



Member IMC Group

# INDEXABLE COUNTERBORING HEAD

**Single Tube System**  
**Double Tube System**



# WORLD WIDE BEST SELLER

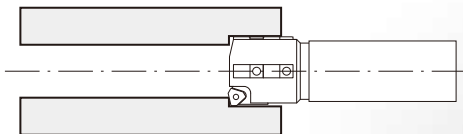
Has been used around the world for its high quality and ease of use for a quarter-century



**DRILL DEEP INTO  
THE FUTURE**

## Counterboring







Counterboring is used to open up a pre-bored hole to obtain a more exact diameter. In some instances where machine power is limited, a hole can be drilled with a smaller diameter drill head and counterbored to the required diameter.



**INDEXABLE COUNTERBORING HEAD**  
ø85.20mm

Former Indexable Reaming Head was renamed to Indexable Counterboring Head.

# INDEXABLE COUNTERBORING HEAD

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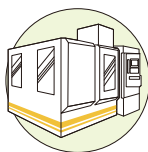
# Features and Success Examples



## Actual Case 1

### Machine spindle

Achieved good hole straightness and cylindricity less than 0.05/1000 and surface roughness (JIS Rz) 6.3μm in Counterboring 35 x 1000(mm) of high hardness steel which does not require additional finishing process.



|               |                     |
|---------------|---------------------|
| ■ Component   | Spindle             |
| ■ Material    | High hardness steel |
| ■ Application | Counterboring       |
| ■ Machine     | BTA machine         |
| ■ Coolant     | Oil based           |

|                     |            |
|---------------------|------------|
| Prehole diameter    | 33.00mm    |
| Cutting Speed       | 63m/min    |
| Feed per Revolution | 0.06mm/rev |
| Chip Breaker        | 1mm        |
| Grade               | CBN        |





### All Thread Types Available

For both STS and DTS

### Multiple Insert Grades and Geometries\*

Uniquely designed 1123 type insert covers wide application area

Patent No 2702061

\* For diameter  $\phi 40.00\text{mm}$  and up

### Resin Guide

High quality surface finish

### Drill diameter can be enlarged\*

By exchanging the cartridge and the guide pads the original head diameter can be increased up to 5mm

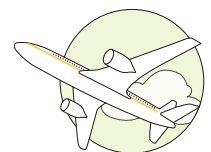
 **Plus**






\* For diameter  $\phi 40.00\text{mm}$  and up

## Actual Case 2

### Airplane engine shaft drilling

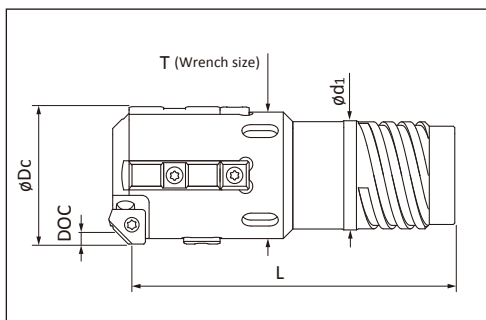
Reduced machining time by 30% and improved hole straightness in counterboring  $\phi 67.80 \times 2320(\text{mm})$  of heat resistant steel.



-  Component
-  Material
-  Application
-  Machine
-  Coolant

Engine Shaft  
Heat resistant steel  
Counterboring  
BTA machine  
Oil based

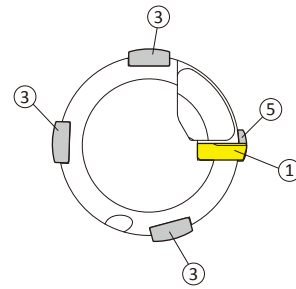
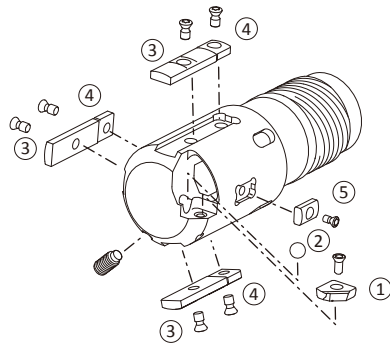
|                     |                         |
|---------------------|-------------------------|
| Prehole diameter    | $\phi 48.00 \text{ mm}$ |
| Cutting Speed       | 49 m/min                |
| Feed per Revolution | 0.12 mm/rev             |
| Chip Breaker        | G                       |
| Grade               | UC2220 (NLX)            |



| Ordering Code  | Diameter<br>øDc (mm) | Drill Tube    |           | DOC<br>(mm) | Dimensions (mm) |      |    |
|----------------|----------------------|---------------|-----------|-------------|-----------------|------|----|
|                |                      | Ordering Code | Dia. (mm) |             | L               | d1   | T  |
| KUSTR02E-xx.xx | 25.00 - 26.40        | ST02          | 22        | 2.8         | 72.5            | 19.5 | 24 |
| KUSTR03E-xx.xx | 26.41 - 28.70        | ST03          | 24        | 2.8         | 72.5            | 21   | 26 |
| KUSTR04E-xx.xx | 28.71 - 31.00        | ST04          | 26        | 2.8         | 72.5            | 23.5 | 28 |
| KUSTR05E-xx.xx | 31.01 - 33.30        | ST05          | 28        | 2.8         | 75.5            | 25.5 | 31 |
| KUSTR06E-xx.xx | 33.31 - 36.20        | ST06          | 30        | 2.8         | 75.5            | 28   | 34 |
| KUSTR07E-xx.xx | 36.21 - 39.60        | ST07          | 33        | 2.8         | 90.5            | 30   | 37 |
| KUSTR08E-xx.xx | 39.61 - 39.99        | ST08          | 36        | 2.8         | 90.5            | 33   | 37 |





Ordering example for DIA=30.00mm : KUSTR04E-30.00

- Before drilling operation please adjust tool diameter. For diameter adjustment please see page 25.









NOTE: According to diameter, some parts may not reflect the picture above

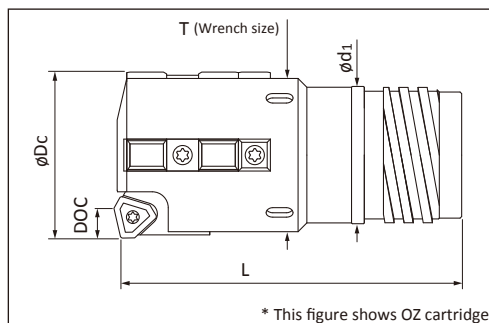
### Cartridge & Insert

| Dia.<br>øDc (mm) | Insert<br>①   |     |  | Insert Screw  |     |        | Adjust Ball<br>②  |     | Adjust Screw   |     |        |
|------------------|---|-----|--|---|-----|--------|---|-----|--|-----|--------|
|                  |  | Qty |  |  | Qty | Wrench |  | Qty |  | Qty | Wrench |
| 25.00 - 29.99    | IIS160-45   | 1   |  | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |
| 30.00 - 37.99    | IIS160-45   | 1   |  | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |
| 38.00 - 39.99    | IIS160-45   | 1   |  | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |

### Guide Pad

| Dia.<br>øDc (mm) | Guide Pad<br>③  |     |  | Lock Screw  |     |        | Protector<br>④  |     |  | Lock Screw   |     |        | Sub Guide<br>⑤  |     |  | Lock Screw  |     |        |
|------------------|---|-----|--|---|-----|--------|---|-----|--|--|-----|--------|---|-----|--|---|-----|--------|
|                  |  | Qty |  |  | Qty | Wrench |  | Qty |  |  | Qty | Wrench |  | Qty |  |  | Qty | Wrench |
| 25.00 - 29.99    | UG08-120CD  | 2   |  | CSTB3S  | 2   | T-9D   | GPT08-120   | 2   |  | CSTB3S   | 2   | T-9D   | CUG06   | 1   |  | CSTB2.2S  | 1   | T-7D   |
| 30.00 - 37.99    | UG08-140CD  | 3   |  | CSTB3S  | 3   | T-9D   | GPT08-140   | 3   |  | CSTB3S   | 3   | T-9D   | CUG06   | 1   |  | CSTB2.2S  | 1   | T-7D   |
| 38.00 - 39.99    | UG08CD  | 3   |  | CSTB3S  | 3   | T-9D   | GPT08   | 3   |  | CSTB3S   | 3   | T-9D   | CUG08   | 1   |  | CSTB3S  | 1   | T-9D   |

- Drill heads come complete with: adjust ball, guide pads, protectors, sub guide pad and wrenches - but less inserts.



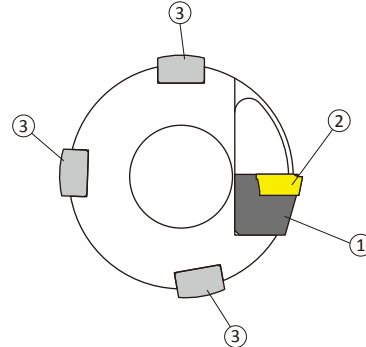
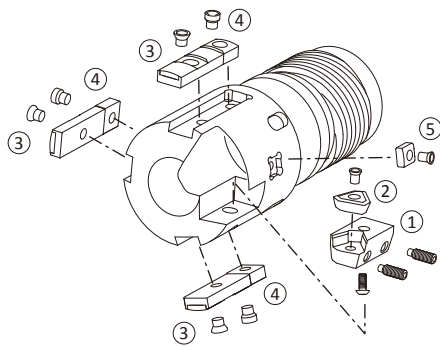
| Ordering Code  | Diameter<br>øDc (mm) | Drill Tube    |           | DOC (mm) |     | Dimensions (mm) |     |     |
|----------------|----------------------|---------------|-----------|----------|-----|-----------------|-----|-----|
|                |                      | Ordering Code | Dia. (mm) | OZ       | OX  | L               | d1  | T   |
| KUSTR08E-xx.xx | 40.00 - 43.00        | ST08          | 36        | 6.4      | 4   | 90              | 33  | 40  |
| KUSTR09E-xx.xx | 43.01 - 47.00        | ST09          | 39        | 6.4      | 4   | 95              | 36  | 43  |
| KUSTR10E-xx.xx | 47.01 - 51.70        | ST10          | 43        | 6.4      | 4   | 95              | 39  | 48  |
| KUSTR11E-xx.xx | 51.71 - 51.99        | ST11          | 47        | 6.4      | 4   | 100             | 43  | 52  |
| KUSTR11E-xx.xx | 52.00 - 56.20        | ST11          | 47        | 7.2      | 4.8 | 100             | 43  | 52  |
| KUSTR12E-xx.xx | 56.21 - 60.60        | ST12          | 51        | 7.2      | 4.8 | 110             | 47  | 57  |
| KUSTR13E-xx.xx | 60.61 - 65.00        | ST13          | 56        | 7.2      | 4.8 | 110             | 51  | 61  |
| KUSTR14E-xx.xx | 65.00 - 66.99        | ST14          | 56        | 7.2      | 4.8 | 150             | 52  | 63  |
| KUSTR15E-xx.xx | 67.00 - 72.99        | ST15          | 62        | 10.4     | 6.4 | 150             | 58  | 69  |
| KUSTR16E-xx.xx | 73.00 - 79.99        | ST16          | 68        | 10.4     | 6.4 | 150             | 63  | 76  |
| KUSTR17E-xx.xx | 80.00 - 86.99        | ST17          | 75        | 10.4     | 6.4 | 180             | 70  | 83  |
| KUSTR18E-xx.xx | 87.00 - 99.99        | ST18          | 82        | 10.4     | 6.4 | 180             | 77  | 96  |
| KUSTR19E-xx.xx | 100.00 - 111.99      | ST19          | 94        | 10.4     | 6.4 | 180             | 89  | 107 |
| KUSTR20E-xx.xx | 112.00 - 123.99      | ST20          | 106       | 10.4     | 6.4 | 205             | 101 | 119 |
| KUSTR21E-xx.xx | 124.00 - 135.99      | ST21          | 118       | 10.4     | 6.4 | 205             | 113 | 131 |
| KUSTR22E-xx.xx | 136.00 - 147.99      | ST22          | 130       | 10.4     | 6.4 | 205             | 125 | 143 |
| KUSTR23E-xx.xx | 148.00 - 159.99      | ST23          | 142       | 10.4     | 6.4 | 225             | 137 | 155 |
| KUSTR24E-xx.xx | 160.00 - 171.99      | ST24          | 154       | 10.4     | 6.4 | 225             | 149 | 167 |
| KUSTR25E-xx.xx | 172.00 - 183.99      | ST25          | 166       | 10.4     | 6.4 | 225             | 161 | 179 |
| KUSTR26E-xx.xx | 184.00 - 195.99      | ST26          | 178       | 10.4     | 6.4 | 245             | 173 | 191 |
| KUSTR27E-xx.xx | 196.00 - 207.99      | ST27          | 190       | 10.4     | 6.4 | 245             | 185 | 203 |
| KUSTR28E-xx.xx | 208.00 - 219.99      | ST28          | 202       | 10.4     | 6.4 | 245             | 197 | 215 |
| KUSTR29E-xx.xx | 220.00 - 231.99      | ST29          | 214       | 10.4     | 6.4 | 265             | 208 | 227 |
| KUSTR30E-xx.xx | 232.00 - 243.99      | ST30          | 226       | 10.4     | 6.4 | 265             | 220 | 239 |
| KUSTR31E-xx.xx | 244.00 - 255.99      | ST31          | 238       | 10.4     | 6.4 | 265             | 232 | 251 |
| KUSTR32E-xx.xx | 256.00 - 267.99      | ST32          | 250       | 10.4     | 6.4 | 290             | 244 | 263 |
| KUSTR33E-xx.xx | 268.00 - 279.99      | ST33          | 262       | 10.4     | 6.4 | 290             | 256 | 275 |
| KUSTR34E-xx.xx | 280.00 - 291.99      | ST34          | 274       | 10.4     | 6.4 | 290             | 268 | 287 |

Ordering example for DIA=100.00mm with OZ cartridge: KUSTR19E-100.00

OX cartridge: KUSTR19E-100.00-OX

- Before drilling operation please adjust tool diameter. For diameter adjustment please see page 24.





NOTE: According to diameter, some parts may not reflect the picture above

## Cartridge & Insert

### OZ type (For large depth of cut)

| Dia.<br>øDc (mm) | Cartridge<br>① | Insert<br>② | Insert Screw    | Adjust Screw     | Lock Screw        |
|------------------|----------------|-------------|-----------------|------------------|-------------------|
|                  | Qty            | Qty         | Qty Wrench      | Qty Wrench       | Qty Wrench        |
| 40.00 - 45.99    | OZ402-04 1     | 1123-04R 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 46.00 - 51.99    | OZ402-04 1     | 1123-04R 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 52.00 - 59.99    | OZ402-32 1     | 1123-32R 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 60.00 - 66.99    | OZ402-32 1     | 1123-32R 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 67.00 - 99.99    | OZ402-43 1     | 1123-43R 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 100.00 - 135.99  | OZ402-43 1     | 1123-43R 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 136.00 - 291.99  | OZ402-43 1     | 1123-43R 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |

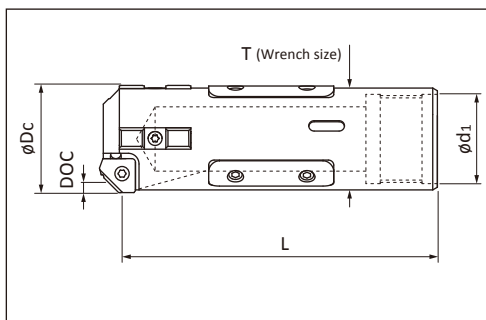
### OX type (For small depth of cut)

| Dia.<br>øDc (mm) | Cartridge<br>① | Insert<br>② | Insert Screw    | Adjust Screw     | Lock Screw        |
|------------------|----------------|-------------|-----------------|------------------|-------------------|
|                  | Qty            | Qty         | Qty Wrench      | Qty Wrench       | Qty Wrench        |
| 40.00 - 45.99    | OX04R 1        | 1123-04L 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 46.00 - 51.99    | OX04R 1        | 1123-04L 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 52.00 - 59.99    | OX32R 1        | 1123-32L 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 60.00 - 66.99    | OX32R 1        | 1123-32L 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 67.00 - 99.99    | OX43R 1        | 1123-43L 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 100.00 - 135.99  | OX43R 1        | 1123-43L 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 136.00 - 291.99  | OX43R 1        | 1123-43L 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |

## Guide Pad

| Dia.<br>øDc (mm) | Guide Pad<br>③ | Lock Screw     | Protector<br>④ | Lock Screw     | Sub Guide<br>⑤ | Lock Screw     |
|------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                  | Qty            | Qty Wrench     | Qty            | Qty Wrench     | Qty            | Qty Wrench     |
| 40.00 - 45.99    | UG08CD 3       | CSTB3S 3 T-9D  | GPT08 3        | CSTB3S 3 T-9D  | CUG08 1        | CSTB3S 1 T-9D  |
| 46.00 - 51.99    | UG10CD 3       | CSTB4S 3 T-15D | GPT10 3        | CSTB4S 3 T-15D | CUG08 1        | CSTB3S 1 T-9D  |
| 52.00 - 59.99    | UG10CD 3       | CSTB4S 3 T-15D | GPT10 3        | CSTB4S 3 T-15D | CUG08 1        | CSTB3S 1 T-9D  |
| 60.00 - 66.99    | UG14CD 3       | CSTA5S 3 T-15D | GPT14 3        | CSTA5S 3 T-15D | CUG10 1        | CSTB3S 1 T-9D  |
| 67.00 - 99.99    | UG14CD 3       | CSTA5S 3 T-15D | GPT14 3        | CSTA5S 3 T-15D | CUG10 1        | CSTB3S 1 T-9D  |
| 100.00 - 135.99  | UG18CD 3       | LS1206S 3 H3   | GPT18-M 3      | LS1206S 3 H3   | CUG14-M 1      | CSTA5S 1 T-15D |
| 136.00 - 291.99  | UG18CD 5       | LS1206S 5 H3   | GPT18-M 5      | LS1206S 5 H3   | CUG14-M 1      | CSTA5S 1 T-15D |

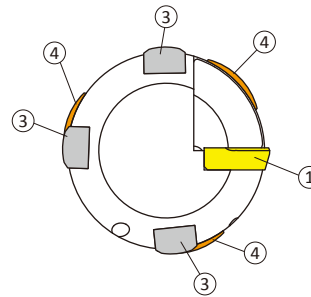
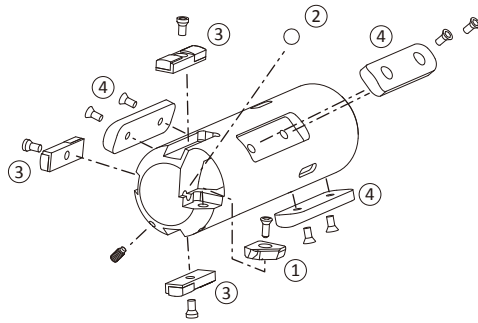
- Plus (+) spare parts will enlarge drill diameter up to 5mm depending on cartridge size. (see page 19 for details)
- Drill heads come complete with: cartridge, guide pads, protectors, sub guide pad and wrenches - but less inserts.



| Ordering Code        | Diameter<br>øDc (mm) | Drill Tube    |           | DOC<br>(mm) | Dimensions (mm) |    |    |
|----------------------|----------------------|---------------|-----------|-------------|-----------------|----|----|
|                      |                      | Ordering Code | Dia. (mm) |             | L               | d1 | T  |
| <b>KUSTR22-xx.xx</b> | <b>25.00 - 26.99</b> | UB22          | 22        | 2.8         | 110.5           | 20 | 24 |
| <b>KUSTR24-xx.xx</b> | <b>27.00 - 29.99</b> | UB24          | 24        | 2.8         | 110.5           | 22 | 27 |
| <b>KUSTR26-xx.xx</b> | <b>30.00 - 31.99</b> | UB26          | 26        | 2.8         | 110.5           | 24 | 29 |
| <b>KUSTR28-xx.xx</b> | <b>32.00 - 33.99</b> | UB28          | 28        | 2.8         | 110.5           | 26 | 31 |
| <b>KUSTR30-xx.xx</b> | <b>34.00 - 36.99</b> | UB30          | 30        | 2.8         | 135.5           | 27 | 34 |
| <b>KUSTR33-xx.xx</b> | <b>37.00 - 39.99</b> | UB33          | 33        | 2.8         | 135.5           | 30 | 37 |





Ordering example for DIA=30.00mm : KUSTR26-30.00

- Before drilling operation please adjust tool diameter. For diameter adjustment please see page 25.







NOTE: According to diameter, some parts may not reflect the picture above

### Cartridge & Insert

| Dia.<br>øDc (mm) | Insert<br>①   |     | Insert Screw  |     |        | Adjust Ball<br>②  |     | Adjust Screw   |     |        |
|------------------|---|-----|---|-----|--------|---|-----|--|-----|--------|
|                  |  | Qty |  | Qty | Wrench |  | Qty |  | Qty | Wrench |
| 25.00 - 29.99    | IIS160-45   | 1   | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |
| 30.00 - 36.99    | IIS160-45   | 1   | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |
| 37.00 - 39.99    | IIS160-45   | 1   | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |

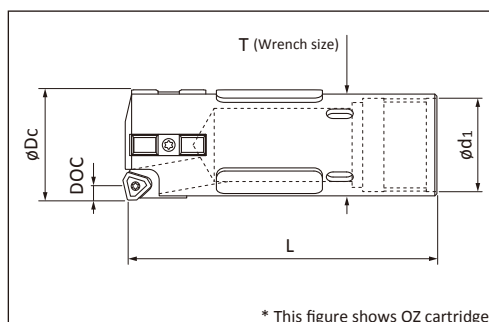
### Guide Pad

| Dia.<br>øDc (mm) | Guide Pad<br>③  |     |   | Lock Screw |        |  | Resin Guide Pad*<br>④   |     |   | Lock Screw |        |  |
|------------------|---|-----|---|------------|--------|--|---|-----|---|------------|--------|--|
|                  |  | Qty |  | Qty        | Wrench |  |  | Qty |  | Qty        | Wrench |  |
| 25.00 - 29.99    | UG08-120CD  | 2   | CSTB3S  | 2          | T-9D   |  | RRG10   | 3   | LS0902.5-6  | 6          | + No.1 |  |
| 30.00 - 36.99    | UG08-140CD  | 3   | CSTB3S  | 3          | T-9D   |  | RRG12   | 3   | LS0903-8  | 6          | H2     |  |
| 37.00 - 39.99    | UG08CD  | 3   | CSTB3S  | 3          | T-9D   |  | RRG15   | 3   | LS0904-10   | 6          | H2.5   |  |

\* When ordering extra resin guide pads for your stock:

Please note that these are supplied oversize. To achieve the correct diameter they will have to be turned to size once mounted in the tool.

- Drill heads come complete with: adjust ball, guide pads, protectors, sub guide pad and wrenches - but less inserts.



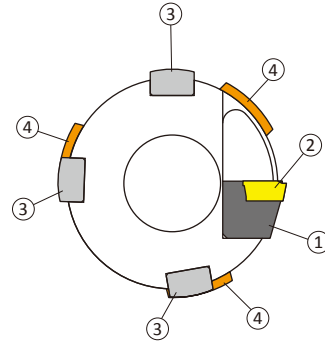
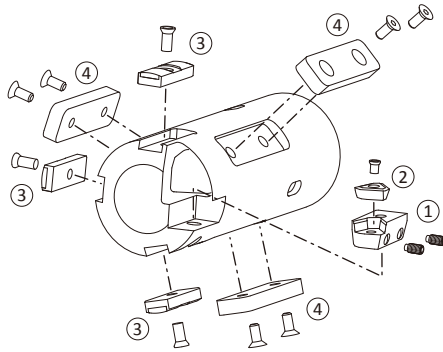
| Ordering Code  | Diameter<br>øDc (mm) | Drill Tube    |           | DOC (mm) |     | Dimensions (mm) |     |     |
|----------------|----------------------|---------------|-----------|----------|-----|-----------------|-----|-----|
|                |                      | Ordering Code | Dia. (mm) | OZ       | OX  | L               | d1  | T   |
| KUSTR36-xx.xx  | 40.00 - 43.99        | UB36          | 36        | 6.4      | 4   | 135             | 33  | 41  |
| KUSTR39-xx.xx  | 44.00 - 46.99        | UB39          | 39        | 6.4      | 4   | 135             | 37  | 43  |
| KUSTR43-xx.xx  | 47.00 - 51.99        | UB43          | 43        | 6.4      | 4   | 145             | 41  | 48  |
| KUSTR47-xx.xx  | 52.00 - 56.99        | UB47          | 47        | 7.2      | 4.8 | 145             | 44  | 53  |
| KUSTR51-xx.xx  | 57.00 - 60.99        | UB51          | 51        | 7.2      | 4.8 | 170             | 49  | 57  |
| KUSTR56-xx.xx  | 61.00 - 66.99        | UB56          | 56        | 7.2      | 4.8 | 170             | 53  | 64  |
| KUSTR56-xx.xx  | 67.00 - 67.99        | UB56          | 56        | 10.4     | 6.4 | 170             | 53  | 64  |
| KUSTR62-xx.xx  | 68.00 - 74.99        | UB62          | 62        | 10.4     | 6.4 | 170             | 59  | 71  |
| KUSTR68-xx.xx  | 75.00 - 80.99        | UB68          | 68        | 10.4     | 6.4 | 205             | 65  | 77  |
| KUSTR75-xx.xx  | 81.00 - 90.99        | UB75          | 75        | 10.4     | 6.4 | 215             | 71  | 87  |
| KUSTR82-xx.xx  | 91.00 - 98.99        | UB82          | 82        | 10.4     | 6.4 | 225             | 79  | 95  |
| KUSTR94-xx.xx  | 99.00 - 110.99       | UB94          | 94        | 10.4     | 6.4 | 235             | 90  | 106 |
| KUSTR106-xx.xx | 111.00 - 122.99      | UB106         | 106       | 10.4     | 6.4 | 235             | 102 | 118 |
| KUSTR118-xx.xx | 123.00 - 134.99      | UB118         | 118       | 10.4     | 6.4 | 265             | 114 | 130 |
| KUSTR130-xx.xx | 135.00 - 148.99      | UB130         | 130       | 10.4     | 6.4 | 265             | 126 | 144 |
| KUSTR142-xx.xx | 149.00 - 161.99      | UB142         | 142       | 10.4     | 6.4 | 265             | 139 | 157 |
| KUSTR154-xx.xx | 162.00 - 173.99      | UB154         | 154       | 10.4     | 6.4 | 285             | 151 | 169 |
| KUSTR166-xx.xx | 174.00 - 185.99      | UB166         | 166       | 10.4     | 6.4 | 285             | 163 | 181 |
| KUSTR178-xx.xx | 186.00 - 197.99      | UB178         | 178       | 10.4     | 6.4 | 310             | 175 | 193 |
| KUSTR190-xx.xx | 198.00 - 209.99      | UB190         | 190       | 10.4     | 6.4 | 310             | 187 | 205 |
| KUSTR202-xx.xx | 210.00 - 221.99      | UB202         | 202       | 10.4     | 6.4 | 320             | 199 | 217 |
| KUSTR214-xx.xx | 222.00 - 233.99      | UB214         | 214       | 10.4     | 6.4 | 325             | 211 | 229 |
| KUSTR226-xx.xx | 234.00 - 245.99      | UB226         | 226       | 10.4     | 6.4 | 325             | 223 | 241 |
| KUSTR238-xx.xx | 246.00 - 257.99      | UB238         | 238       | 10.4     | 6.4 | 325             | 235 | 253 |
| KUSTR250-xx.xx | 258.00 - 269.99      | UB250         | 250       | 10.4     | 6.4 | 360             | 245 | 265 |
| KUSTR262-xx.xx | 270.00 - 281.99      | UB262         | 262       | 10.4     | 6.4 | 360             | 259 | 277 |
| KUSTR274-xx.xx | 282.00 - 293.99      | UB274         | 274       | 10.4     | 6.4 | 360             | 271 | 289 |

Ordering example for DIA=100.00mm with OZ cartridge: KUSTR94-100.00

OX cartridge: KUSTR94-100.00-OX

- Before drilling operation please adjust tool diameter. For diameter adjustment please see page 24.





NOTE: According to diameter, some parts may not reflect the picture above

## Cartridge & Insert

### OZ type (For large depth of cut)

| Dia.<br>øDc (mm) | Cartridge<br>① |   | Insert<br>② |   | Insert Screw |         | Adjust Screw |        | Lock Screw |        |
|------------------|----------------|---|-------------|---|--------------|---------|--------------|--------|------------|--------|
|                  | Qty            |   | Qty         |   | Qty          | Wrench  | Qty          | Wrench | Qty        | Wrench |
| 40.00 - 45.99    | OZ402-04       | 1 | 1123-04R    | 1 | CSTB2.5      | 1 T-8D  | AS0004-8     | 2 H2   | LS1803.5RH | 1 H2.5 |
| 46.00 - 51.99    | OZ402-04       | 1 | 1123-04R    | 1 | CSTB2.5      | 1 T-8D  | AS0004-8     | 2 H2   | LS1803.5RH | 1 H2.5 |
| 52.00 - 56.99    | OZ402-32       | 1 | 1123-32R    | 1 | CSTB3.5D     | 1 T-9D  | AS0005-10    | 2 H2.5 | LS1805RH   | 1 H3   |
| 57.00 - 59.99    | OZ402-32       | 1 | 1123-32R    | 1 | CSTB3.5D     | 1 T-9D  | AS0005-10    | 2 H2.5 | LS1805RH   | 1 H3   |
| 60.00 - 66.99    | OZ402-32       | 1 | 1123-32R    | 1 | CSTB3.5D     | 1 T-9D  | AS0005-10    | 2 H2.5 | LS1805RH   | 1 H3   |
| 67.00 - 80.99    | OZ402-43       | 1 | 1123-43R    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 81.00 - 90.99    | OZ402-43       | 1 | 1123-43R    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 91.00 - 99.99    | OZ402-43       | 1 | 1123-43R    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 100.00 - 135.99  | OZ402-43       | 1 | 1123-43R    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 136.00 - 293.99  | OZ402-43       | 1 | 1123-43R    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |

### OX type (For small depth of cut)

| Dia.<br>øDc (mm) | Cartridge<br>① |   | Insert<br>② |   | Insert Screw |         | Adjust Screw |        | Lock Screw |        |
|------------------|----------------|---|-------------|---|--------------|---------|--------------|--------|------------|--------|
|                  | Qty            |   | Qty         |   | Qty          | Wrench  | Qty          | Wrench | Qty        | Wrench |
| 40.00 - 45.99    | OX04R          | 1 | 1123-04L    | 1 | CSTB2.5      | 1 T-8D  | AS0004-8     | 2 H2   | LS1803.5RH | 1 H2.5 |
| 46.00 - 51.99    | OX04R          | 1 | 1123-04L    | 1 | CSTB2.5      | 1 T-8D  | AS0004-8     | 2 H2   | LS1803.5RH | 1 H2.5 |
| 52.00 - 56.99    | OX32R          | 1 | 1123-32L    | 1 | CSTB3.5D     | 1 T-9D  | AS0005-10    | 2 H2.5 | LS1805RH   | 1 H3   |
| 57.00 - 59.99    | OX32R          | 1 | 1123-32L    | 1 | CSTB3.5D     | 1 T-9D  | AS0005-10    | 2 H2.5 | LS1805RH   | 1 H3   |
| 60.00 - 66.99    | OX32R          | 1 | 1123-32L    | 1 | CSTB3.5D     | 1 T-9D  | AS0005-10    | 2 H2.5 | LS1805RH   | 1 H3   |
| 67.00 - 80.99    | OX43R          | 1 | 1123-43L    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 81.00 - 90.99    | OX43R          | 1 | 1123-43L    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 91.00 - 99.99    | OX43R          | 1 | 1123-43L    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 100.00 - 135.99  | OX43R          | 1 | 1123-43L    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |
| 136.00 - 293.99  | OX43R          | 1 | 1123-43L    | 1 | CSTB4M       | 1 T-15D | AS0005-15    | 2 H2.5 | LS1806RH   | 1 H4   |

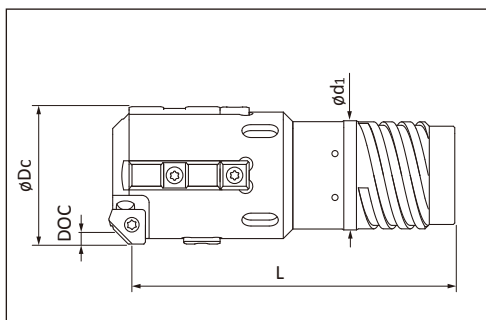
## Guide Pad

| Dia.<br>øDc (mm) | Guide Pad<br>③ |   | Lock Screw |         | Resin Guide Pad*<br>④ |   | Lock Screw |        |
|------------------|----------------|---|------------|---------|-----------------------|---|------------|--------|
|                  | Qty            |   | Qty        | Wrench  | Qty                   |   | Qty        | Wrench |
| 40.00 - 45.99    | UG08CD         | 3 | CSTB3S     | 3 T-9D  | RRG15                 | 3 | LS0904-10  | 6 H2.5 |
| 46.00 - 51.99    | UG10CD         | 3 | CSTB4S     | 3 T-15D | RRG15                 | 3 | LS0904-10  | 6 H2.5 |
| 52.00 - 56.99    | UG10CD         | 3 | CSTB4S     | 3 T-15D | RRG15                 | 3 | LS0904-10  | 6 H2.5 |
| 57.00 - 59.99    | UG10CD         | 3 | CSTB4S     | 3 T-15D | RRG20                 | 3 | LS0905-12  | 6 H3   |
| 60.00 - 66.99    | UG14CD         | 3 | CSTA5S     | 3 T-15D | RRG20                 | 3 | LS0905-12  | 6 H3   |
| 67.00 - 80.99    | UG14CD         | 3 | CSTA5S     | 3 T-15D | RRG20                 | 3 | LS0905-12  | 6 H3   |
| 81.00 - 90.99    | UG14CD         | 3 | CSTA5S     | 3 T-15D | RRG30                 | 3 | LS0906-15  | 6 H4   |
| 91.00 - 99.99    | UG14CD         | 3 | CSTA5S     | 3 T-15D | RRG35                 | 3 | LS0906-15  | 6 H4   |
| 100.00 - 135.99  | UG18CD         | 3 | LS1206S    | 3 H3    | RRG35                 | 3 | LS0906-15  | 6 H4   |
| 136.00 - 293.99  | UG18CD         | 5 | LS1206S    | 5 H3    | RRG35                 | 3 | LS0906-15  | 6 H4   |

\* When ordering extra resin guide pads for your stock:

Please note that these are supplied oversize. To achieve the correct diameter they will have to be turned to size once mounted in the tool.

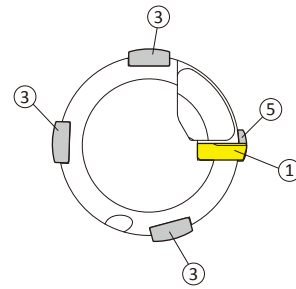
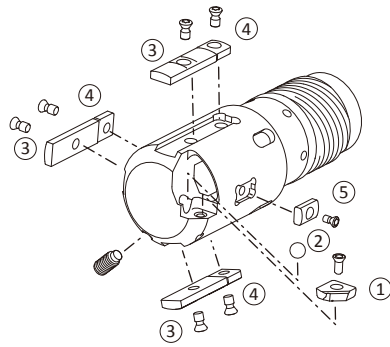
- Plus (+) spare parts will enlarge drill diameter up to 5mm depending on cartridge size. (see page 19 for details)
- Drill heads come complete with: cartridge, guide pads, protectors, sub guide pad and wrenches - but less inserts.



| Ordering Code  | Diameter<br>$\phi D_c$ (mm) | Outer Tube    |           | DOC<br>(mm) | Dimensions (mm) |       |
|----------------|-----------------------------|---------------|-----------|-------------|-----------------|-------|
|                |                             | Ordering Code | Dia. (mm) |             | L               | $d_1$ |
| KUDTR03E-xx.xx | 25.00 - 26.40               | OT03          | 23.5      | 2.8         | 72.5            | 21    |
| KUDTR04E-xx.xx | 26.41 - 28.70               | OT04          | 26        | 2.8         | 72.5            | 23.5  |
| KUDTR05E-xx.xx | 28.71 - 31.00               | OT05          | 28        | 2.8         | 75.5            | 25.5  |
| KUDTR06E-xx.xx | 31.01 - 33.30               | OT06          | 30.5      | 2.8         | 75.5            | 28    |
| KUDTR07E-xx.xx | 33.31 - 36.20               | OT07          | 33        | 2.8         | 75.5            | 30    |
| KUDTR08E-xx.xx | 36.21 - 39.60               | OT08          | 35.5      | 2.8         | 90.5            | 33    |
| KUDTR09E-xx.xx | 39.61 - 39.99               | OT09          | 39        | 2.8         | 90.5            | 36    |





Ordering example for DIA=30.00mm : KUDTR05E-30.00

- Before drilling operation please adjust tool diameter. For diameter adjustment please see page 25.









NOTE: According to diameter, some parts may not reflect the picture above

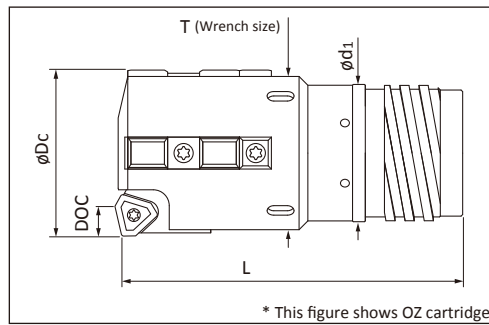
## Cartridge & Insert

| Dia.<br>øDc (mm) | Insert<br>①   |     |  | Insert Screw  |     |        | Adjust Ball<br>②  |     | Adjust Screw   |     |        |
|------------------|---|-----|--|---|-----|--------|---|-----|--|-----|--------|
|                  |  | Qty |  |  | Qty | Wrench |  | Qty |  | Qty | Wrench |
| 25.00 - 29.99    | IIS160-45   | 1   |  | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |
| 30.00 - 37.99    | IIS160-45   | 1   |  | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |
| 38.00 - 39.99    | IIS160-45   | 1   |  | CSTANO3   | 1   | T-9D   | BALL5   | 1   | AS0005-5   | 1   | H2.5   |

## Guide Pad

| Dia.<br>øDc (mm) | Guide Pad<br>③  |     |  | Lock Screw  |     |        | Protector<br>④  |     |  | Lock Screw   |     |        | Sub Guide<br>⑤  |     |  | Lock Screw  |     |        |
|------------------|---|-----|--|---|-----|--------|---|-----|--|--|-----|--------|---|-----|--|---|-----|--------|
|                  |  | Qty |  |  | Qty | Wrench |  | Qty |  |  | Qty | Wrench |  | Qty |  |  | Qty | Wrench |
| 25.00 - 29.99    | UG08-120CD  | 2   |  | CSTB3S  | 2   | T-9D   | GPT08-120   | 2   |  | CSTB3S   | 2   | T-9D   | CUG06   | 1   |  | CSTB2.2S  | 1   | T-7D   |
| 30.00 - 37.99    | UG08-140CD  | 3   |  | CSTB3S  | 3   | T-9D   | GPT08-140   | 3   |  | CSTB3S   | 3   | T-9D   | CUG06   | 1   |  | CSTB2.2S  | 1   | T-7D   |
| 38.00 - 39.99    | UG08CD  | 3   |  | CSTB3S  | 3   | T-9D   | GPT08   | 3   |  | CSTB3S   | 3   | T-9D   | CUG08   | 1   |  | CSTB3S  | 1   | T-9D   |

- Drill heads come complete with: adjust ball, guide pads, protectors, sub guide pad and wrenches - but less inserts.

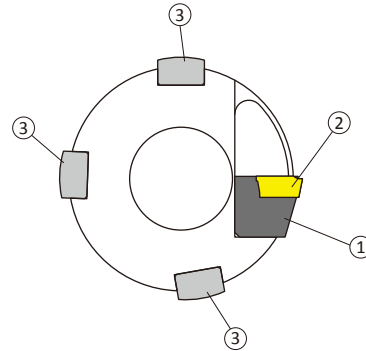
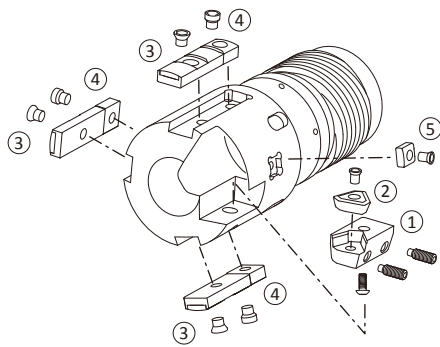


| Ordering Code  | Diameter<br>øDc (mm) | Drill Tube    |           | DOC (mm) |     | Dimensions (mm) |     |     |
|----------------|----------------------|---------------|-----------|----------|-----|-----------------|-----|-----|
|                |                      | Ordering Code | Dia. (mm) | OZ       | OX  | L               | d1  | T   |
| KUDTR09E-xx.xx | 40.00 - 43.00        | OT09          | 39        | 6.4      | 4   | 91              | 36  | 40  |
| KUDTR10E-xx.xx | 43.01 - 47.00        | OT10          | 42.5      | 6.4      | 4   | 95              | 39  | 43  |
| KUDTR11E-xx.xx | 47.01 - 51.70        | OT11          | 46.5      | 6.4      | 4   | 100             | 43  | 48  |
| KUDTR12E-xx.xx | 51.71 - 51.99        | OT12          | 51        | 6.4      | 4   | 100             | 47  | 53  |
| KUDTR12E-xx.xx | 52.00 - 56.20        | OT12          | 51        | 7.2      | 4.8 | 100             | 47  | 53  |
| KUDTR13E-xx.xx | 56.21 - 65.00        | OT13          | 55.5      | 7.2      | 4.8 | 110             | 51  | 61  |
| KUDTR14E-xx.xx | 65.00 - 66.99        | OT14          | 56        | 7.2      | 4.8 | 150             | 52  | 63  |
| KUDTR15E-xx.xx | 67.00 - 72.99        | OT15          | 62        | 10.4     | 6.4 | 150             | 58  | 69  |
| KUDTR16E-xx.xx | 73.00 - 79.99        | OT16          | 68        | 10.4     | 6.4 | 150             | 63  | 76  |
| KUDTR17E-xx.xx | 80.00 - 86.99        | OT17          | 75        | 10.4     | 6.4 | 180             | 70  | 83  |
| KUDTR18E-xx.xx | 87.00 - 99.99        | OT18          | 82        | 10.4     | 6.4 | 180             | 77  | 96  |
| KUDTR19E-xx.xx | 100.00 - 111.99      | OT19          | 94        | 10.4     | 6.4 | 180             | 89  | 107 |
| KUDTR20E-xx.xx | 112.00 - 123.99      | OT20          | 106       | 10.4     | 6.4 | 205             | 101 | 119 |
| KUDTR21E-xx.xx | 124.00 - 135.99      | OT21          | 118       | 10.4     | 6.4 | 205             | 113 | 131 |
| KUDTR22E-xx.xx | 136.00 - 147.99      | OT22          | 130       | 10.4     | 6.4 | 205             | 125 | 143 |
| KUDTR23E-xx.xx | 148.00 - 159.99      | OT23          | 142       | 10.4     | 6.4 | 225             | 137 | 155 |
| KUDTR24E-xx.xx | 160.00 - 171.99      | OT24          | 154       | 10.4     | 6.4 | 225             | 149 | 167 |
| KUDTR25E-xx.xx | 172.00 - 183.99      | OT25          | 166       | 10.4     | 6.4 | 225             | 161 | 179 |

Ordering example for DIA=100.00mm with OZ cartridge: KUDTR19E-100.00  
OX cartridge: KUDTR19E-100.00-OX

- Before drilling operation please adjust tool diameter. For diameter adjustment please see page 24.





NOTE: According to diameter, some parts may not reflect the picture above

## Cartridge & Insert

### OZ type (For large depth of cut)

| Dia.<br>øDc (mm) | Cartridge<br>① | Insert<br>② | Insert Screw    | Adjust Screw     | Lock Screw        |
|------------------|----------------|-------------|-----------------|------------------|-------------------|
|                  | Qty            | Qty         | Qty Wrench      | Qty Wrench       | Qty Wrench        |
| 40.00 - 45.99    | OZ402-04 1     | 1123-04R 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 46.00 - 51.99    | OZ402-04 1     | 1123-04R 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 52.00 - 59.99    | OZ402-32 1     | 1123-32R 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 60.00 - 66.99    | OZ402-32 1     | 1123-32R 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 67.00 - 99.99    | OZ402-43 1     | 1123-43R 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 100.00 - 135.99  | OZ402-43 1     | 1123-43R 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 136.00 - 183.99  | OZ402-43 1     | 1123-43R 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |

### OX type (For small depth of cut)

| Dia.<br>øDc (mm) | Cartridge<br>① | Insert<br>② | Insert Screw    | Adjust Screw     | Lock Screw        |
|------------------|----------------|-------------|-----------------|------------------|-------------------|
|                  | Qty            | Qty         | Qty Wrench      | Qty Wrench       | Qty Wrench        |
| 40.00 - 45.99    | OX04R 1        | 1123-04L 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 46.00 - 51.99    | OX04R 1        | 1123-04L 1  | CSTB2.5 1 T-8D  | AS0004-8 2 H2    | LS1803.5RH 1 H2.5 |
| 52.00 - 59.99    | OX32R 1        | 1123-32L 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 60.00 - 66.99    | OX32R 1        | 1123-32L 1  | CSTB3.5D 1 T-9D | AS0005-10 2 H2.5 | LS1805RH 1 H3     |
| 67.00 - 99.99    | OX43R 1        | 1123-43L 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 100.00 - 135.99  | OX43R 1        | 1123-43L 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |
| 136.00 - 183.99  | OX43R 1        | 1123-43L 1  | CSTB4M 1 T-15D  | AS0005-15 2 H2.5 | LS1806RH 1 H4     |

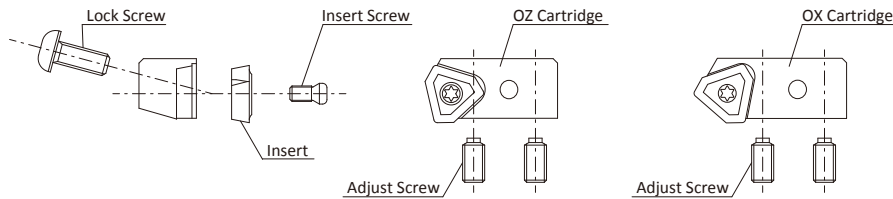
## Guide Pad

| Dia.<br>øDc (mm) | Guide Pad<br>③ | Lock Screw     | Protector<br>④ | Lock Screw     | Sub Guide<br>⑤ | Lock Screw     |
|------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                  | Qty            | Qty Wrench     | Qty            | Qty Wrench     | Qty            | Qty Wrench     |
| 40.00 - 45.99    | UG08CD 3       | CSTB3S 3 T-9D  | GPT08 3        | CSTB3S 3 T-9D  | CUG08 1        | CSTB3S 1 T-9D  |
| 46.00 - 51.99    | UG10CD 3       | CSTB4S 3 T-15D | GPT10 3        | CSTB4S 3 T-15D | CUG08 1        | CSTB3S 1 T-9D  |
| 52.00 - 59.99    | UG10CD 3       | CSTB4S 3 T-15D | GPT10 3        | CSTB4S 3 T-15D | CUG08 1        | CSTB3S 1 T-9D  |
| 60.00 - 66.99    | UG14CD 3       | CSTA5S 3 T-15D | GPT14 3        | CSTA5S 3 T-15D | CUG10 1        | CSTB3S 1 T-9D  |
| 67.00 - 99.99    | UG14CD 3       | CSTA5S 3 T-15D | GPT14 3        | CSTA5S 3 T-15D | CUG10 1        | CSTB3S 1 T-9D  |
| 100.00 - 135.99  | UG18CD 3       | LS1206S 3 H3   | GPT18-M 3      | LS1206S 3 H3   | CUG14-M 1      | CSTA5S 1 T-15D |
| 136.00 - 183.99  | UG18CD 5       | LS1206S 5 H3   | GPT18-M 5      | LS1206S 5 H3   | CUG14-M 1      | CSTA5S 1 T-15D |

- Plus (+) spare parts will enlarge drill diameter up to 5mm depending on cartridge size. (see page 19 for details)
- Drill heads come complete with: cartridge, guide pads, protectors, sub guide pad and wrenches - but less inserts.

# Parts List

## Cartridge & Insert



- Cartridges are supplied with adjust screws and insert screw but without inserts, lock screws and wrenchs

### OZ Type

| Cartridge | Insert   | Insert Screw | Wrench | Adjust Screw | Wrench | Lock Screw | Wrench |
|-----------|----------|--------------|--------|--------------|--------|------------|--------|
|           |          |              |        |              |        |            |        |
| OZ402-04  | 1123-04R | CSTB2.5      | T-8D   | AS0004-8     | H2     | LS1803.5RH | H2.5   |
| OZ402-32  | 1123-32R | CSTB3.5D     | T-9D   | AS0005-10    | H2.5   | LS1805RH   | H3     |
| OZ402-43  | 1123-43R | CSTB4M       | T-15D  | AS0005-15    | H2.5   | LS1806RH   | H4     |

### OX Type

| Cartridge | Insert   | Insert Screw | Wrench | Adjust Screw | Wrench | Lock Screw | Wrench |
|-----------|----------|--------------|--------|--------------|--------|------------|--------|
|           |          |              |        |              |        |            |        |
| OX04R     | 1123-04L | CSTB2.5      | T-8D   | AS0004-8     | H2     | LS1803.5RH | H2.5   |
| OX32R     | 1123-32L | CSTB3.5D     | T-9D   | AS0005-10    | H2.5   | LS1805RH   | H3     |
| OX43R     | 1123-43L | CSTB4M       | T-15D  | AS0005-15    | H2.5   | LS1806RH   | H4     |

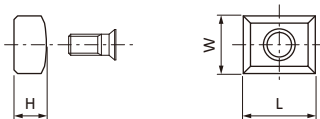
## Guide Pad & Protector



| Guide Pad  | Dimensions (mm) |     |    | Lock Screw | Wrench | Protector | Dimensions (mm) |     |  | Lock Screw | Wrench |
|------------|-----------------|-----|----|------------|--------|-----------|-----------------|-----|--|------------|--------|
|            | W               | H   | L  |            |        |           | W               | H   |  |            |        |
| UG08-120CD | 8               | 4.4 | 25 | CSTB3S     | T-9D   | GPT08-120 | 8               | 4.4 |  | CSTB3S     | T-9D   |
| UG08-140CD | 8               | 3.5 | 25 | CSTB3S     | T-9D   | GPT08-140 | 8               | 3.5 |  | CSTB3S     | T-9D   |
| UG08CD     | 8               | 4.5 | 25 | CSTB3S     | T-9D   | GPT08     | 8               | 4.5 |  | CSTB3S     | T-9D   |
| UG10CD     | 10              | 6   | 35 | CSTB4S     | T-15D  | GPT10     | 10              | 6   |  | CSTB4S     | T-15D  |
| UG14CD     | 14              | 7.5 | 40 | CSTA5S     | T-15D  | GPT14     | 14              | 7.5 |  | CSTA5S     | T-15D  |
| UG18CD     | 18              | 9   | 40 | LS1206S    | H3     | GPT18-M   | 18              | 9   |  | LS1206S    | H3     |

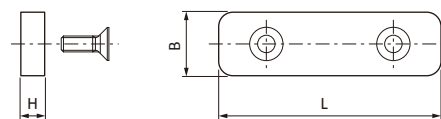
- Other carbide grades, coating and ceramic are available upon request.

## Sub Guide



| Guide Pad | Dimensions (mm) |     |    | Lock Screw | Wrench |
|-----------|-----------------|-----|----|------------|--------|
|           | W               | H   | L  |            |        |
| CUG06     | 6               | 3   | 10 | CSTB2.2S   | T-7D   |
| CUG08     | 8               | 4.5 | 10 | CSTB3S     | T-9D   |
| CUG10     | 10              | 5   | 10 | CSTB3S     | T-9D   |
| CUG14-M   | 14              | 7   | 20 | CSTA5S     | T-15D  |

## Resin Guide



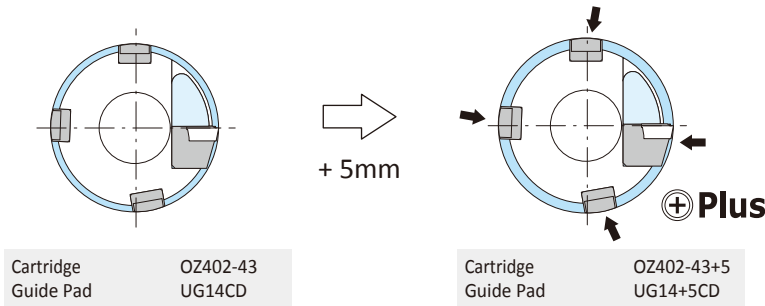
| Resin Guide | Dimensions (mm) |      |     | Lock Screw | Wrench      |
|-------------|-----------------|------|-----|------------|-------------|
|             | B               | H    | L   |            |             |
| RRG10       | 10              | 4    | 40  | LS0902.5-6 | Plus(+) No1 |
| RRG12       | 12              | 5    | 45  | LS0903-8   | H2          |
| RRG15       | 15              | 5.8  | 50  | LS0904-10  | H2.5        |
| RRG20       | 20              | 7.5  | 70  | LS0905-12  | H3          |
| RRG30       | 30              | 12.5 | 80  | LS0906-15  | H4          |
| RRG35       | 35              | 15.5 | 100 | LS0906-15  | H4          |

When ordering extra resin guide pads for your stock:

Please note that these are supplied oversize. To achieve the correct diameter they will have to be turned to size once mounted in the tool.

One drill head can drill multiple size holes up to 5mm larger than nominal diameter. Enlargement size determined by cartridge. e.g. Drill heads using OZ402-32 cartridge can be enlarged up to 4mm, while drill heads using OZ402-43 can be enlarged up to 5mm.

NOTE: Not only cartridge but also guide pad must be used when enlarging the drill head diameter



## Plus



### Plus Cartridge - OZ type

|          | +1mm         | +2mm         | +3mm         | +4mm         | +5mm         |
|----------|--------------|--------------|--------------|--------------|--------------|
| OZ402-04 | OZ402-04+1 ● | OZ402-04+2 ● | OZ402-04+3 ● | -            | -            |
| OZ402-32 | OZ402-32+1 ● | OZ402-32+2 ● | OZ402-32+3 ● | OZ402-32+4 ● | -            |
| OZ402-43 | OZ402-43+1 ● | OZ402-43+2 ● | OZ402-43+3 ● | OZ402-43+4 ● | OZ402-43+5 ● |

Ordering example: OZ402-04+2 10 pcs

## Plus



### Plus Cartridge - OX type

|       | +1mm      | +2mm      | +3mm      | +4mm      | +5mm      |
|-------|-----------|-----------|-----------|-----------|-----------|
| OX32R | OX32R+1 ○ | OX32R+2 ○ | OX32R+3 ○ | OX32R+4 ○ | -         |
| OX43R | OX43R+1 ○ | OX43R+2 ○ | OX43R+3 ○ | OX43R+4 ○ | OX43R+5 ○ |

Ordering example: OX32R+2 10 pcs

## Plus



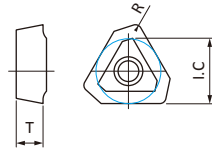
### Plus Guide Pad

|        | +1mm       | +2mm       | +3mm       | +4mm       | +5mm       |
|--------|------------|------------|------------|------------|------------|
| UG08CD | UG08+1CD ● | UG08+2CD ● | UG08+3CD ● | -          | -          |
| UG10CD | UG10+1CD ● | UG10+2CD ● | UG10+3CD ● | UG10+4CD ● | -          |
| UG14CD | UG14+1CD ● | UG14+2CD ● | UG14+3CD ● | UG14+4CD ● | UG14+5CD ● |
| UG18CD | UG18+1CD ● | UG18+2CD ● | UG18+3CD ● | UG18+4CD ● | UG18+5CD ● |

Ordering example: UG08+2CD 10 pcs

● : Standard stock item  
○ : Non-standard stock item

# 1123 Type Insert



(Patent No 2702061)

| Chipbreaker | Code               | Dimensions (mm) |      |     | Grade         |               |               |               |                |              |               |
|-------------|--------------------|-----------------|------|-----|---------------|---------------|---------------|---------------|----------------|--------------|---------------|
|             |                    | IC              | T    | R   | CVD coating   |               |               | PVD coating   |                |              |               |
|             |                    |                 |      |     | UC1220 (DLX2) | UC1125 (DLXT) | UC1230 (DLX3) | UC3215 (KLX2) | UC3210 (KLXT3) | UC2220 (NLX) | UC3120 (KLXT) |
| <b>G</b>    | <b>1123-04R</b>    | 8.45            | 3.50 | 0.8 | ●             |               | ●             | ●             |                | ●            |               |
|             | <b>1123-32R</b>    | 10.30           | 4.00 | 0.8 | ●             |               | ●             | ●             |                | ●            |               |
|             | <b>1123-43R</b>    | 14.20           | 5.50 | 1.2 | ●             |               | ●             | ●             |                | ●            |               |
| <b>BR1</b>  | <b>1123-04RBR1</b> | 8.45            | 3.50 | 0.4 |               | ●             |               |               | ●              | ●            | ●             |
|             | <b>1123-32RBR1</b> | 10.30           | 4.00 | 0.4 |               | ●             |               |               | ●              | ●            | ●             |
|             | <b>1123-43RBR1</b> | 14.20           | 5.50 | 0.4 |               | ●             |               |               | ●              | ●            | ●             |
| <b>B</b>    | <b>1123-32RB</b>   | 10.30           | 4.00 | 0.8 |               |               |               | ●             |                | ●            |               |
|             | <b>1123-43RB</b>   | 14.20           | 5.50 | 1.2 |               |               |               | ●             |                | ●            |               |
| <b>S</b>    | <b>1123-04RS</b>   | 8.45            | 3.50 | 0.8 |               |               |               |               |                | ●            |               |
|             | <b>1123-32RS</b>   | 10.30           | 4.00 | 0.8 |               |               |               |               |                | ●            |               |
|             | <b>1123-43RS</b>   | 14.20           | 5.50 | 1.2 |               |               |               |               |                | ●            |               |

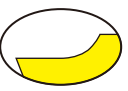

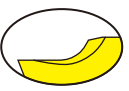

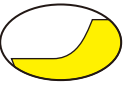

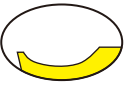

## Left hand type

|          |                  |       |      |     |  |  |   |  |  |   |  |
|----------|------------------|-------|------|-----|--|--|---|--|--|---|--|
| <b>G</b> | <b>1123-04L</b>  | 8.45  | 3.50 | 0.8 |  |  | ● |  |  | ● |  |
|          | <b>1123-32L</b>  | 10.30 | 4.00 | 0.8 |  |  | ● |  |  | ● |  |
|          | <b>1123-43L</b>  | 14.20 | 5.50 | 1.2 |  |  | ● |  |  | ● |  |
| <b>B</b> | <b>1123-32LB</b> | 10.30 | 4.00 | 0.8 |  |  |   |  |  | ● |  |
|          | <b>1123-43LB</b> | 14.20 | 5.50 | 1.2 |  |  |   |  |  | ● |  |
| <b>S</b> | <b>1123-32LS</b> | 10.30 | 4.00 | 0.8 |  |  |   |  |  | ● |  |
|          | <b>1123-43LS</b> | 14.20 | 5.50 | 1.2 |  |  |   |  |  | ● |  |

Ordering example: 1123-04RBR1 UC1125 10 pcs

● : Standard stock item

## Chipbreaker

|            |   |   |
|------------|---|---|
| <b>G</b>   |  |  |
|            | Good chip control with most materials   |   |
| <b>BR1</b> |  |  |
|            | Good chip control with heat resistant super alloy                                   |   |
| <b>B</b>   |  |  |
|            | Good chip control with long chipping materials                                      |   |
| <b>S</b>   |  |  |
|            | Good for lowering cutting resistance  |   |

## Grade

|          | Grade<br>(previous name) | ISO area |    |    |    |    |    |    |    |
|----------|--------------------------|----------|----|----|----|----|----|----|----|
|          |                          | 5        | 10 | 15 | 20 | 25 | 30 | 35 | 40 |
| <b>P</b> | UC1220 (DLX2)            |          |    |    |    |    |    |    |    |
|          | UC2220 (NLX)             |          |    |    |    |    |    |    |    |
|          | UC1125 (DLXT)            |          |    |    |    |    |    |    |    |
|          | UC1230 (DLX3)            |          |    |    |    |    |    |    |    |
| <b>M</b> | UC3120 (KLXT)            |          |    |    |    |    |    |    |    |
|          | UC2220 (NLX)             |          |    |    |    |    |    |    |    |
|          | UC1230 (DLX3)            |          |    |    |    |    |    |    |    |
| <b>K</b> | UC3120 (KLXT)            |          |    |    |    |    |    |    |    |
|          | UC3215 (KLX2)            |          |    |    |    |    |    |    |    |
| <b>N</b> | UC3215 (KLX2)            |          |    |    |    |    |    |    |    |
|          | UC2220 (NLX)             |          |    |    |    |    |    |    |    |
| <b>S</b> | UC3210 (KLXT3)           |          |    |    |    |    |    |    |    |
|          | UC2220 (NLX)             |          |    |    |    |    |    |    |    |
|          | UC3120 (KLXT)            |          |    |    |    |    |    |    |    |
|          | UC1230 (DLX3)            |          |    |    |    |    |    |    |    |

New designation system for insert grades.

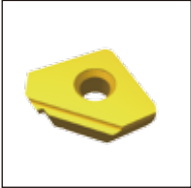
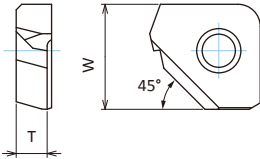


# 1123 Type Insert Selection Chart

Chipbreaker  
Grade

| Workpiece material |   | First Recommendation | Troubleshooting      |                       |
|--------------------|---|----------------------|----------------------|-----------------------|
|                    |   |                      | Chipping             | Wear                  |
| <b>P</b>           | Low carbon steels (C < 0.3)<br>• SS400, SM490, S25C         | G<br>UC2220 (NLX)    | G<br>UC1230 (DLX3)   | G<br>UC1220 (DLX2)    |
|                    | Carbon steels (C > 0.3)<br>• S45C, S55C                     | G<br>UC2220 (NLX)    | G<br>UC1230 (DLX3)   | G<br>UC1220 (DLX2)    |
|                    | Low alloy steels<br>• SCM415                                | G<br>UC2220 (NLX)    | G<br>UC1230 (DLX3)   | G<br>UC1220 (DLX2)    |
|                    | Alloy steels<br>• SCM440, SCr420                            | G<br>UC2220 (NLX)    | G<br>UC1230 (DLX3)   | G<br>UC1220 (DLX2)    |
| <b>M</b>           | Stainless steels (Austenite)<br>• SUS304, SUS316            | G<br>UC2220 (NLX)    | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |
|                    | Stainless steels (Martensite, Ferritic)<br>• SUS430, SUS416 | G<br>UC2220 (NLX)    | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |
|                    | Stainless steels (Precipitation hardened)<br>• SUS630       | G<br>UC2220 (NLX)    | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |
| <b>K</b>           | Gray cast irons<br>• FC250                                  | G<br>UC2220 (NLX)    | G<br>UC1230 (DLX3)   | G<br>UC3215 (KLX2)    |
|                    | Nodular cast irons<br>• FCD700                              | G<br>UC2220 (NLX)    | G<br>UC1230 (DLX3)   | G<br>UC3215 (KLX2)    |
| <b>N</b>           | Aluminium alloys<br>• A2017, ADC12                          | G<br>UC2220 (NLX)    | BR1<br>UC3120 (KLXT) | G<br>UC3215 (KLX2)    |
| <b>S</b>           | Heat resistant super alloys                                 | BR1<br>UC2220 (NLX)  | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |
|                    | Titanium alloys   | BR1<br>UC2220 (NLX)  | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |

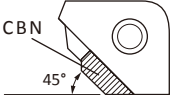
# IIS Insert

| Code      | Dimensions (mm) |     | Grade |   |      |   |   |
|-----------|-----------------|-----|-------|---|------|---|---|
|           |                 |     | P     | M | K    | N | S |
|           | T               | W   | D-TA  |   | K-TA |   |   |
| IIS160-45 | 2.7             | 9.5 | ●     |   | ●    |   |   |

Ordering example: IIS160-45 D-TA    10 pcs                      ● : Standard item

## CBN insert for high hardness steel drilling



Ordering code:

**IIS160-45CBN**

Grade

|   |  |
|---|--|
| K | Highly resistant to chipping. Good for cast iron and heat resistant super alloy. |
| S | Highly resistant to wear. Good for sintered metal.                               |
| P | Good for sintered metal.   |
| H | Good for ceramic material.   |

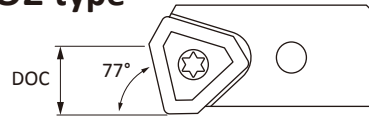
Ordering example: IIS160-45CBN K    10 pc

# INDEXABLE COUNTERBORING HEAD Parts information

## OZ Cartridge and OX Cartridge

Two types of cartridges are available for Indexable Counterboring Head.

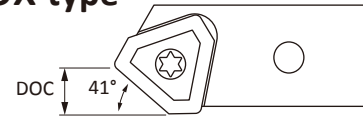
### For large depth of cut OZ type



| Cartridge | DOC * (mm) | Insert   |
|-----------|------------|----------|
| OZ402-04  | 6.4        | 1123-04R |
| OZ402-32  | 7.2        | 1123-32R |
| OZ402-43  | 10.4       | 1123-43R |

\*Minimum DOC is 2mm for all size

### For small depth of cut OX type

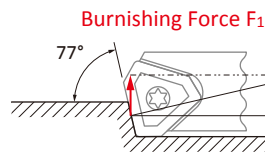


Please use a left hand type insert with a OX cartridge.

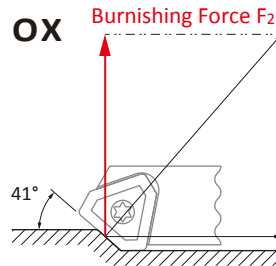
| Cartridge | DOC * (mm) | Insert   |
|-----------|------------|----------|
| OX04R     | 4.0        | 1123-04L |
| OX32R     | 4.8        | 1123-32L |
| OX43R     | 6.4        | 1123-43L |

\*Minimum DOC is 2mm for all size

### OZ



### OX



Due to smaller cutting angle, OX cartridge provides larger burnishing force which results better surface finish.

**Burnishing Force  $F_2 > F_1$**

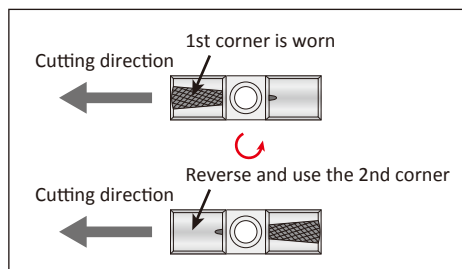
## Replacing Guide Pads

The guide pad is a consumable item as well as the insert

The guide pad has 2 corners.

When the wear comes to 2nd corner, reverse the guide pad.

When the 2nd corner also gets worn, replace the guide pad with a new one.

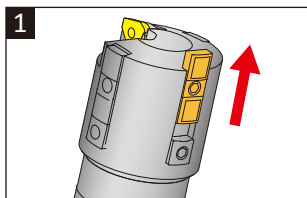


# Diameter Setting

The Drill Head diameter is set and inspected with a master insert in our final inspection. However, the inserts in the market have a tolerance fluctuation so each time you change or index the insert, the diameter must be adjusted as per the following method.



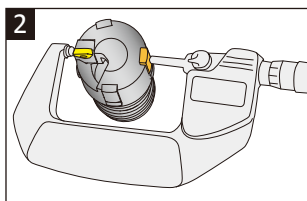
When a corner change is made on the insert, it must be adjusted to correct size or a damage can be caused to the head body or a work piece material.



**1** The dimensional guide pad must be slid forward to measure the diameter.

**1-1** Loosen the lock screw and slide the guide pad forward.

**1-2** Retighten the lock screw at the measuring position.

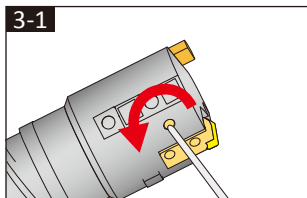


**2** Measure the diameter with a micrometer.

We recommend setting the tool diameter at  $h8$  tolerance to the cutting diameter.

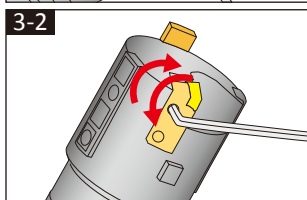
If the diameter is incorrect, go to below step **3**

If it's correct, go to below step **4**

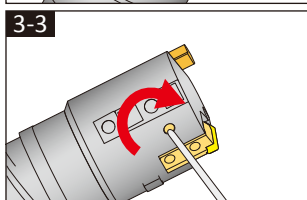


**3** Adjust the cartridge

**3-1** First loosen the lock screw of the cartridge and then tighten it slightly.



**3-2** Proceed to adjust the diameter, using the 2 adjust screws and measure with a micrometer.

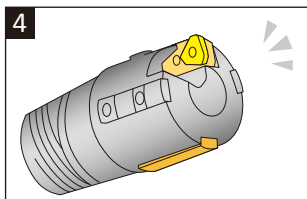


**3-3** When set to the size, retighten the lock screw.

**3-4** Recheck the diameter with a micrometer. If it is still out of tolerance, repeat the procedure from the step **3-1**



Please make sure to tighten the lock screw firmly before using. If loose, the cartridge may move and cause serious problems during machining.



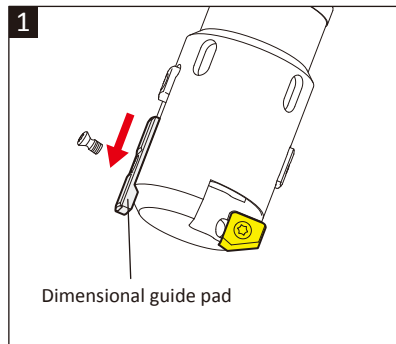
**4** Slide the dimensional guide pad back to the original position and tighten the lock screw.



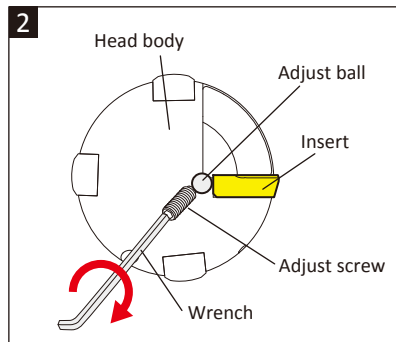
Please check all the lock screws are firmly tightened as they may come loose if vibration occurs during drilling.

# Diameter Setting

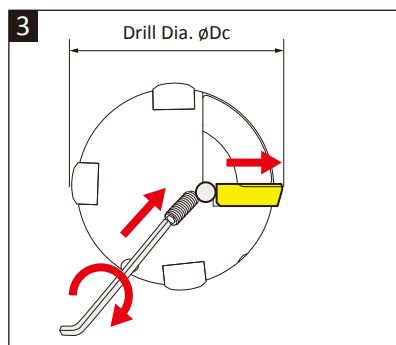
Drill diameter is adjusted with an adjust ball for diameter  $\phi 25 - \phi 39.99\text{mm}$  with the following method.



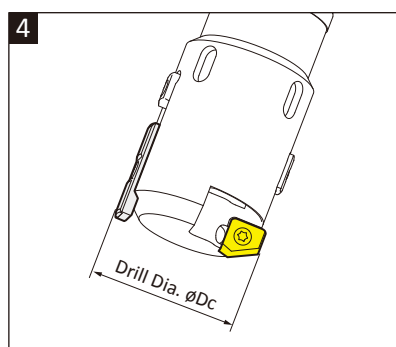
**1** Slide the dimensional guide pad forward and the retighten the lock screw at the measuring position.



**2** Tighten the adjust screw.



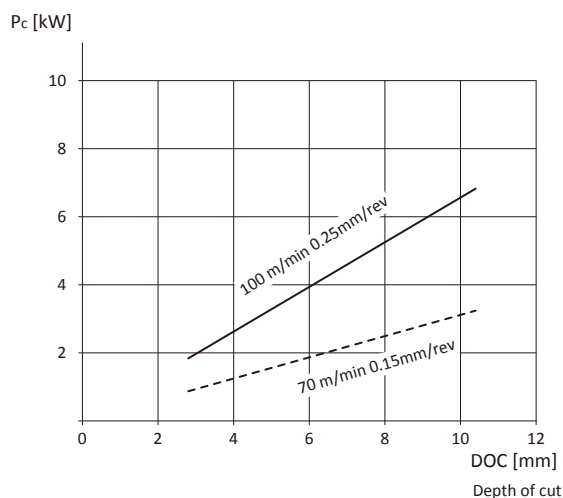
**3** As the adjust screw moves forward, insert moves peripheral direction.



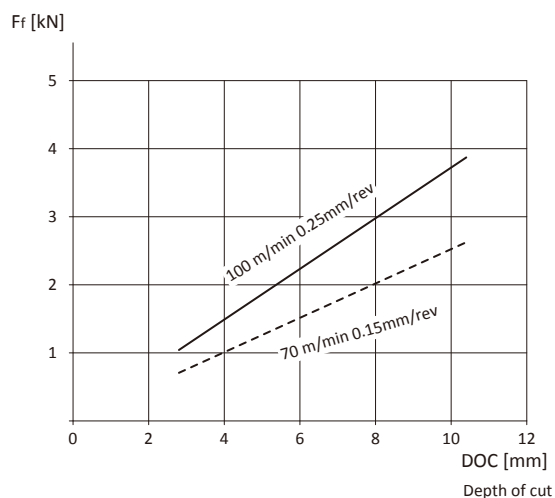
**4** Measure the diameter with a micrometer. If the diameter is larger than expected, loose the adjust screw and insert screw, then retighen the insert screw. Repeat the procedure from the step **2**.

# Counterboring (Single Tube System)

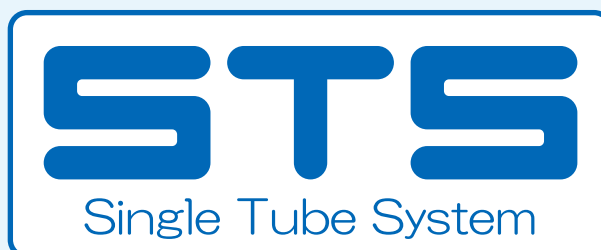
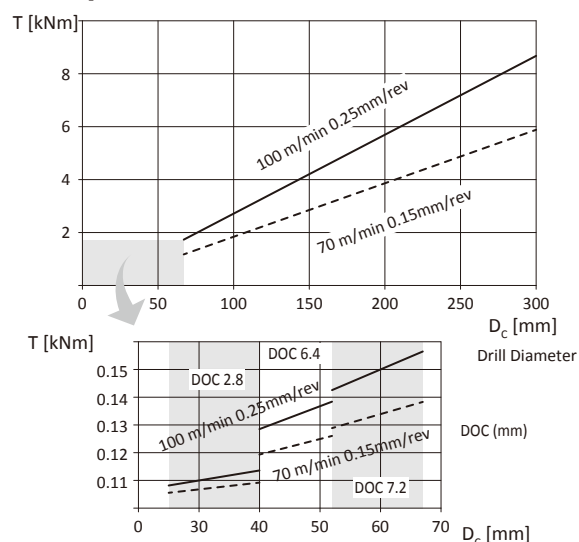
## Net Power



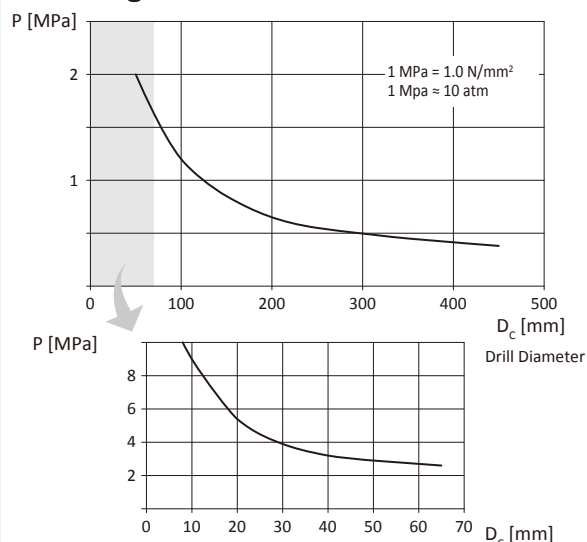
## Feed Force



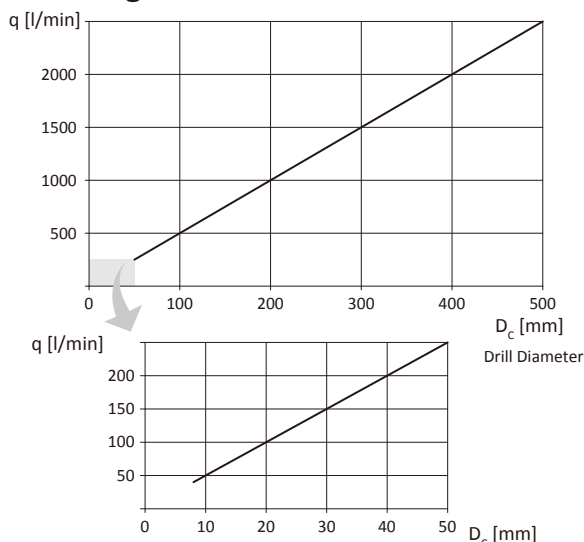
## Torque



## Cutting Fluid Pressure

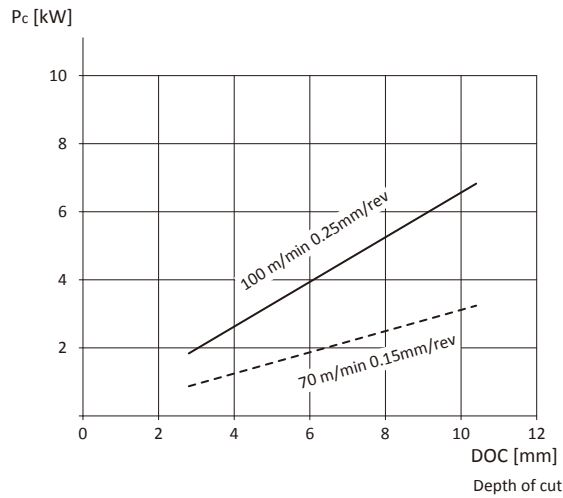


## Cutting Fluid Volume

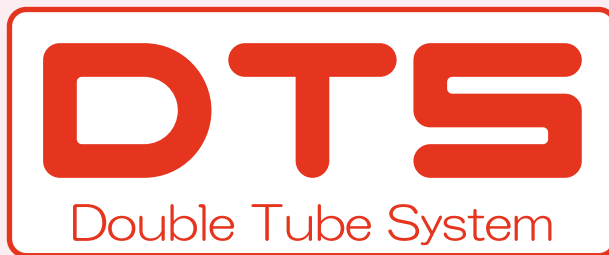
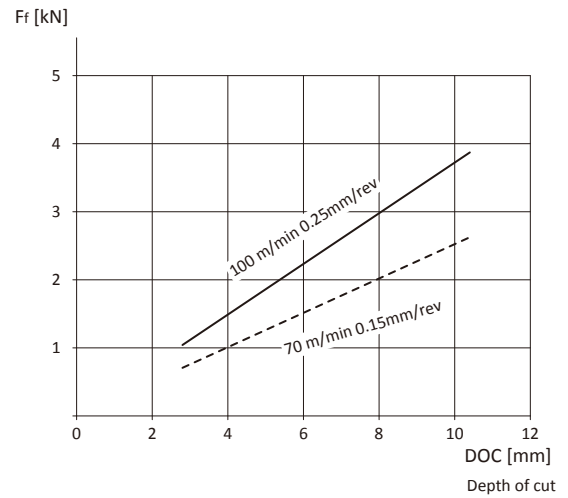


# Counterboring (Double Tube System)

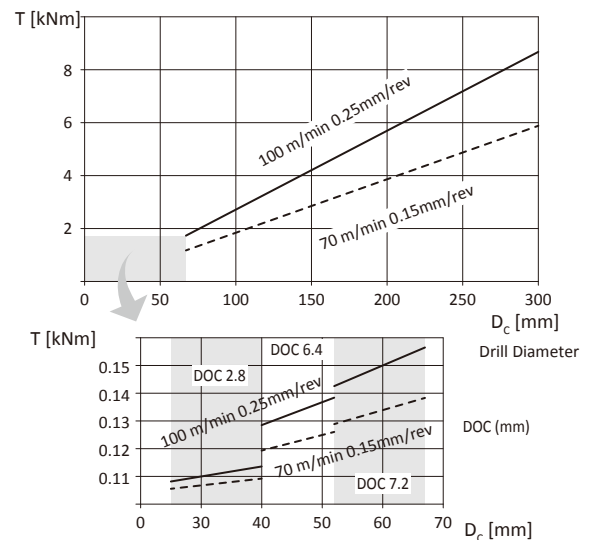
## Net Power



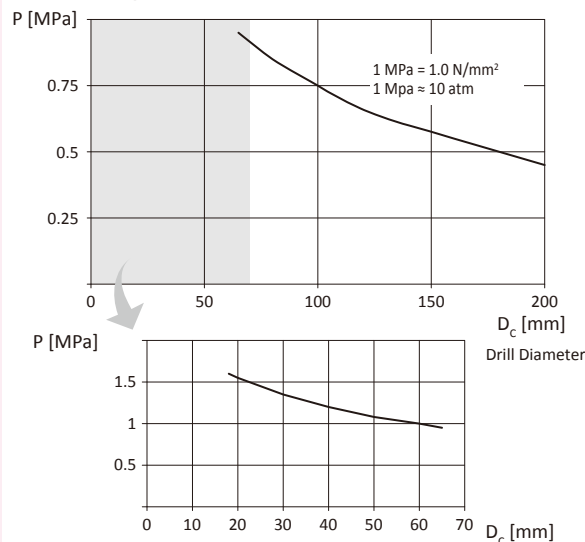
## Feed Force



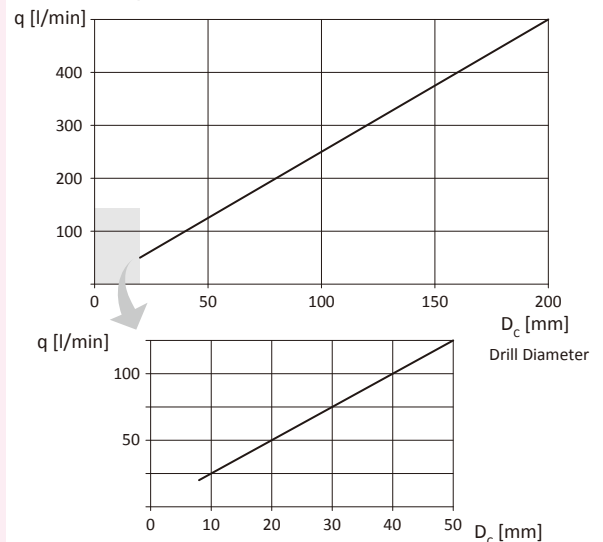
## Torque



## Cutting Fluid Pressure



## Cutting Fluid Volume





# Recommended Cutting Conditions

| ISO      | Material                                     | JIS                        | Condition                            | Hardness<br>(HB) | Cutting<br>Speed<br>Vc (m/min) | Feed rate fn (mm/rev) |          |         |
|----------|--|----------------------------|--------------------------------------|------------------|--------------------------------|-----------------------|----------|---------|
|          |  |                            |                                      |                  |                                | Depth of cut (mm)     |          |         |
|          |  |                            |                                      |                  |                                | 1.0-3.0               | 3.0-8.0  | 8.0-    |
| <b>P</b> | Carbon steel<br>High carbon<br>Cutting steel | S10C - S25C, SS            | 0.1 - 0.25 %C Non-hardened           | 125              | 60-140                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | 0.25 - 0.25 %C Non-hardened          | 190              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  | S25C - S55C                | 0.25 - 0.25 %C Hardened and tempered | 250              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | 0.55 - 0.80 %C Non-hardened          | 220              | 50-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | 0.55 - 0.80 %C Hardened and tempered | 300              | 50-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          | Low alloyed<br>(alloying<br>element < 5%)    | SNC, DCr, SNCN<br>SCM, SMn | Non-hardened                         | 200              | 60-130                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Hardened and tempered                | 275              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            |                                      | 300              | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          | High alloyed<br>Cast iron<br>Tool steel      | SNS, SKD, SKT<br>SKH, SK   | Non-hardened                         | 200              | 50-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Hardened and tempered                | 325              | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
| <b>M</b> | Stainless steel                              | SUS430                     | Ferritic                             | 200              | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  | SUS410, 420J               | Martensite                           | 240              | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  | SUS304, SUS316L            | Austenite                            | 180              | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
| <b>K</b> | Nodular cast<br>iron                         | FCD400 - FCD450            | Ferritic/Pearlitic                   | 180              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  | FCD500 - FCD700            | Pearlitic                            | 260              | 50-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          | Gray cast iron                               | FC100 - FC200              | Low tensile strength                 | 160              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  | FC250 - FC350              | High tensile strength                | 250              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          | Malleable cast<br>iron                       | FCMB, FCMW                 | Ferritic                             | 130              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  | FCMWP, FCMP                | Pearlitic                            | 230              | 60-120                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
| <b>N</b> | Aluminum alloy<br>Forging                    |                            | Non-aged                             | 60               | 70-200                         | 0.1-0.4               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Soluted, Aged                        | 100              | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
|          | Aluminum alloy<br>Casting                    |                            | <=12% Si Non-aged                    | 75               | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
|          |  |                            | Soluted, Aged                        | 90               | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
|          |  |                            | >12% Si High silicon                 | 130              | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
|          | Copper alloy                                 |                            | >1% Pb Free cutting copper           | 110              | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
|          |  |                            | Brass, Red brass                     | 90               | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
|          |  |                            | Electrolytic copper                  | 100              | 60-200                         | 0.1-0.4               | 0.1-0.4  | 0.1-0.4 |
| <b>S</b> | Heat resistant<br>super alloy                |                            | Fe base Non-aged                     | 200              | 40-80                          | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Soluted, Aged                        | 280              | 40-80                          | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Ni / Co base Non-aged                | 250              | 40-80                          | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Soluted, Aged                        | 350              | 40-80                          | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | Casted                               | 320              | 40-80                          | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            |                                      |                  |                                |                       |          |         |
|          | Titanium alloy                               |                            | $\alpha$                             | Rm400            | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |
|          |  |                            | $\alpha - \beta$                     | Rm1050           | 60-100                         | 0.1-0.3               | 0.15-0.3 | 0.1-0.3 |

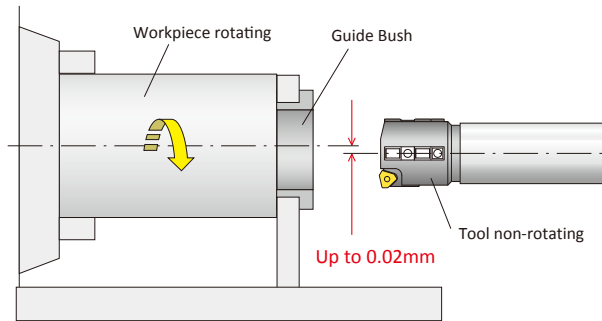
The above values should not be used as the exact recommendations. They may need modification depending on the machining conditions, materials, etc.

# Machine Setting Up

## Notes for Setting Up STS and DTS Systems

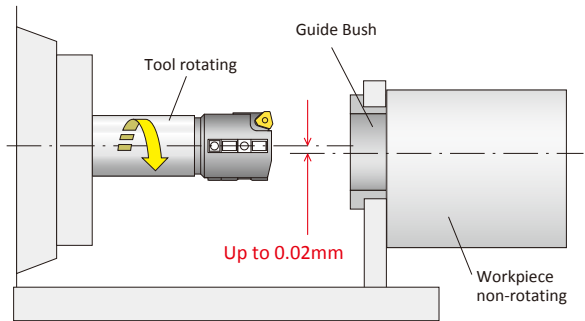


### Workpiece rotating system



- Should be applied only when the workpiece and the tool axis are in line.
- Better result is expected for hole straightness and wear-resistance of the guide bush compared to tool rotating system.
- Keep the alignment between guide bush and spindle within 0.02 mm.

### Tool rotating system



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

## Notes for Setting Up DTS System

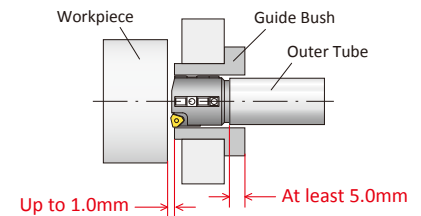


### Positioning of outer tube and guide bush

Be sure to set the outer tube into the guide bush by more than 5.00 mm so that the coolant will be supplied properly

### Positioning of work material and guide bush

Sealing is not required for DTS system because of the vacuum effect, but be sure to keep the gap between the work material and the guide bush 1.0 mm or less.



## Guide Bush

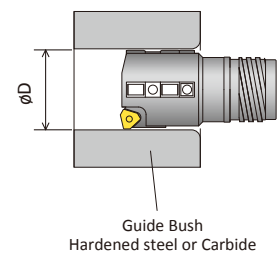
### Guide bush size

Guide bush tolerance should be G6 in order to keep good tool life and cutting accuracy.

| D (mm)          | G6 Tolerance (mm) |
|-----------------|-------------------|
| 18.01 - 30.00   | +0.007 ~ +0.020   |
| 30.01 - 50.00   | +0.009 ~ +0.025   |
| 50.01 - 80.00   | +0.010 ~ +0.029   |
| 80.01 - 120.00  | +0.012 ~ +0.034   |
| 120.01 - 180.00 | +0.014 ~ +0.039   |
| 180.01 - 250.00 | +0.015 ~ +0.044   |
| 250.01 - 315.00 | +0.017 ~ +0.049   |

### Guide bush material

| Guide Bush Material | Method                              | Advantage               |
|---------------------|-------------------------------------|-------------------------|
| Hardened steel      | Workpiece rotating                  | Economical              |
| Carbide             | Tool rotating<br>Workpiece rotating | Long life of guide bush |



## Coolant Management

### Coolant temperature

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

If it exceeds this temperature, the coolant will deteriorate which will cause short tool life and poor surface finish.

### Coolant filtration

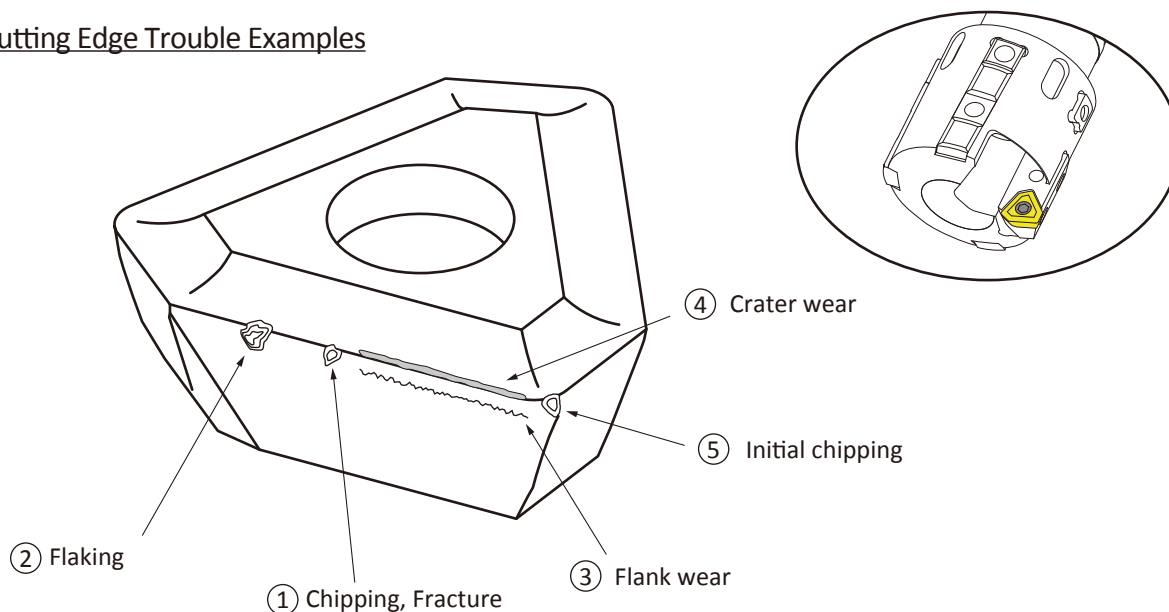
The coolant must be filtered in order to protect the guide pads and the surface finish.

### Using water-soluble coolant

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

# Insert Wear Trouble Shooting

## Cutting Edge Trouble Examples



| Problem              | Causes  | Solutions   |   |
|----------------------|---|---|---|
|                      |   | Grade   | Cutting Conditions / Other  |
| 1 Chipping, Fracture | <ul style="list-style-type: none"> <li>Excessive vibration or shock</li> <li>Built-Up-Edge separated</li> </ul>                         | <ul style="list-style-type: none"> <li>Use tougher grade</li> </ul>   | <ul style="list-style-type: none"> <li>Reduce feed rate</li> <li>Remove vibration</li> </ul>  |
| 2 Flaking            | <ul style="list-style-type: none"> <li>Excessive vibration or shock</li> </ul>  | <ul style="list-style-type: none"> <li>Use tougher grade</li> </ul>   | <ul style="list-style-type: none"> <li>Reduce feed rate</li> <li>Remove vibration</li> </ul>  |
| 3 Flank wear         | <ul style="list-style-type: none"> <li>Cutting speed too high</li> <li>Inadequate tool toughness</li> </ul>                             | <ul style="list-style-type: none"> <li>Use higher wear resistant grade</li> <li>Use coated grade</li> </ul> | <ul style="list-style-type: none"> <li>Reduce cutting speed</li> <li>Reduce feed rate</li> <li>Use proper cutting fluid</li> </ul>                  |
| 4 Crater wear        | <ul style="list-style-type: none"> <li>Cutting speed too high</li> <li>Feed rate too high</li> <li>Inadequate tool toughness</li> </ul> | <ul style="list-style-type: none"> <li>Use higher wear resistant grade</li> <li>Use coated grade</li> </ul> | <ul style="list-style-type: none"> <li>Reduce cutting speed</li> <li>Reduce feed rate</li> <li>Use proper cutting fluid</li> </ul>                  |
| 5 Initial chipping   | <ul style="list-style-type: none"> <li>Guide bush or pilot hole is improper size</li> <li>Misalignment</li> </ul>                       | <ul style="list-style-type: none"> <li>Use tougher grade</li> </ul>   | <ul style="list-style-type: none"> <li>Adjust or change guide bush or pilot hole</li> <li>Reduce feed rate</li> <li>Correct misalignment</li> </ul> |

# Cutting condition and chip form

## Chip formation in deep hole drilling

Chip formation plays a key role as well as the management of cutting fluid temperature and volume in STS (Single Tube System) and DTS (Double Tube System) which enable deep hole drilling by supplying cutting fluid of large volume and high pressure. As chips are evacuated through tube with cutting fluid in deep hole drilling, smooth and steady chip evacuation can be achieved by proper chip formation.

## How to decide chip form

Generally chip length should be 3 - 4 times width, but it tends to be longer with difficult-to-cut materials in which case it is better to make chips thinner (reduce feed) so that smooth chip evacuation is obtained.

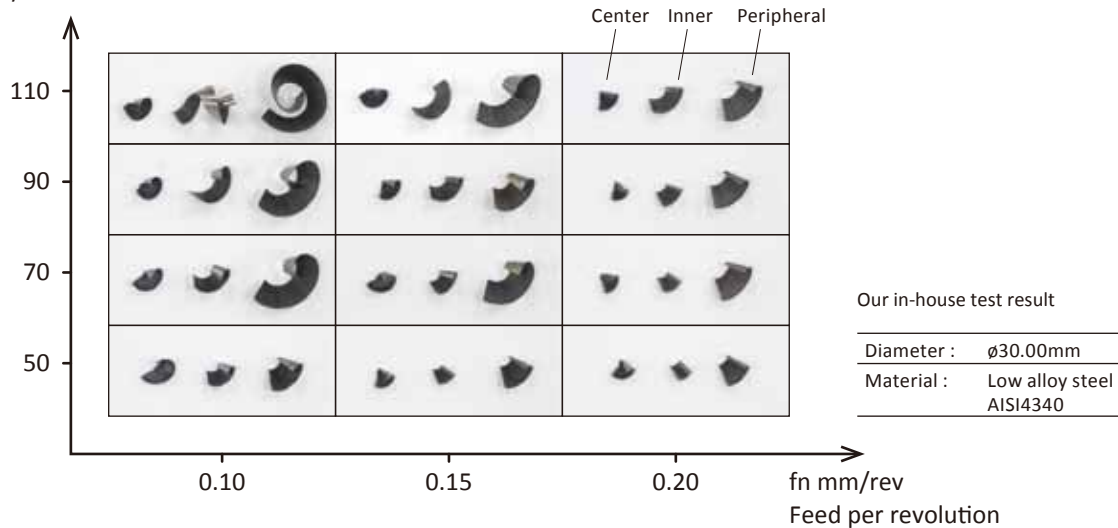
Below picture shows chip formation by cutting speed and feed. Shorter chips are obtained by reducing cutting speed or increasing feed.

## Chip formation

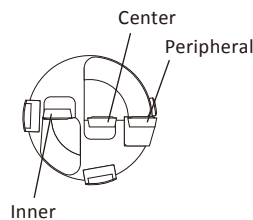
Chip formation is affected by multiple factors such as work material, chipbreaker geometry, cutting speed, feed, type of cutting fluid and cutting fluid temperature. Suitable chip formation depends on cutting situation but is controllable by changing the cutting conditions.

Cutting speed

Vc m/min



From left to right in each box the order is center, inner and peripheral chip.

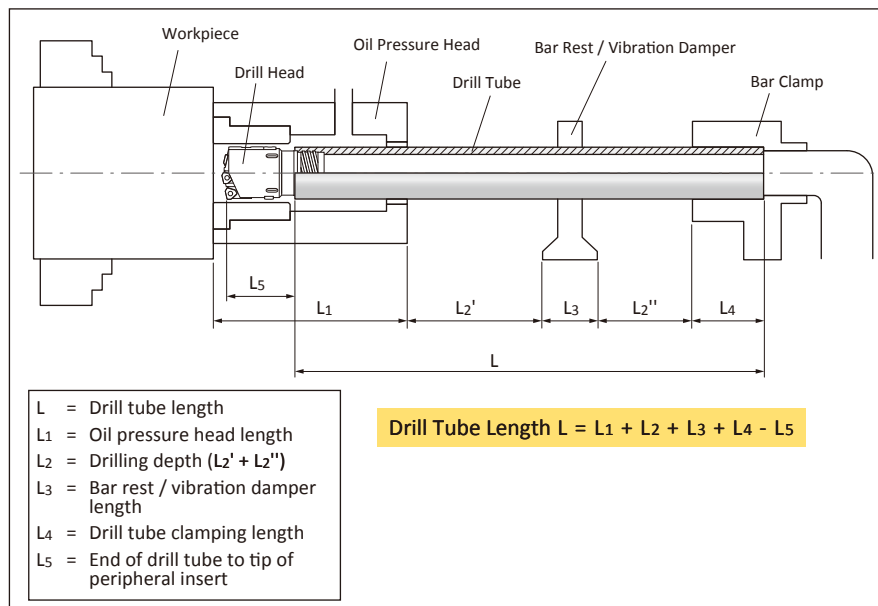


# Calculation of special length tube

Drill tubes with other length than standard item are available upon request.  
Please calculate the tube length as below according to your machine.

## ST

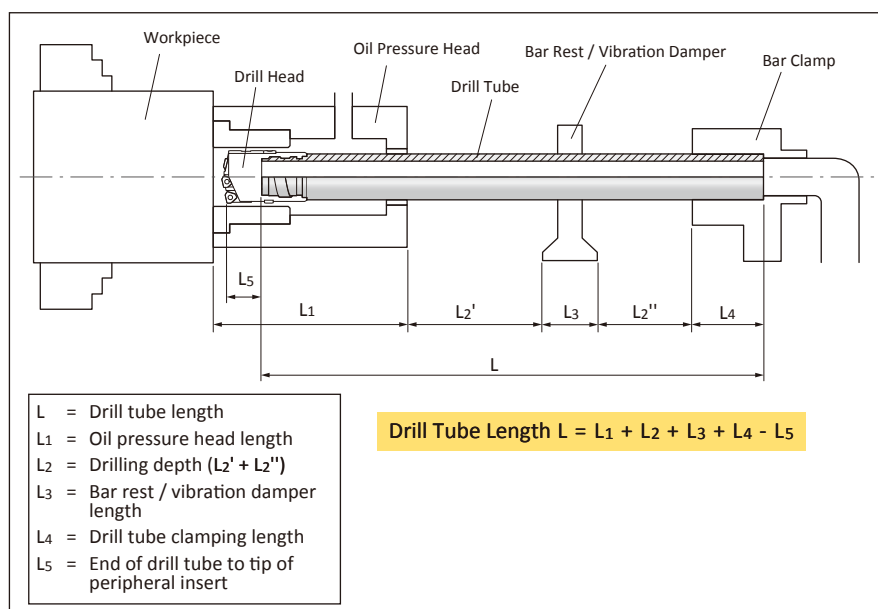
Four start / Two start\*  
Inner thread connection



\* Two start thread is for dia 15.59 and less.

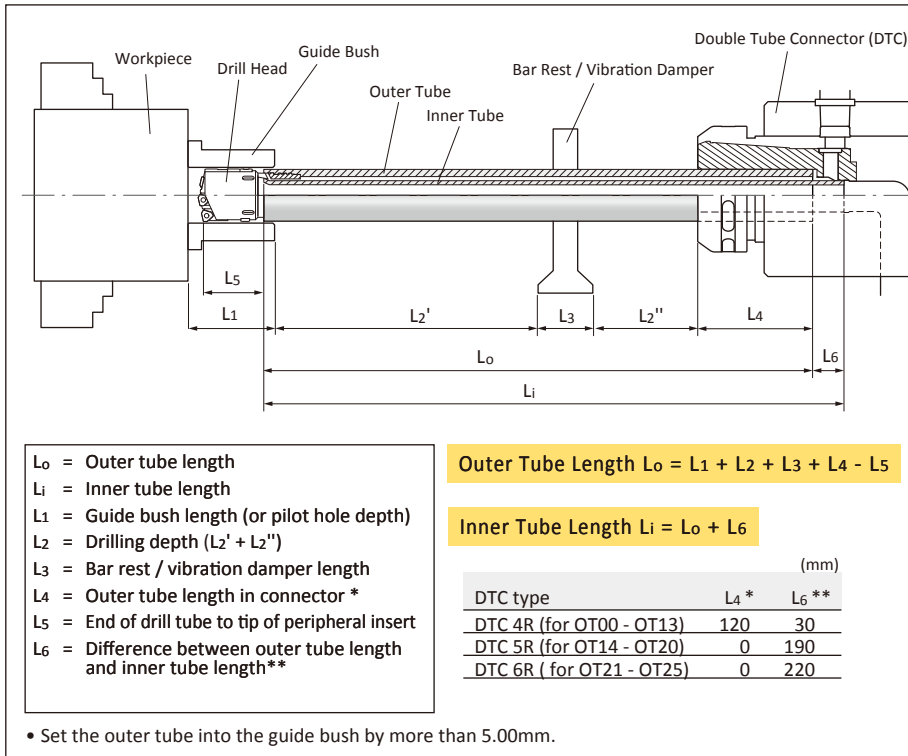
## UB

Single start  
Outer thread connection



# Calculation of special length tube

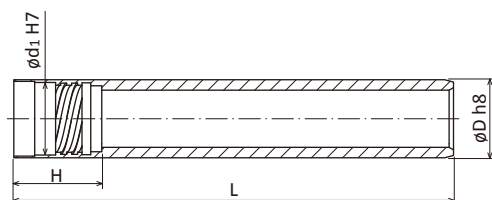
## OT & IT



## ST

### Inner thread connection

Four start thread (for dia. 15.60 and above) / Two start thread (for dia. 15.59 and less)



## ST

| Drill Range (mm) | Code   | L (mm) |      |                | Dimensions (mm) |      |      | Drill Range (mm) | Code | L (mm) | Dimensions (mm) |     |     |
|------------------|--------|--------|------|----------------|-----------------|------|------|------------------|------|--------|-----------------|-----|-----|
|                  |        | 1600   | 2600 | Special Length | D               | d1   | H    |                  |      |        | D               | d1  | H   |
| 12.60 - 13.60    | ST0094 | ●      |      | ○              | 11              | 9.6  | 22   | 65.00 - 66.99    | ST14 | ○      | 56              | 52  | 75  |
| 13.61 - 14.60    | ST0095 | ●      |      | ○              | 12              | 10.6 | 22   | 67.00 - 72.99    | ST15 | ○      | 62              | 58  | 75  |
| 14.61 - 15.59    | ST0096 | ●      |      | ○              | 13              | 11.6 | 22   | 73.00 - 79.99    | ST16 | ○      | 68              | 63  | 75  |
| 15.60 - 16.70    | ST0097 | ●      |      | ○              | 14              | 12.6 | 21   | 80.00 - 86.99    | ST17 | ○      | 75              | 70  | 97  |
| 16.71 - 17.70    | ST0098 | ●      | ●    | ○              | 15              | 13.6 | 21   | 87.00 - 99.99    | ST18 | ○      | 82              | 77  | 97  |
| 17.71 - 18.90    | ST0099 | ●      | ●    | ○              | 16              | 14.5 | 22   | 100.00 - 111.99  | ST19 | ○      | 94              | 89  | 97  |
| 18.91 - 20.00    | ST0000 | ●      | ●    | ○              | 17              | 15.5 | 22   | 112.00 - 123.99  | ST20 | ○      | 106             | 101 | 118 |
| 20.01 - 21.80    | ST00   | ●      | ●    | ○              | 18              | 16   | 27.5 | 124.00 - 135.99  | ST21 | ○      | 118             | 113 | 118 |
| 21.81 - 24.10    | ST01   |        | ●    | ○              | 20              | 18   | 30   | 136.00 - 147.99  | ST22 | ○      | 130             | 125 | 118 |
| 24.11 - 26.40    | ST02   |        | ●    | ○              | 22              | 19.5 | 30   | 148.00 - 159.99  | ST23 | ○      | 142             | 137 | 139 |
| 26.41 - 28.70    | ST03   |        | ●    | ○              | 24              | 21   | 30   | 160.00 - 171.99  | ST24 | ○      | 154             | 149 | 139 |
| 28.71 - 31.00    | ST04   |        | ●    | ○              | 26              | 23.5 | 33   | 172.00 - 183.99  | ST25 | ○      | 166             | 161 | 139 |
| 31.01 - 33.30    | ST05   |        | ●    | ○              | 28              | 25.5 | 33   | 184.00 - 195.99  | ST26 | ○      | 178             | 173 | 144 |
| 33.31 - 36.20    | ST06   |        | ●    | ○              | 30              | 28   | 33   | 196.00 - 207.99  | ST27 | ○      | 190             | 185 | 144 |
| 36.21 - 39.60    | ST07   |        | ●    | ○              | 33              | 30   | 40   | 208.00 - 219.99  | ST28 | ○      | 202             | 197 | 144 |
| 39.61 - 43.00    | ST08   |        | ●    | ○              | 36              | 33   | 40   | 220.00 - 231.99  | ST29 | ○      | 214             | 208 | 164 |
| 43.01 - 47.00    | ST09   |        | ●    | ○              | 39              | 36   | 40   | 232.00 - 243.99  | ST30 | ○      | 226             | 220 | 164 |
| 47.01 - 51.70    | ST10   |        | ●    | ○              | 43              | 39   | 40   | 244.00 - 255.99  | ST31 | ○      | 238             | 232 | 164 |
| 51.71 - 56.20    | ST11   |        | ●    | ○              | 47              | 43   | 44   | 256.00 - 267.99  | ST32 | ○      | 250             | 244 | 184 |
| 56.21 - 60.60    | ST12   |        | ●    | ○              | 51              | 47   | 44   | 268.00 - 279.99  | ST33 | ○      | 262             | 256 | 184 |
| 60.61 - 65.00    | ST13   |        |      | ○              | 56              | 51   | 44   | 280.00 - 291.99  | ST34 | ○      | 274             | 268 | 184 |

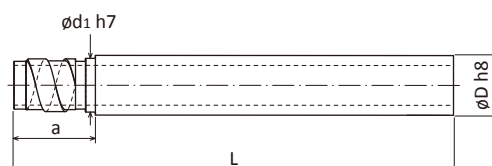
- Please indicate the length (L) when ordering. Ordering example for drill dia.  $\phi 60.00$  mm and drill tube length 1600 mm: ST12X1600
- Other lengths are available upon request. Please contact Unitac sales department for further information.

● : Standard Stock item  
○ : Special length

## UB

### Outer thread connection

### Single start thread



## UB

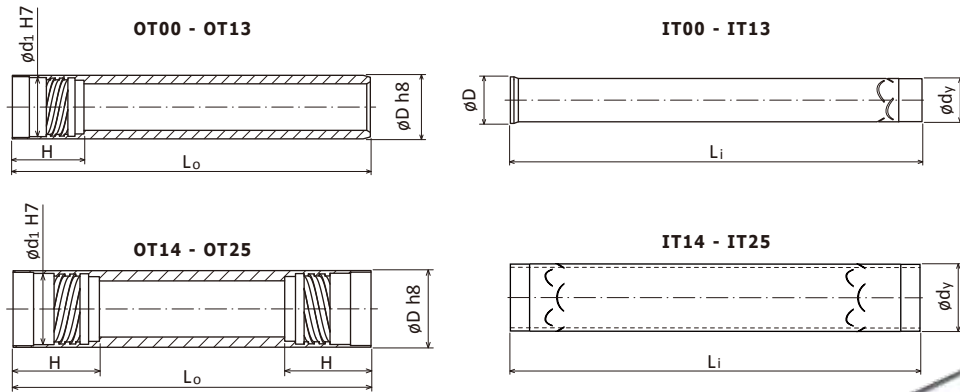
| Drill Range (mm) | Code   | L (mm)         |  |  | Dimensions (mm) |      |    | Drill Range (mm) | Code  | L (mm) | Dimensions (mm) |     |     |
|------------------|--------|----------------|--|--|-----------------|------|----|------------------|-------|--------|-----------------|-----|-----|
|                  |        | Special Length |  |  | D               | d1   | a  |                  |       |        | D               | d1  | a   |
| 14.50 - 15.00    | UB12-1 | ○              |  |  | 12              | 11.5 | 23 | 61.00 - 67.99    | UB56  | ○      | 56              | 53  | 41  |
| 15.01 - 15.50    | UB12-2 | ○              |  |  | 12              | 11.8 | 23 | 68.00 - 74.99    | UB62  | ○      | 62              | 59  | 41  |
| 15.51 - 16.00    | UB13-1 | ○              |  |  | 13              | 12.4 | 23 | 75.00 - 80.99    | UB68  | ○      | 68              | 65  | 71  |
| 16.01 - 16.50    | UB13-2 | ○              |  |  | 13              | 12.7 | 23 | 81.00 - 90.99    | UB75  | ○      | 75              | 71  | 71  |
| 16.51 - 17.25    | UB14-1 | ○              |  |  | 14              | 13.4 | 23 | 91.00 - 98.99    | UB82  | ○      | 82              | 79  | 71  |
| 17.26 - 18.00    | UB14-2 | ○              |  |  | 14              | 13.7 | 23 | 99.00 - 110.99   | UB94  | ○      | 94              | 90  | 71  |
| 18.01 - 19.00    | UB15   | ○              |  |  | 15              | 14.4 | 23 | 111.00 - 122.99  | UB106 | ○      | 106             | 102 | 71  |
| 19.01 - 19.99    | UB16.5 | ○              |  |  | 16.5            | 15.4 | 23 | 123.00 - 134.99  | UB118 | ○      | 118             | 114 | 71  |
| 20.00 - 21.99    | UB18   | ○              |  |  | 18              | 16.5 | 26 | 135.00 - 148.99  | UB130 | ○      | 130             | 126 | 71  |
| 22.00 - 24.99    | UB20   | ○              |  |  | 20              | 19   | 26 | 149.00 - 161.99  | UB142 | ○      | 142             | 139 | 71  |
| 25.00 - 26.99    | UB22   | ○              |  |  | 22              | 20   | 26 | 162.00 - 173.99  | UB154 | ○      | 154             | 151 | 86  |
| 27.00 - 29.99    | UB24   | ○              |  |  | 24              | 22   | 26 | 174.00 - 185.99  | UB166 | ○      | 166             | 163 | 86  |
| 30.00 - 31.99    | UB26   | ○              |  |  | 26              | 24   | 26 | 186.00 - 197.99  | UB178 | ○      | 178             | 175 | 86  |
| 32.00 - 33.99    | UB28   | ○              |  |  | 28              | 26   | 26 | 198.00 - 209.99  | UB190 | ○      | 190             | 187 | 86  |
| 34.00 - 36.99    | UB30   | ○              |  |  | 30              | 27   | 41 | 210.00 - 221.99  | UB202 | ○      | 202             | 199 | 86  |
| 37.00 - 39.99    | UB33   | ○              |  |  | 33              | 30   | 41 | 222.00 - 233.99  | UB214 | ○      | 214             | 211 | 86  |
| 40.00 - 43.99    | UB36   | ○              |  |  | 36              | 33   | 41 | 234.00 - 245.99  | UB226 | ○      | 226             | 223 | 86  |
| 44.00 - 46.99    | UB39   | ○              |  |  | 39              | 37   | 41 | 246.00 - 257.99  | UB238 | ○      | 238             | 235 | 86  |
| 47.00 - 51.99    | UB43   | ○              |  |  | 43              | 41   | 41 | 258.00 - 269.99  | UB250 | ○      | 250             | 247 | 121 |
| 52.00 - 56.99    | UB47   | ○              |  |  | 47              | 44   | 41 | 270.00 - 281.99  | UB262 | ○      | 262             | 259 | 121 |
| 57.00 - 60.99    | UB51   | ○              |  |  | 51              | 49   | 41 | 282.00 - 293.99  | UB274 | ○      | 274             | 271 | 121 |

- Please indicate the length (L) when ordering. Ordering example for drill dia.  $\phi 60.00$  mm and drill tube length 2600 mm: UB51X2600

○ : Special length



## OT & IT Outer Tube & Inner Tube



# OT & IT

| Drill Range (mm) | Outer Tube (OT) |                     |                 |      |                | Inner Tube (IT) |                     |                 |    |                |
|------------------|-----------------|---------------------|-----------------|------|----------------|-----------------|---------------------|-----------------|----|----------------|
|                  | Code            | L <sub>o</sub> (mm) | Dimensions (mm) |      |                | Code            | L <sub>i</sub> (mm) | Dimensions (mm) |    |                |
|                  |                 |                     | Special Length  | D    | d <sub>1</sub> | H               |                     | Special Length  | D  | d <sub>y</sub> |
| 18.40 - 20.00    | OT00            | ○                   |                 | 18   | 16             | 27.5            | IT00                | ○               | 12 | 10             |
| 20.01 - 21.80    | OT01            | ○                   |                 | 19.5 | 18             | 30              | IT01                | ○               | 14 | 12             |
| 21.81 - 24.10    | OT02            | ○                   |                 | 21.5 | 19.5           | 30              | IT02                | ○               | 15 | 13             |
| 24.11 - 26.40    | OT03            | ○                   |                 | 23.5 | 21             | 30              | IT03                | ○               | 16 | 14             |
| 26.41 - 28.70    | OT04            | ○                   |                 | 26   | 23.5           | 33              | IT04                | ○               | 18 | 16             |
| 28.71 - 31.00    | OT05            | ○                   |                 | 28   | 25.5           | 33              | IT05                | ○               | 20 | 18             |
| 31.01 - 33.30    | OT06            | ○                   |                 | 30.5 | 28             | 33              | IT06                | ○               | 22 | 20             |
| 33.31 - 36.20    | OT07            | ○                   |                 | 33   | 30             | 40              | IT07                | ○               | 24 | 22             |
| 36.21 - 39.60    | OT08            | ○                   |                 | 35.5 | 33             | 40              | IT08                | ○               | 26 | 24             |
| 39.61 - 43.00    | OT09            | ○                   |                 | 39   | 36             | 40              | IT09                | ○               | 29 | 27             |
| 43.01 - 47.00    | OT10            | ○                   |                 | 42.5 | 39             | 40              | IT10                | ○               | 32 | 30             |
| 47.01 - 51.70    | OT11            | ○                   |                 | 46.5 | 43             | 44              | IT11                | ○               | 35 | 32             |
| 51.71 - 56.20    | OT12            | ○                   |                 | 51   | 47             | 44              | IT12                | ○               | 39 | 36             |
| 56.21 - 65.00    | OT13            | ○                   |                 | 55.5 | 51             | 44              | IT13                | ○               | 43 | 40             |
| 65.00 - 69.99    | OT14            | ○                   |                 | 56   | 52             | 75              | IT14                | ○               | -  | 40             |
| 70.00 - 72.99    | OT15            | ○                   |                 | 62   | 58             | 75              | IT15                | ○               | -  | 44             |
| 73.00 - 79.99    | OT16            | ○                   |                 | 68   | 63             | 75              | IT16                | ○               | -  | 48             |
| 80.00 - 86.99    | OT17            | ○                   |                 | 75   | 70             | 97              | IT17                | ○               | -  | 54             |
| 87.00 - 99.99    | OT18            | ○                   |                 | 82   | 77             | 97              | IT18                | ○               | -  | 60             |
| 100.00 - 111.99  | OT19            | ○                   |                 | 94   | 89             | 97              | IT19                | ○               | -  | 70             |
| 112.00 - 123.99  | OT20            | ○                   |                 | 106  | 101            | 118             | IT20                | ○               | -  | 80             |
| 124.00 - 135.99  | OT21            | ○                   |                 | 118  | 113            | 118             | IT21                | ○               | -  | 80             |
| 136.00 - 147.99  | OT22            | ○                   |                 | 130  | 125            | 118             | IT22                | ○               | -  | 95             |
| 148.00 - 159.99  | OT23            | ○                   |                 | 142  | 137            | 139             | IT23                | ○               | -  | 100            |
| 160.00 - 171.99  | OT24            | ○                   |                 | 154  | 149            | 139             | IT24                | ○               | -  | 120            |
| 172.00 - 183.99  | OT25            | ○                   |                 | 166  | 161            | 139             | IT25                | ○               | -  | 130            |

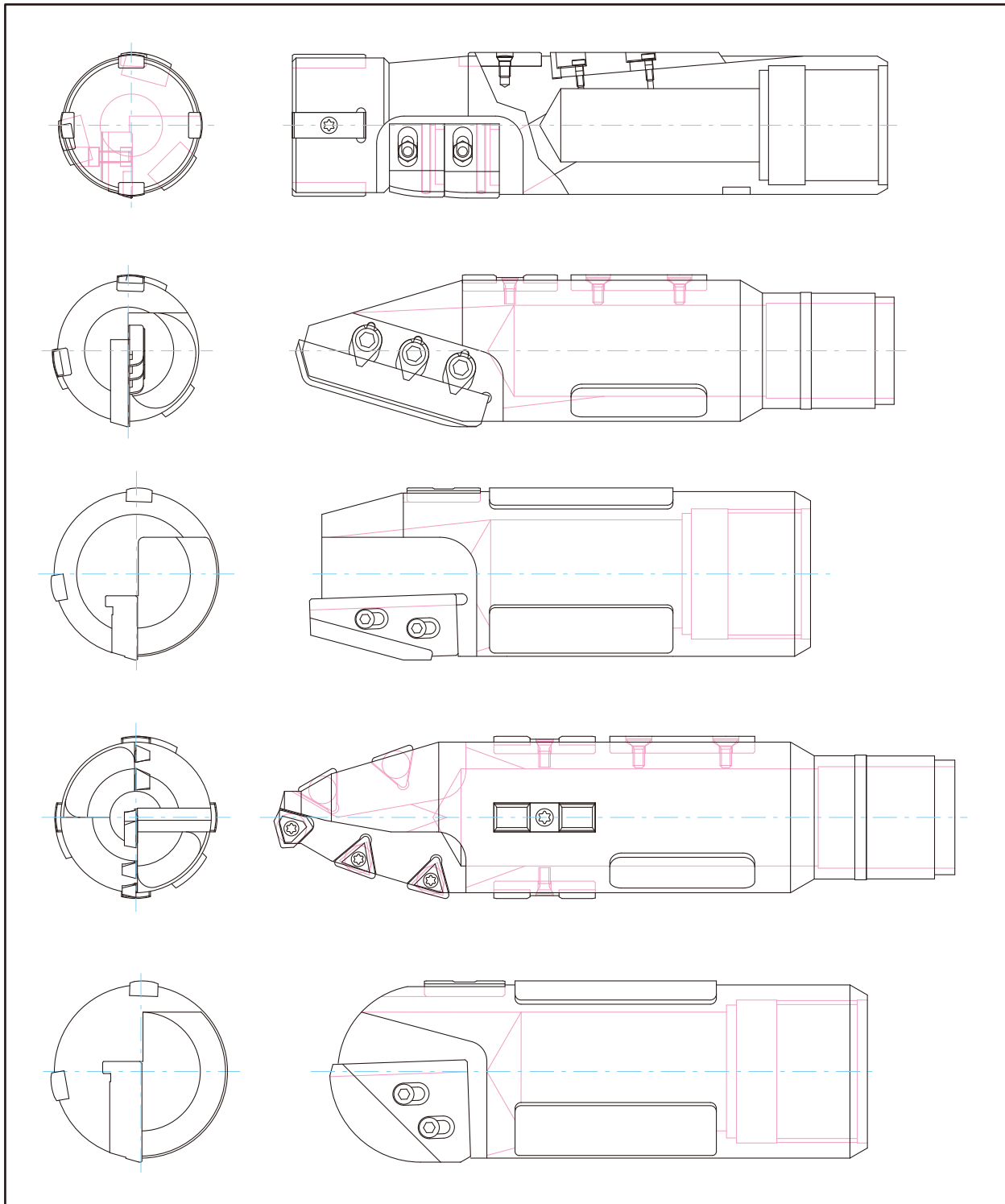
• Please indicate the length (L) when ordering. Ordering example for drill dia. ø60.00 mm and tube length 1070 mm: OT13X1070

○ : Special length

• Inner Tube length (L<sub>i</sub>) should be ordered as follows.

- ▶ For ranges 18.40 - 65.00 (OT00 - OT13) ..... Inner Tube length (L<sub>i</sub>) = Outer Tube length (L<sub>o</sub>) + 30 mm
- ▶ For ranges 65.00 - 123.99 (OT14 - OT20) ..... Inner Tube length (L<sub>i</sub>) = Outer Tube length (L<sub>o</sub>) + 190 mm
- ▶ For ranges 124.00 - 183.99 (OT21 - OT25) .... Inner Tube length (L<sub>i</sub>) = Outer Tube length (L<sub>o</sub>) + 220 mm

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



# Requested Information Form for Special Tooling



|               |  |                |  |
|---------------|--|----------------|--|
| Company Name  |  | Contact Person |  |
| Telephone No. |  | FAX No.        |  |
| Email Address |  |                |  |

|                       |  |  |
|-----------------------|--|--|
| Drill Dia.(ø)         |  | Description of your sytem in use:<br>_____<br>_____<br>_____ |
| Drill Tube Dia.(ø)    |  |  |
| Quantity              |  |  |
| Request Delivery date |  |  |

Please sketch your drilling application

## Order Sheet (Drill Head)



|               |  |         |                |  |
|---------------|--|---------|----------------|--|
| Company Name  |  |         | Contact Person |  |
| Telephone No. |  | FAX No. |                |  |
| Email Address |  |         |                |  |

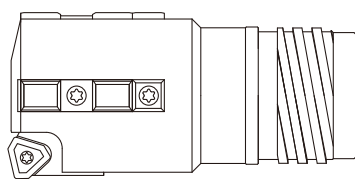
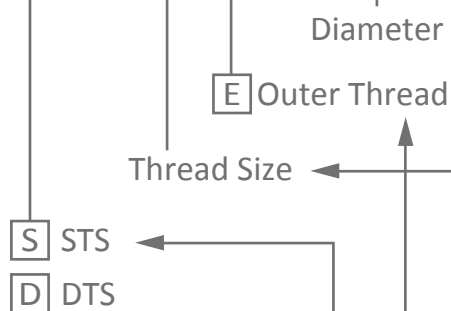
|                           |  |
|---------------------------|--|
| Drill Head Dia.( $\phi$ ) |  |
| DOC                       |  |
| Drill Tube Dia.( $\phi$ ) |  |
| Drill Head code           |  |
| Quantity                  |  |
| Request Delivery Date     |  |

## Ordering example:

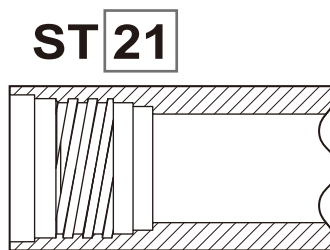
for drill head dia.  $\phi$ 125.00 / STS outer thread KUSTR21E-125.00

CHECK!

- ☐ STS / DTS  
☐ Thread size

**KUSTR21E-125.00**


Drill Head



Tube

## Order Sheet for Semi Standard

|               |  |         |                |  |
|---------------|--|---------|----------------|--|
| Company Name  |  |         | Contact Person |  |
| Telephone No. |  | FAX No. |                |  |
| Email Address |  |         |                |  |

## Outsize Thread

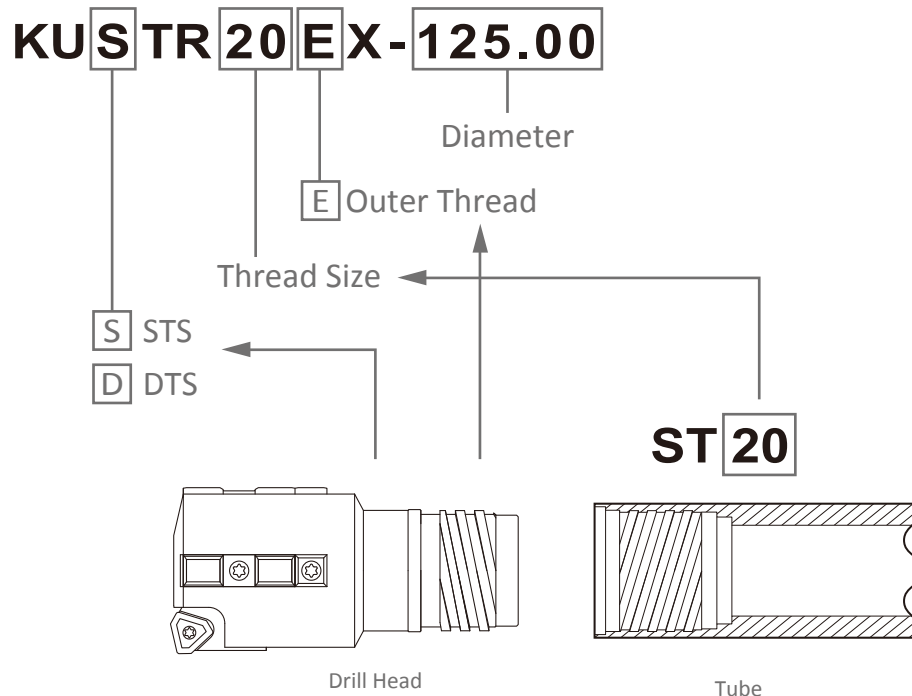
For smaller thread with more than 2 range difference, please use information form for special tooling on page 37.

|                           |  |
|---------------------------|--|
| Drill Head Dia.( $\phi$ ) |  |
| DOC                       |  |
| Drill Tube Dia.( $\phi$ ) |  |
| Drill Head code           |  |
| Quantity                  |  |
| Request Delivery Date     |  |

Please add "X" to ordering code for outsize thread as below

### Ordering example:

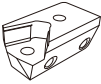














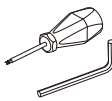
for drill head dia.  $\phi$ 125.00 / STS outer thread with one range smaller thread **KUSTR20EX-125.00**



## Order Sheet (Spare Parts)



|               |  |         |                |  |
|---------------|--|---------|----------------|--|
| Company Name  |  |         | Contact Person |  |
| Telephone No. |  | FAX No. |                |  |
| Email Address |  |         |                |  |








|                    |   | Ordering Code       | Qty |
|--------------------|---|---------------------|-----|
| <b>Cartridge</b>   |    | Cartridge           | pc  |
|                    |    | Adjust Screw        | pc  |
|                    |    | Lock Screw          | pc  |
| <b>Ball</b>        |    | Adjust Ball         | pc  |
|                    |    | Adjust Screw        | pc  |
| <b>Guide Pad</b>   |    | Guide Pad           | pc  |
|                    |    | Lock Screw          | pc  |
| <b>Protector</b>   |    | Guide Pad Protector | pc  |
|                    |   | Lock Screw          | pc  |
| <b>Sub Guide</b>   |  | Sub Guide Pad       | pc  |
|                    |  | Lock Screw          | pc  |
| <b>Resin Guide</b> |  | Resin Guide Pad     | pc  |
|                    |  | Lock Screw          | pc  |
| <b>Insert</b>      |  | Insert              | pc  |
|                    |  | Insert Screw        | pc  |
| <b>Wrench</b>      |  | Wrench              | pc  |
|                    |   |                     | pc  |

# UNITAC Drill Head Series for Deep Hole Drilling





## STS Single Tube System



### Solid Drilling

| Thread Type  | Code         | Appearance  | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture           | Feature   |
|--------------|--------------|---|---------------------|----------------|--------------------|-------------------|---|
| Outer Thread | <b>MBU</b>   |  | 8.00 - 14.79        | IT9            | 2μm                | Brazed Tips       | <ul style="list-style-type: none"> <li>Higher productivity and better surface finish than gundrill</li> <li>Good chip breaking with 3 step cutting edge design</li> </ul>   |
|              | <b>UTE</b>   |  | 12.60 - 20.00       | IT9            | 2μm                |                   | <ul style="list-style-type: none"> <li>Higher productivity and better surface finish than gundrill</li> <li>Good chip breaking with 3 step cutting edge design</li> <li>First recommendation for dia ø12.60 - 15.59mm</li> </ul>                            |
|              | <b>BTU</b>   |  | 12.60 - 65.00       | IT9            | 2μm                |                   | <ul style="list-style-type: none"> <li>First recommendation for dia ø15.60 or more</li> <li>Good chip breaking with 3 cutting edges (ø12.60 - 15.59mm has 2 cutting edges)</li> <li>Covers all materials with various carbide grade combinations</li> </ul> |
|              | <b>KUSTS</b> |  | 38.00 - 247.99      | IT10           | 3μm                | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul>  |
|              | <b>0124</b>  |  | 30.00 - 65.00       | IT11           | 3μm                |                   | <ul style="list-style-type: none"> <li>Direct mount type - No diameter setting necessary</li> <li>Improved productivity and safety in deep hole drilling</li> </ul>   |
| Inner Thread | <b>KUSTS</b> |  | 38.00 - 245.99      | IT10           | 3μm                | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul>  |
|              | <b>0124</b>  |  | 30.00 - 65.00       | IT11           | 3μm                |                   | <ul style="list-style-type: none"> <li>Direct mount type - No diameter setting necessary</li> <li>Improved productivity and safety in deep hole drilling</li> </ul>   |

### Counterboring




| Thread Type  | Code         | Appearance   | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture           | Feature  |
|--------------|--------------|--|---------------------|----------------|--------------------|-------------------|--|
| Outer Thread | <b>KUSTR</b> |   | 25.00 - 291.99      | IT10           | 1-2μm              | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul> |
| Inner Thread | <b>KUSTR</b> |  | 25.00 - 293.99      | IT10           | 1-2μm              | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul> |

### Trepanning


| Thread Type  | Code       | Appearance  | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture           | Feature  |
|--------------|------------|---|---------------------|----------------|--------------------|-------------------|--|
| Outer Thread | <b>UTT</b> |  | 100.00 - 328.00     | IT10           | 1-2μm              | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul> |
| Inner Thread | <b>UTT</b> |  | 100.00 - 305.99     | IT10           | 1-2μm              | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul> |

## DTS Double Tube System

### Solid Drilling

| Thread Type  | Code         | Appearance  | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture           | Feature   |
|--------------|--------------|---|---------------------|----------------|--------------------|-------------------|---|
| Outer Thread | <b>ETU</b>   |  | 18.40 - 65.00       | IT9            | 2μm                | Brazed Tips       | <ul style="list-style-type: none"> <li>Good chip breaking with 3 cutting edges</li> <li>Covers all materials with various carbide grade combinations</li> </ul>     |
|              | <b>KUDTS</b> |  | 38.00 - 183.99      | IT10           | 3μm                | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul>            |
|              | <b>0124</b>  |  | 30.00 - 65.00       | IT11           | 3μm                |                   | <ul style="list-style-type: none"> <li>Direct mount type - No diameter setting necessary</li> <li>Improved productivity and safety in deep hole drilling</li> </ul> |

### Counterboring

| Thread Type  | Code         | Appearance  | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture           | Feature  |
|--------------|--------------|---|---------------------|----------------|--------------------|-------------------|--|
| Outer Thread | <b>KUDTR</b> |  | 25.00 - 183.99      | IT10           | 1-2μm              | Indexable Inserts | <ul style="list-style-type: none"> <li>Cartridge type - Diameter finely adjustable</li> <li>Covers wide application area with various options</li> </ul> |

The above values may change depending on the machining conditions, materials, etc.



# Safety Notes

## 1. Introduction

The following information is provided to be read before using the tool so that the tool is handled properly and safely.

## 2. Basic Information of Cutting Tool Materials

### 2-1. Technical Terms

Cutting Tool Material : General term of tool material, such as Cemented Carbide, Coated Carbide, Cermet, Coated Cermet, Ceramics, CBN and PCD

Carbide Material : Cemented Carbide with WC (Tungsten Carbide) as the main ingredient

### 2-2. Physical Property

Appearance : Depends on materials. (e.g. Gray, Black, Gold, etc.)

Smell : None

Hardness : Carbide and Cermet: 5 - 30GPaHV, Ceramic: 10 - 40GPaHV, CBN: 20 - 50GPaHV, PCD: 80 - 120GPaHV

Specific Gravity : Carbide: 9 - 16, Cermet: 5 - 9, Ceramic: 2 - 7, CBN / PCD: 3 - 5, HSS: 7 - 9, Alloy steel: 7 - 9

### 2-3. Composition

Carbide, Nitride, Carbon-nitride and Oxide with W, Ti, Al, Si, Ta, B, etc. and metals of Co, Ni, Cr, Mo, etc.

## 3. Notes for Handling Cutting Tool Materials

- These cutting tool materials are very hard but brittle. They may be broken by shock or excessive clamp force.
- Since cutting tool materials have high specific gravities, they can be heavy. Handle with care when transferring and storing.
- The thermal expansion of cutting tool material is different from that of metal materials. Because of this, for shrink-fit or cooling-fit products, if the usage temperature is slightly higher (lower) than the specified temperature, cracking may occur.
- If cutting tool materials become corroded due to cutting fluid, lubricating agents, or other moisture, their strength will be reduced. Care should be taken regarding storage conditions.

## 4. Notes for Machining Cutting Tool Materials

- For carbide tool materials, the strength may be slightly reduced due to the surface conditions. For finishing, always use a diamond grinder.
- When cutting tool materials are ground or heated, dust or mist (smoke) occurs. If a lot of it is inhaled, swallowed, or comes in contact with the eyes or skin, it could result in injury to the body. When machining, be careful to avoid exposing your body to the dust or mist; it is recommended that localized ventilation equipment be used and that a protective mask, protective goggles, and protective gloves be worn. In addition, if the dust, etc. comes in contact with your hands, wash them thoroughly with soap and water. Do not drink or eat in the work area, and wash your hands before drinking or eating. Dust on clothes should not be shaken out; use a vacuum, etc. to remove the dust or wash the clothes in a washing machine. If the cobalt contained in the cutting tool material is touched repeatedly or over a long period of time, it has been reported that it may affect the skin, respiratory organs, or heart, etc.
- When performing wet machining of carbide tool materials or brazed tool, the cutting fluid may contain heavy metals and must be disposed of properly.
- When a cutting tool product has been reground, check that there are no cracks after regrinding.
- If a laser or electric pen, etc. is used to mark carbide tool material or products, cracks may form. Do not mark sections which may be subject to stress.
- When electric discharge machining is used on carbide tool materials or products, cracks may form on the surface which cause strength reduction. If this process is necessary, make sure to remove the cracks completely by additional operation such as grinding.
- When brazing the carbide tool materials, use the proper temperature to prevent falling off or breaking of the tip.

## Precaution for using cutting tools

| Items                                   | Issue   | Counter measures   |
|---|---|--|
| General Cutting Tools                   | ◎ Direct touch to a sharp cutting edge may cause injury.  | * When setting up tools to the machine or taking them out of the case, please wear protective gloves.  |
|   | ◎ Misuse or inappropriate working conditions may cause tool breakage or dispersion of broken pieces.  | * Please use safety items, such as safety glasses and protective gloves.<br>* Please use safety goods in the area of our recommended cutting condition. See our catalog or instruction manuals.                      |
|   | ◎ Excessive impact or heavy wear will increase cutting resistance and may cause tool breakage and dispersion of broken pieces.  | * Please use safety items, such as safety glasses and protective gloves.<br>* Early exchanging tools is preferable.  |
|   | ◎ Dispersion of hot or long chips may cause injury or burn.   | * Please use safety items, such as safety glasses and protective gloves.<br>* When getting rid of chips, please stop operation first and wear safety items and use tools such as nipper and clipper.                 |
|   | ◎ During cutting operation, cutting tools generate high heat. Touching tools immediately after operation may cause burn.  | * Please use safety items, such as safety glasses and protective gloves.   |
|   | ◎ Sparks, generation of heat or chips in high temperature during operation may cause fire.  | * Please do not operate around Hazardous zone, in which area there is some possibility of fire or explosion.<br>* In case of using oil-coolant, please be sure there is enough system for fire-prevention.           |
|   | ◎ Lack of dynamic balance in high-speed revolution cause tool to break due to vibration.  | * Please use safety items, such as safety glasses and protective gloves.<br>* Please conduct test-operation before cutting, and confirm that there is no vibration or unusual sound.                                 |
|   | ◎ Direct touch to burrs which were generated on the rough surface of the workpiece may cause injury.  | * Please do not touch workpiece with bare hand.  |
| Indexable Cutting Tools                 | ◎ If inserts or parts are not clamped well, falling off or dispersion may occur and cause injury.   | * Please clean up insert pockets or clamping parts before setting insert.<br>* Please set up inserts with supplied wrench only, and confirm that the inserts or parts are clamped completely.                        |
|   | ◎ If inserts are clamped too tightly by supplementary tools like pipe etc, inserts or body may be broken.   | * Please set up with supplied wrench only.   |
|   | ◎ When inserts are used in high-speed revolution or parts may burst out of the body due to centrifugal force.   | * Please use within recommended usage range. See our catalog or instruction.   |
| Milling Cutters and other Milling Tools | ◎ Since milling cutters have sharp edges, direct contact with bare hands may cause injury.  | * Please use safety items, such as safety glasses and protective gloves.   |
|   | ◎ If a cutter lacks balance, tools would cause vibration and it may cause injury by dispersion of broken pieces.  | * Please use them in the range of our recommended machining condition.<br>* Rotating portion and balancing should be checked regularly to prevent from eccentric rotation or run out due to wear of bearing portion. |
| Drills                                  | ◎ When drilling through hole with rotating workpiece, a disc sometimes flies out from the end of workpiece with high speed. This is very dangerous since the disc has sharp edge. | * Please use safety items, such as safety glasses and protective gloves. Also attach covers on chuck part.   |
|   | ◎ Some micro drills have sharp edge with the top. Direct touch to tools may cause injury.   | * Please use safety items, such as safety glasses and protective gloves.   |
| Brazed Tools                            | ◎ Dispersion or falling off of broken tips may cause injury.  | * Please check tips are brazed firmly.<br>* Please do not use brazed tools in the condition that requires high cutting temperature.  |
| Others                                  | ◎ If brazing is carried out many times, the strength of carbide tip is deteriorated and becomes easy to be broken during cutting.   | * Please do not use carbide tools which are brazed several times since tool strength have been deteriorated.   |
|   | ◎ It is dangerous to use tools except for the fixed application. It may damage tools and machines.  | * Please keep recommended usage of tools.  |

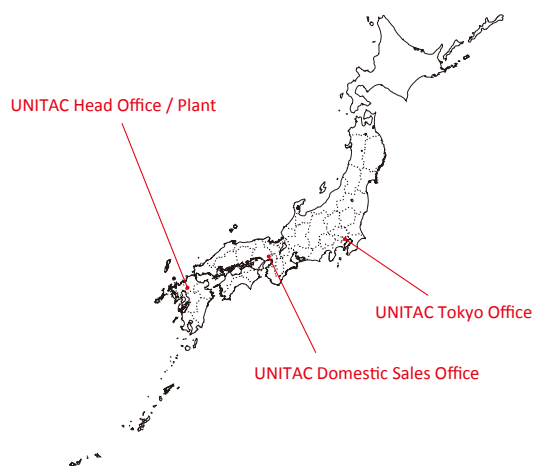
Reference: JAPAN CEMENTED CARBIDE TOOL MANUFACTURERS' ASSOCIATION



## UNITAC Head Office / Plant

Located in Kurume Business Park which has a combination of manufacturing and business enterprises near the center of Kurume City, UNITAC manufactures its high quality deep hole drilling tools. This convenient location allows easy access to highways, airports, rail service and Fukuoka Port.

UNITAC has an extensive quarter-century history in this field and as a member of IMC Group we produce and market our products to customers worldwide.



**Deep hole tooling Manufacturer**  
**UNITAC INCORPORATED**



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Tool specifications are subject to change without notice for the purpose of improvement of the products.

