PRODUCT NEWS

PN-E-014

NEW PRODUCT

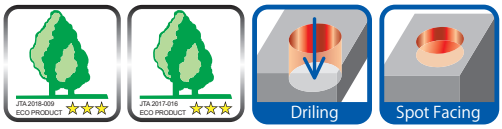
DIJET

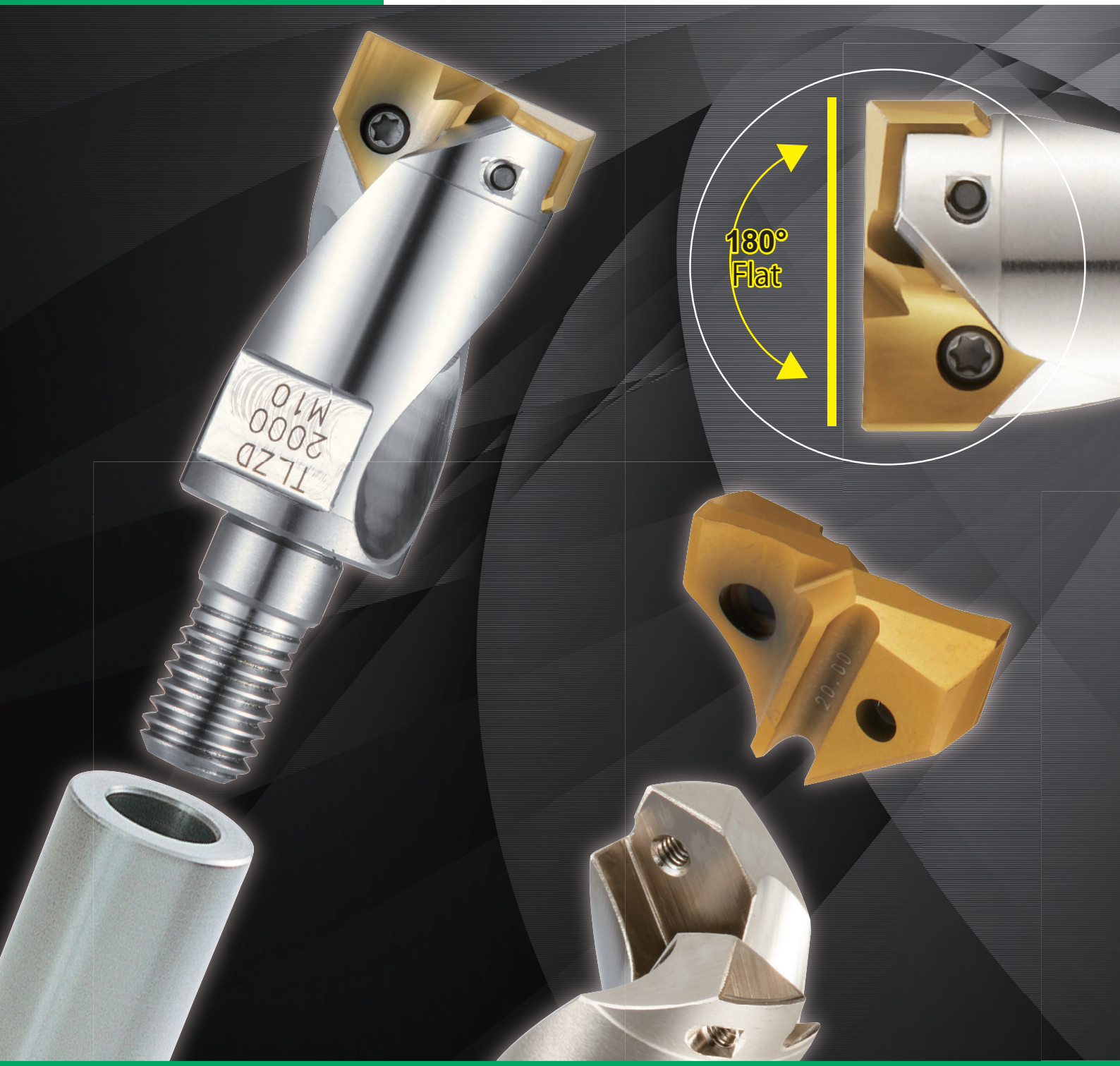
Indexable Drill | Spot facing

“Indexable Spot facing drill”

TLZD type

■Point angle of 180° (flat face).
■Size range : ϕ14-ϕ32mm dia.
(Shank type : 1.5D
Modular head type : 0.7D-1D)





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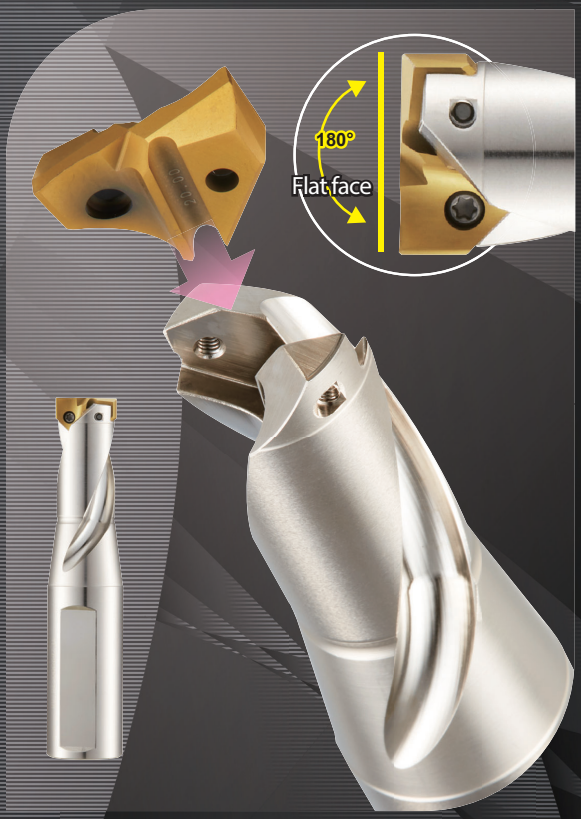
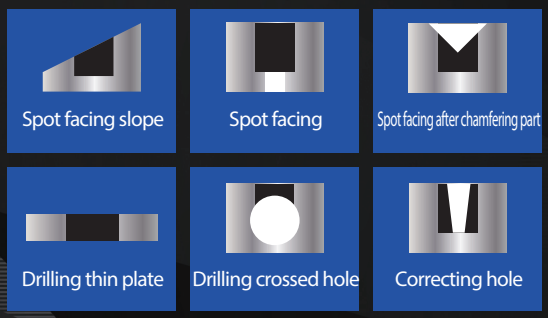


- Flat face
- Achieved non-step drilling
- Size range: φ14-φ32mm dia.(Drilling depth: 1.5D)

Drilling

Spot facing

Application



Feature of product

Features 1

TLZD can be used repeatedly only by exchanging insert.
Easy assembly of insert & body.

Features 2

Achieved non-step drilling without pilot hole even if drilling slope surface and crossed hole.

Features 3

By adopting new PVD coated grade "JC7550" and unique coolant system, achieved longer tool life even if drilling mold steel or stainless steel.

Features 4

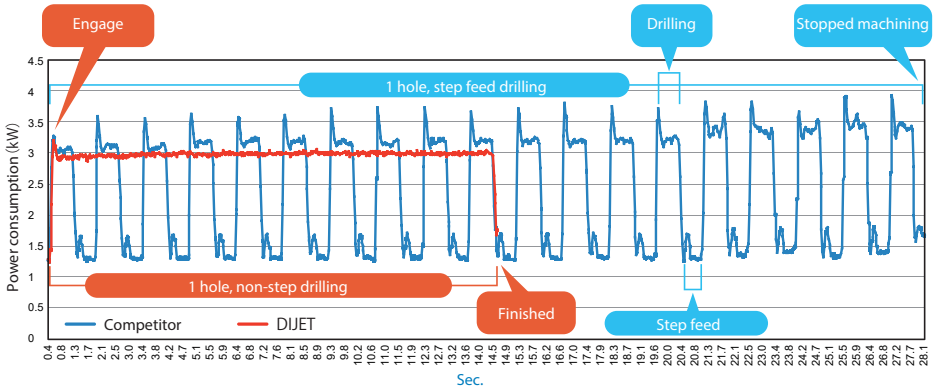
Controlled burr in case of drilling thin plate.

Cutting performance

① Cutting performance (stainless steel)

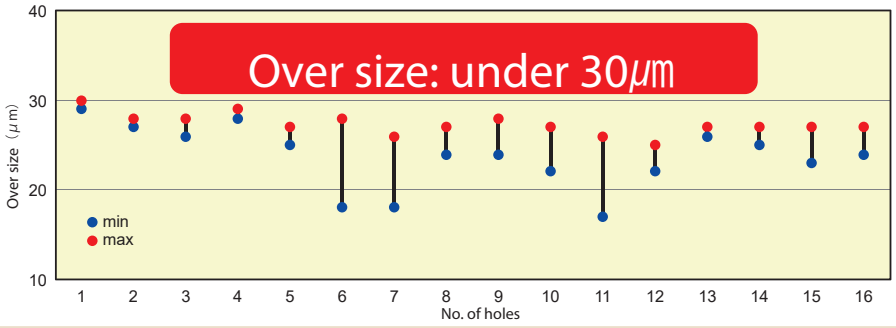
Material: Stainless steel
- Machine : Vertical MC
- Cutting conditions :
  n=1,840min^{-1}, Vc=110m/min,
  Vf=80mm/min, f=0.043mm/rev
- Drilling dia. : φ19
  Drilling depth : 19mm1D, blind
- Tool No. : TLZD1900S25-SS
  Insert No. : TLZ1900 (JC7550) Water soluble

Power consumption



DIJET reduced power consumption and achieved stable machining & good hole accuracy.
Competitor stopped machining at the first hole due to clogging with chips.

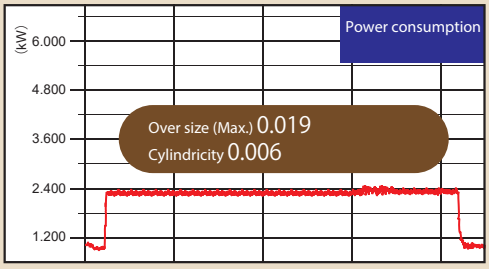
Hole accuracy



Movie

② Cutting performance (mold steel)

Material: Mold steel P21
- Cutting conditions :
  n=300min^{-1}, Vc=30m/min,
  Vf=24mm/min, f=0.08mm/rev
- Drilling dia. : φ32
  Drilling depth : 32mm (1D)
- Tool No. : TLZD3200S32-SS
  Insert No. : TLZ3200 (JC7550)
  Water soluble (internal)

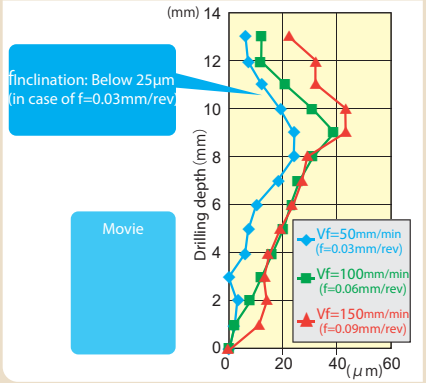


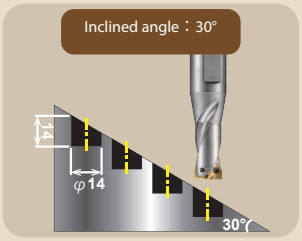
Stable machining even if drilling mold steel.

③ Drilling slope surface (inclined angle: 30°)

Material: Carbon steel C50
- Machine : Vertical MC
- Cutting conditions :
  n=1,590min^{-1}, Vc=70m/min, Vf=50−150mm/min, f=0.03−0.09mm/rev
- Drilling dia. : φ14
  Drilling depth : 14mm Inclined angle : 30°
- Tool No. : TLZD1400S16-SS
  Insert No. : TLZ1400 (JC7550) Mist coolant

But, in case of actual machining, recommend wet coolant.



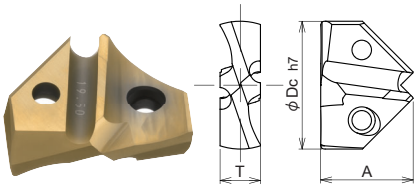


Stable machining even if drilling slope surface (inclined angle 30°). In case of f=0.03mm/rev, inclination was below 25μm.

Line up

Drilling Spot facing

TLZD-SS type



●Through coolant hole
● depth :1.5×Dc

●SS type (1.5D)

■Insert ■Body ■Parts 1/2

Drill dia. (mm)	Insert				Body									Parts	
	Insert No.	PVD coated	Dimensions (mm)		Applicable dia.		SS type (1.5D)							Clamp screw	Wrench (Not be included)
φDc		JC7550	A	T	Over	Or under	Tool No.	Stock	Dimensions (mm) ℓ	ℓ2	ℓs	L	φDs		
14	TLZ1400	●	10.6	4.5	13.5	14.5	TLZD1400S16-SS	●	29	43	48	91	16	DSW-2045H	A-07
14.1	TLZ1410	●													
14.2	TLZ1420	●													
14.3	TLZ1430	●													
14.4	TLZ1440	●													
14.5	TLZ1450	●													
14.6	TLZ1460	●	11.3	4.8	14.5	15.5	TLZD1500S20-SS	●	31	46	50	96	20	DSW-2045H	A-07
14.7	TLZ1470	●													
14.8	TLZ1480	●													
14.9	TLZ1490	●													
15	TLZ1500	●													
15.1	TLZ1510	●													
15.2	TLZ1520	●													
15.3	TLZ1530	●													
15.4	TLZ1540	●													
15.5	TLZ1550	●													
15.6	TLZ1560	●	12.1	5.0	15.5	16.5	TLZD1600S20-SS	●	33	49	50	99	20	TSW-2556H	A-08
15.7	TLZ1570	●													
15.8	TLZ1580	●													
15.9	TLZ1590	●													
16	TLZ1600	●													
16.1	TLZ1610	●													
16.2	TLZ1620	●													
16.3	TLZ1630	●													
16.4	TLZ1640	●													
16.5	TLZ1650	●													
16.6	TLZ1660	●	12.6	5.5	16.5	17.5	TLZD1700S20-SS	●	35	52	50	102	20	TSW-2556H	A-08
16.7	TLZ1670	●													
16.8	TLZ1680	●													
16.9	TLZ1690	●													
17	TLZ1700	●													
17.1	TLZ1710	●													
17.2	TLZ1720	●													
17.3	TLZ1730	●													
17.4	TLZ1740	●													
17.5	TLZ1750	●													
17.6	TLZ1760	●	13.2	5.8	17.5	18.5	TLZD1800S20-SS	●	37	55	50	105	20	TSW-2556H	A-08
17.7	TLZ1770	●													
17.8	TLZ1780	●													
17.9	TLZ1790	●													
18	TLZ1800	●													
18.1	TLZ1810	●													
18.2	TLZ1820	●													
18.3	TLZ1830	●													
18.4	TLZ1840	●													
18.5	TLZ1850	●													

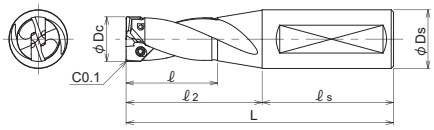
1 insert per case.

● : Standard stock items

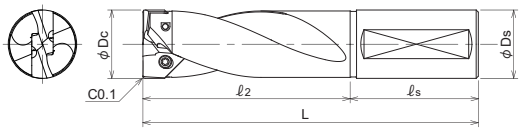
Note) 1. All cutters are supplied without inserts.
2. Please see page 5-7 for recommended cutting conditions.
3. All cutters are supplied without wrench & MOLY since February 2019 for our stock production.

Clamp screw	Recommended torque (N・m)
DSW-2045H	0.9
TSW-2556H	1.2
TSW-2567H	1.2
DSW-307H	2.1
DSW-309H	2.1
TSW-3510H	3.0
TSW-3512H	3.0

In case φDc≦φ30



In case φDc>φ30



■Insert ■Body ■Parts 2/2

Drill dia. (mm) φDc	Insert				Body									Parts	
	Insert No.	PVD coated JC7550	Dimensions (mm) A	Dimensions (mm) T	Applicable dia. Over	Applicable dia. Or under	SS type (1.5D) Tool No.	Stock	Dimensions (mm) ℓ	ℓ2	ℓs	L	φDs	Clamp screw	Wrench (Not be included)
18.6	TLZ1860	●	13.6	6.0	18.5	19.5	TLZD1900S25-SS	●	39	58	56	114	25	TSW-2567H	A-08
18.7	TLZ1870	●													
18.8	TLZ1880	●													
18.9	TLZ1890	●													
19	TLZ1900	●													
19.1	TLZ1910	●													
19.2	TLZ1920	●													
19.3	TLZ1930	●													
19.4	TLZ1940	●													
19.5	TLZ1950	●													
19.6	TLZ1960	●	14.6	6.5	19.5	20.5	TLZD2000S25-SS	●	41	61	56	117	25	TSW-2567H	A-08
19.7	TLZ1970	●													
19.8	TLZ1980	●													
19.9	TLZ1990	●													
20	TLZ2000	●													
20.5	TLZ2050	●													
21	TLZ2100	●	15.2	6.7	20.5	21.5	TLZD2100S25-SS	●	43	64	56	120	25	TSW-2567H	A-08
21.5	TLZ2150	●													
22	TLZ2200	●	15.9	7.5	21.5	22.5	TLZD2200S25-SS	●	45	67	56	123	25	DSW-307H	A-10
22.5	TLZ2250	●													
23	TLZ2300	●	16.7	7.5	22.5	23.5	TLZD2300S25-SS	●	47	70	56	126	25	DSW-307H	A-10
23.5	TLZ2350	●													
24	TLZ2400	●	17.4	8.0	23.5	24.5	TLZD2400S32-SS	●	49	73	60	133	32	DSW-307H	A-10
24.5	TLZ2450	●													
25	TLZ2500	●	18.3	8.0	24.5	25.5	TLZD2500S32-SS	●	51	76	60	136	32	DSW-309H	A-10
25.5	TLZ2550	●													
26	TLZ2600	●	18.8	8.5	25.5	26.5	TLZD2600S32-SS	●	53	79	60	139	32	DSW-309H	A-10
26.5	TLZ2650	●													
27	TLZ2700	●	19.5	8.5	26.5	27.5	TLZD2700S32-SS	●	55	82	60	142	32	DSW-309H	A-10
27.5	TLZ2750	●													
28	TLZ2800	●	20.3	9.0	27.5	28.5	TLZD2800S32-SS	●	57	85	60	145	32	TSW-3510H	A-15
28.5	TLZ2850	●													
29	TLZ2900	●	21.1	9.0	28.5	29.5	TLZD2900S32-SS	●	59	88	60	148	32	TSW-3510H	A-15
29.5	TLZ2950	●													
30	TLZ3000	●	21.5	9.5	29.5	30.5	TLZD3000S32-SS	●	61	91	60	151	32	TSW-3510H	A-15
30.5	TLZ3050	●													
31	TLZ3100	●	22.3	10.0	30.5	31.5	TLZD3100S32-SS	●	—	94	60	154	32	TSW-3512H	A-15
31.5	TLZ3150	●													
32	TLZ3200	●	23.1	10.0	31.5	32.5	TLZD3200S32-SS	●	—	97	60	157	32	TSW-3512H	A-15

1 insert per case.

● : Standard stock items

Note) 1. All cutters are supplied without inserts.
2. Please see page 5-7 for recommended cutting conditions.
3. All cutters are supplied without wrench & MOLY since February 2019 for our stock production.

※Change the appearance of TLZD type

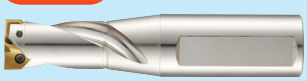
The appearance of TLZD type will be changed sequentially due to improvement of the body rigidity and durability.

Before

Change sequentially

After

※The appearance of the body will be changed glossy silver, but not changed specification.



Recommended cutting conditions

TLZD-SS type

1/3

Work material	Mild steel (Below 180HB)		Carbon steel (C50) Below 280HB		Alloy steel (1.7223) 280～350HB	
V_c (m/min)	50～100（φ14～φ32）		50～100（φ14～φ32）		30～70（φ14～φ32）	
f (mm/rev)	0.06～0.20（φ14～φ16） 0.07～0.21（φ17～φ20） 0.08～0.22（φ21～φ25） 0.09～0.23（φ26～φ29） 0.10～0.24（φ30～φ32）		0.06～0.20（φ14～φ16） 0.07～0.21（φ17～φ20） 0.08～0.22（φ21～φ25） 0.09～0.23（φ26～φ29） 0.10～0.24（φ30～φ32）		0.06～0.20（φ14～φ16） 0.07～0.21（φ17～φ20） 0.08～0.22（φ21～φ25） 0.09～0.23（φ26～φ29） 0.10～0.24（φ30～φ32）	
Drill dia. (mm)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)
14	1,590	190	1,590	190	1,140	140
15	1,490	180	1,490	180	1,060	130
16	1,390	170	1,390	170	990	120
17	1,310	170	1,310	170	940	120
18	1,240	160	1,240	160	880	110
19	1,170	150	1,170	150	840	110
20	1,110	150	1,110	150	800	110
21	1,060	150	1,060	150	760	110
22	1,010	140	1,010	140	720	100
23	970	140	970	140	690	100
24	930	130	930	130	660	90
25	890	130	890	130	640	90
26	860	130	860	130	610	90
27	830	120	830	120	590	90
28	800	120	800	120	570	90
29	770	120	770	120	550	80
30	740	120	740	120	530	80
31	720	120	720	120	510	80
32	700	110	700	110	500	80

V_c : Cutting speed n : Spindle speed V_f : Feed speed f : feed rate

Attention for use
1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. Recommend drilling depth under 1.5D or less. Drilling depth over 1.5D is not recommended.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Work material	Mold steel (P21) 40HRC		Cast iron (GG, GGG)		Stainless steel	
V_c (m/min)	20～40（φ14～φ32）		50～100（φ14～φ32）		80～140（φ14～φ32）	
f (mm/rev)	0.04～0.10（φ14～φ16） 0.04～0.11（φ17～φ18） 0.05～0.11（φ19～φ20） 0.05～0.12（φ21～φ25） 0.05～0.13（φ26～φ27） 0.06～0.13（φ28～φ29） 0.06～0.14（φ30～φ32）		0.06～0.20（φ14～φ16） 0.07～0.21（φ17～φ20） 0.08～0.22（φ21～φ25） 0.09～0.23（φ26～φ29） 0.10～0.24（φ30～φ32）		0.02～0.06（φ14～φ18） 0.03～0.07（φ19～φ25） 0.04～0.08（φ26～φ31） 0.05～0.09（φ32）	
Drill dia. (mm)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)
14	680	40	1,590	190	2,270	90
15	640	40	1,490	180	2,120	90
16	600	40	1,390	170	1,990	80
17	560	40	1,310	170	1,870	80
18	530	40	1,240	160	1,770	80
19	500	40	1,170	150	1,840	80
20	480	40	1,110	150	1,750	80
21	450	40	1,060	150	1,670	80
22	430	30	1,010	140	1,590	80
23	420	30	970	140	1,520	80
24	400	30	930	130	1,460	80
25	380	30	890	130	1,400	80
26	370	30	860	130	1,350	80
27	350	30	830	120	1,300	80
28	340	30	800	120	1,360	80
29	330	30	770	120	1,320	80
30	320	30	740	120	1,270	80
31	310	30	720	120	1,230	80
32	300	30	700	110	1,190	80

V_c : Cutting speed n : Spindle speed V_f : Feed speed f : feed rate

Attention for use

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2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. Recommend drilling depth under 1.5D or less. Drilling depth over 1.5D is not recommended.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
   But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Recommended cutting conditions

TLZD-SS type

Work material	Aluminum alloy					
V_c (m/min)	50～150（φ14～φ32）					
f (mm/rev)	0.06～0.20（φ14～φ16） 0.07～0.21（φ17～φ20） 0.08～0.22（φ21～φ25） 0.09～0.23（φ26～φ29） 0.10～0.24（φ30～φ32）					
Drill dia. (mm)	n (min^{-1})	V_f (mm/min)				
14	2,270	270				
15	2,120	250				
16	1,990	240				
17	1,870	240				
18	1,770	240				
19	1,840	240				
20	1,750	230				
21	1,670	230				
22	1,590	220				
23	1,520	210				
24	1,460	200				
25	1,400	200				
26	1,350	200				
27	1,300	200				
28	1,360	200				
29	1,320	200				
30	1,270	200				
31	1,230	200				
32	1,190	190				

V_c : Cutting speed n : Spindle speed V_f : Feed speed f : feed rate

Attention for use
1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
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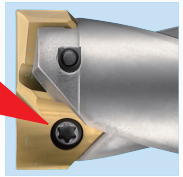
Procedure of mounting insert for TLZD

1. Removing the used insert

Remove the used insert and clean the insert pocket by brush or air blow before mounting new insert. In case of blocking clamp pocket by chips and dust, please remove them before loosening the clamp screw.

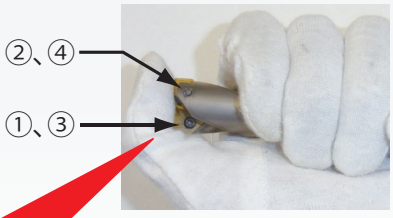
Clean the insert pocket.

Remove chips and dust before loosening the clamp screw.



2. Mounting the new insert

Tighten the two clamp screws lightly with pressing the top of insert (①,②:initial tightning). After confirming that there is no gap, be sure to fix the insert completely by tightening the clamp screws again to the recommended torque (see page 4) (③,④:final tightning). And, please recommend to spread the attached MOLY coat on the clamp screw in advance.



Tighten the two clamp screws with pressing the top of insert.

MOLY (not be included)

⚠ Attention

Clamp screw is expendables, so please also exchange the clamp screw whenever you exchange inserts 10 times. But, in case there is the deformation of the clamp screw, exchange it immediately.

Clamp screw

TLZD

NEW

Drilling

Spot facing

Series expansion, new modular head TLZD type (flat face).

Suitable for spot facing in case of long overhung length such as stamping die or large-sized mold part.

Feature of product

Features 1

Size range: φ14-φ32mm dia. And even in case of long overhung length, stable machining can be possible by combination with MSN carbide shank holder.

TLZD + MSN

Features 2

Achieved non-step drilling without pilot hole even if drilling slope surface and crossed hole.

Features 3

By adopting new PVD coated grade "JC7550" and unique coolant system, achieved longer tool life even if drilling mold steel or stainless steel.

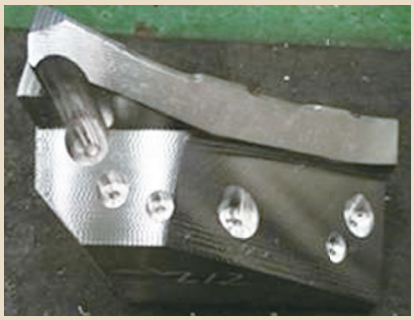
Features 4

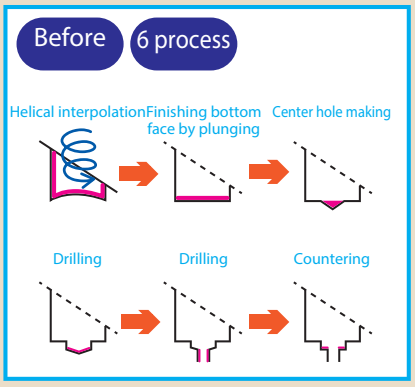
Drilling depth: 0.7-1D.

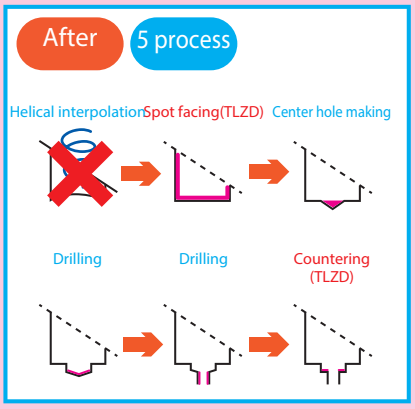
Improvement of machining efficiency

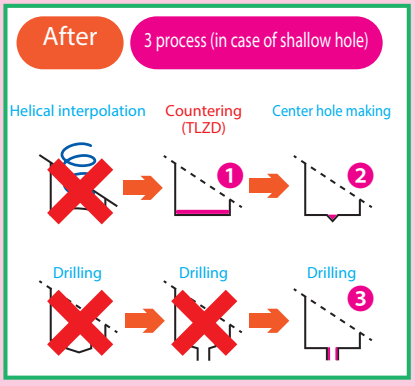
① Process combining

Processing part: Stamping die (Bolt holes for fixing the inserts for die)
Material: Die steel (1.2379, raw), Alloy steel (1.7223), Nodular cast iron (GGG)

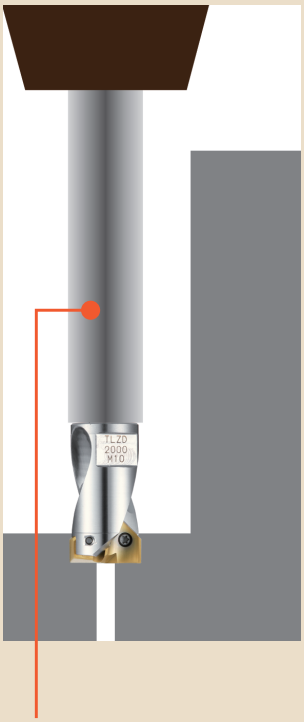








② Long overhung length
(Ex. Spot facing of stamping die or large-sized mold part)

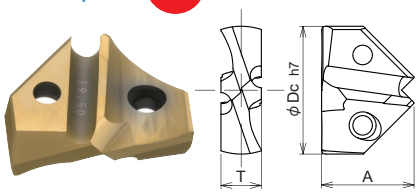


Even in case of long overhung length, stable machining can be possible by combination with MSN carbide shank holder.

Line up

TLZD type (modular head)

NEW



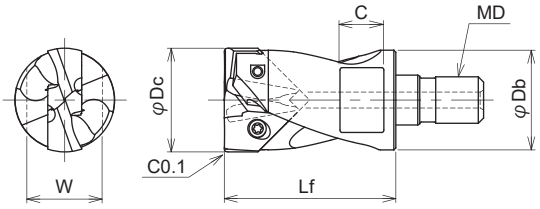
- Through coolant hole
- Hole Depth :0.7～1×Dc

■Insert ■Body ■Parts ■Recommended arbor

Drill dia. (mm)	Insert				Body									Parts		Arbor
	Insert No.	PVD coated	Dimensions (mm)		Applicable dia.		TLZD type (0.7-1D)							Clamp screw	Wrench (Not be included)	See page 13 for the detail of arbor.
φDc		JC7550	A	T	Over	Or under	Tool No.	Stock	Dimensions (mm) Lf	φDb	MD	C	W			
14	TLZ1400	●	10.6	4.5	13.5	14.5	TLZD1400-M6	●	27.5	13.1	M6	7	10	DSW-2045H	A-07	MSN-M6-＊＊-S16C
14.1	TLZ1410	●														
14.2	TLZ1420	●														
14.3	TLZ1430	●														
14.4	TLZ1440	●														
14.5	TLZ1450	●														
14.6	TLZ1460	●	11.3	4.8	14.5	15.5	TLZD1500-M8	●	29.5	14	M8	8	12	DSW-2045H	A-07	MSN-M8-＊＊S-S14C
14.7	TLZ1470	●														
14.8	TLZ1480	●														
14.9	TLZ1490	●														
15	TLZ1500	●														
15.1	TLZ1510	●														
15.2	TLZ1520	●														
15.3	TLZ1530	●														
15.4	TLZ1540	●														
15.5	TLZ1550	●														
15.6	TLZ1560	●	12.1	5.0	15.5	16.5	TLZD1600-M8	●	29.5	15	M8	8	12	TSW-2556H	A-08	MSN-M8-＊＊S-S15C
15.7	TLZ1570	●														
15.8	TLZ1580	●														
15.9	TLZ1590	●														
16	TLZ1600	●														
16.1	TLZ1610	●														
16.2	TLZ1620	●														
16.3	TLZ1630	●														
16.4	TLZ1640	●														
16.5	TLZ1650	●														
16.6	TLZ1660	●	12.6	5.5	16.5	17.5	TLZD1700-M8	●	30.5	16	M8	8	12	TSW-2556H	A-08	MSN-M8-＊＊S-S16C
16.7	TLZ1670	●														
16.8	TLZ1680	●														
16.9	TLZ1690	●														
17	TLZ1700	●														
17.1	TLZ1710	●														
17.2	TLZ1720	●														
17.3	TLZ1730	●														
17.4	TLZ1740	●														
17.5	TLZ1750	●														
17.6	TLZ1760	●	13.2	5.8	17.5	18.5	TLZD1800-M8	●	30.5	17	M8	8	12	TSW-2556H	A-08	MSN-M8-＊＊S-S16C
17.7	TLZ1770	●														
17.8	TLZ1780	●														
17.9	TLZ1790	●														
18	TLZ1800	●														
18.1	TLZ1810	●														
18.2	TLZ1820	●														
18.3	TLZ1830	●														
18.4	TLZ1840	●														
18.5	TLZ1850	●														

1 insert per case.

●: Standard stock items



Clamp screw	Recommended torque (N・m)
DSW-2045H	0.9
TSW-2556H	1.2
TSW-2567H	1.2
DSW-307H	2.1
DSW-309H	2.1
TSW-3510H	3.0
TSW-3512H	3.0

■ Insert ■ Body ■ Parts ■ Recommended arbor

Drill dia. (mm)	Insert				Body										Parts		Arbor
	Insert No.	PVD coated	Dimensions (mm)		Applicable dia.		TLZD type (0.7-1D)								Clamp screw	Wrench (Not be included)	
φDc		JC7550	A	T	Over	0r under	Tool No.	Stock	Dimensions (mm) Lf	φDb	MD	C	W				 See page 13 for the detail of arbor.
18.6	TLZ1860	●	13.6	6.0	18.5	19.5	TLZD1900-M10	●	38.5	18	M10	9	14		TSW-2567H	A-08	MSN-M10-＊＊S-S18C
18.7	TLZ1870	●															
18.8	TLZ1880	●															
18.9	TLZ1890	●															
19	TLZ1900	●															
19.1	TLZ1910	●															
19.2	TLZ1920	●															
19.3	TLZ1930	●															
19.4	TLZ1940	●															
19.5	TLZ1950	●															
19.6	TLZ1960	●	14.6	6.5	19.5	20.5	TLZD2000-M10	●	38.5	19	M10	9	14		TSW-2567H	A-08	MSN-M10-＊＊-S20C
19.7	TLZ1970	●															
19.8	TLZ1980	●															
19.9	TLZ1990	●															
20	TLZ2000	●															
20.5	TLZ2050	●															
21	TLZ2100	●	15.2	6.7	20.5	21.5	TLZD2100-M10	●	38.5	20	M10	9	14		TSW-2567H	A-08	MSN-M10-＊＊S-S20C
21.5	TLZ2150	●															
22	TLZ2200	●	15.9	7.5	21.5	22.5	TLZD2200-M10	●	38.5	21	M10	9	14		DSW-307H	A-10	MSN-M10-＊＊S-S20C
22.5	TLZ2250	●															
23	TLZ2300	●	16.7	7.5	22.5	23.5	TLZD2300-M10	●	38.5	22	M10	9	14		DSW-307H	A-10	MSN-M10-＊＊S-S20C
23.5	TLZ2350	●															
24	TLZ2400	●	17.4	8.0	23.5	24.5	TLZD2400-M12	●	43	23	M12	11	19		DSW-307H	A-10	MSN-M12-＊＊S-S23C
24.5	TLZ2450	●															
25	TLZ2500	●	18.3	8.0	24.5	25.5	TLZD2500-M12	●	43	24	M12	11	19		DSW-309H	A-10	MSN-M12-＊＊-S25C
25.5	TLZ2550	●															
26	TLZ2600	●	18.8	8.5	25.5	26.5	TLZD2600-M12	●	43	25	M12	11	19		DSW-309H	A-10	MSN-M12-＊＊S-S20C
26.5	TLZ2650	●															
27	TLZ2700	●	19.5	8.5	26.5	27.5	TLZD2700-M12	●	43	26	M12	11	19		DSW-309H	A-10	MSN-M12-＊＊S-S20C
27.5	TLZ2750	●															
28	TLZ2800	●	20.3	9.0	27.5	28.5	TLZD2800-M12	●	43	27	M12	11	19		TSW-3510H	A-15	MSN-M12-＊＊S-S20C
28.5	TLZ2850	●															
29	TLZ2900	●	21.1	9.0	28.5	29.5	TLZD2900-M16	●	51	28	M16	12	22		TSW-3510H	A-15	MSN-M16-＊＊S-S28C
29.5	TLZ2950	●															
30	TLZ3000	●	21.5	9.5	29.5	30.5	TLZD3000-M16	●	51	29	M16	12	22		TSW-3510H	A-15	MSN-M16-＊＊-S32C
30.5	TLZ3050	●															
31	TLZ3100	●	22.3	10.0	30.5	31.5	TLZD3100-M16	●	51	30	M16	12	22		TSW-3512H	A-15	MSN-M16-＊＊-S32C
31.5	TLZ3150	●															
32	TLZ3200	●	23.1	10.0	31.5	32.5	TLZD3200-M16	●	51	31	M16	14	26		TSW-3512H	A-15	MSN-M16-＊＊-S32C

1 insert per case.

●: Standard stock items

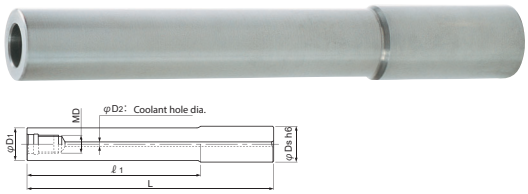
Note) 1. Please see page 14-21 for recommended cutting conditions.
2. All cutters are supplied without inserts.
3. Please see page 22 for tightening torque of modular head.
4. Please see page 8 for procedure of mounting insert.
5. All cutters are supplied without wrench & MOLY since February 2019 for our stock production.
6. Please see page 13 for the detail of arbor.

Line up

MSN Carbide shank arbor

■End mill shank type

●Through coolant hole ●For high productivity



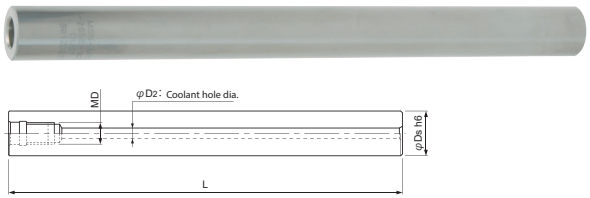
■ For the exclusive use of modular head TLZD type

Cat. No.	Stock	Dimensions (mm)						Weight (kg)
		φDs	ℓ1	L	φD1	MD	φD2	
MSN-M6-15-S16C	●	16	15	60	13.5	M6	3	0.15
MSN-M6-30-S16C	●		30	80				0.19
MSN-M6-50-S16C	●		50	100				0.23
MSN-M6-80-S16C	●		80	130				0.28

●: Standard stock items

■ Straight arbor type

●Through coolant hole ●For high productivity



Item code	Stock	Dimensions (mm)				Weight (kg)
		φDs	L	MD	φD2	
MSN-M8-87S-S14C	●	14	87	M8	4	0.16
MSN-M8-137S-S14C	●		137			0.26

●: Standard stock items

Note) Please see page 22 for recommended tightening torque.

Recommended cutting conditions

TLZD type (modular head) NEW

Work material	Mild steel (Below 180HB)				Carbon steel (C50) Below 280HB				Alloy steel (1.7223) 280～350HB			
V_c (m/min)	70 (φ14～φ32)				70 (φ14～φ32)				70 (φ14～φ32)			
f (mm/rev)	0.04～0.06 (φ14) 0.04～0.08 (φ15～φ18) 0.04～0.09 (φ19～φ23) 0.06～0.12 (φ24～φ28) 0.06～0.14 (φ29～φ32)				0.04～0.06 (φ14) 0.04～0.08 (φ15～φ18) 0.04～0.09 (φ19～φ23) 0.06～0.12 (φ24～φ28) 0.06～0.14 (φ29～φ32)				0.03～0.05 (φ14) 0.03～0.06 (φ15～φ18) 0.04～0.07 (φ19～φ23) 0.05～0.09 (φ24～φ28) 0.06～0.11 (φ29～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
14	40	10	1,590	100	40	10	1,590	100	40	10	1,590	80
	60	10	1,590	60	60	10	1,590	60	60	10	1,590	50
	80	10	1,590	60	80	10	1,590	60	80	10	1,590	50
	—	—	—	—	—	—	—	—	—	—	—	—
15	50	11	1,490	110	50	11	1,490	110	50	11	1,490	90
	70	11	1,490	90	70	11	1,490	90	70	11	1,490	70
	110	11	1,490	60	110	11	1,490	60	110	11	1,490	45
16	50	11	1,390	105	50	11	1,390	105	50	11	1,390	85
	70	11	1,390	85	70	11	1,390	85	70	11	1,390	65
	110	11	1,390	55	110	11	1,390	55	110	11	1,390	40
17	50	12	1,310	100	50	12	1,310	100	50	12	1,310	80
	70	12	1,310	80	70	12	1,310	80	70	12	1,310	60
	110	12	1,310	50	110	12	1,310	50	110	12	1,310	40
18	50	13	1,240	100	50	13	1,240	100	50	13	1,240	75
	70	13	1,240	75	70	13	1,240	75	70	13	1,240	55
	110	13	1,240	50	110	13	1,240	50	110	13	1,240	35
19	60	19	1,170	105	60	19	1,170	105	60	19	1,170	85
	80	19	1,170	95	80	19	1,170	95	80	19	1,170	75
	110	19	1,170	70	110	19	1,170	70	110	19	1,170	65
	130	19	1,170	50	130	19	1,170	50	130	19	1,170	45
	—	—	—	—	—	—	—	—	—	—	—	—
20	60	20	1,110	100	60	20	1,110	100	60	20	1,110	80
	80	20	1,110	90	80	20	1,110	90	80	20	1,110	70
	110	20	1,110	70	110	20	1,110	70	110	20	1,110	60
	130	20	1,110	50	130	20	1,110	50	130	20	1,110	40
	—	—	—	—	—	—	—	—	—	—	—	—
21	60	21	1,060	95	60	21	1,060	95	60	21	1,060	75
	80	21	1,060	85	80	21	1,060	85	80	21	1,060	65
	110	21	1,060	65	110	21	1,060	65	110	21	1,060	55
	130	21	1,060	45	130	21	1,060	45	130	21	1,060	35
	—	—	—	—	—	—	—	—	—	—	—	—

V_c : Cutting speed ℓ : Overhung length H : Max. drilling depth n : Spindle speed V_f : Feed speed f : feed rate

Attention for use
1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Recommended cutting conditions

TLZD type (modular head)

NEW

Work material	Mild steel (Below 180HB)				Carbon steel (C50) Below 280HB				Alloy steel (1.7223) 280～350HB			
V_c (m/min)	70 (φ14～φ32)				70 (φ14～φ32)				70 (φ14～φ32)			
f (mm/rev)	0.04～0.06 (φ14) 0.04～0.08 (φ15～φ18) 0.04～0.09 (φ19～φ23) 0.06～0.12 (φ24～φ28) 0.06～0.14 (φ29～φ32)				0.04～0.06 (φ14) 0.04～0.08 (φ15～φ18) 0.04～0.09 (φ19～φ23) 0.06～0.12 (φ24～φ28) 0.06～0.14 (φ29～φ32)				0.03～0.05 (φ14) 0.03～0.06 (φ15～φ18) 0.04～0.07 (φ19～φ23) 0.05～0.09 (φ24～φ28) 0.06～0.11 (φ29～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
22	60	22	1,010	90	60	22	1,010	90	60	22	1,010	70
	80	22	1,010	80	80	22	1,010	80	80	22	1,010	60
	110	22	1,010	60	110	22	1,010	60	110	22	1,010	55
	130	22	1,010	40	130	22	1,010	40	130	22	1,010	35
	—	—	—	—	—	—	—	—	—	—	—	—
23	60	23	970	85	60	23	970	85	60	23	970	70
	80	23	970	75	80	23	970	75	80	23	970	60
	110	23	970	55	110	23	970	55	110	23	970	50
	130	23	970	35	130	23	970	35	130	23	970	35
	—	—	—	—	—	—	—	—	—	—	—	—
24	70	24	930	110	70	24	930	110	70	24	930	85
	100	24	930	85	100	24	930	85	100	24	930	75
	150	24	930	65	150	24	930	65	150	24	930	55
	180	24	930	55	180	24	930	55	180	24	930	45
	—	—	—	—	—	—	—	—	—	—	—	—
25	70	25	890	100	70	25	890	100	70	25	890	80
	100	25	890	80	100	25	890	80	100	25	890	70
	150	25	890	60	150	25	890	60	150	25	890	50
	180	25	890	50	180	25	890	50	180	25	890	40
	—	—	—	—	—	—	—	—	—	—	—	—
26	70	26	890	100	70	26	890	100	70	26	860	80
	100	26	890	80	100	26	890	80	100	26	860	70
	150	26	890	60	150	26	890	60	150	26	860	50
	180	26	890	50	180	26	890	50	180	26	860	40
	—	—	—	—	—	—	—	—	—	—	—	—
27	70	27	830	95	70	27	830	95	70	27	830	75
	100	27	830	75	100	27	830	75	100	27	830	65
	150	27	830	55	150	27	830	55	150	27	830	45
	180	27	830	45	180	27	830	45	180	27	830	35
	—	—	—	—	—	—	—	—	—	—	—	—

V_c : Cutting speed ℓ : Overhung length H : Max. drilling depth n : Spindle speed V_f : Feed speed f : feed rate

Attention for use

1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
   But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Work material	Mild steel (Below 180HB)				Carbon steel (C50) Below 280HB				Alloy steel (1.7223) 280～350HB			
V_c (m/min)	70（φ14～φ32）				70（φ14～φ32）				70（φ14～φ32）			
f (mm/rev)	0.04～0.06（φ14） 0.04～0.08（φ15～φ18） 0.04～0.09（φ19～φ23） 0.06～0.12（φ24～φ28） 0.06～0.14（φ29～φ32）				0.04～0.06（φ14） 0.04～0.08（φ15～φ18） 0.04～0.09（φ19～φ23） 0.06～0.12（φ24～φ28） 0.06～0.14（φ29～φ32）				0.03～0.05（φ14） 0.03～0.06（φ15～φ18） 0.04～0.07（φ19～φ23） 0.05～0.09（φ24～φ28） 0.06～0.11（φ29～φ32）			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
28	70	28	800	95	70	28	800	95	70	28	800	75
	100	28	800	75	100	28	800	75	100	28	800	65
	150	28	800	55	150	28	800	55	150	28	800	45
	180	28	800	45	180	28	800	45	180	28	800	35
	—	—	—	—	—	—	—	—	—	—	—	—
29	80	29	770	105	80	29	770	105	80	29	770	85
	110	29	770	85	110	29	770	85	110	29	770	75
	130	29	770	75	130	29	770	75	130	29	770	65
	150	29	770	70	150	29	770	70	150	29	770	55
	180	29	770	45	180	29	770	45	180	29	770	45
	—	—	—	—	—	—	—	—	—	—	—	—
30	80	30	740	105	80	30	740	105	80	30	740	85
	110	30	740	85	110	30	740	85	110	30	740	75
	130	30	740	75	130	30	740	75	130	30	740	60
	150	30	740	70	150	30	740	70	150	30	740	50
	180	30	740	45	180	30	740	45	180	30	740	40
	—	—	—	—	—	—	—	—	—	—	—	—
31	80	31	720	100	80	31	720	100	80	31	720	80
	110	31	720	80	110	31	720	80	110	31	720	70
	130	31	720	70	130	31	720	70	130	31	720	60
	150	31	720	65	150	31	720	65	150	31	720	50
	180	31	720	40	180	31	720	40	180	31	720	40
	—	—	—	—	—	—	—	—	—	—	—	—
32	80	32	700	100	80	32	700	100	80	32	700	80
	110	32	700	80	110	32	700	80	110	32	700	70
	130	32	700	70	130	32	700	70	130	32	700	60
	150	32	700	60	150	32	700	60	150	32	700	50
	180	32	700	40	180	32	700	40	180	32	700	40
	—	—	—	—	—	—	—	—	—	—	—	—

V_c : Cutting speed　ℓ : Overhung length　H : Max. drilling depth　n : Spindle speed　V_f : Feed speed　f : feed rate

Attention for use

1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
   But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Recommended cutting conditions

TLZD type (modular head)

NEW

Work material	Mold steel (P21) 40HRC				Cast iron (GG, GGG)				Stainless steel			
Vc (m/min)	40 (φ14～φ32)				100 (φ14～φ32)				100 (φ14～φ32)			
f (mm/rev)	0.02～0.06 (φ14) 0.03～0.07 (φ15～φ18) 0.03～0.08 (φ19～φ23) 0.04～0.10 (φ24～φ28) 0.05～0.13 (φ29～φ32)				0.02～0.07 (φ14) 0.04～0.09 (φ15～φ18) 0.02～0.10 (φ19～φ23) 0.02～0.12 (φ24～φ28) 0.02～0.13 (φ29～φ32)				0.02～0.04 (φ14～φ23) 0.03～0.04 (φ24～φ32)			
Drill dia. (mm)	*ℓ* (mm)	*H* (mm)	*n* (min^{-1})	*Vf* (mm/min)	*ℓ* (mm)	*H* (mm)	*n* (min^{-1})	*Vf* (mm/min)	*ℓ* (mm)	*H* (mm)	*n* (min^{-1})	*Vf* (mm/min)
14	40	10	910	50	40	10	2,270	160	40	10	2,270	80
	60	10	910	20	60	10	2,270	100	60	10	2,270	50
	80	10	910	20	80	10	2,270	100	80	10	2,270	50
	—	—	—	—	110	10	2,270	50	—	—	—	—
15	50	11	850	55	50	11	2,120	180	50	11	2,120	80
	70	11	850	45	70	11	2,120	150	70	11	2,120	65
	110	11	850	25	110	11	2,120	90	110	11	2,120	45
16	50	11	800	50	50	11	1,990	170	50	11	1,990	70
	70	11	800	40	70	11	1,990	140	70	11	1,990	60
	110	11	800	20	110	11	1,990	85	110	11	1,990	40
17	50	12	750	50	50	12	1,870	160	50	12	1,870	70
	70	12	750	40	70	12	1,870	130	70	12	1,870	60
	110	12	750	20	110	12	1,870	80	110	12	1,870	40
18	50	13	710	45	50	13	1,770	150	50	13	1,770	65
	70	13	710	35	70	13	1,770	120	70	13	1,770	55
	110	13	710	20	110	13	1,770	75	110	13	1,770	35
19	60	19	670	50	60	19	1,670	155	60	19	1,670	60
	80	19	670	40	80	19	1,670	135	80	19	1,670	50
	110	19	670	30	110	19	1,670	105	110	19	1,670	40
	130	19	670	20	130	19	1,670	75	130	19	1,670	30
	—	—	—	—	180	19	1,670	30	—	—	—	—
20	60	20	640	50	60	20	1,590	150	60	20	1,590	60
	80	20	640	40	80	20	1,590	130	80	20	1,590	50
	110	20	640	30	110	20	1,590	100	110	20	1,590	40
	130	20	640	20	130	20	1,590	70	130	20	1,590	30
	—	—	—	—	180	20	1,590	30	—	—	—	—
21	60	21	610	50	60	21	1,510	140	60	21	1,510	55
	80	21	610	40	80	21	1,510	120	80	21	1,510	45
	110	21	610	30	110	21	1,510	95	110	21	1,510	35
	130	21	610	20	130	21	1,510	65	130	21	1,510	25
	—	—	—	—	180	21	1,510	25	—	—	—	—

Vc : Cutting speed *ℓ* : Overhung length *H* : Max. drilling depth *n* : Spindle speed *Vf* : Feed speed *f* : feed rate

Attention for use
1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Work material	Mold steel (P21) 40HRC				Cast iron (GG, GGG)				Stainless steel			
V_c (m/min)	40 (φ14～φ32)				100 (φ14～φ32)				100 (φ14～φ32)			
f (mm/rev)	0.02～0.06 (φ14) 0.03～0.07 (φ15～φ18) 0.03～0.08 (φ19～φ23) 0.04～0.10 (φ24～φ28) 0.05～0.13 (φ29～φ32)				0.02～0.07 (φ14) 0.04～0.09 (φ15～φ18) 0.02～0.10 (φ19～φ23) 0.02～0.12 (φ24～φ28) 0.02～0.13 (φ29～φ32)				0.02～0.04 (φ14～φ23) 0.03～0.04 (φ24～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
22	60	22	580	45	60	22	1,450	135	60	22	1,450	55
	80	22	580	35	80	22	1,450	115	80	22	1,450	45
	110	22	580	25	110	22	1,450	90	110	22	1,450	35
	130	22	580	15	130	22	1,450	65	130	22	1,450	25
	—	—	—	—	180	22	1,450	25	—	—	—	—
23	60	23	550	45	60	23	1,380	130	60	23	1,380	50
	80	23	550	35	80	23	1,380	110	80	23	1,380	40
	110	23	550	25	110	23	1,380	85	110	23	1,380	35
	130	23	550	15	130	23	1,380	60	130	23	1,380	25
	—	—	—	—	180	23	1,380	25	—	—	—	—
24	70	24	530	55	70	24	1,330	150	70	24	1,330	55
	100	24	530	45	100	24	1,330	120	100	24	1,330	45
	150	24	530	30	150	24	1,330	85	150	24	1,330	35
	180	24	530	20	180	24	1,330	75	180	24	1,330	35
	—	—	—	—	200	24	1,330	35	—	—	—	—
25	70	25	510	50	70	25	1,270	145	70	25	1,270	50
	100	25	510	40	100	25	1,270	115	100	25	1,270	40
	150	25	510	30	150	25	1,270	80	150	25	1,270	30
	180	25	510	20	180	25	1,270	70	180	25	1,270	30
	—	—	—	—	200	25	1,270	30	—	—	—	—
26	70	26	490	50	70	26	1,220	140	70	26	1,220	50
	100	26	490	40	100	26	1,220	110	100	26	1,220	40
	150	26	490	30	150	26	1,220	80	150	26	1,220	30
	180	26	490	20	180	26	1,220	70	180	26	1,220	30
	—	—	—	—	200	26	1,220	30	—	—	—	—
27	70	27	470	50	70	27	1,180	135	70	27	1,180	50
	100	27	470	40	100	27	1,180	105	100	27	1,180	40
	150	27	470	30	150	27	1,180	75	150	27	1,180	30
	180	27	470	20	180	27	1,180	65	180	27	1,180	30
	—	—	—	—	200	27	1,180	30	—	—	—	—

V_c : Cutting speed ℓ : Overhung length H : Max. drilling depth n : Spindle speed V_f : Feed speed f : feed rate

Attention for use

1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
   But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Recommended cutting conditions

TLZD type (modular head) NEW

Work material	Mold steel (P21) 40HRC				Cast iron (GG, GGG)				Stainless steel			
V_c (m/min)	40 (φ14～φ32)				100 (φ14～φ32)				100 (φ14～φ32)			
f (mm/rev)	0.02～0.06 (φ14) 0.03～0.07 (φ15～φ18) 0.03～0.08 (φ19～φ23) 0.04～0.10 (φ24～φ28) 0.05～0.13 (φ29～φ32)				0.02～0.07 (φ14) 0.04～0.09 (φ15～φ18) 0.02～0.10 (φ19～φ23) 0.02～0.12 (φ24～φ28) 0.02～0.13 (φ29～φ32)				0.02～0.04 (φ14～φ23) 0.03～0.04 (φ24～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
28	70	28	450	45	70	28	1,140	130	70	28	1,140	45
	100	28	450	35	100	28	1,140	100	100	28	1,140	35
	150	28	450	30	150	28	1,140	75	150	28	1,140	25
	180	28	450	20	180	28	1,140	65	180	28	1,140	25
	—	—	—	—	200	28	1,140	30	—	—	—	—
29	80	29	440	55	80	29	1,100	140	80	29	1,100	45
	110	29	440	45	110	29	1,100	110	110	29	1,100	45
	130	29	440	40	130	29	1,100	100	130	29	1,100	40
	150	29	440	30	150	29	1,100	90	150	29	1,100	30
	180	29	440	20	180	29	1,100	55	180	29	1,100	30
	—	—	—	—	210	29	1,100	20	—	—	—	—
30	80	30	420	50	80	30	1,060	135	80	30	1,060	40
	110	30	420	40	110	30	1,060	105	110	30	1,060	40
	130	30	420	35	130	30	1,060	95	130	30	1,060	35
	150	30	420	30	150	30	1,060	85	150	30	1,060	30
	180	30	420	20	180	30	1,060	50	180	30	1,060	30
	—	—	—	—	210	30	1,060	20	—	—	—	—
31	80	31	410	50	80	31	1,030	130	80	31	1,030	40
	110	31	410	40	110	31	1,030	100	110	31	1,030	40
	130	31	410	35	130	31	1,030	90	130	31	1,030	35
	150	31	410	30	150	31	1,030	80	150	31	1,030	30
	180	31	410	20	180	31	1,030	50	180	31	1,030	30
	—	—	—	—	210	31	1,030	20	—	—	—	—
32	80	32	400	50	80	32	1,000	130	80	32	1,000	40
	110	32	400	40	110	32	1,000	100	110	32	1,000	40
	130	32	400	35	130	32	1,000	90	130	32	1,000	35
	150	32	400	30	150	32	1,000	80	150	32	1,000	30
	180	32	400	20	180	32	1,000	50	180	32	1,000	30
	—	—	—	—	210	32	1,000	20	—	—	—	—

V_c : Cutting speed ℓ : Overhung length H : Max. drilling depth n : Spindle speed V_f : Feed speed f : feed rate

Attention for use

1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
   But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

7/9

Work material	Aluminum alloy			
V_c (m/min)	100 (φ14～φ32)			
f (mm/rev)	0.02～0.07 (φ14) 0.04～0.09 (φ15～φ18) 0.02～0.10 (φ19～φ23) 0.02～0.12 (φ24～φ28) 0.02～0.13 (φ29～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
14	40	10	2,270	160
	60	10	2,270	100
	80	10	2,270	100
	110	10	2,270	50
15	50	11	2,120	180
	70	11	2,120	150
	110	11	2,120	90
16	50	11	1,990	170
	70	11	1,990	140
	110	11	1,990	85
17	50	12	1,870	160
	70	12	1,870	130
	110	12	1,870	80
18	50	13	1,770	150
	70	13	1,770	120
	110	13	1,770	75
19	60	19	1,670	155
	80	19	1,670	135
	110	19	1,670	105
	130	19	1,670	75
	180	19	1,670	30
20	60	20	1,590	150
	80	20	1,590	130
	110	20	1,590	100
	130	20	1,590	70
	180	20	1,590	30
21	60	21	1,510	140
	80	21	1,510	120
	110	21	1,510	95
	130	21	1,510	65
	180	21	1,510	25

8/9

Work material	Aluminum alloy			
V_c (m/min)	100 (φ14～φ32)			
f (mm/rev)	0.02～0.07 (φ14) 0.04～0.09 (φ15～φ18) 0.02～0.10 (φ19～φ23) 0.02～0.12 (φ24～φ28) 0.02～0.13 (φ29～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
22	60	22	1,450	135
	80	22	1,450	115
	110	22	1,450	90
	130	22	1,450	65
	180	22	1,450	25
23	60	23	1,380	130
	80	23	1,380	110
	110	23	1,380	85
	130	23	1,380	60
	180	23	1,380	25
24	70	24	1,330	150
	100	24	1,330	120
	150	24	1,330	85
	180	24	1,330	75
	200	24	1,330	35
25	70	25	1,270	145
	100	25	1,270	115
	150	25	1,270	80
	180	25	1,270	70
	200	25	1,270	30
26	70	26	1,220	140
	100	26	1,220	110
	150	26	1,220	80
	180	26	1,220	70
	200	26	1,220	30
27	70	27	1,180	135
	100	27	1,180	105
	150	27	1,180	75
	180	27	1,180	65
	200	27	1,180	30

V_c : Cutting speed ℓ : Overhung length H : Max. drilling depth n : Spindle speed V_f : Feed speed f : feed rate

Attention for use

1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
   But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Recommended cutting conditions

TLZD type (modular head) NEW

9/9

Work material	Aluminum alloy			
V_c (m/min)	100 (φ14～φ32)			
f (mm/rev)	0.02～0.07 (φ14) 0.04～0.09 (φ15～φ18) 0.02～0.10 (φ19～φ23) 0.02～0.12 (φ24～φ28) 0.02～0.13 (φ29～φ32)			
Drill dia. (mm)	ℓ (mm)	H (mm)	n (min^{-1})	V_f (mm/min)
28	70	28	1,140	130
	100	28	1,140	100
	150	28	1,140	75
	180	28	1,140	65
	200	28	1,140	30
29	80	29	1,100	140
	110	29	1,100	110
	130	29	1,100	100
	150	29	1,100	90
	180	29	1,100	55
	210	29	1,100	20
30	80	30	1,060	135
	110	30	1,060	105
	130	30	1,060	95
	150	30	1,060	85
	180	30	1,060	50
	210	30	1,060	20
31	80	31	1,030	130
	110	31	1,030	100
	130	31	1,030	90
	150	31	1,030	80
	180	31	1,030	50
	210	31	1,030	20
32	80	32	1,000	130
	110	32	1,000	100
	130	32	1,000	90
	150	32	1,000	80
	180	32	1,000	50
	210	32	1,000	20

V_c : Cutting speed ℓ : Overhung length H : Max. drilling depth n : Spindle speed V_f : Feed speed f : feed rate

Attention for use
1. Above cutting conditions are for drilling flat surface. In case of drilling slope, the figure to be adjusted as below:For inclined angle under 30°, reduce Feed speed (Vf) to 40-80%, and for inclined angle 30° or more, reduce Feed speed (Vf) to 20-50%.
2. Above cutting conditions are for drilling with water soluble. In case of dry cutting, use air blow to remove the chips.
3. In case of drilling depth over recommendation value H, machine guide hole or use step feed for breaking chips.
4. Horizontal milling is impossible.
5. In case of long chips evacuated, adjust above conditions by increasing Feed speed (Vf) or using step feed for breaking chips.
But, in case of machining stainless steel, not recommend to increase Feed speed for breaking chips. Please increase cutting speed (Vc) and reduce Feed speed (Vf) so that bellows-shaped chips can be occurred.

Line up

Attention

⚠ Attention to mounting head and MSN/ MGN shank holder.

■Tightening procedure

① Cleaning

Remove dirt and chips with air from the connecting thread and face of modular head and MSN/MGN shank holder.

② Initial Tightening

Tighten by hand until the head and the shank holder faces touch.

③ Final Tightening

Tighten slowly with torque control spanner wrench or DIJET DS type spanner wrench and confirm that there is no gap.

Attention : Final tightening without initial tightening cause connecting thread damage.

⚠ NOTE

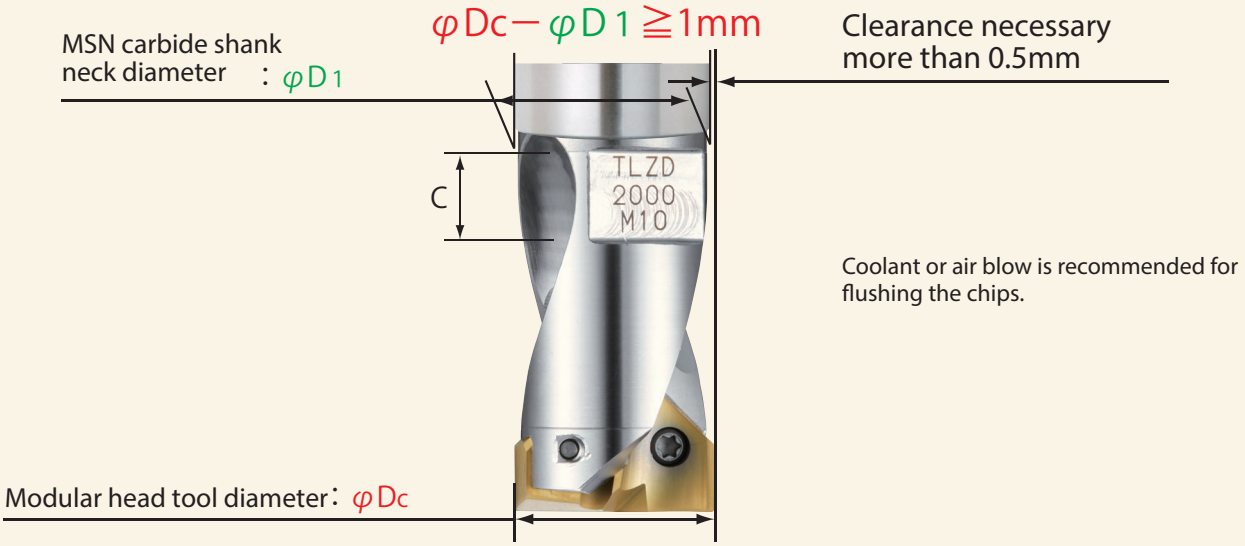
Note) 1. Only use the torque control spanner wrench or DIJET DS type spanner wrench.
2. Please gently apply pressure on wrench.
3. Please confirm that there is no gap between MSN/MGN shank holder and modular head.

Thread	Tightening torque	Spanner size W(mm)
M6	8.0N・m	8☆
M8	16N・m	10, 12☆
M10	16N・m	14, 15
M12	20N・m	17, 19
M16	25N・m	22, 26

Note) 1. Modular heads are supplied without spanner wrench.
2. In case of choosing torque control spanner wrench, confirm that the wrench size is match to the dimensions W & C of each modular head. (There are some cases that modifying the thickness of spanner wrench is necessary)

⚠ Selection of "MSN Carbide shank holder"

In case of using modular head over φ16mm, please select MSN carbide shank that diameter (φD1) is 1mm or more smaller than modular head (φDc). A wrong selection causes damage to the carbide shank.



⚠ Caution for the mounting to shrink fit holder.

When you use a carbide shank and a modular head on the shrink fit holder, please shrink fit the only carbide shank without mounting a modular head together. Please mount a modular head after shrinking fit operation.

Note) In case of shrink fit MSN shank + modular head together, it will be difficult to loose due to heat desipation.

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