DORMER PRAMET™

Force Deep Hole Drills

Solid carbide multi-material deep hole drills

Certainty
at every turn™

Solid carbide multi-material deep hole drills

Redefine deep hole drilling for maximum efficiency

Introducing the Force Deep Hole Drills (DHD) series from Dormer Pramet, designed for high-performance deep hole drilling up to 12xD, 16xD, and 20xD. These solid carbide drills feature a 140° point angle and optimized web design for rapid penetration and superior positional accuracy without pecking. Internal coolant channels enhance chip evacuation, minimizing bottlenecks, while the Nano-Tip multilayer coating provides exceptional thermal stability and longer tool life.

This series also includes 2xD pilot drills with a multilayer TiAlN coating used to create an accurate pilot hole prior to using the deep hole drills (16xD and deeper).

Related products

RC412

12xD

3 – 20 mm

Nano-Tip coating, **Coolant feed**

RC416

16xD

3 – 16 mm

Nano-Tip coating, **Coolant feed**

RC420

20xD

3 – 16 mm

Nano-Tip coating, **Coolant feed**

RC4P

2xD Pilot drill

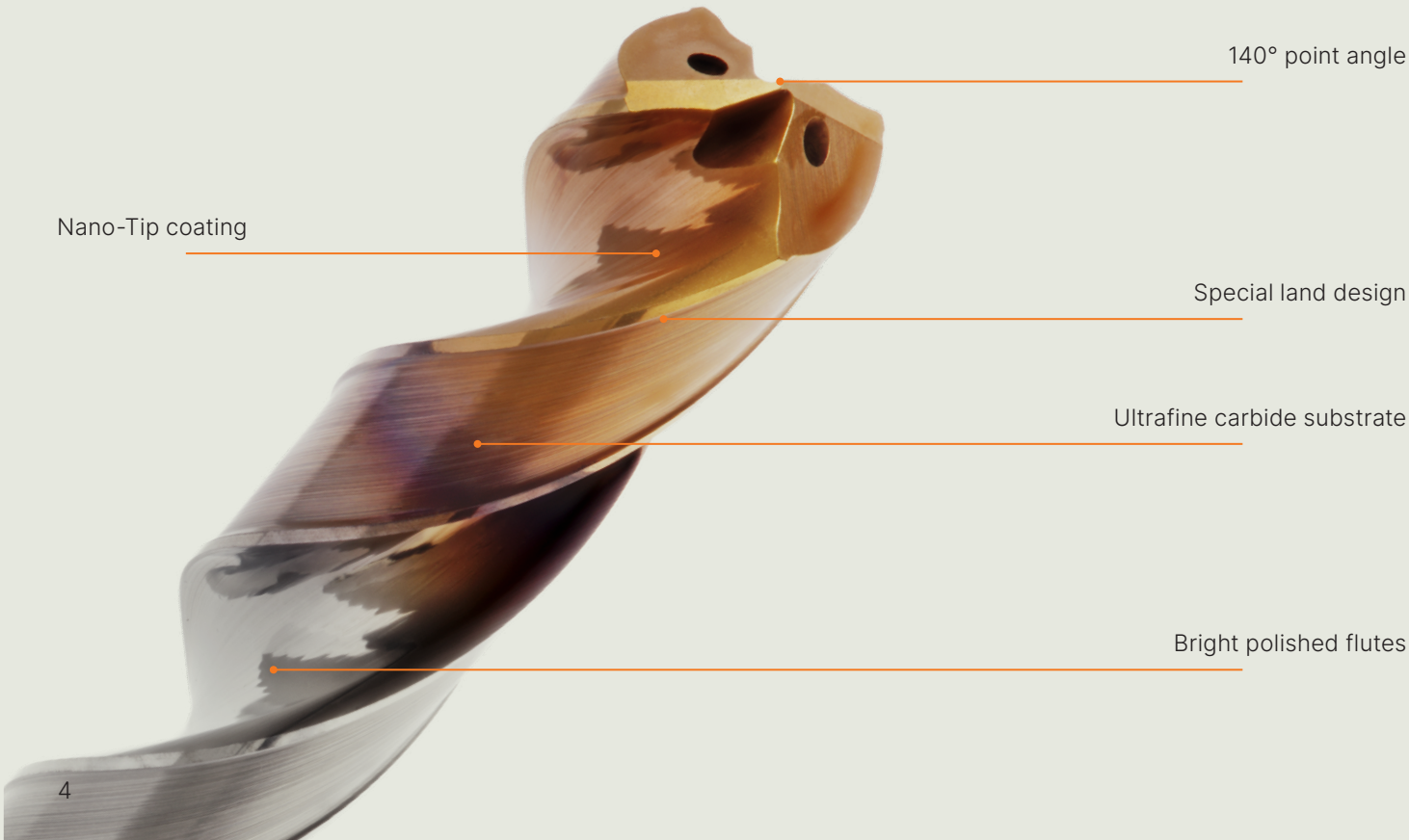
3 – 16 mm

Multi TiAlN coating, **Coolant feed**

Features and benefits

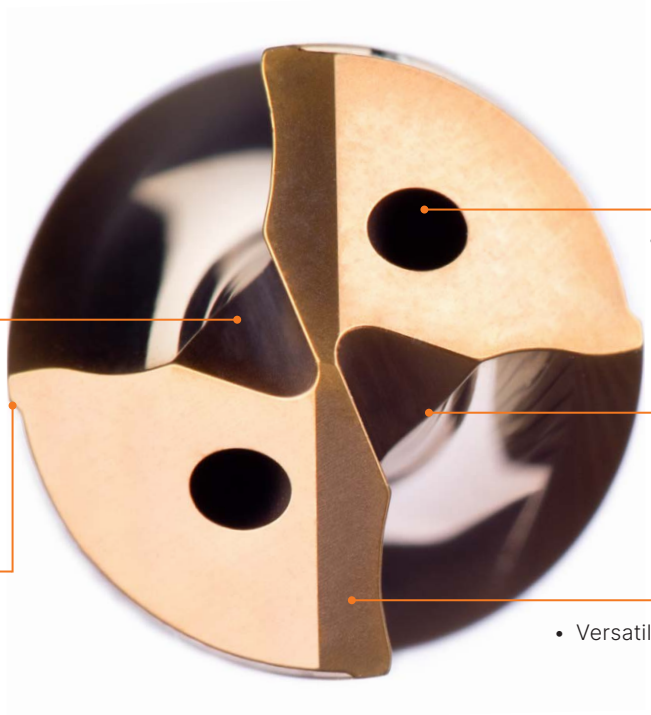
Advanced thinner web design minimizes cutting forces.	**Increased stability** ensures more precise hole positioning and straight drilling paths.
Internal coolant channels improve chip evacuation.	**High process reliability** maintains consistent drilling flow without interruptions.
Eliminates the need for pecking cycles thanks to optimized flute geometrie.	**Faster drilling** reduces cycle times and improves productivity in demanding applications.
High-performance depth capabilities (12xD, 16xD and 20xD).	**Versatile options** allow precise drilling in a wide range of applications and depths. Pilot drills are recommended for use prior to drilling with 16xD and 20xD drills.
Nano-Tip coating enhances wear resistance and thermal stability.	**Extended tool life** reduces cost per hole and increases overall efficiency.

Deep hole drills
(RC412, RC416, RC420)



Features and benefits

Geometry (RC412, RC416, RC420)



Internal coolant holes

- Suitable for a variety of coolants
- Oil or emulsion
- MQL

Optimized web design

- For high drill stiffness
- No restriction of flute size
- Allowing secure and efficient swarf evacuation

Web thinning

- Enhances hole position accuracy

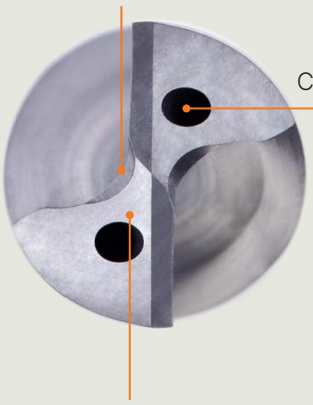
Special land design

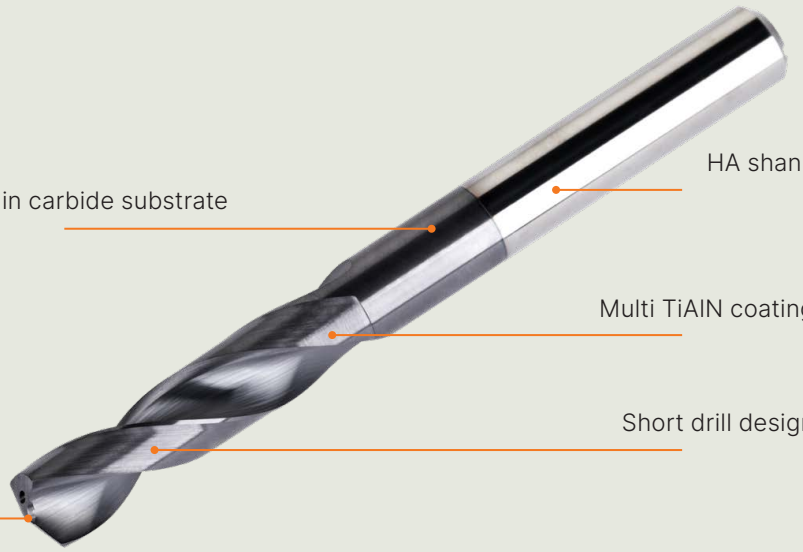
- Allows rapid guidance in hole

Unique geometry

- Versatile drilling in a wide range of WMG´s
- High productivity
- Hole accuracy without pecking

Pilot drills (RC4P)





Please note: Pilot drills are recommended for use prior to drilling with 16xD and 20xD.

Machining examples

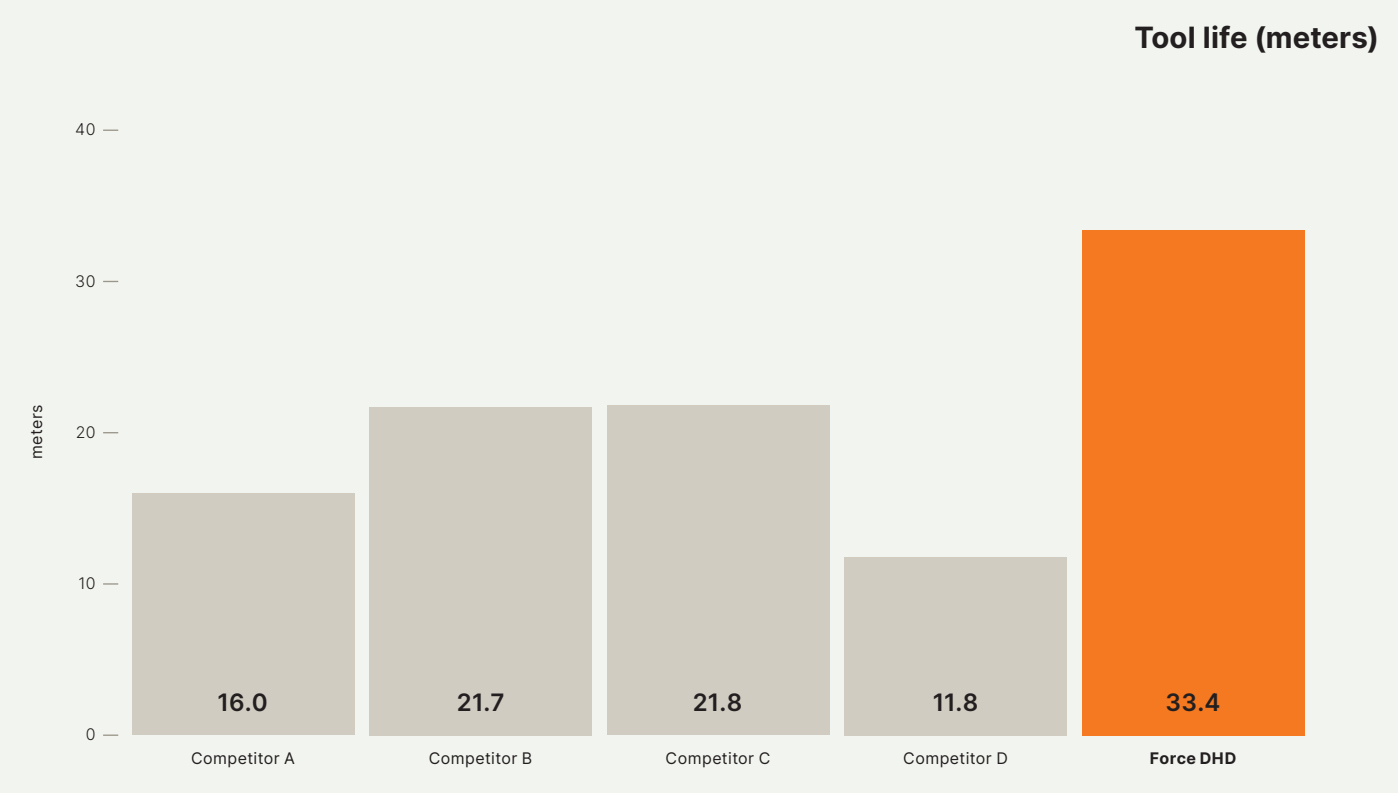
Extend tool life by **50%** in ISO-P materials

The Force Deep Hole Drill delivered a 50% improvement in tool life, reaching 33.4 meters compared to 21.8 meters by the nearest competitor. With fewer tool changes required, it boosts machining efficiency and is perfectly suited for challenging ISO-P applications.

Machining	Drilling
Application	Deep hole drilling
Material	1.7225 / 42CrMo4 / 4140
Coolant	Yes

Dormer Pramer solution		
Force DHD RC4166.0		
Machining data		
v_c	f_n	Depth
90	0.17	90

P3.2



v_c = cutting speed (m/min), f_n = feed per revolution (mm/rev), Depth = drilling depth (mm)

Machining examples

Achieve **179%** longer tool life in ISO-K materials

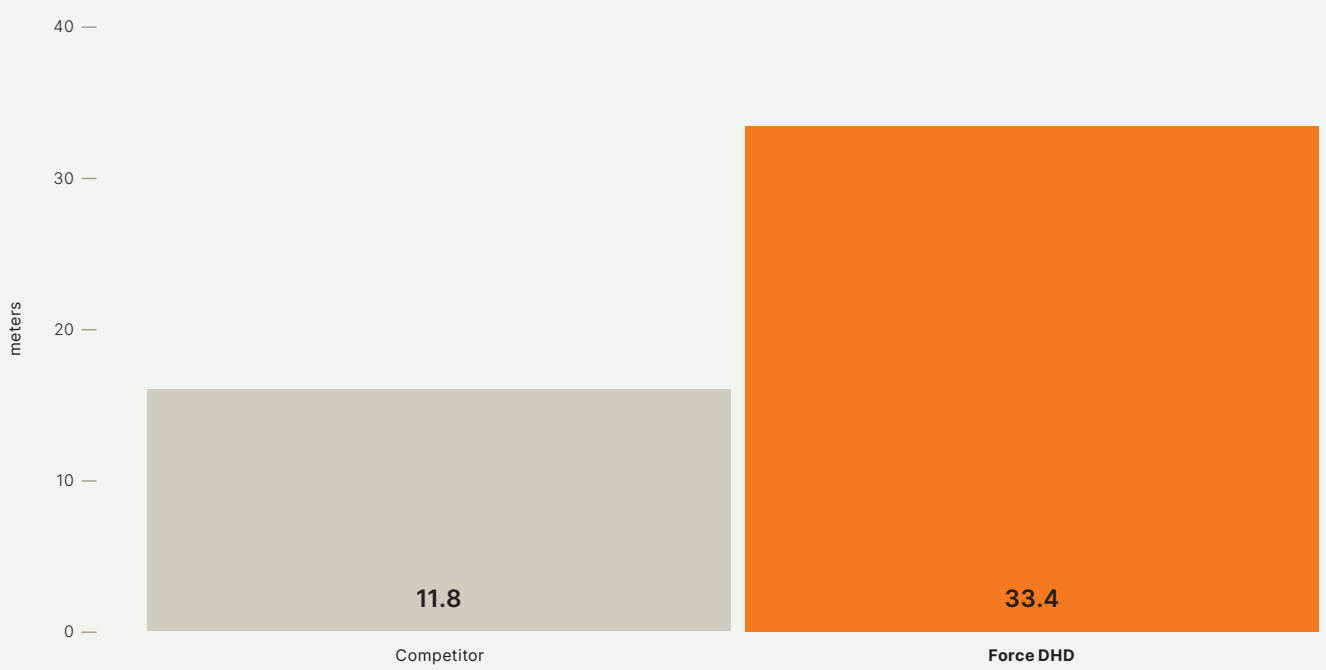
In ISO-K materials, the Force Deep Hole Drill excelled with an impressive 179% increase in tool life, reaching 33.4 meters versus only 11.8 meters by the previous generation. This ensures fewer interruptions, longer machining times, and significantly enhanced productivity for highly demanding operations.

Machining	Drilling
Application	Deep hole drilling
Material	EN-GJV–450 / 230 HB
Coolant	Yes

Dormer Pramer solution		
Force DHD RC4206.0		
Machining data		
v_c	f_n	Depth
150	0.23	110

K5.3

Tool life (meters)



v_c = cutting speed (m/min), f_n = feed per revolution (mm/rev), Depth = drilling depth (mm)

Machining examples

Boost tool life by **20%** in ISO-P materials

Providing a 20% increase in tool life, the Force Deep Hole Drill processed 12 parts per tool compared to 10 parts by a competitor, achieving 33 meters tool life versus 27.5 meters.
Its extended durability ensures greater reliability and optimizes machining efficiency in demanding ISO-P environments.

Machining	Application	Material	Coolant	Dormer Pramet Solution
Drilling	Deep hole drilling	42CrMo4	Yes	Force DHD RC42010.0

Machining data	Competitor	Force DHD
Cutting speed v_c (m/min)	79	79
Feed f_n (mm/rev)	0.25	0.25
Feed v_f (mm/min)	628	628
Spindle speed n (rev/min)	2515	2515
Drilling depth (mm)	185	185
Number of parts	10	12
Tool life (min)	27.5	33

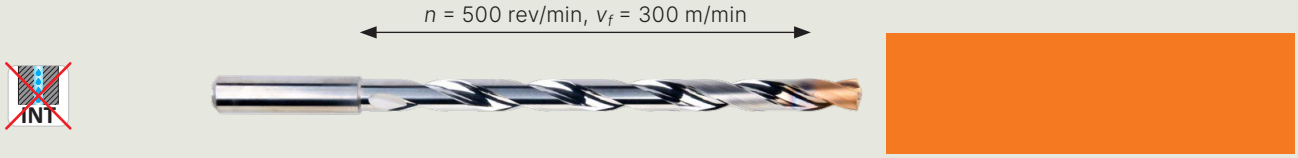
P3.2

Tool life (number of parts)

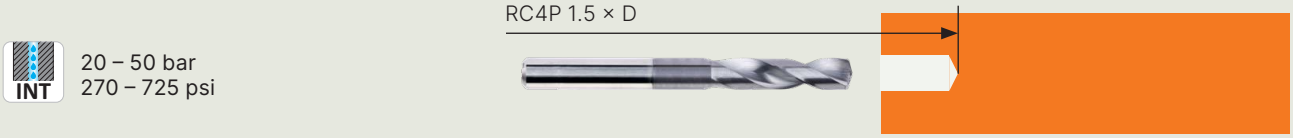
Deep hole drilling application

Machining recommendations

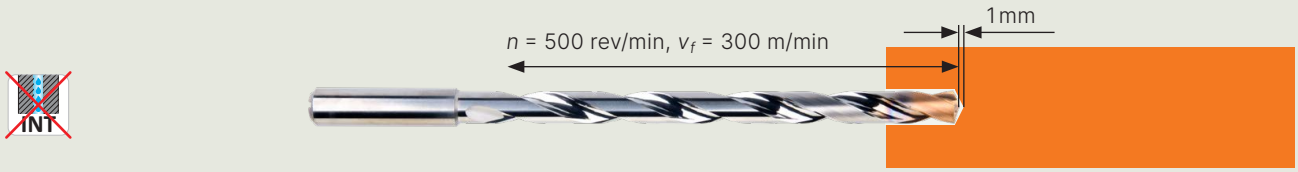
General precaution:
Don't move the deep hole drill outside of the pilot hole with over 500 rev/min and 300 mm/min.



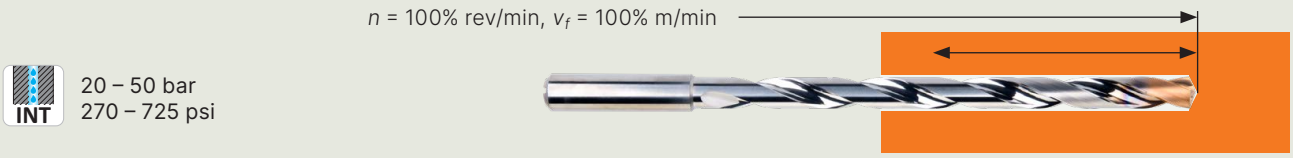
1. Drill a pilot hole (min 1.5 × D)



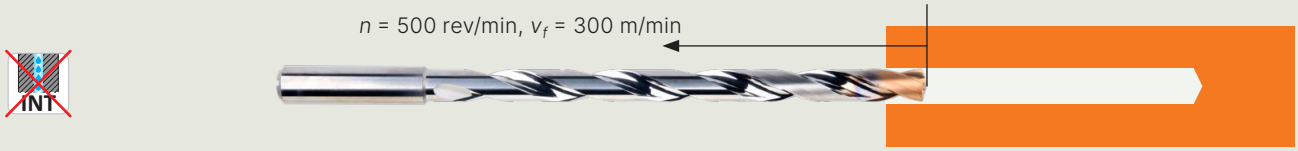
2. Infeed the deep hole drill with low feed (500 rev/min and 300 mm/min) until 1 mm to the depth of drilled pilot hole.



3. Turn on coolant (min 20 bar), start to drill with recommended speed and feed to the final drilling depth – no pecking needed. Return the drill to the pilot drill depth. Coolant off!



4. Feed out the drill from the pilot hole with low speed and feed (500 rev/min and 300 mm/min).

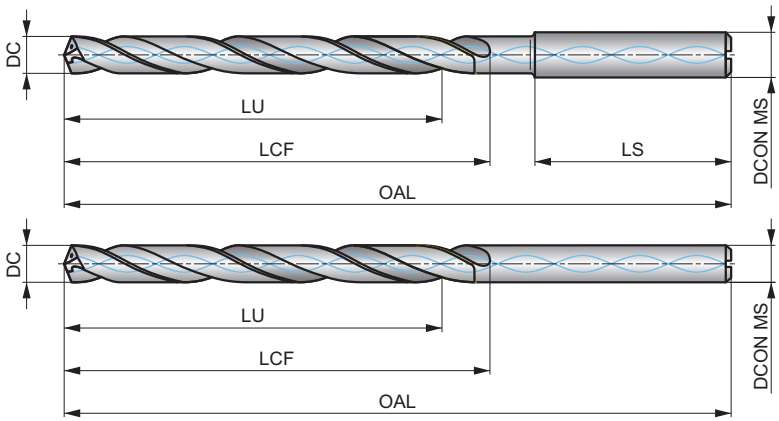


RC412

DORMER PRAMET

FORCE Deep Hole Solid Carbide 12XD Drill with Coolant Feed, Nano-Tip Coated

High-performance deep hole drill with a 140° point angle and thinner web design for drilling up to 12xD without pecking. Designed for rapid penetration and precise guidance, ensuring excellent positional accuracy. Internal coolant enhances chip evacuation, and Nano-Tip multilayer coating delivers superior thermal stability and wear resistance for extended tool life.



HM	DIN 6535	12×D
140°	Nano-Tip	DIN 6535HA
R	DC m7	

Workpiece material group suitability, starting values for cutting speed (m/min) and feed Alpha Code. Tables with feed per revolution can be found starting from page 15.

P1.1	P1.2	P1.3	P2.1	P2.2	P2.3	P3.1	P3.2	P3.3	P4.1	P4.2	P4.3	M1.1	M1.2
■ 116 H	■ 118 H	■ 121 H	■ 113 G	■ 105 H	■ 100 G	■ 113 G	■ 84 G	■ 47 E	■ 76 F	■ 84 G	■ 32 E	■ 100 H	■ 95 H
M2.1	M2.2	M2.3	M3.1	M3.2	M3.3	M4.1	M4.2	K1.1	K1.2	K1.3	K2.1	K2.2	K2.3
◪ 47 F	◪ 44 F	◪ 42 F	◪ 41 D	◪ 40 D	◪ 37 D	◪ 32 C	◪ 37 D	■ 110 J	■ 105 J	■ 95 J	■ 112 J	■ 106 J	■ 100 J
K3.1	K3.2	K3.3	K4.1	K4.2	K4.3	K4.4	K4.5	K5.1	K5.2	K5.3	N1.1	N1.2	N1.3
■ 113 J	■ 103 J	■ 84 J	■ 95 L	■ 76 L	■ 65 V	■ 63 V	■ 58 V	■ 95 J	■ 84 J	■ 79 J	◪ 221 J	■ 208 J	■ 200 J
N2.1	N2.2	N2.3	N3.1	N3.2	N3.3	S1.1	S1.2	S1.3	S2.1	S2.2	S3.1	S3.2	S4.1
■ 200 J	■ 194 L	■ 147 J	■ 126 G	■ 147 H	■ 137 F	■ 37 D	■ 32 B	◪ 26 B	◪ 32 B	◪ 23 B	◪ 26 C	◪ 11 B	◪ 26 C
S4.2													
◪ 11 B													

DCON MS tolerance h6.

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)	DCON MS (mm)
RC4123.0	–	3.00	0.1180	54.0	92.0	36.0	6.00	6.00
RC4123.1	–	3.10	0.1220	54.0	92.0	36.0	6.00	6.00
RC4121/8	1/8	3.17	0.1250	54.0	92.0	36.0	6.00	6.00
RC4123.2	–	3.20	0.1260	54.0	92.0	36.0	6.00	6.00
RC4123.3	–	3.30	0.1300	54.0	92.0	36.0	6.00	6.00
RC4123.4	–	3.40	0.1340	54.0	92.0	36.0	6.00	6.00
RC4123.5	–	3.50	0.1380	54.0	92.0	36.0	6.00	6.00
RC4129/64	9/64	3.57	0.1410	54.0	92.0	36.0	6.00	6.00
RC4123.6	–	3.60	0.1420	54.0	92.0	36.0	6.00	6.00
RC4123.7	–	3.70	0.1460	54.0	92.0	36.0	6.00	6.00
RC4123.8	–	3.80	0.1500	64.0	102.0	36.0	6.00	6.00
RC4123.9	–	3.90	0.1540	64.0	102.0	36.0	6.00	6.00
RC4125/32	5/32	3.97	0.1560	64.0	102.0	36.0	6.00	6.00
RC4124.0	–	4.00	0.1570	64.0	102.0	36.0	6.00	6.00
RC4124.1	–	4.10	0.1610	64.0	102.0	36.0	6.00	6.00
RC4124.2	–	4.20	0.1650	64.0	102.0	36.0	6.00	6.00
RC4124.3	–	4.30	0.1690	64.0	102.0	36.0	6.00	6.00
RC41211/64	11/64	4.37	0.1720	64.0	102.0	36.0	6.00	6.00
RC4124.4	–	4.40	0.1730	64.0	102.0	36.0	6.00	6.00
RC4124.5	–	4.50	0.1770	64.0	102.0	36.0	6.00	6.00
RC4124.6	–	4.60	0.1810	64.0	102.0	36.0	6.00	6.00
RC4124.7	–	4.70	0.1850	64.0	102.0	36.0	6.00	6.00
RC4123/16	3/16	4.76	0.1880	83.0	121.0	36.0	6.00	6.00

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)	DCON MS (mm)
RC4124.8	–	4.80	0.1890	83.0	121.0	36.0	6.00	6.00
RC4124.9	–	4.90	0.1930	83.0	121.0	36.0	6.00	6.00
RC4125.0	–	5.00	0.1970	83.0	121.0	36.0	6.00	6.00
RC4125.1	–	5.10	0.2010	83.0	121.0	36.0	6.00	6.00
RC41213/64	13/64	5.16	0.2030	83.0	121.0	36.0	6.00	6.00
RC4125.2	–	5.20	0.2050	83.0	121.0	36.0	6.00	6.00
RC4125.3	–	5.30	0.2090	83.0	121.0	36.0	6.00	6.00
RC4125.4	–	5.40	0.2130	83.0	121.0	36.0	6.00	6.00
RC4125.5	–	5.50	0.2170	83.0	121.0	36.0	6.00	6.00
RC4125.55	–	5.55	0.2190	83.0	121.0	36.0	6.00	6.00
RC4127/32	7/32	5.56	0.2190	83.0	121.0	36.0	6.00	6.00
RC4125.6	–	5.60	0.2200	83.0	121.0	36.0	6.00	6.00
RC4125.7	–	5.70	0.2240	83.0	121.0	36.0	6.00	6.00
RC4125.8	–	5.80	0.2280	83.0	121.0	36.0	6.00	6.00
RC4125.9	–	5.90	0.2320	83.0	121.0	36.0	6.00	6.00
RC4126.0	–	6.00	0.2360	83.0	121.0	36.0	6.00	6.00
RC4126.1	–	6.10	0.2400	110.0	148.0	36.0	8.00	8.00
RC4126.2	–	6.20	0.2440	110.0	148.0	36.0	8.00	8.00
RC4126.3	–	6.30	0.2480	110.0	148.0	36.0	8.00	8.00
RC4121/4	1/4	6.35	0.2500	110.0	148.0	36.0	8.00	8.00
RC4126.4	–	6.40	0.2520	110.0	148.0	36.0	8.00	8.00
RC4126.5	–	6.50	0.2560	110.0	148.0	36.0	8.00	8.00
RC4126.6	–	6.60	0.2600	110.0	148.0	36.0	8.00	8.00

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)	DCON MS (mm)
RC4126.7	–	6.70	0.2640	110.0	148.0	36.0	8.00	8.00
RC41217/64	17/64	6.75	0.2660	110.0	148.0	36.0	8.00	8.00
RC4126.8	–	6.80	0.2680	110.0	148.0	36.0	8.00	8.00
RC4126.9	–	6.90	0.2720	110.0	148.0	36.0	8.00	8.00
RC4127.0	–	7.00	0.2760	110.0	148.0	36.0	8.00	8.00
RC4127.1	–	7.10	0.2800	110.0	148.0	36.0	8.00	8.00
RC4129/32	9/32	7.14	0.2810	110.0	148.0	36.0	8.00	8.00
RC4127.2	–	7.20	0.2830	110.0	148.0	36.0	8.00	8.00
RC4127.3	–	7.30	0.2870	110.0	148.0	36.0	8.00	8.00
RC4127.4	–	7.40	0.2910	110.0	148.0	36.0	8.00	8.00
RC4127.5	–	7.50	0.2950	110.0	148.0	36.0	8.00	8.00
RC41219/64	19/64	7.54	0.2970	110.0	148.0	36.0	8.00	8.00
RC4127.8	–	7.80	0.3070	110.0	148.0	36.0	8.00	8.00
RC4127.9	–	7.90	0.3110	110.0	148.0	36.0	8.00	8.00
RC4125/16	5/16	7.94	0.3130	110.0	148.0	36.0	8.00	8.00
RC4128.0	–	8.00	0.3150	110.0	148.0	36.0	8.00	8.00
RC4128.1	–	8.10	0.3190	138.0	180.0	40.0	10.00	10.00
RC4128.2	–	8.20	0.3230	138.0	180.0	40.0	10.00	10.00
RC4128.3	–	8.30	0.3270	138.0	180.0	40.0	10.00	10.00
RC4128.4	–	8.40	0.3310	138.0	180.0	40.0	10.00	10.00
RC4128.5	–	8.50	0.3350	138.0	180.0	40.0	10.00	10.00
RC4128.6	–	8.60	0.3390	138.0	180.0	40.0	10.00	10.00
RC4128.7	–	8.70	0.3430	138.0	180.0	40.0	10.00	10.00
RC41211/32	11/32	8.73	0.3440	138.0	180.0	40.0	10.00	10.00
RC4128.8	–	8.80	0.3460	138.0	180.0	40.0	10.00	10.00
RC4129.0	–	9.00	0.3540	138.0	180.0	40.0	10.00	10.00
RC41223/64	23/64	9.13	0.3590	138.0	180.0	40.0	10.00	10.00
RC4129.2	–	9.20	0.3620	138.0	180.0	40.0	10.00	10.00
RC4129.3	–	9.30	0.3660	138.0	180.0	40.0	10.00	10.00
RC4129.5	–	9.50	0.3740	138.0	180.0	40.0	10.00	10.00
RC4123/8	3/8	9.53	0.3750	138.0	180.0	40.0	10.00	10.00
RC4129.6	–	9.60	0.3780	138.0	180.0	40.0	10.00	10.00
RC4129.7	–	9.70	0.3820	138.0	180.0	40.0	10.00	10.00
RC4129.8	–	9.80	0.3860	138.0	180.0	40.0	10.00	10.00
RC41225/64	25/64	9.92	0.3910	138.0	180.0	40.0	10.00	10.00
RC41210.0	–	10.00	0.3940	138.0	180.0	40.0	10.00	10.00
RC41210.1	–	10.10	0.3980	158.0	206.0	45.0	12.00	12.00
RC41210.2	–	10.20	0.4020	158.0	206.0	45.0	12.00	12.00
RC41210.3	–	10.30	0.4060	158.0	206.0	45.0	12.00	12.00
RC41213/32	13/32	10.32	0.4060	158.0	206.0	45.0	12.00	12.00

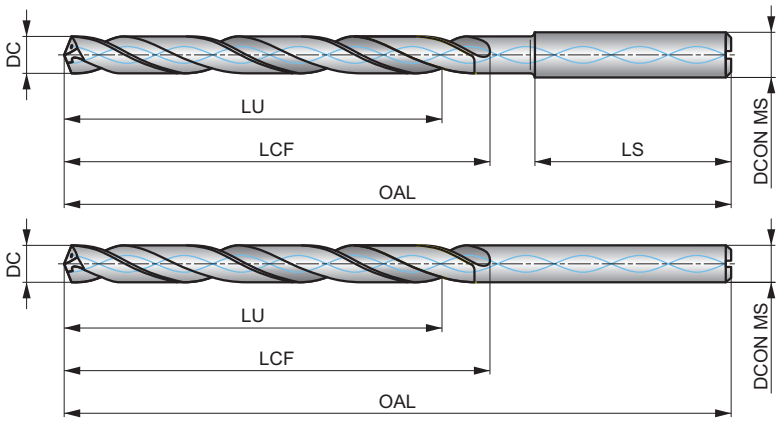
Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)	DCON MS (mm)
RC41210.4	–	10.40	0.4090	158.0	206.0	45.0	12.00	12.00
RC41210.5	–	10.50	0.4130	158.0	206.0	45.0	12.00	12.00
RC41227/64	27/64	10.72	0.4220	158.0	206.0	45.0	12.00	12.00
RC41210.8	–	10.80	0.4250	158.0	206.0	45.0	12.00	12.00
RC41211.0	–	11.00	0.4330	158.0	206.0	45.0	12.00	12.00
RC41211.1	–	11.10	0.4370	158.0	206.0	45.0	12.00	12.00
RC4127/16	7/16	11.11	0.4380	158.0	206.0	45.0	12.00	12.00
RC41211.2	–	11.20	0.4410	158.0	206.0	45.0	12.00	12.00
RC41211.5	–	11.50	0.4530	158.0	206.0	45.0	12.00	12.00
RC41229/64	29/64	11.51	0.4530	158.0	206.0	45.0	12.00	12.00
RC41211.7	–	11.70	0.4610	158.0	206.0	45.0	12.00	12.00
RC41211.8	–	11.80	0.4650	158.0	206.0	45.0	12.00	12.00
RC41215/32	15/32	11.91	0.4690	158.0	206.0	45.0	12.00	12.00
RC41212.0	–	12.00	0.4720	158.0	206.0	45.0	12.00	12.00
RC41212.1	–	12.10	0.4760	182.0	230.0	45.0	14.00	14.00
RC41212.2	–	12.20	0.4800	182.0	230.0	45.0	14.00	14.00
RC41212.3	–	12.30	0.4840	182.0	230.0	45.0	14.00	14.00
RC41231/64	31/64	12.30	0.4840	182.0	230.0	45.0	14.00	14.00
RC41212.5	–	12.50	0.4920	182.0	230.0	45.0	14.00	14.00
RC41212.6	–	12.60	0.4960	182.0	230.0	45.0	14.00	14.00
RC41212.7	–	12.70	0.5000	182.0	230.0	45.0	14.00	14.00
RC41213.0	–	13.00	0.5120	182.0	230.0	45.0	14.00	14.00
RC41217/32	17/32	13.49	0.5310	182.0	230.0	45.0	14.00	14.00
RC41213.5	–	13.50	0.5310	182.0	230.0	45.0	14.00	14.00
RC41214.0	–	14.00	0.5510	182.0	230.0	45.0	14.00	14.00
RC4129/16	9/16	14.29	0.5630	208.0	260.0	48.0	16.00	16.00
RC41214.5	–	14.50	0.5710	208.0	260.0	48.0	16.00	16.00
RC41215.0	–	15.00	0.5910	208.0	260.0	48.0	16.00	16.00
RC41215.5	–	15.50	0.6100	208.0	260.0	48.0	16.00	16.00
RC4125/8	5/8	15.88	0.6250	208.0	260.0	48.0	16.00	16.00
RC41216.0	–	16.00	0.6300	208.0	260.0	48.0	16.00	16.00
RC41216.5	–	16.50	0.6500	234.0	285.0	48.0	18.00	18.00
RC41217.0	–	17.00	0.6690	234.0	285.0	48.0	18.00	18.00
RC41217.5	–	17.50	0.6890	234.0	285.0	48.0	18.00	18.00
RC41218.0	–	18.00	0.7090	234.0	285.0	48.0	18.00	18.00
RC41218.5	–	18.50	0.7280	258.0	310.0	50.0	20.00	20.00
RC41219.0	–	19.00	0.7480	258.0	310.0	50.0	20.00	20.00
RC41219.5	–	19.50	0.7680	258.0	310.0	50.0	20.00	20.00
RC41220.0	–	20.00	0.7870	258.0	310.0	50.0	20.00	20.00

RC416

DORMER PRAMET

FORCE Deep Hole Solid Carbide 16XD Drill with Coolant Feed, Nano-Tip Coated

High-performance deep hole drill with a 140° point angle and thinner web design for drilling up to 16xD without pecking. Designed for rapid penetration and precise guidance, ensuring excellent positional accuracy. Internal coolant enhances chip evacuation, and Nano-Tip multilayer coating delivers superior thermal stability and wear resistance for extended tool life.



HM	DIN 6535	16×D
140°	Nano-Tip	DIN 6535HA
R	DC h7	

Workpiece material group suitability, starting values for cutting speed (m/min) and feed Alpha Code. Tables with feed per revolution can be found starting from page 15.

P1.1	P1.2	P1.3	P2.1	P2.2	P2.3	P3.1	P3.2	P3.3	P4.1	P4.2	P4.3	M1.1	M1.2
■ 110 H	■ 112 H	■ 115 H	■ 108 H	■ 100 H	■ 95 G	■ 108 H	■ 80 G	■ 45 E	■ 72 G	■ 80 G	■ 30 E	■ 95 H	■ 90 H
M2.1	**M2.2**	**M2.3**	**M3.1**	**M3.2**	**M3.3**	**M4.1**	**M4.2**	**K1.1**	**K1.2**	**K1.3**	**K2.1**	**K2.2**	**K2.3**
◪ 45 F	◪ 42 F	◪ 40 F	◪ 39 D	◪ 38 D	◪ 35 D	◪ 30 C	◪ 35 D	■ 105 J	■ 100 J	■ 90 J	■ 107 J	■ 101 J	■ 95 J
K3.1	**K3.2**	**K3.3**	**K4.1**	**K4.2**	**K4.3**	**K4.4**	**K4.5**	**K5.1**	**K5.2**	**K5.3**	**N1.1**	**N1.2**	**N1.3**
■ 108 J	■ 98 J	■ 80 J	■ 90 J	■ 72 L	■ 62 V	■ 60 V	■ 55 V	■ 90 J	■ 80 J	■ 75 J	◪ 210 L	■ 198 L	■ 190 L
N2.1	**N2.2**	**N2.3**	**N3.1**	**N3.2**	**N3.3**	**S1.1**	**S1.2**	**S1.3**	**S2.1**	**S2.2**	**S3.1**	**S3.2**	**S4.1**
■ 190 L	■ 185 L	■ 140 L	■ 120 G	■ 140 H	■ 130 F	■ 35 D	■ 30 B	◪ 25 B	◪ 30 C	◪ 22 A	◪ 25 B	◪ 10 B	◪ 25 B
S4.2													
◪ 10 B													

DCON MS tolerance h6.

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)
RC4163.0	–	3.00	0.1180	57.0	89.0	28.0	4.00
RC4161/8	1/8	3.17	0.1250	66.0	98.0	28.0	4.00
RC4163.5	–	3.50	0.1380	78.0	110.0	28.0	4.00
RC4169/64	9/64	3.57	0.1410	78.0	110.0	28.0	4.00
RC4165/32	5/32	3.97	0.1560	78.0	110.0	28.0	4.00
RC4164.0	–	4.00	0.1570	78.0	110.0	28.0	4.00
RC4164.5	–	4.50	0.1770	100.0	132.0	28.0	5.00
RC4163/16	3/16	4.76	0.1880	100.0	132.0	28.0	5.00
RC4164.8	–	4.80	0.1890	100.0	132.0	28.0	5.00
RC4165.0	–	5.00	0.1970	100.0	132.0	28.0	5.00
RC4165.5	–	5.50	0.2170	110.0	150.0	36.0	6.00
RC4167/32	7/32	5.56	0.2190	120.0	160.0	36.0	6.00
RC4165.8	–	5.80	0.2280	120.0	160.0	36.0	6.00
RC4166.0	–	6.00	0.2360	120.0	160.0	36.0	6.00
RC4166.1	–	6.10	0.2400	135.0	175.0	36.0	8.00
RC4161/4	1/4	6.35	0.2500	135.0	175.0	36.0	8.00
RC4166.5	–	6.50	0.2560	135.0	175.0	36.0	8.00
RC41617/64	17/64	6.75	0.2660	135.0	175.0	36.0	8.00
RC4166.8	–	6.80	0.2680	135.0	175.0	36.0	8.00
RC4167.0	–	7.00	0.2760	135.0	175.0	36.0	8.00
RC4169/32	9/32	7.14	0.2810	152.0	192.0	36.0	8.00
RC4167.4	–	7.40	0.2910	152.0	192.0	36.0	8.00
RC4167.5	–	7.50	0.2950	152.0	192.0	36.0	8.00

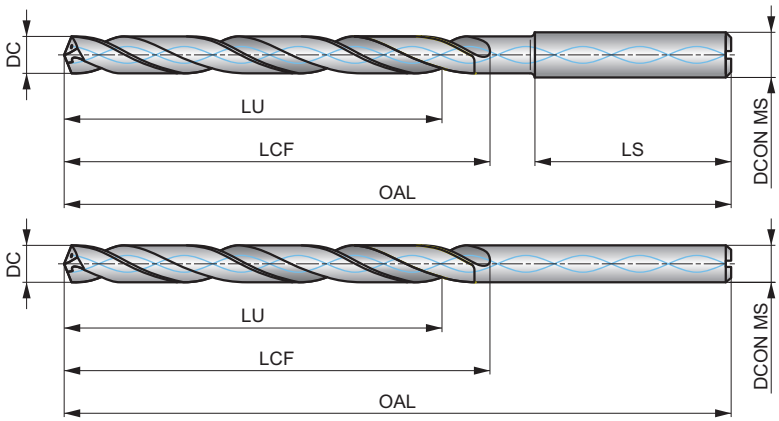
Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)
RC4165/16	5/16	7.94	0.3130	152.0	192.0	36.0	8.00
RC4168.0	–	8.00	0.3150	152.0	192.0	36.0	8.00
RC4168.3	–	8.30	0.3270	162.0	206.0	40.0	10.00
RC4168.5	–	8.50	0.3350	162.0	206.0	40.0	10.00
RC41611/32	11/32	8.73	0.3440	162.0	206.0	40.0	10.00
RC4169.0	–	9.00	0.3540	162.0	206.0	40.0	10.00
RC4163/8	3/8	9.53	0.3750	180.0	224.0	40.0	10.00
RC4169.8	–	9.80	0.3860	180.0	224.0	40.0	10.00
RC41610.0	–	10.00	0.3940	180.0	224.0	40.0	10.00
RC41610.2	–	10.20	0.4020	198.0	247.0	45.0	12.00
RC41613/32	13/32	10.32	0.4060	198.0	247.0	45.0	12.00
RC41611.0	–	11.00	0.4330	198.0	247.0	45.0	12.00
RC4167/16	7/16	11.11	0.4380	216.0	265.0	45.0	12.00
RC41611.5	–	11.50	0.4530	216.0	265.0	45.0	12.00
RC41611.8	–	11.80	0.4650	216.0	265.0	45.0	12.00
RC41615/32	15/32	11.91	0.4690	216.0	265.0	45.0	12.00
RC41612.0	–	12.00	0.4720	216.0	265.0	45.0	12.00
RC41612.7	–	12.70	0.5000	252.0	301.0	45.0	14.00
RC41613.0	–	13.00	0.5120	252.0	301.0	45.0	14.00
RC41614.0	–	14.00	0.5510	252.0	301.0	45.0	14.00
RC4169/16	9/16	14.29	0.5630	288.0	340.0	48.0	16.00
RC41615.0	–	15.00	0.5910	288.0	340.0	48.0	16.00
RC41616.0	–	16.00	0.6300	288.0	340.0	48.0	16.00

RC420

DORMER PRAMET

FORCE Deep Hole Solid Carbide 20XD Drill with Coolant Feed, Nano-Tip Coated

High-performance deep hole drill with a 140° point angle and thinner web design for drilling up to 20xD without pecking. Designed for rapid penetration and precise guidance, ensuring excellent positional accuracy. Internal coolant enhances chip evacuation, and Nano-Tip multilayer coating delivers superior thermal stability and wear resistance for extended tool life.



HM	DIN 6535	20×D
140°	Nano-Tip	DIN 6535HA
R	DC h7	

Workpiece material group suitability, starting values for cutting speed (m/min) and feed Alpha Code. Tables with feed per revolution can be found starting from page 15.

P1.1	P1.2	P1.3	P2.1	P2.2	P2.3	P3.1	P3.2	P3.3	P4.1	P4.2	P4.3	M1.1	M1.2
■ 105 H	■ 106 H	■ 109 H	■ 103 G	■ 95 G	■ 90 F	■ 103 G	■ 76 F	■ 43 E	■ 68 F	■ 76 F	■ 29 E	■ 90 G	■ 86 G
M2.1	**M2.2**	**M2.3**	**M3.1**	**M3.2**	**M3.3**	**M4.1**	**M4.2**	**K1.1**	**K1.2**	**K1.3**	**K2.1**	**K2.2**	**K2.3**
◪ 43 E	◪ 40 E	◪ 38 E	◪ 37 C	◪ 36 C	◪ 33 C	◪ 29 B	◪ 33 D	■ 100 J	■ 95 J	■ 86 J	■ 102 J	■ 96 H	■ 90 H
K3.1	**K3.2**	**K3.3**	**K4.1**	**K4.2**	**K4.3**	**K4.4**	**K4.5**	**K5.1**	**K5.2**	**K5.3**	**N1.1**	**N1.2**	**N1.3**
■ 103 H	■ 93 H	■ 76 H	■ 86 J	■ 68 J	■ 59 V	■ 57 V	■ 52 V	■ 86 J	■ 76 J	■ 71 J	◪ 200 L	■ 188 L	■ 181 L
N2.1	**N2.2**	**N2.3**	**N3.1**	**N3.2**	**N3.3**	**S1.1**	**S1.2**	**S1.3**	**S2.1**	**S2.2**	**S3.1**	**S3.2**	**S4.1**
■ 181 L	■ 176 L	■ 133 J	■ 114 G	■ 133 G	■ 124 E	■ 33 D	■ 29 B	◪ 24 B	◪ 29 B	◪ 21 A	◪ 24 B	◪ 10 A	◪ 24 B
S4.2													
◪ 10 A													

DCON MS tolerance h6.

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)
RC4203.0	–	3.00	0.1180	65.0	97.0	28.0	4.00
RC4201/8	1/8	3.17	0.1250	80.0	112.0	28.0	4.00
RC4203.5	–	3.50	0.1380	92.0	124.0	28.0	4.00
RC4209/64	9/64	3.57	0.1410	92.0	124.0	28.0	4.00
RC4205/32	5/32	3.97	0.1560	92.0	124.0	28.0	4.00
RC4204.0	–	4.00	0.1570	92.0	124.0	28.0	4.00
RC4204.5	–	4.50	0.1770	118.0	150.0	28.0	5.00
RC4203/16	3/16	4.76	0.1880	118.0	150.0	28.0	5.00
RC4204.8	–	4.80	0.1890	118.0	150.0	28.0	5.00
RC4205.0	–	5.00	0.1970	118.0	150.0	28.0	5.00
RC4205.5	–	5.50	0.2170	132.0	170.0	36.0	6.00
RC4207/32	7/32	5.56	0.2190	144.0	182.0	36.0	6.00
RC4205.8	–	5.80	0.2280	144.0	182.0	36.0	6.00
RC4206.0	–	6.00	0.2360	144.0	182.0	36.0	6.00
RC4206.1	–	6.10	0.2400	162.0	200.0	36.0	8.00
RC4201/4	1/4	6.35	0.2500	162.0	200.0	36.0	8.00
RC4206.5	–	6.50	0.2560	162.0	200.0	36.0	8.00
RC42017/64	17/64	6.75	0.2660	162.0	200.0	36.0	8.00
RC4206.8	–	6.80	0.2680	162.0	200.0	36.0	8.00
RC4207.0	–	7.00	0.2760	162.0	200.0	36.0	8.00
RC4209/32	9/32	7.14	0.2810	184.0	222.0	36.0	8.00
RC4207.4	–	7.40	0.2910	184.0	222.0	36.0	8.00
RC4207.5	–	7.50	0.2950	184.0	222.0	36.0	8.00

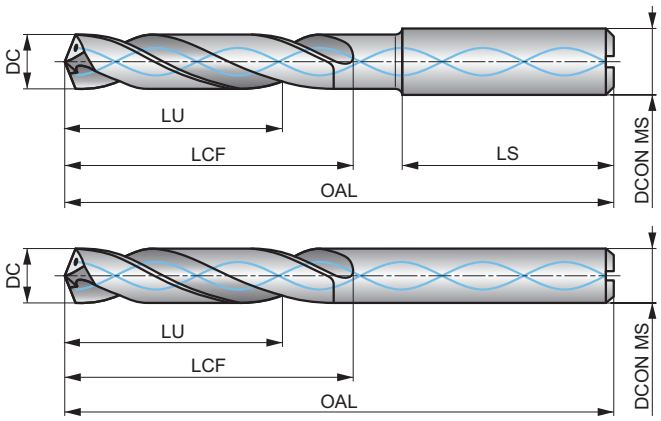
Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)
RC4205/16	5/16	7.94	0.3130	184.0	222.0	36.0	8.00
RC4208.0	–	8.00	0.3150	184.0	222.0	36.0	8.00
RC4208.3	–	8.30	0.3270	198.0	240.0	40.0	10.00
RC4208.5	–	8.50	0.3350	198.0	240.0	40.0	10.00
RC42011/32	11/32	8.73	0.3440	198.0	240.0	40.0	10.00
RC4209.0	–	9.00	0.3540	198.0	240.0	40.0	10.00
RC4203/8	3/8	9.53	0.3750	220.0	262.0	40.0	10.00
RC4209.8	–	9.80	0.3860	220.0	262.0	40.0	10.00
RC42010.0	–	10.00	0.3940	220.0	262.0	40.0	10.00
RC42010.2	–	10.20	0.4020	242.0	289.0	45.0	12.00
RC42013/32	13/32	10.32	0.4060	242.0	289.0	45.0	12.00
RC42011.0	–	11.00	0.4330	242.0	289.0	45.0	12.00
RC4207/16	7/16	11.11	0.4380	264.0	311.0	45.0	12.00
RC42011.5	–	11.50	0.4530	264.0	311.0	45.0	12.00
RC42011.8	–	11.80	0.4650	264.0	311.0	45.0	12.00
RC42015/32	15/32	11.91	0.4690	264.0	311.0	45.0	12.00
RC42012.0	–	12.00	0.4720	264.0	311.0	45.0	12.00
RC42012.7	–	12.70	0.5000	308.0	357.0	45.0	14.00
RC42013.0	–	13.00	0.5120	308.0	357.0	45.0	14.00
RC42014.0	–	14.00	0.5510	308.0	357.0	45.0	14.00
RC4209/16	9/16	14.29	0.5630	352.0	404.0	48.0	16.00
RC42015.0	–	15.00	0.5910	352.0	404.0	48.0	16.00
RC42016.0	–	16.00	0.6300	352.0	404.0	48.0	16.00

RC4P

DORMER PRAMET

FORCE Pilot Solid Carbide Drill 2xD with Coolant Feed, Multi TiAlN Coated

Specially designed pilot drill for precise hole positioning when using Force deep hole drills 16xD and 20xD. Features a 150° point angle and slightly larger drill tolerance p7 for accurate drilling of pilot holes up to 2xD. High quality solid carbide substrate and internal coolant channels provide enhanced cooling efficiency. TiAlN multilayer coating minimizes friction.



HM	DIN 6535	2×D
150°	Multi TiAlN	DIN 6535HA
R	DC p7	

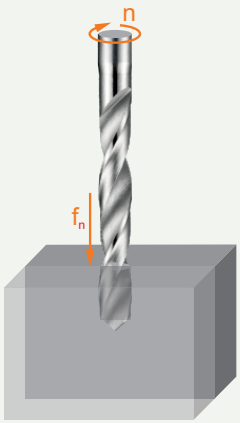
Workpiece material group suitability, starting values for cutting speed (m/min) and feed Alpha Code. Tables with feed per revolution can be found starting from page 15.

P1.1	P1.2	P1.3	P2.1	P2.2	P2.3	P3.1	P3.2	P3.3	P4.1	P4.2	P4.3	M1.1	M1.2
■ 110 I	■ 112 I	■ 108 I	■ 115 G	■ 100 H	■ 90 H	■ 85 H	■ 80 H	■ 70 F	■ 80 G	■ 63 G	■ 50 E	■ 79 H	■ 75 H
M2.1	M2.2	M2.3	M3.1	M3.2	M3.3	M4.1	M4.2	K1.1	K1.2	K1.3	K2.1	K2.2	K2.3
◪ 65 F	◪ 60 F	◪ 58 F	◪ 42 D	◪ 40 D	◪ 38 D	◪ 40 C	◪ 35 D	■ 121 L	■ 120 L	■ 110 J	■ 120 L	■ 110 J	■ 100 J
K3.1	K3.2	K3.3	K4.1	K4.2	K4.3	K4.4	K4.5	K5.1	K5.2	K5.3	N1.1	N1.2	N1.3
■ 80 L	■ 70 J	■ 68 J	■ 100 L	■ 80 L	■ 70 V	■ 60 V	■ 50 V	■ 80 J	■ 75 J	■ 70 J	◪ 302 J	■ 300 J	■ 290 J
N2.1	N2.2	N2.3	N3.1	N3.2	N3.3	S1.1	S1.2	S1.3	S2.1	S2.2	S3.1	S3.2	S4.1
■ 250 J	■ 220 L	■ 200 J	■ 160 G	■ 120 H	■ 110 F	■ 45 D	■ 32 B	◪ 28 B	◪ 32 B	◪ 30 B	◪ 30 C	◪ 11 B	◪ 30 C
S4.2													
◪ 11 B													

DCON MS tolerance h6.

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)
RC4P3.0	–	3.00	0.1180	20.0	66.0	36.0	6.00
RC4P1/8	1/8	3.17	0.1250	20.0	66.0	36.0	6.00
RC4P3.5	–	3.50	0.1380	20.0	66.0	36.0	6.00
RC4P9/64	9/64	3.57	0.1410	20.0	66.0	36.0	6.00
RC4P5/32	5/32	3.97	0.1560	24.0	74.0	36.0	6.00
RC4P4.0	–	4.00	0.1570	24.0	74.0	36.0	6.00
RC4P4.5	–	4.50	0.1770	24.0	74.0	36.0	6.00
RC4P3/16	3/16	4.76	0.1880	28.0	82.0	36.0	6.00
RC4P4.8	–	4.80	0.1890	28.0	82.0	36.0	6.00
RC4P5.0	–	5.00	0.1970	28.0	82.0	36.0	6.00
RC4P5.5	–	5.50	0.2170	28.0	82.0	36.0	6.00
RC4P7/32	7/32	5.56	0.2190	28.0	82.0	36.0	6.00
RC4P5.8	–	5.80	0.2280	28.0	82.0	36.0	6.00
RC4P6.0	–	6.00	0.2360	28.0	82.0	36.0	6.00
RC4P6.1	–	6.10	0.2400	34.0	91.0	36.0	8.00
RC4P1/4	1/4	6.35	0.2500	34.0	91.0	36.0	8.00
RC4P6.5	–	6.50	0.2560	34.0	91.0	36.0	8.00
RC4P6.8	–	6.80	0.2680	34.0	91.0	36.0	8.00
RC4P7.0	–	7.00	0.2760	34.0	91.0	36.0	8.00
RC4P9/32	9/32	7.14	0.2810	41.0	91.0	36.0	8.00
RC4P7.4	–	7.40	0.2910	41.0	91.0	36.0	8.00
RC4P7.5	–	7.50	0.2950	41.0	91.0	36.0	8.00
RC4P5/16	5/16	7.94	0.3130	41.0	91.0	36.0	8.00

Product	DC (inch)	DC (mm)	DC (inch)	LCF (mm)	OAL (mm)	LS (mm)	DCON MS (mm)
RC4P8.0	–	8.00	0.3150	41.0	91.0	36.0	8.00
RC4P8.3	–	8.30	0.3270	47.0	103.0	40.0	10.00
RC4P8.5	–	8.50	0.3350	47.0	103.0	40.0	10.00
RC4P11/32	11/32	8.73	0.3440	47.0	103.0	40.0	10.00
RC4P9.0	–	9.00	0.3540	47.0	103.0	40.0	10.00
RC4P3/8	3/8	9.53	0.3750	47.0	103.0	40.0	10.00
RC4P9.8	–	9.80	0.3860	47.0	103.0	40.0	10.00
RC4P10.0	–	10.00	0.3940	47.0	103.0	40.0	10.00
RC4P10.2	–	10.20	0.4020	55.0	118.0	45.0	12.00
RC4P13/32	13/32	10.32	0.4060	55.0	118.0	45.0	12.00
RC4P11.0	–	11.00	0.4330	55.0	118.0	45.0	12.00
RC4P7/16	7/16	11.11	0.4380	55.0	118.0	45.0	12.00
RC4P11.5	–	11.50	0.4530	55.0	118.0	45.0	12.00
RC4P11.8	–	11.80	0.4650	55.0	118.0	45.0	12.00
RC4P15/32	15/32	11.91	0.4690	55.0	118.0	45.0	12.00
RC4P12.0	–	12.00	0.4720	55.0	118.0	45.0	12.00
RC4P1/2	1/2	12.70	0.5000	60.0	124.0	45.0	14.00
RC4P13.0	–	13.00	0.5120	60.0	124.0	45.0	14.00
RC4P14.0	–	14.00	0.5510	60.0	124.0	45.0	14.00
RC4P9/16	9/16	14.29	0.5630	65.0	133.0	48.0	16.00
RC4P15.0	–	15.00	0.5910	65.0	133.0	48.0	16.00
RC4P16.0	–	16.00	0.6300	65.0	133.0	48.0	16.00



Feed per revolution f_n (mm/rev)
Depending on the working conditions it might be necessary to adjust these values ± 25 %.

How to use this table to find the feed per revolution f_n:

1. Find your Alpha Code on the product page (example: 46J, "**J**" is the Alpha Code).
2. Find the closest diameter for your cutting application in the top row of the table.
3. Find your Alpha Code in the left column of the table.
4. The intersection (cell) of the Diameter and Alpha Code is the feed per revolution f_n.

Feed rates (mm/rev)	ø DC (mm)																		
	0.15	0.5	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	15.0	16.0	20.0	25.0	30.0	40.0	50.0	100
A	0.003	0.006	0.012	0.023	0.029	0.032	0.036	0.042	0.054	0.062	0.069	0.082	0.086	0.110	0.125	0.135	0.155	0.175	0.263
B	0.004	0.007	0.014	0.028	0.037	0.041	0.046	0.053	0.067	0.080	0.090	0.103	0.108	0.135	0.153	0.165	0.188	0.208	0.312
C	0.004	0.008	0.015	0.032	0.044	0.050	0.056	0.064	0.080	0.098	0.110	0.125	0.130	0.160	0.180	0.195	0.220	0.240	0.360
D	0.004	0.008	0.016	0.038	0.053	0.060	0.068	0.078	0.098	0.119	0.130	0.149	0.155	0.188	0.210	0.228	0.253	0.275	0.413
E	0.004	0.009	0.017	0.043	0.062	0.071	0.080	0.092	0.115	0.140	0.150	0.173	0.180	0.215	0.240	0.260	0.285	0.310	0.465
F	0.005	0.009	0.018	0.050	0.073	0.084	0.095	0.109	0.138	0.165	0.178	0.202	0.210	0.248	0.275	0.295	0.320	0.343	0.515
G	0.005	0.010	0.019	0.056	0.084	0.096	0.109	0.126	0.160	0.190	0.205	0.231	0.240	0.280	0.310	0.330	0.355	0.375	0.563
H	0.005	0.010	0.020	0.066	0.102	0.116	0.130	0.150	0.190	0.228	0.243	0.271	0.280	0.320	0.355	0.375	0.398	0.418	0.627
I	0.005	0.011	0.021	0.076	0.119	0.134	0.150	0.173	0.220	0.265	0.280	0.310	0.320	0.360	0.400	0.420	0.440	0.460	0.690
J	0.006	0.012	0.024	0.084	0.135	0.152	0.170	0.197	0.250	0.298	0.315	0.349	0.360	0.405	0.445	0.465	0.485	0.503	0.755
K	0.007	0.013	0.026	0.092	0.150	0.170	0.190	0.220	0.280	0.330	0.350	0.388	0.400	0.450	0.490	0.510	0.530	0.545	0.818
L	0.007	0.014	0.028	0.101	0.165	0.186	0.208	0.240	0.305	0.360	0.385	0.419	0.430	0.485	0.525	0.545	0.568	0.588	0.882
M	0.008	0.015	0.030	0.110	0.180	0.202	0.225	0.260	0.330	0.390	0.420	0.450	0.460	0.520	0.560	0.580	0.605	0.630	0.945
N	0.008	0.016	0.032	0.119	0.195	0.218	0.242	0.280	0.355	0.420	0.455	0.481	0.490	0.555	0.595	0.615	0.642	0.672	1.008
S	0.002	0.004	0.008	0.014	0.020	0.025	0.030	0.037	0.050	0.080	0.100	0.123	0.130	0.150	0.170	0.190	0.220	0.240	–
T	0.004	0.008	0.015	0.028	0.040	0.050	0.060	0.070	0.090	0.110	0.130	0.160	0.170	0.190	0.210	0.230	0.260	0.275	–
U	0.007	0.013	0.026	0.048	0.070	0.080	0.090	0.107	0.140	0.170	0.200	0.223	0.230	0.240	0.270	0.300	0.360	0.375	–
V	0.010	0.019	0.038	0.069	0.100	0.115	0.130	0.153	0.200	0.250	0.280	0.310	0.320	0.340	0.400	0.440	0.510	0.530	–
W	0.012	0.025	0.049	0.089	0.130	0.150	0.170	0.200	0.260	0.330	0.380	0.418	0.430	0.450	0.470	0.490	0.520	0.540	–
X	0.014	0.028	0.056	0.103	0.150	0.180	0.210	0.250	0.330	0.420	0.480	0.533	0.550	0.580	–	–	–	–	–
Y	0.017	0.034	0.068	0.124	0.180	0.220	0.260	0.317	0.430	0.550	0.700	0.700	0.700	0.740	–	–	–	–	–
Z	0.024	0.047	0.094	0.172	0.250	0.325	0.400	0.533	0.800	1.000	1.100	1.175	1.200	1.200	–	–	–	–	–

ISO group		WMG (Work Material Group)				Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)
P	P1	P1.1	Free machining steel (carbon steels with increased machinability)		Sulfurized	< 240 HB	≤ 830
		P1.2			Sulfurized and phosphorized	< 180 HB	≤ 620
		P1.3			Sulfurized/phosphorized and leaded	< 180 HB	≤ 620
	P2	P2.1	Plain carbon steel (steels comprised of mainly iron and carbon)		Containing <0.25 % C	< 180 HB	≤ 620
		P2.2			Containing <0.55 % C	< 240 HB	≤ 830
		P2.3			Containing >0.55 % C	< 300 HB	≤ 1030
	P3	P3.1	Alloy steel (carbon steels with an alloying content ≤ 10%)		Annealed	< 180 HB	≤ 620
		P3.2			Hardened and tempered	180 – 260 HB	> 620 ≤ 900
		P3.3				260 – 360 HB	> 900 ≤ 1240
	P4	P4.1	Tool steel (special alloy steel for tools, dies and molds)		Annealed	< 26 HRC	≤ 900
		P4.2			Hardened and tempered	26 – 39 HRC	> 900 ≤ 1240
		P4.3				39 – 45 HRC	> 1240 ≤ 1450
M	M1	M1.1	Ferritic stainless steel (straight chromium non-hardenable alloys)			< 160 HB	≤ 520
		M1.2				160 – 220 HB	> 520 ≤ 700
	M2	M2.1	Martensitic stainless steel (straight chromium hardenable alloys)		Annealed	< 200 HB	≤ 670
		M2.2			Quenched and tempered	200 – 280 HB	> 670 ≤ 950
		M2.3			Precipitation-hardened	280 – 380 HB	> 950 ≤ 1300
	M3	M3.1	Austenitic stainless steel (chromium-nickel and chromium-nickel-manganese alloys)			< 200 HB	≤ 750
		M3.2				200 – 260 HB	> 750 ≤ 870
		M3.3				260 – 300 HB	> 870 ≤ 1040
	M4	M4.1	Austenitic-ferritic (DUPLEX) or super-austenitic stainless steel			< 300 HB	≤ 990
		M4.2	Precipitation hardening austenitic stainless steel			300 – 380 HB	≤ 1320
K	K1	K1.1	Gray iron or Automotive Gray iron (GG) (iron-carbon castings with a lamellar graphite microstructure)		Ferritic or ferritic-pearlitic	< 180 HB	≤ 190
		K1.2			Ferritic-pearlictic or pearlitic	180 – 240 HB	> 190 ≤ 310
		K1.3			Pearlitic	240 – 280 HB	> 310 ≤ 390
	K2	K2.1	Malleable iron (GTS/GTW) (iron-carbon castings with a graphite-free microstructure)		Ferritic	< 160 HB	≤ 400
		K2.2			Ferritic or pearlitic	160 – 200 HB	> 400 ≤ 550
		K2.3			Pearlitic	200 – 240 HB	> 550 ≤ 660
	K3	K3.1	Ductile iron (GGG) (iron-carbon castings with a nodular graphite microstructure)		Ferritic	< 180 HB	≤ 560
		K3.2			Ferritic or pearlitic	180 – 220 HB	> 560 ≤ 680
		K3.3			Pearlitic	220 – 260 HB	> 680 ≤ 800
	K4	K4.1	Austenitic gray iron (ASTM A436) (iron-carbon alloy castings with an austenitic lamellar graphite microstructure)			< 180 HB	≤ 190
		K4.2	Austenitic ductile iron (ASTM A439 or ASTM A571) (iron-carbon alloy castings with an austenitic nodular graphite microstructure)			< 240 HB	≤ 740
		K4.3	Austempered ductile iron (ASTM A897) (iron-carbon alloy castings with an ausferrite microstructure)			< 280 HB	> 840 ≤ 980
		K4.4				280 – 320 HB	> 980 ≤ 1130
		K4.5				320 – 360 HB	> 1130 ≤ 1280
	K5	K5.1	Compacted graphite iron CGI (ASTM A842) (iron-carbon castings with a vermicular graphite structure)		Ferritic	< 180 HB	≤ 400
		K5.2			Ferritic-pearlitic	180 – 220 HB	> 400 ≤ 450
		K5.3			Pearlitic	220 – 260 HB	> 450 ≤ 500
N	N1	N1.1	Commercially pure wrought aluminium			< 60 HB	≤ 240
		N1.2	Wrought aluminium alloys		Half hard tempered	60 – 100 HB	> 240 ≤ 400
		N1.3			Full hard tempered	100 – 150 HB	> 400 ≤ 590
	N2	N2.1	Cast aluminium alloys			< 75 HB	≤ 240
		N2.2				75 – 90 HB	> 240 ≤ 270
		N2.3				90 – 140 HB	> 270 ≤ 440
	N3	N3.1	Free-cutting copper-alloys materials with excellent machining properties			–	–
		N3.2	Short-chip copper-alloys with good to moderate machining properties			–	–
		N3.3	Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties			–	–
	N4	N4.1	Thermoplastic polymers			–	–
		N4.2	Thermosetting polymers			–	–
		N4.3	Reinforced polymers or composites			–	–
	N5	N5.1	Graphite			–	–
S	S1	S1.1	Titanium or titanium alloys			< 200 HB	≤ 660
		S1.2				200 – 280 HB	> 660 ≤ 950
		S1.3				280 – 360 HB	> 950 ≤ 1200
	S2	S2.1	Fe-based high-temperature alloys			< 200 HB	≤ 690
		S2.2				200 – 280 HB	> 690 ≤ 970
	S3	S3.1	Ni-based high-temperature alloys			< 280 HB	≤ 940
		S3.2				280 – 360 HB	> 940 ≤ 1200
	S4	S4.1	Co-based high-temperature alloys			< 240 HB	≤ 800
		S4.2				240 – 320 HB	> 800 ≤ 1070
H	H1	H1.1	Chilled cast iron			< 440 HB	–
	H2	H2.1	Hardened cast iron			< 55 HRC	–
		H2.2				> 55 HRC	–
	H3	H3.1	Hardened steel < 55 HRC			< 51 HRC	–
		H3.2				51 – 55 HRC	–
	H4	H4.1	Hardened steel > 55 HRC			55 – 59 HRC	–
		H4.2				> 59 HRC	–

Notes

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