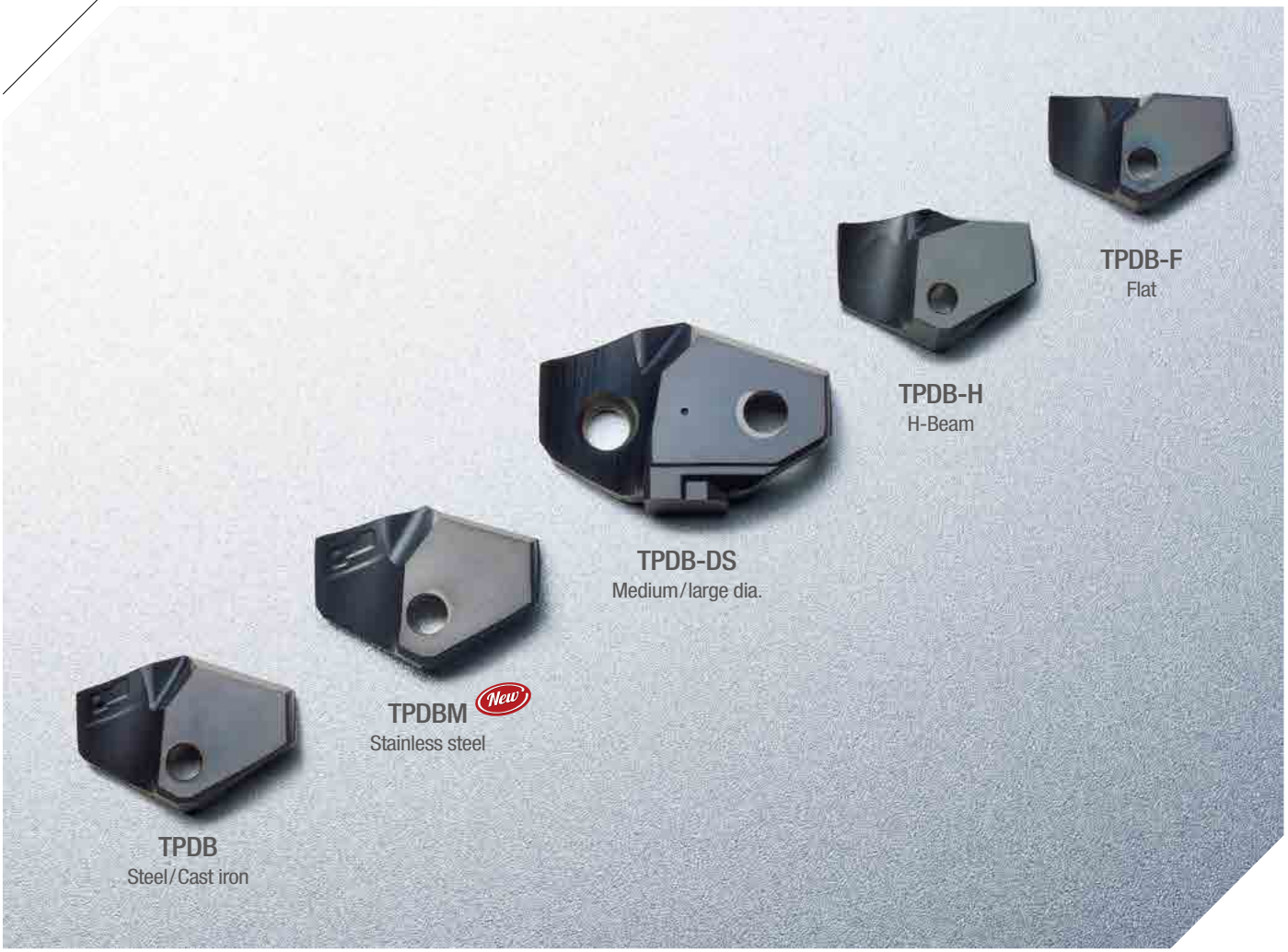
KORLOY TECH-NEWS

TPDB Plus Drill series

TPDB, TPDBM, TPDB-DS, TPDB-H, TPDB-F

High-quality and high efficiency top solid indexable Drill Series

- Improved productivity and excellent machining quality through stable machining
- Versatility in machining various surfaces, structural Steel, and medium/large diameter machining



KORLOY

Highly precise and efficient top solid indexable Drill Series

TPDB Plus Drill series

In various industries, there are demands of excellent performance and machining time reduction to improve machining efficiency. Thus, the demand for efficient cutting tools leads to a continuous increase. To respond to these market demands, KORLOY launching the TPDB Plus Drill, a high-quality and high-efficiency indexable Drill that enhances machining quality and production efficiency.

The **TPDB Plus Drill** with high helix flutes ensures smooth chip evacuation during machining, greatly enhanced hole surface finish, roundness, and machining quality. Additionally, TPDB-F for machining various surfaces, TPDB-H dedicated hole machining in structural Steel, and TPDB-DS for medium / large diameter Drilling provide multi-faceted usability across different industries.

TPDB-DS is a Drill designed for machining medium/large diameter workpieces, applying a strong clamping structure. A special clamping system design and screw clamping method enable stable machining in high cutting load machining environments. Additionally, the double-margin design provides excellent hole surface finish and precision.

The **TPDB-H** insert with unique low-cutting resistance cutting edge improves centering and provides excellent machining quality even in vibration-prone machining environments by reducing machining load. In addition, the high helix angle applied to the flutes prevents from vibration and unexpected tool breakage which caused by chip blockage, resulting in enhanced machining stability and productivity.

The **TPDB-F** is capable of machining sloping surfaces, curved surfaces, flanges, and boring on various workpiece surfaces, and it is suitable for basic hole machining on flat bottom surfaces. By minimizing the number of tools required and reducing tool change time, it is possible to expect decreasing cycle time.

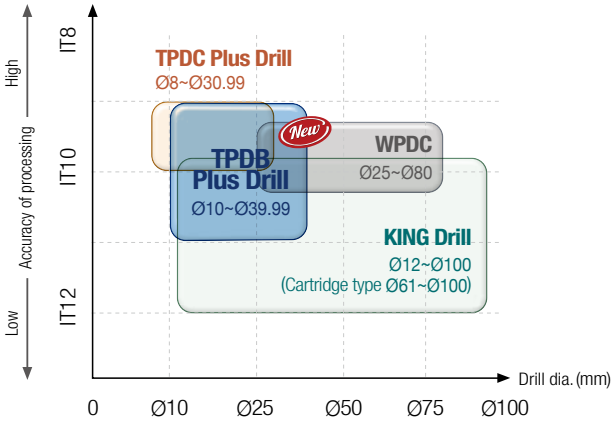
» Excellent machinability

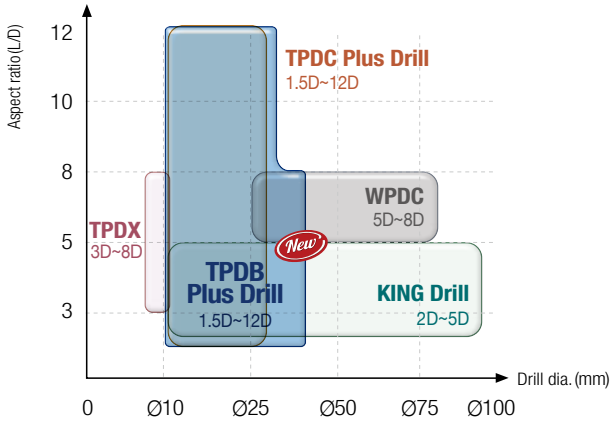
- Excellent hole machining performance with specified cutting edge designs per applications
- Good chip evacuation with high helix angle application

» Improved productivity

- Reduced cycle time through tool simplification
- Durable holder with special surface treatment

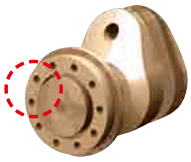
Application range



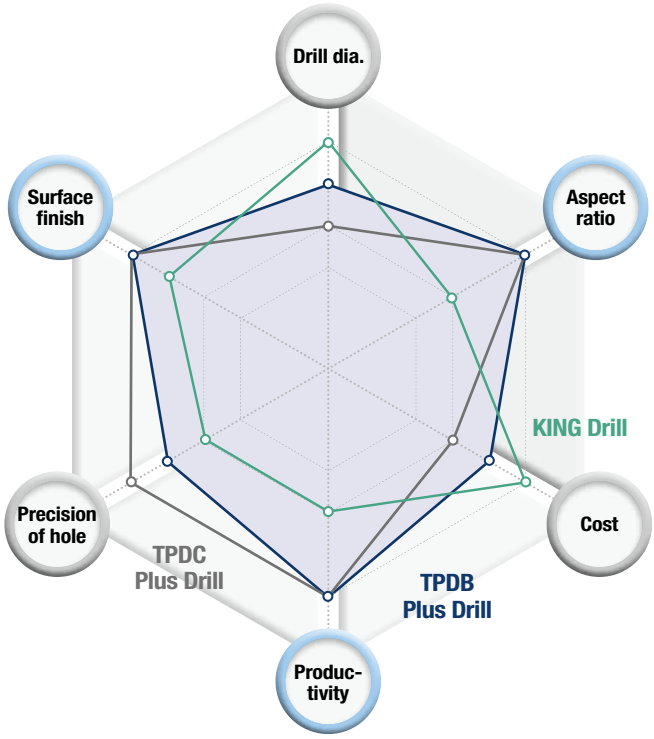


Tool		Application range			
		Drill dia. DC (mm)	Aspect ratio (L/D)	Tolerance of Drill dia.	Workpiece material
TPDB Plus Drill	TPDB(M)	Ø10~Ø32.99mm	3, 5, 8, 10, 12	h7	P, M, K
	TPDB-DS	Ø33~Ø39.99mm	3, 5, 8		P, K
	TPDB-H	Ø14~Ø32.99mm	3, 4, 5, 8		P
	TPDB-F	Ø14~Ø30.99mm	1.5		P

Applicable industries

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

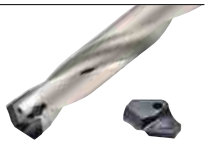
Indexable Drill selection guide



TPDB Plus Drill

New

- Good surface finish
- High productivity
- 1.5D, 3D, 5D, 8D, 10D, 12D



TPDC Plus Drill

- One step clamping
- High precision of hole
- 1.5D, 3D, 5D, 8D, 10D, 12D

KING Drill

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

Tool	Drill dia.	Aspect ratio	Cost	Productivity	Precision of hole	Surface finish
TPDB Plus Drill (New)	★★★	★★★★	★★★	★★★★	★★★	★★★★
TPDC Plus Drill	★★	★★★★	★★	★★★★	★★★★	★★★★
KING Drill	★★★★	★★	★★★★	★★	★★	★★★

TPDB

Code system

Insert

TPD	200	B	M
Top solid Piercing Drill	**Drill dia.** 200 : Ø20mm	**Insert type** B : Blade type	**Machining range** None : Steel, Cast iron M : Stainless

Holder

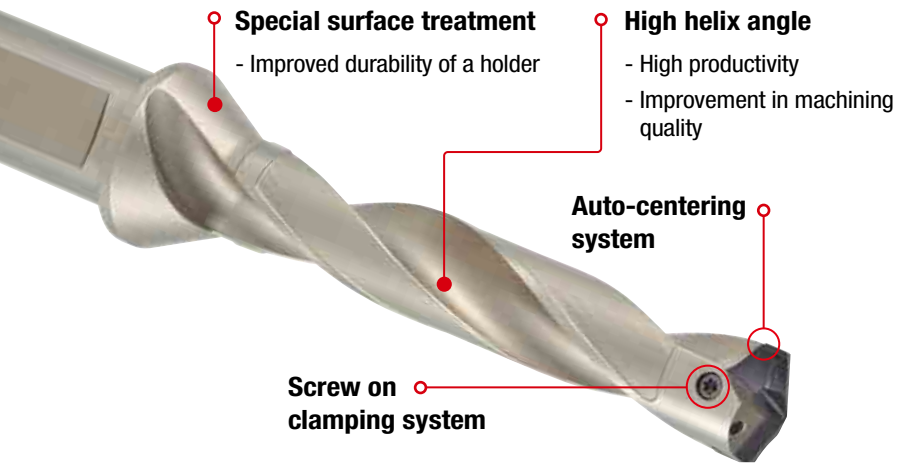
TPD	B	200	-	25	-	5	-	P
Top solid Piercing Drill	**Insert type** B : Blade type	**Drill dia.** 200 : Ø20mm		**Shank dia.** 25 : Ø25mm		**Aspect ratio (L/D)** 1.5D, 3D, 5D, 8D, 10D, 12D		**Plus**

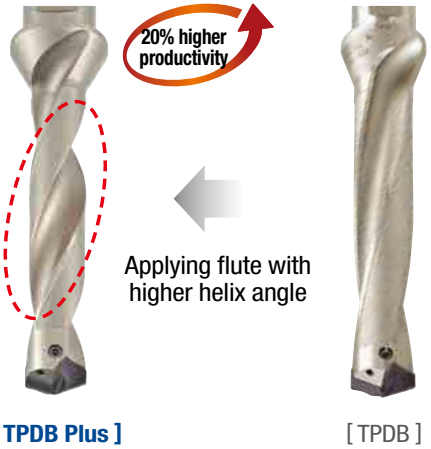
Insert features

Shape	Application	Drill dia.(mm)	features
 **TPDB** Steel/Cast iron	P K	Ø10~Ø32.9	• Cutting edge with low cutting resistance - Low cutting load and excellent chip control • Advanced chip control due to a chip breaker
 **TPDBM** New Stainless steel	M	Ø10~Ø32.9	• Formation of special cutting edge - Excellent centering, reduced vibration, improved surface finish • Advanced chip control due to a chip breaker • Secured chip space to improve chip shape and machinability • Enhanced of point chip strength

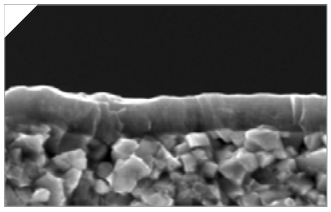
Holder features

- **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
- **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 by applying high helix angle



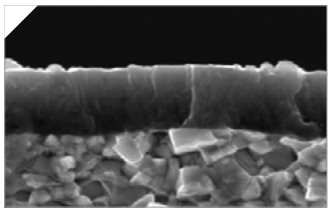


Grade features



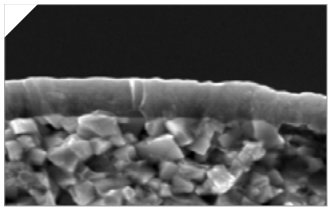
PC5300

- 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



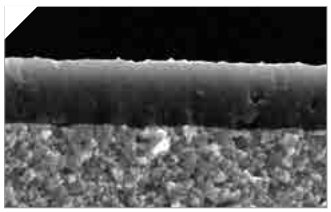
PC5335

- 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

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



PC340UL New

- PVD coating technology with excellent lubricity
- Excellent chip control and welding resistance which leads to superior machining stability
- Suitable for machining stainless steel and heat-resistant alloys

How to clamp an insert

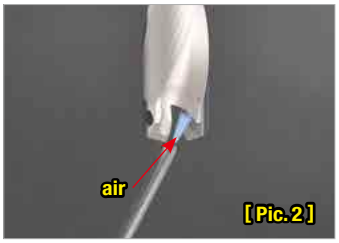
Clamping an insert to a holder

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.

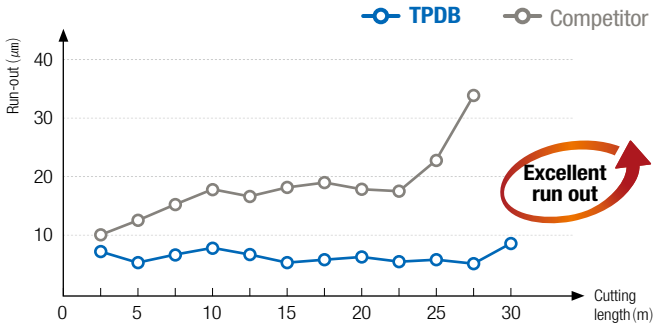
② As the **[Pic.2]**, clean the insert seat.

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.

Run-out

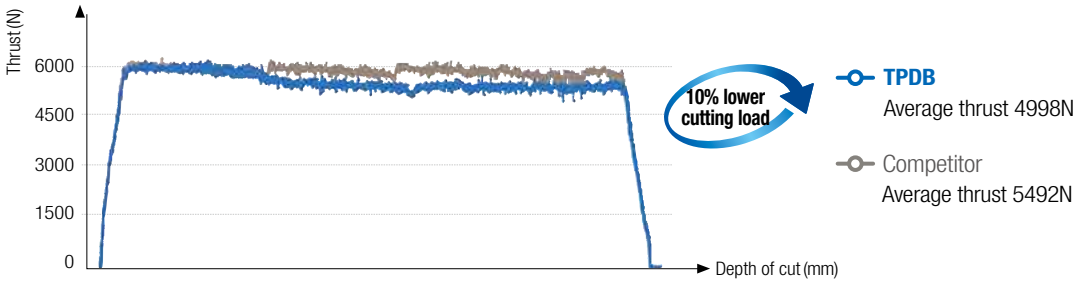
Workpiece	Alloy steel (SCM440, HRC22)
Cutting condition	vc (m/min) = 90, fn (mm/rev) = 0.25, ap (mm) = 120, wet (20 bar)
Tool	Insert TPD250B (PC5300)
	Holder TPDB250-32-5-P (Drill dia. = Ø25 mm)



Performance evaluation

Cutting load

Workpiece	Alloy steel (SCM440, HRC22)
Cutting condition	vc (m/min) = 120, fn (mm/rev) = 0.25, ap (mm) = 120, wet (20 bar)
Tool	**Insert** TPD250B (PC5300) **Holder** TPDB250-32-5-P (Drill dia.=Ø25mm)



» Secured stable cutting load with excellent chip evacuation through applying low cutting resistance cutting edge and high helix flutes

Surface finish

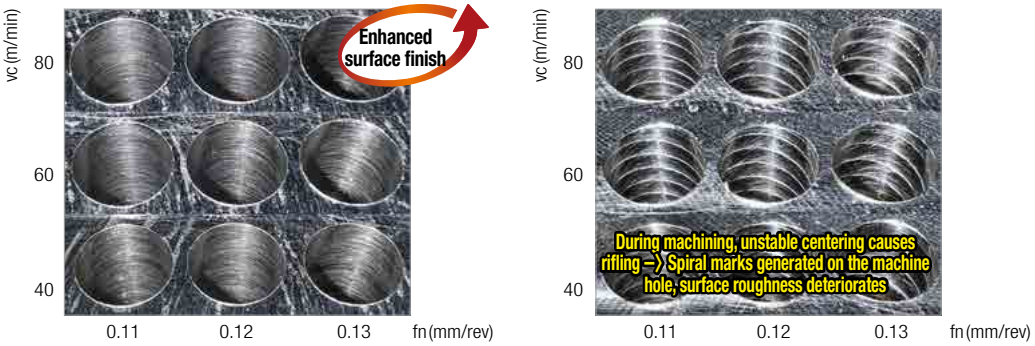
Workpiece	Alloy steel (SCM440, HRC22)
Cutting condition	vc (m/min) = 120, fn (mm/rev) = 0.35, ap (mm) = 120, wet (20 bar)
Tool	**Insert** TPD250B (PC5300) **Holder** TPDB250-32-5-P (Drill dia.=Ø25mm)

[TPDB]
Ra = 0.54㎛

[Competitor]
Ra = 0.57㎛

» Good surface finish due to stable chip shape and chip evacuation

Workpiece	Stainless steel (STS304, HB165)
Cutting condition	vc (m/min) = 40/60/80, fn (mm/rev) = 0.11/0.12/0.13, ap (mm) = 80, wet (20 bar)
Tool	**Insert** TPD100BM (PC340UL) **Holder** TPDB100-16-8-P (Drill dia.=Ø10mm)



[TPDBM]

[Competitor]

» Excellent machining quality ensured by stable chip machinability and machining stability

Performance evaluation

Chip control

Workpiece	Alloy steel (SCM440, HRC22)
Cutting condition	vc (m/min) = 120, fn (mm/rev) = 0.35, ap (mm) = 120, wet (20 bar)
Tool	Insert TPD250B (PC5300) Holder TPDB250-32-5-P (Drill dia.=Ø25mm)

[TPDB]

[Competitor]

» Regular chip shape

Workpiece	Stainless steel (STS316, HB165)
Cutting condition	vc (m/min) = 60, fn (mm/rev) = 0.15, ap (mm) = 100, wet (20 bar)
Tool	Insert TPD200BM (PC340UL) Holder TPDB200-25-5-P (Drill dia.=Ø20mm)

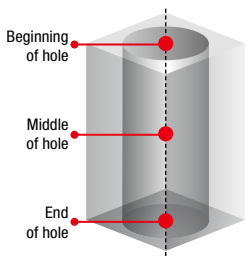
[TPDBM]

[Competitor]

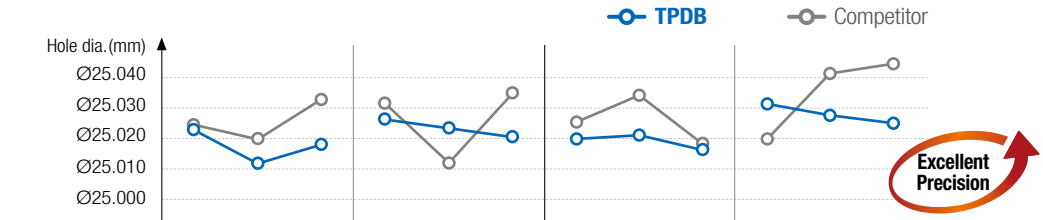
» Regular chip shape (less long chips and fewer adhered chips compared to competitors)

Machining precision

Workpiece	Alloy steel (SCM440, HRC22)
Cutting condition	vc (m/min) = 90/120, fn (mm/rev) = 0.25/0.35, ap (mm) = 120, wet (20 bar)
Tool	Insert TPD250B (PC5300) Holder TPDB250-32-5-P (Drill dia.=Ø25mm)



[Drilling part]



Drilling part	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End
fn (mm/rev)	0.25			0.35			0.25			0.35		
vc (m/min)	90						120					

» High precision cutting due to stable chip evacuation

Performance evaluation

Wear resistance

Workpiece	Alloy steel (SCM440, HRC22)
Cutting condition	vc (m/min) = 100, fn (mm/rev) = 0.3, ap (mm) = 100, wet (30 bar)
Tool	Insert TPD250B (PC5300) Holder TPDB250-32-5-P (Drill dia.=Ø25mm)

[TPDB]

[Competitor]

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

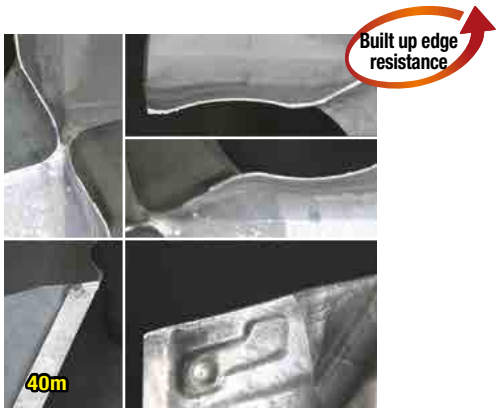
Workpiece	Carbon steel (SM45C, HRC18)
Cutting condition	vc (m/min) = 100, fn (mm/rev) = 0.3, ap (mm) = 100, wet (30 bar)
Tool	Insert TPD250B (PC5335) Holder TPDB250-32-5-P (Drill dia.=Ø25mm)

[TPDB]

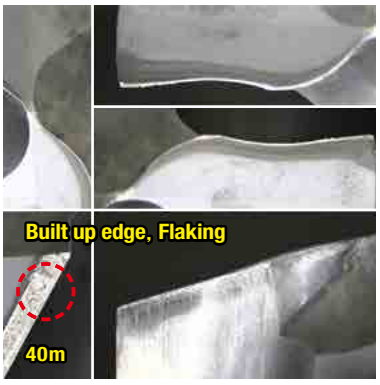
[Competitor]

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

Workpiece	Stainless steel (STS316, HB165)
Cutting condition	vc (m/min) = 60, fn (mm/rev) = 0.15, ap (mm) = 100, wet (20 bar)
Tool	Insert TPD200BM (PC340UL) Holder TPDB200-25-5-P (Drill dia.=Ø20mm)



[TPDBM]



[Competitor]

» Superior centering and chip breaking performance during machining compared to competitors, leading to excellent adhesion at the margin and extended maximum tool life.

Recommended cutting conditions

[3D machining]

Workpiece					Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	vc (m/min)	fn (mm/rev)			
ISO	Workpiece material		KS	ISO					Ø10~Ø15.9	Ø16~Ø20.9	Ø21~Ø26.9	Ø27~Ø32.9
P	Carbon steel	C = 0.10~0.25%	SM15C SM25C	C15 C25	1500	90~200	PC5335 PC330P	80~140	0.3~0.15	0.35~0.2	0.35~0.2	0.4~0.25
		C = 0.25~0.55%	SM35C SM45C	C35 C45	1600	125~225	PC5335 PC330P	80~140	0.3~0.15	0.35~0.2	0.35~0.2	0.4~0.25
		C = 0.55~0.80%	SM58C	C60	1700	150~250	PC5335 PC330P	70~130	0.3~0.15	0.35~0.2	0.35~0.2	0.4~0.25
	Alloy steel ≤ 5%	Non-hardened	SCM440	42CrMo4	1700	180	PC5300	80~140	0.35~0.18	0.38~0.23	0.38~0.23	0.43~0.28
		Hardened and Tempered	SCM445	-	2050	350	PC5300	50~100	0.35~0.18	0.38~0.23	0.38~0.23	0.43~0.28
	Alloy steel > 5%	Annealed	STD11	-	1950	200	PC5300	50~90	0.3~0.18	0.35~0.2	0.35~0.2	0.4~0.25
		Hardened tool steel	STD61	X40CrMoV5-1	3000	352	PC5300	40~80	0.3~0.18	0.35~0.2	0.35~0.2	0.4~0.25
M	Ferritic series Martensitic series		STS410 STS430	410 430	1400	135~275	PC340UL	50~80	0.2~0.12	0.22~0.14	0.24~0.16	0.24~0.16
	Austenite series		STS304 STS316	304 316	2000	135~275	PC340UL	40~70	0.16~0.1	0.18~0.12	0.2~0.14	0.2~0.14
K	Gray cast iron		GC250 GC350	250 350	900	150~230	PC5300	80~140	0.35~0.18	0.4~0.2	0.4~0.2	0.45~0.25
	Ductile cast iron		GCD400 GCD500 GCD600	400-15 150-10 600-3	870	160~260	PC5300	70~130	0.35~0.18	0.4~0.2	0.4~0.2	0.45~0.25

[5D machining]

Workpiece					Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	vc (m/min)	fn (mm/rev)			
ISO	Workpiece material		KS	ISO					Ø10~Ø15.9	Ø16~Ø20.9	Ø21~Ø26.9	Ø27~Ø32.9
P	Carbon steel	C = 0.10~0.25%	SM15C SM25C	C15 C25	1500	90~200	PC5335 PC330P	80~140	0.3~0.15	0.35~0.2	0.35~0.2	0.4~0.25
		C = 0.25~0.55%	SM35C SM45C	C35 C45	1600	125~225	PC5335 PC330P	80~140	0.3~0.15	0.35~0.2	0.35~0.2	0.4~0.25
		C = 0.55~0.80%	SM58C	C60	1700	150~250	PC5335 PC330P	70~130	0.3~0.15	0.35~0.2	0.35~0.2	0.4~0.25
	Alloy steel ≤ 5%	Non-hardened	SCM440	42CrMo4	1700	180	PC5300	80~140	0.35~0.18	0.38~0.23	0.38~0.23	0.43~0.28
		Hardened and Tempered	SCM445	-	2050	350	PC5300	50~100	0.35~0.18	0.38~0.23	0.38~0.23	0.43~0.28
	Alloy steel > 5%	Annealed	STD11	-	1950	200	PC5300	50~90	0.3~0.18	0.35~0.2	0.35~0.2	0.4~0.25
		Hardened tool steel	STD61	X40CrMoV5-1	3000	352	PC5300	40~80	0.3~0.18	0.35~0.2	0.35~0.2	0.4~0.25
M	Ferritic series Martensitic series		STS410 STS430	410 430	1400	135~275	PC340UL	50~80	0.2~0.12	0.22~0.14	0.24~0.16	0.24~0.16
	Austenite series		STS304 STS316	304 316	2000	135~275	PC340UL	40~70	0.16~0.1	0.18~0.12	0.2~0.14	0.2~0.14
K	Gray cast iron		GC250 GC350	250 350	900	150~230	PC5300	80~140	0.35~0.18	0.4~0.2	0.4~0.2	0.45~0.25
	Ductile cast iron		GCD400 GCD500 GCD600	400-15 150-10 600-3	870	160~260	PC5300	70~130	0.35~0.18	0.4~0.2	0.4~0.2	0.45~0.25

Recommended cutting conditions

[8D machining]

Workpiece					Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	vc (m/min)	fn (mm/rev)			
ISO	Workpiece material		KS	ISO					Ø10~Ø15.9	Ø16~Ø20.9	Ø21~Ø26.9	Ø27~Ø32.9
P	Carbon steel	C = 0.10~0.25%	SM15C SM25C	C15 C25	1500	90~200	PC5335 PC330P	80~140	0.24~0.12	0.28~0.16	0.28~0.16	0.32~0.2
		C = 0.25~0.55%	SM35C SM45C	C35 C45	1600	125~225	PC5335 PC330P	80~140	0.24~0.12	0.28~0.16	0.28~0.16	0.32~0.2
		C = 0.55~0.80%	SM58C	C60	1700	150~250	PC5335 PC330P	70~130	0.24~0.12	0.28~0.16	0.28~0.16	0.32~0.2
	Alloy steel ≤ 5%	Non-hardened	SCM440	42CrMo4	1700	180	PC5300	80~140	0.28~0.14	0.3~0.18	0.3~0.18	0.34~0.22
		Hardened and Tempered	SCM445	-	2050	350	PC5300	50~100	0.28~0.14	0.3~0.18	0.3~0.18	0.34~0.22
	Alloy steel > 5%	Annealed	STD11	-	1950	200	PC5300	50~90	0.24~0.14	0.28~0.16	0.28~0.16	0.32~0.2
		Hardened tool steel	STD61	X40CrMoV5-1	3000	352	PC5300	40~80	0.24~0.14	0.28~0.16	0.28~0.16	0.32~0.2
M	Ferritic series Martensitic series		STS410 STS430	410 430	1400	135~275	PC340UL	50~80	0.17~0.12	0.18~0.14	0.2~0.16	0.2~0.16
	Austenite series		STS304 STS316	304 316	2000	135~275	PC340UL	40~70	0.14~0.1	0.15~0.12	0.17~0.14	0.17~0.14
K	Gray cast iron		GC250 GC350	250 350	900	150~230	PC5300	80~140	0.28~0.14	0.32~0.16	0.32~0.16	0.36~0.2
	Ductile cast iron		GCD400 GCD500 GCD600	400-15 150-10 600-3	870	160~260	PC5300	70~130	0.28~0.14	0.32~0.16	0.32~0.16	0.36~0.2

※ Use after machining a pilot hole (1.5) if necessary
※ For interrupted machining, reduce feed by 0.1~0.15 near the interrupted part

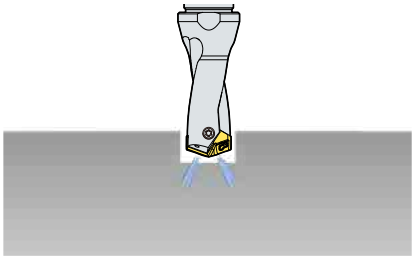
[10D, 12D machining]

Workpiece					Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	vc (m/min)	fn (mm/rev)			
ISO	Workpiece material		KS	ISO					Ø10~Ø15.9	Ø16~Ø20.9	Ø21~Ø26.9	Ø27~Ø32.9
P	Carbon steel	C = 0.10~0.25%	SM15C SM25C	C15 C25	1500	90~200	PC5335 PC330P	80~140	0.24~0.12	0.28~0.16	0.28~0.16	0.32~0.2
		C = 0.25~0.55%	SM35C SM45C	C35 C45	1600	125~225	PC5335 PC330P	80~140	0.24~0.12	0.28~0.16	0.28~0.16	0.32~0.2
		C = 0.55~0.80%	SM58C	C60	1700	150~250	PC5335 PC330P	70~130	0.24~0.12	0.28~0.16	0.28~0.16	0.32~0.2
	Alloy steel ≤ 5%	Non-hardened	SCM440	42CrMo4	1700	180	PC5300	80~140	0.28~0.14	0.3~0.18	0.3~0.18	0.34~0.22
		Hardened and Tempered	SCM445	-	2050	350	PC5300	50~100	0.28~0.14	0.3~0.18	0.3~0.18	0.34~0.22
	Alloy steel > 5%	Annealed	STD11	-	1950	200	PC5300	50~90	0.24~0.14	0.28~0.16	0.28~0.16	0.32~0.2
		Hardened tool steel	STD61	X40CrMoV5-1	3000	352	PC5300	40~80	0.24~0.14	0.28~0.16	0.28~0.16	0.32~0.2
M	Ferritic series Martensitic series		STS410 STS430	410 430	1400	135~275	PC340UL	50~80	0.17~0.12	0.18~0.14	0.2~0.16	0.2~0.16
	Austenite series		STS304 STS316	304 316	2000	135~275	PC340UL	40~70	0.14~0.1	0.15~0.12	0.17~0.14	0.17~0.14
K	Gray cast iron		GC250 GC350	250 350	900	150~230	PC5300	80~140	0.28~0.14	0.32~0.16	0.32~0.16	0.36~0.2
	Ductile cast iron		GCD400 GCD500 GCD600	400-15 150-10 600-3	870	160~260	PC5300	70~130	0.28~0.14	0.32~0.16	0.32~0.16	0.36~0.2

※ Refer to page 12 for recommended machining method

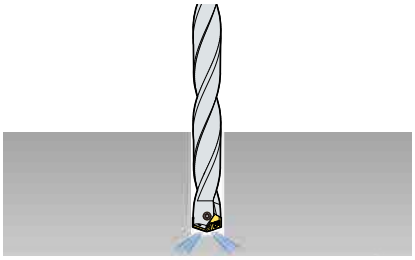
Recommended Drilling method (10D, 12D)

Machine a pilot hole (with a pilot Drill)



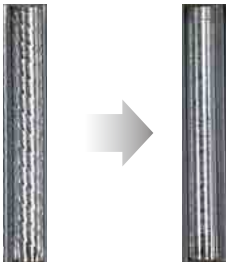
- Machine a pilot hole with the depth of cut as 0.5D and at 30% lower speed using a 1.5D or 3D Drill.

Start Drilling



- After machining the pilot hole, replace the pilot Drill to a Drill for further operation and machine in recommended cutting conditions.

Good surface finish

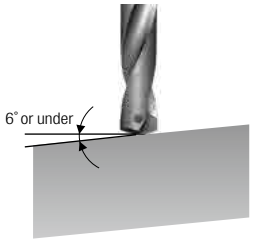


Result of general Drilling

Result of recommended Drilling

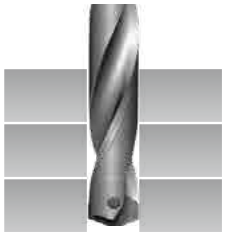
Precaution in Drilling

Angled surface Drilling



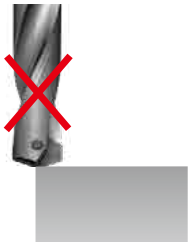
- The approach angle between Drill and the workpiece at the beginning and the end should be less than 6°.
- Reduce the feed (fn) to 30-50% than general cutting conditions at the beginning and the end of angled surface.

Stacked plates Drilling



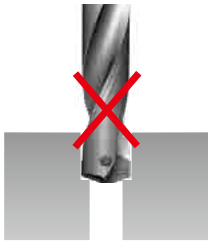
- Gap between the plates could make wrong chip evacuation causing fracture of the Drill.
- Strongly clamp the workpiece together to eliminate any gaps and then proceed with usage.

Plunging



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

Boring



- Boring is not recommended as it can cause excessive wear and chipping at the insert's corner.
- In case of necessity, process it with a 2mm stepping. (30% reduction in transfer during processing)

Basic checklist for the Drilling operations

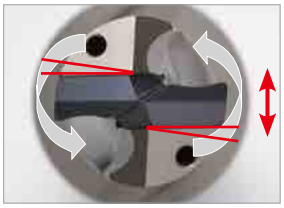
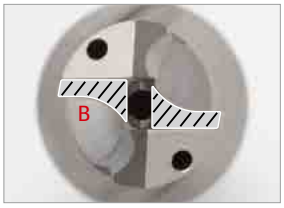
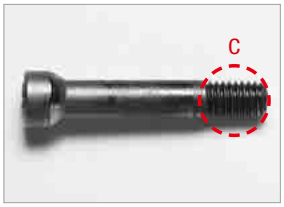
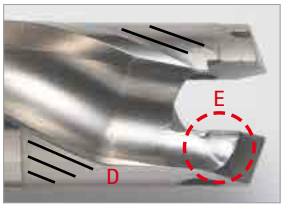
- Workpiece clamping condition
- Rotational state of the main axial in the machining equipment
- Holder condition
- Clamped drill's Run-out : Max. 0.03mm
- Coolant supply condition (pressure, flow rate, concentration)
- Chip evacuation condition

Coolant application system

- Adequate supply of cutting fluid at the entrance of the hole
- Minimum cutting fluid pressure : 5 bar or above
- Minimum flow rate : 5ℓ/min or avobe

[Dry] [Internal coolant] [External coolant]

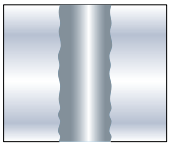
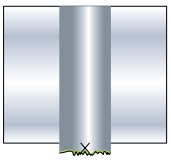
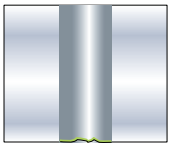
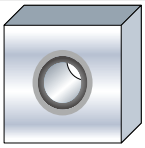
Replacement of holders and screws

Worn part	How to check	Description
[Pic. 1] 	[Pic. 2] Check the gap 	• 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.
[Pic. 3] 	[Pic. 4] Check the gap 	• 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.
[Pic. 5] 	Check the gap 	• After an extended period of use, the screw can be worn as shown in the 'C' 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.
[Pic. 6] ① Check the 'D' and 'E' parts as shown in the **[Pic. 6]** ② Check whether the chips are getting longer or not.		• Winding or jamming of long and tiny chips in Drilling causes wear or scratch on the 'D' 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 'E' 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		
	**Factor**	• 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
	Solution	• 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		
	**Factor**	• Due to machining pure metal or heat resisting alloy • Less back taper due to using a holder for a long time • Unstable machining at the end of hole due to interruption • Lack of coolant lubrication on the peripheral section of holder contacting workpiece
	Solution	• Set up proper tool life and manage its usage • Check the shape of machining part • Check the kind and concentration of coolant
Chipping on the corner		
	**Factor**	• Interrupted machining (end of hole is inclined or curved shape, junction hole in the middle of hole.) • Chattering in Drilling due to unstable clamping, low rigidity of machine or bending of Drill • Chattering due to unstable clamping of Drill
	Solution	• 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 rake face		
	**Factor**	• Low cutting speed • Machining free-cutting Steel • Erosion of chip and flute • Lack of coolant lubrication
	Solution	• Increase cutting speed • Set a lower thinning angle • Reduce the honing • Use more coolant
Chipping on the rake face		
	**Factor**	• Fracture on the cutting edge partially due to pre-treatment on the center of hole • Unstable chip evacuation due to step Drilling and external coolant • Chattering in Drilling and low precision of holder installment
	Solution	• 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

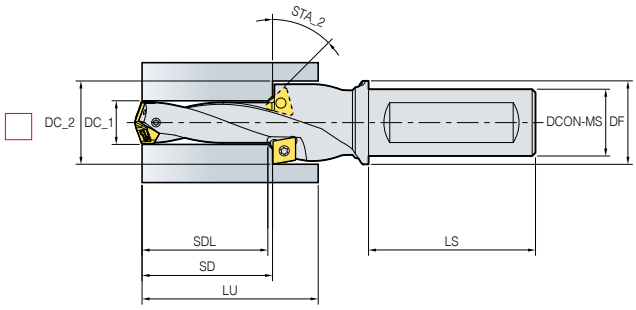
Poor surface finish (rough, scratch, etc.)		
	**Factor**	• Low rigidity of machine and improperly clamped workpiece • Large concentricity and lack of coolant
	Solution	• Clamp the workpiece properly and check the concentricity • Increase the amount and pressure of coolant
Remained lots of burr at the end of the Drilled hole		
	**Factor**	• High feed and excessive honing of the cutting edge • Exceeded cutting tool's tool life (too much wear and chipping)
	Solution	• Reduce feed (especially at the end of hole) and use a new Drill • Increase point angle or reduce honing
Flaking the end of the Drilled hole		
	**Factor**	• Machining of low toughness materials as cast iron • Rapid feed and excessive honing of the cutting edge • Exceeded cutting tool's tool life (too much wear and chipping)
	Solution	• Reduce the feed. (especially at the end of hole) • Use a new Drill • Reduce honing on the cutting edge
Thermal deformation and oxidation of the end of the Drilled hole		
	**Factor**	• Rapid feed • Lack of coolant • Excessive cutting load • Exceeded cutting tool's tool life (too much wear and chipping)
	Solution	• Reduce the feed and honing on the cutting edge • Use more coolant and use a new Drill

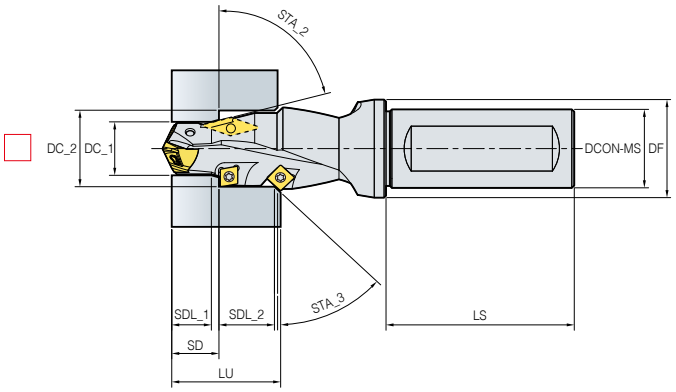
Solutions for troubles

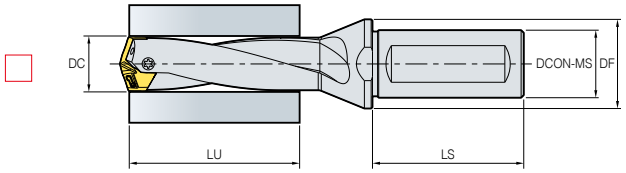
↑ Increase ↓ Decrease ○ Use

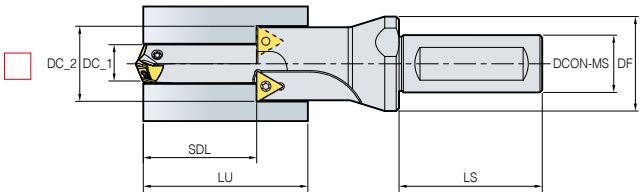
Trouble	Designation	Solution															
		Cutting condition					Tool shape					Grade		The other			
		vc	fn	Coolant	fn (in the beginning)	Depth of cut	Relief angle	Point angle	Thinning angle	Honing	Flute width rate	Toughness	Hardness	Rigidity of machine	Chattering of machine	Fixing workpiece	Overhang
Chipping	• 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	• Improper cutting conditions • Too much cutting load • Too long overhang • Less rigidity of machine	↓	↓	○	↓	↓								↑		↑	↓
Poor chip evacuation	• Improper cutting conditions		↓	○		↓					↑						
Poor surface finish	• Built-up edge • Chattering • Improper cutting conditions	↑	↓	○	↓			↓		↓				↑	↓	↑	↓
Poor accuracy of hole	• Low cutting speed (wear in the center of Drill)	↑	↓											↑	↓		↓

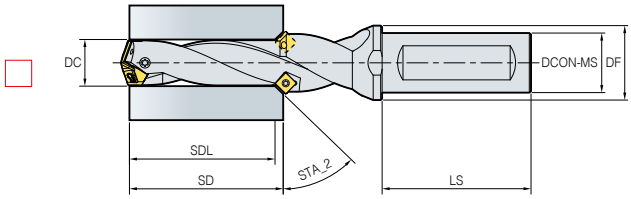
Special Drill order form











Hole type

☐ Blind hole ☐ Through hole

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):
  - Depth of cut, ap (mm):
- Standard of measuring tool life:
- Currently using machine
  - Machining center:
  - General lathe:
  - CNC lathe:

Shank type

☐  Plain type

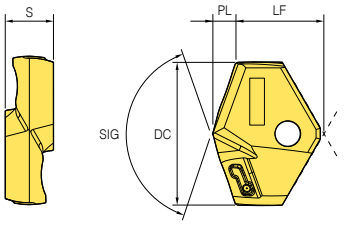
☐  Flat type

☐  Weldon type

☐  Whistle notch type

Insert

TPDB(Steel/Cast iron)

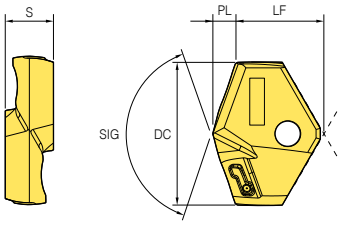


(mm)

Designation		Coated			DC	S	LF	PL	SIG(°)
		PC5300	PC5335	PC330P					
TPD	100B	●			10	3.5	6.21	1.58	140
	101B	●			10.1	3.5	6.2	1.59	140
	102B	●			10.2	3.5	6.18	1.61	140
	103B	●			10.3	3.5	6.17	1.62	140
	105B	●			10.5	3.5	6.13	1.66	140
	108B	●			10.8	3.5	6.09	1.7	140
	110B	●	●		11	3.5	7.06	1.73	140
	111B	●			11.1	3.5	7.04	1.75	140
	115B	●			11.5	3.5	6.98	1.81	140
	118B	●			11.8	3.5	6.93	1.86	140
	120B	●	●		12	3.5	7.22	2.07	140
	121B	●			12.1	3.5	7.21	2.08	140
	122B	●			12.2	3.5	7.19	2.1	140
	123B	●			12.3	3.5	7.17	2.12	140
	124B	●			12.4	3.5	7.16	2.13	140
	125B	●	●		12.5	3.5	7.14	2.15	140
	126B	●			12.6	3.5	7.12	2.17	140
	130B	●			13	4	8.05	2.24	140
	132B	●			13.2	4	8.02	2.27	140
	135B	●			13.5	4	7.97	2.32	140
	137B	●			13.7	4	7.93	2.36	140
	140B	●	●		14	4	8.38	2.41	140
	141B	●			14.1	4	8.36	2.43	140
	142B	●			14.2	4	8.35	2.44	140
	143B	●			14.3	4	8.33	2.46	140
	144B	●			14.4	4	8.31	2.48	140
	145B	●	●		14.5	4	8.29	2.5	140
	146B	●			14.6	4	8.28	2.51	140
	147B	●			14.7	4	8.26	2.53	140
	150B	●	●		15	4	8.71	2.58	140
	151B	●			15.1	4	8.69	2.6	140
	152B	●			15.2	4	8.67	2.62	140
	154B	●			15.4	4	8.64	2.65	140
	155B	●	●		15.5	4	8.62	2.67	140
	157B	●			15.7	4	8.59	2.7	140
	158B	●			15.8	4	8.57	2.72	140
	159B				15.9	4	8.55	2.74	140
	160B	●	●	●	16	5.5	9.54	2.75	140
	161B	●			16.1	5.5	9.52	2.77	140
	162B	●			16.2	5.5	9.5	2.79	140
	163B	●			16.3	5.5	9.48	2.81	140
	164B	●			16.4	5.5	9.47	2.82	140
	165B	●		●	16.5	5.5	9.45	2.84	140
	166B	●		●	16.6	5.5	9.43	2.86	140
	167B	●		●	16.7	5.5	9.41	2.88	140
	170B	●	●		17	5.5	9.86	2.93	140
	171B	●			17.1	5.5	9.85	2.94	140
	172B	●			17.2	5.5	9.83	2.96	140
	173B	●			17.3	5.5	9.81	2.98	140
	174B	●			17.4	5.5	9.79	3	140
	175B	●	●	●	17.5	5.5	9.78	3.01	140
	176B	●			17.6	5.5	9.76	3.03	140
	177B	●			17.7	5.5	9.74	3.05	140
	178B	●		●	17.8	5.5	9.73	3.06	140
	180B	●	●	●	18	6	10.69	3.1	140
	181B	●			18.1	6	10.67	3.12	140
	182B	●			18.2	6	10.66	3.13	140
	185B	●	●	●	18.5	6	10.6	3.19	140
	186B	●	●		18.6	6	10.59	3.2	140
	187B	●		●	18.7	6	10.57	3.22	140
	190B	●	●	●	19	6	11.02	3.27	140
	191B	●			19.1	6	11	3.29	140
	192B	●		●	19.2	6	10.98	3.31	140
	193B	●			19.3	6	10.97	3.32	140
	195B	●		●	19.5	6	10.93	3.36	140

Insert

TPDB (Steel / Cast iron)



(mm)

Designation		Coated			DC	S	LF	PL	SIG(°)
		PC5300	PC5335	PC330P					
TPD	196B	●			19.6	6	10.92	3.37	140
	197B	●			19.7	6	10.9	3.39	140
	198B	●		●	19.8	6	10.88	3.41	140
	200B	●			20	6.5	11.99	3.44	140
	201B	●			20.1	6.5	11.97	3.46	140
	202B	●			20.2	6.5	11.95	3.48	140
	204B	●			20.4	6.5	11.92	3.51	140
	205B	●			20.5	6.5	11.9	3.53	140
	206B	●			20.6	6.5	11.88	3.55	140
	210B	●	●	●	21	6.5	12.31	3.62	140
	211B	●			21.1	6.5	12.3	3.63	140
	212B	●	●		21.2	6.5	12.28	3.65	140
	213B	●			21.3	6.5	12.26	3.67	140
	215B	●			21.5	6.5	12.23	3.7	140
	217B	●			21.7	6.5	12.19	3.74	140
	219B	●			21.9	6.5	12.16	3.77	140
	220B	●	●	●	22	7	12.64	3.79	140
	222B	●			22.2	7	12.61	3.82	140
	223B	●		●	22.3	7	12.59	3.84	140
	225B	●		●	22.5	7	12.56	3.87	140
	227B	●			22.7	7	12.52	3.91	140
	230B	●	●	●	23	7	12.97	3.96	140
	235B	●			23.5	7	12.88	4.05	140
	237B	●			23.7	7	12.85	4.08	140
	240B	●	●		24	7.5	13.45	4.13	140
	242B	●			24.2	7.5	13.41	4.17	140
	244B	●			24.4	7.5	13.38	4.2	140
	245B	●			24.5	7.5	13.36	4.22	140
	247B	●			24.7	7.5	13.33	4.25	140
	250B	●	●	●	25	7.5	13.65	4.43	140
	251B	●			25.1	7.5	13.64	4.44	140
	252B	●			25.2	7.5	13.62	4.46	140
	253B	●			25.3	7.5	13.6	4.48	140
	255B	●		●	25.5	7.5	13.56	4.52	140
	256B	●			25.6	7.5	13.55	4.53	140
	258B	●			25.8	7.5	13.51	4.57	140
	259B	●			25.9	7.5	13.49	4.59	140
	260B	●	●		26	8.5	13.98	4.6	140
	262B	●			26.2	8.5	13.94	4.64	140
	265B	●		●	26.5	8.5	13.89	4.69	140
	270B	●		●	27	8.5	14.8	4.78	140
	275B				27.5	8.5	14.71	4.87	140
	280B	●		●	28	9.5	15.76	4.96	140
	285B	●			28.5	9.5	15.67	5.05	140
	290B	●			29	9.5	16.09	5.13	140
	295B	●			29.5	9.5	16	5.22	140
	300B	●		●	30	10	16.26	5.46	140
	310B	●			31	10	16.58	5.64	140
	320B	●		●	32	10	16.9	5.82	140
	329B	●			32.9	10	16.73	5.99	140

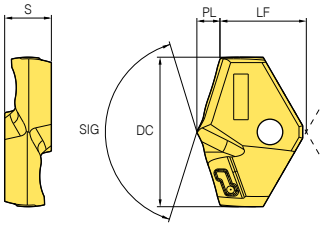
※ TPD Inserts not list above within the range of Ø10.00 ~ Ø32.99 can be made to order ● : Stock item

Parts

Designation		Drill dia. DC (mm)	Screw	Wrench	Torque (N·m)
TPD	100B ~ 129B	10 ~ 12.9	FTNB0209-P	TW06P	0.4
	130B ~ 149B	13 ~ 14.9	FTNB02512-P	TW07S	0.8
	150B ~ 179B	15 ~ 17.9	FTNB02514-P	TW07S	0.8
	180B ~ 199B	18 ~ 19.9	FTNB0316-P	TW09S	1.2
	200B ~ 239B	20 ~ 23.9	FTNB0319	TW09S	1.2
	240B ~ 259B	24 ~ 25.9	FTNB03522	TW15S	3
	260B ~ 279B	26 ~ 27.9	FTNB03524	TW15S	3
	280B ~ 299B	28 ~ 29.9	FTNB0426	TW15S	3
	300B ~ 329B	30 ~ 32.9	FTNB0528	TW20-100	4

Insert New

TPDBM(Stainless steel)



(mm)

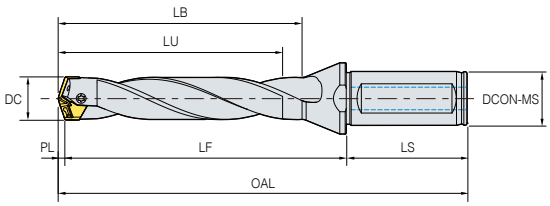
Designation		Coated PC340UL	DC	S	LF	PL	SIG(°)
TPD	100BM		10	3.5	6.24	1.55	145
	110BM		11	3.5	7.1	1.69	145
	120BM	●	12	3.5	7.43	1.86	145
	125BM	●	12.5	3.5	7.37	1.92	145
	130BM	●	13	4	8.28	2.01	145
	140BM	●	14	4	8.63	2.16	145
	145BM	●	14.5	4	8.56	2.23	145
	150BM	●	15	4	8.97	2.32	145
	160BM	●	16	5.5	9.82	2.47	145
	165BM	●	16.5	5.5	9.74	2.55	145
	170BM	●	17	5.5	10.16	2.63	145
	175BM	●	17.5	5.5	10.1	2.69	145
	180BM	●	18	6	11.01	2.78	145
	181BM	●	18.1	6	10.99	2.8	145
	185BM	●	18.5	6	10.94	2.85	145
	190BM	●	19	6	11.35	2.94	145
	200BM	●	20	6.5	12.34	3.09	145
	210BM	●	21	6.5	12.68	3.25	145
	220BM	●	22	7	13.03	3.4	145
	230BM	●	23	7	13.37	3.56	145
	240BM	●	24	7.5	13.87	3.71	145
	250BM	●	25	7.5	14.16	3.92	145
	259BM	●	25.9	7.5	14.04	4.04	145
	260BM	●	26	8.5	14.6	3.98	145
	270BM	●	27	8.5	15.41	4.17	145
	275BM	●	27.5	8.5	15.34	4.24	145
	280BM	●	28	9.5	16.39	4.33	145
	290BM	●	29	9.5	16.74	4.48	145
	300BM	●	30	10	17.08	4.64	145
	310BM		31	10	17.47	4.75	145
	320BM		32	10	17.8	4.92	145

● : Stock item

Parts

Designation		Drill dia. DC(mm)	Screw	Wrench	Torque (N·m)
TPD	100BM ~ 129BM	10 ~ 12.9	FTNB0209-P	TW06P	0.4
	130BM ~ 149BM	13 ~ 14.9	FTNB02512-P	TW07S	0.8
	150BM ~ 179BM	15 ~ 17.9	FTNB02514-P	TW07S	0.8
	180BM ~ 199BM	18 ~ 19.9	FTNB0316-P	TW09S	1.2
	200BM ~ 239BM	20 ~ 23.9	FTNB0319	TW09S	1.2
	240BM ~ 259BM	24 ~ 25.9	FTNB03522	TW15S	3
	260BM ~ 279BM	26 ~ 27.9	FTNB03524	TW15S	3
	280BM ~ 299BM	28 ~ 29.9	FTNB0426	TW15S	3
	300BM ~ 329BM	30 ~ 32.9	FTNB0528	TW20-100	4

TPDB (3D)

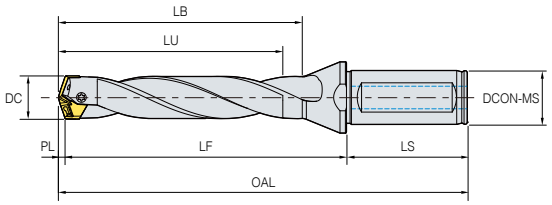


(mm)

	Designation	Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDB	100-16-3-P	●	10-10.4	16	31.58	47.02	37.08	48	96.6	1.58	TPD100B(M)~104B(M)
	105-16-3-P	●	10.5-10.9	16	33.16	47.94	38.91	48	97.6	1.66	TPD105B(M)~109B(M)
	110-16-3-P	●	11-11.4	16	34.73	49.97	40.73	48	99.7	1.73	TPD110B(M)~114B(M)
	115-16-3-P	●	11.5-11.9	16	36.31	50.89	42.56	48	100.7	1.81	TPD115B(M)~119B(M)
	120-16-3-P	●	12-12.4	16	38.07	53.83	44.57	48	103.9	2.07	TPD120B(M)~124B(M)
	125-16-3-P	●	12.5-12.9	16	39.65	55.75	46.4	48	105.9	2.15	TPD125B(M)~129B(M)
	130-16-3-P	●	13-13.4	16	41.24	59.06	48.24	48	109.3	2.24	TPD130B(M)~134B(M)
	135-16-3-P	●	13.5-13.9	16	42.82	60.98	50.07	48	111.3	2.32	TPD135B(M)~139B(M)
	140-16-3-P	●	14-14.4	16	44.41	63.09	51.91	48	113.5	2.41	TPD140B(M)~144B(M)
	145-16-3-P	●	14.5-14.9	16	46	66	53.75	48	116.5	2.5	TPD145B(M)~149B(M)
	150-20-3-P	●	15-15.4	20	47.58	68.12	55.58	50	120.7	2.58	TPD150B(M)~154B(M)
	155-20-3-P	●	15.5-15.9	20	49.17	70.03	57.42	50	122.7	2.67	TPD155B(M)~159B(M)
	160-20-3-P	●	16-16.4	20	50.75	72.15	59.25	50	124.9	2.75	TPD160B(M)~164B(M)
	165-20-3-P	●	16.5-16.9	20	52.34	74.06	61.09	50	126.9	2.84	TPD165B(M)~169B(M)
	170-20-3-P	●	17-17.4	20	53.93	77.17	62.93	50	130.1	2.93	TPD170B(M)~174B(M)
	175-20-3-P	●	17.5-17.9	20	55.51	79.09	64.76	50	132.1	3.01	TPD175B(M)~179B(M)
	180-25-3-P	●	18-18.4	25	57.1	81.1	66.6	56	140.2	3.1	TPD180B(M)~184B(M)
	185-25-3-P	●	18.5-18.9	25	58.69	83.01	68.44	56	142.2	3.19	TPD185B(M)~189B(M)
	190-25-3-P	●	19-19.4	25	60.27	86.03	70.27	56	145.3	3.27	TPD190B(M)~194B(M)
	195-25-3-P	●	19.5-19.9	25	61.86	87.94	72.11	56	147.3	3.36	TPD195B(M)~199B(M)
	200-25-3-P	●	20-20.4	25	63.44	90.06	73.94	56	149.5	3.44	TPD200B(M)~204B(M)
	205-25-3-P	●	20.5-20.9	25	65.03	91.97	75.78	56	151.5	3.53	TPD205B(M)~209B(M)
	210-25-3-P	●	21-21.4	25	66.62	91.08	77.62	60	154.7	3.62	TPD210B(M)~214B(M)
	215-25-3-P	●	21.5-21.9	25	68.2	93	79.45	60	156.7	3.7	TPD215B(M)~219B(M)
	220-25-3-P	●	22-22.4	25	69.79	95.11	81.29	60	158.9	3.79	TPD220B(M)~224B(M)
	225-25-3-P	●	22.5-22.9	25	71.37	97.03	83.12	60	160.9	3.87	TPD225B(M)~229B(M)
	230-25-3-P	●	23-23.4	25	72.96	100.14	84.96	60	164.1	3.96	TPD230B(M)~234B(M)
	235-25-3-P	●	23.5-23.9	25	74.55	102.05	86.8	60	166.1	4.05	TPD235B(M)~239B(M)
	240-32-3-P	●	24-24.4	32	76.13	108.17	88.63	60	172.3	4.13	TPD240B(M)~244B(M)
	245-32-3-P	●	24.5-24.9	32	77.72	110.08	90.47	60	174.3	4.22	TPD245B(M)~249B(M)
	250-32-3-P	●	25-25.4	32	79.43	113.07	92.43	60	177.5	4.43	TPD250B(M)~254B(M)
	255-32-3-P	●	25.5-25.9	32	81.02	114.98	94.27	60	179.5	4.52	TPD255B(M)~259B(M)
	260-32-3-P	●	26-26.9	32	82.6	117.1	96.1	60	181.7	4.6	TPD260B(M)~269B(M)
	270-32-3-P	●	27-27.9	32	85.78	122.12	99.78	60	186.9	4.78	TPD270B(M)~279B(M)
	280-32-3-P	●	28-28.9	32	88.96	126.04	103.46	60	191	4.96	TPD280B(M)~289B(M)
	290-32-3-P	●	29-29.9	32	92.13	131.07	107.13	60	196.2	5.13	TPD290B(M)~299B(M)
	300-32-3-P	●	30-30.9	32	95.46	133.94	110.96	60	199.4	5.46	TPD300B(M)~309B(M)
	310-32-3-P	●	31-31.9	32	98.64	138.96	114.64	60	204.6	5.64	TPD310B(M)~319B(M)
	320-32-3-P	●	32-32.9	32	101.82	140.98	118.32	60	206.8	5.82	TPD320B(M)~329B(M)

● : Stock item

TPDB (5D)

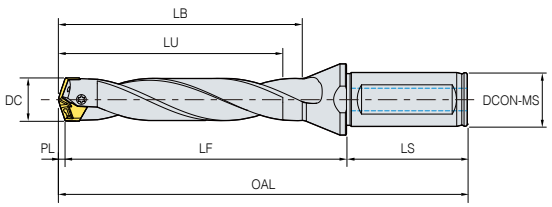


(mm)

	Designation	Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDB	100-16-5-P	●	10-10.4	16	51.58	67.02	57.08	48	116.6	1.58	TPD100B(M)~104B(M)
	105-16-5-P	●	10.5-10.9	16	54.16	68.94	59.91	48	118.6	1.66	TPD105B(M)~109B(M)
	110-16-5-P	●	11-11.4	16	56.73	71.97	62.73	48	121.7	1.73	TPD110B(M)~114B(M)
	115-16-5-P	●	11.5-11.9	16	59.31	74.89	65.56	48	124.7	1.81	TPD115B(M)~119B(M)
	120-16-5-P	●	12-12.4	16	62.07	78.03	68.57	48	128.1	2.07	TPD120B(M)~124B(M)
	125-16-5-P	●	12.5-12.9	16	64.65	81.05	71.4	48	131.2	2.15	TPD125B(M)~129B(M)
	130-16-5-P	●	13-13.4	16	67.24	85.06	74.24	48	135.3	2.24	TPD130B(M)~134B(M)
	135-16-5-P	●	13.5-13.9	16	69.82	88.08	77.07	48	138.4	2.32	TPD135B(M)~139B(M)
	140-16-5-P	●	14-14.4	16	72.41	91.09	79.91	48	141.5	2.41	TPD140B(M)~144B(M)
	145-16-5-P	●	14.5-14.9	16	75	95.1	82.75	48	145.6	2.5	TPD145B(M)~149B(M)
	150-20-5-P	●	15-15.4	20	77.58	98.12	85.58	50	150.7	2.58	TPD150B(M)~154B(M)
	155-20-5-P	●	15.5-15.9	20	80.17	101.03	88.42	50	153.7	2.67	TPD155B(M)~159B(M)
	160-20-5-P	●	16-16.4	20	82.75	104.15	91.25	50	156.9	2.75	TPD160B(M)~164B(M)
	165-20-5-P	●	16.5-16.9	20	85.34	107.06	94.09	50	159.9	2.84	TPD165B(M)~169B(M)
	170-20-5-P	●	17-17.4	20	87.93	111.17	96.93	50	164.1	2.93	TPD170B(M)~174B(M)
	175-20-5-P	●	17.5-17.9	20	90.51	114.09	99.76	50	167.1	3.01	TPD175B(M)~179B(M)
	180-25-5-P	●	18-18.4	25	93.1	117.1	102.6	56	176.2	3.1	TPD180B(M)~184B(M)
	185-25-5-P	●	18.5-18.9	25	95.69	120.01	105.44	56	179.2	3.19	TPD185B(M)~189B(M)
	190-25-5-P	●	19-19.4	25	98.27	124.03	108.27	56	183.3	3.27	TPD190B(M)~194B(M)
	195-25-5-P	●	19.5-19.9	25	100.86	126.94	111.11	56	186.3	3.36	TPD195B(M)~199B(M)
	200-25-5-P	●	20-20.4	25	103.44	130.06	113.94	56	189.5	3.44	TPD200B(M)~204B(M)
	205-25-5-P	●	20.5-20.9	25	106.03	132.97	116.78	56	192.5	3.53	TPD205B(M)~209B(M)
	210-25-5-P	●	21-21.4	25	108.62	133.08	119.62	60	196.7	3.62	TPD210B(M)~214B(M)
	215-25-5-P	●	21.5-21.9	25	111.2	136	122.45	60	199.7	3.7	TPD215B(M)~219B(M)
	220-25-5-P	●	22-22.4	25	113.79	139.11	125.29	60	202.9	3.79	TPD220B(M)~224B(M)
	225-25-5-P	●	22.5-22.9	25	116.37	142.03	128.12	60	205.9	3.87	TPD225B(M)~229B(M)
	230-25-5-P	●	23-23.4	25	118.96	146.14	130.96	60	210.1	3.96	TPD230B(M)~234B(M)
	235-25-5-P	●	23.5-23.9	25	121.55	149.05	133.8	60	213.1	4.05	TPD235B(M)~239B(M)
	240-32-5-P	●	24-24.4	32	124.13	156.17	136.63	60	220.3	4.13	TPD240B(M)~244B(M)
	245-32-5-P	●	24.5-24.9	32	126.72	159.08	139.47	60	223.3	4.22	TPD245B(M)~249B(M)
	250-32-5-P	●	25-25.4	32	129.43	163.07	142.43	60	227.5	4.43	TPD250B(M)~254B(M)
	255-32-5-P	●	25.5-25.9	32	132.02	165.98	145.27	60	230.5	4.52	TPD255B(M)~259B(M)
	260-32-5-P	●	26-26.9	32	134.60	169.1	148.1	60	233.7	4.6	TPD260B(M)~269B(M)
	270-32-5-P	●	27-27.9	32	139.78	176.12	153.78	60	240.9	4.78	TPD270B(M)~279B(M)
	280-32-5-P	●	28-28.9	32	144.96	182.04	159.46	60	247	4.96	TPD280B(M)~289B(M)
	290-32-5-P	●	29-29.9	32	150.13	189.07	165.13	60	254.2	5.13	TPD290B(M)~299B(M)
	300-32-5-P	●	30-30.9	32	155.46	193.94	170.96	60	259.4	5.46	TPD300B(M)~309B(M)
	310-32-5-P	●	31-31.9	32	160.64	200.96	176.64	60	266.6	5.64	TPD310B(M)~319B(M)
	320-32-5-P	●	32-32.9	32	165.82	204.98	182.32	60	270.8	5.82	TPD320B(M)~329B(M)

● : Stock item

TPDB (8D)

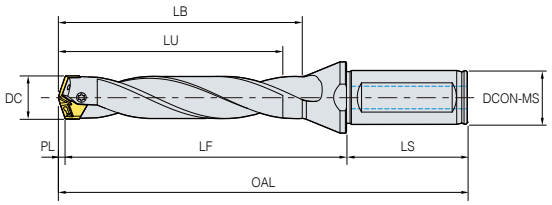


(mm)

	Designation	Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDB	100-16-8-P	●	10-10.4	16	81.58	97.02	87.08	48	146.6	1.58	TPD100B(M)~104B(M)
	105-16-8-P	●	10.5-10.9	16	85.66	100.94	91.41	48	150.6	1.66	TPD105B(M)~109B(M)
	110-16-8-P	●	11-11.4	16	89.73	104.97	95.73	48	154.7	1.73	TPD110B(M)~114B(M)
	115-16-8-P	●	11.5-11.9	16	93.81	108.89	100.06	48	158.7	1.81	TPD115B(M)~119B(M)
	120-16-8-P	●	12-12.4	16	98.07	114.03	104.57	48	164.1	2.07	TPD120B(M)~124B(M)
	125-16-8-P	●	12.5-12.9	16	102.15	118.55	108.9	48	168.7	2.15	TPD125B(M)~129B(M)
	130-16-8-P	●	13-13.4	16	106.24	124.06	113.24	48	174.3	2.24	TPD130B(M)~134B(M)
	135-16-8-P	●	13.5-13.9	16	110.32	128.58	117.57	48	178.9	2.32	TPD135B(M)~139B(M)
	140-16-8-P	●	14-14.4	16	114.41	133.09	121.91	48	183.5	2.41	TPD140B(M)~144B(M)
	145-16-8-P	●	14.5-14.9	16	118.5	138.6	126.25	48	189.1	2.5	TPD145B(M)~149B(M)
	150-20-8-P	●	15-15.4	20	122.58	143.12	130.58	50	195.7	2.58	TPD150B(M)~154B(M)
	155-20-8-P	●	15.5-15.9	20	126.67	147.53	134.92	50	200.2	2.67	TPD155B(M)~159B(M)
	160-20-8-P	●	16-16.4	20	130.75	152.15	139.25	50	204.9	2.75	TPD160B(M)~164B(M)
	165-20-8-P	●	16.5-16.9	20	134.84	156.56	143.59	50	209.4	2.84	TPD165B(M)~169B(M)
	170-20-8-P	●	17-17.4	20	138.93	162.17	147.93	50	215.1	2.93	TPD170B(M)~174B(M)
	175-20-8-P	●	17.5-17.9	20	143.01	166.59	152.26	50	219.6	3.01	TPD175B(M)~179B(M)
	180-25-8-P	●	18-18.4	25	147.1	171.1	156.6	56	230.2	3.1	TPD180B(M)~184B(M)
	185-25-8-P	●	18.5-18.9	25	151.19	175.51	160.94	56	234.7	3.19	TPD185B(M)~189B(M)
	190-25-8-P	●	19-19.4	25	155.27	181.03	165.27	56	240.3	3.27	TPD190B(M)~194B(M)
	195-25-8-P	●	19.5-19.9	25	159.36	185.44	169.61	56	244.8	3.36	TPD195B(M)~199B(M)
	200-25-8-P	●	20-20.4	25	163.44	190.06	173.94	56	249.5	3.44	TPD200B(M)~204B(M)
	205-25-8-P	●	20.5-20.9	25	167.53	194.47	178.28	56	254	3.53	TPD205B(M)~209B(M)
	210-25-8-P	●	21-21.4	25	171.62	196.08	182.62	60	259.7	3.62	TPD210B(M)~214B(M)
	215-25-8-P	●	21.5-21.9	25	175.7	200.5	186.95	60	264.2	3.7	TPD215B(M)~219B(M)
	220-25-8-P	●	22-22.4	25	179.79	205.11	191.29	60	268.9	3.79	TPD220B(M)~224B(M)
	225-25-8-P	●	22.5-22.9	25	183.87	209.73	195.62	60	273.6	3.87	TPD225B(M)~229B(M)
	230-25-8-P	●	23-23.4	25	187.96	215.14	199.96	60	279.1	3.96	TPD230B(M)~234B(M)
	235-25-8-P	●	23.5-23.9	25	192.05	219.55	204.3	60	283.6	4.05	TPD235B(M)~239B(M)
	240-32-8-P	●	24-24.4	32	196.13	228.17	208.63	60	292.3	4.13	TPD240B(M)~244B(M)
	245-32-8-P	●	24.5-24.9	32	200.22	232.58	212.97	60	296.8	4.22	TPD245B(M)~249B(M)
	250-32-8-P	●	25-25.4	32	204.43	238.07	217.43	60	302.5	4.43	TPD250B(M)~254B(M)
	255-32-8-P	●	25.5-25.9	32	208.52	242.48	221.77	60	307	4.52	TPD255B(M)~259B(M)
	260-32-8-P	●	26-26.9	32	212.6	247.1	226.1	60	311.7	4.6	TPD260B(M)~269B(M)
	270-32-8-P	●	27-27.9	32	220.78	257.12	234.78	60	321.9	4.78	TPD270B(M)~279B(M)
	280-32-8-P	●	28-28.9	32	228.96	266.04	243.46	60	331	4.96	TPD280B(M)~289B(M)
	290-32-8-P	●	29-29.9	32	237.13	276.07	252.13	60	341.2	5.13	TPD290B(M)~299B(M)
	300-32-8-P	●	30-30.9	32	245.46	283.94	260.96	60	349.4	5.46	TPD300B(M)~309B(M)
	310-32-8-P	●	31-31.9	32	253.64	293.96	269.64	60	359.6	5.64	TPD310B(M)~319B(M)
	320-32-8-P	●	32-32.9	32	261.82	300.98	278.32	60	366.8	5.82	TPD320B(M)~329B(M)

● : Stock item

TPDB (10D)

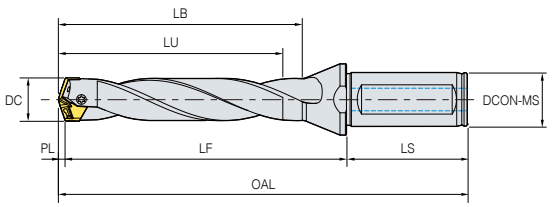


(mm)

Designation		Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDB	100-16-10-P	●	10-10.4	16	101.58	117.02	107.08	48	166.6	1.58	TPD100B(M)~104B(M)
	105-16-10-P	●	10.5-10.9	16	106.66	121.94	112.41	48	171.6	1.66	TPD105B(M)~109B(M)
	110-16-10-P	●	11-11.4	16	111.73	126.97	117.73	48	176.7	1.73	TPD110B(M)~114B(M)
	115-16-10-P	●	11.5-11.9	16	116.81	131.89	123.06	48	181.7	1.81	TPD115B(M)~119B(M)
	120-16-10-P	●	12-12.4	16	122.07	138.03	128.57	48	188.1	2.07	TPD120B(M)~124B(M)
	125-16-10-P	●	12.5-12.9	16	127.15	143.55	133.9	48	193.7	2.15	TPD125B(M)~129B(M)
	130-16-10-P	●	13-13.4	16	132.24	150.06	139.24	48	200.3	2.24	TPD130B(M)~134B(M)
	135-16-10-P	●	13.5-13.9	16	137.32	155.58	144.57	48	205.9	2.32	TPD135B(M)~139B(M)
	140-16-10-P	●	14-14.4	16	142.41	161.09	149.91	48	211.5	2.41	TPD140B(M)~144B(M)
	145-16-10-P	●	14.5-14.9	16	147.5	167.6	155.25	48	218.1	2.5	TPD145B(M)~149B(M)
	150-20-10-P	●	15-15.4	20	152.58	173.12	160.58	50	225.7	2.58	TPD150B(M)~154B(M)
	155-20-10-P	●	15.5-15.9	20	157.67	178.53	165.92	50	231.2	2.67	TPD155B(M)~159B(M)
	160-20-10-P	●	16-16.4	20	162.75	184.15	171.25	50	236.9	2.75	TPD160B(M)~164B(M)
	165-20-10-P	●	16.5-16.9	20	167.84	189.56	176.59	50	242.4	2.84	TPD165B(M)~169B(M)
	170-20-10-P	●	17-17.4	20	172.93	196.17	181.93	50	249.1	2.93	TPD170B(M)~174B(M)
	175-20-10-P	●	17.5-17.9	20	178.01	201.59	187.26	50	254.6	3.01	TPD175B(M)~179B(M)
	180-25-10-P	●	18-18.4	25	183.1	207.1	192.6	56	266.2	3.1	TPD180B(M)~184B(M)
	185-25-10-P	●	18.5-18.9	25	188.19	212.51	197.94	56	271.7	3.19	TPD185B(M)~189B(M)
	190-25-10-P	●	19-19.4	25	193.27	219.03	203.27	56	278.3	3.27	TPD190B(M)~194B(M)
	195-25-10-P	●	19.5-19.9	25	198.36	224.44	208.61	56	283.8	3.36	TPD195B(M)~199B(M)
	200-25-10-P	●	20-20.4	25	203.44	230.06	213.94	56	289.5	3.44	TPD200B(M)~204B(M)
	205-25-10-P	●	20.5-20.9	25	208.53	235.47	219.28	56	295	3.53	TPD205B(M)~209B(M)
	210-25-10-P	●	21-21.4	25	213.62	238.08	224.62	60	301.7	3.62	TPD210B(M)~214B(M)
	215-25-10-P	●	21.5-21.9	25	218.7	243.5	229.95	60	307.2	3.7	TPD215B(M)~219B(M)
	220-25-10-P	●	22-22.4	25	223.79	249.11	235.29	60	312.9	3.79	TPD220B(M)~224B(M)
	225-25-10-P	●	22.5-22.9	25	228.87	254.73	240.62	60	318.6	3.87	TPD225B(M)~229B(M)
	230-25-10-P	●	23-23.4	25	233.96	261.14	245.96	60	325.1	3.96	TPD230B(M)~234B(M)
	235-25-10-P	●	23.5-23.9	25	239.05	266.55	251.3	60	330.6	4.05	TPD235B(M)~239B(M)
	240-32-10-P	●	24-24.4	32	244.13	276.17	256.63	60	340.3	4.13	TPD240B(M)~244B(M)
	245-32-10-P	●	24.5-24.9	32	249.22	281.58	261.97	60	345.8	4.22	TPD245B(M)~249B(M)
	250-32-10-P	●	25-25.4	32	254.43	288.07	267.43	60	352.5	4.43	TPD250B(M)~254B(M)
	255-32-10-P	●	25.5-25.9	32	259.52	293.48	272.77	60	358	4.52	TPD255B(M)~259B(M)
	260-32-10-P	●	26-26.9	32	264.6	299.1	278.1	60	363.7	4.6	TPD260B(M)~269B(M)
	270-32-10-P	●	27-27.9	32	274.78	311.12	288.78	60	375.9	4.78	TPD270B(M)~279B(M)
	280-32-10-P	●	28-28.9	32	284.96	322.04	299.46	60	387	4.96	TPD280B(M)~289B(M)
	290-32-10-P	●	29-29.9	32	295.13	334.07	310.13	60	399.2	5.13	TPD290B(M)~299B(M)
	300-32-10-P	●	30-30.9	32	305.46	343.94	320.96	60	409.4	5.46	TPD300B(M)~309B(M)
	310-32-10-P	●	31-31.9	32	315.64	355.96	331.64	60	421.6	5.64	TPD310B(M)~319B(M)
	320-32-10-P	●	32-32.9	32	325.82	364.98	342.32	60	430.8	5.82	TPD320B(M)~329B(M)

● : Stock item

TPDB (12D)



(mm)

	Designation	Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDB	100-16-12-P	●	10-10.4	16	121.58	137.02	127.08	48	186.6	1.58	TPD100B(M)~104B(M)
	105-16-12-P	●	10.5-10.9	16	127.66	142.94	133.41	48	192.6	1.66	TPD105B(M)~109B(M)
	110-16-12-P	●	11-11.4	16	133.73	148.97	139.73	48	198.7	1.73	TPD110B(M)~114B(M)
	115-16-12-P	●	11.5-11.9	16	139.81	154.89	146.06	48	204.7	1.81	TPD115B(M)~119B(M)
	120-16-12-P	●	12-12.4	16	146.07	162.03	152.57	48	212.1	2.07	TPD120B(M)~124B(M)
	125-16-12-P	●	12.5-12.9	16	152.15	168.55	158.9	48	218.7	2.15	TPD125B(M)~129B(M)
	130-16-12-P	●	13-13.4	16	158.24	176.06	165.24	48	226.3	2.24	TPD130B(M)~134B(M)
	135-16-12-P	●	13.5-13.9	16	164.32	182.58	171.57	48	232.9	2.32	TPD135B(M)~139B(M)
	140-16-12-P	●	14-14.4	16	170.41	189.09	177.91	48	239.5	2.41	TPD140B(M)~144B(M)
	145-16-12-P	●	14.5-14.9	16	176.5	196.6	184.25	48	247.1	2.5	TPD145B(M)~149B(M)
	150-20-12-P	●	15-15.4	20	182.58	203.12	190.58	50	255.7	2.58	TPD150B(M)~154B(M)
	155-20-12-P	●	15.5-15.9	20	188.67	209.53	196.92	50	262.2	2.67	TPD155B(M)~159B(M)
	160-20-12-P	●	16-16.4	20	194.75	216.15	203.25	50	268.9	2.75	TPD160B(M)~164B(M)
	165-20-12-P	●	16.5-16.9	20	200.84	222.56	209.59	50	275.4	2.84	TPD165B(M)~169B(M)
	170-20-12-P	●	17-17.4	20	206.93	230.17	215.93	50	283.1	2.93	TPD170B(M)~174B(M)
	175-20-12-P	●	17.5-17.9	20	213.01	236.59	222.26	50	289.6	3.01	TPD175B(M)~179B(M)
	180-25-12-P	●	18-18.4	25	219.1	243.1	228.6	56	302.2	3.1	TPD180B(M)~184B(M)
	185-25-12-P	●	18.5-18.9	25	225.19	249.51	234.94	56	308.7	3.19	TPD185B(M)~189B(M)
	190-25-12-P	●	19-19.4	25	231.27	257.03	241.27	56	316.3	3.27	TPD190B(M)~194B(M)
	195-25-12-P	●	19.5-19.9	25	237.36	263.44	247.61	56	322.8	3.36	TPD195B(M)~199B(M)
	200-25-12-P	●	20-20.4	25	243.44	270.06	253.94	56	329.5	3.44	TPD200B(M)~204B(M)
	205-25-12-P	●	20.5-20.9	25	249.53	276.47	260.28	56	336	3.53	TPD205B(M)~209B(M)
	210-25-12-P	●	21-21.4	25	255.62	280.08	266.62	60	343.7	3.62	TPD210B(M)~214B(M)
	215-25-12-P	●	21.5-21.9	25	261.7	286.5	272.95	60	350.2	3.7	TPD215B(M)~219B(M)
	220-25-12-P	●	22-22.4	25	267.79	293.11	279.29	60	356.9	3.79	TPD220B(M)~224B(M)
	225-25-12-P	●	22.5-22.9	25	273.87	299.73	285.62	60	363.6	3.87	TPD225B(M)~229B(M)
	230-25-12-P	●	23-23.4	25	279.96	307.14	291.96	60	371.1	3.96	TPD230B(M)~234B(M)
	235-25-12-P	●	23.5-23.9	25	286.05	313.55	298.3	60	377.6	4.05	TPD235B(M)~239B(M)
	240-32-12-P	●	24-24.4	32	292.13	324.17	304.63	60	388.3	4.13	TPD240B(M)~244B(M)
	245-32-12-P	●	24.5-24.9	32	298.22	330.58	310.97	60	394.8	4.22	TPD245B(M)~249B(M)
	250-32-12-P	●	25-25.4	32	304.43	338.07	317.43	60	402.5	4.43	TPD250B(M)~254B(M)
	255-32-12-P	●	25.5-25.9	32	310.52	344.48	323.77	60	409	4.52	TPD255B(M)~259B(M)
	260-32-12-P	●	26-26.9	32	316.6	351.1	330.1	60	415.7	4.6	TPD260B(M)~269B(M)
	270-32-12-P	●	27-27.9	32	328.78	365.12	342.78	60	429.9	4.78	TPD270B(M)~279B(M)
	280-32-12-P	●	28-28.9	32	340.96	378.04	355.46	60	443	4.96	TPD280B(M)~289B(M)
	290-32-12-P	●	29-29.9	32	353.13	392.07	368.13	60	457.2	5.13	TPD290B(M)~299B(M)
	300-32-12-P	●	30-30.9	32	365.46	403.94	380.96	60	469.4	5.46	TPD300B(M)~309B(M)
	310-32-12-P	●	31-31.9	32	377.64	417.96	393.64	60	483.6	5.64	TPD310B(M)~319B(M)
	320-32-12-P	●	32-32.9	32	389.82	428.98	406.32	60	494.8	5.82	TPD320B(M)~329B(M)

● : Stock item

TPDB-DS

Code system

Insert

TPD	360	B	-	DS
Top solid Piercing Drill	Drill dia. 360 : Ø36 mm	Insert type B : Blade type		Margin shape DS : Double margin Shape

Holder

TPD	B	360	-	40	-	5	-	P
Top solid Piercing Drill	Insert type B : Blade type	Drill dia. 360 : Ø36 mm		Shank dia. 40 : Ø40 mm		Aspect ratio (L/D) 3D, 5D, 8D		Plus

Features

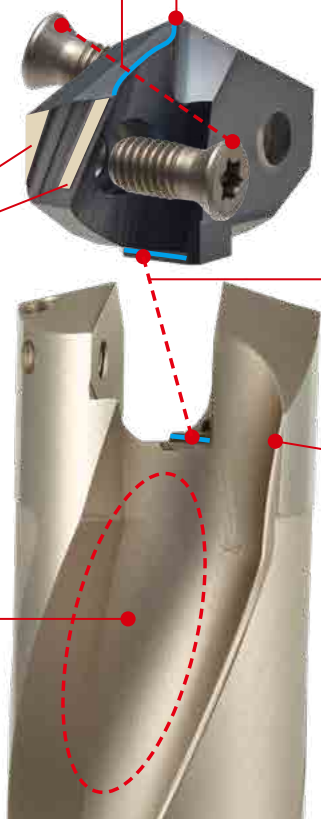
- A curved linear insert with high helix angle applied holder, which has low cutting load and excellent chip handling performance.
- Excellent clamping stability with a specially designed clamping section and 2 screws-on clamping methods.
- Improved wear resistance and durability through special surface treatment.

Screw-on clamping

- Good clamping stability due to 2 screws-on clamping method

Cutting edge shape for low cutting resistance

- Less cutting load and better chip control



Applied double margin

- Increased cutting stability
- Better surface finish on inner wall of the hole
- Higher precision of hole size

Applied key preventing insert misalignment

- High precision of clamping

Special surface treatment

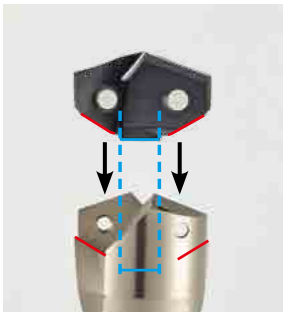
- High durability of the holder

2-steped flute shape

- Good chip evacuation

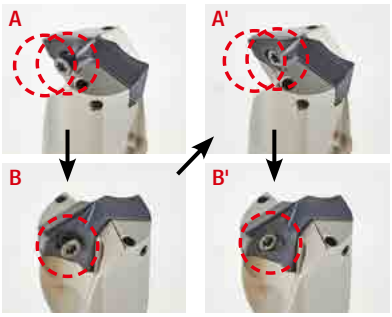
How to clamp an insert

① Clean the tip seat.



② Put an insert in.

③ Lightly press the insert while screwing to prevent it from rotating.



④ Clamp a screw partially just like in the case of A and B to prevent laterality.

⑤ Clamp the screws completely in the order of A', B'.

Recommended cutting conditions

Workpiece					Specific cutting force (N/mm^2)	Brinell hardness (HB)	Grade	vc (m/min)	Aspect ratio (L/D) = 3D, 5D
ISO	Workpiece material		KS	ISO					fn (mm/rev)
P	Carbon steel	C = 0.10~0.25%	SM15C SM25C	C15 C25	1500	90~200	PC5300	80~140	0.4~0.25
		C = 0.25~0.55%	SM35C SM45C	C35 C45	1600	125~225	PC5300	80~140	0.4~0.25
		C = 0.55~0.80%	SM58C	C60	1700	150~250	PC5300	70~130	0.4~0.25
	Alloy steel ≤ 5%	Non-hardened	SCM440	42CrMo4	1700	180	PC5300	80~130	0.45~0.25
		Hardened and Tempered	SCM445	-	2050	350	PC5300	60~110	0.45~0.25
	Alloy steel > 5%	Annealed	STD11	-	1950	200	PC5300	60~100	0.4~0.25
		Hardened tool steel	STD61	X40CrMoV5-1	3000	352	PC5300	50~90	0.35~0.2
K	Gray cast iron		GC250 GC350	250 350	900	150~230	PC5300	80~140	0.45~0.25
	Ductile cast iron		GCD400 GCD500 GCD600	400-15 150-10 600-3	870	160~260	PC5300	70~130	0.45~0.25

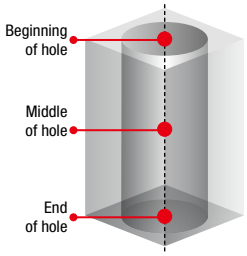
※ For 8D, reduce the recommended cutting conditions by 20% to 30% at the machining depth from its entry to 0.5D depth then proceed with the above-mentioned cutting conditions.

※ For interrupted machining, reduce the feed to 0.1 to 0.15 in the vicinity of the interrupted cutting area.

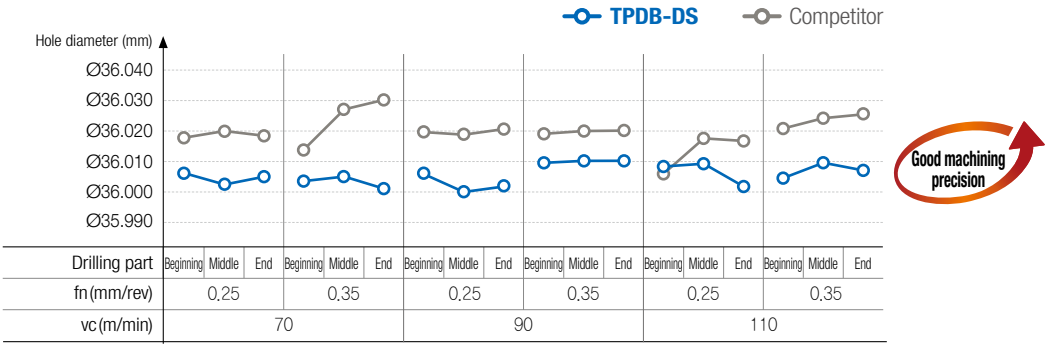
Performance evaluation

Machining precision

Workpiece	Alloy steel (42CrMo4, HRC22)
Cutting condition	vc (m/min) = 70/90/110, fn (mm/rev) = 0.25/0.35, ap (mm) = 150, wet (20 bar)
Tool	Insert TPD360B-DS (PC5300) Holder TPDB360-40-5-P (Drill dia. = Ø36 mm)



[Drilling part]

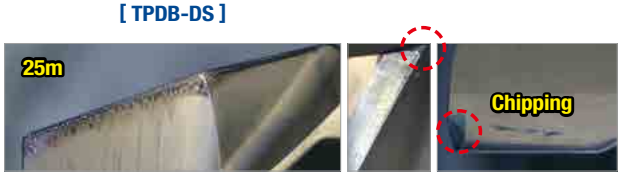


» Improved machining precision through double margin and stable chip evacuation

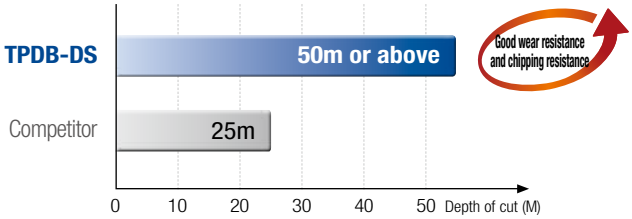
Wear resistance

Workpiece	Alloy steel (42CrMo4, HRC22)
Cutting condition	vc (m/min) = 90, fn (mm/rev) = 0.3, ap (mm) = 150, wet (20 bar)
Tool	Insert TPD360B-DS (PC5300) Holder TPDB360-40-5-P (Drill dia. = Ø36 mm)

[TPDB-DS]



[Competitor]



» Increased maximum tool life with more stable chipping resistance compared to the competitor's

Cutting surface finish / chip surface finish

Workpiece	Alloy steel (42CrMo4, HRC22)
Cutting condition	vc (m/min) = 90, fn (mm/rev) = 0.35, ap (mm) = 150, wet (20 bar)
Tool	Insert TPD360B-DS (PC5300) Holder TPDB360-40-5-P (Drill dia. = Ø36 mm)

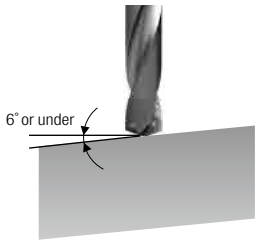
[TPDB-DS]

[Competitor]

» Good surface finish due to stable chip formation and effective chip evacuation

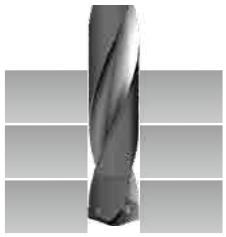
Precaution in Drilling

Angled surface Drilling



- The approach angle between Drill and the workpiece at the beginning and the end should be less than 6°.
- Reduce the feed(fn) to 30-50% than general cutting conditions at the beginning and the end of angled surface.

Stacked plates Drilling

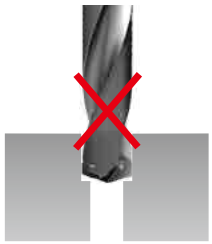


- Gap between the plates could make wrong chip evacuation causing fracture of the Drill.
- Strongly clamp the workpiece together to eliminate any gaps and then proceed with usage.

Plunging

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

Boring



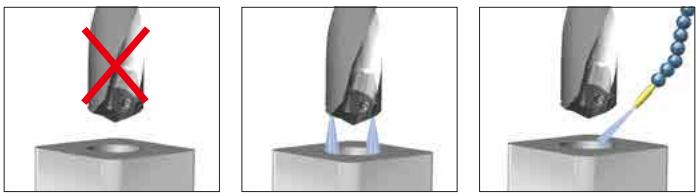
- Boring is not recommended as it can cause excessive wear and chipping at the insert's corner.
- In case of necessity, process it with a 2mm stepping. (30% reduction in transfer during processing)

Basic checklist for the Drilling operations

- Workpiece clamping condition
- Rotational state of the main axial in the machining equipment
- Holder condition
- Clamped drill's Run-out : Max. 0.03mm
- Coolant supply condition(pressure, flow rate, concentration)
- Chip evacuation condition

Coolant application system

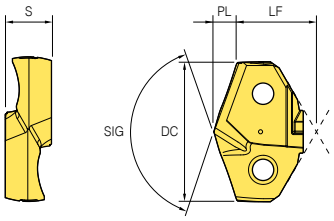
- Adequate supply of cutting fluid at the entrance of the hole
- Minimum cutting fluid pressure : 5 bar or above
- Minimum flow rate : 5ℓ/min or avobe



[Dry] [Internal coolant] [External coolant]

Insert

TPDB-DS



(mm)

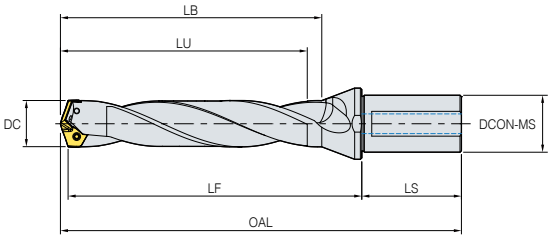
Designation		Coated PC5300	DC	S	LF	PL	SIG(°)
TPD	330B-DS	●	33	10.5	18.16	5.38	140
	335B-DS		33.5	10.5	18.08	5.46	140
	340B-DS	●	34	11	18.55	5.54	140
	345B-DS		34.5	11	18.47	5.62	140
	350B-DS	●	35	11.5	19.48	5.7	140
	355B-DS	●	35.5	11.5	19.4	5.78	140
	360B-DS	●	36	11.5	20.41	5.87	140
	365B-DS		36.5	11.5	20.33	5.95	140
	370B-DS	●	37	12	20.8	6.03	140
	375B-DS		37.5	12	20.72	6.11	140
	380B-DS	●	38	12	21.63	6.19	140
	385B-DS	●	38.5	12	21.55	6.27	140
	390B-DS	●	39	12.5	22.02	6.35	140
	395B-DS		39.5	12.5	21.93	6.44	140

※ TPD Inserts not list above within the range of Ø33.00 ~ Ø39.99 can be made to order ● : Stock item

Parts

Designation		Drill dia. DC(mm)	Screw	Wrench
TPD	330B-DS ~ 339B-DS	33 ~ 33.9	FTKA0410	TW15S
	340B-DS ~ 349B-DS	34 ~ 34.9	FTKA0410	TW15S
	350B-DS ~ 359B-DS	35 ~ 35.9	FTKA0410	TW15S
	360B-DS ~ 369B-DS	36 ~ 36.9	FTNC04511	TW20S
	370B-DS ~ 379B-DS	37 ~ 37.9	FTNC04511	TW20S
	380B-DS ~ 389B-DS	38 ~ 38.9	FTNA0511	TW20S
	390B-DS ~ 399B-DS	39 ~ 39.9	FTNA0511	TW20S

TPDB-DS (3D, 5D, 8D)



(mm)

	Designation	Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDB	330-40-3-P	●	33-33.9	40	104.38	140.3	117.58	70	215.7	5.38	TPD330B ~ 339B-DS
	340-40-3-P	●	34-34.9	40	107.54	144.41	121.15	70	219.9	5.54	TPD340B ~ 349B-DS
	350-40-3-P	●	35-35.9	40	110.7	148.51	124.71	70	224.2	5.7	TPD350B ~ 359B-DS
	360-40-3-P	●	36-36.9	40	113.87	152.6	128.27	70	228.5	5.87	TPD360B ~ 369B-DS
	370-40-3-P	●	37-37.9	40	117.03	156.7	131.83	70	232.7	6.03	TPD370B ~ 379B-DS
	380-40-3-P	●	38-38.9	40	120.19	160.81	135.4	70	237	6.19	TPD380B ~ 389B-DS
	390-40-3-P	●	39-39.9	40	123.35	164.91	138.96	70	241.3	6.35	TPD390B ~ 399B-DS
	330-40-5-P		33-33.9	40	170.38	206.3	183.58	70	281.7	5.38	TPD330B ~ 339B-DS
	340-40-5-P		34-34.9	40	175.54	212.41	189.15	70	287.9	5.54	TPD340B ~ 349B-DS
	350-40-5-P		35-35.9	40	180.7	218.51	194.71	70	294.2	5.7	TPD350B ~ 359B-DS
	360-40-5-P		36-36.9	40	185.87	224.6	200.27	70	300.5	5.87	TPD360B ~ 369B-DS
	370-40-5-P		37-37.9	40	191.03	230.7	205.83	70	306.7	6.03	TPD370B ~ 379B-DS
	380-40-5-P		38-38.9	40	196.19	236.81	211.4	70	313	6.19	TPD380B ~ 389B-DS
	390-40-5-P		39-39.9	40	201.35	242.91	216.96	70	319.3	6.35	TPD390B ~ 399B-DS
	330-40-8-P		33-33.9	40	269.38	305.3	282.58	70	380.7	5.38	TPD330B ~ 339B-DS
	340-40-8-P		34-34.9	40	277.54	314.41	291.15	70	389.9	5.54	TPD340B ~ 349B-DS
	350-40-8-P		35-35.9	40	285.7	323.51	299.71	70	399.2	5.7	TPD350B ~ 359B-DS
	360-40-8-P		36-36.9	40	293.87	332.6	308.27	70	408.5	5.87	TPD360B ~ 369B-DS
	370-40-8-P		37-37.9	40	302.03	341.7	316.83	70	417.7	6.03	TPD370B ~ 379B-DS
	380-40-8-P		38-38.9	40	310.19	350.81	325.4	70	427	6.19	TPD380B ~ 389B-DS
	390-40-8-P		39-39.9	40	318.35	359.91	333.96	70	436.3	6.35	TPD390B ~ 399B-DS

※ We can provide if you order exact machining specification. ● : Stock item

TPDB-H

Code system

Holder

Special Type

TPD	B	P	240	-	32	S	-	595	-	3	-	H
Top solid Piercing Drill	Insert type B : Blade type	Power clamping	Drill dia. 240 : Ø24		Shank dia. 32 : Ø32	Shank type None : Flange Shank, Weldone S : Straight Shank, Weldone		Effective depth 595 : 59.5mm		Aspect ratio (L/D) 3D, 4D, 5D, 8D		H-Beam

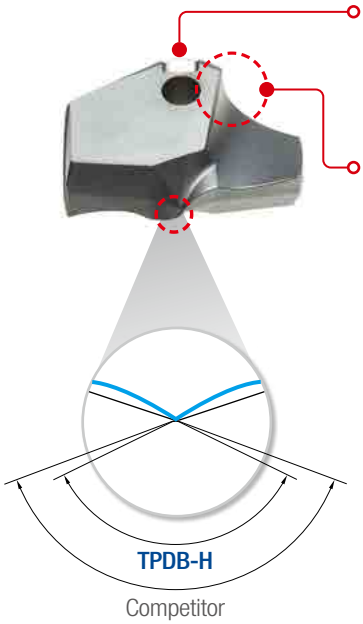
Insert

TPD	240	B	P	-	H
Top solid Piercing Drill	Drill dia. 240 : Ø24	Insert type B : Blade type	Cutting range P : Steel		H-Beam

Features

- **High precision clamping system** - High precision clamping due highly precise grinding and auto-centering
- **Screw on clamping system** - Enhanced clamping force and clamping stability from applying a main screw and a sub screw
- **Edge design with excellent centering** - Low cutting load and good chip control
- **Applying shape for better chip breaking** - Increasing chip breaking due to applying web taper
- **High durability holder** - Improved wear resistance and durability with special surface treatment implementation
- **Optimally designed oil hole** - Long tool life

Insert features



Sub screw hole

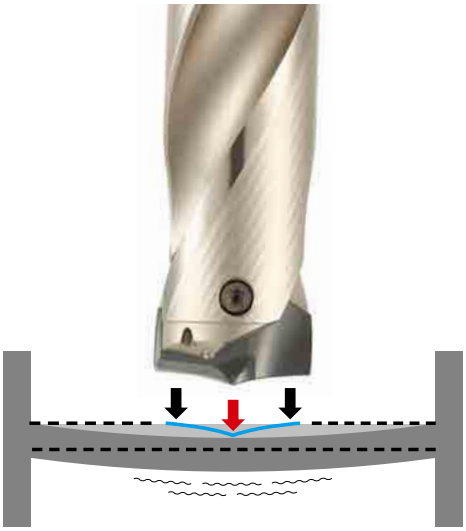
- Increased clamping force and clamping stability

Applying web taper

- Enhanced chip breaking

Double R point cutting edge

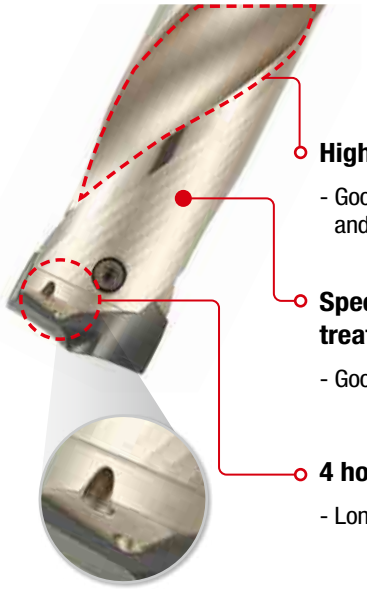
- Stable centering and machinability



Applied Double R point edge design optimized for excellent centering and stable machinability.

Machinability and productivity are improved by minimizing both workpiece's bending and chipping at edge corner section.

Holder features



High helix angle

- Good chip evacuation and machinability

Special surface treatment

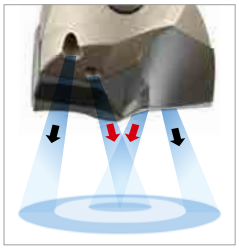
- Good holder durability

4 hole cooling system

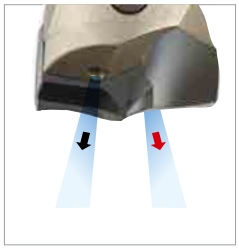
- Long tool life

Additional sub screw

- Increased clamping force and clamping stability



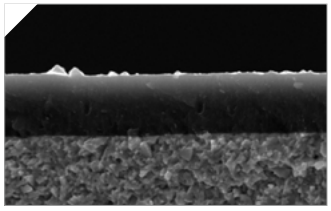
[TPDB-H]



[Competitor]

Concentrated coolant injection on delicate cutting edge increases tool life.

Grade features



PC340UL

- PVD coating technology enhancing lubrication and welding resistance
- Applied high toughness substrate with good fracture resistance
- Increased chipping resistance and cutting stability due to good surface finish

Performance evaluation

Chip control

Workpiece	Carbon steel (SM355A, HRC20)
Cutting condition	vc (m/min) = 80, fn (mm/rev) = 0.2,
	ap (mm) = 30, Mist
Tool	Insert TPD240BP-H (PC340UL)
	Holder TPDBP240-32S-4-H (Drill dia. = Ø24mm)

[TPDB-H]

[Competitor]

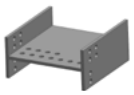
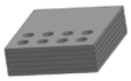
Wear resistance

Workpiece	Carbon steel (SM355A, HRC20)
Cutting condition	vc (m/min) = 80, fn (mm/rev) = 0.23,
	ap (mm) = 50, Mist
Tool	Insert TPD240BP-H (PC340UL)
	Holder TPDBP240-32S-4-H (Drill dia. = Ø24mm)

[TPDB-H]

[Competitor]

Workpiece and recommended cutting conditions

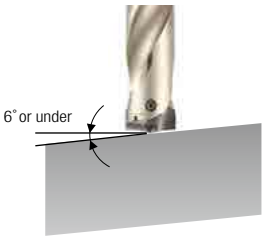
Workpiece					Yield Strength (Mpa, min)	Brinell hardness (HB)	Grade	vc (m/min)	Aspect ratio (L/D) = 3D, 4D, 5D, 8D	
ISO	Workpiece material		KS	AISI					fn (mm/rev)	
									Ø14~Ø21.9	Ø22~Ø32.9
P	H-Beam		SS275 (SS400*) SM355 (SM490*) SHN355 (SHN490*)	A36 A572	275 355 355 (t≤16)	-	PC340UL	60~75	0.25~0.2	0.3~0.2
	Angle						PC340UL	60~75	0.25~0.2	0.3~0.2
	Plate						PC340UL	60~75	0.25~0.2	0.3~0.2
	Plate (Stacked)						PC340UL	55~65	0.25~0.15	0.25~0.15

※ In case of 5D over, machine in 30% lower cutting conditions or use under the above conditions

* : Old symbol

Precaution in Drilling

Angled surface Drilling

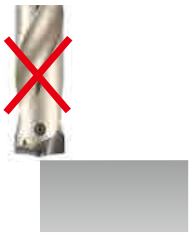


- The approach angle between Drill and the workpiece at the beginning and the end should be less than 6°.
- Reduce the feed(fn) to 30-50% than general cutting conditions at the beginning and the end of angled surface.

Stacked plates Drilling

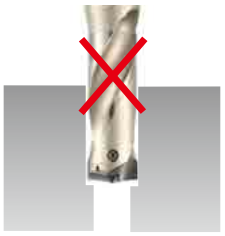
- Gap between the plates could make wrong chip evacuation causing fracture of the Drill.
- Strongly clamp the workpiece together to eliminate any gaps and then proceed with usage.

Plunging



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

Boring



- Boring is not recommended as it can cause excessive wear and chipping at the insert's corner.
- In case of necessity, process it with a 2mm stepping. (30% reduction in transfer during processing)

Performance evaluation

Carbon steel (SM355)

Cutting condition	vc (m/min) = 47, fn (mm/rev) = 0.24, ap (mm) = 50, MQL (Mist)
Tool	Insert TPD240BP-H (PC340UL)
	Holder TPDBP240-32S-4-H (Drill dia. = Ø24 mm)
Tool life	64m (Corner chipping)

» Stable chip evacuation ensures tool life as 60 m in even machining with over 40 mm thickness.

Carbon steel (SM355)

Cutting condition	vc (m/min) = 80, fn (mm/rev) = 0.27, ap (mm) = 25, Wet
Tool	Insert TPD220BP-H (PC340UL)
	Holder TPDBP220-25S-4-H (Drill dia. = Ø22 mm)
Tool life	41m (Corner chipping)

» High speed and high feed machining saves machining hours.

Carbon steel (SS275)

Cutting condition	vc (m/min) = 70, fn (mm/rev) = 0.23, ap (mm) = 30, Wet
Tool	Insert TPD260BP-H (PC340UL)
	Holder TPDBP260-32S-4-H (Drill dia. = Ø26 mm)
Tool life	35m (Corner chipping)

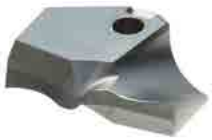
» Stable machinability and longer tool life when machining various workpieces such as SM355, SS275, SHN355 etc.

Carbon steel (SM355)

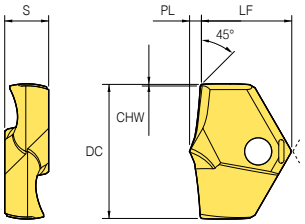
Cutting condition	vc (m/min) = 56, fn (mm/rev) = 0.31, ap (mm) = 40, Wet
Tool	Insert TPD270BP-H (PC340UL)
	Holder TPDBP270-32S-4-H (Drill dia. = Ø26 mm)
Tool life	47m (Corner chipping)

» Minimized cutting load in horizontal machining ensures high quality machining.

Insert



TPDB-H



(mm)

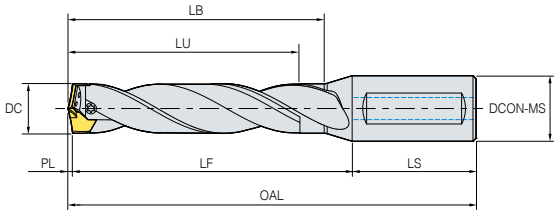
Designation		Coated PC340UL	DC	S	LF	PL	CHW
TPD	140BP-H	●	14	4	9.45	1.17	0.05
	150BP-H		15	4	9.83	1.29	0.05
	160BP-H	●	16	5.5	10.73	1.39	0.07
	170BP-H		17	5.5	11.14	1.48	0.07
	180BP-H	●	18	6	12.15	1.51	0.07
	190BP-H		19	6	12.54	1.6	0.07
	200BP-H	●	20	6.5	13.45	1.67	0.07
	210BP-H		21	6.5	13.86	1.76	0.07
	220BP-H	●	22	7	14.54	1.89	0.09
	230BP-H		23	7	14.7	1.94	0.09
	240BP-H	●	24	7.5	15.56	2.02	0.09
	250BP-H		25	7.5	15.98	2.1	0.09
	260BP-H	●	26	8.5	16.35	2.23	0.09
	270BP-H	●	27	8.5	17.43	2.28	0.13
	280BP-H		28	9.5	18.26	2.32	0.13
	290BP-H		29	9.5	18.64	2.55	0.13
	300BP-H	●	30	10	19.03	2.61	0.13
	310BP-H		31	10	19.44	2.7	0.13
	320BP-H	●	32	10	19.85	2.79	0.13

● : Stock item

Parts

Designation		Drill dia. DC(mm)	Screw	Wrench	Sub screw	Wrench for sub screw
TPD	140BP-H~159BP-H	∅14 ~ ∅15.9	FTNB02512-P	TW07S	-	-
	160BP-H~179BP-H	∅16 ~ ∅17.9	FTNB02514-P	TW07S	KHMA02505	HW13LB
	180BP-H~199BP-H	∅18 ~ ∅19.9	FTNB0316-P	TW09S	KHMA02505	HW13LB
	200BP-H~239BP-H	∅20 ~ ∅23.9	FTNB0319	TW09S	KHMA0306	HW15L
	240BP-H~259BP-H	∅24 ~ ∅25.9	FTNB03522	TW15S	KHMA0308	HW15L
	260BP-H~279BP-H	∅26 ~ ∅27.9	FTNB03524	TW15S	KHMA0308	HW15L
	280BP-H~299BP-H	∅28 ~ ∅29.9	FTNB0426	TW15S	KHMA0410	HW20L
	300BP-H~329BP-H	∅30 ~ ∅32.9	FTNB0528	TW20-100	KHMA0410	HW20L

TPDB-H (3D, 4D)

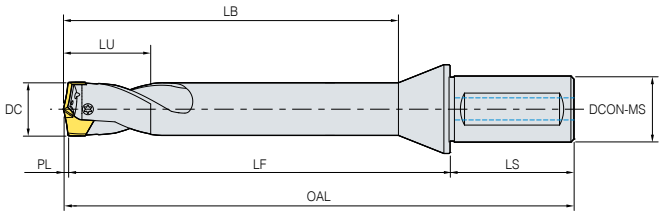


(mm)

Designation		Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDBP	140-16S-3-H	●	14-14.9	16	35.67	48.83	43.17	48	98	1.17	TPD140BP-H-149BP-H
	150-20S-3-H		15-15.9	20	38.29	52.21	46.29	50	103.5	1.29	TPD150BP-H-159BP-H
	160-20S-3-H	●	16-16.9	20	40.89	55.11	49.39	50	106.5	1.39	TPD160BP-H-169BP-H
	170-20S-3-H		17-17.9	20	43.48	58.02	52.48	50	109.5	1.48	TPD170BP-H-179BP-H
	180-20S-3-H	●	18-18.9	20	46.01	62.49	55.51	50	114	1.51	TPD180BP-H-189BP-H
	190-20S-3-H		19-19.9	20	48.6	67.4	58.6	50	119	1.6	TPD190BP-H-199BP-H
	200-25S-3-H	●	20-20.9	25	51.17	76.33	61.67	56	128	1.67	TPD200BP-H-209BP-H
	210-25S-3-H		21-21.9	25	53.76	73.24	64.76	56	131	1.76	TPD210BP-H-219BP-H
	220-25S-3-H	●	22-22.9	25	56.39	76.11	67.89	56	134	1.89	TPD220BP-H-229BP-H
	230-25S-3-H		23-23.9	25	58.94	79.06	70.94	56	137	1.94	TPD230BP-H-239BP-H
	240-32S-3-H	●	24-24.9	32	61.52	84.78	74.02	60	146.8	2.02	TPD240BP-H-249BP-H
	250-32S-3-H		25-25.9	32	64.1	84.9	77.1	60	147	2.1	TPD250BP-H-259BP-H
	260-32S-3-H	●	26-26.9	32	66.73	87.77	80.23	60	150	2.23	TPD260BP-H-269BP-H
	270-32S-3-H	●	27-27.9	32	69.28	90.72	83.28	60	153	2.28	TPD270BP-H-279BP-H
	280-32S-3-H		28-28.9	32	71.82	93.68	86.32	60	156	2.32	TPD280BP-H-289BP-H
	290-32S-3-H		29-29.9	32	74.55	96.45	89.55	60	159	2.55	TPD290BP-H-299BP-H
	300-32S-3-H	●	30-30.9	32	77.11	99.39	92.61	60	162	2.61	TPD300BP-H-309BP-H
	310-32S-3-H		31-31.9	32	79.7	102.3	95.7	60	165	2.7	TPD310BP-H-319BP-H
	320-32S-3-H	●	32-32.9	32	82.29	105.21	98.79	60	168	2.79	TPD320BP-H-329BP-H
	140-16S-4-H		14-14.9	16	49.67	62.83	57.17	48	112	1.17	TPD140BP-H-149BP-H
	150-20S-4-H		15-15.9	20	53.29	67.21	61.29	50	118.5	1.29	TPD150BP-H-159BP-H
	160-20S-4-H		16-16.9	20	56.89	71.11	65.39	50	122.5	1.39	TPD160BP-H-169BP-H
	170-20S-4-H		17-17.9	20	60.48	75.02	69.48	50	126.5	1.48	TPD170BP-H-179BP-H
	180-20S-4-H		18-18.9	20	64.01	80.49	73.51	50	132	1.51	TPD180BP-H-189BP-H
	190-20S-4-H		19-19.9	20	67.6	86.4	77.6	50	138	1.6	TPD190BP-H-199BP-H
	200-25S-4-H		20-20.9	25	71.17	96.33	81.67	56	148	1.67	TPD200BP-H-209BP-H
	210-25S-4-H		21-21.9	25	74.76	94.24	85.76	56	152	1.76	TPD210BP-H-219BP-H
	220-25S-4-H	●	22-22.9	25	78.39	98.11	89.89	56	156	1.89	TPD220BP-H-229BP-H
	230-25S-4-H		23-23.9	25	81.94	102.06	93.94	56	160	1.94	TPD230BP-H-239BP-H
	240-32S-4-H	●	24-24.9	32	85.52	108.78	98.02	60	170.8	2.02	TPD240BP-H-249BP-H
	250-32S-4-H		25-25.9	32	89.1	109.9	102.1	60	172	2.1	TPD250BP-H-259BP-H
	260-32S-4-H	●	26-26.9	32	92.73	113.77	106.23	60	176	2.23	TPD260BP-H-269BP-H
	270-32S-4-H	●	27-27.9	32	96.28	117.72	110.28	60	180	2.28	TPD270BP-H-279BP-H
	280-32S-4-H		28-28.9	32	99.82	121.68	114.32	60	184	2.32	TPD280BP-H-289BP-H
	290-32S-4-H		29-29.9	32	103.55	125.45	118.55	60	188	2.55	TPD290BP-H-299BP-H
	300-32S-4-H		30-30.9	32	107.11	129.39	122.61	60	192	2.61	TPD300BP-H-309BP-H
	310-32S-4-H		31-31.9	32	110.7	133.3	126.7	60	196	2.7	TPD310BP-H-319BP-H
	320-32S-4-H		32-32.9	32	114.29	137.21	130.79	60	200	2.79	TPD320BP-H-329BP-H

● : Stock item

TPDB-H (5D, 8D)



(mm)

Designation		Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	PL	Applicable insert
TPDBP	140-16-345-5-H	●	14-14.9	16	35.67	83.83	71.17	48	133	1.17	TPD140BP-H-149BP-H
	150-20-370-5-H		15-15.9	20	38.29	90.21	76.29	50	141.5	1.29	TPD150BP-H-159BP-H
	160-20-395-5-H	●	16-16.9	20	40.89	95.11	81.39	50	146.5	1.39	TPD160BP-H-169BP-H
	170-20-420-5-H		17-17.9	20	43.48	100.02	86.48	50	151.5	1.48	TPD170BP-H-179BP-H
	180-20-445-5-H	●	18-18.9	20	46.01	106.49	91.51	50	158	1.51	TPD180BP-H-189BP-H
	190-20-470-5-H		19-19.9	20	48.6	113.4	96.6	50	165	1.6	TPD190BP-H-199BP-H
	200-25-495-5-H	●	20-20.9	25	51.17	123.33	101.67	56	175	1.67	TPD200BP-H-209BP-H
	210-25-520-5-H		21-21.9	25	53.76	122.24	106.76	56	180	1.76	TPD210BP-H-219BP-H
	220-25-545-5-H	●	22-22.9	25	56.39	127.11	111.89	56	185	1.89	TPD220BP-H-229BP-H
	230-25-570-5-H		23-23.9	25	58.94	132.06	116.94	56	190	1.94	TPD230BP-H-239BP-H
	240-32-595-5-H	●	24-24.9	32	61.52	144.78	122.02	60	206.8	2.02	TPD240BP-H-249BP-H
	250-32-620-5-H		25-25.9	32	64.1	146.9	127.1	60	209	2.1	TPD250BP-H-259BP-H
	260-32-645-5-H	●	26-26.9	32	66.73	151.77	132.23	60	214	2.23	TPD260BP-H-269BP-H
	270-32-670-5-H		27-27.9	32	69.28	156.72	137.28	60	219	2.28	TPD270BP-H-279BP-H
	280-32-695-5-H		28-28.9	32	71.82	161.68	142.32	60	224	2.32	TPD280BP-H-289BP-H
	290-32-720-5-H		29-29.9	32	74.55	166.45	147.55	60	229	2.55	TPD290BP-H-299BP-H
	300-32-745-5-H	●	30-30.9	32	77.11	171.39	152.61	60	234	2.61	TPD300BP-H-309BP-H
	310-32-770-5-H		31-31.9	32	79.7	176.3	157.7	60	239	2.7	TPD310BP-H-319BP-H
	320-32-795-5-H	●	32-32.9	32	82.29	181.21	162.79	60	244	2.79	TPD320BP-H-329BP-H
	140-16-345-8-H	●	14-14.9	16	35.67	125.83	113.17	48	175	1.17	TPD140BP-H-149BP-H
	150-20-370-8-H		15-15.9	20	38.29	135.21	121.29	50	186.5	1.29	TPD150BP-H-159BP-H
	160-20-395-8-H	●	16-16.9	20	40.89	143.11	129.39	50	194.5	1.39	TPD160BP-H-169BP-H
	170-20-420-8-H		17-17.9	20	43.48	151.02	137.48	50	202.5	1.48	TPD170BP-H-179BP-H
	180-20-445-8-H	●	18-18.9	20	46.01	160.49	145.51	50	212	1.51	TPD180BP-H-189BP-H
	190-20-470-8-H		19-19.9	20	48.6	170.4	153.6	50	222	1.6	TPD190BP-H-199BP-H
	200-25-495-8-H	●	20-20.9	25	51.17	183.33	161.67	56	235	1.67	TPD200BP-H-209BP-H
	210-25-520-8-H		21-21.9	25	53.76	185.24	169.76	56	243	1.76	TPD210BP-H-219BP-H
	220-25-545-8-H	●	22-22.9	25	56.39	193.11	177.89	56	251	1.89	TPD220BP-H-229BP-H
	230-25-570-8-H		23-23.9	25	58.94	201.06	185.94	56	259	1.94	TPD230BP-H-239BP-H
	240-32-595-8-H		24-24.9	32	61.52	216.78	194.02	60	278.8	2.02	TPD240BP-H-249BP-H
	250-32-620-8-H		25-25.9	32	64.1	221.9	202.1	60	284	2.1	TPD250BP-H-259BP-H
	260-32-645-8-H		26-26.9	32	66.73	229.77	210.23	60	292	2.23	TPD260BP-H-269BP-H
	270-32-670-8-H		27-27.9	32	69.28	237.72	218.28	60	300	2.28	TPD270BP-H-279BP-H
	280-32-695-8-H		28-28.9	32	71.82	245.68	226.32	60	308	2.32	TPD280BP-H-289BP-H
	290-32-720-8-H		29-29.9	32	74.55	253.45	234.55	60	316	2.55	TPD290BP-H-299BP-H
	300-32-745-8-H		30-30.9	32	77.11	261.39	242.61	60	324	2.61	TPD300BP-H-309BP-H
	310-32-770-8-H		31-31.9	32	79.7	269.3	250.7	60	332	2.7	TPD310BP-H-319BP-H
	320-32-795-8-H		32-32.9	32	82.29	277.21	258.79	60	340	2.79	TPD320BP-H-329BP-H

● : Stock item

TPDB-F

Code system

Insert

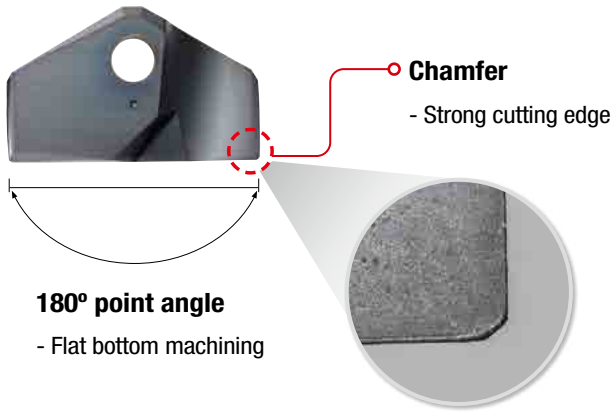
TPD	200	B	-	F
Top solid Piercing Drill	Drill dia. 200 : Ø20	Insert type B : Blade type		Cutting edge F : Flat FC : Flat Candle

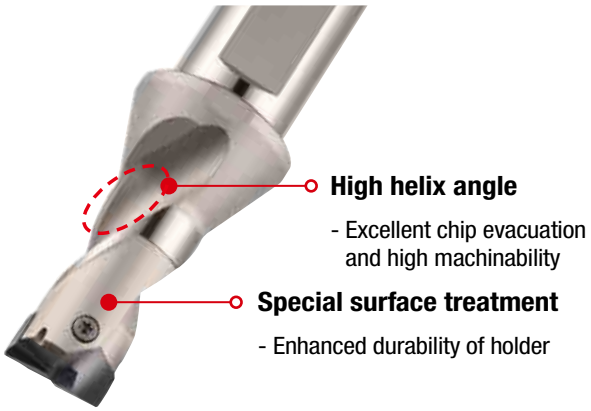
Holder

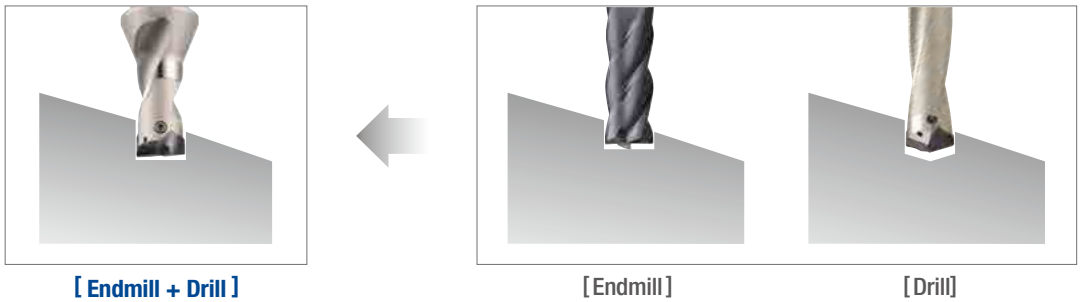
TPD	B	220	-	25	-	1.5	-	F
Top solid Piercing Drill	Insert type B : Blade type	Drill dia. 220 : Ø22		Shank dia. 25 : Ø25		Aspect ratio (L/D) 1.5D		Flat

Features

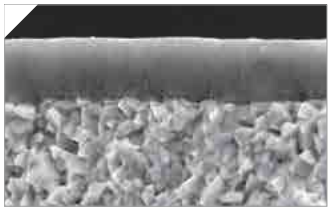
- **High precision clamping system** - High precision clamping due to high precise grinding and auto-centering
- **Screw on clamping system** - Easy to replace insert
- **Cutting edge with 180º point angle** - Flat bottom machining
- **Low cutting load cutting edge** - Low cutting load and excellent chip control
- **High durability holder** - Improved wear resistance and durability with special surface treatment implementation
- **Holder with good chip evacuation** - Good chip evacuation and reduced cutting load with high helix angle







Grade features



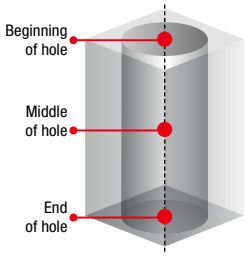
PC5400

- PVD coating technology with high lubrication, built up edge resistance and chipping resistance
- Excellent chipping resistance due to high toughness coating with high adhesive strength
- Enhanced fracture resistance and stable machinability due to ultra-fine substrate with high toughness substrate

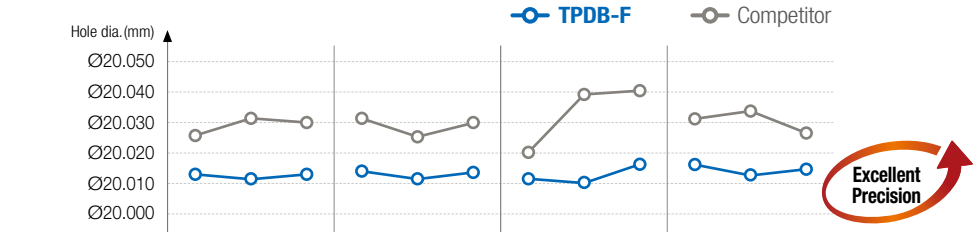
Performance evaluation

Machining precision

Workpiece	Alloy steel (42CrMo4, HRC22)
Cutting condition	vc (m/min) = 70/90, fn (mm/rev) = 0.2/0.3, ap (mm) = 30, wet (20 bar)
Tool	Insert TPD200B-F (PC5400) Holder TPDB200-25-1.5-F (Drill dia. = Ø20 mm)



[Drilling part]

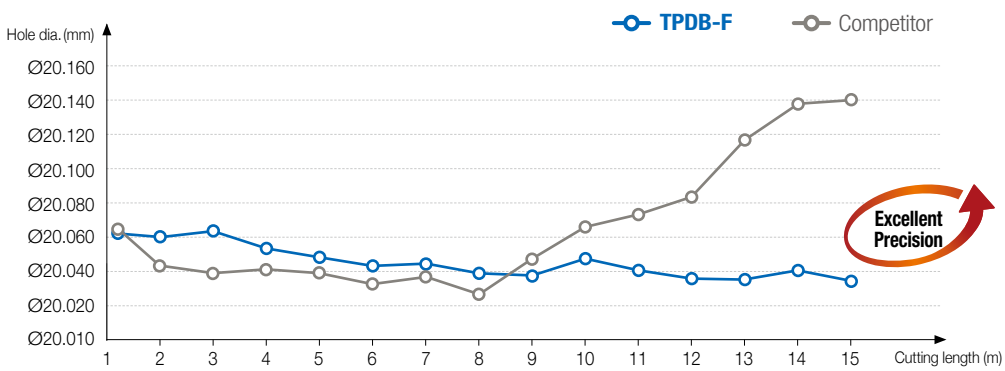


Drilling part	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End
fn (mm/rev)	0.2			0.3			0.2			0.3		
vc (m/min)	70						90					

» Cutting edge with low cutting load enhances high precision.

Workpiece	Alloy steel (42CrMo4, HRC22), Angled surface 15°
Cutting condition	vc (m/min) = 70, fn (mm/rev) = 0.21, ap (mm) = 20, wet (20 bar)
Tool	Insert TPD200B-F (PC5400) Holder TPDB200-25-1.5-F (Drill dia. = Ø20 mm)

[Angled surface Drilling]



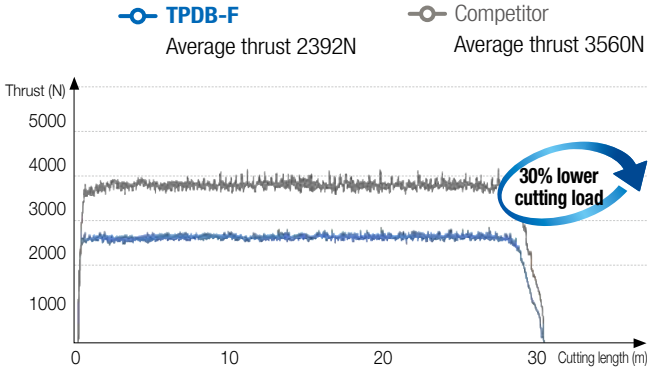
» Cutting edge with low cutting load enhances high precision.

Performance evaluation

Cutting load

Workpiece	Alloy steel (42CrMo4, HRC22)
Cutting condition	vc (m/min) = 70, fn (mm/rev) = 0.25,
	ap (mm) = 30, wet (20 bar)
Tool	Insert TPD200B-F (PC5400)
	Holder TPDB200-25-1.5-F (Drill dia. = Ø20 mm)

» The sharp point shape reduces cutting load.



Wear resistance

Workpiece	Alloy steel (42CrMo4, HRC22), Angled surface 15°
Cutting condition	vc (m/min) = 70, fn (mm/rev) = 0.21,
	ap (mm) = 20, wet (20 bar)
Tool	Insert TPD200B-F (PC5400)
	Holder TPDB200-25-1.5-F (Drill dia. = Ø20 mm)

» Enhanced chipping resistance increases too life due to stable wear on the cutting edge.

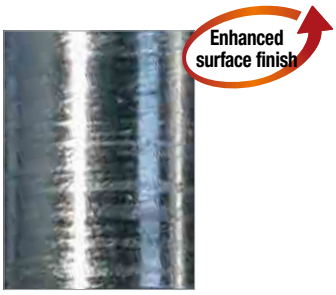
[TPDB-F]

[Competitor]

Surface finish

Workpiece	Alloy steel (42CrMo4, HRC22), Angled surface 15°
Cutting condition	vc (m/min) = 90, fn (mm/rev) = 0.18,
	ap (mm) = 20, wet (20 bar)
Tool	Insert TPD150B-F (PC5400)
	Holder TPDB150-16-1.5-F (Drill dia. = Ø15 mm)

» Low cutting load cutting edge ensures good surface finish.



[TPDB-F]

[Competitor]

Chip control

Workpiece	Carbon steel (C45, HRC18)
Cutting condition	vc (m/min) = 90, fn (mm/rev) = 0.25,
	ap (mm) = 30, wet (20 bar)
Tool	Insert TPD200B-F (PC5400)
	Holder TPDB200-25-1.5-F (Drill dia. = Ø20 mm)

» Stable chip curling controls chip shape.

[TPDB-F]

[Competitor]

Recommended cutting conditions

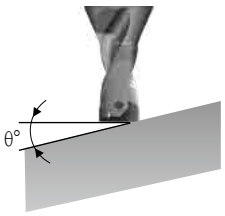
Workpiece					Specific cutting force (N/mm²)	Brinell hardness (HB)	Grade	vc (m/min)	Aspect ratio (L/D) = 1.5D	
									fn (mm/rev)	
ISO	Workpiece material		KS	ISO					Ø14 ~ Ø21.9	Ø22 ~ Ø30.9
P	Carbon steel	C = 0.10 ~ 0.25%	SM15C SM25C	C15 C25	1500	90 ~ 200	PC5400	60 ~ 100	0.3 ~ 0.2	0.32 ~ 0.22
		C = 0.25 ~ 0.55%	SM35C SM45C	C35 C45	1600	125 ~ 225	PC5400	60 ~ 100	0.3 ~ 0.2	0.32 ~ 0.22
		C = 0.55 ~ 0.80%	SM58C	C60	1700	150 ~ 250	PC5400	50 ~ 90	0.3 ~ 0.2	0.32 ~ 0.22
	Alloy steel ≤ 5%	Non-hardened	SCM440	42CrMo4	1700	180	PC5400	50 ~ 90	0.3 ~ 0.2	0.32 ~ 0.22
		Hardened and Tempered	SCM445	-	2050	350	PC5400	40 ~ 80	0.2 ~ 0.2	0.32 ~ 0.22
	Alloy steel > 5%	Annealed	STD11	-	1950	200	PC5400	40 ~ 80	0.28 ~ 0.18	0.3 ~ 0.2
		Hardened tool steel	STD61	X40CrMoV5-1	3000	352	PC5400	30 ~ 70	0.28 ~ 0.18	0.3 ~ 0.2

Type	Flat surface Drilling	Angled surface Drilling	Curved surface Drilling	Plunging	Boring
Pic.					
1.5D	○	○	○	○	○

※ Please refer to the precaution in Drilling in case of angled surface, curved surface Drilling, plunging and boring.

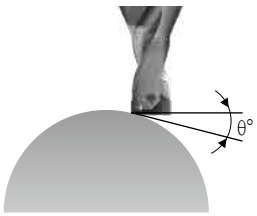
Precaution in Drilling

Angled surface Drilling



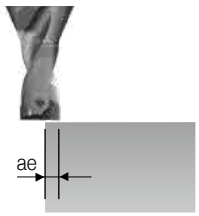
- Reduce the feed (fn) to 30% than general cutting conditions at the beginning and the end of angled surface. (In case, θ is over 30°, reduce it to 50%.)

Curved surface Drilling



- Reduce the feed (fn) to 30% than general cutting conditions at the beginning of curved surface. (In case, θ is over 30°, reduce it to 50%.)

Plunging



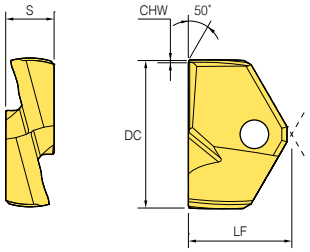
- Reduce the depth of cut (ae) to shorter than 1/2 of Drill diameter.
- In case, the depth of cut is longer than Drill diameter, plunge with divided depth of cut.

Boring

- Reduce the feed (fn) to 30% than general cutting conditions at the beginning of boring.
- Start with 2 mm stepping before boring to prevent long chip.

Insert

TPDB-F



(mm)

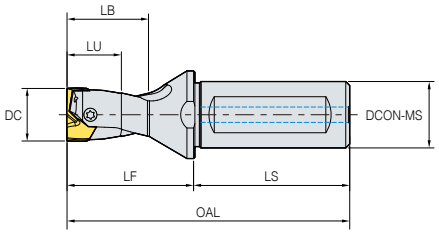
Designation		Coated PC5400	DC	S	LF	CHW
TPD	140B-F		14	4	9.04	0.06
	145B-F		14.5	4	9.04	0.06
	150B-F		15	4	9.54	0.06
	155B-F		15.5	4	9.54	0.06
	160B-F		16	5.5	10.54	0.06
	165B-F		16.5	5.5	10.54	0.06
	170B-F		17	5.5	11.04	0.06
	175B-F		17.5	5.5	11.04	0.06
	180B-F		18	6	12.18	0.06
	185B-F		18.5	6	12.18	0.06
	190B-F		19	6	12.77	0.06
	195B-F		19.5	6	12.77	0.06
	200B-F	●	20	6.5	13.18	0.08
	205B-F		20.5	6.5	13.18	0.08
	210B-F		21	6.5	13.68	0.08
	215B-F		21.5	6.5	13.68	0.08
	220B-F	●	22	7	14.18	0.08
	225B-F		22.5	7	14.18	0.08
	230B-F		23	7	14.68	0.08
	235B-F		23.5	7	14.68	0.08
	240B-F		24	7.5	15.33	0.08
	245B-F		24.5	7.5	15.33	0.08
	250B-F	●	25	7.5	15.83	0.08
	255B-F		25.5	7.5	15.83	0.08
	260B-F		26	8.5	16.33	0.08
	265B-F	●	26.5	8.5	16.33	0.08
	270B-F		27	8.5	17.33	0.08
	275B-F		27.5	8.5	17.33	0.08
	280B-F		28	9.5	18.33	0.08
	285B-F		28.5	9.5	18.33	0.08
	290B-F		29	9.5	18.97	0.08
	295B-F		29.5	9.5	18.97	0.08
	300B-F		30	10	19.47	0.08
	305B-F		30.5	10	19.47	0.08

※ TPD Inserts not list above within the range of Ø14.00 ~ Ø30.99 can be made to order ● : Stock item

Parts

Designation		Drill dia. DC (mm)	Screw	Wrench	Torque (N·m)
TPD	140B-F ~ 149B-F	14 ~ 14.9	FTNB02512-P	TW07S	0.8
	150B-F ~ 179B-F	15 ~ 17.9	FTNB02514-P	TW07S	0.8
	180B-F ~ 199B-F	18 ~ 19.9	FTNB0316-P	TW09S	1.2
	200B-F ~ 239B-F	20 ~ 23.9	FTNB0319	TW09S	1.2
	240B-F ~ 259B-F	24 ~ 25.9	FTNB03522	TW15S	3
	260B-F ~ 279B-F	26 ~ 27.9	FTNB03524	TW15S	3
	280B-F ~ 299B-F	28 ~ 29.9	FTNB0426	TW15S	3
	300B-F ~ 309B-F	30 ~ 30.9	FTNB0528	TW20-100	4

TPDB-F (1.5D)



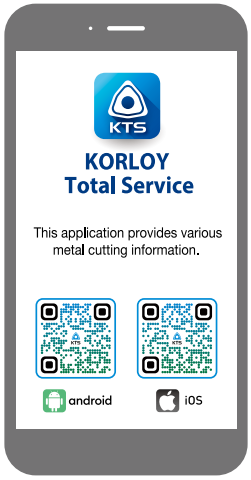
(mm)

	Designation	Stock	DC	DCON-MS	LU	LF	LB	LS	OAL	Applicable insert
TPDB	140-16-1.5-F		14-14.4	16	21	38	28	48	86	TPD140B-F~144B-F
	145-16-1.5-F		14.5-14.9	16	21.75	39	29	48	87	TPD145B-F~149B-F
	150-20-1.5-F		15-15.4	20	22.5	43	30	50	93	TPD150B-F~154B-F
	155-20-1.5-F		15.5-15.9	20	23.25	44	31	50	94	TPD155B-F~159B-F
	160-20-1.5-F		16-16.4	20	24	45	32	50	95	TPD160B-F~164B-F
	165-20-1.5-F		16.5-16.9	20	24.75	46	33	50	96	TPD165B-F~169B-F
	170-20-1.5-F		17-17.4	20	25.5	47	34	50	97	TPD170B-F~174B-F
	175-20-1.5-F		17.5-17.9	20	26.25	48	35	50	98	TPD175B-F~179B-F
	180-20-1.5-F		18-18.4	20	27	49	36	50	99	TPD180B-F~184B-F
	185-20-1.5-F		18.5-18.9	20	27.75	50	37	50	100	TPD185B-F~189B-F
	190-25-1.5-F		19-19.4	25	28.5	45	38	56	101	TPD190B-F~194B-F
	195-25-1.5-F		19.5-19.9	25	29.25	46	39	56	102	TPD195B-F~199B-F
	200-25-1.5-F		20-20.4	25	30	60	40	56	116	TPD200B-F~204B-F
	205-25-1.5-F		20.5-20.9	25	30.75	61	41	56	117	TPD205B-F~209B-F
	210-25-1.5-F		21-21.4	25	31.5	62	42	56	118	TPD210B-F~214B-F
	215-25-1.5-F		21.5-21.9	25	32.25	63	43	56	119	TPD215B-F~219B-F
	220-25-1.5-F		22-22.4	25	33	64	44	56	120	TPD220B-F~224B-F
	225-25-1.5-F		22.5-22.9	25	33.75	65	45	56	121	TPD225B-F~229B-F
	230-25-1.5-F		23-23.4	25	34.5	66	46	56	122	TPD230B-F~234B-F
	235-25-1.5-F		23.5-23.9	25	35.25	67	47	56	123	TPD235B-F~239B-F
	240-32-1.5-F		24-24.4	32	36	68.5	48	60	128.5	TPD240B-F~244B-F
	245-32-1.5-F		24.5-24.9	32	36.75	69.5	49	60	129.5	TPD245B-F~249B-F
	250-32-1.5-F		25-25.4	32	37.5	70.5	50	60	130.5	TPD250B-F~254B-F
	255-32-1.5-F		25.5-25.9	32	38.25	71.5	51	60	131.5	TPD255B-F~259B-F
	260-32-1.5-F		26-26.4	32	39	72.5	52	60	132.5	TPD260B-F~264B-F
	265-32-1.5-F		26.5-26.9	32	39.75	73.5	53	60	133.5	TPD265B-F~269B-F
	270-32-1.5-F		27-27.4	32	40.5	74.5	54	60	134.5	TPD270B-F~274B-F
	275-32-1.5-F		27.5-27.9	32	41.25	75.5	55	60	135.5	TPD275B-F~279B-F
	280-32-1.5-F		28-28.4	32	42	76.5	56	60	136.5	TPD280B-F~284B-F
	285-32-1.5-F		28.5-28.9	32	42.75	77.5	57	60	137.5	TPD285B-F~289B-F
	290-32-1.5-F		29-29.4	32	43.5	78.5	58	60	138.5	TPD290B-F~294B-F
	295-32-1.5-F		29.5-29.9	32	44.25	79.5	59	60	139.5	TPD295B-F~299B-F
	300-32-1.5-F		30-30.4	32	45	80.5	60	60	140.5	TPD300B-F~304B-F
	305-32-1.5-F		30.5-30.9	32	45.75	81.5	61	60	141.5	TPD305B-F~309B-F

● : Stock item

⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the tools can be pulled out due to centrifugal force while high speed machining.



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