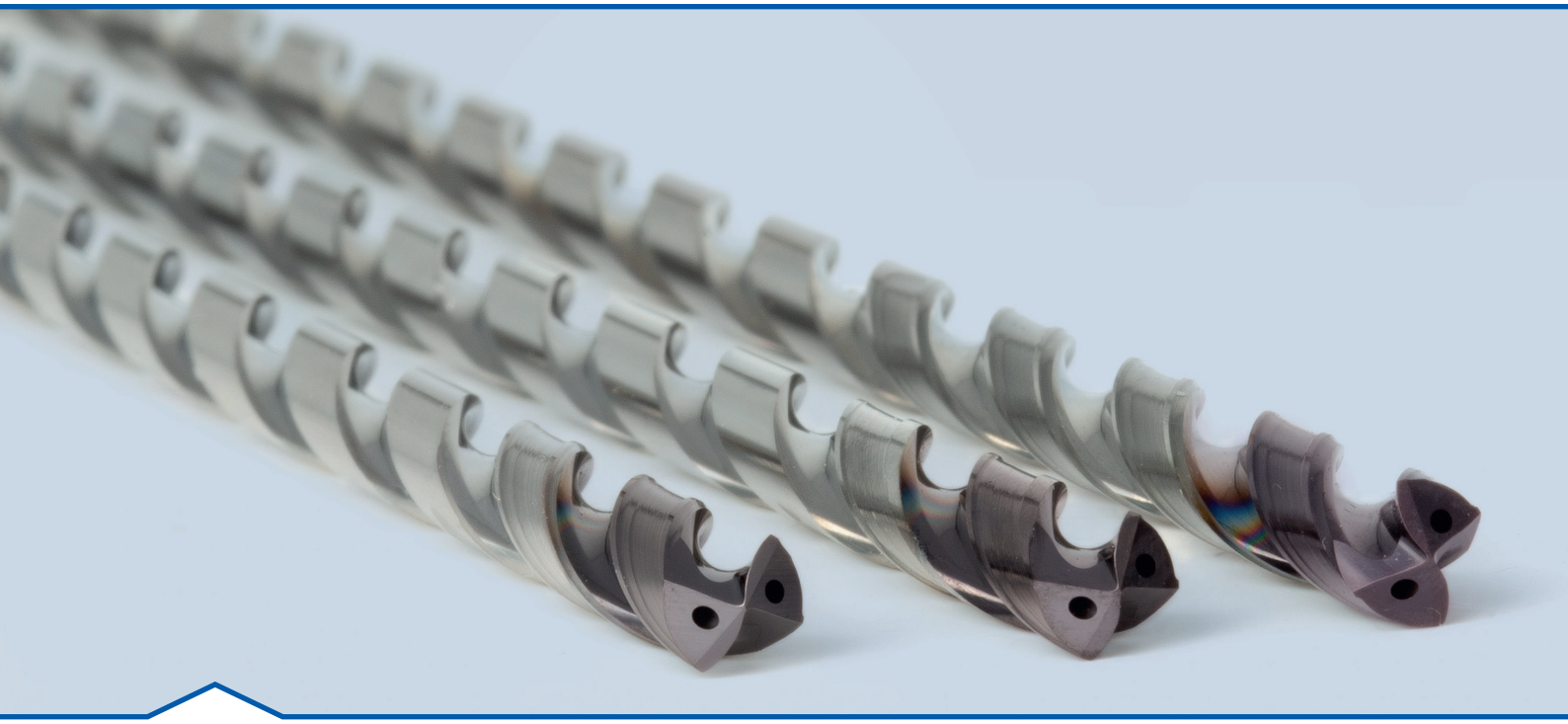
MILLER
MAPAL GROUP



Your technology partner for cost-effective machining

MEGA-Deep-Drill-Steel

MEGA-Deep-Drill-Steel

Efficient deep drilling up to 40xD

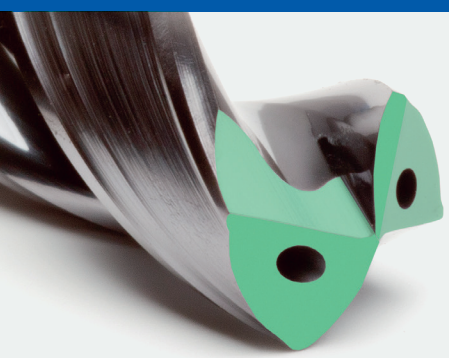
The new MEGA-Deep-Drill-Steel is a deep drill for highly efficient deep drilling applications on steel and cast-iron materials. Due to its innovative geometrical and cutting material design, the deep drill is ideally adapted to high feed rates and maximum productivity in bore machining up to 40xD.

The convex cutting edge and the optimised core diameter profile result in excellent cutting properties with maximum stability. The cooling channel diameters were enlarged by approx. 20% to ensure optimal cooling of the main cutters and cutting edges as well as improved chip removal.

The deep drill is suitable for emulsion and MQL on machining centres with a coolant pressure of 10–40 bar.

The four margin lands ensure exact boring accuracy and a very low bore runout. The adapted guide length and the widened rear margin lands ensure maximum guiding accuracy even with inclined bore outlets. With its smooth surface, the HiPIMS head coating enables maximum tool life and ensures smooth chip flow.

HIGH WEAR RESISTANCE



Good cutting properties, short chips
- Convex cutting edge shape

Maximum tool life
- Innovative cutting material

Maximum stability
- Perfectly adapted core diameter profile

PROCESS RELIABILITY

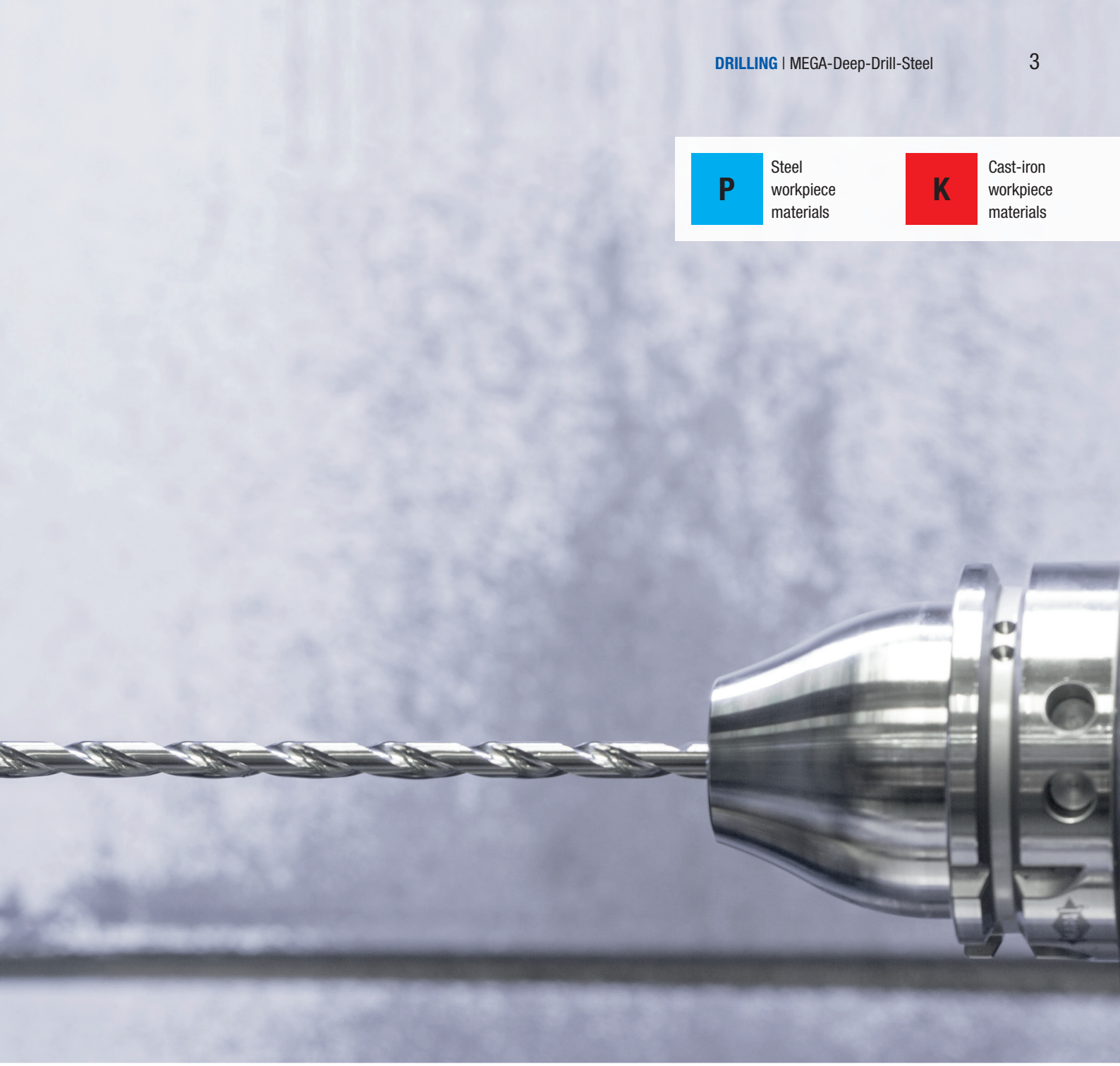
Exact boring accuracy
- Thanks to four margin lands

Very low bore runout
- Thanks to the larger circumference surface area of the rear margin lands

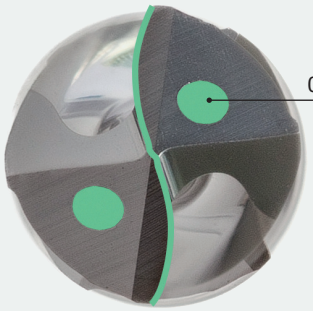
Maximum guiding accuracy even with inclined bore outlets
- Ideal length of margin lands

P Steel workpiece materials

K Cast-iron workpiece materials



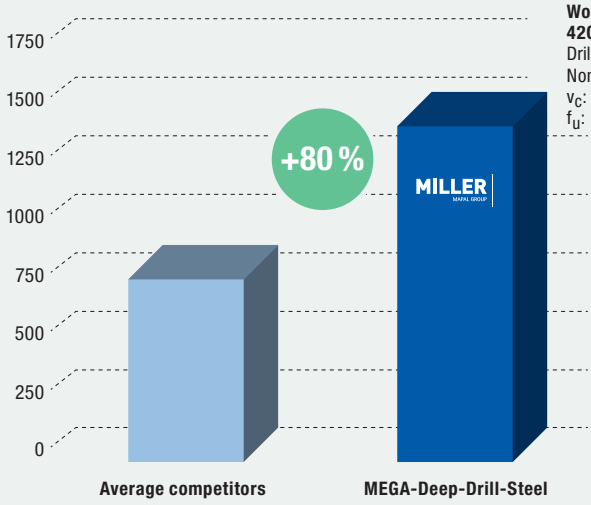
MAXIMUM PRODUCTIVITY



Good cutting properties and maximum feed rates
- Thanks to spherical main cutter
- Maximum cooling capacity
- Maximum cutting stability

Ideal chip removal
- Tightly rolled chips

Maximum tool life according to the number of bores



Workpiece material: 42CrMo4
Drilling depth: 30xD
Nominal Ø: 6.00 mm
v_c: 80 m/min
f_u: 0.3 mm/rev

Deep drilling in three steps

1 Making a pilot bore

MEGA-Drill-Steel-Plus
[M2003P, M2103P]
For general drilling conditions

MEGA-Step-Drill-Steel-Plus
[M2303P, M2403P]
For general drilling conditions
incl. 90° countersink

MEGA-Speed-Drill-Steel
[M9923]
For general drilling conditions

Info:
Select nominal Ø that is 0.02 mm larger.

Example:
Pilot tool: MEGA-Speed-Drill-Steel,
nominal Ø 5.02 mm
Subsequent tool: MEGA-Deep-Drill-Steel,
nominal Ø 5.00 mm

MEGA-180°-Drill
[M9185]
For difficult drilling conditions

2 Deep drilling up to 30xD

Entry into the pilot bore:

- Enter at max. 300 rpm and v_f = 1,000 mm/min
- Without coolant – drill up to 1 mm before the bottom of the pilot bore
- Switch on coolant –> cooling lubricant = 10–40 bar/MQL
- Spot drilling with specified cutting data according to table

Info:
Further method for spot drilling with the MEGA-Deep-Drill-Steel: Spot drilling with 50% feed, linear acceleration to 100% feed up to drilling depth of 4xD

- **Deep drilling up to 30xD in one shot, without chip removal cycles**

Running out:

- Run out at max. 300 rpm and double the feed (2x v_f)
- Switch off coolant

3 Deep drilling up to 40xD

Entry into the 30xD bore:

- Enter at max. 300 rpm and v_f = 1,000 mm/min
- Without coolant – up to 1 mm before the bottom of the 30xD bore
- Switch on coolant –> cooling lubricant = 10–40 bar/MQL
- Spot drilling with specified cutting data according to table

Info:
Further method for spot drilling with the MEGA-Deep-Drill-Steel: Spot drilling with 50% feed, linear acceleration to 100% feed up to drilling depth of 32xD

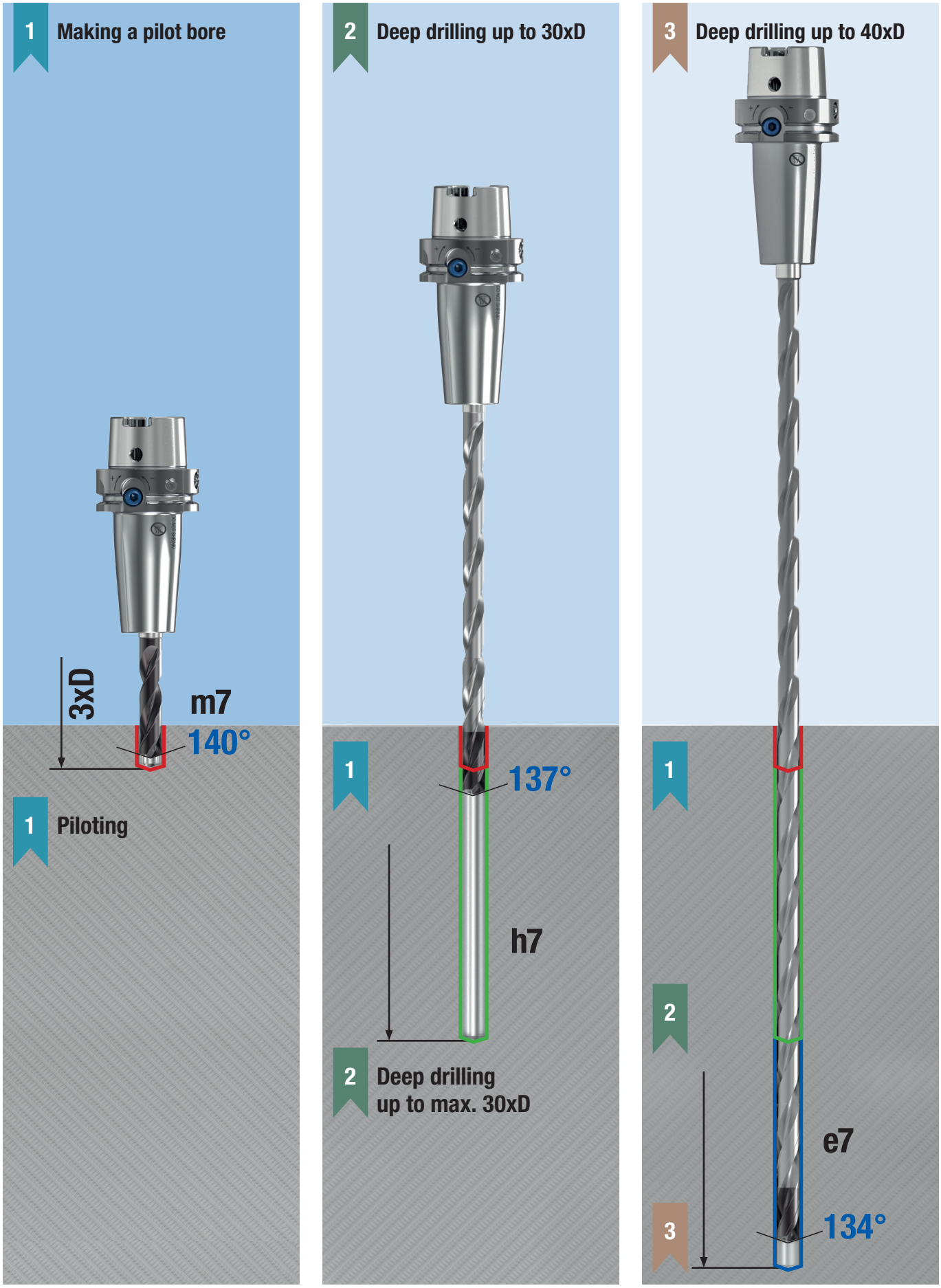
- **Deep drilling up to 40xD in one shot, without chip removal cycles**

Running out:

- Run out at max. 300 rpm and double the feed (2x v_f)
- Switch off coolant

Selecting the right pilot drill

- The nominal diameter of the pilot drill must match the nominal diameter of the MEGA-Deep-Drill-Steel
- The point angle and diameter tolerances are matched for optimal functionality as well as for the interaction of pilot drill and deep drill

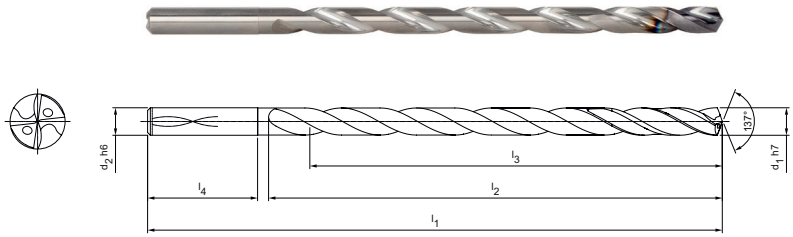

1 Making a pilot bore
3xD
m7
140°
1 Piloting
2 Deep drilling up to 30xD
1
137°
h7
2 Deep drilling
up to max. 30xD
3 Deep drilling up to 40xD
1
2
e7
3
134°

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9115 (15xD), internal coolant supply

Design:

Drill diameter:	3.00 - 16.00 mm
Bore tolerance:	IT9 (available)
Shank form:	HA
Coating:	Mx18
Number of cutting edges:	2
Tip angle:	137°
Helix angle:	30°
Special features:	Head coating



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

CONFIG Expert LINE

IT9 15xD HA DIN 6535

Preferred series available from stock

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order no.
3,00	4,00	90	58	52	28		31459473
3,50	4,00	98	66	60	28	M9115-0300A15	31459474
4,00	4,00	98	66	60	28	M9115-0350A15	31459475
4,50	5,00	107	75	68	28	M9115-0400A15	31459476
5,00	5,00	115	83	75	28	M9115-0450A15	31459477
5,50	6,00	131	91	83	36	M9115-0500A15	31459478
6,00	6,00	139	99	90	36	M9115-0550A15	31459479
7,00	8,00	156	116	105	36	M9115-0600A15	31459510
8,00	8,00	172	132	120	36	M9115-0700A15	31459511
9,00	10,00	193	149	135	40	M9115-0800A15	31459512
9,50	10,00	209	165	150	40	M9115-0900A15	31459513
10,00	10,00	209	165	150	40	M9115-0950A15	31459514
11,00	12,00	231	182	165	45	M9115-1000A15	31459515
12,00	12,00	247	198	180	45	M9115-1100A15	31459516
13,00	14,00	264	215	195	45	M9115-1200A15	31459517
14,00	14,00	280	231	210	45	M9115-1300A15	31459518
15,00	16,00	300	248	225	48	M9115-1400A15	31459519
16,00	16,00	316	264	240	48	M9115-1500A15	31459520

M9115-1600A15

Configurable features

Diameter:
Diameter in increments of
0.01 mm freely selectable

Specification:
M9115-**[diameter]**A15

Example:
M9115-**0735**A15

Tool diameter d_1 = 7.35 mm

Dimensions in mm.
For recommended pilot drill, see page 4
For cutting data recommendation, see page 11.

Dimensions of configurable series h7

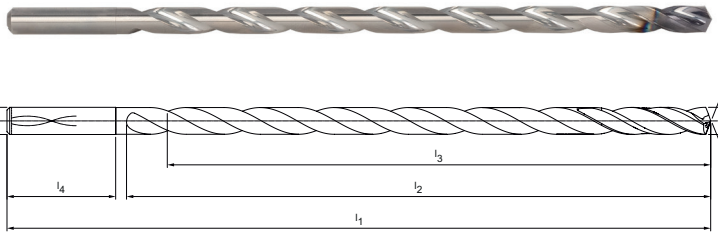
d_1 min.	d_1 max.	d_2 h6	l_1	l_2	l_3	l_4
3,00	3,49	4,00	90	58	52	28
3,50	4,00	4,00	98	66	60	28
4,01	4,50	5,00	107	75	68	28
4,51	5,00	5,00	115	83	75	28
5,01	5,50	6,00	131	91	83	36
5,51	6,00	6,00	139	99	90	36
6,01	7,00	8,00	156	116	105	36
7,01	8,00	8,00	172	132	120	36
8,01	9,00	10,00	193	149	135	40
9,01	10,00	10,00	209	165	150	40
10,01	11,00	12,00	231	182	165	45
11,01	12,00	12,00	247	198	180	45
12,01	13,00	14,00	264	215	195	45
13,01	14,00	14,00	280	231	210	45
14,01	15,00	16,00	300	248	225	48
15,01	16,00	16,00	316	264	240	48

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9120 (20xD), internal coolant supply

Design:

Drill diameter:	3.00 - 16.00 mm
Bore tolerance:	IT9 (available)
Shank form:	HA
Coating:	Mx18
Number of cutting edges:	2
Tip angle:	137°
Helix angle:	30°
Special features:	Head coating



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

CONFIG Expert LINE IT9 20xD HA DIN 6535

Preferred series available from stock

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order no.
3,00	4,00	108	76	70	28	M9120-0300A15	31459521
3,50	4,00	118	86	80	28	M9120-0350A15	31459522
4,00	4,00	118	86	80	28	M9120-0400A15	31459523
4,50	5,00	129	97	90	28	M9120-0450A15	31459524
5,00	5,00	140	108	100	28	M9120-0500A15	31459525
5,50	6,00	159	119	110	36	M9120-0550A15	31459526
6,00	6,00	169	129	120	36	M9120-0600A15	31459527
6,50	8,00	191	151	140	36	M9120-0650A15	31459528
7,00	8,00	191	151	140	36	M9120-0700A15	31459529
8,00	8,00	212	172	160	36	M9120-0800A15	31459530
9,00	10,00	238	194	180	40	M9120-0900A15	31459531
10,00	10,00	259	215	200	40	M9120-1000A15	31459532
11,00	12,00	286	237	220	45	M9120-1100A15	31459533
12,00	12,00	307	258	240	45	M9120-1200A15	31459534
13,00	14,00	329	280	260	45	M9120-1300A15	31459535
14,00	14,00	350	301	280	45	M9120-1400A15	31459536
15,00	16,00	375	323	300	48	M9120-1500A15	31459537
16,00	16,00	396	344	320	48	M9120-1600A15	31459538

Configurable features

Diameter:
Diameter in increments of
0.01 mm freely selectable

Specification:
M9120-**[diameter]**A15

Example:
M9120-**0735**A15

Tool diameter d_1 = 7.35 mm

Dimensions in mm.
For recommended pilot drill, see page 4
For cutting data recommendation, see page 11.

Dimensions of configurable series h7

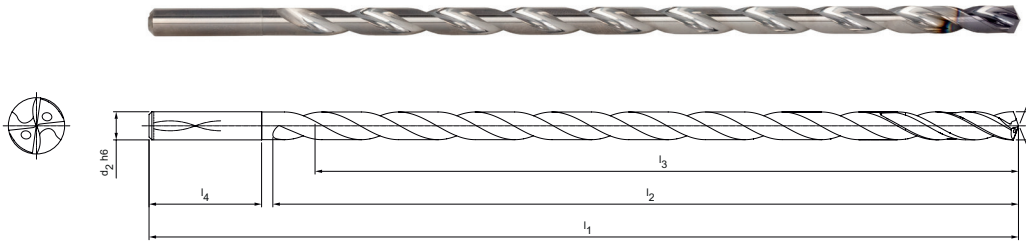
d_1 min.	d_1 max.	d_2 h6	l_1	l_2	l_3	l_4
3,00	3,49	4,00	108	76	70	28
3,50	4,00	4,00	118	86	80	28
4,01	4,50	5,00	129	97	90	28
4,51	5,00	5,00	140	108	100	28
5,01	5,50	6,00	159	119	110	36
5,51	6,00	6,00	169	129	120	36
6,01	7,00	8,00	191	151	140	36
7,01	8,00	8,00	212	172	160	36
8,01	9,00	10,00	238	194	180	40
9,01	10,00	10,00	259	215	200	40
10,01	11,00	12,00	286	237	220	45
11,01	12,00	12,00	307	258	240	45
12,01	13,00	14,00	329	280	260	45
13,01	14,00	14,00	350	301	280	45
14,01	15,00	16,00	375	323	300	48
15,01	16,00	16,00	396	344	320	48

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9125 (25xD), internal coolant supply

Design:

Drill diameter:	3.00 - 14.00 mm
Bore tolerance:	IT9 (available)
Shank form:	HA
Coating:	Mx18
Number of cutting edges:	2
Tip angle:	137°
Helix angle:	30°
Special features:	Head coating



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

CONFIG Expert LINE IT9 25xD HA DIN 6535

Preferred series available from stock

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order no.
3,00	4,00	125	93	87	28	M9125-0300A15	31459539
3,50	4,00	138	106	100	28	M9125-0350A15	31459540
4,00	4,00	138	106	100	28	M9125-0400A15	31459541
4,50	5,00	152	120	113	28	M9125-0450A15	31459542
5,00	5,00	165	133	125	28	M9125-0500A15	31459543
5,50	6,00	186	146	137	36	M9125-0550A15	31459544
6,00	6,00	199	159	150	36	M9125-0600A15	31459545
7,00	8,00	226	186	175	36	M9125-0700A15	31459546
8,00	8,00	252	212	200	36	M9125-0800A15	31459547
9,00	10,00	283	239	225	40	M9125-0900A15	31459548
10,00	10,00	309	265	250	40	M9125-1000A15	31459549
11,00	12,00	341	292	275	45	M9125-1100A15	31459550
12,00	12,00	367	318	300	45	M9125-1200A15	31459551
13,00	14,00	394	345	325	45	M9125-1300A15	31459552
14,00	14,00	420	371	350	45	M9125-1400A15	31459553

Configurable features

Diameter:
Diameter in increments of
0.01 mm freely selectable

Specification:
M9125-**[diameter]**A15

Example:
M9125-**0735**A15

Tool diameter d_1 = 7.35 mm

Dimensions of configurable series h7

d_1 min.	d_1 max.	d_2 h6	l_1	l_2	l_3	l_4
3,00	3,49	4,00	125	93	87	28
3,50	4,00	4,00	138	106	100	28
4,01	4,50	5,00	152	120	113	28
4,51	5,00	5,00	165	133	125	28
5,01	5,50	6,00	186	146	138	36
5,51	6,00	6,00	199	159	150	36
6,01	7,00	8,00	226	186	175	36
7,01	8,00	8,00	252	212	200	36
8,01	9,00	10,00	283	239	225	40
9,01	10,00	10,00	309	265	250	40
10,01	11,00	12,00	341	292	275	45
11,01	12,00	12,00	367	318	300	45
12,01	13,00	14,00	394	345	325	45
13,01	14,00	14,00	420	371	350	45

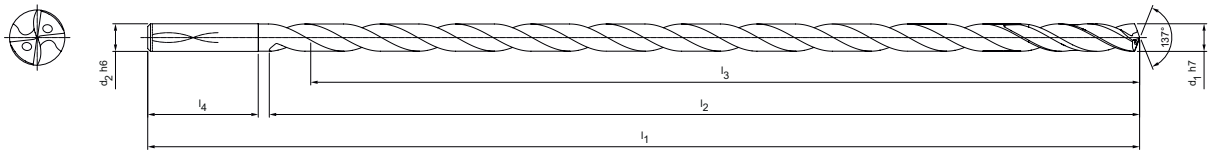
Dimensions in mm.
For recommended pilot drill, see page 4
For cutting data recommendation, see page 11.

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9130 (30xD), internal coolant supply

Design:

Drill diameter:	3.00 - 12.00 mm
Bore tolerance:	IT9 (available)
Shank form:	HA
Coating:	Mx18
Number of cutting edges:	2
Tip angle:	137°
Helix angle:	30°
Special features:	Head coating



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

CONFIG Expert LINE IT9 30xD HA DIN 6535

Preferred series available from stock

Dimensions						Shank form HA	
d_1 h7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order no.
3,00	4,00	143	111	105	28	M9130-0300A15	31459554
3,50	4,00	158	126	120	28	M9130-0350A15	31459555
4,00	4,00	158	126	120	28	M9130-0400A15	31459556
4,50	5,00	174	142	135	28	M9130-0450A15	31459557
5,00	5,00	190	158	150	28	M9130-0500A15	31459558
5,50	6,00	214	174	165	36	M9130-0550A15	31459559
6,00	6,00	229	189	180	36	M9130-0600A15	31459560
6,50	8,00	261	221	210	36	M9130-0650A15	31459561
7,00	8,00	261	221	210	36	M9130-0700A15	31459562
8,00	8,00	292	252	240	36	M9130-0800A15	31459563
9,00	10,00	328	284	270	40	M9130-0900A15	31459564
10,00	10,00	359	315	300	40	M9130-1000A15	31459565
11,00	12,00	396	347	330	45	M9130-1100A15	31459566
12,00	12,00	427	378	360	45	M9130-1200A15	31459567

Configurable features

Diameter:
Diameter in increments of
0.01 mm freely selectable

Specification:
M9130-**[diameter]**A15

Example:
M9130-**0735**A15

Tool diameter d_1 = 7.35 mm

Dimensions of configurable series h7

d_1 min.	d_1 max.	d_2 h6	l_1	l_2	l_3	l_4
3,00	3,49	4,00	143	111	105	28
3,50	4,00	4,00	158	126	120	28
4,01	4,50	5,00	174	142	135	28
4,51	5,00	5,00	190	158	150	28
5,01	5,50	6,00	214	174	165	36
5,51	6,00	6,00	229	189	180	36
6,01	7,00	8,00	261	221	210	36
7,01	8,00	8,00	292	252	240	36
8,01	9,00	10,00	328	284	270	40
9,01	10,00	10,00	359	315	300	40
10,01	11,00	12,00	396	347	330	45
11,01	12,00	12,00	427	378	360	45

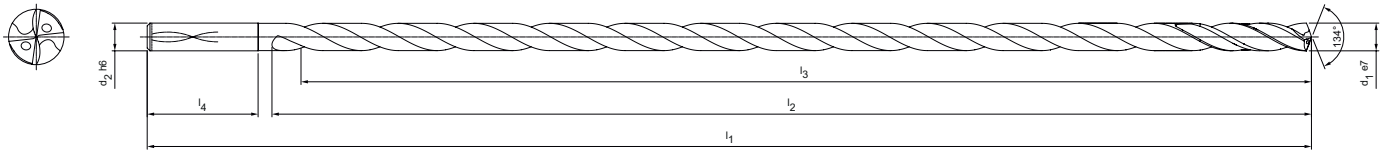
Dimensions in mm.
For recommended pilot drill, see page 4
For cutting data recommendation, see page 11.

MEGA-Deep-Drill-Steel

Solid carbide twist drill
M9140 (40xD), internal coolant supply

Design:

Drill diameter:	3.00 - 9.00 mm
Bore tolerance:	IT9 (available)
Shank form:	HA
Coating:	Mx18
Number of cutting edges:	2
Tip angle:	134°
Helix angle:	30°
Special features:	Head coating



P 1 2 3 4 5 6 M 1 2 3 K 1 2 3 N 1 2 3 4 S 1 2 3 4 5 H 1 2 3

CONFIG Expert LINE IT9 40xD HA DIN 6535

Preferred series available from stock

Dimensions						Shank form HA	
d_1 e7	d_2 h6	l_1	l_2	l_3	l_4	Specification	Order no.
3,00	4,00	178	146	140	28	M9140-0300A15	31459568
3,50	4,00	198	166	160	28	M9140-0350A15	31459569
4,00	4,00	198	166	160	28	M9140-0400A15	31459570
4,50	5,00	219	187	180	28	M9140-0450A15	31459571
5,00	5,00	240	208	200	28	M9140-0500A15	31459572
6,00	6,00	289	249	240	36	M9140-0600A15	31459573
7,00	8,00	331	291	280	36	M9140-0700A15	31459574
8,00	8,00	372	332	320	36	M9140-0800A15	31459575
9,00	10,00	418	374	360	40	M9140-0900A15	31459576

Configurable features

Diameter:
Diameter in increments of
0.01 mm freely selectable

Specification:
M9140-**[diameter]**A15

Example:
M9140-**0735**A15

Tool diameter d_1 = 7.35 mm

Dimensions of configurable series e7

d_1 min.	d_1 max.	d_2 h6	l_1	l_2	l_3	l_4
3,00	3,49	4,00	178	146	140	28
3,50	4,00	4,00	198	166	160	28
4,01	4,50	5,00	219	187	180	28
4,51	5,00	5,00	240	208	200	28
5,01	5,50	6,00	269	229	220	36
5,51	6,00	6,00	289	249	240	36
6,01	7,00	8,00	331	291	280	36
7,01	8,00	8,00	372	332	320	36
8,01	9,00	10,00	418	374	360	40

Dimensions in mm.
For recommended pilot drill, see page 4
For cutting data recommendation, see page 11.

Cutting data recommendations for deep drills

Feed and cutting speed

MEGA-Deep-Drill-Steel | M9115, M9120, M9125, M9130, M9140

MMG*			Workpiece material	Strength/hardness [N/mm²] [HRC]	Cutting speed v_c [m/min]		Feed f [mm] for drill diameter					
					Internal cooling	MQL	3.00	4.00	6.00	8.00	12.00	16.00
P	P1	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	**100**	**90**	0.16	0.19	0.24	0.30	0.40	0.48
		P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	**90**	**75**	0.20	0.24	0.31	0.38	0.48	0.60
	P2	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	**100**	**85**	0.19	0.23	0.29	0.36	0.46	0.57
		P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	**70**	**60**	0.16	0.19	0.24	0.29	0.39	0.45
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	**75**	**65**	0.17	0.20	0.26	0.32	0.42	0.51
		P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	**60**	**55**	0.14	0.17	0.22	0.27	0.35	0.42
		P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	**60**	**50**	0.12	0.14	0.18	0.21	0.28	0.32
	P5	P5.1	Cast steel		**100**	**85**	0.19	0.23	0.29	0.36	0.46	0.57
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	**120**	**85**	0.21	0.28	0.37	0.48	0.62	0.80
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	**160**	**120**	0.22	0.27	0.35	0.45	0.58	0.74
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	**100**	**75**	0.20	0.24	0.31	0.39	0.52	0.63
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	**60**	**50**	0.14	0.17	0.22	0.27	0.35	0.42
	K3	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	**90**	**80**	0.21	0.26	0.34	0.42	0.55	0.68
		K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	**80**	**70**	0.18	0.22	0.28	0.34	0.45	0.54

Top drilling results with the new UNIQ hydraulic chucks

The newly-developed hydraulic expansion clamping system enables high machining parameters through excellent stability and accuracy. It minimises self-excited vibration so that clamped tools are not exposed to micro-vibration. This in turn leads to a reduced spindle load of up to 15 per cent, enables significantly longer tool life and guarantees optimal surface quality.

ADVANTAGES

- Corrosion-resistant chucks
- Self-explanatory and simple 'foolproof' handling
- Maximum stability at optimal use of resources

Find out more about UNIQ hydraulic chucks at:
www.mapal.com

* MILLER machining groups
** If the alloy parts Cr, Mo, Ni, V, W in total >8%, then select the next highest MILLER machining group.
The specified cutting data are guide values.
The optimum data for the respective machining task should be determined during the test or machining.

MILLER
MAPAL GROUP

Your specialist for solid carbide drills
and milling cutters

Solid carbide drills for steel, aluminium,
stainless steel and hardened materials

High performance drills with more cutting edges
and additional margin lands

Replaceable head drill TTD

Solid carbide milling range for steel, aluminium,
stainless steel and hardened materials

High-performance milling cutters
for high machining volumes

Tool product line for machining modern
workpiece materials and super alloys

www.miller-tools.de

V1.0.0
MEGA-DEEP-DRILL-STEEL-EN-PC-20-0923 | PDF | Technical modifications reserved.