

YU-IO21 AMERICA

BEST VALUE IN THE WORLD OF CUTTING TOOLS



COMPLETE METALWORKING SOLUTIONS
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ISO Certified customerservice@ahbinc.com

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TO SEE i-ONE DRILLS AT WORK



YG1YUIO201200001



i-ONE DRILLS

**MICRO GRAIN CARBIDE INSERTS
AND PREMIUM TOOL STEEL HOLDERS**

Cost Efficient High Performance
Exchangeable Drilling Tools



FEATURES OF *i*-ONE DRILLS

Micro Grain Carbide Inserts and Premium Tool Steel Holder with Coolant Holes

“COST EFFICIENT HIGH PERFORMANCE EXCHANGEABLE DRILLING TOOLS”

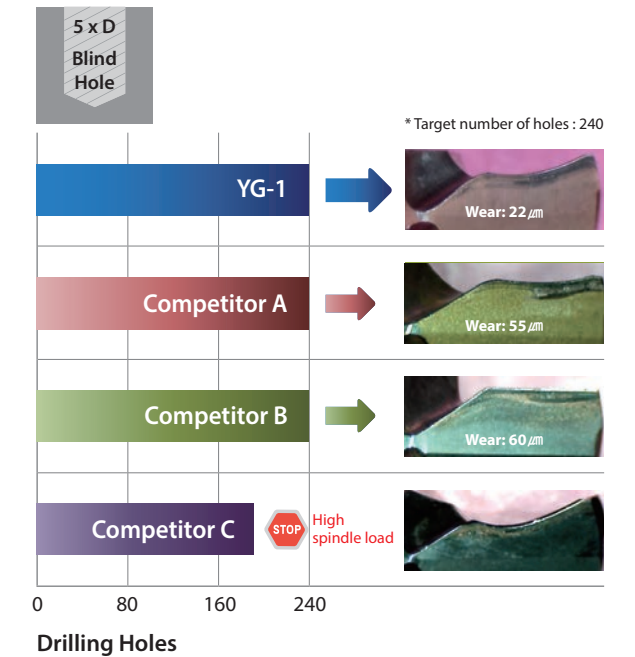
- Torx Plus® Screw** for clamping insert
- Optimized flute shape** for better chip evacuation
- Nickel-plated Steel holder** for corrosion resistance and wear resistance
- Body Clearance** for elimination of undesirable contact with work piece
- Internal cooling channel** for higher drilling performance
- Ground bright finished shank** for more precise clamping
- Cylindrical shank with a parallel flat** according to ISO9766 Plain shank and Whistle notch shank are available on request

- Secure & Quick clamping system**
- Multi layered 'H'-coating** reduces the cracking and provides higher shear strength while achieving excellent oxidation resistance and hot hardness
- Optimized point geometry** of i-ONE Drills ensures centering ability and smoother cutting
- Self Centering and Chip Breaking** by Radius Thinning
- Ground Negative land** on cutting edge for Reliable Tool Life

CASE STUDY

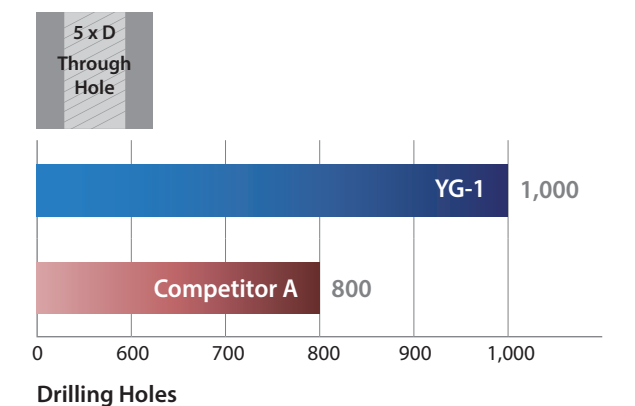
► Ø14.0mm, Alloy Steel

Tool	Y141H1400	Competitors
O.D Size (mm)	Ø14.0 (0.5512 inch)	
Work Material	-DIN: 42CrMo4 -AISI: 4140 -JIS: SCM440(HRc30)	
Cutting Speed	80 m/min. (262.5 ft/min.)	
RPM	1,819 rev./min.	
Feed	0.18 mm/rev. (0.0071 in/rev.)	
Drilling Depth	65.0 mm (5XD / Blind)	
Cooling Method	Internal Cooling (35 bar) Water Soluble (9% Emulsion)	
Machine	Machining Center	



► Ø16.0mm, Pre-Hardened

Tool	YG-1	Competitor A
O.D Size (mm)	Ø16.0 (0.6299 inch)	
Work Material	-DIN: CK45 -AISI: 1045 -JIS: S45C(HRc20)	
Cutting Speed	75 m/min. (246.1 ft/min.)	
RPM	1,493 rev./min.	
Feed	0.3 mm/rev. (0.0118 in/rev.)	
Drilling Depth	35.0 mm (Through)	
Cooling Method	Internal Cooling (10 bar) Water Soluble (9% Emulsion)	
Machine	Machining Center	



SELECTION GUIDE

SERIES	Y101H	Y121H	Y141H	Y161H
SIZE MIN	10.00	12.00	14.00	16.00
SIZE MAX	11.91	13.90	15.90	17.90
PAGE	6	7	8	9

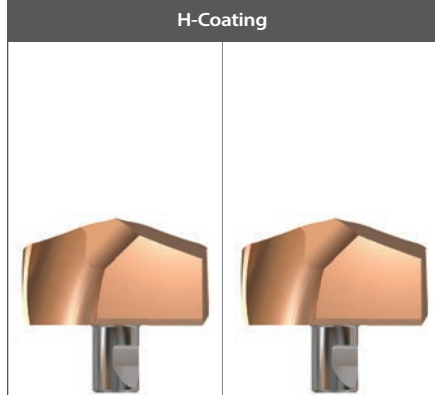
Please visit global.yg1.com/mat for material search

i-ONE DRILLS

High Performance Exchangeable Carbide Inserts for General Steels and Cast Iron

◎ : Excellent ○ : Good

ISO	VDI 3323	Material Description	Composition / Structure / Heat Treatment	HB	HRC	Y101H	Y121H	Y141H	Y161H	
P	1	Non-alloy steel	About 0.15% C Annealed	125		◎	◎	◎	◎	
	2		About 0.45% C Annealed	190	13	◎	◎	◎	◎	
	3		About 0.45% C Quenched & tempered	250	25	◎	◎	◎	◎	
	4		About 0.75% C Annealed	270	28	◎	◎	◎	◎	
	5		About 0.75% C Quenched & tempered	300	32	◎	◎	◎	◎	
	6	Low alloy steel	Annealed	180	10	◎	◎	◎	◎	
	7		Quenched & tempered	275	29	◎	◎	◎	◎	
	8		Quenched & tempered	300	32	◎	◎	◎	◎	
	9		Quenched & tempered	350	38	◎	◎	◎	◎	
	10		High alloyed steel, and tool steel	Annealed	200	15	◎	◎	◎	◎
	11		Quenched & Tempered	325	35	◎	◎	◎	◎	
M	12	Stainless steel	Ferritic / Martensitic Annealed	200	15					
	13		Martensitic Quenched & Tempered	240	23					
	14		Austenitic	180	10					
K	15	Grey cast iron	Pearlitic / ferritic	180	10	◎	◎	◎	◎	
	16		Pearlitic (Martensitic)	260	26	◎	◎	◎	◎	
	17	Nodular cast iron	Ferritic	160	3	◎	◎	◎	◎	
	18		Pearlitic	250	25	◎	◎	◎	◎	
	19		Ferritic	130		◎	◎	◎	◎	
20	Malleable cast iron	Pearlitic	230	21	◎	◎	◎	◎		
N	21	Aluminum-wrought alloy	Not Curable	60						
	22		Curable Hardened	100						
	23	Aluminum-cast, alloyed	≤ 12% Si, Not Curable	75						
	24		≤ 12% Si, Curable Hardened	90						
	25		> 12% Si, Not Curable	130						
	26	Copper and Copper Alloys	Cutting Alloys, PB>1%	110						
	27		CuZn, CuSnZn (Brass)	90						
	28	(Bronze / Brass)	CuSn, lead-free copper and electrolytic copper	100						
	29		Duroplastic, Fiber Reinforced Plastic							
	30	Non Metallic Materials	Rubber, Wood, etc.							
S	31	Heat Resistant Super Alloys	Fe Based Annealed	200	15					
	32		Cured	280	30					
	33		Annealed	250	25					
	34		Ni or Co Based Cured	350	38					
	35		Cast	320	34					
	36	Titanium Alloys	Pure Titanium	400 Rm						
	37		Alpha + Beta Alloys Hardened	1050 Rm						
H	38	Hardened steel	Hardened	550	55					
	39		Hardened	630	60					
	40		Chilled Cast Iron	Cast	400	42				
	41		Hardened Cast Iron	Hardened	550	55				



Y181H	Y201H	Y221H	Y241H	Y261H	Y281H	Y301H	Y321H	ZD*3	ZD*5	ZD*8
18.00	20.00	22.00	24.00	26.00	28.00	30.00	32.00	3XD	5XD	8XD
19.90	21.90	23.90	25.90	27.90	29.90	31.90	33.90			
10	11	12	13	14	15	16	17			



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GUIDE LINE TO ICONS

Tool Raw Material

CARBIDE

Point Angle

140°

Tolerance of Dimension

h7 Tolerance of Outside Diameter

ISO 9766 Tolerance of Shank Diameter

Cutting Condition Page

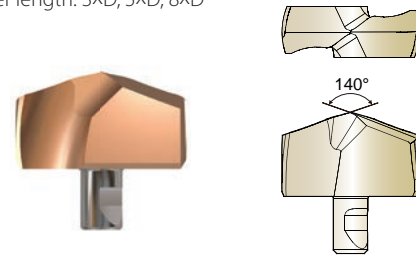
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y141H SERIES

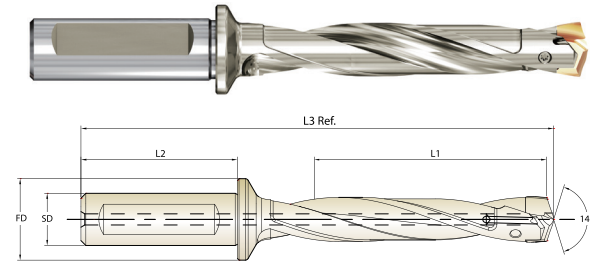
► Applications

- For carbon steels, alloy steels and cast iron
- Holder length: 3XD, 5XD, 8XD



► Benefits

- Secure and quick clamping system
- High performance with cost efficiency
- Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range (mm)	Insert EDP No. H-Coating	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth		Overall Length L3 Ref.	Screw No.
		h7							L1	L3 Ref.		
		dec.	frac.	mm								
S14 Ø14.00 to Ø15.99	Y141H1400	0.5512		14.00	ZD14003063 ZD14005063 ZD14008063	5/8	1-7/8	29/32	3D	1-23/32	4-9/16	TX1415P7
	Y141H1410	0.5551		14.10					5D	2-55/64	5-43/64	
	Y141H1420	0.5591		14.20					8D	4-9/16	7-5/16	
	Y141H1429	0.5625	9/16	14.29								
	Y141H1430	0.5630		14.30								
	Y141H1440	0.5669		14.40								
	Y141H1450	0.5709		14.50	ZD14503063 ZD14505063 ZD14508063	5/8	1-7/8	29/32	3D	1-49/64	4-41/64	
	Y141H1460	0.5748		14.60					5D	2-61/64	5-25/32	
	Y141H1468	0.5781	37/64	14.68					8D	4-23/32	7-1/2	
	Y141H1470	0.5787		14.70								
	Y141H1480	0.5827		14.80								
	Y141H1490	0.5866		14.90								
	Y141H1500	0.5906		15.00	ZD15003063 ZD15005063 ZD15008063	5/8	1-7/8	29/32	3D	1-53/64	4-23/32	
	Y141H1508	0.5938	19/32	15.08					5D	3-3/64	5-29/32	
	Y141H1510	0.5945		15.10					8D	4-7/8	7-43/64	
	Y141H1520	0.5984		15.20								
	Y141H1530	0.6024		15.30								
	Y141H1540	0.6063		15.40								
	Y141H1548	0.6094	39/64	15.48	ZD15503063 ZD15505063 ZD15508063	5/8	1-7/8	29/32	3D	1-57/64	4-49/64	
	Y141H1550	0.6102		15.50					5D	3-5/32	5-63/64	
Y141H1560	0.6142		15.60	8D					5-3/64	7-13/16		
Y141H1570	0.6181		15.70									
Y141H1580	0.6220		15.80									
Y141H1588	0.6250	5/8	15.88									
Y141H1590	0.6260		15.90									

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K																											
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel				Grey cast iron		Nodular cast iron		Malleable cast iron																			
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
HRc	13	25	28	32	38	10	29	32	38	15	35	15	23	10	10	26	3	25			15	35	15	23	10	10	26	3	25			15	30	25	38	34	55	60	42	55		
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	180	260	160	250	130	230					200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

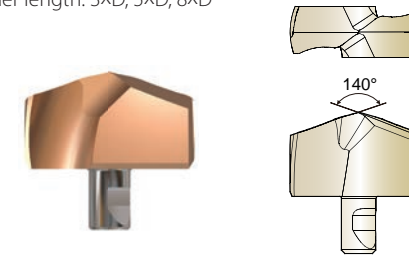
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y161H SERIES

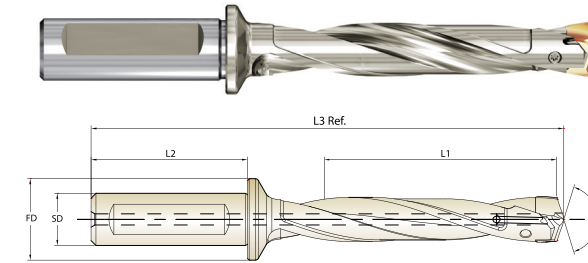
► Applications

- For carbon steels, alloy steels and cast iron
- Holder length: 3XD, 5XD, 8XD



► Benefits

- Secure and quick clamping system
- High performance with cost efficiency
- Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range (mm)	Insert EDP No. H-Coating	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth		Overall Length L3 Ref.	Screw No.
		h7							L1	L3 Ref.		
		dec.	frac.	mm								
S16 Ø16.00 to Ø17.99	Y161H1600	0.6299		16.00	ZD16003075 ZD16005075 ZD16008075	3/4	2	1	3D	2-1/64	5-1/32	TX1617P7
	Y161H1609	0.6335		16.09					5D	3-11/32	6-21/64	
	Y161H1610	0.6339		16.10					8D	5-23/64	8-9/32	
	Y161H1620	0.6378		16.20								
	Y161H1627	0.6406	41/64	16.27								
	Y161H1630	0.6417		16.30								
	Y161H1640	0.6457		16.40								
	Y161H1650	0.6496		16.50								
	Y161H1660	0.6535		16.60								
	Y161H1667	0.6563	21/32	16.67								
	Y161H1670	0.6575		16.70								
	Y161H1680	0.6614		16.80								
	Y161H1690	0.6654		16.90								
	Y161H1700	0.6693		17.00	ZD17003075 ZD17005075 ZD17008075	3/4	2	1	3D	2-1/8	5-5/32	
	Y161H1707	0.6719	43/64	17.07					5D	3-35/64	6-17/32	
	Y161H1710	0.6732		17.10					8D	5-43/64	8-19/32	
	Y161H1720	0.6772		17.20								
	Y161H1730	0.6811		17.30								
	Y161H1740	0.6850		17.40								
	Y161H1746	0.6875	11/16	17.46								
Y161H1750	0.6890		17.50									
Y161H1760	0.6929		17.60									
Y161H1770	0.6969		17.70									
Y161H1780	0.7008		17.80									
Y161H1786	0.7031	45/64	17.86									
Y161H1790	0.7047		17.90									

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K																											
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel				Grey cast iron		Nodular cast iron		Malleable cast iron																			
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
HRc	13	25	28	32	38	10	29	32	38	15	35	15	23	10	10	26	3	25			15	35	15	23	10	10	26	3	25			15	30	25	38	34	55	60	42	55		
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	180	260	160	250	130	230					200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

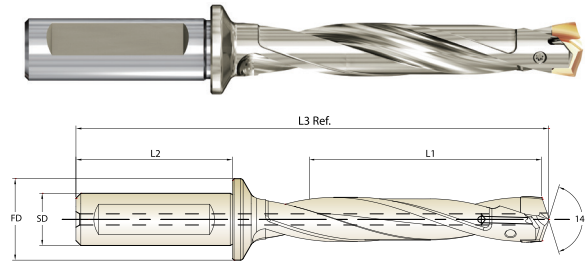
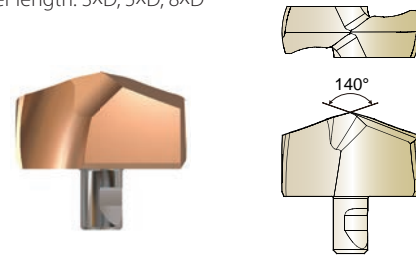
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y181H SERIES

- Applications
 - For carbon steels, alloy steels and cast iron
 - Holder length: 3XD, 5XD, 8XD

- Benefits
 - Secure and quick clamping system
 - High performance with cost efficiency
 - Multi-layered coating delivers outstanding productivity and reliability



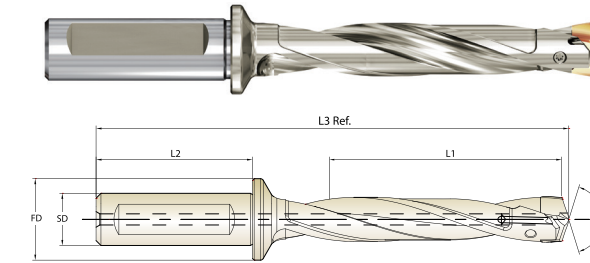
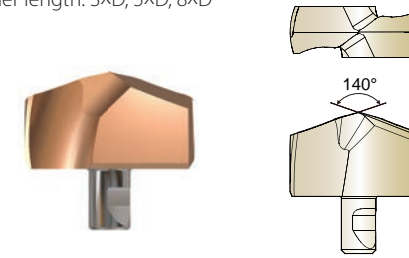
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y201H SERIES

- Applications
 - For carbon steels, alloy steels and cast iron
 - Holder length: 3XD, 5XD, 8XD

- Benefits
 - Secure and quick clamping system
 - High performance with cost efficiency
 - Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth L1	Overall Length L3 Ref.	Screw No.
		h7									
		dec.	frac.	mm							
S18 Ø18.00 to Ø19.99	Y181H1800	0.7087		18.00	ZD18003100 ZD18005100 ZD18008100	1	2-3/16	1-1/4	3D 2-1/4	5-35/64	TX1819P9
	Y181H1810	0.7126		18.10					5D 3-47/64		
	Y181H1820	0.7165		18.20					8D 5-63/64		
	Y181H1826	0.7188	23/32	18.26							
	Y181H1830	0.7205		18.30							
	Y181H1840	0.7244		18.40							
	Y181H1850	0.7283		18.50							
	Y181H1860	0.7323		18.60							
	Y181H1865	0.7344	47/64	18.65							
	Y181H1870	0.7362		18.70							
	Y181H1880	0.7402		18.80							
	Y181H1890	0.7441		18.90							
	Y181H1900	0.7480		19.00							
	Y181H1905	0.7500	3/4	19.05							
	Y181H1910	0.7520		19.10							
	Y181H1920	0.7559		19.20							
	Y181H1927	0.7587		19.27							
	Y181H1930	0.7598		19.30							
	Y181H1940	0.7638		19.40							
	Y181H1945	0.7656	49/64	19.45							
Y181H1950	0.7677		19.50								
Y181H1960	0.7717		19.60								
Y181H1970	0.7756		19.70								
Y181H1980	0.7795		19.80								
Y181H1984	0.7813	25/32	19.84								
Y181H1990	0.7835		19.90								
				ZD19003100 ZD19005100 ZD19008100	1	2-3/16	1-1/4	3D 2-23/64 5D 3-15/16 8D 6-19/64	5-45/64 7-15/64 9-35/64	TX1920P9	

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K									
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel				Grey cast iron	Nodular cast iron		Malleable cast iron		
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
HRc	13	25	28	32	38	10	29	32	38	45	15	23	28	35	10	26	3	25	21	21				
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230				
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H						
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys			Hardened steel	Chilled Cast Iron	Hardened Cast Iron				
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			
HRc											15	30	25	38	34			55	60	42	55			
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550			
Recommended																								

Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth L1	Overall Length L3 Ref.	Screw No.
		h7									
		dec.	frac.	mm							
S20 Ø20.00 to Ø21.99	Y201H2000	0.7874		20.00	ZD20003100 ZD20005100 ZD20008100	1	2-3/16	1-1/4	3D 2-31/64	5-51/64	TX2021P9
	Y201H2010	0.7913		20.10					5D 4-9/64		
	Y201H2020	0.7953		20.20					8D 6-39/64		
	Y201H2024	0.7969	51/64	20.24							
	Y201H2030	0.7992		20.30							
	Y201H2040	0.8031		20.40							
	Y201H2050	0.8071		20.50							
	Y201H2060	0.8110		20.60							
	Y201H2064	0.8125	13/16	20.64							
	Y201H2070	0.8150		20.70							
	Y201H2080	0.8189		20.80							
	Y201H2090	0.8228		20.90							
	Y201H2100	0.8268		21.00							
	Y201H2103	0.8281	53/64	21.03							
	Y201H2110	0.8307		21.10							
	Y201H2120	0.8346		21.20							
	Y201H2130	0.8386		21.30							
	Y201H2140	0.8425		21.40							
	Y201H2143	0.8438	27/32	21.43							
	Y201H2150	0.8465		21.50							
Y201H2160	0.8504		21.60								
Y201H2170	0.8543		21.70								
Y201H2180	0.8583		21.80								
Y201H2183	0.8594	55/64	21.83								
Y201H2190	0.8622		21.90								
				ZD21003100 ZD21005100 ZD21008100	1	2-3/16	1-1/4	3D 2-19/32 5D 4-21/64 8D 6-59/64	5-29/32 7-19/32 10-9/64	TX2122P9	

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K									
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel				Grey cast iron	Nodular cast iron		Malleable cast iron		
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
HRc	13	25	28	32	38	10	29	32	38	45	15	23	28	35	10	26	3	25	21	21				
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230				
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H						
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys			Hardened steel	Chilled Cast Iron	Hardened Cast Iron				
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			
HRc											15	30	25	38	34			55	60	42	55			
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550			
Recommended																								

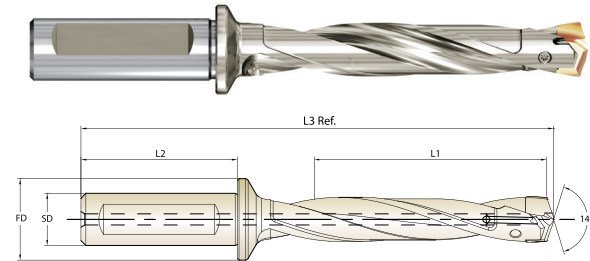
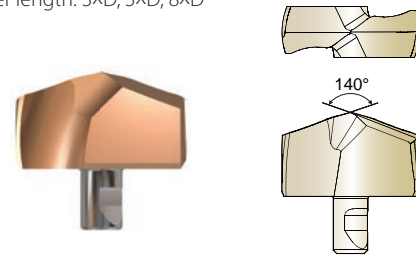
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y221H SERIES

- Applications
 - For carbon steels, alloy steels and cast iron
 - Holder length: 3XD, 5XD, 8XD

- Benefits
 - Secure and quick clamping system
 - High performance with cost efficiency
 - Multi-layered coating delivers outstanding productivity and reliability



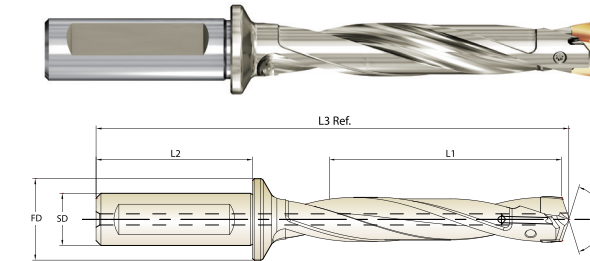
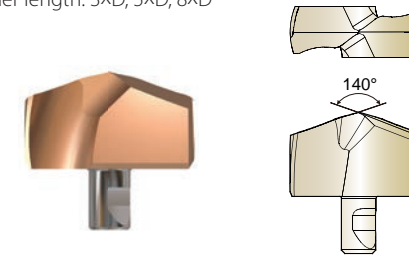
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y241H SERIES

- Applications
 - For carbon steels, alloy steels and cast iron
 - Holder length: 3XD, 5XD, 8XD

- Benefits
 - Secure and quick clamping system
 - High performance with cost efficiency
 - Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth L1	Overall Length L3 Ref.	Screw No.	
		h7										
		dec.	frac.	mm								
S22 Ø22.00 to Ø23.99	Y221H2200	0.8661		22.00	ZD22003100 ZD22005100 ZD22008100	1	2-3/16	1-1/4	3D	2-23/32	6-1/32	TX2223P9
	Y221H2210	0.8701		22.10					5D	4-34/64	7-51/64	
	Y221H2220	0.8740		22.20					8D	7-1/4	10-29/64	
	Y221H2223	0.8750	7/8	22.23								
	Y221H2230	0.8780		22.30								
	Y221H2240	0.8819		22.40								
	Y221H2250	0.8858		22.50								
	Y221H2260	0.8898		22.60								
	Y221H2262	0.8906	57/64	22.62								
	Y221H2270	0.8937		22.70								
	Y221H2280	0.8976		22.80								
	Y221H2290	0.9016		22.90								
	Y221H2300	0.9055		23.00	ZD23003100 ZD23005100 ZD23008100	1	2-3/16	1-1/4	3D	2-53/64	6-3/16	TX2223P9
	Y221H2302	0.9063	29/32	23.02					5D	4-23/32	8-1/32	
	Y221H2310	0.9094		23.10					8D	7-9/16	10-13/16	
	Y221H2320	0.9134		23.20								
	Y221H2330	0.9173		23.30								
	Y221H2340	0.9213		23.40								
	Y221H2342	0.9219	59/64	23.42								
	Y221H2350	0.9252		23.50								
Y221H2360	0.9291		23.60									
Y221H2370	0.9331		23.70									
Y221H2380	0.9370		23.80									
Y221H2381	0.9375	15/16	23.81									
Y221H2390	0.9409		23.90									

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel		Grey cast iron		Nodular cast iron	Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRc	13	25	28	32	38	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H			
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys			Hardened steel	Chilled Cast Iron	Hardened Cast Iron	
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended																					

Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth L1	Overall Length L3 Ref.	Screw No.	
		h7										
		dec.	frac.	mm								
S24 Ø24.00 to Ø25.99	Y241H2400	0.9449		24.00	ZD24003125 ZD24005125 ZD24008125	1-1/4	2-3/8	1-15/32	3D	2-61/64	6-17/32	TX2425P10
	Y241H2410	0.9488		24.10					5D	4-59/64	8-15/32	
	Y241H2420	0.9528		24.20					8D	7-7/8	11-23/64	
	Y241H2421	0.9531	61/64	24.21								
	Y241H2430	0.9567		24.30								
	Y241H2440	0.9606		24.40								
	Y241H2450	0.9646		24.50								
	Y241H2460	0.9685		24.60								
	Y241H2461	0.9688	31/32	24.61								
	Y241H2470	0.9724		24.70								
	Y241H2480	0.9764		24.80								
	Y241H2490	0.9803		24.90								
	Y241H2500	0.9844	63/64	25.00	ZD25003125 ZD25005125 ZD25008125	1-1/4	2-3/8	1-15/32	3D	3-5/64	6-47/64	TX2526P10
	Y241H2510	0.9882		25.10					5D	5-1/8	8-47/64	
	Y241H2520	0.9921		25.20					8D	8-3/16	11-3/4	
	Y241H2530	0.9961		25.30								
	Y241H2540	1.0000	1	25.40								
	Y241H2550	1.0039		25.50								
	Y241H2560	1.0079		25.60								
	Y241H2567	1.0106		25.67								
Y241H2570	1.0118		25.70									
Y241H2580	1.0156	1-1/64	25.80									
Y241H2590	1.0197		25.90									

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K						
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel		Grey cast iron		Nodular cast iron	Malleable cast iron	
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
HRc	13	25	28	32	38	10	29	32	38	15	35	15	23	10	10	26	3	25	21	21	
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230	
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H			
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys			Hardened steel	Chilled Cast Iron	Hardened Cast Iron	
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended																					

MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

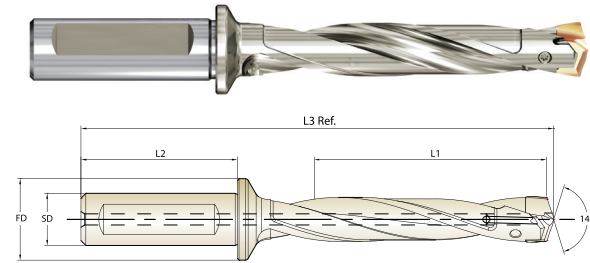
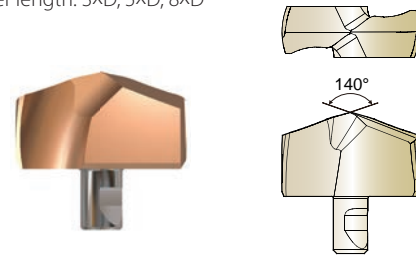
Y261H SERIES

► Applications

- For carbon steels, alloy steels and cast iron
- Holder length: 3XD, 5XD, 8XD

► Benefits

- Secure and quick clamping system
- High performance with cost efficiency
- Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth		Overall Length L3 Ref.	Screw No.
		h7							L1	L3 Ref.		
		dec.	frac.	mm								
S26 Ø26.00 to Ø27.99	Y261H2600	1.0236		26.00	ZD26003125 ZD26005125 ZD26008125	1-1/4	2-3/8	1-15/32	3D	3-3/16	6-51/64	TX2627P10
	Y261H2619	1.0311	1-1/32	26.19					5D	5-5/16	8-7/8	
	Y261H2620	1.0315		26.20					8D	8-1/2	12-1/64	
	Y261H2650	1.0433		26.50								
	Y261H2659	1.0469	1-3/64	26.59								
	Y261H2660	1.0472		26.60								
	Y261H2670	1.0512		26.70								
	Y261H2680	1.0551		26.80								
	Y261H2690	1.0591		26.90								
	Y261H2699	1.0626	1-1/16	26.99								
	Y261H2700	1.0630		27.00	ZD27003125 ZD27005125 ZD27008125	1-1/4	2-3/8	1-15/32	3D	3-5/16	6-29/32	TX2728P10
	Y261H2710	1.0669		27.10					5D	5-33/64	9-5/64	
	Y261H2720	1.0709		27.20					8D	8-13/16	12-21/64	
	Y261H2730	1.0748		27.30								
	Y261H2738	1.0780	1-5/64	27.38								
	Y261H2740	1.0787		27.40								
	Y261H2750	1.0827		27.50								
	Y261H2760	1.0866		27.60								
	Y261H2770	1.0906		27.70								
	Y261H2778	1.0937	1-3/32	27.78								
Y261H2780	1.0945		27.80									
Y261H2790	1.0984		27.90									

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel		Grey cast iron	Nodular cast iron		Malleable cast iron
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRC	13	25	28	32	38	10	29	32	38	45	15	35	40	45	10	26	3	25	10	21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H			
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron	
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRC											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended																					

MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

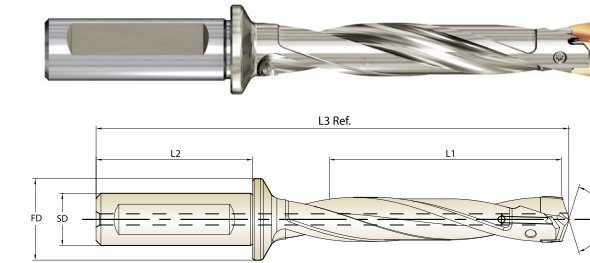
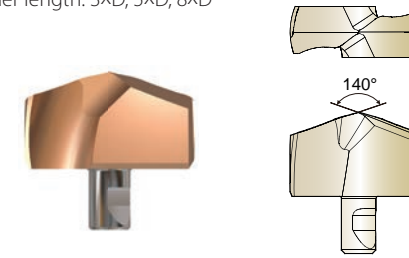
Y281H SERIES

► Applications

- For carbon steels, alloy steels and cast iron
- Holder length: 3XD, 5XD, 8XD

► Benefits

- Secure and quick clamping system
- High performance with cost efficiency
- Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth		Overall Length L3 Ref.	Screw No.
		h7							L1	L3 Ref.		
		dec.	frac.	mm								
S28 Ø28.00 to Ø29.99	Y281H2800	1.1024		28.00	ZD28003125 ZD28005125 ZD28008125	1-1/4	2-3/8	1-15/32	3D	3-27/64	7-1/16	TX2830P10
	Y281H2810	1.1063		28.10					5D	5-45/64	9-5/16	
	Y281H2818	1.1094	1-7/64	28.18					8D	9-9/64	12-43/64	
	Y281H2820	1.1102		28.20								
	Y281H2830	1.1142		28.30								
	Y281H2840	1.1181		28.40								
	Y281H2850	1.1220		28.50								
	Y281H2858	1.1252	1-1/8	28.58								
	Y281H2860	1.1260		28.60								
	Y281H2870	1.1299		28.70								
	Y281H2880	1.1339		28.80	ZD29003125 ZD29005125 ZD29008125	1-1/4	2-3/8	1-15/32	3D	3-35/64	7-7/32	TX2930P10
	Y281H2890	1.1378		28.90					5D	5-29/32	9-35/64	
	Y281H2900	1.1417		29.00					8D	9-29/64	13-1/32	
	Y281H2910	1.1457		29.10								
	Y281H2920	1.1496		29.20								
	Y281H2930	1.1535		29.30								
	Y281H2937	1.1563	1-5/32	29.37								
	Y281H2940	1.1575		29.40								
	Y281H2950	1.1614		29.50								
	Y281H2960	1.1654		29.60								
Y281H2970	1.1693		29.70									
Y281H2977	1.1720	1-11/64	29.77									
Y281H2980	1.1732		29.80									
Y281H2990	1.1772		29.90									

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel		Grey cast iron	Nodular cast iron		Malleable cast iron
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRC	13	25	28	32	38	10	29	32	38	45	15	35	40	45	10	26	3	25	10	21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H			
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys					Titanium Alloys		Hardened steel	Chilled Cast Iron	Hardened Cast Iron	
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRC											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended																					

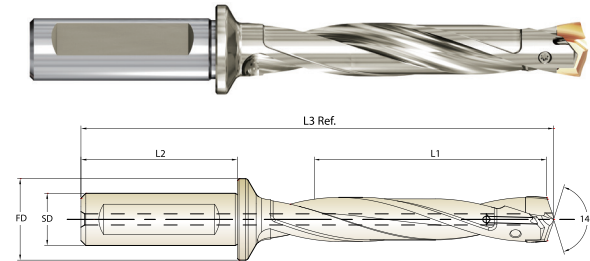
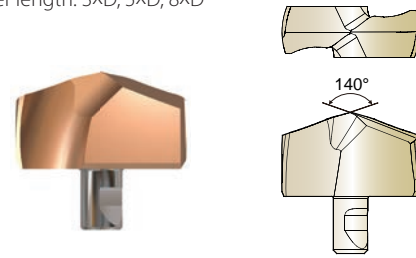
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y301H SERIES

- Applications
 - For carbon steels, alloy steels and cast iron
 - Holder length: 3XD, 5XD, 8XD

- Benefits
 - Secure and quick clamping system
 - High performance with cost efficiency
 - Multi-layered coating delivers outstanding productivity and reliability



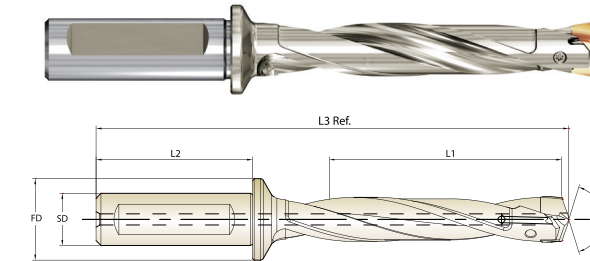
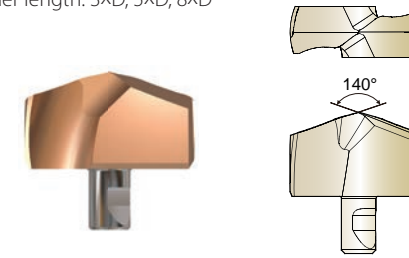
MICRO GRAIN CARBIDE INSERTS and PREMIUM TOOL STEEL HOLDERS

i-ONE DRILLS INSERTS & HOLDERS

Y321H SERIES

- Applications
 - For carbon steels, alloy steels and cast iron
 - Holder length: 3XD, 5XD, 8XD

- Benefits
 - Secure and quick clamping system
 - High performance with cost efficiency
 - Multi-layered coating delivers outstanding productivity and reliability



Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth L1	Overall Length L3 Ref.	Screw No.
		h7									
		dec.	frac.	mm							
S30 Ø30.00 to Ø31.99	Y301H3000	1.1811		30.00	ZD30003125 ZD30005125 ZD30008125	1-1/4	2-3/8	1-15/32	3D 3-21/32 5D 6-7/64 8D 9-49/64	7-3/8 9-25/32 13-3/8	TX3031P15
	Y301H3010	1.1850		30.10							
	Y301H3016	1.1874	1-3/16	30.16							
	Y301H3020	1.1890		30.20							
	Y301H3030	1.1929		30.30							
	Y301H3040	1.1969		30.40							
	Y301H3050	1.2008		30.50							
	Y301H3056	1.2031	1-13/64	30.56							
	Y301H3060	1.2047		30.60							
	Y301H3070	1.2087		30.70							
	Y301H3080	1.2126		30.80							
	Y301H3090	1.2165		30.90							
	Y301H3096	1.2189	1-7/32	30.96							
	Y301H3100	1.2205		31.00							
	Y301H3110	1.2244		31.10							
	Y301H3120	1.2283		31.20							
	Y301H3130	1.2323		31.30							
	Y301H3140	1.2362		31.40							
	Y301H3150	1.2402		31.50							
	Y301H3160	1.2441		31.60							
Y301H3170	1.2480		31.70								
Y301H3175	1.2500	1-1/4	31.75								
Y301H3180	1.2520		31.80								
Y301H3190	1.2559		31.90								
				ZD31003125 ZD31005125 ZD31008125	1-1/4	2-3/8	1-15/32	3D 3-25/32 5D 6-19/64 8D 10-5/64	7-17/32 10-1/64 13-47/64	TX3132P15	

► Other diameters of insert and shank types of holder are available upon request.

◎ : Excellent ○ : Good

ISO Material Description	P										M				K					
	Non-alloy steel					Low alloy steel					High alloyed steel, and tool steel				Stainless steel		Grey cast iron		Nodular cast iron	Malleable cast iron
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HRc	13	25	28	32	38	10	29	32	38	45	15	35	40	45	10	26	3	25	3	21
HB	125	190	250	270	300	180	275	300	350	200	325	200	240	180	180	260	160	250	130	230
Recommended	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

ISO Material Description	N										S							H			
	Aluminum-wrought alloy		Aluminum-cast, alloyed			Copper and Copper Alloys (Bronze / Brass)			Non Metallic Materials		Heat Resistant Super Alloys				Titanium Alloys			Hardened steel	Chilled Cast Iron	Hardened Cast Iron	
VDI 3323	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
HRc											15	30	25	38	34			55	60	42	55
HB	60	100	75	90	130	110	90	100			200	280	250	350	320	400 Rm	1050 Rm	550	630	400	550
Recommended																					

Unit: inch

Series Range	Insert EDP No.	Insert O.D.			Holder EDP No.	Shank Dia. SD	Shank Length L2	Flange Dia. FD	Drilling Depth L1	Overall Length L3 Ref.	Screw No.
		h7									
		dec.	frac.	mm							
S32 Ø32.00 to Ø33.99	Y321H3200	1.2598		32.00	ZD32003125 ZD32005125 ZD32008125	1-1/4	2-3/8	1-15/32	3D 3-57/64 5D 6-1/2 8D 10-25/64	7-25/32 10-21/64 14-11/64	TX3233P15
	Y321H3210	1.2638		32.10							
	Y321H3215	1.2657	1-17/64	32.15							
	Y321H3220	1.2677		32.20							
	Y321H3230	1.2717		32.30							
	Y321H3240	1.2756		32.40							
	Y321H3250	1.2795		32.50							
	Y321H3254	1.2811	1-9/32	32.54							
	Y321H3260	1.2835		32.60							
	Y321H3270	1.2874		32.70							
	Y321H3280	1.2913		32.80							
	Y321H3290	1.2953		32.90							
	Y321H3294	1.2969	1-19/64	32.94							
	Y321H3300	1.2992		33.00							
	Y321H3310	1.3031		33.10							
	Y321H3320	1.3071		33.20							
	Y321H3330	1.3110		33.30							
	Y321H3334	1.3126	1-5/16	33.34							
	Y321H3340	1.3150		33.40							
	Y321H3350	1.3189		33.50							
Y321H3360	1.3228		33.60								
Y321H3370	1.3268		33.70								
Y321H3373	1.3280	1-21/64	33.73								
Y321H3380	1.3307		33.80								
Y321H3390	1.3346		33.90								
				ZD33003125 ZD33005125 ZD33008125	1-1/4	2-3/8	1-15/32	3D 4-1/64 5D 6-11/16 8D 10-45/64	7-15/16 10-37/64 14-17/32	TX3334P15	

► Other diameters of insert and shank types of holder are available upon request.

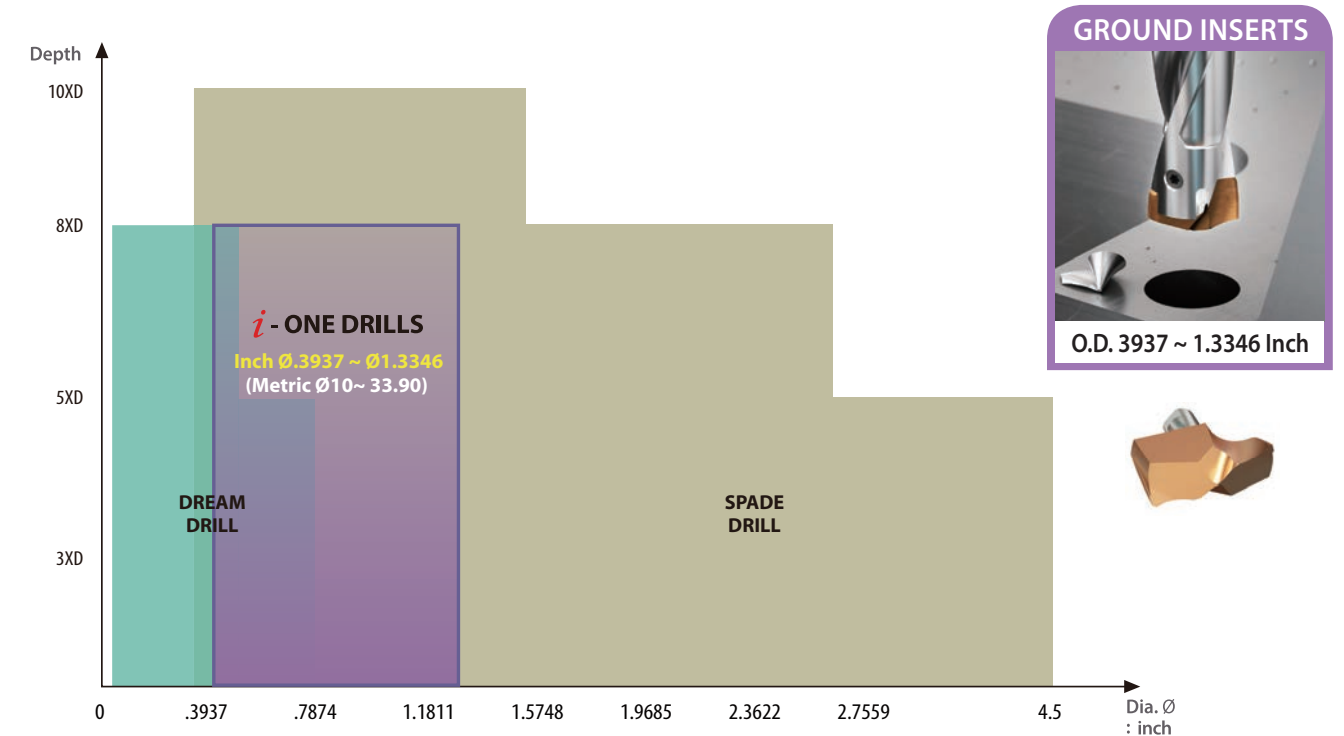
◎ : Excellent ○ : Good

SFM = ft/min.
Feed(IPR) = inch/rev.

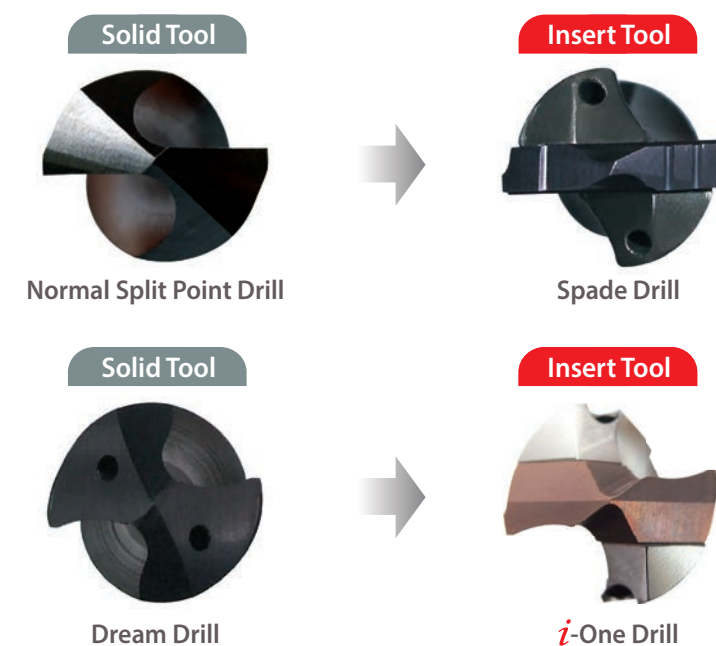
ISO	VDI 3323	Material Description	Cutting Speed	Feed(IPR)					
				SFM	Ø10.0~11.99	Ø12.09~14.99	Ø15.00~17.99	Ø18.00~21.99	Ø22.0~26.99
P	1	Non-alloy steel	328~413	0.006~0.009	0.007~0.012	0.009~0.015	0.012~0.017	0.015~0.022	0.016~0.024
	2		276~361	0.005~0.008	0.006~0.010	0.009~0.015	0.012~0.017	0.015~0.022	0.016~0.024
	3		207~276	0.004~0.007	0.005~0.009	0.007~0.012	0.009~0.014	0.013~0.020	0.014~0.021
	4		190~243	0.004~0.006	0.004~0.007	0.007~0.011	0.009~0.013	0.011~0.017	0.013~0.019
	5		190~243	0.004~0.006	0.004~0.007	0.007~0.011	0.009~0.013	0.011~0.017	0.013~0.019
	6	Low alloy steel	243~312	0.004~0.007	0.005~0.009	0.007~0.012	0.009~0.014	0.013~0.020	0.015~0.022
	7		207~276	0.004~0.007	0.005~0.009	0.007~0.011	0.009~0.014	0.013~0.020	0.015~0.022
	8		190~243	0.004~0.006	0.004~0.007	0.006~0.009	0.009~0.013	0.011~0.017	0.013~0.019
	9		154~207	0.003~0.004	0.004~0.005	0.006~0.009	0.009~0.013	0.011~0.017	0.013~0.019
	10	High alloyed steel, and tool steel	174~223	0.004~0.006	0.004~0.007	0.006~0.009	0.008~0.011	0.009~0.013	0.010~0.015
	11		138~190	0.004~0.006	0.004~0.007	0.005~0.008	0.009~0.013	0.009~0.013	0.010~0.015
K	15	Grey cast iron	344~430	0.005~0.009	0.007~0.011	0.009~0.016	0.012~0.018	0.016~0.022	0.017~0.024
	16		259~328	0.004~0.007	0.005~0.009	0.007~0.013	0.009~0.013	0.011~0.015	0.013~0.017
	17	Nodular cast iron	328~413	0.004~0.008	0.006~0.009	0.007~0.013	0.009~0.014	0.012~0.017	0.014~0.019
	18		259~328	0.004~0.007	0.005~0.009	0.006~0.011	0.008~0.013	0.011~0.015	0.013~0.017
	19	Malleable cast iron	344~430	0.004~0.008	0.006~0.009	0.007~0.013	0.009~0.014	0.012~0.017	0.014~0.019
20	259~328		0.004~0.006	0.005~0.008	0.006~0.011	0.008~0.013	0.011~0.015	0.013~0.017	

- ▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.
- ▶ Recommend you to reduce the feed rate to 85%, 70% when you use 5xD, 8xD holders.
- ▶ For use of 8xD holder, we recommend to use a pilot drill with equal to or larger than 140° point angle (0.5xD ~ 1.5xD).
The use of the centering pre-hole improves hole location, roundness and surface finish.

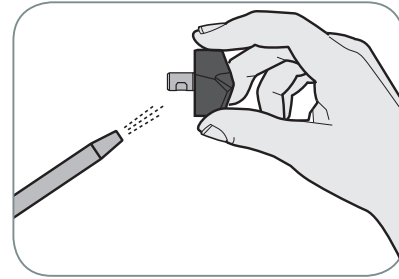
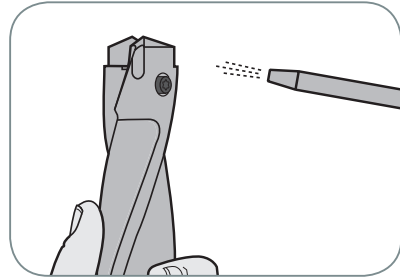
YG-1 EXCHANGEABLE RANGE OF DRILLS - POSITIONING MAP



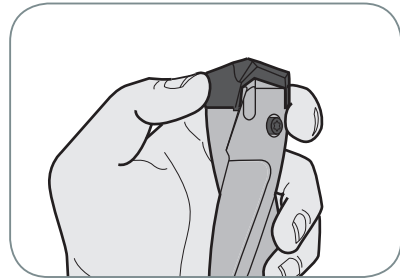
COMPARISON WITH SPLIT POINT DRILL - SPADE DRILL & DREAM DRILL



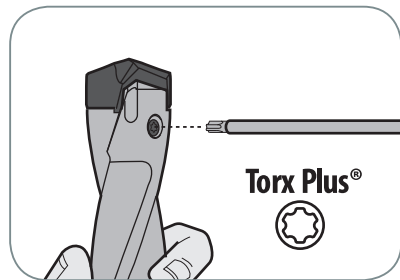
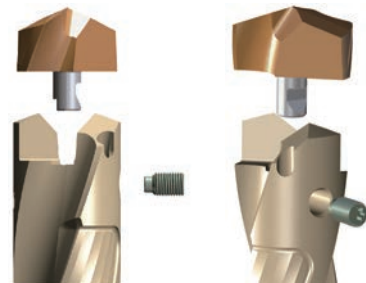
ASSEMBLY OF *i*-ONE DRILLS



Make sure to clean the insert and insert seat.



Slide the drill insert into the slot of the holder and press down the insert to touch the bottom of the slot.



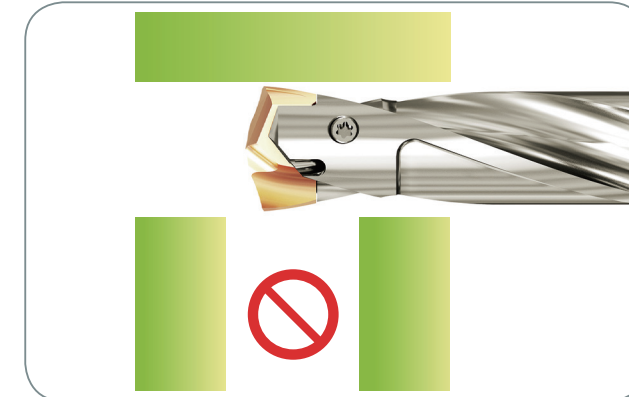
After confirming the insert is pressed down to the bottom of the slot, tighten the screw using anti-seize compound.

Wrench Type	Product No.	Series (Insert Size)	Torx Plus®	Torque (lbs-in)
	TWFP05	S10 ~ S12 Inch: Ø.3937~Ø.5472 Metric: Ø10.00~Ø13.90	5IP	5.5
		S14 ~ S16 Inch: Ø.5512~Ø.7047 Metric: Ø14.00~Ø17.90		
	TWDP07	S18 ~ S22 Inch: Ø.7087~Ø.9409 Metric: Ø18.00~Ø23.90	7IP	9.0
	TWDP09	S24 ~ S28 Inch: Ø.9449 ~ Ø1.1772 Metric: Ø24.00 ~ Ø29.90	9IP	13.5
	TWDP10	S30 ~ S32 Inch: Ø1.1811~Ø1.3346 Metric: Ø30.00~Ø33.90	10IP	20.0
	TWDP15		15IP	28.5

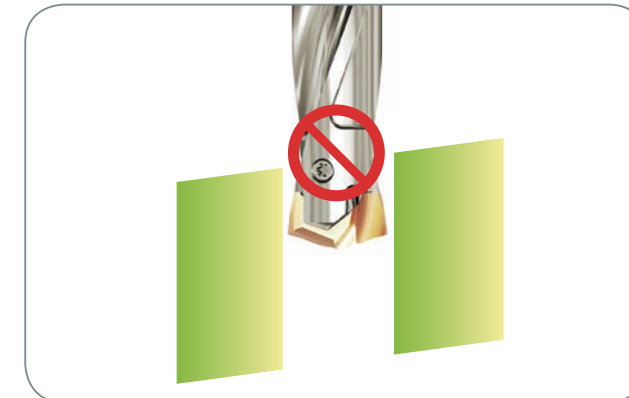
Use the Torx Plus® wrench

- ▶ Need to use appropriate wrenches and screws as indicated.
- ▶ It's important to tighten up the screw properly.

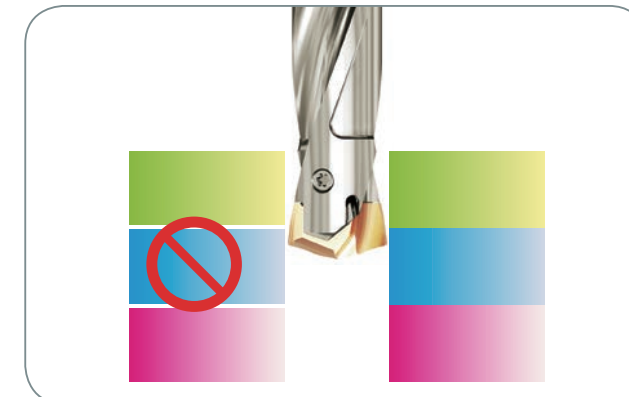
CAUTION-NOT RECOMMENDABLE APPLICATION



Intersecting cross hole is bigger than the drill insert's Margin Length.

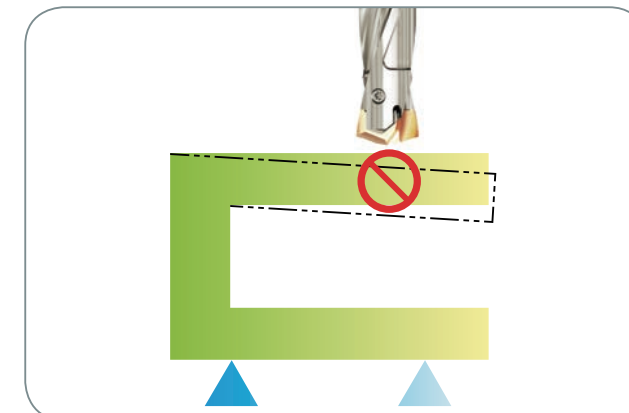


Material with slanting entrance and exit over 7 degree. (If drilling 7 degree or under slanting surface, reduce the feed about 30-50%)



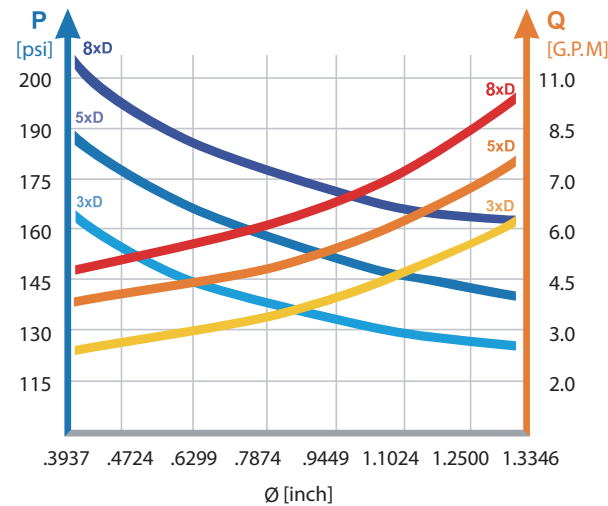
For drilling stacked plates, minimize the space between the plates.

The space stacked plates can cause insert breakage or poor chip control.



The material needs to be fixtured securely before drilling.

RECOMMENDED COOLANT PRESSURE AND FLOW RATE ON VERTICAL DRILLING



- Recommended emulsion mix is 6 - 8%.
- For Drilling in Stainless and High Strength steels, a mix of 10% is recommended.
- For horizontal drilling, 30% reduction on the coolant pressure and flow rate is possible.
- Dry drilling is possible for 1 - 2xD drilling. But not recommended.

TROUBLE SHOOTING

	<p>1) Heavy flank wear / Fast flank wear - Reduce cutting speed - Increase feed</p>		<p>2) Chipping on cutting edge - Reduce feed - Check the rigidity of spindle and chuck - Rigid clamping of workpiece</p>
	<p>3) Build up on cutting edge - Increase cutting speed - Use a coated insert</p>		<p>4) Chipping or break down on outer corner - Reduce feed - Rigid clamping of workpiece</p>
	<p>5) Wear of land margin - Rigid clamping of workpiece - Reduce cutting speed - Increase coolant flow</p>		<p>6) Unsatisfactory positioning of the hole - Rigid clamping of workpiece - Reduce feed during entrance or exit</p>
	<p>7) Scratching on holder - Rigid clamping of workpiece - Reduce feed - Increase coolant flow</p>		<p>8) Unsatisfactory surface finish - Rigid clamping of workpiece - Increase coolant flow and pressure</p>

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