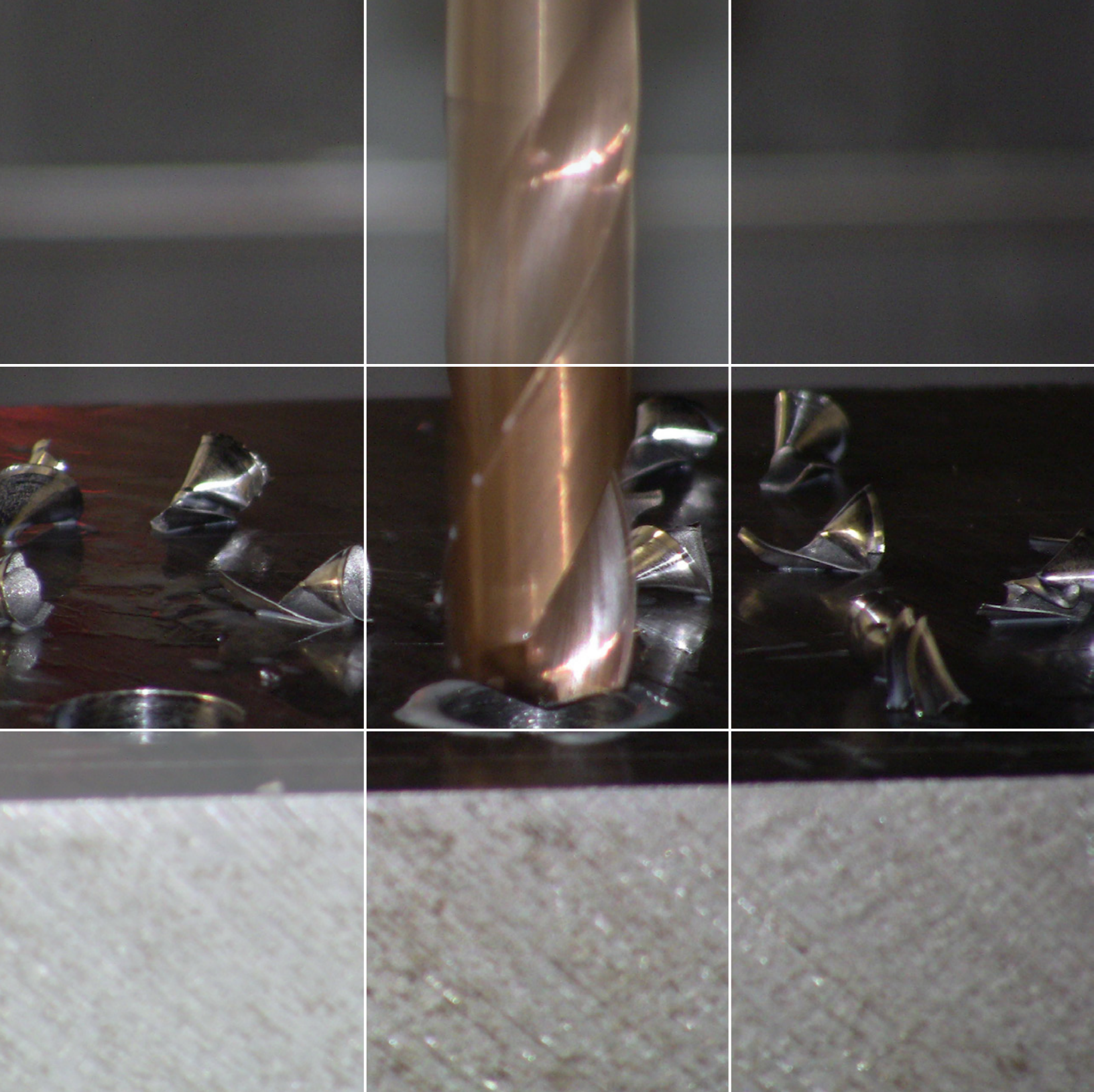


**NIAGARA  
CUTTER™  
UNIVERSAL  
DRILL  
HOLEMAKING**



**OPTIMUM PERFORMANCE  
& VALUE IN DRILLING**



# FLEXIBILITY & PERFORMANCE

Niagara Universal solid carbide drills feature advanced coating technology and optimized geometries for specialized applications that focus on hole quality, high-volume production and achieving the lowest cost per hole. The new Universal Drill line adds to the Niagara Cutter family by bringing versatility and reduced inventory costs to low and medium batch production.

## MULTI-PURPOSE GEOMETRY

Niagara Universal drills offer performance and value for holemaking applications across all industry segments. The line features a multi-purpose, 4 facet point geometry that provides excellent centering capability, maintains an IT8 / 9 hole tolerance and is easy to regrind. These drills also feature a polished AlCrN coating that offers high-abrasion resistance, toughness and good chip evacuation.

## YOUR NIAGARA BENEFIT

- Rigid multi-purpose geometry for predictable tool life
- Application security and high-capacity utilization
- Versatility and reduced inventory cost

## RANGE OVERVIEW

- Diameters ranging from 0.118" to 0.787" (3 to 20 mm), in increments of 0.004" (0.1 mm)
- 5 x D, coolant-through, R1 cylindrical shank
- 3 x D, coolant-through, R1 cylindrical shank
- 3 x D, non-coolant, R1 cylindrical shank
- Compatible with Seco shrinkfit holders, Seco hydraulic chucks and Seco high-precision collet chucks

## PRODUCT FEATURES

- Drills steel, stainless steel, cast iron and more
- Incorporates a multi-purpose, 4 facet point geometry
- Optimized through a polished AlCrN coating



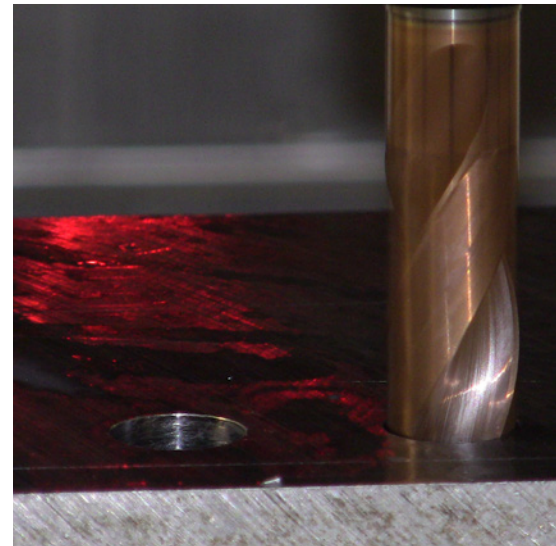
## HOLEMAKING

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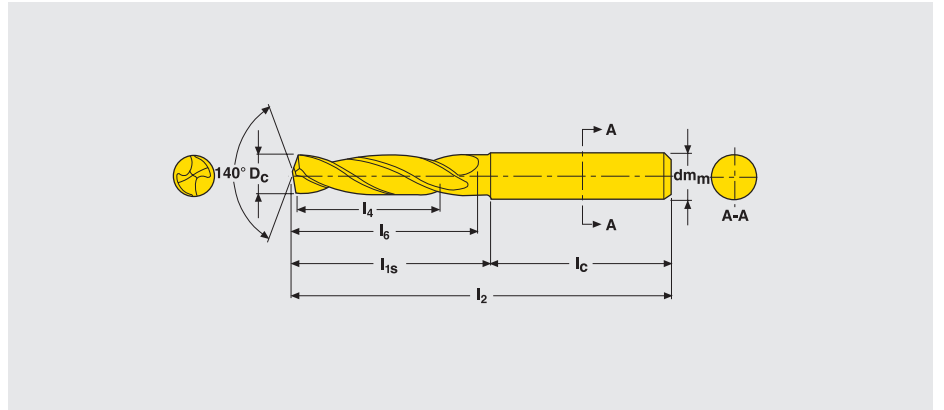


Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A



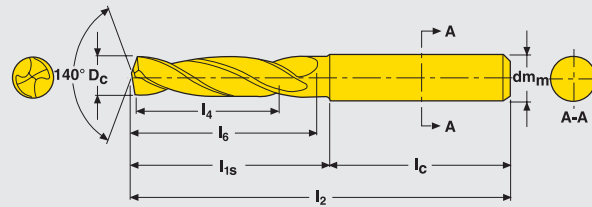
- External coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9



EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00963	DRILL_3.0mm_3xD	3.000	—	—	—	—	14	62	26	36	20	6
N00724	DRILL_3.1mm_3xD	3.100	—	—	—	—	14	62	26	36	20	6
N00926	DRILL_1/8_3xD	3.175	1/8	—	—	—	14	62	26	36	20	6
N00725	DRILL_3.2mm_3xD	3.200	—	—	—	—	14	62	26	36	20	6
N00726	DRILL_3.25mm_3xD	3.250	—	—	—	M3.5	14	62	26	36	20	6
N00727	DRILL_3.3mm_3xD	3.300	—	—	M4	—	14	62	26	36	20	6
N00728	DRILL_3.4mm_3xD	3.400	—	—	—	—	14	62	26	36	20	6
N00729	DRILL_3.5mm_3xD	3.500	—	—	UNC8-32 / MF4X0.5 / UNF8-36	—	14	62	26	36	20	6
N00927	DRILL_9/64_3xD	3.572	9/64	—	—	—	14	62	26	36	20	6
N00732	DRILL_3.6mm_3xD	3.600	—	—	—	—	14	62	26	36	20	6
N00733	DRILL_3.65mm_3xD	3.650	—	—	—	—	14	62	26	36	20	6
N00734	DRILL_3.7mm_3xD	3.700	—	—	M4.5	M4	14	62	26	36	20	6
N00735	DRILL_3.8mm_3xD	3.800	—	—	—	—	17	66	30	36	24	6
N00736	DRILL_3.9mm_3xD	3.900	—	4H7	UNC10-24	—	17	66	30	36	24	6
N00928	DRILL_5/32_3xD	3.969	5/32	—	—	—	17	66	30	36	24	6
N00737	DRILL_4.0mm_3xD	4.000	—	—	—	—	17	66	30	36	24	6
N00738	DRILL_4.1mm_3xD	4.100	—	—	UNF10-32	—	17	66	30	36	24	6
N00739	DRILL_4.2mm_3xD	4.200	—	—	M5	—	17	66	30	36	24	6
N00742	DRILL_4.3mm_3xD	4.300	—	—	—	—	17	66	30	36	24	6
N00929	DRILL_11/64_3xD	4.366	11/64	—	—	—	17	66	30	36	24	6
N00743	DRILL_4.4mm_3xD	4.400	—	—	UNC12-24 / MF5X0.5	—	17	66	30	36	24	6
N00744	DRILL_4.5mm_3xD	4.500	—	—	UNC12-24 / MF5X0.5	—	17	66	30	36	24	6
N00745	DRILL_4.6mm_3xD	4.600	—	—	—	M5	17	66	30	36	24	6
N00746	DRILL_4.65mm_3xD	4.650	—	—	—	M5	17	66	30	36	24	6
N00747	DRILL_4.7mm_3xD	4.700	—	—	—	—	17	66	30	36	24	6
N00932	DRILL_3/16_3xD	4.763	3/16	—	—	MF5	20	66	30	36	28	6
N00748	DRILL_4.8mm_3xD	4.800	—	—	—	MF5	20	66	30	36	28	6
N00749	DRILL_4.9mm_3xD	4.900	—	5H7	M6	—	20	66	30	36	28	6
N00964	DRILL_5.0mm_3xD	5.000	—	—	UNC1/4-20	—	20	66	30	36	28	6
N00752	DRILL_5.1mm_3xD	5.100	—	—	UNC1/4-20	—	20	66	30	36	28	6
N00933	DRILL_13/64_3xD	5.159	13/64	—	MF6X0.75	—	20	66	30	36	28	6
N00753	DRILL_5.2mm_3xD	5.200	—	—	MF6X0.75	—	20	66	30	36	28	6
N00754	DRILL_5.3mm_3xD	5.300	—	—	—	—	20	66	30	36	28	6
N00755	DRILL_5.4mm_3xD	5.400	—	—	UNF1/4-28	—	20	66	30	36	28	6
N00756	DRILL_5.5mm_3xD	5.500	—	—	UNF1/4-28	—	20	66	30	36	28	6
N00757	DRILL_5.55mm_3xD	5.550	—	—	—	M6	20	66	30	36	28	6
N00934	DRILL_7/32_3xD	5.556	7/32	—	—	—	20	66	30	36	28	6
N00758	DRILL_5.6mm_3xD	5.600	—	—	—	—	20	66	30	36	28	6
N00759	DRILL_5.7mm_3xD	5.700	—	—	—	—	20	66	30	36	28	6
N00762	DRILL_5.8mm_3xD	5.800	—	6H6	—	—	20	66	30	36	28	6
N00763	DRILL_5.9mm_3xD	5.900	—	6H6/6H7	—	—	20	66	30	36	28	6
N00935	DRILL_15/64_3xD	5.953	15/64	—	M7	—	20	66	30	36	28	6

Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A



- External coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

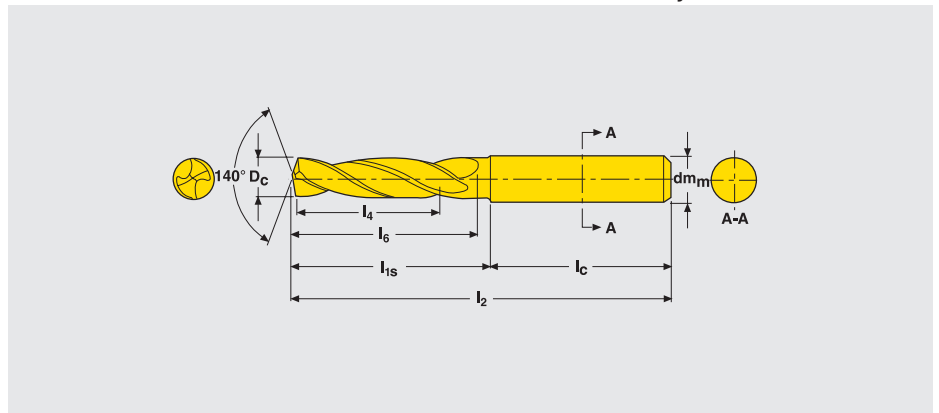
EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							I <sub>4</sub>	I <sub>2</sub>	I <sub>1s</sub>	I <sub>c</sub>	I <sub>6</sub>	dm <sub>m</sub> h6
N00764	DRILL_ 6.0mm_ 3xD	6.000	—	—	NPTF1/16	—	20	66	30	36	28	6
N00765	DRILL_ 6.1mm_ 3xD	6.100	—	—	NPTF1/16	—	24	79	43	36	34	8
N00766	DRILL_ 6.2mm_ 3xD	6.200	—	—	—	—	24	79	43	36	34	8
N00767	DRILL_ 6.3mm_ 3xD	6.300	—	—	—	—	24	79	43	36	34	8
N00936	DRILL_ 1/4_ 3xD	6.350	1/4	—	—	—	24	79	43	36	34	8
N00787	DRILL_ 6.4mm_ 3xD	6.400	—	—	—	—	24	79	43	36	34	8
N00788	DRILL_ 6.5mm_ 3xD	6.500	—	—	UNC5/16-18	—	24	79	43	36	34	8
N00804	DRILL_ 6.6mm_ 3xD	6.600	—	—	UNC5/16-18	—	24	79	43	36	34	8
N00937	DRILL_ 17/64_ 3xD	6.747	17/64	—	—	—	24	79	43	36	34	8
N00805	DRILL_ 6.8mm_ 3xD	6.800	—	7H6	M8	—	24	79	43	36	34	8
N00806	DRILL_ 6.9mm_ 3xD	6.900	—	7H6/7H7	UNF5/16-24	—	24	79	43	36	34	8
N00807	DRILL_ 7.0mm_ 3xD	7.000	—	—	MF8X1	—	24	79	43	36	34	8
N00808	DRILL_ 7.1mm_ 3xD	7.100	—	—	—	—	29	79	43	36	41	8
N00938	DRILL_ 9/32_ 3xD	7.144	9/32	—	—	—	29	79	43	36	41	8
N00809	DRILL_ 7.2mm_ 3xD	7.200	—	—	MF8X0.75	—	29	79	43	36	41	8
N00814	DRILL_ 7.3mm_ 3xD	7.300	—	—	—	—	29	79	43	36	41	8
N00815	DRILL_ 7.4mm_ 3xD	7.400	—	—	—	—	29	79	43	36	41	8
N00816	DRILL_ 7.5mm_ 3xD	7.500	—	—	—	—	29	79	43	36	41	8
N00939	DRILL_ 19/64_ 3xD	7.541	19/64	—	—	—	29	79	43	36	41	8
N00817	DRILL_ 7.55mm_ 3xD	7.550	—	—	—	MF8	29	79	43	36	41	8
N00818	DRILL_ 7.6mm_ 3xD	7.600	—	—	—	—	29	79	43	36	41	8
N00819	DRILL_ 7.7mm_ 3xD	7.700	—	—	—	—	29	79	43	36	41	8
N00824	DRILL_ 7.8mm_ 3xD	7.800	—	8H6	—	—	29	79	43	36	41	8
N00825	DRILL_ 7.9mm_ 3xD	7.900	—	—	—	—	29	79	43	36	41	8
N00942	DRILL_ 5/16_ 3xD	7.938	5/16	—	—	—	29	79	43	36	41	8
N00826	DRILL_ 8.0mm_ 3xD	8.000	—	—	UNC3/8-16	—	29	79	43	36	41	8
N00827	DRILL_ 8.1mm_ 3xD	8.100	—	—	—	—	35	89	49	40	47	10
N00828	DRILL_ 8.2mm_ 3xD	8.200	—	—	—	—	35	89	49	40	47	10
N00829	DRILL_ 8.3mm_ 3xD	8.300	—	—	—	—	35	89	49	40	47	10
N00943	DRILL_ 21/64_ 3xD	8.334	21/64	—	—	—	35	89	49	40	47	10
N00834	DRILL_ 8.4mm_ 3xD	8.400	—	—	NPT1/8 / NPTF1/8	—	35	89	49	40	47	10
N00835	DRILL_ 8.5mm_ 3xD	8.500	—	—	M10	—	35	89	49	40	47	10
N00836	DRILL_ 8.6mm_ 3xD	8.600	—	—	—	—	35	89	49	40	47	10
N00837	DRILL_ 8.7mm_ 3xD	8.700	—	—	—	—	35	89	49	40	47	10
N00944	DRILL_ 11/32_ 3xD	8.731	11/32	—	—	—	35	89	49	40	47	10
N00838	DRILL_ 8.8mm_ 3xD	8.800	—	9H6	G1/8 / MF10X1.25	—	35	89	49	40	47	10
N00839	DRILL_ 8.9mm_ 3xD	8.900	—	9H6/9H7	—	—	35	89	49	40	47	10
N00842	DRILL_ 9.0mm_ 3xD	9.000	—	—	MF10X1	—	35	89	49	40	47	10
N00843	DRILL_ 9.1mm_ 3xD	9.100	—	—	—	—	35	89	49	40	47	10
N00945	DRILL_ 23/64_ 3xD	9.128	23/64	—	—	—	35	89	49	40	47	10
N00844	DRILL_ 9.2mm_ 3xD	9.200	—	—	MF10X0.75	—	35	89	49	40	47	10
N00845	DRILL_ 9.3mm_ 3xD	9.300	—	—	—	—	35	89	49	40	47	10

Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A



- External coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9



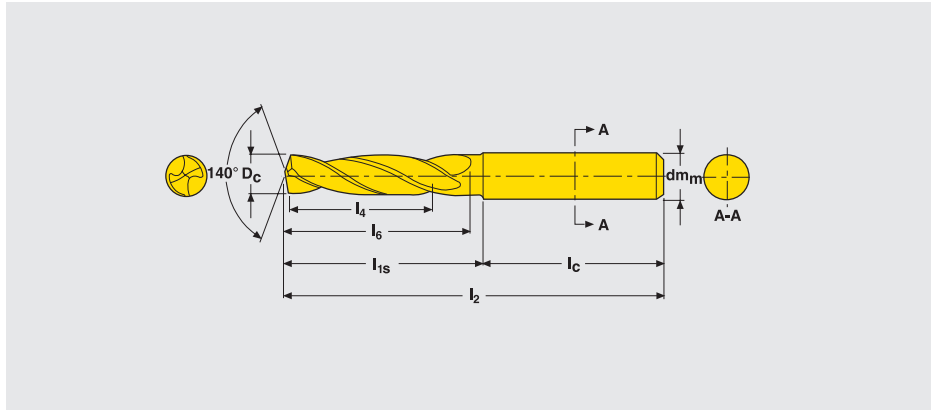
EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00846	DRILL_9.4mm_3xD	9.400	—	—	UNC7/16-14	—	35	89	49	40	47	10
N00847	DRILL_9.5mm_3xD	9.500	—	—	—	—	35	89	49	40	47	10
N00946	DRILL_3/8_3xD	9.525	3/8	—	—	—	35	89	49	40	47	10
N00848	DRILL_9.55mm_3xD	9.550	—	—	—	MF10	35	89	49	40	47	10
N00849	DRILL_9.6mm_3xD	9.600	—	—	—	—	35	89	49	40	47	10
N00852	DRILL_9.7mm_3xD	9.700	—	—	—	—	35	89	49	40	47	10
N00853	DRILL_9.8mm_3xD	9.800	—	10H6/10H7	—	—	35	89	49	40	47	10
N00854	DRILL_9.9mm_3xD	9.900	—	10H6/10H7	UNF7/16-20	—	35	89	49	40	47	10
N00947	DRILL_25/64_3xD	9.922	25/64	—	—	—	35	89	49	40	47	10
N00855	DRILL_10.0mm_3xD	10.000	—	—	—	—	35	89	49	40	47	10
N00856	DRILL_10.2mm_3xD	10.200	—	—	M12	—	40	102	57	45	55	12
N00948	DRILL_13/32_3xD	10.319	13/32	—	—	—	40	102	57	45	55	12
N00857	DRILL_10.4mm_3xD	10.400	—	—	—	—	40	102	57	45	55	12
N00858	DRILL_10.5mm_3xD	10.500	—	—	MF12X1.5	—	40	102	57	45	55	12
N00859	DRILL_10.6mm_3xD	10.600	—	—	—	—	40	102	57	45	55	12
N00949	DRILL_27/64_3xD	10.716	27/64	—	—	—	40	102	57	45	55	12
N00862	DRILL_10.8mm_3xD	10.800	—	11H6/11H7	UNC1/2-13 / MF12X1.25	—	40	102	57	45	55	12
N00863	DRILL_10.9mm_3xD	10.900	—	11H6/11H7	—	—	40	102	57	45	55	12
N00864	DRILL_11.0mm_3xD	11.000	—	—	MF12X1 / NPTF1/4	—	40	102	57	45	55	12
N00865	DRILL_11.1mm_3xD	11.100	—	—	NPT1/4	—	40	102	57	45	55	12
N00952	DRILL_7/16_3xD	11.113	7/16	—	—	—	40	102	57	45	55	12
N00866	DRILL_11.2mm_3xD	11.200	—	—	—	M12	40	102	57	45	55	12
N00867	DRILL_11.3mm_3xD	11.300	—	—	—	—	40	102	57	45	55	12
N00868	DRILL_11.4mm_3xD	11.400	—	—	—	—	40	102	57	45	55	12
N00869	DRILL_11.5mm_3xD	11.500	—	—	UNF1/2-20	—	40	102	57	45	55	12
N00953	DRILL_29/64_3xD	11.509	29/64	—	—	—	40	102	57	45	55	12
N00872	DRILL_11.55mm_3xD	11.550	—	—	—	MF12	40	102	57	45	55	12
N00873	DRILL_11.6mm_3xD	11.600	—	—	—	—	40	102	57	45	55	12
N00874	DRILL_11.7mm_3xD	11.700	—	—	—	—	40	102	57	45	55	12
N00875	DRILL_11.8mm_3xD	11.800	—	12H6/12H7	G1/4	—	40	102	57	45	55	12
N00876	DRILL_11.9mm_3xD	11.900	—	12 H6/12 H7	—	—	40	102	57	45	55	12
N00954	DRILL_15/32_3xD	11.906	15/32	—	—	—	40	102	57	45	55	12
N00877	DRILL_12.0mm_3xD	12.000	—	—	M14	—	40	102	57	45	55	12
N00965	DRILL_12.1mm x 3xD	12.100	—	—	—	—	43	107	62	45	60	14
N00878	DRILL_12.2mm_3xD	12.200	—	—	—	—	43	107	62	45	60	14
N00955	DRILL_31/64_3xD	12.303	31/64	—	—	—	43	107	62	45	60	14
N00879	DRILL_12.4mm_3xD	12.400	—	—	—	—	43	107	62	45	60	14
N00882	DRILL_12.5mm_3xD	12.500	—	—	MF14X1.5	—	43	107	62	45	60	14
N00883	DRILL_12.6mm_3xD	12.600	—	—	—	—	43	107	62	45	60	14
N00956	DRILL_1/2_3xD	12.700	1/2	—	—	—	43	107	62	45	60	14
N00884	DRILL_12.75mm_3xD	12.750	—	—	—	—	43	107	62	45	60	14
N00885	DRILL_12.8mm_3xD	12.800	—	13H6/13H7	MF14X1.25	—	43	107	62	45	60	14

Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A



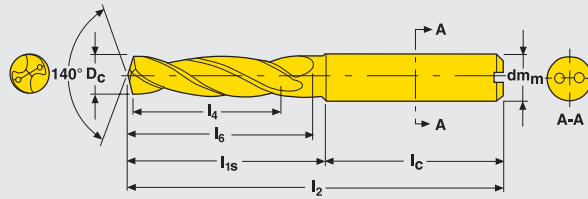
- External coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9



EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00886	DRILL_12.9mm_3xD	12.900	—	13H6/13H7	—	—	43	107	62	45	60	14
N00887	DRILL_13.0mm_3xD	13.000	—	—	MF14X1	—	43	107	62	45	60	14
N00888	DRILL_33/64_3xD	13.100	33/64	—	—	M14	43	107	62	45	60	14
N00889	DRILL_13.2mm_3xD	13.200	—	—	—	—	43	107	62	45	60	14
N00892	DRILL_13.3mm_3xD	13.300	—	—	—	—	43	107	62	45	60	14
N00893	DRILL_13.4mm_3xD	13.400	—	—	—	—	43	107	62	45	60	14
N00957	DRILL_17/32_3xD	13.494	17/32	—	—	—	43	107	62	45	60	14
N00894	DRILL_13.5mm_3xD	13.500	—	—	—	—	43	107	62	45	60	14
N00895	DRILL_13.6mm_3xD	13.600	—	—	—	—	43	107	62	45	60	14
N00896	DRILL_13.7mm_3xD	13.700	—	—	—	—	43	107	62	45	60	14
N00897	DRILL_13.8mm_3xD	13.800	—	14H6/14H7	—	—	43	107	62	45	60	14
N00898	DRILL_35/64_3xD	13.890	35/64	14H6/14H7	—	—	43	107	62	45	60	14
N00899	DRILL_14.0mm_3xD	14.000	—	—	—	—	43	107	62	45	60	14
N00902	DRILL_14.2mm_3xD	14.200	—	—	—	M16	45	115	67	48	65	16
N00958	DRILL_9/16_3xD	14.288	9/16	—	—	—	45	115	67	48	65	16
N00903	DRILL_14.5mm_3xD	14.500	—	—	MF16X1.5 / UNF5/8-18	—	45	115	67	48	65	16
N00904	DRILL_37/64_3xD	14.680	37/64	—	—	—	45	115	67	48	65	16
N00905	DRILL_14.75mm_3xD	14.750	—	—	—	—	45	115	67	48	65	16
N00906	DRILL_14.8mm_3xD	14.800	—	15 H6/15 H7	—	—	45	115	67	48	65	16
N00907	DRILL_15.0mm_3xD	15.000	—	—	MF16X1	—	45	115	67	48	65	16
N00908	DRILL_15.1mm_3xD	15.100	—	—	—	M16	45	115	67	48	65	16
N00909	DRILL_15.3mm_3xD	15.300	—	—	—	—	45	115	67	48	65	16
N00912	DRILL_39/64_3xD	15.480	39/64	—	M18	—	45	115	67	48	65	16
N00913	DRILL_15.7mm_3xD	15.700	—	—	—	—	45	115	67	48	65	16
N00914	DRILL_15.8mm_3xD	15.800	—	16H6/16H7	—	—	45	115	67	48	65	16
N00959	DRILL_5/8_3xD	15.875	5/8	16H6/16H7	—	—	45	115	67	48	65	16
N00915	DRILL_16.0mm_3xD	16.000	—	—	—	—	45	115	67	48	65	16
N00916	DRILL_16.5mm_3xD	16.500	—	—	MF18X1.5	—	51	123	75	48	73	18
N00917	DRILL_17.0mm_3xD	17.000	—	—	MF18X1	—	51	123	75	48	73	18
N00918	DRILL_11/16_3xD	17.460	11/16	—	M20	—	51	123	75	48	73	18
N00919	DRILL_18.0mm_3xD	18.000	—	—	—	—	51	123	75	48	73	18
N00922	DRILL_18.5mm_3xD	18.500	—	—	MF20X1.5	—	55	131	81	50	79	20
N00923	DRILL_19.0mm_3xD	19.000	—	—	G1/2 / MF20X1	—	55	131	81	50	79	20
N00962	DRILL_3/4_3xD	19.050	3/4	—	—	—	55	131	81	50	79	20
N00924	DRILL_49/64_3xD	19.447	49/64	—	M22	—	55	131	81	50	79	20
N00925	DRILL_20.0mm_3xD	20.000	—	—	—	—	55	131	81	50	79	20

Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A



- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00453	DRILL_3.0mm_3xD_A	3.000	—	—	—	—	14	62	26	36	20	6
N00525	DRILL_3.1mm_3xD_A	3.100	—	—	—	—	14	62	26	36	20	6
N00687	DRILL_1/8_3xD_A	3.175	1/8	—	—	—	14	62	26	36	20	6
N00526	DRILL_3.2mm_3xD_A	3.200	—	—	—	—	14	62	26	36	20	6
N00527	DRILL_3.25mm_3xD_A	3.250	—	—	—	M3.5	14	62	26	36	20	6
N00528	DRILL_3.3mm_3xD_A	3.300	—	—	M4	—	14	62	26	36	20	6
N00529	DRILL_3.4mm_3xD_A	3.400	—	—	—	—	14	62	26	36	20	6
N00532	DRILL_3.5mm_3xD_A	3.500	—	—	UNC8-32 / MF4X0.5 / UNF8-36	—	14	62	26	36	20	6
N00688	DRILL_9/64_3xD_A	3.572	9/64	—	—	—	14	62	26	36	20	6
N00533	DRILL_3.6mm_3xD_A	3.600	—	—	—	—	14	62	26	36	20	6
N00534	DRILL_3.65mm_3xD_A	3.650	—	—	—	—	14	62	26	36	20	6
N00535	DRILL_3.7mm_3xD_A	3.700	—	—	M4.5	M4	14	62	26	36	20	6
N00536	DRILL_3.8mm_3xD_A	3.800	—	—	—	—	17	66	30	36	24	6
N00537	DRILL_3.9mm_3xD_A	3.900	—	4H7	UNC10-24	—	17	66	30	36	24	6
N00689	DRILL_5/32_3xD_A	3.969	5/32	—	—	—	17	66	30	36	24	6
N00538	DRILL_4.0mm_3xD_A	4.000	—	—	—	—	17	66	30	36	24	6
N00539	DRILL_4.1mm_3xD_A	4.100	—	—	UNF10-32	—	17	66	30	36	24	6
N00542	DRILL_4.2mm_3xD_A	4.200	—	—	M5	—	17	66	30	36	24	6
N00543	DRILL_4.3mm_3xD_A	4.300	—	—	—	—	17	66	30	36	24	6
N00692	DRILL_11/64_3xD_A	4.366	11/64	—	—	—	17	66	30	36	24	6
N00545	DRILL_4.5mm_3xD_A	4.500	—	—	—	—	17	66	30	36	24	6
N00546	DRILL_4.6mm_3xD_A	4.600	—	—	—	—	17	66	30	36	24	6
N00547	DRILL_4.65mm_3xD_A	4.650	—	—	—	M5	17	66	30	36	24	6
N00548	DRILL_4.7mm_3xD_A	4.700	—	—	—	—	17	66	30	36	24	6
N00693	DRILL_3/16_3xD_A	4.763	3/16	—	—	—	20	66	30	36	28	6
N00549	DRILL_4.8mm_3xD_A	4.800	—	—	—	MF5	20	66	30	36	28	6
N00552	DRILL_4.9mm_3xD_A	4.900	—	5H7	—	—	20	66	30	36	28	6
N00424	DRILL_5.0mm_3xD_A	5.000	—	—	M6	—	20	66	30	36	28	6
N00553	DRILL_5.1mm_3xD_A	5.100	—	—	UNC1/4-20	—	20	66	30	36	28	6
N00694	DRILL_13/64_3xD_A	5.159	13/64	—	—	—	20	66	30	36	28	6
N00564	DRILL_5.2mm_3xD_A	5.200	—	—	MF6X0.75	—	20	66	30	36	28	6
N00554	DRILL_5.3mm_3xD_A	5.300	—	—	—	—	20	66	30	36	28	6
N00555	DRILL_5.4mm_3xD_A	5.400	—	—	—	—	20	66	30	36	28	6
N00556	DRILL_5.5mm_3xD_A	5.500	—	—	UNF1/4-28	—	20	66	30	36	28	6
N00557	DRILL_5.55mm_3xD_A	5.550	—	—	—	M6	20	66	30	36	28	6
N00695	DRILL_7/32_3xD_A	5.556	7/32	—	—	—	20	66	30	36	28	6
N00558	DRILL_5.6mm_3xD_A	5.600	—	—	—	—	20	66	30	36	28	6
N00559	DRILL_5.7mm_3xD_A	5.700	—	—	—	—	20	66	30	36	28	6
N00562	DRILL_5.8mm_3xD_A	5.800	—	6H6	—	—	20	66	30	36	28	6
N00563	DRILL_5.9mm_3xD_A	5.900	—	6H6/6H7	—	—	20	66	30	36	28	6
N00696	DRILL_15/64_3xD_A	5.953	15/64	—	—	—	20	66	30	36	28	6
N00565	DRILL_6.0mm_3xD_A	6.000	—	—	M7	—	20	66	30	36	28	6

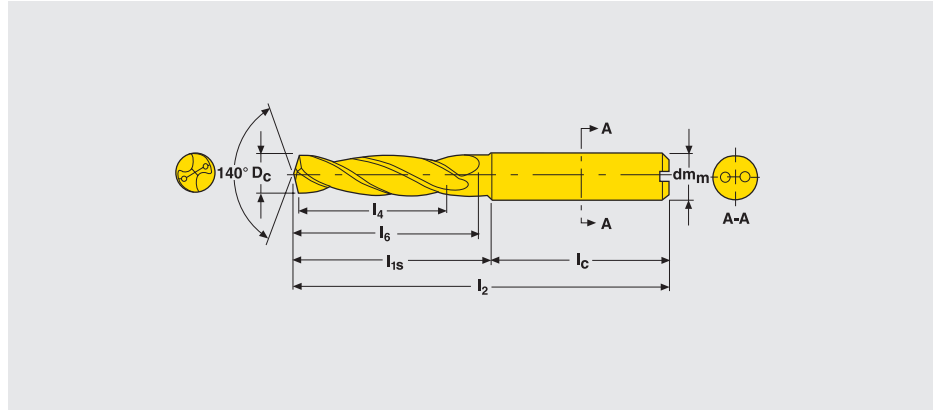


Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A



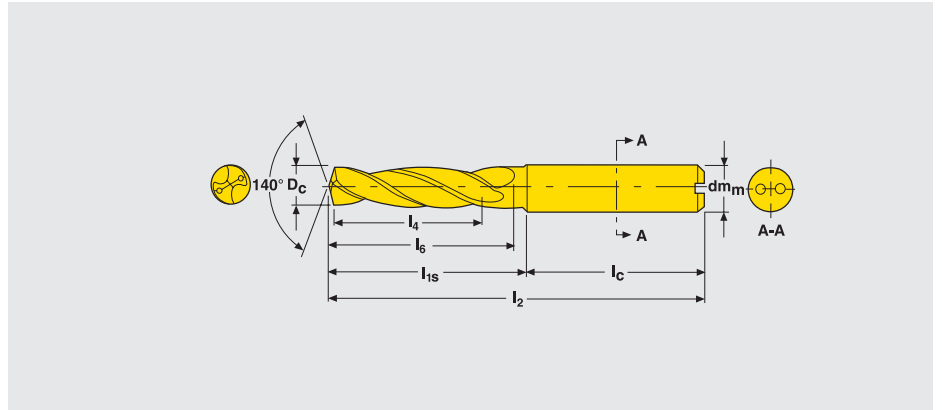
- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9



EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							I <sub>4</sub>	I <sub>2</sub>	I <sub>1s</sub>	I <sub>c</sub>	I <sub>6</sub>	dm <sub>m</sub> h6
N00566	DRILL 6.1mm 3xD_A	6.100	—	—	NPTF1/16	—	24	79	43	36	34	8
N00567	DRILL 6.2mm 3xD_A	6.200	—	—	—	—	24	79	43	36	34	8
N00568	DRILL 6.3mm 3xD_A	6.300	—	—	—	—	24	79	43	36	34	8
N00697	DRILL 1/4 3xD_A	6.350	1/4	—	—	—	24	79	43	36	34	8
N00569	DRILL 6.4mm 3xD_A	6.400	—	—	—	—	24	79	43	36	34	8
N00572	DRILL 6.5mm 3xD_A	6.500	—	—	—	—	24	79	43	36	34	8
N00573	DRILL 6.6mm 3xD_A	6.600	—	—	UNC5/16-18	—	24	79	43	36	34	8
N00544	DRILL 6.7mm 3xD_A	6.700	—	—	—	—	24	79	43	36	34	8
N00698	DRILL 17/64 3xD_A	6.747	17/64	—	—	—	24	79	43	36	34	8
N00574	DRILL 6.8mm 3xD_A	6.800	—	7H6	M8	—	24	79	43	36	34	8
N00575	DRILL 6.9mm 3xD_A	6.900	—	7H6/7H7	UNF5/16-24	—	24	79	43	36	34	8
N00576	DRILL 7.0mm 3xD_A	7.000	—	—	MF8X1	—	24	79	43	36	34	8
N00577	DRILL 7.1mm 3xD_A	7.100	—	—	—	—	29	79	43	36	41	8
N00699	DRILL 9/32 3xD_A	7.144	9/32	—	—	—	29	79	43	36	41	8
N00578	DRILL 7.2mm 3xD_A	7.200	—	—	MF8X0.75	—	29	79	43	36	41	8
N00579	DRILL 7.3mm 3xD_A	7.300	—	—	—	—	29	79	43	36	41	8
N00582	DRILL 7.4mm 3xD_A	7.400	—	—	—	—	29	79	43	36	41	8
N00423	DRILL 7.5mm 3xD_A	7.500	—	—	—	—	29	79	43	36	41	8
N00702	DRILL 19/64 3xD_A	7.541	19/64	—	—	—	29	79	43	36	41	8
N00583	DRILL 7.55mm 3xD_A	7.550	—	—	—	MF8	29	79	43	36	41	8
N00584	DRILL 7.6mm 3xD_A	7.600	—	—	—	—	29	79	43	36	41	8
N00585	DRILL 7.7mm 3xD_A	7.700	—	—	—	—	29	79	43	36	41	8
N00586	DRILL 7.8mm 3xD_A	7.800	—	8H6	—	—	29	79	43	36	41	8
N00587	DRILL 7.9mm 3xD_A	7.900	—	8H6/8H7	—	—	29	79	43	36	41	8
N00703	DRILL 5/16 3xD_A	7.938	5/16	—	—	—	29	79	43	36	41	8
N00588	DRILL 8.0mm 3xD_A	8.000	—	—	UNC3/8-16	—	29	79	43	36	41	8
N00589	DRILL 8.1mm 3xD_A	8.100	—	—	—	—	35	89	49	40	47	10
N00592	DRILL 8.2mm 3xD_A	8.200	—	—	—	—	35	89	49	40	47	10
N00593	DRILL 8.3mm 3xD_A	8.300	—	—	—	—	35	89	49	40	47	10
N00704	DRILL 21/64 3xD_A	8.334	21/64	—	—	—	35	89	49	40	47	10
N00594	DRILL 8.4mm 3xD_A	8.400	—	—	NPT1/8 / NPTF1/8	—	35	89	49	40	47	10
N00595	DRILL 8.5mm 3xD_A	8.500	—	—	M10	—	35	89	49	40	47	10
N00596	DRILL 8.6mm 3xD_A	8.600	—	—	—	—	35	89	49	40	47	10
N00597	DRILL 8.7mm 3xD_A	8.700	—	—	—	—	35	89	49	40	47	10
N00705	DRILL 11/32 3xD_A	8.731	11/32	—	—	—	35	89	49	40	47	10
N00598	DRILL 8.8mm 3xD_A	8.800	—	9H6	G1/8 / MF10X1.25	—	35	89	49	40	47	10
N00599	DRILL 8.9mm 3xD_A	8.900	—	9H6/9H7	—	—	35	89	49	40	47	10
N00602	DRILL 9.0mm 3xD_A	9.000	—	—	MF10X1	—	35	89	49	40	47	10
N00603	DRILL 9.1mm 3xD_A	9.100	—	—	—	—	35	89	49	40	47	10
N00706	DRILL 23/64 3xD_A	9.128	23/64	—	—	—	35	89	49	40	47	10
N00604	DRILL 9.2mm 3xD_A	9.200	—	—	MF10X0.75	—	35	89	49	40	47	10
N00605	DRILL 9.3mm 3xD_A	9.300	—	—	—	—	35	89	49	40	47	10

Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A

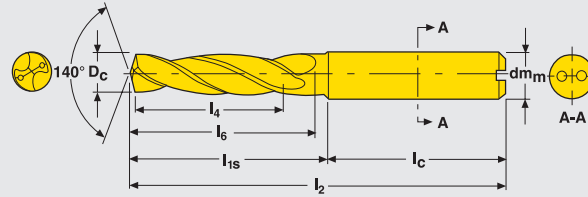


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00606	DRILL 9.4mm 3xD A	9.400	—	—	UNC7/16-14	—	35	89	49	40	47	10
N00607	DRILL 9.5mm 3xD A	9.500	—	—	—	—	35	89	49	40	47	10
N00707	DRILL 3/8 3xD A	9.525	3/8	—	—	—	35	89	49	40	47	10
N00608	DRILL 9.55mm 3xD A	9.550	—	—	—	—	35	89	49	40	47	10
N00609	DRILL 9.6mm 3xD A	9.600	—	—	—	—	35	89	49	40	47	10
N00612	DRILL 9.7mm 3xD A	9.700	—	—	—	—	35	89	49	40	47	10
N00613	DRILL 9.8mm 3xD A	9.800	—	10H6/10H7	UNF7/16-20	—	35	89	49	40	47	10
N00708	DRILL 25/64 3xD A	9.922	25/64	—	—	—	35	89	49	40	47	10
N00614	DRILL 9.9mm 3xD A	9.900	—	10H6/10H7	—	MF10	35	89	49	40	47	10
N00615	DRILL 10.0mm 3xD A	10.000	—	—	—	—	35	89	49	40	47	10
N00616	DRILL 10.2mm 3xD A	10.200	—	—	M12	—	40	102	57	45	55	12
N00709	DRILL 13/32 3xD A	10.319	13/32	—	—	—	40	102	57	45	55	12
N00617	DRILL 10.4mm 3xD A	10.400	—	—	—	—	40	102	57	45	55	12
N00618	DRILL 10.5mm 3xD A	10.500	—	—	MF12X1.5	—	40	102	57	45	55	12
N00619	DRILL 10.6mm 3xD A	10.600	—	—	—	—	40	102	57	45	55	12
N00712	DRILL 27/64 3xD A	10.716	27/64	—	—	—	40	102	57	45	55	12
N00622	DRILL 10.8mm 3xD A	10.800	—	11H6/11H7	UNC1/2-13 / MF12X1.25	—	40	102	57	45	55	12
N00623	DRILL 10.9mm 3xD A	10.900	—	11H6/11H7	—	—	40	102	57	45	55	12
N00624	DRILL 11.0mm 3xD A	11.000	—	—	MF12X1 / NPTF1/4	—	40	102	57	45	55	12
N00625	DRILL 11.1mm 3xD A	11.100	—	—	NPT1/4	—	40	102	57	45	55	12
N00713	DRILL 7/16 3xD A	11.113	7/16	—	—	—	40	102	57	45	55	12
N00626	DRILL 11.2mm 3xD A	11.200	—	—	—	M12	40	102	57	45	55	12
N00627	DRILL 11.3mm 3xD A	11.300	—	—	—	—	40	102	57	45	55	12
N00628	DRILL 11.4mm 3xD A	11.400	—	—	—	—	40	102	57	45	55	12
N00629	DRILL 11.5mm 3xD A	11.500	—	—	UNF1/2-20	—	40	102	57	45	55	12
N00714	DRILL 29/64 3xD A	11.509	29/64	—	—	—	40	102	57	45	55	12
N00632	DRILL 11.55mm 3xD A	11.550	—	—	—	MF12	40	102	57	45	55	12
N00633	DRILL 11.6mm 3xD A	11.600	—	—	—	—	40	102	57	45	55	12
N00634	DRILL 11.7mm 3xD A	11.700	—	—	—	—	40	102	57	45	55	12
N00635	DRILL 11.8mm 3xD A	11.800	—	—	—	—	40	102	57	45	55	12
N00636	DRILL 11.9mm 3xD A	11.900	—	12H6/12H7	G1/4	—	40	102	57	45	55	12
N00715	DRILL 15/32 3xD A	11.906	15/32	12H6/12H7	—	—	40	102	57	45	55	12
N00637	DRILL 12.0mm 3xD A	12.000	—	—	M14	—	40	102	57	45	55	12
N00638	DRILL 12.1mm 3xD A	12.100	—	—	—	—	43	107	62	45	60	14
N00639	DRILL 12.2mm 3xD A	12.200	—	—	—	—	43	107	62	45	60	14
N00716	DRILL 31/64 3xD A	12.303	31/64	—	—	—	43	107	62	45	60	14
N00642	DRILL 12.4mm 3xD A	12.400	—	—	—	—	43	107	62	45	60	14
N00643	DRILL 12.5mm 3xD A	12.500	—	—	MF14X1.5	—	43	107	62	45	60	14
N00644	DRILL 12.6mm 3xD A	12.600	—	—	—	—	43	107	62	45	60	14
N00717	DRILL 1/2 3xD A	12.700	1/2	—	—	—	43	107	62	45	60	14
N00645	DRILL 12.75mm 3xD A	12.750	—	—	—	—	43	107	62	45	60	14
N00646	DRILL 12.8mm 3xD A	12.800	—	13H6/13H7	MF14X1.25	—	43	107	62	45	60	14

Drilling depth ~ 3 x D

Cylindrical shank DIN 6537A

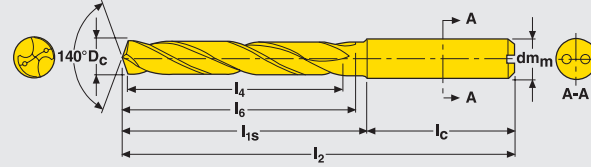


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM						d <sub>m</sub> h6
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>		
N00647	DRILL_12.9mm_3xD_A	12.900	—	13H6/13H7	—	—	43	107	62	45	60	14	
N00648	DRILL_13.0mm_3xD_A	13.000	—	—	MF14X1	—	43	107	62	45	60	14	
N00649	DRILL_33/64_3xD_A	13.100	33/64	—	—	M14	43	107	62	45	60	14	
N00652	DRILL_13.2mm_3xD_A	13.200	—	—	—	—	43	107	62	45	60	14	
N00653	DRILL_13.3mm_3xD_A	13.300	—	—	—	—	43	107	62	45	60	14	
N00654	DRILL_13.4mm_3xD_A	13.400	—	—	—	—	43	107	62	45	60	14	
N00718	DRILL_17/32_3xD_A	13.494	17/32	—	—	—	43	107	62	45	60	14	
N00655	DRILL_13.5mm_3xD_A	13.500	—	—	—	—	43	107	62	45	60	14	
N00656	DRILL_13.6mm_3xD_A	13.600	—	—	—	—	43	107	62	45	60	14	
N00657	DRILL_13.7mm_3xD_A	13.700	—	—	—	—	43	107	62	45	60	14	
N00658	DRILL_13.8mm_3xD_A	13.800	—	14H6/14H7	—	—	43	107	62	45	60	14	
N00659	DRILL_35/64_3xD_A	13.890	35/64	14H6/14H7	—	—	43	107	62	45	60	14	
N00662	DRILL_14.0mm_3xD_A	14.000	—	—	M16	—	43	107	62	45	60	14	
N00663	DRILL_14.2mm_3xD_A	14.200	—	—	—	—	45	115	67	48	65	16	
N00719	DRILL_9/16_3xD_A	14.288	9/16	—	—	—	45	115	67	48	65	16	
N00664	DRILL_14.5mm_3xD_A	14.500	—	—	MF16X1.5 / UNF5/8-18	—	45	115	67	48	65	16	
N00665	DRILL_37/64_3xD_A	14.680	37/64	—	—	—	45	115	67	48	65	16	
N00666	DRILL_14.75mm_3xD_A	14.750	—	—	—	—	45	115	67	48	65	16	
N00667	DRILL_14.8mm_3xD_A	14.800	—	15H6/15H7	—	—	45	115	67	48	65	16	
N00668	DRILL_15.0mm_3xD_A	15.000	—	—	MF16X1	—	45	115	67	48	65	16	
N00669	DRILL_15.1mm_3xD_A	15.100	—	—	—	M16	45	115	67	48	65	16	
N00672	DRILL_15.3mm_3xD_A	15.300	—	—	—	—	45	115	67	48	65	16	
N00673	DRILL_39/64_3xD_A	15.480	39/64	—	M18	—	45	115	67	48	65	16	
N00674	DRILL_15.7mm_3xD_A	15.700	—	—	—	—	45	115	67	48	65	16	
N00675	DRILL_15.8mm_3xD_A	15.800	—	16H6/16H7	—	—	45	115	67	48	65	16	
N00722	DRILL_5/8_3xD_A	15.875	5/8	16H6/16H7	—	—	45	115	67	48	65	16	
N00676	DRILL_16.0mm_3xD_A	16.000	—	—	—	—	45	115	67	48	65	16	
N00677	DRILL_16.5mm_3xD_A	16.500	—	—	MF18X1.5	—	51	123	75	48	73	18	
N00678	DRILL_17.0mm_3xD_A	17.000	—	—	MF18X1	—	51	123	75	48	73	18	
N00679	DRILL_11/16_3xD_A	17.460	11/16	—	M20	—	51	123	75	48	73	18	
N00682	DRILL_18.0mm_3xD_A	18.000	—	—	—	—	51	123	75	48	73	18	
N00683	DRILL_18.5mm_3xD_A	18.500	—	—	MF20X1.5	—	55	131	81	50	79	20	
N00684	DRILL_19.0mm_3xD_A	19.000	—	—	G1/2 / MF20X1	—	55	131	81	50	79	20	
N00723	DRILL_3/4_3xD_A	19.050	3/4	—	—	—	55	131	81	50	79	20	
N00685	DRILL_49/64_3xD_A	19.470	49/64	—	M22	—	55	131	81	50	79	20	
N00686	DRILL_20.0mm_3xD_A	20.000	—	—	—	—	55	131	81	50	79	20	

Drilling depth ~ 5 x D

Cylindrical shank DIN 6537A

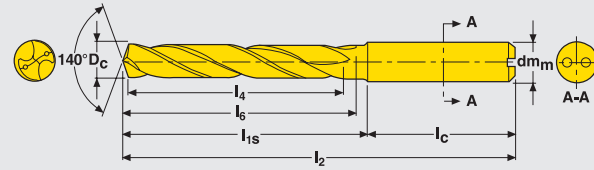


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							I <sub>4</sub>	I <sub>2</sub>	I <sub>1s</sub>	I <sub>3</sub>	I <sub>5</sub>	dm <sub>m</sub> h6
N00966	DRILL 3.0mm 5xD A	3.000	—	—	—	—	23	66	30	36	28	6
N00967	DRILL 3.1mm 5xD A	3.100	—	—	—	—	23	66	30	36	28	6
N12142	DRILL 1/8 5xD A	3.175	1/8	—	—	—	23	66	30	36	28	6
N00968	DRILL 3.2mm 5xD A	3.200	—	—	—	—	23	66	30	36	28	6
N00969	DRILL 3.25mm 5xD A	3.250	—	—	—	M3.5	23	66	30	36	28	6
N00972	DRILL 3.3mm 5xD A	3.300	—	—	M4	—	23	66	30	36	28	6
N00973	DRILL 3.4mm 5xD A	3.400	—	—	—	—	23	66	30	36	28	6
N00974	DRILL 3.5mm 5xD A	3.500	—	—	UNC8-32 / MF4X0.5 / UNF8-36	—	23	66	30	36	28	6
N12143	DRILL 9/64 5xD A	3.572	9/64	—	—	—	23	66	30	36	28	6
N00975	DRILL 3.6mm 5xD A	3.600	—	—	—	—	23	66	30	36	28	6
N00976	DRILL 3.65mm 5xD A	3.650	—	—	—	—	23	66	30	36	28	6
N00977	DRILL 3.7mm 5xD A	3.700	—	—	M4.5	M4	23	66	30	36	28	6
N00978	DRILL 3.8mm 5xD A	3.800	—	—	—	—	29	74	38	36	36	6
N00979	DRILL 3.9mm 5xD A	3.900	—	4H7	UNC10-24	—	29	74	38	36	36	6
N12144	DRILL 5/32 5xD A	3.969	5/32	—	—	—	29	74	38	36	36	6
N00982	DRILL 4.0mm 5xD A	4.000	—	—	—	—	29	74	38	36	36	6
N00983	DRILL 4.1mm 5xD A	4.100	—	—	UNF10-32	—	29	74	38	36	36	6
N00984	DRILL 4.2mm 5xD A	4.200	—	—	M5	—	29	74	38	36	36	6
N00985	DRILL 4.3mm 5xD A	4.300	—	—	—	—	29	74	38	36	36	6
N12145	DRILL 11/64 5xD A	4.366	11/64	—	—	—	29	74	38	36	36	6
N00986	DRILL 4.4mm 5xD A	4.400	—	—	—	—	29	74	38	36	36	6
N00987	DRILL 4.5mm 5xD A	4.500	—	—	UNC12-24 / MF5X0.5	—	29	74	38	36	36	6
N00988	DRILL 4.6mm 5xD A	4.600	—	—	—	—	29	74	38	36	36	6
N00989	DRILL 4.65mm 5xD A	4.650	—	—	—	M5	29	74	38	36	36	6
N00992	DRILL 4.7mm 5xD A	4.700	—	—	—	—	29	74	38	36	36	6
N12146	DRILL 3/16 5xD A	4.763	3/16	—	—	—	35	82	46	36	44	6
N12177	DRILL 4.8mm 5xD A	4.800	—	—	—	MF5	35	82	46	36	44	6
N00993	DRILL 4.9mm 5xD A	4.900	—	5H7	—	—	35	82	46	36	44	6
N00994	DRILL 5.0mm 5xD A	5.000	—	—	M6	—	35	82	46	36	44	6
N00995	DRILL 5.1mm 5xD A	5.100	—	—	UNC1/4-20	—	35	82	46	36	44	6
N12147	DRILL 13/64 5xD A	5.159	13/64	—	—	—	35	82	46	36	44	6
N00996	DRILL 5.2mm 5xD A	5.200	—	—	MF6X0.75	—	35	82	46	36	44	6
N00997	DRILL 5.3mm 5xD A	5.300	—	—	—	—	35	82	46	36	44	6
N00998	DRILL 5.4mm 5xD A	5.400	—	—	—	—	35	82	46	36	44	6
N00999	DRILL 5.5mm 5xD A	5.500	—	—	UNF1/4-28	—	35	82	46	36	44	6
N12178	DRILL 5.55mm 5xD A	5.550	—	—	—	M6	35	82	46	36	44	6
N12148	DRILL 7/32 5xD A	5.556	7/32	—	—	—	35	82	46	36	44	6
N01002	DRILL 5.6mm 5xD A	5.600	—	—	—	—	35	82	46	36	44	6
N01003	DRILL 5.7mm 5xD A	5.700	—	—	—	—	35	82	46	36	44	6
N01004	DRILL 5.8mm 5xD A	5.800	—	6H6	—	—	35	82	46	36	44	6
N01005	DRILL 5.9mm 5xD A	5.900	—	6H6/6H7	—	—	35	82	46	36	44	6
N12149	DRILL 15/64 5xD A	5.953	15/64	—	—	—	35	82	46	36	44	6

Drilling depth ~ 5 x D

Cylindrical shank DIN 6537A

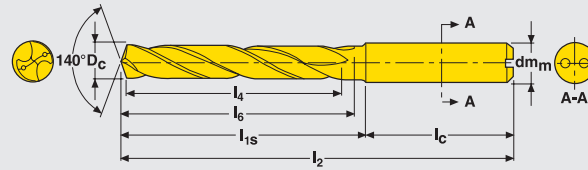


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N01006	DRILL 6.0mm 5xD A	6.000	—	—	M7	—	35	82	46	36	44	6
N01007	DRILL 6.1mm 5xD A	6.100	—	—	NPTF1/16	—	43	91	55	36	53	8
N01008	DRILL 6.2mm 5xD A	6.200	—	—	—	—	43	91	55	36	53	8
N01009	DRILL 6.3mm 5xD A	6.300	—	—	—	—	43	91	55	36	53	8
N12152	DRILL 1/4 5xD A	6.350	1/4	—	—	—	43	91	55	36	53	8
N01012	DRILL 6.4mm 5xD A	6.400	—	—	—	—	43	91	55	36	53	8
N01013	DRILL 6.5mm 5xD A	6.500	—	—	—	—	43	91	55	36	53	8
N01014	DRILL 6.6mm 5xD A	6.600	—	—	UNC5/16-18	—	43	91	55	36	53	8
N01015	DRILL 6.7mm 5xD A	6.700	—	—	—	—	43	91	55	36	53	8
N12153	DRILL 17/64 5xD A	6.747	17/64	—	—	—	43	91	55	36	53	8
N01016	DRILL 6.8mm 5xD A	6.800	—	7H6	M8	—	43	91	55	36	53	8
N01017	DRILL 6.9mm 5xD A	6.900	—	7H6/7H7	UNF5/16-24	—	43	91	55	36	53	8
N01018	DRILL 7.0mm 5xD A	7.000	—	—	MF8X1	—	43	91	55	36	53	8
N01019	DRILL 7.1mm 5xD A	7.100	—	—	—	—	43	91	55	36	53	8
N12154	DRILL 9/32 5xD A	7.144	9/32	—	—	—	43	91	55	36	53	8
N01022	DRILL 7.2mm 5xD A	7.200	—	—	MF8X0.75	—	43	91	55	36	53	8
N01023	DRILL 7.3mm 5xD A	7.300	—	—	—	—	43	91	55	36	53	8
N01024	DRILL 7.4mm 5xD A	7.400	—	—	—	—	43	91	55	36	53	8
N01025	DRILL 7.5mm 5xD A	7.500	—	—	—	—	43	91	55	36	53	8
N12155	DRILL 19/64 5xD A	7.541	19/64	—	—	—	43	91	55	36	53	8
N01026	DRILL 7.55mm 5xD A	7.550	—	—	—	MF8	43	91	55	36	53	8
N01027	DRILL 7.6mm 5xD A	7.600	—	—	—	—	43	91	55	36	53	8
N01028	DRILL 7.7mm 5xD A	7.700	—	—	—	—	43	91	55	36	53	8
N01029	DRILL 7.8mm 5xD A	7.800	—	8H6	—	—	43	91	55	36	53	8
N01032	DRILL 7.9mm 5xD A	7.900	—	8H6/8H7	—	—	43	91	55	36	53	8
N12156	DRILL 5/16 5xD A	7.938	5/16	—	—	—	43	91	55	36	53	8
N01033	DRILL 8.0mm 5xD A	8.000	—	—	UNC3/8-16	—	43	91	55	36	53	8
N01034	DRILL 8.1mm 5xD A	8.100	—	—	—	—	49	103	63	40	61	10
N01035	DRILL 8.2mm 5xD A	8.200	—	—	—	—	49	103	63	40	61	10
N01036	DRILL 8.3mm 5xD A	8.300	—	—	—	—	49	103	63	40	61	10
N12157	DRILL 21/64 5xD A	8.334	21/64	—	—	—	49	103	63	40	61	10
N01037	DRILL 8.4mm 5xD A	8.400	—	—	NPT1/8 / NPTF1/8	—	49	103	63	40	61	10
N01038	DRILL 8.5mm 5xD A	8.500	—	—	M10	—	49	103	63	40	61	10
N01039	DRILL 8.6mm 5xD A	8.600	—	—	—	—	49	103	63	40	61	10
N01042	DRILL 8.7mm 5xD A	8.700	—	—	—	—	49	103	63	40	61	10
N12158	DRILL 11/32 5xD A	8.731	11/32	—	—	—	49	103	63	40	61	10
N01043	DRILL 8.8mm 5xD A	8.800	—	9H6	G1/8 / MF10X1.25	—	49	103	63	40	61	10
N01044	DRILL 8.9mm 5xD A	8.900	—	9H6/9H7	—	—	49	103	63	40	61	10
N01045	DRILL 9.0mm 5xD A	9.000	—	—	MF10X1	—	49	103	63	40	61	10
N01046	DRILL 9.1mm 5xD A	9.100	—	—	—	—	49	103	63	40	61	10
N12159	DRILL 23/64 5xD A	9.128	23/64	—	—	—	49	103	63	40	61	10
N01047	DRILL 9.2mm 5xD A	9.200	—	—	MF10X0.75	—	49	103	63	40	61	10

Drilling depth ~ 5 x D

Cylindrical shank DIN 6537A

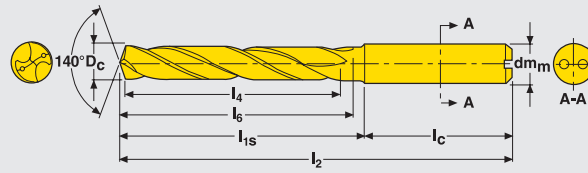


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE*	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N09239	DRILL_9.3mm_5xD_A	9.300	—	—	—	—	49	103	63	40	61	10
N09242	DRILL_9.4mm_5xD_A	9.400	—	—	UNC7/16-14	—	49	103	63	40	61	10
N09243	DRILL_9.5mm_5xD_A	9.500	—	—	—	—	49	103	63	40	61	10
N12162	DRILL_3/8_5xD_A	9.525	3/8	—	—	—	49	103	63	40	61	10
N09244	DRILL_9.55mm_5xD_A	9.550	—	—	—	MF10	49	103	63	40	61	10
N09245	DRILL_9.6mm_5xD_A	9.600	—	—	—	—	49	103	63	40	61	10
N09246	DRILL_9.7mm_5xD_A	9.700	—	—	—	—	49	103	63	40	61	10
N09247	DRILL_9.8mm_5xD_A	9.800	—	10H6/10H7	—	—	49	103	63	40	61	10
N09249	DRILL_9.9mm_5xD_A	9.900	—	10H6/10H7	UNF7/16-20	—	49	103	63	40	61	10
N12163	DRILL_25/64_5xD_A	9.922	25/64	—	—	—	49	103	63	40	61	10
N09252	DRILL_10.0mm_5xD_A	10.000	—	—	—	—	49	103	63	40	61	10
N09253	DRILL_10.1mm_5xD_A	10.100	—	—	—	—	56	118	73	45	71	12
N09254	DRILL_10.2mm_5xD_A	10.200	—	—	M12	—	56	118	73	45	71	12
N09255	DRILL_10.3mm_5xD_A	10.300	—	—	—	—	56	118	73	45	71	12
N12164	DRILL_13/32_5xD_A	10.319	13/32	—	—	—	56	118	73	45	71	12
N09256	DRILL_10.4mm_5xD_A	10.400	—	—	—	—	56	118	73	45	71	12
N09257	DRILL_10.5mm_5xD_A	10.500	—	—	MF12X1.5	—	56	118	73	45	71	12
N09259	DRILL_10.6mm_5xD_A	10.600	—	—	—	—	56	118	73	45	71	12
N09262	DRILL_10.7mm_5xD_A	10.700	—	—	—	—	56	118	73	45	71	12
N12165	DRILL_27/64_5xD_A	10.716	27/64	—	—	—	56	118	73	45	71	12
N09263	DRILL_10.8mm_5xD_A	10.800	—	11H6/11H7	UNC1/2-13 / MF12X1.25	—	56	118	73	45	71	12
N09264	DRILL_10.9mm_5xD_A	10.900	—	11H6/11H7	—	—	56	118	73	45	71	12
N09265	DRILL_11.0mm_5xD_A	11.000	—	—	MF12X1 / NPTF1/4	—	56	118	73	45	71	12
N09266	DRILL_11.1mm_5xD_A	11.100	—	—	NPT1/4	—	56	118	73	45	71	12
N12166	DRILL_7/16_5xD_A	11.113	7/16	—	—	—	56	118	73	45	71	12
N09267	DRILL_11.2mm_5xD_A	11.200	—	—	—	M12	56	118	73	45	71	12
N09269	DRILL_11.3mm_5xD_A	11.300	—	—	—	—	56	118	73	45	71	12
N09272	DRILL_11.4mm_5xD_A	11.400	—	—	—	—	56	118	73	45	71	12
N09273	DRILL_11.5mm_5xD_A	11.500	—	—	UNF1/2-20	—	56	118	73	45	71	12
N12167	DRILL_29/64_5xD_A	11.509	29/64	—	—	—	56	118	73	45	71	12
N09274	DRILL_11.55mm_5xD_A	11.550	—	—	—	MF12	56	118	73	45	71	12
N09275	DRILL_11.6mm_5xD_A	11.600	—	—	—	—	56	118	73	45	71	12
N09276	DRILL_11.7mm_5xD_A	11.700	—	—	—	—	56	118	73	45	71	12
N09277	DRILL_11.8mm_5xD_A	11.800	—	12H6/12H7	G1/4	—	56	118	73	45	71	12
N09279	DRILL_11.9mm_5xD_A	11.900	—	12H6/12H7	—	—	56	118	73	45	71	12
N12168	DRILL_15/32_5xD_A	11.906	15/32	—	—	—	56	118	73	45	71	12
N09282	DRILL_12.0mm_5xD_A	12.000	—	—	M14	—	56	118	73	45	71	12
N09283	DRILL_12.1mm_5xD_A	12.100	—	—	—	—	60	124	79	45	77	14
N09284	DRILL_12.2mm_5xD_A	12.200	—	—	—	—	60	124	79	45	77	14
N09285	DRILL_12.25mm_5xD_A	12.250	—	—	—	—	60	124	79	45	77	14
N12169	DRILL_31/64_5xD_A	12.303	31/64	—	—	—	60	124	79	45	77	14
N09286	DRILL_12.4mm_5xD_A	12.400	—	—	—	—	60	124	79	45	77	14

Drilling depth ~ 5 x D

Cylindrical shank DIN 6537A

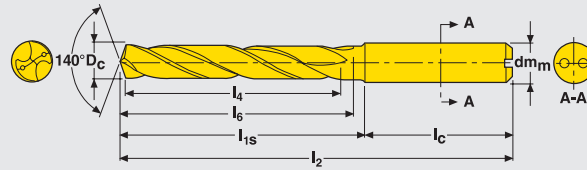


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE*	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N09287	DRILL 12.5mm_5xD_A	12.500	—	—	MF14X1.5	—	60	124	79	45	77	14
N09289	DRILL 12.6mm_5xD_A	12.600	—	—	—	—	60	124	79	45	77	14
N12172	DRILL 1/2_5xD_A	12.700	1/2	—	—	—	60	124	79	45	77	14
N09292	DRILL 12.75mm_5xD_A	12.750	—	—	—	—	60	124	79	45	77	14
N09293	DRILL 12.8mm_5xD_A	12.800	—	13H6/13H7	MF14X1.25	—	60	124	79	45	77	14
N09294	DRILL 12.9mm_5xD_A	12.900	—	13H6/13H7	—	—	60	124	79	45	77	14
N09295	DRILL 13.0mm_5xD_A	13.000	—	—	MF14X1	—	60	124	79	45	77	14
N09296	DRILL 33/64_5xD_A	13.100	33/64	—	—	M14	60	124	79	45	77	14
N09297	DRILL 13.2mm_5xD_A	13.200	—	—	—	—	60	124	79	45	77	14
N09299	DRILL 13.3mm_5xD_A	13.300	—	—	—	—	60	124	79	45	77	14
N09302	DRILL 13.4mm_5xD_A	13.400	—	—	—	—	60	124	79	45	77	14
N12173	DRILL 17/32_5xD_A	13.494	17/32	—	—	—	60	124	79	45	77	14
N09303	DRILL 13.5mm_5xD_A	13.500	—	—	—	—	60	124	79	45	77	14
N09304	DRILL 13.6mm_5xD_A	13.600	—	—	—	—	60	124	79	45	77	14
N09305	DRILL 13.7mm_5xD_A	13.700	—	—	—	—	60	124	79	45	77	14
N09306	DRILL 13.8mm_5xD_A	13.800	—	14H6/14H7	—	—	60	124	79	45	77	14
N09307	DRILL 35/64_5xD_A	13.890	35/64	14H6/14H7	—	—	60	124	79	45	77	14
N09309	DRILL 14.0mm_5xD_A	14.000	—	—	M16	—	60	124	79	45	77	14
N09313	DRILL 14.1mm_5xD_A	14.100	—	—	—	—	63	133	85	48	83	16
N09316	DRILL 14.2mm_5xD_A	14.200	—	—	—	—	63	133	85	48	83	16
N12174	DRILL 9/16_5xD_A	14.288	9/16	—	—	—	63	133	85	48	83	16
N09317	DRILL 14.3mm_5xD_A	14.300	—	—	NPT3/8 / NPTF3/8	—	63	133	85	48	83	16
N09319	DRILL 14.4mm_5xD_A	14.400	—	—	—	—	63	133	85	48	83	16
N09323	DRILL 14.5mm_5xD_A	14.500	—	—	MF16X1.5 / UNF5/8-18	—	63	133	85	48	83	16
N09326	DRILL 14.6mm_5xD_A	14.600	—	—	—	—	63	133	85	48	83	16
N09353	DRILL 37/64_5xD_A	14.680	37/64	—	—	—	63	133	85	48	83	16
N10398	DRILL 14.75mm_5xD_A	14.750	—	—	—	—	63	133	85	48	83	16
N11428	DRILL 14.8mm_5xD_A	14.800	—	15H6/15H7	—	—	63	133	85	48	83	16
N11460	DRILL 14.9mm_5xD_A	14.900	—	15H6/15H7	—	—	63	133	85	48	83	16
N11929	DRILL 15.0mm_5xD_A	15.000	—	—	MF16X1	—	63	133	85	48	83	16
N12077	DRILL 19/32_5xD_A	15.080	19/32	—	—	M16	63	133	85	48	83	16
N12078	DRILL 15.2mm_5xD_A	15.200	—	—	—	—	63	133	85	48	83	16
N12079	DRILL 15.3mm_5xD_A	15.300	—	—	—	—	63	133	85	48	83	16
N12082	DRILL 15.4mm_5xD_A	15.400	—	—	—	—	63	133	85	48	83	16
N12083	DRILL 39/64_5xD_A	15.480	39/64	—	M18	—	63	133	85	48	83	16
N12084	DRILL 15.6mm_5xD_A	15.600	—	—	—	—	63	133	85	48	83	16
N12085	DRILL 15.7mm_5xD_A	15.700	—	—	—	—	63	133	85	48	83	16
N12086	DRILL 15.8mm_5xD_A	15.800	—	16H6/16H7	—	—	63	133	85	48	83	16
N12175	DRILL 5/8_5xD_A	15.875	5/8	16H6/16H7	—	—	63	133	85	48	83	16
N12087	DRILL 15.9mm_5xD_A	15.900	—	16H6/16H7	—	—	63	133	85	48	83	16
N12088	DRILL 16.0mm_5xD_A	16.000	—	—	—	—	63	133	85	48	83	16
N12089	DRILL 16.1mm_5xD_A	16.100	—	—	—	—	71	143	95	48	93	18

Drilling depth ~ 5 x D

Cylindrical shank DIN 6537A

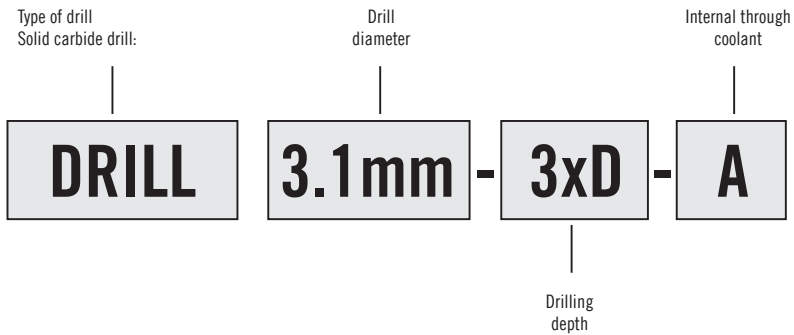


- Internal coolant
- For cutting data see pages 20-23
- Coating: AlCrN
- Hole tolerance: IT8-9

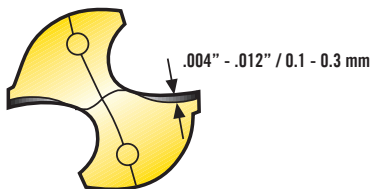
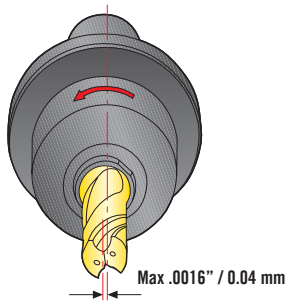
EDP	ANSI DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							I <sub>4</sub>	I <sub>2</sub>	I <sub>1s</sub>	I <sub>c</sub>	I <sub>6</sub>	dm <sub>m</sub> h6
N12092	DRILL_16.2mm_5xD_A	16.200	—	—	—	—	71	143	95	48	93	18
N12093	DRILL_41/64_5xD_A	16.270	41/64	—	—	—	71	143	95	48	93	18
N12094	DRILL_16.4mm_5xD_A	16.400	—	—	—	—	71	143	95	48	93	18
N12095	DRILL_16.5mm_5xD_A	16.500	—	—	MF18X1.5	—	71	143	95	48	93	18
N12096	DRILL_16.6mm_5xD_A	16.600	—	—	—	—	71	143	95	48	93	18
N12097	DRILL_21/32_5xD_A	16.670	21/32	—	—	—	71	143	95	48	93	18
N12098	DRILL_16.75mm_5xD_A	16.750	—	—	—	—	71	143	95	48	93	18
N12099	DRILL_16.8mm_5xD_A	16.800	—	17H6/17H7	—	—	71	143	95	48	93	18
N12102	DRILL_16.9mm_5xD_A	16.900	—	17H6/17H7	—	—	71	143	95	48	93	18
N12103	DRILL_17.0mm_5xD_A	17.000	—	—	MF18X1	—	71	143	95	48	93	18
N12104	DRILL_43/64_5xD_A	17.070	43/64	—	—	—	71	143	95	48	93	18
N12105	DRILL_17.2mm_5xD_A	17.200	—	—	—	—	71	143	95	48	93	18
N12106	DRILL_17.3mm_5xD_A	17.300	—	—	—	—	71	143	95	48	93	18
N12107	DRILL_17.4mm_5xD_A	17.400	—	—	—	—	71	143	95	48	93	18
N12108	DRILL_11/16_5xD_A	17.460	11/16	—	M20	—	71	143	95	48	93	18
N12109	DRILL_17.6mm_5xD_A	17.600	—	—	NPTF1/2	—	71	143	95	48	93	18
N12112	DRILL_17.7mm_5xD_A	17.700	—	—	—	—	71	143	95	48	93	18
N12113	DRILL_17.8mm_5xD_A	17.800	—	18H6/18H7	—	—	71	143	95	48	93	18
N12114	DRILL_45/64_5xD_A	17.860	45/64	18H6/18H7	NPT1/2	—	71	143	95	48	93	18
N12115	DRILL_18.0mm_5xD_A	18.000	—	—	—	—	71	143	95	48	93	18
N12116	DRILL_18.1mm_5xD_A	18.100	—	—	—	—	77	153	103	50	101	20
N12117	DRILL_18.2mm_5xD_A	18.200	—	—	—	—	77	153	103	50	101	20
N12118	DRILL_23/32_5xD_A	18.260	23/32	—	—	—	77	153	103	50	101	20
N12119	DRILL_18.4mm_5xD_A	18.400	—	—	—	—	77	153	103	50	101	20
N12122	DRILL_18.5mm_5xD_A	18.500	—	—	MF20X1.5	—	77	153	103	50	101	20
N12123	DRILL_18.6mm_5xD_A	18.600	—	—	—	—	77	153	103	50	101	20
N12124	DRILL_47/64_5xD_A	18.650	47/64	—	—	—	77	153	103	50	101	20
N12125	DRILL_18.8mm_5xD_A	18.800	—	19H6/19H7	—	—	77	153	103	50	101	20
N12126	DRILL_18.9mm_5xD_A	18.900	—	19H6/19H7	—	M20	77	153	103	50	101	20
N12127	DRILL_19.0mm_5xD_A	19.000	—	—	G1/2 / MF20X1	—	77	153	103	50	101	20
N12176	DRILL_3/4_5xD_A	19.050	3/4	—	—	—	77	153	103	50	101	20
N12128	DRILL_19.1mm_5xD_A	19.100	—	—	—	—	77	153	103	50	101	20
N12129	DRILL_19.2mm_5xD_A	19.200	—	—	—	—	77	153	103	50	101	20
N12132	DRILL_19.3mm_5xD_A	19.300	—	—	—	—	77	153	103	50	101	20
N12133	DRILL_19.4mm_5xD_A	19.400	—	—	—	—	77	153	103	50	101	20
N12134	DRILL_49/64_5xD_A	19.450	49/64	—	M22	—	77	153	103	50	101	20
N12135	DRILL_19.6mm_5xD_A	19.600	—	—	—	—	77	153	103	50	101	20
N12136	DRILL_19.7mm_5xD_A	19.700	—	—	—	—	77	153	103	50	101	20
N12137	DRILL_19.8mm_5xD_A	19.800	—	20H6/20H7	—	—	77	153	103	50	101	20
N12138	DRILL_25/32_5xD_A	19.840	25/32	20H6/20H7	—	—	77	153	103	50	101	20
N12139	DRILL_20.0mm_5xD_A	20.000	—	—	—	—	77	153	103	50	101	20



## Code key Niagara Cutter Universal



## SET UP



### HOLDING/RUN-OUT

Drills with cylindrical shanks can be used with Shrinkfit holders, hydraulic chucks or collet chucks. For best results keep run-out < .0008" / .02 mm. Keep the total indicated run-out of the drill within Max .0016" / .04 mm.

### STABILITY

The stability of the application is important to obtain the best tool life and hole accuracy. Check the condition of the machine spindle, fixture and fixturing of the component to secure maximum stability and rigidity. Unstable conditions can cause tool breakages.

### TOOL LIFE

Drills should not be used with flank wear exceeding .004" - .012" / 0.1 - 0.3 mm measured at the largest point.

### RECOMMENDED TOOL HOLDERS

For best result use holders:

Type 5603 - Shrinkfit holders, DIN type

Type 5834 - Hydraulic chucks

Type 5672 - High precision collet chucks

For more information see EPB Tooling systems catalog

### SHRINKFIT HOLDER

(For cylindrical, R1 shanks only)



### HYDRAULIC CHUCK

(For cylindrical, -R1 shanks only)



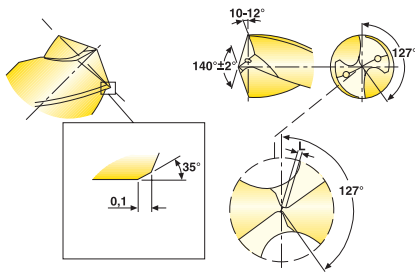
### HIGH PRECISION COLLET CHUCKS

(For cylindrical, -R1 shanks only)



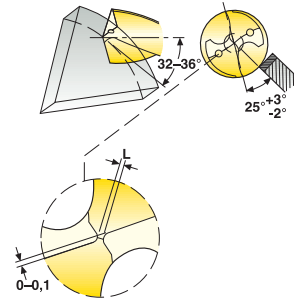
## Regrinding instructions for ND1103, ND1103A and ND1105A

### 1. FOUR FACET POINT



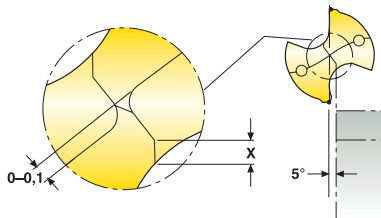
Lip height distance (axial run-out) to be within 0.02 mm

### 2. WEB THINNING



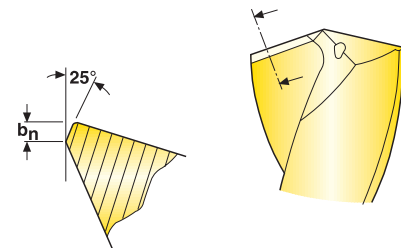
Drill $\varnothing D_c$ (mm)	L (mm)
2-10	0.1-0.3
10-20	0.2-0.4

### 3. GRINDING OF FLAT X



$X = 0,08 \times \text{drill diameter } D_c$

### 4. EDGE PREPARATION



Workpiece material	$b_n$ (mm)	
	Drill $\varnothing \leq 10$ (mm)	Drill $\varnothing > 10$ (mm)
Steel	0.05	0.10
Stainless steel	0.05	0.05
Cast iron	0.05	0.10

Max. allowed flank wear before regrinding is 0.1-0.3 mm / .004"-0.012" measured at the largest point.

## SPECIFICATIONS

Proposed specification of diamond wheels:

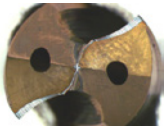
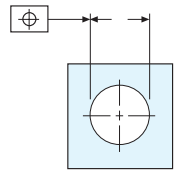
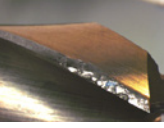
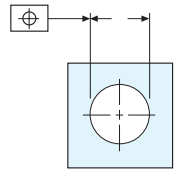

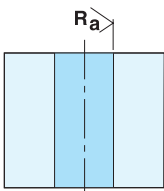

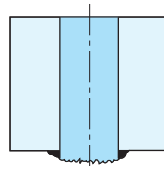
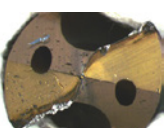
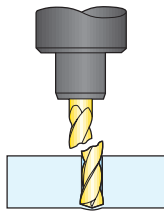
- Conical clearance: Wheel shape 12A2 Grit size D54 (picture 1)
- Gashing: Wheel shape 1A1 or 1V1 Grit size D64-D46 (picture 2-3)
- Corner chamfer: Wheel shape 1A1 or 12A2 (picture 1)
- Edge treatment: grinding K-land or brushing (picture 4)

## IMPORTANT:

- The cutting edges must be uniform and have the same size of edge preparation
- The edge preparation must be applied on the whole length of the cutting edges

## TROUBLESHOOTING – INITIAL CHECK POINTS:

- Fixturing stability
- Machine spindle condition
- Tool holder condition
- Clamping of tool:
  - Run-out within .02 mm / .0008" TIR
  - If using pre drilling within .04 mm / .0016" TIR
- Chip evacuation:
  - Cutting data
- Coolant:
  - Pressure
  - Flow
  - Concentration

<p><b>RAPID FLANK WEAR</b></p> <ul style="list-style-type: none"> <li>• Reduce the cutting speed</li> <li>• Increase coolant concentration</li> </ul> 	<p><b>UNSATISFACTORY DIAMETER TOLERANCE</b></p> <ul style="list-style-type: none"> <li>• Increase the feed/rev</li> <li>• Use a reaming operation</li> <li>• Use a boring operation</li> </ul> 
<p><b>WEAR / PERIPHERY LAND</b></p> <ul style="list-style-type: none"> <li>• Reduce the cutting speed</li> <li>• Increase coolant concentration</li> </ul> 	<p><b>UNSATISFACTORY POSITIONING OF THE HOLE</b></p> <ul style="list-style-type: none"> <li>• Reduce feed/rev on entrance / Reduce feed/rev</li> <li>• Use a boring operation</li> <li>• If drilling through rough, hard and angled surfaces - reduce the feed by 30%-50% during entrance and exit</li> <li>• Center drill with a 140° point angle</li> </ul> 
<p><b>CHIPPING / CENTER</b></p> <ul style="list-style-type: none"> <li>• Reduce feed during entrance</li> <li>• Increase coolant pressure and adjust the feed to optimize the chip formation</li> </ul> 	<p><b>UNSATISFACTORY SURFACE FINISH</b></p> <ul style="list-style-type: none"> <li>• Reduce the feed/rev</li> <li>• Increase the cutting speed</li> <li>• Use a reaming operation</li> </ul> 
<p><b>CHIPPING / OUTER CORNER, CUTTING EDGE</b></p> <ul style="list-style-type: none"> <li>• Reduce feed during entrance/exit</li> <li>• Reduce the cutting speed</li> <li>• Increase coolant concentration</li> <li>• Regrind the drill</li> </ul> 	<p><b>BURRS ON EXIT</b></p> <ul style="list-style-type: none"> <li>• Reduce the feed/rev. on exit</li> <li>• Reduce the width of edge preparation (<math>b_r</math>)</li> </ul> 
<p><b>BUILT-UP EDGE</b></p> <ul style="list-style-type: none"> <li>• If closer to the periphery increase the cutting speed</li> <li>• If closer to center increase feed/rev</li> <li>• If the drill is worn, regrind it</li> </ul> 	<p><b>BREAKAGE ON CONTACT / AT HOLE BOTTOM</b></p> <ul style="list-style-type: none"> <li>• Reduce the feed/rev. during entrance/exit</li> <li>• Adjust cutting data for improved chip evacuation</li> </ul> 

SMG v2 is the foundation for a new and accurate way of organizing work materials and choosing the correct speed, feed rate and depth of cut for any work material and any Niagara tool. In addition to using a greater number of work material groups compared to our previous system, SMG v2 also incorporates a reference material - or standard - for each group. The machinability of all other materials within that group can be compared to the standard, allowing for adjustments to the cutting data and accounting for the unique characteristics of each material.

## THE USE OF SMG v2 IS ILLUSTRATED BELOW

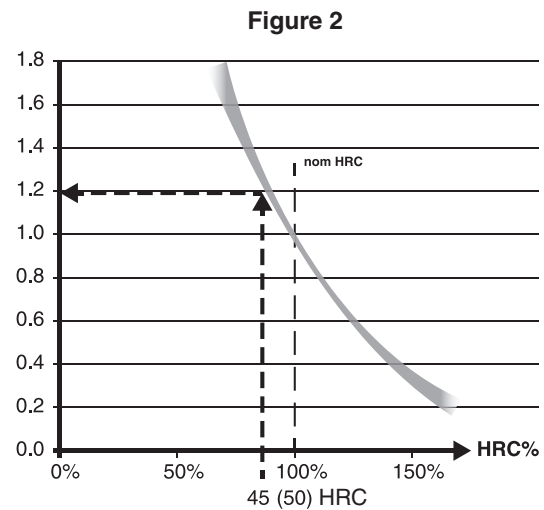
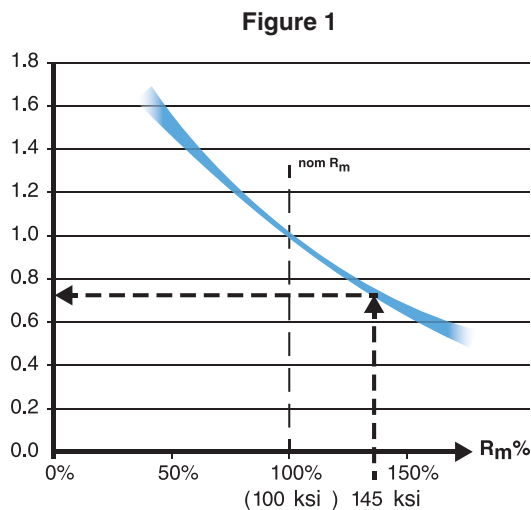
As shown in Table I, the reference material for work material group P4 is 1045, for P5 it is 4140 steel and for H5 it is 4140 hardened to 50 HRC. 4140 steel is available in a wide variety of hardness and tensile strengths. It will be expected that the machinability will vary with these properties.

SMG	DESCRIPTION	PROPERTIES (KSI)	REFERENCE	SMG	DESCRIPTION	PROPERTIES	REFERENCE
P4	Low alloy general structural steels, 0.25% < C < 0.67%wt	75 < UTS < 175	1045 UTS = 95 ksi	H5	Quenched & Tempered steels	38 < HRC < 56	4140 50 HRC
	Low alloy Quench & Temper steels						
P5	Structural steels, 0.25% < C < 0.67%wt Quench & Temper steels	80 < UTS < 175	4140 UTS = 100 ksi				

Table II gives some examples of 4140 in different conditions.

SMG	EN	W.-Nr	AFNOR	BS	UNI	JIS	AISI / ASTM	GOST	CONDITION	UTS (ksi)	HRC <sub>nom</sub>
P5	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Annealed	100	
	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Quenched & Tempered	145	
H5	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Quenched & Tempered		45
	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Quenched & Tempered		50

The graphs indicate how the speed recommendation for a specific material can be adjusted to account for the different properties of the steel. As an example, consider 4140 with a tensile strength (UTS) of 145 ksi. The standard material for SMG P5 is 4140 steel with a tensile strength of 100 ksi. Since the material of interest is 45% stronger, the cutting speed will have to be reduced. Following the black arrows in Figure 1, it can be seen that a speed 75% of that recommended for 4140 at 100 ksi should be used. So if a cutting speed of 900 sf/min is suggested for a tool of interest when machining 4140 at 100 ksi, a speed of 675 sf/min (900 X 0.75) should be used if the 4140 has a tensile strength of 145 ksi.



If the 4140 is quenched and tempered to a hardness of 45 HRC, an accurate cutting speed can be obtained by using Figure 2. The standard material for SMG H5 is 4140 heat treated to a hardness of 50 HRC. Logically, a softer material, in this case 45 HRC, can be machined at a higher speed. Since the hardness, 45 HRC, is 90% that of the standard material, Figure 2 shows a speed 120% that of the standard could be used. If a speed of 200 sfpm is recommended when machining 4140 at 50 HRC, a speed of 240 sf/min (200 X 1.2) could be used if the 4140 is 45 HRC.

For more convenient cutting data recommendations use applicable tools in My Pages - [www.secotools.com](http://www.secotools.com)

**Steels, ferritic and martensitic stainless steels**

SMG	DESCRIPTION	PROPERTIES UTS = Ultimate tensile strength (ksi)	REFERENCE MATERIAL (ANSI)
P1	Free-cutting steels 1213, 1211, 1212, 1215, 12L14, 1117, 1118	50 < UTS < 75	1213 UTS = 55 ksi
P2	Low alloy ferritic steels, C < 0.25%wt Low alloy weldable general structural steels 1018, 1020, 1025, ASTM A570 Grade 30, 33, 36, 40, 45, 50	45 < UTS < 85	A 573 Gr. 58 UTS = 60 ksi
P3	Ferritic & ferritic/pearlitic steels, C < 0.25%wt Weldable general structural steels Case hardening steels 5115, 5015, 5120, 8620, 4320	60 < UTS < 90	5115 UTS = 80 ksi
P4	Low alloy general structural steels, 0.25% < C < 0.67%wt Low alloy Quench & Temper steels 1045, 1040, 1050	75 < UTS < 175	1045 UTS = 95 ksi
P5	Structural steels, 0.25% < C < 0.67%wt Quench & Temper steels 4140 Annealed, 4142 Annealed, 4340	80 < UTS < 175	4140 UTS = 100 ksi
P6	Low alloy through hardening steels, C > 0.67%wt Low alloy spring and bearing steels 1095, 1070	75 < UTS < 170	1095 UTS = 85 ksi
P7	Through hardening steels, C > 0.67%wt Spring and bearing steels 52100	85 < UTS < 170	52100 UTS = 95 ksi
P8	Tool steels High Speed Steels (HSS) H13, O1, D2, M42	85 < UTS < 170	H13 UTS = 100 ksi
P11	Ferritic & martensitic stainless steels 420, 410, 410S, 416, 431, 440, 446	60 < UTS < 170	420 UTS = 95 ksi

**Free-cutting, austenitic and duplex stainless steels**

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
M1	Free-cutting austenitic stainless steels 303		303
M2	Low alloy austenitic stainless steels 304, 302, 316, 304L, 309, 321, 347, Monel K500, Alloy 20		304
M3	Medium alloy austenitic stainless steels 316 L, 316N, Nitronic 30, Nitronic 33, Nitronic 40, Nitronic 50, Nitronic 60, XM-19, 314, 348		316 L
M4	High alloy austenitic and duplex stainless steels 2205 Duplex, 2304, F51, 254 SMO, ASTM A240		2205 Duplex
M5	Difficult high alloy austenitic and duplex stainless steels 2507 Super duplex, Zeron 100, Ferralium 255, F53, F55		2507 Super duplex

**Cast irons**

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
K1	Grey cast irons (GCI) Class 25, 30, 35 or 40, G2500, G3000, G3500, G4000		A48 35 B
K2	Compacted graphite irons (CGI) JV/300/S, JV/350/S, JV/400/S, JV/450/S, JV/500/S		Grade 400-15
K3	Malleable cast irons (MCI) 60-18-18, 65-45-12		A220 60004
K4	Nodular cast irons (SGI) 80-55-06, 100-70-03		80-55-06
K5	Austempered ductile irons (ADI) 1050/700/7, 130-90-09, 150-110-07, 175-125-04, 200-155-02, 230-185-01		1050/700/7
K6	Austenitic lamellar cast irons		A436 Type 1 (Ni-Resist 1)
K7	Austenitic nodular cast irons		A439 Type D-2M (Ni-Resist D-2M)

**Hard materials**

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
H3	Case hardened steels 5115, 8620, 1015, 1018, 1020, 4320	58 < HRC < 62	5115 60 HRC
H5	Quenched & Tempered steels 4140, 1045, 4340, A514, A514B, T1, AR400, AR450, AR500	38 < HRC < 56	4140 50 HRC
H7	Quenched & Tempered steels Bearing steels 52100	56 < HRC < 64	52100 60 HRC
H8	Tool steels High Speed Steels H13, A2, D2, O1, M42	38 < HRC < 64	H13 50 HRC
H11	Martensitic stainless steels 420, 410, 416, 431, 440	38 < HRC < 50	420 45 HRC
H12	Precipitation hardened stainless steels 17-4, 13-8, 15-5, 17-7, AM350, AM355	33 < HRC < 50	17-4PH 35 HRC
H21	Manganese steels Tensamang, Mangaloy, Hadfield	23 < HRC < 64	Hadfield, High manganese steel 50 HRC
H31	White cast irons ASTM A532 Class I Type A & B, ASTM A532 Class II ASTM A532 Class III, Ni-Hard	50 < HRC < 64	A532 ID, White cast iron 55 HRC

## ND1103 – Ø 0.118-0.787 - EXTERNAL COOLANT SUPPLY

SMG	f										v <sub>c</sub>
	Ø 0.118	Ø 0.157	Ø 0.236	Ø 0.315	Ø 0.394	Ø 0.472	Ø 0.551	Ø 0.630	Ø 0.709	Ø 0.787	
P1	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	350
P2	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	340
P3	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.012	0.013	0.013	0.013	295
P4	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	260
P5	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	245
P6	0.0044	0.0050	0.0065	0.0080	0.0085	0.010	0.011	0.012	0.013	0.013	275
P7	0.0044	0.0050	0.0065	0.0080	0.0085	0.010	0.011	0.012	0.013	0.013	260
P8	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.012	0.013	0.013	0.013	245
P11	0.0044	0.0050	0.0065	0.0080	0.0085	0.010	0.011	0.012	0.013	0.013	255
M1	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	185
M2	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	150
K1	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	230
K2	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	200
K3	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	170
K4	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	160
K5	0.0040	0.0048	0.0060	0.0070	0.0080	0.0095	0.010	0.010	0.011	0.012	95
H3	0.0020	0.0024	0.0030	0.0036	0.0040	0.0048	0.0050	0.0050	0.0055	0.0060	80
H5	0.0030	0.0034	0.0044	0.0055	0.0065	0.0070	0.0075	0.0080	0.0085	0.0085	150
H7	0.0020	0.0024	0.0030	0.0036	0.0040	0.0048	0.0050	0.0050	0.0055	0.0060	80
H8	0.0022	0.0026	0.0034	0.0040	0.0048	0.0050	0.0060	0.0065	0.0065	0.0065	150
H11	0.0030	0.0034	0.0044	0.0055	0.0065	0.0070	0.0075	0.0080	0.0085	0.0085	190
H12	0.0030	0.0034	0.0044	0.0055	0.0065	0.0070	0.0075	0.0080	0.0085	0.0085	285

## ND110XA – Ø 0.118-0.787 - INTERNAL COOLANT SUPPLY

SMG	f										v <sub>c</sub>
	Ø 0.118	Ø 0.157	Ø 0.236	Ø 0.315	Ø 0.394	Ø 0.472	Ø 0.551	Ø 0.630	Ø 0.709	Ø 0.787	
P1	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	465
P2	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	455
P3	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.012	0.013	0.013	0.013	390
P4	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	345
P5	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	330
P6	0.0044	0.0050	0.0065	0.0080	0.0085	0.010	0.011	0.012	0.013	0.013	370
P7	0.0044	0.0050	0.0065	0.0080	0.0085	0.010	0.011	0.012	0.013	0.013	350
P8	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.012	0.013	0.013	0.013	330
P11	0.0044	0.0050	0.0065	0.0080	0.0085	0.010	0.011	0.012	0.013	0.013	340
M1	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	245
M2	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	195
K1	0.0048	0.0055	0.0070	0.0085	0.010	0.011	0.012	0.013	0.013	0.014	295
K2	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	255
K3	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	215
K4	0.0044	0.0050	0.0065	0.0080	0.0095	0.010	0.011	0.012	0.013	0.013	205
K5	0.0040	0.0048	0.0060	0.0070	0.0080	0.0095	0.010	0.010	0.011	0.012	125
H3	0.0020	0.0024	0.0030	0.0036	0.0040	0.0048	0.0050	0.0050	0.0055	0.0060	105
H5	0.0030	0.0034	0.0044	0.0055	0.0065	0.0070	0.0075	0.0080	0.0085	0.0085	200
H7	0.0020	0.0024	0.0030	0.0036	0.0040	0.0048	0.0050	0.0050	0.0055	0.0060	105
H8	0.0022	0.0026	0.0034	0.0040	0.0048	0.0050	0.0060	0.0065	0.0065	0.0065	200
H11	0.0030	0.0034	0.0044	0.0055	0.0065	0.0070	0.0075	0.0080	0.0085	0.0085	255
H12	0.0030	0.0034	0.0044	0.0055	0.0065	0.0070	0.0075	0.0080	0.0085	0.0085	380

SMG = Seco Material Group  
 f = in/rev  
 vc = sf/min  
 All cutting data are start values

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