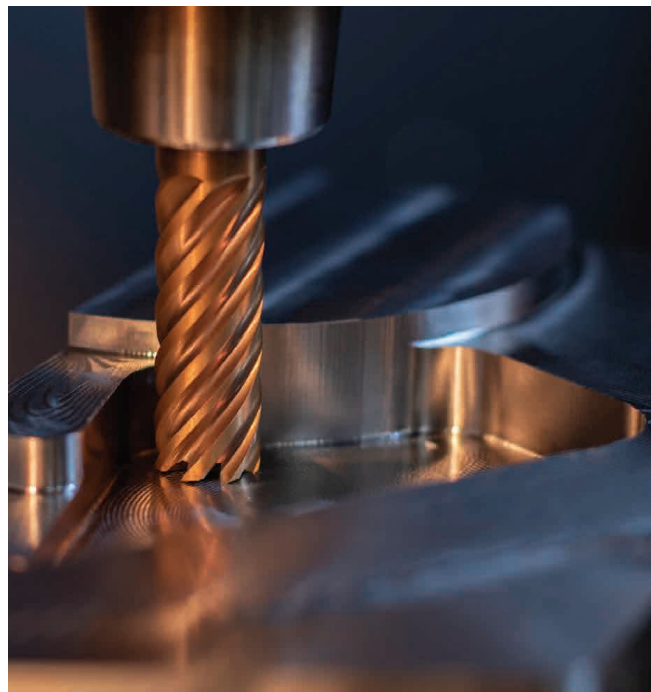
- Unequal flute spacing, and modified helix angles provide ideal harmonic dampening for smooth cutting characteristics.
- Highly controlled micro geometry with a special edge preparation ensures consistent performance.
- A new nanocomposite "X" coating formulated with excellent wear resistant qualities for titanium.

Applications - 5 Flute

- Roughing
- Heavy Profiling – 20% radial engagement
- HEM Profiling – 7% radial engagement
- Applications in ISO-S titanium alloys

Applications - 7 Flute

- HEM Profiling – 7-10% radial engagement
- Finishing operations
- Applications in ISO-S titanium alloys



Titanium Milling: Heavy Profile

Tool:

TRX (Ident No. TRX2650602)

Cutting Diameter (d1) = 5/8" No. of Flutes (z) =5

Cutting Material: Solid Carbide

Material: 6Al-4V Titanium

Cutting Data:

SFM (v_c) = 230

RPM (n) = 1,400

Feed (v_f) = 22 in/min

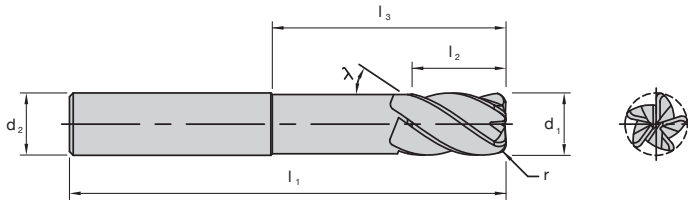
Chipload (f_z) = .0031 in

RDoC (a_e) = .100 - .125 in

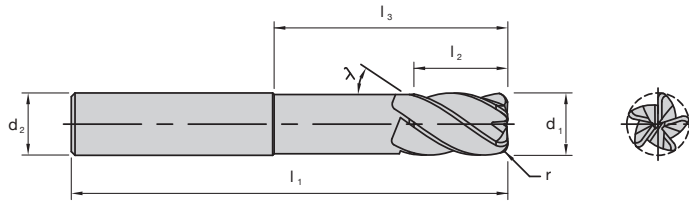
ADoC (a_p) = .500 in

TRX Series

5 Flute



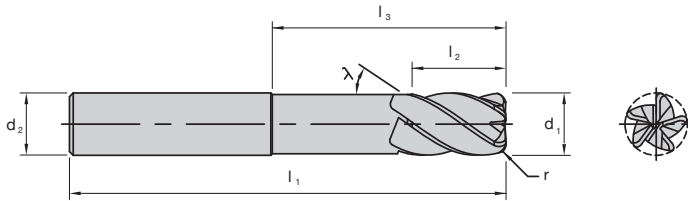
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TRXS-5	1/4	3/8	2	-	1/4	5	Square	TRX2652101	2652101
TRXS-5	1/4	3/8	2	-	1/4	5	0.015	TRX2652102	2652102
TRXM-5	1/4	3/4	2 1/2	-	1/4	5	Square	TRX2652103	2652103
TRXM-5	1/4	3/4	2 1/2	-	1/4	5	0.015	TRX2652104	2652104
TRXL-5	1/4	1 1/8	3	-	1/4	5	Square	TRX2652105	2652105
TRXL-5	1/4	1 1/8	3	-	1/4	5	0.015	TRX2652106	2652106
TRXS-5	3/8	1/2	2 1/2	-	3/8	5	Square	TRX2650567	2652107
TRXS-5	3/8	1/2	2 1/2	-	3/8	5	0.015	TRX2650568	2652108
TRXS-5	3/8	1/2	2 1/2	-	3/8	5	0.030	TRX2650569	2652109
TRXM-5	3/8	7/8	2 1/2	-	3/8	5	Square	TRX2650573	2652110
TRXM-5	3/8	7/8	2 1/2	-	3/8	5	0.015	TRX2650574	2652111
TRXM-5	3/8	7/8	2 1/2	-	3/8	5	0.030	TRX2650575	2652112
TRXL-5	3/8	1 1/4	3	-	3/8	5	Square	TRX2650579	2652113
TRXL-5	3/8	1 1/4	3	-	3/8	5	0.015	TRX2650580	2652114
TRXL-5	3/8	1 1/4	3	-	3/8	5	0.030	TRX2650581	2652115
TRXS-5	1/2	5/8	2 1/2	-	1/2	5	Square	TRX2650031	2652116
TRXS-5	1/2	5/8	2 1/2	-	1/2	5	0.015	TRX2650032	2652117
TRXS-5	1/2	5/8	2 1/2	-	1/2	5	0.030	TRX2650033	2652118
TRXS-5	1/2	5/8	2 1/2	-	1/2	5	0.060	TRX2650118	2652119
TRXS-5	1/2	5/8	2 1/2	-	1/2	5	0.120	TRX2650120	2652120
TRXM-5	1/2	1 1/4	3	-	1/2	5	Square	TRX2650037	2652121
TRXM-5	1/2	1 1/4	3	-	1/2	5	0.015	TRX2650038	2652122
TRXM-5	1/2	1 1/4	3	-	1/2	5	0.030	TRX2650039	2652123
TRXM-5	1/2	1 1/4	3	-	1/2	5	0.060	TRX2650126	2652124
TRXM-5	1/2	1 1/4	3	-	1/2	5	0.120	TRX2650128	2652125
TRXL-5	1/2	1 5/8	4	-	1/2	5	Square	TRX2650591	2652126
TRXL-5	1/2	1 5/8	4	-	1/2	5	0.015	TRX2650592	2652127
TRXL-5	1/2	1 5/8	4	-	1/2	5	0.030	TRX2650593	2652128
TRXL-5	1/2	1 5/8	4	-	1/2	5	0.060	TRX2650594	2652129
TRXL-5	1/2	1 5/8	4	-	1/2	5	0.120	TRX2652130	2652130



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TRXXL-5	1/2	2 1/8	4	-	1/2	5	Square	TRX2650596	2652131
TRXXL-5	1/2	2 1/8	4	-	1/2	5	0.015	TRX2650597	2652132
TRXXL-5	1/2	2 1/8	4	-	1/2	5	0.030	TRX2650598	2652133
TRXXL-5	1/2	2 1/8	4	-	1/2	5	0.060	TRX2650599	2652134
TRXXL-5	1/2	2 1/8	4	-	1/2	5	0.120	TRX2652135	2652135
TRXNS-5	1/2	5/8	4	-	1/2	5	Square	TRX2650043	2652136
TRXNS-5	1/2	5/8	4	-	1/2	5	0.030	TRX2650044	2652137
TRXNS-5	1/2	5/8	4	-	1/2	5	0.060	TRX2650045	2652138
TRXNS-5	1/2	5/8	4	-	1/2	5	0.120	TRX2650134	2652139
TRXS-5	5/8	3/4	3	-	5/8	5	Square	TRX2650601	2652140
TRXS-5	5/8	3/4	3	-	5/8	5	0.030	TRX2650602	2652141
TRXS-5	5/8	3/4	3	-	5/8	5	0.060	TRX2650603	2652142
TRXS-5	5/8	3/4	3	-	5/8	5	0.120	TRX2650605	2652143
TRXM-5	5/8	1 3/8	3 1/2	-	5/8	5	Square	TRX2650607	2652144
TRXM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.030	TRX2650608	2652145
TRXM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.060	TRX2650609	2652146
TRXM-5	5/8	1 3/8	3 1/2	-	5/8	5	0.120	TRX2650611	2652147
TRXL-5	5/8	1 5/8	3 1/2	-	5/8	5	Square	TRX2650613	2652148
TRXL-5	5/8	1 5/8	3 1/2	-	5/8	5	0.030	TRX2650614	2652149
TRXL-5	5/8	1 5/8	3 1/2	-	5/8	5	0.060	TRX2650615	2652150
TRXXL-5	5/8	2 1/4	4	-	5/8	5	Square	TRX2650616	2652151
TRXXL-5	5/8	2 1/4	4	-	5/8	5	0.030	TRX2650617	2652152
TRXXL-5	5/8	2 1/4	4	-	5/8	5	0.060	TRX2650618	2652153
TRXS-5	3/4	1 1/8	3	-	3/4	5	Square	TRX2650054	2652154
TRXS-5	3/4	1 1/8	3	-	3/4	5	0.030	TRX2650055	2652155
TRXS-5	3/4	1 1/8	3	-	3/4	5	0.060	TRX2650056	2652156
TRXS-5	3/4	1 1/8	3	-	3/4	5	0.090	TRX2650147	2652157
TRXS-5	3/4	1 1/8	3	-	3/4	5	0.120	TRX2650057	2652158
TRXS-5	3/4	1 1/8	3	-	3/4	5	0.250	TRX2650149	2652159
TRXM-5	3/4	1 5/8	4	-	3/4	5	Square	TRX2650063	2652160

TRX Series

5 Flute



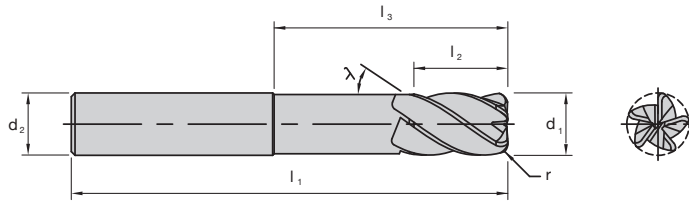
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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TRXM-5	3/4	1 5/8	4	-	3/4	5	0.030	TRX2650064	2652161
TRXM-5	3/4	1 5/8	4	-	3/4	5	0.060	TRX2650065	2652162
TRXM-5	3/4	1 5/8	4	-	3/4	5	0.090	TRX2650159	2652163
TRXM-5	3/4	1 5/8	4	-	3/4	5	0.120	TRX2650066	2652164
TRXM-5	3/4	1 5/8	4	-	3/4	5	0.250	TRX2650161	2652165
TRXL-5	3/4	2 1/4	5	-	3/4	5	Square	TRX2650102	2652166
TRXL-5	3/4	2 1/4	5	-	3/4	5	0.030	TRX2650103	2652167
TRXL-5	3/4	2 1/4	5	-	3/4	5	0.060	TRX2650167	2652168
TRXL-5	3/4	2 1/4	5	-	3/4	5	0.090	TRX2650168	2652169
TRXL-5	3/4	2 1/4	5	-	3/4	5	0.120	TRX2650169	2652170
TRXL-5	3/4	2 1/4	5	-	3/4	5	0.250	TRX2650171	2652171
TRXXL-5	3/4	3 1/8	5	-	3/4	5	Square	TRX2650619	2652172
TRXXL-5	3/4	3 1/8	5	-	3/4	5	0.030	TRX2650620	2652173
TRXXL-5	3/4	3 1/8	5	-	3/4	5	0.060	TRX2650621	2652174
TRXNS-5	3/4	1 1/8	5	2 5/8	3/4	5	Square	TRX2652175	2652175
TRXNS-5	3/4	1 1/8	5	2 5/8	3/4	5	0.030	TRX2652176	2652176
TRXNS-5	3/4	1 1/8	5	2 5/8	3/4	5	0.060	TRX2652177	2652177
TRXNS-5	3/4	1 1/8	5	2 5/8	3/4	5	0.090	TRX2652178	2652178
TRXNS-5	3/4	1 1/8	5	2 5/8	3/4	5	0.120	TRX2652179	2652179
TRXNS-5	3/4	1 1/8	5	2 5/8	3/4	5	0.190	TRX2652180	2652180
TRXS-5	1	1 1/4	4	-	1	5	Square	TRX2650193	2652181
TRXS-5	1	1 1/4	4	-	1	5	0.030	TRX2650081	2652182
TRXS-5	1	1 1/4	4	-	1	5	0.060	TRX2650194	2652183
TRXS-5	1	1 1/4	4	-	1	5	0.090	TRX2650195	2652184
TRXM-5	1	1 5/8	4	-	1	5	Square	TRX2652185	2652185
TRXM-5	1	1 5/8	4	-	1	5	0.030	TRX2652186	2652186
TRXM-5	1	1 5/8	4	-	1	5	0.060	TRX2652187	2652187
TRXM-5	1	1 5/8	4	-	1	5	0.090	TRX2652188	2652188
TRXL-5	1	2 1/8	5	-	1	5	Square	TRX2650205	2652189
TRXL-5	1	2 1/8	5	-	1	5	0.030	TRX2650090	2652190

Cutting data recommendations on page 105

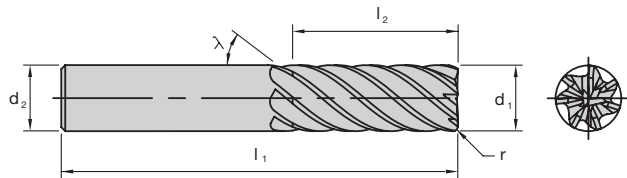
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TRX Series

5 Flute

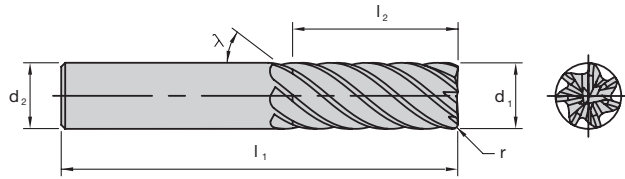


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	SAP No.
TRXL-5	1	2 1/8	5	-	1	5	0.060	TRX2650206	2652191
TRXL-5	1	2 1/8	5	-	1	5	0.090	TRX2650207	2652192
TRXXL-5	1	3 1/8	6	-	1	5	Square	TRX2650623	2652193
TRXXL-5	1	3 1/8	6	-	1	5	0.030	TRX2650624	2652194
TRXXL-5	1	3 1/8	6	-	1	5	0.060	TRX2650625	2652195
TRXNM-5	1	1 1/4	6	3 1/8	1	5	Square	TRX2650208	2652196
TRXNM-5	1	1 1/4	6	3 1/8	1	5	0.030	TRX2650209	2652197
TRXNM-5	1	1 1/4	6	3 1/8	1	5	0.060	TRX2650094	2652198
TRXNL-5	1	1 1/4	7	4 1/8	1	5	Square	TRX2650212	2652199
TRXNL-5	1	1 1/4	7	4 1/8	1	5	0.030	TRX2650213	2652200
TRXNL-5	1	1 1/4	7	4 1/8	1	5	0.060	TRX2650097	2652201

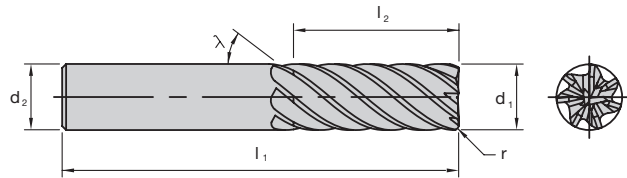


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Series	Cutting Diameter d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shank Diameter d ₂	Flutes z	Corner Radius r	Ident No.	Ident SAP No.	Chip Splitter Ident No.	Chip Splitter SAP No.
TRXM-7	3/8	7/8	3	—	3/8	7	Square	TRX700021	2653617	TRX700022	2653723
TRXM-7	3/8	7/8	3	—	3/8	7	0.015	TRX700023	2653618	TRX700024	2653724
TRXM-7	3/8	7/8	3	—	3/8	7	0.020	TRX700025	2653619	TRX700026	2653725
TRXM-7	3/8	7/8	3	—	3/8	7	0.030	TRX700027	2653620	TRX700028	2653726
TRXM-7	3/8	7/8	3	—	3/8	7	0.040	TRX700029	2653621	TRX700030	2653727
TRXL-7	3/8	1 1/4	3	—	3/8	7	Square	TRX700031	2653622	TRX700032	2653728
TRXL-7	3/8	1 1/4	3	—	3/8	7	0.015	TRX700033	2653623	TRX700034	2653729
TRXL-7	3/8	1 1/4	3	—	3/8	7	0.030	TRX700035	2653624	TRX700036	2653730
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	Square	TRX700051	2653625	—	—
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	0.020	TRX700401	2653626	—	—
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	0.030	TRX700055	2653627	—	—
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	0.040	TRX700403	2653628	—	—
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	0.060	TRX700057	2653629	—	—
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	0.090	TRX700059	2653630	—	—
TRXS-7	1/2	5/8	2 1/2	—	1/2	7	0.120	TRX700061	2653631	—	—
TRXM-7	1/2	1 1/4	3	—	1/2	7	Square	TRX700107	2653632	TRX700108	2653731
TRXM-7	1/2	1 1/4	3	—	1/2	7	0.030	TRX700111	2653633	TRX700112	2653732
TRXM-7	1/2	1 1/4	3	—	1/2	7	0.060	TRX700113	2653634	—	—
TRXM-7	1/2	1 1/4	3	—	1/2	7	0.090	TRX700115	2653635	—	—
TRXM-7	1/2	1 1/4	3	—	1/2	7	0.120	TRX700117	2653636	—	—
TRXXL-7	1/2	2 1/8	4	—	1/2	7	Square	TRX700163	2653637	TRX700164	2653733
TRXXL-7	1/2	2 1/8	4	—	1/2	7	0.030	TRX700167	2653638	TRX700168	2653734
TRXXL-7	1/2	2 1/8	4	—	1/2	7	0.060	TRX700169	2653639	—	—
TRXXL-7	1/2	2 1/8	4	—	1/2	7	0.090	TRX700171	2653640	—	—
TRXXL-7	1/2	2 1/8	4	—	1/2	7	0.120	TRX700173	2653641	—	—
TRXNM-7	1/2	1 1/4	5	3 1/8	1/2	7	Square	TRX700405	2653642	TRX700406	2653735
TRXNM-7	1/2	1 1/4	5	3 1/8	1/2	7	0.030	TRX700407	2653643	TRX700408	2653736
TRXNM-7	1/2	1 1/4	5	3 1/8	1/2	7	0.060	TRX700409	2653644	—	—
TRXNM-7	1/2	1 1/4	5	3 1/8	1/2	7	0.120	TRX700411	2653645	—	—
TRXNL-7	1/2	1 1/4	6	4 1/8	1/2	7	Square	TRX700413	2653646	TRX700414	2653737

TRX Series 7 Flute

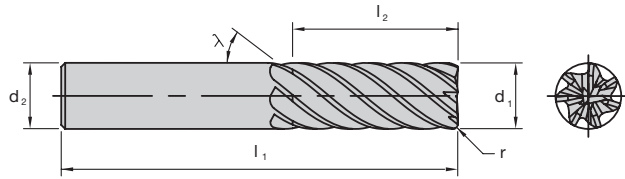


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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	Ident SAP No.	Chip Splitter Ident No.	Chip Splitter SAP No.
TRXNL-7	1/2	1 1/4	6	4 1/8	1/2	7	0.030	TRX700415	2653647	TRX700416	2653738
TRXNL-7	1/2	1 1/4	6	4 1/8	1/2	7	0.060	TRX700417	2653648	—	—
TRXNL-7	1/2	1 1/4	6	4 1/8	1/2	7	0.090	TRX700419	2653649	—	—
TRXNL-7	1/2	1 1/4	6	4 1/8	1/2	7	0.120	TRX700421	2653650	—	—
TRXM-7	5/8	1 1/4	3 1/2	—	5/8	7	Square	TRX700423	2653651	TRX700424	2653739
TRXM-7	5/8	1 1/4	3 1/2	—	5/8	7	0.030	TRX700425	2653652	TRX700426	2653740
TRXM-7	5/8	1 1/4	3 1/2	—	5/8	7	0.060	TRX700427	2653653	TRX700428	2653741
TRXM-7	5/8	1 1/4	3 1/2	—	5/8	7	0.120	TRX700429	2653654	—	—
TRXL-7	5/8	1 3/4	4	—	5/8	7	Square	TRX700431	2653655	TRX700432	2653742
TRXL-7	5/8	1 3/4	4	—	5/8	7	0.030	TRX700433	2653656	TRX700434	2653743
TRXL-7	5/8	1 3/4	4	—	5/8	7	0.060	TRX700435	2653657	TRX700436	2653744
TRXL-7	5/8	1 3/4	4	—	5/8	7	0.120	TRX700437	2653658	—	—
TRXXL-7	5/8	2 1/4	5	—	5/8	7	Square	TRX700177	2653659	TRX700178	2653745
TRXXL-7	5/8	2 1/4	5	—	5/8	7	0.030	TRX700179	2653660	TRX700180	2653746
TRXXL-7	5/8	2 1/4	5	—	5/8	7	0.060	TRX700181	2653661	TRX700182	2653747
TRXXL-7	5/8	2 1/4	5	—	5/8	7	0.120	TRX700185	2653662	—	—
TRXNM-7	5/8	1 5/8	5	3 1/8	5/8	7	Square	TRX700439	2653663	TRX700440	2653748
TRXNM-7	5/8	1 5/8	5	3 1/8	5/8	7	0.030	TRX700441	2653664	TRX700442	2653749
TRXNM-7	5/8	1 5/8	5	3 1/8	5/8	7	0.060	TRX700443	2653665	TRX700444	2653750
TRXNM-7	5/8	1 5/8	5	3 1/8	5/8	7	0.090	TRX700445	2653666	—	—
TRXNM-7	5/8	1 5/8	5	3 1/8	5/8	7	0.120	TRX700447	2653667	—	—
TRXS-7	3/4	1 1/4	4	—	3/4	7	Square	TRX700079	2653668	—	—
TRXS-7	3/4	1 1/4	4	—	3/4	7	0.030	TRX700081	2653669	—	—
TRXS-7	3/4	1 1/4	4	—	3/4	7	0.060	TRX700083	2653670	—	—
TRXS-7	3/4	1 1/4	4	—	3/4	7	0.090	TRX700085	2653671	—	—
TRXS-7	3/4	1 1/4	4	—	3/4	7	0.120	TRX700087	2653672	—	—
TRXS-7	3/4	1 1/4	4	—	3/4	7	0.250	TRX700091	2653673	—	—
TRXM-7	3/4	1 3/4	4	—	3/4	7	Square	TRX700135	2653674	TRX700136	2653751
TRXM-7	3/4	1 3/4	4	—	3/4	7	0.030	TRX700137	2653675	TRX700138	2653752
TRXM-7	3/4	1 3/4	4	—	3/4	7	0.060	TRX700139	2653676	TRX700140	2653753

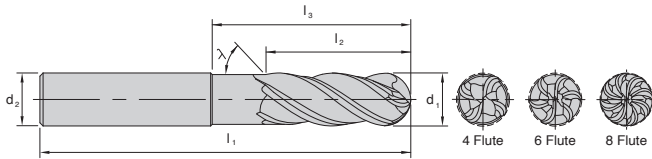


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Series	Cutting Diameter d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Shank Diameter d ₂	Flutes z	Corner Radius r	Ident No.	Ident SAP No.	Chip Splitter Ident No.	Chip Splitter SAP No.
TRXM-7	3/4	1 3/4	4	—	3/4	7	0.090	TRX700141	2653677	—	—
TRXM-7	3/4	1 3/4	4	—	3/4	7	0.120	TRX700145	2653678	—	—
TRXM-7	3/4	1 3/4	4	—	3/4	7	0.250	TRX700147	2653679	—	—
TRXL-7	3/4	2 5/8	5	—	3/4	7	Square	TRX700191	2653680	TRX700192	2653754
TRXL-7	3/4	2 5/8	5	—	3/4	7	0.030	TRX700193	2653681	TRX700194	2653755
TRXL-7	3/4	2 5/8	5	—	3/4	7	0.060	TRX700195	2653682	TRX700196	2653756
TRXL-7	3/4	2 5/8	5	—	3/4	7	0.090	TRX700197	2653683	—	—
TRXL-7	3/4	2 5/8	5	—	3/4	7	0.120	TRX700199	2653684	—	—
TRXL-7	3/4	2 5/8	5	—	3/4	7	0.250	TRX700203	2653685	—	—
TRXNM-7	3/4	1 5/8	5	3 1/8	3/4	7	Square	TRX700449	2653686	—	—
TRXNM-7	3/4	1 5/8	5	3 1/8	3/4	7	0.030	TRX700451	2653687	—	—
TRXNM-7	3/4	1 5/8	5	3 1/8	3/4	7	0.060	TRX700453	2653688	—	—
TRXNM-7	3/4	1 5/8	5	3 1/8	3/4	7	0.090	TRX700455	2653689	—	—
TRXNM-7	3/4	1 5/8	5	3 1/8	3/4	7	0.120	TRX700457	2653690	—	—
TRXNM-7	3/4	1 5/8	5	3 1/8	3/4	7	0.250	TRX700459	2653691	—	—
TRXNL-7	3/4	1 5/8	6	4 1/8	3/4	7	Square	TRX700461	2653692	—	—
TRXNL-7	3/4	1 5/8	6	4 1/8	3/4	7	0.030	TRX700463	2653693	—	—
TRXNL-7	3/4	1 5/8	6	4 1/8	3/4	7	0.060	TRX700465	2653694	—	—
TRXNL-7	3/4	1 5/8	6	4 1/8	3/4	7	0.090	TRX700467	2653695	—	—
TRXNL-7	3/4	1 5/8	6	4 1/8	3/4	7	0.120	TRX700469	2653696	—	—
TRXNL-7	3/4	1 5/8	6	4 1/8	3/4	7	0.250	TRX700471	2653697	—	—
TRXS-7	1	1 3/8	4	—	1	7	Square	TRX700093	2653698	—	—
TRXS-7	1	1 3/8	4	—	1	7	0.030	TRX700095	2653699	—	—
TRXS-7	1	1 3/8	4	—	1	7	0.060	TRX700097	2653700	—	—
TRXS-7	1	1 3/8	4	—	1	7	0.120	TRX700101	2653701	—	—
TRXS-7	1	1 3/8	4	—	1	7	0.250	TRX700105	2653702	—	—
TRXL-7	1	2 3/8	5	—	1	7	Square	TRX700473	2653703	—	—
TRXL-7	1	2 3/8	5	—	1	7	0.030	TRX700475	2653704	—	—
TRXL-7	1	2 3/8	5	—	1	7	0.060	TRX700477	2653705	—	—
TRXL-7	1	2 3/8	5	—	1	7	0.120	TRX700479	2653706	—	—

TRX Series 7 Flute



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Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Shank Diameter d_2	Flutes z	Corner Radius r	Ident No.	Ident SAP No.	Chip Splitter Ident No.	Chip Splitter SAP No.
TRXL-7	1	2 3/8	5	—	1	7	0.250	TRX700481	2653707	—	—
TRXXL-7	1	3 3/8	6	—	1	7	Square	TRX700483	2653708	—	—
TRXXL-7	1	3 3/8	6	—	1	7	0.030	TRX700485	2653709	—	—
TRXXL-7	1	3 3/8	6	—	1	7	0.060	TRX700487	2653710	—	—
TRXXL-7	1	3 3/8	6	—	1	7	0.120	TRX700489	2653711	—	—
TRXXL-7	1	3 3/8	6	—	1	7	0.250	TRX700491	2653712	—	—
TRXNM-7	1	2	5	3 1/8	1	7	Square	TRX700493	2653713	—	—
TRXNM-7	1	2	5	3 1/8	1	7	0.030	TRX700495	2653714	—	—
TRXNM-7	1	2	5	3 1/8	1	7	0.060	TRX700497	2653715	—	—
TRXNM-7	1	2	5	3 1/8	1	7	0.120	TRX700499	2653716	—	—
TRXNM-7	1	2	5	3 1/8	1	7	0.250	TRX700501	2653717	—	—
TRXNL-7	1	2	7	4 1/8	1	7	Square	TRX700503	2653718	—	—
TRXNL-7	1	2	7	4 1/8	1	7	0.030	TRX700505	2653719	—	—
TRXNL-7	1	2	7	4 1/8	1	7	0.060	TRX700507	2653720	—	—
TRXNL-7	1	2	7	4 1/8	1	7	0.120	TRX700509	2653721	—	—
TRXNL-7	1	2	7	4 1/8	1	7	0.250	TRX700511	2653722	—	—



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Series	Cutting Dia. d_1	LOC L_2	OAL L_1	Neck Length L_3	Shank Dia. d_2	Flutes z	Corner Radius r	Ident Number	SAP Number
TRXBS-4	1/4	3/8	2	-	1/4	4	Ball	TRX2661700	2661700
TRXBM-4	1/4	3/4	2 1/2	-	1/4	4	Ball	TRX2661701	2661701
TRXBNS-4	1/4	3/8	4	1 1/8	1/4	4	Ball	TRX2661702	2661702
TRXBNM-4	1/4	3/8	4	1 5/8	1/4	4	Ball	TRX2661703	2661703
TRXBS-4	3/8	1/2	2	-	3/8	4	Ball	TRX2661704	2661704
TRXBM-4	3/8	7/8	3	-	3/8	4	Ball	TRX2661705	2661705
TRXBL-4	3/8	1 1/4	3	-	3/8	4	Ball	TRX2661706	2661706
TRXBNS-4	3/8	1/2	4	2 1/8	3/8	4	Ball	TRX2661707	2661707
TRXBNM-4	3/8	1/2	6	3 1/8	3/8	4	Ball	TRX2661708	2661708
TRXBS-6	1/2	5/8	2 1/2	-	1/2	6	Ball	TRX2661709	2661709
TRXBM-6	1/2	1 1/8	3	-	1/2	6	Ball	TRX2661710	2661710
TRXBL-6	1/2	1 5/8	4	-	1/2	6	Ball	TRX2661711	2661711
TRXBNS-6	1/2	5/8	4	2 1/8	1/2	6	Ball	TRX2661712	2661712
TRXBNM-6	1/2	5/8	6	3 1/8	1/2	6	Ball	TRX2661713	2661713
TRXBNL-6	1/2	5/8	6	4 1/8	1/2	6	Ball	TRX2661714	2661714
TRXBS-6	3/4	1 1/8	4	-	3/4	6	Ball	TRX2661715	2661715
TRXBM-6	3/4	1 5/8	4	-	3/4	6	Ball	TRX2661716	2661716
TRXBL-6	3/4	2 1/4	5	-	3/4	6	Ball	TRX2661717	2661717
TRXBNS-6	3/4	1 1/4	4	2 1/2	3/4	6	Ball	TRX2661718	2661718
TRXBNM-6	3/4	1 1/4	6	3 1/2	3/4	6	Ball	TRX2661719	2661719
TRXBNL-6	3/4	1 1/4	6	4 1/8	3/4	6	Ball	TRX2661720	2661720
TRXBS-8	1	1 1/4	4	-	1	8	Ball	TRX2661721	2661721
TRXBM-8	1	2 1/4	5	-	1	8	Ball	TRX2661722	2661722
TRXBL-8	1	3 1/4	6	-	1	8	Ball	TRX2661723	2661723
TRXBNS-8	1	1 1/4	5	2 1/2	1	8	Ball	TRX2661724	2661724
TRXBNM-8	1	1 1/4	7	3 5/8	1	8	Ball	TRX2661725	2661725

■ = First Choice □ = Second Choice

Radial Milling Cutter (RMC) Series

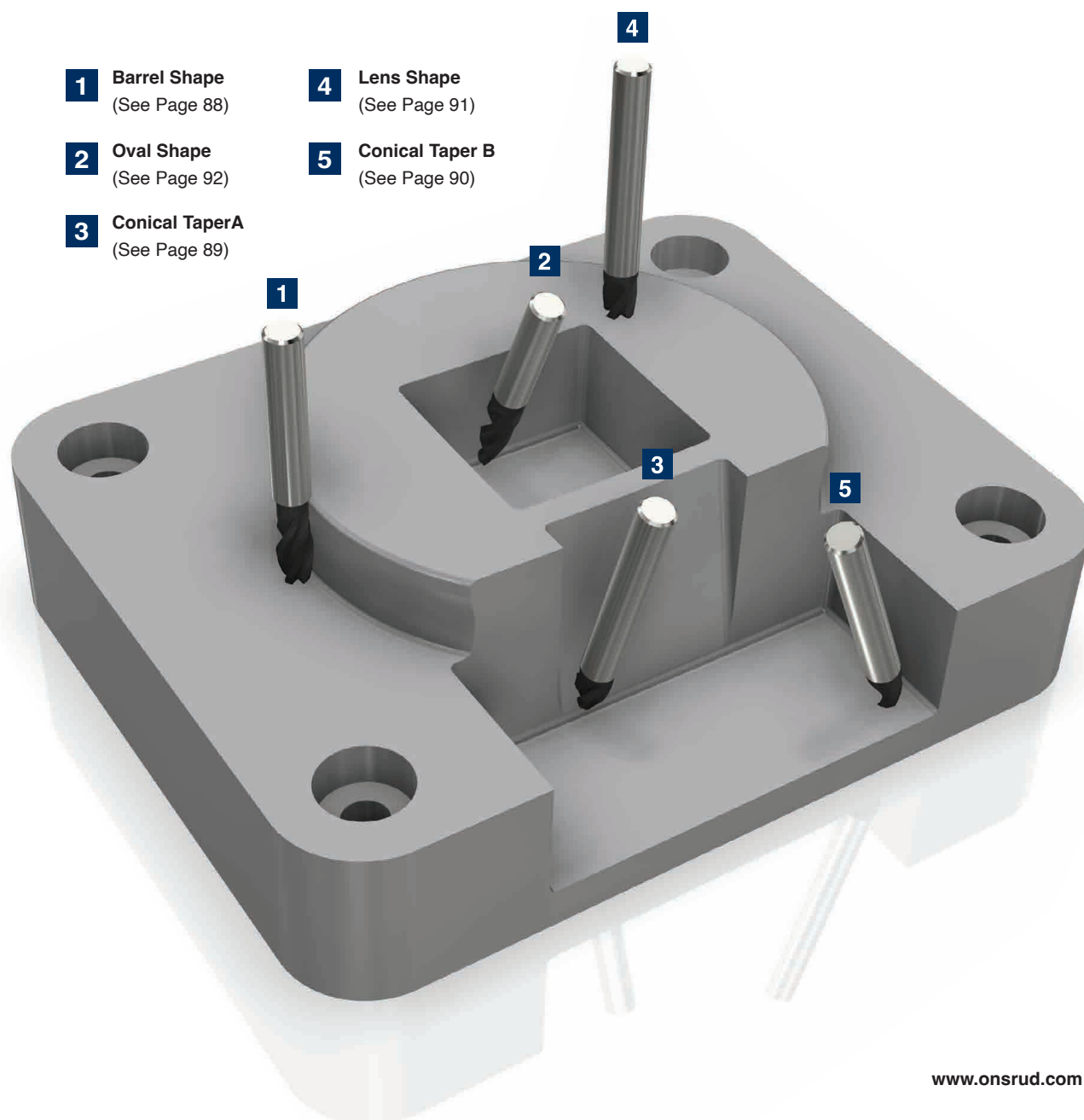
The Perfect Solution

Reduced Cycle Times. Increased Surface Quality.

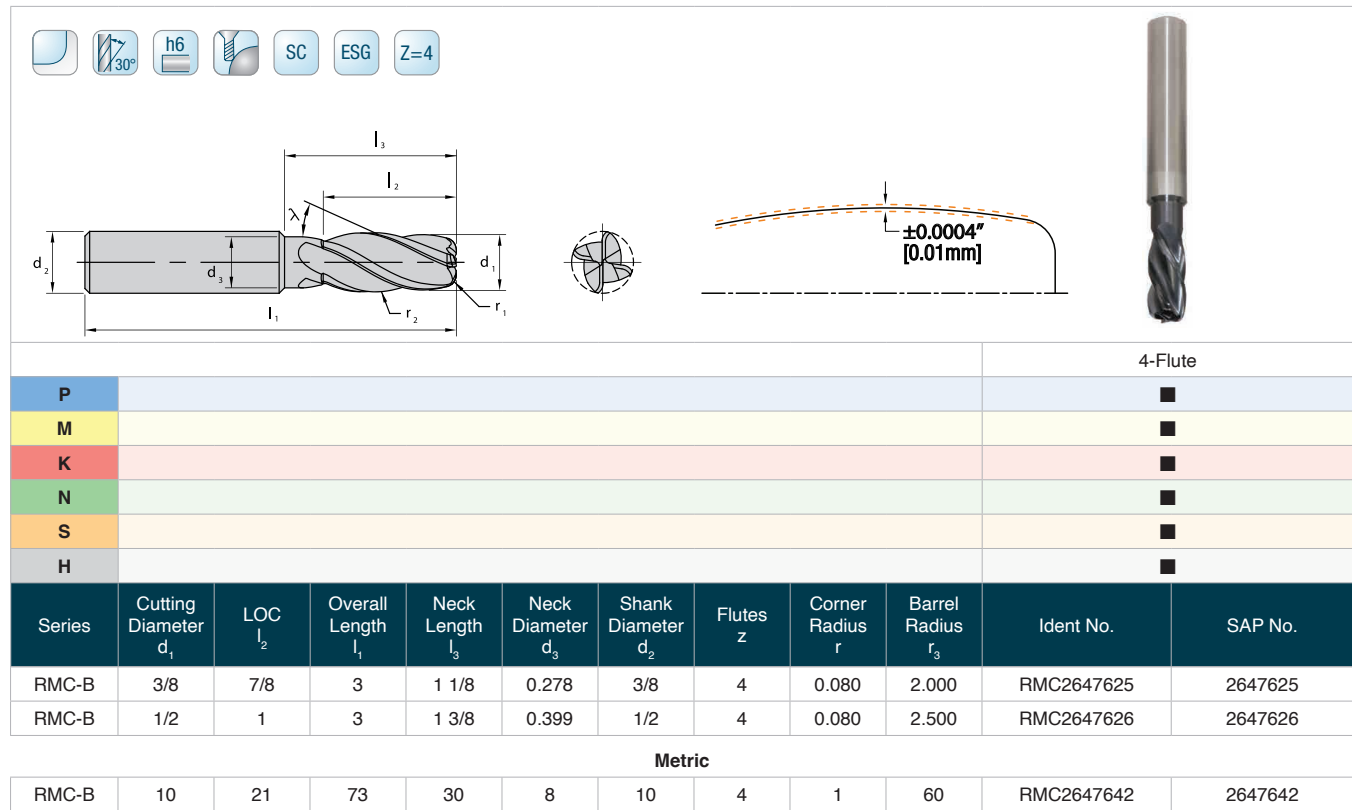
A new breed of cutting tools powered by the latest in CAM technology is ready to take on some of the toughest challenges in the machining of complex parts.

LMT Onsrud's Radial Milling Cutter family, with their large radii profiles, emulate ballnose tooling on an entirely different scale. The large radii increases your step over distance between tool paths. This enables more efficient strategies in blade machining, mold making, and the production of thin-walled aerostructures.

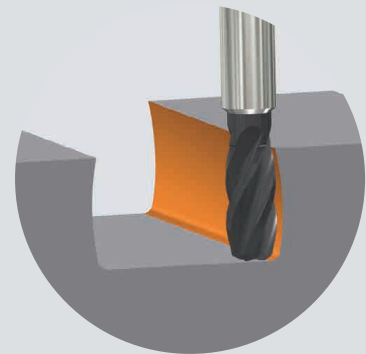
To take full advantage of this concept, a 5-axis machining center and a CAM system capable of supporting the tool path strategies is required.



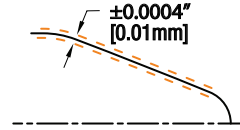
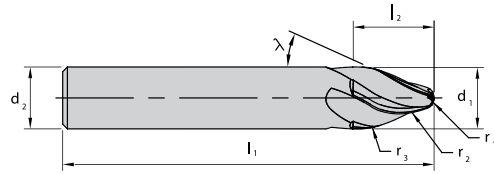
Radial Milling Cutter Series Barrel Shape



The Barrel Shape has a continuous radius along the length of cut and a reduced neck.



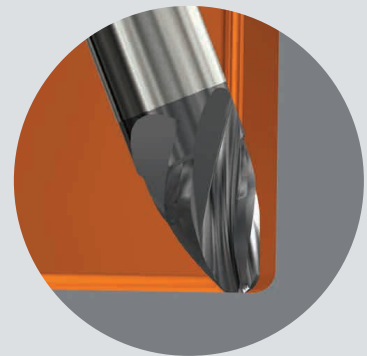
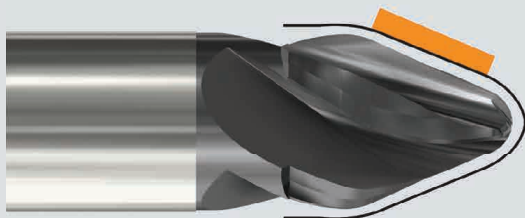
Radial Milling Cutter Series Conical Taper A



												4-Flute	
P												■	
M												■	
K												■	
N												■	
S												■	
H												■	
Series	Cutting Diameter d ₁	LOC l ₂	Overall Length l ₁	Neck Length l ₃	Neck Diameter d ₃	Shank Diameter d ₂	Flutes z	Corner Radius r ₁	Corner Radius r ₂	Corner Radius r ₃	Tilt Angle	Ident No.	SAP No.
RMC-CTA	1/4	0.425	2 1/2	-	-	1/4	4	0.040	10	0.120	12.5°	RMC2647631	2647631
RMC-CTA	5/8	1 1/4	4	-	-	5/8	4	0.080	40	0.190	12.5°	RMC2647632	2647632
RMC-CTA	5/16	.0450	3	-	-	5/16	4	0.060	10	0.150	17.5°	RMC2647633	2647633
RMC-CTA	3/8	0.475	3	-	-	3/8	4	0.080	10	0.190	20°	RMC2647634	2647634
RMC-CTA	1/2	1/2	3	-	-	1/2	4	0.120	10	0.250	20°	RMC2647635	2647635
RMC-CTA	5/8	5/8	4	-	-	5/8	4	0.160	60	0.250	20°	RMC2647636	2647636

Metric													
RMC-CTA	16	24	109	-	-	16	4	4	1000	5	12.5°	RMC2647646	2647646
RMC-CTA	6	9.5	64	-	-	6	4	1	250	3	17.5°	RMC2647647	2647647
RMC-CTA	10	12.5	80	-	-	10	4	2	250	5	20°	RMC2647648	2647648
RMC-CTA	12	22	88	-	-	12	4	3	250	6	20°	RMC2647649	2647649

The Conical Taper Form A is a side cutting end mill with a mutiple radii blend for milling steep walls with a tilt angle <45°.

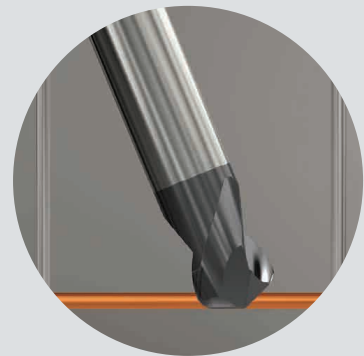
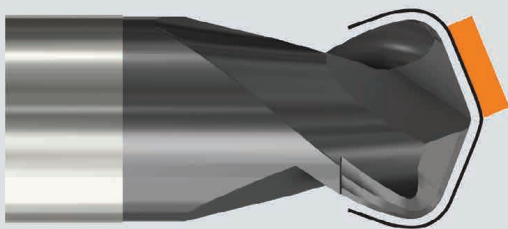


Radial Milling Cutter Series Conical Taper B

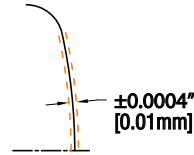
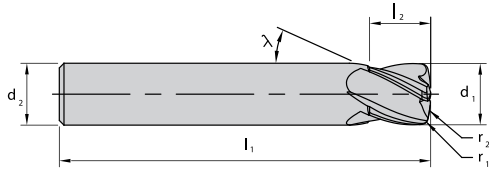


												2-Flute	
P												■	
M												■	
K												■	
N												■	
S												■	
H												■	
Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Neck Length l_3	Neck Diameter d_3	Shank Diameter d_2	Flutes z	Corner Radius r_1	Corner Radius r_2	Corner Radius r_3	Tilt Angle	Ident No.	SAP No.
RMC-CTB	3/8	1/4	3	-	-	3/8	2	0.040	8	0.060	70°	RMC2647637	2647637
Metric													
RMC-CTB	10	6	81	-	-	10	2	1	200	2	70°	RMC2647650	2648216

The Conical Taper Form B has an end cutting geometry for tilt angles $>45^\circ$ for semi-finishing and finishing workpiece floors.



Radial Milling Cutter Series Lens Shape

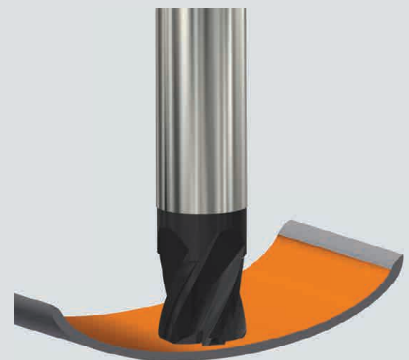
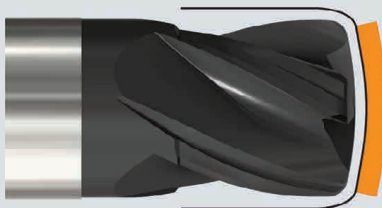


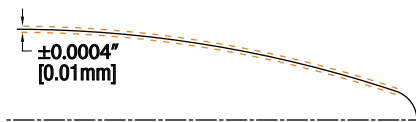
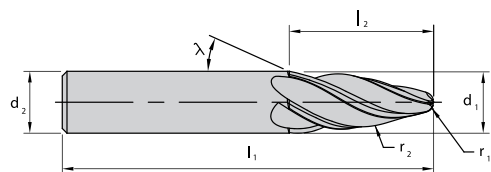
										2-Flute	
P										■	
M										■	
K										■	
N										■	
S										■	
H										■	
Series	Cutting Diameter d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Neck Diameter d_3	Shank Diameter d_2	Flutes Z	Corner Radius r_1	Lens Radius r_2	Ident No.	SAP No.
RMC-L	0.1575	1/4	2 1/2	3/4	0.1575	1/4	4	0.010	0.250	RMC2647638	2647638
RMC-L	5/16	5/16	2 1/2	-	-	5/16	4	0.030	0.600	RMC2647639	2647639
RMC-L	3/8	3/8	3	-	-	3/8	4	0.040	0.800	RMC2647640	2647640
RMC-L	1/2	1/2	3	-	-	1/2	4	0.050	1.000	RMC2647641	2647641
RMC-L	1/2	1/2	3	-	-	1/2	8	0.050	1.000	RMC2647652	2663173

Metric

RMC-L	16	16	100	-	-	16	4	2	30	RMC2647651	2648217
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The Lens Shape Radial Milling Cutter utilizes a convex face cutting geometry which is useful for contoured floor finishing.



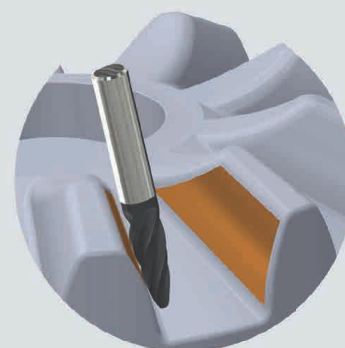


										4-Flute	
P										■	
M										■	
K										■	
N										■	
S										■	
H										■	
Series	Cutting Diameter d_1	LOC L_2	Overall Length L_1	Neck Length L_3	Neck Diameter d_3	Shank Diameter d_2	Flutes Z	Corner Radius r_1	Oval Radius r_2	Ident No.	SAP No.
RMC-O	1/4	0.830	2 1/2	-	-	1/4	4	0.040	3.750	RMC2647627	2647627
RMC-O	3/8	0.915	3	-	-	3/8	4	0.080	3.375	RMC2647628	2647628
RMC-O	1/2	1.100	3	-	-	1/2	4	0.080	3.125	RMC2647629	2647629
RMC-O	5/8	1.150	3 1/2	-	-	5/8	4	0.120	3.000	RMC2647630	2647630
RMC-O	1/2	1.100	3	-	-	1/2	8	0.080	3.125	RMC2647652	2663174

Metric

RMC-O	6	22	64	-	-	6	4	1	95	RMC2647643	2647643
RMC-O	10	24.5	73	-	-	10	4	2	90	RMC2647644	2647644
RMC-O	12	27	84	-	-	12	4	2	85	RMC2647645	2647645

The Oval Shape has a side cutting geometry with a continuous radius ending at the cutting diameter.



MDR Ballnose Series

The MDR Ballnose is optimized for High Speed Machining techniques with low radial engagement in mold and die steel.

Features and Benefits

- Engineered to provide more clearance to make complex contours attainable.
- Unique conical design stabilizes the tool for superior finish.
- ENDURASpeed Red coating combined with a reinforced cutting edge ensures longer tool life.
- The MDR 2 flute ball nose end mill is specifically designed for mold steels.

Applications

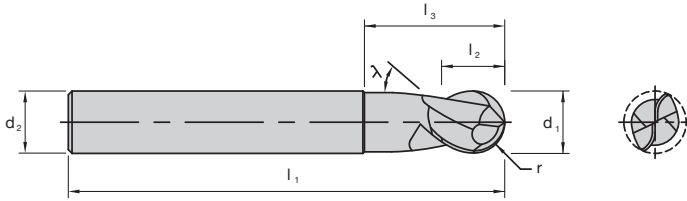
- Finishing

Usage

- Mold and Die Steel

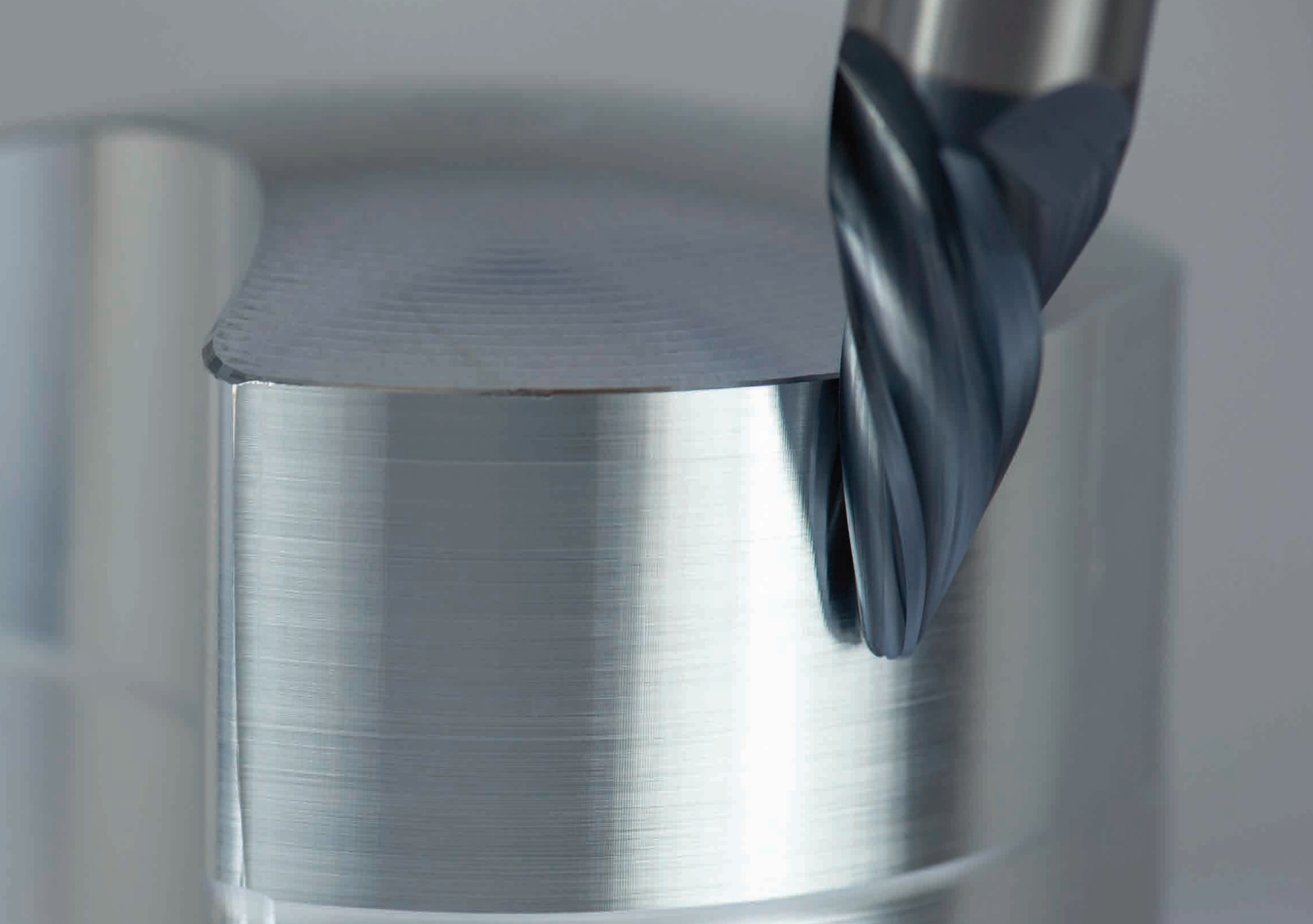


MDR Series 2 Flute Ballnose



									2-Flute	
P										
M										
K										
N										
S										
H									■	
Series	Cutting Diameter d_1	LOC l_2	Overall Length l_1	Extended Reach l_3	Shank Diameter d_2	Angle	Flutes z	Corner Radius r	Ident No.	SAP No.
MDR-2	1/16	1/16	3	1/8	1/4	8	2	0.031	MDR2641036	2641036
MDR-2	3/32	3/32	3	3/16	1/4	8	2	0.047	MDR2641037	2641037
MDR-2	1/8	1/8	3	1/4	1/4	9	2	0.063	MDR2641038	2641038
MDR-2	3/16	3/16	3	3/8	1/4	9	2	0.094	MDR2641039	2641039
MDR-2	1/4	1/4	3 1/2	1/2	1/4	-	2	0.125	MDR2641040	2641040
MDR-2	5/16	5/16	4	3/4	5/16	-	2	0.156	MDR2641041	2641041
MDR-2	3/8	3/8	4	7/8	3/8	-	2	0.188	MDR2641042	2641042
MDR-2	1/2	1/2	4 1/2	1 1/8	1/2	-	2	0.250	MDR2641043	2641043

Cutting Diameter (inch)	Tolerances (inch) Diameter	SHK
1/16 - 3/32	+0/-0.0010	h6
> 3/32 - 1/4	+0/-0.0012	h6
> 1/4 - 3/8	+0/-0.0016	h6
> 3/8 - 1/2	+0/-0.0020	h6



Technical Information

ALU 2 & 3 Flute Series Non-Coolant Through

ISO Grade	Material	SFM Range	Application	Recommended Starting Parameters											
				Rad DOC % of DIA	Axial DOC x DIA	SFM Starting	Chip Load Per Tooth								
							1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
N	Aluminum	500 -1500	Full Slotting	100%	1x	1000	.0015	.0020	.0027	.0035	.0043	.0056	.0070	.0085	.0112
			Heavy Profile	33%	1x	1200	.0016	.0021	.0029	.0037	.0046	.0060	.0074	.0090	.0119
			HEM*Profile	15%	2x	1200	.0021	.0028	.0038	.0049	.0060	.0078	.0098	.0119	.0157
			Finishing	5%	2x	1000	.0034	.0046	.0062	.0080	.0099	.0128	.0161	.0195	.0257
	Brass / Bronze	500 - 900	Full Slotting	100%	1x	600	.0013	.0016	.0023	.0027	.0034	.0046	.0057	.0069	.0091
			Heavy Profile	25%	1x	700	.0015	.0018	.0027	.0031	.0039	.0053	.0066	.0080	.0105
			HEM*Profile	15%	2x	700	.0018	.0022	.0032	.0038	.0048	.0064	.0080	.0097	.0127
			Finishing	5%	2x	600	.0030	.0037	.0053	.0062	.0078	.0106	.0131	.0158	.0209
	CopperAlloys	700 -1000	Full Slotting	100%	1x	500	.0014	.0017	.0020	.0023	.0026	.0030	.0035	.0040	.0045
			Heavy Profile	25%	1x	600	.0016	.0020	.0023	.0027	.0030	.0035	.0040	.0046	.0052
			HEM*Profile	15%	2x	600	.0020	.0024	.0028	.0032	.0036	.0042	.0049	.0056	.0063
			Finishing	5%	2x	500	.0032	.0039	.0046	.0053	.0060	.0069	.0080	.0092	.0103
	Magnesium	500 - 900	Full Slotting	100%	1x	500	.0016	.0019	.0028	.0034	.0042	.0056	.0070	.0085	.0112
			Heavy Profile	33%	1x	700	.0017	.0020	.0030	.0036	.0045	.0060	.0074	.0090	.0119
			HEM*Profile	15%	2x	700	.0022	.0027	.0039	.0048	.0059	.0078	.0098	.0119	.0157
			Finishing	5%	2x	500	.0037	.0044	.0064	.0078	.0096	.0128	.0161	.0195	.0257

Remember to check horsepower requirements for your cut

Required motor horsepower = feed rate x axial doc x radia.L doc x unit power x machine efficiency %

Unit power for aluminum alloys ≈ 0.32

Unit power for brass / bronze alloys ≈ 0.64

Unit power for copper alloys ≈ 1

Unit power for magnesium alloys ≈ 0.16

Machine efficiency % ≈ 0.8

ALU 3 Flute Series Coolant Through

ISO Grade	Material	SFM Range	Application	Recommended Starting Parameters								
				Rad DOC % of DIA	Axial DOC x DIA	SFM Starting	Chip Load Per Tooth					
							1/4	3/8	1/2	5/8	3/4	1
N	Aluminum	500 -1500	Full Slotting	100%	1x	1000	.0032	.0051	.0067	.0084	.0100	.0130
			Heavy Profile	33%	1x	1200	.0034	.0054	.0071	.0089	.0106	.0138
			HEM*Profile	15%	2x	1200	.0045	.0071	.0094	.0118	.0140	.0182
			Finishing	5%	2x	1000	.0073	.0117	.0154	.0193	.0229	.0298
	Brass / Bronze	500 - 900	Full Slotting	100%	1x	600	.0026	.0039	.0053	.0065	.0079	.0105
			Heavy Profile	25%	1x	700	.0030	.0045	.0061	.0075	.0091	.0121
			HEM*Profile	15%	2x	700	.0036	.0055	.0074	.0091	.0111	.0147
			Finishing	5%	2x	600	.0060	.0089	.0122	.0149	.0181	.0241
	CopperAlloys	300-800	Full Slotting	100%	1x	400	.0024	.0031	.0036	.0042	.0048	.0054
			Heavy Profile	25%	1x	600	.0028	.0036	.0042	.0048	.0055	.0062
			HEM*Profile	15%	2x	600	.0034	.0043	.0050	.0059	.0067	.0076
			Finishing	5%	2x	400	.0055	.0071	.0083	.0096	.0110	.0124
	Magnesium	500 - 900	Full Slotting	100%	1x	500	.0032	.0043	.0067	.0084	.0100	.0130
			Heavy Profile	25%	1x	700	.0037	.0050	.0077	.0097	.0115	.0150
			HEM*Profile	15%	2x	700	.0045	.0060	.0094	.0118	.0140	.0182
			Finishing	5%	2x	500	.0073	.0099	.0154	.0193	.0229	.0298

Remember to check horsepower requirements for your cut

HEM* = High Efficiency Machining

Required motor horsepower = feed rate x axial doc x radia.L doc x unit power x machine efficiency %

Unit power for aluminum alloys ≈ 0.32

Unit power for brass / bronze alloys ≈ 0.64

Unit power for copper alloys ≈ 1

Unit power for magnesium alloys ≈ 0.16

Machine efficiency % ≈ 0.8

AF 2 & 3 Flute Series Non-Coolant Through

ISO Grade	Material	Unit Power	SFM Range	Application	Recommended Starting Parameters											
					Rad DOC % of DIA	Axial DOC x DIA	SFM Starting	Chip Load Per Tooth								
								1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
N	Aluminum	0.32	500 -1500	Full Slotting	100%	1x	1000	.0015	.0020	.0027	.0035	.0043	.0056	.0070	.0085	.0112
				Heavy Profile	33%	1x	1200	.0016	.0021	.0029	.0037	.0046	.0060	.0074	.0090	.0119
				HEM*Profile	15%	2x	1200	.0021	.0028	.0038	.0049	.0060	.0078	.0098	.0119	.0157
				Finishing	5%	2x	1000	.0034	.0046	.0062	.0080	.0099	.0128	.0161	.0195	.0257
	Brass / Bronze	0.64	500 - 900	Full Slotting	100%	1x	600	.0013	.0016	.0023	.0027	.0034	.0046	.0057	.0069	.0091
				Heavy Profile	25%	1x	700	.0015	.0018	.0027	.0031	.0039	.0053	.0066	.0080	.0105
				HEM*Profile	15%	2x	700	.0018	.0022	.0032	.0038	.0048	.0064	.0080	.0097	.0127
				Finishing	5%	2x	600	.0030	.0037	.0053	.0062	.0078	.0106	.0131	.0158	.0209
	CopperAlloys	1	700 -1000	Full Slotting	100%	1x	500	.0014	.0017	.0020	.0023	.0026	.0030	.0035	.0040	.0045
				Heavy Profile	25%	1x	600	.0016	.0020	.0023	.0027	.0030	.0035	.0040	.0046	.0052
				HEM*Profile	15%	2x	600	.0020	.0024	.0028	.0032	.0036	.0042	.0049	.0056	.0063
				Finishing	5%	2x	500	.0032	.0039	.0046	.0053	.0060	.0069	.0080	.0092	.0103
	Magnesium	0.16	500 - 900	Full Slotting	100%	1x	500	.0016	.0019	.0028	.0034	.0042	.0056	.0070	.0085	.0112
				Heavy Profile	33%	1x	700	.0017	.0020	.0030	.0036	.0045	.0060	.0074	.0090	.0119
				HEM*Profile	15%	2x	700	.0022	.0027	.0039	.0048	.0059	.0078	.0098	.0119	.0157
				Finishing	5%	2x	500	.0037	.0044	.0064	.0078	.0096	.0128	.0161	.0195	.0257

AF 3 Flute Series Coolant Through

ISO Grade	Material	Unit Power	SFM Range	Application	Recommended Starting Parameters								
					Rad DOC % of DIA	Axial DOC x DIA	SFM Starting	Chip Load Per Tooth					
								1/4	3/8	1/2	5/8	3/4	1
N	Aluminum	0.32	500 -1500	Full Slotting	100%	1x	1000	.0032	.0051	.0067	.0084	.0100	.0130
				Heavy Profile	33%	1x	1200	.0034	.0054	.0071	.0089	.0106	.0138
				HEM*Profile	15%	2x	1200	.0045	.0071	.0094	.0118	.0140	.0182
				Finishing	5%	2x	1000	.0073	.0117	.0154	.0193	.0229	.0298
	Brass / Bronze	0.64	500 - 900	Full Slotting	100%	1x	600	.0026	.0039	.0053	.0065	.0079	.0105
				Heavy Profile	25%	1x	700	.0030	.0045	.0061	.0075	.0091	.0121
				HEM*Profile	15%	2x	700	.0036	.0055	.0074	.0091	.0111	.0147
				Finishing	5%	2x	600	.0060	.0089	.0122	.0149	.0181	.0241
	CopperAlloys	1	300-800	Full Slotting	100%	1x	400	.0024	.0031	.0036	.0042	.0048	.0054
				Heavy Profile	25%	1x	600	.0028	.0036	.0042	.0048	.0055	.0062
				HEM*Profile	15%	2x	600	.0034	.0043	.0050	.0059	.0067	.0076
				Finishing	5%	2x	400	.0055	.0071	.0083	.0096	.0110	.0124
	Magnesium	0.16	500 - 900	Full Slotting	100%	1x	500	.0032	.0043	.0067	.0084	.0100	.0130
				Heavy Profile	25%	1x	700	.0037	.0050	.0077	.0097	.0115	.0150
				HEM*Profile	15%	2x	700	.0045	.0060	.0094	.0118	.0140	.0182
				Finishing	5%	2x	500	.0073	.0099	.0154	.0193	.0229	.0298

Remember to check horsepower requirements for your cut
Machine efficiency % $\approx$ 0.8

HEM* = High Efficiency Machining

AR Series Non-Coolant Through

ISO Grade	Material	Unit Power	SFM Range	Application	Recommended Starting Parameters						
					Rad DOC % of DIA	Axial DOC x DIA	SFM Starting	Chip Load Per Tooth			
								3/8	1/2	3/4	1
N	Aluminum	0.32	500 - 1500	Full Slotting	100%	1x	1000	.0060	.0080	.0120	.0156
				Heavy Profile	33%	1x	1200	.0064	.0085	.0128	.0166
				Profile	15%	1x	1200	.0084	.0112	.0168	.0218
	Brass / Bronze	0.64	500 - 900	Full Slotting	100%	1x	500	.0046	.0063	.0094	.0126
				Heavy Profile	33%	1x	700	.0049	.0067	.0100	.0134
				Profile	15%	1x	700	.0064	.0088	.0132	.0176
	CopperAlloys	1	700 - 1000	Full Slotting	100%	1x	400	.0038	.0043	.0058	.0065
				Heavy Profile	33%	1x	600	.0040	.0046	.0062	.0069
				Profile	15%	1x	600	.0053	.0060	.0081	.0091
	Magnesium	0.16	500 - 900	Full Slotting	100%	1x	500	.0051	.0080	.0120	.0155
				Heavy Profile	33%	1x	700	.0054	.0085	.0128	.0165
				Profile	15%	1x	700	.0071	.0112	.0168	.0217

AR Series Coolant Through

ISO Grade	Material	Unit Power	SFM Range	Application	Recommended Starting Parameters						
					Rad DOC % of DIA	Axial DOC x DIA	SFM Starting	Chip Load Per Tooth			
								3/8	1/2	3/4	1
N	Aluminum	0.32	500 - 1500	Full Slotting	100%	1x	1000	.0066	.0088	.0132	.0170
				Heavy Profile	33%	1x	1200	.0070	.0094	.0140	.0181
				Profile	15%	1x	1200	.0092	.0123	.0185	.0238
	Brass / Bronze	.064	500 - 900	Full Slotting	100%	1x	500	.0050	.0069	.0103	.0138
				Heavy Profile	33%	1x	700	.0053	.0073	.0110	.0147
				Profile	15%	1x	700	.0070	.0097	.0144	.0193
	CopperAlloys	1	700 - 1000	Full Slotting	100%	1x	400	.0041	.0047	.0063	.0071
				Heavy Profile	33%	1x	600	.0044	.0050	.0067	.0075
				Profile	15%	1x	600	.0057	.0066	.0088	.0099
	Magnesium	0.16	500 - 900	Full Slotting	100%	1x	500	.0056	.0088	.0132	.0170
				Heavy Profile	33%	1x	700	.0060	.0094	.0140	.0181
				Profile	15%	1x	700	.0078	.0123	.0185	.0238

Remember to check horsepower requirements for your cut
Machine efficiency % $\approx$ 0.8

HEM* = High Efficiency Machining

TV-7 End Mills

ISO Grade	Material / Grade	SFM Hardness		Application	Recommended Starting Parameters (<32Rc)							
		<32Rc	>32Rc		Rad DOC % of DIA	Axial DOC x DIA	SFM Starting (<32Rc)	Chip Load Per Tooth				
								1/2	5/8	3/4	1	1 1/4
P	Carbon Steel 10XX, 11XX 12XX, 15XX	450 - 800	150 - 250	HEM* Profile	10%	2x	650	.0050	.0058	.0067	.0075	.0083
		450 - 800	150 - 250	HEM* Profile	7%	2x	650	.0059	.0069	.0078	.0088	.0098
		300 - 600	150 - 250	Finishing	2-3%	2x	450	.0096	.0112	.0128	.0144	.0160
	Alloy Steel 13XX, 40XX, 41XX, 43XX 44XX, 46XX, 47XX, 48XX	400 - 750	100 - 200	HEM* Profile	10%	2x	600	.0042	.0050	.0058	.0067	.0075
		400 - 750	100 - 200	HEM* Profile	7%	2x	600	.0049	.0059	.0069	.0078	.0088
		200 - 450	100 - 200	Finishing	2-3%	2x	400	.0080	.0096	.0112	.0128	.0144
	Mold & Die Steel M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	300 - 550	70 -150	HEM* Profile	10%	2x	400	.0037	.0043	.0050	.0058	.0067
		300 - 550	70 -150	HEM* Profile	7%	2x	400	.0043	.0051	.0059	.0069	.0078
		150 - 250	70 -150	Finishing	2-3%	2x	200	.0070	.0083	.0096	.0112	.0128
	Tool Steel PM STEELS	250 - 500	—	HEM* Profile	10%	2x	350	.0042	.0050	.0058	.0067	.0075
		250 - 500	—	HEM* Profile	7%	2x	350	.0049	.0059	.0069	.0078	.0088
		100 - 200	—	Finishing	2-3%	2x	150	.0080	.0096	.0112	.0128	.0144
M	Austenitic Stainless 301, 302, 303, 304/304L/304H, 316/316L, 317L, 321/321H, 347/347H, Nitronic, 309/309S, 310/310S/310H, 330	250 - 400	80 - 200	HEM* Profile	10%	2x	375	.0040	.0047	.0053	.0060	.0067
		250 - 400	80 - 200	HEM* Profile	7%	2x	375	.0047	.0055	.0063	.0071	.0078
		200 -350	80 - 200	Finishing	2-3%	2x	250	.0077	.0090	.0102	.0115	.0128
	Martensitic Stainless 403, 405, 409, 410/410S/410HT, 416/416HT, 420, 422, 430, 440C	300 - 500	100 - 250	HEM* Profile	10%	2x	400	.0042	.0050	.0058	.0067	.0075
		300 - 500	100 - 250	HEM* Profile	7%	2x	400	.0049	.0059	.0069	.0078	.0088
		300 - 450	100 - 250	Finishing	2-3%	2x	350	.0080	.0096	.0112	.0128	.0144
	Precipitation Stainless 13-8 PH, 15-5 PH, 15-7 PH 17-4 PH, 17-7 PH, S143	250 - 500	90 -125	HEM* Profile	10%	2x	325	.0040	.0047	.0053	.0060	.0067
		250 - 500	90 -125	HEM* Profile	7%	2x	325	.0047	.0055	.0063	.0071	.0078
		120 - 225	90 -125	Finishing	2-3%	2x	225	.0077	.0090	.0102	.0115	.0128
K	Cast Iron Grey 20A, 25A, 30A, 35A, 40A, 45A, 50A	400 - 750	130 -300	HEM* Profile	10%	2x	550	.0050	.0058	.0067	.0075	.0083
		400 - 750	130 -300	HEM* Profile	7%	2x	550	.0059	.0069	.0078	.0088	.0098
		375 - 500	130 -300	Finishing	2-3%	2x	450	.0096	.0112	.0128	.0144	.0160
	Cast Ductile / Nodular 40010, 60-40-18, 65-45-12 32510, 32518	270 - 650	80 -140	HEM* Profile	10%	2x	400	.0033	.0040	.0047	.0053	.0060
		270 - 650	80 -140	HEM* Profile	7%	2x	400	.0039	.0047	.0055	.0063	.0071
		180 -350	80 -140	Finishing	2-3%	2x	275	.0064	.0077	.0090	.0102	.0115
S	Cobalt Base Haynes 21, 25, L-605, Mar-M302, NASA Co-W-Re, Stellite, Ultimet	90 -160	40 - 90	HEM* Profile	10%	1.25x	125	.0027	.0030	.0035	.0040	.0045
		90 -160	40 - 90	HEM* Profile	7%	1.25x	125	.0031	.0035	.0041	.0047	.0053
		70 -140	40 - 90	Finishing	2-3%	1.5x	100	.0051	.0058	.0067	.0077	.0086
	Iron Base A-286, Discaloy Incoloy 800-802, Multimet, 16-25-6	100 -160	40 - 70	HEM* Profile	10%	1.25x	140	.0030	.0035	.0040	.0045	.0050
		100 -160	40 - 70	HEM* Profile	7%	1.25x	140	.0035	.0041	.0047	.0053	.0059
		90 -135	40 - 70	Finishing	2-3%	1.5x	110	.0058	.0067	.0077	.0086	.0096
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Invar, Kovar, Monel, Nimonic, Rene 41, 77, 95, Udimet, Waspaloy	100 -150	40 - 90	HEM* Profile	10%	1.5x	130	.0033	.0040	.0047	.0053	.0060
		100 -150	40 - 90	HEM* Profile	7%	1.5x	130	.0039	.0047	.0055	.0063	.0071
		105 -180	40 - 90	Finishing	3%	1.5x	110	.0064	.0077	.0090	.0102	.0115
	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	180 -350	100 -160	HEM* Profile	10%	1.5x	325	.0033	.0040	.0047	.0053	.0060
		180 -350	100 -160	HEM* Profile	7%	1.5x	325	.0038	.0045	.0053	.0063	.0071
		160 -300	100 - 220	Finishing	3%	1.5x	250	.0064	.0077	.0090	.0102	.0115
	Titanium Ti10-2-3, Beta 21S, Ti5553	120 -180	80 -140	HEM* Profile	10%	1.5x	150	.0023	.0028	.0033	.0038	.0043
		120 -180	80 -140	HEM* Profile	7%	1.5x	150	.0027	.0033	.0039	.0045	.0051
		80 -140	100 -120	Finishing	3%	1.5x	115	.0045	.0054	.0064	.0074	.0083

HEM* = High Efficiency Machining

MXV 4 Flute Series

ISO Grade	Material / Grade	SFM Hardness		Application	Rad DOC	Axial DOC	SFM
		<32Rc	>32Rc		% of DIA	x DIA	Starting (<32Rc)
P	Carbon Steel 10XX,11XX 12XX,15XX	400 - 600	150 - 250	Full Slotting	100%	.5x	425
		350 - 650	150 - 250	Heavy Profile	33%	1.25x	500
		500 - 850	225 - 325	HEM Profile	15%	2x	525
		350 - 450	200 - 300	Finishing	3-5%	2x	500
	Alloy Steel 13XX, 40XX, 41XX, 43XX 44XX, 46XX, 47XX, 48XX	275 - 400	100 - 200	Full Slotting	100%	.5x	400
		300 - 450	150 - 225	Heavy Profile	33%	1.25x	475
		450 - 750	175 - 300	HEM Profile	15%	2x	525
		375 - 450	200 - 250	Finishing	3-5%	2x	450
	Mold & Die Steel 300M, 4340, 52100, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	225 - 325	70 - 150	Full Slotting	100%	.5x	275
		225 - 375	70 - 150	Heavy Profile	33%	1.25x	275
		350 - 500	150 - 275	HEM Profile	10%	2x	400
		300 - 400	125 - 225	Finishing	3-5%	2x	350
	Tool Steel PM STEELS	125 - 275	-	Full Slotting	100%	.5x	200
		175 - 325	-	Heavy Profile	25%	1.25x	250
		275 - 475	-	HEM Profile	10%	2x	350
		250 - 350	-	Finishing	3-5%	2x	350
M	Austenitic Stainless 301, 302, 303, 304/304L/304H, 316/316L, 317L, 321/321H, 347/347H, Nitronic, 309/309S, 310/310S/310H, 330	200 - 325	80 - 200	Full Slotting	100%	.5x	275
		250 - 350	80 - 200	Heavy Profile	33%	1.25x	325
		300 - 500	150 - 275	HEM Profile	15%	2x	400
		250 - 350	175 - 275	Finishing	3-5%	2x	350
	Martensitic Stainless 403, 405, 409, 410/410S/410HT, 416/416HT, 420, 422, 430, 440C	200 - 325	100 - 250	Full Slotting	100%	.5x	275
		225 - 350	100 - 250	Heavy Profile	25%	1.25x	300
		275 - 450	125 - 250	HEM Profile	10%	2x	400
		250 - 350	150 - 275	Finishing	3-5%	2x	350
	Precipitation Stainless 13-8 PH,15-5 PH,15-7 PH 17-4 PH,17-7 PH, S143	160 - 225	90 - 180	Full Slotting	100%	.5x	200
		180 - 250	90 - 125	Heavy Profile	25%	1.25x	225
		225 - 450	125 - 250	HEM Profile	10%	2x	400
		225 - 325	150 - 275	Finishing	3-5%	2x	325
K	Cast Iron Grey 20A, 25A, 30A, 35A, 40A, 45A, 50A	250 - 400	130 - 300	Full Slotting	100%	.5x	375
		250 - 450	170 - 300	Heavy Profile	33%	1.25x	425
		300 - 550	350 - 500	HEM Profile	10%	2x	500
		300 - 400	300 - 400	Finishing	3-5%	2x	400
	Cast Ductile / Nodular 40010, 60-40-18, 65-45-12 32510, 32518	120 - 300	80 - 140	Full Slotting	100%	.5x	275
		220 - 350	100 - 150	Heavy Profile	33%	1.25x	325
		300 - 500	170 - 270	HEM Profile	10%	2x	450
		275 - 400	140 - 200	Finishing	3-5%	2x	400
S	Cobalt Base Haynes 21, 25, L-605, Mar-M302, NASA Co-W-Re, Stellite, Ultimet	70 - 120	40 - 90	Full Slotting	100%	.33x	100
		70 - 120	40 - 90	Heavy Profile	20%	.75x	100
		150 - 210	80 - 100	HEM Profile	8%	1.25x	170
		80-120	80 - 100	Finishing	3-5%	1.50x	100
	Iron Base A-286, Discaloy Incoloy 800-802, Multimet,16-25-6	60 - 90	40 - 70	Full Slotting	100%	.33x	70
		80 - 140	40 - 70	Heavy Profile	20%	.75x	120
		150 - 200	60 - 80	HEM Profile	8%	1.25x	170
		80-120	60 - 80	Finishing	3-5%	1.50x	120
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Invar, Kovar, Monel, Nimonic, Rene 41, 77, 95, Udimet, Waspaloy	70 - 100	40 - 80	Full Slotting	100%	.33x	70
		70 - 120	40 - 90	Heavy Profile	20%	.75x	90
		100 - 150	70 - 120	HEM Profile	8%	1.25x	125
		90 - 125	70 - 100	Finishing	3-5%	1.50x	125
	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	120 - 180	80 - 120	Full Slotting	100%	1x	180
		120 - 200	90 - 130	Heavy Profile	30%	1x	225
		200 - 450	100 - 140	HEM Profile	10%	1.5x	350
		200 - 400	100 - 140	Finishing	3-5%	1.5x	300
	Titanium Ti10-2-3, Beta 21S, Ti5553	80 - 120	60 - 100	Full Slotting	100%	1x	100
		90 - 140	80 - 120	Heavy Profile	20%	1x	120
		100 - 150	80 - 120	HEM Profile	8%	1.5x	140
		100 - 160	100 - 120	Finishing	3-5%	1.5x	160

HEM* = High Efficiency Machining

Chip Load Per Tooth (Inches)						
1/8	1/4	3/8	1/2	5/8	3/4	1
.0008	.0016	.0024	.0028	.0036	.0044	.0050
.0009	.0017	.0026	.0030	.0038	.0047	.0053
.0011	.0022	.0034	.0039	.0050	.0062	.0070
.0020	.0041	.0061	.0071	.0092	.0112	.0128
.0008	.0016	.0024	.0028	.0036	.0044	.0050
.0009	.0017	.0026	.0030	.0038	.0047	.0053
.0011	.0022	.0034	.0039	.0050	.0062	.0070
.0020	.0041	.0061	.0071	.0092	.0112	.0128
.0004	.0012	.0019	.0024	.0028	.0033	.0038
.0004	.0013	.0020	.0026	.0030	.0035	.0040
.0007	.0020	.0032	.0040	.0047	.0055	.0063
.0010	.0031	.0048	.0061	.0071	.0084	.0097
.0005	.0010	.0020	.0025	.0030	.0035	.0040
.0006	.0012	.0023	.0029	.0035	.0040	.0046
.0008	.0017	.0033	.0042	.0050	.0058	.0067
.0013	.0026	.0051	.0064	.0077	.0089	.0102
.0006	.0013	.0022	.0026	.0032	.0039	.0045
.0006	.0014	.0023	.0028	.0034	.0041	.0048
.0008	.0018	.0031	.0036	.0045	.0055	.0063
.0015	.0033	.0056	.0066	.0082	.0100	.0115
.0004	.0010	.0020	.0023	.0030	.0035	.0040
.0005	.0012	.0023	.0027	.0035	.0040	.0046
.0007	.0017	.0033	.0038	.0050	.0058	.0067
.0010	.0026	.0051	.0059	.0077	.0089	.0102
.0004	.0010	.0020	.0025	.0030	.0035	.0040
.0005	.0012	.0023	.0029	.0035	.0040	.0046
.0007	.0017	.0033	.0042	.0050	.0058	.0067
.0010	.0026	.0051	.0064	.0077	.0089	.0102
.0005	.0015	.0025	.0030	.0035	.0040	.0046
.0005	.0016	.0027	.0032	.0037	.0043	.0049
.0008	.0025	.0042	.0050	.0058	.0067	.0077
.0013	.0038	.0064	.0077	.0089	.0102	.0117
.0005	.0011	.0020	.0025	.0030	.0035	.0040
.0005	.0012	.0021	.0027	.0032	.0037	.0043
.0008	.0018	.0033	.0042	.0050	.0058	.0067
.0013	.0028	.0051	.0064	.0077	.0089	.0102
.0003	.0008	.0015	.0020	.0024	.0027	.0030
.0004	.0010	.0019	.0025	.0030	.0034	.0038
.0006	.0015	.0028	.0037	.0044	.0050	.0055
.0008	.0020	.0038	.0051	.0061	.0069	.0077
.0004	.0010	.0020	.0025	.0030	.0035	.0040
.0005	.0013	.0025	.0031	.0038	.0044	.0050
.0007	.0018	.0037	.0046	.0055	.0065	.0074
.0010	.0026	.0051	.0064	.0077	.0089	.0102
.0003	.0008	.0016	.0020	.0023	.0027	.0030
.0004	.0010	.0020	.0025	.0029	.0034	.0038
.0006	.0015	.0029	.0037	.0042	.0050	.0055
.0008	.0020	.0041	.0051	.0059	.0069	.0077
.0004	.0010	.0020	.0025	.0030	.0036	.0041
.0004	.0011	.0022	.0027	.0033	.0039	.0045
.0007	.0017	.0033	.0042	.0050	.0060	.0068
.0010	.0026	.0051	.0064	.0077	.0092	.0105
.0003	.0007	.0015	.0020	.0023	.0027	.0030
.0004	.0009	.0019	.0025	.0029	.0034	.0038
.0006	.0013	.0028	.0037	.0042	.0050	.0055
.0008	.0018	.0038	.0051	.0059	.0069	.0077

MXV 5 Flute Series

ISO Grade	Material / Grade	SFM Hardness		Application	Rad DOC	Axial DOC	SFM
		<32Rc	>32Rc		% of DIA	x DIA	Starting (<32Rc)
P	Carbon Steel 10XX, 11XX 12XX, 15XX	400 - 600	150 - 250	Full Slotting	100%	.5x	350
		350 - 650	150 - 250	Heavy Profile	33%	1.25x	400
		500 - 850	225 - 325	HEM Profile	15%	2x	550
		350 - 450	200 - 300	Finishing	3-5%	2x	450
	Alloy Steel 13XX, 40XX, 41XX, 43XX 44XX, 46XX, 47XX, 48XX	275 - 400	100 - 200	Full Slotting	100%	.5x	325
		300 - 450	150 - 225	Heavy Profile	33%	1.25x	350
		450 - 750	175 - 300	HEM Profile	15%	2x	500
		375 - 450	200 - 250	Finishing	3-5%	2x	450
	Mold & Die Steel 300M, 4340, 52100, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	225 - 325	70 - 150	Full Slotting	100%	.5x	275
		225 - 375	70 - 150	Heavy Profile	33%	1.25x	275
		350 - 500	150 - 275	HEM Profile	10%	2x	400
		300 - 400	125 - 225	Finishing	3-5%	2x	350
	Tool Steel PM STEELS	125 - 275	–	Full Slotting	100%	.5x	200
		175 - 325	–	Heavy Profile	25%	1.25x	250
		275 - 475	–	HEM Profile	10%	2x	350
		250 - 350	–	Finishing	3-5%	2x	350
M	Austenitic Stainless 301, 302, 303, 304/304L/304H, 316/316L, 317L, 321/321H, 347/347H, Nitronic, 309/309S, 310/310S/310H, 330	200 - 325	80 - 200	Full Slotting	100%	.5x	275
		250 - 350	80 - 200	Heavy Profile	33%	1.25x	325
		300 - 500	150 - 275	HEM Profile	15%	2x	400
		250 - 350	175 - 275	Finishing	3-5%	2x	350
	Martensitic Stainless 403, 405, 409, 410/410S/410HT, 416/416HT, 420, 422, 430, 440C	200 - 325	100 - 250	Full Slotting	100%	.5x	275
		225 - 350	100 - 250	Heavy Profile	25%	1.25x	300
		275 - 450	125 - 250	HEM Profile	10%	2x	400
		250 - 350	150 - 275	Finishing	3-5%	2x	350
	Precipitation Stainless 13-8 PH, 15-5 PH, 15-7 PH 17-4 PH, 17-7 PH, S143	160 - 225	90 - 180	Full Slotting	100%	.5x	200
		180 - 250	90 - 125	Heavy Profile	25%	1.25x	225
		225 - 450	125 - 250	HEM Profile	10%	2x	400
		225 - 325	150 - 275	Finishing	3-5%	2x	325
K	Cast Iron Grey 20A, 25A, 30A, 35A, 40A, 45A, 50A	250 - 400	130 - 300	Full Slotting	100%	.5x	375
		250 - 450	170 - 300	Heavy Profile	33%	1.25x	425
		300 - 550	350 - 500	HEM Profile	10%	2x	500
		300 - 400	300 - 400	Finishing	3-5%	2x	400
	Cast Ductile / Nodular 40010, 60-40-18, 65-45-12 32510, 32518	120 - 300	80 - 140	Full Slotting	100%	.5x	275
		220 - 350	100 - 150	Heavy Profile	33%	1.25x	325
		300 - 500	170 - 270	HEM Profile	10%	2x	450
		275 - 400	140 - 200	Finishing	3-5%	2x	400
S	Cobalt Base Haynes 21, 25, L-605, Mar-M302, NASA Co-W-Re, Stellite, Ultimet	70 - 120	40 - 90	Full Slotting	100%	.33x	100
		70 - 120	40 - 90	Heavy Profile	20%	.75x	100
		150 - 210	80 - 100	HEM Profile	8%	1.25x	170
		80-120	80 - 100	Finishing	3-5%	1.50x	100
	Iron Base A-286, Discaloy Incoloy 800-802, Multimet, 16-25-6	60 - 90	40 - 70	Full Slotting	100%	.25x	70
		80 - 140	40 - 70	Heavy Profile	20%	.75x	120
		150 - 200	60 - 80	HEM Profile	8%	1.25x	170
		80-120	60 - 80	Finishing	3-5%	1.5x	120
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Invar, Kovar, Monel, Nimonic, Rene 41, 77, 95, Udimet, Waspaloy	70 - 100	40 - 80	Full Slotting	100%	.25x	70
		70 - 120	40 - 90	Heavy Profile	20%	.75x	90
		100 - 150	70 - 120	HEM Profile	8%	1.50x	125
		90 - 125	70 - 100	Finishing	3-5%	1.50x	125
	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	120 - 180	80 - 120	Full Slotting	100%	.50x	140
		120 - 200	90 - 130	Heavy Profile	30%	1x	160
		200 - 450	100 - 140	HEM Profile	10%	1.5x	350
		200 - 400	100 - 140	Finishing	3-5%	1.5x	300
	Titanium Ti10-2-3, Beta 21S, Ti 5553	80 - 120	60 - 100	Full Slotting	100%	.25x	100
		90 - 140	80 - 120	Heavy Profile	20%	1x	120
		100 - 150	80 - 120	HEM Profile	8%	1.5x	140
		100 - 160	100 - 120	Finishing	3-5%	1.5x	160

HEM* = High Efficiency Machining

Chip Load Per Tooth (Inches)						
1/8	1/4	3/8	1/2	5/8	3/4	1
.0005	.0012	.0020	.0024	.0031	.0037	.0043
.0005	.0013	.0021	.0026	.0033	.0039	.0046
.0007	.0017	.0028	.0034	.0043	.0052	.0060
.0013	.0031	.0051	.0061	.0079	.0094	.0110
.0005	.0012	.0020	.0024	.0030	.0037	.0043
.0005	.0014	.0021	.0026	.0032	.0039	.0046
.0007	.0016	.0028	.0034	.0042	.0052	.0060
.0013	.0027	.0051	.0061	.0077	.0094	.0110
.0003	.0010	.0150	.0020	.0024	.0029	.0033
.0003	.0011	.0160	.0021	.0026	.0031	.0035
.0005	.0017	.0250	.0033	.0040	.0048	.0055
.0008	.0026	.0383	.0051	.0061	.0074	.0084
.0003	.0008	.0015	.0020	.0025	.0030	.0035
.0003	.0009	.0017	.0023	.0029	.0035	.0040
.0005	.0013	.0025	.0033	.0042	.0050	.0058
.0008	.0020	.0038	.0051	.0064	.0077	.0089
.0004	.0010	.0018	.0022	.0027	.0033	.0040
.0004	.0011	.0019	.0023	.0029	.0035	.0043
.0006	.0014	.0025	.0031	.0038	.0046	.0056
.0010	.0026	.0046	.0056	.0069	.0084	.0102
.0003	.0008	.0015	.0017	.0023	.0026	.0030
.0003	.0009	.0018	.0020	.0026	.0030	.0035
.0005	.0013	.0026	.0029	.0038	.0044	.0050
.0008	.0020	.0039	.0044	.0057	.0067	.0077
.0003	.0008	.0160	.0021	.0025	.0030	.0035
.0003	.0009	.0185	.0024	.0029	.0035	.0040
.0005	.0013	.0267	.0035	.0042	.0050	.0058
.0008	.0019	.0408	.0054	.0064	.0077	.0089
.0003	.0011	.0020	.0025	.0030	.0035	.0040
.0003	.0012	.0021	.0027	.0032	.0037	.0043
.0005	.0018	.0033	.0042	.0050	.0058	.0067
.0008	.0028	.0051	.0064	.0077	.0089	.0102
.0003	.0008	.0015	.0020	.0025	.0030	.0035
.0003	.0009	.0016	.0021	.0027	.0032	.0037
.0005	.0013	.0025	.0033	.0042	.0050	.0058
.0008	.0020	.0038	.0051	.0064	.0077	.0089
.0002	.0005	.0011	.0014	.0018	.0023	.0027
.0003	.0006	.0014	.0018	.0023	.0029	.0034
.0004	.0009	.0020	.0026	.0033	.0042	.0050
.0005	.0013	.0028	.0036	.0046	.0059	.0069
.0003	.0008	.0015	.0019	.0025	.0030	.0035
.0004	.0010	.0019	.0023	.0031	.0038	.0044
.0006	.0015	.0028	.0034	.0046	.0055	.0065
.0008	.0020	.0038	.0047	.0064	.0077	.0089
.0002	.0005	.0011	.0015	.0019	.0022	.0026
.0003	.0006	.0014	.0019	.0024	.0028	.0033
.0004	.0009	.0020	.0028	.0035	.0041	.0048
.0005	.0013	.0028	.0038	.0048	.0056	.0066
.0003	.0008	.0015	.0020	.0025	.0030	.0034
.0003	.0008	.0016	.0021	.0027	.0033	.0037
.0005	.0013	.0025	.0033	.0042	.0050	.0057
.0008	.0019	.0038	.0050	.0064	.0077	.0087
.0002	.0005	.0011	.0015	.0018	.0022	.0026
.0003	.0006	.0014	.0019	.0023	.0028	.0033
.0004	.0009	.0020	.0028	.0033	.0041	.0048
.0005	.0013	.0028	.0038	.0046	.0056	.0066

MXR End Mills

ISO Grade	Material / Grade	SFM Hardness		Application	Recommended Starting Parameters (<32Rc)									
		<32Rc	>32Rc		Rad DOC % of DIA	Axial DOC x DIA	SFM Starting (<32Rc)	Chip Load Per Tooth						
								1/8	1/4	3/8	1/2	5/8	3/4	1
S	Cobalt Base Haynes 21, 25, L-605, Mar-M302, NASA Co-W-Re, Stellite, Ultimet	70 -120	40 - 90	Full Slotting	100%	.33x	100	.0002	.0005	.0011	.0014	.0018	.0023	.0027
		70 -120	40 - 90	Heavy Profile	15%	.75x	100	.0003	.0007	.0015	.0020	.0025	.0032	.0038
		150 - 210	80 -100	HEMProfile	8%	1.25x	170	.0004	.0009	.0020	.0026	.0033	.0042	.0050
	Iron Base A-286, Discaloy Incoloy 800-802, Multimet, 16-25-6	60 - 90	40 - 70	Full Slotting	100%	.25x	70	.0003	.0008	.0015	.0019	.0025	.0030	.0035
		80 -140	40 - 70	Heavy Profile	15%	.75x	120	.0004	.0011	.0021	.0026	.0035	.0042	.0049
		150 - 200	60 - 80	HEMProfile	8%	1.25x	170	.0006	.0015	.0028	.0034	.0046	.0055	.0065
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Invar, Kovar, Monel, Nimonic, Rene 41, 77, 95, Udimet, Waspaloy	70 -100	40 - 80	Full Slotting	100%	.25x	70	.0002	.0005	.0011	.0015	.0019	.0022	.0026
		70 -120	40 - 90	Heavy Profile	15%	.75x	90	.0003	.0007	.0015	.0021	.0027	.0031	.0036
		100 -150	70 -120	HEMProfile	8%	1.50x	125	.0004	.0009	.0020	.0028	.0035	.0041	.0048
	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	120 -180	80 -120	Full Slotting	100%	.5x	140	.0003	.0008	.0015	.0020	.0025	.0030	.0034
		120 - 200	90 -130	Heavy Profile	30%	1x	160	.0003	.0008	.0016	.0022	.0027	.0033	.0037
		200 - 450	100 -140	HEMProfile	10%	1.5x	350	.0005	.0013	.0025	.0033	.0042	.0050	.0057
	Titanium Ti10-2-3, Beta 21S, Ti 5553	80 -120	60 -100	Full Slotting	100%	.25x	100	.0002	.0005	.0011	.0015	.0018	.0022	.0026
		90 -140	80 -120	Heavy Profile	20%	1x	120	.0003	.0006	.0014	.0019	.0023	.0028	.0033
		100 -150	80 -120	HEMProfile	8%	1.5x	140	.0004	.0009	.0020	.0028	.0033	.0041	.0048

HXR End Mills

ISO Grade	Material / Grade	SFM Hardness		Application	Recommended Starting Parameters (<32Rc)									
		<32Rc	>32Rc		Rad DOC % of DIA	Axial DOC x DIA	SFM Starting (<32Rc)	Chip Load Per Tooth						
								3/8	1/2	5/8	3/4	1	1-1/4	
S	Cobalt Base Haynes 21, 25, L-605, Mar-M302, NASA Co-W-Re, Stellite, Ultimet	90-160	40 - 90	HEMProfile	10%	1.25x	125	.0018	.0023	.0030	.0038	.0045	.0053	
		90-160	40 - 90	HEMProfile	7%	1.25x	125	.0022	.0027	.0035	.0045	.0053	.0063	
		70-140	40 - 90	Finishing	3%	2x	100	.0032	.0041	.0053	.0067	.0079	.0094	
	Iron Base A-286, Discaloy Incoloy 800-802, Multimet, 16-25-6	100 -160	40 - 70	HEMProfile	10%	1.25x	140	.0025	.0031	.0042	.0050	.0058	.0067	
		100 -160	40 - 70	HEMProfile	7%	1.25x	140	.0029	.0036	.0049	.0059	.0069	.0078	
		90 -135	40 - 70	Finishing	3%	2x	110	.0044	.0055	.0073	.0088	.0103	.0117	
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Invar, Kovar, Monel, Nimonic, Rene 41, 77, 95, Udimet, Waspaloy	100 -150	40 - 90	HEMProfile	10%	1.5x	125	.0018	.0025	.0032	.0037	.0043	.0050	
		100 -150	40 - 90	HEMProfile	7%	1.5x	125	.0022	.0029	.0037	.0043	.0051	.0059	
		105 -180	40 - 90	Finishing	3%	2x	110	.0032	.0044	.0056	.0064	.0076	.0088	
	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	180 -350	100 -160	HEMProfile	10%	1.5x	325	.0025	.0033	.0042	.0050	.0057	.0065	
		180 -350	100 -160	HEMProfile	7%	1.5x	325	.0029	.0039	.0049	.0059	.0067	.0076	
		160 -300	100 - 220	Finishing	3%	2x	250	.0044	.0059	.0073	.0088	.0100	.0114	
	Titanium Ti10-2-3, Beta 21S, Ti5553	120 -180	80 -140	HEMProfile	10%	1.5x	150	.0018	.0025	.0030	.0037	.0043	.0050	
		120 -180	80 -140	HEMProfile	7%	1.5x	150	.0022	.0029	.0035	.0043	.0051	.0059	
		80 -140	100 -120	Finishing	3%	2x	115	.0032	.0044	.0053	.0064	.0076	.0088	

HEM* = High Efficiency Machining

RXR Series

ISO Grade	Material / Grade	SFM Hardness		Application	Recommended Starting Parameters (<32Rc)							
		<32Rc	>32Rc		Rad DOC % of DIA	Axial DOC x DIA	SFM Starting (<32Rc)	Chip Load Per Tooth				
								1/2	5/8	3/4	1	1-1/4
S	Cobalt Base Haynes 21, 25, L-605 Mar-M302, NASA Co-W-Re, Stellite, Ultimet	70 -120	30 - 70	Heavy Profile	10%	1.5x	95	.0027	.0030	.0035	.0040	.0045
		70 -120	30 - 70	HEM Profile	5-7%	1.5x	95	.0031	.0035	.0041	.0047	.0053
		55 -105	30 - 70	Finishing	3%	1.5x	75	.0047	.0053	.0062	.0070	.0079
	Iron Base A-286, Discaloy, Incoloy 800-802, Multimet, 16-25-6	75 -120	30 - 55	Heavy Profile	10%	1.5x	105	.0030	.0035	.0040	.0045	.0050
		75 -120	30 - 55	HEM Profile	5-7%	1.5x	105	.0035	.0041	.0047	.0053	.0059
		70 -100	30 - 55	Finishing	3%	1.5x	85	.0053	.0062	.0070	.0079	.0088
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Invar, Kovar, Monel, Nimonic, Rene 41, 77, 95, Udimet, Waspaloy	75 -115	30 - 70	Heavy Profile	10%	1.5x	95	.0035	.0042	.0051	.0058	.0066
		75 -115	30 - 70	HEM Profile	5-7%	1.5x	95	.0041	.0050	.0059	.0069	.0078
		60 -105	75 - 90	Finishing	3%	1.5x	90	.0044	.0053	.0064	.0073	.0085

TRX 5 Flute Series

ISO Grade	Material / Grade	SFM Hardness		Application	Recommended Starting Parameters (<32Rc)									
		<32Rc	>32Rc		Rad DOC % of DIA	Axial DOC x DIA	SFM Starting (<32Rc)	Chip Load Per Tooth						
								1/4	3/8	1/2	5/8	3/4	1	1-1/4
S	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	160 - 225	100 -160	Full Slotting	100%	1x	200	.0011	.0018	.0021	.0025	.0030	.0035	.0040
		180 -300	100 -160	Heavy Profile	20%	1.5x	230	.0013	.0023	.0026	.0031	.0038	.0044	.0050
		225 -350	100 -160	HEM Profile	7%	2x	325	.0021	.0035	.0041	.0049	.0059	.0069	.0078
		180 -300	100 - 220	Finishing	2-3%	3x	260	.0034	.0058	.0067	.0080	.0096	.0112	.0128
	Titanium Ti10-2-3, Beta 21S, Ti 5553	80 -110	60 -100	Full Slotting	100%	.5x	90	.0010	.0017	.0021	.0025	.0029	.0034	.0039
		90 -120	80 -100	Heavy Profile	20%	1x	95	.0013	.0022	.0026	.0031	.0036	.0043	.0049
		95 -125	80 -110	HEM Profile	12%	1.5x	105	.0015	.0027	.0032	.0038	.0045	.0052	.0060
		90 -130	100 -120	Finishing	3%	2x	120	.0032	.0056	.0067	.0080	.0093	.0109	.0125

TRX 7 Flute Series

ISO Grade	Material	SFM Hardness		Application	Recommended Starting Parameters							
		<32Rc	>32Rc		Rad DOC % of Dia.	Axial DOC x Dia.	SFM Starting (<32Rc)	Chip Load Per Tooth				
								3/8	1/2	5/8	3/4	1
S	Titanium 6Al-4V, Commercially Pure, TitaniumAluminide	180 -300	100 -160	HEM Profile	10%	1.5x	325	.0030	.0035	.0042	.0050	.0058
		225 -350	100 -160	HEM Profile	7%	2x	325	.0035	.0041	.0049	.0059	.0069
		180 -300	100 - 220	Finishing	2-3%	3x	260	.0058	.0067	.0080	.0096	.0112
	Titanium Ti10-2-3, Beta 21S, Ti 5553	90 -120	80 -100	HEM Profile	10%	1x	95	.0028	.0035	.0042	.0048	.0057
		95 -125	80 -110	HEM Profile	7%	1.5x	105	.0033	.0041	.0049	.0057	.0067
		90 -130	100 -120	Finishing	2-3%	2x	120	.0054	.0067	.0080	.0093	.0109

RMC Series

ISO Grade	Material / Grade	Lens Shape					Barrel Shape					Conical Taper ShapeA&B					Oval Shape				
		SFM	Fz (in)				SFM	Fz (in)				SFM	Fz (in)				SFM	Fz (in)			
			1/4	3/8	1/2	5/8		1/4	3/8	1/2	5/8		1/4	3/8	1/2	5/8		1/4	3/8	1/2	5/8
P	Carbon Steel 10XX, 11XX, 12XX, 15XX	900	.0010	.0015	.0020	.0025	900	.0013	.0019	.0025	.0031	900	.0008	.0011	.0015	.0019	900	.0013	.0019	.0025	.0031
	Alloy Steel 13XX, 40XX, 41XX, 43XX, 44XX, 46XX, 47XX, 48XX	800	.0010	.0015	.0020	.0025	825	.0010	.0015	.0020	.0025	825	.0008	.0011	.0015	.0019	825	.0010	.0015	.0020	.0025
	Mold & Die Steel 300M, 4340, 52100, M50,A2, D2, H13, L2, M2, P20, S7, T15, W2	650	.0008	.0011	.0015	.0019	675	.0008	.0011	.0015	.0019	675	.0005	.0008	.0010	.0013	675	.0008	.0011	.0015	.0019
	Tool Steel PM STEELS	600	.0005	.0008	.0010	.0013	650	.0005	.0008	.0010	.0013	650	.0005	.0008	.0010	.0013	650	.0005	.0008	.0010	.0013
M	Austenitic Stainless 301, 302, 303, 304/304L/304H, 316/316L, 317L, 321/321H, 347/347H, Nitronic, 309/309S, 310/310S/310H, 330	400	.0005	.0008	.0010	.0013	275	.0005	.0008	.0010	.0013	275	.0005	.0008	.0010	.0013	275	.0005	.0008	.0010	.0013
	Martensitic Stainless 403, 405, 409, 410/410S/410HT, 416/416HT, 420, 422, 430, 440C	500	.0005	.0008	.0010	.0013	325	.0005	.0008	.0010	.0013	325	.0005	.0008	.0010	.0013	325	.0005	.0008	.0010	.0013
	Precipitation Stainless 13-8 PH, 15-5 PH, 15-7 PH, 17-4 PH, 17-7 PH, S143	300	.0003	.0004	.0005	.0006	200	.0003	.0004	.0005	.0006	200	.0003	.0004	.0005	.0006	200	.0003	.0004	.0005	.0006
K	Cast Iron Grey 20A, 25A, 30A, 35A, 40A, 45A, 50A	1000	.0013	.0019	.0025	.0031	925	.0013	.0019	.0025	.0031	925	.0010	.0015	.0020	.0025	925	.0013	.0019	.0025	.0031
	Cast Ductile /Nodular 40010, 60-40-18, 65-45-12, 32518	900	.0010	.0015	.0020	.0025	825	.0010	.0015	.0020	.0025	825	.0010	.0015	.0020	.0025	825	.0010	.0015	.0020	.0025
N	Aluminum	2300	.0013	.0019	.0025	.0031	1950	.0013	.0019	.0025	.0031	1950	.0010	.0015	.0020	.0025	1950	.0013	.0019	.0025	.0031
	Brass / Bronze	1900	.0010	.0015	.0020	.0025	1300	.0010	.0015	.0020	.0025	1300	.0008	.0011	.0015	.0019	1300	.0013	.0019	.0025	.0031
	CopperAlloys	900	.0010	.0015	.0020	.0025	600	.0010	.0015	.0020	.0025	600	.0010	.0015	.0020	.0025	600	.0010	.0015	.0020	.0025
	Magnesium	1800	.0018	.0026	.0035	.0044	1300	.0018	.0026	.0035	.0044	1300	.0018	.0026	.0035	.0044	1300	.0018	.0026	.0035	.0044
S	Cobalt Base Haynes 21, 25, L-605, Mar-M302, NASA Co-W-Re, Stellite, Ulmet	250	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006
	Iron Base A-286, Discaloy, Incoloy 800-802, Multimet, 16-25-6	250	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006
	Nickel Base Hastelloy, Haynes 242, Inconel 600, 625, 718, Kovar, Monel, Nimonic, Rene 41, 77, 95 Udimet, Waspaloy	250	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006	100	.0003	.0004	.0005	.0006
	Titanium 6Al-4V, Commercially PureAluminide	500	.0008	.0011	.0015	.0019	325	.0003	.0004	.0005	.0006	325	.0008	.0011	.0015	.0019	325	.0008	.0011	.0015	.0019
	Titanium Ti 0-2-3, Beta 21S, Ti 5553	400	.0005	.0008	.0010	.0013	250	.0005	.0008	.0010	.0013	250	.0005	.0008	.0010	.0013	250	.0005	.0008	.0010	.0013

MDR Series Ballnose

ISO Grade	Material / Grade	Machinability Rating	Application	Recommended Starting Parameters (<32Rc)											
				Axial DOC	SFM Hardness			SFM Starting (<50Rc)	Chip Load Per Tooth						
					< 40Rc	40-50Rc	> 50Rc		1/16	3/32	1/8	3/16	1/4	3/8	1/2
P	Mold & Die Steel 300M, 4340, 52100, M50,A2, D2, H13, L2, M2, P20, S7, T15, W2	35-65%	Finishing	3%	750-1000	800-1200	800-1200	1000	.0008	.0012	.0022	.0025	.0030	.0045	.0060

RPM
$(3.82 \times \text{SFM}) / \text{tool diameter}$

SFM
$\text{RPM} \times .262 \times \text{tool diameter}$

FEED RATE (in / min)
$\text{chipload} \times \# \text{ flutes} \times \text{RPM}$

Material Removal Rate (in ³ / min)
$\text{Feed Rate} \times \text{ADoC} \times \text{RDoC}$

Feed / Tooth (in)
$\text{Feed Rate} / (\text{RPM} \times \# \text{ Flutes})$

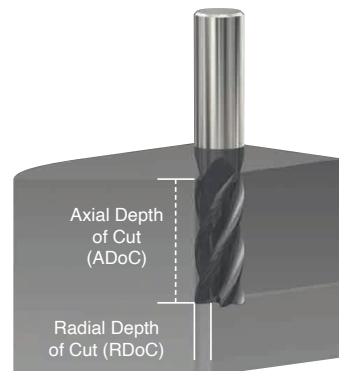
Required Motor Horsepower
$\text{Feed rate} \times \text{Axial doc} \times \text{radial doc} \times \text{unit power} \times \text{machine efficiency} \%$

Radial Chip Thinning
$\frac{\text{Chipload} \times (\text{dia}/2)}{\sqrt{(\text{dia} \times \text{RDoC}) - \text{RDoC}^2}}$

Reduce SFM When End Mill is Projecting From the Tool Holder	
PROJECTION LENGTH < 2.5 X Ø	REDUCE SPEEDS & FEEDS 0%
2.5 X Ø	15%
3 X Ø	20%
4 X Ø	55%
5 X Ø	65%
6 X Ø	75%



RampAngle = 1° -3°
Reduce chipload by
20% of slotting rates.



Apply radial chip
thinning formula when
 $\text{RDoC} < 0.5 \times \text{tool dia.}$



See chart for SFM
reductions for projection
length > 2.5 x tool dia.

Customer Information

Company		Contact	
Address		Phone	
		E-Mail	
		Date	

Application

☐ Roughing

☐ Finishing

☐ Corner Milling 

☐ Slotting 

☐ Circular Milling 

☐ Pocket Milling 

☐ Dynamic Milling 

☐ Other _____

Workpiece Data

Material	
Material Grade	
Hardness	
Depth of Cut	
Width of Cut	

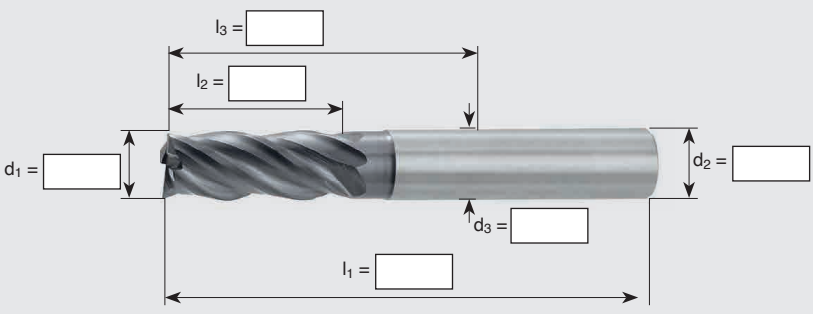
Tool Data

Tool similar to	
Number of Flutes	
Center Cutting	☐ Yes ☐ No
Coating	☐ ESG ☐ ESR ☐ ZRN ☐ NM ☐ TiN ☐ DLC ☐ X ☐ N/A ☐ Other _____
Shank Type	☐ Weldon ☐ Straight ☐ Other _____
Coolant Through	☐ Axial ☐ Radial ☐ None

Machine Information

Machine Type			
Tool Clamping			
Spindle Position	☐ Horizontal	☐ Vertical	☐ 5-Axis
Lubrication	☐ Oil ☐ MQL	☐ Dry ☐ Air Pressure	☐ Emulsion _____ % ☐ Dust Collection

Dimensions



Corner Radius 		Edge Protection 	x 45°
Roughing Profile 	☐ Yes ☐ No	Chipbreaker 	☐ Yes ☐ No

Quantity & Pricing

Quantity Needed (Minimum of 6 pieces)		
Target Pricing?	☐ Distributor ☐ End User	

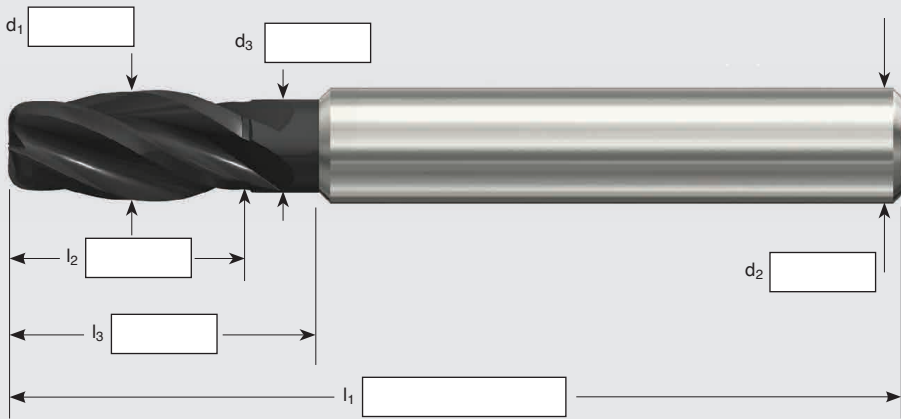
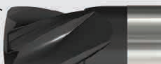
Notes

Inquiry Sheet Radial Milling Cutters

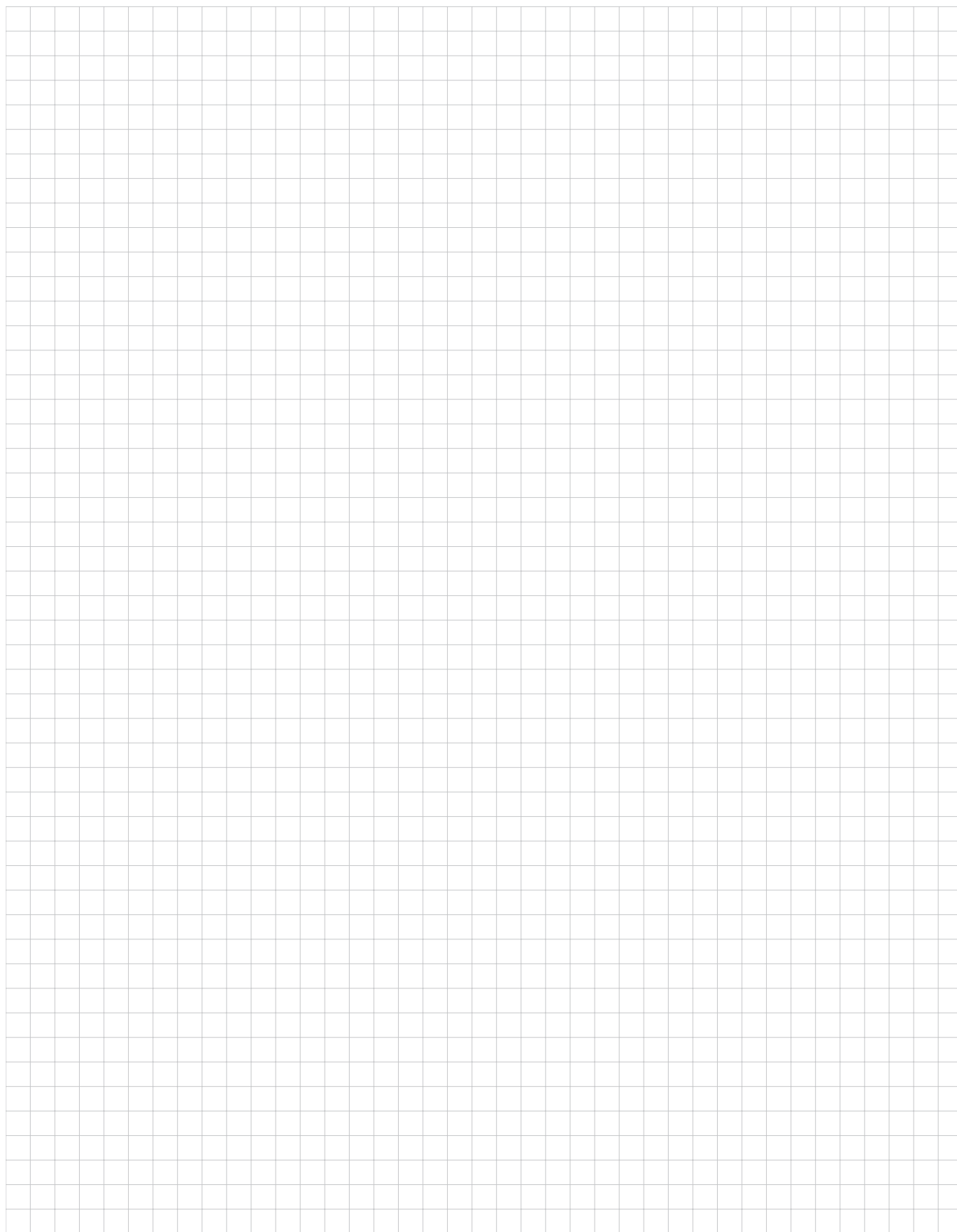
Customer Information			
Company		Contact	
Address		Phone	
		E-Mail	
		Date	

Material		Machine (5-Axis Required)	
Material Type		SpindleAdaptation	
Material Designation		Max. Spindle Speed	
Hardness		Lubrication	☐ Oil ☐ Emulsion _____ % ☐ MQL ☐ Air Pressure ☐ Dry ☐ Dust Collection
Additional Info			

Tool Data			
Quantity Breaks (Minimum 6 Pieces)		Coating	☐ Uncoated ☐ TiN ☐ DLC ☐ ESG ☐ ZRN ☐ ESR ☐ NM ☐ Other _____

Face Geometry	Construction Dimensions
$r_2 =$ 	
$r_2 =$ 	
$r_2 =$ 	
$r_2 =$ 	
$r_2 =$ 	
Type of Shank ☐ HA  ☐ HE  ☐ HB 	

Notes





Indexable Milling

Indexable Milling Tools

120	Indexable Milling
120	Univex Premium
130	Mills 90° For Non-Ferrous Metals and Plastics
133	MultiEdge T90 PRO8
136	MultiFace P45 PRO8
142	MultiEdge 45° Universal
148	MultiEdge 2Feed Mini
154	MultiEdge 4Feed
162	CopyLine GWR
180	CopyLine GWV
206	ACU-Jet Double 6
210	Bevel Milling Cutters 45° and 60°

Standards For Shanks And Cutting Edges	
Cutting Materials	
	Solid carbide
Special Features	
	Internal cooling central (ICC)
	Internal cooling radial (ICR)
	Dry machining
	Wet machining
	Air Jet
Applications	
	Heat resistant alloys
	Material hardness > 60 HRC
	Material hardness > 58 HRC
	Material hardness 65 HRC
	Material hardness < 58 HRC

Tolerance Classes	
	Shank tolerances
Processes	
	Roughing
	Semi finishing
	Finishing
	Superfinishing
	Roughing + Semi finishing
	Roughing + Finishing
	Semi finishing + Finishing
	Face milling
	Copying
	Corner milling
	Contour milling
	High feed milling
	Slotting
	Pocket milling
	Circular milling
	Contour milling cutter

The LMT Cutting Material Key

LMT has developed a user-oriented grades index for the new LMT cutting material and coating grades to ensure that users always select the correct LMT cutting material for their applications.

This recommendation is based on the internationally used ISO key for workpiece materials.

Example: The previously used grade designations remain valid until further notice.
LCK10M
L – LMT
C – Carbide, coated
K – Cast iron
10 – Toughness
M – Milling

L	C	K	P	3	0	M	1
1	2	3		4	5	6	

1	LMT Brand
2	Cutting material
	A = HSS
	B = CBN
	C = Carbide, coated
	D = PCD
	E = Monocrystalline diamond
	T = Cermet
	W = Carbide, uncoated
	X = Ceramics
3	Workpiece material (ISO 513 – Primary and auxiliary application)
	P = Steel
	M = Stainless steel
	K = Cast iron
	N = Non-ferrous metals
	S = Heat-resistant alloys
	H = Hardened steel

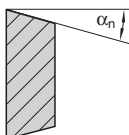
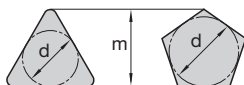
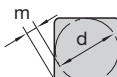
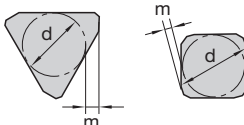
4	Toughness (ISO 513)
5	Machining Types
	B = Boring/Drilling
	C = Crankshaft
	D = Tapping/Threading
	F = Reaming
	G = Grooving
	H = High feed geometrie
	M = Milling
	R = Rolling
	T = Turning
6	Version number (optional)

Cutting Material Grades	Description
LCH33M	HC-K30 fine-grain PVD TiAlN ALX coated Highly wear-resistant ultra fine grain grade with high toughness for wet and dry machining of steel, cast steel, cast iron and non-ferrous metals. Suitable also for hard machining. ■ Medium to high cutting speeds ■ Low to medium depths of cut ■ Low to medium chip load
LCHK10M	HC-K10 fine-grain PVD TiAlN ALX coated Highly wear-resistant grade with high toughness for wet and dry machining of steel, cast steel, cast iron and non-ferrous metals. Especially suitable for hard machining of materials > 56 HRC
LCHP15M	HC-K15 – PVD TiSiN coated Special fine grain solid carbide grade especially for hard machining up to 65 HRC. Also suitable for machining steel.
LCK10M	Cutting material grades specifically for cast iron milling. Finest grade carbide coated with TERA speed (AlTiN) for high-performance cast iron machining, high cutting speeds and dry machining
LCK20M	HC-K20-CVD coated Wear-resistant grade for processing cast iron, ductile graphite iron, and spheroidal graphite iron, suitable for roughing and finishing
LCKP10M	HC-K10 PVD TiAlN coated Highly wear-resistant coated milling grade with high cutting edge stability for fine machining of alloyed and unalloyed tool steels, high-strength materials, non-ferrous metals and cast iron at high cutting speeds. ■ Low to medium depths of cut ■ Low to medium chip load

Cutting Material Grades	Description
LCKP20M	Coated with HC-P20 – PVD-AlTiCr N Wear-resistant and tough multi-application grade with a coating which is characterized by high toughness and simultaneously high strength. Suitable for wet and dry milling of steel, alloyed and unalloyed tool steels, cast steel and cast iron. Medium cutting speeds with medium infeeds and medium to high chip load
LCKP30M	HC-K30 TiAlN AL2Plus coated Highly wear-resistant milling grade with high cutting edge stability for machining of alloyed and unalloyed tool steels, high-strength materials and cast iron at medium cutting speeds. ■ Medium depths of cut ■ Medium chip loads
LCM44M	PVD – Type of multi-layer coated carbide grade for wet-milling of stainless steel and high-temperature resistant alloys. Improved wear behaviour and less chipping at medium cutting speed for light and medium processing.
LCM45M	HC-P40 – PVD AlTiN Ultra-fine grain substrate with high cobalt content combined with a nanocrystalline AlTiN coating. The new grade offers economic efficiency of dry and wet milling of stainless and corrosion-resistant steel grades at low to medium cutting speeds.

Cutting Material Grades	Description
LCMS34M/ LCMS35M	Carbide grade: M35/M34 CVD coating Special grade for processing stainless, highly heat-resistant steels and titanium, suitable for medium roughing operations and for finishing.
LCN10M	HC-K10 – CVD diamond coated Diamond-coated carbide for graphite machining suitable for roughing and finishing, can be used for 3- and 5 axis as well as for high speed cutting
LCP25M	HC-P25 PVD-TiAlN AL2Plus coated Highly wear-resistant multiple-application grade with high toughness for wet and dry milling of steel, cast steel and cast iron. ■ High cutting speeds ■ Low to medium depths of cut ■ Low to medium chip load
LCP40M	HC-P40 – PVD-AlCrN coated Highly wear-resistant grade with high toughness for wet milling and dry milling, in particular, steel, cast steel and cast iron. ■ Medium to high cutting speeds ■ Medium to high chip-forming cross sections ■ Medium to high chip load
LCPK10M	HC-K10 PVD- AlCrN coated Highly wear-resistant coated milling grade with high cutting edge stability for fine machining alloyed and unalloyed tool steels. High stability and wear-resistance specifically by high temperatures. Suitable for dry machining and high speed cutting up to 54 HRC. ■ Low to medium depths of cut ■ Low to medium chip load

Cutting Material Grades	Description
LCPK20M	HC-P20 PVD-TiAlN Wear-resistant multi-application grade with good toughness for wet milling and especially for dry milling of steel, cast steel and cast iron. ■ Medium to high cutting speeds ■ Low to medium depths of cut ■ Low to medium chip load
LCPK30M	Wear-resistant milling grade with maximum cutting edge stability. Suitable for roughing and semi-finishing of alloyed and non-alloyed tool steel, high-strength materials, and cast iron. Ideal for dry machining.
LCPM40M	Suited for high feed rates. A combination of tough carbide substrate with a double PVD coating makes it obvious that these indexable inserts are ideal for roughing. The inserts are completely coated with AL6 and have an additional TiN-layer at circumference which allows to observe wear easier
LWNS10M	HW-K10 micro-grain uncoated Milling grade with high wear resistance for machining of grey cast iron, aluminium alloys, and non-ferrous metals at medium to higher cutting speeds, even under unfavourable machining conditions.
LWN10M	HW-K10 micro-grain uncoated Milling grade with high wear resistance for machining of grey cast iron, aluminum alloys, and non-ferrous metals at medium to higher cutting speeds, even under unfavorable machining conditions.

S Insert Shape	E Clearance Angle	K Tolerances (mm)	T Chip Breaker, Clamp Type	12 Cutting Edge Length (mm)																																																																														
A 	 α_n	<table><tr><td></td><td>m</td><td>s</td><td>d</td></tr><tr><td>A</td><td>±0.005</td><td>±0.025</td><td>±0.025</td></tr><tr><td>C</td><td>±0.013</td><td>±0.025</td><td>±0.025</td></tr><tr><td>E</td><td>±0.025</td><td>±0.025</td><td>±0.025</td></tr><tr><td>F</td><td>±0.005</td><td>±0.025</td><td>±0.013</td></tr><tr><td>G</td><td>±0.025</td><td>±0.13</td><td>±0.025</td></tr><tr><td>H</td><td>±0.013</td><td>±0.025</td><td>±0.013</td></tr><tr><td>J</td><td>±0.005</td><td>±0.025</td><td>see Tab. 4</td></tr><tr><td>K</td><td>±0.013</td><td>±0.025</td><td>see Tab. 4</td></tr><tr><td>L</td><td>±0.025</td><td>±0.025</td><td>see Tab. 4</td></tr><tr><td>M</td><td>see Tab. 5</td><td>±0.13</td><td>see Tab. 4</td></tr><tr><td>N</td><td>see Tab. 5</td><td>±0.025</td><td>see Tab. 4</td></tr><tr><td>U</td><td>see Tab. 5</td><td>±0.13</td><td>see Tab. 4</td></tr></table>		m	s	d	A	±0.005	±0.025	±0.025	C	±0.013	±0.025	±0.025	E	±0.025	±0.025	±0.025	F	±0.005	±0.025	±0.013	G	±0.025	±0.13	±0.025	H	±0.013	±0.025	±0.013	J	±0.005	±0.025	see Tab. 4	K	±0.013	±0.025	see Tab. 4	L	±0.025	±0.025	see Tab. 4	M	see Tab. 5	±0.13	see Tab. 4	N	see Tab. 5	±0.025	see Tab. 4	U	see Tab. 5	±0.13	see Tab. 4	A  (70° – 90°)	<table><tr><td></td><td>I</td></tr><tr><td>06</td><td>6.350</td></tr><tr><td>07</td><td>7.938</td></tr><tr><td>09</td><td>9.525</td></tr><tr><td>11</td><td>11.000</td></tr><tr><td>12</td><td>12.700</td></tr><tr><td>15</td><td>15.875</td></tr><tr><td>16</td><td>16.500</td></tr><tr><td>19</td><td>19.050</td></tr><tr><td>22</td><td>22.000</td></tr><tr><td>25</td><td>25.400</td></tr><tr><td>31</td><td>31.750</td></tr><tr><td>38</td><td>38.100</td></tr></table>		I	06	6.350	07	7.938	09	9.525	11	11.000	12	12.700	15	15.875	16	16.500	19	19.050	22	22.000	25	25.400	31	31.750	38	38.100
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31	31.750																																																																																	
38	38.100																																																																																	
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D 			F 																																																																															
E 			G  (70° – 90°)																																																																															
H 	A 3°	<table><tr><td colspan="2">d</td><td>J, K, L, M</td><td>U</td></tr><tr><td>over</td><td>up to</td><td></td><td></td></tr><tr><td>3.9</td><td>10.0</td><td>±0.05</td><td>±0.08</td></tr><tr><td>10.0</td><td>15.0</td><td>±0.08</td><td>±0.13</td></tr><tr><td>15.0</td><td>20.0</td><td>±0.10</td><td>±0.18</td></tr><tr><td>20.0</td><td>26.0</td><td>±0.13</td><td>±0.25</td></tr><tr><td>26.0</td><td>32.0</td><td>±0.15</td><td>±0.25</td></tr></table>	d		J, K, L, M	U	over	up to			3.9	10.0	±0.05	±0.08	10.0	15.0	±0.08	±0.13	15.0	20.0	±0.10	±0.18	20.0	26.0	±0.13	±0.25	26.0	32.0	±0.15	±0.25	H  (70° – 90°)																																																			
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S 	N 0°	 Corner rounding, even number of sides	U  (40° – 60°)																																																																															
T 	P 11°		W  (40° – 60°)																																																																															
V 	O																																																																																	
W 	X Normal clearance angles, which require a special description.	 Chamfered inserts																																																																																
The corner angle is in the case of not equiangular basic forms always the smaller angle.			X with special feature acc. to drawing																																																																															

() Cone angle for screw

04 Thickness (mm)	AF Cutting edge corner (mm)	S Cutting edge type ¹⁾	N Direction of cut ¹⁾	- BM LMT-Standard
	For radius inserts 			TR Geometry
	Corner radius-r	sharp-edged	RH cut only	CF Chip breaker
	00 sharp-edged			T bevelled cutting edge
	02 0.2			TT Heavy duty roughing geometry
	04 0.4	rounded	LH cut only	ALC Geometry for nonferrous metals
	08 0.8			ALM Al geometry die and mould
	12 1.2			BM Geometry for stainless steel
	16 1.6			BMS Geometry for superalloys
	20 2.0			
	etc.			
	For chamfered insert face milling 			
	Setting angle χ_r	chamfered	RH and LH cut	
	A 45°		¹⁾ The use of these reference letters is left open.	
	D 60°			
	E 75°	chamfered and rounded		
	F 85°			
	P 90°			
	Z Special			
	Clearance α_n of face milling edge α_n			
	A 3°			
	B 5°	double chamfered		
	C 7°			
	D 15°			
	E 20°			
	F 25°			
	G 30°			
	N 0°			
	P 11°	double chamfered and round		
	Z Sonder Special			
	MO Round insert metric			
	OO Round insert Inch			

Example:

	S	E	K	T	12	04	AF	S	N-BM	
#	1	2	3	4	5	6	7	8	9	10
1	Basic form						square			
2	Clearance angle						20°			
3	Tolerances						m ± 0.013			
s ± 0.025										
d ± 0.13										
4	Fixing Cutting face									
5	Length of cutting edge						12.7			
6	Thickness						4.76			
7	Cutting edge corner						45° / 25°			
8	Cutting edge						chamfered and rounded			
9	Direction of cut						right- and lefthand			
10	Internal designation						Geometry for stainless steel			

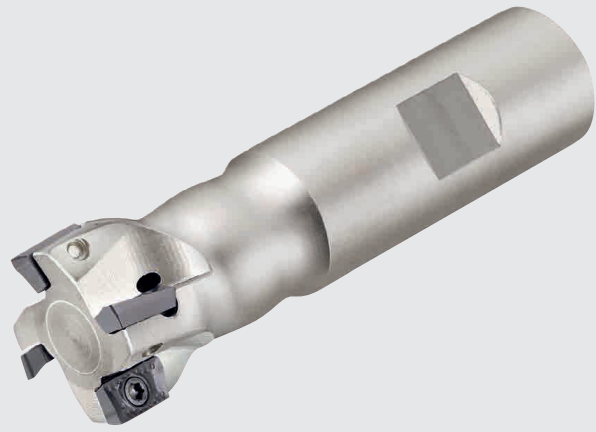
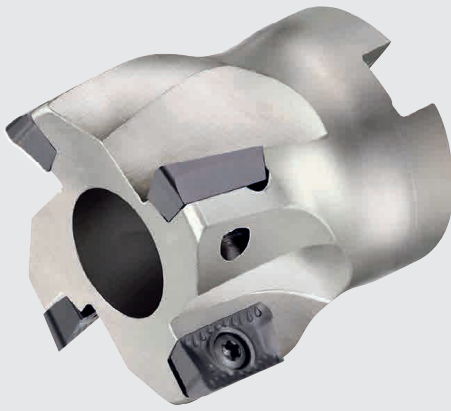
¹⁾ Dimensions in mm

 Corner Milling	 Face Milling
MultiEdge T90 PRO8 FMP90T X 133 Ø 2.0–3.0 in ■ Tangential shoulder milling system ■ Depth of cut up to 10 mm (0.394 in) with 8 times operable inserts ■ Directly sintered tangential insert P K  	MultiFace P45 PRO8 FMP45 136 Ø 2.0–3.0 in ■ Smooth cutting milling system ■ Depth of cut up to 4 mm (0.157 in) with 8 times operable inserts P M K S  
Univex Premium EMU90 / FMU90 120 Ø 0.75–6.0 in ■ Exact 90° milling ■ Wide variety in cutting grades and geometries (inserts) ■ Body with wear protection P M K N  	MultiEdge Universal FCT45 142 Ø 2.0–5.0 in ■ Milling system for different types of inserts (e.g. round inserts, inserts with 4 or 8 cutting edges) ■ For finishing and roughing applications P M K N  
Mills 90° EMZ90 / FMZ90 130 Ø 1.0–3.0 in ■ System for non-ferrous metals ■ Very sharp insert geometry ■ Depth of cut up to 14 mm (0.551 in) N  	

	High feed milling		Copy milling
	MultiEdge 2Feed mini EHP / FHP 148 Ø 0.75–3.0 in ■ Unified insert for the entire diameter range ■ System for lower powered machining centers ■ Small and cost efficient press-to-size insert P M K H  		CopyLine Ball nose copying program EBG R 162 Ø 0.250–2.0 in ■ Extremely accurate insert seat ■ Maximum quality ■ Tight runout tolerance and balancing P K N S H  
	MultiEdge 4Feed ECP / FCP 154 Ø 0.75–3.0 in ■ System for highest chip volumes ■ Wide variety in cutting grades and geometries (inserts) ■ Economic processing P M K  		CopyLine Toric copying program EBG V 180 Ø 0.375–1.25 in ■ Extremely accurate insert seat ■ Maximum quality ■ Tight runout tolerance and balancing P K N S H  
	ACU-Jet Double6 ECC / FCC 206 Ø 2.0–4.0 in ■ Double sided inserts up to 12 cutting edges ■ For roughing and semifinishing ■ Insert diameter 16 mm (0.630 in) P M K S  		

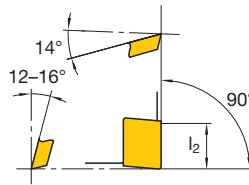
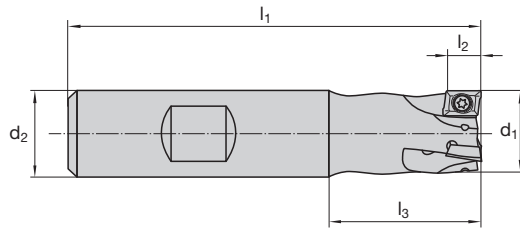
	Profile milling
	45° and 60° Bevel milling cutter (EFZ) 210 Ø 0.50–1.25 in ■ Depth of cut up to 13 mm (0.512 in) P K N  

- Wide range of body types (Shank, Arbor type)
- High variety of indexable inserts (size, geometry, grades)
- Diverse program of inserts for steel, cast iron, stainless steel and non-ferrous materials
- Precise 90° shoulder milling



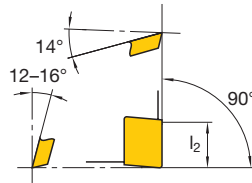
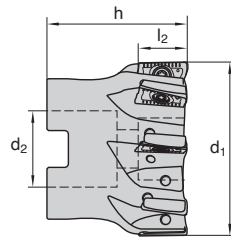
Wherever straight edges are needed, LMT Fette makes precise 90° face milling possible – with Univex Premium, which works on steel, cast iron, stainless steel and non-ferrous materials.

Univex Premium milling cutters have outstanding machining properties: they work precisely, smoothly and allow the machine to operate with a low power consumption. This means high productivity and excellent processing.



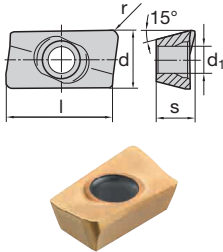
Catalog Number							EMU90 IK			
d ₁	l ₂	l ₁	l ₃	d ₂	z	Ident No.	LMT-Code			
0.750	0.472	3.250	1.220	0.750	2	7168965	EMU90 A12.075WDI	ADHX 12... ADKX 12...	2237513	1048326 T8
1.000	0.472	3.250	1.220	1.000	3	7168966	EMU90 A12.100WDI			
1.250	0.472	3.250	1.220	1.000	4	7168967	EMU90 A12.125WEI			
1.250	0.472	3.250	1.220	1.000	5	7168968	EMU90 A12.125WEIF			
1.000	0.650	4.000	1.720	1.000	2	1950345	EMU90 A17-100WEI	ADHX 17... ADKX 17...	1045105	1048335 T15
1.000	0.650	6.000	1.720	1.000	2	1950346	EMU90 A17-100SEI			
1.250	0.650	4.000	1.720	1.250	2	1950348	EMU90 A17-125WFI		1045114	
1.250	0.650	6.000	1.720	1.250	2	1950349	EMU90 A17-125SFI			
1.250	0.650	4.000	1.720	1.250	3	1950351	EMU90 A17-125WFIF			
1.250	0.650	6.000	1.720	1.250	3	1950352	EMU90 A17-125SCFIF			
1.500	0.650	4.500	1.720	1.500	3	1950353	EMU90 A17-150WGI			
1.500	0.650	6.000	1.720	1.500	3	1950354	EMU90 A17-150SGI			
1.500	0.650	4.500	1.720	1.500	4	1950356	EMU90 A17-150WGIF			
1.500	0.650	6.000	1.720	1.500	4	1950357	EMU90 A17-150SGIF			
Long										
1.000	0.650	10.000	1.720	1.000	2	1950347	EMU90 A17-100SEI	ADHX 17... ADKX 17...	1045105	1048335 T15
1.250	0.650	10.000	1.720	1.000	2	1950350	EMU90 A17-125SFI		1045114	
1.500	0.650	10.000	1.720	1.250	3	1950355	EMU90 A17-150SGI			

Cutting data recommendations starting page 126



Catalog Number						FMU90 IK			
d ₁	l ₂	h	d ₂	z	Ident No.	LMT-Code			
2.000	0.650	1.575	0.750	4	1950280	FMU90 A17-200AAI	ADHX 17... ADKX 17...	1045114	1048335 T15
2.000	0.650	1.575	0.750	5	1950281	FMU90 A17-200AAIF			
2.500	0.650	1.575	1.000	5	1950282	FMU90 A17-250ABI			
2.500	0.650	1.575	1.000	6	1950283	FMU90 A17-250ABIF			
3.000	0.650	1.960	1.250	5	1950284	FMU90 A17-300ACI			
3.000	0.650	1.960	1.250	8	1950285	FMU90 A17-300ACIF			
4.000	0.650	1.960	1.500	6	1950286	FMU90 A17-400ADI			
4.000	0.650	1.990	1.500	9	1950287	FMU90 A17-400ADIF			
5.000	0.650	1.970	1.500	9	9187004	FMU90 A17-500ADIF			
6.000	0.650	1.970	2.000	10	9186523	FMU90 A17-600AEIF			

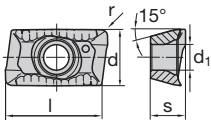
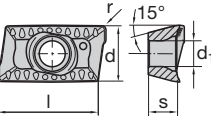
Cutting data recommendations starting page 126

							Cutting material Ident No.												For cutter				
N = Number of cutting edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.	
		l	d	s	d ₁	r																	
 N = 2	ADHX 120404 ER	12.8	7.4	4.65	3.4	0.4	7284695								7284697							EMU90 IK ERU90 FMU90 IK FRU90	
	ADHX 120406 ER	12.8	7.4	4.65	3.4	0.6	7284699								7284701								
	ADHX 120408 ER	12.8	7.4	4.65	3.4	0.8	7194072								7194074								
							■								□							P	
							□																M
																■							K
															□								N
															□								S
																							H

Description/Designation of grades and ISO-Code starting page 116

Description/Designation of grades and ISO-Code starting page 116

■ = First choice □ = Second choice

							Cutting material Ident No.												For cutter				
N = Number of cutting edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.	
		l	d	s	d ₁	r																	
  N = 2	ADHX 120408 FR-ALC	12.7	7.4	4.76	3.4	0.8												1069074	1069074	7019511		EMU90 IK ERU90 FMU90 IK FRU90	
	ADHX 120412 FR-ALC	12.7	7.4	4.76	3.4	1.2												1069079	1069079	7019512			
	ADHX 120416 FR-ALC	12.7	7.4	4.76	3.4	1.6												1069084	1069084	7019513			
	ADHX 120420 FR-ALC	12.7	7.4	4.76	3.4	2.0												1069089	1069089	7019514			
  N = 2	ADKX 120408 SR-TR	12.7	7.4	4.76	3.4	0.8	1069070					7054285	7054286	1069071			7048193					EMU90 IK ERU90 FMU90 IK FRU90	
	ADKX 120412 SR-TR	12.7	7.4	4.76	3.4	1.2	1069075					7054287	7054288	1069076			7048194						
	ADKX 120416 SR-TR	12.7	7.4	4.76	3.4	1.6	1069080					7054289	7054290	1069081			7048195						
	ADKX 120420 SR-TR	12.7	7.4	4.76	3.4	2	1069085					7054291	7054292	1069086			7048196						
	ADKX 120440 SR	12.7	7.4	4.76	3.4	4 ¹⁾	7017226																
							■					□	□	□								P	
							□					■	■										M
														■		■							K
														□			■	■					N
														□									S
																							H

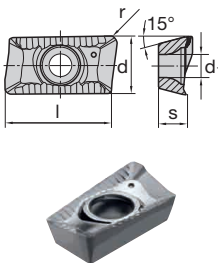
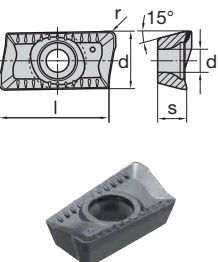
¹⁾ from corner radius r > 2, subsequent machining must be carried out on the plate in the corner area.

Description/Designation of grades and ISO-Code starting page 116

¹⁾ from corner radius $r > 2$, subsequent machining must be carried out on the plate in the corner area.

Description/Designation of grades and ISO-Code starting page 116

■ = First choice □ = Second choice

							Cutting material Ident No.												For cutter				
N = Number of cutting edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.	
		l	d	s	d ₁	r																	
 N = 2	ADHX 170508 FR-ALC	17.5	9.62	5.6	3.8	0.8												2414009	9206028			EMU90 IK FMU90 IK FRU90	
	ADHX 170512 FR-ALC	17.5	9.62	5.6	3.8	1.2												7019835	7019836				
	ADHX 170516 FR-ALC	17.5	9.62	5.6	3.8	1.6												7019837	7019838				
	ADHX 170520 FR-ALC	17.5	9.62	5.6	3.8	2												7019839	7019840				
	ADHX 170530 FR-ALC	17.5	9.62	5.6	3.8	3 ¹⁾												7019841	7019842				
	ADHX 170540 FR-ALC	17.5	9.62	5.6	3.8	4 ¹⁾												7011958	7011957				
 N = 2	ADKX 170508 SR-TR	17.5	9.62	5.6	3.8	0.8	2412980							2413978	2414004		7048197					EMU90 IK FMU90 IK FRU90	
	ADKX 170512 SR-TR	17.5	9.62	5.6	3.8	1.2	2412982					7054293	7054294	2413980	2414005		7048198						
	ADKX 170516 SR-TR	17.5	9.62	5.6	3.8	1.6	2412984					7054295	7054296	2413982	2414006		7048199						
	ADKX 170520 SR-TR	17.5	9.62	5.6	3.8	2	2412986					7054297	7054298	2413984	2414007		7048200						
	ADKX 170532 SR-TR	17.5	9.62	5.6	3.8	3.2 ¹⁾						7054299	7054300	2413228									
							■					□	□	□	□							P	
												■	■										M
							□							■	■		■						K
														□	□			■	■				N
														□	□								S
																							H

¹⁾ from corner radius r > 2, subsequent machining must be carried out on the plate in the corner area.

Description/Designation of grades and ISO-Code starting page 116

¹⁾ from corner radius $r > 2$, subsequent machining must be carried out on the plate in the corner area.

Description/Designation of grades and ISO-Code starting page 116

■ = First choice □ = Second choice

Material		Hardness	LCP40M			
			v _c (SFM)	f _z (in/z)		
				ADKX ADHX 1204	ADKX 1705	
P	Plain carbon steel + free cutting steel	<32 Rc	655-785	0.0071	0.0118	
	Heat-treatment steel, medium strength	<32 Rc	460-590	0.0063	0.0094	
	Cast steel	<32 Rc	460-590	0.0063	0.0094	
	Case hardening steel	<32 Rc	460-590	0.0063	0.0094	
	Stainless steel, ferritic, martensitic	<32 Rc	460-590	0.0063	0.0094	
	Heat-treatment steel, high strength	30 - 44 Rc	390-460	0.0055	0.0079	
	Nitriding steel, heat treated	30 - 44 Rc	390-460	0.0055	0.0079	
	Tool steel	<44 Rc	390-460	0.0055	0.0079	
M	Stainless steel, austenitic	<32 Rc	590-785 	0.0039	0.0063	
	Stainless steel, martensitic steel	<32 Rc				
K	Grey cast iron	<32 Rc				
	Alloyed grey cast iron	<32 Rc				
	Nodular cast iron	<32 Rc				
	Malleable cast iron	<32 Rc				
N	Aluminium alloys, short chipping	<32 Rc				
	Aluminium alloys, long chipping	<32 Rc				
	Copper alloys, short chipping	<32 Rc				
	Copper alloys, long chipping	<32 Rc				
	Thermoplastics	<32 Rc				
	Duroplastics	<32 Rc				
S	Titanium alloys, medium strength	<32 Rc				
	Titanium alloys, high strength	27 - 44 Rc				
	Nickel based alloys, medium strength	<32 Rc				
	Heat resistant nickel based alloys, high strength	27 - 44 Rc				

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Cutting speed v_c (SFM) Feed per tooth f_z (in/z)									
	LCK10M			LCM45M LCM44M			LCKP10M LCKP30M		
	v_c (SFM)	f_z (in/z)		v_c (SFM)	f_z (in/z)		v_c (SFM)	f_z (in/z)	
		ADKX 1204	ADKX 1705		ADKX 1204	ADKX 1705		ADKX ADHX 1204	ADKX 1705
							755-820	0.0055	0.0094
							590-720	0.0055	0.0079
							590-720	0.0055	0.0079
							590-720	0.0055	0.0079
							590-720	0.0055	0.0079
							460-590	0.0043	0.0063
							460-590	0.0043	0.0063
							460-590	0.0043	0.0063
				590-785 (195-260) 	0.0047	0.0063			
	785-985	0.0098	0.0138				720-918	0.0098	0.0138
	720-285	0.0079	0.0118				590-655	0.0087	0.0126
	525-655	0.0079	0.0118				460-590	0.0079	0.0118
							525-655	0.0059	0.0098
							985-1310	0.0059	0.0079
							985-1310	0.0059	0.0079
							655-820	0.0059	0.0079
							655-820	0.0059	0.0079
							820-985	0.0098	0.0138
							655-820	0.0098	0.0138
				196-262	0.0047	0.0059	196-262	0.0047	0.0059
				130-196	0.0047	0.0059	130-196	0.0047	0.0059
				130-196	0.0047	0.0059	130-196	0.0047	0.0059
				65-130	0.0047	0.0059	65-130	0.0047	0.0059



Dry machining, air-blast cooling is advantageous

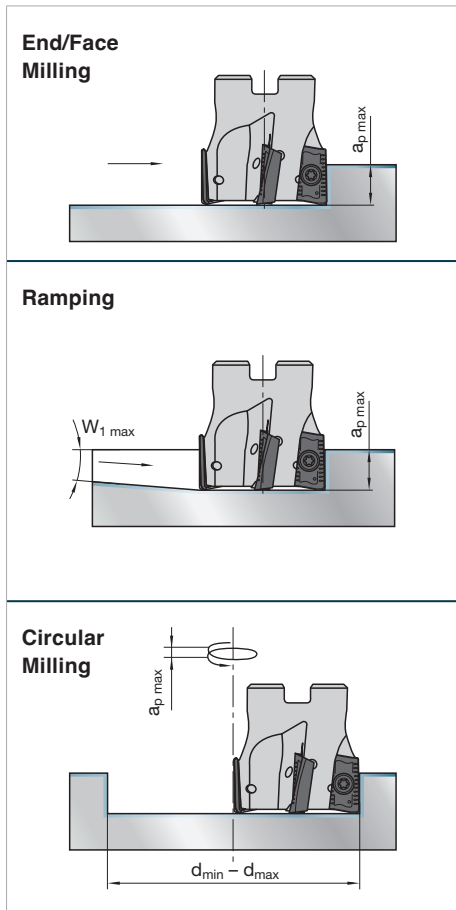


Wet machining, sufficient emulsion volume required

	Material	Hardness	
N	Aluminium alloys, short chipping	<32 Rc	
	Aluminium alloys, long chipping	<32 Rc	
	Copper alloys, short chipping	<32 Rc	
	Copper alloys, long chipping	<32 Rc	
	Thermoplastics		
	Duroplastics		

The cutting data indicated are starting and must be adjusted to the prevailing conditions.

Univex Premium Application Areas



Tool	E(F)MU90 A12	E(F)MU90 A17
Insert	AD_X 1204	AD_X 1705
$a_{p \max}$ (in)	0.4724 (12 mm)	0.6496 (16.5 mm)
d_1 (in)	$W_1 \max$ Ramping angle (°)	
3/4	3.5	
1	2.5	4.0
1 1/4	1.8	2.7
1 1/2	1.4	2.0
2	1.0	2.0
2 1/2	0.8	1.1
3		1.0
4		0.6
5		
6		
d_1 (in)	$d_{\min} - d_{\max}$ (in)	
3/4	1.417–1.575	
1	1.811–1.969	1.772–1.969
1 1/4	2.362–2.520	2.323–2.520
1 1/2	2.992–3.150	2.953–3.150
2	3.780–3.937	3.740–3.937
2 1/2	4.764–4.921	4.724–4.921
3		6.102–6.299
4		7.677–7.874
5		9.596–9.843
6		11.516–11.811

$a_{p \max}$ Maximum Depth of Cut
 d_1 Tool Diameter

	Cutting speed v_c (SFM) Feed per tooth f_z (in/z)		
	v_c (SFM)	LWN10M LCN10M	
		ADHX 1204 FR-ALC	ADHX 1705 FR-ALC
	1148-1640	0.0059	0.0079
	2624-3280	0.0118	0.0157
	1148-1640	0.0059	0.0079
	1148-1640	0.0079	0.0118
	820-985	0.0095	0.0138
	655-1148	0.0095	0.0138



Aluminum Component Guide Column

Tool:

FMU90 IK, $d_1 = 2.00$, $z = 5$

Insert:

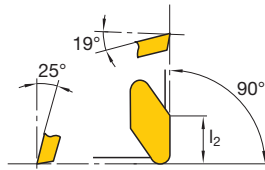
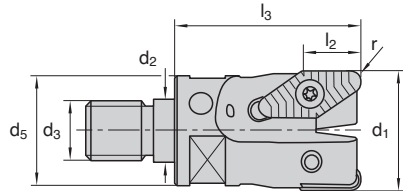
ADHX 170508FR-ALC LCN10M

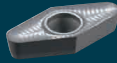
Cutting data:

$v_c = 3280$ SFM
 $n = 6265$ RPM
 $f_z = 0.0157$ in
 $v_f = 492$ in/min
 $a_e = 0.3937$ in
 $a_p = 0.1969$ in

Coolant:

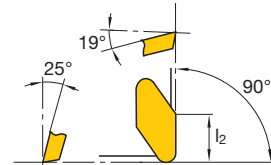
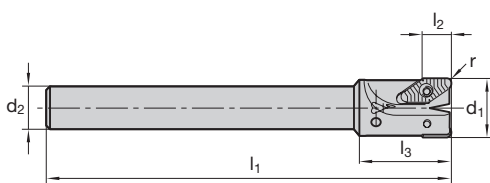
wet

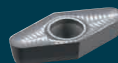


Catalog Number									EMZ 90 THR IK			
d ₁	r	l ₂	l ₃	d ₅	d ₃	d ₂	z	Ident No.	LMT-Code			
1.00	0.05	0.53	1.57	0.83	M12	0.49	2	1950301	EMZ90 V16-100TF-I	VPMT 160412-ALM	1051312	1048335 T15
1.25	0.12	0.59	1.97	1.02	M16	0.67	2	1950302	EMZ90 V22-125TH-I	VCGT 220530-ALM	1045766	
1.50	0.12	0.59	1.97	1.02	M16	0.67	2	1950303	EMZ90 V22-150TH-I			

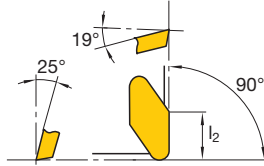
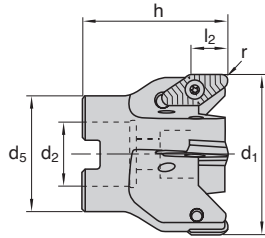
Cutting data recommendations starting page 132

Mills 90° For Non-Ferrous Metals And Plastics – Shank Type



Catalog Number								EMZ 90 IK				
d ₁	r	l ₂	l ₁	l ₃	d ₂	z	Ident No.	LMT-Code				
1.00	0.05	0.53	8.00	2.00	0.75	2	2915132	EMZ90 V16-100SA-I	VPMT 160412-ALM	1044972	1048326 T8 1048335 T15	
1.00	0.05	0.53	7.88	1.58	1.00	2	1950291	EMZ90 V16-100SB-I		1051312		
1.00	0.05	0.53	4.28	2.00	1.00	2	2915120	EMZ90 V16-100WB-I				
1.25	0.05	0.53	8.00	2.00	1.00	2	2915125	EMZ90 V16-125SB-I				
1.25	0.05	0.53	4.28	2.00	1.25	2	2915121	EMZ90 V16-125WB-I				
1.25	0.12	0.59	8.62	2.00	1.00	2	1950292	EMZ90 V22-125SB-I	VCGT 220530-ALM	1045766		

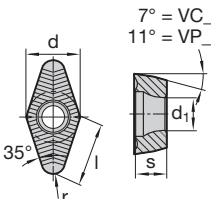
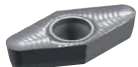
Cutting data recommendations starting page 132



Catalog Number								FMZ 90 IK			
d ₁	r	l ₂	h	d ₂	d ₅	z	Ident No.	LMT-Code			
1.50	0.05	0.53	2.12	0.75	1.26	3	1950294	FMZ90 V16-150AA-I	VPGT 160412-ALM	1051312	1048335 T15
2.00	0.05	0.53	2.12	0.75	1.75	4	2915004	FMZ90 V16 200AAF-I	VCGT 220530-ALM	1045766	
2.00	0.12	0.59	2.12	0.75	1.57	3	1950295	FMZ90 V22-200AA-I			
2.50	0.12	0.59	2.12	0.75	1.89	4	1950296	FMZ90 V22-250AA-I			
3.00	0.12	0.59	2.12	1.00	—	3	2915145	FMZ90 V22-300AB-I			
3.00	0.12	0.59	2.12	1.00	2.36	4	1950297	FMZ90 V22-300ABE-I			
3.00	0.12	0.59	2.12	1.00	2.29	5	2915141	FMZ90 V22-300ABF-I			

Cutting data recommendations starting page 132

Indexable Inserts For Milling Cutters 90° For Non-Ferrous Metals And Plastics

							Cutting materials Ident No.												For cutter				
N = Number of cutting edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.	
		l	d	s	d ₁	r																	
  N = 2	VCGT 220530 ALM	22.1	12.7	5.56	5.5	3.0												1069760	1069759			EMZ90 FMZ90	
	VPGT 160412 ALM	16.6	12.7	4.76	4.4	1.2												1069758	1069757				
Description/Designation of grades and ISO-Code starting page 116																							P
																							M
																							K
																		■	■				N
																							S
																							H

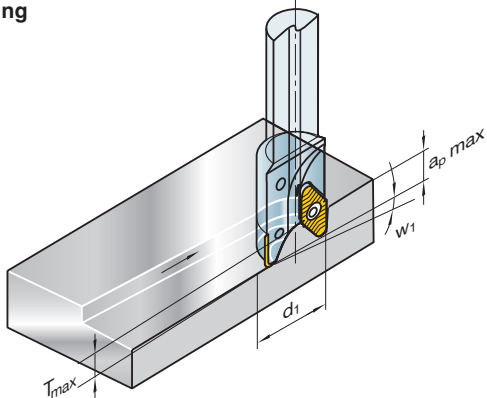
Description/Designation of grades and ISO-Code starting page 116

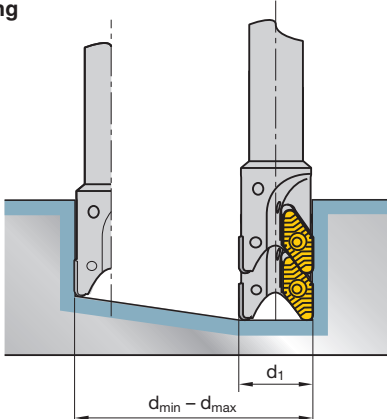
■ = First choice □ = Second choice

Material		Hardness	Cutting Speed v _c (SFM)		Maximum Feed Per Tooth f _z (in/z)	
			LCN10M	LWN10M	VPGT1604 ...	VCGT2205 ...
N	Aluminium alloys, short chipping	<32 Rc	3280	2624	0.0138	0.0197
	Aluminium alloys, long chipping	<32 Rc	4920-9842	3280-6562		
			3280-6562	2624-5250		
	Copper alloys, short chipping	<32 Rc	1640	1310		
	Copper alloys, long chipping	<32 Rc	984	820		
	Thermoplastics		1310	985	0.0118	0.0157
	Duroplastics		655	490		

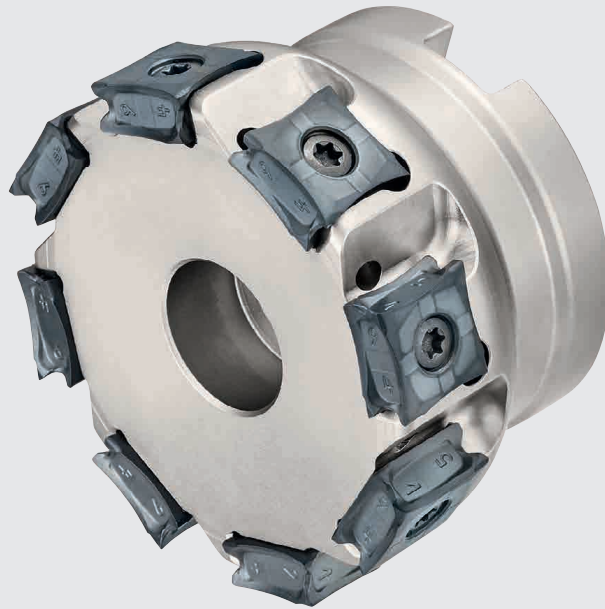
The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Further Application Recommendations

Ramping 	Helix angle $W_{1 \max}$ and internal depth of cut $T_{\max}$		
		VPGT 160412-ALM	VCGT 220530-ALM
	$a_p \max$	0.5315 (13.5 mm)	0.5906 (15 mm)
	$T_{\max}$	0.3150 (8 mm)	0.3543 (9 mm)
	d_1 (in)	$W_{1 \max}$ Ramping angle (°)	
	1	12	
	1 1/4	11	
	1 1/2	7.5	
	2	6	
	2 1/2	4.5	
	3	3.5	
	4	2.5	

Circular Milling 	d_1 (in)	$d_{\min} - d_{\max}$ (in)	
	1	1.38	1.89
	1 1/4	1.65	2.28
	1 1/2	2.44	3.07
	2	3.22	3.85
	2 1/2	4.33	4.96
	3	5.43	6.06
	4	7.01	7.64

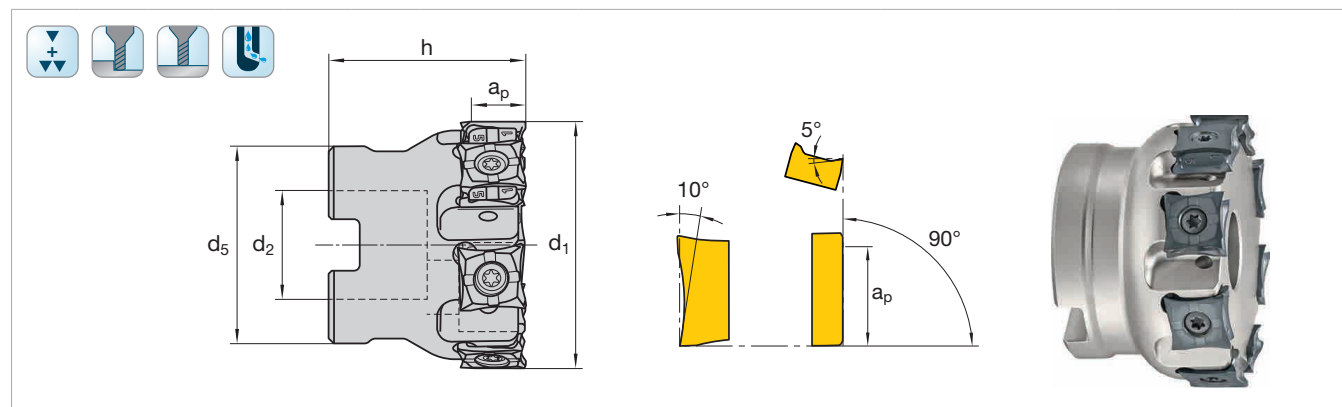
- Cost Savings Through Cycle Time Reduction
- Press-To-Size-Insert With 8 Effective Cutting Edges
- Depth Of Cut Up To 10 mm (0.394 in)



The MultiEdge T90 PRO8 is as modular milling systems with tangential inserts. It is designed for roughing and semi finishing operations in steel and cast iron.

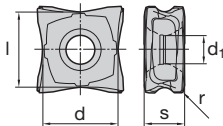
The program covers cutter bodies in the diameter range from 2 to 3 in and indexable inserts with cutting depths up to 10 mm (0.394 in) for the machining of steel (ISO P materials), cast iron (ISO K materials), and stainless steel (ISO M materials).

MultiEdge T90 Pro8 Shoulder Milling Cutter – Arbor Type



Catalog Number							FMP90T X			
d ₁	h	d ₂	d ₅	a _p	z	Ident No.	LMT-Code			
2.00	1.57	0.75	1.57	0.394	5	7327318	FMP90T X12.200AA-I			
2.00	1.57	0.75	1.57	0.394	6	7327324	FMP90T X12.200AA-IF			
3.00	1.97	1.00	2.36	0.394	8	7327320	FMP90T X12.300AB-I			
3.00	1.97	1.00	2.36	0.394	10	7327326	FMP90T X12.300AB-IF			

Indexable inserts

							Cutting material Ident No.												For cutter					
N = Number of cutting edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHPT15M	LCH50M	Cat-No.		
		l	d	s	d ₁	r																		
  N = 8	XNMU 120608 ER	12	12	6.35	4.4	0.8	7163384					7281866		7163385		7192762							FMP90T X	
Description/Designation of grades and ISO-Code starting page 116							■					■		■		■							P	
												■											M	
														■		■							K	
																							N	
												□											S	
																							H	

■ = First choice □ = Second choice

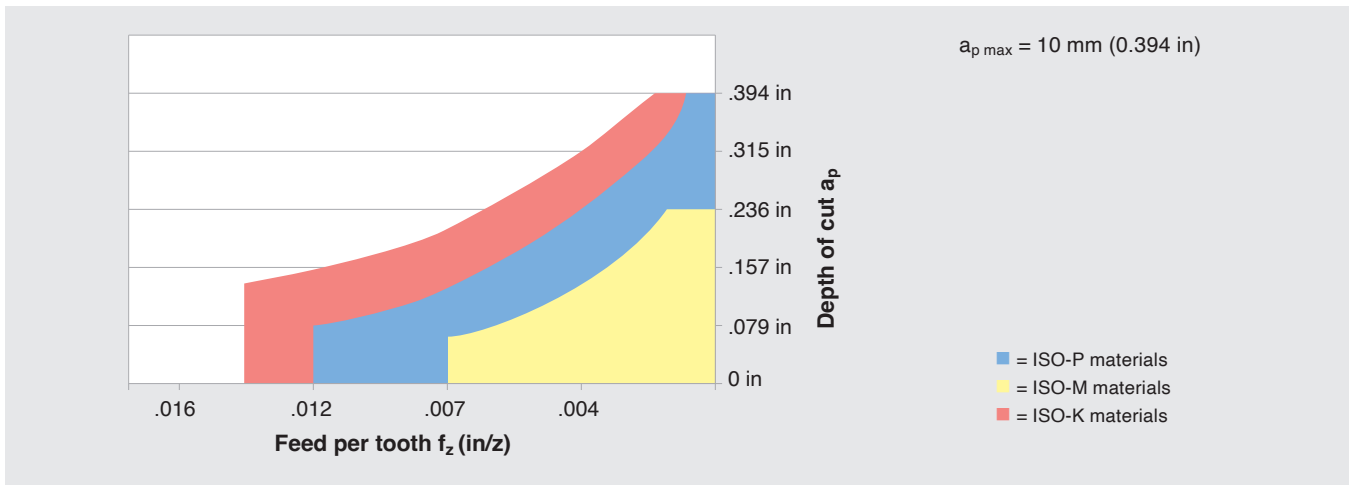
	Material	Hardness	Cutting Material Grade	Recommended cutting speed v_c (SFM) with $a_e = 0.66 \times d_1$
				v_c (SFM)
P	Plain carbon steel	<32 Rc	LCP40M LCPK30M	656-722
	Free cutting steel	<32 Rc		
	Plain carbon steel	<32 Rc		
	Heat-treatment steel, medium strength	<32 Rc	LCP40M LCPK30M	590-656
	Cast steel	<32 Rc	LCP40M LCPK30M	459-525
	Case hardening steel	<32 Rc	LCP40M LCPK30M	459-590
	Heat-treatment steel, high strength	30 - 44 Rc	LCP40M LCPK30M	394-525
	Nitriding steel, heat treated	30 - 44 Rc	LCP40M LCPK30M	394-459
	Tool steel	30 - 44 Rc		
M	Stainless steel, austenitic	<32 Rc	LCM45M	525 - 722 
	Stainless steel, martensitic steel	<32 Rc		262 - 394 
K	Cast iron with flake graphite	<32 Rc	LCPK30M	656-787
	Alloyed cast iron	<32 Rc	LCPK30M	525-656
	Graphite cast iron	<32 Rc	LCPK30M	459-590
	Malleable cast iron	<32 Rc	LCPK30M	525-656

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

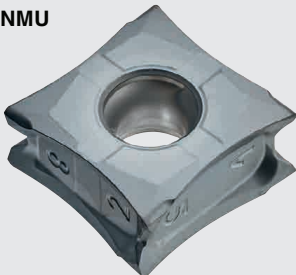
 Dry machining, air-blast cooling is advantageous

 Wet machining, sufficient emulsion volume required

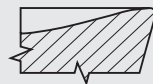
Recommended Feed Per Tooth With $a_e = 0.66 \times D_1$



XN MU



Chip-breakers:



-ER

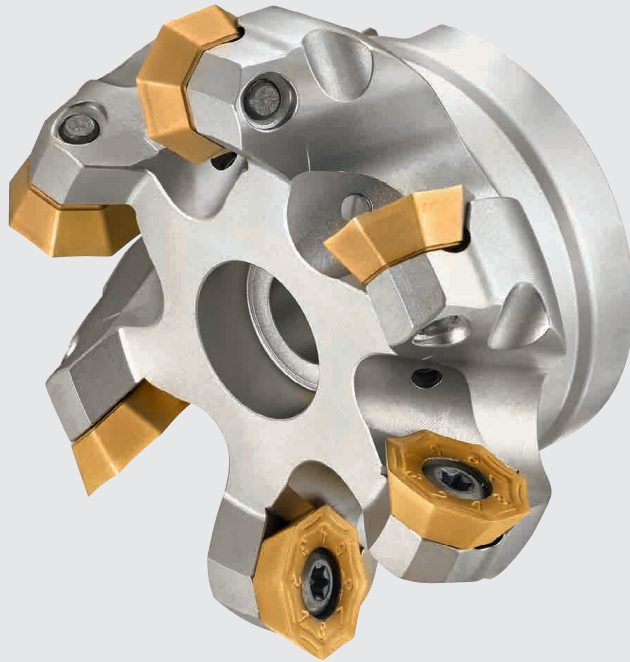
Features:

- Soft-cutting indexable insert geometry to reduce cutting forces
- Tangential insert with 8 cutting edges for high efficiency
- Depth of cut up to $a_{p \max} = 10 \text{ mm (0.394 in)}$

MultiFace P45 PRO8

Positive Face Milling System For Reduced Power Consumption

- 15° chipping angle for reduced machining forces
- Cutting grades and coatings for a long tool life and high clearance for chip evacuation
- Depth of cut up to 4.0 mm (0.157 in)
- Geometries for the machining of ISO-P, ISO-K, ISO-M and ISO-S

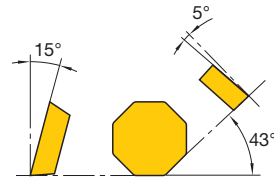
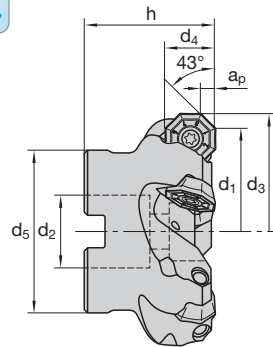


With the MultiFace P45 PRO8, LMT Fette is expanding its product range with a very soft cutting edge milling system for roughing and finishing different materials.

For the machining of different materials there are specially developed geometries and cutting materials.

In the diameter range from 2 to 3 inches, the standard program offers a normal as well as fine pitched version.

MultiFace P45 PRO8 Face Milling Cutter – Arbor Type



Catalog Number							FMP45			
d ₁	h	d ₂	d ₅	a _{p max}	z	Ident No.	LMT-Code			
2.00	1.57	0.75	1.57	0.157	4	7273660	FMP45 O06.200AA-I	OEKT 06...	1045777	1048344 T20
2.00	1.57	0.75	1.57	0.157	5	7273666	FMP45 O06.200AA-IF			
3.00	1.97	1.00	1.57	0.157	6	7273662	FMP45 O06.300AB-I			
3.00	1.97	1.00	1.57	0.157	7	7273668	FMP45 O06.300AB-IF			

Cutting data recommendations starting page 140



OEKT 0605 AE-SN

Features:

- Very stable geometry
- For challenging applications
- Negative chamfer with edge preparation

Chip-breaker



-SN

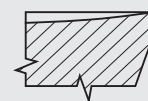


OEKT 0605 AEEN-BM

Features:

- Soft-cutting geometry
- For uncomplicated applications
- Additional 8° chipping angle with edge preparation

Chip-breaker



-BM



OEKT 0605 AESN-BMS

Features:

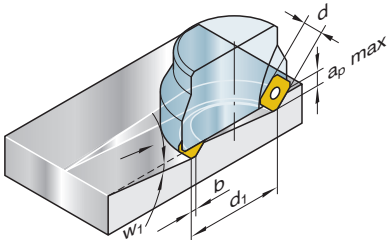
- Universal geometry
- For cross-section applications
- Additional 15° chipping angle with edge preparation

Chip-breaker

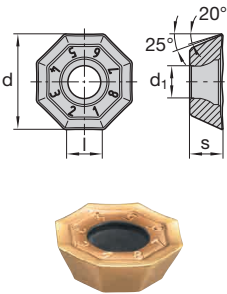
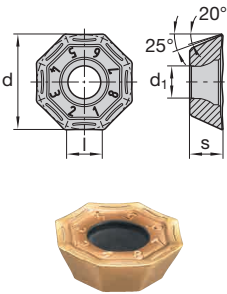
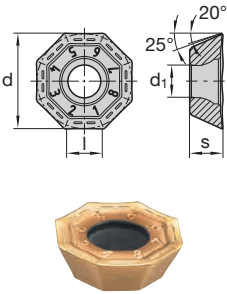


-BMS

Technical Recommendations

Ramping		
Bevel angle W_1 max. for plunge milling "ramping" 	Tool	FMP45
	Insert	OEKT 0605
	$a_p \text{ max (in)}$	.157
	$T_{\text{max}} \text{ (in)}$	.118
	d_1 (in)	$W_1 \text{ max}$ Grad Degree
	2	5
	3	2.5

T_{max} : inner cutting depth

							Cutting material Ident No.														For Cutter			
N = Number of Cutting Edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCMS35M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.		
		l	d	s	d ₁	r																		
 N = 8	OEKT 0605 AESN	6	15.88	5.56	5.5	—	7212188		7212189			7212190			7212191								FMP45	
 N = 8	OEKT 0605 AEEN-BM	6	15.88	5.56	5.5	—	7212192					7212193											FMP45	
 N = 8	OEKT 0605 AESN-BMS	6	15.88	5.56	5.5	—	7212194						7212195										FMP45	
Description/Designation of grades and ISO-Code starting page 116							■	■				□			□								P	
							□					■	■										M	
								□					□	■									K	
																							N	
													■										S	
																							H	

■ = First choice □ = Second choice

	Material	Hardness	Cutting Material Grade	
P	Plain carbon steel + free cutting steel	<32 Rc	LCP40M LCPK30M	
	Heat-treatment steel, medium strength	<32 Rc	LCP40M LCPK30M	
	Cast steel	<32 Rc	LCP40M	
	Case hardening steel	<32 Rc	LCP40M	
	Stainless steel, ferritic, martensitic	<32 Rc	LCP40M LCPK30M	
	Heat-treatment steel, high strength	30 - 44 Rc	LCP40M LCPK30M	
	Nitriding steel, heat treated	30 - 44 Rc <32 Rc	LCP40M LCPK30M	
	Tool steel	<44 RC	LCP40M LCPK30M	
M	Stainless steel, austenitic	<32 Rc	LCM45M LCMS35M	
	Stainless steel, martensitic steel	<32 Rc	LCM45M LCMS35M	
K	Grey cast iron	<32 Rc	LCKP30M	
	Alloyed grey cast iron	<32 Rc	LCKP30M	
	Nodular cast iron	<32 Rc	LCKP30M	
	Malleable cast iron	<32 Rc	LCKP30M	
N	Aluminium alloys, short chipping	<32 Rc	LCN10M	
	Aluminium alloys, long chipping	<32 Rc	LWN10M	
	Copper alloys, short chipping	<32 Rc	LWN10M LCN10M	
	Copper alloys, long chipping	<32 Rc	LWN10M LCN10M	
	Thermoplastics	<32 Rc	LWN10M	
	Duroplastics	<32 Rc	LWN10M	
S	Titanium alloys, medium strength	<32 Rc	LCMS35M	
	Titanium alloys, high strength	27 - 44 Rc	LCMS35M	
	Nickel based alloys, medium strength	<32 Rc	LCMS35M	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	LCMS35M	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Roughing 			Finishing 		
	v_c (SFM)	f_z (in/z)	a_p (in) (max .157 in)	v_c (SFM)	f_z (in/z)	a_p (in)
	492-820 590-919	.0078-.0157 .0059-.0118	.1181-.1575	590-984 656-1050	.0031-.0078 .0031-.0059	.0079-.0787
	492-820 590-919	.0078-.0157 .0059-.0118	.1181-.1575	328-820 427-919	.0031-.0059 .0031-.0039	.0079-.0787
	492-820	.0078-.0157	.1181-.1575	590-984	.0031-.0078	.0079-.0787
	328-656	.0078-.0157	.1181-.1575	590-984	.0031-.0059	.0079-.0787
	328-656 427-722	.0078-.0157 .0059-.0118	.1181-.1575	492-820 590-984	.0031-.0059 .0031-.0039	.0079-.0787
	328-656 427-722	.0078-.0157 .0059-.0118	.1181-.1575	492-820 590-984	.0031-.0059 .0031-.0039	.0079-.0787
	328-656 427-722	.0078-.0157 .0059-.0118	.1181-.1575	492-820 590-984	.0031-.0059 .0031-.0039	.0079-.0787
	328-656 427-722	.0059-.0138 .0059-.0118	.1181-.1575	492-820 590-984	.0031-.0059 .0031-.0039	.0079-.0787
	262-394 525-722	.0059-.0098	.0394-.1181	262-394 525-787	.0020-.0059	.0079-.0393
	197-328 525-722	.0078-.0157	.0394-.1181	197-328 525-787	.0020-.0059	.0079-.0393
	328-787	.0039-.0138	.1181-.1575	656-853	.0039-.0078	.0079-.0787
	328-590	.0039-.0138	.1181-.1575	525-656	.0039-.0078	.0079-.0787
	328-525	.0039-.0138	.1181-.1575	459-590	.0039-.0078	.0079-.0787
	328-656	.0039-.0138	.1181-.1575	525-722	.0039-.0078	.0079-.0787
	1312	.0118-.0157	.1181-.1575	1312	.0039-.0078	.0079-.0787
	1640-3281	.0118-.0157	.1181-.1575	1640-3281	.0039-.0078	.0079-.0787
	492-984	.0118-.0157	.1181-.1575	656-1148	.0039-.0078	.0079-.0787
	820-1640	.0118-.0157	.1181-.1575	984-1640	.0039-.0078	.0079-.0787
	590-984	.0118-.0157	.1181-.1575	656-1312	.0039-.0078	.0079-.0787
	656-820	.0118-.0157	.1181-.1575	656-820	.0039-.0078	.0079-.0787
	131-262	.0020-.0059	.0394-.0984	131-262	.0020-.0039	.0079-.0393
	65-197	.0020-.0059	.0197-.0787	98-197	.0020-.0039	.0079-.0393
	98-262	.0020-.0059	.0394-.0984	131-262	.0020-.0039	.0079-.0393
	98-262	.0020-.0059	.0394-.0984	131-262	.0020-.0039	.0079-.0393



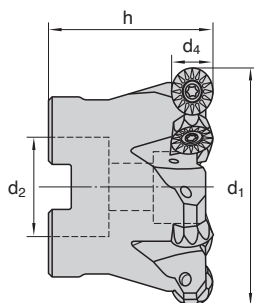
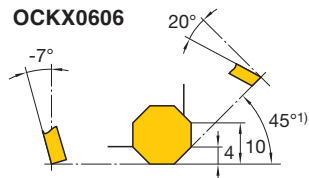
Wet machining, sufficient emulsion volume required



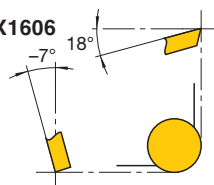
Dry machining, air-blast cooling is advantageous



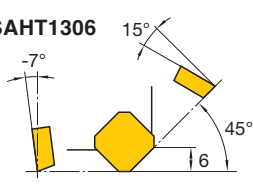
OCKX0606



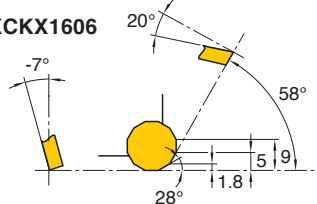
RCKX1606



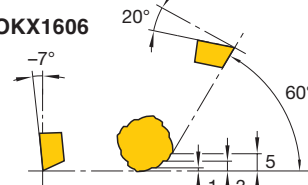
SAHT1306



XCKX1606



XOKX1606

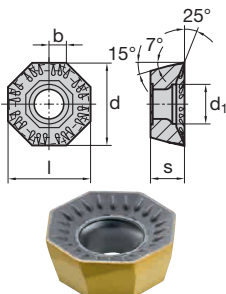
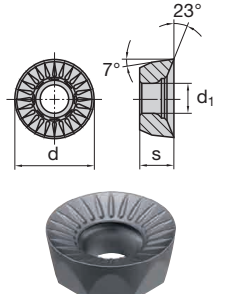


Catalog Number

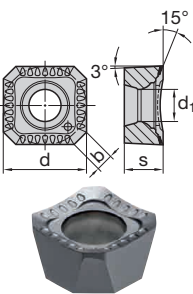
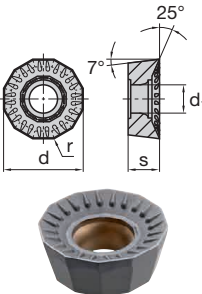
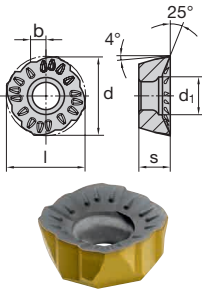
FCT45

d_1	d_4	h	d_2	z	Ident No.	LMT-Code							
2.00	0.63	1.57	0.75	4	1950259	FCT45 O06-200AA	OCKX 0606	RCKX 1606	SAHT 1306	XCKX 1606	XOKX 1606	1045777	1048344 T20
2.50	0.63	1.97	0.75	4	1950260	FCT45 O06-250AA							
3.00	0.63	1.97	1.00	5	1950261	FCT45 O06-300AB							
4.00	0.63	1.97	1.50	7	1950262	FCT45 O06-400AD							
5.00	0.63	2.48	1.50	8	1950263	FCT45 O06-500AD							

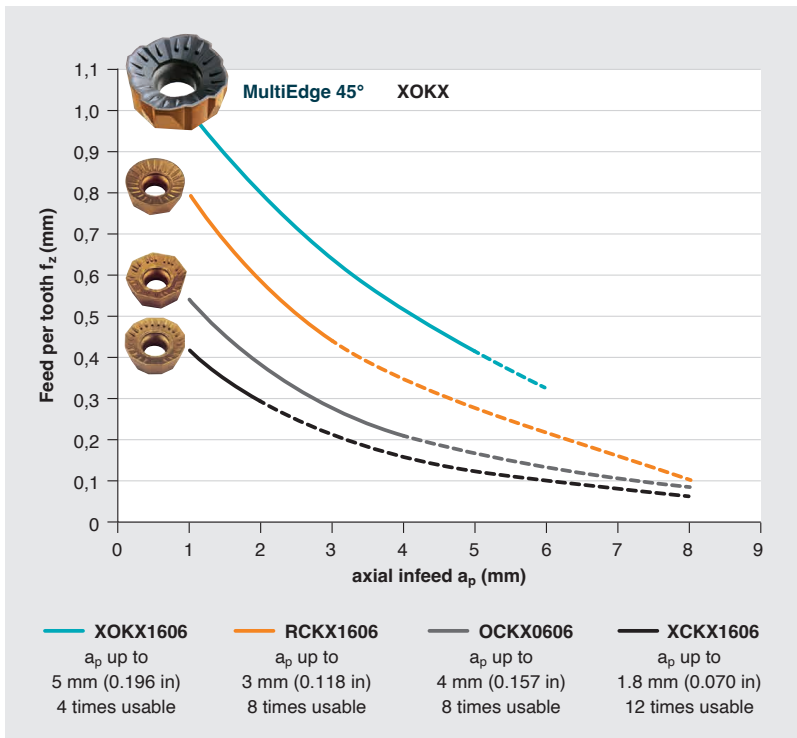
Cutting data recommendations starting page 146

							Cutting Material Ident No.												For cutter									
N = Number of Cutting Edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.						
		l	d	s	d ₁	b																						
 N = 8	OCKX 0606 AD-TR	16	16	6.35	5.8	0.5	1054003	7002774			7002770	7002781			1054005		7047993					FCT45						
	OCKX 0606 AD-TRT	16	16	6.35	5.8	0.5		7002782							1054011		7047994											
	RCKX 1606 MO-TR	–	16	6.35	5.8	–	1068433	7002762			7002764	7002763			1068435		7047996					FCT45						
	RCKX 1606 MO-TRT	–	16	6.35	5.8	–		7002767			7002768				1068464		7047997											
Description/Designation of grades and ISO-Code starting page 116							■	■			■	■				□								P				
							□	□			□																M	
																□					■		■					K
																												N
																												S

■ = First choice □ = Second choice

							Cutting Material Ident No.												For cutter									
N = Number of Cutting Edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.						
		l	d	s	d ₁	b/r																						
 N = 4	SAHT 1306 AA EN	13.5	13.5	6.35	5.5	0.8	1054040					7002747			1054045		7048355		9206774			FCT45						
 N = 12	XCKX 1606 ZDR-TR	16	16	6.35	5.8	0.5	1055677					7002783			1055678							FCT45						
 N = 4	XOKX 1606 ZD-TR	16	16	6.35	5.8	0.5	1054021	1054023			1054020	1054024			1054022							FCT45						
Description/Designation of grades and ISO-Code starting page 116							■	■		■	■					□								P				
							□	□		□																	M	
																□				■		■						K
																									■			N
																												S

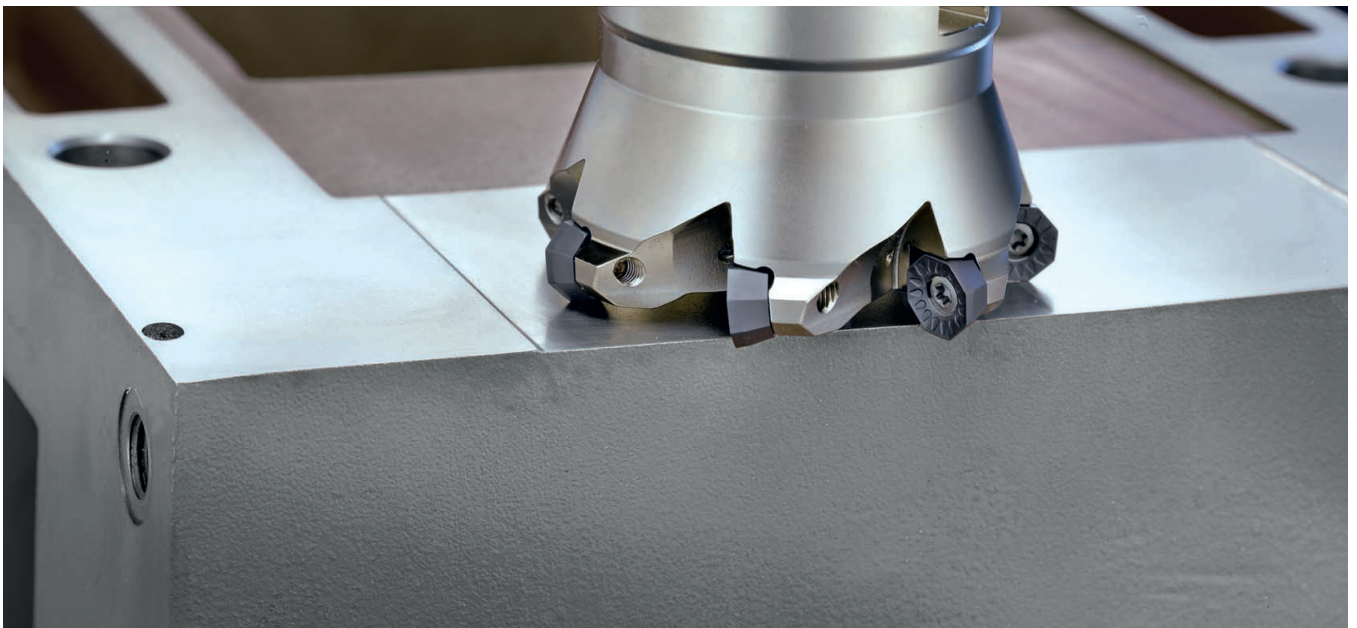
■ = First choice □ = Second choice



Feed per tooth of MultiEdge 45° compared with other inserts shape



MultiEdge 45°:
Small chips because of chip division



Material		Hardness	
P	Plain carbon steel + free cutting steel	<32 Rc	
	Heat-treatment steel ,medium strength	<32 Rc	
	Cast steel	<32 Rc	
	Case hardening steel	<32 Rc	
	Stainless steel, ferritic, martensitic	<32 Rc	
	Heat-treatment steel, high strength	30 - 44 Rc	
	Nitriding steel, heat treated	30 - 44 Rc	
	Tool steel	<44 Rc	
		>44 Rc	
M	Stainless steel, austenitic	<32 Rc	
	Stainless steel, martensitic steel	<32 Rc	
K	Grey cast iron	<32 Rc	
	Alloyed grey cast iron	<32 Rc	
	Nodular cast iron	<32 Rc	
	Malleable cast iron	<32 Rc	
N	Aluminium alloys, short chipping	<32 Rc	
	Aluminium alloys, long chipping		
	Copper alloys, short chipping	<32 Rc	
	Copper alloys, long chipping	<32 Rc	
	Thermoplastics	<32 Rc	
	Duroplastics	<32 Rc	
S	Titanium alloys, medium strength	<32 Rc	
	Titanium alloys, high strength	27 - 44 Rc	
	Nickel based alloys, medium strength	<32 Rc	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	

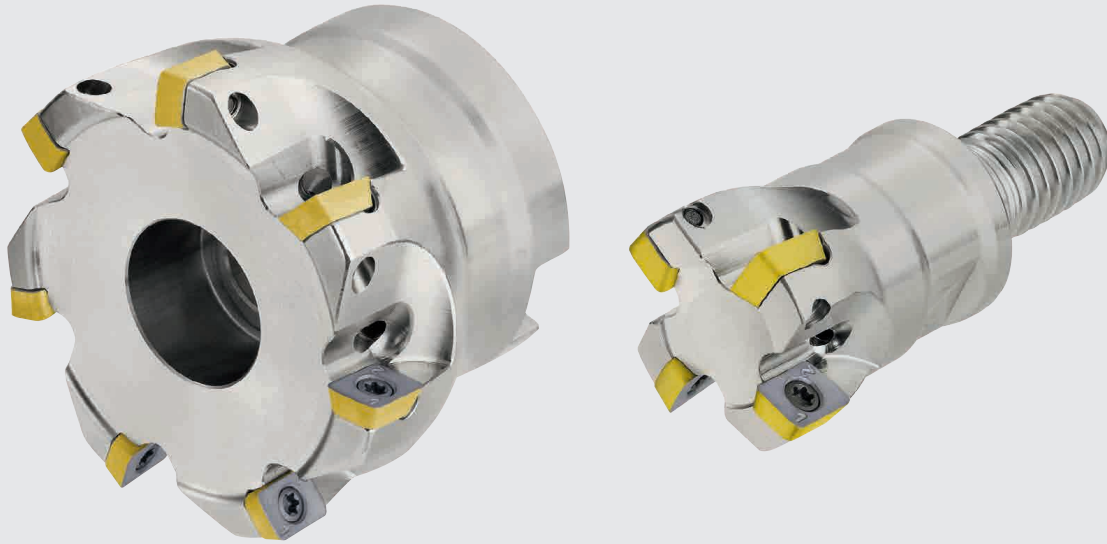
1) For SAHT 1306 with $a_p = 3 \text{ mm}$

	Max. feed per tooth f_z with $a_e = 0.75 \times d_1$ (d_1 = Cutter diameter)				
	Face Milling			Copy Milling	
	v_c (SFM)	f_z (in/z)		v_c (SFM)	f_z (in/z)
		SAHT 1306 ¹⁾	OCKX 0606 XCKX 1606		
	525-720	0.0157	0.0197	820-985	0.0197
	460-590	0.0138	0.0157	655-820	0.0157
	460-590	0.0118	0.0138	655-820	0.0138
	460-590	0.0098	0.0118	655-820	0.0118
	390-490	0.0098	0.0118	590-720	0.0118
	390-490	0.0098	0.0118	590-720	0.0118
	390-490	0.0079	0.0098	590-720	0.0098
	460-590	0.0138	0.0157	655-820	0.0157
	390-490	0.0079	0.0098	590-720	0.0098
	590-785	0.0079	0.0098	590-785	0.0118
	655-850	0.0157	0.0197	820-985	0.0197
	525-655	0.0118	0.0138	590-820	0.0138
	460-590	0.0138	0.0157	525-820	0.0157
	525-655	0.0138	0.0157	655-985	0.0157
	1310	0.0118-0.0157	0.0118-0.0157	1310	0.0118-0.0157
	1640-3937	0.0118-0.0157	0.0118-0.0157	1640-3937	0.0118-0.0157
	985	0.0118-0.0157	0.0118-0.0157	985	0.0138-0.0177
	1640	0.0118-0.0157	0.0118-0.0157	1640	0.0138-0.0177
	1310	0.0118-0.0157	0.0118-0.0157	1310	0.0138-0.0177
	820	0.0118-0.0157	0.0118-0.0157	820	0.0138-0.0177
	196-262	0.0059-0.0079	0.0079-0.0118	196-262	0.0059-0.0079
	130-196	0.0039-0.0059	0.0039-0.0079	130-196	0.0039-0.0079
	130-196	0.0059-0.0079	0.0079-0.0118	130-196	0.0079-0.0118
	65-130	0.0039-0.0059	0.0039-0.0079	65-130	0.0039-0.0079

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.
The f_z -values are quoted with respect to the depths of cut a_p specified in the table.

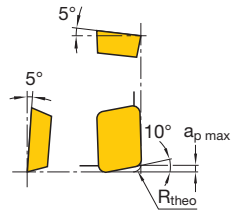
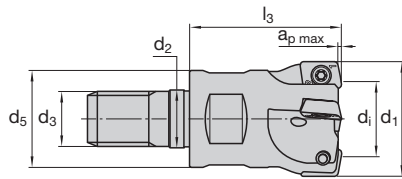
- Designed for high feed milling applications
- up to 1.0 mm (0.0393 in) ($a_{p \max}$)
- Positive cutting geometry for high feed operations even on less powerful machining centers

- Unified small inserts for the entire diameter range
- Geometries for the machining of ISO-P, ISO-K, ISO-M and ISO-S



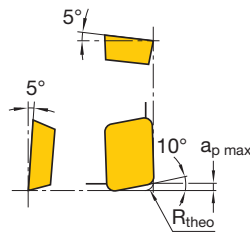
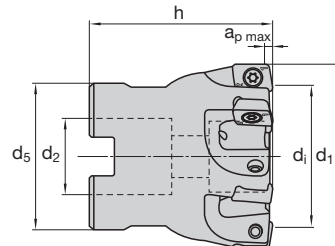
The indexable insert cutters MultiEdge 2Feed mini LMT Fette is designed for roughing applications of small and medium work pieces. The cutter bodies for the MultiEdge 2Feed mini are available in diameters 0.75–1.50 inches for screw-on-type with 3–7 teeth, as well as in diameters of 2–3 inches for arbor type with up to 7 teeth.

MultiEdge 2Feed Mini High Feed Milling Cutter – Screw-On Type



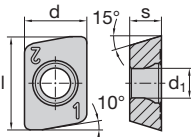
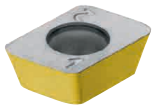
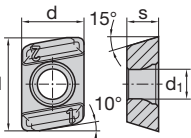
Catalog Number									EHP IK			
d ₁	d _i	l ₃	d ₃	d ₅	d ₂	z	a _{p max}	Ident No.	LMT-Code			
0.75	0.40	1.18	M10	0.71	0.41	3	0.04	7179562	EHP X09-075TS-I	XDMW 0903... XDMT 0903...	1044972	1048326 T8
1.00	0.65	1.30	M12	0.83	0.49	4	0.04	7179563	EHP X09-100TF-I			
1.25	0.90	1.69	M16	1.14	0.67	5	0.04	7186877	EHP X09-125TH-I			
1.50	1.15	1.69	M16	1.14	0.67	5	0.04	7179564	EHP X09-150TH-I			

MultiEdge 2Feed Mini High Feed Milling Cutter – Arbor Type



Catalog Number								FHP IK			
d ₁	d _i	h	d ₅	d ₂	z	a _{p max}	Ident No.	LMT-Code			
2.00	1.65	1.57	1.57	0.75	5	0.04	7179565	FHP X09-200AA-IW	XDMW 0903... XDMT 0903...	1044972	1048326 T8
2.50	2.15	1.97	1.97	0.75	6	0.04	7179566	FHP X09-250AA-IW			
3.00	2.65	1.97	1.97	1.00	7	0.04	7179567	FHP X09-300AB-IW			

Cutting data recommendations starting page 152

							Cutting Material Ident No.														For cutter								
N = Number of Cutting edges	ISO-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCMS34M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.							
		l	d	s	d ₁	r _{theo}																							
  N = 2	XDMW 090308 SR	9	6	3	2.8	1.5	7139504								7139506								EHP IK FHP IK						
	XDMW 090316 SR	9	6	3	2.8	2.0	7154732					7202194 7310100									7258691								
  N = 2	XDMT 090308 ER	9	6	3	2.8	1.5	7139507								7139508								EHP IK FHP IK						
	XDMT 090316 ER	9	6	3	2.8	2.0	7154734					7310101																	
Description/Designation of grades and ISO-Code starting page 116							■					□			□					■			P						
							□					■	■														M		
																			■						□			K	
																												N	
																	□	■											S
																					□						■		H

■ = First choice □ = Second choice



Features:

- Soft-cutting indexable insert geometry to reduce cutting forces
- Use for unstable setups
- Particularly useful for machine tools with low power capacities

XDMT

Chip-breaker



-ER

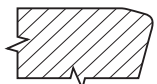


Features:

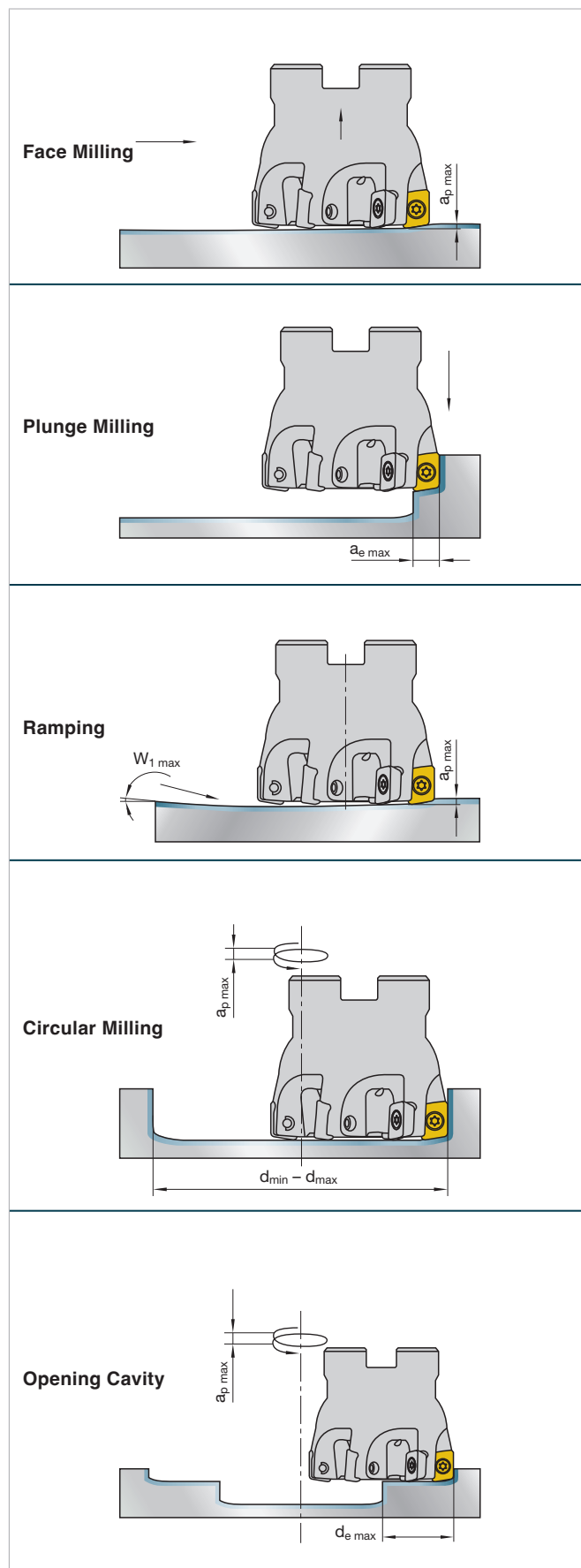
- Stable indexable insert geometry for cutting high-strength tempering and tool steels
- Negative protective chamfer with rounded cutting edge

XDMW

Chip-breaker



-SR



Tool	E(F)HP X09.
Insert	XDMW 090308SR XDMW 090316SR XDMT 090308ER XDMT 090316ER
$a_p \text{ max}$	1 mm (0.040")
$a_e \text{ max}$	5 mm (0.197")
$T_{\max}$	0.5 mm (0.020")

d_1 (in)	$W_1 \text{ max}$ (°)
3/4	4.0
1	4.0
1 1/4	2.5
1 1/2	1.8
2	1.5
2 1/2	1.0
3	0.8

d_1 (in)	$d_{\min} - d_{\max}$ (in)
3/4	1.181–1.535
1	1.574–1.929
1 1/4	2.125–2.440
1 1/2	2.755–3.070
2	3.543–3.858
2 1/2	4.566–4.881
3	5.905–6.770

d_1 (in)	$d_e \text{ max}$ (in)
3/4	0.590
1	0.787
1 1/4	1.062
1 1/2	1.377
2	1.771
2 1/2	2.283
3	2.952

$T_{\max}$: axial drilling depth

Material		Hardness	
P	Plain carbon steel + free cutting steel	<32 Rc	
	Heat-treatment steel, medium strength	<32 Rc	
	Cast steel	<32 Rc	
	Case hardening steel	<32 Rc	
	Stainless steel, ferritic, martensitic	<32 Rc	
	Heat-treatment steel, high strength	30 - 44 Rc	
	Nitriding steel, heat treated	30 - 44 Rc	
	Tool steel	<44 Rc	
		>44 Rc	
M	Stainless steel, austenitic	<32 Rc	
	Stainless steel, martensitic steel	<32 Rc	
K	Grey cast iron	<32 Rc	
	Alloyed grey cast iron	<32 Rc	
	Nodular cast iron	<32 Rc	
	Malleable cast iron	<32 Rc	
S	Titanium alloys, medium strength	<32 Rc	
	Titanium alloys, high strength	27 - 44 Rc	
	Nickel based alloys, medium strength	<32 Rc	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	
H	Chilled cast iron	32 - 57 Rc	
		45 - 52 Rc	
	Hardened steel	53 - 59 Rc	
		60 - 65 Rc	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Recommended max. feed per tooth f_z with $a_e = 0.75 \times d_1$ and $a_p = 0.0024$ in (d_1 = Cutter diameter)								
	Feed per tooth f_z (in/z)								
	LCP40M			LCM45M LCMS34M			LCKP10M LCHK15M		
	v_c (SFM)	XDMW... f_z	XDMT... f_z	v_c (SFM)	XDMW... f_z	XDMT... f_z	v_c (SFM)	XDMW... f_z	XDMT... f_z
	655-850	0.0669	0.0551				850-885	0.0590	0.0512
	525-689	0.0590	0.0512				590-720	0.0551	0.0472
	490-590	0.0551	0.0472				525-623	0.0512-0.0551	0.0433-0.0472
	490-590	0.0551					525-623	0.0512-0.0551	0.0433-0.0472
	525-689	0.0590	0.0512				525-689	0.0551	0.0472
	525-689	0.0472-0.0551	0.0394-0.0472				525-689	0.0472-0.0551	0.0394-0.0472
	390-460	0.0472	0.0394				590	0.0394	0.0315
	525-689	0.0394-0.0551	0.0315-0.0472				590-720	0.0394-0.0551	0.0315-0.0472
	460-590	0.0394-0.0551	0.0315-0.0472				689-785	0.0394-0.0551	0.0315-0.0472
	460-525		0.0236-0.0315	655-785	0.0236-0.0315	0.0236-0.0315			
	390-460		0.0236-0.0315	655-785	0.0236-0.0315	0.0236-0.0315			
							590-655	0.0315-0.0472	
							655-785	0.0315-0.0472	
				130-262	0.0236-0.0315	0.0236-0.0315			
				65-196	0.0236-0.0315	0.0236-0.0315			
				98-262	0.0236-0.0315	0.0236-0.0315			
				98-262	0.0236-0.0315	0.0236-0.0315			
							196-295	0.0276-0.0394	
							262	0.0276	
							213	0.0158	
							196	0.0118	

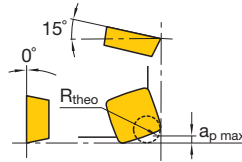
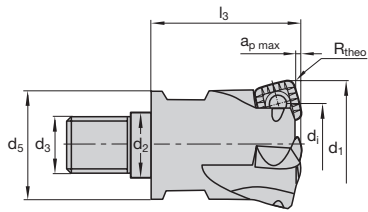


Dry machining, air-blast cooling is advantageous



Wet machining, sufficient emulsion volume required

MultiEdge 4Feed High Feed Milling Cutter – Screw-On Type



Catalog Number										ECP			
d ₁	d _i	l ₃	d ₃	d ₅	d ₂	z	a _{p max}	R _{theo}	Ident No.	LMT-Code			
0.75	0.24	1.18	M10	0.67	0.41	2	0.04	0.06	9089007	ECP V07-075TS118-I	XCN..070308..	1045127	1048326
1.00	0.49	1.30	M12	0.83	0.49	3	0.04	0.06	9089008	ECP V07-100TF130-I		2237513	T8
1.25	0.66	1.69	M16	1.13	0.67	4	0.05	0.10	9089010	ECP V09-125TH169-IF	XCN..09T312..	1045105	1048335
1.50	0.67	1.69	M16	1.13	0.67	4	0.05	0.10	9095431	ECP V09-150TH169-I			T15

Cutting data recommendations starting page 160

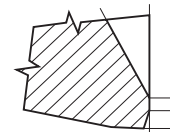


XCNNT

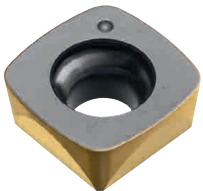
Features:

- Universal indexable insert geometry for a broad area of application
- Wide negative protective chamfer for increased cutting edge stability
- Ideal for use on powerful machines

Chip-breakers:



-SN-TR

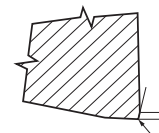


XCNW

Features:

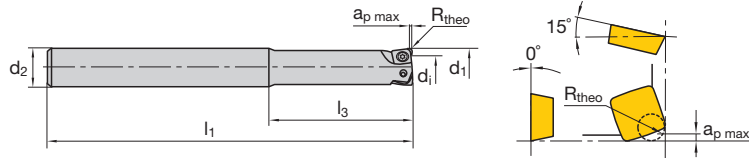
- Robust indexable insert geometry for cutting high-strength tempering and tool steels
- Negative protective chamfer with rounded cutting edge

Chip-breakers:



-SN

MultiEdge 4Feed High Feed Milling Cutter – Shank Type



Catalog Number										ECP			
d ₁	d _i	l ₃	l ₁	d ₂	z	a _{p max}	R _{theo}	Ident No.		LMT-Code			
0.75	0.24	2.36	6.89	0.75	2	0.04	0.06	9089014		ECP V07-075AD689-I	XCNT..070308..	1045127	1048326
1.00	0.49	2.95	7.48	1.00	3	0.04	0.06	9089015		ECP V07-100AE748-I		2237513	T8
1.25	0.66	3.15	8.27	1.25	4	0.05	0.10	9089017		ECP V09-125AF827-IF	XCNT..09T312..	1045105	1048335
1.50	0.91	3.50	9.00	1.50	4	0.05	0.10	9095050		ECP V09-150AF900-IF			

Cutting data recommendations starting page 160

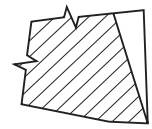


XCNT

Features:

- Soft-cutting indexable insert geometry to reduce cutting forces
- Use of stainless steels and long-chipping materials
- Particularly useful for machine tools with low power capacities

Chip-breakers:



-EN -TR

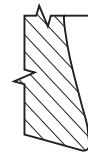


XCNT

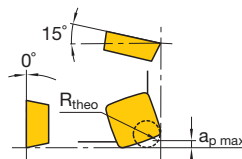
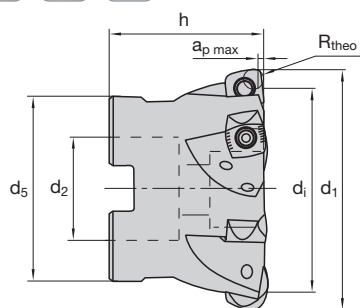
Features:

- Soft-cutting indexable insert geometry to reduce cutting forces
- Use for unstable setups
- Particularly useful for machine tools with low power capacities

Chip-breakers:

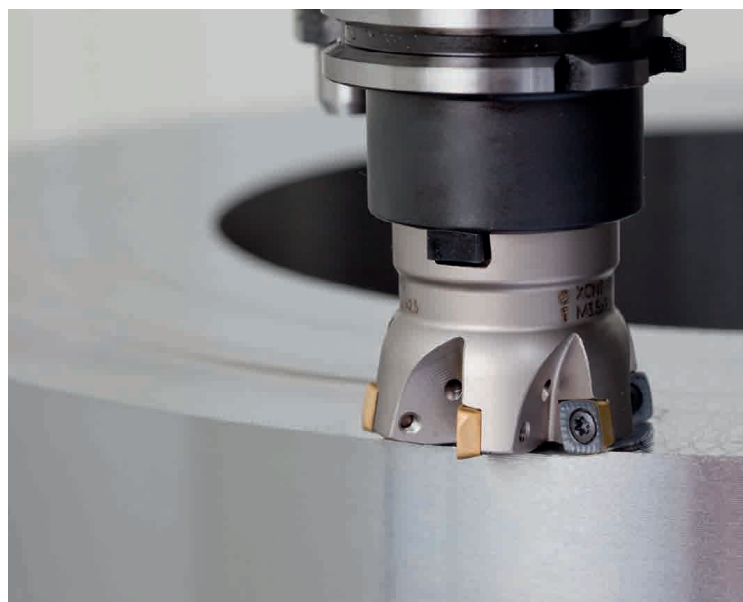


-EN



Catalog Number									FCP			
d ₁	d _i	h	d ₅	d ₂	z	a _{p max}	R _{theo}	Ident No.	LMT-Code			
2.00	1.41	1.57	1.56	0.75	4	0.05	0.10	9089021	FCP V09-200AA158-IW	XCN..09T312..	1045114	1048335 T15
2.00	1.41	1.57	1.56	0.75	5	0.05	0.10	9089022	FCP V09-200AA158-I			
2.00	1.41	1.57	1.56	0.75	6	0.05	0.10	9089023	FCP V09-200AA158-IF			
2.00	1.26	1.57	1.56	0.75	4	0.07	0.14	9089026	FCP V12-200AA158-IW	XCN..120520..	1045123	1048344 T20
2.00	1.26	1.57	1.56	0.75	5	0.07	0.14	9089027	FCP V12-200AA158-I			
2.50	1.76	1.57	2.00	1.00	6	0.07	0.14	9089029	FCP V12-250AB158-I			
2.50	1.76	1.57	2.00	1.00	7	0.07	0.14	9089030	FCP V12-250AB158-IF			
3.00	2.26	1.97	2.36	1.25	5	0.07	0.14	9095685	FCP V12-300AC197-IW			
3.00	2.26	1.97	2.36	1.25	8	0.07	0.14	9095686	FCP V12-300AC197-I			

Cutting data recommendations starting page 160



Face Milling, Machine Component, Flange

Tool:

FCP V09.200 AA-IF, d₁ = 2.00 in, z = 6

Material:

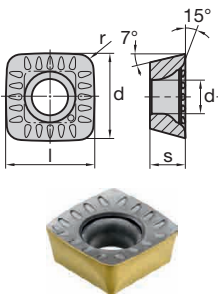
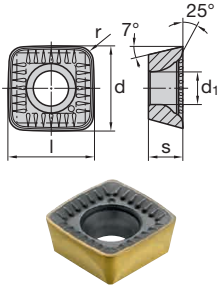
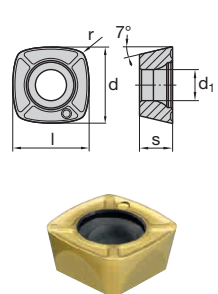
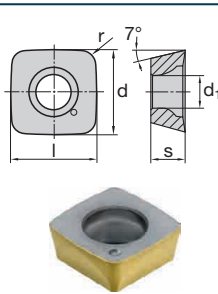
Stainless steel, austenitic

Insert:

XCNT 09T312 EN-TR | LCPM40M

Cutting data:

v_c = 787 SFM
n = 1470 RPM
f_z = 0.047 in
v_f = 417 in/min
a_e = 1.378 in
a_p = 0.039 in

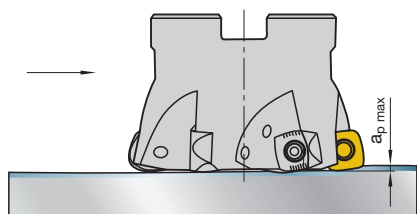
							Cutting Material Ident No.												For cutter				
N = Number of Cutting edges	LMT-Code	(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.	
		l	d	s	d1	r																	
 N = 4	XCNT 070308 EN-TR	7.94	7.94	3.18	3.4	0.8		9186375	7011714		9186376				9186377								ECP FCP
	XCNT 09T312 EN-TR	9.52	9.52	3.97	3.8	1.2		9186350	7011717		9186351				9186352								
	XCNT 120520 EN-TR	12.7	12.7	5.56	5.2	2.0		9186206	7011721		9186207				9186208								
 N = 4	XCNT 070308 SN-TR	7.94	7.94	3.18	3.4	0.8		1058100							1058106			7047949					ECP FCP
	XCNT 09T312 SN-TR	9.52	9.52	3.97	3.8	1.2		1058102			1058103				1058107			7047950					
	XCNT 120520 SN-TR	12.7	12.7	5.56	5.2	2.0		1058104			1058105				1058108			7047951					
 N = 4	XCNT 09T312 EN	9.52	9.52	3.97	3.8	1.2	7159747					7159748			7159749								ECP FCP
	XCNT 120520 EN	12.7	12.7	5.56	5.2	2.0	7159750					7159751											
 N = 4	XCNW 070308 SN	7.94	7.94	3.18	3.4	0.8		9186492			9186493				9186494			7047952					ECP FCP
	XCNW 09T312 SN	9.52	9.52	3.97	3.8	1.2		9186440			9186441				9186442			7047953					
	XCNW 120520 SN	12.7	12.7	5.56	5.2	2.0		9186431			9186432				9186433			7047954					
							■	■	■		■	□			□								P
Description/Designation of grades and ISO-Code starting page 116							□	□				■											M
									□	□				■	■								K
																							N
												□											S
																							H

Description/Designation of grades and ISO-Code starting page 116

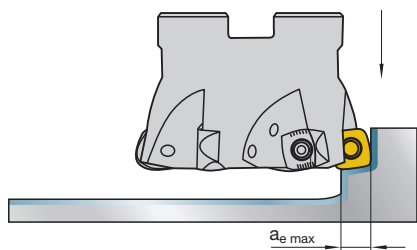
■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	P
□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	M
																						K
																						N
																						S
																						H

■ = First choice □ = Second choice

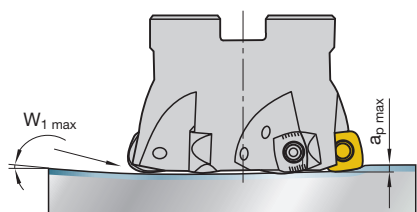
Face Milling



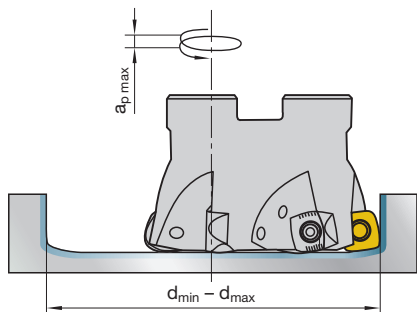
Plunge Milling



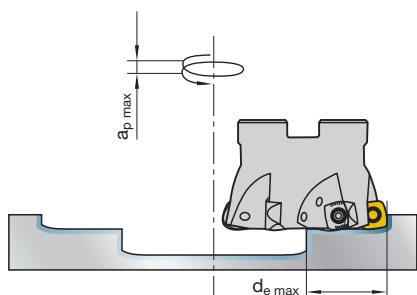
Ramping



Circular Milling



Opening Cavity



Tool	ECP V07.	E(F)CP V09.	E(F)CP V12.
Insert	XCN_070308	XCN_09T312	XCN_120420
$a_p \text{ max (in)}$	0.0315 (0.8 mm)	0.0394 (1 mm)	0.0590 (1.5 mm)
$T_{\text{max (in)}}$	0.0315 (0.8 mm)	0.0394 (1 mm)	0.0590 (1.5 mm)
$a_e \text{ max (in)}$	0.2756 (7 mm)	0.3150 (8 mm)	0.3937 (10 mm)
$d_1 \text{ (in)}$	$W_1 \text{ max (}^\circ\text{)}$		
3/4	7.5		
1	4		
1 1/4	2.5	4	
1 1/2	2	3	
2		1.5	3
2 1/2			2
3			1.5
$d_1 \text{ (in)}$	$d_{\text{min}} - d_{\text{max}} \text{ (in)}$		
3/4	1.023–1.535		
1	1.417–1.929		
1 1/4	1.968–2.440	1.889–2.440	
1 1/2	2.204–2.677	2.126–2.677	
2		3.464–4.015	3.307–4.015
2 1/2			4.409–5.118
3			5.511–6.220
$d_1 \text{ (in)}$	$d_{\text{max}} \text{ (in)}$		
3/4	0.511		
1	0.708		
1 1/4	0.984	0.944	
1 1/2	1.102	1.063	
2		1.732	1.653
2 1/2			2.204
3			2.755

T_{max} : axial drilling depth



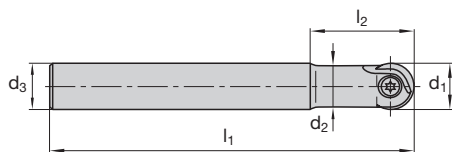
Material		Hardness	
P	Plain carbon steel + free cutting steel	<32 Rc	
	Heat-treatment steel, medium strength	<32 Rc	
	Cast steel	<32 Rc	
	Case hardening steel	<32 Rc	
	Stainless steel, ferritic, martensitic	<32 Rc	
	Heat-treatment steel, high strength	30 - 44 Rc	
	Nitriding steel, heat treated	30 - 44 Rc	
	Tool steel	<44 Rc	
M	Stainless steel, austenitic	<32 Rc	
	Stainless steel, martensitic steel	<32 Rc	
K	Grey cast iron	<32 Rc	
	Alloyed grey cast iron	<32 Rc	
	Nodular cast iron	<32 Rc	
	Malleable cast iron	<32 Rc	
N	Aluminium alloys, short chipping	<32 Rc	
	Aluminium alloys, long chipping	<32 Rc	
	Copper alloys, short chipping	<32 Rc	
	Copper alloys, long chipping	<32 Rc	
S	Titanium alloys, medium strength	<32 Rc	
	Titanium alloys, high strength	27 - 44 Rc	
	Nickel based alloys, medium strength	<32 Rc	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Recommended max. feed per tooth f_z with $a_e = 0.75 \times d_1$ (d_1 = Cutter diameter)																			
	Cutting speed v_c (SFM)																			
	LCPM40M LCP40M LCM45M							LCK10M				LCKP10M LCPK10M LCPK30M								
	v_c (SFM)	XCNT07 SN-TR XCNT07 SN	XCNT09 SN-TR XCNT09 SN	XCNT09 SN-TR XCNT09 EN	XCNT12 SN-TR XCNT12 SN	XCNT12 SN-TR XCNT12 EN	XCNT07 EN-TR	XCNT09 EN-TR	XCNT12 EN-TR	v_c (SFM)	XCNT07 SN-TR XCNT07 SN	XCNT09 SN-TR XCNT09 SN	XCNT12 SN-TR XCNT12 SN	v_c (SFM)	XCNT07 SN-TR XCNT07 SN	XCNT09 SN-TR XCNT09 SN	XCNT09 SN-TR XCNT09 EN	XCNT12 SN-TR XCNT12 SN	XCNT07 EN-TR	XCNT09 EN-TR
	655-850	0.0787	0.0984	0.1181	0.0551	0.0669	0.0787						785-985	0.0630	0.0787	0.0945	0.0433	0.0551	0.0630	
	525-655	0.0669	0.0787	0.0984	0.0472	0.0590	0.0709						590-720	0.0551	0.0709	0.0827	0.0394	0.0472	0.0551	
	460-590	0.0590	0.0709	0.0866	0.0394	0.0512	0.0630						525-655	0.0472	0.0630	0.0748	0.0315	0.0394	0.0472	
	460-590	0.0590	0.0709	0.0866	0.0394	0.0512	0.0630						525-655	0.0472	0.0630	0.0748	0.0315	0.0394	0.0472	
	426-555	0.0590	0.0709	0.0866	0.0394	0.0512	0.0630						460-590	0.0472	0.0630	0.0748	0.0315	0.0394	0.0472	
	460-590	0.0669	0.0787	0.0984	0.0472	0.0590	0.0709						525-655	0.0551	0.0709	0.0827	0.0394	0.0472	0.0551	
	390-460	0.0630	0.0787	0.0866	0.0433	0.0551	0.0590						525-655	0.0512	0.0630	0.0709	0.0354	0.0433	0.0472	
	460-590	0.0472-0.0709	0.0590-0.0906	0.0709-0.0984	0.0315-0.0512	0.0433-0.0630	0.0512-0.0787						590-785	0.0394-0.0630	0.0472-0.0787	0.0551-0.0906	0.0276-0.0433	0.0315-0.0551	0.0394-0.0630	
	525-720																			
		0.0315	0.0472	0.0590	0.0315	0.0472	0.0590													
	655-850	0.0590	0.0787	0.0984	0.0472	0.0630	0.0787	785-985	0.0590	0.0787	0.0984	655-850	0.0590	0.0787	0.0984	0.0472	0.0630	0.0787		
	525-655	0.0512	0.0709	0.0866	0.0394	0.0551	0.0709	655-785	0.0512	0.0709	0.0866	590-655	0.0512	0.0669	0.0866	0.0394	0.0551	0.0709		
	655-785	0.0590	0.0787	0.0984	0.0394	0.0551	0.0669	590-785	0.0472	0.0551	0.0630	655-785	0.0590	0.0787	0.0984	0.0394	0.0551	0.0669		
	525-655	0.0433	0.0512	0.0590	0.0276	0.0354	0.0394	525-655	0.0433	0.0512	0.0590	525-655	0.0433	0.0512	0.0590	0.0276	0.0354	0.0394		
													1310-2624				0.0709	0.0787	0.0866	
													820-1310				0.0551	0.0630	0.0709	
													262-390				0.0197	0.0315	0.0394	
													130-262				0.0118	0.0197	0.0315	
													262-390				0.0197	0.0315	0.0394	
													130-262				0.0118	0.0197	0.0315	



Dry machining, air-blast cooling is advantageous



Catalog Number							GWR			
d ₁	l ₂	l ₁	d ₃	d ₂	z	Ident No.	LMT-Code		 ¹⁾	
0.375	1.34	3.54	0.500	0.34	2	6121394	EBG R0375A0500 090N	WPR 0375	GWS 10	T15
0.375	1.96	5.91	0.375	0.34	2	6129378	EBG R0375A0375 150N			
0.500	1.26	5.12	0.500	0.41	2	6121396	EBG R0500A0500 130N	WPR 0500	GWS 12	T20
0.500	1.81	5.91	0.500	0.41	2	6121398	EBG R0500A0500 150N			
0.625	1.42	5.51	0.625	0.55	2	6121386	EBG R0625A0625 140N	WPR 0625	GWS 16	T20
0.625	2.09	6.30	0.625	0.55	2	6121388	EBG R0625A0625 160N			
0.750	1.77	6.30	0.750	0.71	2	6121374	EBG R0750A0750 160N	WPR 0750	GWS 20	T20
0.750	2.40	6.89	0.750	0.71	2	6121376	EBG R0750A0750 175N			
0.750	2.36	8.27	0.750	0.71	2	6121366	EBG R0750A0750 210N	WPR 1000	GWS 25	T30
0.750	2.36	10.00	0.750	0.71	2	6129152	EBG R0750A0750 254N			
1.000	1.77	6.30	1.000	0.88	2	6121368	EBG R1000A1000 160N	WPR 1250	GWS 32	T30
1.000	2.76	7.48	1.000	0.88	2	6121370	EBG R1000A1000 190N			
1.000	3.14	9.06	1.000	0.88	2	6121357	EBG R1000A1000 230N	WPR 2000	GWS 50	2146556
1.000	—	10.00	1.000	0.88	2	6129153	EBG R1000A1000 254N			
1.250	2.20	6.89	1.250	1.13	2	6121360	EBG R1250A1250 175N	WPR 2000	GWS 50	2146556
1.250	3.15	8.27	1.250	1.13	2	6121362	EBG R1250A1250 210N			
2.000	4.92	12.99	2.000	1.77	2	6121393	EBG R2000A20000 330N	WPR 2000	GWS 50	2146556

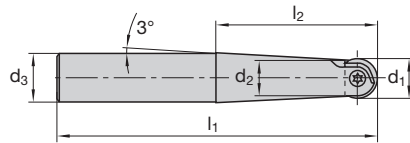
¹⁾ Torque see overview page 165

Cutting data recommendations starting page 172

Ident No. Screws and wrenches see page 165

CopyLine GWR

Ball Nose Copy Cutters Tapered Neck with Steel Shank

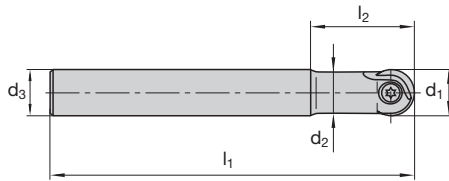


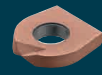
Catalog Number							GWR					
d ₁	l ₂	l ₁	d ₃	d ₂	z	Ident No.	LMT-Code					
0.250	1.57	3.54	0.375	0.22	2	6128482	EBG R0250A0375 090T	WPR 0250	WPV 0250	WPB 0250	GWS 06	T6
0.312	1.97	5.51	0.500	0.30	2	6121294	EBG R0312A0500 140T	WPR 0312	WPV 0312	WPB 0312	GWS 08	T8
0.375	1.38	5.10	0.500	0.35	2	6121295	EBG R0375A0500 150T	WPR 0375	WPV 0375	WPB 0375	GWS 10	T10
0.500	2.36	6.30	0.625	0.41	2	6121296	EBG R0500A0625 160T	WPR 0500			GWS 12	T20
0.500	2.36	10.00	0.625	0.41	2	6129150	EBG R0500A0625 254T					
0.625	2.64	6.89	0.750	0.55	2	6121297	EBG R0625A0750 175T	WPR 0625			GWS 16	
0.750	2.64	10.00	0.750	0.55	2	6129151	EBG R0625A0750 254T	WPR 0750			GWS 20	
0.750	3.15	7.48	1.000	0.71	2	6121298	EBG R0750A1000 190T					
1.000	3.94	8.27	1.250	0.88	2	6121299	EBG R1000A1250 210T	WPR 1000			GWS 25	T30
1.250	4.84	9.45	1.500	1.17	2	6121300	EBG R1250A1500 240T	WPR 1250			GWS 32	

¹⁾ Torque see overview page 165

Cutting data recommendations starting page 172

Ident No. Screws and wrenches see page 165

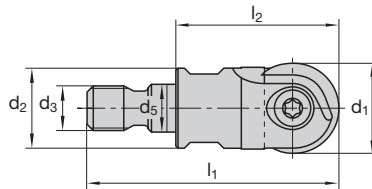


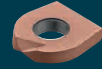
Catalog Number								GWR				
d ₁	l ₂	l ₁	d ₃	d ₂	z	Ident No.	ICC Ident No.	LMT-Code			 1)	
0.250	1.57	3.94	0.375	0.22	2	6128439		EBG R0250A0375 100NC	WPR 0250	WPB 0250	GWS 06	T6
0.250	1.57	3.94	0.250	0.22	2	6131238		EBG R0250A0250 100NC-40				
0.250	2.76	5.91	0.250	0.22	2	6131239		EBG R0250A0250 150NC-70				
0.250	3.94	7.88	0.250	0.22	2	6131240		EBG R0250A0250 200NC-100				
0.250	5.51	7.88	0.250	0.22	2	6131234		EBG R0250A0250 200NC-140				
0.312	0.99	3.94	0.375	0.28	2	6128633		EBG R0312A0375 100NC	WPR 0312	WPB 0312	GWS 08	T8
0.312	1.57	5.91	0.375	0.28	2	6128635		EBG R0312A0375 150NC				
0.312	3.94	7.88	0.312	0.28	2	6131232		EBG R0312A0312 200NC-100				
0.375	1.38	4.73	0.375	0.35	2	6128636		EBG R0375A0375 120NC	WPR 0375	WPB 0375	GWS 10	T15
0.375	1.97	5.91	0.375	0.35	2	6128638		EBG R0375A0375 150NC				
0.375	3.94	7.88	0.375	0.35	2	6131236		EBG R0375A0375 200NC-100				
0.500	1.38	4.73	0.500	0.42	2		7022522	EBG R0500A0500 120NC	WPR 0500		GWS 12	T20
0.500	1.97	6.30	0.500	0.42	2		7022523	EBG R0500A0500 160NC				
0.625	1.58	5.52	0.625	0.63	2		7022524	EBG R0625A0625 140NC	WPR 0625		GWS 16	
0.625	2.17	6.89	0.625	0.63	2		7022525	EBG R0625A0625 175NC				
0.750	1.58	5.52	0.750	0.71	2		7022526	EBG R0750A0750 140NC	WPR 0750		GWS 20	
0.750	2.96	7.48	0.750	0.71	2		7022527	EBG R0750A0750 190NC				
1.000	2.37	6.30	1.000	0.89	2		7022528	EBG R1000A1000 160NC	WPR 1000		GWS 25	T30
1.000	3.55	8.27	1.000	0.89	2		7022529	EBG R1000A1000 210NC				
1.250	2.56	7.48	1.250	1.13	2		7022530	EBG R1250A1250 190NC	WPR 1250		GWS 32	
1.250	4.14	9.45	1.250	1.13	2		7022531	EBG R1250A1250 240NC				

¹⁾ Torque see overview page 165

Ident No. Screws and wrenches see page 165

Cutting data recommendations starting page 172



Catalog Number									GWR			
d ₁	l ₂	l ₁	d ₃	d ₅	d ₂	z	Ident No.	ICC Ident No	LMT-Code		 ¹⁾	
0.375	0.984	1.555	M6	0.255	0.368	2	9101920		EBG R 0375 T0375	WPR 0375	GWS 10	T15
0.500	0.984	1.555	M6	0.255	0.393	2		7085216	EBG R 0500 T0500-I	WPR 0500	GWS 12	T20
0.625	1.023	1.712	M8	0.334	0.511	2		9101922	EBG R 0625 T0625-I	WPR 0625	GWS 16	
0.750	1.181	1.948	M10	0.413	0.708	2		9101924	EBG R 0750 T075-I	WPR 0750	GWS 20	
1.000	1.574	2.440	M12	0.492	0.826	2		9101925	EBG R 1000 T1000-I	WPR 1000	GWS 25	T30

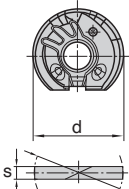
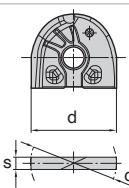
¹⁾ Torque see overview below

Cutting data recommendations starting page 172

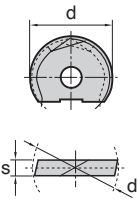
Ident No. Screws and wrenches see page 165

Torque Indexable Insert Cutters

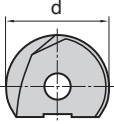
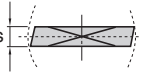
EBG R... / EBG V... Torque					
				ft - lb	
				GWR	GWV
GWS 06	6260409	T6	1048434	0.369	0.369
GWS 08	6119572	T8	1048326	0.737	0.737
GWS 10	6119571	T15	1048335	2.212	2.212
GWS 12	6119559	T20	1048444	2.950	2.950
GWS 16	6119560	T20	1048444	3.687	3.687
GWS 20	6119561	T20	1048444	3.687	3.687
GWS 25	6119562	T30	6119533	5.900	5.900
GWS 32	6119563	T30	6119533	5.900	5.900

   N = Number of Cutting edges	ISO-Code	(in)		Cutting Material Ident No.	For Cutter
		d	s	LCPK30M	Catalog-No.
  N=2	WPR 0500 AR	0.500	0.098	9077903	EBG R 0500
	WPR 0625 AR	0.625	0.118	9073899	EBG R 0625
	WPR 0750 AR	0.750	0.118	9073919	EBG R 0750
  N=2	WPR 1000 AR	1.000	0.157	9077910	EBG R 1000
Description/Designation of grades and ISO-Code starting page 116				■	P
					M
				■	K
					N
					S
					H

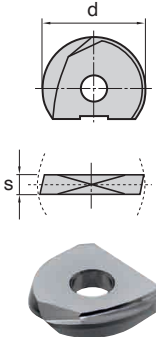
■ = First choice □ = Second choice

 N = Number of Cutting edges	ISO-Code	(in)		Cutting Material Ident No.		For Cutter
		d	s	LCP40M	LCPK10M	Catalog-No.
  N=2	WPR 0312 CF	0.312	0.060	6130279	6122842	EBG R 0312
	WPR 0375 CF	0.375	0.080	6130280	6122830	EBG R 0375
	WPR 0500 CF	0.500	0.100	6130281	6122825	EBG R 0500
	WPR 0625 CF	0.625	0.120	6130282	6122817	EBG R 0625
	WPR 0750 CF	0.750	0.120	6130283	6122808	EBG R 0750
	WPR 1000 CF	1.000	0.160	6130284	6122783	EBG R 1000
	WPR 1250 CF	1.250	0.200	6130045	6122774	EBG R 1250
	WPR 2000 CF	2.000	0.240		9132483	EBG R 2000
Description/Designation of grades and ISO-Code starting page 116				■	■	P
					□	M
					■	K
						N
						S
						H

■ = First choice □ = Second choice

   	ISO-Code	(in)		Cutting Material Ident No.		For Cutter
		d	s	LCKP10M	LCH33M	Catalog-No.
   N=2	WPR 0250 D	0.250	0.063	7131716	7131723	EBG R 0250
	WPR 0375 D	0.375	0.100	7131718	7131725	EBG R 0375
	WPR 0500 D	0.500	0.100	7131719	7131726	EBG R 0500
	WPR 0625 D	0.625	0.012	7131720	7131727	EBG R 0625
	WPR 0750 D	0.750	0.120	7131721	7131728	EBG R 0750
	WPR 1000 D	1.000	0.016	7131722	7131729	EBG R 1000
Description/Designation of grades and ISO-Code starting page 116				■	□	P
				□		M
				■	■	K
						N
						S
				□	■	H

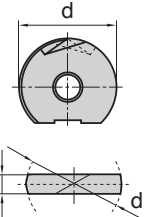
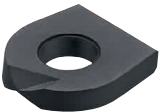
■ = First choice □ = Second choice

 N = Number of Cutting edges	ISO-Code	(in)		Cutting Material Ident No.	For Cutter
		d	s	LCKP10M	Catalog-No.
 N=2	WPR 0250 DN	0.250	0.063	9186899	EBG R 0250
	WPR 0312 DN	0.312	0.080	9186031	EBG R 0312
	WPR 0375 DN	0.375	0.100	9186035	EBG R 0375
	WPR 0500 DN	0.500	0.100	6131308	EBG R 0500
	WPR 0625 DN	0.625	0.012	9186037	EBG R 0625
	WPR 0750 DN	0.750	0.120	9186038	EBG R 0750
	WPR 1000 DN	1.000	0.016	6131309	EBG R 1000

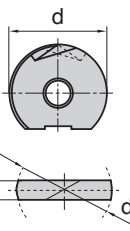
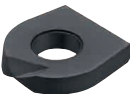
Description/Designation of grades and ISO-Code starting page 116

■	P
□	M
■	K
	N
	S
□	H

■ = First choice □ = Second choice

   	ISO-Code	(in)		Cutting Material Ident No.	For Cutter
		d	s	LCKP10M	Catalog-No.
  N=2 7° Clearance Angle	WPR 0312 N	0.312	0.060	6122907	EBG R 0312
	WPR 0375 N	0.375	0.080	6122896	EBG R 0375
	WPR 0500 N	0.500	0.100	6122887	EBG R 0500
	WPR 0625 N	0.625	0.120	6122873	EBG R 0625
	WPR 0750 N	0.750	0.120	6122869	EBG R 0750
	WPR 1000 N	1.000	0.160	6122860	EBG R 1000
	WPR 1250 N	1.250	0.200	6122851	EBG R 1250
	WPR 2000 N	2.000	0.240	6127904	EBG R 2000
Description/Designation of grades and ISO-Code starting page 116 All WPR, WPV and WPB inserts are available in grade LCN10M (diamond coated) or PCD/CBN tipped.				■	P
				□	M
				■	K
					N
					S
				□	H

■ = First choice □ = Second choice

   	ISO-Code	(in)		Cutting Material Ident No.	For Cutter
		d	s	LCKP10M	Catalog-No.
  N=2 12° Clearance Angle	WPR 0375 NP	0.375	0.080	7132305	EBG R 0375
	WPR 0500 NP	0.500	0.100	7132306	EBG R 0500
	WPR 0625 NP	0.625	0.120	7132307	EBG R 0625
	WPR 0750 NP	0.750	0.120	7132309	EBG R 0750
	WPR 1000 NP	1.000	0.160	7132310	EBG R 1000

Description/Designation of grades and ISO-Code starting page 116

■	P
□	M
■	K
	N
	S
□	H

■ = First choice □ = Second choice

	Material	Hardness	Cutting speed v_c (SFM)	Feed per tooth f_z (in/z)				a_e Roughing
				$\varnothing$ 1/2	$\varnothing$ 5/8	$\varnothing$ 3/4	$\varnothing$ 1	
			WPR-AR LCPK30M	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	525-590	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	d x 0.10 - d x 0.12
	Heat-treatment steel, medium strength	<32 Rc	525-590	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
	Cast steel	<32 Rc	460-525	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
	Case hardening steel	<32 Rc	460-525	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
	Stainless steel, ferritic, martensitic	<32 Rc	390-460	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
	Heat-treatment steel, high strength	30 - 44 Rc	460-525	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
	Nitriding steel, heat treated	30 - 44 Rc	525-590	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
	Tool steel	<44 Rc	525-655	0.1181 0.0098	0.1575 0.0138	0.1969 0.0157	0.2362 0.0177	
M	Stainless steel, austenitic	<32 Rc	390-460	0.0984 0.0079	0.1181 0.0118	0.1575 0.0138	0.1969 0.0157	d x 0.08 - d x 0.10
	Stainless steel, martensitic steel	<32 Rc	328-390	0.0984 0.0079	0.1181 0.0118	0.1575 0.0138	0.1969 0.0157	
K	Grey cast iron	<32 Rc	390-460	0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	d x 0.10 - d x 0.12
	Alloyed grey cast iron	<32 Rc	390-460	0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Nodular cast iron	<32 Rc	590-655	0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Malleable cast iron	<32 Rc	525-590	0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
N	Aluminium alloys, short chipping	<32 Rc		0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	d x 0.10 - d x 0.12
	Aluminium alloys, long chipping	<32 Rc		0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Copper alloys, short chipping	<32 Rc		0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Copper alloys, long chipping	<32 Rc		0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Thermoplastics			0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Duroplastics			0.1575 0.0098	0.1969 0.0138	0.2362 0.0157	0.315 0.0177	
	Graphite							
	Zircon oxide ceramics							
S	Titanium alloys, medium strength	<32 Rc		0.0590- 0.0787 0.0098	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	0.1181- 0.1575 0.0177	d x 0.08 - d x 0.10
	Titanium alloys, high strength	27 - 44 Rc		0.0590- 0.0787 0.0098	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	0.1181- 0.1575 0.0177	
	Nickel based alloys, medium strength	<32 Rc		0.0590- 0.0787 0.0098	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	0.1181- 0.1575 0.0177	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc		0.0590- 0.0787 0.0098	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	0.1181- 0.1575 0.0177	
	Cobalt chromium alloys							
H	Chilled cast iron	32 - 57 Rc		0.0394- 0.0590 0.0079	0.0787- 0.0984 0.0118	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	d x 0.08 - d x 0.10
	Hardened steel	45 - 52 Rc		0.0590- 0.0787 0.0098	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	0.1181- 0.1575 0.0177	d x 0.10 - d x 0.12
		53 - 59 Rc		0.0590- 0.0787 0.0098	0.0984- 0.1181 0.0138	0.1181- 0.1378 0.0157	0.1181- 0.1575 0.0177	d x 0.08 - d x 0.10
		60 - 65 Rc						

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Material	Hardness	Cutting speed v_c (SFM)	Feed per tooth f_z (in/z)							a_e Finishing
			WPR-DN LWNS10M	Ø 1/4	Ø 5/16	Ø 3/8	Ø 1/2	Ø 5/8	Ø 3/4	Ø 1	
				a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	
N	Aluminium alloys, short chipping	<32 Rc	1310-1969	0.0039 0.0047	0.0059 0.0059	0.0079 0.0071	0.0079 0.0079	0.0079 0.0118	0.0118 0.0118	0.0138 0.0138	d x 0.02
	Aluminium alloys, long chipping	<32 Rc	985-1310	0.0039 0.0047	0.0059 0.0059	0.0079 0.0071	0.0079 0.0079	0.0118 0.0118	0.0118 0.0118	0.0138 0.0138	
	Copper alloys, short chipping	<32 Rc	985-1310	0.0039 0.0047	0.0059 0.0059	0.0079 0.0071	0.0079 0.0079	0.0118 0.0118	0.0118 0.0118	0.0138 0.0138	
	Copper alloys, long chipping	<32 Rc	985-1310	0.0039 0.0047	0.0059 0.0059	0.0079 0.0071	0.0079 0.0079	0.0118 0.0118	0.0118 0.0118	0.0138 0.0138	
	Thermoplastics		1640-1969	0.0039 0.0047	0.0059 0.0059	0.0079 0.0071	0.0079 0.0079	0.0118 0.0118	0.0118 0.0118	0.0138 0.0138	
	Duroplastics		655-985	0.0039 0.0047	0.0059 0.0059	0.0079 0.0071	0.0079 0.0079	0.0118 0.0118	0.0118 0.0118	0.0138 0.0138	
	Graphite										
	Zircon oxide ceramics										
S	Titanium alloys, medium strength	<32 Rc	1310-1640	0.0039 0.0039	0.0059 0.0039	0.0079 0.0059	0.0079 0.0079	0.0098 0.0098	0.0098 0.0098	0.0118 0.0118	d x 0.02
	Titanium alloys, high strength	27 - 44 Rc	1310-1148	0.0039 0.0047	0.0059 0.0039	0.0079 0.0059	0.0079 0.0079	0.0098 0.0098	0.0098 0.0098	0.0118 0.0118	
	Nickel based alloys, medium strength	<32 Rc	130-196	0.0039 0.0047	0.0059 0.0039	0.0079 0.0059	0.0079 0.0079	0.0098 0.0098	0.0098 0.0098	0.0118 0.0118	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	130-196	0.0039 0.0047	0.0059 0.0039	0.0079 0.0059	0.0079 0.0079	0.0098 0.0098	0.0098 0.0098	0.0118 0.0118	
	Cobalt chromium alloys										

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Material	Hardness	
P	Plain carbon steel + free cutting steel	<32 Rc	
	Heat-treatment steel, medium strength	<32 Rc	
	Cast steel	<32 Rc	
	Case hardening steel	<32 Rc	
	Stainless steel, ferritic, martensitic	<32 Rc	
	Heat-treatment steel, high strength	30 - 44 Rc	
	Nitriding steel, heat treated	30 - 44 Rc	
	Tool steel	<44 Rc	
M	Stainless steel, austenitic	<32 Rc	
	Stainless steel, martensitic steel	<32 Rc	
K	Grey cast iron	<32 Rc	
	Alloyed grey cast iron	<32 Rc	
	Nodular cast iron	<32 Rc	
	Malleable cast iron	<32 Rc	
N	Aluminium alloys, short chipping	<32 Rc	
	Aluminium alloys, long chipping	<32 Rc	
	Copper alloys, short chipping	<32 Rc	
	Copper alloys, long chipping	<32 Rc	
	Thermoplastics		
	Duroplastics		
	Graphite		
	Zircon oxide ceramics		
S	Titanium alloys, medium strength	<32 Rc	
	Titanium alloys, high strength	27 - 44 Rc	
	Nickel based alloys, medium strength	<32 Rc	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	
	Cobalt chromium alloys		
H	Chilled cast iron	32 - 57 Rc	
	Hardened steel	45 - 52 Rc	
		53 - 59 Rc	
		60 - 65 Rc	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Cutting speed v_c (SFM)	Feed per tooth f_z (in/z)							a_e Finishing
		$\varnothing$ 5/16	$\varnothing$ 3/8	$\varnothing$ 1/2	$\varnothing$ 5/8	$\varnothing$ 3/4	$\varnothing$ 1	$\varnothing$ 1-1/4	
	WPR-N/CF LCKP10M LCPK15M	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	
	918-985	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	d x 0.02
	720-785	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	785-850	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	918-985	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	655-720	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	720-785	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	918-985	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	918-984	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	590-656	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	d x 0.02
	525-590	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	918-985	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	d x 0.02
	850-918	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	984-1148	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	785-850	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
									d x 0.02
									d x 0.02
	390-460	0.0039 0.0031	0.0059 0.0394	0.0039 0.0071	0.0059 0.0079	0.0079 0.0098	0.0098 0.0098	0.0118 0.0118	d x 0.02
	785-850	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	655-720	0.0059 0.0059	0.0059 0.0079	0.0098 0.0098	0.0118 0.0118	0.0138 0.0157	0.0157 0.0157	0.0177 0.0197	
	390-460	0.0039 0.0031	0.0059 0.0394	0.0039 0.0071	0.0059 0.0079	0.0079 0.0098	0.0098 0.0098	0.0118 0.0118	

	Material	Hardness	Cutting speed v _c (SFM)				
			WPR-N/CF LWP40M	WPR-N/CF LCKP10M I LCPK15M	Ø 5/16	Ø 3/8	
					a _p max f _z max	a _p max f _z max	
P	Plain carbon steel + free cutting steel	<32 Rc	590-655	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Heat-treatment steel, medium strength	<32 Rc	590-655	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Cast steel	<32 Rc	525-590	525-590	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Case hardening steel	<32 Rc	590-655	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Stainless steel, ferritic, martensitic	<32 Rc	460-525	460-525	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Heat-treatment steel, high strength	30 - 44 Rc	525-590	525-590	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Nitriding steel, heat treated	30 - 44 Rc	590-655	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Tool steel	<44 Rc	655-720	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
M	Stainless steel, austenitic	<32 Rc	460-525	460-525	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Stainless steel, martensitic steel	<32 Rc	390-460	390-460	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
K	Grey cast iron	<32 Rc	525-590	525-590	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Alloyed grey cast iron	<32 Rc	590-655	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Nodular cast iron	<32 Rc			0.0394-0.0590 0.0039-0.0059	0.0394-0.0590 0.0039-0.0059	
	Malleable cast iron	<32 Rc			0.0394-0.0590 0.0039-0.0059	0.0394-0.0590 0.0039-0.0059	
N	Aluminium alloys, short chipping	<32 Rc			0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Aluminium alloys, long chipping	<32 Rc					
	Copper alloys, short chipping	<32 Rc	655-720	720-785	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Copper alloys, long chipping	<32 Rc	590-655	655-720	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
	Thermoplastics						
	Duroplastics						
	Graphite						
	Zircon oxide ceramics						
S	Titanium alloys, medium strength	<32 Rc					
	Titanium alloys, high strength	27 - 44 Rc					
	Nickel based alloys, medium strength	<32 Rc	262-328		0.0118-0.0197 0.0039-0.0047	0.0118-0.0197 0.0039-0.0047	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	262-328		0.0118-0.0197 0.0039-0.0047	0.0118-0.0197 0.0039-0.0047	
	Cobalt chromium alloys						
H	Chilled cast iron	32 - 57 Rc	390-460	390-460	0.0118-0.0197 0.0039-0.0047	0.0118-0.0197 0.0039-0.0047	
	Hardened steel	45 – 52 Rc	460-525	460-525	0.0394-0.0590 0.0039-0.0059	0.0590-0.0787 0.0059-0.0071	
		53 – 59 Rc		390-460	0.0118-0.0197 0.0039-0.0047	0.0118-0.0197 0.0039-0.0047	
		60 – 65 Rc		328-390			

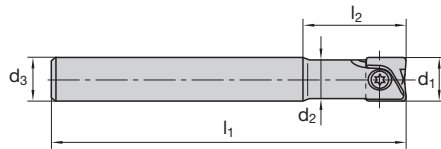
The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

0.0197-0.0315 0.0039-0.0059	0.0197-0.0394 0.0071-0.0079	0.0197-0.0394 0.0079-0.0098	0.0315-0.0472 0.0098-0.0118	0.0315-0.0472 0.0098-0.0118	0.0472-0.0709 0.0098-0.0118
0.0787-0.0984 0.0079-0.0098	0.1181 0.0079-0.0118	0.1181 0.0098-0.0138	0.1378 0.0118-0.0157	0.1378 0.0118-0.0157	0.1575 0.0118-0.0157
0.0197-0.0315 0.0039-0.0059	0.0197-0.0394 0.0071-0.0079	0.0197-0.0394 0.0079-0.0098	0.0315-0.0472 0.0098-0.0118	0.0315-0.0472 0.0098-0.0118	0.0472-0.0709 0.0098-0.0118

	Material	Hardness	Cutting speed v_c (SFM)		Ø 1/4	
			WPR-D LCKP10M	WPR-D LCH33M	a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	850-918	950-1017	0.0039 0.0039	
	Heat-treatment steel, medium strength	<32 Rc	850-918	950-1017	0.0039 0.0039	
	Cast steel	<32 Rc	785-850	850-950	0.0039 0.0039	
	Case hardening steel	<32 Rc	785-850	850-950	0.0039 0.0039	
	Stainless steel, ferritic, martensitic	<32 Rc	720-785	785-850	0.0039 0.0039	
	Heat-treatment steel, high strength	30 - 44 Rc	850-918	950-1017	0.0039 0.0039	
	Nitriding steel, heat treated	30 - 44 Rc	850-918	950-1017	0.0039 0.0039	
	Tool steel	<44 Rc	918-1050	1017-1148	0.0039 0.0039	
M	Stainless steel, austenitic	<32 Rc	720-785	785-850	0.0039 0.0039	
	Stainless steel, martensitic steel	<32 Rc	720-785	785-850	0.0039 0.0039	
K	Grey cast iron	<32 Rc	720-785	785-850	0.0039 0.0039	
	Alloyed grey cast iron	<32 Rc	655-720	720-785	0.0039 0.0039	
	Nodular cast iron	<32 Rc	918-984	1017-1083	0.0039 0.0039	
	Malleable cast iron	<32 Rc	655-720	720-785	0.0039 0.0039	
N	Aluminium alloys, short chipping	<32 Rc				
	Aluminium alloys, long chipping	<32 Rc				
	Copper alloys, short chipping	<32 Rc	918-984	1017-1083	0.0039 0.0039	
	Copper alloys, long chipping	<32 Rc	850-918	950-1017	0.0039 0.0039	
	Thermoplastics					
	Duroplastics					
	Graphite					
	Zircon oxide ceramics					
S	Titanium alloys, medium strength	<32 Rc				
	Titanium alloys, high strength	27 - 44 Rc				
	Nickel based alloys, medium strength	<32 Rc	390-460	425-525	0.0039 0.0039	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	262-328	295-360	0.0039 0.0039	
	Cobalt chromium alloys					
H	Chilled cast iron	32 - 57 Rc	460-525	490-590	0.0039 0.0031	
	Hardened steel	45 - 52 Rc	918-984	1017-1083	0.0039 0.0039	
		53 - 59 Rc	785-850	885-950	0.0039 0.0039	
		60 - 65 Rc	525-655	590-720	0.0039 0.0031	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f_z (in/z)						a_e Finishing
	$\emptyset$ 3/8	$\emptyset$ 1/2	$\emptyset$ 5/8	$\emptyset$ 3/4	$\emptyset$ 1	
	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	d x 0.02
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	d x 0.02
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	d x 0.02
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
						d x 0.02
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
						d x 0.02
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0039 0.0059	0.0039 0.0071	0.0059 0.0079	0.0079 0.0098	0.0098 0.0098	d x 0.02
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0059 0.0079	0.0079 0.0098	0.0098 0.0118	0.0098 0.0157	0.0118 0.0157	
	0.0039 0.0059	0.0039 0.0071	0.0059 0.0079	0.0079 0.0098	0.0098 0.0098	

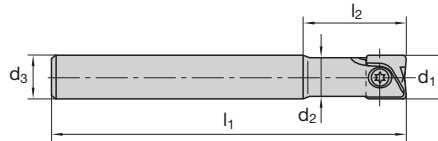


Catalog Number							GWV				
d ₁	l ₂	l ₁	d ₃	d ₂	z	Ident No.	LMT-Code			 1)	
0.500	1.34	5.20	0.500	0.41	2	6121400	EBG V0500A0500 130N	WPB 0500	WPV 0500	GWS 12	T20
0.500	1.89	5.98	0.500	0.41	2	6121384	EBG V0500A0500 150N				
0.625	1.50	5.51	0.625	0.55	2	6121390	EBG V0625A0625 140N	WPB 0625	WPV 0625	GWS 16	
0.625	2.16	6.30	0.625	0.55	2	6121381	EBG V0625A0625 160N				
0.750	1.85	6.30	0.750	0.71	2	6121378	EBG V0750A0750 160N	WPB 0750	WPV 0750	GWS 20	
0.750	2.48	6.89	0.750	0.71	2	6121380	EBG V0750A0750 175N				
0.750	2.36	8.27	0.750	0.71	2	6121365	EBG V0750A0750 210N				T30
1.000	1.85	6.30	1.000	0.88	2	6121372	EBG V1000A1000 160N	WPB 1000	WPV 1000	GWS 25	
1.000	2.83	7.48	1.000	0.88	2	6121356	EBG V1000A1000 190N				
1.000	3.14	9.06	1.000	0.88	2	6121358	EBG V1000A1000 230N				

¹⁾ Torque see overview page 165

Ident No. Screws and wrenches see page 165

Cutting data recommendations starting page 189



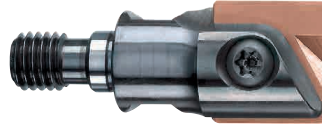
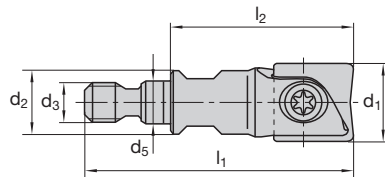
Catalog Number								GWV				
d ₁	l ₂	l ₁	d ₃	d ₂	z	Ident No.	LMT-Code			 1)		
0.500	1.38	4.73	0.500	0.42	2	7022532	EBG V0500A0500 120NC-I	WPB 0500	WPV 0500	GWS 12	T20	
0.500	1.97	6.30	0.500	0.42	2	7022533	EBG V0500A0500 160NC-I			GWS 16		
0.625	1.58	5.52	0.625	0.56	2	7022534	EBG V0625A0625 140NC-I					
0.625	2.17	6.89	0.625	0.56	2	7022535	EBG V0625A0625 175NC-I			GWS 20		
0.750	1.58	5.52	0.750	0.70	2	7022536	EBG V0750A0750 140NC-I	WPB 0750	WPV 0750	GWS 25	T30	
0.750	2.96	7.48	1.000	0.89	2	7022537	EBG V0750A0750 190NC-I	WPB 1000	WPV 1000			
1.000	2.37	6.30	1.000	0.89	2	7022538	EBG V1000A1000 160NC-I					
1.000	3.55	8.27	1.000	0.89	2	7022539	EBG V1000A1000 210NC-I					
1.250	2.70	7.48	1.250	1.13	2	6128694	EBG V1250A1250 190NC-I	WPB 1250				
1.250	4.27	10.00	1.250	1.13	2	6128696	EBG V1250A1250 240NC-I					

All have internal coolant supply

Cutting data recommendations starting page 189

1) Torque see overview page 165

Ident No. Screws and wrenches see page 165

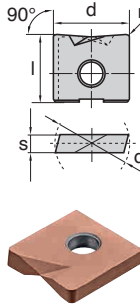


Catalog Number									GWV				
d ₁	l ₂	l ₁	d ₃	d ₅	d ₂	z	Ident No.	ICC Ident No.	LMT-Code			 1)	
0.375	0.98	1.555	M6	0.25	0.390	2	9101926		EBG V 0375 T0375	WPV 0375	WPB 0375	GWS 10	T15
0.500	0.98	1.555	M6	0.25	0.368	2		7085208	EBG V 0500 T0500-I	WPV 0500	WPB 0500	GWS 12	T20
0.625	1.10	1.791	M8	0.33	0.510	2		9101928	EBG V 0625 T0625-I	WPV 0625	WPB 0625	GWS 16	
0.750	1.26	2.027	M10	0.41	0.710	2		9101929	EBG V 0750 T0750-I	WPV 0750	WPB 0750	GWS 20	
1.000	1.65	2.519	M12	0.49	0.830	2		9101930	EBG V 1000 T1000-I	WPV 1000	WPB 1000	GWS 25	T30

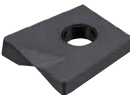
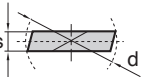
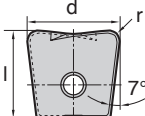
1) Torque see overview page 165

Cutting data recommendations starting page 189

Ident No. Screws and wrenches see page 165

						Cutting Material Ident No.	For cutter
N = Number of Cutting edges	LMT-Code	(in)				LCPK10M	Cat-No.
		d	l	s	r		
 N=2	WPV 0375 N	0.375	0.45	0.08	0.031	6127876	EBG V 0375
		0.375	0.45	0.08	0.062	6127947	
	WPV 0500 N	0.500	0.55	0.10	0.031	6127785	EBG V 0500
		0.500	0.55	0.10	0.062	6122509	
	WPV 0625 N	0.625	0.62	0.12	0.031	6122525	EBG V 0625
		0.625	0.62	0.12	0.062	6127786	
	WPV 0750 N	0.750	0.70	0.12	0.031	6122518	EBG V 0750
		0.750	0.70	0.12	0.062	6127787	
	WPV 1000 N	1.000	0.92	0.16	0.031	6127789	EBG V 1000
		1.000	0.92	0.16	0.062	6127788	
		1.000	0.92	0.16	0.125	6127790	
Description/Designation of grades and ISO-Code starting page 116						■	P
						□	M
						■	K
							N
							S
							H

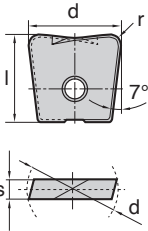
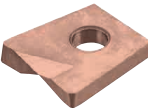
■ = First choice □ = Second choice

						Cutting Material Ident No.	For cutter
N = Number of Cutting edges	LMT-Code	(in)				LCPK10M	Cat-No.
		d	l	s	r		
 N=2	WPB 0375 N	0.375	0.45	0.08	0.032	7031925	EBG R 0375 EBG V 0375
		0.375	0.45	0.08	0.063	7031927	
	WPB 0500 N	0.500	0.55	0.10	0.032	6122370	EBG V 0500
		0.500	0.55	0.10	0.063	6122376	
	WPB 0625 N	0.625	0.62	0.12	0.032	6127791	EBG V 0625
		0.625	0.62	0.12	0.063	6127792	
	WPB 0750 N	0.750	0.70	0.12	0.032	6127793	EBG V 0750
		0.750	0.70	0.12	0.063	6127794	
	WPB 1000 N	1.000	0.92	0.16	0.032	6122374	EBG V 1000
		1.000	0.92	0.16	0.063	6122362	
		1.000	0.92	0.16	0.125	6127795	
Description/Designation of grades and ISO-Code starting page 116						■	P
						□	M
						■	K
							N
							S
							H

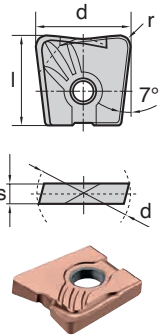
■ = First choice □ = Second choice

	Length w of the WPB wiper in inches	
	Insert	Wiper "w"
	WPB 0250	0.020
	WPB 0375	0.040
	WPB 0500	0.040
	WPB 0625	0.040
	WPB 0750	0.060
	WPB 1000	0.060

not for WPB-HF

						Cutting Material Ident No.	For cutter
N = Number of Cutting edges	LMT-Code	(in)				LCKP10M	Cat-No.
		d	l	s	r		
  N=2	WPB 0375 NP	0.375	0.45	0.08	0.032	7132387	EBG R 0375 EBG V 0375
		0.375	0.45	0.08	0.063	7132388	
	WPB 0500 NP	0.500	0.55	0.10	0.032	7131503	EBG V 0500
		0.500	0.55	0.10	0.063	7132391	
	WPB 0625 NP	0.625	0.62	0.12	0.032	7132392	EBG V 0625
		0.625	0.62	0.12	0.063	7132393	
	WPB 0750 NP	0.750	0.70	0.12	0.032	7132394	EBG V 0750
		0.750	0.70	0.12	0.063	7132395	
		0.750	0.70	0.12	0.125	7156654	
	WPB 1000 NP	1.000	0.92	0.16	0.032	7132397	EBG V 1000
		1.000	0.92	0.16	0.063	7132398	
		1.000	0.92	0.16	0.125	7132399	
Description/Designation of grades and ISO-Code starting page 116						■	P
						□	M
						■	K
							N
							S
	H						

■ = First choice □ = Second choice

						Cutting Material Ident No.	For cutter
N = Number of Cutting edges	LMT-Code	(in)				LCHK10M	Cat-No.
		d	l	s	r		
 N=2	WPB 0250 AF	0.250	0.31	0.06	0.032	7148949	EBG R 0250 EBG V 0250
		0.250	0.31	0.06	0.063	7148950	
	WPB 0375 AF	0.375	0.45	0.08	0.032	7148951	EBG R 0375 EBG V 0375
		0.375	0.45	0.08	0.063	7148952	
	WPB 0500 AF	0.500	0.55	0.10	0.032	7148953	EBG V 0500
		0.500	0.55	0.10	0.063	7148954	
	WPB 0625 AF	0.625	0.62	0.12	0.032	7051668	EBG V 0625
		0.625	0.62	0.12	0.063	7051669	
	WPB 0750 AF	0.750	0.70	0.12	0.032	7051666	EBG V 0750
		0.750	0.70	0.12	0.063	7051667	
	WPB 1000 AF	1.000	0.92	0.16	0.032	7148955	EBG V 1000
		1.000	0.92	0.16	0.063	7148956	
		1.000	0.92	0.16	0.125	7148957	

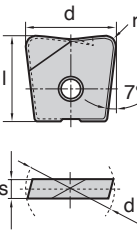
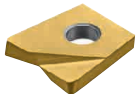
Description/Designation of grades and ISO-Code starting page 116

■	P
□	M
■	K
	N
	S
■	H

■ = First choice □ = Second choice

							Cutting Material Ident No.	For cutter
N = Number of Cutting edges	LMT-Code	(in)					LCPK30M	Cat-No.
		d	l	s	$a_{p \max}$	R_{theo}		
 N=2	WPB 0500 HF	0.500	0.55	0.10	0.025	0.045	6132184	EBG V 0500
	WPB 0625 HF	0.625	0.63	0.12	0.030	0.050	6132186	EBG V 0625
	WPB 0750 HF	0.750	0.70	0.12	0.040	0.080	6132188	EBG V 0750
Description/Designation of grades and ISO-Code starting page 116							■	P
								M
							■	K
								N
								S
								H

■ = First choice □ = Second choice

     						Cutting Material Ident No.	For Cutter
N = Number of Cutting edges	LMT-Code	(in)				LCPK10M	Cat-No.
		d	l	s	r		
  N=2	WPB 0250 CF	0.250	0.31	0.06	0.032	6130879	EBG R 0250
	WPB 0375 CF	0.375	0.45	0.10	0.032	6130878	EBG R 0375 EBG V 0375
		0.375	.045	0.10	0.063	6130877	
	WPB 0500 CF	0.500	0.55	0.10	0.032	6130870	EBG V 0500
		0.500	0.55	0.10	0.063	6128916	
	WPB 0625 CF	0.625	0.62	0.12	0.032	6130869	EBG V 0625
		0.625	0.62	0.12	0.063	6130871	
	WPB 0750 CF	0.750	0.70	0.12	0.032	6130872	EBG V 0750
		0.750	0.70	0.12	0.063	6130873	
	WPB 1000 CF	1.000	0.92	0.16	0.032	6130874	EBG V 1000
		1.000	0.92	0.16	0.063	6130875	
		1.000	0.92	0.16	0.125	6130876	
Description/Designation of grades and ISO-Code starting page 116						■	P
						□	M
						□	K
							N
							S
		H					

■ = First choice □ = Second choice

Screws and Wrenches

			
LMT-Code	Ident No.	LMT-Code	Ident No.
GWS 06	6260409	T6	6119544
GWS 08	6119572	T8	6119528
GWS 10	6119571	T15	6119529
GWS 12	6119559	T20	6119530
GWS 16	6119560		
GWS 20	6119561	T30	6119533
GWS 25	6119562		
GWS 32	6119563		

	Material	Hardness	Cutting speed v_c (SFM)	Feed per tooth f_z (in/z)			a_e Roughing max. 70%
				$\varnothing$ 1/2	$\varnothing$ 5/8	$\varnothing$ 3/4	
			WPB-HF LCPK30M	a_p max f_z max	a_p max f_z max	a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	590-655	0.0236 0.0236	0.0315 0.0315	0.0394 0.0472	d x 0.7
	Heat-treatment steel, medium strength	<32 Rc	590-655	0.0236 0.0236	0.0315 0.0315	0.0394 0.0472	
	Cast steel	<32 Rc	590-655	0.0236 0.0236	0.0315 0.0315	0.0394 0.0472	
	Case hardening steel	<32 Rc	590-655	0.0315 0.0197	0.0394 0.0236	0.0394 0.0315	
	Stainless steel, ferritic, martensitic	<32 Rc	525-590	0.0197 0.0197	0.0236 0.0236	0.0315 0.0315	
	Heat-treatment steel, high strength	30 - 44 Rc	460-525	0.0197 0.0197	0.0236 0.0236	0.0315 0.0315	
	Nitriding steel, heat treated	<44 Rc	460-525	0.0236 0.0197	0.0315 0.0236	0.0394 0.0315	
	Tool steel	<44 Rc	590-655	0.0236 0.0236	0.0315 0.0315	0.0394 0.0472	
M	Stainless steel, austenitic	<32 Rc	460-525	0.0236 0.0236	0.0315 0.0315	0.0394 0.0394	d x 0.7
	Stainless steel, martensitic steel	<32 Rc	460-525	0.0236 0.0197	0.0315 0.0315	0.0394 0.0394	
K	Grey cast iron	<32 Rc	590-655	0.0236 0.0236	0.0315 0.0315	0.0394 0.0394	d x 0.7
	Alloyed grey cast iron	<32 Rc	590-655	0.0315 0.0197	0.0394 0.0236	0.0394 0.0315	
	Nodular cast iron	<32 Rc	590-655	0.0315 0.0197	0.0394 0.0236	0.0394 0.0315	
	Malleable cast iron	<32 Rc	590-655	0.0315 0.0197	0.0394 0.0236	0.0394 0.0315	
N	Aluminium alloys, short chipping	<32 Rc	1310-1640	0.0315 0.0197	0.0394 0.0236	0.0394 0.0315	d x 0.7
	Aluminium alloys, long chipping	<32 Rc	1148-1310	0.0315 0.0197	0.0394 0.0236	0.0394 0.0315	
	Copper alloys, short chipping	<32 Rc	820-985	0.0236 0.0315	0.0394 0.0472	0.0394 0.0590	
	Copper alloys, long chipping	<32 Rc	820-985	0.0236 0.0315	0.0315 0.0472	0.0394 0.0590	
	Thermoplastics		1640-1969	0.0236 0.0394	0.0315 0.0472	0.0394 0.0590	
	Duroplastics						
	Graphite						
	Zircon oxide ceramics						
S	Titanium alloys, medium strength	<32 Rc	262-328	0.0157 0.0157	0.0197 0.0197	0.0197 0.0236	d x 0.7
	Titanium alloys, high strength	27 - 44 Rc	196-262	0.0157 0.0157	0.0197 0.0197	0.0197 0.0236	
	Nickel based alloys, medium strength	<32 Rc	328-390	0.0157 0.0157	0.0197 0.0197	0.0197 0.0236	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	262-328	0.0157 0.0157	0.0197 0.0197	0.0197 0.0236	
	Cobalt chromium alloys						
H	Chilled cast iron	32 - 57 Rc	328-390	0.0157 0.0157	0.0197 0.0197	0.0197 0.0236	d x 0.7
	Hardened steel	45 - 52 Rc	460-525	0.0236 0.0236	0.0315 0.0315	0.0394 0.0472	
		53 - 59 Rc	262-328	0.0157 0.0157	0.0197 0.0197	0.0197 0.0236	
		60 - 65 Rc					

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

	Material	Hardness	Cutting speed v_c (SFM)			
				$\varnothing$ 1/4	$\varnothing$ 3/8	
			WPB-AF LCHK10M	a_p max f_z max	a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	918-985	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, medium strength	<32 Rc	918-985	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Cast steel	<32 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Case hardening steel	<32 Rc	918-985	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Stainless steel, ferritic, martensitic	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, high strength	30 - 44 Rc	655-720	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Nitriding steel, heat treated	30 - 44 Rc <32 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Tool steel	<44 Rc	918-1116	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
M	Stainless steel, austenitic	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Stainless steel, martensitic steel	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
K	Grey cast iron	<32 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Alloyed grey cast iron	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Nodular cast iron	<32 Rc	785-918	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Malleable cast iron	<32 Rc	785-918	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
N	Aluminium alloys, short chipping	<32 Rc		0.079 0.0031-0.047	0.0098 0.0059-0.0079	
	Aluminium alloys, long chipping	<32 Rc		0.079 0.0031-0.047	0.0098 0.0059-0.0079	
	Copper alloys, short chipping	<32 Rc	1310-1476	0.0079 0.0031-0.0047	0.0098 0.0059-0.0079	
	Copper alloys, long chipping	<32 Rc	985-1148	0.0079 0.0031-0.0047	0.0098 0.0059-0.0079	
	Thermoplastics			0.0079 0.0031-0.0047	0.0098 0.0059-0.0079	
	Duroplastics			0.0079 0.0059-0.0079	0.0098 0.0059-0.0079	
	Graphite			0.0079 0.0059-0.0079	0.0098 0.0059-0.0079	
	Zircon oxide ceramics					
S	Titanium alloys, medium strength	<32 Rc		0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Titanium alloys, high strength	27 - 44 Rc		0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Nickel based alloys, medium strength	<32 Rc	262-328	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	196-262	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Cobalt chromium alloys					
H	Chilled cast iron	32 - 57 Rc	390-460	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Hardened steel	45 - 52 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
		53 - 59 Rc	525-590	0.0020-0.0031 0.0031-0.0047	0.0047-0.0031 0.0059-0.0071	
		60 - 65 Rc	328-390	0.0020-0.0031 0.0031-0.0047	0.0047-0.0031 0.0059-0.0071	

Feed per tooth f_z (in/z)

	Material	Hardness	Cutting speed v_c (SFM)			
			WPB-N/NP LCKP10M LCPK10M	$\varnothing$ 3/8 f_z max	$\varnothing$ 1/2 f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	590-655	0.0118	0.0138	
	Heat-treatment steel, medium strength	<32 Rc	590-655	0.0118	0.0138	
	Cast steel	<32 Rc	590-655	0.0118	0.0138	
	Case hardening steel	<32 Rc	590-655	0.0118	0.0138	
	Stainless steel, ferritic, martensitic	<32 Rc	525-590	0.0118	0.0138	
	Heat-treatment steel, high strength	30 - 44 Rc	460-525	0.0118	0.0138	
	Nitriding steel, heat treated	30 - 44 Rc	460-525	0.0118	0.0138	
	Tool steel	<44 Rc	590-655	0.0118	0.0138	
M	Stainless steel, austenitic	<32 Rc	460-525	0.0118	0.0138	
	Stainless steel, martensitic steel	<32 Rc	390-460	0.0118	0.0138	
K	Grey cast iron	<32 Rc	525-590	0.0118	0.0138	
	Alloyed grey cast iron	<32 Rc	460-525	0.0118	0.0138	
	Nodular cast iron	<32 Rc	590-655	0.0118	0.0138	
	Malleable cast iron	<32 Rc	525-590	0.0118	0.0138	
N	Aluminium alloys, short chipping	<32 Rc				
	Aluminium alloys, long chipping	<32 Rc				
	Copper alloys, short chipping	<32 Rc				
	Copper alloys, long chipping	<32 Rc				
	Thermoplastics					
	Duroplastics					
	Graphite					
	Zircon oxide ceramics					
S	Titanium alloys, medium strength	<32 Rc				
	Titanium alloys, high strength	27 - 44 Rc				
	Nickel based alloys, medium strength	<32 Rc				
	Heat resistant nickel based alloys, high strength	27 - 44 Rc				
	Cobalt chromium alloys					
H	Chilled cast iron	32 - 57 Rc				
	Hardened steel	45 - 52 Rc	590-655	0.0118	0.0138	
		53 - 59 Rc	460-525	0.0118	0.0138	
		60 - 65 Rc				

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f_z (in/z)				WPB $a_{p \max}$ $r + w$	a_e Roughing Step	a_e Roughing Plane
	$\varnothing 5/8$	$\varnothing 3/4$	$\varnothing 1$			
	$f_z \max$	$f_z \max$	$f_z \max$			
	0.0157	0.0177	0.0177	$r + w$	$d \times 0.1 - d \times 0.3$	$d \times 0.3 - d \times 0.7$
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177	$r + w$	$d \times 0.1 - d \times 0.3$	$d \times 0.3 - d \times 0.7$
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177	$r + w$	$d \times 0.1 - d \times 0.3$	$d \times 0.3 - d \times 0.7$
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
	0.0157	0.0177	0.0177			
				$r + w$		
				$r + w$		
	0.0157	0.0177	0.0177	$r + w$	$d \times 0.1 - d \times 0.3$	$d \times 0.3 - d \times 0.7$
	0.0157	0.0177	0.0177			

	Material	Hardness	Cutting speed v_c (SFM)		
			WPB-N/NP LCKP10M LCPK10M	$\varnothing$ 3/8	
				a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, medium strength	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Cast steel	<32 Rc	785-850	0.0079-0.0118 0.0059-0.0079	
	Case hardening steel	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Stainless steel, ferritic, martensitic	<32 Rc	655-785	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, high strength	30 - 44 Rc	655-720	0.0079-0.0118 0.0059-0.0079	
	Nitriding steel, heat treated	30 - 44 Rc <32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Tool steel	<44 Rc	785-918	0.0079-0.0118 0.0059-0.0079	
M	Stainless steel, austenitic	<32 Rc			
	Stainless steel, martensitic steel	<32 Rc			
K	Grey cast iron	<32 Rc	655-720	0.0079-0.0118 0.0059-0.0079	
	Alloyed grey cast iron	<32 Rc	655-720	0.0079-0.0118 0.0059-0.0079	
	Nodular cast iron	<32 Rc	785-850	0.0079-0.0118 0.0059-0.0079	
	Malleable cast iron	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
N	Aluminium alloys, short chipping	<32 Rc			
	Aluminium alloys, long chipping	<32 Rc			
	Copper alloys, short chipping	<32 Rc			
	Copper alloys, long chipping	<32 Rc			
	Thermoplastics				
	Duroplastics				
	Graphite				
S	Zircon oxide ceramics				
	Titanium alloys, medium strength	<32 Rc			
	Titanium alloys, high strength	27 - 44 Rc			
	Nickel based alloys, medium strength	<32 Rc			
	Heat resistant nickel based alloys, high strength	27 - 44 Rc			
H	Cobalt chromium alloys				
	Chilled cast iron	32 - 57 Rc	390-460	0.0047-0.0071 0.0039-0.0047	
	Hardened steel	45 - 52 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
		53 - 59 Rc	590-655	0.0079-0.0118 0.0059-0.0079	
		60 - 65 Rc	390-460	0.0047-0.0071 0.0039-0.0047	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f_z (in/z)					a_e Finishing Step (Contour)	a_e Finishing Plane
	$\varnothing$ 1/2	$\varnothing$ 5/8	$\varnothing$ 3/4	$\varnothing$ 1		
	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0059-0.0079 0.0047-0.0071	0.0071-0.0098 0.0059-0.0079	0.0071-0.0098 0.0071-0.0087	0.0079-0.0118 0.0079-0.0098	d x 0.15- d x 0.18	d x 0.1- d x 0.3
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.02	d x 0.3- d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.15- d x 0.18	d x 0.1- d x 0.3
	0.0059-0.0079 0.0047-0.0071	0.0071-0.0098 0.0059-0.0079	0.0071-0.0098 0.0071-0.0087	0.0079-0.0118 0.0079-0.0098	d x 0.15- d x 0.18	d x 0.1- d x 0.3

	Material	Hardness	Cutting speed v_c (SFM)			
			WPB-CF LCPK10M	Ø 1/4	Ø 3/8	
				a_p max f_z max	a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	590-655	0.0039 0.0079	0.0039 0.0118	
	Heat-treatment steel, medium strength	<32 Rc	590-655	0.0039 0.0079	0.0039 0.0118	
	Cast steel	<32 Rc	590-655	0.0039 0.0079	0.0039 0.0118	
	Case hardening steel	<32 Rc	590-655	0.0039 0.0079	0.0039 0.0118	
	Stainless steel, ferritic, martensitic	<32 Rc	525-590	0.0039 0.0079	0.0039 0.0118	
	Heat-treatment steel, high strength	30 - 44 Rc	460-525	0.0039 0.0079	0.0039 0.0118	
	Nitriding steel, heat treated	<44 Rc	460-525	0.0039 0.0079	0.0039 0.0118	
	Tool steel	<44 Rc	590-655	0.0039 0.0079	0.0039 0.0118	
M	Stainless steel, austenitic	<32 Rc	460-525	0.0039 0.0079	0.0039 0.0118	
	Stainless steel, martensitic steel	<32 Rc	390-460	0.0039 0.0079	0.0039 0.0118	
K	Grey cast iron	<32 Rc	525-590	0.0039 0.0079	0.0039 0.0118	
	Alloyed grey cast iron	<32 Rc	460-525	0.0039 0.0079	0.0039 0.0118	
	Nodular cast iron	<32 Rc	590-655	0.0039 0.0079	0.0039 0.0118	
	Malleable cast iron	<32 Rc	525-590	0.0039 0.0079	0.0039 0.0118	
N	Aluminium alloys, short chipping	<32 Rc	400–500	0.0039 0.0098	0.0039 0.0138	
	Aluminium alloys, long chipping	<32 Rc	300–400	0.0039 0.0098	0.0039 0.0138	
	Copper alloys, short chipping	<32 Rc	300–400	0.0039 0.0098	0.0039 0.0138	
	Copper alloys, long chipping	<32 Rc	250–300	0.0039 0.0098	0.0039 0.0138	
	Thermoplastics		500–600	0.0039 0.0098	0.0039 0.0138	
	Duroplastics		300–400	0.0039 0.0098	0.0039 0.0138	
	Graphite					
	Zircon oxide ceramics					
S	Titanium alloys, medium strength	<32 Rc		0.0039 0.0059	0.0039 0.0098	
	Titanium alloys, high strength	27 - 44 Rc		0.0039 0.0059	0.0039 0.0098	
	Nickel based alloys, medium strength	<32 Rc	262-328	0.0039 0.0059	0.0039 0.0098	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	196-262	0.0039 0.0059	0.0039 0.0098	
	Cobalt chromium alloys					
H	Chilled cast iron	32 - 57 Rc				
	Hardened steel	45 – 52 Rc	590-655	0.0039 0.0059	0.0039 0.0098	
		53 – 59 Rc	460-525	0.0039 0.0059	0.0039 0.0098	
		60 – 65 Rc				

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f_z (in/z)					WPB $a_{p \max}$ $r + w$	a_e Roughing Step (Contour)	a_e Roughing Plane
	$\emptyset 1/2$	$\emptyset 5/8$	$\emptyset 3/4$	$\emptyset 1$			
	$a_{p \max}$ $f_z \max$	$a_{p \max}$ $f_z \max$	$a_{p \max}$ $f_z \max$	$a_{p \max}$ $f_z \max$			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177	r + w	d x 0.08 - d x 0.012	d x 0.3 - d x 0.7
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0157	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177	r + w	d x 0.08 - d x 0.12	d x 0.3 - d x 0.7
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177	r + w	d x 0.08 - d x 0.12	d x 0.3 - d x 0.7
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0138	0.0059 0.0157	0.0059 0.0177	0.0079 0.0177			
	0.0059 0.0157	0.0059 0.0177	0.0059 0.0197	0.0079 0.0256	r + w	d x 0.08 - d x 0.12	d x 0.3 - d x 0.7
	0.0059 0.0157	0.0059 0.0177	0.0059 0.0197	0.0079 0.0256			
	0.0059 0.0157	0.0059 0.0177	0.0059 0.0197	0.0079 0.0236			
	0.0059 0.0157	0.0059 0.0177	0.0059 0.0197	0.0079 0.0236			
	0.0059 0.0157	0.0059 0.0177	0.0059 0.0197	0.0079 0.0236			
	0.0059 0.0157	0.0059 0.0177	0.0059 0.0197	0.0079 0.0236			
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157	r + w	d x 0.08 - d x 0.12	d x 0.3 - d x 0.7
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157			
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157			
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157			
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157	r + w	d x 0.08 - d x 0.12	d x 0.3 - d x 0.7
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157			
	0.0059 0.0118	0.0059 0.0138	0.0059 0.0138	0.0079 0.0157			

	Material	Hardness	Cutting speed v_c (SFM)			
			WPB-CF LCPK10M	Ø 1/4	Ø 3/8	
				a_p max f_z max	a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, medium strength	<32 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Cast steel	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Case hardening steel	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Stainless steel, ferritic, martensitic	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, high strength	30 - 44 Rc		0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Nitriding steel, heat treated	<44 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Tool steel	<44 Rc	785-850	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
M	Stainless steel, austenitic	<32 Rc	720-785	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Stainless steel, martensitic steel	<32 Rc	655-720	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
K	Grey cast iron					
	Alloyed grey cast iron					
	Nodular cast iron					
	Malleable cast iron					
N	Aluminium alloys, short chipping	<32 Rc	1310-1640	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Aluminium alloys, long chipping	<32 Rc	985-1310	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Copper alloys, short chipping	<32 Rc	985-1310	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Copper alloys, long chipping	<32 Rc	820-985	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Thermoplastics		1640-1969	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Duroplastics		985-1310	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Graphite					
S	Titanium alloys, medium strength	<32 Rc				
	Titanium alloys, high strength	27 - 44 Rc		0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Nickel based alloys, medium strength	<32 Rc	262-328	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	196-262	0.0020-0.0039 0.0031-0.0047	0.0079-0.0118 0.0059-0.0079	
	Cobalt chromium alloys					
H	Chilled cast iron	32 - 57 Rc				
		45 - 52 Rc				
	Hardened steel	53 - 59 Rc				
		60 - 65 Rc				

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f_z (in/z)					a_e Finishing Step (Contour)	a_e Finishing Plane
	$\varnothing$ 1/2	$\varnothing$ 5/8	$\varnothing$ 3/4	$\varnothing$ 1		
	a_p max f_z max	a_p max f_z max	a_p max f_z max	a_p max f_z max		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
					d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0098-0.0118	0.0118-0.0157 0.0098-0.0138	0.0157-0.0197 0.0118-0.0157		

	Material	Hardness	Cutting speed v _c (SFM)	Ø 3/8	
			WPV-N LCPK10M	a _p max f _z max	
P	Plain carbon steel + free cutting steel	<32 Rc	590-655	0.0394-0.0787 0.0118	
	Heat-treatment steel, medium strength	<32 Rc	590-655	0.0394-0.0787 0.0118	
	Cast steel	<32 Rc	590-655	0.0394-0.0787 0.0118	
	Case hardening steel	<32 Rc	590-655	0.0394-0.0787 0.0118	
	Stainless steel, ferritic, martensitic	<32 Rc	525-590	0.0394-0.0787 0.0118	
	Heat-treatment steel, high strength	30 - 44 Rc	460-525	0.0394-0.0787 0.0118	
	"Nitriding steel, heat treated"	<44 Rc	460-525	0.0394-0.0787 0.0118	
	Tool steel	<44 Rc	590-655	0.0394-0.0787 0.0118	
M	Stainless steel, austenitic	<32 Rc	460-525	0.0394-0.0787 0.0118	
	Stainless steel, martensitic steel	<32 Rc	390-460	0.0394-0.0787 0.0118	
K	Grey cast iron	<32 Rc	525-590	0.0394-0.0787 0.0118	
	Alloyed grey cast iron	<32 Rc	460-525	0.0394-0.0787 0.0118	
	Nodular cast iron	<32 Rc	590-655	0.0394-0.0787 0.0118	
	Malleable cast iron	<32 Rc	525-590	0.0394-0.0787 0.0118	
N	Aluminium alloys, short chipping	<32 Rc			
	Aluminium alloys, long chipping	<32 Rc			
	Copper alloys, short chipping	<32 Rc			
	Copper alloys, long chipping	<32 Rc			
	Thermoplastics				
	Duroplastics				
	Graphite				
	Zircon oxide ceramics				
S	Titanium alloys, medium strength	<32 Rc			
	Titanium alloys, high strength	27 - 44 Rc			
	Nickel based alloys, medium strength	<32 Rc			
	Heat resistant nickel based alloys, high strength	27 - 44 Rc			
	Cobalt chromium alloys				
H	Chilled cast iron	32 - 57 Rc			
	Hardened steel	45 – 52 Rc	590-655	0.0394-0.0787 0.0118	
		53 – 59 Rc	460-525	0.0394-0.0787 0.0118	
		60 – 65 Rc			

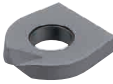
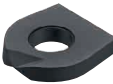
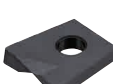
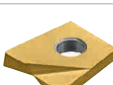
The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f_z (in/z)					WPV $a_{p \max}$ I Dimension	a_e Roughing Step (Contour)	a_e Roughing Plane
	$\emptyset$ 1/2	$\emptyset$ 5/8	$\emptyset$ 3/4	$\emptyset$ 1			
	$a_{p \max}$ $f_z \max$	$a_{p \max}$ $f_z \max$	$a_{p \max}$ $f_z \max$	$a_{p \max}$ $f_z \max$		d x 0.1 - d x 0.3	d x 0.3 - d x 0.5
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177		d x 0.1 - d x 0.3	d x 0.3 - d x 0.5
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177		d x 0.1 - d x 0.3	d x 0.3 - d x 0.5
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			
							
							
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177		d x 0.1 - d x 0.3	d x 0.3 - d x 0.5
	0.0590-0.0787 0.0138	0.0590-0.1181 0.0157	0.0590-0.1575 0.0177	0.0787-0.1575 0.0177			

	Material	Hardness	Cutting speed v_c (SFM)		
			WPV-N LCPK10M	Ø 3/8	
				a_p max f_z max	
P	Plain carbon steel + free cutting steel	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, medium strength	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Cast steel	<32 Rc	785-850	0.0079-0.0118 0.0059-0.0079	
	Case hardening steel	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Stainless steel, ferritic, martensitic	<32 Rc	655-785	0.0079-0.0118 0.0059-0.0079	
	Heat-treatment steel, high strength	30 - 44 Rc	655-720	0.0079-0.0118 0.0059-0.0079	
	Nitriding steel, heat treated	<44 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
	Tool steel	<44 Rc	785-918	0.0079-0.0118 0.0059-0.0079	
M	Stainless steel, austenitic	<32 Rc			
	Stainless steel, martensitic steel	<32 Rc			
K	Grey cast iron	<32 Rc	655-720	0.0079-0.0118 0.0059-0.0079	
	Alloyed grey cast iron	<32 Rc	655-720	0.0079-0.0118 0.0059-0.0079	
	Nodular cast iron	<32 Rc	785-850	0.0079-0.0118 0.0059-0.0079	
	Malleable cast iron	<32 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
N	Aluminium alloys, short chipping	<32 Rc			
	Aluminium alloys, long chipping	<32 Rc			
	Copper alloys, short chipping	<32 Rc			
	Copper alloys, long chipping	<32 Rc			
	Thermoplastics				
	Duroplastics				
	Graphite				
	Zircon oxide ceramics				
S	Titanium alloys, medium strength	<32 Rc			
	Titanium alloys, high strength	27 - 44 Rc			
	Nickel based alloys, medium strength	<32 Rc			
	Heat resistant nickel based alloys, high strength	27 - 44 Rc			
	Cobalt chromium alloys				
H	Chilled cast iron	32 - 57 Rc	390-460	0.0047-0.0071 0.0039-0.0047	
	Hardened steel	45 - 52 Rc	720-785	0.0079-0.0118 0.0059-0.0079	
		53 - 59 Rc	590-655	0.0079-0.0118 0.0059-0.0079	
		60 - 65 Rc	390-460	0.0047-0.0071 0.0039-0.0047	

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

Feed per tooth f _z (in/z)					a_e Finishing Step (Contour)	a_e Finishing Plane
	Ø 1/2	Ø 5/8	Ø 3/4	Ø 1		
	a _p max f _z max	a _p max f _z max	a _p max f _z max	a _p max f _z max		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.02	d x 0.3 – d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118		
	0.0057-0.0079 0.0047-0.0071	0.0071-0.0098 0.0059-0.0079	0.0071-0.0098 0.0071-0.0087	0.0079-0.0118 0.0079-0.0098	d x 0.15- d x 0.18	d x 0.1- d x 0.3
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.02	d x 0.3- d x 0.7
	0.0079-0.0118 0.0079-0.0098	0.0079-0.0118 0.0079-0.0098	0.0118-0.0157 0.0079-0.0098	0.0157-0.0197 0.0079-0.0118	d x 0.15- d x 0.18	d x 0.1- d x 0.3
	0.0057-0.0079 0.0047-0.0071	0.0071-0.0098 0.0059-0.0079	0.0071-0.0098 0.0071-0.0087	0.0079-0.0118 0.0079-0.0098	d x 0.15- d x 0.18	d x 0.1- d x 0.3

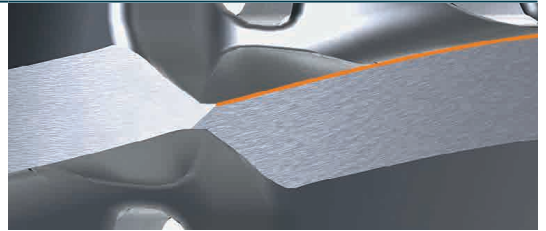
ISO-Code	Geometry	Diameter	Page	Parameters	Roughing	Semi-finishing	Finishing	Materials						Application
								P	M	K	N	S	H	
WPR ...-N		0.312 - 2.0	170	356										Steel, cast steel, high temperature alloys and hardened steel up to 60 HRC
WPR ...-CF		0.312 - 2.0	167	356										With chip breaker for long chipping ferrous metals
WPR ...-D		0.25 - 1.0	168	362										Steel, cast steel, high temperature alloys
WPR ...-DN		0.25 - 1.0	169	364										Non-ferrous materials, plastics, graphite and titanium
WPR ...-AR		0.50 - 1.0	166	352										Steel, cast steel, high temperature alloys
WPR ...-NP		0.375 - 1.0	171											Steel, cast steel, high temperature alloys and hardened steel up to 60 HRC
WPB ...-N		0.375 - 1.0	184	376										Steel, cast steel, high temperature alloys and hardened steel up to 60 HRC
WPB ...-CF		0.25 - 1.0	188	384										With chip breaker for longchipping ferrous metals
WPB ...-AF		0.25 - 1.0	186	374										Steel, cast steel, high temperature alloys and hardened steel up to 62 HRC
WPB ...-NP		0.375 - 1.0	185	396										Steel, cast steel, high temperature alloys and hardened steel up to 60 HRC
WPB ...-HF		0.50 - 0.75	187	394										Steel, cast steel, high temperature alloys
WPV ...-N		0.375 - 1.0	183	388										Steel, cast steel, high temperature alloys and hardened steel up to 60 HRC

WPR – AR

Very stable insert geometry for roughing and semi-finishing of steel, cast steel and high-temperature steels.

Feature:

- Stable cross-cut and substructure down to the center of the cutting edges

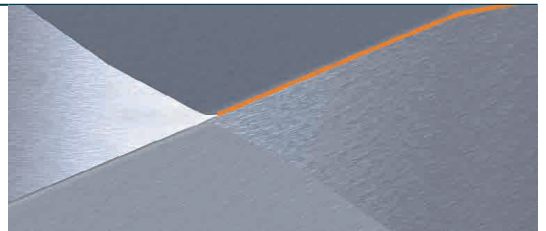


WPR – N

Universal geometry for machining steel, cast steel and high-temperature steels and hardened steel up to approx. 60 HRC.

Feature:

- Very small cross-cut for universal use

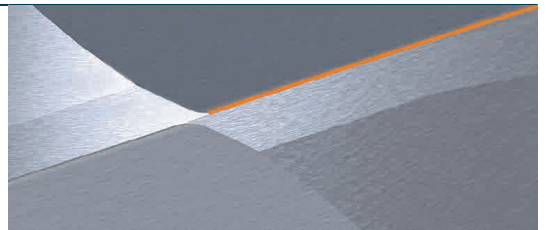


WPR – D

Finishing geometry with helical cutting edge and minimum cross-cut for machining steel, cast steel and high-temperature steels and hardened steel up to approx. 63 HRC.

Feature:

- Helical cutting edge for soft cutting

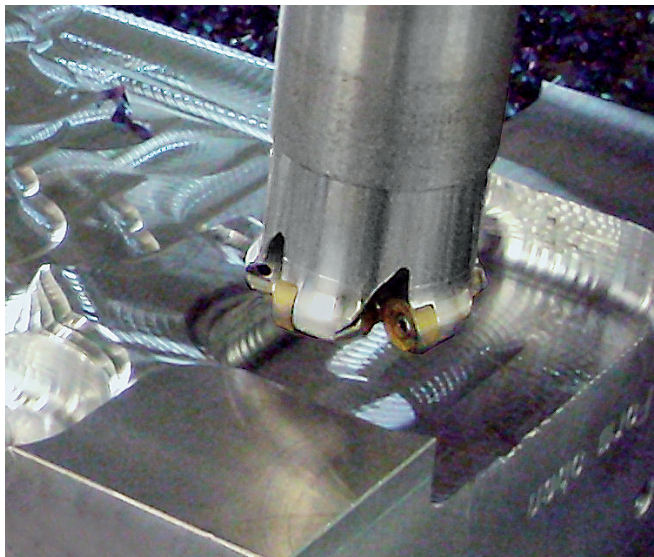
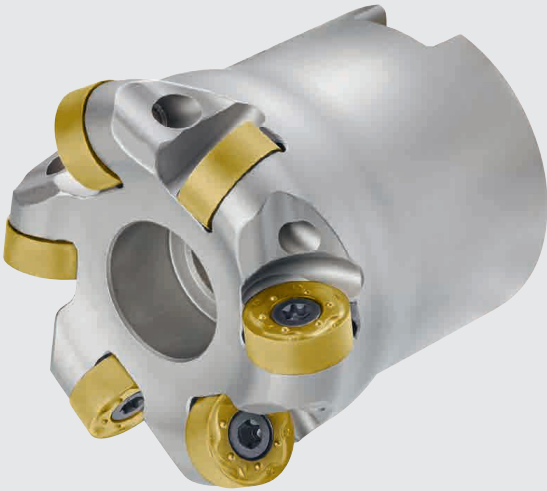


Many tool systems quickly reach their limits when roughing tool steel, stainless steel or even superalloys.

The result is a tool which offers maximum stability and process reliability and which impresses with improved economy due to the double-sided use of the cutting inserts. Up to 12 applications per insert are possible.

Features:

- Double-sided indexable insert for up to 12 applications
- Antitwist protection of the insert for more process reliability
- 4 high performance grades for machining ISO P, M, K and S
- R = heavy roughing operations, stable cutting edge
- M = average machining, positive geometry



Mold plate

Tool:

ACU-Jet Double6, R16.2000-I-Double6

Insert: RNKX 1605 MO | LCPK20M

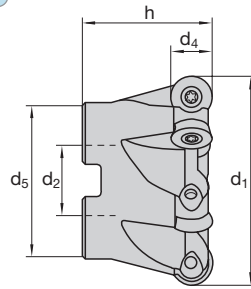
Material: Tool Steel

Cutting data:

$v_c = 574 \text{ SFM}$
 $n = 850 \text{ RPM}$
 $f_z = 0.0322 \text{ in}$
 $v_f = 137 \text{ in/min}$
 $a_e = 1.89 \text{ in}$
 $a_p = 0.078 \text{ in}$

Result:

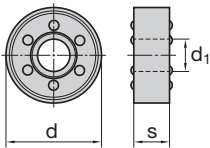
Tool life each insert approx. 180 min.



Catalog Number								FCC			
d ₁	d _i	h	d ₂	d ₅	z	d ₄ (a _{p max})	Ident No.	LMT-Code			
2.000	2.00	2.00	0.750	1.75	5	0.25	7112750	FCC R16.2000 05-I-DOUBLE 6		1044990	1048344 T20
2.500	2.50	2.00	1.000	2.25	6	0.25	2919676	FCC R16.2500 05-I- DOUBLE 6			
3.000	3.00	2.00	1.250	2.36	7	0.25	7112751	FCC R16.3000 07-I- DOUBLE 6			
4.000	4.00	2.20	1.500	3.15	8	0.25	7112752	FCC R16.4000 08-I- DOUBLE 6			

Cutting data recommendations see page 208

Indexable Inserts For Copying Mills

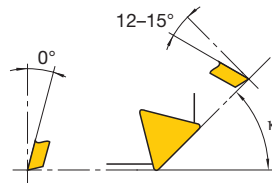
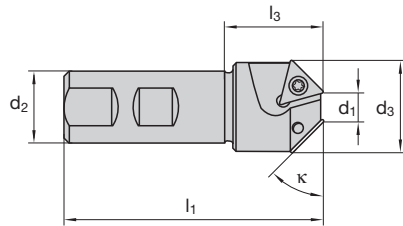
							Cutting materials Ident No.										For cutter Cat-No.						
N = Number of Cutting edges	ISO-Code	(mm)					LC280QN	LCS40M	LCM35M	LCKP20M	LCKP28M	LCPK20M	LCKP30M	LCPK15M	LWNS10M	LCH05M		LBHK85M					
		l	d	s	d ₁	r																	
  N = 2	RNKX 1605 MO	—	16	4.76	5.2	—				7089594		7083759							FCC				
Description/Designation of grades and ISO-Code starting page 116										■		■								P			
										□													M
										■		□											K
																							N
										□													
																		H					

■ = First choice □ = Second choice

	Material	Hardness	Cutting speed v_c (SFM)	
			LCKP20M LCPK20M	
P	Plain carbon steel + free cutting steel	<32 Rc		
	Heat-treatment steel, medium strength	<32 Rc	820-985	
	Cast steel	<32 Rc	820-985	
	Case hardening steel	<32 Rc	490-820	
	Stainless steel, ferritic, martensitic	<32 Rc	820-985	
	Heat-treatment steel, high strength	30 - 44 Rc	590-655	
	Nitriding steel, heat treated	30 - 44 Rc	590-720	
	Tool steel	<44 Rc	390-720	
M	Stainless steel, austenitic	<32 Rc		
	Stainless steel, martensitic steel	<32 Rc		
K	Grey cast iron	<32 Rc	460-525	
	Alloyed grey cast iron	<32 Rc	460-525	
	Nodular cast iron	<32 Rc	460-525	
	Malleable cast iron	<32 Rc	460-525	
N	Aluminium alloys, short chipping	<32 Rc		
	Aluminium alloys, long chipping	<32 Rc		
	Copper alloys, short chipping	<32 Rc		
	Copper alloys, long chipping	<32 Rc		
	Thermoplastics			
	Duroplastics			
S	Titanium alloys, medium strength	<32 Rc		
	Titanium alloys, high strength	27 - 44 Rc		
	Nickel based alloys, medium strength	<32 Rc		
	Heat resistant nickel based alloys, high strength	27 - 44 Rc		
H	Chilled cast iron	32 - 57 Rc	130-262	
	Hardened steel	45 - 52 Rc		
		53 - 59 Rc		
		60 - 65 Rc		

The cutting data indicated are starting values and must be adjusted to the prevailing conditions.

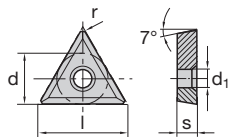
	Roughing			Finishing		
	f_z (in/z)	a_p (in)	a_e max	f_z (in/z)	a_p (in)	a_e max
	0.0197-0.0394	0.0197-0.1181	d x 0.66	0.0079-0.0315	0.0118-0.0315	d x 0.33
	0.0197-0.0394	0.0197-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0197-0.0394	0.0197-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0197-0.0394	0.0197-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0197-0.0394	0.0197-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0118-0.0394	0.0394-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0118-0.0394	0.0394-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0118-0.0394	0.0394-0.1181		0.0059-0.0197	0.0039-0.0197	
	0.0118-0.0394	0.0590-0.0787	d x 0.66	0.0059-0.0197	0.0039-0.0197	d x 0.33
				0.0059-0.0197	0.0039-0.0197	
	0.0118-0.0394	0.0394-0.1181	d x 0.66	0.0079-0.0157	0.0118-0.0315	d x 0.33
	0.0118-0.0394	0.0394-0.1181		0.0079-0.0157	0.0118-0.0315	
	0.0118-0.0394	0.0197-0.0787		0.0079-0.0157	0.0118-0.0315	
	0.0118-0.0394	0.0394-0.1181		0.0079-0.0157	0.0118-0.0315	
	0.0079-0.0394	0.0197-0.1575		0.0039-0.0236	0.0039-0.0197	d x 0.33
	0.0079-0.0394	0.0197-0.1575		0.0039-0.0236	0.0039-0.0197	
	0.0079-0.0394	0.0197-0.1575		0.0039-0.0236	0.0039-0.0197	
	0.0079-0.0394	0.0197-0.1575		0.0039-0.0236	0.0039-0.0197	
	0.0079-0.0394	0.0197-0.1575		0.0039-0.0236	0.0039-0.0197	
	0.0079-0.0394	0.0197-0.1575		0.0039-0.0236	0.0039-0.0197	
	0.0079-0.0157	0.0197-0.1181		0.0020-0.0079	0.0039-0.0315	d x 0.33
	0.0079-0.0157	0.0197-0.1181		0.0020-0.0079	0.0039-0.0315	
	0.0079-0.0157	0.0197-0.1181		0.0020-0.0079	0.0039-0.0315	
	0.0079-0.0157	0.0197-0.1181		0.0020-0.0079	0.0039-0.0315	
				0.0039-0.0079	0.0079-0.0197	d x 0.33
				0.0031-0.0079	0.0079-0.0197	
				0.0031-0.0079	0.0079-0.0197	
				0.0031-0.0079	0.0079-0.0197	



Catalog Number							EFZ 1148				
κ	d ₁	d ₃	l ₁	l ₃	d ₂	z	Ident No.	LMT-Code			
45°	0.05	0.63	2.16	0.79	0.50	1	1950224	EFZ45 T11-047WB	TCMT 110202	1044972	1048326 T8
	0.24	0.83	3.15	1.26	0.63	2	1950226	EFZ45 T11-244WC			
	0.41	1.26	3.74	1.26	1.00	2	1950228	EFZ45 T16-409WE	TCMT 16T304	1045114	1048335 T15
60°	0.21	0.63	2.76	0.79	0.50	1	1950230	EFZ60 T11-213WB	TCMT 110202	1044972	1048326 T8
	0.57	0.98	3.15	1.26	0.63	2	1950232	EFZ60 T11-567WC			
	0.63	1.26	3.74	1.42	1.00	2	1950233	EFZ60 T16-630WE	TCMT 16T304	1045114	1048335 T15

Cutting data recommendations starting page 211

Indexable Inserts For Bevel Milling Cutters 45° And 60°

N = Number of Cutting edges	ISO-Code						Cutting materials Ident No.												For cutter										
		(mm)					LCP40M	LCPM40M	LCPK30M	LCP25M	LCPK10M	LCM45M	LCM44M	LCKP30M	LCKP10M	LCK20M	LCK10M	LCN10M	LWN10M	LCHP15M	LCH50M	Cat-No.							
		l	d	s	d1	r																							
  N = 3	TCMT 110202 1166-00	11	6.35	2.4	2.8	0.2					7075668					1055661				1052107			EFZ45T11 EFZ60T11 EFZ45T16 EFZ60T16						
	TCMT 16T304 1166-10	16.5	9.52	3.97	4.3	0.4					7075679					1055662				1052109									
Description/Designation of grades and ISO-Code starting page 116											■					□								P					
											□																	M	
																					■								K
																									■				N
																							H						

■ = First choice □ = Second choice

Bevel Milling Cutters 45° And 60° Cutting Data Recommendations

	Material	Hardness	Cutting Speed v_c (SFM)	Feed per Tooth f_z (in/z)
P	Plain carbon steel + free cutting steel	<32 Rc	525-655	0.006-0.008
	Heat-treatment steel, medium strength	<32 Rc	460	
	Cast steel	<32 Rc	426	
	Case hardening steel	<32 Rc	426	
	Stainless steel, ferritic, martensitic	<32 Rc	460	
	Heat-treatment steel, high strength	30 - 44 Rc	390	
	Nitriding steel, heat treated	<44 Rc	390	
	Tool steel	<44 Rc	390	
M	Stainless steel, austenitic	<32 Rc	785	0.004
	Stainless steel, martensitic steel	<32 Rc	 196	
K	Grey cast iron	<32 Rc	525	0.008-0.010
	Alloyed grey cast iron	<32 Rc	360	
	Nodular cast iron	<32 Rc	295	
	Malleable cast iron	<32 Rc	328	
N	Aluminium alloys, short chipping	<32 Rc	985	0.012
	Aluminium alloys, long chipping	<32 Rc	3280	
	Copper alloys, short chipping	<32 Rc	820	
	Copper alloys, long chipping	<32 Rc	820	
	Thermoplastics		820	
	Duroplastics		655	
	Graphite			
S	Titanium alloys, medium strength	<32 Rc	230	0.003
	Titanium alloys, high strength	27 - 44 Rc	130	
	Nickel based alloys, medium strength	<32 Rc	130	
	Heat resistant nickel based alloys, high strength	27 - 44 Rc	98	
H	Chilled cast iron	32 - 57 Rc	130	0.004



Wet machining, sufficient emulsion volume required

When using uncoated grades reduce cutting speed by 30%. The cutting data indicated are starting values and must be adjusted to the prevailing conditions.



Threading

Threading

214 XChange

XChange Machine Taps
XChange Extra Long Shanks
XChange DIN ANSI Shanks
Spare Parts

228 HPF Max

HPF Max Forming Taps
HPF Max Extra Long Shanks
HPF Max DIN ANSI Shanks
Spare Parts

For the first time it has been possible to combine the advantages of carbide and steel in a modular tap with XChange from LMT Fette with its patented interface.

Approximately 90% of the taps used nowadays are made from high-speed steel. This is because high-speed steel has the toughness needed for absorbing the torsional stress as well as the necessary load at the cutting edge when retracting the tap. HSS does have some disadvantages compared to solid-carbide taps: tool life, cycle times are significantly lower and most importantly feasible cutting speeds.

With XChange two physically prohibitive properties are combined:

The solid-carbide threaded head, a combination of ultra-fine grain carbide and high performance coating, provides:

- maximum tool life
- and high cutting speeds

The flexible steel shank guarantees:

- the stability of the tool
- and offers extra efficiency

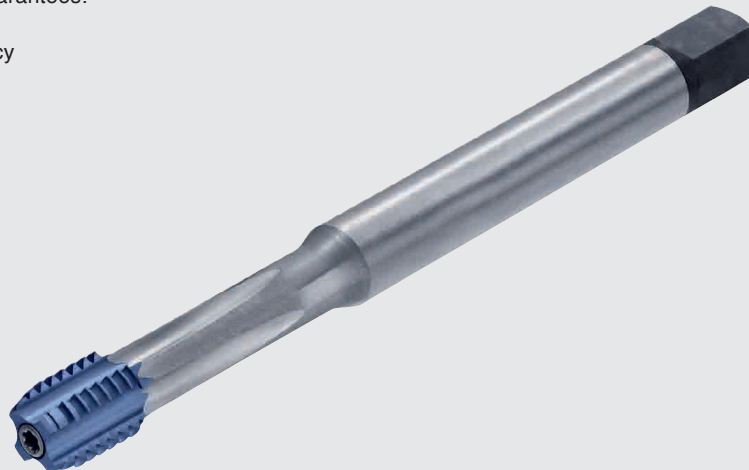
Advantages:

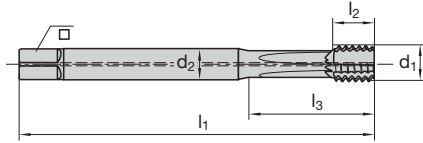
High cutting speeds are possible with maximum productivity – a major plus for the cost-effectiveness of thread production.

Modular Design Offers Advantages:

- Twice as much cutting speed is possible with the XChange compared to HSS tools.
- Thereby, the cycle time and the related machine cost will be reduced drastically, resulting in efficient production.
- Thus threads with long overhang are only cost-effective with XChange.
- A new head can be mounted several times to the steel shank!

XChange is suitable for all short chipping materials, particularly cast iron, brass and AlSi alloys.

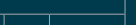
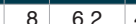
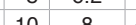




Catalog Number

6050

P1 Plain carbon steel, free cutting steel**P2** Heat-treated steel, medium strength**P3** Tool Steel**M1** Stainless steel, austenitic**M2** Stainless steel, martensitic**K1** Grey cast iron**K2** Nodular cast iron**N1** Alu- & Copper alloys long chipping < 5 % Si**N2** Alu- & Copper alloys long chipping 5–10 % Si**N3** Alu- & Copper alloys short chipping > 10 % Si**N4** Graphite**S1** Titanium alloys medium strength**S2** Titanium alloys high strength**H1** Chilled steel and Hardened steel■ $v_c = 131\text{--}197$ SFM■ $v_c = 98\text{--}131$ SFM■ $v_c = 98\text{--}164$ SFM■ $v_c = 66\text{--}82$ SFM

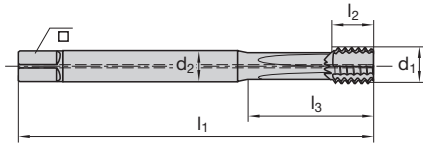
Nominal size	(in)	P	(mm)						z	(in)	Shank Description		Shank	Indexable nib set	
	d ₁		l ₁	l ₂	l ₃	d ₂	□ h12			Size No.				Ident No.	 C
UNF 5/16	0.3125	24	90	9	35	8	6.2	4	0.2717	XCHANGE Size 01 (ICR)	7053688		7152025	7152026	
UNF 3/8	0.375	24	100	10	40	10	8	4	0.3346	XCHANGE Size 02 (ICR)	7053689		7152029	7152030	
UNF 1/2	0.500	20	110	14	50	12	9	4	0.4528	XCHANGE Size 04 (ICR)	7053691		7134086	7134094	
UNF 9/16	0.562	18	110	14	50	12	9	4	0.5079	XCHANGE Size 05 (ICR)	7053692		7134088	7134096	
UNF 5/8	0.625	18	110	14	50	12	9	4	0.5709	XCHANGE Size 05 (ICR)	7053692		7134090	7134098	
UNF 3/4	0.750	16	125	16	60	16	12	4	0.6890	XCHANGE Size 07 (ICR)	7083811		7134092	7134100	

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

■ = First choice □ = Second choice

DIN/ANSI Shanks Options See Page 226



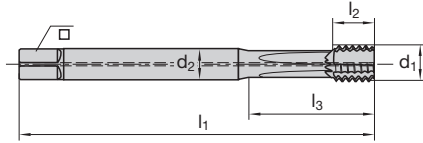
Catalog Number												6050	
P1	Plain carbon steel, free cutting steel												
P2	Heat-treated steel, medium strength												
P3	Tool Steel												
M1	Stainless steel, austenitic												
M2	Stainless steel, martensitic												
K1	Grey cast iron											■ v _c = 131–197 SFM	
K2	Nodular cast iron											■ v _c = 98–131 SFM	
N1	Alu- & Copper alloys long chipping < 5 % Si												
N2	Alu- & Copper alloys long chipping 5–10 % Si												
N3	Alu- & Copper alloys short chipping > 10 % Si											■ v _c = 98–164 SFM	
N4	Graphite											■ v _c = 66–82 SFM	
S1	Titanium alloys medium strength												
S2	Titanium alloys high strength												
H1	Chilled steel and Hardened steel												
Nominal size	(in)	P	(mm)						(in)	Shank Description	Shank	Indexable nib set	
	d ₁		l ₁	l ₂	l ₃	d ₂	□ h12	z		Size No.	Ident No.		
UNF 5/16	0.3125	24	90	9	35	8	6.2	4	0.2717	XCHANGE Size 01 (ICC)	7027434	7147195	7147199
UNF 3/8	0.375	24	100	10	40	10	8	4	0.3346	XCHANGE Size 02 (ICC)	7027435	7147197	7147201
UNF 1/2	0.500	20	110	14	50	12	9	4	0.4528	XCHANGE Size 04 (ICC)	7027437	7134197	7134078
UNF 9/16	0.562	18	110	14	50	12	9	4	0.5079	XCHANGE Size 05 (ICC)	7027438	7134072	7134080
UNF 5/8	0.625	18	110	14	50	12	9	4	0.5709	XCHANGE Size 05 (ICC)	7027438	7134074	7134082
UNF 3/4	0.750	16	125	16	60	16	12	4	0.6890	XCHANGE Size 07 (ICC)	7083812	7134076	7134084

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

■ = First choice □ = Second choice

DIN/ANSI Shanks Options See Page 226



Catalog Number

6040

P1 Plain carbon steel, free cutting steel**P2** Heat-treated steel, medium strength**P3** Tool Steel**M1** Stainless steel, austenitic**M2** Stainless steel, martensitic**K1** Grey cast iron**K2** Nodular cast iron**N1** Alu- & Copper alloys long chipping < 5 % Si**N2** Alu- & Copper alloys long chipping 5–10 % Si**N3** Alu- & Copper alloys short chipping > 10 % Si**N4** Graphite**S1** Titanium alloys medium strength**S2** Titanium alloys high strength**H1** Chilled steel and Hardened steel■ $v_c = 131\text{--}197$ SFM■ $v_c = 98\text{--}131$ SFM■ $v_c = 98\text{--}164$ SFM■ $v_c = 66\text{--}82$ SFM

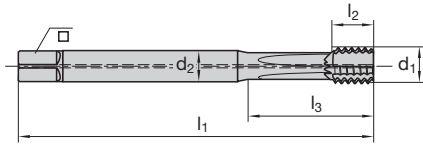
Nominal size	(in)	P	(mm)						(in)	Shank Description	Shank Ident No.	Indexable nib set	
	d_1		l_1	l_2	l_3	d_2	h12	z	Size No.			Ident No.	Ident No.
UNC 5/16	0.3125	18	90	9	35	8	6.2	4	0.2598	XCHANGE Size 01 (ICR)	7053688	7152023	7152024
UNC 3/8	0.375	16	100	10	40	10	8	4	0.3150	XCHANGE Size 02 (ICR)	7053689	7152027	7152028
UNC 1/2	0.500	13	110	14	50	12	9	4	0.4250	XCHANGE Size 04 (ICR)	7053691	7134085	7134093
UNC 9/16	0.562	12	110	14	50	12	9	4	0.4803	XCHANGE Size 05 (ICR)	7053692	7134087	7134095
UNC 5/8	0.625	11	110	14	50	12	9	4	0.5315	XCHANGE Size 05 (ICR)	7053692	7134089	7134097
UNC 3/4	0.750	10	125	16	60	16	12	4	0.6500	XCHANGE Size 07 (ICR)	7083811	7134091	7134099

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

■ = First choice □ = Second choice

DIN/ANSI Shanks Options See Page 226



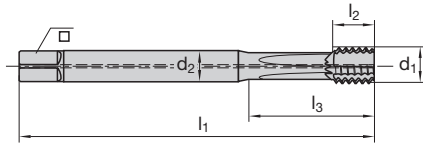
Catalog Number											6040		
P1	Plain carbon steel, free cutting steel												
P2	Heat-treated stee, medium strength												
P3	Tool Steel												
M1	Stainless steel, austenitic												
M2	Stainless steel, martensitic												
K1	Grey cast iron										■ v _c = 131–197 SFM	■ v _c = 98–131 SFM	
K2	Nodular cast iron												
N1	Alu- & Copper alloys long chipping < 5 % Si										■ v _c = 98–164 SFM	■ v _c = 66–82 SFM	
N2	Alu- & Copper alloys long chipping 5–10 % Si												
N3	Alu- & Copper alloys short chipping > 10 % Si												
N4	Graphite												
S1	Titanium alloys medium strength												
S2	Titanium alloys high strength												
H1	Chilled steel and Hardened steel												
Nominal size	(in)	P	(mm)						(in)	Shank Description	Shank 	Indexable nib set	
	d ₁		I ₁	I ₂	I ₃	d ₂	□ h12	z					Size No.
UNC 5/16	0.3125	18	90	9	35	8	6.2	4	0.2598	XCHANGE Size 01 (ICC)	7027434	7147194	7147198
UNC 3/8	0.375	16	100	10	40	10	8	4	0.3150	XCHANGE Size 02 (ICC)	7027435	7147196	7147200
UNC 1/2	0.500	13	110	14	50	12	9	4	0.4250	XCHANGE Size 04 (ICC)	7027437	7134069	7134077
UNC 9/16	0.562	12	110	14	50	12	9	4	0.4803	XCHANGE Size 05 (ICC)	7027438	7134071	7134079
UNC 5/8	0.625	11	110	14	50	12	9	4	0.5315	XCHANGE Size 05 (ICC)	7027438	7134073	7134081
UNC 3/4	0.750	10	125	16	60	16	12	4	0.6500	XCHANGE Size 07 (ICC)	7083812	7134075	7134083

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

■ = First choice □ = Second choice

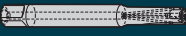
DIN/ANSI Shanks Options See Page 226



Catalog Number

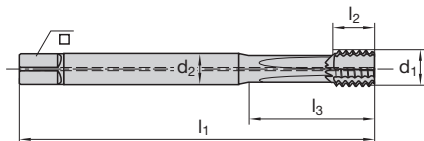
6030

P1 Plain carbon steel, free cutting steel**P2** Heat-treated steel, medium strength**P3** Tool Steel**M1** Stainless steel, austenitic**M2** Stainless steel, martensitic**K1** Grey cast iron**K2** Nodular cast iron**N1** Alu- & Copper alloys long chipping < 5 % Si**N2** Alu- & Copper alloys long chipping 5–10 % Si**N3** Alu- & Copper alloys short chipping > 10 % Si**N4** Graphite**S1** Titanium alloys medium strength**S2** Titanium alloys high strength**H1** Chilled steel and Hardened steel■ $v_c = 131\text{--}197$ SFM■ $v_c = 98\text{--}131$ SFM■ $v_c = 98\text{--}164$ SFM■ $v_c = 66\text{--}82$ SFM

d ₁	(mm)						z	(mm)	Shank Description	Shank 	Indexable nib set	
	P	l ₁	l ₂	l ₃	d ₂	□ h12					 Ident No.	 Ident No.
MF 8	1.00	90	9	35	8	6.2	4	7	XCHANGE Size 01 (ICR)	7053688	7055057	7055065
MF 10	1.00	100	10	40	10	8	4	9	XCHANGE Size 02 (ICR)	7053689	7055058	7055066
MF 10	1.25	100	10	40	10	8	4	8.8	XCHANGE Size 02 (ICR)	7053689	7055059	7055067
MF 12	1.00	110	12	40	12	9	4	11	XCHANGE Size 03 (ICR)	7053690	7055060	7055068
MF 12	1.25	110	12	40	12	9	4	10.8	XCHANGE Size 03 (ICR)	7053690	7107472	7107473
MF 12	1.50	110	12	40	12	9	4	10.5	XCHANGE Size 03 (ICR)	7053690	7055061	7055069
MF 12	1.50	110	12	—	9	7	4	10.5	XCHANGE Size 03.1 (ICR)	7164189	7055061	7055069
MF 14	1.50	110	14	—	12	9	4	12.5	XCHANGE Size 04 (ICR)	7053691	7055062	7055070
MF 14	1.50	110	14	—	11	9	4	12.5	XCHANGE Size 04.1 (ICR)	7164190	7055062	7055070
MF 16	1.50	110	14	—	12	9	4	14.5	XCHANGE Size 05 (ICR)	7053692	7055063	7055071
MF 18	1.50	125	16	—	14	11	4	16.5	XCHANGE Size 06 (ICR)	7053693	7055064	7055072
MF 20	1.50	125	16	—	16	12	4	18.5	XCHANGE Size 07 (ICR)	7083811	7085243	7085244

Spare parts see page 227

■ = First choice □ = Second choice

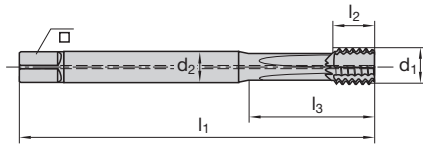


Catalog Number										6030		
P1	Plain carbon steel, free cutting steel											
P2	Heat-treated steel, medium strength											
P3	Tool Steel											
M1	Stainless steel, austenitic											
M2	Stainless steel, martensitic											
K1	Grey cast iron									■ v _c = 131–197 SFM		
K2	Nodular cast iron									■ v _c = 98–131 SFM		
N1	Alu- & Copper alloys long chipping < 5 % Si											
N2	Alu- & Copper alloys long chipping 5–10 % Si											
N3	Alu- & Copper alloys short chipping > 10 % Si									■ v _c = 98–164 SFM		
N4	Graphite									■ v _c = 66–82 SFM		
S1	Titanium alloys medium strength											
S2	Titanium alloys high strength											
H1	Chilled steel and Hardened steel											
d ₁	(mm)						z	(mm)	Shank Description	Shank	Indexable nib set	
	P	l ₁	l ₂	l ₃	d ₂	□ h12					Size No.	Ident No.
MF 8	1.00	90	9	35	8	6.2	4	7	XCHANGE Size 01 (ICC)	7027434	7055085	7055093
MF 10	1.00	100	10	40	10	8	4	9	XCHANGE Size 02 (ICC)	7027435	7055086	7055094
MF 10	1.25	100	10	40	10	8	4	8.8	XCHANGE Size 02 (ICC)	7027435	7055087	7055095
MF 12	1.00	110	12	40	12	9	4	11	XCHANGE Size 03 (ICC)	7027436	7055088	7055096
MF 12	1.25	110	12	40	12	9	4	10.8	XCHANGE Size 03 (ICC)	7027436	7107470	7107471
MF 12	1.50	110	12	40	12	9	4	10.5	XCHANGE Size 03 (ICC)	7027436	7055089	7055097
MF 12	1.50	110	12	—	9	7	4	10.5	XCHANGE Size 03.1 (ICC)	7164186	7055089	7055097
MF 14	1.50	110	14	—	12	9	4	12.5	XCHANGE Size 04 (ICC)	7027437	7055090	7055098
MF 14	1.50	110	14	—	11	9	4	12.5	XCHANGE Size 04.1 (ICC)	7164107	7055090	7055098
MF 16	1.50	110	14	—	12	9	4	14.5	XCHANGE Size 05 (ICC)	7027438	7055091	7055099
MF 18	1.50	125	16	—	14	11	4	16.5	XCHANGE Size 06 (ICC)	7027439	7055092	7055100
MF 20	1.50	125	16	—	16	12	4	18.5	XCHANGE Size 07 (ICC)	7083812	7085245	7085246

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

■ = First choice □ = Second choice



Catalog Number

6030

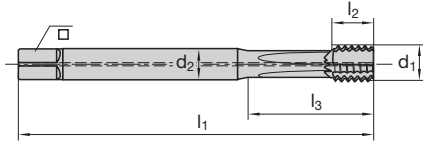
P1	Plain carbon steel, free cutting steel	
P2	Heat-treated steel, medium strength	
P3	Tool Steel	
M1	Stainless steel, austenitic	
M2	Stainless steel, martensitic	
K1	Grey cast iron	■ $v_c = 131-197$ SFM
K2	Nodular cast iron	■ $v_c = 98-131$ SFM
N1	Alu- & Copper alloys long chipping < 5 % Si	
N2	Alu- & Copper alloys long chipping 5-10 % Si	
N3	Alu- & Copper alloys short chipping > 10 % Si	■ $v_c = 98-164$ SFM
N4	Graphite	■ $v_c = 66-82$ SFM
S1	Titanium alloys medium strength	
S2	Titanium alloys high strength	
H1	Chilled steel and Hardened steel	

d_1	(mm)						z	(mm)	Shank Description Size No.	Shank Ident No.	Indexable nib set	
	P	l_1	l_2	l_3	d_2	$\square$ h12					C (2-3)	E (1.5-2)
MF 8	1.00	90	9	35	8	6.2	4	7	XCHANGE Size 01 (ICC)	7027434	7055057	7055065
MF 10	1.00	100	10	40	10	8	4	9	XCHANGE Size 02 (ICC)	7027435	7055058	7055066
MF 10	1.25	100	10	40	10	8	4	8.8	XCHANGE Size 02 (ICC)	7027435	7055059	7055067
MF 12	1.00	110	12	40	12	9	4	11	XCHANGE Size 03 (ICC)	7027436	7055060	7055068
MF 12	1.50	110	12	40	12	9	4	10.5	XCHANGE Size 03 (ICC)	7027436	7055061	7055069
MF 14	1.50	110	14	50	12	9	4	12.5	XCHANGE Size 04 (ICC)	7027437	7055062	7055070
MF 16	1.50	110	14	50	12	9	4	14.5	XCHANGE Size 05 (ICC)	7027438	7055063	7055071
MF 18	1.50	125	16	50	14	11	4	16.5	XCHANGE Size 06 (ICC)	7027439	7055064	7055072
MF 20	1.50	125	16	50	16	12	4	18.5	XCHANGE Size 07 (ICC)	7083812	7085243	7085244

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

■ = First choice □ = Second choice



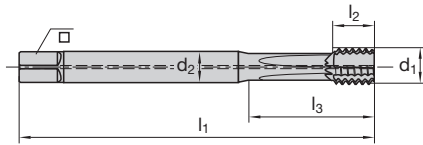
Catalog Number

6020

P1	Plain carbon steel, free cutting steel											
P2	Heat-treated steel, medium strength											
P3	Tool Steel											
M1	Stainless steel, austenitic											
M2	Stainless steel, martensitic											
K1	Grey cast iron							■ v _c = 131–197 SFM ■ v _c = 98–131 SFM				
K2	Nodular cast iron											
N1	Alu- & Copper alloys long chipping < 5 % Si											
N2	Alu- & Copper alloys long chipping 5–10 % Si											
N3	Alu- & Copper alloys short chipping > 10 % Si							■ v _c = 98–164 SFM ■ v _c = 66–82 SFM				
N4	Graphite											
S1	Titanium alloys medium strength											
S2	Titanium alloys high strength											
H1	Chilled steel and Hardened steel											
d₁	(mm)						z	(mm)	Shank Description	Shank	Indexable nib set	
	P	l₁	l₂	l₃	d₂	□ h12						Size No.
M 8	1.25	90	9	35	8	6.2	4	6.8	XCHANGE Size 01 (ICR)	7053688	7027459	7055051
M 10	1.50	100	10	40	10	8	4	8.5	XCHANGE Size 02 (ICR)	7053689	7027470	7055052
M 12	1.75	110	12	40	12	9	4	10.2	XCHANGE Size 03 (ICR)	7053690	7027471	7055053
M 12	1.75	110	12	—	9	7	4	10.2	XCHANGE Size 03.1 (ICR)	7164189	7027471	7055053
M 14	2.00	110	14	50	12	9	4	12.0	XCHANGE Size 04 (ICR)	7053691	7027472	7055054
M 14	2.00	110	14	—	11	9	4	12.0	XCHANGE Size 04.1 (ICR)	7164190	7027472	7055054
M 16	2.00	110	14	50	12	9	4	14.0	XCHANGE Size 05 (ICR)	7053692	7027473	7055055
M 18	2.50	125	16	50	14	11	4	15.5	XCHANGE Size 06 (ICR)	7053693	7027474	7055056
M 20	2.50	125	16	50	16	12	4	17.5	XCHANGE Size 07 (ICR)	7083811	7085174	7085175

Spart Parts See Page 227

■ = First choice □ = Second choice



Catalog Number

6020

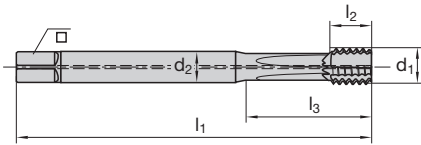
P1	Plain carbon steel, free cutting steel	
P2	Heat-treated steel, medium strength	
P3	Tool Steel	
M1	Stainless steel, austenitic	
M2	Stainless steel, martensitic	
K1	Grey cast iron	■ $v_c = 131-197$ SFM
K2	Nodular cast iron	■ $v_c = 98-131$ SFM
N1	Alu- & Copper alloys long chipping < 5 % Si	
N2	Alu- & Copper alloys long chipping 5-10 % Si	
N3	Alu- & Copper alloys short chipping > 10 % Si	■ $v_c = 98-164$ SFM
N4	Graphite	■ $v_c = 66-82$ SFM
S1	Titanium alloys medium strength	
S2	Titanium alloys high strength	
H1	Chilled steel and Hardened steel	

d ₁	(mm)						z	(mm)	Shank Description	Shank 	Indexable nib set	
	P	l ₁	l ₂	l ₃	d ₂	h ₁₂						Ident No.
M 8	1.25	90	9	35	8	6.2	4	6.8	XCHANGE Size 01 (ICC)	7027434	7055073	7055079
M 10	1.50	100	10	40	10	8	4	8.5	XCHANGE Size 02 (ICC)	7027435	7055074	7055080
M 12	1.75	110	12	40	12	9	4	10.2	XCHANGE Size 03 (ICC)	7027436	7055075	7055081
M 12	1.75	110	12	—	9	7	4	10.2	XCHANGE Size 03.1 (ICC)	7164186	7055075	7055081
M 14	2.00	110	14	50	12	9	4	12.0	XCHANGE Size 04 (ICC)	7027437	7055076	7055082
M 14	2.00	110	14	—	11	9	4	12.0	XCHANGE Size 04.1 (ICC)	7164107	7055076	7055082
M 16	2.00	110	14	50	12	9	4	14.0	XCHANGE Size 05 (ICC)	7027438	7055077	7055083
M 18	2.50	125	16	50	14	11	4	15.5	XCHANGE Size 06 (ICC)	7027439	7055078	7055084
M 20	2.50	125	16	50	16	12	4	17.5	XCHANGE Size 07 (ICC)	7083812	7085176	7085177

XChange Shanks Extra Long Options See Page 225

Spare Parts See Page 227

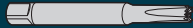
■ = First choice □ = Second choice



Catalog Number

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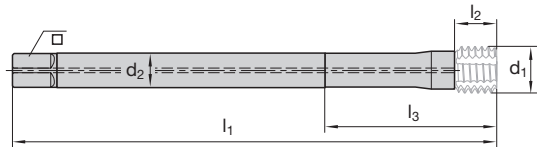
P1	Plain carbon steel, free cutting steel	
P2	Heat-treated steel, medium strength	
P3	Tool Steel	
M1	Stainless steel, austenitic	
M2	Stainless steel, martensitic	
K1	Grey cast iron	■ $v_c = 131-197$ SFM
K2	Nodular cast iron	■ $v_c = 98-131$ SFM
N1	Alu- & Copper alloys long chipping < 5 % Si	
N2	Alu- & Copper alloys long chipping 5-10 % Si	
N3	Alu- & Copper alloys short chipping > 10 % Si	■ $v_c = 98-164$ SFM
N4	Graphite	■ $v_c = 66-82$ SFM
S1	Titanium alloys medium strength	
S2	Titanium alloys high strength	
H1	Chilled steel and Hardened steel	

d ₁	(mm)						z	(mm)	Shank Description	Shank 	Indexable nib set	
	P	l ₁	l ₂	l ₃	d ₂	□ h12					 C 2-3	 E 1.5-2
M 8	1.25	90	9	35	8	6.2	4	6.8	XCHANGE Size 01 (ICC)	7027434	7027459	7055051
M 10	1.50	100	10	40	10	8	4	8.5	XCHANGE Size 02 (ICC)	7027435	7027470	7055052
M 12	1.75	110	12	40	12	9	4	10.2	XCHANGE Size 03 (ICC)	7027436	7027471	7055053
M 14	2.00	110	14	50	12	9	4	12.0	XCHANGE Size 04 (ICC)	7027437	7027472	7055054
M 16	2.00	110	14	50	12	9	4	14.0	XCHANGE Size 05 (ICC)	7027438	7027473	7055055
M 18	2.50	125	16	50	14	11	4	15.5	XCHANGE Size 06 (ICC)	7027439	7027474	7055056
M 20	2.50	125	16	50	16	12	4	17.5	XCHANGE Size 07 (ICC)	7083812	7085174	7085175
M 18	2.50	125	16	50	14	11	4	15.5	XCHANGE Size 06 (ICC)	7027439	7055078	7055084
M 20	2.50	125	16	50	16	12	4	17.5	XCHANGE Size 07 (ICC)	7083812	7085176	7085177

XChange Shanks Extra Long Options See Page 225

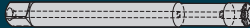
Spare Parts See Page 227

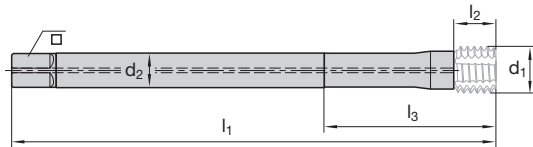
■ = First choice □ = Second choice



Catalog Number

6090

Threadsize Type	Shank Extra Long 					Shank Description 	Ident No.
	l_1	l_2	l_3	d_2	$\square h_{12}$		
M8, MF8, UNC $\frac{5}{16}$, UNF $\frac{5}{16}$	140	9	45	8	6.2	XCHANGE Size 01 ICC long	7144665
M10, MF10, UNC $\frac{3}{8}$, UNF $\frac{3}{8}$	160	10	50	10	8	XCHANGE Size 02 ICC long	7144666
M12, MF12	180	12	-	9	7	XCHANGE Size 03 ICC long	7144667
M14, MF14, UNC $\frac{1}{2}$, UNF $\frac{1}{2}$	180	14	-	11	9	XCHANGE Size 04 ICC long	7144668
M16, MF16, UNC $\frac{9}{16}$, UNC $\frac{5}{8}$, UNF $\frac{9}{16}$, UNF $\frac{5}{8}$	180	14	-	12	9	XCHANGE Size 05 ICC long	7144669
M18, MF18	200	16	-	14	11	XCHANGE Size 06 ICC long	7144670
M20, MF20, UNC $\frac{3}{4}$, UNF $\frac{3}{4}$	200	16	-	16	12	XCHANGE Size 07 ICC long	7144671



Catalog Number

6090

XChange Shank DIN ANSI (ICR)



d ₁	l ₁	l ₂	l ₃	d ₂	Square	Shank Description Ident No.	Shank Ident No.
5/16	3.543 (90mm)	0.244 (6.2mm)	1.378 (35mm)	0.318 (8.08mm)	0.238 (6.05mm)	XCHANGE INCH Size 08 ICR	7152021
3/8	3.937 (100mm)	0.291 (7.4mm)	1.575 (40mm)	0.381 (9.68mm)	0.286 (7.26mm)	XCHANGE INCH Size 09 ICR	7152022
1/2	4.331 (110mm)	0.402 (10.2mm)	1.969 (50mm)	0.429 (10.9mm)	0.322 (8.18mm)	XCHANGE INCH Size 10 ICR	7134113
9/16	4.331 (110mm)	0.453 (11.5mm)	1.969 (50mm)	0.480 (12.19mm)	0.360 (9.14mm)	XCHANGE INCH Size 11 ICR	7134114
5/8	4.331 (110mm)	0.469 (11.9mm)	1.969 (50mm)	0.480 (12.19mm)	0.360 (9.14mm)	XCHANGE INCH Size 12 ICR	7134115
3/4	4.921 (125mm)	0.618 (15.7mm)	2.362 (60mm)	0.590 (14.99mm)	0.442 (11.23mm)	XCHANGE INCH Size 13 ICR	7134116

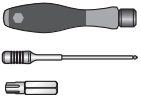
XChange Shank DIN ANSI (ICC)

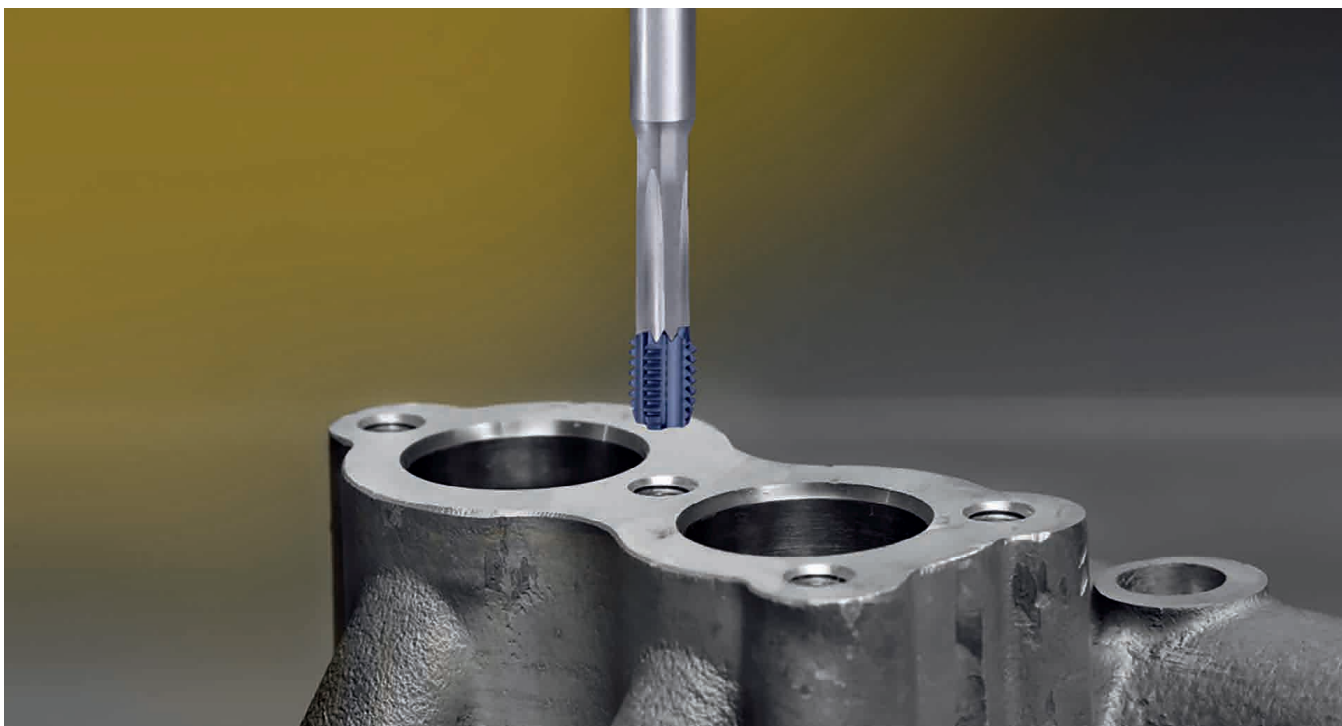


d ₁	l ₁	l ₂	l ₃	d ₂	Square	Shank Description Ident No.	Shank Ident No.
5/16	3.543 (90mm)	0.244 (6.2mm)	1.378 (35mm)	0.318 (8.08mm)	0.238 (6.05mm)	XCHANGE INCH Size 08 ICC	7147202
3/8	3.937 (100mm)	0.291 (7.4mm)	1.575 (40mm)	0.381 (9.68mm)	0.286 (7.26mm)	XCHANGE INCH Size 09 ICC	7147203
1/2	4.331 (110mm)	0.402 (10.2mm)	1.969 (50mm)	0.429 (10.9mm)	0.322 (8.18mm)	XCHANGE INCH Size 10 ICC	7134109
9/16	4.331 (110mm)	0.453 (11.5mm)	1.969 (50mm)	0.480 (12.19mm)	0.360 (9.14mm)	XCHANGE INCH Size 11 ICC	7134110
5/8	4.331 (110mm)	0.469 (11.9mm)	1.969 (50mm)	0.480 (12.19mm)	0.360 (9.14mm)	XCHANGE INCH Size 12 ICC	7134111
3/4	4.921 (125mm)	0.618 (15.7mm)	2.362 (60mm)	0.590 (14.99mm)	0.442 (11.23mm)	XCHANGE INCH Size 13 ICC	7134112

TorqueFix Screwdrivers and Inserts

TorqueFix screwdrivers with calibrated torque. Handy, ergonomic handhold. Smooth "slipping" mechanism signals when the set torque has been achieved. At a size of 20IP the screwdriver comes with T-handle for better power transmission. Complete delivery set including interchangeable blade.

Threads type Shank size	Screw without ICC		Screw with ICC	Torx Plus size	Torque	Set	Universal holder	Bit
								
M 8 I MF 8 I UNC $\frac{5}{16}$ I UNF $\frac{5}{16}$ XCHANGE Size 01	M 2.2	7015414	7036286	7IP	1.1 Nm	7166662	7074853	7166664
M 10 I MF 10 I UNC $\frac{3}{8}$ I UNF $\frac{3}{8}$ XCHANGE Size 02	M 2.5	7019736	7036350	8IP	1.5 Nm	7150409	7074853	7074854
M 12 I MF 12 XCHANGE Size 03	M 3	7019929	7036355	8IP	3.0 Nm	7078115	7074853	7074854
M 14 I MF 14 UNC $\frac{1}{2}$ I UNF $\frac{1}{2}$ XCHANGE Size 04	M 4	7020096	7036356	15IP	6.5 Nm	7150410	7074853	7150404
M 16 I MF 16 I UNC $\frac{9}{16}$, $\frac{5}{8}$ I UNF $\frac{9}{16}$, $\frac{5}{8}$ XCHANGE Size 05	M 4	7020096	7036356	15IP	6.5 Nm	7150410	7074853	7150404
M 18 I MF 18 XCHANGE Size 06	M 5	7021059	7036357	20IP	12.5 Nm	7150411	7150408	7150405
M 20 I UNC $\frac{3}{4}$ I UNF $\frac{3}{4}$ XCHANGE Size 07	M 5	7021059	7036357	20IP	12.5 Nm	7150411	7150408	7150405



HPF Max Forming Tap

With the modular HPF, LMT Fette has established a unique selling point in non-cutting internal thread production. After the great success with our HPF and the new type HPF Max, we have extended our range with the modular forming tap to include even larger dimensions.

In addition to the modular design, significant design features contribute to an improved performance:

- Fine grain carbide substrate (LCP25G)
- Optimized former geometry (SX)
- Wear-resistant TiCN coating

This outstanding performance is reflected in an even longer tool life in comparison to single-piece HSS forming taps and a higher cutting speed.

This makes the HPF Max a cost-effective partner for serial production and in mechanical engineering.

Information:

The use of thread forming taps requires a material breaking elongation of at least 8 % and a maximum tensile strength of up to 1400 N/mm².

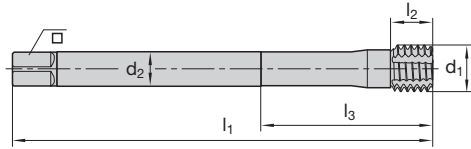
Advantages of HPF Max:

- At the end of the tool life only the threaded head is changed and not the complete tool
- Fast tool change possible – even in the machine
- No new length adjustment necessary
- The best of “both worlds” – a tough, flexible steel shank and a wear-resistant carbide head
- Economic resource deployment

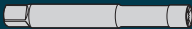
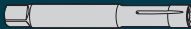
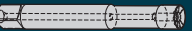
Customer benefits at a glance:

- Maximum tool life thanks to improved fine grain carbide in combination with a new geometry and the TiCN coating
- Shorter machining time thanks to high circumferential speeds
- Resource efficiency thanks to the repeated use of the tool shank
- Efficient deployment in large-series production and in mechanical engineering
- Wide range of application in the material groups P, N, M





Catalog Number		6085
P1	Plain carbon steel, free cutting steel	■ $v_c = 66-97$ SFM
P2	Heat-treated steel, medium strength	■ $v_c = 66-164$ SFM
P3	Tool steel	□ $v_c = 49-98$ SFM
M1	Stainless steel, austenitic	■ $v_c = 33-66$ SFM ²⁾
M2	Stainless steel, martensitic	□ $v_c = 33-66$ SFM ²⁾
K1	Grey cast iron	
K2	Nodular cast iron	□ $v_c = 66-164$ SFM
N1	Alu- & Copper alloys long chipping < 5 % Si	■ $v_c = 66-197$ SFM
N2	Alu- & Copper alloys long chipping 5-10 % Si	■ $v_c = 66-197$ SFM
N3	Alu- & Copper alloys short chipping > 10 % Si	
N4	Graphite	
S1	Titanium alloys medium strength	□ $v_c = 26-49$ SFM ²⁾
S2	Titanium alloys high strength	
H1	Chilled steel and Hardened steel	

UNF thread (fine) ASME-B1.1														 Recommended Drill Size
Solid carbide indexable nib set 					Shank 									
Nominal Size	(in)	P	Z	 Typ SX ³⁾	(mm)									
	d ₁			Ident No.	l ₁	l ₂	l ₃	d ₂	□			No.	Ident No.	
UNF 5/16	0.3125	24	5	7248873	90	8.5	35	8	6.2	Size No. 2	9115324	Size No. 2-C	9124006	0.2913
UNF 3/8	0.3750	24	5	7248874	100	10	40	10	8	Size No. 3	9115325	Size No. 3-C	9123970	0.3543
UNF 7/16	0.4375	20	5	7248875	100	12	45	11	9	Size No. 4	9115326	Size No. 4-C	9126424	0.4130
UNF 1/2	0.5000	20	5	7248876	110	13	50	12	9	Size No. 6	9115328	Size No. 6-C	9126425	0.4724
UNF 9/16	0.5625	18	6	7248877	110	13.5	—	12	9	Size No. 7	9115329	Size No. 7-C	9124024	0.5315
UNF 5/8	0.6250	18	6	7248878	110	13.5	—	12	9	Size No. 8	9115330	Size No. 8-C	9124043	0.5937
UNF 3/4	0.7500	16	7	7248879	125	16.5	—	16	12	Size No. 10	9115332	Size No. 10-C	9126426	0.7230
Solid carbide indexable nib set 					Shank 									
UNF 5/16	0.3125	24	5	7248933	90	8.5	35	8	6.2	—	—	Size No. 2-I	7074833	0.2913
UNF 3/8	0.3750	24	5	7248934	100	10	40	10	8	—	—	Size No. 3-I	7074834	0.3543
UNF 7/16	0.4375	20	5	7248935	100	12	45	11	9	—	—	Size No. 4-I	7074835	0.4130
UNF 1/2	0.5000	20	5	7248936	110	13	50	12	9	—	—	Size No. 6-I	7074837	0.4724
UNF 9/16	0.5625	18	6	7248937	110	13.5	—	12	9	—	—	Size No. 7-I	7074838	0.5315
UNF 5/8	0.6250	18	6	7248938	110	13.5	—	12	9	—	—	Size No. 8-I	7074839	0.5937
UNF 3/4	0.7500	16	7	7248939	125	16.5	—	16	12	—	—	Size No. 10-I	7074841	0.7230

1) Chamfer form C on request available

2) Cutting oil is recommended

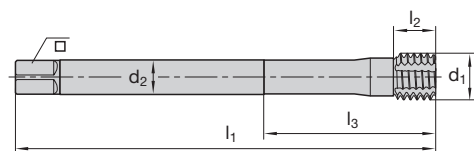
3) with coolant grooves

HPF Max Shanks Extra Long Options See Page 236

DIN/ANSI Shanks Options See Page 236

Spare parts see page 237

■ = First choice □ = Second choice



Catalog Number

6085

P1	Plain carbon steel, free cutting steel	■ $v_c = 66-97$ SFM
P2	Heat-treated steel, medium strength	■ $v_c = 66-164$ SFM
P3	Tool steel	□ $v_c = 49-98$ SFM
M1	Stainless steel, austenitic	■ $v_c = 33-66$ SFM ²⁾
M2	Stainless steel, martensitic	□ $v_c = 33-66$ SFM ²⁾
K1	Grey cast iron	
K2	Nodular cast iron	□ $v_c = 66-164$ SFM
N1	Alu- & Copper alloys long chipping < 5 % Si	■ $v_c = 66-197$ SFM
N2	Alu- & Copper alloys long chipping 5-10 % Si	■ $v_c = 66-197$ SFM
N3	Alu- & Copper alloys short chipping > 10 % Si	
N4	Graphite	
S1	Titanium alloys medium strength	□ $v_c = 26-49$ SFM ²⁾
S2	Titanium alloys high strength	
H1	Chilled steel and Hardened steel	

UNF thread (fine) ASME-B1.1

Solid carbide indexable nib set

Shank

Nominal Size	(in)	P	Z		(mm)					No.	Ident No.			Recommended Drill Size
	d ₁			l ₁	l ₂	l ₃	d ₂	□	No.			Ident No.	(in)	
	Typ SX ³⁾													Ident No.
UNC ⁵ / ₁₆	0.3125	18	5	7248866	90	8.5	35	8	6.2	Size No. 2	9115324	Size No. 2-C	9124006	0.2854
UNC ³ / ₈	0.3750	16	5	7248867	100	10	40	10	8	Size No. 3	9115325	Size No. 3-C	9123970	0.3445
UNC ⁷ / ₁₆	0.4375	14	5	7248868	100	12	45	11	9	Size No. 4	9115326	Size No. 4-C	9126424	0.4040
UNC ¹ / ₂	0.5000	13	5	7248869	110	13	50	12	9	Size No. 6	9115328	Size No. 6-C	9126425	0.4634
UNC ⁹ / ₁₆	0.5625	12	6	7248870	110	13.5	—	12	9	Size No. 7	9115329	Size No. 7-C	9124024	0.5229
UNC ⁵ / ₈	0.6250	11	6	7248871	110	13.5	—	12	9	Size No. 8	9115330	Size No. 8-C	9124043	0.5781
UNC ³ / ₄	0.7500	10	7	7248872	125	16.5	—	16	12	Size No. 10	9115332	Size No. 10-C	9126426	0.7024

Solid carbide indexable nib set

Shank

UNC 5/16	0.3125	18	5	7248926	90	8.5	35	8	6.2	—	—	Size No. 2-I	7074833	0.2854
UNC 3/8	0.3750	16	5	7248927	100	10	40	10	8	—	—	Size No. 3-I	7074834	0.3445
UNC 7/16	0.4375	14	5	7248928	100	12	45	11	9	—	—	Size No. 4-I	7074835	0.4040
UNC 1/2	0.5000	13	5	7248929	110	13	50	12	9	—	—	Size No. 6-I	7074837	0.4634
UNC 9/16	0.5625	12	6	7248930	110	13.5	—	12	9	—	—	Size No. 7-I	7074838	0.5229
UNC 5/8	0.6250	11	6	7248931	110	13.5	—	12	9	—	—	Size No. 8-I	7074839	0.5781
UNC 3/4	0.7500	10	7	7248932	125	16.5	—	16	12	—	—	Size No. 10-I	7074841	0.7024

¹⁾ Chamfer form C on request available

²⁾ Cutting oil is recommended

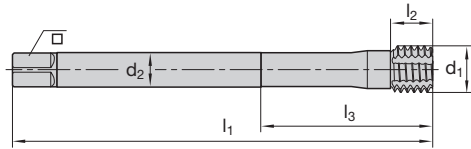
³⁾ with coolant grooves

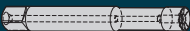
HPF Max Shanks Extra Long Options See Page 236

DIN/ANSI Shanks Options See Page 236

Spare parts see page 237

■ = First choice □ = Second choice



Catalog Number				6095											
P1	Plain carbon steel, free cutting steel			■ v _c = 66–97 SFM											
P2	Heat-treated steel, medium strength			■ v _c = 66–164 SFM											
P3	Tool steel			□ v _c = 49–98 SFM											
M1	Stainless steel, austenitic			■ v _c = 33–66 SFM ²⁾											
M2	Stainless steel, martensitic			□ v _c = 33–66 SFM ²⁾											
K1	Grey cast iron														
K2	Nodular cast iron			□ v _c = 66–164 SFM											
N1	Alu- & Copper alloys long chipping < 5 % Si			■ v _c = 66–197 SFM											
N2	Alu- & Copper alloys long chipping 5–10 % Si			■ v _c = 66–197 SFM											
N3	Alu- & Copper alloys short chipping > 10 % Si														
N4	Graphite														
S1	Titanium alloys medium strength			□ v _c = 26–49 SFM ²⁾											
S2	Titanium alloys high strength														
H1	Chilled steel and Hardened steel														
Solid carbide indexable nib set 				Shank 								 Recommended Drill Size			
Nominal Size d ₁	Z	6HX	6GX	(mm)					No.	Ident No.				(mm)	
		Typ SX ³⁾	Typ SX ³⁾	l ₁	l ₂	l ₃	d ₂	□			No.				Ident No.
Ident No.									No.			Ident No.			
MF 8 x 1	5	7248901	on demand	90	8.5	35	8	6.2	–	–	Size No. 2-l	7074833	7.55		
MF 10 x 1	5	7248902	7248919	100	10	40	10	8	–	–	Size No. 3-l	7074834	9.55		
MF 10 x 1.25	5	7248903	on demand										9.40		
MF 12 x 1	5	7248904	7248920	110	12	50	12	9	–	–	Size No. 5-l	7074836	11.55		
MF 12 x 1.25	5	7248905	7248921										11.40		
MF 12 x 1.5	5	7248906	7248922										11.30		
MF 12 x 1	5	7248904	7248920										11.55		
MF 12 x 1.25	5	7248905	7248921	110	12	–	9	7	–	–	Size No. 5.1-l	7143564	11.40		
MF 12 x 1.5	5	7248906	7248922										11.30		
MF 14 x 1	6	7248907	on demand	110	13.5	–	12	9	–	–	Size No. 7-l	7074838	13.55		
MF 14 x 1.5	6	7248908	7248923										13.30		
MF 14 x 1	6	7248907	on demand	110	13.5	–	11	9	–	–	Size No. 7.1-l	7143565	13.55		
MF 14 x 1.5	6	7248908	7248923										13.30		
MF 16 x 1	6	7248909	on demand	110	13.5	–	12	9	–	–	Size No. 8-l	7074839	15.55		
MF 16 x 1.5	6	7248910	7248924										15.30		
MF 18 x 1	6	on demand	on demand	125	16.5	–	14	11	–	–	Size No. 9-l	7074840	17.55		
MF 18 x 1.5	6	7248911	on demand										17.30		
MF 20 x 1.5	6	7248912	7248925	125	17	–	16	12	–	–	Size No. 10-l	7074841	19.30		

¹⁾ Chamfer form C on request available

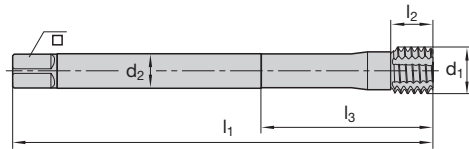
²⁾ Cutting oil is recommended

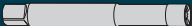
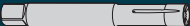
³⁾ with coolant grooves

HPF Max Shanks Extra Long Options See Page 236

Spare parts see page 237

■ = First choice □ = Second choice



Catalog Number				6095									
P1	Plain carbon steel, free cutting steel			■ v _c = 66–97 SFM									
P2	Heat-treated steel, medium strength			■ v _c = 66–164 SFM									
P3	Tool steel			□ v _c = 49–98 SFM									
M1	Stainless steel, austenitic			■ v _c = 33–66 SFM ²⁾									
M2	Stainless steel, martensitic			□ v _c = 33–66 SFM ²⁾									
K1	Grey cast iron												
K2	Nodular cast iron			□ v _c = 66–164 SFM									
N1	Alu- & Copper alloys long chipping < 5 % Si			■ v _c = 66–197 SFM									
N2	Alu- & Copper alloys long chipping 5–10 % Si			■ v _c = 66–197 SFM									
N3	Alu- & Copper alloys short chipping > 10 % Si												
N4	Graphite												
S1	Titanium alloys medium strength			□ v _c = 26–49 SFM ²⁾									
S2	Titanium alloys high strength												
H1	Chilled steel and Hardened steel												
Solid Carbide Indexable Nib Set 				Shank 									
Nominal Size d ₁	Z	6HX	6GX	(mm)					No.	Ident No.			Recommended Drill Size
		Typ SX ³⁾		l ₁	l ₂	l ₃	d ₂	□			No.	Ident No.	
		Ident No.											
MF 8 x 1	5	7248841	on demand	90	8.5	35	8	6.2	Size No. 2	9115324	Size No. 2-C	9124006	7.55
MF 10 x 1	5	7248842	7248859	100	10	40	10	8	Size No. 3	9115325	Size No. 3-C	9123970	9.55
MF 10 x 1.25	5	7248843	on demand										9.40
MF 12 x 1	5	7248844	7248860	110	12	50	12	9	Size No. 5	9115327	Size No. 5-C	9124018	11.55
MF 12 x 1.25	5	7248845	7248861										11.40
MF 12 x 1.5	5	7248846	7248862										11.30
MF 14 x 1	6	7248847	on demand	110	13.5	–	12	9	Size No. 7	9115329	Size No. 7-C	9124024	13.55
MF 14 x 1.5	6	7248848	7248863										13.30
MF 16 x 1	6	7248849	on demand	110	13.5	–	12	9	Size No. 8	9115330	Size No. 8-C	9124043	15.55
MF 16 x 1.5	6	7248850	7248864										15.30
MF 18 x 1	6	on demand	on demand	125	16.5	–	14	11	Size No. 9	9115331	Size No. 9-C	9124063	17.55
MF 18 x 1.5	6	7248851	on demand										17.30
MF 20 x 1.5	6	7248852	7248865	125	17	–	16	12	Size No. 10	9115332	Size No. 10-C	9126426	19.30

¹⁾ Chamfer form C on request available

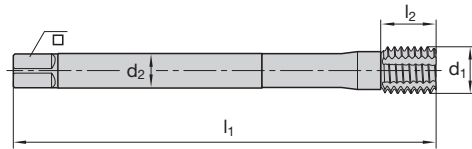
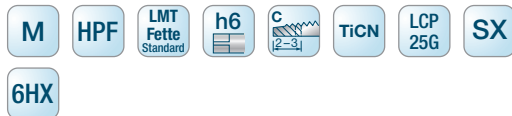
HPF Max Shanks Extra Long Options See Page 236

■ = First choice □ = Second choice

²⁾ Cutting oil is recommended

Spare parts see page 237

³⁾ with coolant grooves



Catalog Number					6096			6096			
P1	Plain carbon steel, free cutting steel				■	v _c = 66–131 SFM		■	v _c = 66–131 SFM		
P2	Heat-treated steel, medium strength				■	v _c = 66–131 SFM		■	v _c = 66–131 SFM		
P3	Tool steel				□	v _c = 49–98 SFM		□	v _c = 49–98 SFM		
M1	Stainless steel, austenitic				■	v _c = 33–66 SFM ¹⁾		■	v _c = 33–66 SFM ¹⁾		
M2	Stainless steel, martensitic				□	v _c = 33–66 SFM ¹⁾		□	v _c = 33–66 SFM ¹⁾		
K1	Grey cast iron										
K2	Nodular cast iron				□	v _c = 66–131 SFM		□	v _c = 66–131 SFM		
N1	Alu- & Copper alloys long chipping < 5 % Si				■	v _c = 66–197 SFM		■	v _c = 66–197 SFM		
N2	Alu- & Copper alloys long chipping 5–10 % Si				■	v _c = 66–197 SFM		■	v _c = 66–197 SFM		
N3	Alu- & Copper alloys short chipping > 10 % Si										
N4	Graphite										
S1	Titanium alloys medium strength										
S2	Titanium alloys high strength										
H1	Chilled steel and Hardened steel										
Solid carbide indexable nib set					Shank 		Type SX ²⁾	Shank 		Type SX ²⁾	 Recommended Drill Size
											
Nominal Size d ₁	(mm)				ICC No.	Ident No.	Ident No.	ICR No.	Ident No.	Ident No.	(mm)
M 22 x 1.5	140	16.5	18	14.5	Size No. 19-1	7286812	7286751	Size No. 19-C	7286817	7286760	21.35
M 22 x 2	140	16.5	18	14.5			7286752			7286761	21.10
M 22 x 2.5	140	16.5	18	14.5			7286741			7286746	20.85
M 24 x 1.5	160	21	18	14.5	Size No. 20-1	7286813	7286753	Size No. 20-C	7286818	7286762	23.35
M 24 x 2	160	21	18	14.5			7286754			7286763	23.10
M 24 x 3	160	21	18	14.5			7286742			7286747	22.60
M 27 x 1.5	160	25	20	16	Size No. 21-1	7286814	7286755	Size No. 21-C	7286819	7286764	26.35
M 27 x 2	160	25	20	16			7286756			7286765	26.10
M 27 x 3	160	25	20	16			7286743			7286748	25.60
M 30 x 1.5	180	25	22	18	Size No. 22-1	7286815	7286757	Size No. 22-C	7286820	7286766	29.35
M 30 x 2	180	25	22	18			7286858			7286767	29.10
M 30 x 3.5	180	25	22	18			7286744			7286749	28.35
M 33 x 2	180	25	25	20	No. 23	7286816	7286759	Size No. 23-C	7286821	7286768	32.10
M 33 x 3.5	180	25	25	20			7286745			7286750	31.35

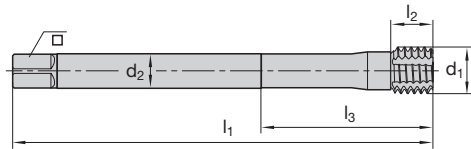
1) Cutting oil is recommended

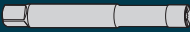
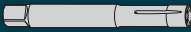
2) with coolant grooves

3) Predrill diameter should be adapted to the process (material)

Spare parts see page 237

■ = First choice □ = Second choice



Catalog Number				6095														
P1	Plain carbon steel, free cutting steel			■ $v_c = 66\text{--}97$ SFM														
P2	Heat-treated steel, medium strength			■ $v_c = 66\text{--}164$ SFM														
P3	Tool steel			□ $v_c = 49\text{--}98$ SFM														
M1	Stainless steel, austenitic			■ $v_c = 33\text{--}66$ SFM ²⁾														
M2	Stainless steel, martensitic			□ $v_c = 33\text{--}66$ SFM ²⁾														
K1	Grey cast iron																	
K2	Nodular cast iron			□ $v_c = 66\text{--}164$ SFM														
N1	Alu- & Copper alloys long chipping < 5 % Si			■ $v_c = 66\text{--}197$ SFM														
N2	Alu- & Copper alloys long chipping 5–10 % Si			■ $v_c = 66\text{--}197$ SFM														
N3	Alu- & Copper alloys short chipping > 10 % Si																	
N4	Graphite																	
S1	Titanium alloys medium strength			□ $v_c = 26\text{--}49$ SFM ²⁾														
S2	Titanium alloys high strength																	
H1	Chilled steel and Hardened steel																	
Solid carbide indexable nib set 				Shank 														
Nominal Size d_1	Z	6HX	6GX	(mm)					 No.		 Ident No.		 No.		 Ident No.		Recommended Drill Size (mm)	
		Typ SX ³⁾			l_1	l_2	l_3	d_2										□
		Ident No.																
M 8 x 1.25	5	7248835	7248853	90	8.5	35	8	6.2	Size No. 2	9115324	Size No. 2-C	9124006	7.45					
M 10 x 1.5	5	7248836	7248854	100	10	40	10	8	Size No. 3	9115325	Size No. 3-C	9123970	9.30					
M 12 x 1.75	5	7248837	7248855	110	12	50	12	9	Size No. 5	9115327	Size No. 5-C	9124018	11.20					
M 14 x 2	6	7248838	7248856	110	13.5	–	12	9	Size No. 7	9115329	Size No. 7-C	9124024	13.10					
M 16 x 2	6	7248839	7248857	110	13.5	–	12	9	Size No. 8	9115330	Size No. 8-C	9124043	15.05					
M 18 x 2.5	6	on demand	on demand	125	16.5	–	14	11	Size No. 9	9115331	Size No. 9-C	9124063	16.80					
M 20 x 2.5	6	7248840	7248858	125	17	–	16	12	Size No. 10	9115332	Size No. 10-C	9126426	18.80					
Solid carbide indexable nib set 				Shank 														
M 8 x 1.25	5	7248895	7248913	90	8.5	35	8	6.2	–	–	Size No. 2-I	7074833	7.45					
M 10 x 1.5	5	7248896	7248914	100	10	40	10	8	–	–	Size No. 3-I	7074834	9.30					
M 12 x 1.75	5	7248897	7248915	110	12	50	12	9	–	–	Size No. 5-I	7074836	11.20					
M 12 x 1.75	5	7248897	7248915	110	12	–	9	7	–	–	Size No. 5.1-I	7143564	11.20					
M 14 x 2	6	7248898	7248916	110	13.5	–	12	9	–	–	Size No. 7-I	7074838	13.10					
M 14 x 2	6	7248898	7248916	110	13.5	–	11	9	–	–	Size No. 7.1-I	7143565	13.10					
M 16 x 2	6	7248899	7248917	110	13.5	–	12	9	–	–	Size No. 8-I	7074839	15.05					
M 18 x 2.5	6	on demand	on demand	125	16.5	–	14	11	–	–	Size No. 9-I	7074840	16.80					
M 20 x 2.5	6	7248900	7248918	125	17	–	16	12	–	–	Size No. 10-I	7074841	18.80					

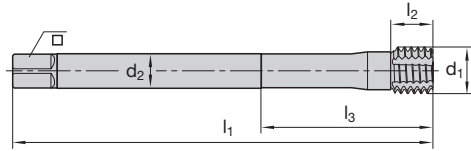
¹⁾ Chamfer form C on request available

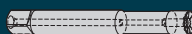
Spare parts see page 237

■ = First choice □ = Second choice

²⁾ Cutting oil is recommended

³⁾ with coolant grooves



Catalog Number					6075									
P1	Plain carbon steel, free cutting steel				■ v _c = 66–97 SFM									
P2	Heat-treated steel, medium strength				■ v _c = 66–164 SFM									
P3	Tool steel				□ v _c = 49–98 SFM									
M1	Stainless steel, austenitic				■ v _c = 33–66 SFM ²⁾									
M2	Stainless steel, martensitic				□ v _c = 33–66 SFM ²⁾									
K1	Grey cast iron													
K2	Nodular cast iron				□ v _c = 66–164 SFM									
N1	Alu- & Copper alloys long chipping < 5 % Si				■ v _c = 66–197 SFM									
N2	Alu- & Copper alloys long chipping 5–10 % Si				■ v _c = 66–197 SFM									
N3	Alu- & Copper alloys short chipping > 10 % Si													
N4	Graphite													
S1	Titanium alloys medium strength				□ v _c = 26–49 SFM ²⁾									
S2	Titanium alloys high strength													
H1	Chilled steel and Hardened steel													
Solid carbide indexable nib set 					Shank 							 Recommended Drill Size		
Nominal Size ³⁾	(mm)	P	Z	Typ SX ⁴⁾	(mm)					No.	Ident No.			Recommended Drill Size (mm)
	d ₁				Ident No.	l ₁	l ₂	l ₃	d ₂			□	No.	
G 1/8	9.728	18	5	7248881	100	10	40	10	8	Size No. 3	9115325	Size No. 3-C	9123970	9.25
G 1/4	13.157	19	5	7248882	110	13	50	12	9	Size No. 6	9115328	Size No. 6-C	9126425	12.50
G 3/8	16.662	19	6	7248883	125	16.5	—	14	11	Size No. 9	9115331	Size No. 9-C	9124063	16.00
G 1/2	20.955	14	6	7248884	125	16.5	—	16	12	Size No. 10	9115332	Size No. 10-C	9126426	20.00
Solid Carbide Indexable Nib Set 					Shank 									
G 1/8	9.728	18	5	7248885	100	10	40	10	8	—	—	Size No. 3-I	7074834	9.25
G 1/4	13.157	19	5	7248886	110	13	50	12	9	—	—	Size No. 6-I	7074837	12.50
G 3/8	16.662	19	6	7248887	125	16.5	—	14	11	—	—	Size No. 9-I	7074840	16.00
G 1/2	20.955	14	6	7248888	125	16.5	—	16	12	—	—	Size No. 10-I	7074841	20.00

1) Chamfer form C on request available

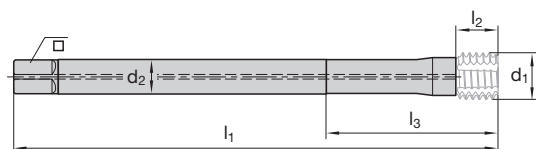
2) Cutting oil is recommended

3) Whitworth

4) with coolant grooves

Spare parts see page 237

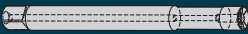
■ = First choice □ = Second choice



Catalog Number

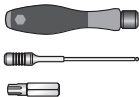
6090

Threadsize type	Shank extra long 						No.	Ident No.
	l_1	l_2	l_3	d_2	$\square h12$			
M 8 MF 8 UNC $5/16-18$ UNF $5/16-24$	140	8.5	35	8	6.2		Size No. 2 ICC long	7190681
M 10 MF 10 UNC $3/8-16$ UNF $5/16-24$ G $1/8$	160	10	40	10	8		Size No. 3 ICC long	7190682
UNC $7/16-14$ UNF $7/16-20$	160	12	—	11	9		Size No. 4 ICC long	7190683
M 12 MF 12	180	12	—	9	7		Size No. 5.1 ICC long	7190684
UNC $1/2-13$ UNF $1/2-20$ G $1/4$	180	13	45	12	9		Size No. 6 ICC long	7190685
M 14 MF 14 UNC $9/16-12$ UNF $9/16-18$	180	13.5	—	11	9		Size No. 7.1 ICC long	7190686
M 16 MF 16 UNC $5/8-11$ UNF $5/8-18$	180	13.5	—	12	9		Size No. 8 ICC long	7190687
M 18 MF 18 G $3/8$	200	16.5	—	14	11		Size No. 9 ICC long	7190688
M 20 MF 20 UNC $3/4-10$ UNF $3/4-6$ G $1/2$	200	17	—	16	12		Size No. 10 ICC long	7190689

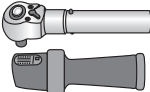
HPF Max Shank DIN ANSI (ICR) 						Shank Description Ident No.	Shank Ident No.
d_1	l_1	l_2	l_3	d_2	Square		
5/16	3.543 (90mm)	0.335 (8.5mm)	1.378 (35mm)	0.318 (8.08mm)	0.238 (6.05mm)	HPF MAX INCH Size 11 ICR	9169773
3/8	3.937 (100mm)	0.3937 (10mm)	1.575 (40mm)	0.381 (9.68mm)	0.286 (7.26mm)	HPF MAX INCH Size 12 ICR	9169775
7/16	3.937 (100mm)	0.4724 (12mm)	1.772 (45mm)	0.429 (10.9mm)	0.322 (8.18mm)	HPF MAX INCH Size 13 ICR	9169778
1/2	4.331 (110mm)	0.5118 (13mm)	1.969 (50mm)	0.480 (12.19mm)	0.360 (9.14mm)	HPF MAX INCH Size 14 ICR	9169779
9/16	4.331 (110mm)	0.5315 (13.5mm)		0.480 (12.19mm)	0.360 (9.14mm)	HPF MAX INCH Size 15 ICR	9169780
5/8	4.331 (110mm)	0.5315 (13.5mm)		0.480 (12.19mm)	0.360 (9.14mm)	HPF MAX INCH Size 16 ICR	9169782
3/4	4.921 (125mm)	0.6496 (16.5mm)		0.590 (14.99mm)	0.442 (11.23mm)	HPF MAX INCH Size 17 ICR	9169783

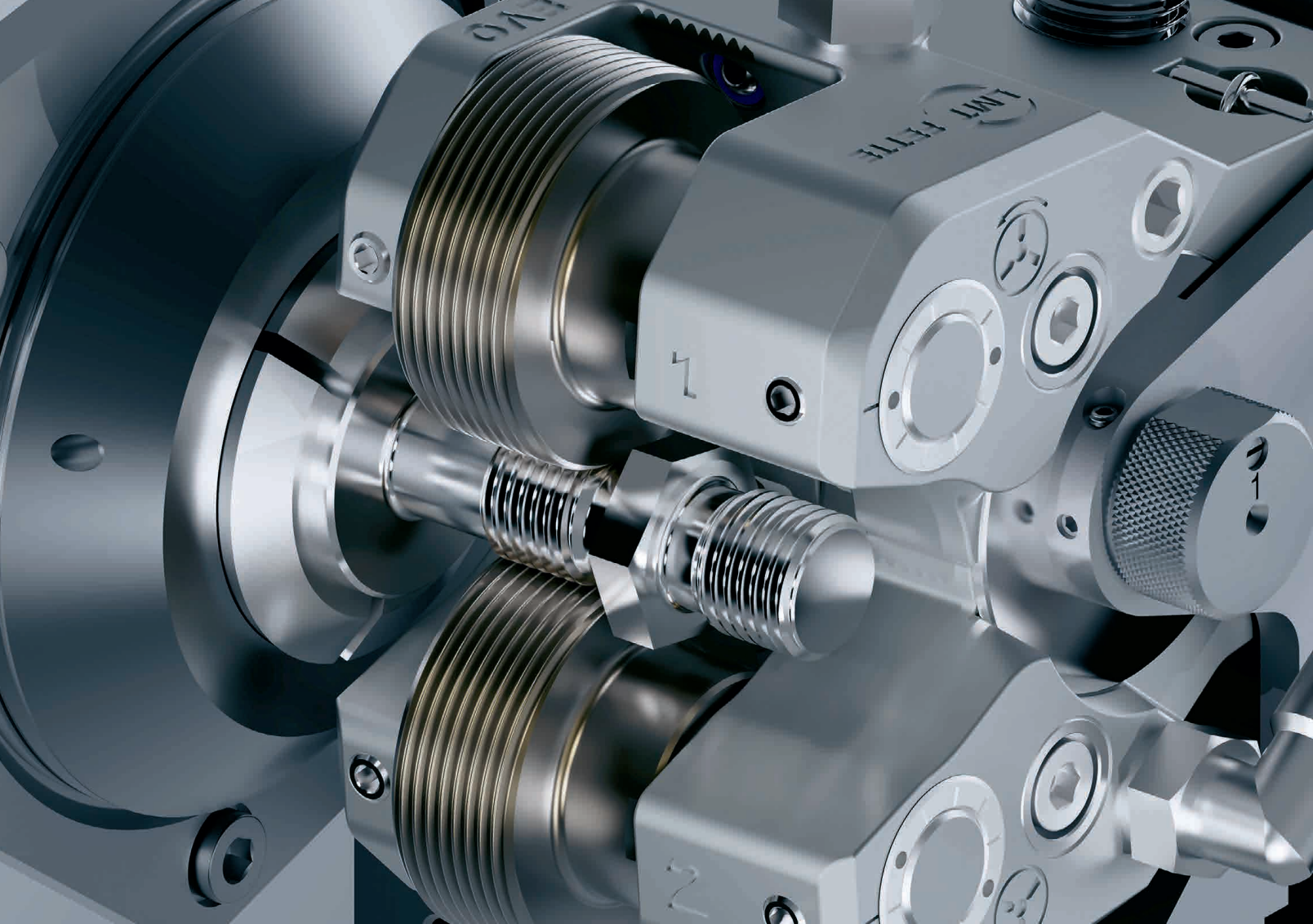
Torquefix Screwdrivers And Inserts

TorqueFix screwdrivers with calibrated torque. Handy, ergonomic handhold. Smooth "slipping" mechanism signals when the set torque has been achieved. At a size of 20IP the screwdriver comes with T-handle for better power transmission. Complete delivery set including interchangeable blade.

Threads type Shank size	Screw without ICC		Screw with ICC		Torx Plus size	Torque	Set Set	holder	Bit
									
M 8 I MF 8 I UNC $\frac{5}{16}$ I UNF $\frac{5}{16}$ Size No. 02	M 2.5	2422355	7074842		8IP	1.5 Nm	7150409	7074853	7074854
M 10 I MF 10 I MF 10 I UNC $\frac{3}{8}$ I UNF $\frac{3}{8}$ I G $\frac{1}{8}$ Size No. 03	M 3	2422354	7003148		8IP	3.0 Nm	7078115	7074853	7074854
UNC $\frac{7}{16}$ I UNF $\frac{7}{16}$ Size No. 04	M 4	2422353	7074843		15IP	6.5 Nm	7150410	7074853	7150404
M 12 I MF 12 Size No. 05	M 4	2422353	7074843		15IP	6.5 Nm	7150410	7074853	7150404
UNC $\frac{1}{2}$ I UNF $\frac{1}{2}$ I G $\frac{1}{4}$ Size No. 06	M 4	2422353	7074843		15IP	6.5 Nm	7150410	7074853	7150404
M 14 I MF 14 I UNC $\frac{9}{16}$ Size No. 07	M 4	2422353	7074843		15IP	6.5 Nm	7150410	7074853	7150404
M 16 I MF 16 I UNC $\frac{5}{8}$ Size No. 08	M 5	2422352	7063907		20IP	12.5 Nm	7150411	7150408	7150405
M 18 I MF 18 I G $\frac{3}{8}$ Size No. 09	M 5	2422352	7063907		20IP	12.5 Nm	7150411	7150408	7150405
MF 20 I UNC $\frac{3}{4}$ I UNF $\frac{3}{4}$ I G $\frac{1}{2}$ Size No. 10	M 5	2422352	7063907		20IP	12.5 Nm	7150411	7150408	7150405

Torque wrench and bits

Threads type	Screw without ICC		Screw with ICC		Torx Plus size	Torque	Torque wrench	Bithalter Socket/Bitholder	Bit Torx 30IP
									
M 22 – M 33	M 8	7270101	M 8	7280358	30IP	40 Nm	7298725	7298726	7298727



Rolling Systems

Rolling Systems

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273	F01 EVO Compatible with Coolant Closing Device
277	F1 EVO, K1 EVO
281	F12 EVO, K12 EVO
285	F1223 EVO, K1223 EVO
289	F2 EVO, K2 EVO
293	F23 EVO, K23 EVO
297	F233400 EVO, K233400 EVO
301	F3 EVO, K3 EVO
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A broad program with technical perfection

LMT Fette is the leader in thread rolling technology, a fact proven thousands of times world wide. No other manufacturer offers such a broad range; we can recommend the best system for your rolling application.

Since 1952, LMT Fette has always forced technological progress, continually striving to strengthen its position as the leader.

Our program range, product quality, experience and service have helped us become “No. 1” in this field.

We offer the broadest rolling program available, backed by professional expertise based on our vast experience. Because all applications vary in some manner, each is carefully studied by our engineering staff. In cases of exotic materials, special profiles, or the need for special leads to enhance material flow LMT Fette always offers the best and the most economical solution to problems faced by customers.

Certified quality assurance system

The LMT Fette quality assurance system fulfills the demand laid down in the standard DIN EN ISO 9001:2008 and VDA 6.4. As a result, our customers get the benefits of the highest standard of quality maintained throughout the line.

Theory and practice of thread rolling

In our technology centers in Waukegan, Illinois and Schwarzenbek, Germany, we demonstrate the very latest rolling advances with modern CNC-lathes. We also offer seminars to explain the latest technologies in theory and practice about the non-cutting, cold forming of external threads, and forms.

Assistance

For all questions, please contact your local representative. We would be glad to assist you!

For More Information

Visit our site – www.lmt-tools.com

Contact us – 1-800-234-1560

1. Our Competence

All over the world, thousands of plant managers, designers, supervisors mechanics, and operators are working with LMT Fette-made thread rolling heads and tangential side rolling attachments to make good use of their advantages. All have become familiar with these tools. This catalog comprehensively describes and illustrates LMT Fette rolling systems, available types of rolling heads and attachments, work ranges, dimensions, replacement parts and thread rolls. It gives practical rolling examples, many technical details and a lot of helpful information for the user. You should get in touch with LMT Fette’s information and consulting service, whenever any problem arises with the use and application of the machine and its tools.

You can find technical information on our website:

<http://www.lmt-tools.com/en/downloads>.

The following services are available:

- Local sales partners
- Trained application engineers
- Customer service department, testing and rolling head repair
- Design and application assistance

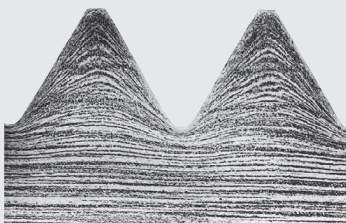
Every workday, we communicate advice and information to hundreds of customers – LMT Fette experience passed on to practical users.

Technicians who have no practical experience with the application of thread rolling heads and those who are still being trained to use them will appreciate the following instructions.

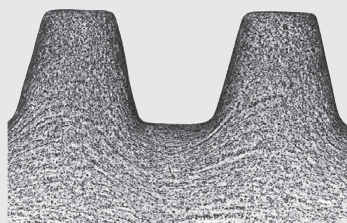
2. Cold-forming

In this process, the component material is stressed beyond its yield point, being deformed plastically, and thus permanently. In the profiling process, the grain structure of the material is, unlike cutting, displaced not removed. This process can be readily seen on the micrographs below, illustrating threads formed and rolled (Fig. 1, 2, 3).

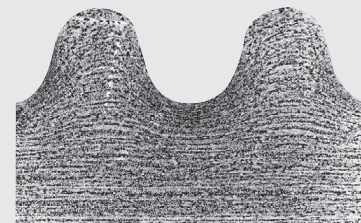
1
Micrograph Of A V-Type Thread



2
Micrograph Of An Acme/Trapezoidal Thread



3
Micrograph Of A Knuckle Thread



3. Economic Advantages of Thread Rolling

- Extremely short machining time
- Long service life of tools
- Full utilization of the machine
- Smaller blanks/bars
- Simple operation

Rolling speeds, ranging from 60–270 SFM are considerably higher than the cutting speeds used in thread cutting operations. When cutting with thread chasing heads, speeds rarely exceed (30 SFM). When using thread rolling processes, the net thread rolling time will never be the deciding factor in the work cycle. Please refer to the application examples.

To give another example: – Threading a 5/8" x 18 UNF, 19 mm (0.748") long on a cast steel journal.

The time to thread cut was **4.8 secs** per piece. However, when rolling was performed only **0.8 secs** were required with an axial-type rolling head and **0.2 secs** with a radial-type (see Fig. 4).

For any thread rolling process performed with rolling heads the long tool life of the thread rolls gives very low tool costs.

LMT Fette rolling heads help to reduce expensive machining time, as the threads are produced in seconds and in only one pass, whereas cutting requires numerous passes.

The longevity of thread rolls compared to a single point tool meets today's requirements for lowest personnel efforts in setting up and operating the CNC machine.

The advantage of a chipless cold formed thread compared to a cut thread with a single point tool is often used to produce a smaller component or to reduce workpiece weight. In this case, thread rolling is a necessity. Such components can be completely machined with the use of LMT Fette rolling heads on CNC equipment. A second clamping or the rolling of the component on a separate thread rolling machine is not necessary.

The well-designed rolling heads are compact units needing a rotary motion in order to function properly. To meet that requirement simple turning lathes will suffice. These rolling heads can also be used on CNC lathes, Swiss type lathes, multispindle lathes, screw machines and machining centers. These compact heads deliver thread production without problems and easily fit in the machine with extremely fast cycle times.

The thread rolling starting diameter is the pitch diameter of the thread, unlike thread cutting where it is identical with the outside (major) diameter of the thread. With many workpieces this means a considerable savings on material, especially if the material has been drawn to the pitch thread diameter where it can be used immediately. No cutting process takes place and no bothersome chips are produced with the thread rolling operation.

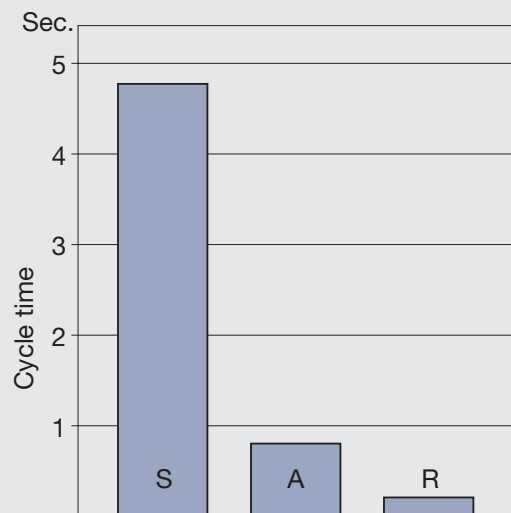
4

Cycle time for production of a 5/8" UNF (0.748") long on forged axle stub

S = Thread chaser (cutting)

A = Axial-type rolling head (rolling)

R = Radial-type rolling head (rolling)



4. Technical Advantages of Thread Rolling

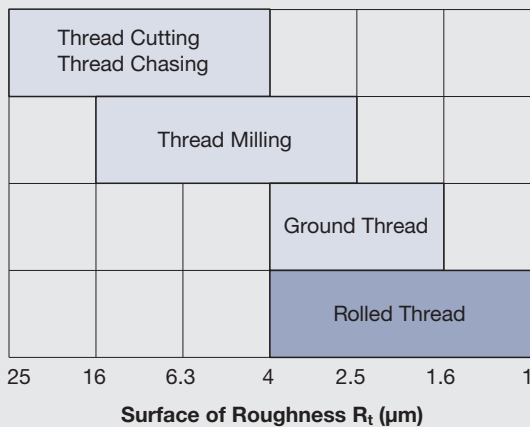
- A high degree of profile accuracy
- A stronger thread
- Burnished thread flanks
- Improved wear resistance

The tensile and fatigue strength under reversed bending stresses are inherent to the uninterrupted structure. Micrographs (Page 240, Fig. 1, 2, and 3) show distinctly how the material grain follows the thread profile.

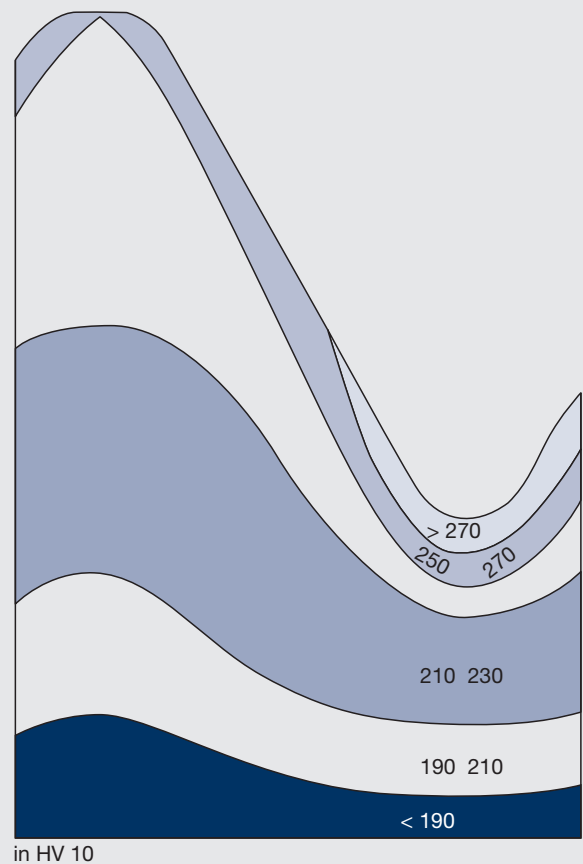
The burnished thread surface with a roughness level of below 5 μm improves resistance to corrosion and reduces abrasion within the thread. The work hardened flank provides increased surface tensile, yield, and shear strength. Due to pressure deformation, a residual compressive stress system builds up at the thread root, which counteracts tensile loading.

When compared to a cut thread, the load capacity of the rolled thread is increased. Please refer also to Fig. 5, 6, and 7.

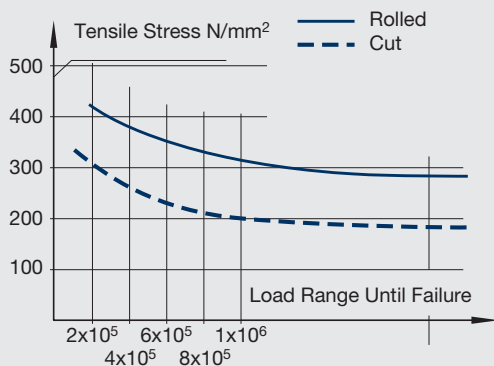
5 Comparison of thread rolling surfaces produced by different methods



6 Increase of hardness of a rolled thread compared with the component core



7 Fatigue test for cut and rolled threads



5. LMT Fette Rolling Heads

With its versatile thread rolling head program, offering axial, radial, and tangential-type thread rolling processes, LMT Fette can satisfy almost any thread rolling requirement.

Axial type rolling

Axial-type rolling heads usually contain two or three thread rolls and in special cases up to six. They consist of annular grooves ground on the periphery of the rolls.

The rolls revolve around their horizontal axis feeding the component axially one pitch per rotation into the head (see Fig. 8a). As the rolls are moving axially along the component, any required length of thread can be manufactured. An additional key advantage is that the component can remain stationary while the rolling head spins. Conversely, the rolling head remains stationary while the component spins.

The rolling head can be mounted universally on the longitudinal carriage, the turret, the spindle or tailstock of standard and automatic lathes.

Radial Type Rolling

In radial-type rolling one must differentiate between two versions. Type E generates the thread after being positioned by traversing axially over the component and initiated externally, (see Fig. 8c). The thread is produced in one revolution of the rolls. The thread rolls are put in contact and radially penetrate into the component. The maximum thread length is restricted by the width of the roll.

The short machining time for thread rolling is a great advantage. Production of threads having an extremely short thread runout is also feasible. Mounting possibilities for the (E-type) rolling head are similar to that of the axial-type thread rolling head.

Type EW functions like type E, but it features automatic initiation of the rolling process started by contact of the workpiece with a trigger mechanism.

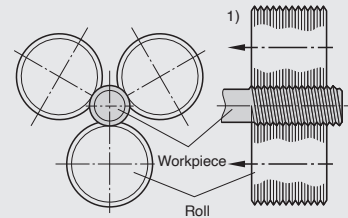
Tangential Type Rolling

The tangential-type side-rolling attachment is equipped with two opposed thread rolls, which are traversed towards the component at 90° to its axis. During the progressive feed, it forms the thread mainly in a tangential direction (Fig. 8d).

The forming process is generally completed when the center line of the roll meets the center line of the component. This situation is usually reached after 15 to 30 contact revolutions of the component. There is no release mechanism in the tangential side rolling process. Tangential-type rolling heads can be conveniently mounted on the cross-slide of screw machines and automatic lathes and CNC lathes.

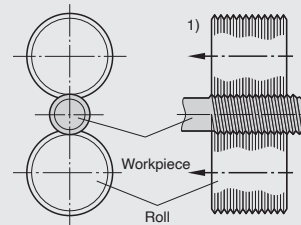
8a

Axial Thread Rolling Head Type F, FU, F-RN, K



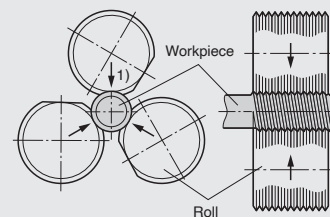
8b

Axial Thread Rolling Head Type AC



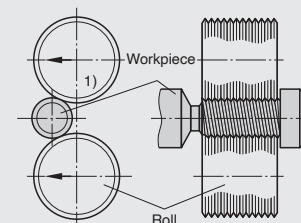
8c

Radial Thread Rolling Head Type E



8d

Tangential Side Rolling Attachment Type T



1) Arrow shows forming direction

6. Threads And Profiles

Almost all the normal types of threads can be rolled. Such as parallel and tapered “V” threads, knuckle and half knuckle threads, parallel type wood screw threads, and in certain circumstances buttress threads. Flank angle should not be less than 10°. Within this range of conditions any special shaped thread can be rolled. Diameters may be rolled between 0.055" to approx. 9.055".

Assuming that axially parallel grooves are regarded as being threads with infinitely large helix angles, one can understand that knurls, serrations, and similar configurations are rollable regardless of whether they are axially parallel, right or left handed helical knurls, or diamond knurls. Annular grooves without any lead – such as for hose connections and couplings – can also be rolled.

Surfaces of cylindrical components can be burnished with burnishing rolls, and pipe ends can be reduced, beveled or swaged with profiled rolls.

7. Rollable Materials

As the material will be plastically deformed by pressure, it should have a minimum elongation of 5% and a tensile strength of 1700 N/mm²/246,000 PSI should not be exceeded.

Structural steels, case hardening steels, stainless steels and heat treatable steels within these limits are suitable for rolling, as are soft brass, copper and aluminium.

Not suitable would be materials that have less than 5% elongation like cast iron, hard brass alloys and other hardened materials. The consistency of the respective component material will have a certain influence upon the tool life of the rolls.

8. Requirements For The Workpiece

As far as the configuration of the component is concerned, the rolling process can be employed virtually without restriction. Provided, the component can be clamped and positioned properly, and the rolling head can be brought into the correct machining position. In many cases one will have an option to either have the rotary motion performed by the head or by the component. Threads can also be rolled on automatic screw machines, for example on bars, working behind a shoulder, prior to cut off the component. When using bar material, it is theoretically possible to roll threads with an unlimited length. The rolling of threads on tubular parts, such as pipe, is feasible in many cases. When rolling thin-walled pipe, these can be supported by an arbor. The remaining wall-thickness left between thread root diameter and inner pipe diameter, should not be less than 0.020" + one half the depth of thread however.

9. Machine Requirement

As far as the rolling operation is concerned, the only requirement is that either the component or the rolling head or both are rotating relative to one another. Rolling heads can be used on any type of lathe, drilling machines, and automated lathes including CNC automatic lathes, swiss machines, screw machines and machining centers.

Certain requirements, such as machine power, torque, and speed depend on the type of rolling to be done and the selected rolling head design.

LMT Fette thread rolling heads can be equipped with round shanks and shanks similar to VDI or as per customer requirements.

10. Power Requirements

In general, the power requirements for thread rolling are less than the capacity for modern machine tools. In special cases, the rolling procedure requires an estimate of necessary power.

With the **axial-method**, threads are progressively formed along the axis of the workpiece. This way the thread length is formed practically without influence of the necessary drive power. The formula should be used with rolls for threads coarser than 20 TPI or 0.079" and rolls for trapezoidal and acme profiles.

The **radial-method** forms a complete thread in a single revolution of the rolls. This also produces a moment of high torque requirements on the machine, so it is recommended that the torque and drive power be calculated. It is also very important that the component to be rolled is securely clamped.

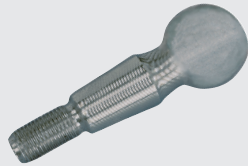
With the **Tangential-method**, a thread is formed within 15 – 30 revolutions of the rolls. In this case, the drive power of the spindle is not usually a critical factor. The power to roll the profile comes from the drive of the cross-slide (or turret). With cam-controlled automatic lathes, this is usually not a problem. With hydraulic or electrically driven cross-slides and turrets it is necessary that the tangential force be calculated so that a sufficient cross-slide force can be provided.

The formulas for calculating necessary power for the three types of rolling methods can be found in the LMT Fette Rolling Systems Tools & Knowledge Catalog available at www.lmt-tools.com

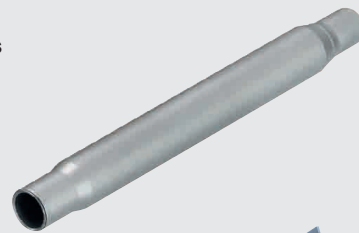
9

A small selection of profiles that can be rolled

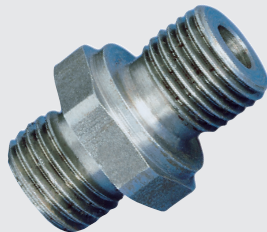
Sphere burnishing



Swaging of tubes



Thread rolling in the front and behind a shoulder



Knurling and splining



Thread on axle hub



Tapered knurl



11. Rolling System Selection

The selection criteria are compiled on pages 248 and 249 depending on the machine available, subject to the type of the component and the length of thread to be rolled. First, it must be decided whether an axial, radial or tangential side type rolling head should be used. Page 247 shows various components with a note as to which rolling system is recommended for a certain thread rolling process.

Conditional to the size and type of the thread that is to be machined, the rolling head and the size to be used can be determined from the individual tabulated charts.

We would be pleased to provide you with additional technical and price information on request.

12. Coolants And Lubricants

Conventional cutting fluids are normally suitable for rolling applications. For instance, emulsions with a 1:10 to 1:20 dilution are commonly used sometimes with high pressure additives like low viscosity cutting oils. High pressure additives will reduce friction between rolls and components, thereby increasing the tool life of the thread rolls.

Please consult us if dry machining is needed.

13. Cycle Times

In cold forming operations, extremely short cycle times are not just a welcome attribute, but rather a condition of the process. In plastic deforming, higher rolling speeds are better than low speeds.

Rolling speeds are obtained similar to cutting speeds. SFM can be calculated using the blank diameter of the thread to be rolled.

Basically, Unified and V-type threads can be generated at higher rolling speeds than acme, trapezoidal threads, as these have large masses of deformation to cope with. On the other hand, the rolling speed for materials with a higher coefficient of elongation can be higher than for materials with elongation values at the lower limit of 5%. Higher material strengths require lower rolling speeds.

In the axial, radial and tangential side rolling process, different relationships are found to exist between speed, thread diameters, pitch of thread, length of thread, feed, rolling speed and rolling time. More information on these factors is presented in individual sections of this catalog.

a) Axial rolling:

Recommended rolling speeds 60 SFM to 180 SFM possibly to 270 SFM. Component diameter and RPM along with the thread pitch and length of thread govern cycle time.

b) Radial rolling:

Recommended rolling speeds are 60–180 SFM. Since the radial rolling operation is performed in only one revolution of the roll, rolling time is extremely short.

c) Tangential side rolling:

Recommended rolling speeds are 60–240 SFM. The controlled feed required in this operation, must provide that the rolling operation is completed within 15–30 revolutions of the component. Within 5 to 7 additional component revolutions, at the most, the attachment is moved in rapid reverse travel out of the engagement position.

Rolling times of only a few seconds or even fractions of a second are an essential feature of the economic thread rolling process.

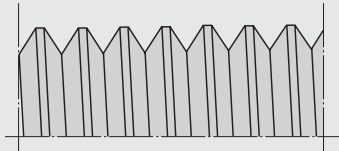
10

Rolling Times

Thread M 10 x 1.5 mm

Thread length 1.575"

Rolling time 0.9 sec.

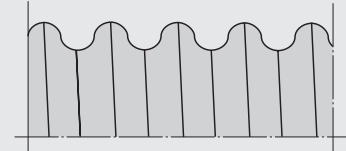


Knuckle type thread

Rd. 10 - $\frac{1}{10}$ mm

Thread length 1.575"

Rolling time 0.53 sec.

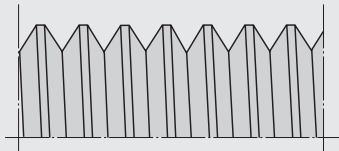


Thread M 10 x 3 mm

Pitch 1.5 mm

Thread length 1.575"

Rolling time 0.45 sec.



Knurling 10 mm Ø

Pitch 1 mm

Length of profile 1.575"

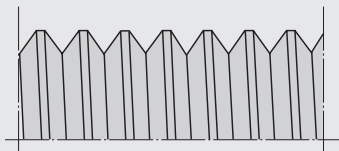
Rolling time 1.0 sec.



Thread M 24 x 1.5 mm

Thread length 0.472"

Rolling time 1.3 sec.



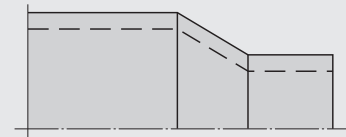
Tube reduction

from 0.354" to 0.276" diameter,

over a length of 0.394"

and 0.039" wall thickness

Rolling time 0.3 sec.

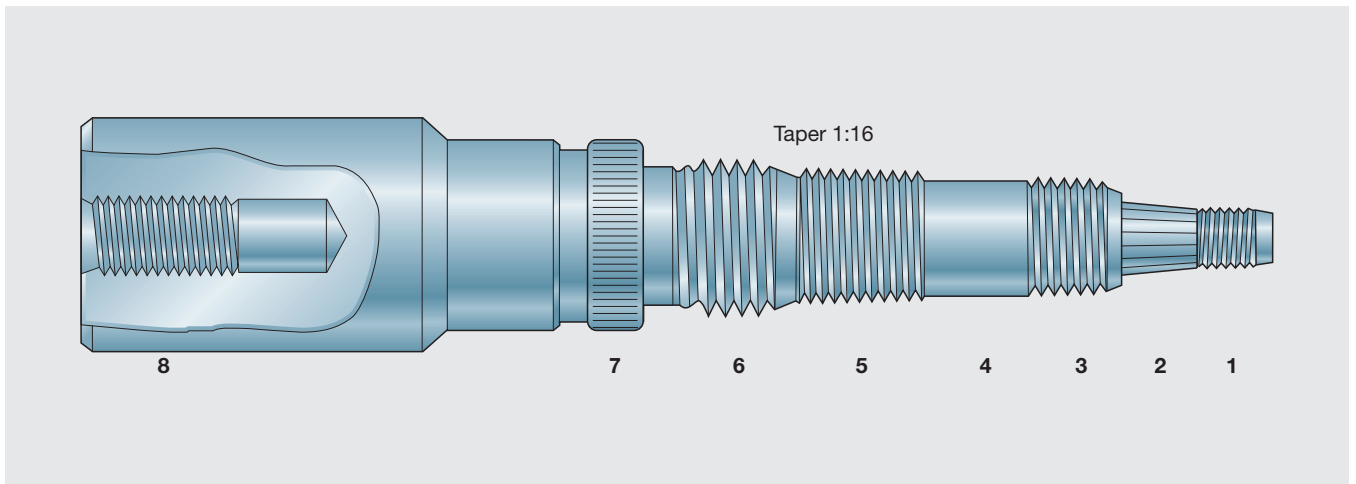


Thread Tr. 10 x 2

Thread length 1.575"

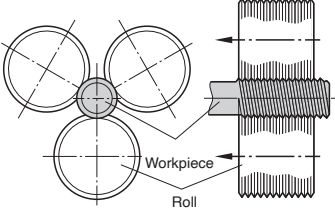
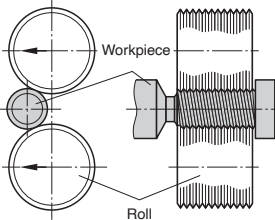
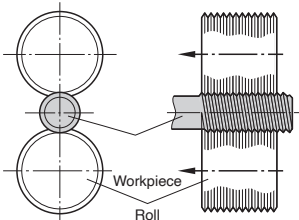
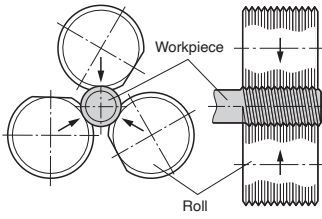
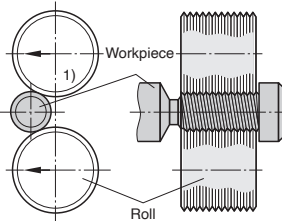
Rolling time 0.67 sec.





Pos.	Roll Method	Thread Roll Head Type	Rolling Process/ Style of Thread	Profile Length	Rolling Time 160 SFM
1	Radial	EW 10	Thread M 8 x 1.25	0.320"	0.11 s
2	Axial	KR 12	Tapered knurl Ø 11 DIN 72783	0.320"	0.07 s
3	Axial	F 2	Thread M 12 x 1.5 DIN 13	0.400"	0.28 s
4	Axial	AC2 R	Burnishing Ø 11.9 mm	0.400"	0.18 s
5	Tangential	T 18	Taper thread R ¼ – 19 DIN 2999	0.550"	0.97 s
6	Axial	AC 2	Thread 5/8 – 14 BSF B.S. 84	0.400"	0.31 s
7	Axial	F 23	Straight knurl Ø 20.5 x 1mm RAA DIN 82	0.240"	0.28 s

The types E and T are primarily designed for V-threads. In some cases for extremely short threads, if the material is easy to roll, other types of profiles can also be rolled.

Rolling Head Type	Functional Principle	No. of Rolls	Shape of Roll	Work Range Dia	Max. Length of Profile	
Axial rolling heads Types F, FU, F-RN, K 	 Feed in axial direction (in the direction of the arrow) 1. Rotating rolling head, stationary workpiece 2. Stationary rolling head, rotating workpiece	3 (2-6)		0.055" to 9.055"	Unlimited	
Tangential EVO Rolling Heads Type T 	 Feed in tangential direction (in the direction of the arrow) Stationary rolling head, rotating workpiece	2		0.063" to 3.149"	Roll width max. 2.106"	
Type AC 	 Feed in axial direction (in the direction of the arrow) Stationary rolling head, rotating workpiece	2		0.315" to 4.015" max. 2 mm Pitch	Unlimited	
Radial rolling heads Types E + EW 	 Feed in radial direction via the roll geometry 1. Rotating rolling head, stationary workpiece 2. Stationary rolling head, rotating workpiece	3 (2)		0.118" to 1.772"	Roll width max. 1.535"	
Tangential Knurling 	 Feed in tangential direction (in the direction of the arrow) Stationary rolling head, rotating workpiece	2		0.157" to 3.149"	Roll width max. 1.181"	

	Rolling Time	Special Benefits	Machine Requirements	Rolling Head Location
	Depends on thread length, speed and pitch Example: M 10 x 1.5 Thread length 0.15" Speed 1600 RPM Rolling Time: 0.5 sec	■ Unlimited profile length ■ Stationary or rotating workpiece ■ Wide range of rollable profiles	■ Universal lathe ■ CNC lathe ■ Turret lathe ■ Turning and milling centers ■ Rotary transfer machines ■ Transfer lines ■ Special lathes ■ Swiss lathe ■ Machining Center	■ Turret ■ Spindle nose ■ Tailstock ■ Tool Post
	Depends on speed and duration of engagement Example: M 10 x 1.5 Thread length 0.15" Speed 1600 RPM Rolling Time: 0.56 sec	■ Thread behind a shoulder ■ Narrow thread runout ■ Short thread length ■ Thread between shoulders ■ Workpiece held between centers	■ All lathes with feed motion control	■ Cross Slide ■ Turret
	Depends on thread length, speed and pitch Example: M 10 x 1.5 Thread length 0.15" Speed 1600 RPM Rolling Time: 0.5 sec	■ Unlimited profile length ■ Specially for CNC machines ■ Workpiece held between center	■ CNC Lathe	■ Turret ■ Cross Slide
	Depends on speed, number of threads on the roll and pitch Example: M 10 x 1.5 Thread length 0.15" Speed 1600 RPM Rolling Time: 0.19 sec	■ Narrow or small thread runout ■ Short thread length ■ Short machining times ■ Stationary or rotating workpiece ■ Automatic trigger ■ Can get closest to clamping face	■ Universal lathe ■ CNC lathe ■ Turret lathe ■ Turning and milling centers ■ Rotary transfer machines ■ Transfer lines ■ Special lathes ■ Machining Center	■ Turret ■ Spindle nose ■ Tailstock ■ Tool Post
	Depends on speed and duration of engagement Example: Straight Knurl 1/2" OD and 20 TPI pitch Thread length 0.15" Speed RPM 1000 Rolling Time: 0.9 sec	■ Knurl behind a collar ■ Short runout ■ Short knurls ■ Between shoulders	■ All lathes with controlled feed	■ Cross slide ■ Turret

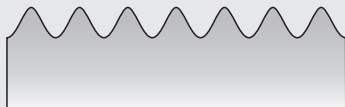
When You Want To Roll A Variety Of Profiles

Almost all standardized or special threads – from cylindrical and tapered triangular threads, through trapezoidal, round and semi-round threads to cylindrical wood threads and even buttress threads – can be rolled.

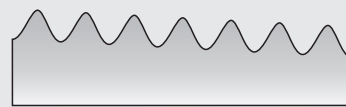
And what is more:

- Knurling
- Groves without lead
- Reduction/swaging of pipe ends
- Pipe forming
- Smoothing surfaces/burnishing
- Special profiles
- Form rolling

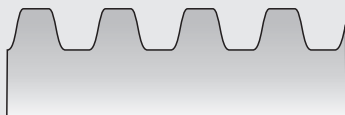
Triangular Thread



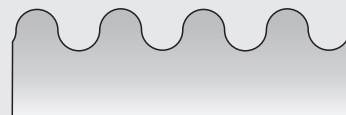
Tapered Triangular Thread



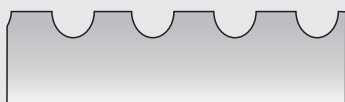
Trapezoidal Thread



Round Thread

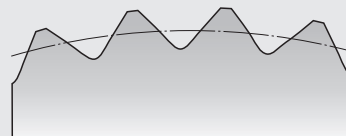


Semi-Round Thread



Splining 90°

Knurling DIN 82



Buttress thread LMT Fette Norm 10°



Typical Workpieces

A small selection of workpieces you can machine perfectly with our tools!

The workpiece can be machined either stationary or rotating. Endless threads or short threads can be rolled either in front of or behind a collar. Almost any material that has a minimum elongation of about 5% can be rolled.

Thin-walled hollow object (pipes) can be rolled if an internal mandrel is used.



Type of process

	Axial Method Type F		Tangential Method Type T
	Axial Method Type AC		Used Rotating
	Radial Method Type E		Used Stationary

Shanks/Holder

	Fixed Shank		Flange
	Change Shanks		Rolling Head Holder

Thread types

M	BA	BSF	BSFS	BSW	FG	G	MF	NPT	NPTF
R	RD	RD DIN 405	UN	UNC	UNF	UNS	UNEF	VG	API

Rollable Profiles

	Left-hand thread		Knurls RAA
	Right-hand thread		Knurls RAA taper
	Fine pitch thread		Knurls RGE
	Thread (Coarse)		Triangular thread
	Taper thread		Buttress thread
	Tube end closing		Wood thread
	Smoothing/Burmishing		Round thread
	Crimp and groove		Trapezoidal thread
	Reduction of Pipes/Swaging		

Rolls

	Tangential Roll Form B, Full Width		Number of Rolls
	Tangential Roll Form A		Number of Rolls
	Tangential Roll Form A, Taper		Number of Rolls
	Tangential Roll Form AV, Taper		Radial Roll Form AK, Conical
			Radial Roll Form A, Conical

Types

	LMT Fette Standard
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Thread length

Axial

Radial

Tangential

Thread Ø

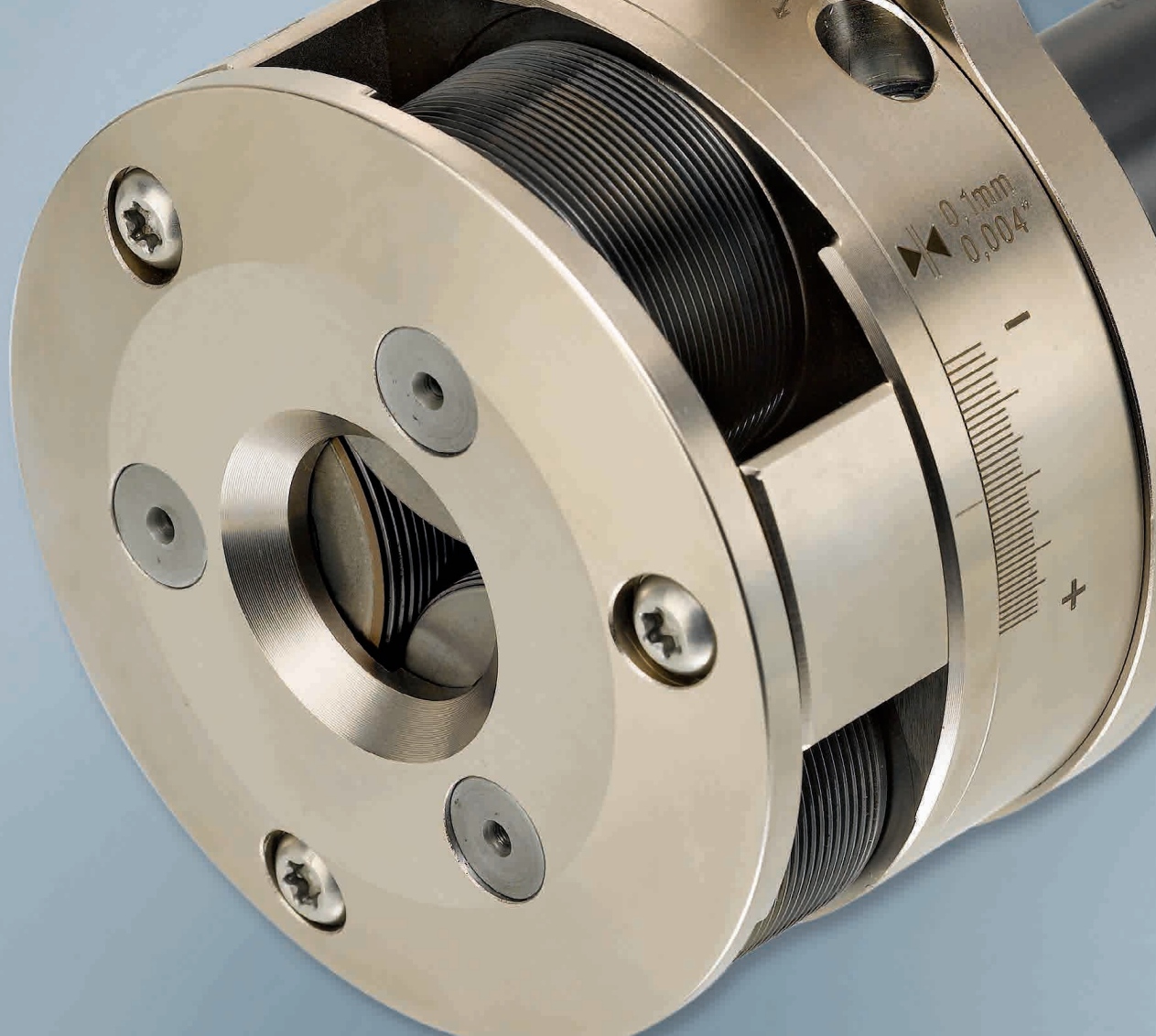
Axial

Radial

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Tangential

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



Axial Rolling Heads

EVOLINE

Easy and precise fine
adjustment of the
rolling diameter

Short machining times,
high thread strength and
high thread quality

Increased process
safety due to chip
guard

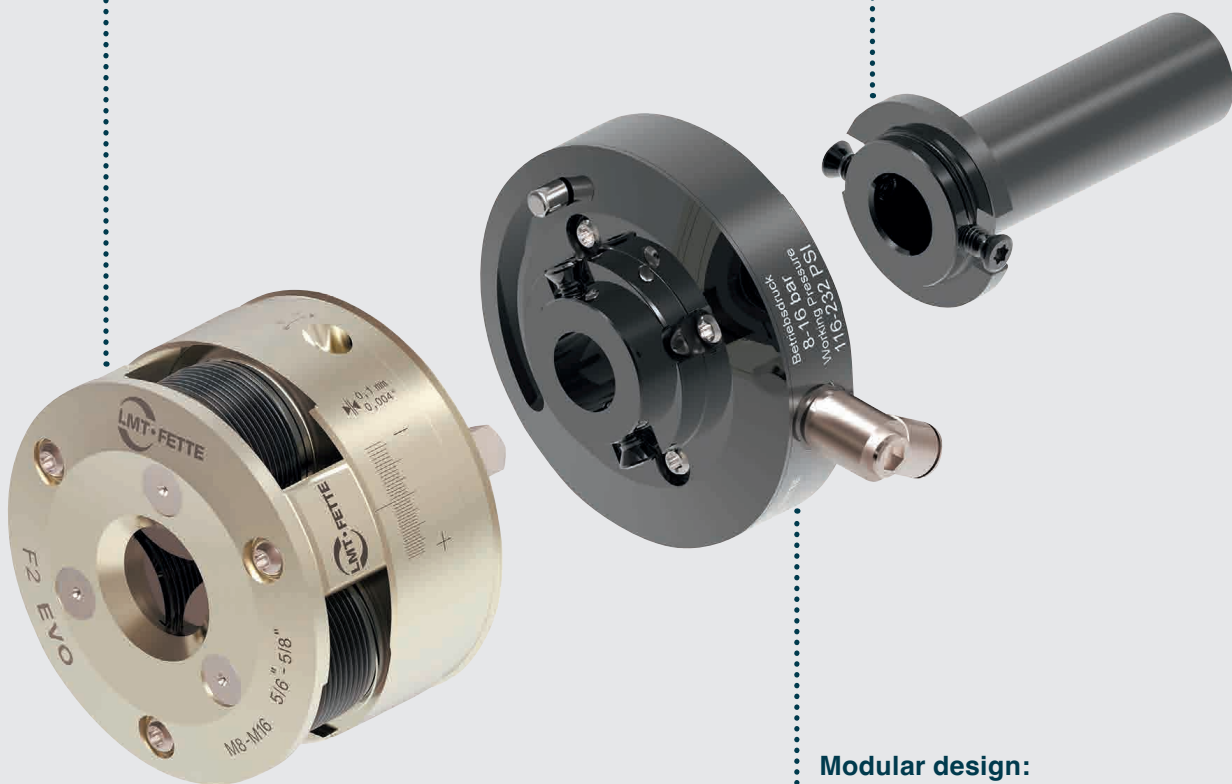
Safe and easy assembly
due to modular design

Modern closing device
is easy to adapt



Axial rolling head EVOLine:
Increased process safety and
highest user friendliness.

**New shank adaption for
precise concentricity and
safe torque transmission.**
High flexibility and
efficiency due to modular
change shanks.



**Central adjustment of the rolling
diameter with fine adjustment.**
Easy handling and precise
repeatability of the settings.

Modular design:
A modern, coolant operated closing
device can be integrated very easily.

EVOLINE 



Fine Adjustment Of The Rolling Diameter

- Patented central adjustment of the diameter range including fine adjustment of the rolling diameter
- Fine adjustment by adjusting spindle
- Precise adjustment possible (in range of 0.004")
- High repeatability – reproducibility of pitch diameter at same scale position is ± 0.0004 "



Chip Guard

- Increased process safety due to new chip guard
- Protection from chips and other particles (from pre/post processes) even when clutch is open

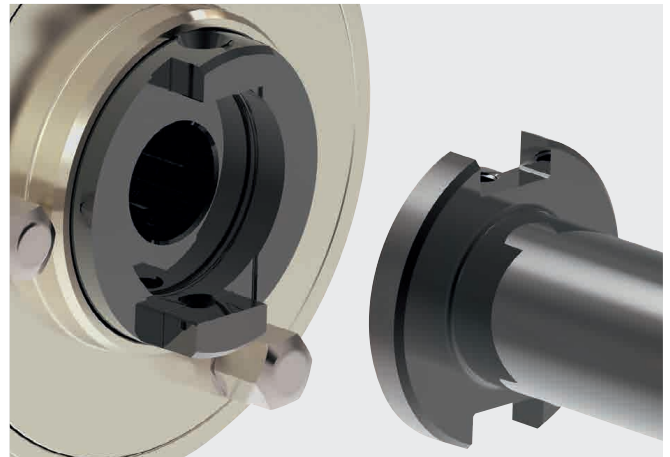


Modular Design

- Consisting of thread rolls, roller cage, rolling system housing incl. central fine adjustment, closing clip resp. closing device and shank with new adaption
- Closing clip revolving full 360° and can be set perfectly to the adaption situation in the machine
- Coolant driven closing device is optionally available and can be integrated easily between clutch and shank
- High flexibility and efficiency due to interchangeable shanks

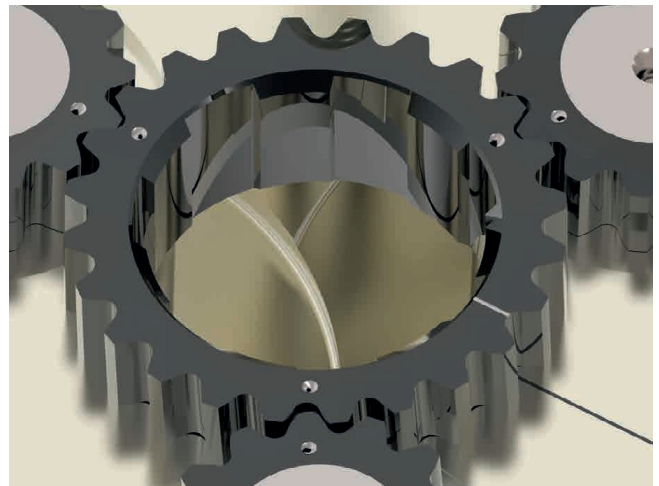
New Shank Adaption

- The ideal modular design – optional closing device can be integrated
- Precise concentricity
- Safe torque transmission
- Easy assembly
- High flexibility due to a wide range of standard shank sizes



Easy Assembly

- High process safety due to defined mounting position
- Additional marking on gears for error-free assembly
- Defined mounting position of the clutch due to different angle



Closing Clip

- Adjustable range 360°
- Perfect set-up to suit machine tool requirements
- Interface for different fastening elements (closing roller, closing pin) available



EVOLINE

LMT Fette axial rolling heads generate the thread or required form and then open automatically after rolling. Before the next thread can be rolled the head has to be put back into working position, means the head must be closed.

The completely new designed closing clip, delivered as standard, already allows an flexible and user friendly layout of the process for closing the rolling head.

Another significant optimization of the closing process can be realized with the new coolant operated closing device (CCD) for EVOLine. Adapted between rolling head and shank and connected with the coolant supply, closing of the rolling head can be transferred from process time to the non-productive time of the machine.

Closing by coolant (or even compressed air) can be integrated in the machine program by a simple function.

Easy, safe and fast.

- Because of the modular design of EVOLine the closing device can be easily integrated between head and shank
- All shank variants still can be used

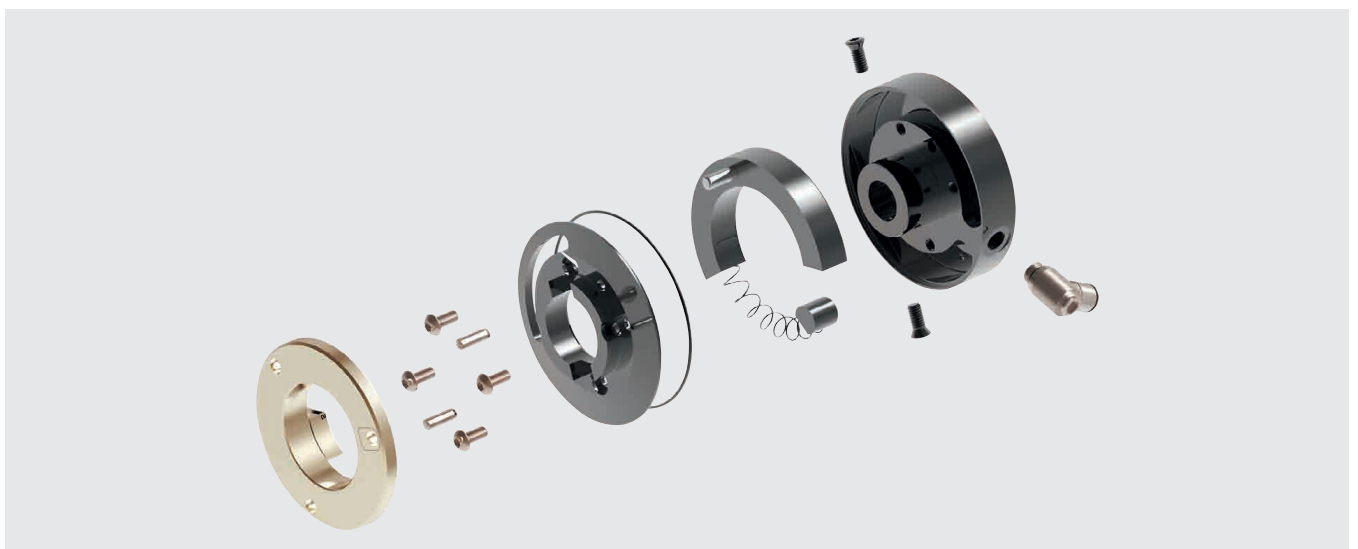
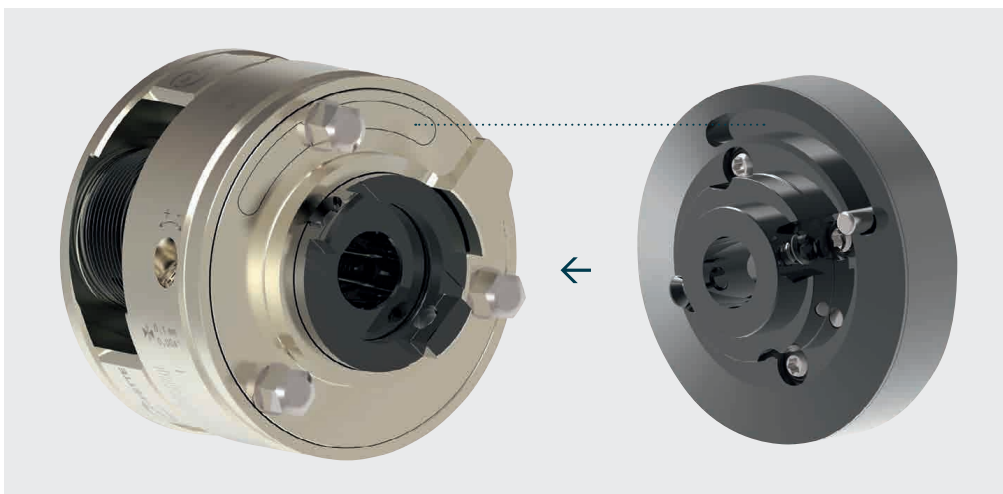
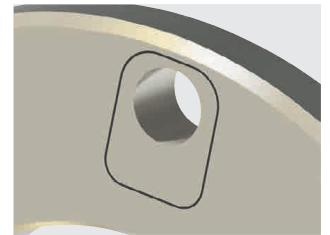
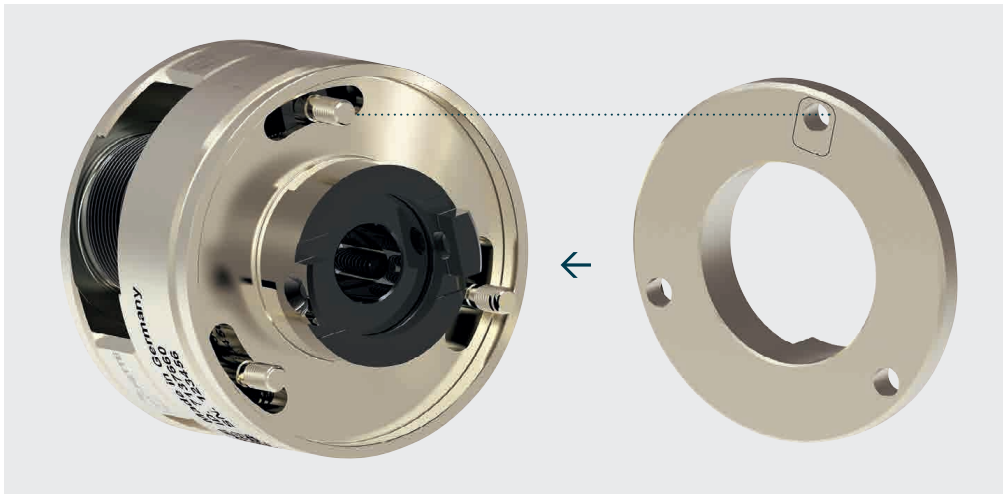


- The closing device can be operated with any coolant and also with compressed air
- The working pressure is at range from 8–16 bar (116-232 psi)



- Delivered as a standard is a complete starter package: beside the closing device there is a special chip guard, different connecting elements and a pressure hose

- High process safety and easy assembly due to defined mounting position and one-to-one marking at chip guard



Selection Of Rolling Head Sizes According To Thread Dimensions

	UN	UNC	UNEF	UNF	UNJ							
	Rolling Head											
Page	264	268	272	277	281	285	289	293	297	301	305	309
Thread Size	F0 K0	F001	F01 K01-1 EVO	F1 K1 EVO	F12 K12 EVO	F1223 K1223 EVO	F2 K2 EVO	F23 K23 EVO	F233400 K233400 EVO	F3 K3 EVO	F34 K34 EVO	F4-1 RN
0 – 80 UNF	■											
1 – 64 UNC	■											
1 – 72 UNF	■											
2 – 56 UNC	■											
3 – 64 UNF	■											
3 – 48 UNC	■											
3 – 56 UNF	■											
4 – 40 UNC	■	■										
4 – 48 UNF	■	■										
5 – 40 UNC	■	■										
5 – 44 UNF	■	■										
6 – 32 UNC	■	■										
6 – 40 UNF	■	■	■									
8 – 32 UNC	■	■	■									
8 – 36 UNF	■		■									
10 – 24 UNC	■		■									
10 – 32 UNF	■		■									
12 – 24 UNC	■		■			■						
12 – 28 UNF	■		■			■						
12 – 32 UNEF	■		■									
1/4 – 20 UNC			■	■		■						
1/4 – 28 UNF			■	■		■						
1/4 – 32 UNEF			■		■	■						
5/16 – 18 UNC				■		■						
5/16 – 20 UN				■		■						
5/16 – 24 UNF				■		■	■					
5/16 – 28 UN				■			■					
5/16 – 32 UNEF					■			■				
3/8 – 16 UNC				■			■					
3/8 – 20 UN				■								
3/8 – 24 UNF				■	■		■					
3/8 – 28 UN					■			■				
3/8 – 32 UNEF					■			■				
7/16 – 14 UNC				14			■			■		
7/16 – 16 UN							■			■		
7/16 – 20 UNF				14	14		■			■		
7/16 – 28 UNEF					14			■				
7/16 – 32 UN								■				
1/2 – 13 UNC							■			■		
1/2 – 16 UN							■			■		
1/2 – 18 UN							■			■		
1/2 – 20 UNF					14		■	■		■		
1/2 – 28 UNEF					14			■			■	
1/2 – 32 UN								■			■	
9/16 – 12 UN							■			■		■
9/16 – 14 UN							■			■		
9/16 – 16 UN							■			■		
9/16 – 18 UNF							■	■		■		

■ = Unlimited length of thread

	UN	UNC	UNEF	UNF	UNJ					
	Rolling Head									
Page	289	293	297	301	305	309	313	317	321	
Thread Size	F2 K2 EVO	F23 K23 EVO	F233400 K233400 EVO	F3 K3 EVO	F34 K34 EVO	F4-1 RN	F45-1 RN	F5-1 RN	F56-1 RN	
9/16 – 20 UN		■		S■	■					
9/16 – 22 UN		■			■					
9/16 – 24 UNEF		■			■					
9/16 – 26 UNEF										
9/16 – 28 UN		■			■					
9/16 – 32 UN		■			■					
5/8 – 11 UNC	■			■		■				
5/8 – 12 UN	■			■		■				
5/8 – 16 UN	■	■		■		■				
5/8 – 18 UNF	■	■	73	■	■	■				
5/8 – 20 UN		■	73		■	■				
5/8 – 24 UNEF		■	73		■					
5/8 – 28 UN		■	73		■					
5/8 – 32 UN		■	73		■					
11/16 – 12 UN				■		■				
11/16 – 16 UN		19	73	■		■				
11/16 – 20 UN		19	73		■					
11/16 – 24 UNEF		19	73		■					
11/16 – 28 UN		19	73		■					
11/16 – 32 UN			73	S■						
3/4 – 10 UNC				■		■		■		
3/4 – 12 UN				■		■		■		
3/4 – 16 UNF		19	73	■	■	■		■		
3/4 – 20 UNEF		19	73		■		■			
3/4 – 24 UN			73							
3/4 – 28 UN			73				■			
3/4 – 32 UN			73				■			
13/16 – 12 UN			73	■		■		■		
13/16 – 16 UN		19	73		■		■			
13/16 – 20 UNEF		19	73		■		■			
13/16 – 28 UN			73		■		■			
13/16 – 32 UN			73				■			
7/8 – 9 UNC				■		■		■		
7/8 – 12 UN			73		■	■		■		
7/8 – 14 UNF			73	■	■	■	■	■		
7/8 – 16 UN			73		■		■		■	
7/8 – 20 UNEF		19	73		■		■		■	
7/8 – 28 UN			73		■		■		■	
7/8 – 32 UN							■		■	
15/16 – 12 UN			73		24	■		■		
15/16 – 16 UN			73		24		■		■	
15/16 – 20 UNEF			73		24		■		■	
15/16 – 28 UN							■		■	
15/16 – 32 UN									■	
1 – 8 UNC						■		■		

14 = Maximum length of rolling 14 mm (0.551")

19 = maximum length of rolling 19 mm (0.748")

24 = maximum length of rolling 24 mm (0.945")

73 = maximum length of rolling 73 mm (2.874")

S = Special rolling head helix angle necessary

Selection Of Rolling Head Sizes According To Thread Dimensions

UNUNCUNEFUNFUNJ								
		Rolling Head						
Page		297	301	305	309	313	317	321
Thread Size		F233400 K233400 EVO	F3 K3 EVO	F34 K34 EVO	F4-1 RN	F45-1 RN	F5-1 RN	F56-1 RN
1 – 12 UNF	73		24	■	■	■		
1 – 16 UN	73		24		■			■
1 – 20 UNEF	73		24		■			■
1 – 28 UN								■
1 – 32 UN								■
1 ¹ / ₁₆ – 8 UN					■		■	
1 ¹ / ₁₆ – 12 UN	73		24		■	■		
1 ¹ / ₁₆ – 16 UN	73		24		■			■
1 ¹ / ₁₆ – 18 UNEF	73		24		■			■
1 ¹ / ₁₆ – 20 UN	73		24		■			■
1 ¹ / ₁₆ – 28 UN								■
1 ¹ / ₈ – 7 UNC					■		■	
1 ¹ / ₈ – 8 UN					■		■	
1 ¹ / ₈ – 12 UNF	24			S■	■	■		■
1 ¹ / ₈ – 16 UN	24		24		■			■
1 ¹ / ₈ – 18 UNEF	24		24		■			■
1 ¹ / ₈ – 20 UN	24		24		■			■
1 ¹ / ₈ – 28 UN								■
1 ³ / ₁₆ – 8 UN					■		■	
1 ³ / ₁₆ – 12 UN	24		24		■			■
1 ³ / ₁₆ – 16 UN	24		24		■			■
1 ³ / ₁₆ – 18 UNEF	24		24		■			■
1 ³ / ₁₆ – 20 UN	24		24		■			■
1 ³ / ₁₆ – 28 UN								■
1 ¹ / ₄ – 7 UNC							■	
1 ¹ / ₄ – 8 UN							■	
1 ¹ / ₄ – 12 UNF	24					■		■
1 ¹ / ₄ – 16 UN	24					■		■
1 ¹ / ₄ – 18 UNEF	24					■		■
1 ¹ / ₄ – 20 UN						■		■
1 ¹ / ₄ – 28 UN								■
1 ⁵ / ₁₆ – 8 UN							■	
1 ⁵ / ₁₆ – 12 UN	24					■		■
1 ⁵ / ₁₆ – 16 UN	24					■		■
1 ⁵ / ₁₆ – 18 UNEF	24					■		■
1 ⁵ / ₁₆ – 20 UN						■		■
1 ⁵ / ₁₆ – 28 UN								■
1 ³ / ₈ – 6 UNC							■	
1 ³ / ₈ – 8 UN							■	
1 ³ / ₈ – 12 UNF	24					■		■
1 ³ / ₈ – 16 UN	24					■		■
1 ³ / ₈ – 18 UNEF	24					■		■
1 ³ / ₈ – 20 UN					S■			■
1 ³ / ₈ – 28 UN								S■
1 ⁷ / ₁₆ – 6 UN							■	

■ = Unlimited length of thread

S = Special rolling head helix angle necessary

UNUNCUNEFUNFUNJ					
		Rolling Head			
Page		297	313	317	321
Thread Size		F233400 K233400 EVO	F45-1 RN	F5-1 RN	F56-1 RN
17/16 – 8 UN				■	
17/16 – 12 UN	24	28		■	
17/16 – 16 UN	24	28		■	
17/16 – 18 UNEF				■	
17/16 – 20 UN				■	
17/16 – 28 UN				S■	
11/2 – 6 UNC			■		
11/2 – 8 UN			■		
11/2 – 12 UNF	28			■	
11/2 – 16 UN	28			■	
11/2 – 18 UNEF				■	
11/2 – 20 UN				■	
11/2 – 28 UN				S■	
19/16 – 12 UN	28			■	
19/16 – 16 UN	28			■	
19/16 – 18 UNEF				■	
19/16 – 20 UN				S■	
15/8 – 12 UN				■	
15/8 – 16 UN				■	
15/8 – 18 UNEF				■	
15/8 – 20 UN				S■	
111/16 – 12 UN				■	
111/16 – 16 UN				■	
111/16 – 18 UNEF				■	
111/16 – 20 UN				S■	
13/4 – 8 UN				■	
13/4 – 12 UN				■	
13/4 – 16 UN				■	
13/4 – 20 UN				S■	
113/16 – 8 UN				■	
113/16 – 12 UN				■	
113/16 – 16 UN				■	
113/16 – 20 UN				S■	
17/8 – 8 UN				95	
17/8 – 12 UN				95	

24 = maximum length of rolling 24 mm (0.945")
28 = maximum length of rolling 28 mm (1.102")
38 = Maximum length of rolling 38 mm (1.496")
73 = maximum length of rolling 73 mm (2.874")
75 = maximum length of rolling 75 mm (2.953")
95 = maximum length of rolling 95 mm (3.740")

UN UNC	
Rolling head	
Page	321
Thread size	F56-1 RN
1 ⁷ / ₈ – 16 UN	95
1 ⁷ / ₈ – 20 UN	S 95
1 ¹⁵ / ₁₆ – 8 UN	95
1 ¹⁵ / ₁₆ – 12 UN	95
1 ¹⁵ / ₁₆ – 16 UN	95
1 ¹⁵ / ₁₆ – 20 UN	S 95
2 – 8 UN	95
2 – 12 UN	95
2 – 16 UN	95
2 – 20 UN	S 95
2 ¹ / ₈ – 8 UN	38
2 ¹ / ₈ – 12 UN	38
2 ¹ / ₈ – 16 UN	S 38
2 ¹ / ₈ – 20 UN	S 38

Larger thread sizes up to 9" x 6 UN are available.

M MF DIN 13								
		Rolling Head						
Page		264	268	272	277	281	285	289
Thread size		F0 K0	F001	F01 K01-1 EVO	F1 K1 EVO	F12 K12 EVO	F1223 K1223 EVO	F2 K2 EVO
MF 1.4 x 0.3		■						
M 1.6 x 0.35		■						
M 1.8 x 0.35		■						
M 2 x 0.4		■						
M 2.2 x 0.45		■						
MF 2.3 x 0.4		■						
M 2.5 x 0.45		■						
MF 2.6 x 0.45		■	■					
MF 3 x 0.6		■	■					
M 3 x 0.5		■	■					
M 3.5 x 0.6		■	■	■				
MF 3.5 x 0.5		■	■	■				
MF 4 x 0.75		■	■	■				
M 4 x 0.7		■	■	■				
MF 4 x 0.5		S■	S■	S■				
M 4.5 x 0.75		■		■				
MF 4.5 x 0.5		S■		S■				
MF 5 x 0.9		■		■				
M 5 x 0.8		■		■			■	
MF 5 x 0.75		■		■				
MF 5 x 0.5		S■		S■				
MF 5.5 x 0.9		■		■				
MF 5.5 x 0.75		■		■				
MF 5.5 x 0.5		S■		S■				
M 6 x 1				■	■		■	
MF 6 x 0.75				S■	■	■	■	
MF 6 x 0.5				S■		■		
M 7 x 1					■		■	
MF 7 x 0.75					■	■	■	
MF 7 x 0.5						■	S■	
M 8 x 1.25					■		■	■
MF 8 x 1					■	■	■	
MF 8 x 0.75						■	■	■
MF 8 x 0.5						■	S■	■
M 9 x 1.25					■			■
MF 9 x 1					■	■		■
MF 9 x 0.75						■		■
MF 9 x 0.5						S■		■
M 10 x 1.5					■			■
MF 10 x 1.25					■	■		■
MF 10 x 1					■	■		■
MF 10 x 0.75						■		■
MF 10 x 0.5						S■		■
M 11 x 1.5								■
MF 11 x 1						14		■
MF 11 x 0.75						14		■
MF 11 x 0.5						S 14		S■

■ = Unlimited length of thread
S = Special rolling head helix angle necessary

M MF DIN 13										
		Rolling head								
Page		281	285	289	293	297	301	305	309	313
Thread size		F12 K12 EVO	F1223 K1223 EVO	F2 K2 EVO	F23 K23 EVO	F233400 K233400 EVO	F3 K3 EVO	F34 K34 EVO	F4-1 RN	F45-1 RN
M 12 x 1.75				■			■			
MF 12 x 1.5	14		■				■			
MF 12 x 1.25	14		■				■			
MF 12 x 1	14			■				■		
MF 12 x 0.75	14			■				■		
MF 12 x 0.5	S 14			S■				■		
MF 13 x 1.5	14		■				■			
MF 13 x 1				■				■		
MF 13 x 0.75				■				■		
MF 13 x 0.5				S■				S■		
M 14 x 2			■				■		■	
MF 14 x 1.5			■				■		■	
MF 14 x 1.25				■						
MF 14 x 1				■				■		
MF 14 x 0.75				■				■		
MF 14 x 0.5				S■				S■		
MF 15 x 1.5			■				■		■	
MF 15 x 1				■				■		
MF 15 x 0.75				■				■		
MF 15 x 0.5				S■				S■		
M 16 x 2			■				■		■	
MF 16 x 1.5			■	■	73		■	■	■	
MF 16 x 1.25				■						
MF 16 x 1				■	73			■		■
MF 16 x 0.75				S■	73			S■		■
MF 16 x 0.5				S■	S 73			S■		S■
MF 17 x 2							■		■	
MF 17 x 1.5					19	73		■	■	
MF 17 x 1						73		■		■
MF 17 x 0.75					S 19	73		S■		■
MF 17 x 0.5					S 19	S 73		S■	S■	S■
M 18 x 2.5							■		■	■
MF 18 x 2							■		■	■
MF 18 x 1.5					19	73		■	■	■
MF 18 x 1					19	73		■		■
MF 18 x 0.75					S 19	73		S■		■
MF 18 x 0.5					S 19	S 73				
MF 19 x 2							■	S■	■	S■
MF 19 x 1.5					19	73		■		■
MF 19 x 1					19	73		■		■
MF 19 x 0.75					S 19	S 73		S■		■
MF 19 x 0.5					S 19	S 73		S■		S■
M 20 x 2.5							■		■	■
MF 20 x 2							■		■	■
MF 20 x 1.5					19	73		■		■

14 = maximum length of rolling 14 mm (0.551")
19 = maximum length of rolling 19 mm (0.748")
73 = maximum length of rolling 73 mm (2.874")

Selection Of Rolling Head Sizes According To Thread Dimensions

M	MF	DIN 13							
		Rolling head							
Page		293	297	301	305	309	313	317	321
Thread size		F23 K23 EVO	F233400 K233400 EVO	F3 K3 EVO	F34 K34 EVO	F4-1 RN	F45-1 RN	F5-1 RN	F56-1 RN
MF 20 x 1		19	73		■		■		
MF 20 x 0.75	S 19	S 73		S	■		■		
MF 21 x 2				■		■		■	
MF 21 x 1.5	19	73			■		■		■
MF 21 x 1	S 19	73			■		■		
MF 21 x 0.75	S 19	S 73		S	■		S	■	
M 22 x 2.5				■		■		■	
MF 22 x 2		73		■		■		■	
MF 22 x 1.5	19	73			24				■
MF 22 x 1	S 19	73			S 24		■		■
MF 22 x 0.75	S 19	S 73			S 24		S	■	■
MF 23 x 2		73			24	■	■	■	
MF 23 x 1.5		73			24		■		■
MF 23 x 1		73			S 24		■		■
MF 23 x 0.75		S 73			S 24		S	■	■
M 24 x 3						■		■	
MF 24 x 2		73			24	■	■	■	
MF 24 x 1.5		73			24		■		■
MF 24 x 1		S 73			S 24		■		■
MF 24 x 0.75		S 73			S 24		S	■	■
MF 25 x 2		73			24	■	■	■	
MF 25 x 1.5					24		■		■
MF 25 x 1		S 73			S 24		■		■
MF 25 x 0.75		S 73			S 24		S	■	S
MF 26 x 2		73			24		■		
MF 26 x 1.5		73			24		■		■
MF 26 x 1		S 73			S 24		■		■
MF 26 x 0.75		S 73			S 24		S	■	S
M 27 x 3						■		■	
MF 27 x 2		73			24		■		■
MF 27 x 1.5		73			24		■		■
MF 27 x 1		S 73			S 24		■		■
MF 27 x 0.75		S 73			S 24		S	■	S
MF 28 x 3						■		■	
MF 28 x 2		24			24		■		■
MF 28 x 1.5		24			24		■		■
MF 28 x 1		S 24			S 24		S	■	■
MF 28 x 0.75		S 24			S 24		S	■	S
MF 29 x 1.5		24			24		■		■
MF 29 x 1		S 24			S 24		S	■	■
M 30 x 3.5						■		■	
MF 30 x 3						■		■	
MF 30 x 2		24			24		■		■
MF 30 x 1.5		24			24		■		■

■ = Unlimited length of thread
S = Special rolling head helix angle necessary

M MF DIN 13								
		Rolling head						
Page		297	301	305	309	313	317	321
Thread Size		F233400 K233400 EVO	F3 K3 EVO	F34 K34 EVO	F4-1 RN	F45-1 RN	F5-1 RN	F56-1 RN
MF 30 x 1	S 24		S 24		S ■		■	
MF 31 x 1.5	24				■		■	
MF 31 x 1	S 24				S ■		■	
MF 32 x 3						■		
MF 32 x 2	24				■		■	
MF 32 x 1.5	24				■		■	
MF 32 x 1	S 24				S ■		S ■	
M 33 x 3.5						■		
MF 33 x 3						■		
MF 33 x 2	24				■		■	
MF 33 x 1.5	S 24				■		■	
MF 33 x 1	S 24				S ■		■	
MF 34 x 3						■		
MF 34 x 2	24				■		■	
MF 34 x 1.5	24				■		■	
MF 34 x 1	S 24				S ■		S ■	
MF 35 x 3						■		
MF 35 x 2	24				■		■	
MF 35 x 1.5	S 24				■		■	
MF 35 x 1	S 24				S ■		S ■	
M 36 x 4						■		
MF 36 x 3						■		
MF 36 x 2	24				■		■	
MF 36 x 1.5	24				■		■	
MF 36 x 1	S 24				S ■		S ■	
MF 37 x 1.5					28		■	
MF 37 x 1					S 28		S ■	
MF 38 x 3						■		
MF 38 x 2					28		■	
MF 38 x 1.5					28		■	
M 39 x 4						■		
MF 39 x 2					28		■	
MF 39 x 1.5					28		■	
MF 40 x 3							■	
MF 40 x 2					28		■	
MF 40 x 1.5					28		■	
M 42 x 4.5							■	
MF 42 x 4							■	
MF 42 x 3							■	
MF 42 x 2					28		■	
MF 42 x 1.5							■	

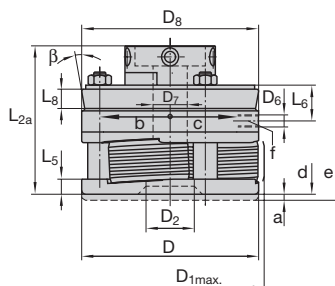
19 = maximum length of rolling 19 mm (0.748")
24 = maximum length of rolling 24 mm (0.945")
28 = maximum length of rolling 28 mm (1.102")
73 = maximum length of rolling 73 mm (2.874")
75 = maximum length of rolling 75 mm (2.953")
95 = Maximum length of rolling 95 mm (3.740")

M MF DIN 13		
		Rolling head
Page		321
Thread size		F56-1 RN
MF 45 x 3		■
MF 45 x 2		■
MF 45 x 1.5		■
MF 48 x 3	95	
MF 48 x 2	95	
MF 48 x 1.5	95	
MF 50 x 3	95	
MF 50 x 2	95	
MF 50 x 1.5	S 95	
MF 52 x 3	95	
MF 52 x 2	95	
MF 52 x 1.5	S 95	

Larger sizes up to
M 230 x 3 are available.



Type	Ident. No.
F0 C1	2430900
F0L C1	2430901
K0 C1	2430902
K0L C1	2430903



Dimension in Inches

D	D _{1max}	D ₂	D ₆	D ₇	D ₈ ¹⁾	L _{2a}	L ₅	L ₆	L ₈ ¹⁾	a	α	β ¹⁾	γ
1.969	2.146	0.453	M5	0.256	2.165	1.811	0.197	0.224	0.547	0.079	50°	10°	4°

F0 C1 and K0 C1 for right-hand threads
 F0L C1 and K0L C1 for left-hand threads
 F0 C1 and F0L C1 to be used stationary only
 K0 C1 and K0L C1 used stationary or rotating

m-Rk	m-Ro
approx. 1.1 lb	approx. 0.07–0.11 lb

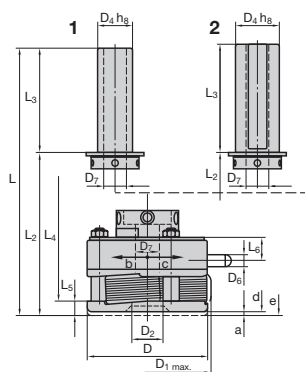
a = Pull off for opening
 b = Head opens when type K, and closes when type F
 c = Head closes when type K, and opens when type F (for rollings heads for left-hand threads, the direction of operation is reversed)
 d = Rolling head closed
 e = Rolling head opened
 f = Thread for handle with stationary operation. Rolling heads can also be delivered with closing rod, closing roller and closing spring, instead of handle (see page 331).
 α = Closing angle
 γ = Inclined position of rolls
 m-Rk = Rolling head weight without shank and rolls
 m-Ro = Weight of 1 set of 3 rolls

¹⁾ Only for Type K

Change Shanks ... -C1

Type	Ident. No.
R20-C1	2430980
R25-C1	2430973
R ³ / ₄ -C1	2430981
R1-C1	2430977
R1 ¹ / ₄ -C1	2430982

- 1 Straight shank
- 2 Straight shank with flat (upon request)



Shank Dia.	Dimension in Inches						
	D ₄	D _{7a}	D ₉	L	L ₂	L ₃	m-Rs ¹⁾
20 mm	0.787	0.449	—	4.272	1.909	2.362	appr. 0.29 lb
25 mm	0.984	0.449	—	4.272	1.909	2.362	appr. 0.46 lb
³ / ₄	0.750	0.449	—	4.272	1.909	2.362	appr. 0.27 lb
1	1.000	0.449	—	4.272	1.909	2.362	appr. 0.49 lb
1 ¹ / ₄	1.250	0.449	—	4.272	1.909	2.362	appr. 0.79 lb

Change shanks will be delivered with the according fastening screws (5 x 1045129).

¹⁾ Weight for shank

For a functional axial rolling system, select a head, a shank, and thread rolls. A coolant closing device to automate the resetting of the head is available as a special. Inquire with customer service.



UNJ

Nominal size x TPI	Lead 1k
	Ident No.
UNJ 4-5 x 40	On Request
UNJ 6-8 x 32	2167251
UNJ 6 x 40	On Request
UNJ 10 x 24	On Request
UNJ 10 x 32	2167354

M

Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 1.4 x 0.3	1500201	1500210
M 1.6 ... 1.8 x 0.35	1500229	1500238
M 2 ... 2.3 x 0.4	1500247	1500256
M 2.2 ... 2.6 x 0.45	1500265	1500274
M 2.5 ... 3 x 0.5	1500283	1500292
M 3 ... 3.5 x 0.6	1500318	1500327
M 4 x 0.7	1500345	1500354
M 4 ... 4.5 x 0.75	1500363	1500372
M 5 ... 5.5 x 0.8	1500381	1500407
M 5 ... 5.5 x 0.9	1500416	1500425

UNC

Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC 1 – 64	2166134	2241178
UNC 2 – 56	2166135	1500568
UNC 3 – 48	2240154	2241179
UNC 4... 5 – 40	1500577	1500586
UNC 6... 8 – 32	1500595	1500602
UNC 10...12 – 24	1500611	1500620

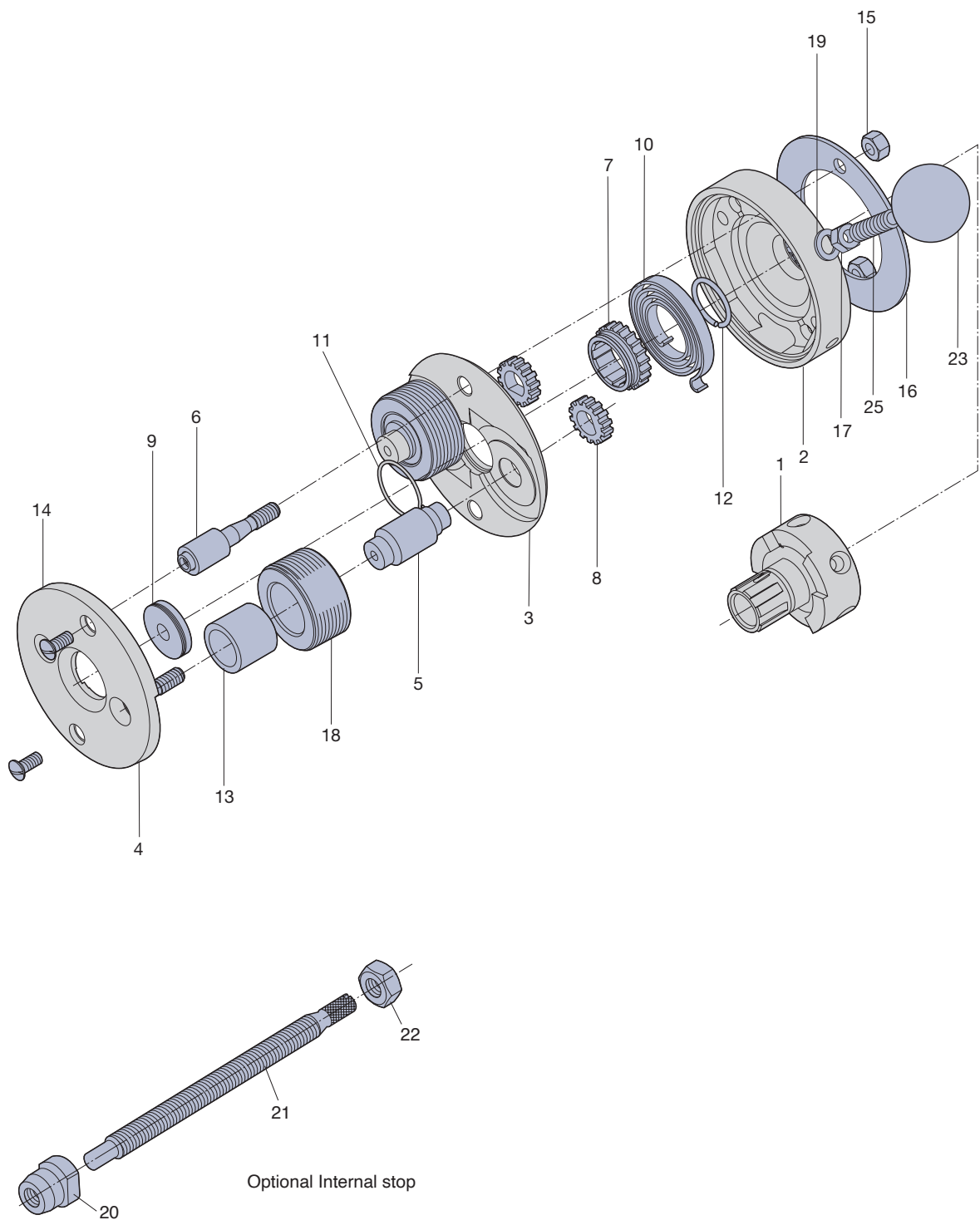
UNF

Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 0 – 80	2166136	2241181
UNF 1 – 72	2166137	2241183
UNF 2 – 64	1500657	2241185
UNF 3 – 56	2164714	2241186
UNF 4 – 48	1500675	1500684
UNF 5 – 44	1500693	1500700
UNF 6 – 40	1500719	2169077
UNF 8 – 36	1500737	1500746
UNF 10 – 32	1500755	1500764
UNF 12 – 28	1500773	1500782

Thread dimensions combined in one block can be rolled with **one** set of rolls.

Rolling head			F0 C1	F0L C1 Left hand head	Rolling head			K0 C1	K0L C1 Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	2430904	2430905	1	1	Clutch	2430905	2430904
2	1	Spring housing	2164502	2164511	2	1	Spring housing	2164543	2168919
3	1	Centre plate	2164503	2164516	3	1	Centre plate	2164544	2168920
4	1	Front plate	2164504	2164519	4	1	Front plate	2164545	2168921
5	2	Eccentric spindles	2164505		5	2	Eccentric spindles	2164505	
6	2	Spacer studs	2164506		6	2	Spacer studs	2164506	
7	1	Center gear	2164507	2164520	7	1	Center gear	2164507	2164520
8	2	Spur gear	2164508		8	2	Spur gear	2164508	
9	1	Guide bushing	see individual		9	1	Guide bushing	see individual	
10	1	Coil spring	2164512	2164521	10	1	Coil spring	2164521	
11	1	Circlip	2164513		11	1	Circlip	2164513	
12	1	Circlip	2164514		12	1	Circlip	2164514	
13	2	Carbide bushing	2167472		13	2	Carbide bushing	2167472	
14	2	Front plate screw	2142488		14	2	Front plate screw	2142488	
15	2	Hexagon nut	2148397		15	2	Hexagon nut	2148397	
16	1	Ring washer	2164515		16	1	Ring washer	2164515	
17	1	Hexagon nut	2148397		17	1	Hexagon nut	2148397	
18	2	Roll	see individual		18	2	Roll	see individual	
19	1	Washer	2148867		19	1	Washer	2148867	
23	1	Ball	2141699		23	1	Ball	2141699	
Optional internal stop ²⁾			ISO C1	ISO L C1 Left hand thread	24a ¹⁾	2	Set screw	2142064	
Part No.	Qty.	Part description			Ident No.	Ident No.	24b ¹⁾	2	Set screw
30	1	Internal stop complete	2430906	2430908	24c ¹⁾	2	Set screw	2142065	
20	1	Stop screw body	2430907	2430909	25	1	Stud	2148840	
21	1	Stop screw	2164518	2164523	¹⁾ Not shown in the sketch ²⁾ Only required for machines without controlled feed stop. Please order additionally.				
22	1	Hexagon nut	2148387	2148389					

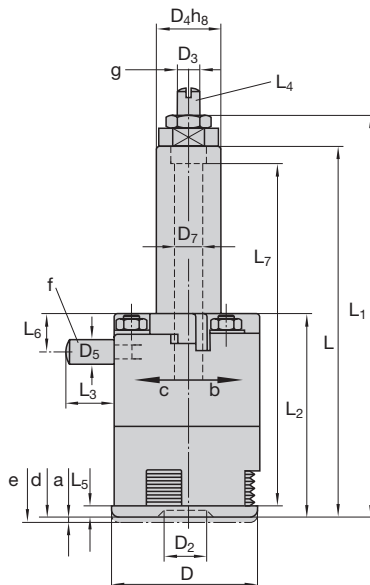
When ordering spare parts, please state rolling head type,
Part No. and Ident No.



Needle bearing alternates + accessories see page 331



Type	Shank dia.	Ident No.
F001	20	1501308
	3/4"	1501317
	16	1501326
	5/8"	1501335
F001L	20	2168415
	3/4"	2168416
	16	2168417
	5/8"	2168418



Dimension in inches

D	D _{1max}	D ₂	D ₃ ¹⁾		D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	D ₁₀	D ₁₁ x T		D ₁₂
1.575	-	0.276	M6	LH	0.787	0.315	M5	0.295	-	-	-	-	-	-
					0.750									
					0.630									
					0.625									
L	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	a	α	β
2.575	2.870	1.591	0.551	2.598	0.098	0.413	1.969	-	-	-	-	0.059	32°	-
F001 for right-hand threads F001L for left-hand threads F001 to be used stationary only										γ	m-Rk		m-Ro	
										4°	approx. 0.66 lb		approx. 0.07-0.09 lb	

a = Pull off for opening
b = Rolling head/opening direction
c = Rolling head/closing direction (For rolling heads for left-hand threads, the direction of operation is reversed.)
d = Rolling head closed
e = Rolling head opened
f = Thread for handle with stationary operation. Rolling heads can also be delivered with closing rod, closing roller and closing spring, instead of handle (see page 331).
α = Closing angle
γ = Inclined position of rolls

m-Rk = Rolling head weight without rolls
m-Ro = Weight of 1 set of 3 rolls

¹⁾ For L.H. thread rolling heads: R.H. thread.

For a functional axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device to automate the resetting of the head is available as a special.
Inquire with customer service.



M

Nominal size x pitch mm	Lead 1K	Lead 2K
	Ident No.	
M 2.6 x 0.45	1501406	1501415
M 3 x 0.5	1501460	1501479
M 3 ... 3.5 x 0.6	1501497	1501503
M 4 x 0.7	1501521	1501530

UNC

Nominal size x TPI	Lead 1K	Lead 2K
	Ident No.	
UNC 4 ... 5 – 40	1501567	1501576
UNC 6 ... 8 – 32	1501585	1501594

UNF

Nominal size x TPI	Lead 1K	Lead 2K
	Ident No.	
UNF 4 – 48	1501601	1501610
UNF 5 – 44	1501629	1501638
UNF 6 – 40	1501647	1501656

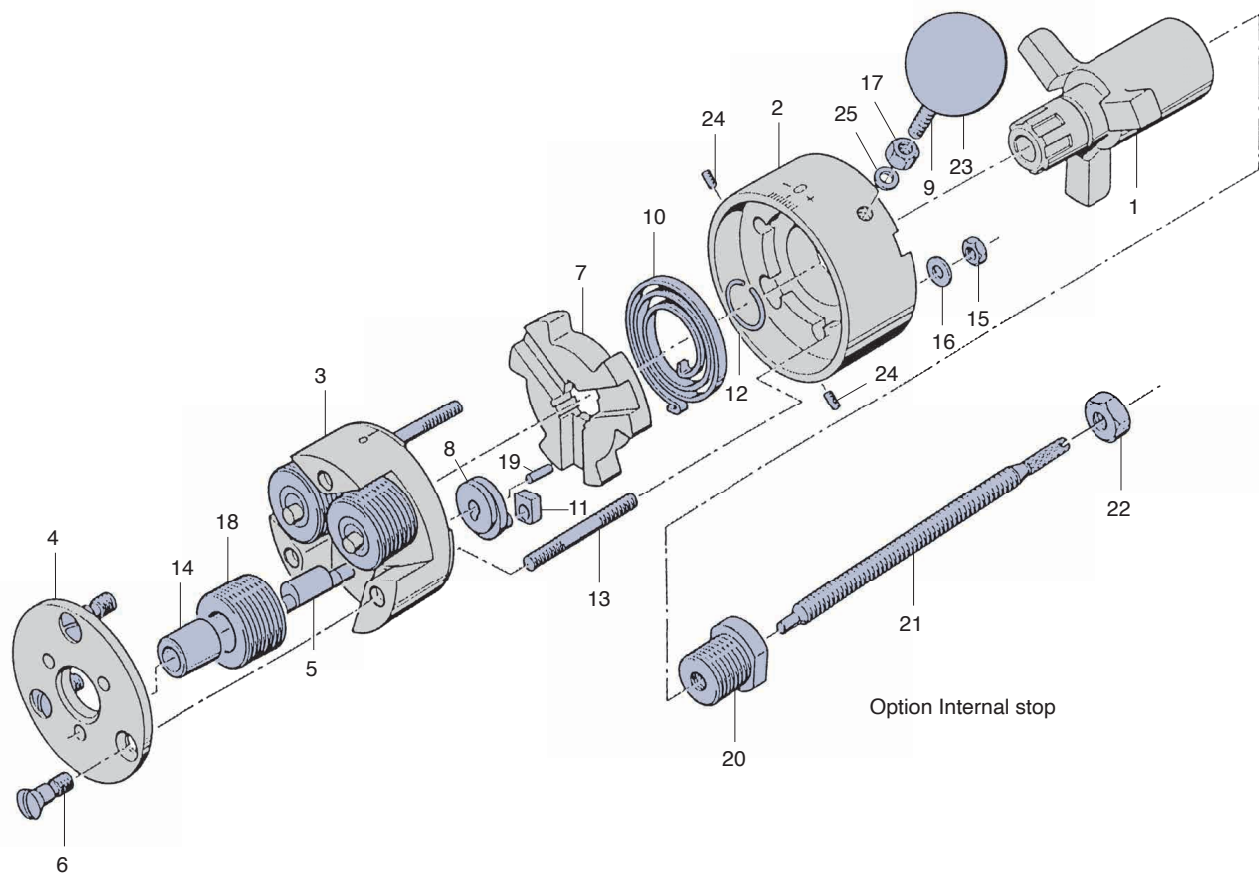
UNJ

Nominal size x TPI	Lead 1K
	Ident No.
UNJ 4-5 x 40	2169667
UNJ 4 x 48	2248197
UNJ 6-8 x 32	2169666
UNJ 6 x 40	2424731

Thread dimensions combined in one block can be rolled with **one** set of rolls.

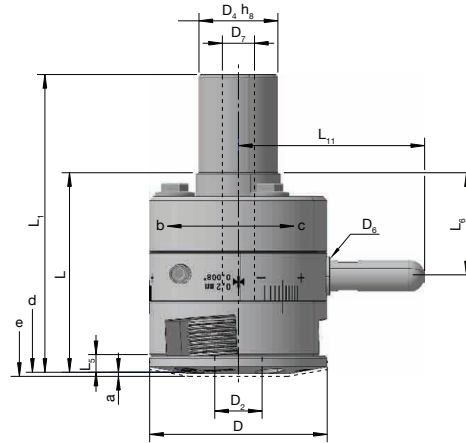
Rolling head			F001	F001 L Left hand head	Rolling head			F001	F001 L Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1a	1	Shank Ø 16	2164562		12	1	Circlip	2164556	
1b	1	Shank Ø 20	2164546		13	3	Stud	2164557	
1c	1	Shank Ø 5/8"	2164563		14	3	Carbide bushing	2164558	
1d	1	Shank Ø 3/4"	2164561		15	3	Hexagon nut	2148395	
2	1	Spring housing	2164547	2168109	16	3	Washer	2141462	
3	1	Centre plate	2164548	2168106	17	1	Hexagon nut	2148397	
4	1	Front plate	2164549	2168107	18	3	Roll	see individual	
5	3	Eccentric spindles	2164550	2168108	19	3	Shear pin	2127386	
6	3	Front plate screw	2164551		20	1	Stop screw body	2164559	2164581
7	1	Clutch plate	2164552	2168105	21	1	Stop screw	2164560	2164582
8	3	Ball lever	2164553		22	1	Hexagon nut	2148387	2142394
9	1	Stud	2148840		23	1	Ball	2141699	
10	1	Coil spring	2164554	2164580	24	2	Set screw	2142058	
11	3	Hardened slides	2164555		25	1	Washer	2148867	

When ordering spare parts, please state rolling head type, Part No. and Ident No.





Type	Shank Dia.	Ident No.
F01 EVO	20mm	7424840
	3/4"	7424841
	16mm	7424842
	5/8"	7424843
F01L EVO	20mm	7424844
	3/4"	7424845
	16mm	7424846
	5/8"	7424847
K01 EVO	20mm	7424848
	3/4"	7424849
	16mm	7424850
	5/8"	7424851



Dimensions in inch

D	D ₂	D ₄	D ₆	D ₇	L	L ₁	L ₅	L ₆	L ₁₁	a
1.772	0.472	—	M5	0.256	2	3	0.177	1.023	1.850	0.059
F01 and K01 for right-hand threads F01L for left-hand threads F01 and F01L to be used stationary only K01 used stationary or rotating					γ	m-Rk		m-Ro		
					3° 30'	approx. 1.10 lb		approx. 0.11 lb		

a = Pull off for opening
b = Head opens when type K, and closes when type F
c = Head closes when type K, and opens when type F (For rolling heads for left-hand threads, the direction of operation is reversed.)
d = Rolling head closed
e = Rolling head opened
α = Closing angle
γ = Inclined position of rolls

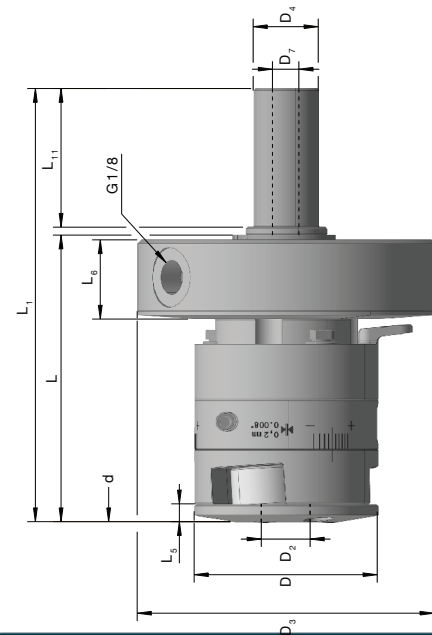
m-Rk = Rolling head weight without rolls
m-Ro = Weight of 1 set of 3 rolls

For a functional axial rolling system, select a head, a shank, and thread rolls. A coolant closing device to automate the resetting of the head is available and requires a head compatible with a coolant closer.

Axial Rolling Head F01 EVO

Compatible with Coolant Closing Device (CCD)

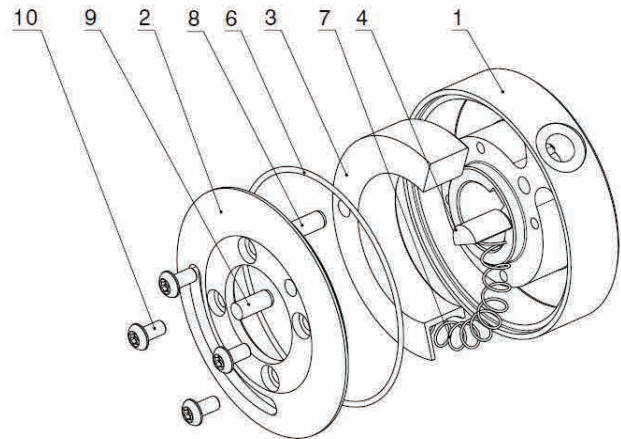
Type	Shank Dia.	Ident No.
F01 EVO for CCD	20mm	7477857
	3/4"	7408438
	16mm	7328305
	5/8"	7450196
Compatible with CCD = 7302823		



Dimensions in inch

D	D ₂	D ₃	D ₄	D ₇	L	L ₁	L ₅	L ₆	L ₁₁	a
1.772	0.472	2.874	—	0.256	2.807	4.417	0.177	0.787	1.378	0.059
a = Pull off for opening d = Rolling head closed e = Rolling head opened α = Closing angle γ = Inclined position of rolls m-Rk = Rolling head weight without rolls m-CCD = Coolant Closer Weight m-Ro = Weight of 1 set of 3 rolls				γ	m-Rk	m-Ro	m-CCD			
				3° 30'	approx. 1.10 lb	approx. 0.11 lb	1.21 lb			

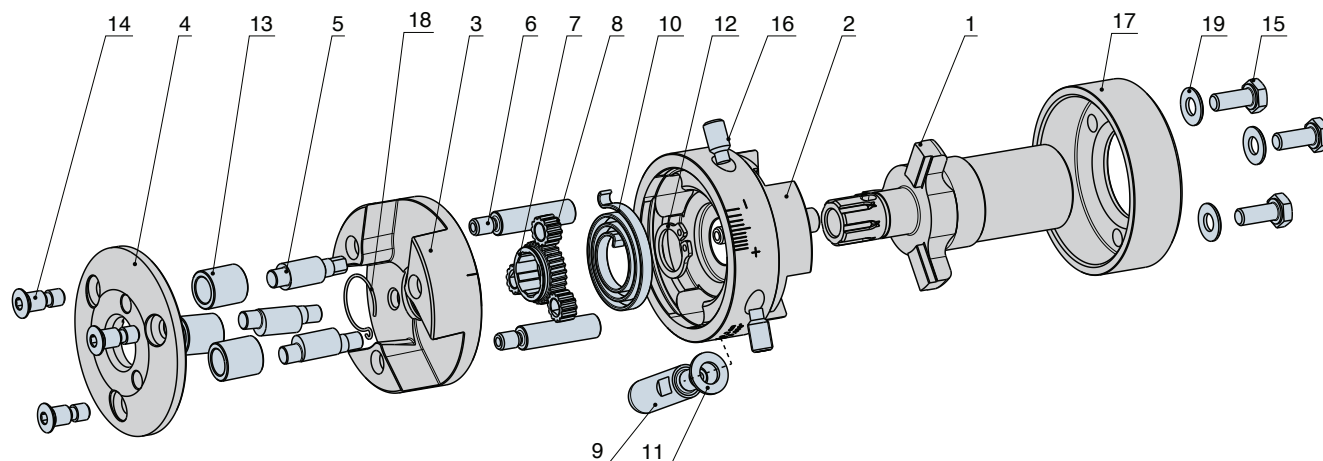
Coolant Closing Device - Size 01 RH			7302823
Item	Pcs.	Name	ID no.
1	1	Housing	7313441
2	1	Cover Plate	7285831
3	1	Piston	7154983
4	1	Spring Seat	7154978
6	1	O-Ring	7154976
7	1	Pressure Spring	7154977
8	1	Cylindrical pin	2142677
9	1	Cylindrical pin	2142673
10	4	Screw T20 M4X8	7123889
Not Shown	1	L-Fitting G1/8 - 6	7167804
Not Shown	1	I-Fitting G1/8 - 6	7167806
Not Shown	1	Polyamid hose	7167807



The following ID numbers apply to the standard rolling head versions:

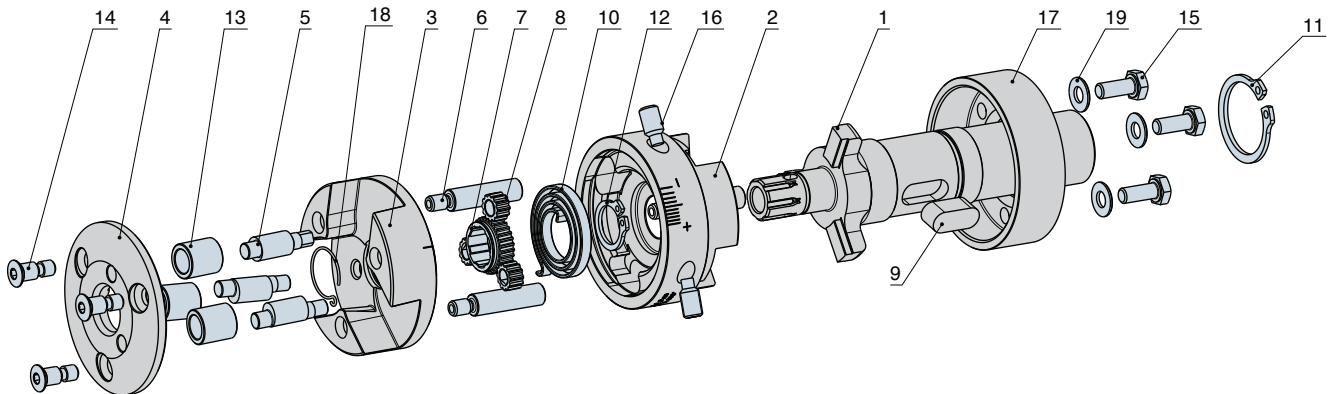
Rolling Head			F01	F01L Left hand head	Rolling Head			K01	K01L Left hand head
Part No.	Qty	Part Description	Ident No.	Ident No.	Part No.	Qty	Part Description	Ident No.	Ident No.
1	1	Clutch with shank Ø 16	7424858		1	1	Clutch with shank Ø 16	7424858	
1	1	Clutch with shank Ø 20	7424856		1	1	Clutch with shank Ø 20	7424856	
1	1	Clutch with shank Ø 5/8"	7424859		1	1	Clutch with shank Ø 5/8"	7424859	
1	1	Clutch with shank Ø 3/4"	7424857		1	1	Clutch with shank Ø 3/4"	7424857	
2	1	Spring housing	7424860	7424861	2	1	Spring housing	7424861	7424860
3	1	Center plate	7424862	7424863	3	1	Center plate	7424864	7424865
4	1	Front plate	7424866	7424867	4	1	Front plate	7424868	7424869
5	3	Eccentric spindle	7159845		5	3	Eccentric spindle	7159845	
6	3	Stud	7424838		6	3	Stud	7424838	
7	1	Center gear	7424870	7424871	7	1	Center gear	7424872	7424873
8	3	Spur gear	7202831	7159847	8	3	Spur gear	7159847	7202831
9	1	Closing pin	2164584		9	1	Closing pin	2164584	
10	1	Coil spring	2164554	2164580	10	1	Coil spring	2164580	2164554
11	1	Washer	2143364		11	1	Washer	2143364	
12	1	Circlip	7159849		12	1	Circlip	7159849	
13	3	Carbide bushing	2164574		13	3	Carbide bushing	2164574	
14	3	Front plate screw	2164551		14	3	Front plate screw	2164551	
15	3	Screw	2142309		15	3	Screw	2142309	
16	2	Set screw	2142159		16	2	Set screw	2142159	
17	1	Chip guard	7424839		17	1	Chip guard	7424839	
18	1	Circlip	2164513		18	1	Circlip	2164513	
19	3	Washer	2141462		19	3	Washer	2141462	

When ordering spare parts, please state rolling head type, Part No. and Ident No.



Spare Parts Axial Rolling Head F01 EVO
Compatible with Coolant Closing Device

Coolant Closing Device Compatible Heads			F01
Part No.	Qty	Part Description	Ident No.
1	1	Clutch with shank Ø 20mm for CCD	7477861
1	1	Clutch with shank Ø 3/4" for CCD	7445810
1	1	Clutch with shank Ø 5/8" for CCD	7450193
1	1	Clutch with shank Ø 16mm for CCD	7449956
2	1	Spring housing	7424860
3	1	Center plate	7424862
4	1	Front plate	7424866
5	3	Eccentric spindles	7159845
6	3	Stud	7424838
7	1	Center gear	7424870
8	3	Spur gear	7202831
9	1	Fitting key	7210734
10	1	Coil spring	2164554
11	1	Circlip	7210735
12	1	Circlip	7159849
13	3	Carbide bushing	2164574
14	3	Front plate screw	2164551
15	3	Screw	2142309
16	2	Set screw	2142159
17	1	Chip guard	7210731
18	1	Circlip	2164513
19	3	Washer	2141462





M		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 3.5 x 0.6	1502539	1502548
M 4 x 0.7	1502619	1502628
M 4 ... 4.5 x 0.75	1502655	1502664
M 5 x 0.8	1502762	1502771
M 5 ... 5.5 x 0.9	1502806	1502815
M 6 x 1	1502879	1502888

MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 4 ... 5 x 0.5	2167460	1502584

Thread dimensions combined in one block can be rolled with **one** set of rolls.

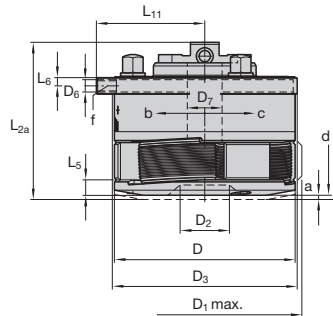
UNC		
Nominal size x TPI	Lead 1K	Lead 2K
	Ident No.	
UNC 8 – 32	1503039	1503048
UNC 10 ... 12 – 24	1503057	1503066
UNC 1/4 – 20	2169901	1503093

UNF		
Nominal size x TPI	Lead 1K	Lead 2K
	Ident No.	
UNF 6 – 40	2240710	2168469
UNF 8 – 36	1503100	1503119
UNF 10 – 32	1503128	1503137
UNF 12 – 28	1503146	1503155
UNF 1/4 – 28	1503164	1503173

UNJ	
Nominal size x TPI	Lead 1K
	Ident No.
UNJ 6 x 40	2247675
UNJ 8 x 32	2240595
UNJ 8 x 36	2424573
UNJ 10 x 24	7085193
UNJ 10 x 32	1503191
UNJ 1/4 x 20	On Request
UNJ 1/4 x 28	2169030



Type	Ident No.
F1 EVO	7146300
F1L EVO	7169593
K1 EVO	7169594
K1L EVO	7169595



Dimension in inches

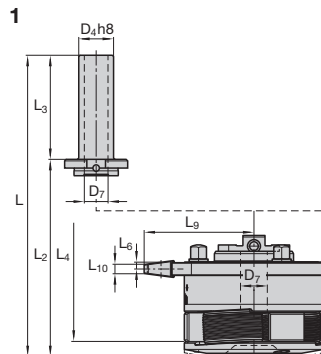
D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
2.520	2.756	0.669	2.598	M5	0.449	2.402	0.236	0.138	1.508	0.079	60°	3°30'
F1 EVO, K1 EVO for right-hand threads F1L EVO, K1L EVO for left-hand threads F1 EVO, F1L EVO to be used stationary only K1 EVO, K1L EVO used stationary or rotating									m-Rk	m-Ro		
									approx. 1.98 lb	approx. 0.23–0.34 lb		

a = Pull off for opening
 b = Head closes when type F
 c = Head opens when type F
 d = Rolling head closed
 e = Rolling head opened
 f = Thread for hand grip with stationary operation
 α = Closing angle
 γ = Inclined position of rolls
 m-Rk = Rolling head weight without shank and rolls
 m-Ro = Weight of 1 set of 3 rolls

Change shanks EVOLine

Type	Ident No.
R20-size 1	7139594
R25-size 1	7139596
R 3/4-size 1	7139598
R1-size 1	7139600
R1 1/4-size 1	7139602

1 Roundshank



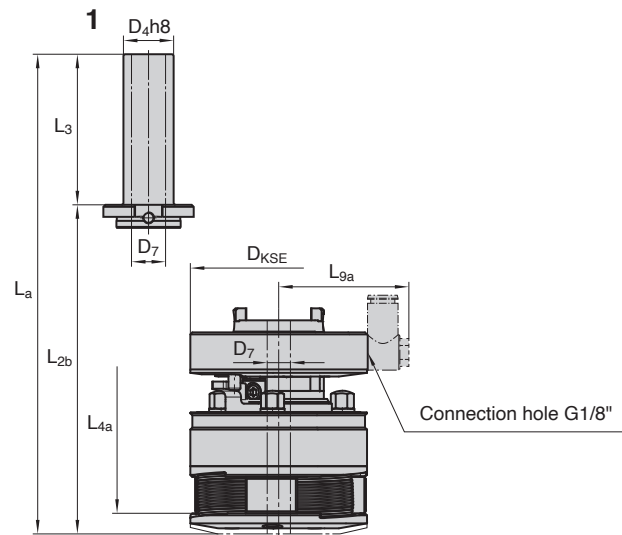
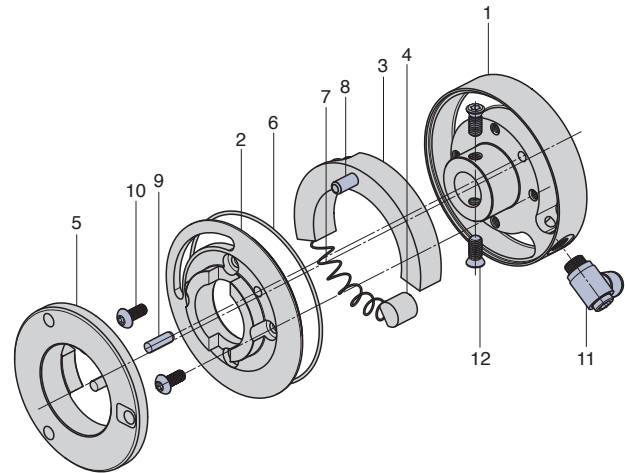
Shank dia.	Dimension in inches								
	D ₄	D ₇	D ₉	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
20 mm	0.787	0.449	—	2.874	4.764	5.984	2.402	3.622	2.362
25 mm	0.984	0.449	—	2.874	4.764	5.984	2.402	3.622	2.362
3/4	0.750	0.449	—	2.874	4.764	5.984	2.402	3.622	2.362
1	1.000	0.449	—	2.874	4.764	5.984	2.402	3.622	2.362
1 1/4	1.250	0.449	—	2.874	4.764	5.984	2.402	3.622	2.362

Change shanks will be delivered with shank adaption screw size 1 (2 x 7211620).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
 A coolant closing device can be added to automate the resetting of the head.

EVoline Spare parts for closing device Right Hand			CCD Size 1 Right Hand
Part No.	Qty.	Part description	Ident No.
1	1	Housing	7154981
2	1	Cover plate	7154982
3	1	Curved piston	7154983
4	1	Spring bolt	7154978
5	1	Chip guard	7154975
6	1	Sealing Ring	7154976
7	1	Pressure spring	7154977
8	1	Cylindrical pin	2142677
9	1	Cylindrical pin	2142673
10	4	Screw	7123889
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 1	7211620

Type	Ident No.
CCD EVoline Size 1 Right Hand	7154980
CCD EVoline Size 1 Left Hand	7170332



L ₆	L ₉	L ₁₀	m-Rs
0.138	2.079	0.197	approx. 0.29 lb
0.138	2.079	0.197	approx. 0.46 lb
0.138	2.079	0.197	approx. 0.27 lb
0.138	2.079	0.197	approx. 0.49 lb
0.138	2.079	0.197	approx. 0.77 lb

m-Rs = Weight shank



M		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 6 ... 8 x 1	1504564	1504573
M 8 ... 9 x 1.25	1504653	1504671
M 10 x 1.5	1504715	1504724

MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 6 ... 8 x 0.75	7180387	7180385
MF 8 ... 10 x 1	1504813	1504822
MF 10 ... 11 x 1.25	1505000	1505019

UNC		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC 1/4 – 20	1505545	1505554
UNC 5/16 – 18	1505563	1505572
UNC 3/8 – 16	1505581	1505590
UNC 7/16 ¹⁾ – 14	2166949	2166784

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 1/4 – 28	1505625	1505634
UNF 5/16... 3/8 – 24	7180380	7180381
UNF 7/16 ¹⁾ – 20	2241471	2169909

NPT	
Nominal size x TPI	Lead 1k
	Ident No.
NPT 1/16 – 27	1506964
NPT 1/8 – 27	1506973

NPTF	
Nominal size x TPI	Lead 1k
	Ident No.
NPTF 1/16 – 27	2248946
NPTF 1/8 – 27	2245597

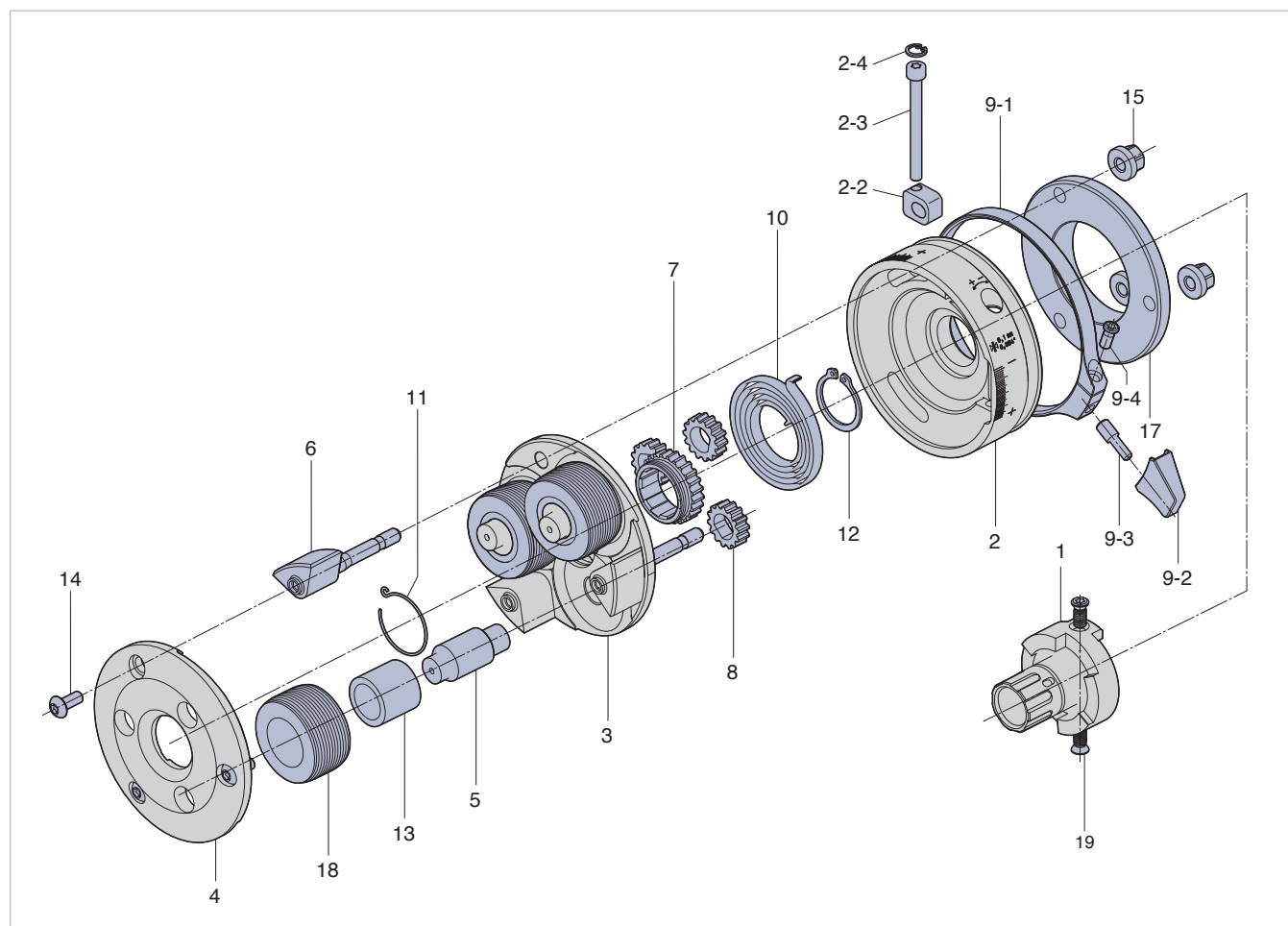
UNJ	
Nominal size x TPI	Lead 1K
	Ident No.
UNJ 1/4 x 20	2168129
UNJ 1/4 x 28	1505769
UNJ 5/16 x 18	2247467
UNJ 5/16 - 3/8 x 24	2165229
UNJ 3/8 x 16	7008351
UNJ 7/16 x 14 ¹⁾	9139332
UNJ 7/16 x 20 ¹⁾	7046461

¹⁾ For thread lengths up to 14 mm (0.551") including runout.

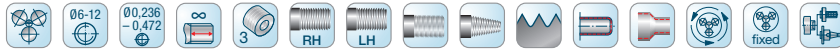
Thread dimensions combined in one block can be rolled with **one** set of rolls.

Rolling head			F1 EVO	F1L EVO	Rolling head			F1 EVO	F1L EVO
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7146301	7179770	9-3	1	Threaded pin	7146299	
2	1	Adjustment housing	7146302	7179771	9-4	1	Screw	1045105	
2-2	1	Slide block Size 1	7146312		10	1	Coil spring	7146310	7179776
2-3	1	Adjusting spindle Size 1	7126415		11	1	Circlip	2164642	
2-4	1	Retention clip Size 1	7129764		12	1	Circlip DIN 471	7130049	
3	1	Center plate	7146303	7179772	13	3	Carbide bushing	2164705	
4	1	Front plate	7146304	7179773	14	3	Screw	7123889	
5	3	Eccentric spindle	2164637		15	3	Shoulder nut	7202800	
6	3	Spacer stud	7146306		17	1	Chip guard	7146305	
7	1	Center gear	7146307	7179774	18	3	Roll	see individual	
8	3	Spur gear	7146309	7179775	19	2	Shank adaption screw	7211620	
9	1	Closing clip complete	7146296						
9-1	1	Clip	7146297						
9-2	1	Hand grip	7146298						

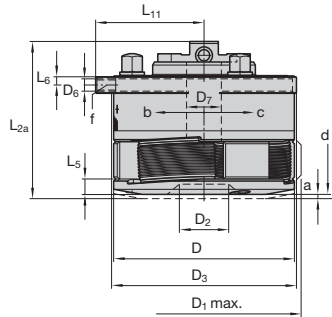
When ordering spare parts, please state rolling head type, Part No. and Ident No.



Needle bearing alternates + accessories see page 331



Type	Ident No.
F12 EVO	7156343
F12L EVO	7169596
K12 EVO	7169597
K12L EVO	7169598



Dimension in inches

D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
2.520	2.756	0.787	2.598	M5	0.449	2.445	0.236	0.138	1.508	0.079	60°	1° 50'
										m-Rk	m-Ro	
										approx. 1.81 lb	approx. 0.15–0.29 lb	

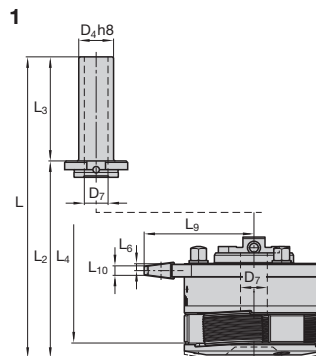
F12 EVO, K12 EVO for right-hand threads
 F12L EVO, K12L EVO for left-hand threads
 F12 EVO, F12L EVO to be used stationary only
 K12 EVO, K12L EVO used stationary or rotating

a = Pull off for opening
 b = Head closes when type F
 c = Head opens when type F
 d = Rolling head closed
 e = Rolling head opened
 f = Thread for hand grip with stationary operation
 α = Closing angle
 γ = Inclined position of rolls
 m-Rk = Rolling head weight without shank and rolls
 m-Ro = Weight of 1 set of 3 rolls

Change shanks EVOLine

Type	Ident No.
R20-size 1	7139594
R25-size 1	7139596
R3/4-size 1	7139598
R1-size 1	7139600
R1 1/4-size 1	7139602

1 Roundshank



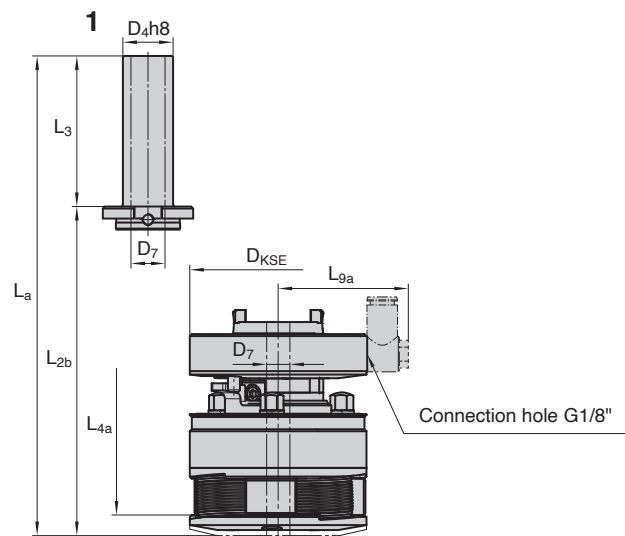
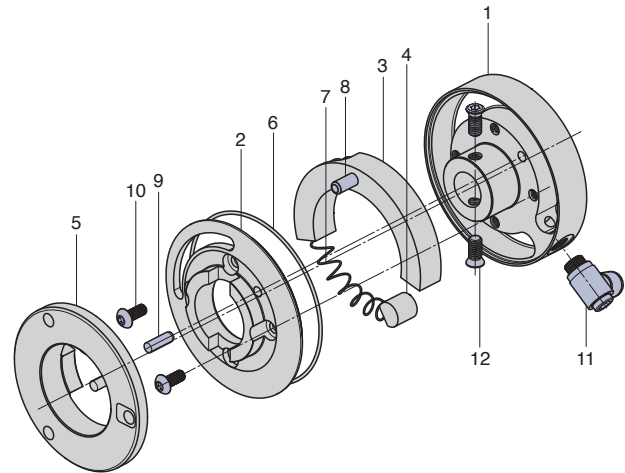
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
20 mm	0.787	0.449	2.874	4.807	6.028	2.449	3.665	2.362
25 mm	0.984	0.449	2.874	4.807	6.028	2.449	3.665	2.362
3/4	0.750	0.449	2.874	4.807	6.028	2.449	3.665	2.362
1	1.000	0.449	2.874	4.807	6.028	2.449	3.665	2.362
1 1/4	1.250	0.449	2.874	4.807	6.028	2.449	3.665	2.362

Change shanks will be delivered with shank adaption screw size 1 (2 x 7211620).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOLine Spare parts for closing device Right Hand			CCD Size 1 Right Hand
Part No.	Qty.	Part description	Ident No.
1	1	Housing	7154981
2	1	Cover plate	7154982
3	1	Curved piston	7154983
4	1	Spring bolt	7154978
5	1	Chip guard	7154975
6	1	Sealing ring	7154976
7	1	Pressure spring	7154977
8	1	Cylindrical pin	2142677
9	1	Cylindrical pin	2142673
10	4	Screw	7123889
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 1	7211620

Type	Ident No.
CCD EVOLine Size 1 Right Hand	7154980
CCD EVOLine Size 1 Left Hand	7170332



L ₆	L ₉	L ₁₀	m-Rs
0.138	2.079	0.197	approx. 0.29 lb
0.138	2.079	0.197	approx. 0.46 lb
0.138	2.079	0.197	approx. 0.27 lb
0.138	2.079	0.197	approx. 0.49 lb
0.138	2.079	0.197	approx. 0.77 lb

m Rs = Weight shank



MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 6 ... 7 x 0.5	1507516	1507525
MF 7 ... 8 x 0.5	1507534	1507543
MF 6 ... 7 x 0.75	1507605	1507614
MF 8 ... 9 x 0.75	1507632	1507641
MF 9 ... 10 x 0.75	1507669	1507678
MF 10 ... 11 x 0.75	1507703	1507712
MF 11 ... 12 x 0.75 ¹⁾	1507721	1507730
MF 8 ... 9 x 1	1507767	1507776
MF 9 ... 10 x 1	1507785	1507794
MF 10 ... 11 x 1	1507838	1507847
MF 11 ... 12 x 1 ¹⁾	1507865	1507874
MF 10 ... 11 x 1.25	1507892	1507909
MF 11 ... 12 x 1.25 ¹⁾	1507918	1507927
MF 12 x 1.5 ¹⁾	1507963	1507972

UN		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UN 3/8 ... 7/16 – 32	2242122	2242123

Thread dimensions combined in one block can be rolled with **one** set of rolls.

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 5/16 ... 3/8 – 36	2242136	2242137
UNF 7/16 – 36	2242138	2242139
UNF 7/16 ... 1/2 ¹⁾ – 32	2242140	2242141
UNF 3/8 ... 7/16 – 28	2242142	2242143
UNF 7/16 ... 1/2 ¹⁾ – 26	2242144	2242145
UNF 7/16 ... 1/2 ¹⁾ – 22	2242146	2242148
UNF 7/16 ... 1/2 ¹⁾ – 20	1508178	1508187

UNEF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNEF 5/16... 3/8 – 32	1508105	1508114
UNEF 7/16... 1/2 ¹⁾ – 28	1508123	1508132

UNS		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNS 1/4 ... 5/16 – 40	2246368	2169907
UNS 3/8 ... 7/16 – 24	2167553	1508150
UNS 7/16 ... 1/2 ¹⁾ – 24	1508203	2242147

UNJ	
Nominal size x TPI	Lead 1K
	Ident No.
UNJ 1/4 x 28	2249436
UNJ 5/16-3/8 x 32	2448660
UNJ 3/8-7/16 ¹⁾ x 24	7202389
UN 7/16 ¹⁾ -1/2 ¹⁾ x 20	2168234

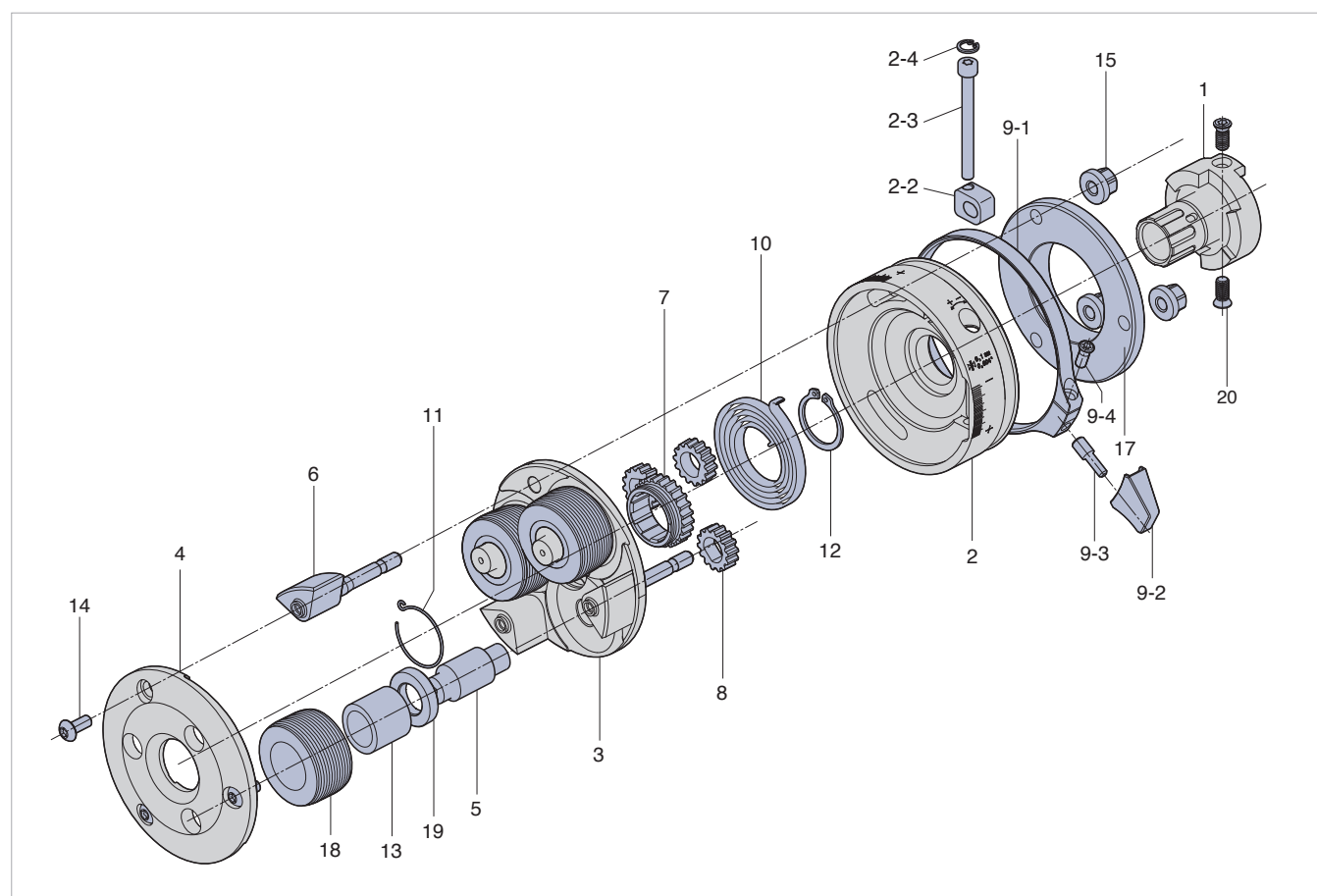
G		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G 1/8 – 28	1508052	1508061
G 1/4 – 19 ¹⁾	1508089	1508098

NPT	
Nominal size x TPI	Lead 1k
	Ident No.
NPT 1/8 – 27	2164716
NPT 1/4 – 18	2167396

NPTF	
Nominal size x TPI	Lead 1k
	Ident No.
NPTF 1/8 – 27	2166823
NPTF 1/4 – 18	2243188

¹⁾ For thread lengths up to 14 mm (0.551") including runout.

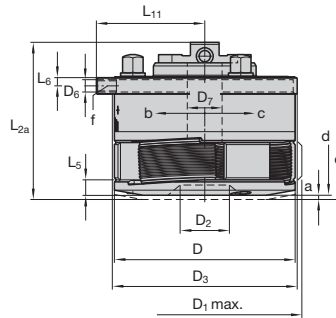
Rolling head			F12 EVO	F12L EVO Left hand head	Rolling head			F12 EVO	F12L EVO Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7146301	7179770	9-3	1	Threaded pin	7146299	
2	1	Adjustment housing	7146302	7179771	9-4	1	Screw	1045105	
2-2	1	Slide block Size 2	7146312		10	1	Coil spring	7146310	7179776
2-3	1	Adjusting spindle Size 2	7126415		11	1	Circlip	2164642	
2-4	1	Retention clip Size 2	7129764		12	1	Circlip DIN 471	7130049	
3	1	Center plate	7156351	7189109	13	3	Carbide bushing	2173512	
4	1	Front plate	7156350	7189110	14	3	Screw	7123889	
5	3	Eccentric spindle	2164737		15	3	Shoulder nut	7202800	
6	3	Spacer stud	7156352		17	1	Chip guard	7146305	
7	1	Center gear	7156356	7189111	18	3	Roll	see individual	
8	3	Spur gear	7156354	7189112	19	3	Washer	2164741	
9	1	Closing clip complete	7146296		20	2	Shank adaption screw	7211620	
9-1	1	Clip	7146297		When ordering spare parts, please state rolling head type, Part No. and Ident No.				
9-2	1	Hand grip	7146298						



Needle bearing alternates + accessories see page 331



Type	Ident No.
F1223 EVO	7186234
F1223L EVO	7186579
K1223 EVO	7197241
K1223L EVO	7221280



Dimension in inches

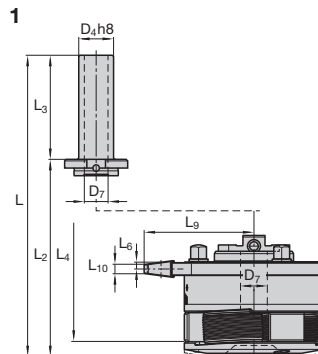
D	D _{1max}	D ₂	D ₆	D ₇	D ₈	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
2.520	2.520	0.630	M 8 x 1 Typ "F" M 5 Typ "K"	0.323	2.520	2.283	0.197	0.137	1.507	0.079	60°	3°
F1223 EVO and K1223 EVO for right-hand threads F1223L EVO and K1223L EVO for left-hand threads F1223 EVO and F1223L EVO to be used stationary only K1223 EVO and K1223L EVO used stationary or rotating										m-Rk	m-Ro	
										approx. 1.76 lb	approx. 0.20–0.25 lb	

a = Pull off for opening
b = Head closes when type F
c = Head opens when type F
d = Rolling head closed
e = Rolling head opened
f = Thread for hand grip with stationary operation
α = Closing angle
γ = Inclined position of rolls
m-Rk = Rolling head weight without shank and rolls
m-Ro = Weight of 1 set of 3 rolls

Change Shanks EVOLine

Type	Ident No.
R20-size 1	7139594
R25-size 1	7139596
R3/4-size 1	7139598
R1-size 1	7139600
R1 1/4-size 1	7139602

1 Roundshank



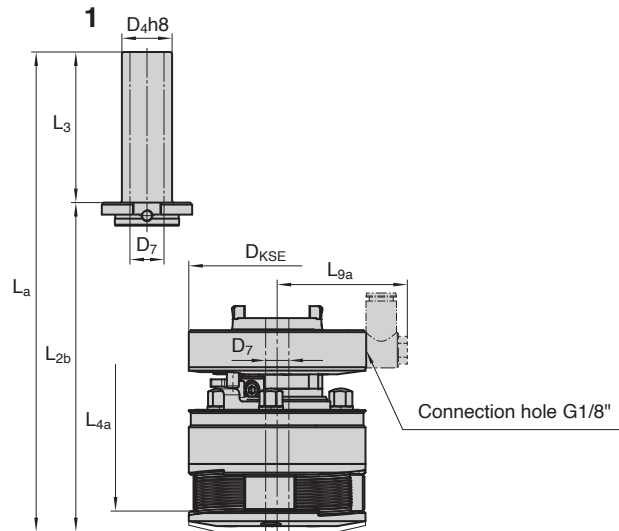
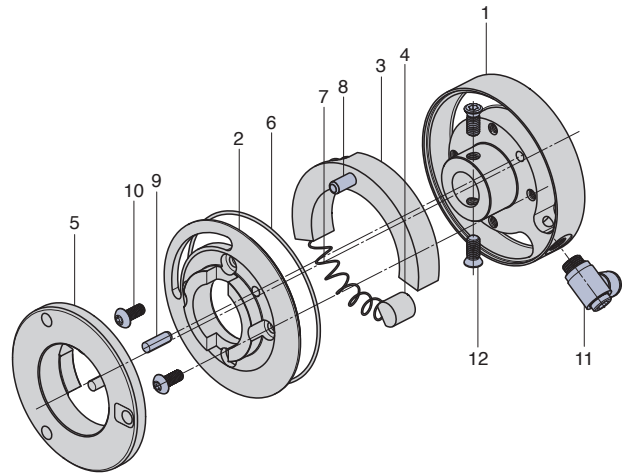
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
20 mm	0.787	0.449	2.874	4.764	5.984	2.402	3.622	2.362
25 mm	0.984	0.449	2.874	4.764	5.984	2.402	3.622	2.362
3/4	0.750	0.449	2.874	4.764	5.984	2.402	3.622	2.362
1	1.000	0.449	2.874	4.764	5.984	2.402	3.622	2.362
1 1/4	1.250	0.449	2.874	4.764	5.984	2.402	3.622	2.362

Change shanks will be delivered with shank adaption screw size 1 (2 x 7211620).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOLine Spare parts for closing device Right Hand			CCD Size 1 Right Hand
Part No.	Qty.	Part description	Ident No.
1	1	Housing	7154981
2	1	Cover plate	7154982
3	1	Curved piston	7154983
4	1	Spring bolt	7154978
5	1	Chip guard	7154975
6	1	Sealing ring	7154976
7	1	Pressure spring	7154977
8	1	Cylindrical pin	2142677
9	1	Cylindrical pin	2142673
10	4	Screw	7123889
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 1	7211620

Type	Ident No.
CCD EVOLine Size 1 Right Hand	7154980
CCD EVOLine Size 1 Left Hand	7170332



L ₆	L ₉	L ₁₀	m-Rs
0.138	2.079	0.197	approx. 0.29 lb
0.138	2.079	0.197	approx. 0.46 lb
0.138	2.079	0.197	approx. 0.27 lb
0.138	2.079	0.197	approx. 0.49 lb
0.138	2.079	0.197	approx. 0.77 lb

m Rs = Weight shank

**M**

Nominal size x TPI mm	Lead 1k	Lead 2k
	Ident No.	
M 5 ... 6 x 0,8	1508427	1508436
M 6 ... 7 x 1	1508490	1508506
M 8 x 1.25	1508560	1508579

MF

Nominal size x TPI mm	Lead 1k	Lead 2k
	Ident No.	
MF 6 ... 7 x 0.75	1508463	1508472
MF 8 x 1	1508533	1508542

UNC

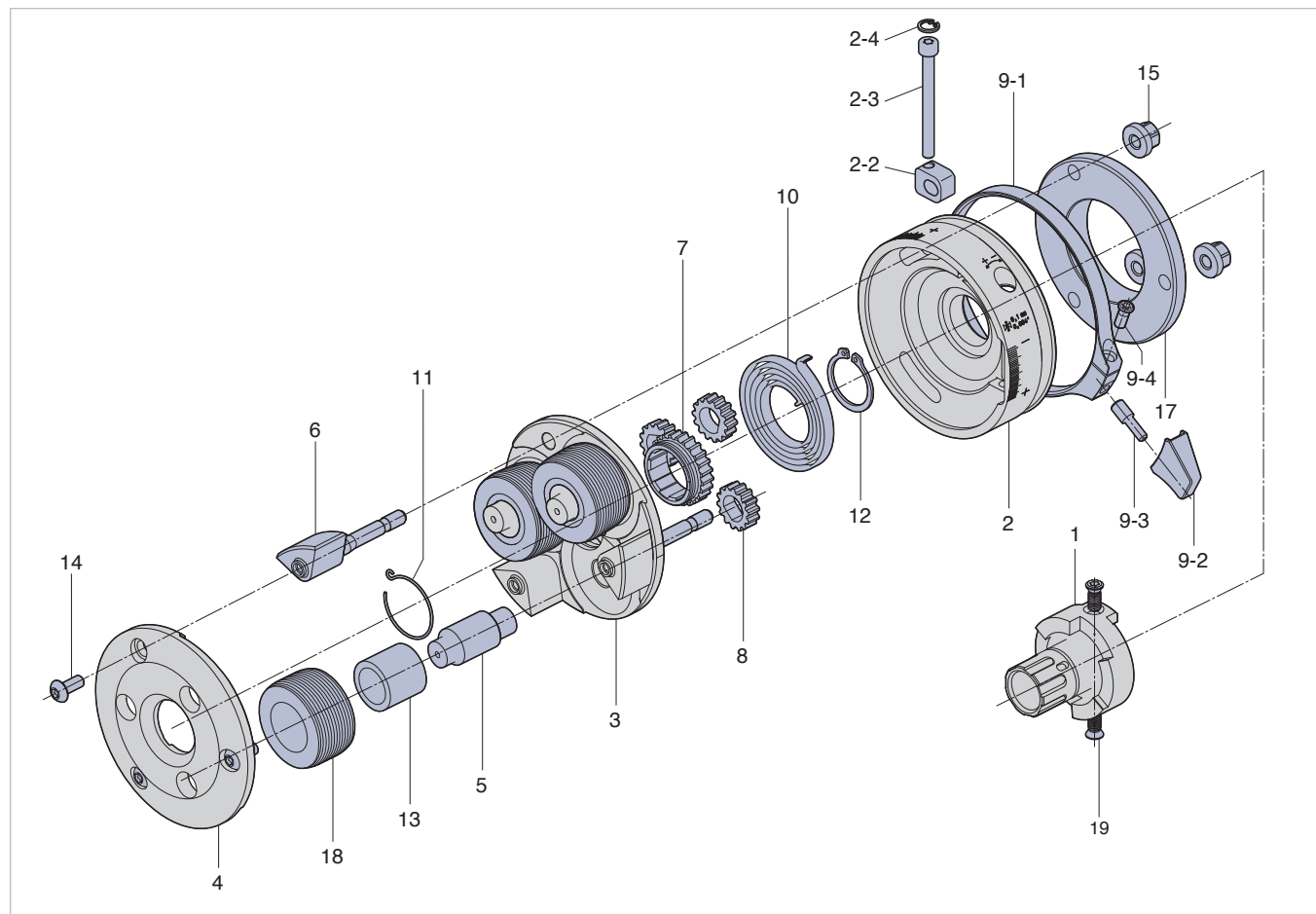
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC 12 – 24	2242168	2242169
UNC 1/4 – 20	1508659	1508668
UNC 5/16 – 18	2242170	1508677

UNF

Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 12 – 28	2242171	2242172
UNF 1/4 – 28	1508702	1508711
UNF 5/16 – 24	2165600	1508720

Thread dimensions combined in one block
can be rolled with **one** set of rolls.

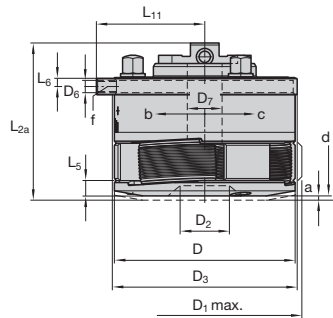
Rolling head			F1223 EVO	F1223L EVO Left hand head	Rolling head			F1223 EVO	F1223L EVO Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7186235	7186580	9-3	1	Threaded pin	7146299	
2	1	Adjustment housing	7146302	7179771	9-4	1	Screw	1045105	
2-2	1	Slide block Size 1	7146312		10	1	Coil spring	7146310	7179776
2-3	1	Adjusting spindle Size 1	7126415		11	1	Circlip	2164830	
2-4	1	Retention clip Size 1	7129764		12	1	Circlip DIN 471	7130049	
3	1	Center plate	7186236	7186581	13	3	Carbide bushing	2168892	
4	1	Front plate	7186237	7186582	14	3	Screw	7123889	
5	3	Eccentric spindle	2164824		15	3	Shoulder nut	7202800	
6	3	Spacer stud	7146306		17	1	Chip guard	7146305	
7	1	Center gear	7186238	7186583	18	3	Roll	see individual	
8	3	Spur gear	7186590	7186584	19	2	Shank adaption screw	7211620	
9	1	Closing clip complete	7146296		When ordering spare parts, please state rolling head type, Part No. and Ident No.				
9-1	1	Clip	7146297						
9-2	1	Hand grip	7146298						



Needle bearing alternates + accessories see page 331



Type	Ident No.
F2 EVO	7137660
F2L EVO	7159830
K2 EVO	7159820
K2L EVO	7169599



Dimension in inches

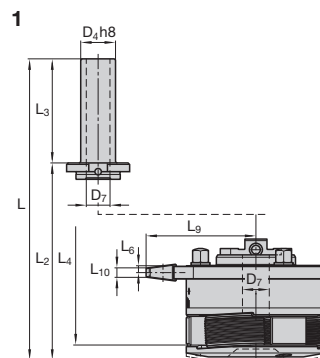
D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
3.465	3.681	0.945	3.543	M6	0.669	3.051	0.295	0.158	2.079	0.118	60°	3°
F2 EVO, K2 EVO for right-hand threads F2L EVO, K2L EVO for left-hand threads F2 EVO, F2L EVO to be used stationary only K2 EVO, K2L EVO used stationary or rotating										m-Rk	m-Ro	
										appr. 3.96 lb	0.54 – 0.94 lb	

a = Pull off for opening
b = Head closes when type F
c = Head opens when type F
d = Rolling head closed
e = Rolling head opened
f = Thread for hand grip with stationary operation
α = Closing angle
γ = Inclined position of rolls
m-Rk = Rolling head weight without shank and rolls
m-Ro = Weight of 1 set of 3 rolls

Change Shanks EVOLine

Type	Ident No.
R25-size 2	7137673
R30-size 2	7139612
R1-size 2	7139614
R1 1/4-size 2	7139616
R1 1/2-size 2	7139618

1 Roundshank



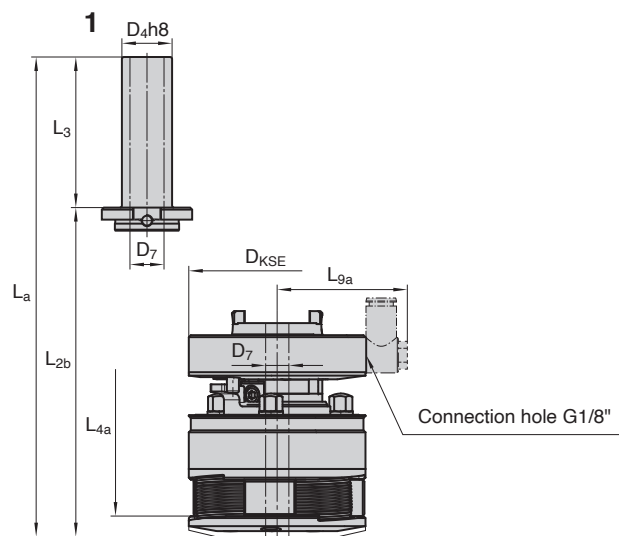
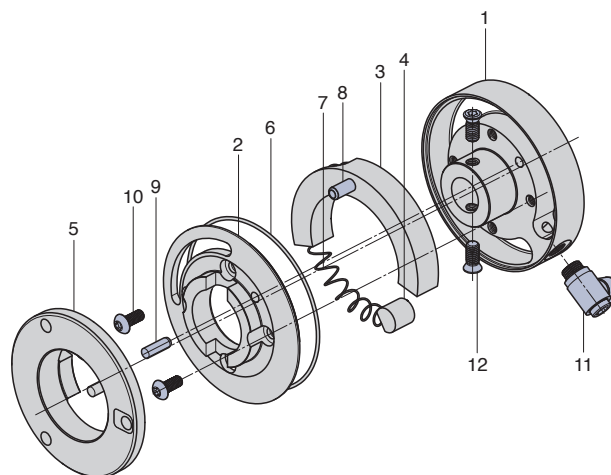
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
25 mm	0.984	0.669	3.465	6.004	7.394	3.051	4.441	2.953
30 mm	1.181	0.669	3.465	6.594	7.984	3.051	4.441	3.543
1	1.000	0.669	3.465	6.004	7.394	3.051	4.441	2.953
1 1/4	1.250	0.669	3.465	6.594	7.984	3.051	4.441	3.543
1 1/2	1.500	0.669	3.465	6.594	7.984	3.051	4.441	3.543

Change shanks will be delivered with shank adaption screw size 2 (2 x 7211621).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOline Spare parts for closing device Right Hand			CCD Size 2 Right Hand Ident No.
Part No.	Qty.	Part description	
1	1	Housing	7144713
2	1	Cover plate	7144714
3	1	Curved piston	7144715
4	1	Spring bolt	7159855
5	1	Chip guard	7151992
6	1	Sealing ring	7151997
7	1	Pressure spring	7170169
8	1	Cylindrical pin	2142691
9	2	Cylindrical pin	2142675
10	4	Screw	7123891
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 2	7211621

Type	Ident No.
CCD EVOLine Size 2 Right Hand	7144712
CCD EVOLine Size 2 Left Hand	7170333



L₆	L₉	L₁₀	m-Rs
0.158	2.721	0.236	approx. 0.49 lb
0.158	2.721	0.236	approx. 0.50 lb
0.158	2.721	0.236	approx. 0.51 lb
0.158	2.721	0.236	approx. 1.04 lb
0.158	2.721	0.236	approx. 1.57 lb

m Rs = Weight shank



M		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 8 ... 10 x 1.25	1509569	1509578
M 10 ... 12 x 1.5	1509747	1509756
M 12 ... 14 x 1.75	1509970	1509989
M 14 ... 16 x 2	1510085	1510094

MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 8 ... 10 x 1	1509532	1509541
MF 10 ... 12 x 1.25	1509676	1509685
MF 12 ... 14 x 1.5	1509925	1509934

UNC		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC 3/8 – 16	1510548	1510566
UNC 7/16 – 14	1510575	1510584
UNC 1/2 – 13	1510593	1510600
UNC 9/16 – 12	1510628	1510637
UNC 5/8 – 11	1510646	1510655

NPT		
Nominal size x TPI	Lead 1k	
	Ident No.	
NPT 1/4 – 18	2164717	

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 5/16... 3/8 – 24	1510717	1510726
UNF 7/16... 1/2 – 20	1510744	1510753
UNF 9/16... 5/8 – 18	1510762	1510771

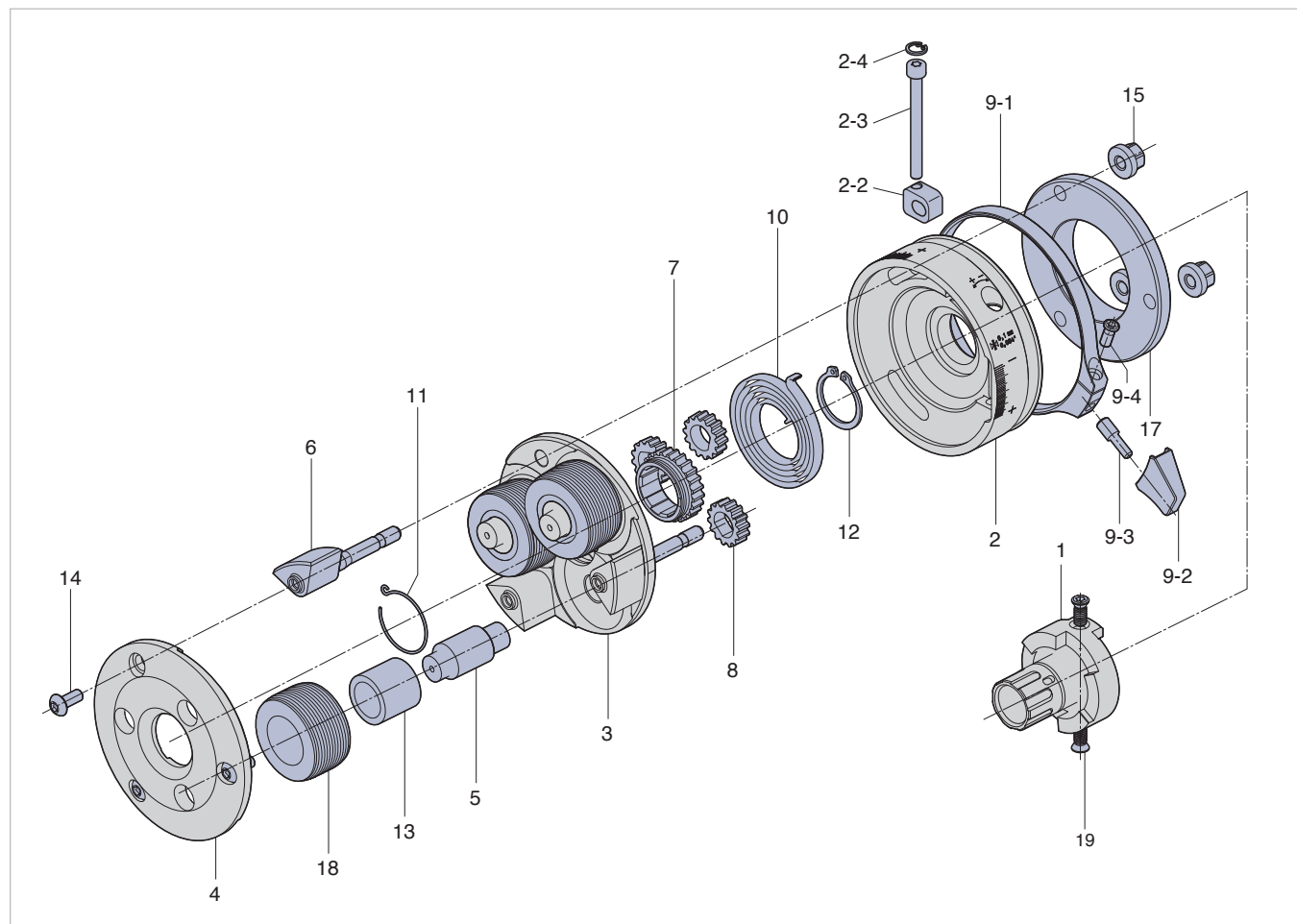
UNJ		
Nominal size x TPI	Lead 1K	
	Ident No.	
UNJ 5/16...3/8 x 24	2167303	
UNJ 3/8 x 16	7151459	
UNJ 7/16 x 14	9093404	
UNJ 7/16...1/2 x 20	2165269	
UNJ 1/2 x 13	9088624	
UNJ 9/16...5/8 x 18	2242377	
UNJ 5/8 x 11	On Request	

G		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G 1/4 – 19	1510450	2168838

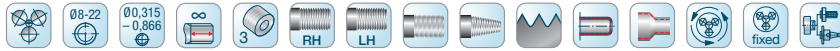
NPTF		
Nominal size x TPI	Lead 1k	
	Ident No.	
NPTF 1/4 – 18	2168616	

Thread dimensions combined in one block can be rolled with **one** set of rolls.

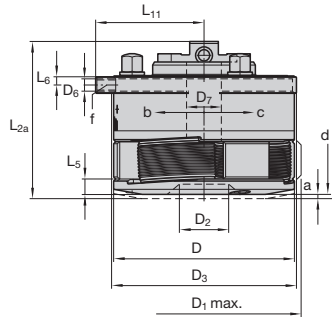
Rolling head			F2 EVO	F2L EVO	Rolling head			F2 EVO	F2L EVO
Part No.	Qty.	Part description	Ident No.	Left hand head Ident No.	Part No.	Qty.	Part description	Ident No.	Left hand head Ident No.
1	1	Clutch	7137661	7159821	9-3	1	Threaded pin	7137658	
2	1	Adjustment housing	7137662	7159829	9-4	1	Screw	1044990	
2-2	1	Slide block Size 2	7137659		10	1	Coil spring	2164774	2164786
2-3	1	Adjusting spindle Size 2	7126024		11	1	Circlip	2164775	
2-4	1	Retention clip Size 2	7113299		12	1	Circlip	7113298	
3	1	Center plate	7137663	7159833	13	3	Carbide bushing	2164887	
4	1	Front plate	7137664	7159834	14	3	Screw	7123891	
5	3	Eccentric spindle	2164770		15	3	Shoulder nut	7202801	
6	3	Spacer stud	7137666		17	1	Chip guard	7137672	
7	1	Center gear	7137667	7159835	18	3	Roll	see individual	
8	3	Spur gear	7137668	7159828	19	2	Shank adaption screw	7211621	
9	1	Closing clip complete	7137669		When ordering spare parts, please state rolling head type, Part No. and Ident No.				
9-1	1	Clip	7137656						
9-2	1	Hand grip	7137657						



Needle bearing alternates + accessories see page 331



Type	Ident No.
F23 EVO	7155144
F23L EVO	7169600
K23 EVO	7169601
K23L EVO	7169602



Dimension in inches

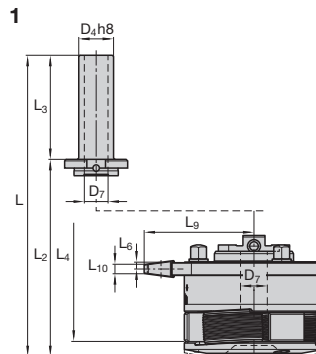
D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
3.465	3.681	1.102	3.543	M6	0.669	3.094	0.295	0.158	2.079	0.118	60°	1° 25'
F23 EVO, K23 EVO for right-hand threads F23L EVO, K23L EVO for left-hand threads F23 EVO, F23L EVO to be used stationary only K23 EVO, K23L EVO used stationary or rotating									m-Rk		m-Ro	
									approx. 4.10 lb		approx. 0.37 – 0.71 lb	

a = Pull off for opening
 b = Head closes when type F
 c = Head opens when type F
 d = Rolling head closed
 e = Rolling head opened
 f = Thread for hand grip with stationary operation
 α = Closing angle
 γ = Inclined position of rolls
 m-Rk = Rolling head weight without shank and rolls
 m-Ro = Weight of 1 set of 3 rolls

Change shanks EVOLine

Type	Ident No.
R25-size 2	7137673
R30-size 2	7139612
R1-size 2	7139614
R1 1/4-size 2	7139616
R1 1/2-size 2	7139618

1 Roundshank



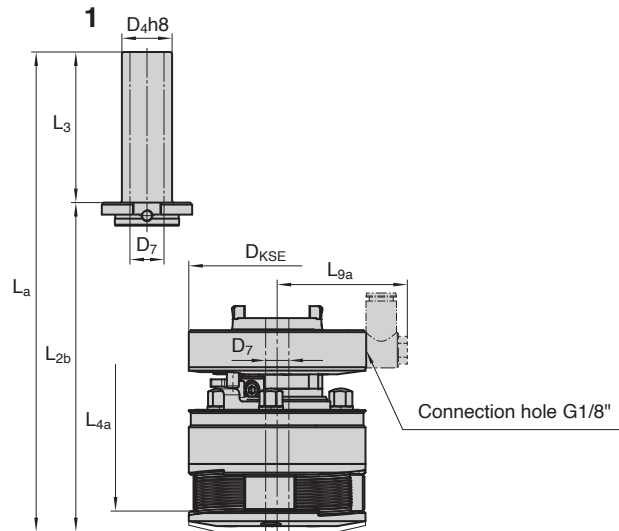
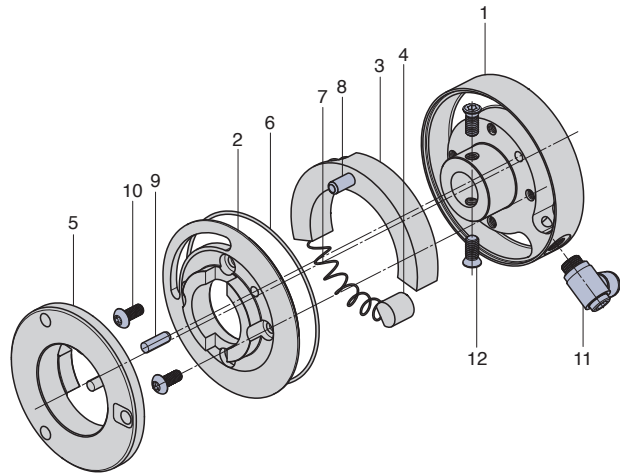
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
25 mm	0.984	0.669	3.465	6.047	7.441	3.094	4.488	2.953
30 mm	1.181	0.669	3.465	6.638	8.032	3.094	4.488	3.543
1	1.000	0.669	3.465	6.047	7.441	3.094	4.488	2.953
1 1/4	1.250	0.669	3.465	6.638	8.032	3.094	4.488	3.543
1 1/2	1.500	0.669	3.465	6.638	8.032	3.094	4.488	3.543

Change shanks will be delivered with shank adaption screw size 2 (2 x 7211621).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOLine Spare parts for closing device Right Hand			CCD Size 2 Right Hand
Part No.	Qty.	Part description	Ident No.
1	1	Housing	7144713
2	1	Cover plate	7144714
3	1	Curved piston	7144715
4	1	Spring bolt	7159855
5	1	Chip guard	7151992
6	1	Sealing ring	7151997
7	1	Pressure spring	7170169
8	1	Cylindrical pin	2142691
9	2	Cylindrical pin	2142675
10	4	Screw	7123891
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 2	7211621

Type	Ident No.
CCD EVOLine Size 2 Right Hand	7144712
CCD EVOLine Size 2 Left Hand	7170333



L ₆	L ₉	L ₁₀	m-Rs
0.157	2.721	0.236	approx. 0.49 lb
0.157	2.721	0.236	approx. 0.90 lb
0.157	2.721	0.236	approx. 0.51 lb
0.157	2.721	0.236	approx. 1.04 lb
0.157	2.721	0.236	approx. 1.57 lb

m Rs = Weight shank



MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
Ident No.		
MF 8 ... 10 x 0.5	1511725	2242958
MF 8 ... 10 x 0.75	1511707	1511716
MF 10 ... 12 x 0.75	1511743	1511752
MF 10 ... 12 x 1	1511770	1511789
MF 12 ... 14 x 1	1511798	1511814
MF 14 ... 16 x 1	1511887	1511912
MF 16 ... 18 ¹⁾ x 1	1511985	1511994
MF 18 ¹⁾ ... 20 ¹⁾ x 1	1512074	1512083
MF 14 ... 16 x 1.25	1511949	1511958
MF 16 ... 18 ¹⁾ x 1.5	1512029	1512038
MF 18 ¹⁾ ... 20 ¹⁾ x 1.5	1512127	1512136
MF 20 ¹⁾ ... 22 ¹⁾ x 1.5	1512172	1512181

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
UNF 9/16 ... 5/8 - 18	1512494	1512500
UNF 11/16 ¹⁾ ... 3/4 ¹⁾ - 16	1512449	1512458

UN		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
UN 7/16 ... 1/2 - 32	2240057	2168596
UN 1/2 ... 9/16 - 20	1512421	1512430
UN 1/2 ... 9/16 - 28	2242730	2242905
UN 1/2 ... 9/16 - 32	2242906	2242907
UN 9/16 ... 5/8 - 20	2168849	2168772
UN 9/16 ... 5/8 - 28	2242288	2242909
UN 9/16 ... 5/8 - 32	2242087	1512369
UN 5/8 ... 11/16 ¹⁾ - 16	2242911	2242912
UN 5/8 ... 11/16 ¹⁾ - 20	2242913	2242914
UN 5/8 ... 11/16 ¹⁾ - 28	2242917	2242918
UN 3/4 ¹⁾ ... 13/16 ¹⁾ - 16	2245452	2242920

UNEF		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
UNEF 5/16 ... 3/8 - 32	2242608	1512412
UNEF 3/8 ... 7/16 - 32	2242901	2242902
UNEF 7/16 ... 1/2 - 28	1512378	2242903
UNEF 9/16 ... 5/8 - 24	2169198	2242908
UNEF 5/8 ... 11/16 ¹⁾ - 24	2242915	2242916
UNEF 11/16 ¹⁾ ... 3/4 ¹⁾ - 20	1512387	1512396
UNEF 3/4 ¹⁾ ... 13/16 ¹⁾ - 20	2242921	2242922
UNEF 13/16 ¹⁾ ... 7/8 ¹⁾ - 20	2242923	2242924

UNJ	
Nominal size x TPI	Lead 1K
Ident No.	
UNJEF 5/16 ... 3/8 x 32	2248869
UNJF 1/2 x 20	2169959
UNJF 9/16 ... 5/8 x 18	2169031
UNJEF 9/16 ... 5/8 x 24	On Request
UNJEF 5/8 ... 11/16 ¹⁾ x 24	On Request
UNJEF 11/16 ¹⁾ ... 3/4 ¹⁾ x 20	7389015
UNJF 3/4 ¹⁾ x 16	2169032

¹⁾ For thread lengths up to 19 mm (0.748") including runout.

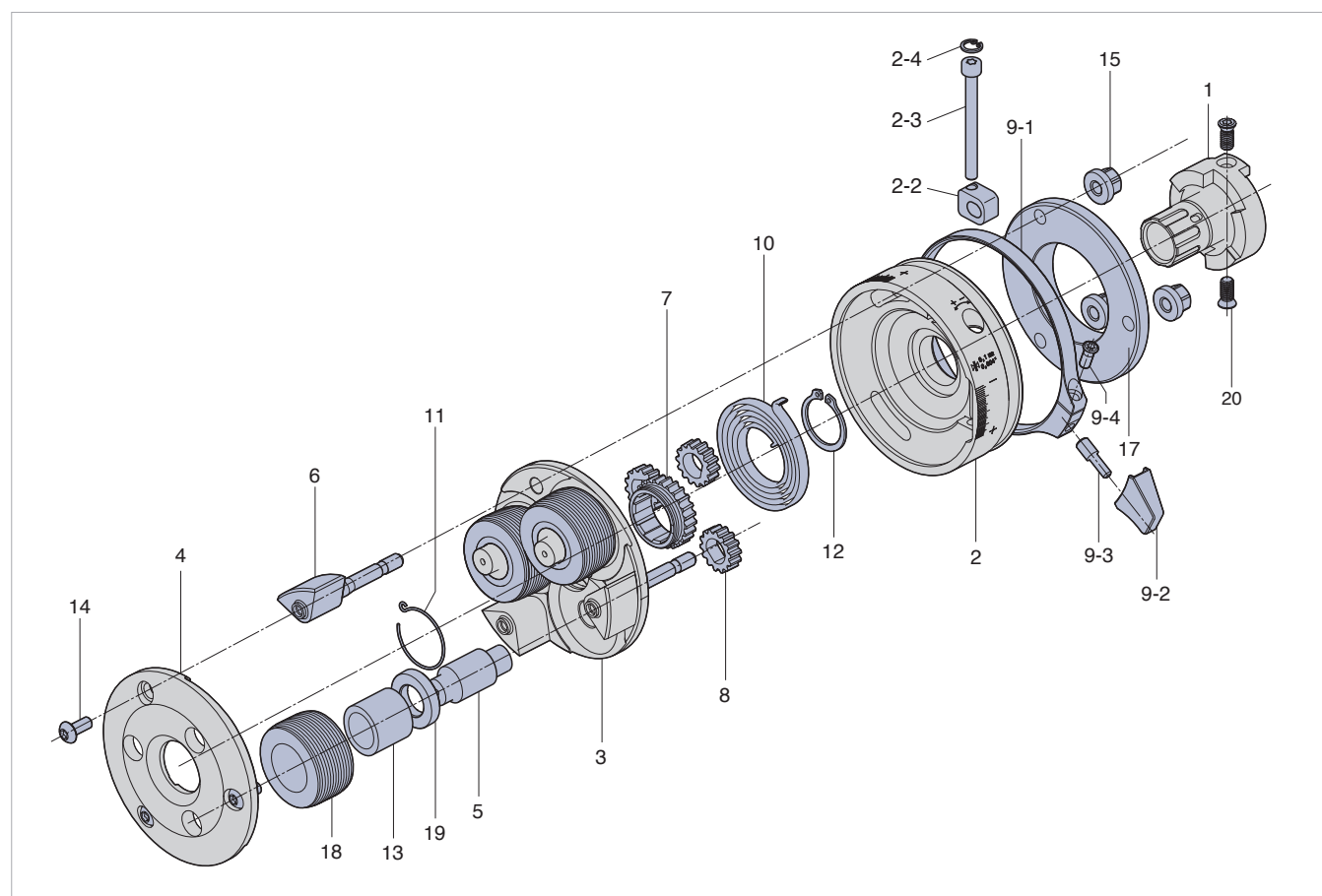
NPT	
Nominal size x TPI	Lead 1k
Ident No.	
NPT 1/8 - 27	2165335
NPT 1/4 - 18	2164611
NPT 3/8 - 18	2166779

NPTF	
Nominal size x TPI	Lead 1k
Ident No.	
NPTF 1/8 - 27	2164629
NPTF 1/4 - 18	2166947
NPTF 3/8 - 18	2168651

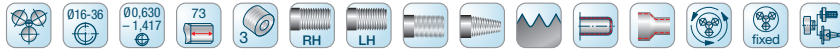
G		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
G 1/8 - 28	1512305	1512314
G 1/4 - 19	1512323	1512332
G 3/8 ¹⁾ - 19	1512341	1512350
G 1/2 ¹⁾ - 14	1512519	2168208

Thread dimensions combined in one block can be rolled with **one** set of rolls.

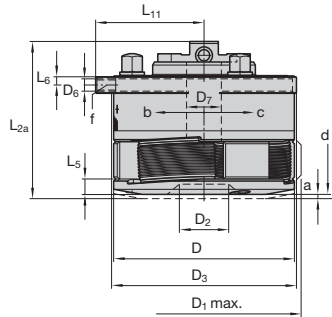
Rolling head			F23 EVO	F23L EVO Left hand head	Rolling head			F23 EVO	F23L EVO Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7137661	7159821	9-3	1	Threaded pin	7137658	
2	1	Adjustment housing	7137662	7217335	9-4	1	Screw	1044990	
2-2	1	Slide Block Size 2	7137659		10	1	Coil spring	2164774	2164786
2-3	1	Adjusting spindle Size 2	7126024		11	1	Circlip	2164775	
2-4	1	Retention clip Size 2	7113299		12	1	Circlip DIN 471	7113298	
3	1	Center plate	7155528	7217336	13	3	Carbide bushing	2164705	
4	1	Front plate	7155531	7217337	14	3	Screw	7123891	
5	3	Eccentric spindle	2164931		15	3	Shoulder nut	7202801	
6	3	Spacer stud	7155532		17	1	Chip guard	7137672	
7	1	Center gear	7155534	7217338	18	3	Roll	see individual	
8	3	Spur gear	7155533	7245255	19	3	Washer	2164935	
9	1	Closing clip complete	7137669		20	2	Shank adaption screw	7211621	
9-1	1	Clip	7137656		When ordering spare parts, please state rolling head type, Part No. and Ident No.				
9-2	1	Hand grip	7137657						



Needle bearing alternates + accessories see page 331



Type	Ident No.
F233400 EVO	7156345
F233400L EVO	7169603
K233400 EVO	7169604
K233400L EVO	7169605



Dimension in inches

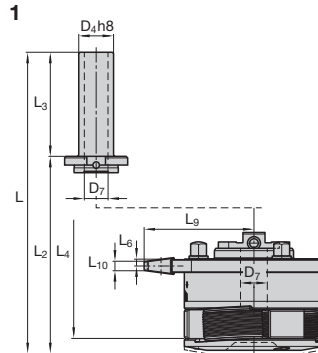
D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
3.780	4.528	1.535	3.858	M6	1.102	3.780	0.315	0.158	2.236	0.118	30°	1° 15'
F233400 EVO, K233400 EVO for right-hand threads F233400L EVO, K233400L EVO for left-hand threads F233400 EVO, F233400L EVO to be used stationary only K233400 EVO, K233400L EVO used stationary or rotating										m-Rk	m-Ro	
										approx. 7.5 lb	approx. 0.41–0.88 lb	

a = Pull off for opening
 b = Head closes when type F
 c = Head opens when type F
 d = Rolling head closed
 e = Rolling head opened
 f = Thread for hand grip with stationary operation
 α = Closing angle
 γ = Inclined position of rolls
 m-Rk = Rolling head weight without shank and rolls
 m-Ro = Weight of 1 set of 3 rolls

Change Shanks EVOLine

Type	Ident No.
R25-size 3	7139628
R30-size 3	7139630
R1-size 3	7139632
R1 1/4-size 3	7139634
R1 1/2-size 3	7139636

1 Roundshank



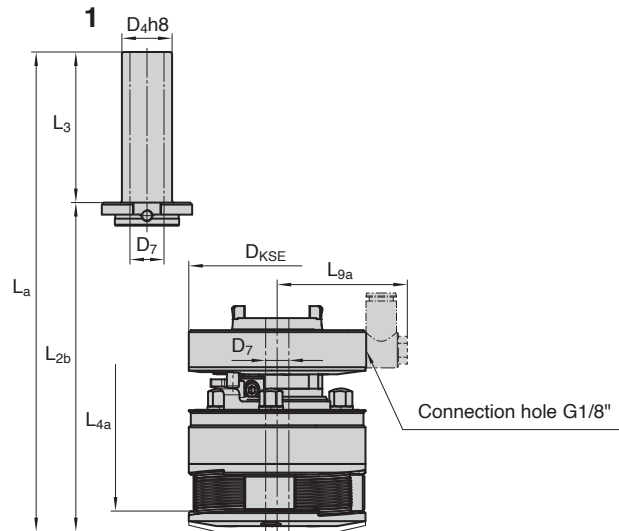
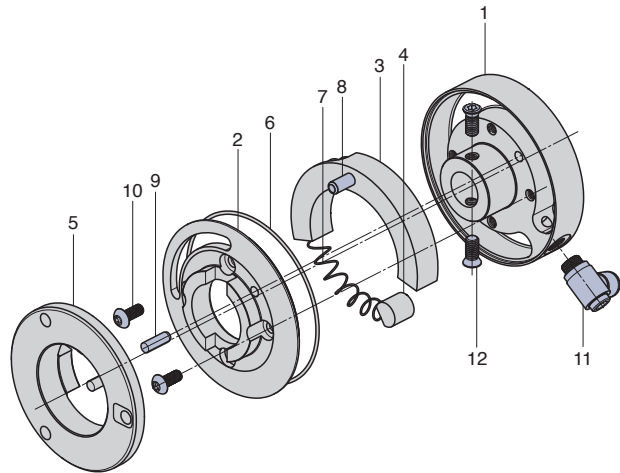
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
25 mm	0.984	0.669	4.449	6.732	8.284	3.779	5.331	2.953
30 mm	1.181	0.886	4.449	7.322	8.874	3.779	5.331	3.543
1	1.000	0.669	4.449	6.732	8.284	3.779	5.331	2.953
1 1/4	1.250	0.886	4.449	7.322	8.874	3.779	5.331	3.543
1 1/2	1.500	0.886	4.449	7.322	8.874	3.779	5.331	3.543

Change shanks will be delivered with shank adaption screw size 3 (2 x 7211622).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOLine Spare parts for closing device Right Hand			CCD Size 3 (F233400) Right Hand
Part No.	Qty.	Part description	Ident No.
1	1	Housing	7137676
2	1	Cover plate	7137677
3	1	Curved piston	7137678
4	1	Spring bolt	7137679
5	1	Chip guard	7156379
6	1	Sealing ring	7137674
7	1	Pressure spring	7155154
8	1	Cylindrical pin	2142691
9	2	Cylindrical pin	2142688
10	4	Screw	7123891
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 3	7211622

Type	Ident No.
CCD EVOLine Size 3 (F233400) Right Hand	7137680
CCD EVOLine Size 3 (F233400L) Left Hand	7170335



L ₆	L ₉	L ₁₀	m-Rs
0.158	2.906	0.236	approx. 0.75 lb
0.158	2.906	0.236	approx. 0.82 lb
0.158	2.906	0.236	approx. 0.75 lb
0.158	2.906	0.236	approx. 0.82 lb
0.158	2.906	0.236	approx. 0.88 lb

m Rs = Weight shank



MF		
Nominal size x Pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 16 ¹ ... 18 ¹ x 1.5	1513037	1513064
MF 18 ¹ ... 20 ¹ x 1.5	1513073	1513091
MF 20 ¹ ... 22 ¹ x 1.5	1513108	1513126
MF 22 ¹ ... 24 ¹ x 1.5	1513144	1513153
MF 24 ¹ ... 26 ¹ x 1.5	1513171	1513180
MF 26 ¹ ... 28 ² x 1.5	1513233	1513242
MF 28 ² ... 30 ² x 1.5	2246617	2243039
MF 30 ² ... 32 ² x 1.5	1513297	1513304
MF 32 ² ... 34 ² x 1.5	1513340	1513359
MF 34 ² ... 36 ² x 1.5	2243042	1513386
MF 22 ¹ ... 24 ¹ x 2	1513162	2243044
MF 24 ¹ ... 26 ¹ x 2	1513199	2169638
MF 26 ¹ ... 28 ² x 2	1513251	2243045
MF 28 ² ... 30 ² x 2	1513288	2243046
MF 30 ² ... 32 ² x 2	1513313	1513331
MF 32 ² ... 34 ² x 2	1513368	2243047
MF 34 ² ... 36 ² x 2	1513402	2243048

UN		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UN 5/8 ¹ ... 11/16 ¹ -20	2243064	2243065
UN 11/16 ¹ ... 3/4 ¹ -20	2166139	2243068
UN 3/4 ¹ -24	2240085	2243069
UN 3/4 ¹ ... 13/16 ¹ -16	2167189	1513554
UN 13/16 ¹ ... 7/8 ¹ -16	2243073	2243074
UN 7/8 ¹ ... 15/16 ¹ -16	2169149	2242227
UN 7/8 ¹ ... 15/16 ¹ -12	2166038	2243078
UN 15/16 ¹ ... 1 ¹ -16	2243080	2243081
UN 1 ¹ ... 1 1/16 ¹ -16	2168340	2166867
UN 1 1/16 ¹ ... 1 1/8 ² -20	2169148	2243087
UN 1 1/8 ² ... 1 3/16 ² -20	2243091	2243092
UN 1 1/8 ² ... 1 3/16 ² -16	2243095	2243096
UN 1 1/8 ² ... 1 3/16 ² -12	2241120	2243097
UN 1 3/16 ² ... 1 1/4 ² -16	2168027	2243098
UN 1 3/16 ² ... 1 1/4 ² -12	2243099	2243100
UN 1 1/4 ² ... 1 5/16 ² -16	2243101	2243102
UN 1 1/4 ² ... 1 5/16 ² -12	2165845	2243103
UN 1 5/16 ² ... 1 3/8 ² -16	2243104	2243105
UN 1 5/16 ² ... 1 3/8 ² -12	2243106	2243107
UN 1 3/8 ² ... 1 7/16 ² -16	2242215	2243108
UN 1 3/8 ² ... 1 7/16 ² -12	2243109	2243110

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 5/8 ¹ -18	2167797	2241562
UNF 11/16 ¹ ... 3/4 ¹ -16	2167188	2242668
UNF 13/16 ¹ ... 7/8 ¹ -14	1513563	1513572
UNF 7/8 ¹ ... 15/16 ¹ -14	2243076	2243077
UNF 15/16 ¹ ... 1 ¹ -12	2243082	2167075
UNF 1 ¹ ... 1 1/16 ¹ -12	2168130	2243086
UNF 1 1/16 ¹ ... 1 1/8 ² -12	2242012	2243090

UNEF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNEF 5/8 ¹ -24	2243148	2243063
UNEF 1 1/16 ¹ -24	2243066	2243067
UNEF 3/4 ¹ ... 13/16 ¹ -20	2243070	2243071
UNEF 13/16 ¹ ... 7/8 ¹ -20	2169153	2243072
UNEF 7/8 ¹ ... 15/16 ¹ -20	2168774	2243075
UNEF 15/16 ¹ ... 1 ¹ -20	2242407	2243079
UNEF 1 ¹ ... 1 1/16 ¹ -20	2169150	2243083
UNEF 1 ¹ ... 1 1/16 ¹ -18	2243084	2243085
UNEF 1 1/16 ¹ ... 1 1/8 ² -18	2240059	2243088
UNEF 1 1/16 ¹ ... 1 1/8 ² -16	2168691	2243089
UNEF 1 1/8 ² ... 1 3/16 ² -18	2243093	2243094

G		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G 3/8 ¹ -19	1513411	1513439
G 1/2 ¹ -14	1513448	2168886
G 5/8 ¹ -14	1513466	2243146
G 3/4 ¹ -14	1513484	2243147
G 7/8 ² -14	1513509	1513518
G 1 ² -11	1513527	2241298

NPT	
Nominal size x TPI	Lead 1k
	Ident No.
NPT 3/8 -18	2164626

NPTF	
Nominal size x TPI	Lead 1k
	Ident No.
NPTF 3/8 -18	2165232

UNJ	
Nominal size x TPI	Lead 1K
	Ident No.
UNJ 5/8 ¹ x 18	2242439
UNJ 5/8 ¹ x 24	On Request
UNJ 1 1/16 ¹ x 24	7317952
UNJ 1 1/16 ¹ ... 3/4 ¹ x 16	2242438
UNJ 3/4 ¹ ... 13/16 ¹ x 20	9191007
UNJ 15/16 ¹ ... 1 ¹ x 20	7151717
UNJ 1 ¹ ... x 12	2249063

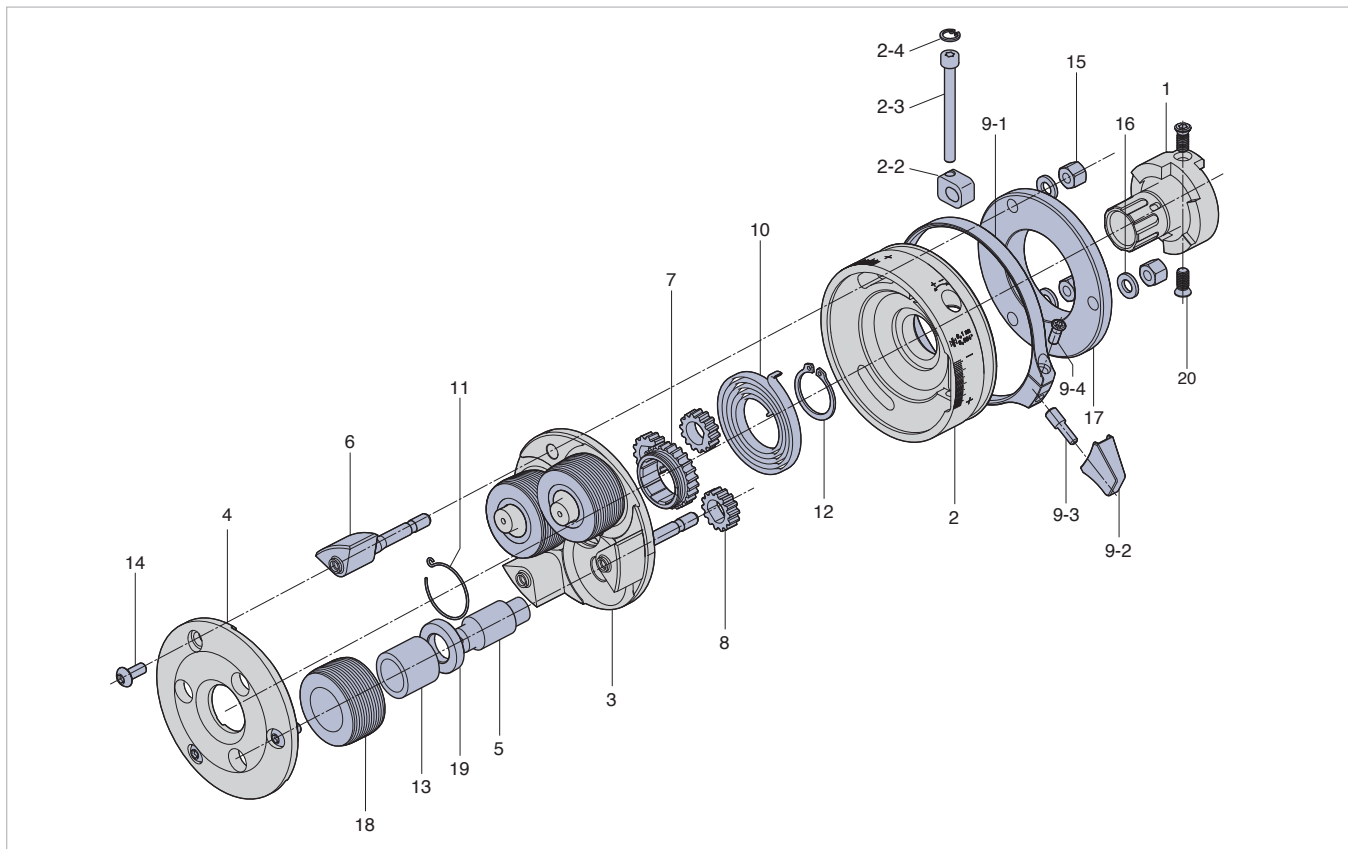
Thread dimensions combined in one block
can be rolled with **one** set of rolls.

¹) For thread lengths up to 72 mm (2.835")
including runout.

²) For thread lengths up to 24 mm (0.945")
including runout.

Rolling head			F233400 EVO	F233400L EVO Left hand head	Rolling head			F233400 EVO	F233400L EVO Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7156369	7201777	9-4	1	Screw	1044990	
2	1	Adjustment housing	7156370	7201778	10	1	Coil spring	2164974	2164987
2-2	1	Slide Block Size 233400	7156372		11	1	Circlip	2164975	
2-3	1	Adjusting spindle Size 2	7126024		12	1	Circlip DIN 471	7161312	
2-4	1	Retention clip Size 2	7113299		13	3	Carbide bushing	2168237	
3	1	Center plate	7156363	7201780	14	3	Screw	7123891	
4	1	Front plate	7156364	7201781	15	3	Nut	7221734	
5	3	Eccentric spindle	2164969		16	3	Washer	2143366	
6	3	Spacer stud	7156365		17	1	Chip guard	7156376	
7	1	Center gear	7156367	7201782	18	3	Roll	see individual	
8	3	Spur gear	7156368	7201783	19	3	Washer	2164978	
9	1	Closing clip complete	7156374		20	2	Shank adaption screw	7211622	
9-1	1	Clip	7156375						
9-2	1	Hand grip	7137657						
9-3	1	Threaded pin	7137658						

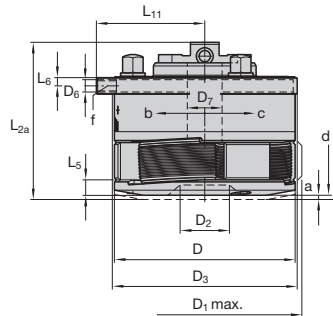
When ordering spare parts, please state
rolling head type, Part No. and Ident No.



Needle bearing alternates + accessories see page 331



Type	Ident No.
F3 EVO	7146720
F3L EVO	7169606
K3 EVO	7169607
K3L EVO	7169608



Dimension in inches

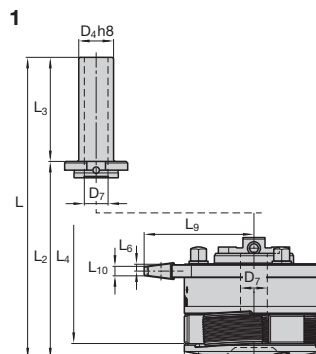
D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
4.606	5.157	1.496	4.685	M8	0.886	3.756	0.315	0.197	2.630	0.157	60°	2° 40'
F3 EVO, K3 EVO for right-hand threads F3L EVO, K3L EVO for left-hand threads F3 EVO, F3L EVO to be used stationary only K3 EVO, K3L EVO used stationary or rotating									m-Rk		m-Ro	
									approx. 8.82 lb		approx. 1.65–2.65 lb	

a = Pull off for opening
 b = Head closes when type F
 c = Head opens when type F
 d = Rolling head closed
 e = Rolling head opened
 f = Thread for hand grip with stationary operation
 α = Closing angle
 γ = Inclined position of rolls
 m-Rk = Rolling head weight without shank and rolls
 m-Ro = Weight of 1 set of 3 rolls

Change shanks EVOLine

Type	Ident No.
R25-size 3	7139628
R30-size 3	7139630
R1-size 3	7139632
R1 1/4-size 3	7139634
R1 1/2-size 3	7139636

1 Roundshank



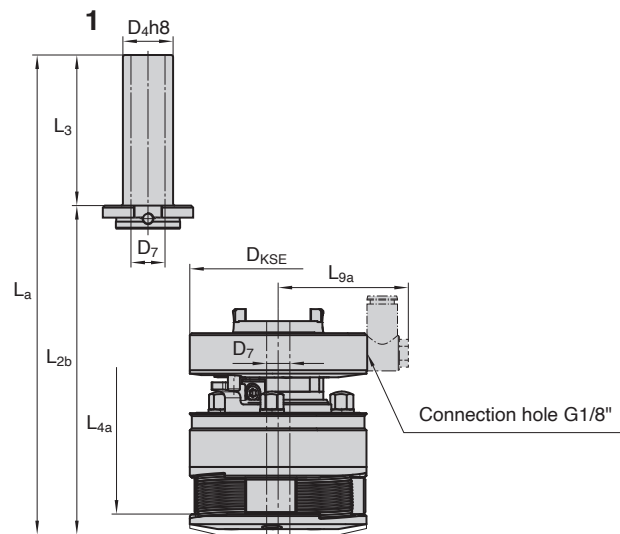
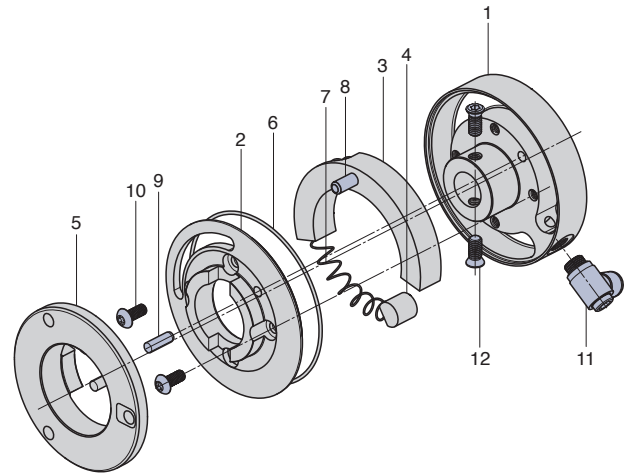
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
25 mm	0.984	0.669	4.449	6.709	8.268	3.756	5.315	2.953
30 mm	1.181	0.886	4.449	7.299	8.858	3.756	5.315	3.543
1	1.000	0.669	4.449	6.709	8.268	3.756	5.315	2.953
1 1/4	1.250	0.886	4.449	7.299	8.858	3.756	5.315	3.543
1 1/2	1.500	0.886	4.449	7.299	8.858	3.756	5.315	3.543

Change shanks will be delivered with shank adaption screw size 3 (2 x 7211622).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOLine Spare parts for closing device Right Hand			CCD Size 3 Right Hand Ident No.
Part No.	Qty.	Part description	
1	1	Housing	7137676
2	1	Cover plate	7137677
3	1	Curved piston	7137678
4	1	Spring bolt	7137679
5	1	Chip guard	7146737
6	1	Sealing ring	7137674
7	1	Pressure spring	7155154
8	1	Cylindrical pin	2142691
9	2	Cylindrical pin	2142688
10	4	Screw	7123891
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 3	7211622

Type	Ident No.
CCD EVOLine Size 3 Right Hand (F3)	7137675
CCD EVOLine Size 3 Left Hand (F3L)	7170334



L ₆	L ₉	L ₁₀	m-Rs
0.197	3.382	0.358	approx. 0.75 lb
0.197	3.382	0.358	approx. 0.82 lb
0.197	3.382	0.358	approx. 0.75 lb
0.197	3.382	0.358	approx. 0.82 lb
0.197	3.382	0.358	approx. 0.88 lb

m Rs = Weight shank



M		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 12 ... 14 x 1.75	1514312	1514321
M 14 ... 16 x 2	1514438	1514447
M 18 ... 20 x 2.5	1514642	1514660
M 20 ... 22 x 2.5	1514768	1514777

MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 12 ... 14 x 1.5	1514269	1514278
MF 14 ... 16 x 1.5	1514385	1514401
MF 18 ... 20 x 2	1514606	1514615
MF 20 ... 22 x 2	2168931	1514740

UNC		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC $\frac{7}{16}$ – 14	1515400	1515419
UNC $\frac{1}{2}$ – 13	1515437	1515446
UNC $\frac{9}{16}$ – 12	1515455	1515464
UNC $\frac{5}{8}$ – 11	1515482	1515491
UNC $\frac{3}{4}$ – 10	1515507	1515516
UNC $\frac{7}{8}$ – 9	1515534	1515543

¹⁾ For thread lengths up to 24 mm (0.945") including runout.

NPT	
Nominal size x TPI	Lead 1k
	Ident No.
NPT $\frac{1}{4}$ – 18	2241666

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF $\frac{7}{16}$... $\frac{1}{2}$ – 20	1515570	1515589
UNF $\frac{9}{16}$... $\frac{5}{8}$ – 18	1515605	1515614
UNF $\frac{3}{4}$ – 16	1515650	1515669
UNF $\frac{7}{8}$ – 14	1515678	2169974

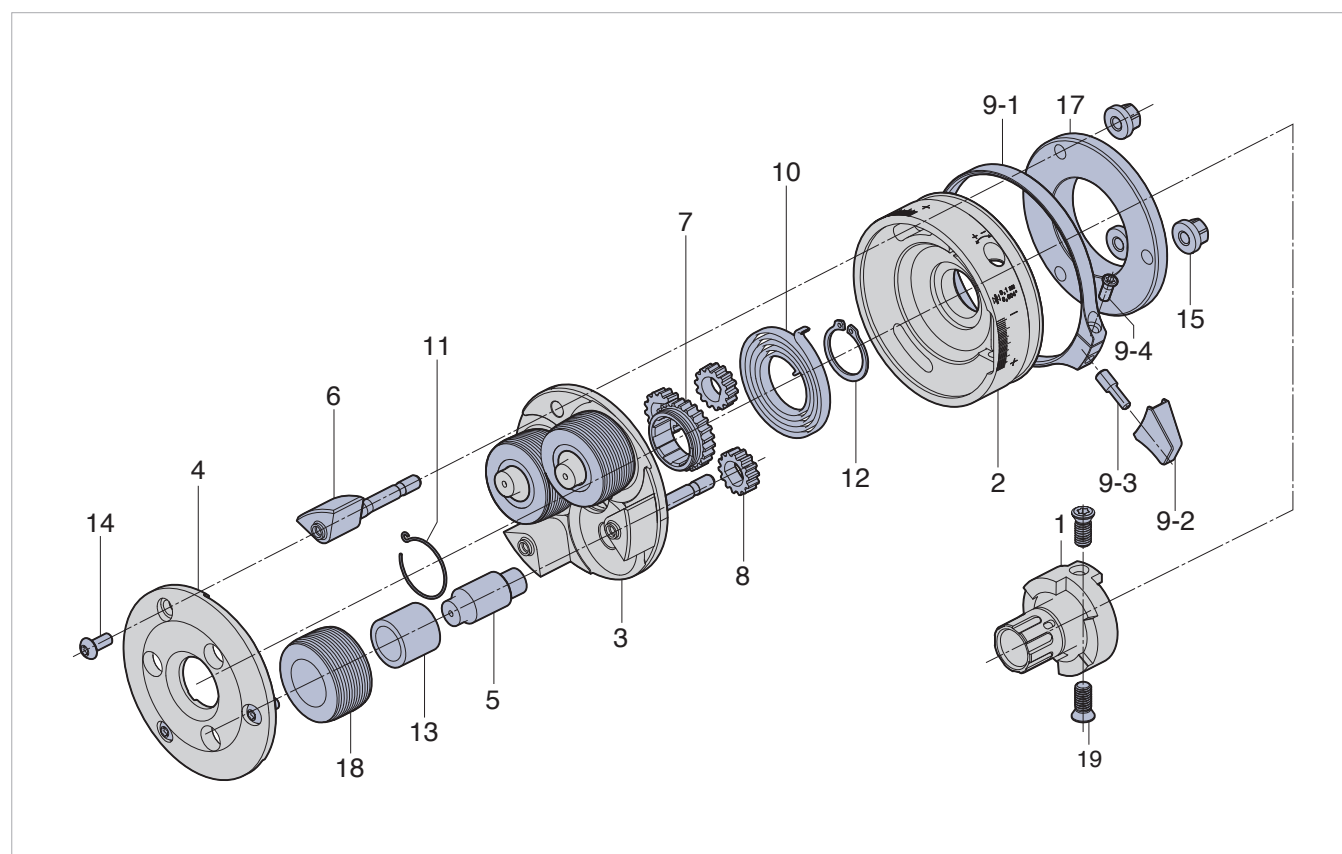
UNJ	
Nominal size x TPI	Lead 1K
	Ident No.
UNJ $\frac{7}{16}$ x 14	9124142
UNJ $\frac{7}{16}$... $\frac{1}{2}$ x 20	2166333
UNJ $\frac{1}{2}$ x 13	7013906
UNJ $\frac{9}{16}$ x 12	On Request
UNJ $\frac{9}{16}$... $\frac{5}{8}$ x 18	2167776
UNJ $\frac{5}{8}$ x 11	On Request
UNJ $\frac{3}{4}$ x 10	2424324
UNJ $\frac{11}{16}$... $\frac{3}{4}$ x 16	2169904
UNJ $\frac{7}{8}$ x 14	7331892

Thread dimensions combined in one block can be rolled with **one** set of rolls.

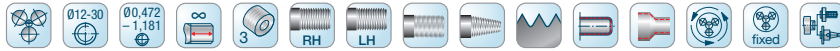
NPTF	
Nominal size x TPI	Lead 1k
	Ident No.
NPTF $\frac{1}{4}$ – 18	2166887

G		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G $\frac{1}{4}$... $\frac{3}{8}$ – 19	7180392	7180400
G $\frac{1}{2}$ – 14	1515080	1515106

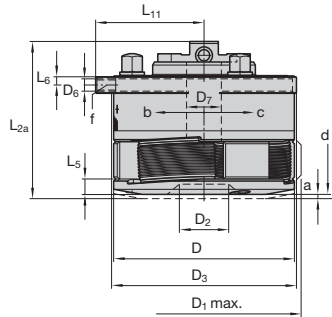
Rolling head			F3 EVO	F3L EVO Left hand head	Rolling head			F3 EVO	F3L EVO Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7146721	7173339	9-3	1	Threaded pin	7146733	
2	1	Adjustment housing	7146722	7173340	9-4	1	Screw	2237766	
2-2	1	Slide Block Size 3	7146719		10	1	Coil spring	2165032	2165045
2-3	1	Adjusting spindle Size 3	7132608		11	1	Circlip	2165033	
2-4	1	Retention clip Size 3	7132605		12	1	Circlip DIN 471	7132606	
3	1	Center plate	7146723	7173341	13	3	Carbide bushing	2165072	
4	1	Front plate	7146724	7173342	14	3	Screw	7132607	
5	3	Eccentric spindle	2165028		15	3	Shoulder nut	7202802	
6	3	Spacer stud	7146726		17	1	Chip guard	7146725	
7	1	Center gear	7146727	7173343	18	3	Roll	see individual	
8	3	Spur gear	7146728	7173551	19	2	Shank adaption screw	7211622	
9	1	Closing clip complete	7146730		When ordering spare parts, please state rolling head type, Part No. and Ident No.				
9-1	1	Clip	7146731						
9-2	1	Hand grip	7146732						



Needle bearing alternates + accessories see page 331



Type	Ident No.
F34 EVO	7156344
F34L EVO	7169609
K34 EVO	7169610
K34L EVO	7169611



Dimension in inches

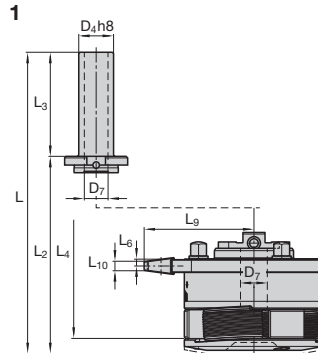
D	D _{1max}	D ₂	D ₃	D ₆	D ₇	L _{2a}	L ₅	L ₆	L ₁₁	a	α	γ
4.606	5.039	1.732	4.685	M8	0.886	3.819	0.315	0.197	2.630	0.157	60°	1° 15'
F34 EVO, K34 EVO for right-hand threads F34L EVO, K34L EVO for left-hand threads F34 EVO, F34L EVO to be used stationary only K34 EVO, K34L EVO used stationary or rotating										m-Rk	m-Ro	
										approx. 8.49 lb	approx. 0.71–1.87 lb	

a = Pull off for opening
b = Head closes when type F
c = Head opens when type F
d = Rolling head closed
e = Rolling head opened
f = Thread for hand grip with stationary operation
α = Closing angle
γ = Inclined position of rolls
m-Rk = Rolling head weight without shank and rolls
m-Ro = Weight of 1 set of 3 rolls

Change Shanks EVOLine

Type	Ident No.
R25-size 3	7139628
R30-size 3	7139630
R1-size 3	7139632
R1 1/4-size 3	7139634
R1 1/2-size 3	7139636

1 Roundshank



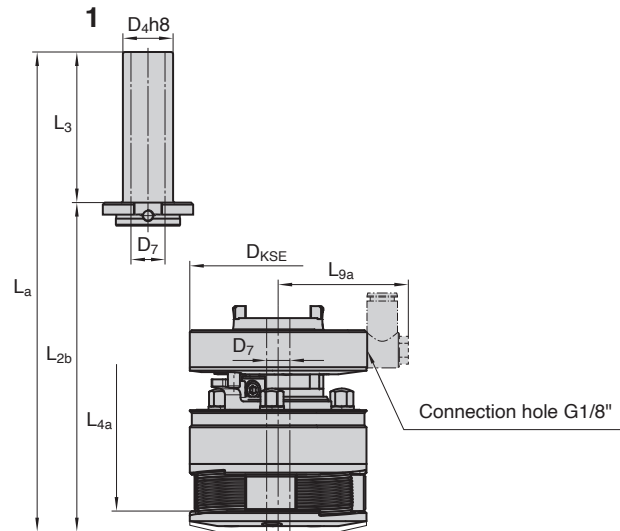
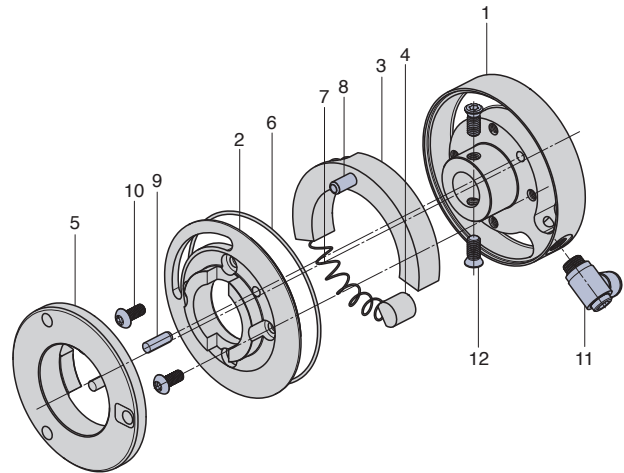
Shank dia.	Dimension in inches							
	D ₄	D ₇	D _{KSE}	L	L _a	L ₂	L _{2b}	L ₃
25 mm	0.984	0.669	4.449	6.772	8.327	3.819	5.374	2.953
30 mm	1.181	0.886	4.449	7.362	8.917	3.819	5.374	3.543
1	1.000	0.669	4.449	6.772	8.327	3.819	5.374	2.953
1 1/4	1.250	0.886	4.449	7.362	8.917	3.819	5.374	3.543
1 1/2	1.500	0.886	4.449	7.362	8.917	3.819	5.374	3.543

Change shanks will be delivered with shank adaption screw size 3 (2 x 7211622).

For a functional EVOLine axial rolling system, select a head, a shank, and thread rolls.
A coolant closing device can be added to automate the resetting of the head.

EVOLine Spare parts for closing device Right Hand			CCD Size 3 Right Hand Ident No.
Part No.	Qty.	Part description	
1	1	Housing	7137676
2	1	Cover plate	7137677
3	1	Curved piston	7137678
4	1	Spring bolt	7137679
5	1	Chip guard	7146737
6	1	Ring sealing	7137674
7	1	Pressure spring	7155154
8	1	Cylindrical pin	2142691
9	2	Cylindrical pin	2142688
10	4	Screw	7123891
11	1	L- and I-Fitting G1/8"	7167804-L 7167806-I
12	2	Shank adaption screw size 3	7211622

Type	Ident No.
CCD EVOLine Size 3 Right Hand (F34)	7137675
CCD EVOLine Size 3 Left Hand (F34L)	7170334



L ₆	L ₉	L ₁₀	m-Rs
0.197	3.382	0.358	approx. 0.75 lb
0.197	3.382	0.358	approx. 0.82 lb
0.197	3.382	0.358	approx. 0.75 lb
0.197	3.382	0.358	approx. 0.82 lb
0.197	3.382	0.358	approx. 0.88 lb

m Rs = Weight shank



MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 12 ... 14 x 1	1516800	1516819
MF 14 ... 16 x 1	1516828	1516837
MF 16 ... 18 x 1	1516846	1516855
MF 18 ... 20 x 1	1516864	1516882
MF 16 ... 18 x 1.5	1517006	1517015
MF 18 ... 20 x 1.5	1517042	1517060
MF 20 ... 22 x 1.5	1517088	1517113
MF 22 ... 24 ¹⁾ x 1.5	1517159	1517177
MF 24 ¹⁾ ... 27 ¹⁾ x 1.5	1517195	1517202
MF 27 ¹⁾ ... 30 ¹⁾ x 1.5	1517220	1517248

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 5/8 – 18	1517505	1517514
UNF 11/16 ... 3/4 – 16	2169256	2241532
UNF 3/4 ... 13/16 – 16	1517523	1517541
UNF 7/8 – 14	1517550	1517569
UNF 1 ¹⁾ – 12	1517578	1517587

UNEF				
Nominal size x TPI		Lead 1k	Lead 2k	Ident No.
UNEF 1/2 – 28		2243650	2243655	
UNEF 9/16 ... 5/8 – 24		2243651	2243656	
UNEF 5/8 ... 11/16 – 24		2240319	2243657	
UNEF 3/4 ... 13/16 – 20		2243652	2243658	
UNEF 13/16 ... 7/8 – 20		2166331	2166820	
UNEF 7/8 ... 15/16 ¹⁾ – 20		2243653	2243659	
UNEF 15/16 ¹⁾ ... 1 ¹⁾ – 20		2168615	2243660	
UNEF 11/16 ¹⁾ ... 11/8 ¹⁾ – 18		2243654	2243661	

UN			
Nominal size x TPI	Lead 1k	Lead 2k	Ident No.
UN 5/8 ... 11/16 – 28	2165494	2246320	
UN 11/16 ... 3/4 – 28	2246314	2246321	
UN 3/4 ... 13/16 – 28	2246315	2246322	
UN 13/16 ... 7/8 – 28	2246318	2246324	
UN 5/8 ... 11/16 – 20	2246313	2246319	
UN 7/8 ... 15/16 ¹⁾ – 16	2246317	2241474	
UN 7/8 ... 15/16 ¹⁾ – 12	2246316	2246323	

UNJ	
Nominal size x TPI	Lead 1K
Ident No.	
UNJ 5/8 x 18	7285865
UNJ 5/8 ... 11/16 x 24	On Request
UNJ 3/4 x 16	2242086
UNJ 3/4 ... 13/16 x 20	7085322
UNJ 7/8 x 14	2245611
UNJ 7/8 ... 15/16 ¹⁾ x 20	On Request
UNJ 1 ¹⁾ ... 11/16 ¹⁾ x 12	2242085
UNJ 1 ¹⁾ x 20	On Request

¹⁾ For thread lengths up to 24 mm (0.945") including runout.

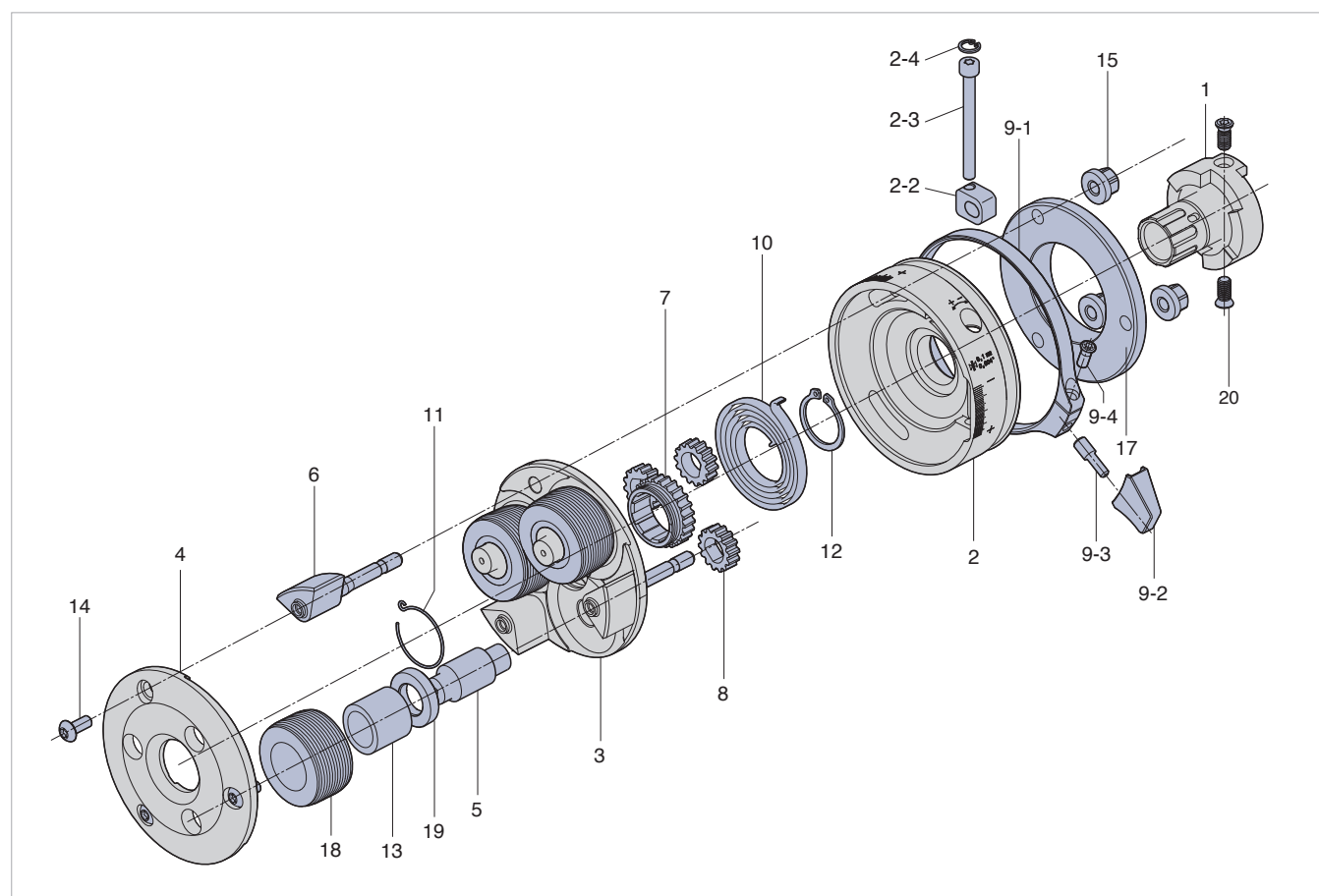
NPTF	
Nominal size x TPI	Lead 1k
Ident No.	
NPTF 3/8 – 18	2165391
NPTF 1/2 – 14	1517765
NPTF 3/4 – 14	1517774

G			
Nominal size x TPI	Lead 1k	Lead 2k	Ident No.
G 3/8 – 19	1517408	1517417	
G 1/2 ... 5/8 ¹⁾ – 14	1517435	1517444	
G 3/4 ¹⁾ – 14	1517462	1517471	
G 7/8 ¹⁾ – 14	2168006	2243649	

NPT	
Nominal size x TPI	Lead 1k
Ident No.	
NPT 3/8 – 18	1517710
NPT 1/2 – 14	1517738
NPT 3/4 – 14	1517756

Thread dimensions combined in one block can be rolled with **one** set of rolls.

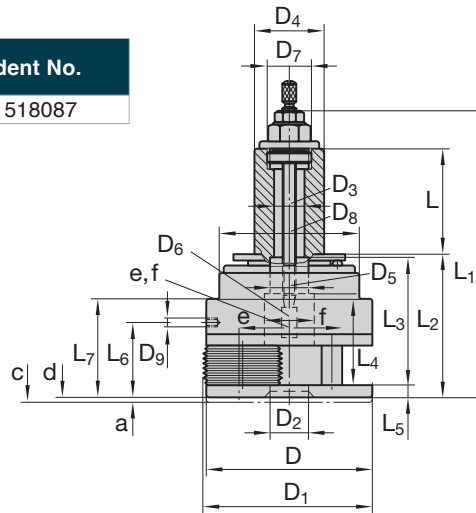
Rolling head			F34 EVO	F34L EVO Left hand head	Rolling head			F34 EVO	F34L EVO Left hand head
Part No.	Qty.	Part description	Ident No.	Ident No.	Part No.	Qty.	Part description	Ident No.	Ident No.
1	1	Clutch	7146721	7173339	9-3	1	Threaded pin	7146733	
2	1	Adjustment housing	7146722	7217339	9-4	1	Screw	2237766	
2-2	1	Slide block Size 3	7146719		10	1	Coil spring	2165032	2165045
2-3	1	Adjusting spindle Size 3	7132608		11	1	Circlip	2165033	
2-4	1	Retention clip Size 3	7132605		12	1	Circlip DIN 471	7132606	
3	1	Center plate	7156357	7217340	13	3	Carbide bushing	2165072	2164887
4	1	Front plate	7156358	7217341	14	3	Screw	7132607	
5	3	Eccentric spindle	2165534		15	3	Shoulder nut	7202802	
6	3	Spacer stud	7156359		17	1	Chip guard	7146725	
7	1	Center gear	7156361	7217342	18	3	Roll	see individual	
8	3	Spur gear	7156362	7254734	19	3	Washer	2165539	
9	1	Closing clip complete	7146730		20	2	Shank adaption screw	7211622	
9-1	1	Clip	7146731		When ordering spare parts, please state rolling head type, Part No. and Ident No.				
9-2	1	Hand grip	7146732						



Needle bearing alternates + accessories see page 331



Type	Ident No.
F4-1RN-1.5" Round Shank	1518087



Dimension in inches

D	D _{1max}	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	a	α
6.496	6.339	1.811	1.102	1.5	1.260	—	M 30 x 1.5 LH	4.921	M 8	3.13	9.783	5.433	4.724	—	0.394"	2.441"	3.406"	0.157"	30°
F4-1RN for right-hand threads Left-hand head upon request														γ		m-Rk		m-Ro	
														2° 30'		approx. 29.76 lb		approx. 2.43–4.41 lb	

a = Pull off for opening
c = Rolling head open
d = Rolling head closed
e = Rolling head opening direction
f = Rolling head closing direction
γ = Inclined position of rolls
<D₃ = Unlimited rollable length
>D₃ = Rollable length 4.724"

m-Rk = Rolling head weight without rolls
m-Ro = Weight of 1 set of 3 rolls

For axial rolling head with suffix "RN", select a head and thread rolls only.

RN heads have integrated shanks or flanges. Coolant closing devices do not exist for RN style heads.



M		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 14 ... 16 x 2	1518531	1518540
M 18 ... 20 x 2.5	1518648	1518657
M 20 ... 22 x 2,5	1518675	1518693
M 24 ... 27 x 3	1518728	1518737
M 27 ... 30 ¹⁾ x 3.5	1518764	1518773

MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 14 ... 16 x 1.5	1518318	1518336
MF 16 ... 18 x 1.5	1518345	1518354
MF 18 ... 20 x 2	1518586	1518595
MF 22 ... 24 x 2	1518611	1518620

UNC		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC $\frac{9}{16}$ – 12	1519200	2241861
UNC $\frac{5}{8}$ – 11	1519219	1519228
UNC $\frac{3}{4}$ – 10	1519237	1519246
UNC $\frac{7}{8}$ – 9	1519255	1519273
UNC 1 – 8	1519282	1519291
UNC 1 $\frac{1}{8}$ ¹⁾ – 7	1519308	1519317

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF $\frac{9}{16}$... $\frac{5}{8}$ – 18	1519326	1519335
UNF $\frac{3}{4}$ – 16	1519344	1519353
UNF $\frac{7}{8}$ – 14	1519362	1519371
UNF 1 – 12	1519380	1519399

G		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G $\frac{3}{8}$ – 19	1518942	1518951
G $\frac{1}{2}$... $\frac{5}{8}$ – 14	1518960	1518979

NPT	
Nominal size x TPI	Lead 1k
	Ident No.
NPT $\frac{1}{2}$ – 14	1519852

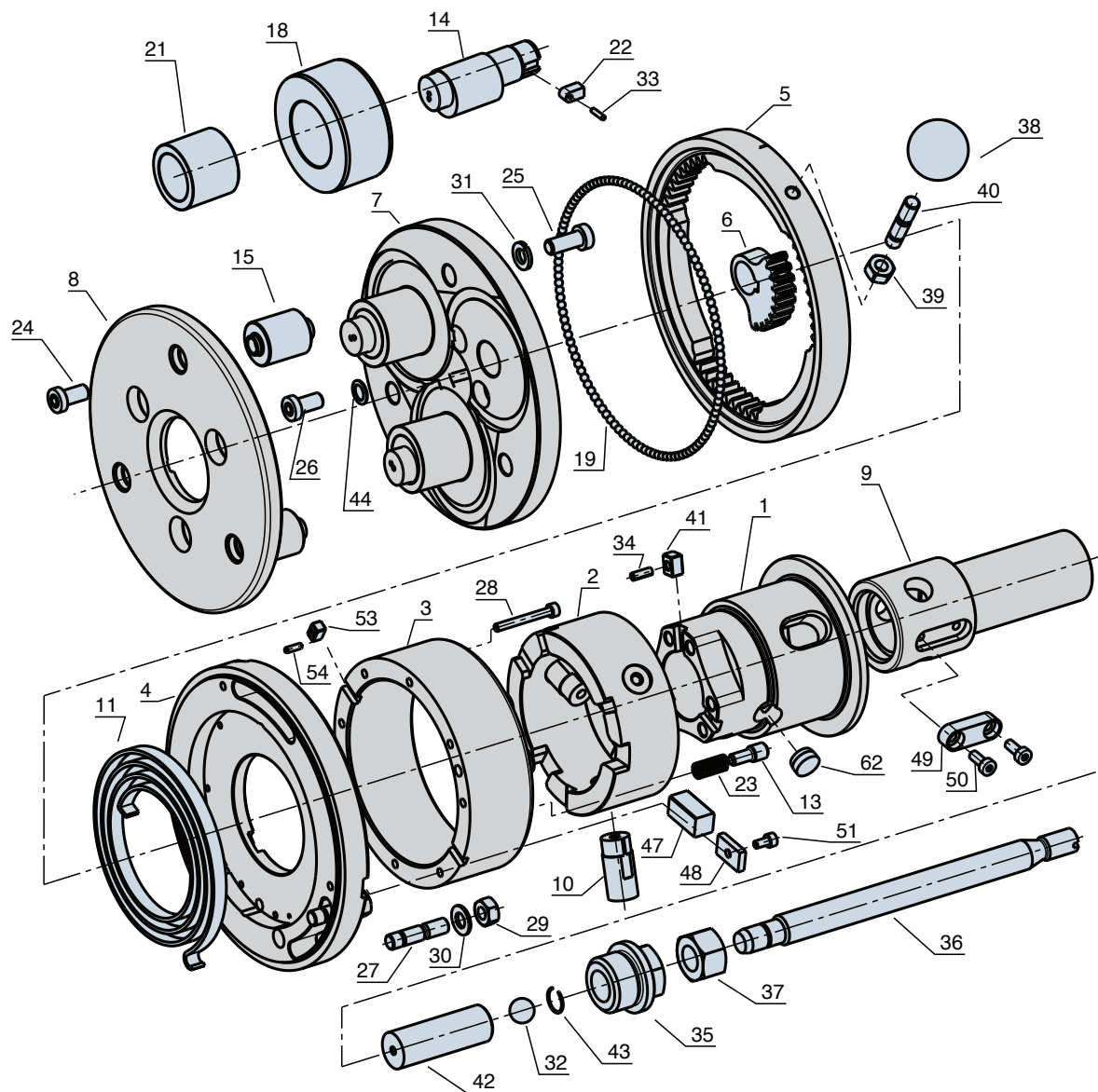
NPTF	
Nominal size x TPI	Lead 1k
	Ident No.
NPTF $\frac{1}{2}$ – 14	2248847

Thread dimensions combined in one block can be rolled with **one** set of rolls.

¹⁾ For thread lengths up to 4.724" including runout.

Rolling head			F4-1RN	Rolling head			F4-1RN
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange	2165631	30	6	Washer	2141465
2	1	Clutch	2165632	31	3	Lock washer	2141717
3	1	Operating ring	2165633	32	1	Steel ball	2148795
4	1	Spring housing	2165584	33	3	Pin	2141237
5	1	Gear ring	2165585	34	3	Roll pin	2142576
6	3	Gear sectors	2165586	35	1	Stop screw body	2165596
7	1	Centre plate	2165587	36	1	Stop screw	2165565
8	1	Front plate	2165588	37	1	Hexagon nut	2148391
9	1	Shank-round 1.5"	2165637	38	1	Ball	2141701
10	3	Pin	2165590	39	1	Setscrew	2142086
11	1	Coil spring	2165591	40	1	Clip	2167024
13	4	Spring pin	2165090	41	3	Fitting key	2173673
14	3	Eccentric spindles	2165593	42	1	Rotating end stop	2167300
15	3	Spacer studs	2165594	43	1	Circlip	2165008
19	116	Steel ball	2148807	44	6	Lock washer	2149015
21	3	Carbide bushing	2167324	47	3	Clutch wedge	2165598
22	3	Fitting key	2165595	48	3	Cover plate	2165597
23	4	Pressure spring	2165095	49	1	Fitting key	2165641
24	3	Cap screw	2143016	50	2	Cap screw	2167742
25	3	Cap screw	2143017	51	3	Cap screw	2141882
26	6	Cap screw	2148743	53	2	Fitting key	2165097
27	6	Stud	2148839	54	2	Roll pin	2142566
28	8	Cap screw	2141888	62	1	Plug	7112038
29	6	Hexagon nut	2148398				

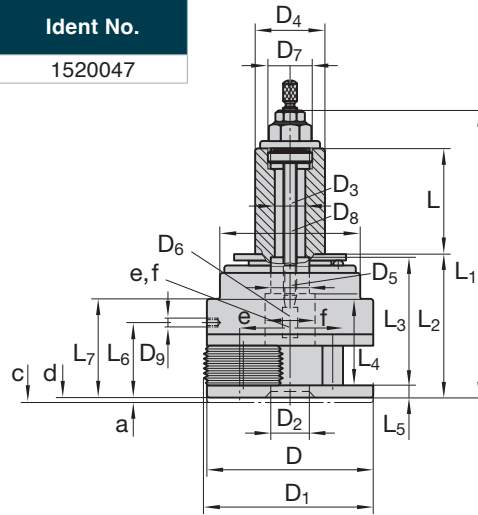
When ordering spare parts, please state rolling head type, Part No. and Ident No.



Needle bearing alternates + accessories see page 331



Type	Ident No.
F45-1RN - 1.5 Round Shank	1520047



Dimension in inches

D	D _{1max}	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	a	α
6.496	6.339	1.890	1.102	1.5	1.260	1.457	M 30 x 1.5 LH	4.921	M 8	3.13	9.803	5.512	4.764	3.504	0.394	2.567	3.531	0.157	30°

F45-1RN for right-hand threads
Left-hand head upon request

γ	v	m-Ro
1° 10'	approx. 29.76 lb	approx. 2.0–3.5 lb

a = Pull off for opening
c = Rolling head open
d = Rolling head closed
e = Rolling head opening direction
f = Rolling head closing direction
γ = Inclined position of rolls
<D₃ = Unlimited rollable length
>D₃ = Restricted rollable length

m-Rk = Rolling head weight without rolls
m-Ro = Weight of 1 set of 3 rolls

For axial rolling head with suffix “RN”, select a head and thread rolls only.
RN heads have integrated shanks or flanges. Coolant closing devices do not exist for RN style heads.



MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
Ident No.		
MF 16 ... 18 x 1	1520109	1520118
MF 18 ... 20 x 1	1520127	1520136
MF 20 ... 22 x 1	2243816	1520145
MF 22 ... 24 x 1	2243817	1520154
MF 18 ... 20 x 1.5	1520190	1520207
MF 20 ... 22 x 1.5	1520216	1520225
MF 22 ... 24 x 1.5	1520234	1520243
MF 24 ... 27 x 1.5	1520261	1520289
MF 27 ... 30 ¹⁾ x 1.5	1520298	1520314
MF 30 ¹⁾ ... 33 ²⁾ x 1.5	1520341	1520378
MF 33 ²⁾ ... 36 ²⁾ x 1.5	1520396	1520412
MF 36 ²⁾ ... 39 ³⁾ x 1.5	1520449	1520467
MF 38 ³⁾ ... 40 ³⁾ x 1.5	1520476	1520485
MF 24 ... 27 x 2	1520528	1520537
MF 27 ... 30 ¹⁾ x 2	1520546	1520555
MF 30 ¹⁾ ... 33 ²⁾ x 2	1520564	1520573
MF 33 ²⁾ ... 36 ²⁾ x 2	1520591	1520608
MF 36 ²⁾ ... 39 ³⁾ x 2	1520626	1520635
MF 39 ³⁾ ... 42 ³⁾ x 2	1520644	1520653

UN		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
UN 3/4 ... 13/16 -32	2243874	2243875
UN 13/16 ... 7/8 -32	2243876	2243877
UN 3/4 ... 13/16 -28	2243878	2243879
UN 13/16 ... 7/8 -28	2243880	2243881
UN 7/8 ... 15/16 -28	2243882	2243883
UN 1 1/16 ... 1 1/8 ¹⁾ -20	2243892	2243893
UN 1 1/8 ¹⁾ ... 1 3/16 ¹⁾ -20	2243894	2243895
UN 1 3/16 ¹⁾ ... 1 1/4 ²⁾ -20	2243896	2243897
UN 1 1/4 ²⁾ ... 1 5/16 ²⁾ -20	2243898	2240384
UN 13/16 ... 7/8 -16	2243907	2243908
UN 7/8 ... 15/16 -16	2243909	2243910
UN 15/16 ... 1 -16	2243911	7412388
UN 1 ... 1 1/16 -16	2243913	2243914
UN 1 1/16 ... 1 1/8 ¹⁾ -16	2167040	2243915
UN 1 1/8 ¹⁾ ... 1 3/16 ¹⁾ -16	2243916	2243917
UN 1 3/16 ¹⁾ ... 1 1/4 ²⁾ -16	2243918	1521037
UN 1 1/4 ²⁾ ... 1 5/16 ²⁾ -16	2243919	2243920
UN 1 5/16 ²⁾ ... 1 3/8 ²⁾ -16	2243921	2243922
UN 1 3/8 ²⁾ ... 1 7/16 ³⁾ -16	2243923	2243924
UN 1 7/16 ³⁾ ... 1 1/2 ³⁾ -16	2243925	2243926
UN 1 1/2 ³⁾ ... 1 9/16 ³⁾ -16	2243927	2243928

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
UNF 7/8 -14	2245326	1520993
UNF 1 -14	1521000	1521019
UNF 1 ... 1 1/16 -12	2243930	2241312
UNF 1 1/16 ... 1 1/8 ¹⁾ -12	1520902	2243931
UNF 1 1/8 ¹⁾ ... 1 3/16 ¹⁾ -12	1520920	1520939
UNF 1 3/16 ¹⁾ ... 1 1/4 ²⁾ -12	1520948	1520957
UNF 1 1/4 ²⁾ ... 1 5/16 ²⁾ -12	2243932	1520966
UNF 1 5/16 ²⁾ ... 1 3/8 ²⁾ -12	2243933	1520975
UNF 1 3/8 ²⁾ ... 1 7/16 ³⁾ -12	2243934	2243935
UNF 1 7/16 ³⁾ ... 1 1/2 ³⁾ -12	2241309	1520984
UNF 1 1/2 ³⁾ ... 1 9/16 ³⁾ -12	2243936	2243937

G		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
G 3/8 - 19	1520751	1520760
G 1/2 - 14	1520779	1520788
G 5/8 - 14	1520797	1520804
G 3/4 - 14	1520813	1520822
G 7/8 - 14 ¹⁾	1520831	2243864
G 1 - 11 ²⁾	1520859	1520868
G 1 1/8 - 11 ³⁾	2243865	1520877
G 1 1/4 - 11 ³⁾	1520886	2243866

Thread dimensions combined in one block can be rolled with **one** set of rolls.

1) For thread lengths up to 4.764" including runout.

2) For thread lengths up to 3.500" including runout.

3) For thread lengths up to 1.061" including runout.

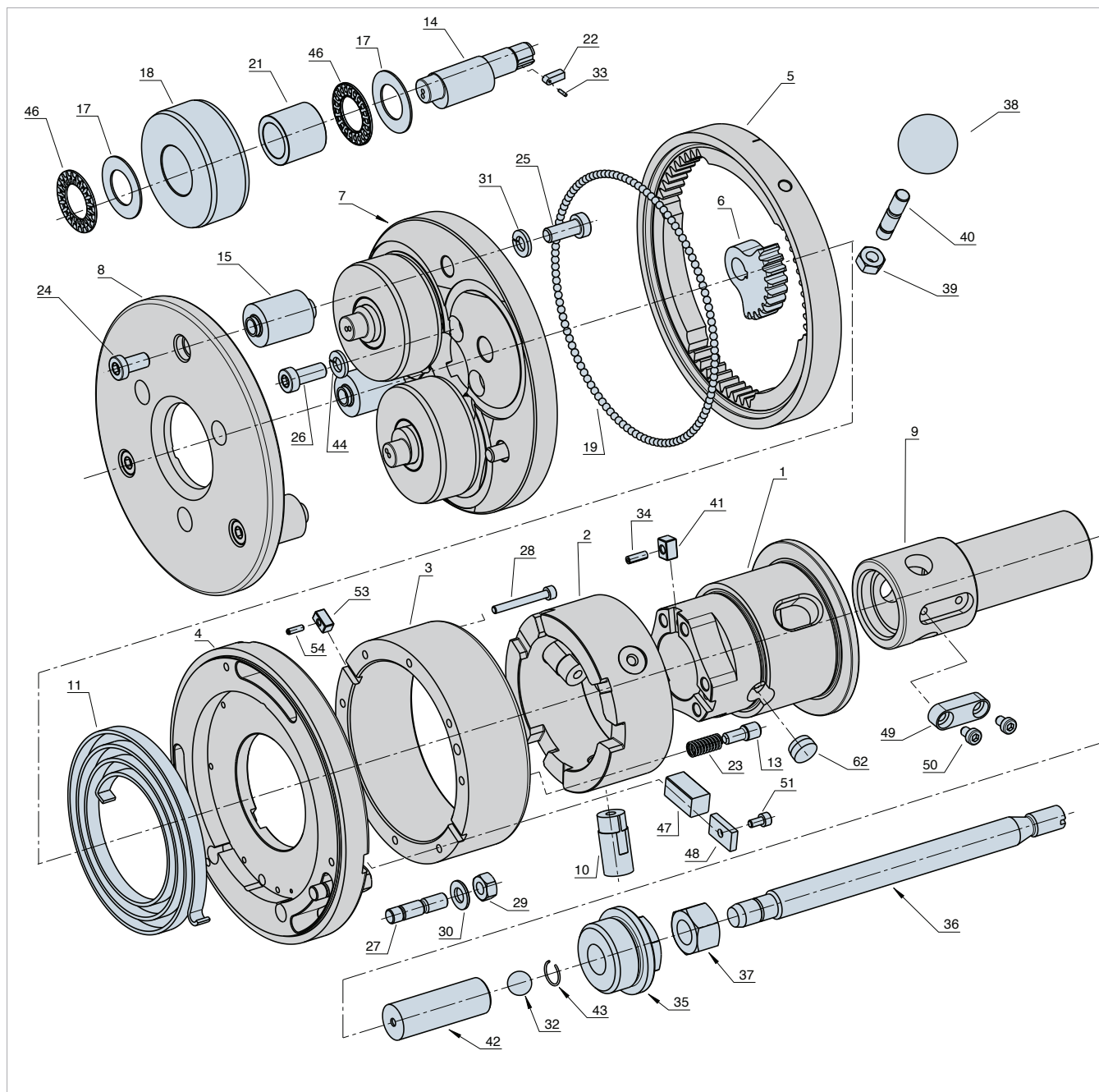
UNEF		
Nominal size x TPI	Lead 1k	Lead 2k
Ident No.		
UNEF 3/4 ... 13/16 -20	2243884	2243885
UNEF 13/16 ... 7/8 -20	2243886	2242860
UNEF 7/8 ... 15/16 -20	2243887	2243888
UNEF 15/16 ... 1 -20	2243889	2168117
UNEF 1 ... 1 1/16 -20	2243890	2243891
UNEF 1 1/16 ... 1 1/8 ¹⁾ -18	2167041	2243899
UNEF 1 1/8 ¹⁾ ... 1 3/16 ¹⁾ -18	2243900	2243901
UNEF 1 3/16 ¹⁾ ... 1 1/4 ²⁾ -18	2243902	2240097
UNEF 1 1/4 ²⁾ ... 1 5/16 ²⁾ -18	2243903	2240384
UNEF 1 5/16 ²⁾ ... 1 3/8 ²⁾ -18	2243905	2243906

NPT	
Nominal size x TPI	Lead 1k
Ident No.	
NPT 1 - 11.5	2248848
NPT 3/4 - 14	2168213

NPTF	
Nominal size x TPI	Lead 1k
Ident No.	
NPTF 1 - 11.5	2248850
NPTF 3/4 - 14	2248849

Rolling head			F45-1RN	Rolling head			F45-1RN
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange	2165631	30	6	Washer	2141465
2	1	Clutch	2165632	31	3	Spring washer	2141717
3	1	Operating ring	2165633	32	1	Steel ball	2148795
4	1	Spring housing	2165584	33	3	Pin	2148376
5	1	Gear ring	2165585	34	3	Roll pin	2142576
6	3	Gear sectors	2165653	35	1	Stop screw body	2165009
7	1	Centre plate	2165654	36	1	Stop screw	2165565
8	1	Front plate	2165655	37	1	Hexagon nut	2148391
9	1	Shank-round 1.5"	2165637	38	1	Ball	2141701
10	3	Pin	2165590	39	1	Hexagon nut	2148398
11	1	Coil spring	2165591	40	1	Stud	2148839
13	4	Spring pin	2165090	41	3	Fitting key	2173673
14	3	Eccentric spindles	2165658	42	1	Rotating end stop	2167300
15	3	Spacer studs	2165659	43	1	Circlip	2165008
17	6	Axial washer	2148881	44	6	Lock washer	2149015
19	116	Steel ball	2148807	46	6	Thrust bearing	2147534
21	3	Carbide bushing	2165072	47	3	Clutch wedge	2165598
22	3	Fitting key	2165094	48	3	Cover plate	2165597
23	4	Pressure spring	2165095	49	1	Fitting key	2165641
24	3	Cap screw	2143016	50	2	Cap screw	2167742
25	3	Cap screw	2143017	51	3	Cap screw	2141882
26	6	Cap screw	2148743	53	2	Fitting key	2165097
27	6	Stud	2148839	54	2	Roll pin	2142566
28	8	Cap screw	2142014	62	1	Plug	7112038
29	6	Hexagon nut	2148398				

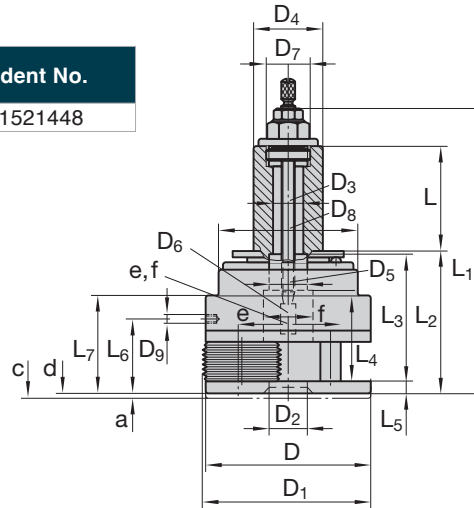
When ordering spare parts, please state rolling head type, Part No. and Ident No.



Needle bearing alternates + accessories see page 331



Type	Ident No.
F5-1RN-2" Round Shank	1521448



D	D _{1max}	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	a	α
7.874	8.031	2.165	1.260	2	1.575	—	M 39 x 1.5 LH	6.142	M 10	3.74	11.713	6.831	5.472	—	0.551	3.500	4.764	0.197	30°
F5-1RN for right-hand thread Left-hand head upon request															γ	m-Rk	m-Ro		
															2° 30'	approx. 57.76 lb	approx. 4.41–9.26 lb		
a = Pull off for opening c = Rolling head open d = Rolling head closed e = Rolling head opening direction f = Rolling head closing direction γ = Inclined position of rolls <D ₃ = Unlimited rollable length >D ₃ = Rollable length 5.472" m-Rk = Rolling head weight without rolls m-Ro = Weight of 1 set of 3 rolls																			

For axial rolling head with suffix "RN", select a head and thread rolls only.

RN heads have integrated shanks or flanges. Coolant closing devices do not exist for RN style heads.



UNC

Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNC $\frac{3}{4}$ – 10	1521910	1521929
UNC $\frac{7}{8}$ – 9	1521938	1521947
UNC 1 – 8	1521956	1521965
UNC $1\frac{1}{8}$... $1\frac{1}{4}$ ¹⁾ – 7	1521983	1521992
UNC $1\frac{3}{8}$ ¹⁾ ... $1\frac{1}{2}$ ¹⁾ – 6	1522009	1522018

UNF

Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF $\frac{3}{4}$ – 16	1522027	1522036
UNF $\frac{7}{8}$ – 14	2240106	2243957
UNF 1 – 12	2243958	2243959

G

Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G $\frac{1}{2}$... $\frac{5}{8}$ – 14	2243947	2243948

M

Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
M 18 ... 20 x 2.5	1521590	1521607
M 20 ... 22 x 2.5	1521625	1521634
M 24 ... 27 x 3	1521643	1521652
M 30 ... 33 ¹⁾ x 3.5	1521689	1521698
M 36 ¹⁾ ... 39 ¹⁾ x 4	1521705	1521723

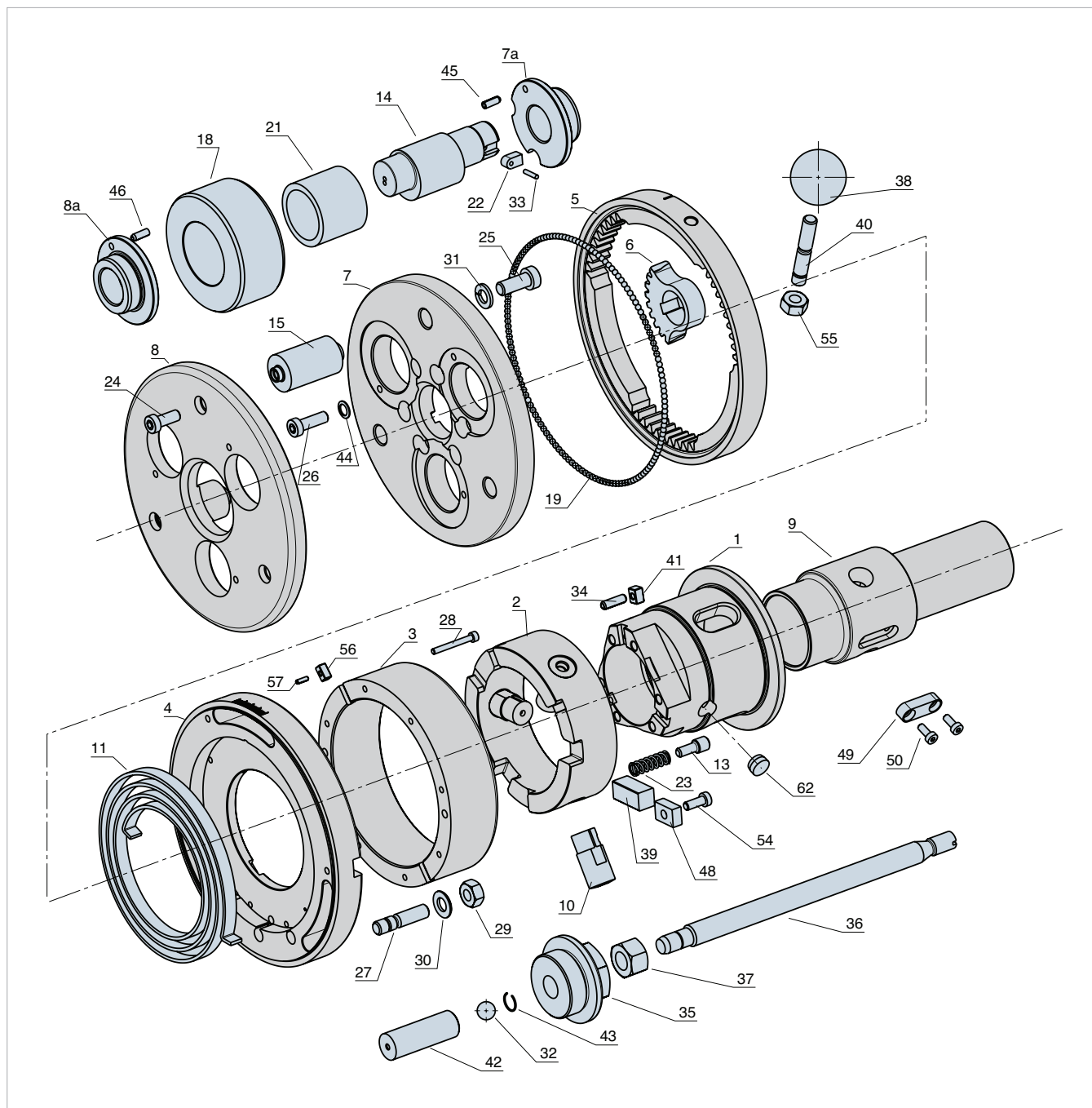
MF

Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 18 x 1.5	1521509	1521518
MF 18 ... 20 x 2	2243938	2168955
MF 20 ... 22 x 2	2249598	2249599
MF 22 ... 24 x 2	1521536	1521545
MF 30 ... 33 ¹⁾ x 3	2243939	2168736
MF 33 ¹⁾ ... 36 ¹⁾ x 3	2243940	1521670

Thread dimensions combined in one block can be rolled with **one** set of rolls.

¹⁾ For thread lengths up to 5.472" including runout.

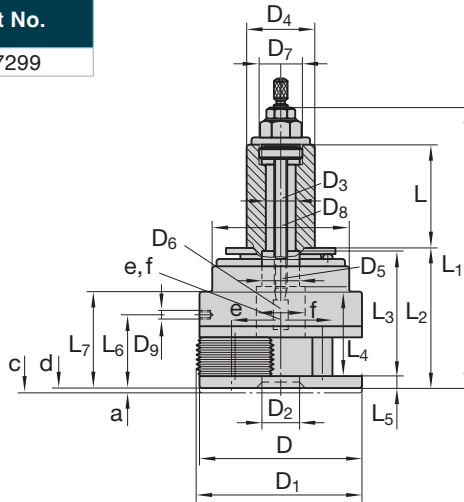
Rolling head			F5-1RN	Rolling head			F5-1RN
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange	2165705	29	6	Hexagon nut	2148399
2	1	Clutch	2165706	30	6	Washer	2141466
3	1	Operating ring	2165707	31	3	Lock washer	2141718
4	1	Spring housing	2165668	21	1	Steel ball	2148795
5	1	Gear ring	2165669	33	3	Shear pin	2141244
6	3	Gear sectors	2165670	34	3	Roll pin	2142576
7	1	Centre plate	2165671	35	1	Stoop screw body	2165596
7.1	3	Centre plate bushing	2165673	36	1	Stop screw	2165714
8	1	Front plate	2165672	37	1	Hexagon nut	2148391
8.1	3	Front plate bushing	2165674	38	1	Ball	2141702
9	1	Shank 2"	2165711	39	3	Clutch wedge	2165688
10	3	Pin	2165676	40	1	Handle	2148828
11	1	Coil Spring	2165677	41	3	Fitting key	2173673
13	3	Spring Pin	2165679	42	1	Rotating end stop	2167300
14	3	Eccentric spindle	2165680	43	1	Circlip	2165008
15	3	Spacer stud	2165681	44	6	Circlip	2149015
18	3	Thread roll	Individual	45	3	Roll pin	2148550
19	145	Ball	2148807	46	3	Roll pin	2148850
21	3	Carbide bushing	2173803	48	3	Cover plate	2165687
22	3	Fitting key	2165683	49	1	Fitting key	2165641
23	3	Pressure spring	2165713	50	2	Cap screw	2142999
24	3	Cap screw	2143017	54	3	Cap screw	2143009
25	3	Cap screw	2143029	55	1	Hexagon nut	2148399
26	6	Cap screw	2128712	56	2	Fitting key	2165096
27	6	Stud	2148827	57	2	Roll pin	2142566
28	8	Cap screw	2141889	62	1	Plug	7112038



Needle bearing alternates + accessories see page 331



Type	Ident No.
F56-1RN-2" Round shank	2167299



Dimension in inches

D	D _{1max}	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	a	α
7.874	8.031	2.283	1.260	2	1.575	2.087	M 39 x 1.5 LH	6.142	M 10	3.74	11.555	6.614	5.276	3.898	0.573	3.374	4.634	0.197	30°
F56-1RN for right-hand threads Left-hand head upon request															γ	m-Rk	m-Ro		
															1°	approx. 52.60 lb	approx. 4.41–9.26 lb		

a = Pull off for opening
c = Rolling head open
d = Rolling head closed
e = Rolling head opening direction
f = Rolling head closing direction
γ = Inclined position of rolls
<D₃ = Unlimited rollable length
>D₃ = Restricted rollable length

m-Rk = Rolling head weight without rolls
m-Ro = Weight of 1 set of 3 rolls

For axial rolling head with suffix "RN", select a head and thread rolls only.
RN heads have integrated shanks or flanges. Coolant closing devices do not exist for RN style heads.



MF		
Nominal size x pitch mm	Lead 1k	Lead 2k
	Ident No.	
MF 22 ... 24 x 1.5	2244068	1522740
MF 24 ... 27 x 1.5	1522759	1522768
MF 27 ... 30 x 1.5	1522777	1522786
MF 30 ... 33 ¹⁾ x 1.5	1522795	1522802
MF 33 ¹⁾ ... 36 ¹⁾ x 1.5	1522820	1522839
MF 36 ¹⁾ ... 39 ¹⁾ x 1.5	1522848	1522866
MF 39 ¹⁾ ... 42 ²⁾ x 1.5	1522884	1522893
MF 42 ²⁾ ... 45 ²⁾ x 1.5	1522919	1522928
MF 45 ²⁾ ... 48 ²⁾ x 1.5	1522937	1522946
MF 27 ... 30 x 2	2240550	1522973
MF 30 ... 33 ¹⁾ x 2	1522982	1522991
MF 33 ¹⁾ ... 36 ¹⁾ x 2	2166778	1523008
MF 36 ¹⁾ ... 39 ¹⁾ x 2	1523017	1523026
MF 39 ¹⁾ ... 42 ²⁾ x 2	2241545	1523035
MF 42 ²⁾ ... 45 ²⁾ x 2	1523044	1523053
MF 45 ²⁾ ... 48 ²⁾ x 2	1523062	1523071
MF 48 ²⁾ ... 50 ²⁾ x 2	2244069	2244070
MF 50 ²⁾ ... 52 ²⁾ x 2	1523080	1523099
MF 42 ²⁾ ... 45 ²⁾ x 3	1523124	1523133
MF 45 ²⁾ ... 48 ²⁾ x 3	2244071	1523142
MF 48 ²⁾ ... 50 ²⁾ x 3	2244072	1523151
MF 50 ²⁾ ... 52 ²⁾ x 3	2167076	2244073

UN		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UN 7/8 ... 1 – 32	2244204	2244205
UN 7/8 ... 1 – 28	2244206	2244207
UN 1 ... 1 1/8 – 28	2244208	2244209
UN 1 1/8 ... 1 1/4 ¹⁾ – 28	2244210	2244211
UN 1 1/4 ¹⁾ ... 1 5/16 ¹⁾ – 28	2244212	2244213
UN 1 1/8 ¹⁾ ... 1 1/4 ¹⁾ – 20	2244218	2244219
UN 1 1/4 ¹⁾ ... 1 3/8 ¹⁾ – 20	2244220	2244221
UN 1 3/8 ¹⁾ ... 1 1/2 ¹⁾ – 20	2244222	2244223
UN 7/8 ... 1 – 16	2244234	2244235
UN 1 ... 1 1/8 – 16	2244236	2244237
UN 1 1/8 ... 1 1/4 ¹⁾ – 16	2241610	2244238
UN 1 1/4 ¹⁾ ... 1 3/8 ¹⁾ – 16	2244239	2244240
UN 1 3/8 ¹⁾ ... 1 1/2 ¹⁾ – 16	2241611	2244241
UN 1 1/2 ¹⁾ ... 1 5/8 ²⁾ – 16	2244242	2244243
UN 1 5/8 ²⁾ ... 1 3/4 ²⁾ – 16	2241612	2244244
UN 1 3/4 ²⁾ ... 1 7/8 ²⁾ – 16	2244245	2244246
UN 1 7/8 ²⁾ ... 2 ²⁾ – 16	2167459	2166948
UN 1 3/4 ²⁾ ... 1 7/8 ²⁾ – 12	1523384	2244249
UN 1 7/8 ²⁾ ... 2 ²⁾ – 12	2244250	1523393
UN 2 ²⁾ ... 2 1/8 ³⁾ – 12	2244251	2166193
UN 1 3/4 ²⁾ ... 1 7/8 ²⁾ – 8	2244252	2241453
UN 1 7/8 ²⁾ ... 2 ²⁾ – 8	2244253	2167964
UN 2 ²⁾ ... 2 1/8 ³⁾ – 8	2242633	2244254

UNF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNF 1 1/8 ... 1 1/4 ¹⁾ – 12	2244247	2169807
UNF 1 1/4 ¹⁾ ... 1 3/8 ¹⁾ – 12	2243016	1523311
UNF 1 3/8 ¹⁾ ... 1 1/2 ¹⁾ – 12	1523339	1523357
UNF 1 1/2 ¹⁾ ... 1 5/8 ²⁾ – 12	2244248	1523348
UNF 1 5/8 ²⁾ ... 1 3/4 ²⁾ – 12	2167963	1523366

UNEF		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
UNEF 7/8 ... 1 – 20	2244214	2244215
UNEF 1 ... 1 1/8 – 20	2244216	2244217
UNEF 1 1/16 ... 1 3/16 – 18	2244224	2244225
UNEF 1 3/16 ... 1 5/16 ¹⁾ – 18	2244226	2244227
UNEF 1 5/16 ¹⁾ ... 1 7/16 ¹⁾ – 18	2244228	2244229
UNEF 1 7/16 ¹⁾ ... 1 9/16 ²⁾ – 18	2244230	2244231
UNEF 1 9/16 ²⁾ ... 1 11/16 ²⁾ – 18	2244232	2244233

- 1) For thread lengths up to 5.276" including runout.
 2) For thread lengths up to 3.868" including runout.
 3) For thread lengths up to 1.500" including runout.

G		
Nominal size x TPI	Lead 1k	Lead 2k
	Ident No.	
G 3/4 – 14	2169005	2166905
G 7/8 – 14	2244198	2169902
G 1 ¹⁾ – 11	1523222	1523231
G 1 1/8 ¹⁾ – 11	2244199	2244200
G 1 1/4 ²⁾ ... 1 3/8 ²⁾ – 11	1523240	1523268
G 1 1/2 ²⁾ – 11	1523277	1523286
G 1 5/8 ²⁾ – 11	2244201	2244202
G 1 3/4 ³⁾ – 11	1523295	2244203

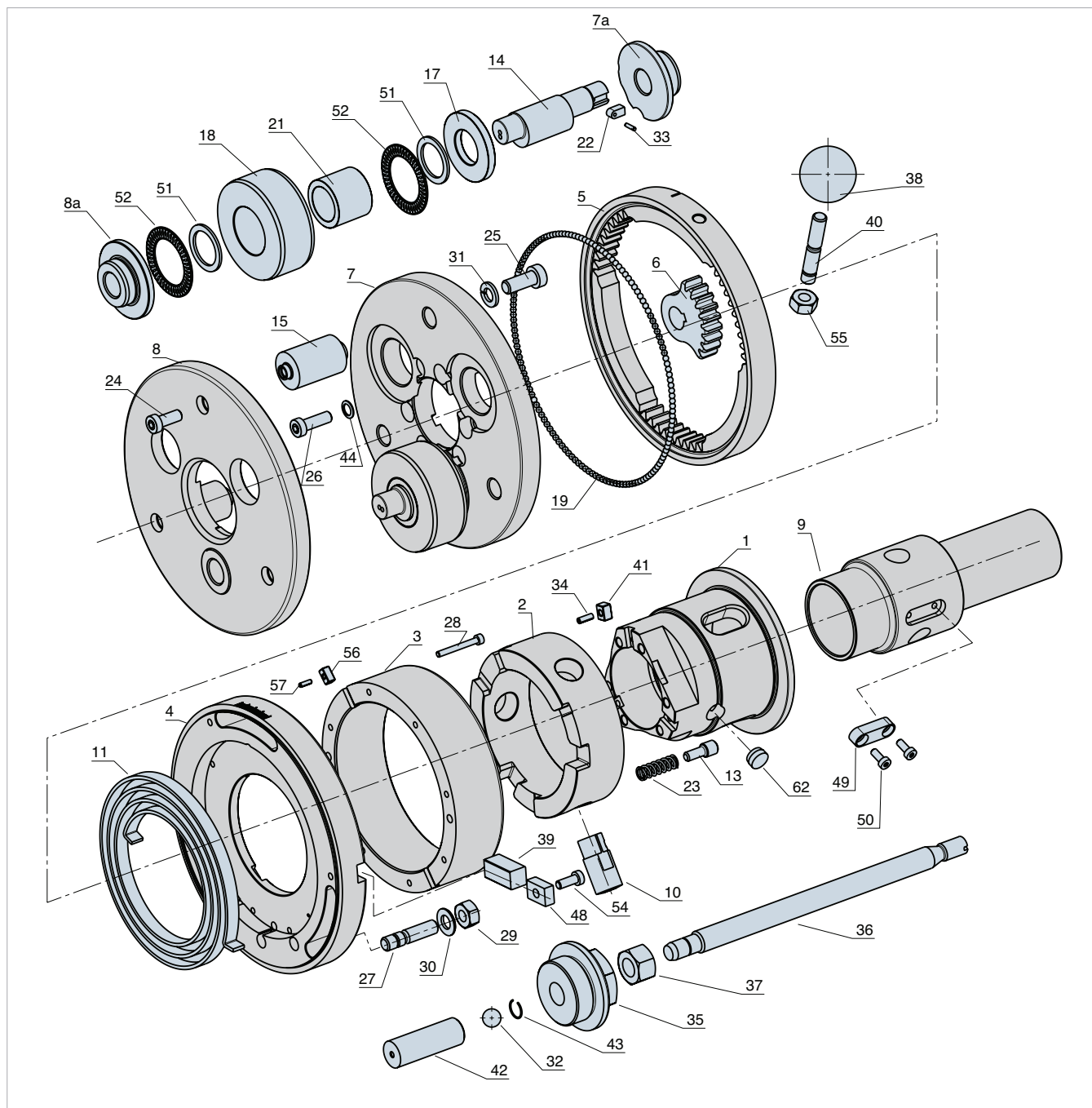
NPT	
Nominal size x TPI	Lead 1k
	Ident No.
NPT 3/4 – 14	2167489
NPT 1 – 11.5	1523507
NPT 1 1/4 – 11.5	1523516
NPT 1 1/2 – 11.5	1523525

NPTF	
Nominal size x TPI	Lead 1k
	Ident No.
NPTF 3/4 – 14	2245180
NPTF 1 – 11.5	2245181
NPTF 1 1/4 – 11.5	2248851
NPTF 1 1/2 – 11.5	2248852

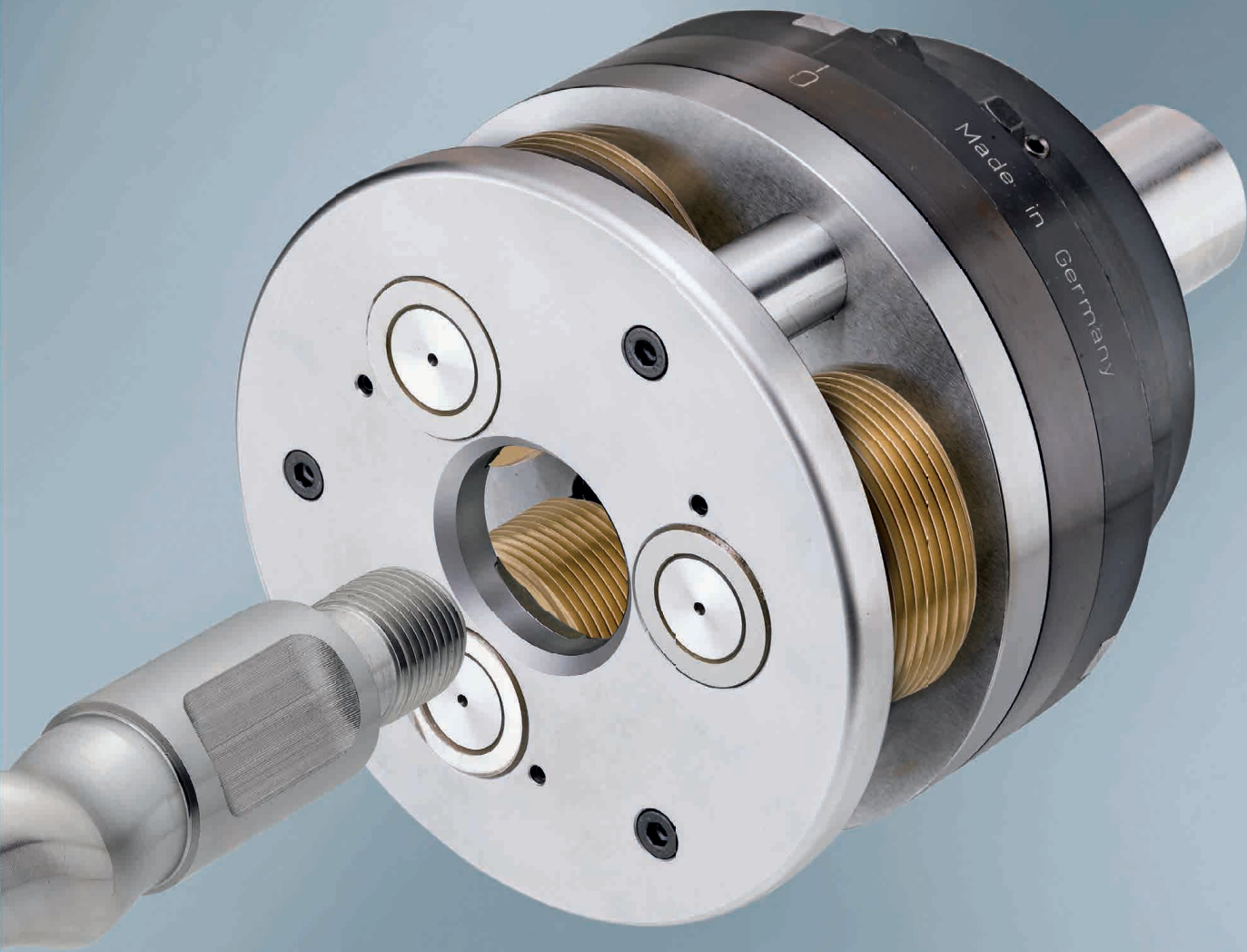
Thread dimensions combined in one block can be rolled with **one** set of rolls.

Rolling head			F56-1RN	Rolling head			F56-1RN
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange	2165705	29	6	Hexagon nut	2148399
2	1	Clutch	2165706	30	6	Washer	2141466
3	1	Operating ring	2165707	31	3	Spring washer	2141718
4	1	Spring housing	2165668	32	1	Steel ball	2148795
5	1	Gear ring	2165669	33	3	Pin	2141237
6	3	Gear sectors	2165729	34	3	Roll pin	2142576
7	1	Centre plate	2165730	35	1	Stop screw body	2165596
7a	3	Centre plate bushing	2165731	36	1	Stop screw	2165714
8	1	Front plate	2165732	37	1	Hexagon nut	2148391
8a	3	Front plate bushing	2165733	38	1	Ball	2141702
9	1	Shank 2"	2165711	39	3	Clutch wedge	2165688
10	3	Pin	2165676	40	1	Stud	2148828
11	1	Coil spring	2165677	41	3	Fitting key	2173673
13	3	Spring pin	2165679	42	1	Rotating end stop	2167300
14	3	Eccentric spindles	2165736	43	1	Circlip	2165008
15	3	Spacer studs	2165737	44	6	Lock washer	2149015
17	3	Axial washer	2165738	48	3	Cover plate	2165687
19	145	Steel ball	2148807	49	1	Fitting key	2165641
21	3	Carbide bushing	2167324	50	2	Cap screw	2142999
22	3	Fitting key	2165595	51	6	Centering ring	2165630
23	3	Pressure spring	2165713	52	6	Thrust bearing	2147347
24	3	Cap screw	2143017	54	3	Cap screw	2143009
25	3	Cap screw	2143029	55	1	Hexagon nut	2148399
26	6	Cap screw	2128712	56	2	Fitting key	2165096
27	6	Stud	2148827	57	2	Roll pin	2142566
28	8	Cap screw	2141889	62	1	Plug	7112038

When ordering spare parts, please state rolling head type, Part No. and Ident No.



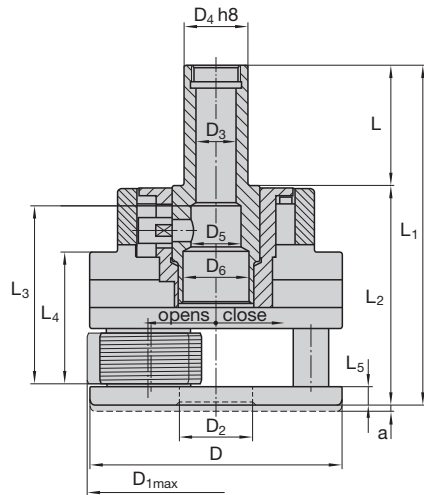
Needle bearing alternates + accessories see page 331



Thread Rolling on API Thread Rods

For challenging oil & gas
applications

Axial Type Rolling Head F4-API-SR and F5-API-SR



Dimension in inches

Type Rod Size Ident No.	D	D _{1max} ¹⁾	D ₂	D ₃	D ₄	D ₅	D ₆	L	L ₁	L ₂	L ₃	L ₄	L ₅	a	α	γ
F4-API-SR 7055578	6.496	6.496	2.047	1.260	2.000	–	1.417	3.110	8.622	5.512	–	3.031	0.394	0.157	30°	1° 45'
F5-API-SR 7068202	7.874"	8.031"	2.303"	1.260"	2.000"	1.575"	2.087"	3.740"	10.563"	6.823"	5.508"	4.091"	0.591"	0.197"	30°	1° 40'

F4-API-SR and F5-API-SR used stationary or rotating

a = Pull off for opening

α = Closing angle

γ = Inclined position of rolls

¹⁾ Largest outside diameter of rolling head when rolls in open position.

Further dimensions upon request

For axial rolling head with suffix "RN", select a head and thread rolls only.

RN heads have integrated shanks or flanges. Coolant closing devices do not exist for RN style heads.



API

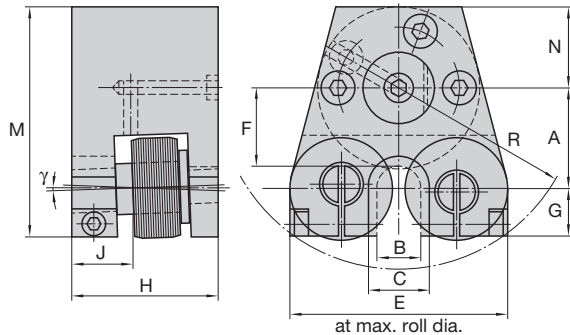
Rod Nominal dia.	Rod		Lead	F4-Rolls	F5-Rolls
	Thread	Design		Ident No. (set of 3)	
1/2	API 3/4 – 10	Sucker Rod	3k	–1)	
5/8	API 15/16 – 10	Sucker Rod	3k	7055635	7072643
		Polished Rod	3k	7118002	7118006
3/4	API 1 1/16 – 10	Sucker Rod	3k	7055636	7072644
		Polished Rod	3k	7118003	7118007
7/8	API 1 3/16 – 10	Sucker Rod	3k	7055637	7072645
		Polished Rod	3k	7118004	7118008
1	API 1 3/8 – 10	Sucker Rod	3k	7055638	7072646
		Polished Rod	3k	7118005	7118009
1 1/8	API 1 9/16 – 10	Sucker Rod	3k	–	7072647
		Polished Rod	3k	–	7118010

¹⁾ upon request

Customer benefits

- Chip-less thread-forming process for increased fatigue strength of API-thread rods
- Our premium solutions on rolling heads and respective thread rolls
- High productive rolling process

Axial Type Rolling Head AC5 API-SR



Dimensions in inches

Type Ident No.	A	B	C	E	F	G	H	J	M	N	R	γ
AC5-API-SR-5/8 7410950	2.165	2.087	2.716	7.441	1.122	1.299	3.504	1.142	5.039	1.575	4.646	2°
AC5-API-SR-3/4 7221791	2.165	2.205	2.835	7.598	1.063	1.299	3.504	1.142	5.039	1.575	4.685	1° 50'
AC5-API-SR-7/8 7221792	2.165	2.323	2.953	7.716	1.004	1.299	3.504	1.142	5.039	1.575	4.744	1° 40'
AC5-API-SR-1 7221793	2.165	2.520	3.150	7.992	0.905	1.299	3.504	1.142	5.039	1.575	4.803	1° 25'
AC5-API-SR-1 1/8 7221794	2.165	2.716	3.346	8.071	0.807	1.299	3.504	1.142	5.039	1.575	4.881	1° 15'

AC5 for right-hand threads
γ = Inclined position of rolls



API

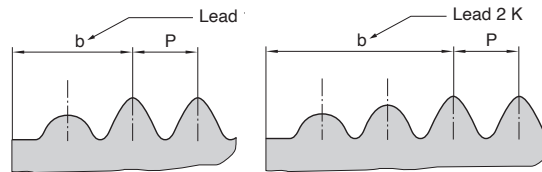
Rod Nominal dia.	Thread Roll		Lead	AC5-Rolls
	Pitch	Design		Ident No. (per pc)
All Sizes	10 TPI	Sucker Rod	3K	7475109
		Polished Rod	3K	7209797

Machine specific tool holder required to integrate tool with processing machine.

For a functional AC5-API rolling system, select a head, thread rolls, and a holder.
The same thread rolls can be used for all sucker rod sizes.

Lengths Of Imperfect Starting Threads On Rolls (Lead)

This table shows the distance from the front of the roll to the center of the first full thread on the roll. It is used to determine if the lead you want to use (1 K or 2 K) will thread into the undercut on a particular component, or if you can produce the required length of full thread.



Pitch mm	Lead	Rolling head size											
		0 ¹⁾	001	01 01-1	1 23	12	1223	2 233400 34 34-1	2T 3 32 3-1 45-1	4-1 56-1	3T 3-1T	4-1T 5-1 6700	5-1T 6a-1 6b-1
inch													
0.25	0.6 K	0.012	0.013	0.013									
	1 K	0.017	0.016	0.016									
	2 K	0.027	0.026	0.026									
0.3	0.6 K	0.013	0.018	0.018	0.016		0.014						
	1 K	0.019	0.022	0.022	0.020		0.018						
	2 K	0.031	0.033	0.033	0.031		0.030						
0.35	0.6 K	0.016	0.018	0.015	0.017		0.018						
	1 K	0.023	0.023	0.027	0.022		0.023						
	2 K	0.037	0.037	0.041	0.036		0.037						
0.4	0.6 K	0.020	0.025	0.021	0.025		0.021						
	1 K	0.028	0.030	0.026	0.030		0.026						
	2 K	0.043	0.046	0.042	0.046		0.042						
0.45	0.6 K	0.020	0.029	0.026	0.027		0.025						
	1 K	0.029	0.034	0.031	0.032		0.031						
	2 K	0.047	0.052	0.049	0.050		0.048						
0.5	0.6 K	0.025	0.026	0.026	0.026	0.026	0.026	0.026					
	1 K	0.034	0.033	0.033	0.033	0.033	0.033	0.033					
	2 K	0.054	0.052	0.052	0.052	0.052	0.052	0.052					
0.6	0.6 K	0.033	0.028	0.028	0.031	0.031	0.035	0.035					
	1 K	0.045	0.035	0.035	0.039	0.039	0.043	0.043					
	2 K	0.069	0.059	0.059	0.063	0.063	0.067	0.067					
0.7	0.6 K	0.027	0.037	0.041	0.043	0.039	0.037	0.031					
	1 K	0.040	0.046	0.050	0.052	0.048	0.046	0.054					
	2 K	0.068	0.073	0.077	0.079	0.075	0.073	0.081					
0.75	0.6 K	0.032	0.044	0.044	0.039	0.039	0.034	0.034	0.044				
	1 K	0.047	0.054	0.054	0.049	0.049	0.044	0.044	0.054				
	2 K	0.076	0.084	0.084	0.079	0.079	0.074	0.074	0.084				
0.8	0.6 K	0.039		0.050	0.038	0.042	0.050	0.042	0.046				
	1 K	0.055		0.060	0.049	0.052	0.060	0.052	0.056				
	2 K	0.087		0.092	0.080	0.084	0.092	0.084	0.088				
0.9	0.6 K	0.042		0.049	0.041	0.053	0.057	0.051	0.043				
	1 K	0.060		0.061	0.053	0.065	0.069	0.063	0.055				
	2 K	0.095		0.096	0.089	0.100	0.104	0.098	0.091				
1	0.6 K	0.049		0.052	0.052	0.052	0.052	0.052	0.052	0.052		0.052	
	1 K	0.069		0.066	0.066	0.066	0.066	0.066	0.066	0.066		0.066	
	2 K	0.108		0.105	0.105	0.105	0.105	0.105	0.105	0.105		0.105	
1.25	0.6 K			0.066	0.066	0.056	0.071	0.066	0.066	0.066		0.066	
	1 K			0.082	0.082	0.072	0.087	0.082	0.082	0.082		0.082	
	2 K			0.131	0.131	0.121	0.136	0.131	0.131	0.131		0.131	
1.5	0.6 K			0.069	0.079	0.079		0.089	0.069	0.079		0.069	0.089
	1 K			0.089	0.098	0.098		0.108	0.089	0.098		0.089	0.108
	2 K			0.148	0.157	0.157		0.167	0.148	0.157		0.148	0.167
1.75	0.6 K					0.087		0.107	0.102	0.097		0.087	0.077
	1 K					0.110		0.129	0.124	0.120		0.110	0.135
	2 K					0.179		0.198	0.193	0.189		0.179	0.203
2	0.6 K							0.105	0.125	0.105		0.105	0.105
	1 K							0.131	0.151	0.131		0.130	0.131
	2 K							0.210	0.230	0.210		0.208	0.210
2.5	0.6 K								0.131	0.131	0.131	0.131	0.131
	1 K								0.163	0.164	0.164	0.163	0.164
	2 K								0.262	0.262	0.262	0.261	0.262
3	0.6 K								0.177	0.157	0.138	0.177	0.138
	1 K								0.216	0.196	0.177	0.216	0.177
	2 K								0.334	0.341	0.295	0.335	0.295

¹⁾ For size 0 heads, lead is 0.5 k.

Lengths Of Imperfect Starting Threads On Rolls (Lead)

Pitch mm	Lead	Rolling head size											
		0 ¹⁾	001	01 01-1	1 23	12	1223	2 233400 34 34-1	2T 3 32 3-1 45-1	4-1 56-1	3T 3-1T	4-1T 5-1 6700	5-1T 6a-1 6b-1
inch													
3.5	0.6 K								0.194	0.154	0.184	0.213	0.203
	1 K								0.239	0.268	0.230	0.258	0.249
	2 K								0.377	0.406	0.367	0.396	0.387
4	0.6 K										0.190	0.210	0.249
	1 K										0.243	0.263	0.302
	2 K										0.400	0.420	0.459
4.5	0.6 K										0.217	0.226	0.246
	1 K										0.276	0.463	0.305
	2 K										0.453	0.640	0.482
5	0.6 K										0.262	0.262	0.262
	1 K										0.328	0.329	0.328
	2 K										0.525	0.525	0.525
5.5	0.6 K												0.299
	1 K												0.371
	2 K												0.587

¹⁾ For size 0 heads, lead is 0.5 k.

Lengths Of Imperfect Starting Threads On Rolls (Lead)

Pitch TPI	Lead	Rolling head size											
		0 ¹⁾	001	01 01-1	1 23	12	1223	2 233400 34 34-1	2T 3 32 3-1 45-1	4-1 56-1	3T 3-1T	4-1T 5-1 6700	5-1T 6a-1 6b-1
inch													
90	0.6 K	0.016	0.014	0.017									
	1 K	0.021	0.018	0.021									
	2 K	0.033	0.029	0.032									
80	0.6 K	0.017	0.017	0.020	0.018		0.017						
	1 K	0.023	0.021	0.024	0.022		0.021						
	2 K	0.035	0.033	0.036	0.034		0.034						
72	0.6 K	0.015	0.017	0.021	0.022		0.016						
	1 K	0.023	0.022	0.025	0.027		0.021						
	2 K	0.036	0.036	0.039	0.040		0.035						
64	0.6 K	0.021	0.018	0.022	0.019	0.023	0.023						
	1 K	0.029	0.023	0.028	0.024	0.028	0.028						
	2 K	0.044	0.039	0.043	0.040	0.043	0.044						
60	0.6 K	0.020	0.027	0.019	0.026	0.025	0.023						
	1 K	0.028	0.032	0.025	0.032	0.031	0.029						
	2 K	0.045	0.049	0.041	0.048	0.047	0.045						
56	0.6 K	0.019	0.028	0.024	0.024	0.028	0.023						
	1 K	0.028	0.034	0.030	0.030	0.034	0.028						
	2 K	0.046	0.051	0.048	0.048	0.052	0.046						
48	0.6 K	0.027	0.030	0.027	0.031	0.024	0.033	0.026					
	1 K	0.038	0.037	0.034	0.038	0.031	0.040	0.033					
	2 K	0.059	0.058	0.055	0.059	0.052	0.060	0.054					
44	0.6 K	0.027	0.032	0.034	0.030	0.028	0.033	0.026					
	1 K	0.038	0.039	0.042	0.038	0.036	0.041	0.034					
	2 K	0.061	0.062	0.064	0.061	0.058	0.064	0.057					
40	0.6 K	0.026	0.034	0.030	0.029	0.032	0.034	0.040					
	1 K	0.039	0.042	0.038	0.037	0.040	0.042	0.048					
	2 K	0.064	0.067	0.063	0.074	0.065	0.067	0.073					
36	0.6 K	0.039	0.036	0.039	0.041	0.037	0.035	0.042					
	1 K	0.053	0.045	0.049	0.050	0.046	0.044	0.051					
	2 K	0.081	0.073	0.076	0.078	0.074	0.072	0.079					
32	0.6 K	0.040	0.039	0.035	0.040	0.044	0.036	0.045	0.049				
	1 K	0.056	0.049	0.061	0.050	0.054	0.062	0.055	0.060				
	2 K	0.087	0.080	0.093	0.082	0.085	0.093	0.086	0.091				
28	0.6 K	0.041		0.048	0.057	0.052	0.055	0.048	0.058				
	1 K	0.059		0.060	0.069	0.064	0.067	0.060	0.070				
	2 K	0.095		0.096	0.105	0.099	0.103	0.096	0.105				

¹⁾ For size 0 heads, lead is 0.5 k.

Pitch TPI	Lead	Rolling head size											
		0 ¹⁾	001	01 01-1	1 23	12	1223	2 233400 34 34-1	2T 3 32 3-1 45-1	4-1 56-1	3T 3-1T	4-1T 5-1 6700	5-1T 6a-1 6b-1
inch													
26	0.6 K	0.052		0.056	0.058	0.057	0.058	0.060	0.043				
	1 K	0.071		0.069	0.071	0.070	0.070	0.073	0.075				
24	2 K	0.109		0.107	0.109	0.108	0.109	0.112	0.114				
	0.6 K	0.043		0.065	0.059	0.063	0.060	0.053	0.048	0.063		0.051	
	1 K	0.064		0.079	0.073	0.077	0.074	0.067	0.083	0.077		0.065	
22	2 K	0.105		0.120	0.115	0.118	0.116	0.109	0.124	0.118		0.107	
	0.6 K	0.055		0.053	0.060	0.070	0.063	0.068	0.053	0.060		0.053	
	1 K	0.073		0.068	0.075	0.085	0.078	0.083	0.068	0.075		0.067	
20	2 K	0.118		0.113	0.121	0.130	0.124	0.128	0.113	0.121		0.113	
	0.6 K	0.070		0.064	0.062	0.078	0.067	0.060	0.059	0.057		0.079	
	1 K	0.095		0.080	0.079	0.095	0.084	0.077	0.075	0.099		0.096	
19	2 K	0.145		0.130	0.129	0.145	0.134	0.127	0.125	0.149		0.146	
	0.6 K				0.076	0.070	0.083	0.069	0.062	0.082		0.068	
	1 K				0.094	0.087	0.100	0.087	0.080	0.099		0.086	
18	2 K				0.146	0.140	0.153	0.139	0.132	0.152		0.138	
	0.6 K				0.064	0.088	0.072	0.079	0.066	0.081		0.084	0.086
	1 K				0.082	0.107	0.090	0.097	0.085	0.100		0.10	0.105
16	2 K				0.138	0.162	0.146	0.153	0.140	0.155		0.156	0.160
	0.6 K				0.097	0.101		0.071	0.075	0.080		0.089	0.099
	1 K				0.118	0.090		0.091	0.096	0.101		0.110	0.119
14	2 K				0.181	0.153		0.154	0.159	0.163		0.173	0.182
	0.6 K				0.105			0.096	0.087	0.114		0.097	0.115
	1 K				0.129			0.120	0.111	0.138		0.121	0.103
13	2 K				0.200			0.191	0.183	0.210		0.192	0.175
	0.6 K							0.112	0.095	0.116		0.121	0.087
	1 K							0.137	0.120	0.142		0.146	0.112
12	2 K							0.214	0.197	0.219		0.223	0.189
	0.6 K							0.130	0.103	0.118		0.107	0.095
	1 K							0.158	0.131	0.146		0.135	0.123
11	2 K							0.241	0.214	0.229		0.218	0.206
	0.6 K							0.106	0.113	0.121		0.136	0.105
	1 K							0.136	0.144	0.151		0.166	0.136
10	2 K							0.227	0.235	0.242		0.257	0.227
	0.6 K							0.127	0.125	0.124	0.122	0.121	0.118
	1 K							0.160	0.159	0.157	0.154	0.154	0.151
9	2 K							0.260	0.258	0.257	0.256	0.254	0.251
	0.6 K							0.153	0.140	0.128	0.170	0.158	0.132
	1 K							0.190	0.177	0.165	0.208	0.195	0.169
8	2 K							0.301	0.288	0.275	0.319	0.306	0.281
	0.6 K							0.185	0.159	0.195	0.168	0.142	0.151
	1 K							0.165	0.200	0.238	0.210	0.183	0.193
7	2 K							0.290	0.325	0.361	0.335	0.308	0.318
	0.6 K								0.183	0.210	0.165	0.192	0.175
	1 K								0.230	0.257	0.214	0.239	0.222
6	2 K								0.373	0.400	0.357	0.382	0.365
	0.6 K								0.214	0.229	0.245	0.260	0.206
	1 K								0.270	0.2851	0.30	0.315	0.262
5	2 K								0.437	0.452	0.467	0.482	0.429
	0.6 K										0.256	0.254	0.251
	1 K										0.522	0.319	0.3211
4.5	2 K										0.722	0.519	0.517
	0.6 K										0.319		0.281
	1 K										0.393		0.355
4	2 K										0.615		0.575
	0.6 K										0.397		0.318
	1 K										0.356		0.401
3.5	2 K										0.606		0.651
	0.6 K												0.365
	1 K												0.460
3	2 K												0.746
	0.6 K												0.429
	1 K												0.540
	2 K												0.873

Rolling head size	Needle bearing alternate for type F und K	Closing pin for type F	Closing roller for type F	Blocking ring for type F and K	Blocking cap for type F and K	Inertial-weight for type K	Brake shoes for type K 1 Set = 2 Pieces	Intenal stop for type F and K
0	36 x 2148805	2164584	2169961		2241090		2190304	R = 2430906 L = 2430908
001		2164584	2169961	7002945	2169875			R = 2424640 L = 2424641
01 01-1		2164584	2169961	7002945	2169875 2241089	2168549	2190295	R = 2424642 L = 2424643
1 EVO	57 x 2148817	2164584	2169961	7179614		2241654	2190303	R = 2430916 L = 2430917
12 EVO	54 x 2148820	2164584	2169961	7179614		2241654	2190303	R = 2430916 L = 2430917
1223 EVO	72 x 2148822	2164584	2169961			2241654	2190303	R = 2430926 L = 2430927
2 EVO	57 x 2148803	2164790	2169069	7179615		2166184	2190305	R = 2430936 L = 2430937
23 EVO	57 x 2148817	2164790	2169069	7179615		2166184	2190305	R = 2430936 L = 2430937
233400 EVO	72 x 2148819	2164790	2165069	7194091			2191170	R = 2430954 ¹⁾ L = 2430955 ¹⁾
3 EVO	54 x 2148814	2168271	2165069	7179616		2244828	2190306	R = 2430954 ¹⁾ L = 2430955 ¹⁾
34 EVO	57 x 2148803	2168271	2165069	7179616		2244828	2190306	R = 2430954 ¹⁾ L = 2430955 ¹⁾
32 3-1	54 x 2165094		2165069					
34-1	57 x 2148803		2165069					
4-1	57 x 2148811		2165069					
45-1	54 x 2148814		2165069					
5-1	78 x 2148800							
56-1	57 x 2148811							
6a-1 6b-1	69 x 2148798							
6700	57 x 2148800							

R = For right hand heads
L = For left hand heads

¹⁾ Not for shank diameter 25 mm and 1".



Tangential Rolling Heads

On machines with controlled feed such as cam-controlled or hydraulic multispindle automatic lathes, CNC lathes and machining centers, it is now possible to feed from the side of the part and obtain all of the advantages of the rolling method. Tangential type rolling attachments are especially suited to produce the following threads and profiles:

- Thread rolled behind a shoulder
- Extremely short thread lengths
- Threads with a very short runout (approx. $\frac{1}{4} - 1 \times$ pitch)
- Tapered threads
- Straight knurls DIN 82
- Burnishing
- Forming

Tangential rolling attachments complete the range of tools for the cold forming of various profiles.

The component must rotate for this application. Tangential side rolling attachments are available in multiple sizes covering a wide range of diameters. It is recommended that the largest rolling attachment that can be adapted on the machine always be used, thereby offering the advantage that the entire work range of the machine can be utilized. This way, you also are able to achieve longer thread lengths, a maximum workpiece diameter as well as an increased economic efficiency of the rolling head and rolls.

Capacity Ranges Tangential EVOLine Rolling Heads

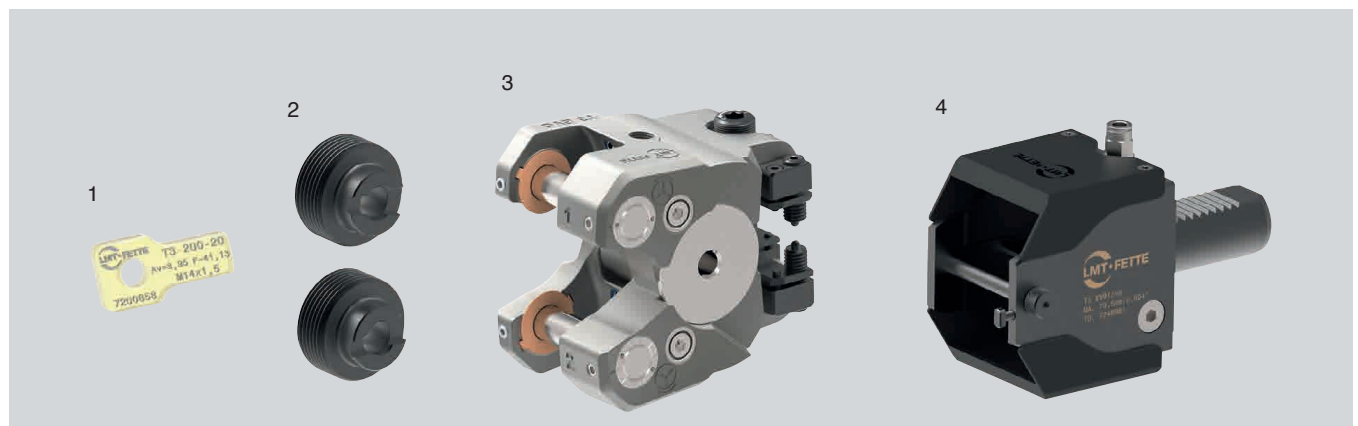
Rollable thread size range for tangential heads						
Rolling head	Major Ø of profile		Min TPI Max Pitch For threads	Roll Width	Taper threads ANSI B1.20.1	
	Min.	Max.			Min.	Max.
T1 Evo	1/16" 1.6 mm	9/16" 14 mm	16 1.5 mm	0.610"	1/16 - 27 NPT (NPTF)	1/4 - 18 NPT (NPTF)
T2 Evo	5/64" 2 mm	5/8" 16 mm	16 1.75 mm	0.728"	1/16 - 27 NPT (NPTF)	3/8 - 18 NPT (NPTF)
T3 Evo	1/8" 3 mm	3/4" 18 mm	12 2 mm	0.866"	1/16 - 27 NPT (NPTF)	1/2 - 14 NPT (NPTF)
T3.18 Evo	1/8" 3 mm	3/4" 18 mm	12 2 mm	0.866"	1/16 - 27 NPT (NPTF)	1/2 - 14 NPT (NPTF)
T4 Evo	1/8" 3 mm	1" 24 mm	10 2.5 mm	1.024"	1/16 - 27 NPT (NPTF)	1/2 - 14 NPT (NPTF)
T5 Evo	3/16" 5 mm	1.5/16" 34 mm	10 2.5 mm	1.220"	1/16 - 27 NPT (NPTF)	1 - 11.5 NPT (NPTF)

The Rolling System

A tangential rolling system consists of 4 components:

1. Setting gauge
2. Rolls (1 set = 2 pieces)
3. Rolling head
4. Rolling head holder ¹⁾

With the QR Code you will find our inquiry sheet which is necessary for processing your inquiry.



¹⁾ The rolling head holder is individually designed for each processing machine.

EVOLINE 
The evolution of rolling heads

Chip Protection Due To
Individual Covers And
Integrated Flushing
Nozzles



Compact Design And
Weight Optimization

**Short Processing Times,
High Thread Strength
And Thread Quality**

**Fast And Error-Free
Roll Change**



Smart Service

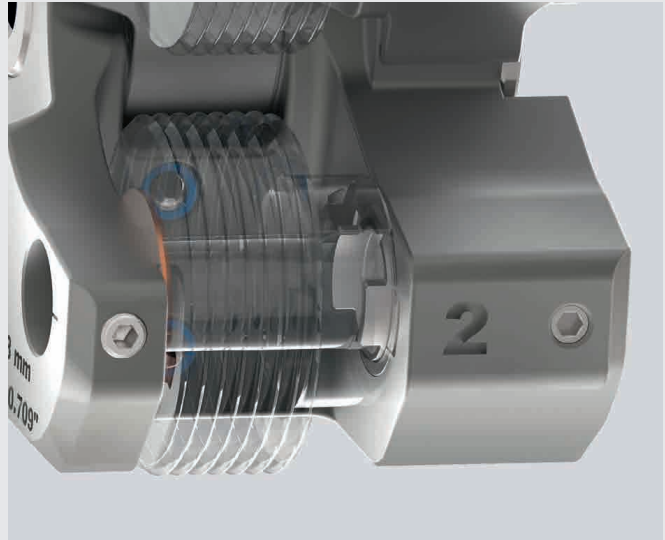
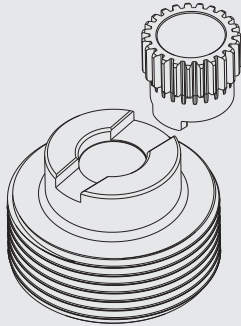
**Increased Breaking
Strength Due To Force-
Flow-Optimized Com-
ponent Structure**

EVOLINE

The evolution of rolling heads

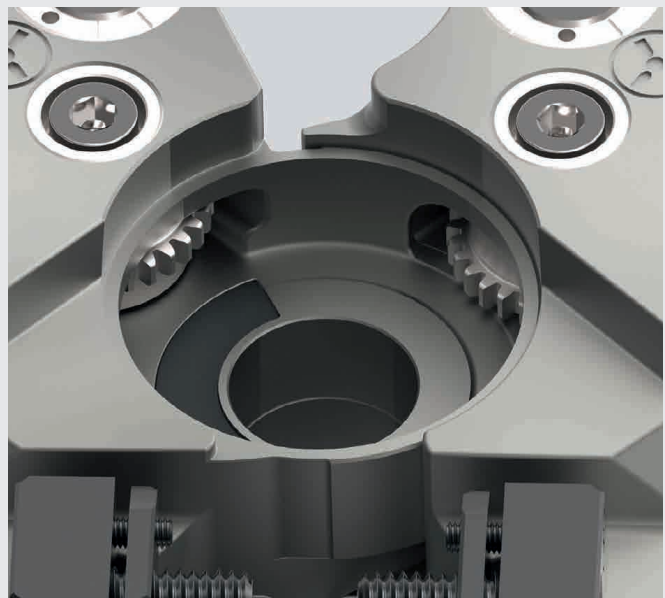
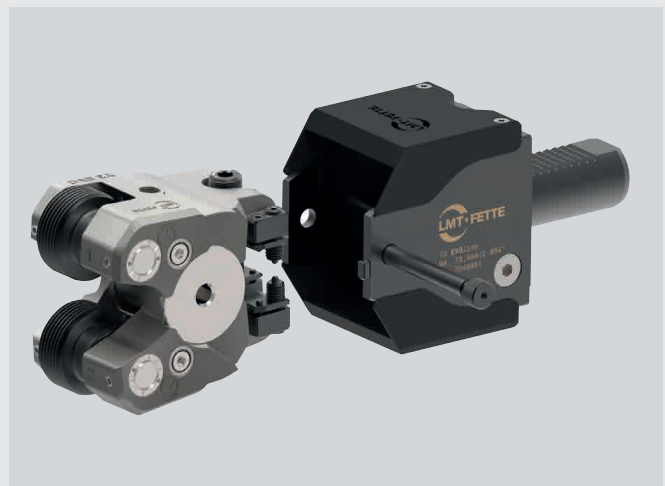
Process Reliability

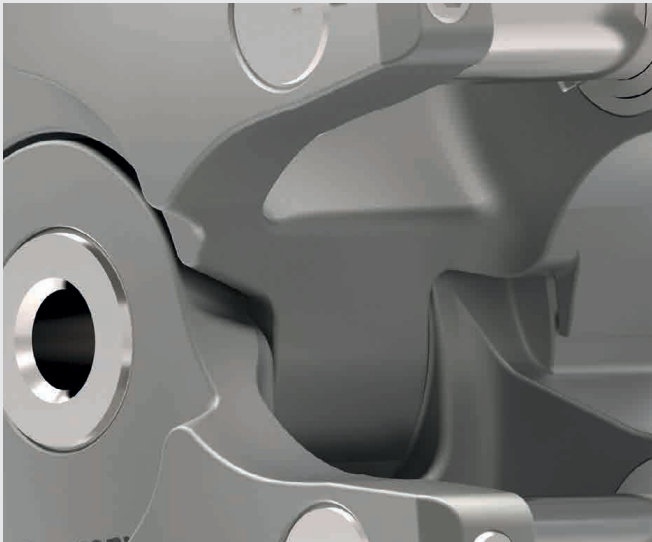
- Fast and error-free roll change due to clear marking system
- Easy and precise roll diameter adjustment
- Simplified setup due to clear markings
- Chip protection as a standard



Safe Tool Handling

- Tool-free installation and removal of the rolling head
- Tool-free gear synchronization
- Central adjustment spindle for diameter adjustment
- Easy installation due to defined installation positions

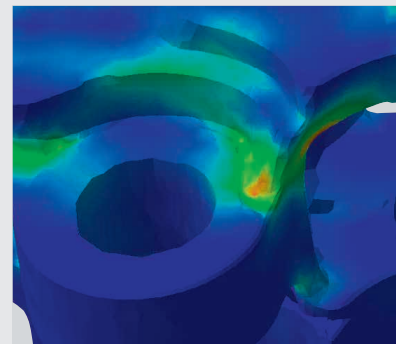


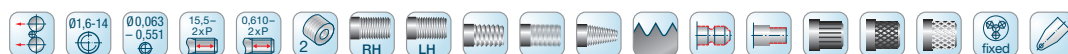


Additive Manufacturing

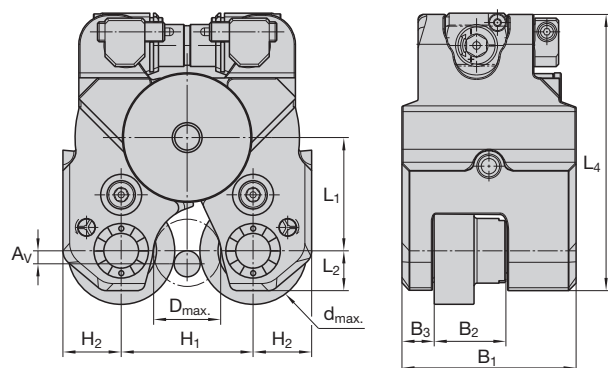
3d Printing Of The Rolling Head Arms

- Integrated cooling and flushing nozzles
 - Adjustable
 - Directly in the working zone
 - Optimized volume flow
- Increased breaking strength
 - Force flow oriented component structures
 - Topology optimization
- Chip protection





Type	Ident No.
T1 EVO	7294600



Please contact customer service for details of rolling head holder with chip guard, rolls and setting gauge.

Dimension in inches

B ₁	B ₂ max	B ₃	d max	H ₁ min	H ₁ max	H ₂	L ₁ min	L ₁ max	L ₂	L ₄
1.693	0.610	0.283	1.240	1.043	1.575	0.551	0.913	1.087	0.393	2.677
m-Rk ¹⁾		m-Rh ²⁾		m-Ro ³⁾		m-Total ⁴⁾				
approx. 1.8 lb		approx. 1.0–2.5 lb		approx. 0.4 lb		approx. 3.0–4.5 lb				

For left-hand-threads and right-hand-threads the same rolling head would be used.
However the thread rolls are different.

D_{max} = Max. shoulder diameter is specific to thread size, please contact for further information.

A_v = Operating feed

¹⁾ Rolling head weight

²⁾ Rolling head holder weight

³⁾ Roll weight

⁴⁾ Weight for rolling head with rolling head holder and roll

Rolling Head Holder

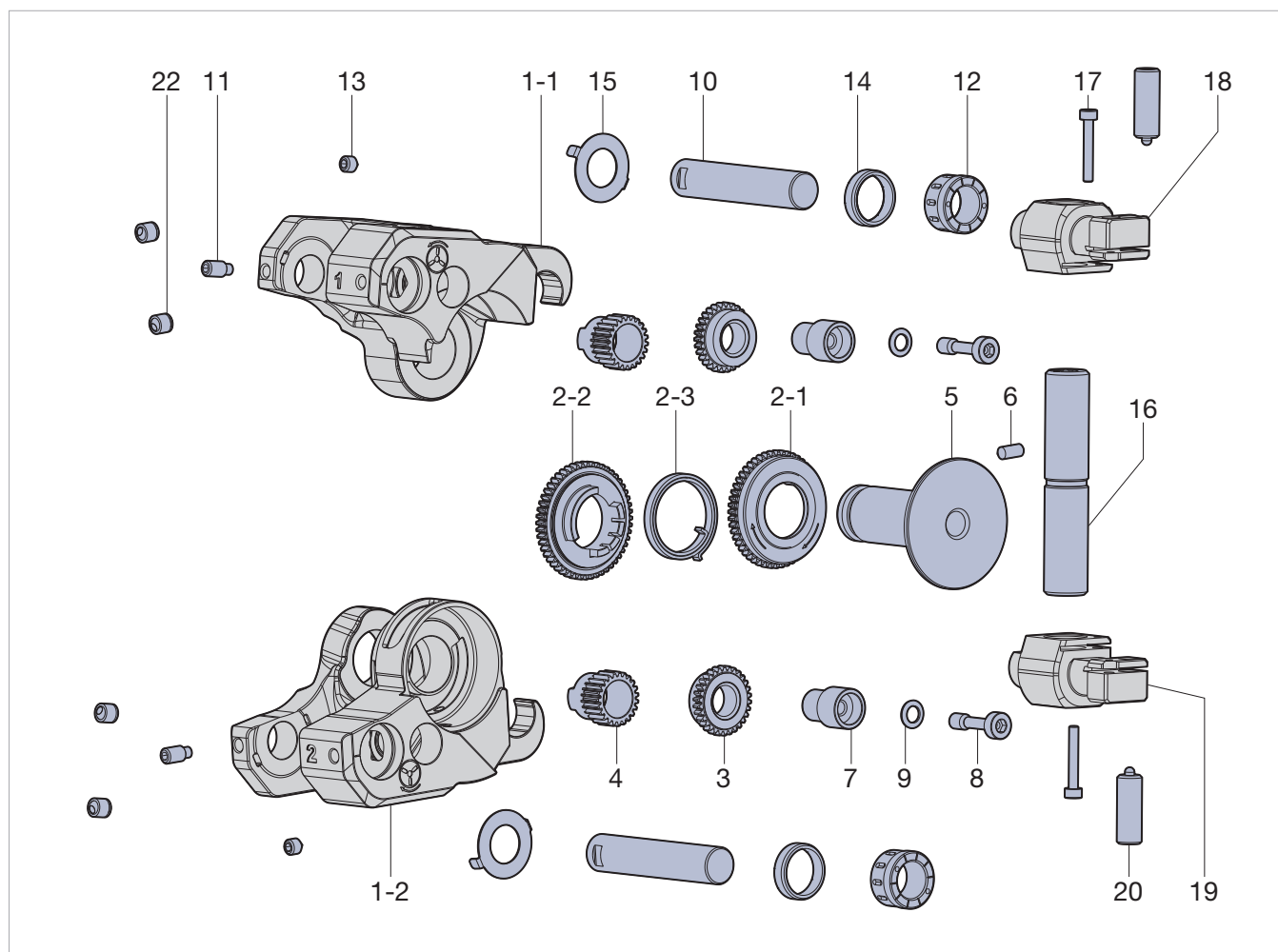
The rolling head holder is individually designed for each processing machine.
For information about suitable rolling head holders for your processing machine,
please contact our customer service.

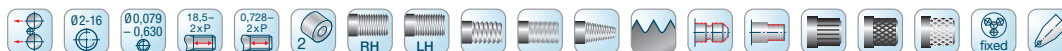
Universal holders with round shanks are available from stock. Details on page 352.

For a functional tangential rolling system, select a head, a holder, thread rolls, and a setting gauge.

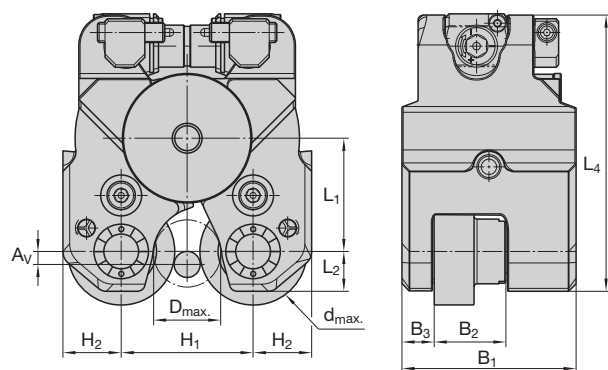


Rolling head				Rolling head			
Part No.	Qty.	Part description	T1 EVO Ident No.	Part No.	Qty.	Part description	T1 EVO Ident No.
1	1	Pair of rolling head arms	7294601	13	2	Clamping screw adjust. bushing	7294643
2	1	Compensation gear	7294602	14	2	Wear ring	7294614
2-1	1	Compensation gear upper part	see part no. 2	15	2	Wear plate	7294615
2-2	1	Compensation gear lower part	see part no. 2	16	1	Adjustment spindle	7294616
2-3	1	Coil spring compensation gear	2173426	17	2	Clamping screw adjustm. spindle	7294644
2-4	1	Magnet	—	18	1	Spindle bearing 1	7294618
3	2	Spur gear	7294603	19	1	Spindle bearing 2	7294619
4	2	Pinion	7294604	20	2	Spring plunger	7294645
5	1	Axis rolling head arms	7294605	21	2	Clamping screw spring plunger	—
6	1	Clamping screw rolling head arm axis	7294641	22	4	Nozzle	7045437
7	2	Bearing pin	7294607	23	1	Electronic	—
8	2	Clamping screw bearing pin	7294608	24	1	Electronic cover	—
9	2	Lock washer	2149269	31	1	Rolling head holder with chip guard	see individual
10	2	Roll axis	7294610	32	1	Setting gauge	see individual
11	2	Clamping screw roll axis	7294642	33	2	Roll	see individual
12	2	Adjustment bushing	7294612	44	2	Adjusting key axial play	7294640





Type	Ident No.
T2 EVO	7294200



Please contact customer service for details of rolling head holder with chip guard, rolls and setting gauge.

Dimension in inches

B ₁	B ₂ max	B ₃	d max	H ₁ min	H ₁ max	H ₂	L ₁ min	L ₁ max	L ₂	L ₄
1.969	0.728	0.335	1.476	1.260	1.890	0.768	1.112	1.316	0.512	3.071
			m-Rk ¹⁾		m-Rh ²⁾		m-Ro ³⁾		m-Total ⁴⁾	
			approx. 3.1 lb		approx. 1.5–3.5 lb		approx. 0.7 lb		approx. 4.0–7.0 lb	

For left-hand-threads and right-hand-threads the same rolling head would be used. However the thread rolls are different.

D_{max} = Max. shoulder diameter is specific to thread size, please contact customer service for information.

A_v = Operating feed

¹⁾ Rolling head weight

²⁾ Rolling head holder weight

³⁾ Roll weight

⁴⁾ Weight for rolling head with rolling head holder and roll

Rolling Head Holder

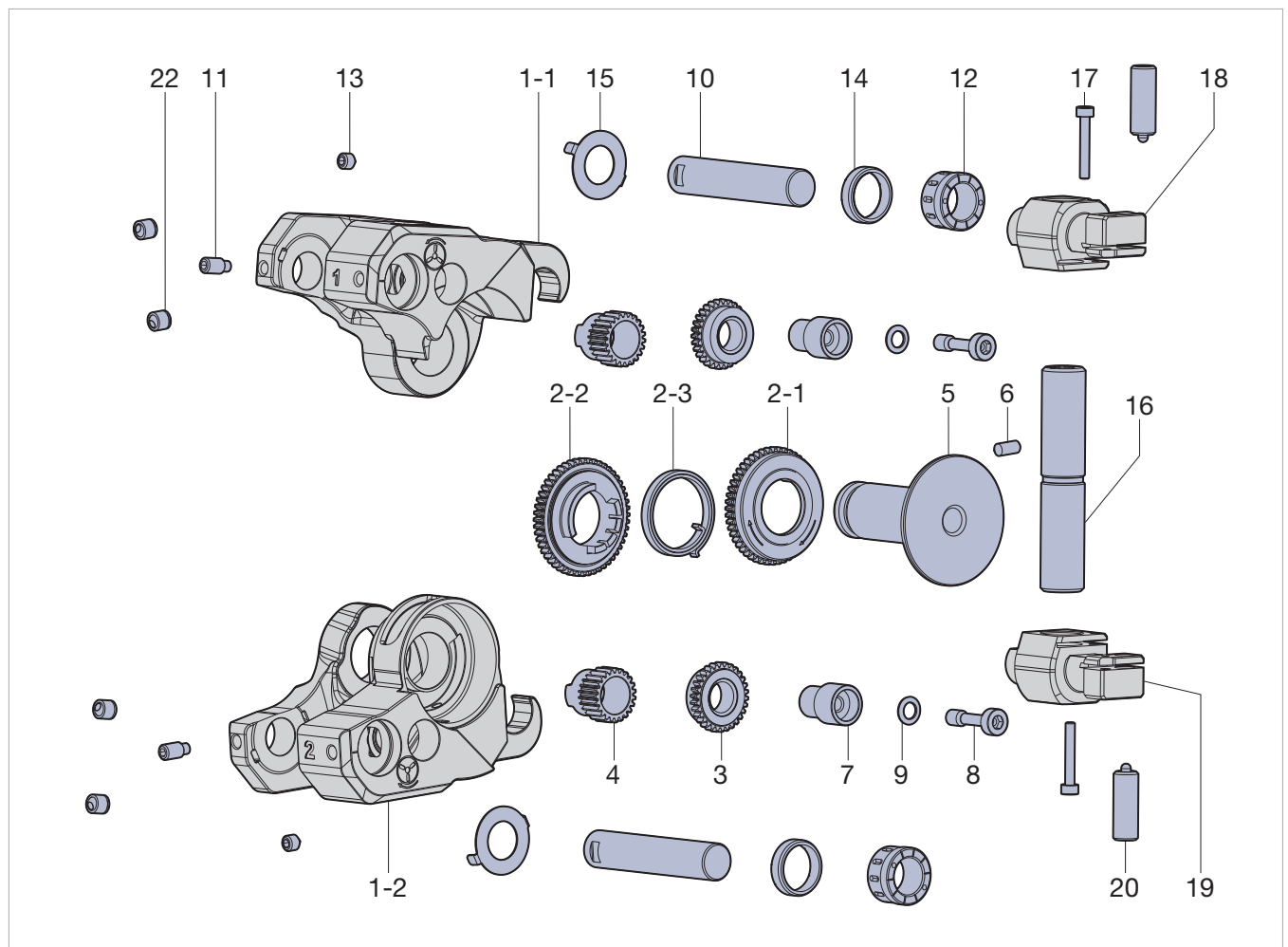
The rolling head holder is individually designed for each processing machine. For information about suitable rolling head holders for your processing machine, please contact our customer service.

Universal holders with round shanks are available from stock. Details on page 352.

For a functional tangential rolling system, select a head, a holder, thread rolls, and a setting gauge.

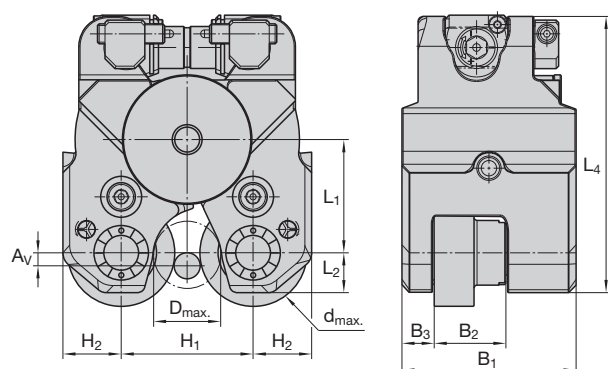


Rolling head				T2 EVO	Rolling head				T2 EVO
Part No.	Qty.	Part description	Ident No.		Part No.	Qty.	Part description	Ident No.	
1	1	Pair of rolling head arms	7294201		13	2	Clamping screw adjust. bushing	7294243	
2	1	Compensation gear	7294202		14	2	Wear ring	7294214	
2-1	1	Compensation gear upper part	see part no. 2		15	2	Wear plate	7294215	
2-2	1	Compensation gear lower part	see part no. 2		16	1	Adjustment spindle	7294216	
2-3	1	Coil spring compensation gear	2170317		17	2	Clamping screw adjustm. spindle	7294644	
2-4	1	Magnet	—		18	1	Spindle bearing 1	7294218	
3	2	Spur gear	7294203		19	1	Spindle bearing 2	7294219	
4	2	Pinion	7294204		20	2	Spring plunger	7294245	
5	1	Axis rolling head arms	7294205		21	2	Clamping screw spring plunger	—	
6	1	Clamping screw rolling head arm axis	7350145		22	4	Nozzle	7045437	
7	2	Bearing pin	7294207		23	1	Electronic	—	
8	2	Clamping screw bearing pin	7294208		24	1	Electronic cover	—	
9	2	Lock washer	2149270		31	1	Rolling head holder with chip guard	see individual	
10	2	Roll axis	7294210		32	1	Setting gauge	see individual	
11	2	Clamping screw roll axis	7294242		33	2	Roll	see individual	
12	2	Adjustment bushing	7294212		44	2	Adjusting key axial play	7294240	





Type	Ident No.
T3 EVO	7294300



Please contact customer service for details of rolling head holder with chip guard, rolls and setting gauge.

Dimension in inches

B ₁	B ₂ max	B ₃	d max	H ₁ min	H ₁ max	H ₂	L ₁ min	L ₁ max	L ₂	L ₄
2.263	0.846	0.433	1.772	1.594	2.323	0.709	1.233	1.495	0.572	3.740
			m-Rk ¹⁾		m-Rh ²⁾		m-Ro ³⁾		m-Total ⁴⁾	
			approx. 4.9 lb		approx. 2.0–4.5 lb		approx. 1.3 lb		approx. 9.0–11.0 lb	

For left-hand-threads and right-hand-threads the same rolling head would be used.
However the thread rolls are different.

D_{max} = Max. shoulder diameter is specific to thread size, please contact customer service for information.

A_v = Operating feed

¹⁾ Rolling head weight

²⁾ Rolling head holder weight

³⁾ Roll weight

⁴⁾ Weight for rolling head with rolling head holder and roll

Rolling Head Holder

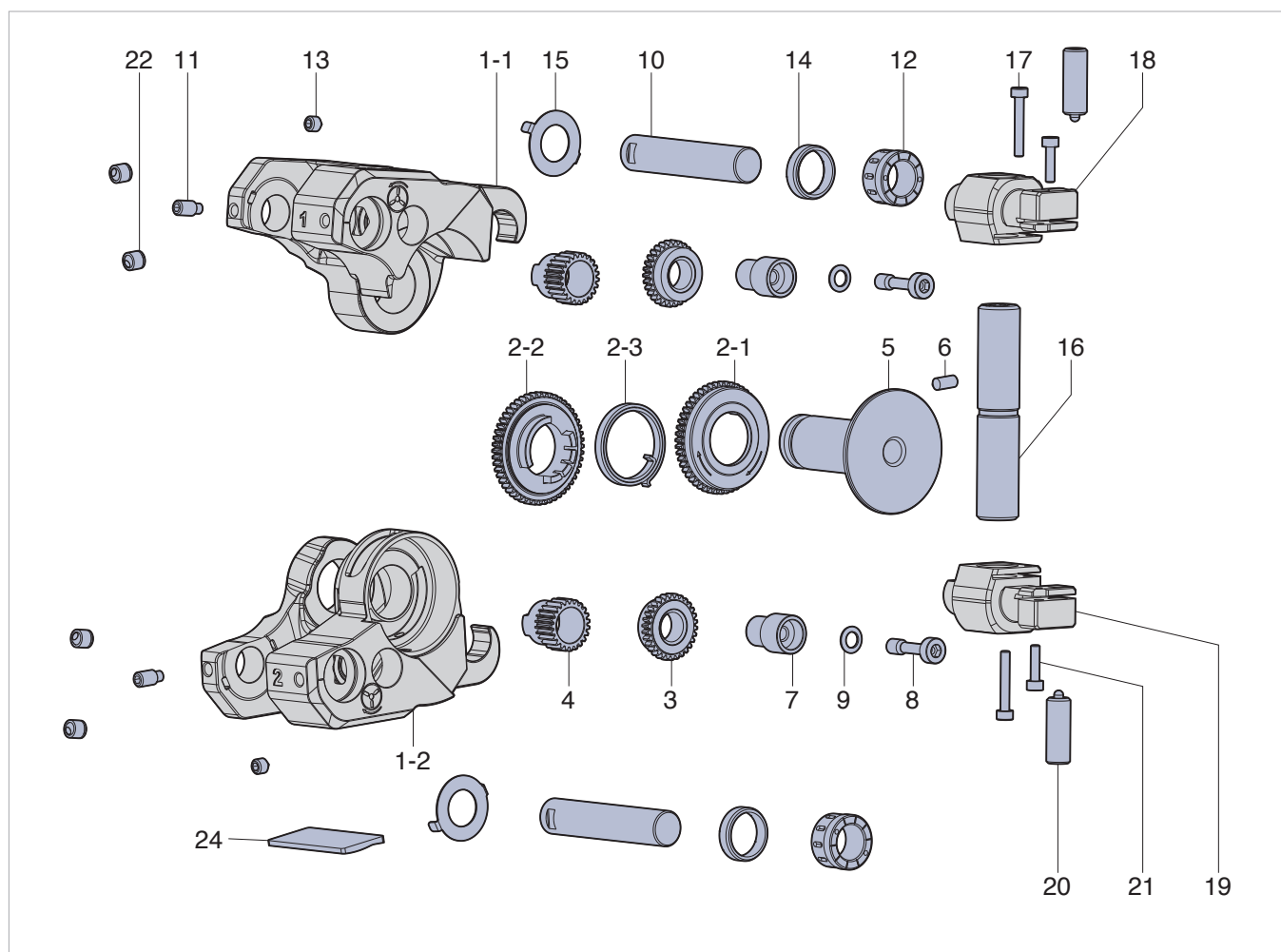
The rolling head holder is individually designed for each processing machine.
For information about suitable rolling head holders for your processing machine,
please contact our customer service.

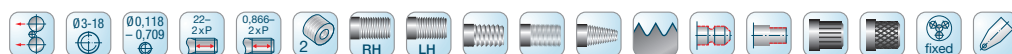
Universal holders with round shanks are available from stock. Details on page 352.

**For a functional tangential rolling system, select a
head, a holder, thread rolls, and a setting gauge.**

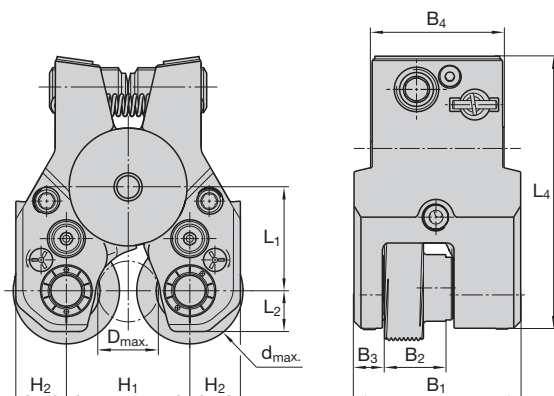


Rolling head				T3 EVO	Rolling head				T3 EVO
Part No.	Qty.	Part description	Ident No.		Part No.	Qty.	Part description	Ident No.	
1	1	Pair of rolling head arms	7294301		13	2	Clamping screw adjust. bushing	7294343	
2	1	Compensation gear	7294302		14	2	Wear ring	7294314	
2-1	1	Compensation gear upper part	see part no. 2		15	2	Wear plate	7294315	
2-2	1	Compensation gear lower part	see part no. 2		16	1	Adjustment spindle	7294316	
2-3	1	Coil spring compensation gear	2173446		17	2	Clamping screw adjustm. spindle	7294344	
2-4	1	Magnet	see part no. 2		18	1	Spindle bearing 1	7294318	
3	2	Spur gear	7294303		19	1	Spindle bearing 2	7294319	
4	2	Pinion	7294304		20	2	Spring plunger	7294345	
5	1	Axis rolling head arms	7294305		21	2	Clamping screw spring plunger	7294347	
6	1	Clamping screw rolling head arm axis	7294341		22	4	Nozzle	7045437	
7	2	Bearing pin	7294307		24	1	Electronic cover	7294324	
8	2	Clamping screw bearing pin	7294308		31	1	Rolling head holder with chip guard	see individual	
9	2	Lock washer	2149271		32	1	Setting gauge	see individual	
10	2	Roll axis	7294310		33	2	Roll	see individual	
11	2	Clamping screw roll axis	7294342		44	2	Adjusting key axial play	7294340	
12	2	Adjustment bushing	7294312						





Type	Ident No.
T3.18 EVO	7417009



Please contact customer service for details of rolling head holder, rolls and setting gauge.
Reduced center height for versatile use on multi-spindle automatic lathes.

Dimensions in inches

B ₁	B ₂ max	B ₃	B ₄	d max	H ₁ min	H ₁ max	H ₂	L ₁ min	L ₁ max	L ₂	L ₄
2.362	0.866	0.433	1.890	1.772	1.594	2.323	0.709	1.233	1.496	0.572	3.858
				m-Rk ¹⁾		m-Rh ²⁾		m-Ro ³⁾		m-Total ⁴⁾	
				4.9 lb		2.0–4.5 lb		1.3 lb		9.0–11.0 lb	

For left and right hand threads the same rolling head will be used. However, the thread rolls are different.

D_{max} = Max. shoulder diameter is specific to thread size, please contact customer service for further information.

A_v = Operating feed

¹⁾ Rolling head weight

²⁾ Rolling head holder weight

³⁾ Roll weight

⁴⁾ Weight for rolling head with rolling head holder and roll

Rolling Head Holder

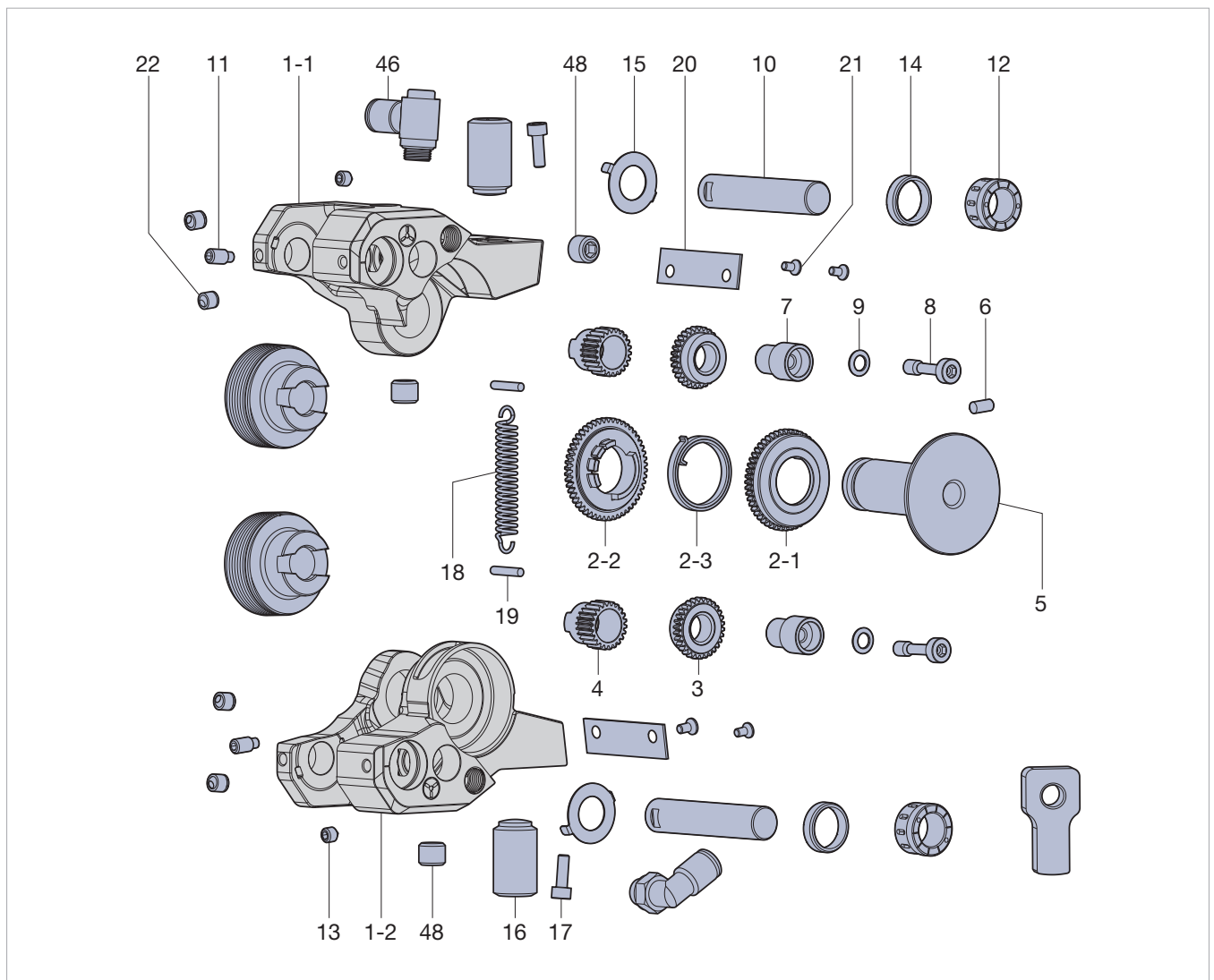
The rolling head holder is individually designed for each processing machine.
For information about suitable rolling head holders for your processing machine,
please contact our customer service. Compatible with T18F holders.

Universal holders with round shanks are available from stock. Details on page 352.

For a functional tangential rolling system, select a head, a holder, thread rolls, and a setting gauge.

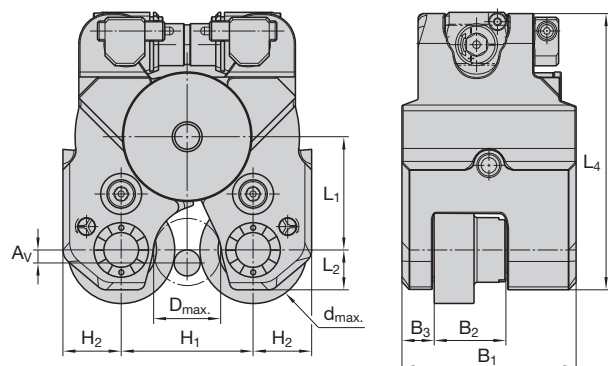


Rolling head			T3.18 EVO Ident No.	Rolling head			T3.18 EVO Ident No.
Part No.	Qty.	Part description		Part No.	Qty.	Part description	
1-1 1-2	1	Pair of rolling head arms	7417008	14	2	Wear ring	7294314
2	1	Compensation gear	7390990	15	2	Wear plant	7294315
3	2	Spur gear	7294303	16	2	Adjustment screw	2173449
4	2	Pinion	7294304	17	2	Clamping screw	7408343
5	2	Axis rolling head arms	2173434	18	1	Tension spring	2173439
6	1	Clamping screw	7350146	19	2	Straight pin	2141245
7	2	Bearing pin	7294307	20	2	Plate	2173444
8	2	Bearing pin screw	7294308	21	4	Screw	2143237
9	2	Lock washer	2149271	22	4	Nozzle	7045437
10	2	Roll axis	7294310	46	2	L-Fitting G ¹ / ₈	7167804
11	2	Claming screw	2142159	47	2	Coolant hose	7167807
12	2	Adjustment bushing	7294312	48	2	Closing Screw	7417003
13	2	Clamping screw	2142119				





Type	Ident No.
T4 EVO	7294400



Please contact customer service for details of rolling head holder with chip guard, rolls and setting gauge.

Dimension in inches

B ₁	B ₂ max	B ₃	d max	H ₁ min	H ₁ max	H ₂	L ₁ min	L ₁ max	L ₂	L ₄
2.756	1.024	0.512	2.087	1.890	2.756	0.925	1.549	1.845	0.630	4.370
			m-Rk ¹⁾		m-Rh ²⁾		m-Ro ³⁾		m-Total ⁴⁾	
			approx. 8.3 lb		approx. 3.0–6.5 lb		approx. 2.0 lb		approx. 13.0–18.0 lb	

For left-hand-threads and right-hand-threads the same rolling head would be used.
However the thread rolls are different.

D_{max} = Max. shoulder diameter is specific to thread size, please contact customer service for further information.

A_v = Operating feed

¹⁾ Rolling head weight

²⁾ Rolling head holder weight

³⁾ Roll weight

⁴⁾ Weight for rolling head with rolling head holder and roll

Rolling Head Holder

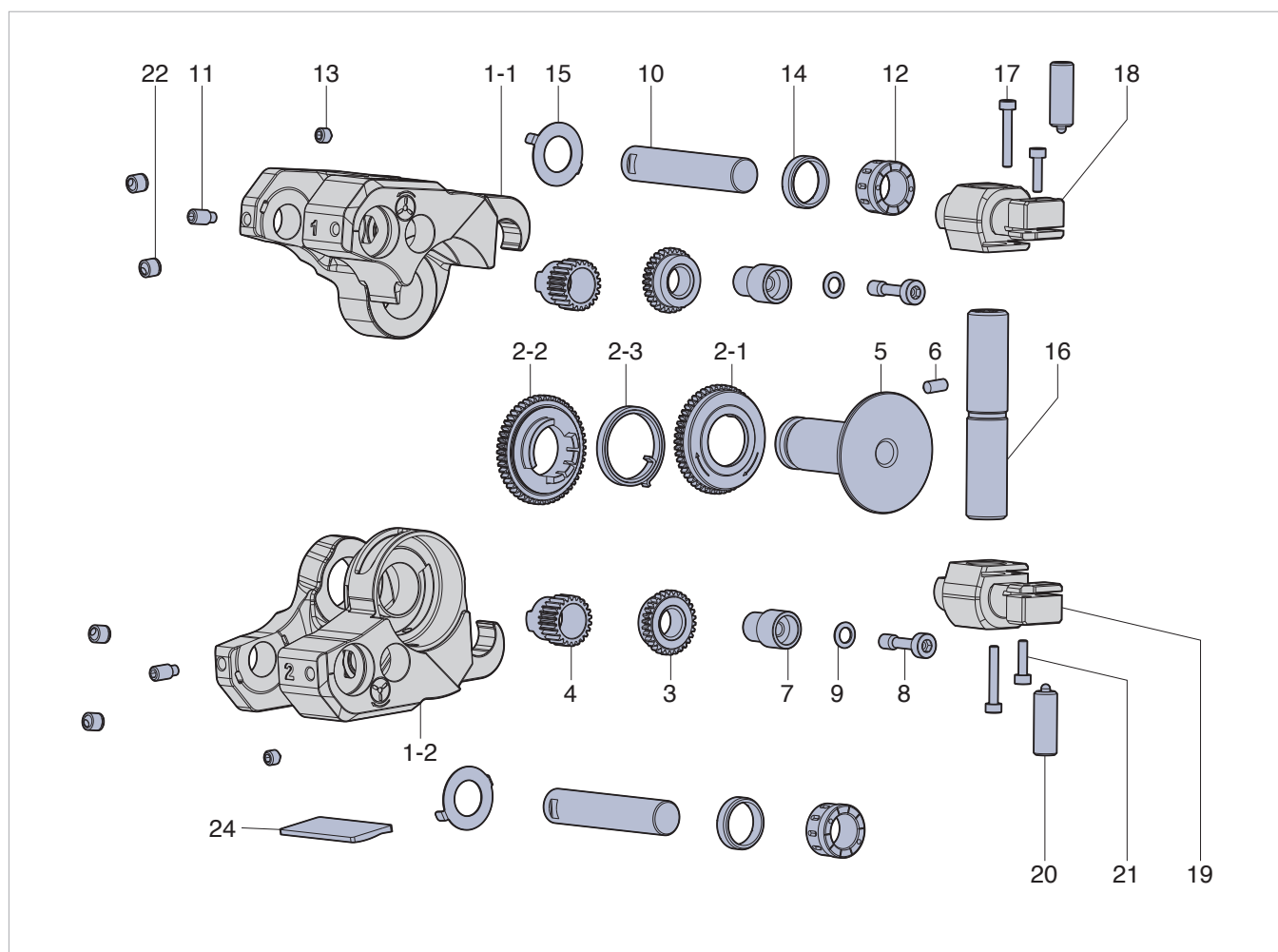
The rolling head holder is individually designed for each processing machine.
For information about suitable rolling head holders for your processing machine,
please contact our customer service.

Universal holders with round shanks are available from stock. Details on page 352.

**For a functional tangential rolling system, select a
head, a holder, thread rolls, and a setting gauge.**

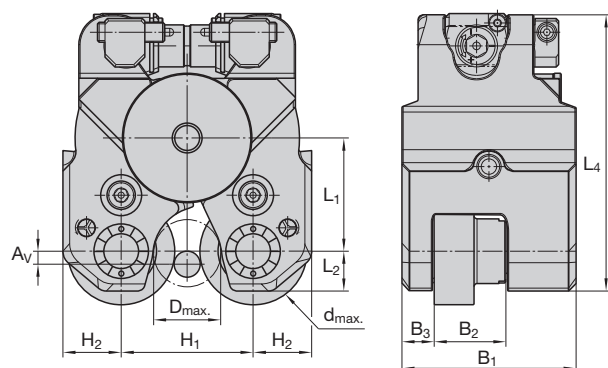


Rolling head				T4 EVO	Rolling head				T4 EVO
Part No.	Qty.	Part description	Ident No.		Part No.	Qty.	Part description	Ident No.	
1	1	Pair of rolling head arms	7294401		13	2	Clamping screw adjust. bushing	7294343	
2	1	Compensation gear	7294402		14	2	Wear ring	7294414	
2-1	1	Compensation gear upper part	see part no. 2		15	2	Wear plate	7294415	
2-2	1	Compensation gear lower part	see part no. 2		16	1	Adjustment spindle	7294416	
2-3	1	Coil spring compensation gear	2172162		17	2	Clamping screw adjustm. spindle	7294444	
2-4	1	Magnet	see part no. 2		18	1	Spindle bearing 1	7294418	
3	2	Spur gear	7294403		19	1	Spindle bearing 2	7294419	
4	2	Pinion	7294404		20	2	Spring plunger	7294445	
5	1	Axis rolling head arms	7294405		21	2	Clamping screw spring plunger	7294447	
6	1	Clamping screw rolling head arm axis	7294341		22	4	Nozzle	7210132	
7	2	Bearing pin	7294407		24	1	Electronic cover	7294424	
8	2	Clamping screw bearing pin	7294408		31	1	Rolling head holder with chip guard	see individual	
9	2	Lock washer	2149274		32	1	Setting gauge	see individual	
10	2	Roll axis	7294410		33	2	Roll	see individual	
11	2	Clamping screw roll axis	7294342		44	2	Adjusting key axial play	7294440	
12	2	Adjustment bushing	7294412						





Type	Ident No.
T5 EVO	7294500



Please contact customer service for details of rolling head holder with chip guard, rolls and setting gauge.

Dimension in inches

B ₁	B ₂ max	B ₃	d max	H ₁ min	H ₁ max	H ₂	L ₁ min	L ₁ max	L ₂	L ₄
3.268	1.220	0.618	2.480	2.343	3.425	0.768	1.760	2.158	0.772	5.236
			m-Rk ¹⁾		m-Rh ²⁾		m-Ro ³⁾		m-Total ⁴⁾	
			approx. 12.1 lb		approx. 4.0–9.0 lb		approx. 3.3 lb		approx. 19.5–24.5 lb	

For left-hand-threads and right-hand-threads the same rolling head would be used.
However the thread rolls are different.

D_{max} = Max. shoulder diameter is specific to thread size, please contact customer service for further information.

A_v = Operating feed

¹⁾ Rolling head weight

²⁾ Rolling head holder weight

³⁾ Roll weight

⁴⁾ Weight for rolling head with rolling head holder and roll

Rolling Head Holder

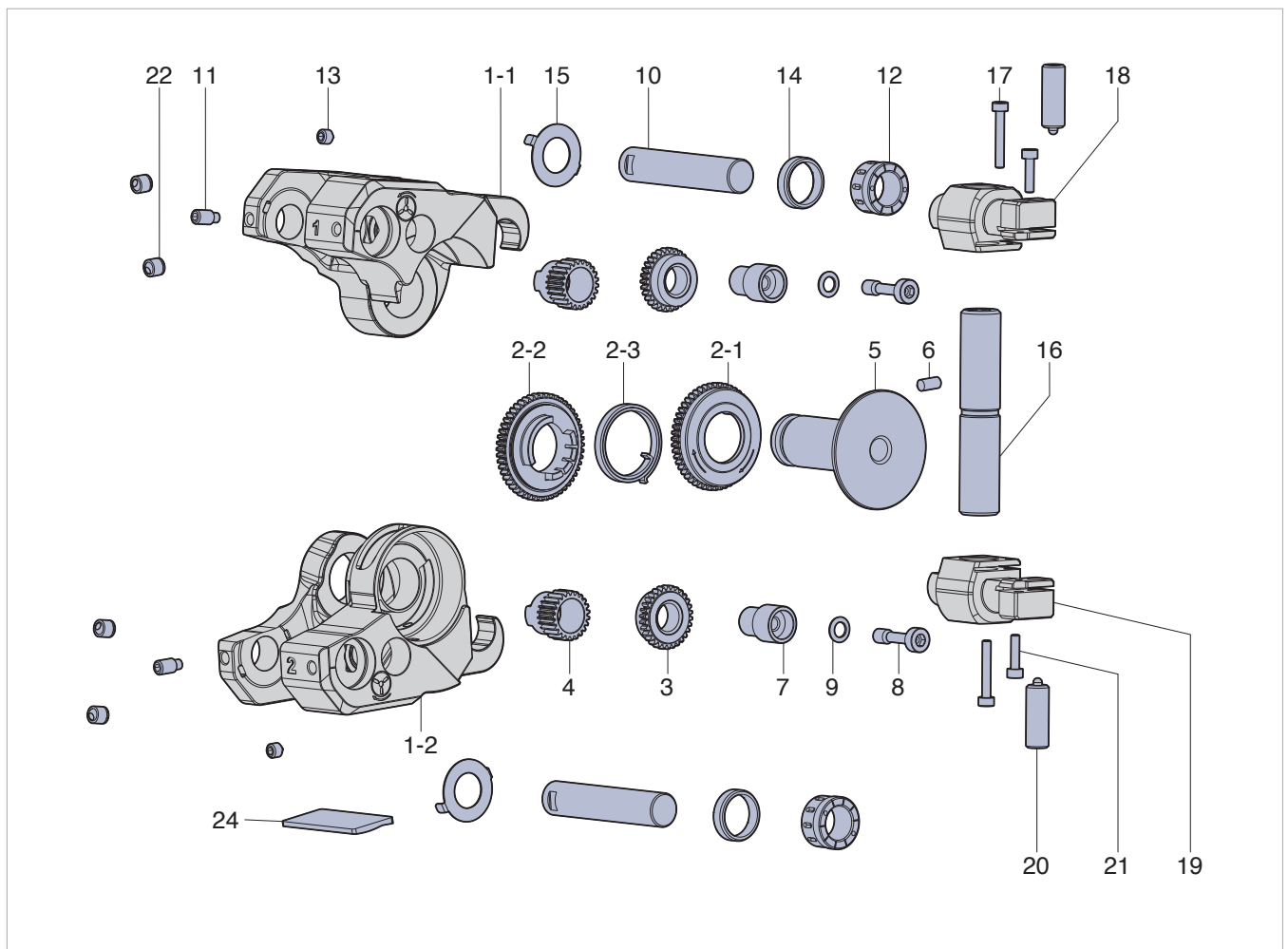
The rolling head holder is individually designed for each processing machine.
For information about suitable rolling head holders for your processing machine,
please contact our customer service.

Universal holders with round shanks are available from stock. Details on page 352.

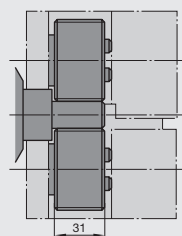
For a functional tangential rolling system, select a head, a holder, thread rolls, and a setting gauge.



Rolling head				T5 EVO	Rolling head				T5 EVO
Part No.	Qty.	Part description	Ident No.		Part No.	Qty.	Part description	Ident No.	
1	1	Pair of rolling head arms	7294501		13	2	Clamping screw adjust. bushing	7294543	
2	1	Compensation gear	7294502		14	2	Wear ring	7294514	
2-1	1	Compensation gear upper part	see part no. 2		15	2	Wear plate	7294515	
2-2	1	Compensation gear lower part	see part no. 2		16	1	Adjustment spindle	7294516	
2-3	1	Coil spring compensation gear	2173466		17	2	Clamping screw adjustm. spindle	7294544	
2-4	1	Magnet	see part no. 2		18	1	Spindle bearing 1	7294518	
3	2	Spur gear	7294503		19	1	Spindle bearing 2	7294519	
4	2	Pinion	7294504		20	2	Spring plunger	7294545	
5	1	Axis rolling head arms	7294505		21	2	Clamping screw spring plunger	7294547	
6	1	Clamping screw rolling head arm axis	7294341		22	4	Nozzle	7210132	
7	2	Bearing pin	7294507		24	1	Electronic cover	7294524	
8	2	Clamping screw bearing pin	7294508		31	1	Rolling head holder with chip guard	see individual	
9	2	Lock washer	2149274		32	1	Setting gauge	see individual	
10	2	Roll axis	7294510		33	2	Roll	see individual	
11	2	Clamping screw roll axis	7294542		44	2	Adjusting key axial play	7294540	
12	2	Adjustment bushing	7294512						

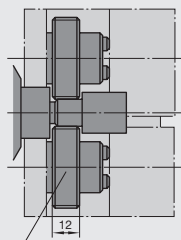


Roll design: "Full roll width"



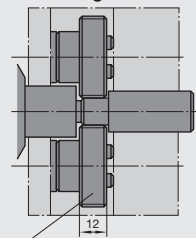
Marking e.g.: T 5-10-31

Roll design: "A"



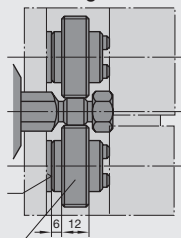
Marking e.g.: T 5-10-12 A

Roll design: "B"

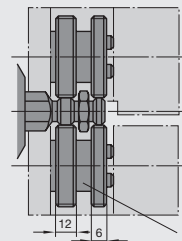


Marking e.g.: T 5-10-12 B

Roll design: "M"



Marking e.g.: T 5-10-12 M6



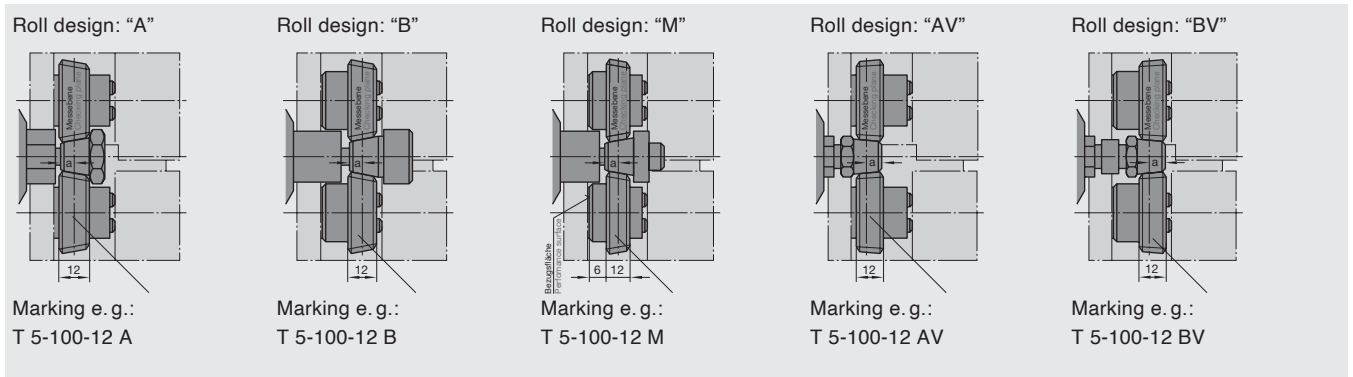
Roll design: "AB"
Roll design possible only if thread dia. and pitch are the same
Marking e. g.: T 5-10-12 A-6 B
if both thread lengths are the same: 12 AB

Design of rolls

Depending on the type of component, rolls of various design configurations can be used (normally design "A" is used). The maximum roll runout on each side can be about 1 x pitch, or in the case of multiple start threads about 1 x lead. The width of rolls must be at least 2 x pitch longer than the effective thread length on the component. It is recommended to round-up to the nearest whole even metric number.

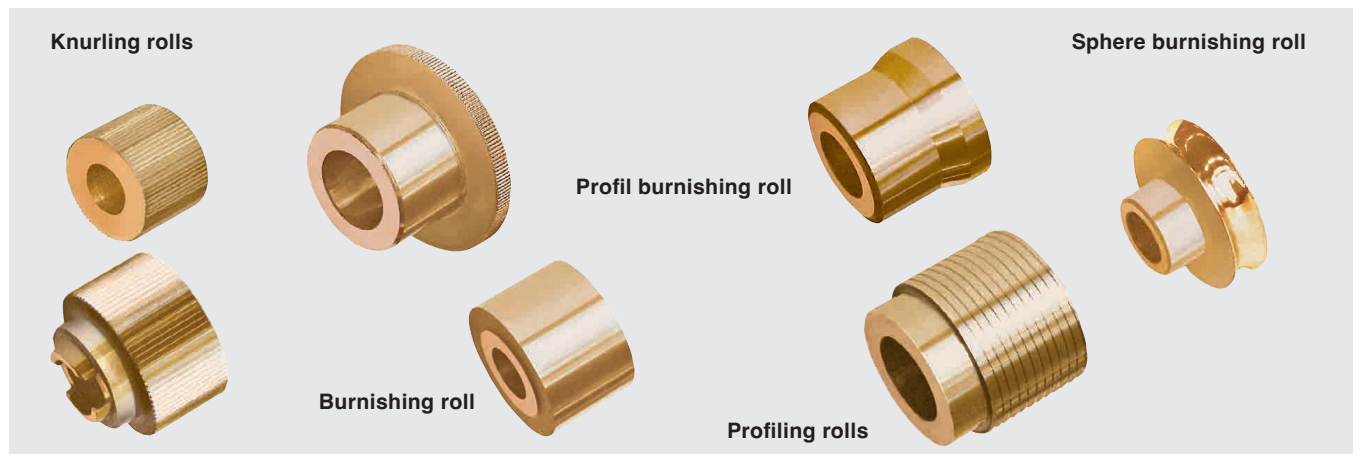
If the roll width is unimportant (Example: journal portion in front, or in front of a shoulder diameter) it would be advisable **to indicate the minimum and the maximum width of the roll**, as it would facilitate delivery from stock. The tangential side rolling attachment can also be used with its wide arm side towards the spindle. One set of rolls and one setting gauge are required for every size of thread to be rolled.

Contact customer service for thread roll and setting gauge part numbers.



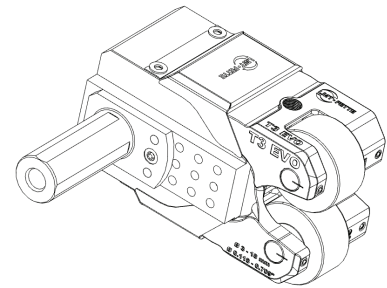
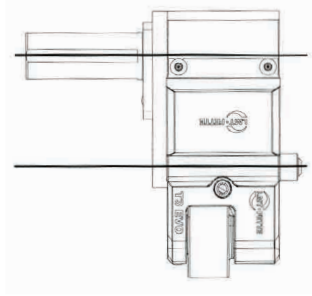
For standard taper threads the DIN or ANSI-No. with effective thread length should be stated. Information on standard or short Design is to be stated, and for threads which deviate from standard, the location of the gage length (L_1) is to be stated. Max. roll runoff 1 x pitch and in case of multiple start threads 1 x lead.

In addition to the roll design versions for threads, roll designs for knurling, burnishing and surface profiling work can be used on the tangential side rolling attachment.



Universal Holder for Tangential Evoline Attachments

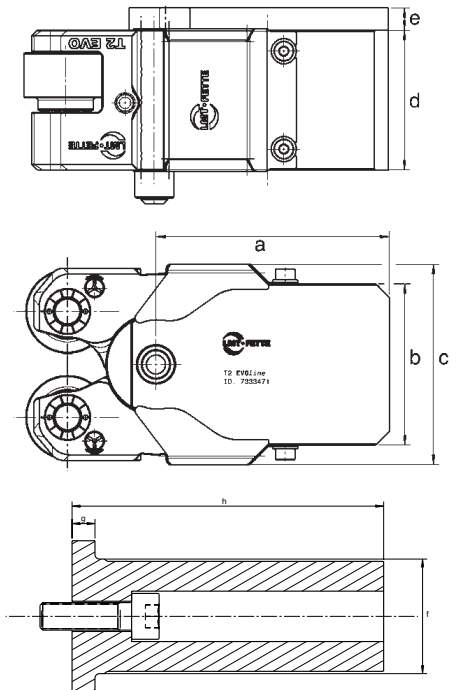
Adjustment Range		
Attachment	lv	Adjustment Increment
T1 Evo	0 - 60 mm 0 - 2.36"	12 mm 0.47"
T2 Evo	0 - 60 mm 0 - 2.36"	12 mm 0.47"
T3 Evo	0 - 60 mm 0 - 2.36"	12 mm 0.47"
T4 Evo	0 - 60 mm 0 - 2.36"	12 mm 0.47"



Holder and Shank

Tool Holder						
Rolling Attachment	Part #	a	b	c	d	e
T1 Evo	7333470	80 mm 3.15"	50 mm 1.97"	61 mm 2.40"	43 mm 1.69"	8 mm 0.31"
T2 Evo	7333471	84 mm 3.31"	58 mm 2.28"	72 mm 2.83"	50 mm 1.97"	8 mm 0.31"
T3 Evo	7333472	84 mm 3.31"	68 mm 2.68"	82 mm 3.23"	60 mm 2.36"	8 mm 0.31"
T4 Evo	7333473	95 mm 3.74"	82 mm 3.23"	99 mm 3.90"	70 mm 2.76"	8 mm 0.31"

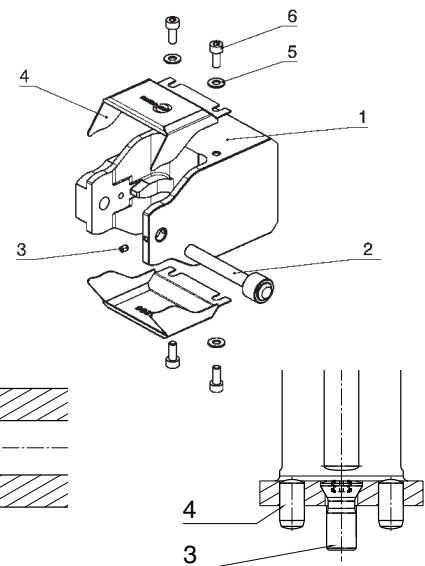
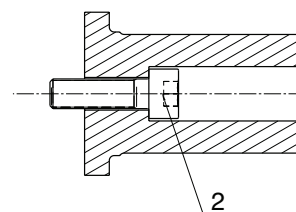
Round Shank				
Shank Size	Part #	f	g	h
1"	7462404	25.4 mm 1"	5 mm 0.197"	68 mm 2.698"
20 mm	7355305	20 mm .787"	5 mm 0.197"	68 mm 2.698"
22 mm	7355306	22 mm 0.866"	5 mm 0.197"	68 mm 2.698"
25 mm	7355307	25 mm 0.984"	5 mm 0.197"	68 mm 2.698"
32 mm	7335235	32 mm 1.259"	5 mm 0.197"	68 mm 2.698"



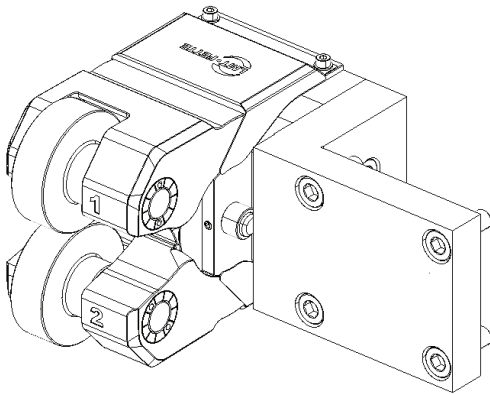
Spare Parts

Holder						
Part #	Part Desc.	T1 Evo	T2 Evo	T3 Evo	T4 Evo	Qty
1	Basic Body	—	—	—	—	—
2	Plug-In Shaft	7294197	7294257	7294397	7294497	1 pc
3	Screw	2142056	2142056	2128868	7337739	1 pc
4	Chip Guard	7294166	7294266	7294366	7294466	2 pc
5	Washer	2143363	2143363	2143363	2143363	4 pc
6	Screw	2143458	2143458	2143458	2143458	4 pc

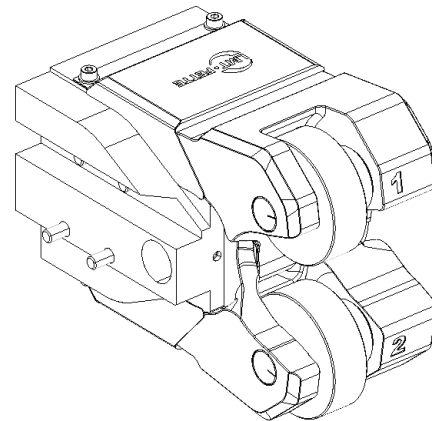
Shank			
Part #	Part Desc.	Qty	Article #
2	Cap Screw	1	2142021
3	Clamping Screw	2	7211621
4	Guide Pin	2	2142672



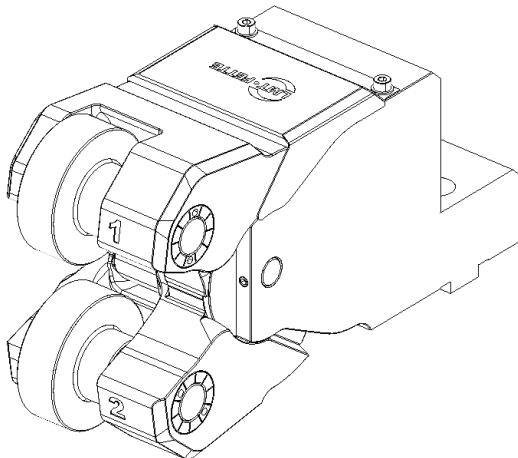
For CNC lather with BMT Turret



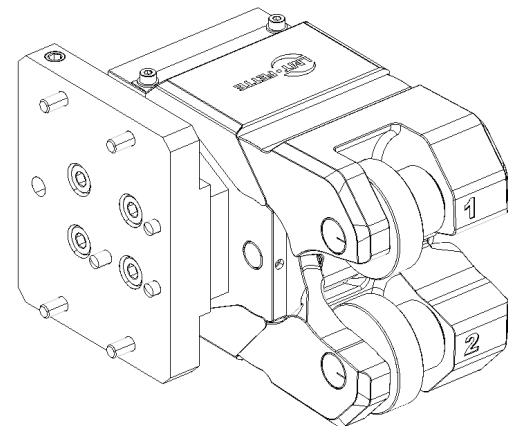
For CNC lather with BMT Turret



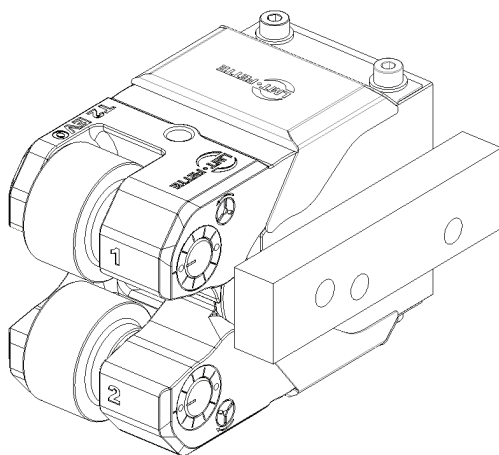
For CNC lather with BMT Turret



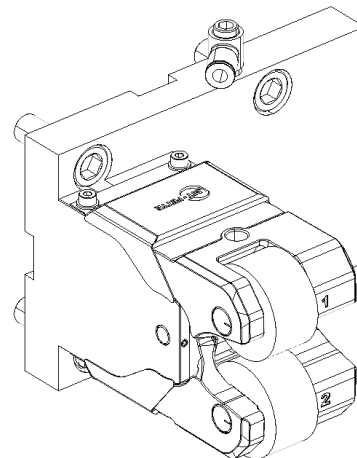
For CNC lather with BMT Turret



For CNC lather with BMT Turret



For CNC lather with BMT Turret





Radial Rolling Heads

LMT Fette radial rolling heads were primarily developed for short threads having an extremely short runout.

Since the rolling heads are suitable for stationary or rotating application it is also possible for threads to be fabricated on workpieces that cannot be rotated.

The centering effect of the three thread rollers mean that these rolling heads are also suitable for threads on longer workpieces clamped at one end.

The speed with which threads are manufactured using LMT Fette radial rolling heads is unsurpassed. Once the rolling head has been put into its working position and the process has been started, the rolling operation is completed with a single turn of the roller.

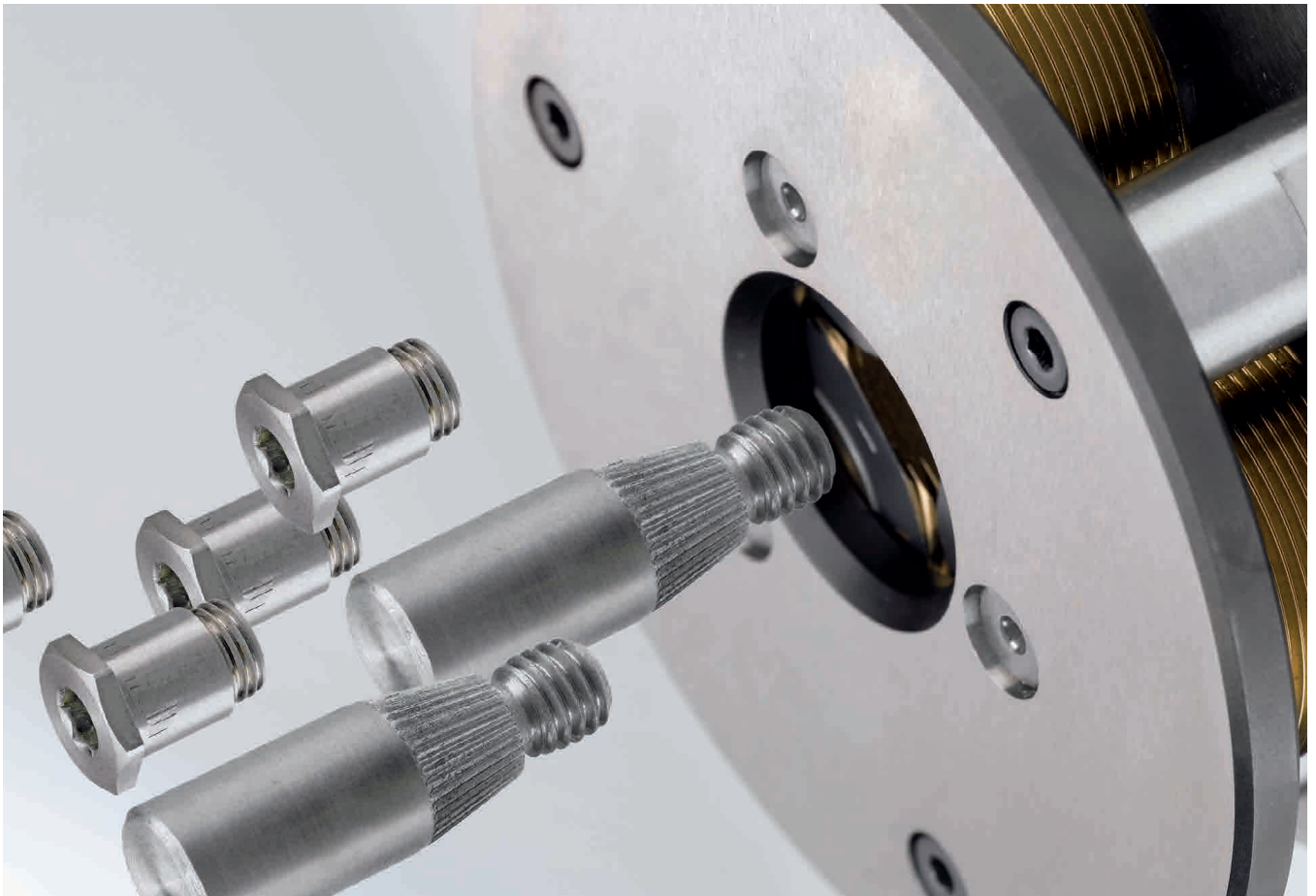
Radial rolling heads can be used for more than just thread making.

The following items can be fabricated with great economy:

- Extremely short threads (right or left-handed)
- Threads with very short runouts
- Tapered threads
- Knurling in accordance with DIN 82
- Burnishing
- Crimping and other forming

The radial rolling heads are available in various types:

- Type E, with standard external trigger
- Type EW, automatic triggering by the workpiece



“**Type E**” radial rolling heads are brought into rolling position on the machine over the workpiece in an axial direction. The rolling head is released, and the rolling process started, by means of one of the two trigger levers (external, internal). The thread has been formed after one rolling rotation, and the rolling head can be drawn back in an axial direction.

An external trigger mechanism (e. g. by means of the spindle) is essential for rolling heads of this type, and this keeps the physical length of these types relatively short.

Radial rolling heads of “**type EW**” do not need an external trigger mechanism. The workpiece triggers the rolling head by means of the rotating internal stop. The workpiece is inserted axially into the rolling head until the internal trigger mechanism initiates the rolling procedure. In order to avoid relative movements of the rolling head and the workpiece during the rolling procedure, the front part of the rolling head is mounted on floating bearings.

Important: the same rolls can be used for all types.

All of these types are available in different sizes (depending on the thread dimensions and the space on the machine) and in a number of versions (flange version, shank versions). Special versions, such as larger front plate holes, thinner front plates and increased roller widths are available (see page 382). Other special versions can be made by request.

Radial rolling heads cover a working range of up to 45 mm diameter. The way in which this range is divided is shown in the following tables. The same rolling head can be used for lefthanded threads as for right-handed threads, but special lefthanded thread rollers must be used. The thread length, including the thread run-out, cannot be longer than the width of the roller.

E-/EW-Rolling head with straight shank (Type A01)



E-/EW-Rolling head with VDI shank (Type A03)

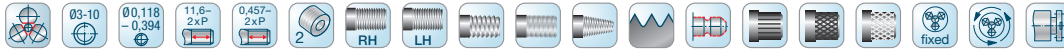


E-/EW-Rolling head with flange (Type A00)

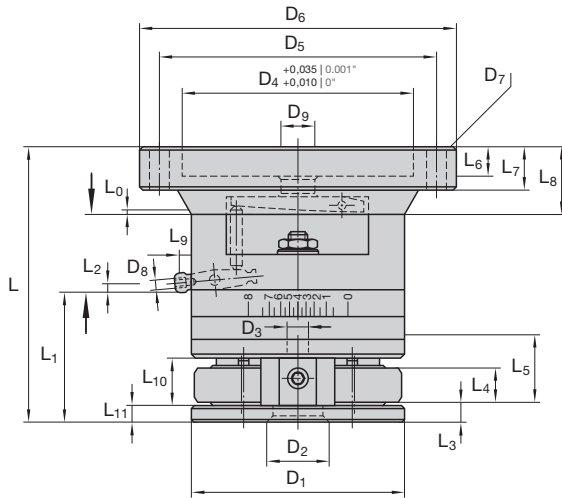


Capacity Range								
Rolling head	Cylindrical Threads					Taper Threads		
	Standard thread mm l inch		Major-Ø mm l inch min.–max.	Fine thread max. pitch min. TPI	Roll width mm l inch	Standard	min.	max.
	min.	max.						
E 8	M 3 x 0.5 5–40	M 10 x 1.5 3/8–16	3–10 #5–3/8	1.5 l 16	11.6 l 0.46	DIN 158 DIN 2999 DIN 3858 ANSI B1.20.1	M 6 x 1 keg. taper R1/16–28 R1/8–28 1/16–27 NPT(NPTF)	M 10 x 1 keg. taper R1/8–28 R1/8–28 1/8–27 NPT(NPTF)
E 10 EW 10	M 8 x 1.25 5/16–24	M 14 x 1.5 9/16–18	8–14 5/16–9/16	1.5 l 16	19.6 l 0.77	DIN 158 DIN 2999 DIN 3858 ANSI B1.20.1	M 8 x 1 keg. taper R1/16–28 R1/8–28 1/16–27 NPT(NPTF)	M 14 x 1,5 keg. taper R1/4–19 R1/4–19 1/4–18 NPT(NPTF)
E 13 EW 13	M 10 x 1.5 7/16–14	M 18 x 1.5 11/16–24	10–18 7/16–11/16	1.5 l 13	24.6 l 0.97	DIN 158 DIN 2999 DIN 3858 ANSI B1.20.1	M 10 x 1 keg. taper R1/8–28 R1/8–28 1/8–27 NPT(NPTF)	M 18 x 1,5 keg. taper R3/8–19 R3/8–19 3/8–18 NPT(NPTF)
E 16 EW 16	M 12 x 1.75 1/2–13	M 22 x 1.5 7/8–14	12–22 1/2–7/8	2.0 l 11	29.6 l 1.17	DIN 158 DIN 2999 DIN 3858 ANSI B1.20.1	M 12 x 1.25 keg. taper R1/4–19 R1/4–19 1/4–18 NPT(NPTF)	M 22 x 1,5 keg. taper R1/2–14 R1/2–14 1/2–14 NPT(NPTF)
E 23 EW 23	M 16 x 2 5/8–11	M 30 x 2 1-3/16 x 18	16–30 5/8–1-3/16	2.0 l 11	34.6 l 1.36	DIN 158 DIN 2999 DIN 3858 ANSI B1.20.1	M 16 x 1.5 keg. taper R3/8–19 R3/8–19 3/8–18 NPT(NPTF)	M 30 x 2 keg. taper R3/4–14 R3/4–14 3/4–14 NPT(NPTF)
E 30 EW 30	M 22 x 2.5 3/4–10	M 45 x 2	22–45 13/16–1-11/16	2.0 l 10	39.6 l 1.56	DIN 158 DIN 2999 DIN 3858 ANSI B1.20.1	M 22 x 1.5 keg. taper R3/4–14 R3/4–14 3/4–14 NPT(NPTF)	M 42 x 2 keg. taper R11/4–11 R11/4–11 1.25–11.5 NPT(NPTF)

A list of Ident No. for the standard right-hand thread rolls version "A" is shown for different head sizes, on pages 383–387.
Please inquire dimensions and pitches not shown in attached table individually.



Type	Ident No.
E8A00	1551101



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
2.520	0.591	0.866	0.118	2.756	3.740	4.921	0.433	—	0.413	3.272	0.020	1.555	0.087	0.205
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
0.457	1.197	0.335	0.492	0.787	0.142	0.591	0.197	approx. 4.4 lb		approx. 0.22 lb		approx. 4.62 lb		

D₂ = Standard

D₇ = 4 x on circumference

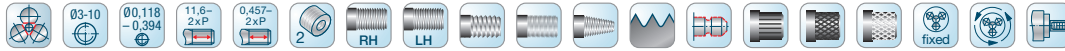
L₀ = Internal trip lever movement

L₂ = External trip lever movement

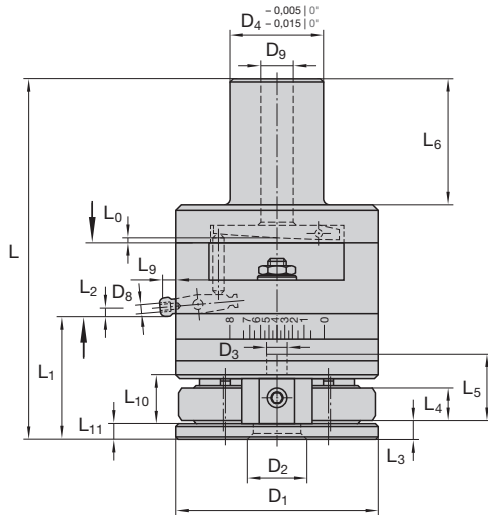
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

For a functional radial rolling system, select both the head and the appropriate thread rolls.



Type	Shank dia.	Ident No.
E8A01	20 mm	2173300
	25 mm	2173301
	30 mm	2173302
	3/4"	2173303
	1"	2173304
	1 1/4"	2173305



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
2.520	0.591	0.866	0.118	3/4, 1, 1 1/4"	—	—	—	—	0.413	4.551	0.020	1.555	0.087"	0.205
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
0.457	1.197	1.575	—	—	0.142	0.591	0.197	approx. 3.52 lb		approx. 0.22 lb		approx. 3.87 lb		

D₂ = Standard

L₀ = Internal trip lever movement

L₂ = External trip lever movement

m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

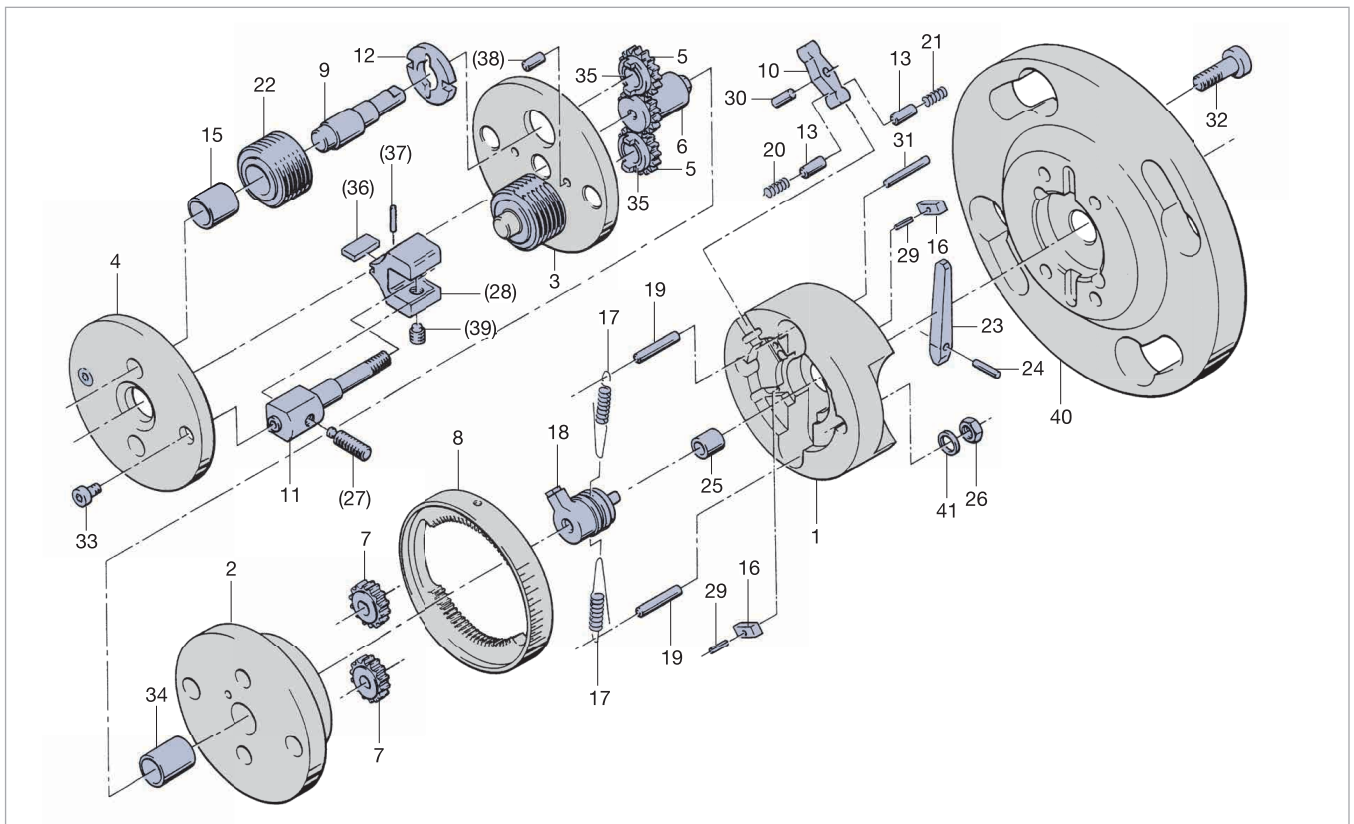
For a functional radial rolling system, select both the head and the appropriate thread rolls.

Rolling head				Rolling head			
E8A00 E8A01				E8A00 E8A01			
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Spring housing	2173498	20	1	Pressure spring, heavy	2173520
2	1	Drive gear plate	2173499	21	1	Pressure spring, light	2127419
3	1	Cover plate	2173500	22	2	Roll	see individual
4	1	Front plate	2173501	23	1	Internal trip release lever	2173521
5	2	Synchronized gear with bushing	2173502	24	1	Pin	2141229
6	1	Centre gear	2173503	25	1	Bushing	2148853
7	2	Adjusting gear	2173504	26	2	Hexagon nut	2148393
8	1	Gear rim	2173505	29	4	Roll pin	2142561
9	2	Eccentric spindle	2173506	30	1	Pin	2142649
10	1	External trip release lever	2173507	31	1	Pin	2173526
11	2	Spacer pin	2173508	32	4	Cap screw	2142016
12	2	Drive plate	2173509	33	2	Cap screw	2141881
13	2	Coupling pin	2173510	34	1	Bushing	2148884
15	2	Bushing	2173512	35	2	Bushing (see part no. 5)	2148865
16	4	Fitting key	2173511	40	1	Flange	2173528
17	1	Tension spring set (2 pieces)	2173516	41	2	Washer	2141464
18	1	Clutch stop	2173519	Additional spare parts E8A01			
19	2	Pin	2141231	14	1	Shank	see table
				24	1	Pin	2142644
Shanks for rolling head E8A01				Guide piece ¹⁾			
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
14	1	Round shank 20 mm	2173531		1	Guide piece complete ¹⁾	2170134
14	1	Round shank 25 mm	2173532	27	1	Set screw	2173522
14	1	Round shank 30 mm	2173533	28	1	Guide piece with carbide	2173523
14	1	Round shank 3/4"	2173534	36	1	Carbide plate see part no. 28	2173525
14	1	Round shank 1"	2173535	37	1	Pin	2142644
14	1	Round shank 1 1/4"	2173536	38	1	Pin	2142658
				39	1	Locking screw	2148366

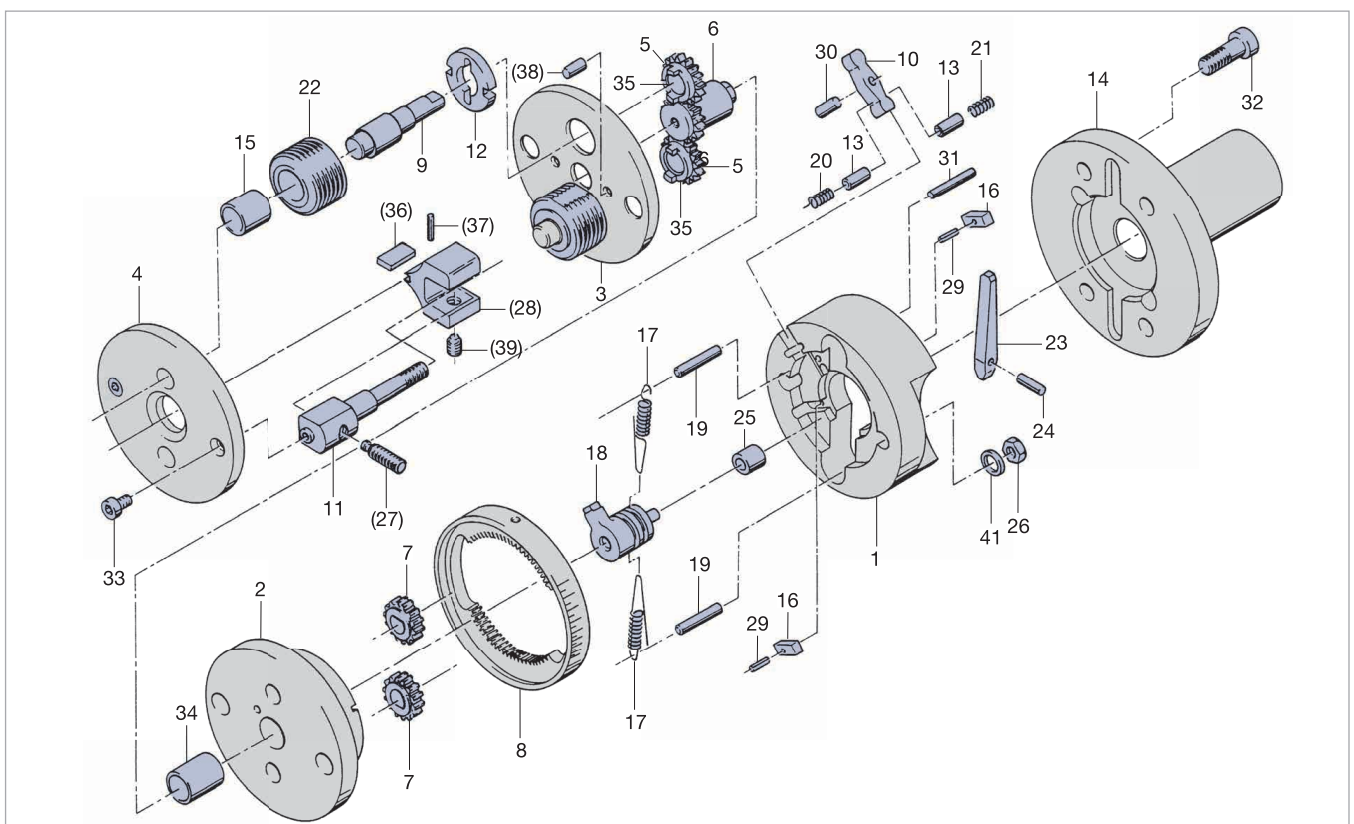
¹⁾ Please order additionally if required. For each rolling head 2 pieces are needed.

When ordering spare parts, please state rolling head type, Part No. and Ident No.

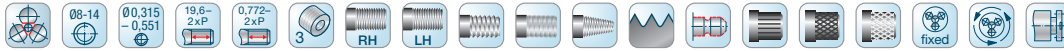
Spare Parts For Radial Type Rolling Head E8A00



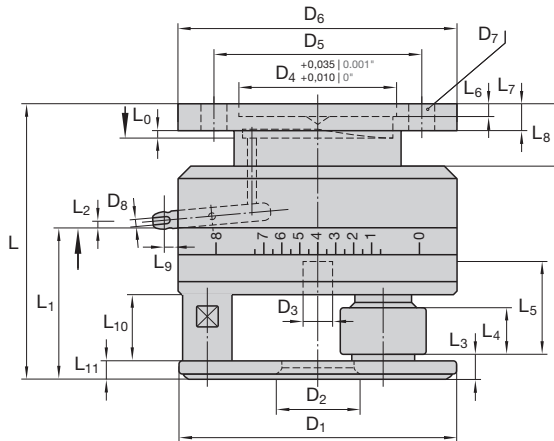
Spare Parts For Radial Type Rolling Head E8A01



() = Optional



Type	Ident No.
E10A00	1551600



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
3.937	1.024	1.181	0.354	2.756	3.740	4.921	0.433	M 5	—	4.488	0.043	2.291	0.138	0.244
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk	m-Ro	m-Total				
0.772	1.969	0.335	0.492	1.102	0.280	0.984	0.236	approx. 9.46 lb	approx. 0.88 lb	approx. 10.34 lb				

D₂ = Standard

D₇ = 4 x on circumference

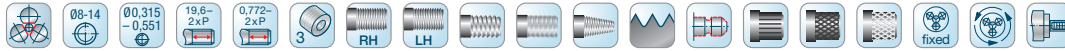
L₀ = Internal trip lever movement

L₂ = External trip lever movement

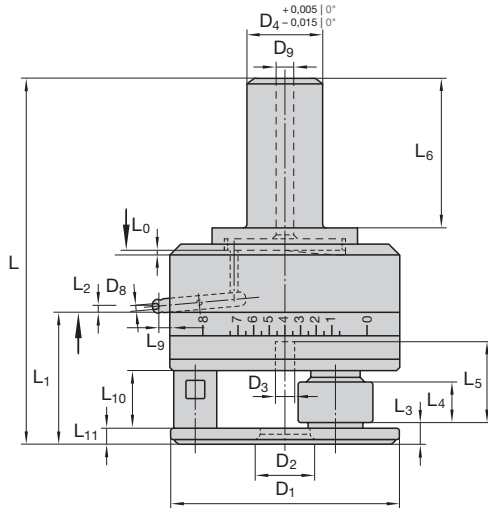
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

For a functional radial rolling system, select both the head and the appropriate thread rolls.



Type	Shank dia.	Ident No.
E10A01	20 mm	2173308
	25 mm	2173309
	30 mm	2173310
	32	2173311
	3/4"	2173312
	1"	2173313
	1 1/4"	2173314



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
3.937	1.024	1.181	0.354	3/4, 1, 1 1/4	—	—	—	M 5	0.492	6.480	0.043	2.291	0.138	0.244
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk	m-Ro	m-Total				
0.772	1.969	2.362	—	—	0.28	0.984	0.236	approx. 9.24 lb	approx. 0.88 lb	approx. 9.68 lb				

D₂ = Standard

L₀ = Internal trip lever movement

L₂ = External trip lever movement

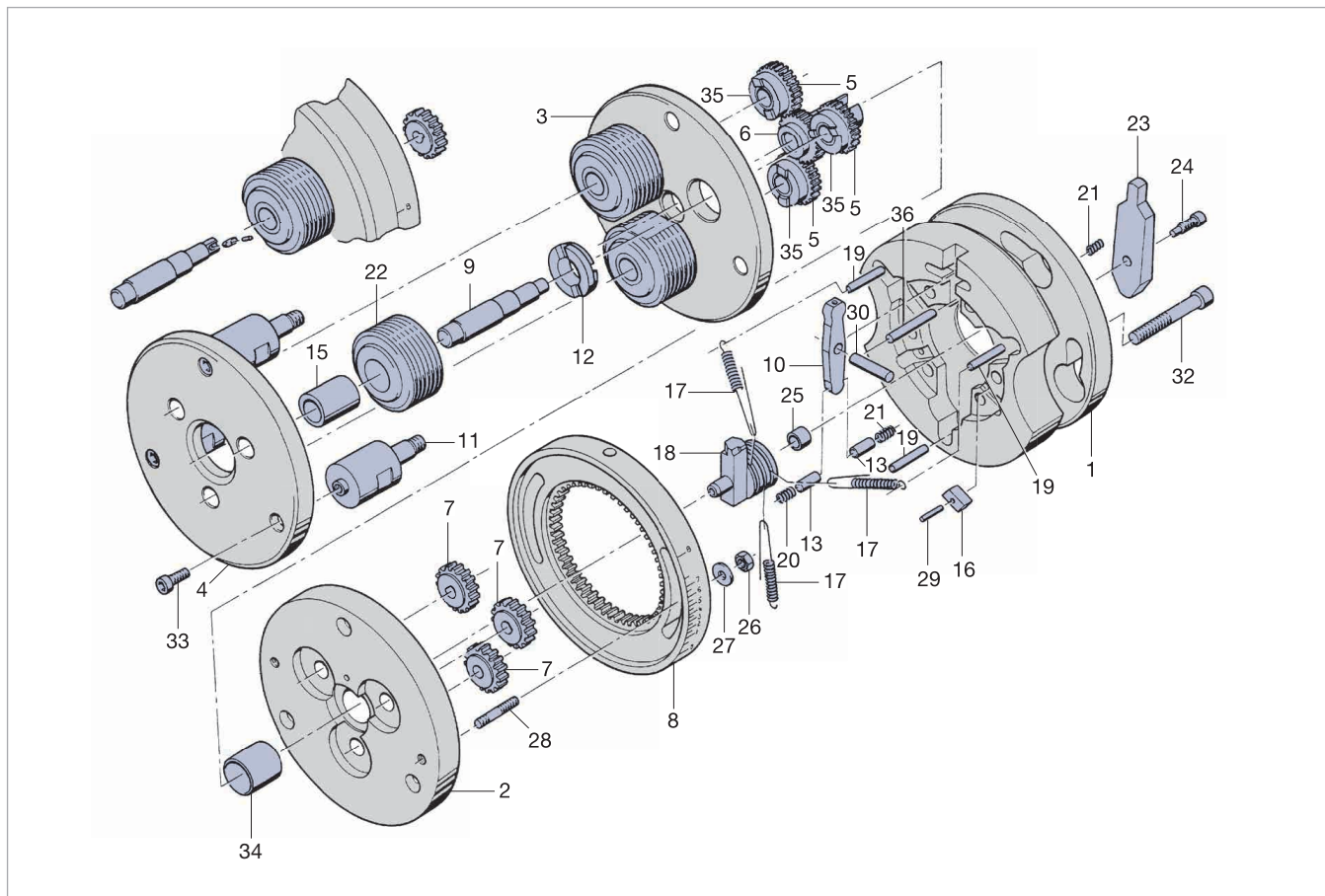
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

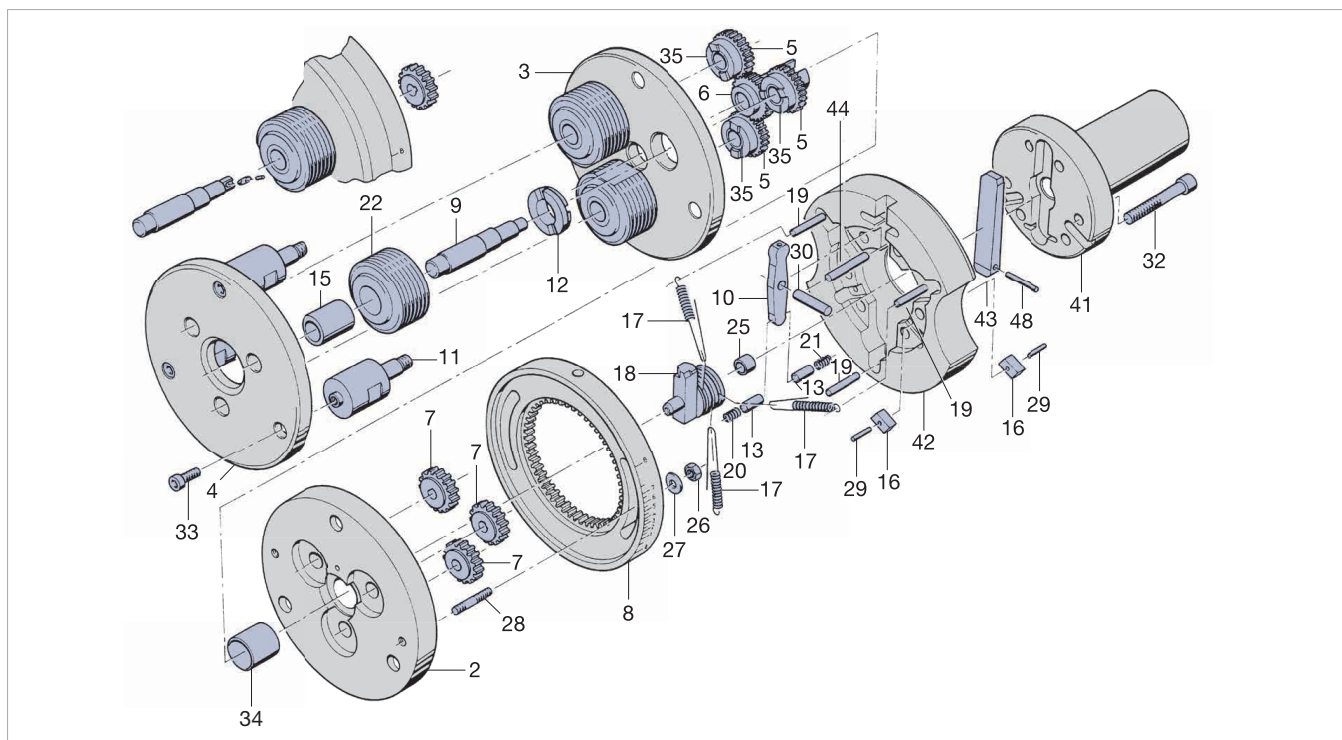
For a functional radial rolling system, select both the head and the appropriate thread rolls.

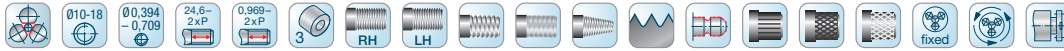
Rolling head				Rolling head			
Part No.	Qty.	Part description	E10A00 E10A01 Ident No.	Part No.	Qty.	Part description	E10A00 E10A01 Ident No.
1	1	Flange (E10A00)	2173659	19	3	Pin	2141260
2	1	Drive gear plate	2173660	20	1	Pressure spring, heavy	2173679
3	1	Cover plate	2173661	21	2	Pressure spring, light	2127414
4	1	Front plate	2173662	22	3	Roll	see individual
5	3	Synchronized gear with bushing	2173663	23	1	Internal trip release lever (E10A00)	2173680
				24	1	Cap screw (E10A00)	2173681
6	1	Centre gear	2173664	25	1	Bushing	2148851
7	3	Adjusting gear	2173665	26	2	Hexagon nut	2142394
8	1	Gear ring	2173666	27	2	Washer	2173682
9	3	Eccentric spindles	2173667	28	2	Stud	2148824
10	1	External trip release lever	2173668	29	2	Roll pin	2142576
11	3	Spacer pin	2173669	30	1	Pin	2142678
12	3	Drive plate	2173670	32	6	Cap screw	2148362
13	2	Coupling pin	2173671	33	3	Cap screw	2142992
15	3	Bushing	2173672	34	1	Bushing	2148858
16	2	Fitting key	2173673	35	3	Bushing (see part no. 5)	2148865
17	1	Tension spring set (3 pieces)	2173674	36	1	Pin (E10A00)	2178549
18	1	Clutch stop	2173678				
Shanks for rolling head E10A01				Additional spare parts E10A01			
Part No.	Qty.	Part description	Ident No.	41	1	Shank	see table
41	1	Round shank 20 mm	2173683	42	1	Spring housing	2173690
41	1	Round shank 25 mm	2173684	43	1	Internal trip release lever	2173691
41	1	Round shank 30 mm	2173685	44	1	Pressure pin	2178550
41	1	Round shank 32 mm	2173686	48	1	Needle roller bearings	2148819
41	1	Round shank 3/4"	2173687				
41	1	Round shank 1"	2173688				
41	1	Round shank 1 1/4"	2173689				

When ordering spare parts, please state rolling head type, Part No. and Ident No.

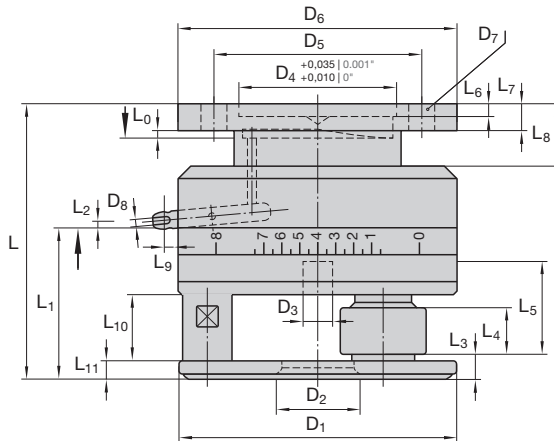


Spare Parts For Radial Type Rolling Head E10A01





Type	Ident No.
E13A00	1552208



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
4.921	1.260	1.614	0.472	2.756	3.740	4.921	0.433	M 5	—	4.843	0.039	2.657	0.118	0.323
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
0.969	2.008	0.335	0.492	1.102	0.295	1.181	0.315	approx. 14.96 lb		approx. 1.76 lb		approx. 16.72 lb		

D₂ = Standard

D₇ = 4 x on circumference

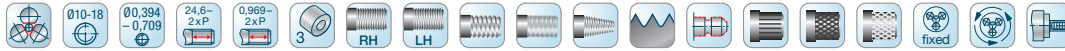
L₀ = Internal trip lever movement

L₂ = External trip lever movement

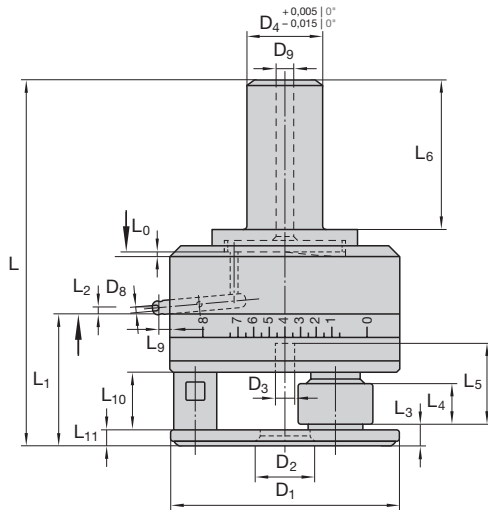
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

For a functional radial rolling system, select both the head and the appropriate thread rolls.



Type	Shank dia.	Ident No.
E13A01	30 mm	2173316
	40 mm	2173317
	1 1/4"	2173318
	1 1/2"	2173319



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
4.921	1.260	1.614	0.472	1 1/4, 1 1/2	—	—	—	M 5	0.492	7.622	0.039	2.657	0.118	0.323
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
0.969	2.008	3.150	—	—	0.295	1.181	0.315	approx. 16.28 lb		approx. 1.76 lb		approx. 18.04 lb		

D₂ = Standard

L₀ = Internal trip lever movement

L₂ = External trip lever movement

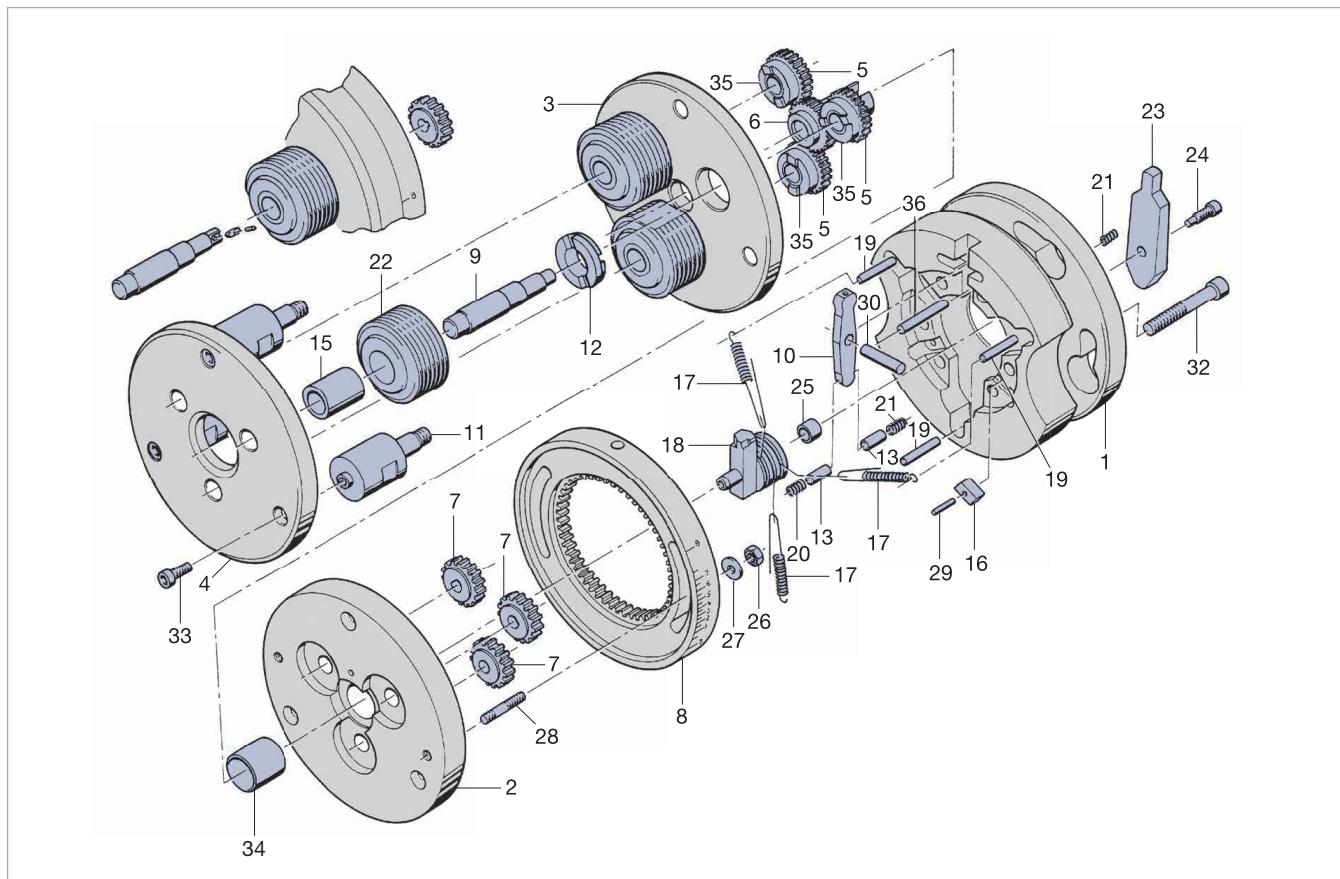
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

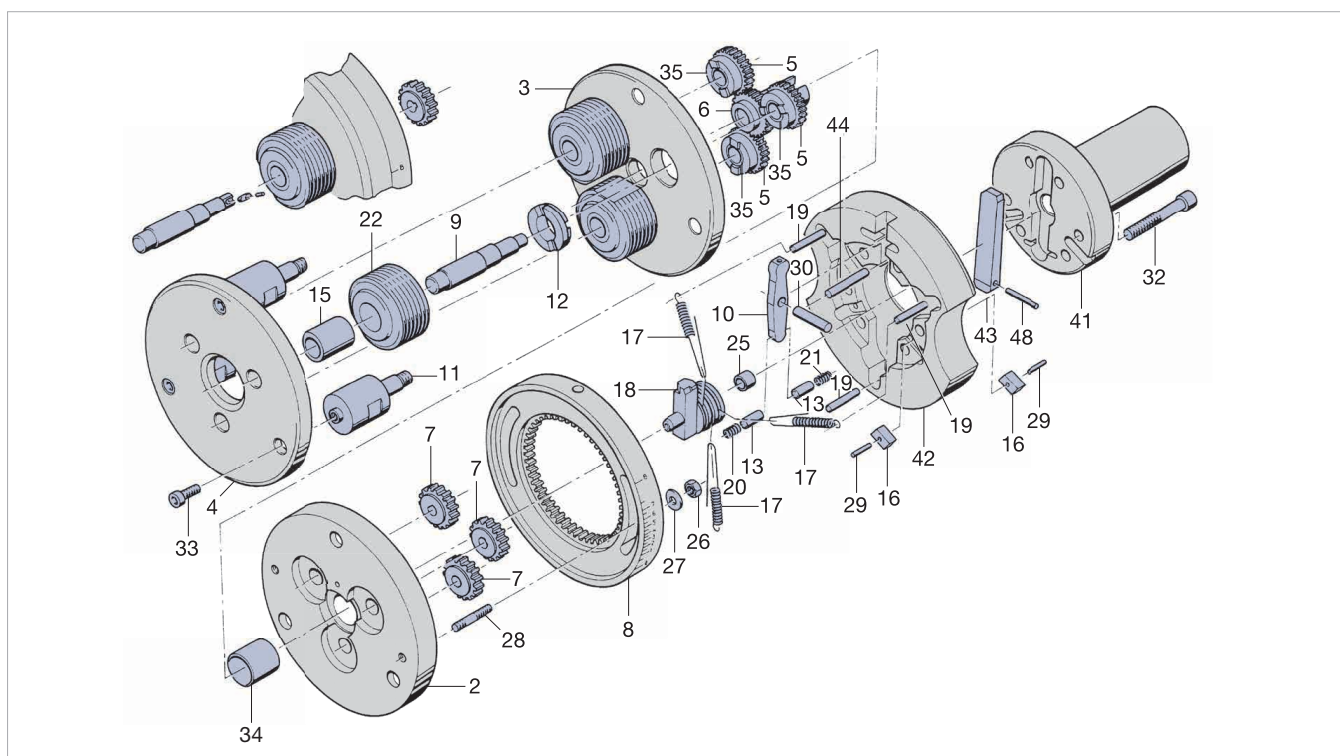
For a functional radial rolling system, select both the head and the appropriate thread rolls.

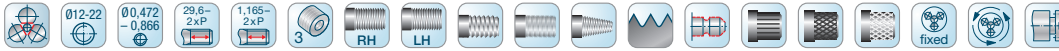
Rolling head			E13A00 E13A01	Rolling head			E13A00 E13A01
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange (E13A00)	2173694	19	3	Pin	2141260
2	1	Drive gear plate	2173695	20	1	Pressure spring, heavy	2173679
3	1	Cover plate	2173696	21	2	Pressure spring, light	2127414
4	1	Front plate	2173697	22	3	Roll	s. individual
5	3	Synchronized gear with bushing	2173698	23	1	Internal trip release lever (E13A00)	2173712
6	1	Centre gear	2173699	24	1	Cap screw (E13A00)	2173713
7	3	Adjusting gear	2173700	25	1	Bushing	2148851
8	1	Gear ring	2173701	26	2	Hexagon nut	2142394
9	3	Eccentric spindles	2173702	27	2	Washer	2173714
10	1	External trip release lever	2173703	28	2	Stud	2148841
11	3	Spacer pin	2173704	29	2	Roll pin	2142576
12	3	Drive plate	2173705	30	1	Pin	2142678
13	2	Coupling pin	2173671	32	6	Cap screw	2148362
15	3	Bushing	2173706	33	3	Cap screw	2143007
16	2	Fitting key	2173673	34	1	Bushing	2148856
17	1	Tension spring set (3 pieces)	2173707	35	3	Bushing (see part no. 5)	2148854
18	1	Clutch stop	2173711	36	1	Pin (E13A00)	2178549
Shanks for rolling head E13A01				Additional spare parts E13A01			
Part No.	Qty.	Part description	Ident No.	41	1	Shank	see table
41	1	Round shank 30 mm	2173715	42	1	Spring housing	2173716
41	1	Round shank 40 mm	2173720	43	1	Internal trip release lever	2173717
41	1	Round shank 1 1/4"	2173721	44	1	Pressure pin	2178550
41	1	Round shank 1 1/2"	2173722	48	1	Needle roller bearings	2148869

When ordering spare parts, please state rolling head type, Part No. and Ident No.

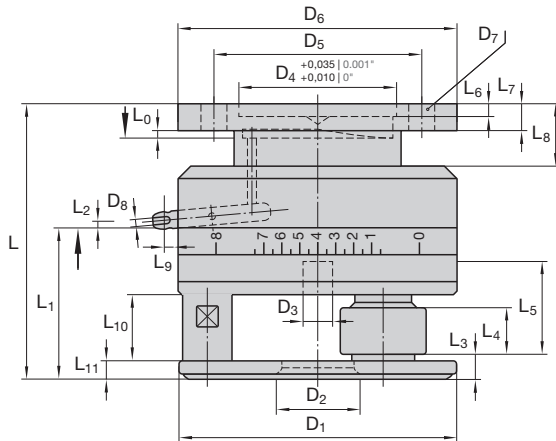


Spare parts for radial type rolling head E13A01





Type	Ident No.
E16A00	1552609



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
5.512	1.594	1.969	0.709	3.622	4.331	5.512	0.512	M 5	—	5.591	0.043	3.138	0.173	0.402
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
1.165	2.402	0.335	0.492	1.102	0.319	1.417	0.394	approx. 21.78 lb		approx. 3.3 lb		approx. 25.08 lb		

D₂ = Standard

D₇ = 4 x on circumference

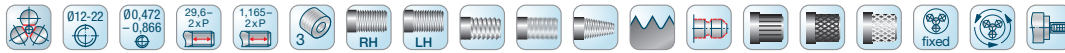
L₀ = Internal trip lever movement

L₂ = External trip lever movement

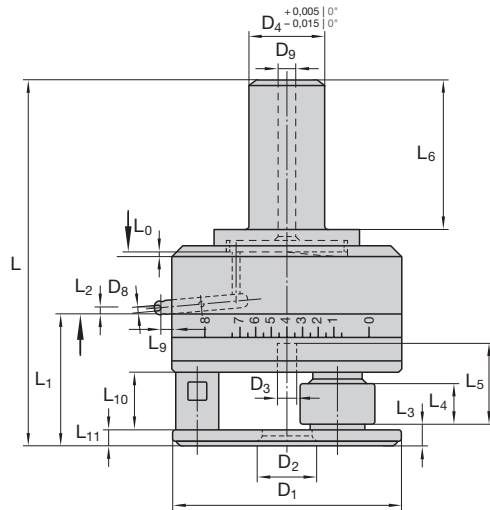
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

For a functional radial rolling system, select both the head and the appropriate thread rolls.



Type	Shank dia.	Ident No.
E16A01	40 mm	2173322
	50 mm	2173323
	1 1/2"	2173324
	2"	2173325



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
5.512	1.594	1.969	0.709	1 1/2, 2	—	—	—	M 5	0.492	8.366	0.043	3.138	0.173	0.402
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
1.165	2.402	3.150	—	—	0.319	1.417	0.394	approx. 23.98 lb		approx. 3.3 lb		approx. 27.28 lb		

D₂ = Standard

L₀ = Internal trip lever movement

L₂ = External trip lever movement

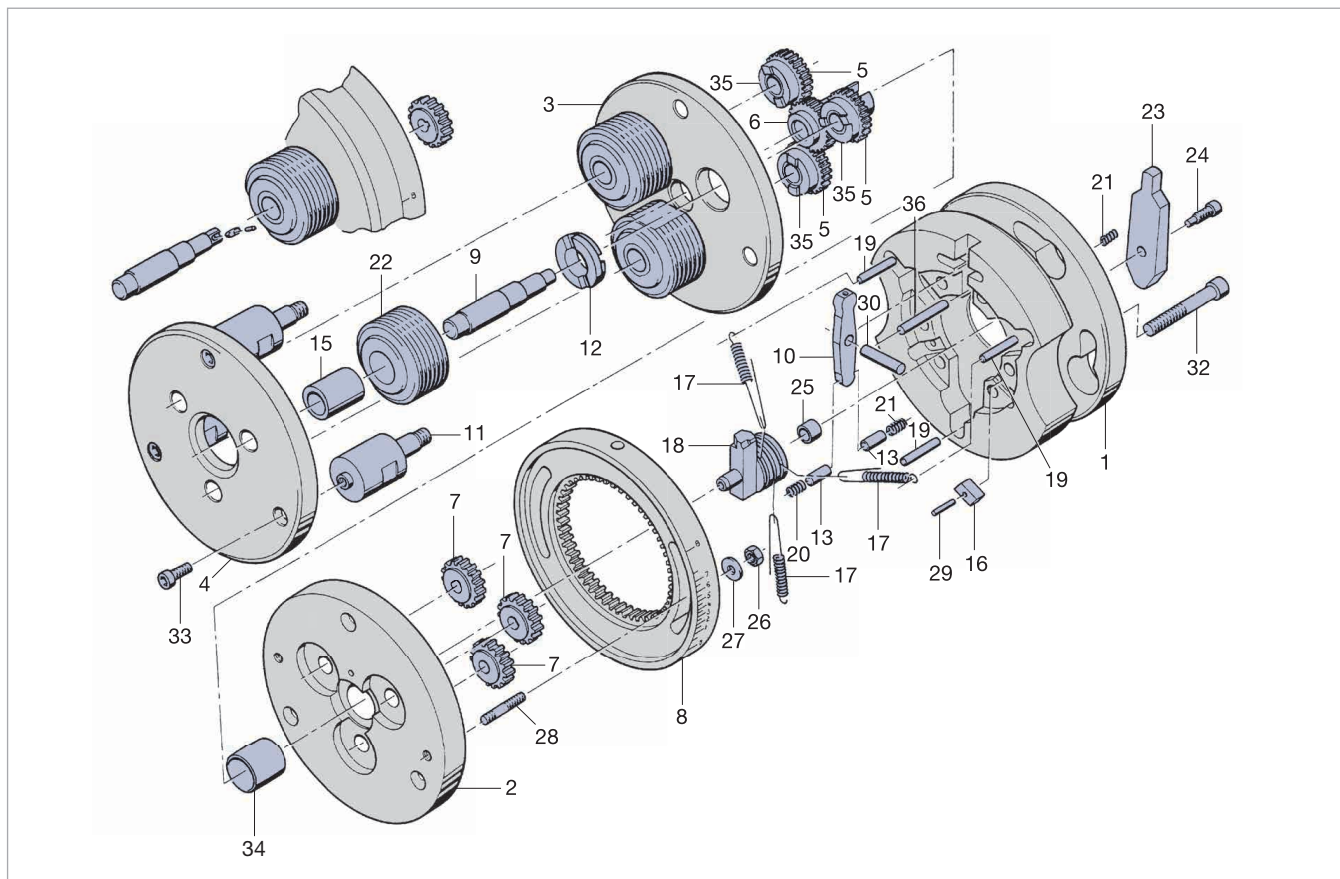
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

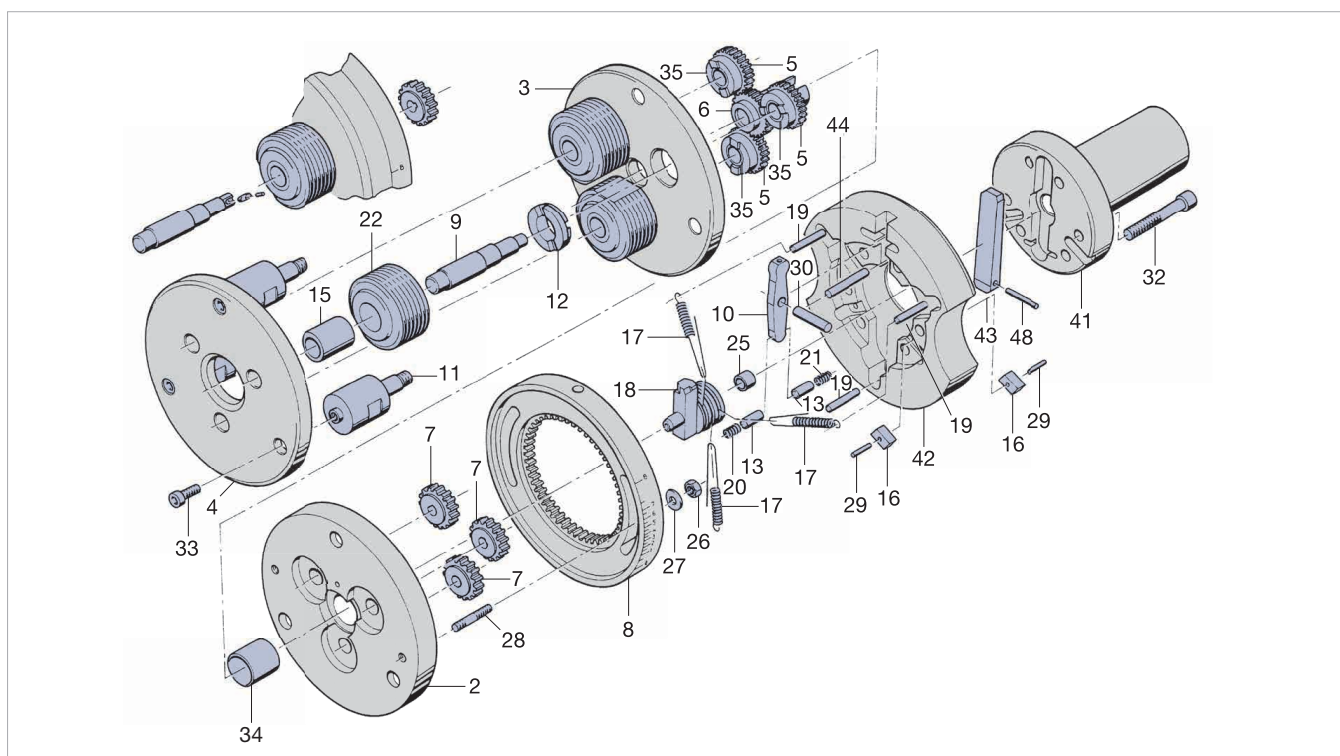
For a functional radial rolling system, select both the head and the appropriate thread rolls.

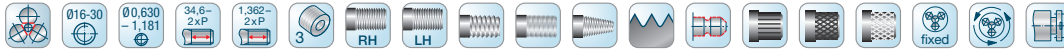
Rolling head			E16A00 E16A01	Rolling head			E16A00 E16A01
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange (E16A00)	2173729	20	1	Pressure spring, heavy	2173749
2	1	Drive gear plate	2173730	21	2	Pressure spring, light	2127416
3	1	Cover plate	2173731	22	3	Roll	s. individual
4	1	Front plate	2173732	23	1	Internal trip release lever (E16A00)	2173750
5	3	Synchronized gear with bushing	2173733	24	1	Cap screw (E16A00)	2173751
				25	1	Bushing	2148865
6	1	Centre gear	2173734	26	2	Hexagon nut	2148398
7	3	Adjusting gear	2173735	27	2	Washer	2173752
8	1	Gear ring	2173736	28	2	Stud	2167020
9	3	Eccentric spindles	2173737	29	2	Roll pin	2142576
10	1	External trip release lever	2173738	30	1	Pin	2142678
11	3	Spacer pin	2173739	32	6	Cap screw	2142034
12	3	Drive plate	2173740	33	3	Cap screw	2143155
13	2	Coupling pin	2173741	34	1	Bushing	2148861
15	3	Bushing	2173742	35	3	Bushing (see part no. 5)	2148857
16	2	Fitting key	2173743	36	1	Pressure pin (E16A00)	2178547
17	1	Tension spring set (3 pieces)	2173744	37	3	Fitting key	–
18	1	Clutch stop	2173748	38	3	Pin	–
19	3	Pin	2141261				
Shanks for rolling head E16A01				Additional spare parts E16A01			
Part No.	Qty.	Part description	Ident No.	41	1	Shank	see table
41	1	Round shank 40 mm	2173753	42	1	Spring housing	2173757
41	1	Round shank 50 mm	2173754	43	1	Internal trip release lever	2173758
41	1	Round shank 1 1/2"	2173755	44	1	Pressure pin	2178548
41	1	Round shank 2"	2173756	48	1	Needle roller bearings	2148869

When ordering spare parts, please state rolling head type, Part No. and Ident No.

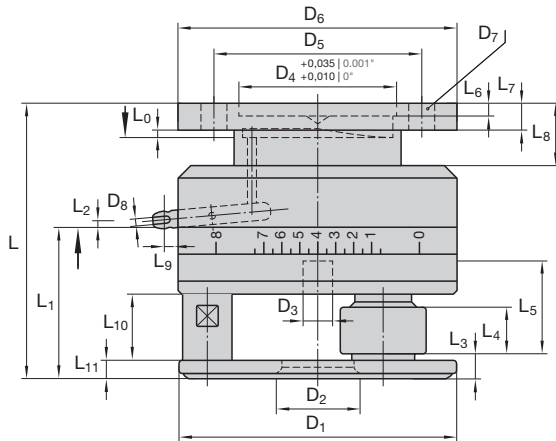


Spare parts for radial type rolling head E16A01





Type	Ident No.
E23A00	1553207



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
6.693	1.969	2.598	0.984	4.331	5.512	6.693	0.512	M 5	—	6.811	0.063	3.965	0.177	0.520
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk	m-Ro	m-Total				
1.362	2.992	0.335	0.492	1.102	—	1.693	0.512	approx. 41.36 lb	approx. 7.04 lb	approx. 48.41 lb				

D₂ = Standard

D₇ = 4 x on circumference

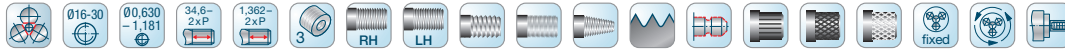
L₀ = Internal trip lever movement

L₂ = External trip lever movement

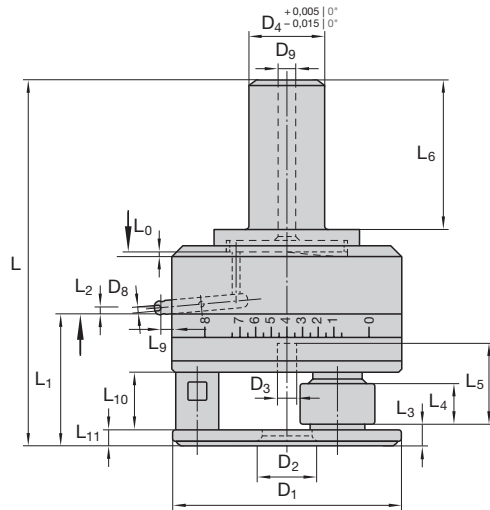
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

For a functional radial rolling system, select both the head and the appropriate thread rolls.



Type	Shank dia.	Ident No.
E23A01	50 mm	2173328
	60 mm	2173329
	2"	2173330
	2 1/2"	2173331



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
6.693	1.969	2.598	0.984	2, 2 1/2	—	—	—	M 5	0.492	10.295	0.063	3.965	0.177	0.520
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk	m-Ro	m-Total				
1.362	2.992	3.937	—	—	0.433	1.693	0.512	approx. 44.00 lb	approx. 7.04 lb	approx. 51.04 lb				

D₂ = Standard I

L₀ = Internal trip lever movement

L₂ = External trip lever movement

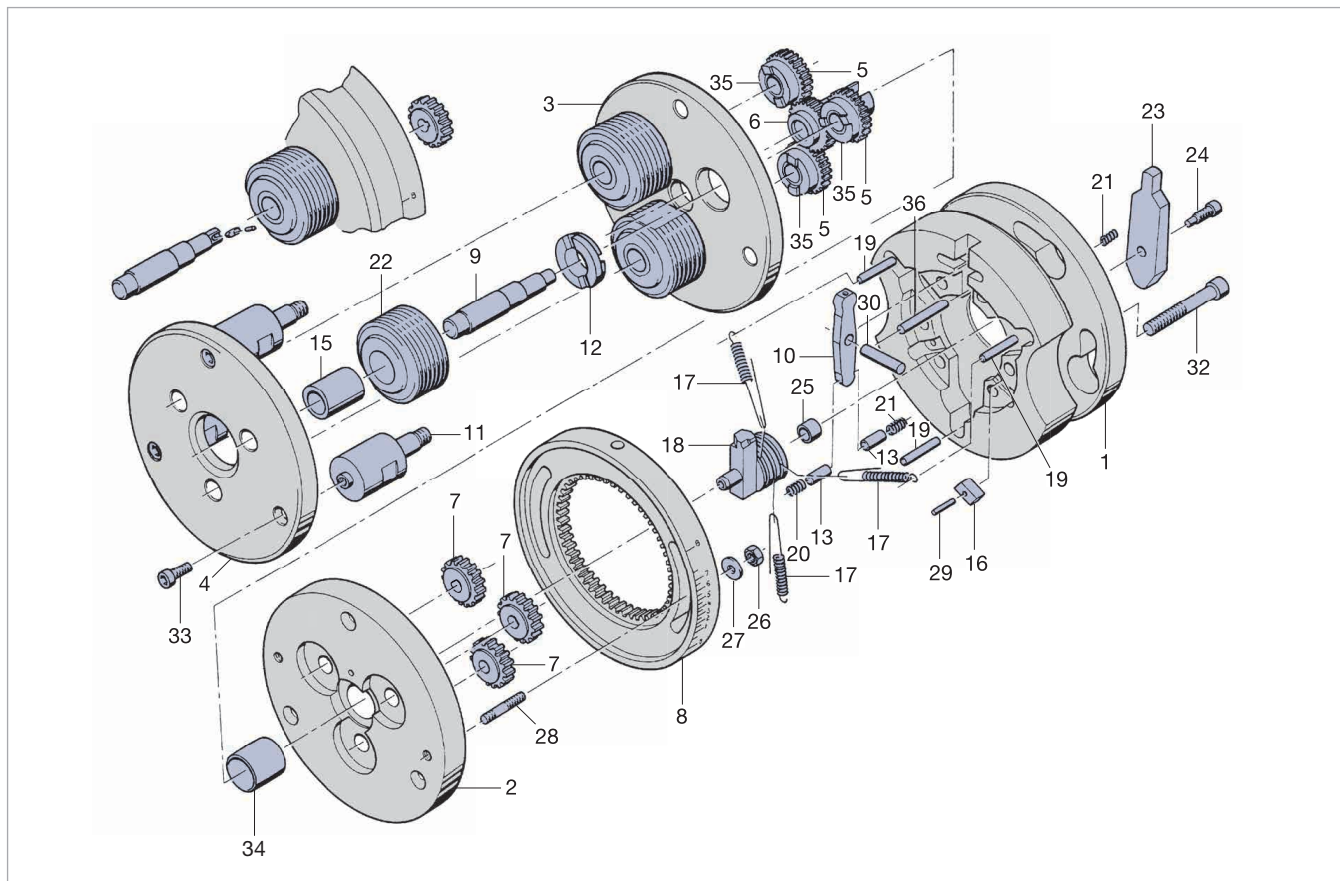
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

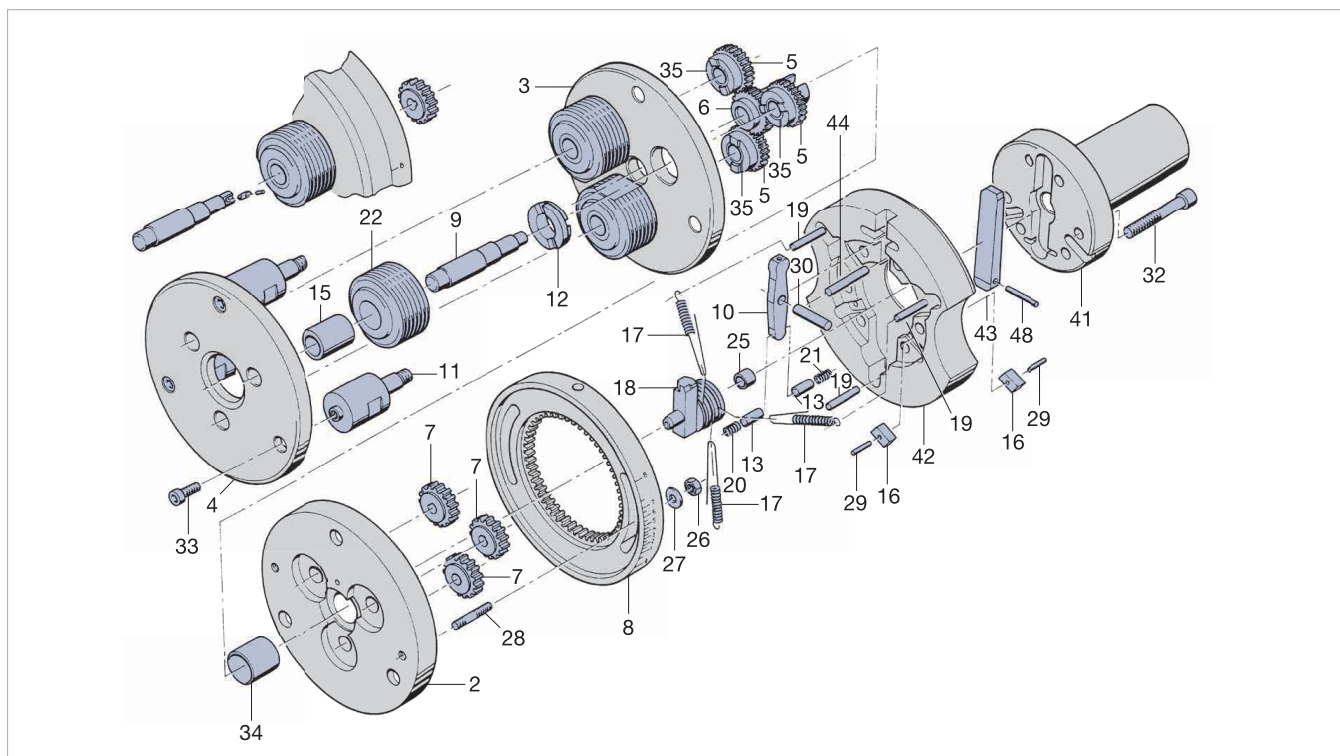
For a functional radial rolling system, select both the head and the appropriate thread rolls.

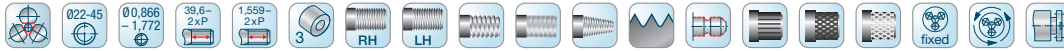
Rolling head			E23A00 E23A01	Rolling head			E23A00 E23A01
Part No.	Qty.	Part description	Ident No.	Part No.	Qty.	Part description	Ident No.
1	1	Flange (E23A00)	2173761	19	3	Pin	2141309
2	1	Drive gear plate	2173762	20	1	Pressure spring, heavy	2127402
3	1	Cover plate	2173763	21	2	Pressure spring, light	2127401
4	1	Front plate	2173764	22	3	Roll	see individual
5	3	Synchronized gear with bushing	2173765	23	1	Internal trip release lever (E23A00)	2173781
6	1	Centre gear	2173766	24	1	Cap screw (E23A00)	2173751
7	3	Adjusting gear	2173767	25	1	Bushing	2148865
8	1	Gear ring	2173768	26	2	Hexagon nut	2148398
9	3	Eccentric spindles	2173769	27	2	Washer	2173752
10	1	External trip release lever	2173770	28	2	Stud	2148839
11	3	Spacer pin	2173771	29	2	Roll pin	2142576
12	3	Drive plate	2173772	30	1	Pin	2142691
13	2	Coupling pin	2173773	32	6	Cap screw	2142036
15	3	Bushing	2173774	33	3	Cap screw	2143017
16	2	Fitting key	2173775	34	1	Bushing	2148866
17	1	Tension spring set (3 pieces)	2173776	35	3	Bushing (see part no. 5)	2148862
18	1	Clutch stop	2173780	36	1	Pressure (E23A00) pin	2178546
Shanks for rolling head E23A01				Additional spare parts E23A01			
Part No.	Qty.	Part description	Ident No.	41	1	Shank	see table
41	1	Round shank 50 mm	2173782	42	1	Spring housing	2173786
41	1	Round shank 60 mm	2173783	43	1	Internal trip release lever	2173787
41	1	Round shank 2"	2173784	44	1	Pressure pin	2178547
41	1	Round shank 2 1/2"	2173785	48	1	Needle roller bearings	2148869

When ordering spare parts, please state rolling head type, Part No. and Ident No.

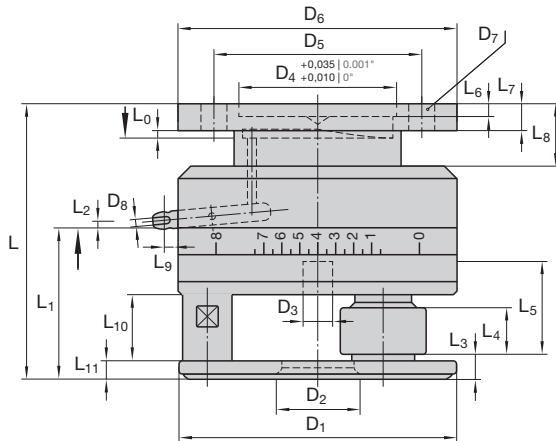


Spare Parts For Radial Type Rolling Head E23A01





Type	Ident No.
E30A00	1553608



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
9.055	2.677	3.150	1.260	5.512	6.693	7.874	0.512	—	—	7.323	0.063	4.449	0.154	0.638
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
1.559	3.386	0.335	0.787	1.378	0.512	1.969	0.630	approx. 77.66 lb		approx. 12.32 lb		approx. 89.89 lb		

D₂ = Standard

D₇ = 4 x on circumference

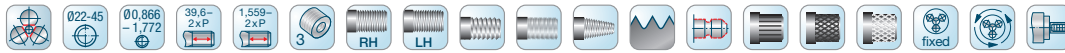
L₀ = Internal trip lever movement

L₂ = External trip lever movement

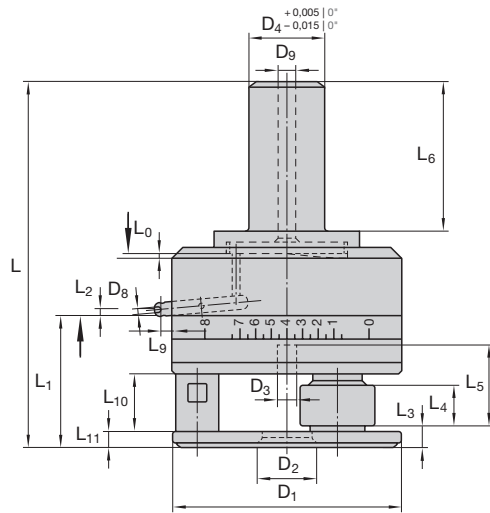
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

For a functional radial rolling system, select both the head and the appropriate thread rolls.



Type	Shank dia.	Ident No.
E30A01	80 mm	2173334
	3"	2173335



Dimension in inches

D ₁	D ₂	D _{2 max}	D ₃	D ₄	D ₅	D ₆	D ₇	D ₈	D ₉	L	L ₀	L ₁	L ₂	L ₃
9.055	2.677	3.150	1.260	3	—	—	—	—	0.492	12.106	0.063	4.449	0.154	0.638
L _{4 max}	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	m-Rk		m-Ro		m-Total		
1.559	3.386	4.724	—	—	0.512	1.969	0.630	approx. 92.18 lb		approx. 12.32 lb		approx. 104.5 lb		

D₂ = Standard

D₇ = 4 x on circumference

L₀ = Internal trip lever movement

L₂ = External trip lever movement

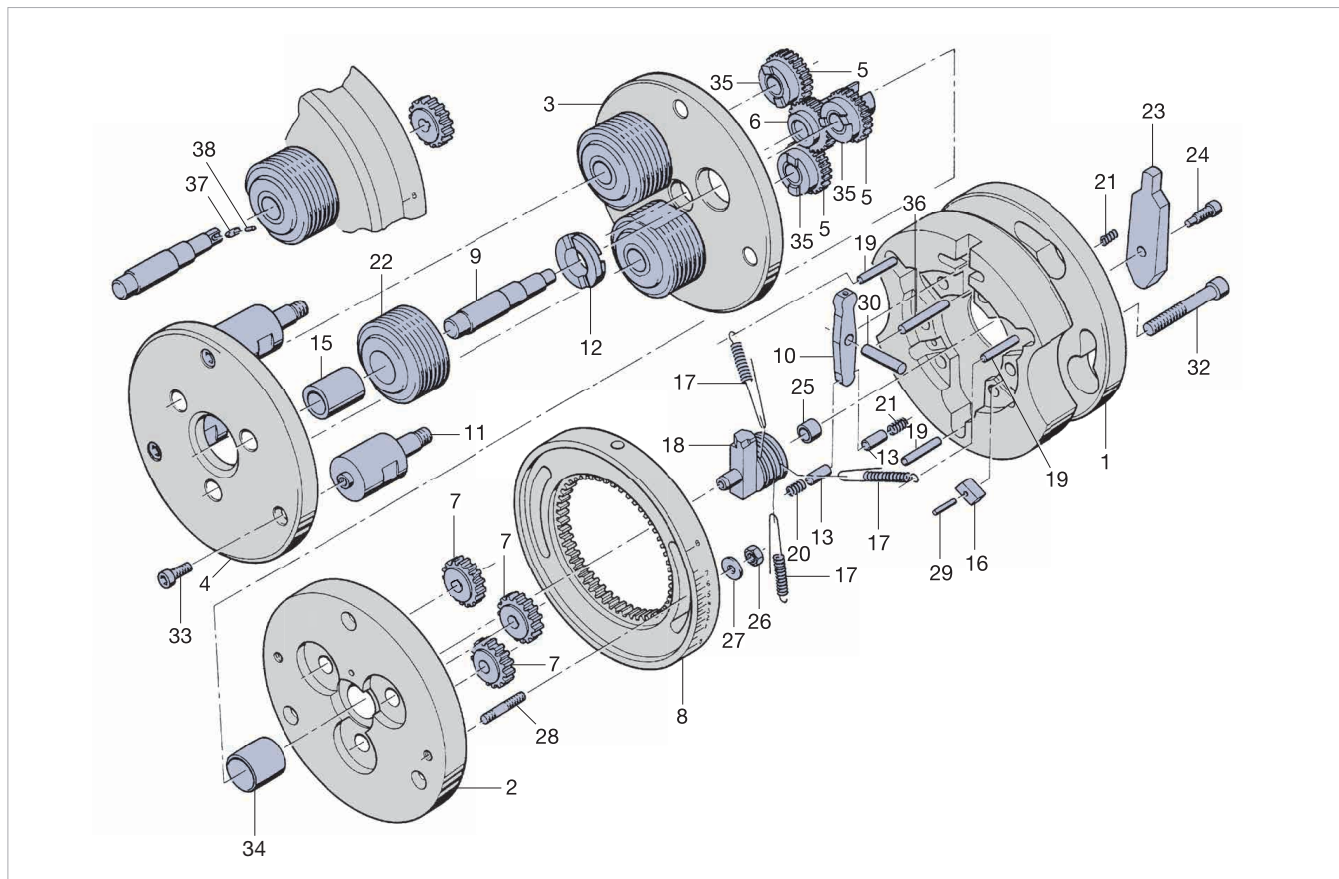
m-Rk = Rolling head weight without rolls

m-Ro = Weight of 1 set rolls

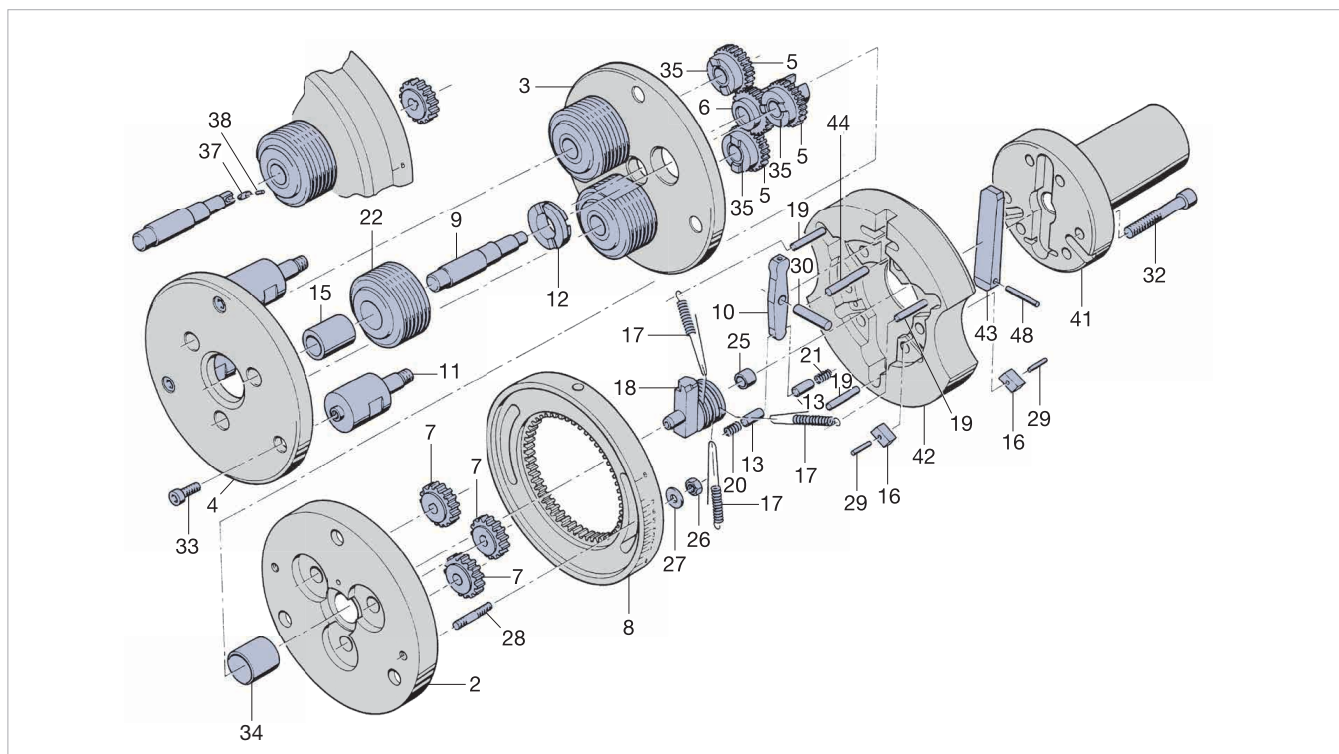
For a functional radial rolling system, select both the head and the appropriate thread rolls.

Rolling head				Rolling head			
Part No.	Qty.	Part description	E30A00 E30A01 Ident No.	Part No.	Qty.	Part description	E30A00 E30A01 Ident No.
1	1	Flange (E30A00)	2173790	20	1	Pressure spring, heavy	2173810
2	1	Drive gear plate	2173791	21	1	Pressure spring, light	2127398
3	1	Cover plate	2173792	22	3	Roll	see individual
4	1	Front plate	2173793	23	1	Internal trip release lever (E30A00)	2173811
5	3	Synchronized gear with bushing	2173794	24	1	Cap screw (E30A00)	2173751
				25	1	Bushing	2148865
6	1	Centre gear	2173795	26	2	Hexagon nut	2148399
7	3	Adjusting gear	2173796	27	2	Washer	2173812
8	1	Gear ring	2173797	28	2	Stud	2148827
9	3	Eccentric spindles	2173798	29	2	Roll pin	2148848
10	1	External trip release lever	2173799	30	1	Pin	2142691
11	3	Spacer pin	2173800	32	6	Cap screw	2142052
12	3	Drive plate	2173801	33	3	Cap screw	2143053
13	2	Coupling pin	2173802	34	1	Bushing	2148863
15	3	Bushing	2173803	35	3	Bushing (see part no. 5)	2148860
16	2	Fitting key	2173804	36	1	Pressure pin	2148812
17	1	Tension spring set (3 pieces)	2173805	37	3	Fitting key	2165595
18	1	Clutch stop	2173809	38	3	Pin	2141237
19	3	Pin	2141308				
Shanks for rolling head E30A01				Additional spare parts E30A01			
Part No.	Qty.	Part description	Ident No.	32	6	Cap screw	2141974
41	1	Round shank 80 mm	2173813	41	1	Shank	see table
41	1	Round shank 3"	2173814	42	1	Spring housing	2173815
				43	1	Internal trip release lever	2173816
				44	1	Pressure pin	2148812
				48	1	Needle roller bearings	2142678

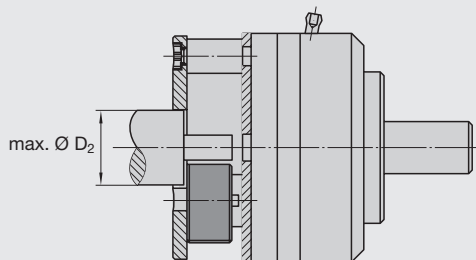
When ordering spare parts, please state rolling head type, Part No. and Ident No.



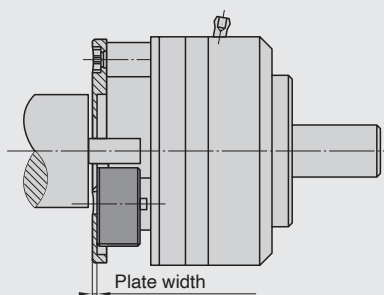
Spare parts for radial type rolling head E30A01



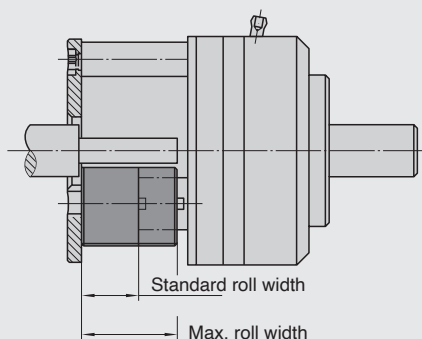
Enlarged front plate bore



Thin front plate version



Extended roll cage for longer threads



In some cases the shoulder diameter of the component is larger than the standard front plate bore diameter D_2 . The maximum front plate bore diameter for the different types is shown in the following table.

Rolling head	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Special version max. Ø D_2	0.866"	1.181"	1.614"	1.968"	2.598"	3.15"
Standard Ø D_2	0.591"	1.024"	1.26"	1.594"	1.968"	2.677"

It is possible to supply the rolling head with a thin front plate, when the component shoulder diameter is larger than the maximum front plate bore permissible. The minimum front plate width for the different types is shown in the following table.

Thread run-out = front plate width + (1 x pitch).

Rolling head	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Plate width special	0.079"	0.079"	0.079"	0.098"	0.098"	0.118"
Plate width standard	0.197"	0.236"	0.315"	0.394"	0.512"	0.63"

The largest thread length possible to be rolled is equal to the roll width. In special cases, depending on component diameter, thread length, pitch and material strength, the roll width can be increased. It is also possible to roll with the elongated rolling head with standard rolls, if the thread to be rolled is too far from the end of the component. Special drive plates are required.

Rolling head	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Roll width special	on request					
Roll width standard	0.457"	0.772"	0.968"	1.165"	1.362"	1.559"

Thread Sizes, Ident No. For Rolls For Straight Right-Hand Threads Version "A"

		DIN 13 DIN 13				
Head types and versions	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Roll width (in)	0.457	0.772	0.968	1.165	1.362	1.559
Roll version	A	A	A	A	A	A
Thread size	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.
M 3 x 0.5	1551218					
M 3.5 x 0.6	2175931					
M 4 x 0.7	1551227					
MF 4 x 0.5	2174548					
M 5 x 0.8	1551236					
MF 5 x 0.5	2174001					
M 6 x 1	1551254					
MF 6 x 0.75	1551245					
MF 6 x 0.5	2175873					
M 8 x 1.25	1551263	1551673				
MF 8 x 1	2174324	1551664				
MF 8 x 0.75	2175162	2180424				
MF 8 x 0.5	2180399	1551655				
M 10 x 1.5	1551272	1551691	1552280			
MF 10 x 1.25	2180400	2175709	1552271			
MF 10 x 1	2173983	1551682	1552262			
MF 10 x 0.75	2173999	2180425	2180456			
M 12 x 1.75			1552315	1552681		
MF 12 x 1.5		1551708	1552306	1552672		
MF 12 x 1.25		2176645	2176092	2174568		
MF 12 x 1		2173405	1552299	1552663		
M 14 x 2				2173386		
MF 14 x 1.5		1551717	1552333	1552690		
MF 14 x 1.25		2180427	2180454	2175803		
MF 14 x 1		2180426	1552324	2180482		
MF 15 x 1.5			2180455	2180481		
MF 15 x 1			2180450	2180485		
M 16 x 2				1552743	1553412	
MF 16 x 1.5			1552342	1552734	1553261	
MF 16 x 1			2180451	1552716	2180522	
MF 17 x 1			2180452	2180484	2180523	
MF 18 x 2				2180487	2180524	
MF 18 x 1.5			2176053	2175157	2174483	
MF 18 x 1			2180453	2180483	1553270	
MF 20 x 2				1552805	2180525	
MF 20 x 1.5				1552770	2176584	
MF 20 x 1				1552761	2180526	
MF 22 x 2				2180488	2180528	2180582
MF 22 x 1.5				2175766	2176989	2180574
MF 22 x 1				2180486	2180529	2180583
MF 24 x 2					2176203	2180585
MF 24 x 1.5					1553289	2175253
MF 24 x 1					2175938	2180586
MF 25 x 1.5					2180530	2180587
MF 26 x 1.5					1553305	2180575
MF 27 x 2					2180531	2180589
MF 27 x 1.5					2176168	2180576
MF 28 x 1.5					1553314	2180590

Left-hand thread rolls and version "B" rolls on request

Thread Sizes, Ident No. For Rolls
For Straight Right-Hand Threads Version “A”

MF DIN 13 						
Head types and versions	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Roll width (in)	0.457	0.772	0.968	1.165	1.362	1.559
Roll version	A	A	A	A	A	A
Thread size	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.
MF 30 x 2					2180532	2180578
MF 30 x 1.5					1553323	2180577
MF 32 x 1.5						2180591
MF 33 x 2						2180592
MF 33 x 1.5						2180593
MF 35 x 1.5						2180579
MF 36 x 2						2180594
MF 36 x 1.5						2180595
MF 38 x 1.5						2180580
MF 39 x 2						2180596
MF 40 x 1.5						2180581
MF 42 x 2						2180597
MF 42 x 1.5						1553680
MF 45 x 2						2180598
MF 45 x 1.5						1553699

UNC UNEF UNF ANSI B1.1 						
Head types and versions	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Roll width (in)	0.457	0.772	0.968	1.165	1.362	1.559
Roll version	A	A	A	A	A	A
Thread size	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.
5 – 40 UNC	2180406					
5 – 44 UNF	2180407					
6 – 32 UNC	2176098					
6 – 40 UNF	2180408					
8 – 32 UNC	2176099					
8 – 36 UNF	2180409					
10 – 24 UNC	2176932					
10 – 32 UNF	2174946					
12 – 24 UNC	2176942					
12 – 28 UNEF	2180410					
1/4 – 20 UNC	1551334					
1/4 – 28 UNF	1551352					
1/4 – 32 UNEF	2180411					
5/16 – 18 UNC	1551343					
5/16 – 24 UNF	1551361	2174620				
5/16 – 32 UNEF	2174485	2176868				
3/8 – 16 UNC	2180412	2173564				
3/8 – 24 UNF	2176378	1551913				
3/8 – 32 UNEF	2176100	2174576				
7/16 – 14 UNC			2175769			
7/16 – 20 UNF		1551904	2174467			
7/16 – 28 UNEF		2180433	2180462			

**Thread Sizes, Ident No. For Rolls
For Straight Right-Hand Threads Version “A”**

UNC UNEF UNF ANSI B1.1						
Head types and versions	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Roll width (in)	0.457	0.772	0.968	1.165	1.362	1.559
Roll version	A	A	A	A	A	A
Thread size	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.
1/2 – 13 UNC			2180463	2180497		
1/2 – 20 UNF		1551922	2176472	1552903		
1/2 – 28 UNEF		2175547	2180464	2173818		
9/16 – 12 UNC				2180498		
9/16 – 18 UNF		1551931	2175206	2175489		
9/16 – 24 UNEF		2180434	2180465	2180499		
5/8 – 11 UNC				2180500	2180543	
5/8 – 18 UNF			1552404	1552912	2175188	
5/8 – 24 UNEF			2180466	2176211	2180544	
11/16 – 24 UNEF			2180467	2180501	2180545	
3/4 – 16 UNF				1552921	2180541	
3/4 – 20 UNEF				2174465	2180542	
13/16 – 20 UNEF				2180502	2180547	2180606
7/8 – 14 UNF				1552930	2175083	2180608
7/8 – 20 UNEF				2174954	2180548	2180609
15/16 – 20 UNEF					2180549	2180610
1 – 12 UNF					2175029	2180612
1 – 20 UNEF					2180550	2180613
1 1/16 – 18 UNEF					2180551	2180614
1 1/8 – 12 UNF					2176377	1553902
1 1/8 – 18 UNEF					1553403	2180615
1 3/16 – 18 UNEF					2180552	2180616
1 1/4 – 12 UNF						2180617
1 1/4 – 18 UNEF						2180618
1 5/16 – 18 UNEF						2180603
1 3/8 – 12 UNF						2180604
1 3/8 – 18 UNEF						2180619
1 7/16 – 18 UNEF						2180620
1 1/2 – 12 UNF						1553911
1 1/2 – 18 UNEF						2180621
1 9/16 – 18 UNEF						2180622
1 5/8 – 18 UNEF						2180605
1 11/16 – 18 UNEF						2180623

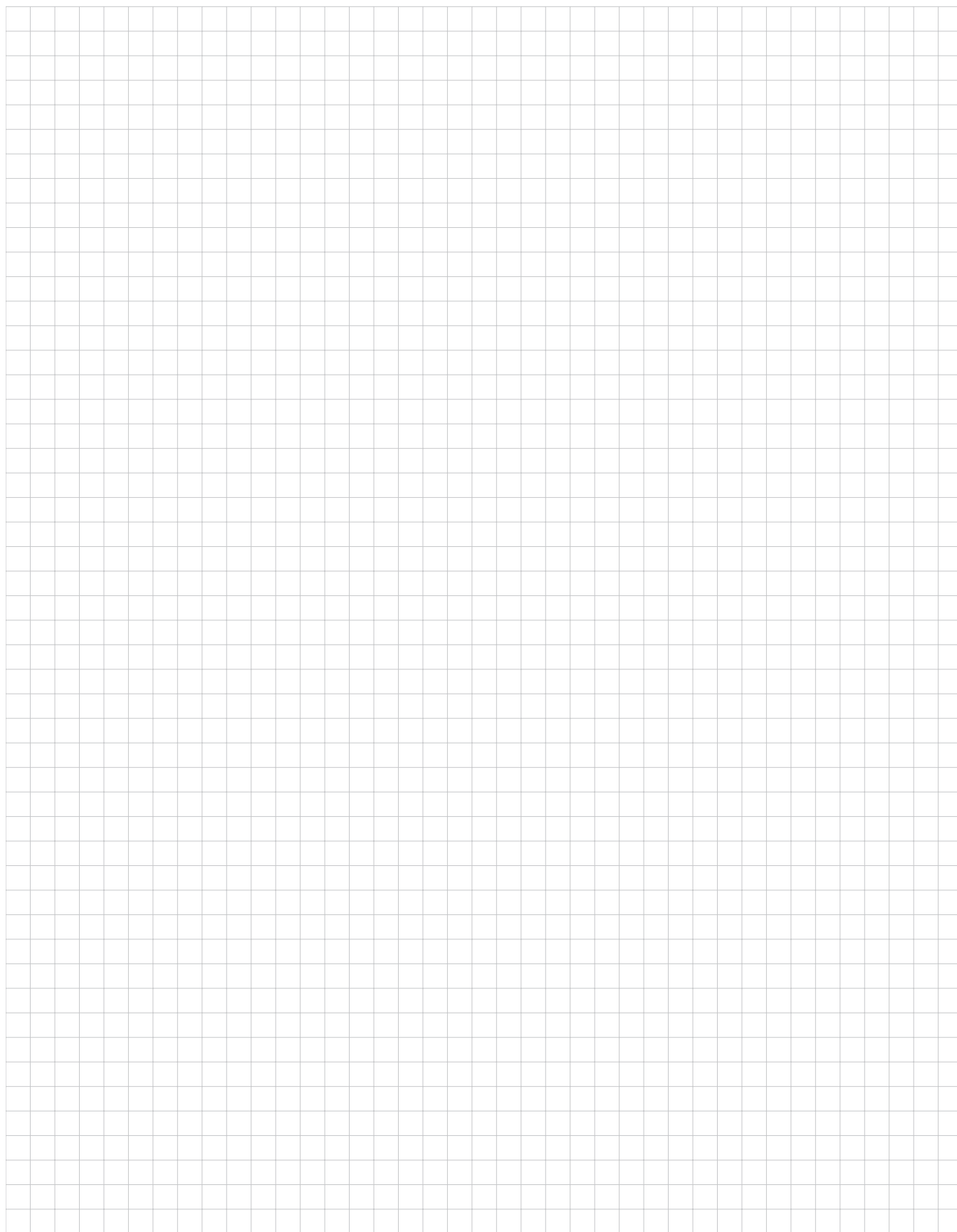
**Thread Sizes, Ident No. For Rolls
For Straight Right-Hand Threads Version "A"**

G DIN ISO 228 						
Head types and versions	E8	E10 EW10	E13 EW13	E16 EW16	E23 EW23	E30 EW30
Roll width (in)	0.457	0.772	0.968	1.165	1.362	1.559
Roll version	A	A	A	A	A	A
Thread size	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.	Ident No.
G 1/8 – 28	2180413	1551860	2176907			
G 1/4 – 19		1551879	2176414	2180489		
G 3/8 – 19			2173584	1552869	2180554	
G 1/2 – 14				1552878	2180553	
G 5/8 – 14					2180555	
G 3/4 – 14					2175465	2180624
G 7/8 – 14						2180625
G 1 – 11						2175283
G 1 1/8 – 11						2180626
G 1 1/4 – 11						1553822

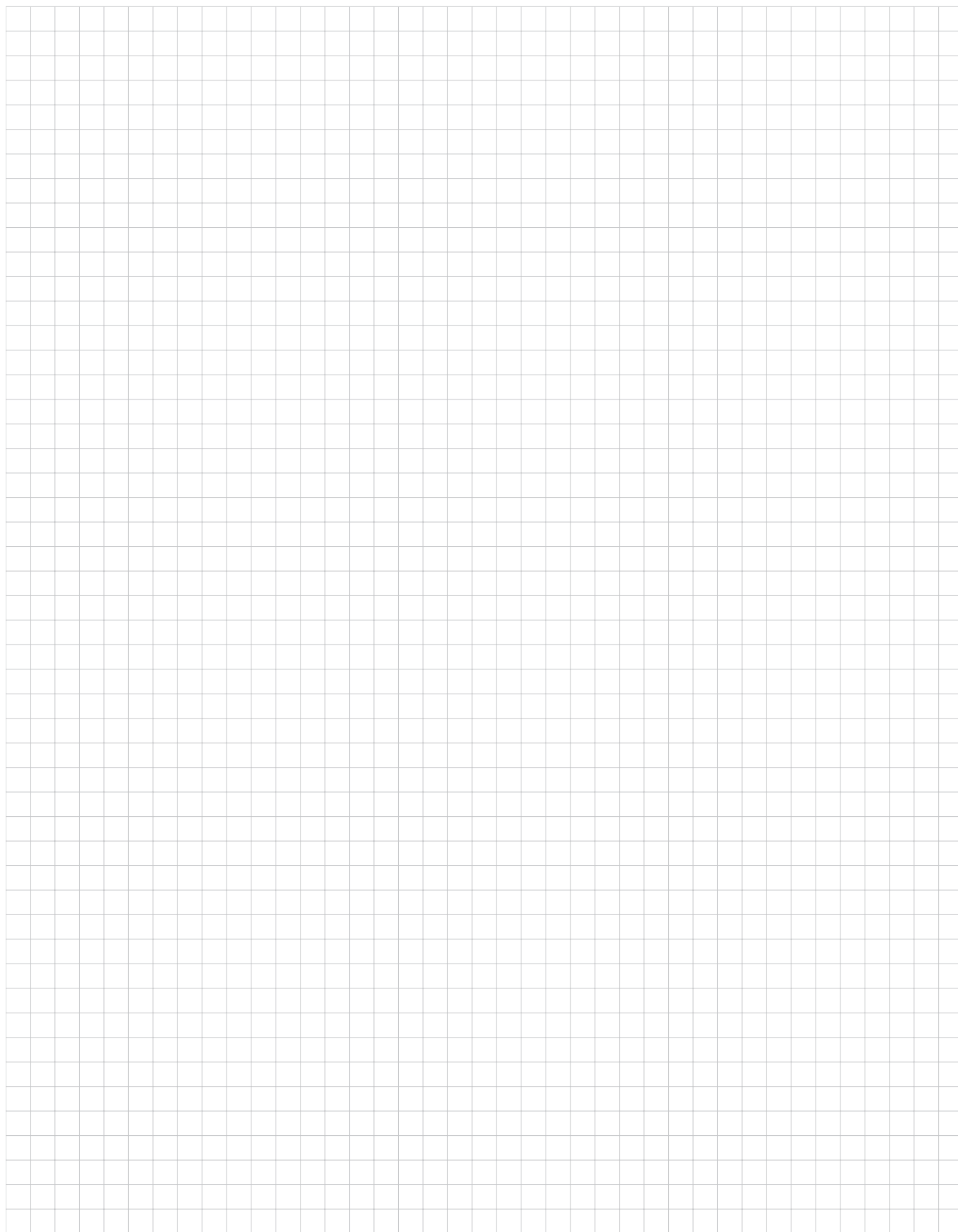
Thread Sizes, Ident No. For Rolls For Parallel Right-Hand Threads Version “A”

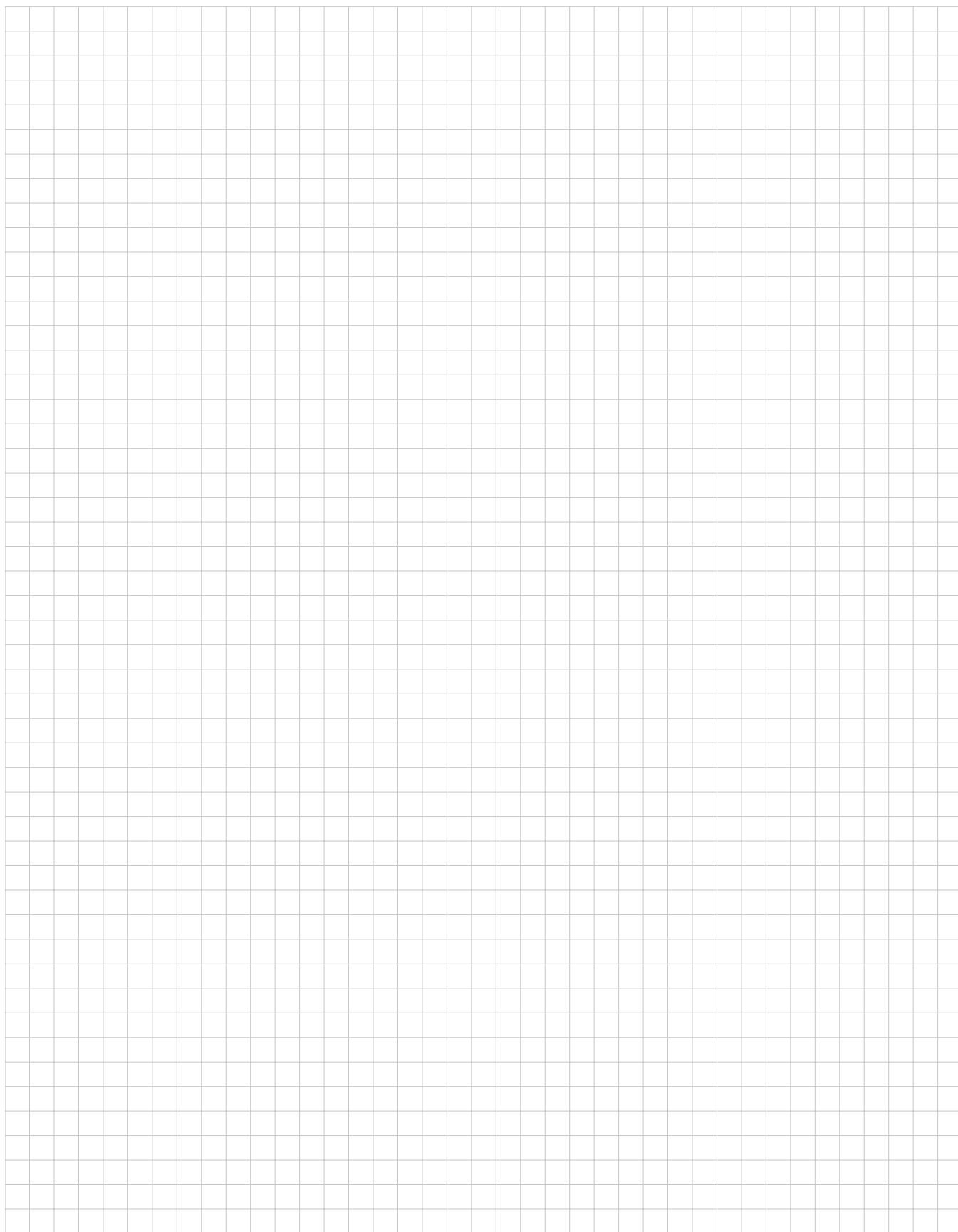
NPT ANSI B1.20.1												
Head types and versions	E8		E10 EW10		E13 EW13		E16 EW16		E23 EW23		E30 EW30	
Roll version	AK		AK		AK		AK		AK		AK	
Thread size	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)
1/16 – 27 NPT	2175099	0.394	2176581	0.394								
1/8 – 27 NPT	2180421	0.394	2174750	0.394	1552413	0.394						
1/4 – 18 NPT			1552002	0.591	1552422	0.591	2174570	0.591				
3/8 – 18 NPT					1552431	0.591	2174569	0.591	2180570	0.591		
1/2 – 14 NPT							1552985	0.748	2173898	0.748		
3/4 – 14 NPT									2174813	0.787	2180649	0.787
1 – 11.5 NPT											2180650	0.945
1 1/4 – 11.5 NPT											2180651	0.984

NPTF ANSI B1.20.4												
Head types and versions	E8		E10 EW10		E13 EW13		E16 EW16		E23 EW23		E30 EW30	
Roll version	AK		AK		AK		AK		AK		AK	
Thread size	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)	Ident No.	Roll width (in)
1/16 – 27 NPTF	2180422	0.394	2180447	0.394								
1/8 – 27 NPTF	2180423	0.394	2180448	0.394	2180479	0.394						
1/4 – 18 NPTF			2180449	0.591	2180480	0.591	2180509	0.591				
3/8 – 18 NPTF					2176082	0.591	2180510	0.591	2180571	0.591		
1/2 – 14 NPTF							1552994	0.748	2180572	0.748		
3/4 – 14 NPTF									2180573	0.787	2180652	0.787
1 – 11.5 NPTF											2180653	0.945
1 1/4 – 11.5 NPTF											2180654	0.984









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