

Top Solid Piercing Drill Blade

TPDB Plus

KORLOY
TECH-NEWS



- Stable machining increases productivity.
- Optimized flute design and excellent chip evacuation ensure high quality of production.

Highly Precise and Efficient Top Solid Indexable Drill

TPDB Plus

These days, economical and high performance cutting tools that improve machinability and decrease the manufacturing cost and time are in high demand in the automobile, aerospace, and space industries.

According to the needs of the market, KORLOY launches a highly precise and efficient drill, TPDB Plus, which increases the processing grade and productivity.

The high helix flute of the **TPDB Plus** improves chip evacuation, increases surface finish of processing

holes and roundness which ensures highly precise machinability.

In addition, TPDB Plus prevents chip jam or unexpected fracture even in deep drilling with over 8D and ensures more stable machinability.

The cutting edge of TPDB Plus decreases cutting resistance. Optimal grades for various workpieces such as PC5300 for alloy steel and cast iron, PC5335 and PC330P for carbon steel ensure longer tool life.



High productivity

- Raised productivity and decreased processing cost
- Increased tool life applying optimal grades

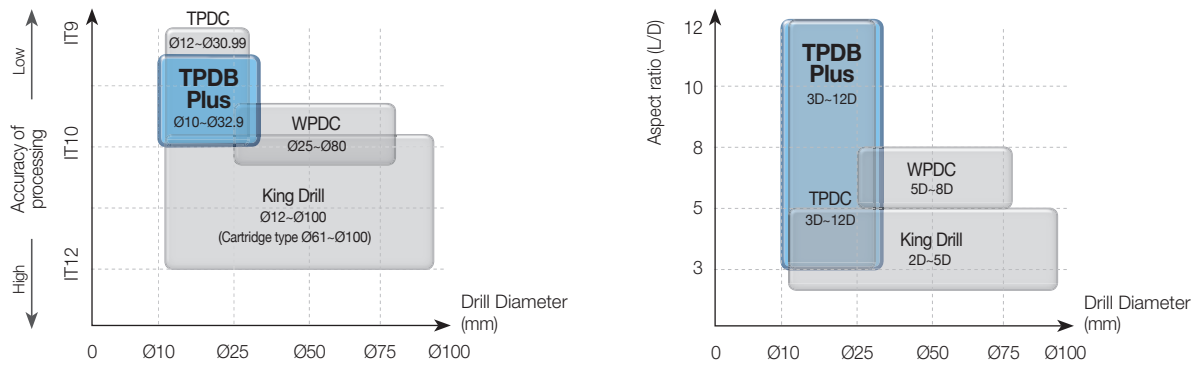
Highly precise machinability

- Good surface finish with excellent chip evacuation
- Outstanding roundness of hole

Highly precise drilling and chip control

- Cutting edge with low cutting resistance
- Improved chip control with a chip breaker

Application Range



Tools	Application range					
	Drill Diameter (Ø)	Aspect ratio (L/D)	Tolerance of drill dia.	Tolerance	Surface finish of hole (Ra)	Workpiece
TPDB Plus	10-32.9 mm	3, 5, 8, 10, 12	h7	IT10	≤ 2.0 μm	P, K

Applicable Industries

Generation of wind and nuclear power	Watercraft	Railway and construction	Aircraft	Automobile

Code System

【Holder】

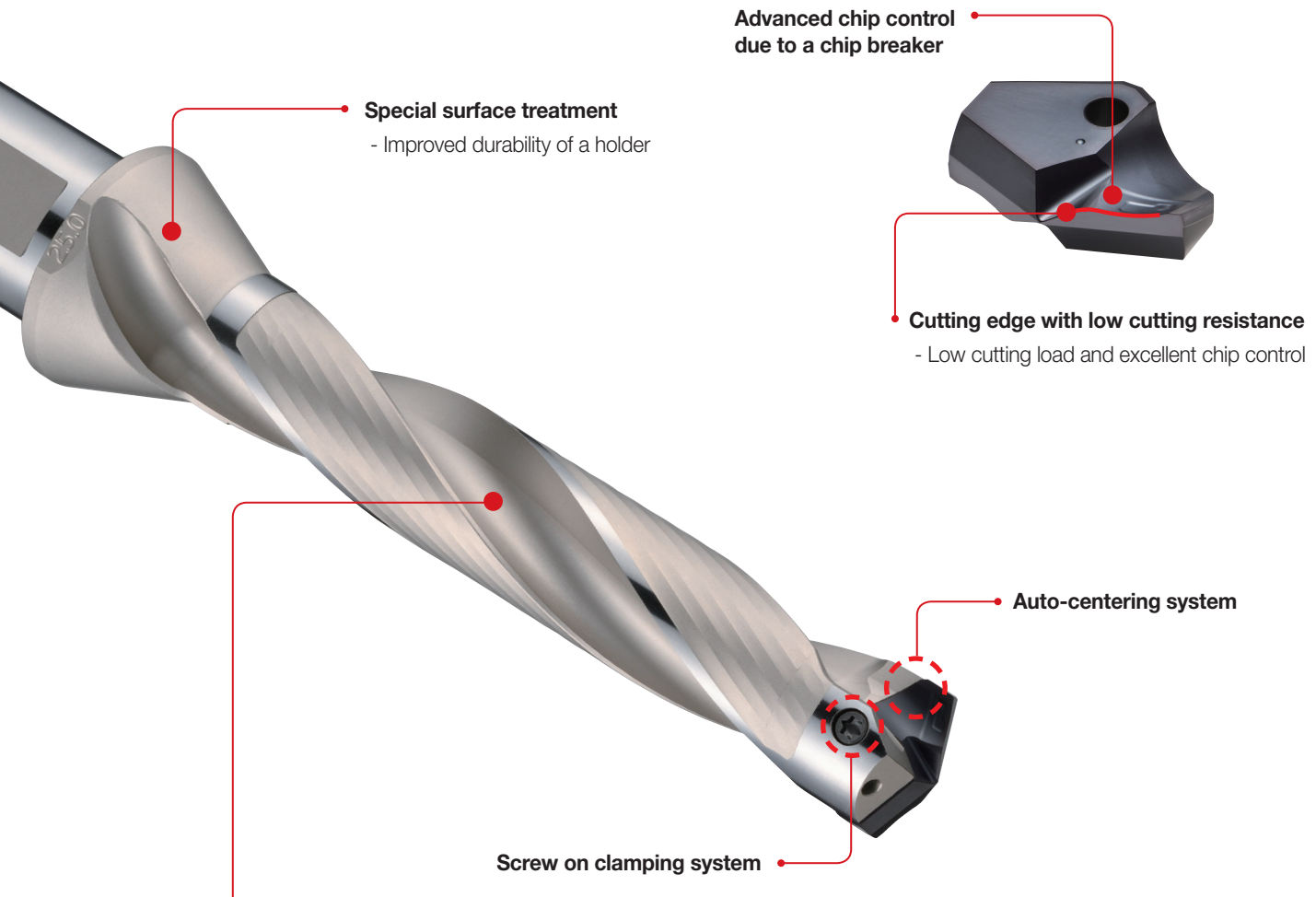
TPD	B	-	200	-	25	-	5	-	P
Top Solid Piercing Drill	Insert type B: Blade type		Drill dia. 200: Ø20.0		Shank dia. 25: Ø25		Aspect ratio 3D, 5D, 8D, 10D, 12D		Plus

【Insert】

TPD	200	B
Top Solid Piercing Drill	Drill dia. 200: Ø20.0	Insert type B: Blade type

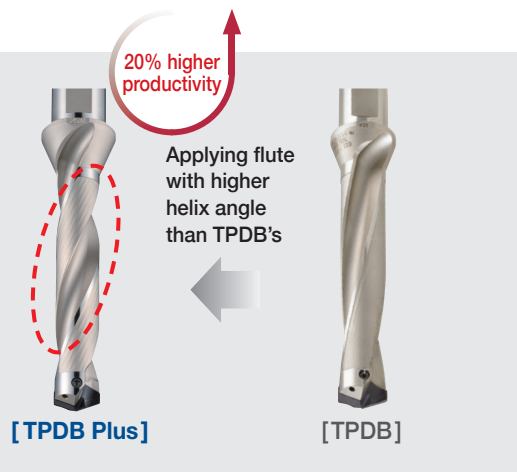
Features

- **Highly precise clamping system:** Superior clamping precision with auto-centering system and highly precise grinding clamping parts
- **Screw on clamping system:** Easy to replace inserts
- **Sharp cutting edge:** Low cutting load and good chip control
- **Holder with excellent durability:** Holder with high rigidity and excellent wear resistance due to special surface treatment
- **Holder with excellent chip control:** Low cutting resistance and outstanding chip evaluation applying high helix angle



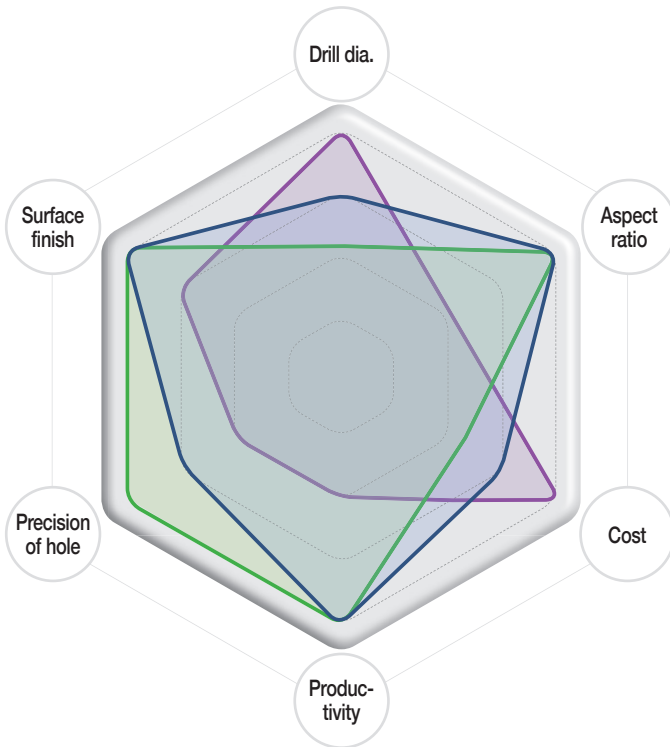
High helix angle

- **High productivity**
 - Stable chip evacuation realizes stable machinability
 - Improved cutting conditions decrease cycle time.
- **High processing grade**
 - Good surface finish and regular size of the hole



Indexable Drill Selection Guide

— TPDB Plus — TPDC — King Drill



TPDB Plus ^{new}

- Good surface finish and chip control
- High feed machining
- 3D, 5D, 8D, 10D, 12D



TPDC

- High precision of hole
- High feed machining
- 3D, 5D, 8D, 10D, 12D



King Drill

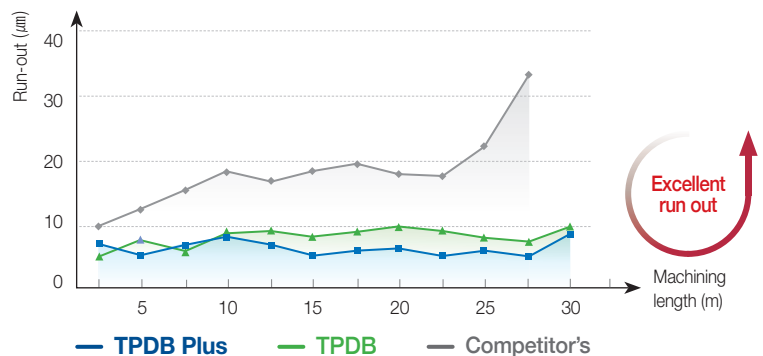
- 4 corners (central and peripheral)
- 2D, 3D, 4D, 5D



Tools	Drill dia.	Aspect ratio	Cost	Productivity	Precision of hole	Surface finish
TPDB Plus ^{new}	★★★	★★★★	★★★	★★★★	★★★	★★★★
TPDC	★★	★★★★	★★	★★★★	★★★★	★★★★
King Drill	★★★★	★★	★★★★	★★	★★	★★★

Run-out

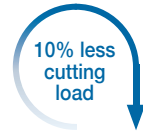
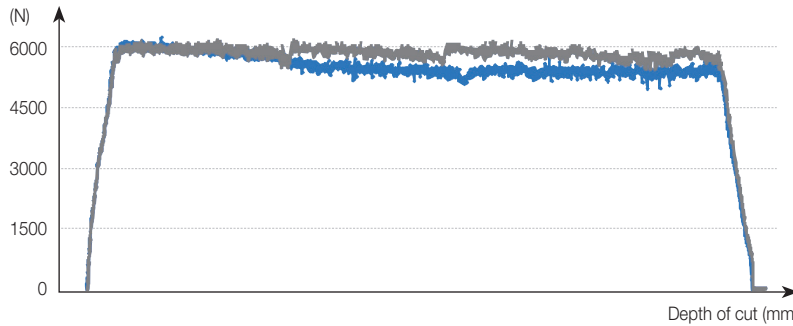
- **Workpiece** Alloy steel (42CrMo4)
- **Cutting conditions** Drill dia. (mm) = Ø25, vc (m/min) = 90, fn (mm/rev) = 0.25, ap (mm) = 120, wet (20 bar)
- **Tool** TPDB250-32-5-P (PC5300)



Performance Evaluation

Cutting load

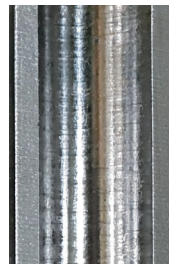
- **Workpiece** Alloy steel (42CrMo4)
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- **Tool** TPDB250-32-5-P (PC5300)



- **TPDB Plus**
The average of thrust 4,998N
- **Competitor's**
The average of thrust 5,492N

Surface finish

- **Workpiece** Alloy steel (42CrMo4)
- **Cutting conditions** Drill dia. (mm) = $\varnothing 25$, vc (m/min) = 120, fn (mm/rev) = 0.35, ap (mm) = 120, wet (20 bar)
- **Tool** TPDB250-32-5-P (PC5300)



[TPDB Plus]
Ra = 0.542 μm

[Competitor's]
Ra = 0.569 μm

Chip control

- **Workpiece** Alloy steel (42CrMo4)
- **Cutting conditions** Drill dia. (mm) = $\varnothing 25$, vc (m/min) = 120, fn (mm/rev) = 0.35, ap (mm) = 120, wet (20 bar)
- **Tool** TPDB250-32-5-P (PC5300)



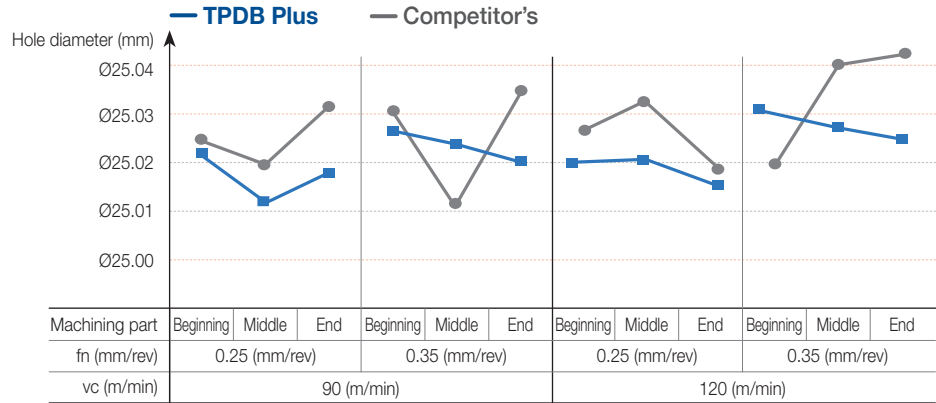
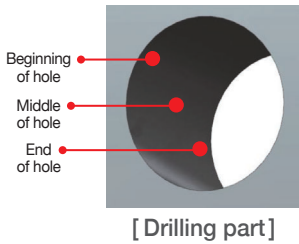
[TPDB Plus]

[Competitor's]

Cutting Performance

Outstanding roundness of hole

- **Workpiece** Alloy steel (42CrMo4)
- **Cutting conditions** Drill dia. (mm) = Ø25, vc (m/min) = 90/120, fn (mm/rev) = 0.25/0.35, ap (mm) = 120, wet (20 bar)
- **Tool** TPDB250-32-5-P (PC5300)



Wear resistance

- **Workpiece** Alloy steel (42CrMo4)
- **Cutting conditions** Drill dia. (mm) = Ø25, vc (m/min) = 100, fn (mm/rev) = 0.3, ap (mm) = 100, wet (30 bar)
- **Tool** TPDB250-32-5-P (PC5300)



[TPDB Plus]



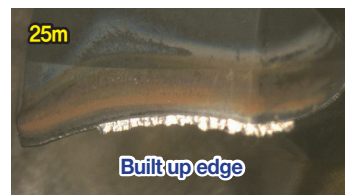
[Competitor's]

- ▶ Improved built up edge and chipping resistance lead stable wear on TPDB Plus insert's edge and obtain longer Max. tool life.

- **Workpiece** Carbon steel (C45)
- **Cutting conditions** Drill dia. (mm) = Ø25, vc (m/min) = 100, fn (mm/rev) = 0.3, ap (mm) = 100, wet (30 bar)
- **Tool** TPDB250-32-5-P (PC5300)



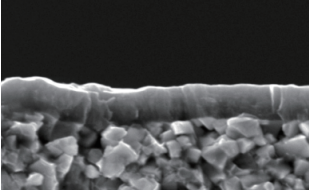
[TPDB Plus]



[Competitor's]

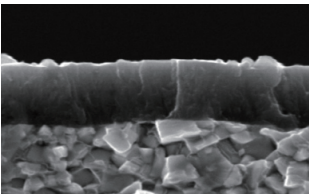
- ▶ Sharper cutting edge than competitor's improves built up edge resistance and tool life.

Features of Grade



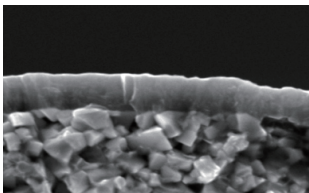
PC5300

- Applying PVD coating with high hardness and stability in machining at high temperature
- Stable drilling due to high cutting edge strength and excellent chipping resistance
- Optimal grade for drilling alloy steel and cast iron



PC5335

- Applying PVD coating with high toughness and excellent lubrication
- Coating layer highly adhering to substrate
- Optimal grade for general structural carbon steel (FE360B, etc.) and machine structural carbon steel (C45, etc.) machining



PC330P

- Applying PVD coating with high surface finish and excellent lubrication
- Coating layer with excellent hardness at high temperature and oxidation resistance
- Optimal grade for built up edge structural carbon steel (E355DD, etc.)

Recommended Cutting Conditions

Workpiece			Grade	vc (m/min)	Depth of cut = 3D~5D Feed rate (mm/rev) per drill dia. (mm)		
ISO	Workpiece	HB			Ø10 - Ø16.9	Ø17 - Ø26.9	Ø27 - Ø32.9
P Carbon steel	Low carbon steel	80 - 120	PC5335 PC330P	110 (80-140)	0.15 - 0.30	0.20 - 0.35	0.25 - 0.40
	High carbon steel	180 - 280	PC5335 PC330P	100 (70-130)	0.15 - 0.30	0.20 - 0.35	0.25 - 0.40
P Alloy steel	Low alloy steel	140 - 260	PC5300	110 (80-140)	0.18 - 0.35	0.23 - 0.38	0.28 - 0.43
	Low alloy heat treated steel	200 - 400	PC5300	75 (50-100)	0.18 - 0.35	0.23 - 0.38	0.28 - 0.43
	High alloy steel	50 - 260	PC5300	70 (50-90)	0.18 - 0.30	0.20 - 0.35	0.25 - 0.40
	High alloy heat treated steel	220 - 450	PC5300	60 (40-80)	0.18 - 0.30	0.20 - 0.35	0.25 - 0.40
K Cast iron	Gray cast iron	150 - 230	PC5300	110 (80-140)	0.18 - 0.35	0.20 - 0.40	0.25 - 0.45
	Ductile cast iron	160 - 260	PC5300	100 (70-130)	0.18 - 0.35	0.20 - 0.40	0.25 - 0.45

※ In case of 8D, machine in 20-30% lower cutting conditions than the mentioned above, or machine the beginning of hole (1.5D) before drilling.

※ In interrupted machining, reduce the feed to 0.1-0.15 machining around the interrupted part.

※ Prefer to the 'Recommended drilling method' on the page 10 for drilling of 10D-12D

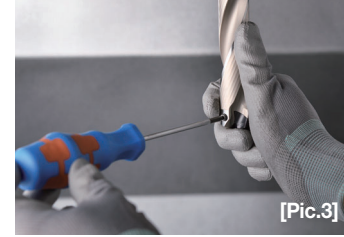
How to Clamp a TPDB Plus Insert

Clamping an insert to a holder



- ① Put an insert on the tip seat of the holder.
- ② As the [Pic.1], push the insert to the v-shaped groove of the holder.
- ③ Screw and clamp the insert.

Changing the used insert to a new one



- ① Unscrew and separate the used insert from the holder.
- ② As the [Pic.2], clean the insert seat.
- ③ Put a new insert on the tip seat.
- ④ As the [Pic.3], clamp the insert pushing it with a hand not to separate from the holder.

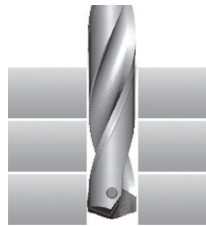
Precaution in Drilling

Sloping



- The approach angle between drill and the workpiece at the beginning should be less than 6°.
- Reduce the feed to 30-50% than general cutting conditions at the beginning and the end of sloping.

Laminated plates machining



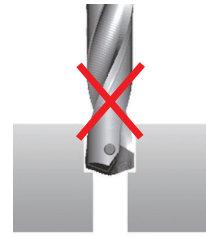
- Gap between the plates could make wrong chip evacuation causing fracture of the drill.
- Place the workpiece, laminated plates without any gap between each.

Plunging



- Irregular cutting resistance in plunging could cause fracture and deformation of the drill.

Boring



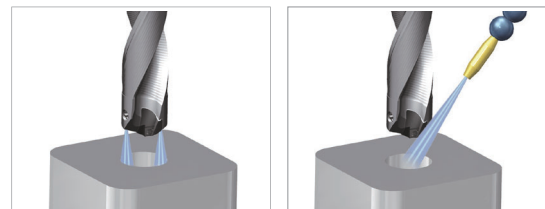
- Boring is not recommended due to wear and chipping in the corner of the insert.

Check Point in Drilling

- Condition of the clamped workpiece
- Revolution of the main axis of the machine
- Condition of the holder
- Run-out of the clamped drill (Max. 0.03 mm)
- Condition of supplying coolant (pressure, flow, concentration)
- Chip evacuation

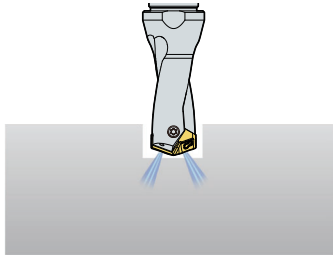
Supply of Coolant

- Supply enough coolant to the beginning of the hole.
- Minimum pressure of oil coolant: 5 bar
- Minimum flow of coolant: 5 l/min



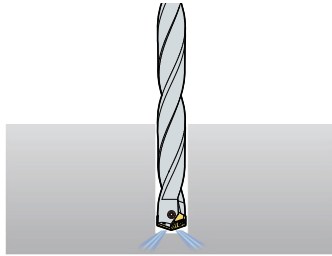
Recommended Drilling Method (10D, 12D)

Machine a beginning hole (with a pilot drill)

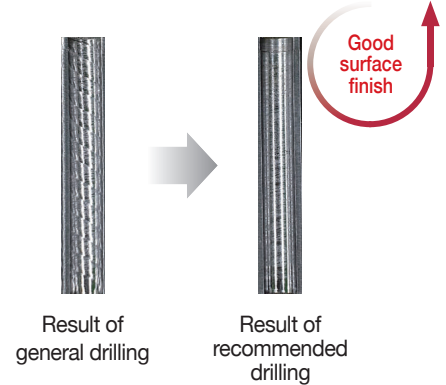


- Machine a beginning hole with the depth of cut as 0.5D and at 30% lower speed using a 1.5D or 3D drill.

Start drilling





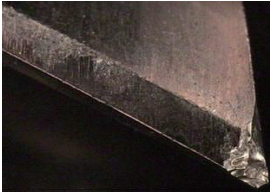
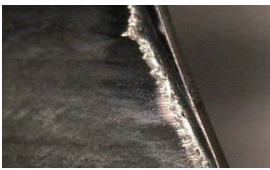
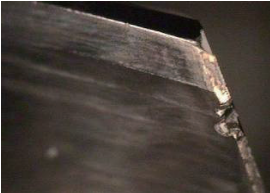
- After machining the beginning hole, replace the pilot drill to a drill for drilling and machine in recommended cutting conditions.



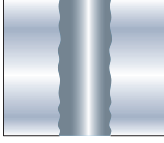
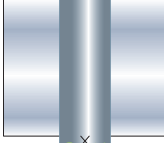
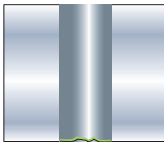
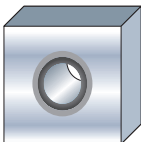
Replacement of Holders and Screws

Worn part	How to check	Description
<p>[Pic.1]</p>	<p>[Pic.2]</p> <p>Check the gap</p>	<ul style="list-style-type: none"> • In case of drilling for a long time as shown in the [Pic.1] the 'A' part is torn and twisted due to torque. • As shown in the [Pic.2] check the gap between the insert and the tip seat turning the clamped insert from side to side. If there is a gap between them, replace the used holder to a new one.
<p>[Pic.3]</p>	<p>[Pic.4]</p> <p>Check the moving</p>	<ul style="list-style-type: none"> • The insert could move up or down due to the load on the Z-axis in drilling over an extended period of time which causes wear on the 'B' part as shown the [Pic.3]. • After clamping an insert, if the insert is moving or there is a gap between the insert and the tip seat as shown in the [Pic.4] replace the used holder to a new one.
<p>[Pic.5]</p>	<p>Check the moving</p>	<ul style="list-style-type: none"> • After an extended period of use, the screw can be worn as shown in the 'E' part of [Pic.5] which could decrease the clamping force of the insert. When the screw is worn, replace the old screw to a new one among the enclosed extras. • Spreading the grease on the screw makes it last longer.
<p>[Pic.6]</p> <ol style="list-style-type: none"> ① Check the 'C' and 'D' parts as shown in the [Pic.6] ② Check whether the chips are getting longer or not. 		<ul style="list-style-type: none"> • Winding or jamming of long and tiny chips in drilling causes wear or scratch on the 'C' part as shown in the [Pic.6] due to chattering from machining in improper cutting conditions. In that case, reset the cutting conditions and check the Run-out before machining. • The excessive wear of the part 'D' as shown in the [Pic.6] relating to chip curling might cause long chips.

Types of Damage to Drill and Solutions

Scratches on the margin		
	Factors	<ul style="list-style-type: none"> • Lack of coolant lubrication • Lack of coolant in deep drilling due to MQL system • Bend of drill due to improperly placed holder or using a long holder • Low rigidity or large concentricity
	Solutions	<ul style="list-style-type: none"> • Use more coolant. • Place workpiece tightly and check the concentricity. • Check the precision of installment of drill. (below 0.03 mm) • Reduce the cutting speed.
Wear on the margin		
	Factors	<ul style="list-style-type: none"> • Due to machining pure metal or heat resisting alloy • Less back taper due to using a holder for a long time • Unstable machining the end of hole due to interruption • Lack of coolant lubrication on the outside of holder contacting workpiece
	Solutions	<ul style="list-style-type: none"> • Do not use a holder for a long time. • Check the shape of machining part • Check the kind and concentration of coolant.
Chipping on the corner		
	Factors	<ul style="list-style-type: none"> • Interrupted machining • Chattering in drilling due to unstable clamping, low rigidity of machine or bending of drill • Chattering due to unstable clamping of drill
	Solutions	<ul style="list-style-type: none"> • Check the part of machining • Machine in lower cutting speed. • Place workpiece tightly. • Check the performance of the machine. • Check the precision of installment of drill. (below 0.03 mm)
Wear on the bevel		
	Factors	<ul style="list-style-type: none"> • Low cutting speed • Machining free-cutting steel • Erosion of chip and flute • Lack of coolant lubrication
	Solutions	<ul style="list-style-type: none"> • Increase cutting speed. • Set a lower thinning angle. • Reduce the honing. • Use more coolant.
Chipping on the bevel		
	Factors	<ul style="list-style-type: none"> • Pre-treatment such as the center of hole could make fracture on the cutting edge partially. • Unstable chip evacuation due to step drilling and external coolant • Chattering in drilling and low precision of holder installment
	Solutions	<ul style="list-style-type: none"> • Check if there is pre-machining or not. • It is recommended to use internal coolant in step drilling. • Check the state of clamping workpiece and the precision of drill installment. (below 0.03 mm)

Types of Damage to Workpiece and Check Points

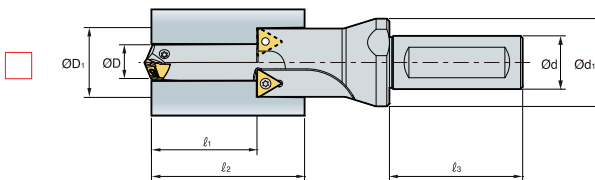
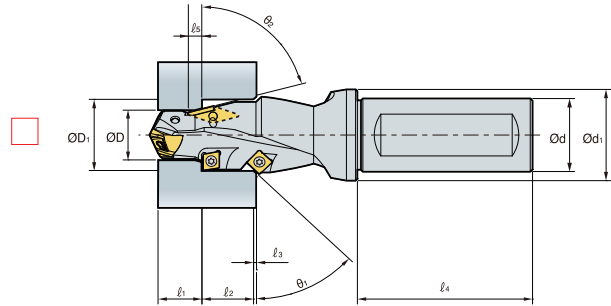
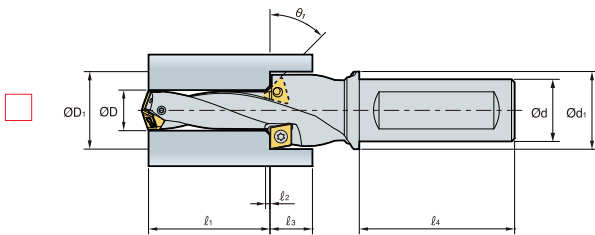
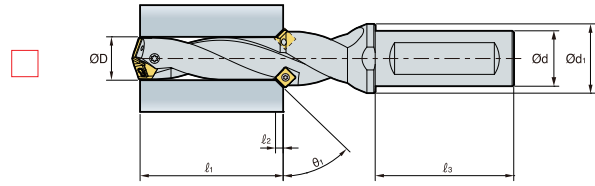
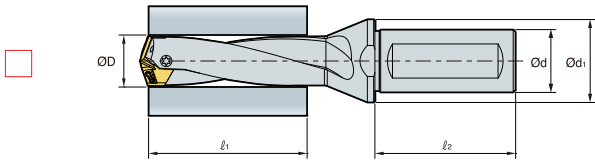
Poor surface finish (rough, scratch, etc.)		
	Factors	<ul style="list-style-type: none"> • Low rigidity of machine and improperly clamped workpiece • Large concentricity and lack of coolant
	Solutions	<ul style="list-style-type: none"> • Clamp the workpiece properly and check the concentricity. • Increase the amount and pressure of coolant
Remained lots of burr at the end of the drilled hole		
	Factors	<ul style="list-style-type: none"> • High feed and excess honing of the cutting edge • Too much wear and chipping
	Solutions	<ul style="list-style-type: none"> • Reduce feed and use a new drill. • Increase point angle or reduce honing
Flaking the end of the drilled hole		
	Factors	<ul style="list-style-type: none"> • Machining of low toughness materials as cast iron • Rapid feed and excess honing of the cutting edge • Too much wear and chipping
	Solutions	<ul style="list-style-type: none"> • Reduce the feed. (Especially at the end of the cutting edge) • Reduce honing on the cutting edge. • Use a new drill.
Thermal deformation and oxidation of the end of the drilled hole		
	Factors	<ul style="list-style-type: none"> • Rapid speed • Excessive cutting load • Lack of coolant • Too much wear and chipping
	Solutions	<ul style="list-style-type: none"> • Reduce the feed and honing on the cutting edge. • Use more coolant and use a new drill.

Solutions for Troubles

↑ Increase ↓ Decrease ○ Use

Trouble	Designation	Solutions															
		Cutting conditions				Tool shape					Grade		The others				
		vc	fn	Coolant	fn (in the beginning)	Depth of cut	Relief angle	Point angle	Thinning angle	Honing	Flute width rate	Toughness	Hardness	Rigidity of machine	Chattering of machine	Fixing workpiece	Overhang
Chipping	<ul style="list-style-type: none"> • Improper cutting conditions • Low rigidity of tool • Built-up edge • Improper grade • Chattering 	↓	↓	○			↓		↓	↑		↑		↑	↓	↑	↓
Wear	• Excessive cutting speed (wear on margin)	↓	↓	○								↑					
	• Low cutting speed (wear in the center of drill)	↑	↓	○								↑					
Fracture	<ul style="list-style-type: none"> • Improper cutting conditions • Too much cutting load • Too long overhang • Less rigidity of machine 	↓	↓	○	↓	↓							↑		↑	↓	
Poor chip evacuation	• Improper cutting conditions		↓	○		↓					↑						
Poor surface finish	<ul style="list-style-type: none"> • Built-up edge • Chattering • Improper cutting conditions 	↑	↓	○	↓		↓		↓				↑	↓	↑	↓	
Poor accuracy of hole	• Low cutting speed (wear in the center of drill)	↑	↓										↑	↓		↓	




Special Drill Order Form



Hole type

- Blind hole Through hole

Shank type

-  Flat type
-  Weldon type
-  Whistle notch type

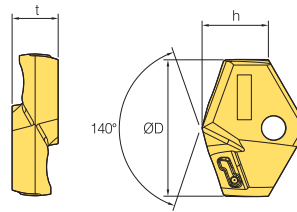
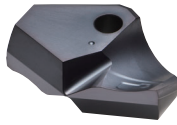
Coolant type

- Internal External

Special note

- Currently using tool:
- Current cutting condition
 - n (rpm) or vc (m/min):
 - vf (mm/min) or fn (mm/rev):
 - ap (mm):
- Standard of measuring tool life:
- Currently using machine
 - Machining center:
 - General lathe:
 - CNC lathe:



Insert



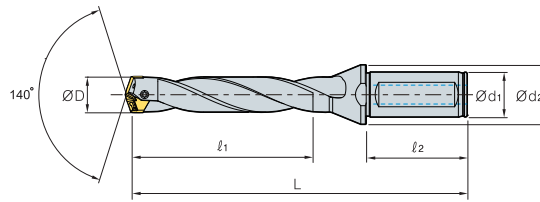
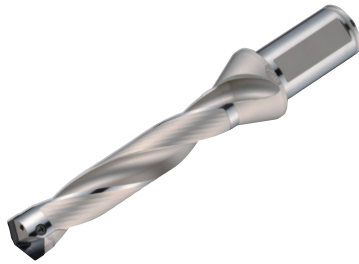
(mm)

Designation		Grade	ØD	h	t	
TPD	100B-109B		10.0 - 10.9	5.5	3.5	
	110B-119B		11.0 - 11.9	5.8	3.5	
	120B-129B		12.0 - 12.9	6.3	3.5	
	130B-139B		13.0 - 13.9	6.5	4.0	
	140B-149B		14.0 - 14.9	6.8	4.0	
	150B-159B		15.0 - 15.9	7.0	4.0	
	160B-169B		16.0 - 16.9	7.7	5.5	
	170B-179B		17.0 - 17.9	7.9	5.5	
	180B-189B		18.0 - 18.9	8.1	6.0	
	190B-199B		19.0 - 19.9	8.3	6.0	
	200B-209B		PC5300	20.0 - 20.9	9.7	6.5
	210B-219B		PC5335	21.0 - 21.9	9.4	6.5
	220B-229B		PC330P	22.0 - 22.9	9.6	7.0
	230B-239B			23.0 - 23.9	9.8	7.0
	240B-249B			24.0 - 24.9	10.7	7.5
	250B-259B			25.0 - 25.9	10.9	7.5
	260B-269B			26.0 - 26.9	11.0	8.5
	270B-279B			27.0 - 27.9	11.8	8.5
	280B-289B			28.0 - 28.9	12.6	9.5
	290B-299B			29.0 - 29.9	12.9	9.5
300B-309B		30.0 - 30.9	13.0	10.0		
310B-319B		31.0 - 31.9	13.2	10.0		
320B-329B		32.0 - 32.9	13.4	10.0		

Parts

Designation		Drill diameter ØD (mm)	Screw 	Wrench 	Torque (N·m)
TPD	100B-129B	10.0 - 12.9	FTNB0209-P	TW06P	0.4
	130B-149B	13.0 - 14.9	FTNB02512-P	TW07S	0.8
	150B-179B	15.0 - 17.9	FTNB02514-P	TW07S	0.8
	180B-199B	18.0 - 19.9	FTNB0316-P	TW09S	1.2
	200B-239B	20.0 - 23.9	FTNB0319	TW09S	1.2
	240B-259B	24.0 - 25.9	FTNB03522	TW15S	3.0
	260B-279B	26.0 - 27.9	FTNB03524	TW15S	3.0
	280B-299B	28.0 - 29.9	FTNB0426	TW15S	3.0
	300B-329B	30.0 - 32.9	FTNB0528	TW20-100	4.0

TPDB Plus - 3D

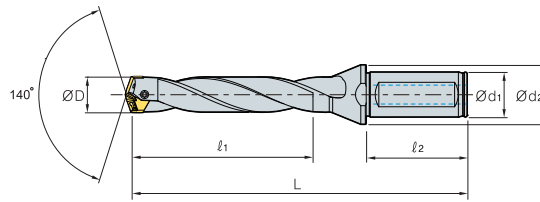
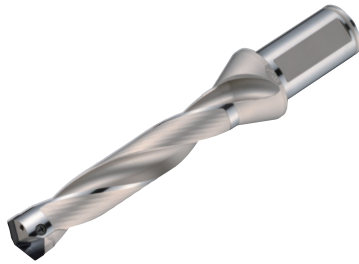


(mm)

Designation	Stock	ØD	Ød1	Ød2	l1	l2	L	Insert
TPDB 100-16-3-P	●	10.0 - 10.4	16	20	30.0	48	95	TPD100B - 104B
105-16-3-P	●	10.5 - 10.9	16	20	31.5	48	96	TPD105B - 109B
110-16-3-P	●	11.0 - 11.4	16	20	33.0	48	98	TPD110B - 114B
115-16-3-P	●	11.5 - 11.9	16	20	34.5	48	99	TPD115B - 119B
120-16-3-P	●	12.0 - 12.4	16	20	36.0	48	102	TPD120B - 124B
125-16-3-P	●	12.5 - 12.9	16	20	37.5	48	104	TPD125B - 129B
130-16-3-P	●	13.0 - 13.4	16	20	39.0	48	107	TPD130B - 134B
135-16-3-P	●	13.5 - 13.9	16	20	40.5	48	109	TPD135B - 139B
140-16-3-P	●	14.0 - 14.4	16	20	42.0	48	111	TPD140B - 144B
145-16-3-P	●	14.5 - 14.9	16	20	43.5	48	114	TPD145B - 149B
150-20-3-P	●	15.0 - 15.4	20	25	45.0	50	118	TPD150B - 154B
155-20-3-P	●	15.5 - 15.9	20	25	46.5	50	120	TPD155B - 159B
160-20-3-P	●	16.0 - 16.4	20	25	48.0	50	122	TPD160B - 164B
165-20-3-P	●	16.5 - 16.9	20	25	49.5	50	124	TPD165B - 169B
170-20-3-P	●	17.0 - 17.4	20	25	51.0	50	127	TPD170B - 174B
175-20-3-P	●	17.5 - 17.9	20	25	52.5	50	129	TPD175B - 179B
180-25-3-P	●	18.0 - 18.4	25	33	54.0	56	137	TPD180B - 184B
185-25-3-P	●	18.5 - 18.9	25	33	55.5	56	139	TPD185B - 189B
190-25-3-P	●	19.0 - 19.4	25	33	57.0	56	142	TPD190B - 194B
195-25-3-P	●	19.5 - 19.9	25	33	58.5	56	144	TPD195B - 199B
200-25-3-P	●	20.0 - 20.4	25	33	60.0	56	146	TPD200B - 204B
205-25-3-P	●	20.5 - 20.9	25	33	61.5	56	148	TPD205B - 209B
210-25-3-P	●	21.0 - 21.4	25	33	63.0	60	151	TPD210B - 214B
215-25-3-P	●	21.5 - 21.9	25	33	64.5	60	153	TPD215B - 219B
220-25-3-P	●	22.0 - 22.4	25	33	66.0	60	155	TPD220B - 224B
225-25-3-P	●	22.5 - 22.9	25	33	67.5	60	157	TPD225B - 229B
230-25-3-P	●	23.0 - 23.4	25	33	69.0	60	160	TPD230B - 234B
235-25-3-P	●	23.5 - 23.9	25	33	70.5	60	162	TPD235B - 239B
240-32-3-P	●	24.0 - 24.4	32	43	72.0	60	168	TPD240B - 244B
245-32-3-P	●	24.5 - 24.9	32	43	73.5	60	170	TPD245B - 249B
250-32-3-P	●	25.0 - 25.4	32	43	75.0	60	173	TPD250B - 254B
255-32-3-P	●	25.5 - 25.9	32	43	76.5	60	175	TPD255B - 259B
260-32-3-P	●	26.0 - 26.9	32	43	78.0	60	177	TPD260B - 269B
270-32-3-P	●	27.0 - 27.9	32	43	81.0	60	182	TPD270B - 279B
280-32-3-P	●	28.0 - 28.9	32	43	84.0	60	186	TPD280B - 289B
290-32-3-P	●	29.0 - 29.9	32	43	87.0	60	191	TPD290B - 299B
300-32-3-P	●	30.0 - 30.9	32	43	90.0	60	195	TPD300B - 309B
310-32-3-P	●	31.0 - 31.9	32	43	93.0	60	200	TPD310B - 319B
320-32-3-P	●	32.0 - 32.9	32	43	96.0	60	204	TPD320B - 329B

● : Stock item

TPDB Plus - 5D

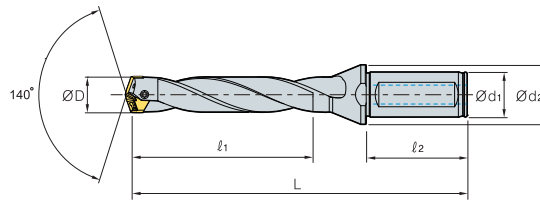
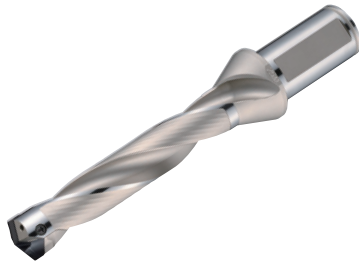


(mm)

Designation	Stock	ØD	Ød1	Ød2	l1	l2	L	Insert
TPDB 100-16-5-P	●	10.0 - 10.4	16	20	50.0	48	115	TPD100B - 104B
105-16-5-P	●	10.5 - 10.9	16	20	52.5	48	117	TPD105B - 109B
110-16-5-P	●	11.0 - 11.4	16	20	55.0	48	120	TPD110B - 114B
115-16-5-P	●	11.5 - 11.9	16	20	57.5	48	123	TPD115B - 119B
120-16-5-P	●	12.0 - 12.4	16	20	60.0	48	126	TPD120B - 124B
125-16-5-P	●	12.5 - 12.9	16	20	62.5	48	129	TPD125B - 129B
130-16-5-P	●	13.0 - 13.4	16	20	65.0	48	133	TPD130B - 134B
135-16-5-P	●	13.5 - 13.9	16	20	67.5	48	136	TPD135B - 139B
140-16-5-P	●	14.0 - 14.4	16	20	70.0	48	139	TPD140B - 144B
145-16-5-P	●	14.5 - 14.9	16	20	72.5	48	143	TPD145B - 149B
150-20-5-P	●	15.0 - 15.4	20	25	75.0	50	148	TPD150B - 154B
155-20-5-P	●	15.5 - 15.9	20	25	77.5	50	151	TPD155B - 159B
160-20-5-P	●	16.0 - 16.4	20	25	80.0	50	154	TPD160B - 164B
165-20-5-P	●	16.5 - 16.9	20	25	82.5	50	157	TPD165B - 169B
170-20-5-P	●	17.0 - 17.4	20	25	85.0	50	161	TPD170B - 174B
175-20-5-P	●	17.5 - 17.9	20	25	87.5	50	164	TPD175B - 179B
180-25-5-P	●	18.0 - 18.4	25	33	90.0	56	173	TPD180B - 184B
185-25-5-P	●	18.5 - 18.9	25	33	92.5	56	176	TPD185B - 189B
190-25-5-P	●	19.0 - 19.4	25	33	95.0	56	180	TPD190B - 194B
195-25-5-P	●	19.5 - 19.9	25	33	97.5	56	183	TPD195B - 199B
200-25-5-P	●	20.0 - 20.4	25	33	100.0	56	186	TPD200B - 204B
205-25-5-P	●	20.5 - 20.9	25	33	102.5	56	189	TPD205B - 209B
210-25-5-P	●	21.0 - 21.4	25	33	105.0	60	193	TPD210B - 214B
215-25-5-P	●	21.5 - 21.9	25	33	107.5	60	196	TPD215B - 219B
220-25-5-P	●	22.0 - 22.4	25	33	110.0	60	199	TPD220B - 224B
225-25-5-P	●	22.5 - 22.9	25	33	112.5	60	202	TPD225B - 229B
230-25-5-P	●	23.0 - 23.4	25	33	115.0	60	206	TPD230B - 234B
235-25-5-P	●	23.5 - 23.9	25	33	117.5	60	209	TPD235B - 239B
240-32-5-P	●	24.0 - 24.4	32	43	120.0	60	216	TPD240B - 244B
245-32-5-P	●	24.5 - 24.9	32	43	122.5	60	219	TPD245B - 249B
250-32-5-P	●	25.0 - 25.4	32	43	125.0	60	223	TPD250B - 254B
255-32-5-P	●	25.5 - 25.9	32	43	127.5	60	226	TPD255B - 259B
260-32-5-P	●	26.0 - 26.9	32	43	130.0	60	229	TPD260B - 269B
270-32-5-P	●	27.0 - 27.9	32	43	135.0	60	236	TPD270B - 279B
280-32-5-P	●	28.0 - 28.9	32	43	140.0	60	242	TPD280B - 289B
290-32-5-P	●	29.0 - 29.9	32	43	145.0	60	249	TPD290B - 299B
300-32-5-P	●	30.0 - 30.9	32	43	150.0	60	255	TPD300B - 309B
310-32-5-P	●	31.0 - 31.9	32	43	155.0	60	262	TPD310B - 319B
320-32-5-P	●	32.0 - 32.9	32	43	160.0	60	268	TPD320B - 329B

● : Stock item

TPDB Plus - 8D

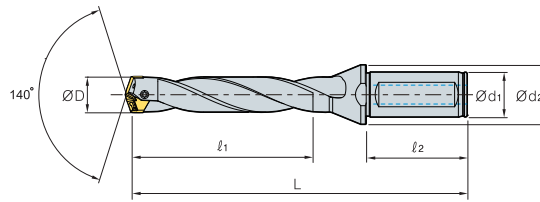
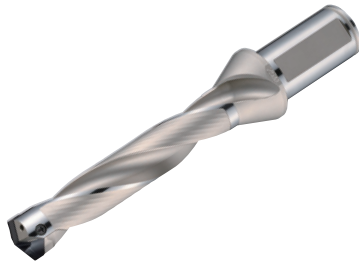


(mm)

Designation	Stock	ØD	Ød1	Ød2	l1	l2	L	Insert
TPDB 100-16-8-P	●	10.0 - 10.4	16	20	80	48	145	TPD100B - 104B
105-16-8-P	●	10.5 - 10.9	16	20	84	48	149	TPD105B - 109B
110-16-8-P	●	11.0 - 11.4	16	20	88	48	153	TPD110B - 114B
115-16-8-P	●	11.5 - 11.9	16	20	92	48	157	TPD115B - 119B
120-16-8-P	●	12.0 - 12.4	16	20	96	48	162	TPD120B - 124B
125-16-8-P	●	12.5 - 12.9	16	20	100	48	166.5	TPD125B - 129B
130-16-8-P	●	13.0 - 13.4	16	20	104	48	172	TPD130B - 134B
135-16-8-P	●	13.5 - 13.9	16	20	108	48	176.5	TPD135B - 139B
140-16-8-P	●	14.0 - 14.4	16	20	112	48	181	TPD140B - 144B
145-16-8-P	●	14.5 - 14.9	16	20	116	48	186.5	TPD145B - 149B
150-20-8-P	●	15.0 - 15.4	20	25	120	50	193	TPD150B - 154B
155-20-8-P	●	15.5 - 15.9	20	25	124	50	197.5	TPD155B - 159B
160-20-8-P	●	16.0 - 16.4	20	25	128	50	202	TPD160B - 164B
165-20-8-P	●	16.5 - 16.9	20	25	132	50	206.5	TPD165B - 169B
170-20-8-P	●	17.0 - 17.4	20	25	136	50	212	TPD170B - 174B
175-20-8-P	●	17.5 - 17.9	20	25	140	50	216.5	TPD175B - 179B
180-25-8-P	●	18.0 - 18.4	25	33	144	56	227	TPD180B - 184B
185-25-8-P	●	18.5 - 18.9	25	33	148	56	231.5	TPD185B - 189B
190-25-8-P	●	19.0 - 19.4	25	33	152	56	237	TPD190B - 194B
195-25-8-P	●	19.5 - 19.9	25	33	156	56	241.5	TPD195B - 199B
200-25-8-P	●	20.0 - 20.4	25	33	160	56	246	TPD200B - 204B
205-25-8-P	●	20.5 - 20.9	25	33	164	56	250.5	TPD205B - 209B
210-25-8-P	●	21.0 - 21.4	25	33	168	60	256	TPD210B - 214B
215-25-8-P	●	21.5 - 21.9	25	33	172	60	260.5	TPD215B - 219B
220-25-8-P	●	22.0 - 22.4	25	33	176	60	265	TPD220B - 224B
225-25-8-P	●	22.5 - 22.9	25	33	180	60	269.5	TPD225B - 229B
230-25-8-P	●	23.0 - 23.4	25	33	184	60	275	TPD230B - 234B
235-25-8-P	●	23.5 - 23.9	25	33	188	60	279.5	TPD235B - 239B
240-32-8-P	●	24.0 - 24.4	32	43	192	60	288	TPD240B - 244B
245-32-8-P	●	24.5 - 24.9	32	43	196	60	292.5	TPD245B - 249B
250-32-8-P	●	25.0 - 25.4	32	43	200	60	298	TPD250B - 254B
255-32-8-P	●	25.5 - 25.9	32	43	204	60	302.5	TPD255B - 259B
260-32-8-P	●	26.0 - 26.9	32	43	208	60	307	TPD260B - 269B
270-32-8-P	●	27.0 - 27.9	32	43	216	60	317	TPD270B - 279B
280-32-8-P	●	28.0 - 28.9	32	43	224	60	326	TPD280B - 289B
290-32-8-P	●	29.0 - 29.9	32	43	232	60	336	TPD290B - 299B
300-32-8-P	●	30.0 - 30.9	32	43	240	60	344	TPD300B - 309B
310-32-8-P	●	31.0 - 31.9	32	43	248	60	354	TPD310B - 319B
320-32-8-P	●	32.0 - 32.9	32	43	256	60	361	TPD320B - 329B

● : Stock item

TPDB Plus - 10D

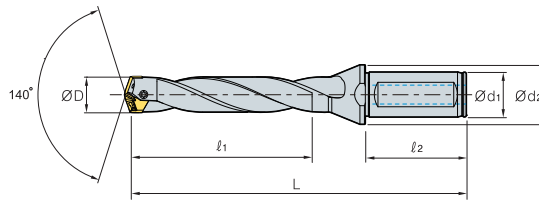
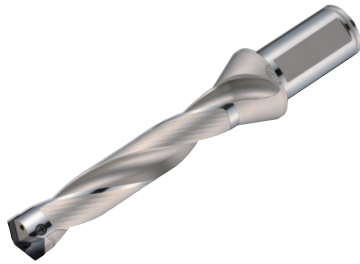


(mm)

Designation	Stock	ØD	Ød1	Ød2	l1	l2	L	Insert
TPDB 100-16-10-P		10.0 - 10.4	16	20	100	48	165	TPD100B - 104B
105-16-10-P		10.5 - 10.9	16	20	105	48	170	TPD105B - 109B
110-16-10-P		11.0 - 11.4	16	20	110	48	175	TPD110B - 114B
115-16-10-P		11.5 - 11.9	16	20	115	48	180	TPD115B - 119B
120-16-10-P		12.0 - 12.4	16	20	120	48	186	TPD120B - 124B
125-16-10-P		12.5 - 12.9	16	20	125	48	191.5	TPD125B - 129B
130-16-10-P		13.0 - 13.4	16	20	130	48	198	TPD130B - 134B
135-16-10-P		13.5 - 13.9	16	20	135	48	203.5	TPD135B - 139B
140-16-10-P		14.0 - 14.4	16	20	140	48	209	TPD140B - 144B
145-16-10-P		14.5 - 14.9	16	20	145	48	215.5	TPD145B - 149B
150-20-10-P		15.0 - 15.4	20	25	150	50	223	TPD150B - 154B
155-20-10-P		15.5 - 15.9	20	25	155	50	228.5	TPD155B - 159B
160-20-10-P		16.0 - 16.4	20	25	160	50	234	TPD160B - 164B
165-20-10-P		16.5 - 16.9	20	25	165	50	239.5	TPD165B - 169B
170-20-10-P		17.0 - 17.4	20	25	170	50	246	TPD170B - 174B
175-20-10-P		17.5 - 17.9	20	25	175	50	251.5	TPD175B - 179B
180-25-10-P		18.0 - 18.4	25	33	180	56	263	TPD180B - 184B
185-25-10-P		18.5 - 18.9	25	33	185	56	268.5	TPD185B - 189B
190-25-10-P		19.0 - 19.4	25	33	190	56	275	TPD190B - 194B
195-25-10-P		19.5 - 19.9	25	33	195	56	280.5	TPD195B - 199B
200-25-10-P		20.0 - 20.4	25	33	200	56	286	TPD200B - 204B
205-25-10-P		20.5 - 20.9	25	33	205	56	291.5	TPD205B - 209B
210-25-10-P		21.0 - 21.4	25	33	210	60	298	TPD210B - 214B
215-25-10-P		21.5 - 21.9	25	33	215	60	303.5	TPD215B - 219B
220-25-10-P		22.0 - 22.4	25	33	220	60	309	TPD220B - 224B
225-25-10-P		22.5 - 22.9	25	33	225	60	314.5	TPD225B - 229B
230-25-10-P		23.0 - 23.4	25	33	230	60	321	TPD230B - 234B
235-25-10-P		23.5 - 23.9	25	33	235	60	326.5	TPD235B - 239B
240-32-10-P		24.0 - 24.4	32	43	240	60	336	TPD240B - 244B
245-32-10-P		24.5 - 24.9	32	43	245	60	341.5	TPD245B - 249B
250-32-10-P		25.0 - 25.4	32	43	250	60	348	TPD250B - 254B
255-32-10-P		25.5 - 25.9	32	43	255	60	353.5	TPD255B - 259B
260-32-10-P		26.0 - 26.9	32	43	260	60	359	TPD260B - 269B
270-32-10-P		27.0 - 27.9	32	43	270	60	371	TPD270B - 279B
280-32-10-P		28.0 - 28.9	32	43	280	60	382	TPD280B - 289B
290-32-10-P		29.0 - 29.9	32	43	290	60	394	TPD290B - 299B
300-32-10-P		30.0 - 30.9	32	43	300	60	404	TPD300B - 309B
310-32-10-P		31.0 - 31.9	32	43	310	60	416	TPD310B - 319B
320-32-10-P		32.0 - 32.9	32	43	320	60	425	TPD320B - 329B

● : Stock item

TPDB Plus - 12D



(mm)

Designation	Stock	ØD	Ød1	Ød2	l1	l2	L	Insert
TPDB 100-16-12-P		10.0 - 10.4	16	20	120	48	185	TPD100B - 104B
105-16-12-P		10.5 - 10.9	16	20	126	48	191	TPD105B - 109B
110-16-12-P		11.0 - 11.4	16	20	132	48	197	TPD110B - 114B
115-16-12-P		11.5 - 11.9	16	20	138	48	203	TPD115B - 119B
120-16-12-P		12.0 - 12.4	16	20	144	48	210	TPD120B - 124B
125-16-12-P		12.5 - 12.9	16	20	150	48	216.5	TPD125B - 129B
130-16-12-P		13.0 - 13.4	16	20	156	48	224	TPD130B - 134B
135-16-12-P		13.5 - 13.9	16	20	162	48	230.5	TPD135B - 139B
140-16-12-P		14.0 - 14.4	16	20	168	48	237	TPD140B - 144B
145-16-12-P		14.5 - 14.9	16	20	174	48	244.5	TPD145B - 149B
150-20-12-P		15.0 - 15.4	20	25	180	50	253	TPD150B - 154B
155-20-12-P		15.5 - 15.9	20	25	186	50	259.5	TPD155B - 159B
160-20-12-P		16.0 - 16.4	20	25	192	50	266	TPD160B - 164B
165-20-12-P		16.5 - 16.9	20	25	198	50	272.5	TPD165B - 169B
170-20-12-P		17.0 - 17.4	20	25	204	50	280	TPD170B - 174B
175-20-12-P		17.5 - 17.9	20	25	210	50	286.5	TPD175B - 179B
180-25-12-P		18.0 - 18.4	25	33	216	56	299	TPD180B - 184B
185-25-12-P		18.5 - 18.9	25	33	222	56	305.5	TPD185B - 189B
190-25-12-P		19.0 - 19.4	25	33	228	56	313	TPD190B - 194B
195-25-12-P		19.5 - 19.9	25	33	234	56	319.5	TPD195B - 199B
200-25-12-P		20.0 - 20.4	25	33	240	56	326	TPD200B - 204B
205-25-12-P		20.5 - 20.9	25	33	246	56	332.5	TPD205B - 209B
210-25-12-P		21.0 - 21.4	25	33	252	60	340	TPD210B - 214B
215-25-12-P		21.5 - 21.9	25	33	258	60	346.5	TPD215B - 219B
220-25-12-P		22.0 - 22.4	25	33	264	60	353	TPD220B - 224B
225-25-12-P		22.5 - 22.9	25	33	270	60	359.5	TPD225B - 229B
230-25-12-P		23.0 - 23.4	25	33	276	60	367	TPD230B - 234B
235-25-12-P		23.5 - 23.9	25	33	282	60	373.5	TPD235B - 239B
240-32-12-P		24.0 - 24.4	32	43	288	60	384	TPD240B - 244B
245-32-12-P		24.5 - 24.9	32	43	294	60	390.5	TPD245B - 249B
250-32-12-P		25.0 - 25.4	32	43	300	60	398	TPD250B - 254B
255-32-12-P		25.5 - 25.9	32	43	306	60	404.5	TPD255B - 259B
260-32-12-P		26.0 - 26.9	32	43	312	60	411	TPD260B - 269B
270-32-12-P		27.0 - 27.9	32	43	324	60	425	TPD270B - 279B
280-32-12-P		28.0 - 28.9	32	43	336	60	438	TPD280B - 289B
290-32-12-P		29.0 - 29.9	32	43	348	60	452	TPD290B - 299B
300-32-12-P		30.0 - 30.9	32	43	360	60	464	TPD300B - 309B
310-32-12-P		31.0 - 31.9	32	43	372	60	478	TPD310B - 319B
320-32-12-P		32.0 - 32.9	32	43	384	60	489	TPD320B - 329B

● : Stock item

www.korloy.com



Holystar B/D, 1350, Nambusunhwan-ro, Geumcheon-gu, Seoul, 08536, Korea
Tel : +82-2-522-3181 Fax : +82-2-522-3184, +82-2-3474-4744 Web : www.korloy.com E-mail : export@korloy.com

KORLOY AMERICA

620 Maple Avenue, Torrance, CA 90503, USA
Tel : +1-310-782-3800 Toll Free : +1-888-711-0001 Fax : +1-310-782-3885
E-mail : sales.kai@korloy.com

KORLOY INDIA

Plot NO.415, Sector 8, IMT Manesar, Gurgaon 122051, Haryana, India
Tel : +91-124-4391790 Fax : +91-124-4050032
E-mail : sales.kip@korloy.com

KORLOY VIETNAM

No. 133, Le Loi street, Hoa Phu ward, Thu Dau Mot city,
Binh Duong, Vietnam
Tel : +84-96-856-1230 E-mail : sales.kvc@korloy.com

KORLOY CHILE

Av. Providencia 1650, Office 1009, 7500027
Providencia-Santiago, Chile
Tel : +56-229-295-490 E-mail : sales.kcs@korloy.com

KORLOY FACTORY QINGDAO

Ground Dongjing Road 56(B) District Free Trade Zone. Qingdao, China
Tel : +86-532-86959880 Fax : +86-532-86760651
E-mail : pro.kfq@korloy.com

KORLOY EUROPE

Gablonzer Str. 25-27, 61440 Oberursel, Germany
Tel : +49-6171-277-83-0 Fax : +49-6171-277-83-59
E-mail : sales.keg@korloy.com

KORLOY BRASIL

Av. Aruana 280, conj.12, WLC, Alphaville, Barueri,
CEP06460-010, SP, Brasil
Tel : +55-11-4193-3810 E-mail : sales.kbl@korloy.com

KORLOY TURKEY

Orucreis Mah. Vadi Cad. No: 108 Istanbul Ticaret Sarayi
Kat 5 No: 318 Giyimkent Sitesi-Esenler/Istanbul, Turkey
Tel : +90-212-438-5197 E-mail : service@korloy.com.tr

KORLOY FACTORY INDIA

Plot No. 415, Sector 8, IMT Manesar, Gurgaon 122051, Haryana, India
Tel : +91-124-4391790 Fax : +91-124-4050032
E-mail : pro.kim@korloy.com