

Brazed

BTA

Deep Hole Drilling



How to use this catalog

Option 1

Standard brazed BTA drill features and size information are listed in Sections 2 and 3 on each page. Use the guide and information in Sections 4 and 6 for tailored tools for specific components and applications.

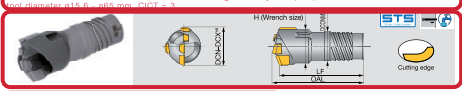
Option 2

For brazed BTA drill head details go to Page 06.

Note: The products are arranged in increasing order of diameter.

1 **BRAZED DRILL HEAD** STS
BTG (for general purpose)

2 Brazed drill head with external 4-start thread for single tube system (STS).
Head diameter: 4 x D_{HT} - 0.05 mm - 0.125 - 1

3 

4 **Non-stocked standard products (to be supplied on request)**

When ordering
BTG00971-xx.xx AHM930

Drill head Diameter (mm) Grade

e.g. Designation for tool diameter ø10.2 mm: BTG00971-16.20 AHM930

5 **ISO classifications for grades**

Grade	5	10	15	20	25	30	35	40
AHMF50								
AHMF20								
AHMF10								
AHMF05								
AHMF02								
AHMF01								


6 **Dimension table of Non-stocked standard products**


Designation	Drill tube		OAL	LF	DCONMS	H		
	DCM	DCX						
BTG00971-xx.xx	16.6	16.2	ST0097	14	45	40.3	12.6	1
BTG00972-xx.xx	16.2	16.2	ST0097	14	45	40.3	12.6	14
BTG00981-xx.xx	18.74	17.2	ST0098	15	45	40.3	13.6	15
BTG00982-xx.xx	17.2	17.2	ST0098	15	45	40.3	13.6	15
BTG00989-xx.xx	17.78	18.4	ST0099	16	47	44.2	14.5	15
BTG00990-xx.xx	18.4	18.9	ST0099	16	47	44.1	14.5	15
BTG01-xx.xx	18.9	19.2	ST0000	17	47	44.1	15.5	17
BTG02-xx.xx	19.2	20	ST0000	17	47	44	15.5	18
BTG01-xx.xx	20.0	20.8	ST005	18	52.5	49.4	16	18
BTG02-xx.xx	20.0	21.8	ST010	18	52.5	49.4	16	18
BTG02-xx.xx	21.8	22.6	ST010	20	56	52.8	18	20
BTG02-xx.xx	22.6	24.1	ST011	20	56	52.8	18	21
BTG03-xx.xx	24.1	25.2	ST012	22	57.5	54	19.5	23
BTG03-xx.xx	24.1	26.6	ST012	22	57.5	54	19.5	24
BTG04-xx.xx	26.6	27.6	ST013	24	57.5	53.8	21	26
BTG04-xx.xx	27.6	28.7	ST013	24	57.5	53.8	21	26
BTG05-xx.xx	28.7	29.8	ST014	26	63.5	59.3	23.5	28
BTG05-xx.xx	29.8	30.8	ST014	26	63.5	59.3	23.5	28
BTG05-xx.xx	30.8	32.1	ST015	28	63.5	59.1	25.5	30
BTG06-xx.xx	32.1	33.3	ST015	28	63.5	59.1	25.5	30
BTG07-xx.xx	33.3	34.8	ST016	30	63.5	59	28	33
BTG07-xx.xx	34.8	36.5	ST016	30	63.5	58.9	28	33
BTG08-xx.xx	36.5	37.8	ST017	33	73.5	68.7	30	34
BTG09-xx.xx	37.8	38.4	ST017	33	73.5	68.5	30	35
BTG08-xx.xx	38.4	39.6	ST017	33	73.5	68.3	30	36
BTG09-xx.xx	39.6	40.6	ST018	36	73.5	68.2	33	37
BTG09-xx.xx	40.6	41.8	ST018	36	73.5	68	33	38
BTG10-xx.xx	41.8	42	ST019	39	73.5	67.8	33	39
BTG10-xx.xx	42	44.2	ST019	39	75	68.5	36	41
BTG11-xx.xx	44.2	45.9	ST019	39	75	68.3	36	42
BTG12-xx.xx	45.9	47	ST019	39	75	68.1	36	43
BTG11-xx.xx	47	48.5	ST010	43	75	68.8	39	44
BTG12-xx.xx	48.5	50.1	ST010	43	75	68.5	39	45
BTG13-xx.xx	50.1	51.7	ST010	43	75	68.5	39	47
BTG13-xx.xx	51.7	53.6	ST011	47	80	75.5	43	48
BTG12-xx.xx	53.6	54.7	ST011	47	80	75.2	43	50
BTG13-xx.xx	54.7	56.9	ST012	51	84	77.4	47	54
BTG14-xx.xx	56.9	58.8	ST012	51	84	76.8	47	56
BTG15-xx.xx	58.8	60.6	ST012	51	84	76.8	47	57
BTG16-xx.xx	60.6	62.8	ST012	51	84	76.8	47	57
BTG16-xx.xx	62.8	66	ST012	55	84	76.5	50	59
BTG17-xx.xx	66	67.8	ST013	59	84	76.8	51	57
BTG18-xx.xx	67.8	69	ST013	56	84	76.5	51	58


7 Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

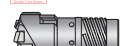
14 www.unitacinc.com


8 **STANDARD CUTTING CONDITIONS**



MBU



UTE


BSG


ETG, ETL, ETU


BTU (2 tip)


BTG, BTL


BTU (3 tip)

ISO Workpiece material	JIS	Condition	Hardness	Cutting speed (m/min)	Feed (mm/min)										
					Vc	f	S	T	W	X	Y	Z			
Carbon steel	STC - SSC	SS	0.1 - 0.25 %C Non-hardened	125	70-130	0.05-0.15	0.1-0.16	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3				
	Cast steel		0.25 - 0.25 %C Non-hardened	100	70-130	0.05-0.15	0.1-0.16	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3				
	High carbon steel		SSC - SSC	250	70-130	0.05-0.15	0.1-0.16	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3				
Low alloy steel			0.35 - 0.65 %C Non-hardened	200	70-130	0.05-0.15	0.1-0.16	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3				
			0.55 - 0.85 %C Non-hardened	200	70-130	0.05-0.15	0.1-0.16	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3				
Cast steel			Non-hardened	200	70-130	0.05-0.15	0.1-0.16	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3				
			Hardened	275	60-110	0.05-0.1	0.1-0.12	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.25				
High alloy steel			Non-hardened	300	60-110	0.05-0.1	0.1-0.12	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.25				
			Hardened	300	70-130	0.05-0.1	0.1-0.12	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.25				
Stainless steel			Non-hardened	200	40-110	0.05-0.13	0.08-0.12	0.08-0.15	0.1-0.28	0.13-0.2	0.16-0.35				
			Hardened	180	40-110	0.05-0.13	0.08-0.12	0.08-0.15	0.1-0.28	0.13-0.2	0.16-0.35				
Titanium alloy			Non-hardened	200	50-110	0.05-0.13	0.08-0.12	0.08-0.15	0.1-0.28	0.13-0.2	0.16-0.35				
			Hardened	180	50-110	0.05-0.13	0.08-0.12	0.08-0.15	0.1-0.28	0.13-0.2	0.16-0.35				

26 www.unitacinc.com

- 1** : Series name
- 2** : Feature
- 3** : Appearance and dimension drawing
- 4** : Ordering requirements of Non-stocked standard products
- 5** : ISO classifications for grades
- 6** : Dimension table of Non-stocked standard products
- 7** : Reference pages
- 8** : Standard cutting conditions

02 www.unitacinc.com

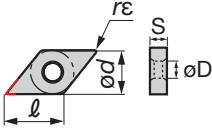
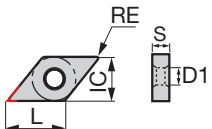
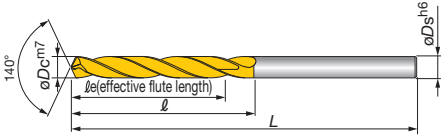
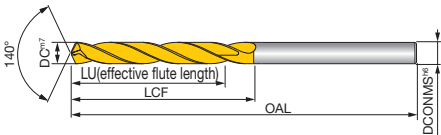
ISO13399 - Cutting tool data representation and exchange

What is ISO13399?

This *Brazed BTA Deep Hole Drilling* catalog is created in compliance with ISO 13399.

ISO13399 defines cutting tool data representation and exchange, allowing the accurate exchange of tooling data among computer aided applications that support and adhere to the standard, including CAD, CAM, CAE, PDM, PLM and tool management systems.

Shown below are examples of the ISO13399 symbols.

	Before	ISO13399
Insert		
Drill		

ISO13399 standardizes not only the format of 2D and 3D CAD data but also the tool dimension symbols (properties) and reference position information. This allows the tool information to be read and combined into NC programs and CAM software, regardless of any tool maker's data. In addition to the General Catalog (paper catalog), we are also updating the symbols in e-catalog (electronic catalog on our website) to the properties conforming to ISO13399. The e-catalog also provides 2D and 3D CAD data in accordance with ISO13399 standard.

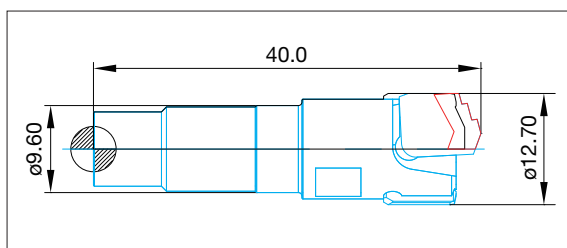
Drill

New symbol	Old symbol	Description
BD	$\phi D1, \phi D2, \phi D3$	Body external diameter
CICT	z	Number of inserts
CND	-	Oil hole diameter
CNT	-	Oil hole plug size
CRKS	S	Mounting screw size
DC	ϕDc	Machining diameter
DCONMS	ϕDs	Mounting part diameter on the machine
DCONWS	$\phi D, \phi d2$	Mounting part diameter on the workpiece
DCSFMS	ϕD	Connecting part diameter
KAPR	κ	Cutting edge angle
LCF	l	Flute length
LF	Lf	Standard length (from the drill shoulder)
LPR	-	Parting length (from flange to tip)
LS	l_s	Shank length
LU	l	Machinable depth
NOF	z	Number of flutes
OAL	L	Overall length (from tip)
PL	PL	Distance from drill tip to shoulder
ZEFP	Z eff	Number of effective cutting edges on periphery

Note:
 - Symbols unspecified in ISO13399 standard and Unitac's original symbols are not included.
 - The symbols still under discussion are included.
 Please note any change or addition may occur.

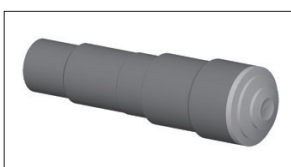
CAD data provided in e-catalog

2D data (DXF format file)



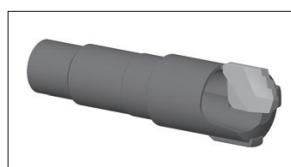
Includes actual cutting edge curve (CUT layer) and body cross section (NOCUT layer).

3D data Light type (STP format file): Can be used to check tool path and interference.



A rotating body model of an actual cutting edge curve and a body cross section.

3D data Detail type (STP format file): Can be used to create a new tool layout chart. (Can be combined with any model on a CAD software.)





Member IMC Group




Brazed BTA tool

Deep Hole Drilling

Page



MBU

 $\varnothing 8 \text{ mm} - \varnothing 14.79 \text{ mm}$

11



UTE

 $\varnothing 12.6 \text{ mm} - \varnothing 20 \text{ mm}$

12

New



BSG

 $\varnothing 15.60 \text{ mm} - \varnothing 16.70 \text{ mm}$

13

New



BTG

 $\varnothing 15.6 \text{ mm} - \varnothing 65 \text{ mm}$

14

New



BTL

 $\varnothing 15.6 \text{ mm} - \varnothing 65 \text{ mm}$

15



BTU

 $\varnothing 12.6 \text{ mm} - \varnothing 65 \text{ mm}$

16

New



ETG

 $\varnothing 18.4 \text{ mm} - \varnothing 65 \text{ mm}$

18

New



ETL

 $\varnothing 18.4 \text{ mm} - \varnothing 65 \text{ mm}$

19




ETU

 $\varnothing 18.4 \text{ mm} - \varnothing 65 \text{ mm}$

20

Drill Head Categories

Brazed Drill Heads

Applications		STS (Single Tube System)					
		MBU	UTE	New BSG	New BTG	New BTL	BTU
Brazed drill heads							
Drill diameter (mm)		ø8 - ø14.79	ø12.6 - ø20	ø15.6 - ø16.7	ø15.6 - ø65	ø15.6 - ø65	ø12.6 - ø65
Thread type	External single-start thread	○	-	-	-	-	-
	External 2-start thread	-	○*1	-	-	-	○
	External 4-start thread	-	○*2	○	○	○	○
Hole tolerance		IT9	IT9	IT9	IT9	IT9	IT9
Surface finish Ra (µm)		2	2	2	2	2	2
Machine	Deep hole drilling machines	○	○	○	○	○	○
	NC machines	-	-	-	-	-	-
	Lathes	-	-	-	-	-	-
	Machining centers M/C	-	-	-	-	-	-
Workpiece material	P Steel	★★★	★★★	★★★	★★★	★★★	★★
	M Stainless	★★★	★★★	★★★	★★★	★★★	★★
	K Cast iron	★★★	★★★	★★★	★★★	★★★	★★
	N Non-ferrous	★★★	★★★	★★★	★★★	★★★	★★★
	S Superalloys	★★	★★	★★	★★	★★	★★
	H Hard materials (≥40HRC)	★★	★★	★★	★★	★★	★★
Page		11	12	13	14	15	16 - 17




★★★(Excellent) ←→ ★(Standard)

*1: UTE & BTU Drill head : ø12.6 mm - ø15.59 mm, External 2-start thread

*2: UTE & BTU Drill head : ø15.6 mm - ø65 mm, External 4-start thread

Drill Head Categories

Brazed Drill Heads

Applications		DTS (Double Tube System)		
		New ETG	New ETL	ETU
Brazed drill heads				
Drill diameter (mm)		ø18.4 - ø65	ø18.4 - ø65	ø18.4 - ø65
Thread type	External single-start thread	-	-	-
	External 2-start thread	-	-	-
	External 4-start thread	○	○	○
Hole tolerance		IT9	IT9	IT9
Surface finish Ra (µm)		2	2	2
Machine	Deep hole drilling machines	○	○	○
	NC machines	○	○	○
	Lathes	○	○	○
	Machining centers M/C	○	○	○
Workpiece material	P Steel	★★★	★★★	★★
	M Stainless	★★★	★★★	★★
	K Cast iron	★★★	★★★	★★
	N Non-ferrous	★★★	★★★	★★★
	S Superalloys	★★	★★	★★
	H Hard materials (≥40HRC)	★★	★★	★★
Page		18	19	20

★★★(Excellent) ←→ ★(Standard)

■ Brazed drill head — Coated area

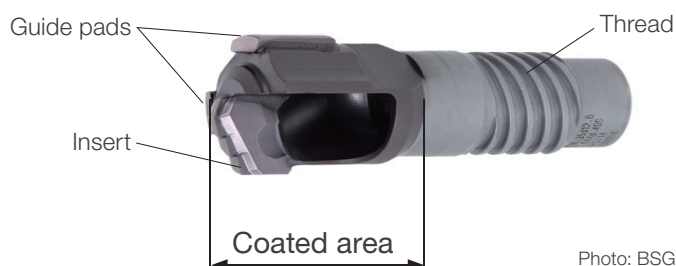






Photo: BSG







Tool Grades

Grade	Coating		Application	Features	Brazed drill heads			
	Main composition	Thickness / μm			MBU	UTE	New BSG BTG/BTL ETG/ETL	BTU ETU
AHM930 P15 - P35 M25 - M35 K10 - K25 S15 - S30	(Ti, Al)N	4.5	P M K S	- High wear resistance - Designed for drilling various materials				
1122 P10 - P30 K15 - K25 N15 - N25 S15 - S25 H15 - H25	TiAlCr	2.5	P K N S H	- High wear resistance - Suitable for steel, cast iron, and difficult-to-cut material	○	○		○
3112 M15 - M25 K10 - K20 N15 - N25 S15 - S25 H15 - H25	TiAlCr	2.5	M K N S H	- Good balance between wear and fracture resistance	○	○		
3132 K15 - K25 N10 - N20 S15 - S25 H15 - H25	TiAlCr	2.5	K N S H	- First choice for heat-resistant alloy under general cutting conditions		○		○

Note: Being brazed tools, the grade codes represent the grade combination of the brazed carbide tip and guide pad grades. They do not represent the individual grade of carbide tips or guide pads.

Drill Tube Categories

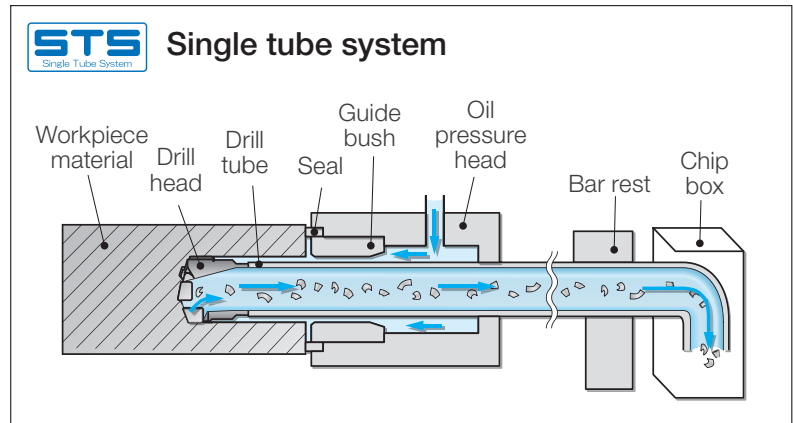
Drill Tubes

Applications			STS (Single Tube System) 			DTS (Double Tube System) 		
			UMBB	ST	ST	OT	IT	
Drill tubes								
Tube diameter (mm)			ø7.1 - ø12	ø11 - ø13	ø14 - ø56	ø18 - ø55.5	ø12 - ø43	
Thread type			Internal single-start thread	Internal 2-start thread	Internal 4-start thread	Internal 4-start thread	-	
Drill heads	Brazed	For solid drilling	MBU	○	-	-	-	-
			BSG, UTE BTG, BTL, BTU	-	○	○	-	-
			ETG, ETL, ETU	-	-	-	○	○
Drill diameter (mm)			ø8 - ø14.79	ø12.6 - ø15.59	ø15.6 - ø65	ø18.4 - ø65	ø18.4 - ø65	
Page			22	22	22	24	24	

Single Tube System (STS) and Double Tube System (DTS)

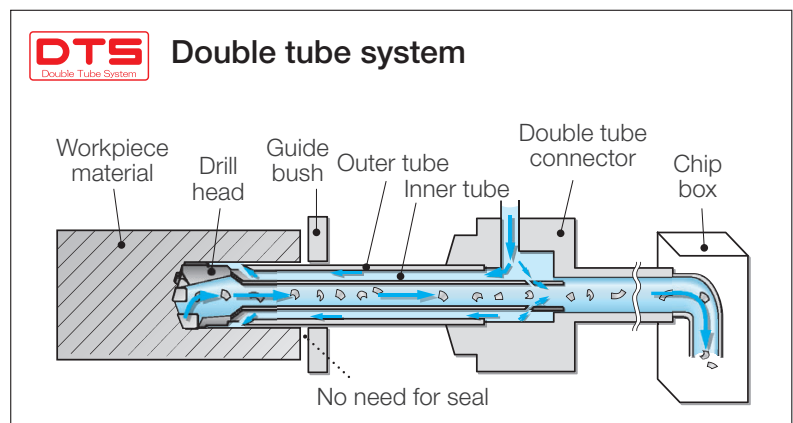
Single Tube System (STS)

The STS is also referred to as the BTA system in the deep hole drilling process. A large volume of coolant is pumped under high pressure to the cutting area in the workpiece. Chips are then forced out through the drill tube at the back and do not touch the workpiece providing an outstanding surface finish. STS is a stable method to create holes with high accuracy by using a dedicated drilling machine and a sealing with the workpiece.



Double Tube System (DTS)

The DTS is characterized by its two tube construction and is therefore known as the double tube system. A sealing system and pressure head, which is required in the Single Tube System (STS), is not necessary for the DTS and it is therefore suitable for conventional general purpose machines such as lathes or machining centers. In general, because of less efficient chip evacuation than the STS, the recommended max drilling depth is 1000mm. The unique DTC-R tube connector that is capable of supplying high pressure coolant can, however, successfully achieve drilling depths of up to 2000mm.



Brazed Drill Head

ø8 mm - ø65 mm

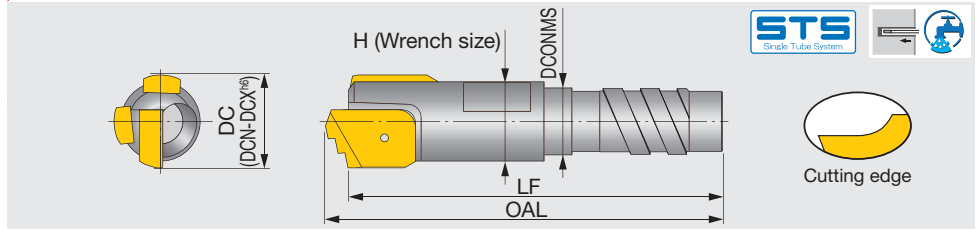


BRAZED DRILL HEAD



MBU

Brazed drill head with external single-start thread for single tube system (STS), tool diameter $\varnothing 8 - \varnothing 14.79$ mm, CICT = 1



Non-stocked standard products (to be supplied on request)

When ordering

MBU-0899-1	xx.xx	1122
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 9$ mm: MBU-0899-1 9.00 1122

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	1122								
M	3112								
K	3112								
N	3112								
S	3112								
H	3112								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
MBU-0899-1 xx.xx	8	8.32	UMBB071	7.1	36	34	6	6
MBU-0899-2 xx.xx	8.33	8.65	UMBB071	7.1	36	34	6	6
MBU-0899-3 xx.xx	8.66	8.99	UMBB071	7.1	36	34	6	6
MBU-0999-1 xx.xx	9	9.32	UMBB083	8.3	36	34	7.2	7
MBU-0999-2 xx.xx	9.33	9.65	UMBB083	8.3	36	34	7.2	7
MBU-0999-3 xx.xx	9.66	9.99	UMBB083	8.3	36	34	7.2	7
MBU-1099-1 xx.xx	10	10.32	UMBB090	9	36	34	7.6	8
MBU-1099-2 xx.xx	10.33	10.65	UMBB090	9	36	34	7.6	8
MBU-1099-3 xx.xx	10.66	10.99	UMBB090	9	36	34	7.6	8
MBU-1199-1 xx.xx	11	11.32	UMBB100	10	36	34	8.6	9
MBU-1199-2 xx.xx	11.33	11.65	UMBB100	10	36	34	8.6	9
MBU-1199-3 xx.xx	11.66	11.99	UMBB100	10	36	34	8.6	9
MBU-1349-1 xx.xx	12	12.36	UMBB110	11	37	34	9.1	10
MBU-1349-2 xx.xx	12.37	12.73	UMBB110	11	37	34	9.1	10
MBU-1349-3 xx.xx	12.74	13.1	UMBB110	11	37	34	9.1	10
MBU-1349-4 xx.xx	13.11	13.49	UMBB110	11	37	34	9.1	10
MBU-1449-1 xx.xx	13.5	13.82	UMBB120	12	37	34	10.8	11
MBU-1449-2 xx.xx	13.83	14.15	UMBB120	12	37	34	10.8	11
MBU-1449-3 xx.xx	14.16	14.48	UMBB120	12	37	34	10.8	11
MBU-1449-4 xx.xx	14.49	14.79	UMBB120	12	37	34	10.8	11

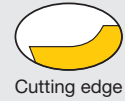
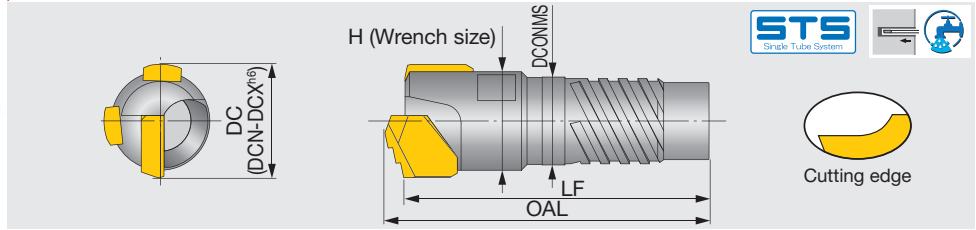
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



UTE

Brazed drill head with external 2-start or 4-start thread for single tube system (STS), tool diameter $\phi 12.6 - \phi 20$ mm, CICT = 1



Non-stocked standard products (to be supplied on request)

When ordering

UTE-0094-1	xx.xx	1122
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\phi 12.92$ mm: UTE-0094-1 12.92 1122

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	1122								
M	3112								
K	3112								
N	3112								
S	3132								
H	3132								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
UTE-0094-1 xx.xx	12.6	12.92	ST0094	11	43	40	9.6	10
UTE-0094-2 xx.xx	12.93	12.99	ST0094	11	43	40	9.6	10
UTE-0094-3 xx.xx	13	13.25	ST0094	11	43	40	9.6	10
UTE-0094-4 xx.xx	13.26	13.6	ST0094	11	43	40	9.6	10
UTE-0095-1 xx.xx	13.61	13.93	ST0095	12	43	40	10.6	11
UTE-0095-2 xx.xx	13.94	13.99	ST0095	12	43	40	10.6	11
UTE-0095-3 xx.xx	14	14.26	ST0095	12	43	40	10.6	11
UTE-0095-4 xx.xx	14.27	14.6	ST0095	12	43	40	10.6	11
UTE-0096-1 xx.xx	14.61	14.93	ST0096	13	43	40	11.6	12
UTE-0096-2 xx.xx	14.94	15.26	ST0096	13	43	40	11.6	12
UTE-0096-3 xx.xx	15.27	15.59	ST0096	13	43	40	11.6	12
UTE-0097-1 xx.xx	15.6	15.96	ST0097	14	44	40	12.6	13
UTE-0097-2 xx.xx	15.97	16.32	ST0097	14	44	40	12.6	13
UTE-0097-3 xx.xx	16.33	16.7	ST0097	14	44	40	12.6	13
UTE-0098-1 xx.xx	16.71	17.03	ST0098	15	44	40	13.6	14
UTE-0098-2 xx.xx	17.04	17.36	ST0098	15	44	40	13.6	14
UTE-0098-3 xx.xx	17.37	17.7	ST0098	15	44	40	13.6	14
UTE-0099-1 xx.xx	17.71	18.09	ST0099	16	44	40	14.5	15
UTE-0099-2 xx.xx	18.1	18.48	ST0099	16	44	40	14.5	15
UTE-0099-3 xx.xx	18.49	18.9	ST0099	16	44	40	14.5	15
UTE-0000-1 xx.xx	18.91	19.26	ST0000	17	44	40	15.5	16
UTE-0000-2 xx.xx	19.27	19.62	ST0000	17	44	40	15.5	16
UTE-0000-3 xx.xx	19.63	20	ST0000	17	44	40	15.5	16

UTE Drill head : $\phi 12.6$ mm - $\phi 15.59$ mm, External 2-start thread
 UTE Drill head : $\phi 15.6$ mm - $\phi 20$ mm, External 4-start thread

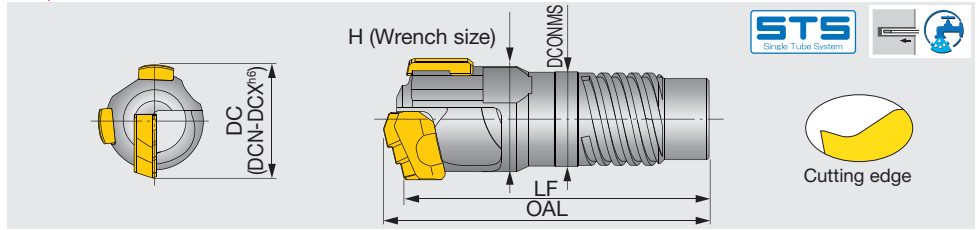
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



BSG

Brazed drill head with external 4-start thread for single tube system (STS), tool diameter $\varnothing 15.6 - \varnothing 16.70$ mm, CICT = 1



Non-stocked standard products (to be supplied on request)

When ordering

BSG0097-

Drill head

XX.XX

Diameter (mm)

AHM930

Grade

e.g. Designation for tool diameter $\varnothing 15.90$ mm: BSG0097-15.90 AHM930

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	AHM930								
M	AHM930								
K	AHM930								
N	AHM930								
S	AHM930								
H	AHM930								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
BSG0097-xx.xx	15.6	16.7	ST0097	14	43.39	40	12.6	13

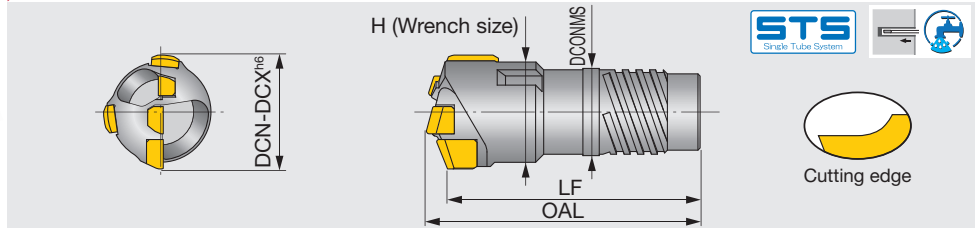
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



BTG(for general purpose)

Brazed drill head with external 4-start thread for single tube system (STS), tool diameter $\varnothing 15.6 - \varnothing 65$ mm, CICT = 3



Non-stocked standard products (to be supplied on request)

When ordering

BTG00971-	xx.xx	AHM930
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 16.2$ mm: BTG00971-16.20 AHM930

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	AHM930								
M	AHM930								
K	AHM930								
N	AHM930								
S	AHM930								
H	AHM930								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
BTG00971-xx.xx	15.6	16.2	ST0097	14	43	40.3	12.6	-
BTG00972-xx.xx	16.21	16.7	ST0097	14	43	40.3	12.6	14
BTG00981-xx.xx	16.71	17.2	ST0098	15	43	40.3	13.6	15
BTG00982-xx.xx	17.21	17.7	ST0098	15	43	40.3	13.6	15
BTG00991-xx.xx	17.71	18.4	ST0099	16	47	44.2	14.5	15
BTG00992-xx.xx	18.41	18.9	ST0099	16	47	44.1	14.5	-
BTG001-xx.xx	18.91	19.2	ST0000	17	47	44.1	15.5	17
BTG002-xx.xx	19.21	20	ST0000	17	47	44	15.5	18
BTG011-xx.xx	20.01	20.9	ST00	18	52.5	49.4	16	18
BTG012-xx.xx	20.91	21.8	ST00	18	52.5	49.4	16	19
BTG021-xx.xx	21.81	22.9	ST01	20	56	52.8	18	20
BTG022-xx.xx	22.91	24.1	ST01	20	56	52.6	18	21
BTG031-xx.xx	24.11	25.2	ST02	22	57.5	54	19.5	23
BTG032-xx.xx	25.21	26.4	ST02	22	57.5	54	19.5	24
BTG041-xx.xx	26.41	27.5	ST03	24	57.5	53.8	21	25
BTG042-xx.xx	27.51	28.7	ST03	24	57.5	53.8	21	26
BTG051-xx.xx	28.71	29.8	ST04	26	63.5	59.5	23.5	27
BTG052-xx.xx	29.81	31	ST04	26	63.5	59.3	23.5	28
BTG061-xx.xx	31.01	32.1	ST05	28	63.5	59.4	25.5	29
BTG062-xx.xx	32.11	33.3	ST05	28	63.5	59.1	25.5	30
BTG071-xx.xx	33.31	34.8	ST06	30	63.5	59	28	32
BTG072-xx.xx	34.81	36.2	ST06	30	63.5	58.9	28	33
BTG081-xx.xx	36.21	37.3	ST07	33	73.5	68.7	30	34
BTG082-xx.xx	37.31	38.4	ST07	33	73.5	68.5	30	35
BTG083-xx.xx	38.41	39.6	ST07	33	73.5	68.3	30	36
BTG091-xx.xx	39.61	40.6	ST08	36	73.5	68.2	33	37
BTG092-xx.xx	40.61	41.8	ST08	36	73.5	68	33	38
BTG093-xx.xx	41.81	43	ST08	36	73.5	67.8	33	39
BTG101-xx.xx	43.01	44.3	ST09	39	75	69.5	36	41
BTG102-xx.xx	44.31	45.6	ST09	39	75	69.3	36	42
BTG103-xx.xx	45.61	47	ST09	39	75	69.1	36	43
BTG111-xx.xx	47.01	48.5	ST10	43	75	68.8	39	44
BTG112-xx.xx	48.51	50.1	ST10	43	75	68.7	39	46
BTG113-xx.xx	50.11	51.7	ST10	43	75	68.5	39	47
BTG121-xx.xx	51.71	53.2	ST11	47	82	75.2	43	49
BTG122-xx.xx	53.21	54.7	ST11	47	82	75.2	43	50
BTG123-xx.xx	54.71	56.2	ST11	47	82	75.2	43	51
BTG131-xx.xx	56.21	58.4	ST12	51	84	77.4	47	54
BTG132-xx.xx	58.41	60.6	ST12	51	84	76.9	47	55
BTG133-xx.xx	60.61	62.8	ST12	51	84	76.8	47	57
BTG134-xx.xx	62.81	65	ST12	51	84	76.5	47	59
BTG133L-xx.xx	60.61	62.8	ST13	56	84	76.8	51	57
BTG134L-xx.xx	62.81	65	ST13	56	84	76.5	51	59

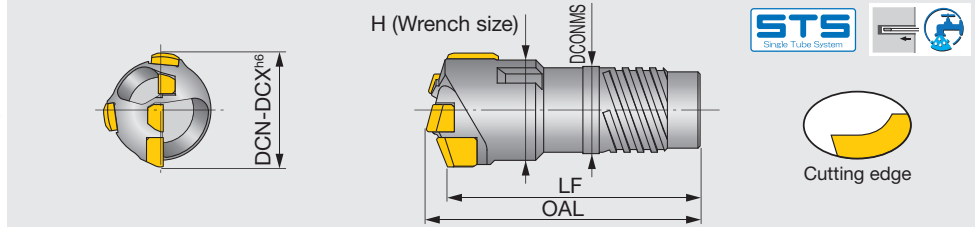
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



BTL(for low feed rate)

Brazed drill head with external 4-start thread for single tube system (STS), tool diameter $\varnothing 15.6 - \varnothing 65$ mm, CICT = 3



Non-stocked standard products (to be supplied on request)

When ordering

BTL00971-	xx.xx	AHM930
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 16.2$ mm: BTL00971-16.20 AHM930

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	AHM930								
M	AHM930								
K	AHM930								
N	AHM930								
S	AHM930								
H	AHM930								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
BTL00971-xx.xx	15.6	16.2	ST0097	14	43	40.3	12.6	-
BTL00972-xx.xx	16.21	16.7	ST0097	14	43	40.3	12.6	14
BTL00981-xx.xx	16.71	17.2	ST0098	15	43	40.3	13.6	15
BTL00982-xx.xx	17.21	17.7	ST0098	15	43	40.3	13.6	15
BTL00991-xx.xx	17.71	18.4	ST0099	16	47	44.2	14.5	15
BTL00992-xx.xx	18.41	18.9	ST0099	16	47	44.1	14.5	-
BTL001-xx.xx	18.91	19.2	ST0000	17	47	44.1	15.5	17
BTL002-xx.xx	19.21	20	ST0000	17	47	44	15.5	18
BTL011-xx.xx	20.01	20.9	ST00	18	52.5	49.4	16	18
BTL012-xx.xx	20.91	21.8	ST00	18	52.5	49.4	16	19
BTL021-xx.xx	21.81	22.9	ST01	20	56	52.8	18	20
BTL022-xx.xx	22.91	24.1	ST01	20	56	52.6	18	21
BTL031-xx.xx	24.11	25.2	ST02	22	57.5	54	19.5	23
BTL032-xx.xx	25.21	26.4	ST02	22	57.5	54	19.5	24
BTL041-xx.xx	26.41	27.5	ST03	24	57.5	53.8	21	25
BTL042-xx.xx	27.51	28.7	ST03	24	57.5	53.8	21	26
BTL051-xx.xx	28.71	29.8	ST04	26	63.5	59.5	23.5	27
BTL052-xx.xx	29.81	31	ST04	26	63.5	59.3	23.5	28
BTL061-xx.xx	31.01	32.1	ST05	28	63.5	59.4	25.5	29
BTL062-xx.xx	32.11	33.3	ST05	28	63.5	59.1	25.5	30
BTL071-xx.xx	33.31	34.8	ST06	30	63.5	59	28	32
BTL072-xx.xx	34.81	36.2	ST06	30	63.5	58.9	28	33
BTL081-xx.xx	36.21	37.3	ST07	33	73.5	68.7	30	34
BTL082-xx.xx	37.31	38.4	ST07	33	73.5	68.5	30	35
BTL083-xx.xx	38.41	39.6	ST07	33	73.5	68.3	30	36
BTL091-xx.xx	39.61	40.6	ST08	36	73.5	68.2	33	37
BTL092-xx.xx	40.61	41.8	ST08	36	73.5	68	33	38
BTL093-xx.xx	41.81	43	ST08	36	73.5	67.8	33	39
BTL101-xx.xx	43.01	44.3	ST09	39	75	69.5	36	41
BTL102-xx.xx	44.31	45.6	ST09	39	75	69.3	36	42
BTL103-xx.xx	45.61	47	ST09	39	75	69.1	36	43
BTL111-xx.xx	47.01	48.5	ST10	43	75	68.8	39	44
BTL112-xx.xx	48.51	50.1	ST10	43	75	68.7	39	46
BTL113-xx.xx	50.11	51.7	ST10	43	75	68.5	39	47
BTL121-xx.xx	51.71	53.2	ST11	47	82	75.2	43	49
BTL122-xx.xx	53.21	54.7	ST11	47	82	75.2	43	50
BTL123-xx.xx	54.71	56.2	ST11	47	82	75.2	43	51
BTL131-xx.xx	56.21	58.4	ST12	51	84	77.4	47	54
BTL132-xx.xx	58.41	60.6	ST12	51	84	76.9	47	55
BTL133-xx.xx	60.61	62.8	ST12	51	84	76.8	47	57
BTL134-xx.xx	62.81	65	ST12	51	84	76.5	47	59
BTL133L-xx.xx	60.61	62.8	ST13	56	84	76.8	51	57
BTL134L-xx.xx	62.81	65	ST13	56	84	76.5	51	59

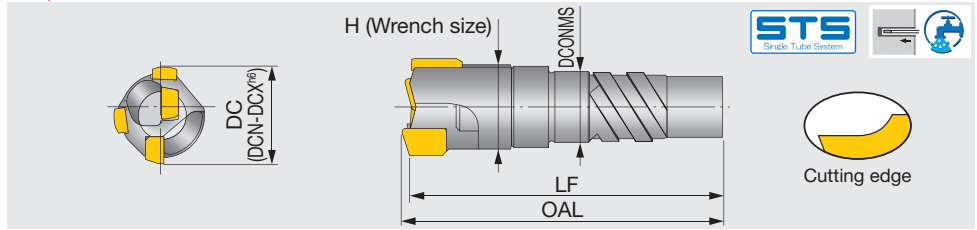
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



BTU(Small diameter, 2 tip)

Brazed drill head with external 2-start thread for single tube system (STS), tool diameter $\varnothing 12.6 - \varnothing 15.59$ mm, CICT = 2



Non-stocked standard products (to be supplied on request)

When ordering

BTU-00941	XX.XX	1122
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 13.1$ mm: BTU-00941 13.10 1122

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	1122								
M	1122								
K	1122								
N	1122								
S	1122								
H	1122								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
BTU-00941 xx.xx	12.6	13.1	ST0094	11	43	41.9	9.6	10
BTU-00942 xx.xx	13.11	13.6	ST0094	11	43	41.9	9.6	10
BTU-00951 xx.xx	13.61	14.1	ST0095	12	43	41.8	10.6	11
BTU-00952 xx.xx	14.11	14.6	ST0095	12	43	41.8	10.6	11
BTU-00961 xx.xx	14.61	15.1	ST0096	13	43	41.7	11.6	12
BTU-00962 xx.xx	15.11	15.59	ST0096	13	43	41.7	11.6	12

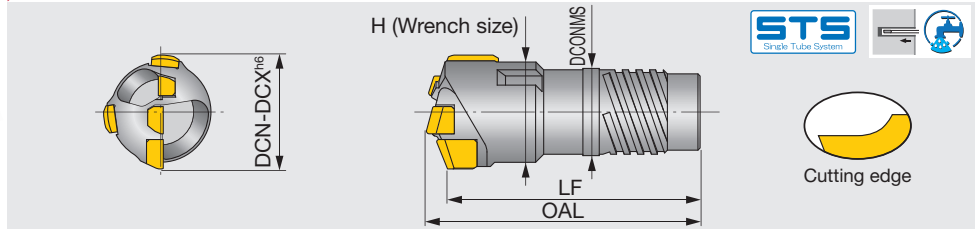
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



BTU(3 tip)

Brazed drill head with external 4-start thread for single tube system (STS), tool diameter $\varnothing 15.6 - \varnothing 65$ mm, CICT = 3



Non-stocked standard products (to be supplied on request)

When ordering

BTU-00971	xx.xx	1122
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 16.2$ mm: **BTU-00971 16.20 1122**

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	1122								
M	1122								
K	3132								
N	3132								
S	3132								
H	3132								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
BTU-00971 xx.xx	15.6	16.2	ST0097	14	43	40.3	12.6	-
BTU-00972 xx.xx	16.21	16.7	ST0097	14	43	40.3	12.6	14
BTU-00981 xx.xx	16.71	17.2	ST0098	15	43	40.3	13.6	15
BTU-00982 xx.xx	17.21	17.7	ST0098	15	43	40.3	13.6	15
BTU-00991 xx.xx	17.71	18.4	ST0099	16	47	44.2	14.5	15
BTU-00992 xx.xx	18.41	18.9	ST0099	16	47	44.1	14.5	-
BTU-001 xx.xx	18.91	19.2	ST0000	17	47	44.1	15.5	17
BTU-002 xx.xx	19.21	20	ST0000	17	47	44	15.5	18
BTU-011 xx.xx	20.01	20.9	ST00	18	52.5	49.4	16	18
BTU-012 xx.xx	20.91	21.8	ST00	18	52.5	49.4	16	19
BTU-021 xx.xx	21.81	22.9	ST01	20	56	52.8	18	20
BTU-022 xx.xx	22.91	24.1	ST01	20	56	52.6	18	21
BTU-031 xx.xx	24.11	25.2	ST02	22	57.5	54	19.5	23
BTU-032 xx.xx	25.21	26.4	ST02	22	57.5	54	19.5	24
BTU-041 xx.xx	26.41	27.5	ST03	24	57.5	53.8	21	25
BTU-042 xx.xx	27.51	28.7	ST03	24	57.5	53.8	21	26
BTU-051 xx.xx	28.71	29.8	ST04	26	63.5	59.5	23.5	27
BTU-052 xx.xx	29.81	31	ST04	26	63.5	59.3	23.5	28
BTU-061 xx.xx	31.01	32.1	ST05	28	63.5	59.4	25.5	29
BTU-062 xx.xx	32.11	33.3	ST05	28	63.5	59.1	25.5	30
BTU-071 xx.xx	33.31	34.8	ST06	30	63.5	59	28	32
BTU-072 xx.xx	34.81	36.2	ST06	30	63.5	58.9	28	33
BTU-081 xx.xx	36.21	37.3	ST07	33	73.5	68.7	30	34
BTU-082 xx.xx	37.31	38.4	ST07	33	73.5	68.5	30	35
BTU-083 xx.xx	38.41	39.6	ST07	33	73.5	68.3	30	36
BTU-091 xx.xx	39.61	40.6	ST08	36	73.5	68.2	33	37
BTU-092 xx.xx	40.61	41.8	ST08	36	73.5	68	33	38
BTU-093 xx.xx	41.81	43	ST08	36	73.5	67.8	33	39
BTU-101 xx.xx	43.01	44.3	ST09	39	75	69.5	36	41
BTU-102 xx.xx	44.31	45.6	ST09	39	75	69.3	36	42
BTU-103 xx.xx	45.61	47	ST09	39	75	69.1	36	43
BTU-111 xx.xx	47.01	48.5	ST10	43	75	68.8	39	44
BTU-112 xx.xx	48.51	50.1	ST10	43	75	68.7	39	46
BTU-113 xx.xx	50.11	51.7	ST10	43	75	68.5	39	47
BTU-121 xx.xx	51.71	53.2	ST11	47	82	75.2	43	49
BTU-122 xx.xx	53.21	54.7	ST11	47	82	75.2	43	50
BTU-123 xx.xx	54.71	56.2	ST11	47	82	75.2	43	51
BTU-131 xx.xx	56.21	58.4	ST12	51	84	77.4	47	54
BTU-132 xx.xx	58.41	60.6	ST12	51	84	76.9	47	55
BTU-133 xx.xx	60.61	62.8	ST12	51	84	76.8	47	57
BTU-134 xx.xx	62.81	65	ST12	51	84	76.5	47	59
BTU-133L xx.xx	60.61	62.8	ST13	56	84	76.8	51	57
BTU-134L xx.xx	62.81	65	ST13	56	84	76.5	51	59

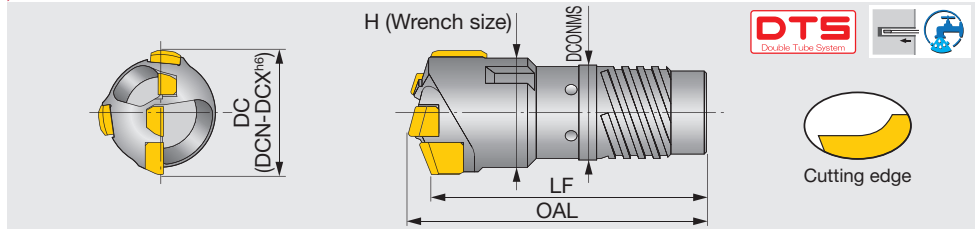
Reference pages: Standard cutting conditions → 26, Drill tube (STS) → 22

BRAZED DRILL HEAD



ETG(for general purpose)

Brazed drill head with external 4-start thread for double tube system (DTS), tool diameter $\varnothing 18.4 - \varnothing 65$ mm, CICT = 3



Non-stocked standard products (to be supplied on request)

When ordering

ETG001-	xx.xx	AHM930
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 19.2$ mm: **ETG001-19.20 AHM930**

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	AHM930								
M	AHM930								
K	AHM930								
N	AHM930								
S	AHM930								
H	AHM930								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
ETG001-xx.xx	18.4	19.2	OT00	18	50	47.1	16	17
ETG002-xx.xx	19.21	20	OT00	18	50	47	16	18
ETG011-xx.xx	20.01	20.9	OT01	19.5	56	52.8	18	18
ETG012-xx.xx	20.91	21.8	OT01	19.5	56	52.7	18	19
ETG021-xx.xx	21.81	22.9	OT02	21.5	56	52.8	19.5	20
ETG022-xx.xx	22.91	24.1	OT02	21.5	56	52.6	19.5	21
ETG031-xx.xx	24.11	25.2	OT03	23.5	57.5	54	21	23
ETG032-xx.xx	25.21	26.4	OT03	23.5	57.5	54	21	24
ETG041-xx.xx	26.41	27.5	OT04	26	60.5	56.8	23.5	25
ETG042-xx.xx	27.51	28.7	OT04	26	60.5	56.8	23.5	26
ETG051-xx.xx	28.71	29.8	OT05	28	63.5	59.5	25.5	27
ETG052-xx.xx	29.81	31	OT05	28	63.5	59.3	25.5	28
ETG061-xx.xx	31.01	32.1	OT06	30.5	63.5	59.4	28	29
ETG062-xx.xx	32.11	33.3	OT06	30.5	63.5	59.2	28	30
ETG071-xx.xx	33.31	34.8	OT07	33	70.5	66	30	32
ETG072-xx.xx	34.81	36.2	OT07	33	70.5	65.8	30	33
ETG081-xx.xx	36.21	37.3	OT08	35.5	73.5	68.7	33	34
ETG082-xx.xx	37.31	38.4	OT08	35.5	73.5	68.5	33	35
ETG083-xx.xx	38.41	39.6	OT08	35.5	73.5	68.3	33	36
ETG091-xx.xx	39.61	40.6	OT09	39	73.5	68.2	36	37
ETG092-xx.xx	40.61	41.8	OT09	39	73.5	68	36	38
ETG093-xx.xx	41.81	43	OT09	39	73.5	67.9	36	39
ETG101-xx.xx	43.01	44.3	OT10	42.5	75	69.5	39	41
ETG102-xx.xx	44.31	45.6	OT10	42.5	75	69.3	39	42
ETG103-xx.xx	45.61	47	OT10	42.5	75	69.1	39	43
ETG111-xx.xx	47.01	48.5	OT11	46.5	79	72.9	43	44
ETG112-xx.xx	48.51	50.1	OT11	46.5	79	72.8	43	46
ETG113-xx.xx	50.11	51.7	OT11	46.5	79	72.5	43	47
ETG121-xx.xx	51.71	53.2	OT12	51	82	75.3	47	49
ETG122-xx.xx	53.21	54.7	OT12	51	82	75.5	47	50
ETG123-xx.xx	54.71	56.2	OT12	51	82	75.3	47	51
ETG131-xx.xx	56.21	58.4	OT13	55.5	84	77.4	51	54
ETG132-xx.xx	58.41	60.6	OT13	55.5	84	76.9	51	55
ETG133-xx.xx	60.61	62.8	OT13	55.5	84	77	51	57
ETG134-xx.xx	62.81	65	OT13	55.5	84	76.6	51	59

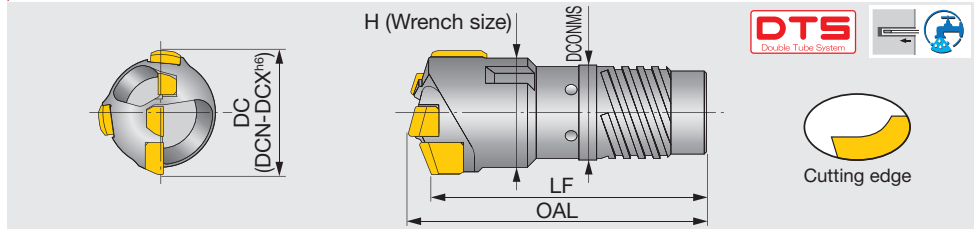
Reference pages: Standard cutting conditions → 26, Drill tube (DTS) → 24

BRAZED DRILL HEAD



ETL(for low feed rate)

Brazed drill head with external 4-start thread for double tube system (DTS), tool diameter $\varnothing 18.4 - \varnothing 65$ mm, CICT = 3



Non-stocked standard products (to be supplied on request)

When ordering

ETL001-	xx.xx	AHM930
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 19.2$ mm: ETL001-19.20 AHM930

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	AHM930								
M	AHM930								
K	AHM930								
N	AHM930								
S	AHM930								
H	AHM930								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
ETL001-xx.xx	18.4	19.2	OT00	18	50	47.1	16	17
ETL002-xx.xx	19.21	20	OT00	18	50	47	16	18
ETL011-xx.xx	20.01	20.9	OT01	19.5	56	52.8	18	18
ETL012-xx.xx	20.91	21.8	OT01	19.5	56	52.7	18	19
ETL021-xx.xx	21.81	22.9	OT02	21.5	56	52.8	19.5	20
ETL022-xx.xx	22.91	24.1	OT02	21.5	56	52.6	19.5	21
ETL031-xx.xx	24.11	25.2	OT03	23.5	57.5	54	21	23
ETL032-xx.xx	25.21	26.4	OT03	23.5	57.5	54	21	24
ETL041-xx.xx	26.41	27.5	OT04	26	60.5	56.8	23.5	25
ETL042-xx.xx	27.51	28.7	OT04	26	60.5	56.8	23.5	26
ETL051-xx.xx	28.71	29.8	OT05	28	63.5	59.5	25.5	27
ETL052-xx.xx	29.81	31	OT05	28	63.5	59.3	25.5	28
ETL061-xx.xx	31.01	32.1	OT06	30.5	63.5	59.4	28	29
ETL062-xx.xx	32.11	33.3	OT06	30.5	63.5	59.2	28	30
ETL071-xx.xx	33.31	34.8	OT07	33	70.5	66	30	32
ETL072-xx.xx	34.81	36.2	OT07	33	70.5	65.8	30	33
ETL081-xx.xx	36.21	37.3	OT08	35.5	73.5	68.7	33	34
ETL082-xx.xx	37.31	38.4	OT08	35.5	73.5	68.5	33	35
ETL083-xx.xx	38.41	39.6	OT08	35.5	73.5	68.3	33	36
ETL091-xx.xx	39.61	40.6	OT09	39	73.5	68.2	36	37
ETL092-xx.xx	40.61	41.8	OT09	39	73.5	68	36	38
ETL093-xx.xx	41.81	43	OT09	39	73.5	67.9	36	39
ETL101-xx.xx	43.01	44.3	OT10	42.5	75	69.5	39	41
ETL102-xx.xx	44.31	45.6	OT10	42.5	75	69.3	39	42
ETL103-xx.xx	45.61	47	OT10	42.5	75	69.1	39	43
ETL111-xx.xx	47.01	48.5	OT11	46.5	79	72.9	43	44
ETL112-xx.xx	48.51	50.1	OT11	46.5	79	72.8	43	46
ETL113-xx.xx	50.11	51.7	OT11	46.5	79	72.5	43	47
ETL121-xx.xx	51.71	53.2	OT12	51	82	75.3	47	49
ETL122-xx.xx	53.21	54.7	OT12	51	82	75.5	47	50
ETL123-xx.xx	54.71	56.2	OT12	51	82	75.3	47	51
ETL131-xx.xx	56.21	58.4	OT13	55.5	84	77.4	51	54
ETL132-xx.xx	58.41	60.6	OT13	55.5	84	76.9	51	55
ETL133-xx.xx	60.61	62.8	OT13	55.5	84	77	51	57
ETL134-xx.xx	62.81	65	OT13	55.5	84	76.6	51	59

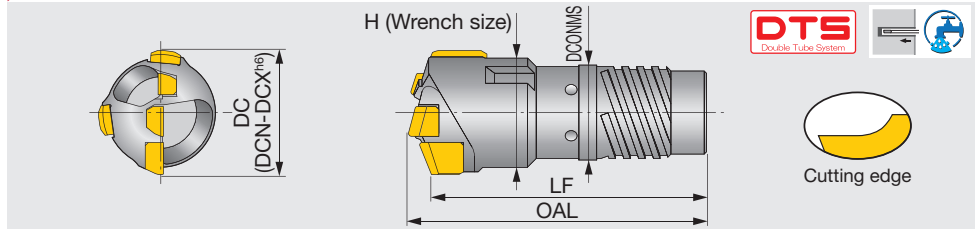
Reference pages: Standard cutting conditions → 26, Drill tube (DTS) → 24

BRAZED DRILL HEAD



ETU

Brazed drill head with external 4-start thread for double tube system (DTS), tool diameter $\varnothing 18.4 - \varnothing 65$ mm, CICT = 3



Non-stocked standard products (to be supplied on request)

When ordering

ETU-001	xx.xx	1122
Drill head	Diameter (mm)	Grade

e.g. Designation for tool diameter $\varnothing 19.2$ mm: **ETU-001 19.20 1122**

ISO classifications for grades

	Grade	ISO area							
		5	10	15	20	25	30	35	40
P	1122								
M	1122								
K	3132								
N	3132								
S	3132								
H	3132								

Designation	DCN	DCX	Drill tube		OAL	LF	DCONMS	H
			Designation	Dia. (mm)				
ETU-001 xx.xx	18.4	19.2	OT00	18	50	47.1	16	17
ETU-002 xx.xx	19.21	20	OT00	18	50	47	16	18
ETU-011 xx.xx	20.01	20.9	OT01	19.5	56	52.8	18	18
ETU-012 xx.xx	20.91	21.8	OT01	19.5	56	52.7	18	19
ETU-021 xx.xx	21.81	22.9	OT02	21.5	56	52.8	19.5	20
ETU-022 xx.xx	22.91	24.1	OT02	21.5	56	52.6	19.5	21
ETU-031 xx.xx	24.11	25.2	OT03	23.5	57.5	54	21	23
ETU-032 xx.xx	25.21	26.4	OT03	23.5	57.5	54	21	24
ETU-041 xx.xx	26.41	27.5	OT04	26	60.5	56.8	23.5	25
ETU-042 xx.xx	27.51	28.7	OT04	26	60.5	56.8	23.5	26
ETU-051 xx.xx	28.71	29.8	OT05	28	63.5	59.5	25.5	27
ETU-052 xx.xx	29.81	31	OT05	28	63.5	59.3	25.5	28
ETU-061 xx.xx	31.01	32.1	OT06	30.5	63.5	59.4	28	29
ETU-062 xx.xx	32.11	33.3	OT06	30.5	63.5	59.2	28	30
ETU-071 xx.xx	33.31	34.8	OT07	33	70.5	66	30	32
ETU-072 xx.xx	34.81	36.2	OT07	33	70.5	65.8	30	33
ETU-081 xx.xx	36.21	37.3	OT08	35.5	73.5	68.7	33	34
ETU-082 xx.xx	37.31	38.4	OT08	35.5	73.5	68.5	33	35
ETU-083 xx.xx	38.41	39.6	OT08	35.5	73.5	68.3	33	36
ETU-091 xx.xx	39.61	40.6	OT09	39	73.5	68.2	36	37
ETU-092 xx.xx	40.61	41.8	OT09	39	73.5	68	36	38
ETU-093 xx.xx	41.81	43	OT09	39	73.5	67.9	36	39
ETU-101 xx.xx	43.01	44.3	OT10	42.5	75	69.5	39	41
ETU-102 xx.xx	44.31	45.6	OT10	42.5	75	69.3	39	42
ETU-103 xx.xx	45.61	47	OT10	42.5	75	69.1	39	43
ETU-111 xx.xx	47.01	48.5	OT11	46.5	79	72.9	43	44
ETU-112 xx.xx	48.51	50.1	OT11	46.5	79	72.8	43	46
ETU-113 xx.xx	50.11	51.7	OT11	46.5	79	72.5	43	47
ETU-121 xx.xx	51.71	53.2	OT12	51	82	75.3	47	49
ETU-122 xx.xx	53.21	54.7	OT12	51	82	75.5	47	50
ETU-123 xx.xx	54.71	56.2	OT12	51	82	75.3	47	51
ETU-131 xx.xx	56.21	58.4	OT13	55.5	84	77.4	51	54
ETU-132 xx.xx	58.41	60.6	OT13	55.5	84	76.9	51	55
ETU-133 xx.xx	60.61	62.8	OT13	55.5	84	77	51	57
ETU-134 xx.xx	62.81	65	OT13	55.5	84	76.6	51	59

Reference pages: Standard cutting conditions → 26, Drill tube (DTS) → 24

RECOMMENDED TOOL

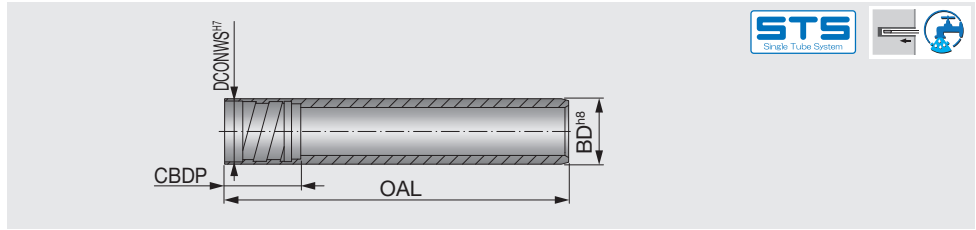
ISO	Workpiece material	Hardness	First choice	Troubleshooting
				Chip Control
P	Low carbon steels (C ≤ 0.3%)	- 200 HB	BTG, AHM930	BTL, AHM930
	Carbon steels (C > 0.3%) Alloy steels	- 300 HB	BTG, AHM930	BTL, AHM930
	Low alloy steels	- 300 HB	BTG, AHM930	BTL, AHM930
	Alloy steels	- 300 HB	BTG, AHM930	BTL, AHM930
M	Stainless steel	- 200 HB	BTG, AHM930	BTL, AHM930
K	Grey cast irons	150 - 250 HB	BTG, AHM930	BTL, AHM930
	Ductile cast irons	150 - 250 HB	BTG, AHM930	BTL, AHM930
N	Aluminium alloy	-	BTG, AHM930	BTL, AHM930
S	Titanium alloys Heat-resistant alloys	- 40 HRC	BTG, AHM930	BTL, AHM930
H	Hardened steel	- 50 HRC	BTG, AHM930	BTL, AHM930

DRILL TUBE



UMBB

Drill tube with internal single-start thread for MBU drill head



Designation	DCN-DCX	OAL Special length	BD	DCONWS	CBDP
UMBB071	8 - 8.99	○	7.1	6	16
UMBB083	9 - 9.99	○	8.3	7.2	16
UMBB090	10 - 10.99	○	9	7.6	16
UMBB100	11 - 11.99	○	10	8.6	16
UMBB110	12 - 13.49	○	11	9.1	16
UMBB120	13.5 - 14.79	○	12	10.8	16

Please specify the length (L) when ordering.

e.g. For ø11 mm drill diameter / 1000 mm drill tube length: UMBB100X1000

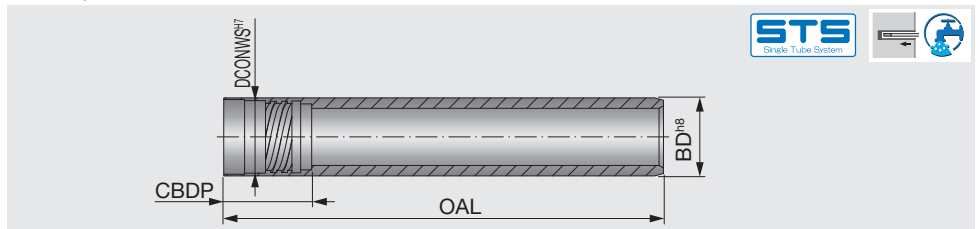
○ : Item to be customized

DRILL TUBE



ST

Drill tube for single tube system (STS), internal thread type, 2-start thread (tool dia. ≤ ø15.59 mm) or 4-start thread (tool dia. ≥ ø15.6 mm)



Designation	DCN-DCX	OAL			BD	DCONWS	CBDP	Designation	DCN-DCX	OAL			BD	DCONWS	CBDP
		1600	2600	Special length						1600	2600	Special length			
ST0094	12.6 - 13.6	●		○	11	9.6	22	ST03	26.41 - 28.7		●	○	24	21	30
ST0095	13.61 - 14.6	●		○	12	10.6	22	ST04	28.71 - 31		●	○	26	23.5	33
ST0096	14.61 - 15.59	●		○	13	11.6	22	ST05	31.01 - 33.3		●	○	28	25.5	33
ST0097	15.6 - 16.7	●		○	14	12.6	21	ST06	33.31 - 36.2		●	○	30	28	33
ST0098	16.71 - 17.7	●	●	○	15	13.6	21	ST07	36.21 - 39.6		●	○	33	30	40
ST0099	17.71 - 18.9	●	●	○	16	14.5	22	ST08	39.61 - 43		●	○	36	33	40
ST0000	18.91 - 20	●	●	○	17	15.5	22	ST09	43.01 - 47		●	○	39	36	40
ST00	20.01 - 21.8	●	●	○	18	16	27.5	ST10	47.01 - 51.7		●	○	43	39	40
ST01	21.81 - 24.1		●	○	20	18	30	ST11	51.71 - 56.2		●	○	47	43	44
ST02	24.11 - 26.4		●	○	22	19.5	30	ST12	56.21 - 60.6		●	○	51	47	44
			●	○				ST13	60.61 - 65			○	56	51	44

Please specify the length (L) when ordering.

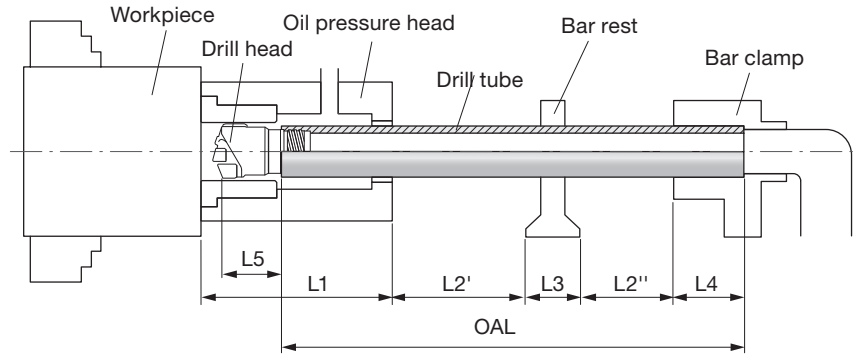
e.g. For ø60 mm drill diameter / 2600 mm drill tube length: ST12X2600
The lengths that are not in the above will be available upon request.

● : Line up
○ : Item to be customized

Reference pages: ST : Drill head → 12 (UTE), 13 (BSG), 14 (BTG), 15 (BTL), 16 (BTU)
UMBB: Drill head → 11 (MBU)

■ Tube length for special drills

Drill tubes with non-standard lengths will be available upon request. Please use the guide below to calculate the drill tube length.



OAL = Drill tube overall length
 L1 = Oil pressure head length
 L2 = Drilling depth (L2' + L2'')
 L3 = Bar rest length
 L4 = Drill tube clamp length
 L5 = Length from drill tube tip and peripheral edge tip

$$\text{Drill tube length OAL} = L1 + L2 + L3 + L4 - L5$$

MBU



DCN-DCX	L5
8 - 8.32	18
8.33 - 8.65	18
8.66 - 8.99	18
9 - 9.32	18
9.33 - 9.65	18
9.66 - 9.99	18
10 - 10.32	18
10.33 - 10.65	18
10.66 - 10.99	18
11 - 11.32	18
11.33 - 11.65	18
11.66 - 11.99	18
12 - 12.36	18
12.37 - 12.73	18
12.74 - 13.1	18
13.11 - 13.49	18
13.5 - 13.82	18
13.83 - 14.15	18
14.16 - 14.48	18
14.49 - 14.79	18

UTE



DCN-DCX	L5
12.6 - 12.92	19
12.93 - 12.99	19
13 - 13.25	19
13.26 - 13.6	19
13.61 - 13.93	19
13.94 - 13.99	19
14 - 14.26	19
14.27 - 14.6	19
14.61 - 14.93	19
14.94 - 15.26	19
15.27 - 15.59	19
15.6 - 15.96	20
15.97 - 16.32	20
16.33 - 16.7	20
16.71 - 17.03	20
17.04 - 17.36	20
17.37 - 17.7	20
17.71 - 18.09	19
18.1 - 18.48	19
18.49 - 18.9	19
18.91 - 19.26	19
19.27 - 19.62	19
19.63 - 20	19

BTG, BTL, BTU

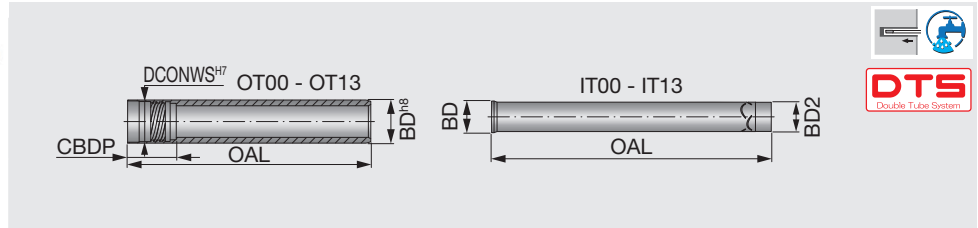


DCN-DCX	L5
12.6 - 17.7	20
17.71 - 19.2	23
19.21 - 21.8	22
21.81 - 24.1	23
24.11 - 28.7	24
28.71 - 33.3	27
33.31 - 36.2	26
36.21 - 40.6	29
40.61 - 43	28
43.01 - 47	30
47.01 - 51.7	29
51.71 - 56.2	32
56.21 - 58.4	34
58.41 - 65	33

BSG



DCN-DCX	L5
15.60-16.70	19



Outer tube (OT)

Designation	DCN-DCX	OAL Special length	BD	DCONWS	CBDP
OT00	18.4 - 20	○	18	16	27.5
OT01	20.01 - 21.8	○	19.5	18	30
OT02	21.81 - 24.1	○	21.5	19.5	30
OT03	24.11 - 26.4	○	23.5	21	30
OT04	26.41 - 28.7	○	26	23.5	33
OT05	28.71 - 31	○	28	25.5	33
OT06	31.01 - 33.3	○	30.5	28	33
OT07	33.31 - 36.2	○	33	30	40
OT08	36.21 - 39.6	○	35.5	33	40
OT09	39.61 - 43	○	39	36	40
OT10	43.01 - 47	○	42.5	39	40
OT11	47.01 - 51.7	○	46.5	43	44
OT12	51.71 - 56.2	○	51	47	44
OT13	56.21 - 65	○	55.5	51	44

Inner tube (IT)

Designation	DCN-DCX	OAL Special length	BD	BD2
IT00	18.4 - 20	○	12	10
IT01	20.01 - 21.8	○	14	12
IT02	21.81 - 24.1	○	15	13
IT03	24.11 - 26.4	○	16	14
IT04	26.41 - 28.7	○	18	16
IT05	28.71 - 31	○	20	18
IT06	31.01 - 33.3	○	22	20
IT07	33.31 - 36.2	○	24	22
IT08	36.21 - 39.6	○	26	24
IT09	39.61 - 43	○	29	27
IT10	43.01 - 47	○	32	30
IT11	47.01 - 51.7	○	35	32
IT12	51.71 - 56.2	○	39	36
IT13	56.21 - 65	○	43	40

Please specify the length when ordering.

e.g. For ø60 mm drill diameter / 1070 mm drill outer tube length: OT13X1070

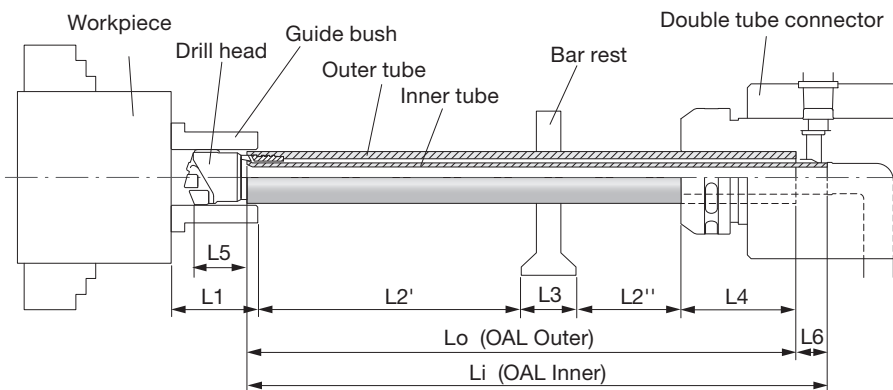
Please choose the inner tube length according to the guide below:

- ▶ tool diameter: ø18.40 - ø65.00 mm (OT00 - OT13) Inner tube length = Outer tube length + 30 mm
- ▶ tool diameter: ø65.00 - ø123.99 mm (OT14 - OT20) Inner tube length = Outer tube length + 190 mm
- ▶ tool diameter: ø124.00 - ø183.99 mm (OT21 - OT25) Inner tube length = Outer tube length + 220 mm

○ : Item to be customized

Tube length for special drills

Please use the guide below to calculate the drill tube length.



Lo = Outer tube overall length
 Li = Inner tube overall length
 L1 = Guide bush length (or Pilot hole depth)
 L2 = Drilling depth (L2' + L2'')
 L3 = Bar rest length
 L4 = Length of outer tube in connector*
 L5 = Length from drill tube tip and peripheral edge tip
 L6 = Difference between outer tube length and inner tube length**

Outer tube overall length
 $Lo = L1 + L2 + L3 + L4 - L5$

Inner tube overall length
 $Li = Lo + L6$

DTC	L4*	L6**
DTC 4R (OT00 - OT13)	120	30

(mm)

ETG, ETL, ETU



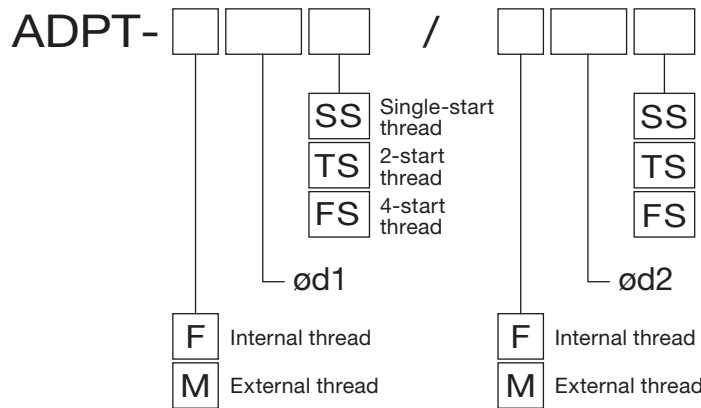
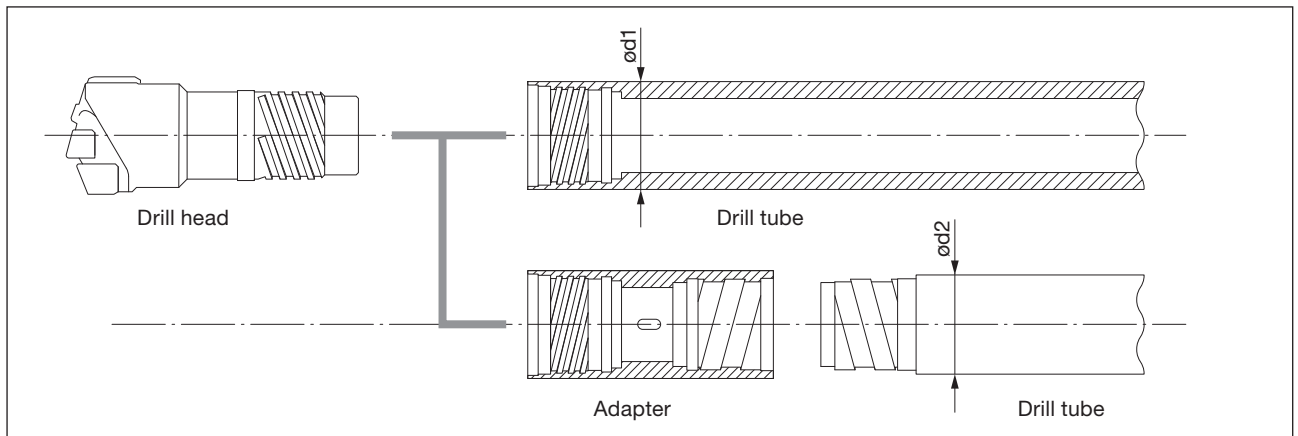
DCN-DCX	L5
18.4 - 20	20
20.01 - 24.1	23
24.11 - 28.7	24
28.71 - 33.3	27
33.31 - 36.2	26
36.21 - 40.6	29
40.61 - 43	28
43.01 - 47	30
47.01 - 51.7	29
51.71 - 56.2	32
56.21 - 58.4	34
58.41 - 65	33

To facilitate a smooth drill entry into the workpiece, make sure that the drill is inside the guiding bush or pilot hole all the way up to 5 mm over the outer tube before starting the drilling.

Conversion adapter

Adapter for external thread - internal thread conversion

An adapter to connect with a smaller tube diameter is also available upon request.



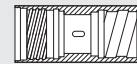
$\varnothing d1$: Outer diameter of the tube that is applicable for the drill head
 $\varnothing d2$: Outer diameter of the tube that is connected with the adapter

Designation example

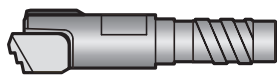
For the conversion from ST11 to UB47

ADPT-F47FS / F47SS

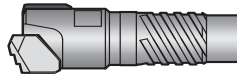
↑ ST11 ↑ UB47



STANDARD CUTTING CONDITIONS



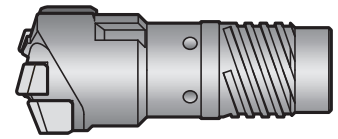
MBU



UTE



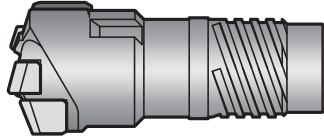
BSG



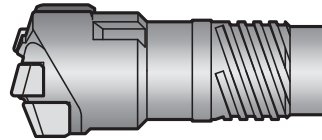
ETG, ETL, ETU



**BTU
(2 tip)**



BTG, BTL



**BTU
(3 tip)**

ISO	Workpiece material	JIS	Condition	Hardness (HB)	Cutting speed Vc (m/min)	Feed: f (mm/rev)						
						Drill dia. (mm)						
						8 - 20	15.6-16.7	12.6 - 20	20.01 - 31	31.01 - 43	43.01 - 65	
P	Carbon steel	S10C - S25C, SS	0.1 - 0.25 %C Non-hardened	125	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
				190	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
	Cast steel	S25C - S55C	0.25 - 0.25 %C Non-hardened	190	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
				250	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
	High carbon steel	SK	0.25 - 0.25 %C Hardened	250	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
				220	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
	Carbon tool steel	SK	0.55 - 0.80 %C Non-hardened	220	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
				300	70 - 130	0.05 - 0.1	0.1 - 0.12	0.08 - 0.12	0.1 - 0.15	0.13 - 0.17	0.15 - 0.28	
	Non-hardened	SNC, DCr, SNCN	Hardened	200	70 - 110	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
				275	60 - 110	0.05 - 0.1	0.1 - 0.12	0.08 - 0.12	0.1 - 0.15	0.13 - 0.17	0.15 - 0.28	
Cast steel (alloying element < 5%)	SCM, SMn	Hardened	300	60 - 110	0.05 - 0.1	0.1 - 0.12	0.08 - 0.12	0.1 - 0.15	0.13 - 0.17	0.15 - 0.28		
			350	60 - 110	0.05 - 0.1	0.1 - 0.12	0.08 - 0.12	0.1 - 0.15	0.13 - 0.17	0.15 - 0.28		
High alloy steel, Cast steel, Tool steel	SNS, SKD, SKT, SKH, SK	Non-hardened	200	70 - 130	0.05 - 0.13	0.1 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3		
			325	70 - 130	0.05 - 0.1	0.1 - 0.12	0.08 - 0.12	0.1 - 0.15	0.13 - 0.17	0.15 - 0.28		
M	Stainless steel	SUS430	Ferritic	200	40 - 110	0.05 - 0.13	0.04 - 0.16	0.08 - 0.15	0.1 - 0.28	0.13 - 0.3	0.16 - 0.35	
		SUS410, 420J	Martensitic	240	40 - 110	0.05 - 0.13	0.04 - 0.16	0.08 - 0.15	0.1 - 0.28	0.13 - 0.3	0.16 - 0.35	
		SUS304, SUS316L	Austenitic	180	40 - 110	0.05 - 0.12	0.04 - 0.14	0.05 - 0.12	0.08 - 0.25	0.1 - 0.28	0.15 - 0.33	
K	Ductile cast iron	FCD400 - FCD450	Ferritic / Pearlitic	180	50 - 110	0.05 - 0.13	0.06 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
		FCD500 - FCD700	Pearlitic	260	50 - 110	0.05 - 0.13	0.06 - 0.16	0.08 - 0.15	0.1 - 0.17	0.13 - 0.2	0.16 - 0.3	
	Grey cast iron	FC100 - FC200	Low tensile strength	160	60 - 110	0.05 - 0.13	0.06 - 0.16	0.06 - 0.13	0.08 - 0.18	0.1 - 0.2	0.15 - 0.25	
		FC250 - FC350	High tensile strength	250	60 - 110	0.05 - 0.13	0.06 - 0.16	0.06 - 0.13	0.08 - 0.18	0.1 - 0.2	0.15 - 0.25	
	Malleable cast iron	FCMB, FCMW	Ferritic	130	70 - 110	0.05 - 0.13	0.06 - 0.16	0.06 - 0.13	0.08 - 0.18	0.1 - 0.2	0.15 - 0.25	
FCMWP, FCMP	Pearlitic	230	70 - 110	0.05 - 0.13	0.06 - 0.16	0.06 - 0.13	0.08 - 0.18	0.1 - 0.2	0.15 - 0.25			
N	Aluminium alloys Wrought		Non-aged	60	65 - 130	0.05 - 0.13	0.08 - 0.16	0.08 - 0.15	0.1 - 0.2	0.15 - 0.25	0.16 - 0.3	
			Soluted, Aged	100	65 - 130	0.05 - 0.13	0.08 - 0.16	0.08 - 0.15	0.1 - 0.2	0.15 - 0.25	0.16 - 0.3	
	Aluminium alloys Cast		≤12% Si	Non-aged	75	65 - 130	0.05 - 0.13	0.08 - 0.16	0.08 - 0.15	0.1 - 0.2	0.15 - 0.25	0.16 - 0.3
			Soluted, Aged	90	65 - 130	0.05 - 0.13	0.08 - 0.16	0.08 - 0.15	0.1 - 0.2	0.15 - 0.25	0.16 - 0.3	
	Copper alloys		>12% Si	High silicon content	130	65 - 130	0.05 - 0.13	0.08 - 0.16	0.08 - 0.15	0.1 - 0.2	0.15 - 0.25	0.16 - 0.3
			>1% Pb	Free-cutting copper	110	65 - 130	0.05 - 0.13	0.08 - 0.16	0.08 - 0.15	0.1 - 0.2	0.15 - 0.25	0.16 - 0.3
S	Heat-resistant alloys		Fe based alloys	Non-aged	200	20 - 50	0.05 - 0.12	0.06 - 0.14	0.06 - 0.12	0.08 - 0.15	0.12 - 0.18	0.15 - 0.25
				Soluted, Aged	280	20 - 50	0.05 - 0.12	0.06 - 0.14	0.06 - 0.12	0.08 - 0.15	0.12 - 0.18	0.15 - 0.25
			Ni / Co based alloys	Non-aged	250	20 - 50	0.05 - 0.12	0.06 - 0.14	0.06 - 0.12	0.08 - 0.15	0.12 - 0.18	0.15 - 0.25
				Soluted, Aged	350	20 - 50	0.05 - 0.12	0.06 - 0.14	0.06 - 0.12	0.08 - 0.15	0.12 - 0.18	0.15 - 0.25
	Titanium alloys		α	Rm400	30 - 60	0.05 - 0.1	0.06 - 0.12	0.05 - 0.1	0.08 - 0.12	0.1 - 0.15	0.12 - 0.2	
			α-β	Rm1050	30 - 60	0.05 - 0.1	0.06 - 0.12	0.05 - 0.1	0.08 - 0.12	0.1 - 0.15	0.12 - 0.2	
H	Hardened steel		≥ 40 HRC		20 - 50	0.05 - 0.1	0.06 - 0.12	0.06 - 0.1	0.08 - 0.12	0.1 - 0.15	0.1 - 0.2	

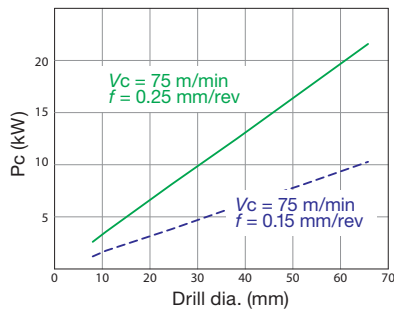
Cutting parameters shown here are relating to the basic recommendations for cutting materials given. Cutting conditions, material hardness, and other relevant variables must be taken into considerations to determine the actual cutting parameters.

Technical guide

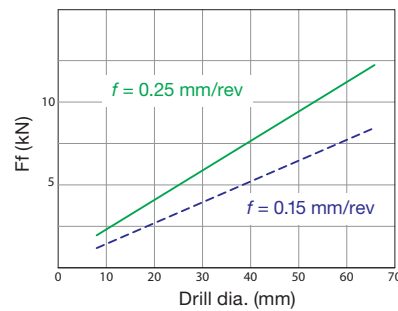
Machine setting for single tube system



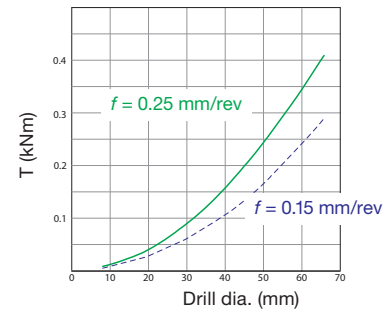
Net power



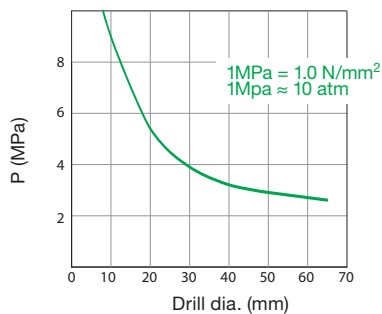
Feed force



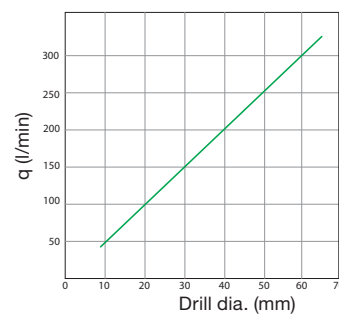
Torque



Coolant pressure



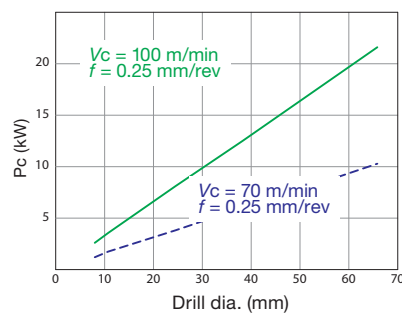
Coolant volume



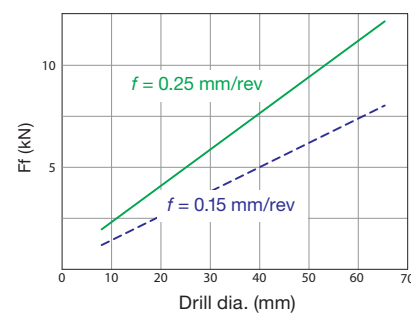
Machine setting for double tube system



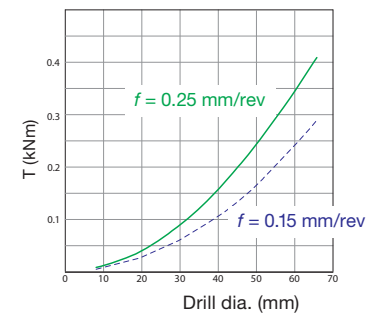
Net power



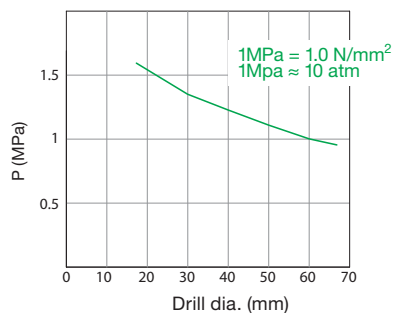
Feed force



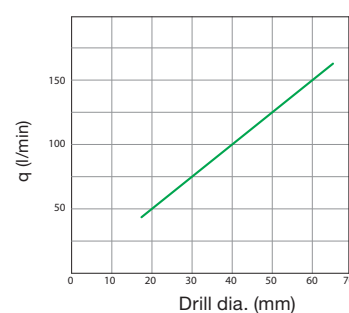
Torque



Coolant pressure



Coolant volume



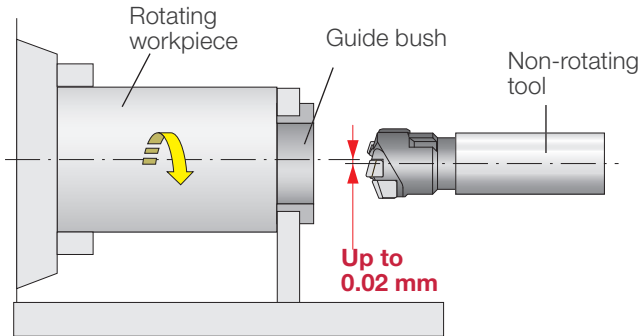
The above values should not be used as the exact recommendations. They may need modification depending on the machining conditions, materials, etc.

Machine setup

STS and DTS

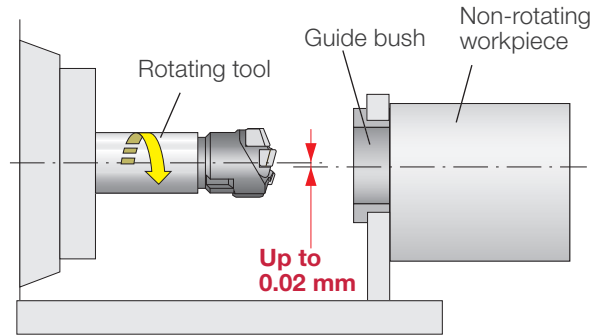


Workpiece rotating system



- Only used when the workpiece and the tool axis are on the same line.
- Better hole straightness and wear resistance on guide bush are provided compared to the tool-rotating system.
- Keep the alignment between guide bush and spindle within 0.02 mm.

Tool rotating system



- Can be used when the workpiece and the tool axis are not on the same line.
- Keep the alignment between guide bush and spindle within 0.02 mm.

DTS

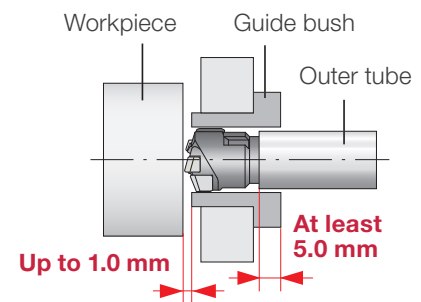


Positioning of outer tube and guide bush

Be sure to set the outer tube more than 5.0 mm into the guide bush to properly supply the coolant.

Positioning of workpiece material and guide bush

Sealing is not required for DTS because of the vacuum effect, but keep the gap between workpiece material and guide bush within 1.0 mm.



Guide bush

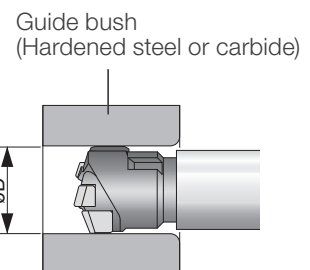
Tolerance

Guide bush tolerance should be G6 in order to keep consistent tool life and cutting accuracy. Diameters for G6 tolerance are shown on the right.

øD (mm)	G6 tolerance (mm)
8.00 - 10.00	+0.005 - +0.014
10.01 - 18.00	+0.006 - +0.017
18.01 - 30.00	+0.007 - +0.020
30.01 - 50.00	+0.009 - +0.025
50.01 - 65.00	+0.010 - +0.029

Material

Guide bush material	System	Advantage
Hardened steel	Workpiece rotating	Economical
Carbide	Tool rotating Workpiece rotating	Long life of guide bush



Coolant

Temperature

The proper coolant temperature is 30 - 40 °C (90 - 100 °F).

If the temperature exceeds this range, the coolant will deteriorate easily and may shorten tool life and generate poor surface finish.

Filtration

The coolant must be filtered properly in order to protect guide pads and workpiece surface.

Water-soluble type

Around 10% (dilution rate 1/10) is recommended for the concentration of water-soluble coolant in order to protect guide pads.

Coolant

Successful deep hole drilling is achieved by an optimal combination of the tool, the machine, and the coolant. Coolant plays an essential role in achieving secure and cost-efficient deep hole drilling operations. Therefore, it is very important to choose the correct type of coolant and use it appropriately.

Coolant

Coolant plays an essential role in lubricating tools, cooling cutting edges, chips, and guide pads, as well as evacuating chips when drilling. It also improves tool life, surface finish, and cutting accuracy when continuously supplied during the machining process.

1) Lubrication

Lubrication of cutting edges and guide pads is necessary in deep hole drilling. For efficient lubrication, it is recommended to use EP (Extreme Pressure) additives which contain sulfur or chlorine.

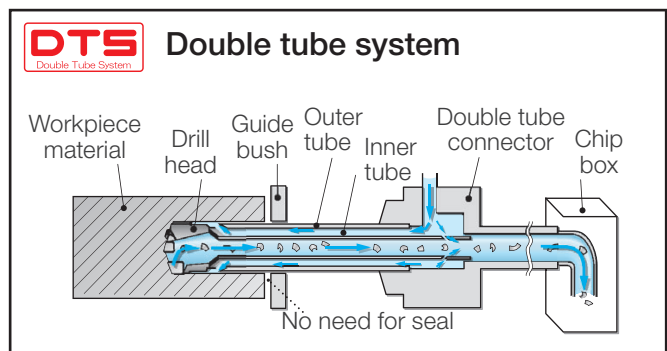
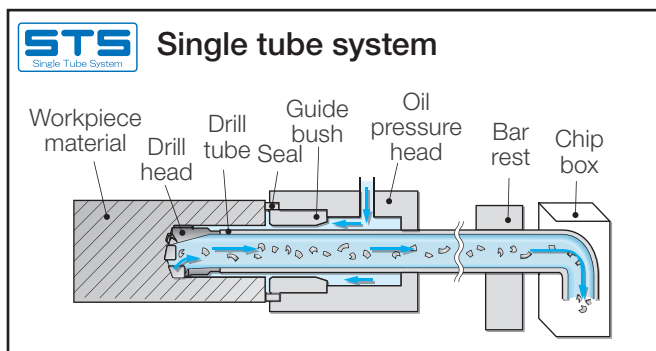
2) Temperature reduction

The ability to cool down the cutting edge and chips depends

on such characteristics as thermal conductivity and relative heat. Coolant with good cooling ability increases tool life, but water-soluble coolant is not preferred in deep hole drilling because it reduces effectiveness. If water-soluble coolant is used, the recommended concentration is 10% (dilution rate 1/10) or more.

3) Chip evacuation

Coolant helps push chips through the back end of the boring bar (for STS) or inner tube (for DTS) until the chips are separated from the workpiece in general cutting conditions. The flow and the pressure of coolant are also important in order to control chip evacuation.



Coolant unit

A coolant unit is also important to obtain the best effect from the coolant.

1) Coolant pressure and volume should be fixed and continuous.

An ideal coolant unit is the one which can set any valve of coolant pressure and volume and monitor the condition with gauges. A system that can detect trapped chips by a pressure gauge, and the screw pumps with an inverter controller are both recommended.

2) Coolant temperature should be maintained.

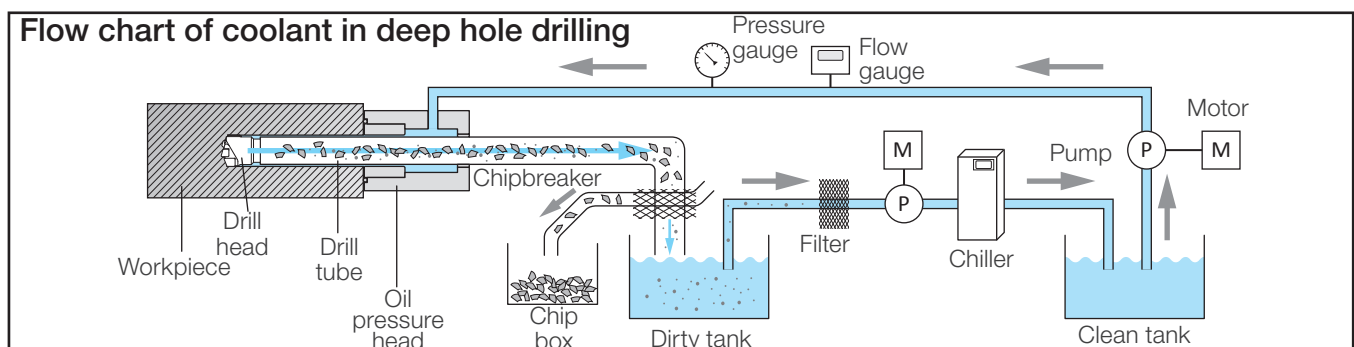
Coolant is heated by factors, such as:

- Cutting edge
- Friction on guide pad
- Contact time of heated chips and coolant
- Pump

Maintaining coolant temperature is important to keeping stable cutting conditions, chip formation, and cutting accuracy. The temperature should be lower than 40 °C (100 °F) for EP additives to provide sufficient lubrication. Therefore, the coolant temperature should be kept between 30 - 40 °C (90 - 100 °F) throughout the cutting operation.

3) Filtering

Unwanted particles are contained in coolant after the cutting operations, thus filtration is necessary to remove them. The filter size should be selected carefully to catch particles but not EP additives. Filter size depends on the coolant, but around 10 - 20 µm is generally suggested. For iron-based workpieces, a magnetic separator is helpful as it decreases the frequency of filter maintenance.



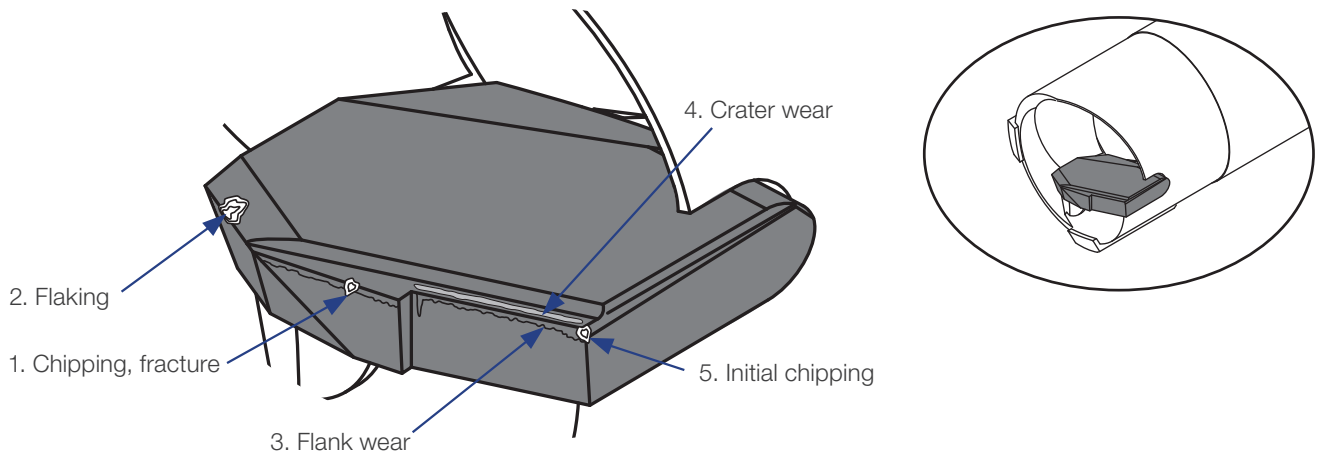
CNC drilling cycle operations

Use the CNC drilling cycle as instructed below in order to optimize the tool performance safely.

	<p>1. Start the CNC cycle operation</p>
	<p>2. Move the oil pressure head and securely seal onto the face of the workpiece.</p>
	<p>3. Move the BTA drill toward the workpiece</p> <p>b Keep the drill 3 - 5 mm* off the face of the workpiece.</p> <p>* If the machine allows this drill setting in Step 1, move on to Step 4.</p>
	<p>4. Start the cutting</p> <p>4-1 Activate the coolant supply. 4-2 Start the rotation (of the drill, the workpiece, or the drill+workpiece). 4-3 Start the drill feed.</p>
	<p>5. Stop the cutting</p> <p>5-1 Stop the drill feed. 5-2 Stop the rotation. 5-3 Stop the coolant supply.</p> <p>c Stop the cutting when the drill shoulder is completely through the end face of the workpiece.</p>
	<p>6. Return the drill to the starting point</p>
	<p>7. Return the oil pressure head to the starting point</p>

Troubleshooting for tip wear

Examples of trouble with cutting edge



Problem	Cause	Solution	
		Grade	Cutting conditions / other
Chipping, fracture	<ul style="list-style-type: none"> - Excessive vibration or impact - Torn away built-up edge 	<ul style="list-style-type: none"> - Use a tough grade 	<ul style="list-style-type: none"> - Reduce the feed rate - Eliminate the vibration
Flaking	<ul style="list-style-type: none"> - Excessive vibration or impact 	<ul style="list-style-type: none"> - Use a tough grade 	<ul style="list-style-type: none"> - Reduce the feed rate - Eliminate the vibration
Flank wear	<ul style="list-style-type: none"> - Cutting speed too high - Inadequate tool toughness 	<ul style="list-style-type: none"> - Use a grade with high wear resistance - Use a coated grade 	<ul style="list-style-type: none"> - Reduce the cutting speed - Reduce the feed rate - Use coolant properly
Crater wear	<ul style="list-style-type: none"> - Cutting speed too high - Feed rate too high - Inadequate tool toughness 	<ul style="list-style-type: none"> - Use a grade with high wear resistance - Use a coated grade 	<ul style="list-style-type: none"> - Reduce the cutting speed - Reduce the feed rate - Use coolant properly
Initial chipping	<ul style="list-style-type: none"> - Inappropriate guide bush or pilot hole - Misalignment 	<ul style="list-style-type: none"> - Use a tough grade 	<ul style="list-style-type: none"> - Adjust or change the guide bushing or pilot hole - Reduce the feed rate - Correct the misalignment

Cutting condition and chip form

Chip form in deep hole drilling

Chip form plays a key role in STS (Single tube system) and DTS (Double tube system) while large-volume and high-pressure coolant do so as well. Because chips are removed through the tube with coolant, proper chip formation is essential for smooth and steady evacuation.

How to decide the chip form

Generally, chip length should be 3 - 4 times its width, but tends to be longer with difficult-to-cut materials. In that case, chip evacuation will be improved by making chips thinner, usually by reducing the feed rate. The graph below shows chip formation for different cutting speeds and feeds. Short chips are created by reducing the cutting speed or increasing the feed.

Chip formation

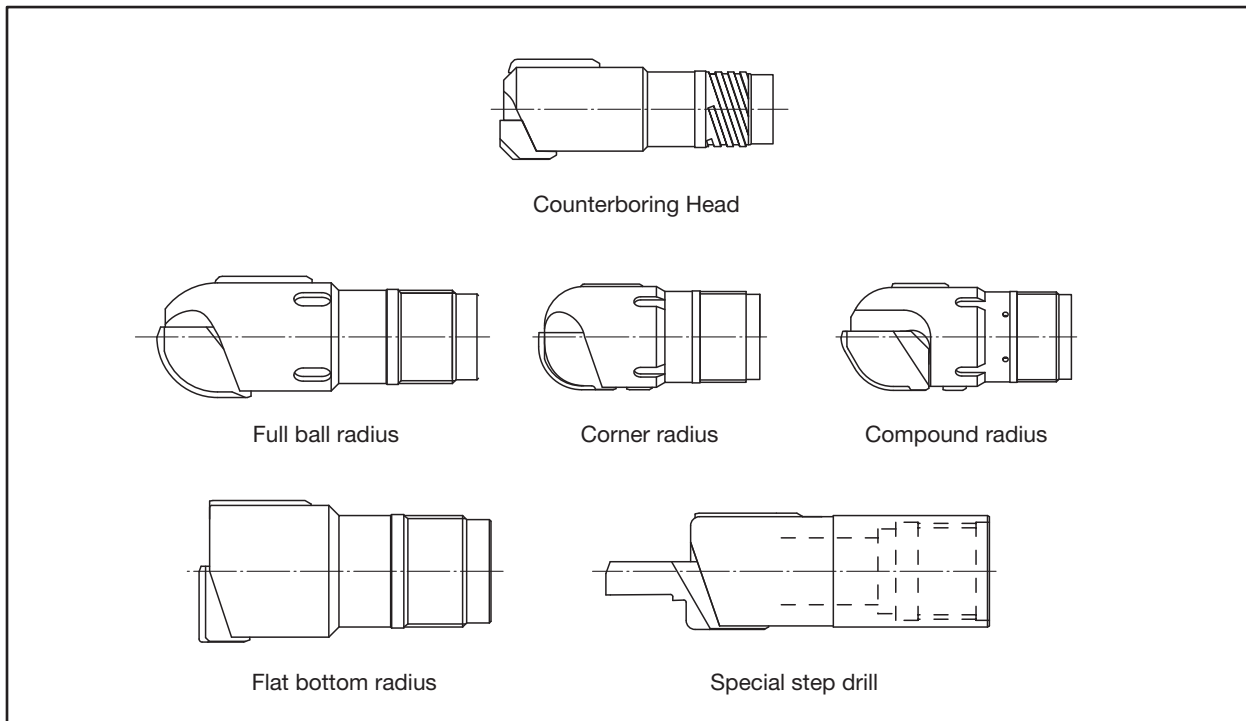
Chip formation is affected by multiple factors, such as workpiece material, chipbreaker geometry, cutting speed, feed, type of coolant, and coolant temperature. Suitable chip formation depends on cutting operation but is controllable by changing the cutting conditions.

Cutting speed: V_c (m/min)	110			
	90			
	70			
	50			
Condition:	0.10	0.15	0.20	
	Feed: f (mm/rev)			

Workpiece material: Low alloy steel (AISI4340)

Special tooling

Various types of special tooling are available upon request. Some examples are shown below. Please contact your sales representative for further information.



Special grade

Not only the standard grades and combinations as shown in the catalogue, but also various types of special grades and combinations are available through years of experience and research.

Applying suitable special grades can make the productivity high and stable with work-piece materials that are difficult to process with standard grades, or even under unstable cutting conditions.

Please contact your sales representative for further information.

B T A



Member IMC Group
3-7-57 Miyanojin, Kurume
Fukuoka 839-0801
www.unitacinc.com

E-Catalog is available



The logo for AS9100 certification, featuring a blue triangle with a white circle inside containing the text "CERTIFIED QMS" and "SI ISO 9001: 2008". Below the triangle is the text "THE STANDARDS INSTITUTION OF ISRAEL".	The logo for ISO 14001 certification, featuring a blue triangle with a white circle inside containing the text "CERTIFIED QMS" and "AS 9100". Below the triangle is the text "THE STANDARDS INSTITUTION OF ISRAEL".	The logo for JACO ISO 14001 certification, featuring a circular emblem with the text "INTERNATIONAL CERTIFICATION ORGANIZATION FOR ENVIRONMENT AND QUALITY - JAPAN" around the perimeter and "JACO" in the center. Below the emblem is the text "ISO 14001 Certified EC97J1123 1997.11.26".
AS9100 Certified 78006 2015.11.04		ISO 14001 Certified EC97J1123 1997.11.26

DISTRIBUTED BY: