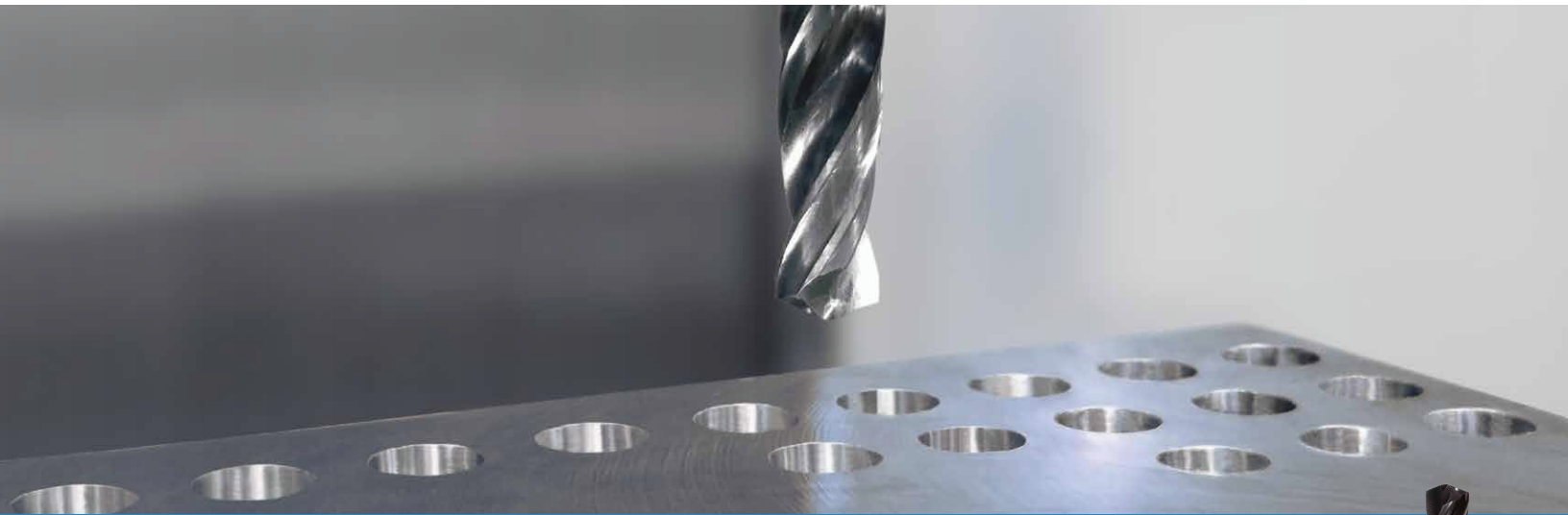




# HYDROS

Coolant Fed Deep Drills for Difficult-to-Cut Material



Excellent Hole Accuracy with a Low Cutting Force Design

Optimized Cutting Edge

Point Design for Accuracy

Double Margin for Smooth Hole Wall Finish

7xD, 8xD, 10xD, and 15xD Drilling Capabilities

**NEW**

New HYDROS Mini Added  
Smaller Diameters from 1.00mm - 4.00mm (8xD / 15xD)

**NEW**

New 7xD Sizes Added

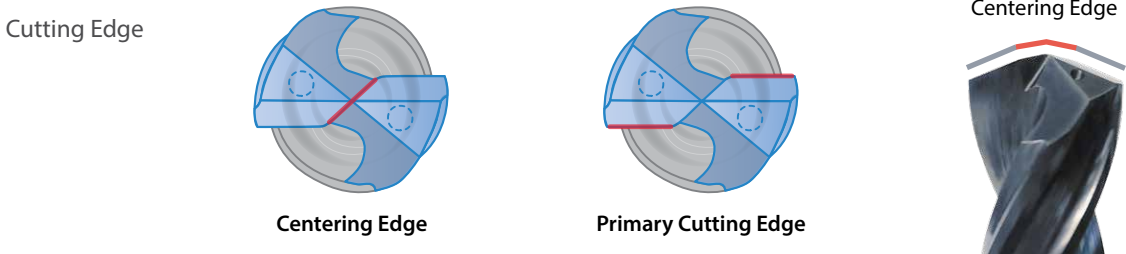


# HYDROS Deep Drill

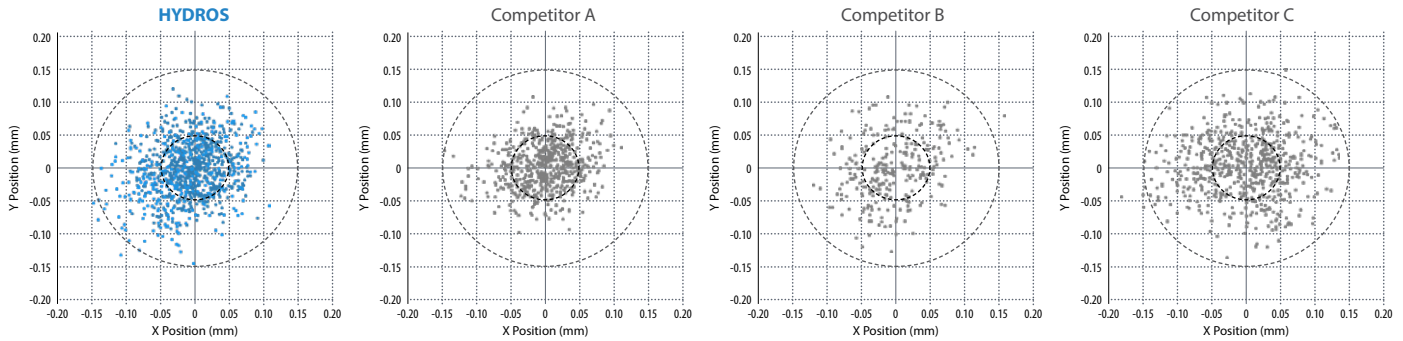
Excellent Hole Accuracy with a Low Cutting Force Design  
Good for Difficult-to-Cut Materials

## 1 Optimized Cutting Edge for Increased Accuracy

The optimized cutting edge creates excellent drilling accuracy during the initial cut by consistently controlling the cutting force across the face of both cutting edges.



Drill Hole Positional Accuracy After 1400 Holes (In-house Evaluation)

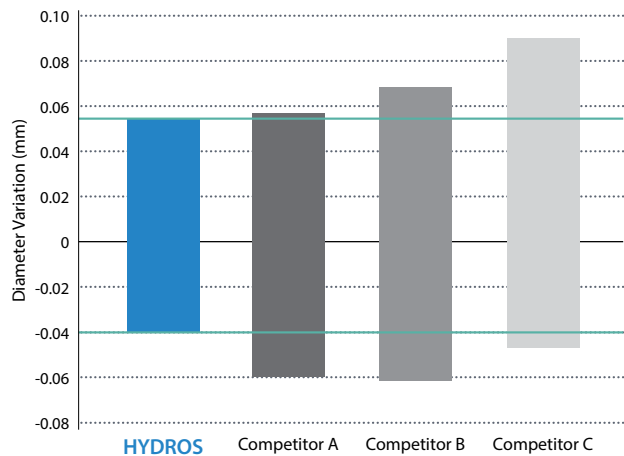


Excellent Hole Positional Accuracy

	HYDROS	Competitor A	Competitor B	Competitor C
Cp	1.92	1.97	1.70	1.50
CpK	1.34	1.35	1.03	0.86
Spec (+/-)	0.15mm	0.15mm	0.15mm	0.15mm

Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

Hole Diameter Variation (In-house Evaluation)



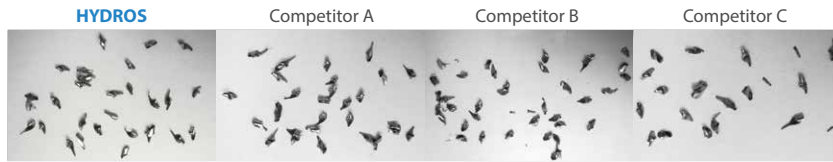
	No. of Holes	Diameter Variation (mm)
HYDROS	600	0.0937
Competitor A	600	0.1141
Competitor B	269 (Broken)	0.1281
Competitor C	600	0.1347

Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

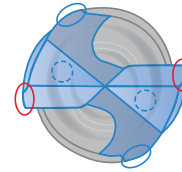
## 2 Double Margin for Smooth Hole Finish

Two margins create a cutting and wiping effect that create a smooth hole finish and smooth cutting performance along the hole wall.

### Chip Comparison



Double Margins

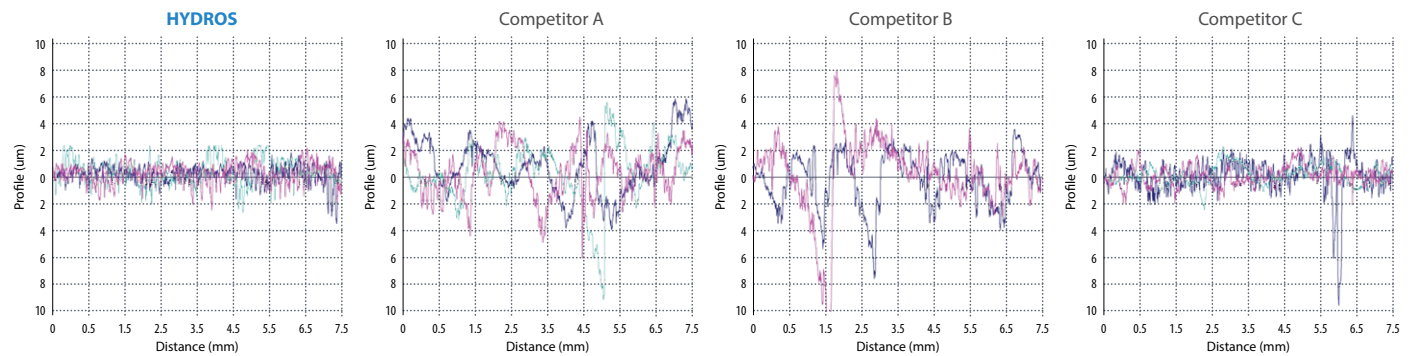


Cutting Edge

Wiping Edge

Optimized for smooth cutting performance with excellent chip evacuation

### Hole Roughness (In-house Evaluation)



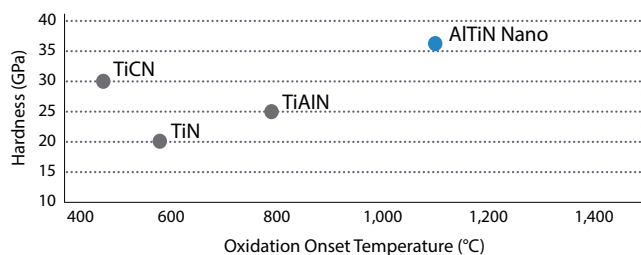
	HYDROS			Competitor A			Competitor B			Competitor C		
	Hole 1	Hole 300	Hole 600	Hole 1	Hole 300	Hole 600	Hole 1	Hole 300	Hole 600	Hole 1	Hole 300	Hole 600
Ra (µm)	0.421	0.539	0.676	1.705	1.540	1.572	1.638	1.977	Broken	0.893	0.559	0.562
Rq (µm)	0.554	0.677	0.869	2.123	1.832	2.113	1.979	2.581	Broken	1.249	0.712	0.687
Rz (µm)	3.282	3.478	4.406	8.076	8.480	10.077	8.847	10.973	Broken	7.178	3.845	3.206

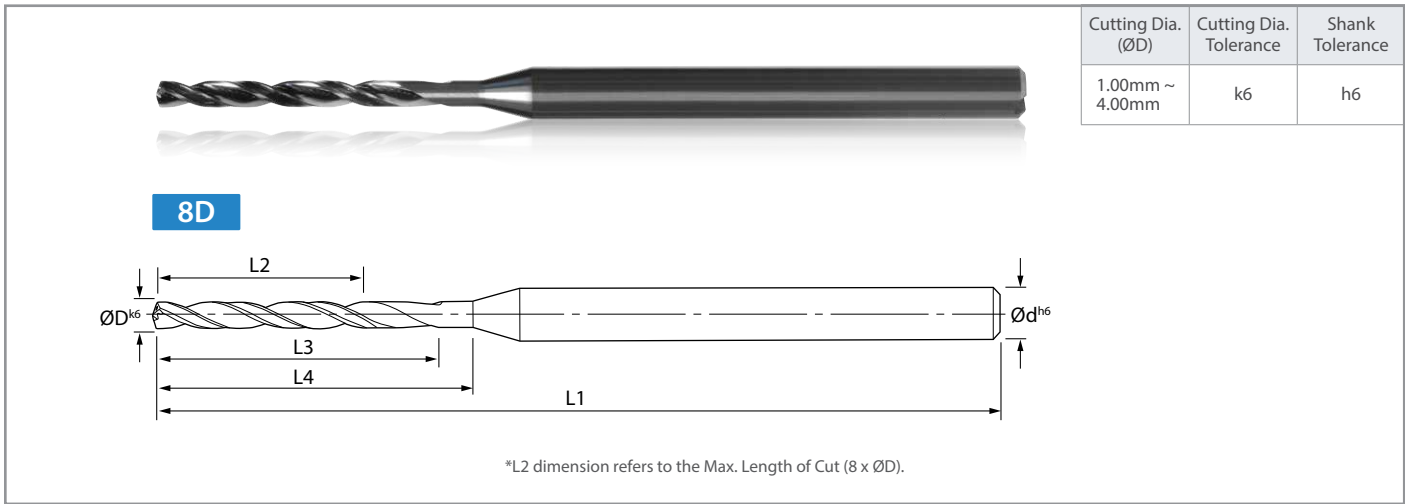
Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

## 3 Nanocomposite Super-nitride AlTiN Coating Technology

Great for difficult-to-cut and hardened materials, the 2nd generation AlTiN supernitride with a nanocomposite coating structure has a hardness GPa of 36.3 and maximum application temperature (°C) of 1,100.

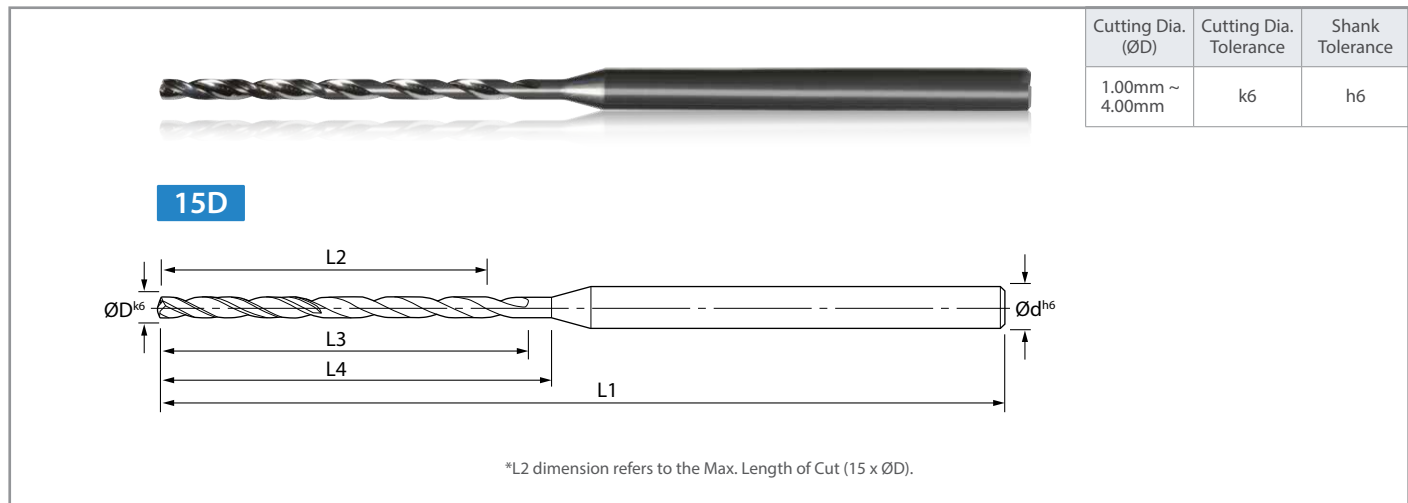
### Coating Properties





Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>k6</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
814-0394L524	●	1.00	4.00	53.00	8.00	13.30	14.36	140°
814-0433L555	●	1.10	4.00	53.00	8.80	14.10	15.23	140°
814-0472L587	●	1.20	4.00	53.00	9.60	14.90	16.09	140°
814-0512L618	●	1.30	4.00	53.00	10.40	15.70	16.96	140°
814-0551L650	●	1.40	4.00	53.00	11.20	16.50	17.82	140°
814-0591L681	●	1.50	4.00	53.00	12.00	17.30	18.68	140°
814-0630L713	●	1.60	4.00	64.00	12.80	18.10	19.55	140°
814-0669L744	●	1.70	4.00	64.00	13.60	18.90	20.41	140°
814-0709L803	●	1.80	4.00	64.00	14.40	20.40	22.03	140°
814-0748L835	●	1.90	4.00	64.00	15.20	21.20	22.90	140°
814-0787L866	●	2.00	4.00	64.00	16.00	22.00	23.76	140°
814-0827L898	●	2.10	4.00	64.00	16.80	22.80	24.62	140°
814-0866L1012	●	2.20	4.00	64.00	17.60	25.70	27.76	140°
814-0906L1043	●	2.30	4.00	64.00	18.40	26.50	28.62	140°
814-0945L1075	●	2.40	4.00	64.00	19.20	27.30	29.48	140°
814-0984L1106	●	2.50	4.00	64.00	20.00	28.10	30.35	140°
814-1024L1138	●	2.60	4.00	76.00	20.80	28.90	31.21	140°
814-1063L1169	●	2.70	4.00	76.00	21.60	29.70	32.08	140°
814-1102L1201	●	2.80	4.00	76.00	22.40	30.50	32.94	140°
814-1142L1268	●	2.90	4.00	76.00	23.20	32.20	34.78	140°
814-1181L1299	●	3.00	4.00	76.00	24.00	33.00	35.64	140°
814-1220L1331	●	3.10	4.00	76.00	24.80	33.80	36.50	140°
814-1260L1362	●	3.20	4.00	76.00	25.60	34.60	37.37	140°
814-1299L1394	●	3.30	4.00	76.00	26.40	35.40	38.23	140°
814-1339L1500	●	3.40	4.00	76.00	27.20	38.10	41.15	140°
814-1378L1531	●	3.50	4.00	76.00	28.00	38.90	42.01	140°
814-1417L1563	●	3.60	4.00	76.00	28.80	39.70	42.88	140°
814-1457L1594	●	3.70	4.00	76.00	29.60	40.50	43.74	140°
814-1496L1626	●	3.80	4.00	76.00	30.40	41.30	44.60	140°
814-1535L1657	●	3.90	4.00	76.00	31.20	42.10	45.47	140°
814-1575L1689	●	4.00	4.00	76.00	32.00	42.90	46.33	140°



Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>k6</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
814-0394L799	●	1.00	4.00	64.00	15.00	20.30	21.32	140°
814-0433L858	●	1.10	4.00	64.00	16.50	21.80	22.89	140°
814-0472L917	●	1.20	4.00	64.00	18.00	23.30	24.47	140°
814-0512L976	●	1.30	4.00	64.00	19.50	24.80	26.04	140°
814-0551L1035	●	1.40	4.00	64.00	21.00	26.30	27.62	140°
814-0591L1094	●	1.50	4.00	64.00	22.50	27.80	29.19	140°
814-0630L1154	●	1.60	4.00	81.00	24.00	29.30	30.77	140°
814-0669L1213	●	1.70	4.00	81.00	25.50	30.80	32.34	140°
814-0709L1299	●	1.80	4.00	81.00	27.00	33.00	34.65	140°
814-0748L1358	●	1.90	4.00	81.00	28.50	34.50	36.23	140°
814-0787L1417	●	2.00	4.00	81.00	30.00	36.00	37.80	140°
814-0827L1476	●	2.10	4.00	81.00	31.50	37.50	39.38	140°
814-0866L1618	●	2.20	4.00	81.00	33.00	41.10	43.16	140°
814-0906L1677	●	2.30	4.00	81.00	34.50	42.60	44.73	140°
814-0945L1736	●	2.40	4.00	81.00	36.00	44.10	46.31	140°
814-0984L1795	●	2.50	4.00	90.00	37.50	45.60	47.88	140°
814-1024L1854	●	2.60	4.00	90.00	39.00	47.10	49.46	140°
814-1063L1913	●	2.70	4.00	90.00	40.50	48.60	51.03	140°
814-1102L1972	●	2.80	4.00	90.00	42.00	50.10	52.61	140°
814-1142L2067	●	2.90	4.00	90.00	43.50	52.50	55.13	140°
814-1181L2126	●	3.00	4.00	90.00	45.00	54.00	56.70	140°
814-1220L2185	●	3.10	4.00	106.00	46.50	55.50	58.28	140°
814-1260L2244	●	3.20	4.00	106.00	48.00	57.00	59.85	140°
814-1299L2303	●	3.30	4.00	106.00	49.50	58.50	61.43	140°
814-1339L2437	●	3.40	4.00	106.00	51.00	61.90	65.00	140°
814-1378L2496	●	3.50	4.00	106.00	52.50	63.40	66.57	140°
814-1417L2555	●	3.60	4.00	106.00	54.00	64.90	68.15	140°
814-1457L2614	●	3.70	4.00	106.00	55.50	66.40	69.72	140°
814-1496L2673	●	3.80	4.00	106.00	57.00	67.90	71.30	140°
814-1535L2732	●	3.90	4.00	106.00	58.50	69.40	72.87	140°
814-1575L2791	●	4.00	4.00	106.00	60.00	70.90	74.45	140°

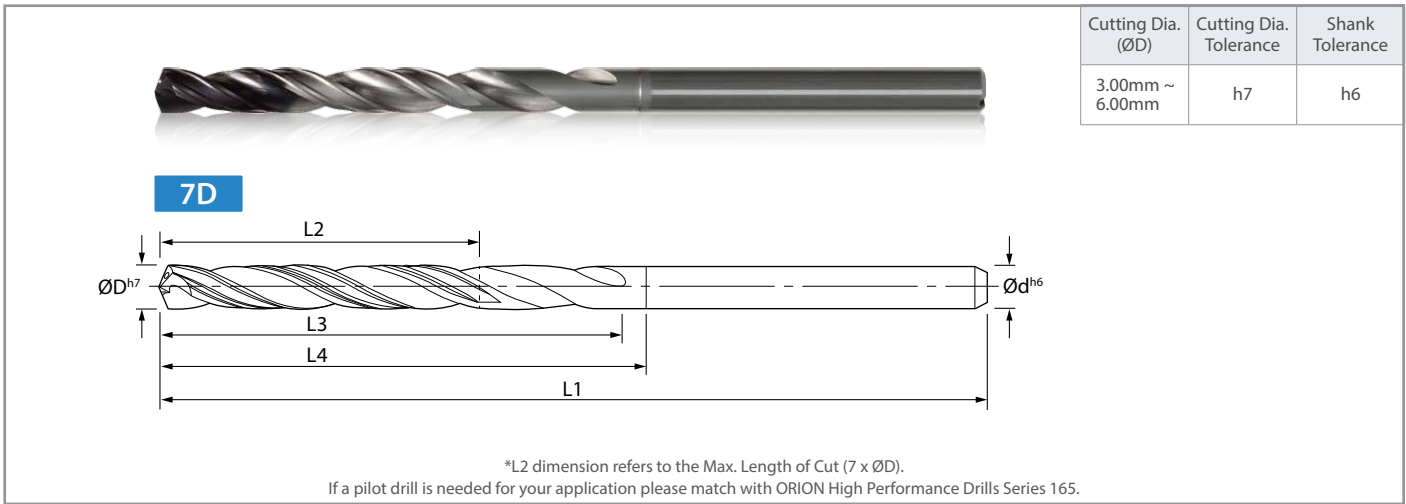


Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
0.1250" ~ 0.2344"	+0.0000" -0.0005"	+0.00000" -0.00032"
0.2500" ~ 0.3750"	+0.0000" -0.0006"	+0.00000" -0.00035"
0.4219" ~ 0.5000"	+0.0000" -0.0007"	+0.00000" -0.00043"

\*L2 dimension refers to the Max. Length of Cut (7 x ØD).  
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 160.

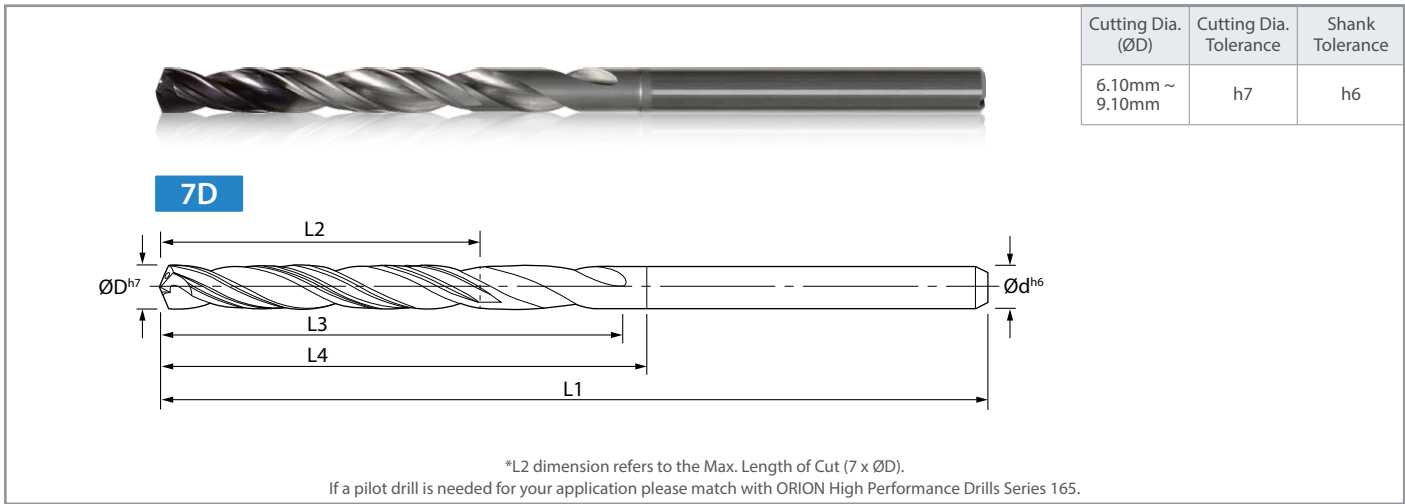
## Inch Drill Dimensions

Part Number	Stock	Dimensions (in)							Point Angle
		ØD		Ød	L1	*L2	L3	L4	
860-1250AG1250	●	0.1250	1/8	1/8	3 1/2	0.875	1.250	1.313	135°
860-1406AG1406	●	0.1406	9/64	3/16	3 1/2	0.984	1.406	1.476	135°
860-1563AG1563	●	0.1563	5/32	3/16	3 1/2	1.094	1.563	1.641	135°
860-1719AG1719	●	0.1719	11/64	3/16	3 1/2	1.203	1.719	1.805	135°
860-1875AG1875	●	0.1875	3/16	3/16	4	1.313	1.875	1.969	135°
860-2031AG2031	●	0.2031	13/64	1/4	4	1.422	2.031	2.133	135°
860-2188AG2188	●	0.2188	7/32	1/4	4	1.532	2.188	2.297	135°
860-2344AG2344	●	0.2344	15/64	1/4	4 1/2	1.641	2.344	2.461	135°
860-2500AG2500	●	0.2500	1/4	1/4	4 1/2	1.750	2.500	2.625	135°
860-2570AG2570	●	0.2570	F	5/16	4 1/2	1.799	2.570	2.699	135°
860-2656AG2656	●	0.2656	17/64	5/16	4 1/2	1.859	2.656	2.789	135°
860-2813AG2813	●	0.2813	9/32	5/16	5	1.969	2.813	2.954	135°
860-3125AG3125	●	0.3125	5/16	5/16	5	2.188	3.125	3.281	135°
860-3320AG3320	●	0.3320	Q	3/8	5 1/2	2.324	3.320	3.486	135°
860-3438AG3438	●	0.3438	11/32	3/8	5 1/2	2.407	3.438	3.610	135°
860-3750AG3750	●	0.3750	3/8	3/8	6	2.625	3.750	3.938	135°
860-4219AG4219	●	0.4219	27/64	7/16	6 1/2	2.953	4.219	4.430	135°
860-4375AG4375	●	0.4375	7/16	7/16	6 1/2	3.063	4.375	4.594	135°
860-4531AG4531	●	0.4531	29/64	1/2	6 1/2	3.172	4.531	4.758	135°
860-5000AG5000	●	0.500	1/2	1/2	7	3.500	5.000	5.250	135°



Metric Drill Dimensions

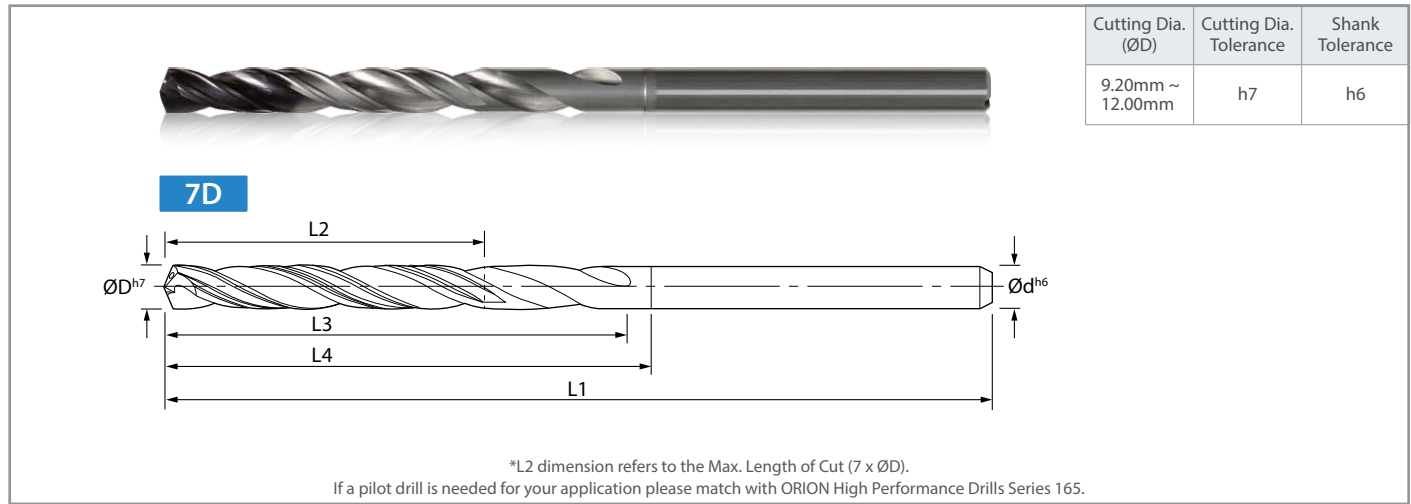
Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>h7</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
865-1181AG1181	●	3.00	3.00	80.37	21.00	30.00	31.50	135°
865-1220AG1220	●	3.10	4.00	80.37	21.70	31.00	32.55	135°
865-1260AG1260	●	3.20	4.00	80.37	22.40	32.00	33.60	135°
865-1299AG1299	●	3.30	4.00	80.37	23.10	33.00	34.65	135°
865-1339AG1339	●	3.40	4.00	80.37	23.80	34.00	35.70	135°
865-1378AG1378	●	3.50	4.00	80.37	24.50	35.00	36.75	135°
865-1417AG1417	●	3.60	4.00	80.37	25.20	36.00	37.80	135°
865-1457AG1457	●	3.70	4.00	90.37	25.90	37.00	38.85	135°
865-1496AG1496	●	3.80	4.00	90.37	26.60	38.00	39.90	135°
865-1535AG1535	●	3.90	4.00	90.37	27.30	39.00	40.95	135°
865-1575AG1575	●	4.00	4.00	90.37	28.00	40.00	42.00	135°
865-1614AG1614	●	4.10	6.00	90.37	28.70	41.00	43.05	135°
865-1654AG1654	●	4.20	6.00	90.37	29.40	42.00	44.10	135°
865-1693AG1693	●	4.30	6.00	90.37	30.10	43.00	45.15	135°
865-1732AG1732	●	4.40	6.00	90.37	30.80	44.00	46.20	135°
865-1772AG1772	●	4.50	6.00	100.37	31.50	45.00	47.25	135°
865-1811AG1811	●	4.60	6.00	100.37	32.20	46.00	48.30	135°
865-1850AG1850	●	4.70	6.00	100.37	32.90	47.00	49.35	135°
865-1890AG1890	●	4.80	6.00	100.37	33.60	48.00	50.40	135°
865-1929AG1929	●	4.90	6.00	100.37	34.30	49.00	51.45	135°
865-1969AG1969	●	5.00	6.00	100.37	35.00	50.00	52.50	135°
865-2008AG2008	●	5.10	6.00	100.37	35.70	51.00	53.55	135°
865-2047AG2047	●	5.20	6.00	100.37	36.40	52.00	54.60	135°
865-2087AG2087	●	5.30	6.00	110.37	37.10	53.00	55.65	135°
865-2126AG2126	●	5.40	6.00	110.37	37.80	54.00	56.70	135°
865-2165AG2165	●	5.50	6.00	110.37	38.50	55.00	57.75	135°
865-2205AG2205	●	5.60	6.00	110.37	39.20	56.00	58.80	135°
865-2244AG2244	●	5.70	6.00	110.47	39.90	57.00	59.85	135°
865-2283AG2283	●	5.80	6.00	110.47	40.60	58.00	60.90	135°
865-2323AG2323	●	5.90	6.00	110.47	41.30	59.00	61.95	135°
865-2362AG2362	●	6.00	6.00	110.47	42.00	60.00	63.00	135°



Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>h7</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
865-2402AG2402	●	6.10	8.00	110.47	42.70	61.00	64.05	135°
865-2441AG2441	●	6.20	8.00	110.47	43.40	62.00	65.10	135°
865-2480AG2480	●	6.30	8.00	110.47	44.10	63.00	66.15	135°
865-2520AG2520	●	6.40	8.00	120.47	44.80	64.00	67.20	135°
865-2559AG2559	●	6.50	8.00	120.47	45.50	65.00	68.25	135°
865-2598AG2598	●	6.60	8.00	120.47	46.20	66.00	69.30	135°
865-2638AG2638	●	6.70	8.00	120.47	46.90	67.00	70.35	135°
865-2677AG2677	●	6.80	8.00	120.47	47.60	68.00	71.40	135°
865-2717AG2717	●	6.90	8.00	120.47	48.30	69.00	72.45	135°
865-2756AG2756	●	7.00	8.00	120.47	49.00	70.00	73.50	135°
865-2795AG2795	●	7.10	8.00	120.47	49.70	71.00	74.55	135°
865-2835AG2835	●	7.20	8.00	120.47	50.40	72.00	75.60	135°
865-2874AG2874	●	7.30	8.00	120.47	51.10	73.00	76.65	135°
865-2913AG2913	●	7.40	8.00	130.47	51.80	74.00	77.70	135°
865-2953AG2953	●	7.50	8.00	130.47	52.50	75.00	78.75	135°
865-2992AG2992	●	7.60	8.00	130.62	53.20	76.00	79.80	135°
865-3031AG3031	●	7.70	8.00	130.62	53.90	77.00	80.85	135°
865-3071AG3071	●	7.80	8.00	130.62	54.60	78.00	81.90	135°
865-3110AG3110	●	7.90	8.00	130.62	55.30	79.00	82.95	135°
865-3150AG3150	●	8.00	8.00	130.62	56.00	80.00	84.00	135°
865-3189AG3189	●	8.10	10.00	140.62	56.70	81.00	85.05	135°
865-3228AG3228	●	8.20	10.00	140.62	57.40	82.00	86.10	135°
865-3268AG3268	●	8.30	10.00	140.62	58.10	83.00	87.15	135°
865-3307AG3307	●	8.40	10.00	140.62	58.80	84.00	88.20	135°
865-3346AG3346	●	8.50	10.00	140.62	59.50	85.00	89.25	135°
865-3386AG3386	●	8.60	10.00	140.62	60.20	86.00	90.30	135°
865-3425AG3425	●	8.70	10.00	140.62	60.90	87.00	91.35	135°
865-3465AG3465	●	8.80	10.00	140.62	61.60	88.00	92.40	135°
865-3504AG3504	●	8.90	10.00	140.62	62.30	89.00	93.45	135°
865-3543AG3543	●	9.00	10.00	140.62	63.00	90.00	94.50	135°
865-3583AG3583	●	9.10	10.00	140.62	63.70	91.00	95.55	135°





Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>h7</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
865-3622AG3622	●	9.20	10.00	140.62	64.40	92.00	96.60	135°
865-3661AG3661	●	9.30	10.00	140.62	65.10	93.00	97.65	135°
865-3701AG3701	●	9.40	10.00	150.62	65.80	94.00	98.70	135°
865-3740AG3740	●	9.50	10.00	150.62	66.50	95.00	99.75	135°
865-3780AG3780	●	9.60	10.00	150.62	67.20	96.00	100.80	135°
865-3819AG3819	●	9.70	10.00	150.62	67.90	97.00	101.85	135°
865-3858AG3858	●	9.80	10.00	150.62	68.60	98.00	102.90	135°
865-3898AG3898	●	9.90	10.00	150.62	69.30	99.00	103.95	135°
865-3937AG3937	●	10.00	10.00	150.62	70.00	100.00	105.00	135°
865-3976AG3976	●	10.10	12.00	150.62	70.70	101.00	106.05	135°
865-4016AG4016	●	10.20	12.00	160.62	71.40	102.00	107.10	135°
865-4055AG4055	●	10.30	12.00	160.62	72.10	103.00	108.15	135°
865-4094AG4094	●	10.40	12.00	160.62	72.80	104.00	109.20	135°
865-4134AG4134	●	10.50	12.00	160.62	73.50	105.00	110.25	135°
865-4173AG4173	●	10.60	12.00	160.62	74.20	106.00	111.30	135°
865-4213AG4213	●	10.70	12.00	160.62	74.90	107.00	112.35	135°
865-4252AG4252	●	10.80	12.00	160.62	75.60	108.00	113.40	135°
865-4291AG4291	●	10.90	12.00	160.62	76.30	109.00	114.45	135°
865-4331AG4331	●	11.00	12.00	160.62	77.00	110.00	115.50	135°
865-4370AG4370	●	11.10	12.00	160.62	77.70	111.00	116.55	135°
865-4409AG4409	●	11.20	12.00	170.62	78.40	112.00	117.60	135°
865-4449AG4449	●	11.30	12.00	170.77	79.10	113.00	118.65	135°
865-4488AG4488	●	11.40	12.00	170.77	79.80	114.00	119.70	135°
865-4528AG4528	●	11.50	12.00	170.77	80.50	115.00	120.75	135°
865-4567AG4567	●	11.60	12.00	170.77	81.20	116.00	121.80	135°
865-4606AG4606	●	11.70	12.00	170.77	81.90	117.00	122.85	135°
865-4646AG4646	●	11.80	12.00	170.77	82.60	118.00	123.90	135°
865-4685AG4685	●	11.90	12.00	170.77	83.30	119.00	124.95	135°
865-4724AG4724	●	12.00	12.00	170.77	84.00	120.00	126.00	135°

# HYDROS 10xD Deep Drills - Inch Sizes (Ø0.1250" - Ø0.5000")

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
0.1250" ~ 0.2344"	+0.0000" -0.0005"	+0.00000" -0.00032"
0.2500" ~ 0.3750"	+0.0000" -0.0006"	+0.00000" -0.00035"
0.4219" ~ 0.5000"	+0.0000" -0.0007"	+0.00000" -0.00043"

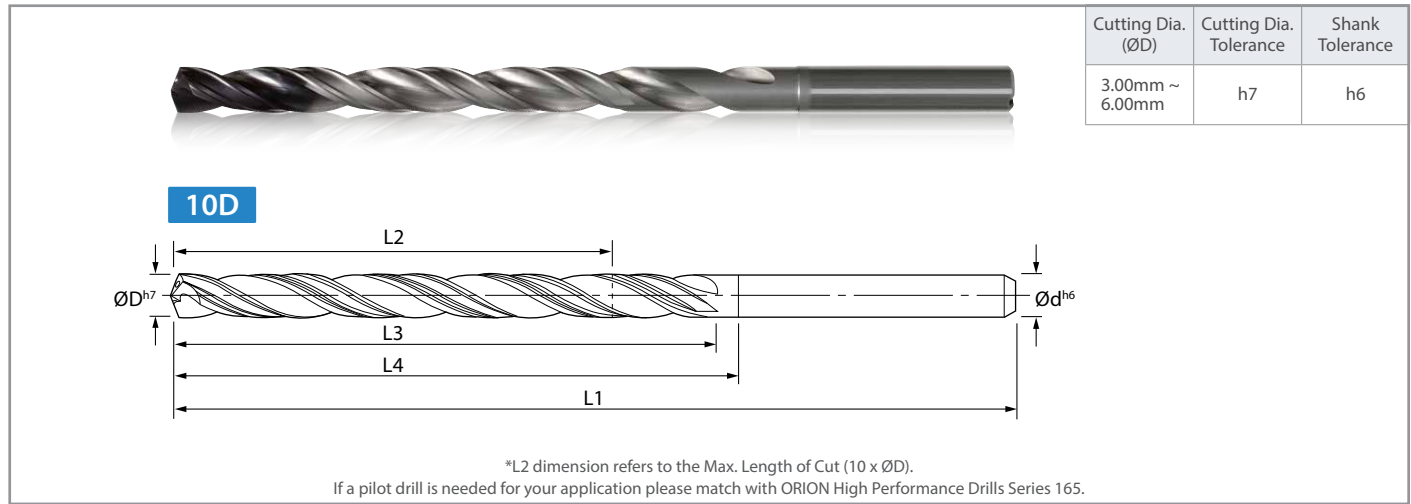
\*L2 dimension refers to the Max. Length of Cut (10 x ØD).

If a pilot drill is needed for your application please match with ORION High Performance Drills Series 160.

## Inch Drill Dimensions

Part Number	Stock	Dimensions (in)							Point Angle
		ØD		Ød	L1	*L2	L3	L4	
860-1250AG1625	●	0.1250	1/8	1/8	3 1/2	1.250	1.625	1.688	135°
860-1406AG1828	●	0.1406	9/64	3/16	4	1.406	1.828	1.898	135°
860-1563AG2031	●	0.1563	5/32	3/16	4	1.563	2.031	2.109	135°
860-1719AG2234	●	0.1719	11/64	3/16	4	1.719	2.234	2.320	135°
860-1875AG2438	●	0.1875	3/16	3/16	4 1/2	1.875	2.438	2.532	135°
860-2031AG2641	●	0.2031	13/64	1/4	4 1/2	2.031	2.641	2.743	135°
860-2188AG2844	●	0.2188	7/32	1/4	5	2.188	2.844	2.953	135°
860-2344AG3047	●	0.2344	15/64	1/4	5	2.344	3.047	3.164	135°
860-2500AG3250	●	0.2500	1/4	1/4	5	2.500	3.250	3.375	135°
860-2570AG3341	●	0.2570	F	5/16	5 1/2	2.570	3.341	3.470	135°
860-2656AG3453	●	0.2656	17/64	5/16	5 1/2	2.656	3.453	3.586	135°
860-2813AG3656	●	0.2813	9/32	5/16	5 1/2	2.813	3.656	3.797	135°
860-3125AG4063	●	0.3125	5/16	5/16	6	3.125	4.063	4.219	135°
860-3320AG4316	●	0.3320	Q	3/8	6 1/2	3.320	4.316	4.482	135°
860-3438AG4469	●	0.3438	11/32	3/8	6 1/2	3.438	4.469	4.641	135°
860-3750AG4875	●	0.3750	3/8	3/8	7	3.750	4.875	5.063	135°
860-4219AG5484	●	0.4219	27/64	7/16	7 1/2	4.219	5.484	5.695	135°
860-4375AG5688	●	0.4375	7/16	7/16	7 1/2	4.375	5.688	5.907	135°
860-4531AG5891	●	0.4531	29/64	1/2	8	4.531	5.891	6.118	135°
860-5000AG6500	●	0.5000	1/2	1/2	8 1/2	5.000	6.500	6.750	135°

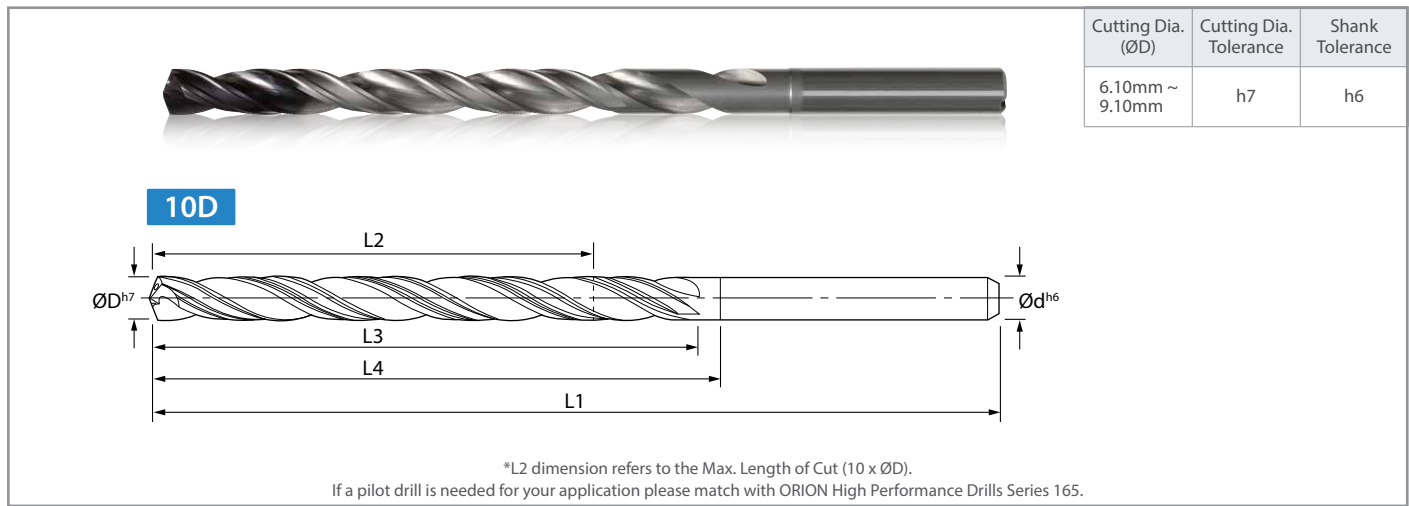
# HYDROS 10xD Deep Drills - Metric Sizes (Ø3.00mm - Ø6.00mm)



## Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>h7</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
865-1181AG1535	●	3.00	3.00	90.00	30.00	39.00	40.50	135°
865-1220AG1587	●	3.10	4.00	90.00	31.00	40.30	41.85	135°
865-1260AG1638	●	3.20	4.00	90.00	32.00	41.60	43.20	135°
865-1299AG1689	●	3.30	4.00	90.00	33.00	42.90	44.55	135°
865-1339AG1740	●	3.40	4.00	90.00	34.00	44.20	45.90	135°
865-1378AG1791	●	3.50	4.00	90.00	35.00	45.50	47.25	135°
865-1417AG1843	●	3.60	4.00	90.00	36.00	46.80	48.60	135°
865-1457AG1894	●	3.70	4.00	100.00	37.00	48.10	49.95	135°
865-1496AG1945	●	3.80	4.00	100.00	38.00	49.40	51.30	135°
865-1535AG1996	●	3.90	4.00	100.00	39.00	50.70	52.65	135°
865-1575AG2047	●	4.00	4.00	100.00	40.00	52.00	54.00	135°
865-1614AG2098	●	4.10	6.00	100.00	41.00	53.30	55.35	135°
865-1654AG2150	●	4.20	6.00	110.00	42.00	54.60	56.70	135°
865-1693AG2201	●	4.30	6.00	110.00	43.00	55.90	58.05	135°
865-1732AG2252	●	4.40	6.00	110.00	44.00	57.20	59.40	135°
865-1772AG2303	●	4.50	6.00	110.00	45.00	58.50	60.75	135°
865-1811AG2354	●	4.60	6.00	110.00	46.00	59.80	62.10	135°
865-1850AG2406	●	4.70	6.00	110.00	47.00	61.10	63.45	135°
865-1890AG2457	●	4.80	6.00	110.00	48.00	62.40	64.80	135°
865-1929AG2508	●	4.90	6.00	110.00	49.00	63.70	66.15	135°
865-1969AG2559	●	5.00	6.00	110.00	50.00	65.00	67.50	135°
865-2008AG2610	●	5.10	6.00	120.00	51.00	66.30	68.85	135°
865-2047AG2661	●	5.20	6.00	120.00	52.00	67.60	70.20	135°
865-2087AG2713	●	5.30	6.00	120.00	53.00	68.90	71.55	135°
865-2126AG2764	●	5.40	6.00	120.00	54.00	70.20	72.90	135°
865-2165AG2815	●	5.50	6.00	120.00	55.00	71.50	74.25	135°
865-2205AG2866	●	5.60	6.00	120.00	56.00	72.80	75.60	135°
865-2244AG2917	●	5.70	6.00	120.00	57.00	74.10	76.95	135°
865-2283AG2969	●	5.80	6.00	120.00	58.00	75.40	78.30	135°
865-2323AG3020	●	5.90	6.00	120.00	59.00	76.70	79.65	135°
865-2362AG3071	●	6.00	6.00	130.00	60.00	78.00	81.00	135°

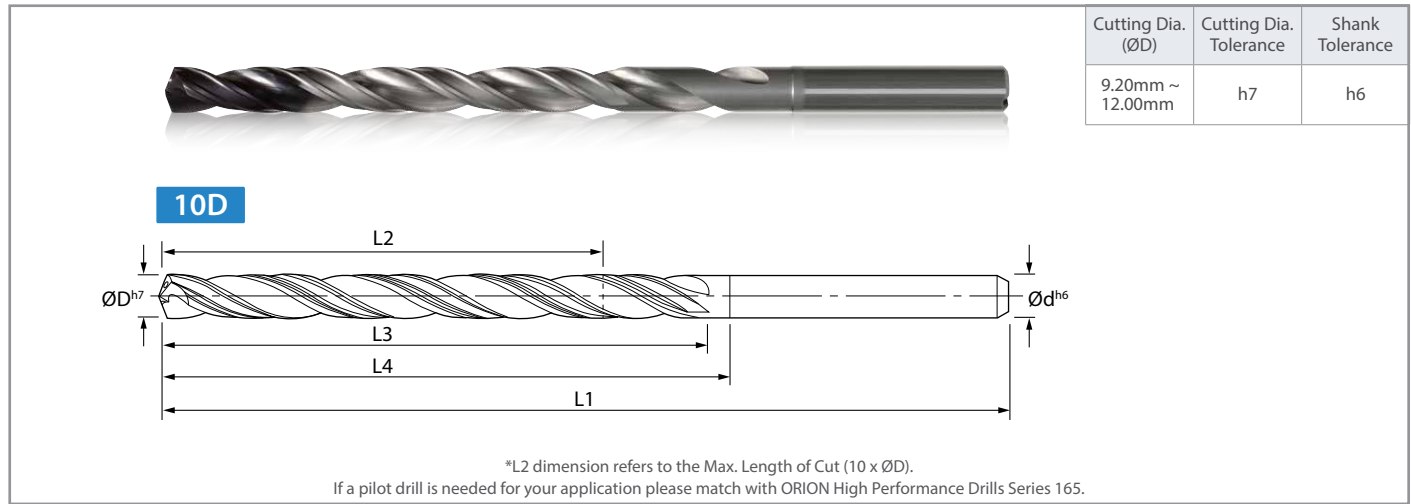
# HYDROS 10xD Deep Drills - Metric Sizes (Ø6.10mm - Ø9.10mm)



## Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>h7</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
865-2402AG3122	●	6.10	8.00	130.00	61.00	79.30	82.35	135°
865-2441AG3173	●	6.20	8.00	130.00	62.00	80.60	83.70	135°
865-2480AG3224	●	6.30	8.00	130.00	63.00	81.90	85.05	135°
865-2520AG3276	●	6.40	8.00	130.00	64.00	83.20	86.40	135°
865-2559AG3327	●	6.50	8.00	140.00	65.00	84.50	87.75	135°
865-2598AG3378	●	6.60	8.00	140.00	66.00	85.80	89.10	135°
865-2638AG3429	●	6.70	8.00	140.00	67.00	87.10	90.45	135°
865-2677AG3480	●	6.80	8.00	140.00	68.00	88.40	91.80	135°
865-2717AG3531	●	6.90	8.00	140.00	69.00	89.70	93.15	135°
865-2756AG3583	●	7.00	8.00	140.00	70.00	91.00	94.50	135°
865-2795AG3634	●	7.10	8.00	140.00	71.00	92.30	95.85	135°
865-2835AG3685	●	7.20	8.00	140.00	72.00	93.60	97.20	135°
865-2874AG3736	●	7.30	8.00	140.00	73.00	94.90	98.55	135°
865-2913AG3787	●	7.40	8.00	150.00	74.00	96.20	99.90	135°
865-2953AG3839	●	7.50	8.00	150.00	75.00	97.50	101.25	135°
865-2992AG3890	●	7.60	8.00	150.00	76.00	98.80	102.60	135°
865-3031AG3941	●	7.70	8.00	150.00	77.00	100.10	103.95	135°
865-3071AG3992	●	7.80	8.00	150.00	78.00	101.40	105.30	135°
865-3110AG4043	●	7.90	8.00	150.00	79.00	102.70	106.65	135°
865-3150AG4094	●	8.00	8.00	150.00	80.00	104.00	108.00	135°
865-3189AG4146	●	8.10	10.00	160.00	81.00	105.30	109.35	135°
865-3228AG4197	●	8.20	10.00	160.00	82.00	106.60	110.70	135°
865-3268AG4248	●	8.30	10.00	160.00	83.00	107.90	112.05	135°
865-3307AG4299	●	8.40	10.00	160.00	84.00	109.20	113.40	135°
865-3346AG4350	●	8.50	10.00	160.00	85.00	110.50	114.75	135°
865-3386AG4402	●	8.60	10.00	160.00	86.00	111.80	116.10	135°
865-3425AG4453	●	8.70	10.00	160.00	87.00	113.10	117.45	135°
865-3465AG4504	●	8.80	10.00	170.00	88.00	114.40	118.80	135°
865-3504AG4555	●	8.90	10.00	170.00	89.00	115.70	120.15	135°
865-3543AG4606	●	9.00	10.00	170.00	90.00	117.00	121.50	135°
865-3583AG4657	●	9.10	10.00	170.00	91.00	118.30	122.85	135°

# HYDROS 10xD Deep Drills - Metric Sizes (Ø9.20mm - Ø12.00mm)



## Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		ØD <sup>h7</sup>	Ød <sup>h6</sup>	L1	*L2	L3	L4	
865-3622AG4709	●	9.20	10.00	170.00	92.00	119.60	124.20	135°
865-3661AG4760	●	9.30	10.00	170.00	93.00	120.90	125.55	135°
865-3701AG4811	●	9.40	10.00	170.00	94.00	122.20	126.90	135°
865-3740AG4862	●	9.50	10.00	170.00	95.00	123.50	128.25	135°
865-3780AG4913	●	9.60	10.00	180.00	96.00	124.80	129.60	135°
865-3819AG4965	●	9.70	10.00	180.00	97.00	126.10	130.95	135°
865-3858AG5016	●	9.80	10.00	180.00	98.00	127.40	132.30	135°
865-3898AG5067	●	9.90	10.00	180.00	99.00	128.70	133.65	135°
865-3937AG5118	●	10.00	10.00	180.00	100.00	130.00	135.00	135°
865-3976AG5169	●	10.10	12.00	180.00	101.00	131.30	136.35	135°
865-4016AG5220	●	10.20	12.00	190.00	102.00	132.60	137.70	135°
865-4055AG5272	●	10.30	12.00	190.00	103.00	133.90	139.05	135°
865-4094AG5323	●	10.40	12.00	190.00	104.00	135.20	140.40	135°
865-4134AG5374	●	10.50	12.00	190.00	105.00	136.50	141.75	135°
865-4173AG5425	●	10.60	12.00	190.00	106.00	137.80	143.10	135°
865-4213AG5476	●	10.70	12.00	190.00	107.00	139.10	144.45	135°
865-4252AG5528	●	10.80	12.00	190.00	108.00	140.40	145.80	135°
865-4291AG5579	●	10.90	12.00	190.00	109.00	141.70	147.15	135°
865-4331AG5630	●	11.00	12.00	200.00	110.00	143.00	148.50	135°
865-4370AG5681	●	11.10	12.00	200.00	111.00	144.30	149.85	135°
865-4409AG5732	●	11.20	12.00	200.00	112.00	145.60	151.20	135°
865-4449AG5783	●	11.30	12.00	200.00	113.00	146.90	152.55	135°
865-4488AG5835	●	11.40	12.00	200.00	114.00	148.20	153.90	135°
865-4528AG5886	●	11.50	12.00	200.00	115.00	149.50	155.25	135°
865-4567AG5937	●	11.60	12.00	200.00	116.00	150.80	156.60	135°
865-4606AG5988	●	11.70	12.00	200.00	117.00	152.10	157.95	135°
865-4646AG6039	●	11.80	12.00	200.00	118.00	153.40	159.30	135°
865-4685AG6091	●	11.90	12.00	210.00	119.00	154.70	160.65	135°
865-4724AG6142	●	12.00	12.00	210.00	120.00	156.00	162.00	135°

# Recommended Cutting Conditions

Workpiece Material	Material Hardness/Types	Recommended Cutting Speed (sfm)	Cutting Dia. ØD (in)	Cutting Dia. ØD (mm)	Drill Length (Cutting Depth) Feed Rate (ipr)			
					7xD HYDROS	8xD Mini	10xD HYDROS	15xD Mini
Low Carbon Steel	12L14 A36	400 - <b>450</b> - 500	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0010 - 0.0020	-	0.0006 - 0.0012
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0020 - 0.0040	0.0016 - 0.0032	0.0012 - 0.0024
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	-	0.0032 - 0.0048	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0060 - 0.0080	-	0.0048 - 0.0064	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0080 - 0.0100	-	0.0064 - 0.0080	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0100 - 0.0120	-	0.0080 - 0.0095	-
Mild Carbon Steel	1018 1028 1050	360 - <b>410</b> - 460	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0009 - 0.0018	-	0.0006 - 0.0012
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0018 - 0.0036	0.0015 - 0.0030	0.0012 - 0.0024
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0038 - 0.0056	-	0.0030 - 0.0045	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0056 - 0.0075	-	0.0045 - 0.0060	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0075 - 0.0095	-	0.0060 - 0.0075	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0095 - 0.0110	-	0.0075 - 0.0090	-
Alloy Steel	4130 4140 4150 8620	260 - <b>310</b> - 360	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0008 - 0.0016	-	0.0005 - 0.0011
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0016 - 0.0034	0.0014 - 0.0027	0.0011 - 0.0022
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0035 - 0.0050	-	0.0027 - 0.0044	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0050 - 0.0070	-	0.0044 - 0.0056	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0070 - 0.0088	-	0.0056 - 0.0070	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0088 - 0.0105	-	0.0070 - 0.0084	-
Preharden Tool Steel	4140PH A2 D2 H13 P20	190 - <b>240</b> - 290	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0005 - 0.0010	-	0.0003 - 0.0007
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0010 - 0.0020	0.0008 - 0.0016	0.0007 - 0.0014
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0020 - 0.0030	-	0.0016 - 0.0024	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0030 - 0.0040	-	0.0024 - 0.0032	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0040 - 0.0050	-	0.0032 - 0.0040	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0050 - 0.0060	-	0.0040 - 0.0048	-
Harden Tool Steel	>48 HRC	125 - <b>150</b> - 175	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0004 - 0.0009	-	0.0003 - 0.0006
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0009 - 0.0016	0.0007 - 0.0014	0.0006 - 0.0011
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0017 - 0.0026	-	0.0014 - 0.0020	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0026 - 0.0035	-	0.0020 - 0.0028	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0035 - 0.0044	-	0.0028 - 0.0035	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0044 - 0.0053	-	0.0035 - 0.0042	-
Stainless Steel	303 304 316 321	130 - <b>180</b> - 230	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0007 - 0.0014	-	0.0005 - 0.0010
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0014 - 0.0028	0.0012 - 0.0023	0.0010 - 0.0019
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0028 - 0.0043	-	0.0023 - 0.0035	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0043 - 0.0058	-	0.0035 - 0.0047	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0058 - 0.0073	-	0.0047 - 0.0059	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0073 - 0.0088	-	0.0059 - 0.0070	-
Stainless Steel	15-5PH 17-4PH 13-8 400 Series	100 - <b>125</b> - 150	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0006 - 0.0011	-	0.0004 - 0.0008
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0011 - 0.0022	0.0009 - 0.0018	0.0008 - 0.0015
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0022 - 0.0034	-	0.0018 - 0.0027	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0034 - 0.0046	-	0.0027 - 0.0037	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0046 - 0.0058	-	0.0037 - 0.0047	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0058 - 0.0070	-	0.0047 - 0.0057	-
Gray Cast Iron	-	375 - <b>425</b> - 475	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0013 - 0.0025	-	0.0009 - 0.0018
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0025 - 0.0050	0.0020 - 0.0040	0.0018 - 0.0034
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0050 - 0.0075	-	0.0040 - 0.0063	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0075 - 0.0100	-	0.0063 - 0.0084	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0100 - 0.0120	-	0.0084 - 0.0105	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0120 - 0.0140	-	0.0105 - 0.0126	-
Nodular Cast Iron	-	310 - <b>360</b> - 410	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0010 - 0.0020	-	0.0006 - 0.0012
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0020 - 0.0030	0.0016 - 0.0032	0.0012 - 0.0024
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	-	0.0032 - 0.0048	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0060 - 0.0080	-	0.0048 - 0.0064	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0080 - 0.0100	-	0.0064 - 0.0080	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0100 - 0.0120	-	0.0080 - 0.0095	-
Nodular Cast Iron	-	310 - <b>360</b> - 410	Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0120 - 0.0140	-	0.0095 - 0.0110	-

\*\* Above recommendations are suggested starting parameters. Cutting speeds and feeds may vary according to machining application, setup, and tool runout.

\*PECK CYCLE: Depending on material, coolant pressure/ location, and depth of hole pecking may be needed. If needed the recommended peck depth is 1.0xDia to 3.0xDia per peck.\*

# Recommended Cutting Conditions

Workpiece Material	Material Hardness/Types	Recommended Cutting Speed (sfm)	Cutting Dia. ØD (in)	Cutting Dia. ØD (mm)	Drill Length (Cutting Depth) Feed Rate (ipr)			
					7xD HYDROS	8xD Mini	10xD HYDROS	15xD Mini
Aluminum	-	ALLOY 375 - 425 - 475  CAST 490 - 540 - 590	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0016 - 0.0032	-	0.0010 - 0.0023
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0032 - 0.0062	0.0025 - 0.0050	0.0023 - 0.0045
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0062 - 0.0090	-	0.0050 - 0.0075	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0125	-	0.0075 - 0.0100	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0125 - 0.0150	-	0.0100 - 0.0125	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0150 - 0.0175	-	0.0125 - 0.0150	-
Copper Alloys	-	275 - 325 - 375	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0016 - 0.0032	-	0.0010 - 0.0023
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0032 - 0.0062	0.0025 - 0.0050	0.0023 - 0.0045
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0062 - 0.0090	-	0.0050 - 0.0075	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0125	-	0.0075 - 0.0100	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0125 - 0.0150	-	0.0100 - 0.0125	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0150 - 0.0175	-	0.0125 - 0.0150	-
Heat Resistant Alloy	Hastelloy Inconel Monel Waspaloy Promet	75 - 90 - 105	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0004 - 0.0007	-	0.0002 - 0.0005
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0007 - 0.0015	0.0006 - 0.0011	0.0005 - 0.0010
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0015 - 0.0022	-	0.0011 - 0.0017	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0022 - 0.0030	-	0.0017 - 0.0023	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0030 - 0.0037	-	0.0023 - 0.0029	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0037 - 0.0044	-	0.0029 - 0.0035	-
Titanium Alloy	-	125 - 150 - 175	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0004 - 0.0009	-	0.0003 - 0.0006
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0009 - 0.0016	0.0007 - 0.0014	0.0006 - 0.0011
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0017 - 0.0026	-	0.0014 - 0.0020	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0026 - 0.0035	-	0.0020 - 0.0028	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0035 - 0.0044	-	0.0028 - 0.0035	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0044 - 0.0053	-	0.0035 - 0.0042	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0053 - 0.0058	-	0.0042 - 0.0046	-

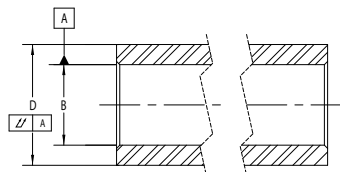
\*\* Above recommendations are suggested starting parameters. Cutting speeds and feeds may vary according to machining application, setup, and tool runout.

\*PECK CYCLE: Depending on material, coolant pressure/ location, and depth of hole pecking may be needed. If needed the recommended peck depth is 1.0xDia to 3.0xDia per peck.\*

## Case Studies

### Adapter - Aerospace 17-4PH1150

Vc = 67sfm (n = 1,050rpm)  
Vf = 4.2ipm  
D.O.C. = 2.000"  
Wet (Internal Coolant)  
Ø0.244"  
865-2441AG3173



Tool Life

**HYDROS** Ø0.244"

**130 pcs / tool**

Tool Life

**1.6x**

Competitor A  
Ø0.244"

**80 pcs / tool**

The HYDROS drill showed 1.6 times the tool life of Competitor A.

(User Evaluation)

### Implant Device - Medical 17-4

Vc = 125sfm (n = 3,970rpm)  
Vf = 4.76ipm  
D.O.C. = 1.000"  
Wet (Internal Coolant)  
Ø0.118"  
865-1181AG1535



Tool Life

**HYDROS** Ø0.118"

**180 pcs / tool**

Tool Life

**1.1x**

Competitor B  
Ø0.118"

**165 pcs / tool**

The HYDROS showed better wear and tool life was 1.1 times that of Competitor B.

(User Evaluation)

# Explore Kyocera's Broad Range of Drilling Solutions



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**HYDROS**

Coolant Through Deep Drills



**2ZDK**

Flat Bottom Drills



**HP131N**

Drills for Non-Ferrous & Aluminum



**DRA**

Replaceable Insert Tip Magic Drills



**DRV**

High Efficiency Indexable Magic Drills



**HOLESHOT™**

DR Indexable Drills

Drill Diameter Range		■ Solid Drills	■ Indexable Drills	1.5D	2D	3D	4D	5D	6D	7D	8D	10D	15D
<b>ORION</b> (Inch)	0.047"~0.500"												
<b>ORION</b> (Metric)	1.00mm~12.00mm					•		•					
<b>HYDROS</b> (Inch)	0.125"~0.500"												
<b>HYDROS</b> (Metric)	1.00mm~12.00mm									•	•	•	•
<b>2ZDK</b> (Metric)	1.00mm~20.00mm												
<b>HP131N</b> (Metric)	3.00mm~12.00mm							•					
<b>DRA</b> (Inch)	0.313"~1.004"												
<b>DRA</b> (Metric)	7.94mm~25.50mm					•	•	•				•	
<b>DRV</b> (Inch)	0.625"~1.000" <i>FUTURE EXPANSION</i>												
<b>DRV</b> (Metric)	14.00mm~32.00mm					•	•	•	•	•			
<b>HOLESHOT</b> (Inch)	0.515"~4.000"												
<b>HOLESHOT</b> (Metric)	14.00mm~63.00mm												

0      Ø0.500      Ø1.000      Ø2.000      Ø3.000      Ø4.000



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