UNITAC

Member IMC Group

# TREPANNING HEAD

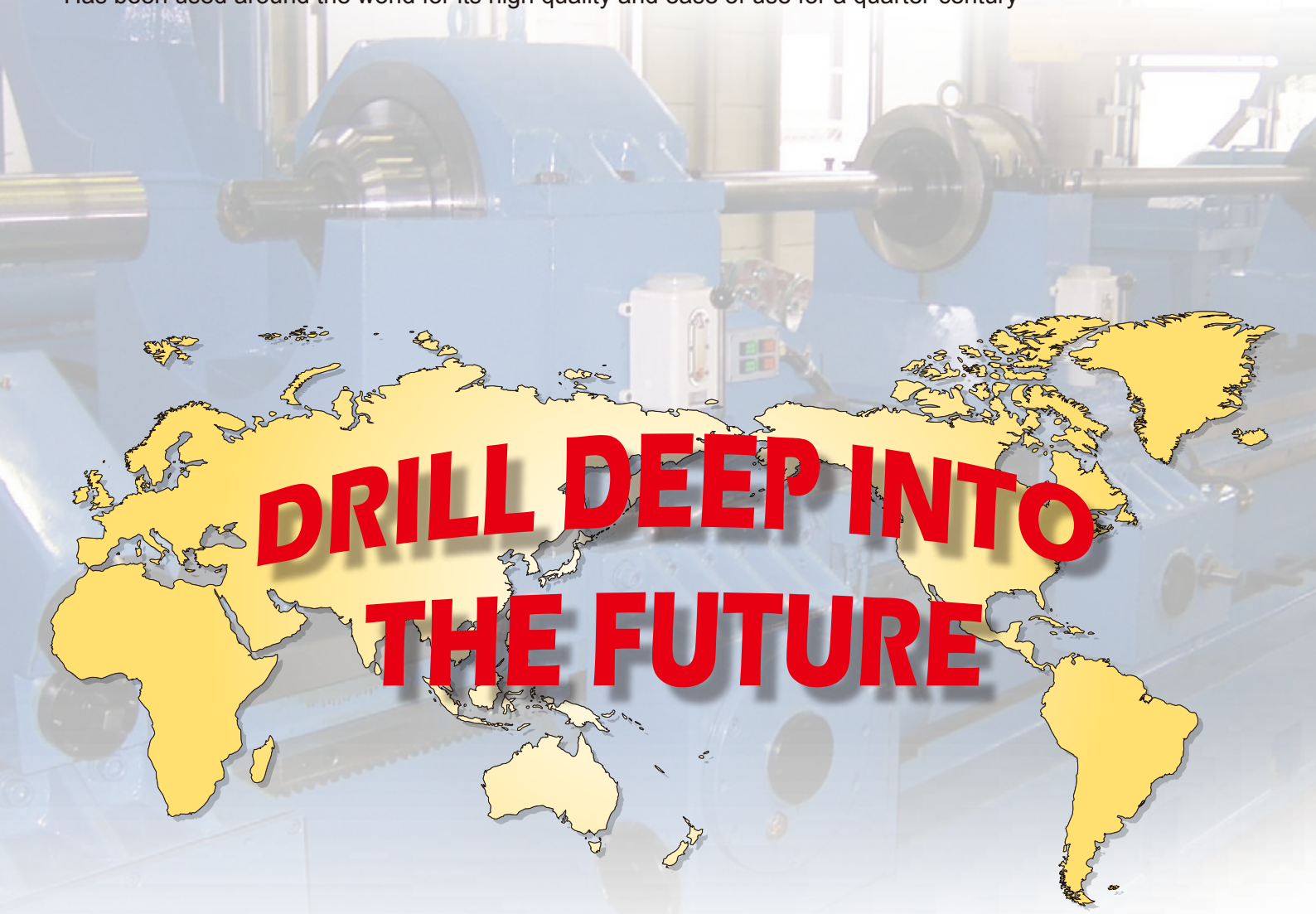
## Single Tube System

STS

Single Tube System

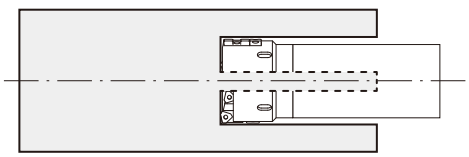
# WORLD WIDE BEST SELLER

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




## Trepanning

Trepanning is a method of hole drilling which leaves a center core. As trepanning consumes less power than solid drilling, it is used for drilling larger holes. This method also has an advantage when drilling a expensive material as the solid core can be used for other purposes.



## Actual Case

### Oil well casing drilling

Trepanning of ø120 x 2000(mm) required 63% of the power compared to solid drilling of the same size hole

| | |
|---|---|
| Component | Down hole drilling tool |
| Material | Alloyed steel |
| Application | Trepanning |
| Machine | BTA machine |
| Coolant | Oil based |

| | |
|---|---|
| Cutting Speed | 63m/min |
| Feed per Revolution | 0.27mm/rev |
| Chip Breaker | G |
| Grade | NLX |

# TREPANNING HEAD

Product information



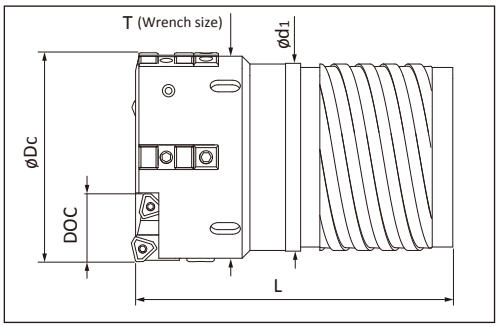
## Features

# TREPANNING HEAD

Outer Four Start Thread

## Single Tube System

ø100.00 - 328.00 (mm)




| Ordering Code | Diameter øDc (mm) | Drill Tube | | DOC (mm) | Dimensions (mm) | | |
|---|---|---|---|---|---|---|---|
| | | Ordering Code | Dia. (mm) | | L | d1 | T |
| UTT19E | 100.00 - 111.99 | ST19 | 94 | 38 | 174 | 89 | 107 |
| UTT20E | 112.00 - 123.99 | ST20 | 106 | 38 | 204 | 101 | 119 |
| UTT21E | 124.00 - 135.99 | ST21 | 118 | 49.5 | 204 | 113 | 131 |
| UTT22E | 136.00 - 147.99 | ST22 | 130 | 49.5 | 204 | 125 | 143 |
| UTT23E | 148.00 - 159.99 | ST23 | 142 | 49.5 | 229 | 137 | 155 |
| UTT24E | 160.00 - 171.99 | ST24 | 154 | 49.5 | 229 | 149 | 167 |
| UTT25E | 172.00 - 183.99 | ST25 | 166 | 49.5 | 229 | 161 | 179 |
| UTT26E | 184.00 - 195.99 | ST26 | 178 | 49.5 | 249 | 173 | 191 |
| UTT27E | 196.00 - 207.99 | ST27 | 190 | 56.5 | 249 | 185 | 203 |
| UTT28E | 208.00 - 219.99 | ST28 | 202 | 56.5 | 249 | 197 | 215 |
| UTT29E | 220.00 - 231.99 | ST29 | 214 | 56.5 | 284 | 208 | 227 |
| UTT30E | 232.00 - 243.99 | ST30 | 226 | 56.5 | 284 | 220 | 239 |
| UTT31E | 244.00 - 255.99 | ST31 | 238 | 56.5 | 284 | 232 | 251 |
| UTT32E | 256.00 - 267.99 | ST32 | 250 | 56.5 | 304 | 244 | 263 |
| UTT33E | 268.00 - 279.99 | ST33 | 262 | 56.5 | 304 | 256 | 275 |
| UTT34E | 280.00 - 291.99 | ST34 | 274 | 56.5 | 304 | 268 | 287 |
| UTT35E | 292.00 - 303.99 | ST35 | 286 | 56.5 | 324 | 280 | 299 |
| UTT36E | 304.00 - 315.99 | ST36 | 298 | 56.5 | 324 | 292 | 311 |
| UTT37E | 316.00 - 328.00 | ST37 | 310 | 56.5 | 324 | 304 | 323 |

Ordering example for DIA=200.00mm : UTT27E-200.00

• Before drilling operation please adjust tool diameter. For diameter adjustment please see page 10.

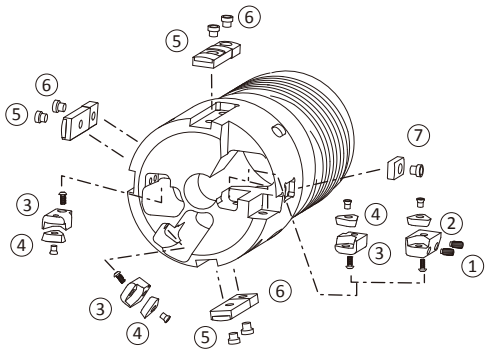
# TREPANNING HEAD

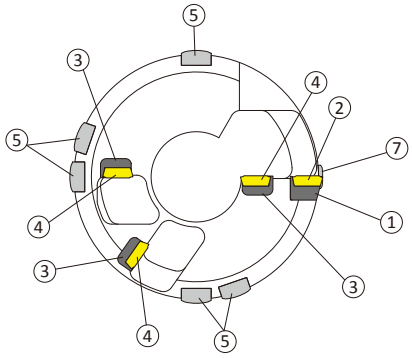
Outer Four Start Thread

Spare Parts and Inserts

ø100.00 - 328.00 (mm)

STS Single Tube System





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

## Cartridge & Insert

### Peripheral

| Dia. øDc (mm) | | | Cartridge ① | Qty | Insert ② | Qty | Insert Screw | Qty | Wrench | Adjust Screw | Qty | Wrench | Lock Screw | Qty | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **100.00** | - | **123.99** | OZ402-32 | 1 | 1123-32R | 1 | CSTB3.5D | 1 | T-9D | AS0005-10 | 2 | H2.5 | LS1805RH | 1 | H3 |
| **124.00** | - | **135.99** | OZ402-43 | 1 | 1123-43R | 1 | CSTB4M | 1 | T-15D | AS0005-15 | 2 | H2.5 | LS1806RH | 1 | H4 |
| **136.00** | - | **195.99** | OZ402-43 | 1 | 1123-43R | 1 | CSTB4M | 1 | T-15D | AS0005-15 | 2 | H2.5 | LS1806RH | 1 | H4 |
| **196.00** | - | **207.99** | OZ402-63 | 1 | 1123-63R | 1 | CSTB5 | 1 | T-20D | AS0006-15 | 2 | H3 | LS1806RH | 1 | H4 |
| **208.00** | - | **328.00** | OZ402-63 | 1 | 1123-63R | 1 | CSTB5 | 1 | T-20D | AS0006-15 | 2 | H3 | LS1806RH | 1 | H4 |

### Inner

| Dia. øDc (mm) | | | Cartridge ③ | Qty | Insert ④ | Qty | Insert Screw | Qty | Wrench | Lock Screw | Qty | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **100.00** | - | **123.99** | IOZ402-32L | 3 | 1123-32L | 3 | CSTB3.5D | 3 | T-9D | CSTA5 | 3 | T-15D |
| **124.00** | - | **135.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3 |
| **136.00** | - | **195.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3L |
| **196.00** | - | **207.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3L |
| **208.00** | - | **328.00** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3L |

## Guide Pad

| Dia. øDc (mm) | | | Guide Pad ⑤ | Qty | Lock Screw | Qty | | Qty | Wrench | Protector ⑥ | Qty | Lock Screw | Qty | Wrench | Sub Guide ⑦ | Qty | Lock Screw | Qty | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **100.00** | - | **123.99** | UG18CD | 3 | LS1206S | 2 | LS1206SS* | 1 | H3 | GPT18-M | 3 | LS1206S | 3 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **124.00** | - | **135.99** | UG18CD | 3 | LS1206S | 3 | - | | H3 | GPT18-M | 3 | LS1206S | 3 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **136.00** | - | **195.99** | UG18CD | 5 | LS1206S | 5 | - | | H3 | GPT18-M | 5 | LS1206S | 5 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **196.00** | - | **207.99** | UG18CD | 5 | LS1206S | 5 | - | | H3 | GPT18-M | 5 | LS1206S | 5 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **208.00** | - | **328.00** | UG22CD | 3 | LS1206S | 3 | - | | H3 | GPT22 | 3 | LS1206S | 3 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |

* Lock screw for dimensional guide pad

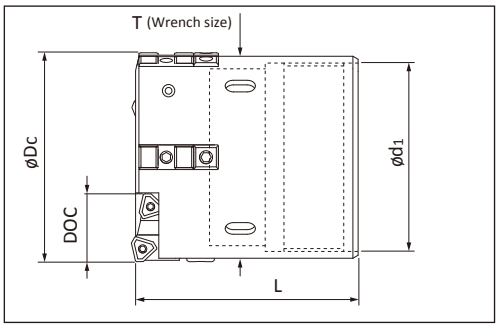
- Drill heads come complete with: cartridges, guide pads, protectors, sub guide pad and wrenches - but less inserts.

# TREPANNING HEAD

## Single Tube System

Inner Single Start Thread

ø100.00 - 305.99 (mm)




| Ordering Code | Diameter øDc (mm) | Drill Tube | | DOC (mm) | Dimensions (mm) | | |
|---|---|---|---|---|---|---|---|
| | | Ordering Code | Dia. (mm) | | L | d1 | T |
| **UTT94** | **100.00 - 110.99** | UB94 | 94 | 38 | 139 | 90 | 106 |
| **UTT106** | **111.00 - 122.99** | UB106 | 106 | 38 | 149 | 102 | 118 |
| **UTT118** | **123.00 - 123.99** | UB118 | 118 | 38 | 149 | 114 | 119 |
| **UTT118** | **124.00 - 134.99** | UB118 | 118 | 49.5 | 149 | 114 | 130 |
| **UTT130** | **135.00 - 148.99** | UB130 | 130 | 49.5 | 149 | 126 | 144 |
| **UTT142** | **149.00 - 161.99** | UB142 | 142 | 49.5 | 149 | 139 | 157 |
| **UTT154** | **162.00 - 173.99** | UB154 | 154 | 49.5 | 169 | 151 | 169 |
| **UTT166** | **174.00 - 185.99** | UB166 | 166 | 49.5 | 169 | 163 | 181 |
| **UTT178** | **186.00 - 195.99** | UB178 | 178 | 49.5 | 169 | 175 | 191 |
| **UTT178** | **196.00 - 197.99** | UB178 | 178 | 56.5 | 169 | 175 | 193 |
| **UTT190** | **198.00 - 209.99** | UB190 | 190 | 56.5 | 169 | 187 | 205 |
| **UTT202** | **210.00 - 221.99** | UB202 | 202 | 56.5 | 189 | 199 | 217 |
| **UTT214** | **222.00 - 233.99** | UB214 | 214 | 56.5 | 189 | 211 | 229 |
| **UTT226** | **234.00 - 245.99** | UB226 | 226 | 56.5 | 189 | 223 | 241 |
| **UTT238** | **246.00 - 257.99** | UB238 | 238 | 56.5 | 189 | 235 | 253 |
| **UTT250** | **258.00 - 266.99** | UB250 | 250 | 56.5 | 209 | 245 | 262 |
| **UTT262** | **267.00 - 281.99** | UB262 | 262 | 56.5 | 209 | 259 | 277 |
| **UTT274** | **282.00 - 293.99** | UB274 | 274 | 56.5 | 209 | 271 | 289 |
| **UTT286** | **294.00 - 305.99** | UB286 | 286 | 56.5 | 209 | 283 | 301 |

Ordering example for DIA=200.00mm : UTT190-200.00

• Before drilling operation please adjust tool diameter. For diameter adjustment please see page 10.

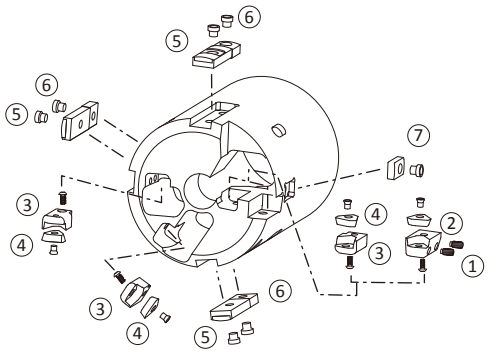
# TREPANNING HEAD

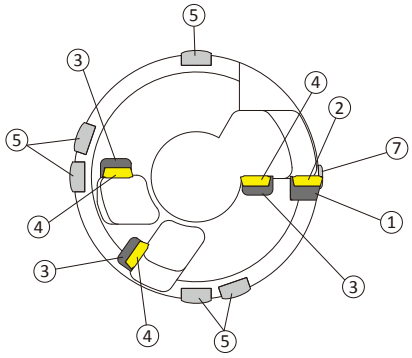
Inner Single Start Thread

Spare Parts and Inserts

ø100.00 - 305.99 (mm)

STS Single Tube System





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

## Cartridge & Insert

### Peripheral

| Dia. øDc (mm) | | | Cartridge ① | Qty | Insert ② | Qty | Insert Screw | Qty | Wrench | Adjust Screw | Qty | Wrench | Lock Screw | Qty | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **100.00** | - | **123.99** | OZ402-32 | 1 | 1123-32R | 1 | CSTB3.5D | 1 | T-9D | AS0005-10 | 2 | H2.5 | LS1805RH | 1 | H3 |
| **124.00** | - | **135.99** | OZ402-43 | 1 | 1123-43R | 1 | CSTB4M | 1 | T-15D | AS0005-15 | 2 | H2.5 | LS1806RH | 1 | H4 |
| **136.00** | - | **195.99** | OZ402-43 | 1 | 1123-43R | 1 | CSTB4M | 1 | T-15D | AS0005-15 | 2 | H2.5 | LS1806RH | 1 | H4 |
| **196.00** | - | **207.99** | OZ402-63 | 1 | 1123-63R | 1 | CSTB5 | 1 | T-20D | AS0006-15 | 2 | H3 | LS1806RH | 1 | H4 |
| **208.00** | - | **305.99** | OZ402-63 | 1 | 1123-63R | 1 | CSTB5 | 1 | T-20D | AS0006-15 | 2 | H3 | LS1806RH | 1 | H4 |

### Inner

| Dia. øDc (mm) | | | Cartridge ③ | Qty | Insert ④ | Qty | Insert Screw | Qty | Wrench | Lock Screw | Qty | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **100.00** | - | **123.99** | IOZ402-32L | 3 | 1123-32L | 3 | CSTB3.5D | 3 | T-9D | CSTA5 | 3 | T-15D |
| **124.00** | - | **135.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3 |
| **136.00** | - | **195.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3L |
| **196.00** | - | **207.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3L |
| **208.00** | - | **305.99** | IOZ402-43L | 3 | 1123-43L | 3 | CSTB4M | 3 | T-15D | LS1206 | 3 | H3L |

## Guide Pad

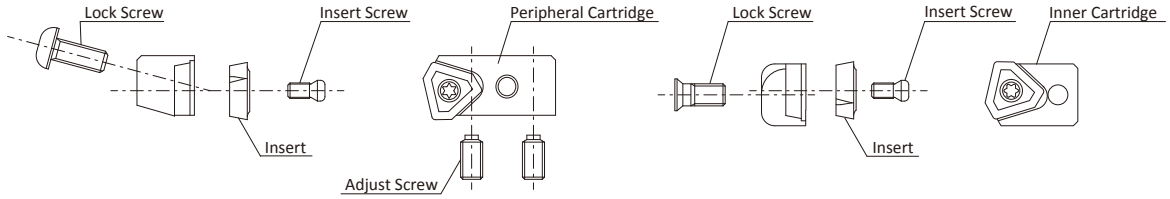
| Dia. øDc (mm) | | | Guide Pad ⑤ | Qty | Lock Screw | Qty | | Qty | Wrench | Protector ⑥ | Qty | Lock Screw | Qty | Wrench | Sub Guide ⑦ | Qty | Lock Screw | Qty | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **100.00** | - | **123.99** | UG18CD | 3 | LS1206S | 2 | LS1206SS* | 1 | H3 | GPT18-M | 3 | LS1206S | 3 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **124.00** | - | **135.99** | UG18CD | 3 | LS1206S | 3 | - | | H3 | GPT18-M | 3 | LS1206S | 3 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **136.00** | - | **195.99** | UG18CD | 5 | LS1206S | 5 | - | | H3 | GPT18-M | 5 | LS1206S | 5 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **196.00** | - | **207.99** | UG18CD | 5 | LS1206S | 5 | - | | H3 | GPT18-M | 5 | LS1206S | 5 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |
| **208.00** | - | **305.99** | UG22CD | 3 | LS1206S | 3 | - | | H3 | GPT22 | 3 | LS1206S | 3 | H3 | CUG14-M | 1 | CSTA5S | 1 | T-15D |

* Lock screw for dimensional guide pad

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

# Parts List

## Cartridge & Insert




- Outer cartridges are supplied with adjust screws and insert screw but without inserts, lock screws and wrenchs
- Inner cartridges are supplied with insert screw but without inserts, lock screws and wrenchs

### Peripheral

| Cartridge | Insert | Insert Screw | Wrench | Adjust Screw | Wrench | Lock Screw | Wrench |
|---|---|---|---|---|---|---|---|
| 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 |
| OZ402-63 | 1123-63R | CSTB5 | T-20D | AS0006-15 | H3 | LS1806RH | H4 |

### Inner

| Cartridge | Insert | Insert Screw | Wrench | Lock Screw | Wrench |
|---|---|---|---|---|---|
| IOZ402-32L | 1123-32L | CSTB3.5D | T-9D | CSTA5 | T-15D |
| IOZ402-43L | 1123-43L | CSTB4M | T-15D | LS1206 | H3 / H3L* |

* H3L for diameter ø136.00mm and up

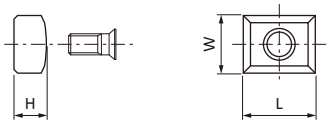
## Guide Pad & Protector


| Guide Pad | Dimensions (mm) | | | Lock Screw | Wrench | Protector | Dimensions (mm) | | Lock Screw | Wrench |
|---|---|---|---|---|---|---|---|---|---|---|
| | W | H | L | | | | W | H | | |
| UG18CD | 18 | 9 | 40 | LS1206S / LS1206SSS ** | H3 | GPT18-M | 18 | 9 | LS1206S | H3 |
| UG22CD | 22 | 15 | 40 | LS1206S | H3 | GPT22 | 22 | 15 | LS1206S | H3 |

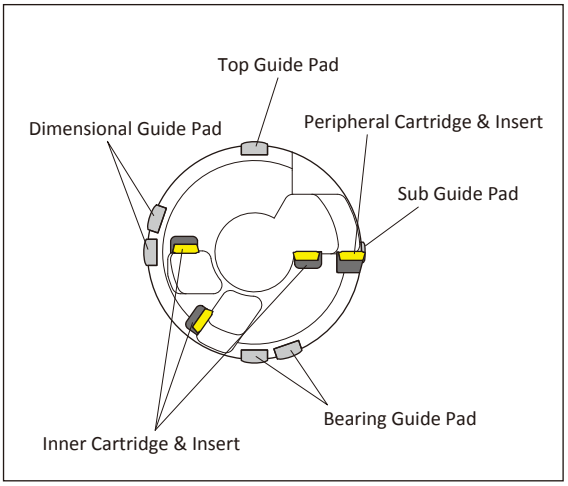
** For dimensional guide pad (for diameter ø100.00 - ø123.99)

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

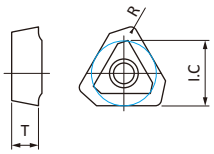
## Sub Guide




| Guide Pad | Dimensions (mm) | | | Lock Screw | Wrench |
|---|---|---|---|---|---|
| | W | H | L | | |
| CUG14-M | 14 | 7 | 20 | CSTA5S | T-15D |



# Insert




(Patent No 2702061)

| Chipbreaker | Code | Dimensions (mm) | | | Grade | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CVD coating | | | PVD coating | | | |
| | | IC | T | R | UC1220 (DLX2) | UC1125 (DLXT) | UC1230 (DLX3) | UC3215 (KLX2) | UC3210 (KLXT3) | UC2220 (NLX) | UC3120 (KLXT) |
| **G** | **1123-32R** | 10.30 | 4.00 | 0.8 | ● | | ● | ● | | ● | |
| | **1123-43R** | 14.20 | 5.50 | 1.2 | ● | | ● | ● | | ● | |
| | **1123-63R** | 17.00 | 7.50 | 1.6 | ● | | ● | ● | | ● | |
| **BR1** | **1123-32RBR1** | 10.30 | 4.00 | 0.4 | | ● | | | ● | ● | ● |
| | **1123-43RBR1** | 14.20 | 5.50 | 0.4 | | ● | | | ● | ● | ● |
| | **1123-63RBR1** | 17.00 | 7.50 | 0.8 | | ● | | | ● | ● | ● |
| **B** | **1123-32RB** | 10.30 | 4.00 | 0.8 | | | | ● | | ● | |
| | **1123-43RB** | 14.20 | 5.50 | 1.2 | | | | ● | | ● | |
| | **1123-63RB** | 17.00 | 7.50 | 1.6 | | | | ● | | ● | |
| **S** | **1123-32RS** | 10.30 | 4.00 | 0.8 | | | | | | ● | |
| | **1123-43RS** | 14.20 | 5.50 | 1.2 | | | | | | ● | |
| | **1123-63RS** | 17.00 | 7.50 | 1.6 | | | | | | ● | |

## Left hand type

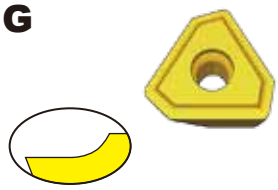
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **G** | **1123-32L** | 10.30 | 4.00 | 0.8 | | | ● | | | ● | |
| | **1123-43L** | 14.20 | 5.50 | 1.2 | | | ● | | | ● | |
| **B** | **1123-32LB** | 10.30 | 4.00 | 0.8 | | | | | | ● | |
| | **1123-43LB** | 14.20 | 5.50 | 1.2 | | | | | | ● | |
| **S** | **1123-32LS** | 10.30 | 4.00 | 0.8 | | | | | | ● | |
| | **1123-43LS** | 14.20 | 5.50 | 1.2 | | | | | | ● | |

Ordering example: 1123-32RBR1 UC1125 10 pcs

● : Standard stock item

## Chipbreaker

**G**

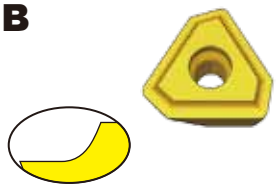


Good chip control with most materials

**BR1**

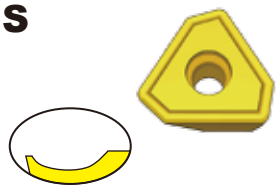
Good chip control with heat resistant super alloy

**B**



Good chip control with long chipping materials

**S**



Good for lowering cutting resistance

## Grade

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

New designation system for insert grades.

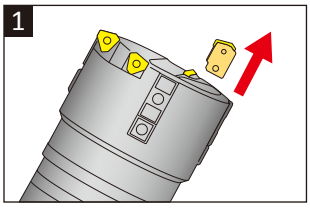
## Selection Chart

| Workpiece material | | First Recommendation | Troubleshooting: Chipping | Troubleshooting: Wear |
|---|---|---|---|---|
| P | • Carbon steels<br>• Alloy steels | G<br>UC2220 (NLX) | G<br>UC1230 (DLX3) | G<br>UC1220 (DLX2) |
| M | • Stainless steels | G<br>UC2220 (NLX) | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |
| K | • Gray cast irons<br>• Nodular cast irons | G<br>UC2220 (NLX) | G<br>UC1230 (DLX3) | G<br>UC3215 (KLX2) |
| N | • Aluminium alloys | G<br>UC2220 (NLX) | BR1<br>UC3120 (KLXT) | G<br>UC3215 (KLX2) |
| S | • Heat resistant super alloys<br>• Titanium alloys | BR1<br>UC2220 (NLX) | BR1<br>UC3120 (KLXT) | BR1<br>UC3210 (KLXT3) |

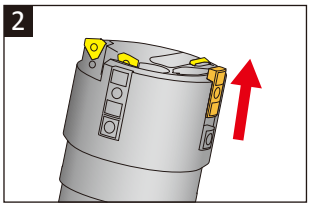
# Diameter Setting

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.



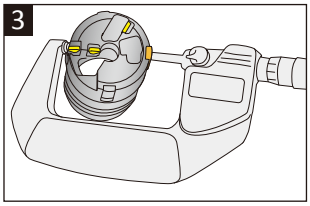

1 Remove the inner cartridge next to the dimensional guide pad to avoid interference with the guide screw.




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

2-1 Loosen the lock screw and slide the guide pad forward.

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

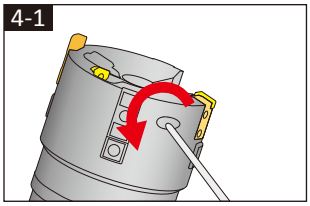



3 Measure the diameter with a micrometer.

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

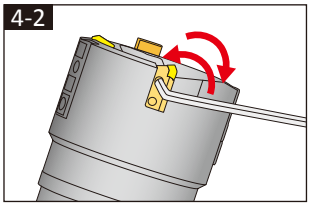
If the diameter is incorrect, go to below step 4

If it's correct, go to below step 5

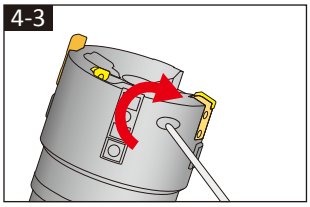



4 Adjust the peripheral cartridge

4-1 First loosen the lock screw of the peripheral cartridge and then tighten it slightly.



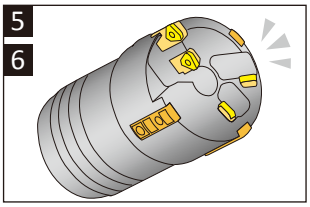

4-2 Proceed to adjust the diameter, using the 2 adjust screws and measure with a micrometer.




4-3 When set to the size, retighten the lock screw.

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

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



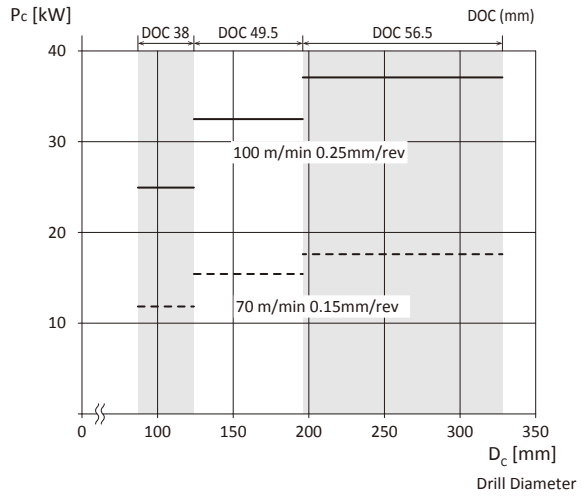

5 Slide the dimensional guide pad back to the original position and tighten the lock screw.

6 Replace the inner cartridge and tighten the lock screw.

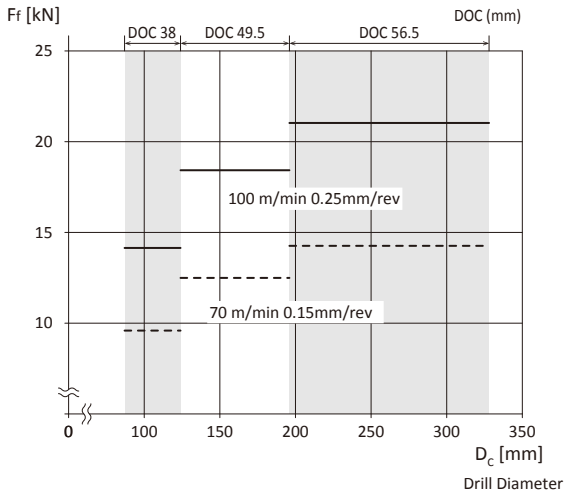
> ⚠ Please check all the lock screws are firmly tightened as they may come loose if vibration occurs during drilling.

# Trepanning (Single Tube System)

## Net Power

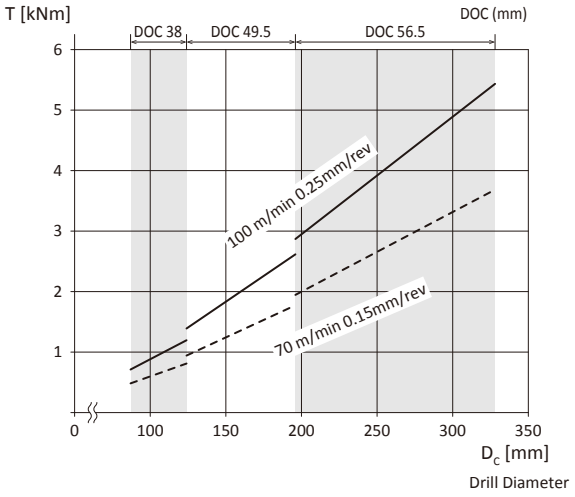



## Feed Force

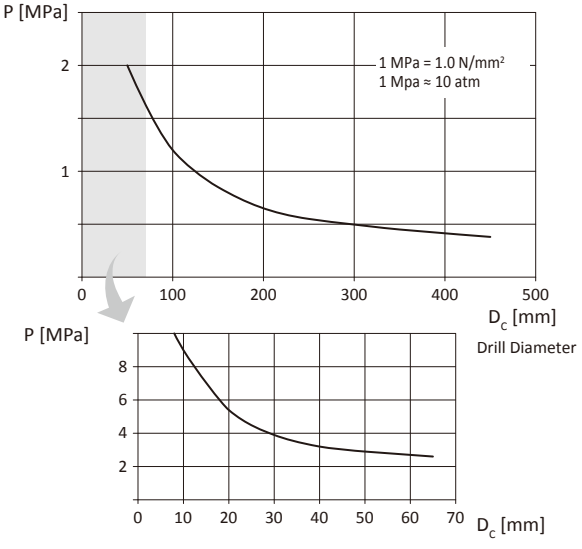



STS
Single Tube System

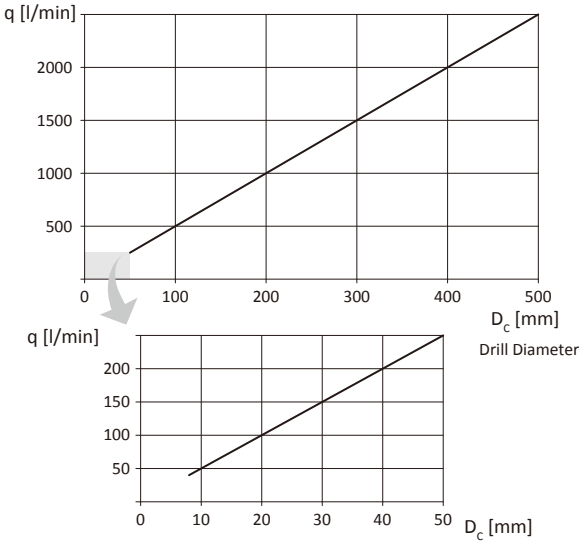
## Torque




## Cutting Fluid Pressure




## Cutting Fluid Volume



# Recommended Cutting Conditions

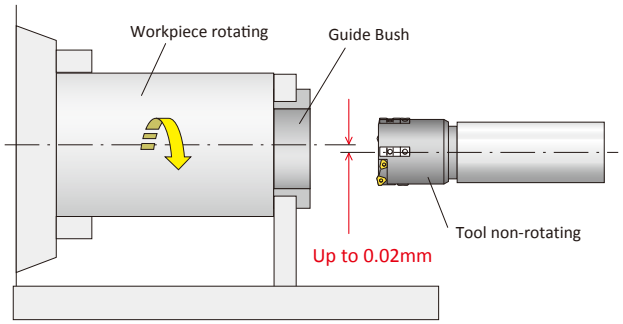
| ISO | Material | JIS | Condition | | Hardness (HB) | Cutting Speed Vc (m/min) | Feed rate fn (mm/rev) |
|---|---|---|---|---|---|---|---|
| P | Carbon steel High carbon Cutting steel | S10C - S25C, SS | 0.1 - 0.25 %C | Non-hardened | 125 | 80-100 | 0.12-0.3 |
| | | S25C - S55C | 0.25 - 0.25 %C | Non-hardened | 190 | 80-100 | 0.12-0.3 |
| | | | 0.25 - 0.25 %C | Hardened and tempered | 250 | 80-100 | 0.12-0.3 |
| | | SK | 0.55 - 0.80 %C | Non-hardened | 220 | 80-100 | 0.12-0.3 |
| | | | 0.55 - 0.80 %C | Hardened and tempered | 300 | 80-100 | 0.12-0.3 |
| | Low alloyed (alloying element < 5%) | SNC,DCr, SNCN SCM, SMn | | Non-hardened | 200 | 70-100 | 0.12-0.3 |
| | | | | Hardened and tempered | 275 | 70-100 | 0.12-0.3 |
| | | | | | 300 | 60-100 | 0.12-0.3 |
| | | | | | 350 | 60-100 | 0.12-0.3 |
| | High alloyed Cast iron Tool steel | SNS,SKD, SKT SKH, SK | | Non-hardened | 200 | 70-100 | 0.12-0.3 |
| | | | | Hardened and tempered | 325 | 60-100 | 0.12-0.3 |
| M | Stainless steel | SUS430 | | Ferritic | 200 | 50-90 | 0.12-0.3 |
| | | SUS410, 420J | | Martensite | 240 | 50-90 | 0.12-0.3 |
| | | SUS304, SUS316L | | Austenite | 180 | 50-90 | 0.12-0.3 |
| K | Nodular cast iron | FCD400 - FCD450 | | Ferritic/Pearlitic | 180 | 80-100 | 0.12-0.3 |
| | | FCD500 - FCD700 | | Pearlitic | 260 | 60-100 | 0.12-0.3 |
| | Gray cast iron | FC100 - FC200 | | Low tensile strength | 160 | 50-100 | 0.12-0.3 |
| | | FC250 - FC350 | | High tensile strength | 250 | 50-100 | 0.12-0.3 |
| | Malleable cast iron | FCMB, FCMW | | Ferritic | 130 | 80-100 | 0.12-0.3 |
| | | FCMWP, FCMP | | Pearlitic | 230 | 80-100 | 0.12-0.3 |
| N | Aluminum alloy Forging | | | Non-aged | 60 | 65-130 | 0.1-0.3 |
| | | | | Soluted, Aged | 100 | 65-130 | 0.1-0.3 |
| | Aluminum alloy Casting | | <=12% Si | Non-aged | 75 | 65-130 | 0.1-0.3 |
| | | | | Soluted, Aged | 90 | 65-130 | 0.1-0.3 |
| | | | >12% Si | High silicon | 130 | 65-130 | 0.1-0.3 |
| | Copper alloy | | >1% Pb | Free cutting copper | 110 | 65-130 | 0.1-0.3 |
| | | | | Brass, Red brass | 90 | 65-130 | 0.1-0.3 |
| | | | | Electrolytic copper | 100 | 65-130 | 0.1-0.3 |
| S | Heat resistant super alloy | | Fe base | Non-aged | 200 | 20-65 | 0.1-0.2 |
| | | | | Soluted, Aged | 280 | 20-65 | 0.1-0.2 |
| | | | Ni / Co base | Non-aged | 250 | 20-65 | 0.1-0.2 |
| | | | | Soluted, Aged | 350 | 20-65 | 0.1-0.2 |
| | | | | Casted | 320 | 20-65 | 0.1-0.2 |
| | Titanium alloy | | $\alpha$ | | Rm400 | 30-100 | 0.1-0.2 |
| | | | $\alpha$ - $\beta$ | | Rm1050 | 30-100 | 0.1-0.2 |

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

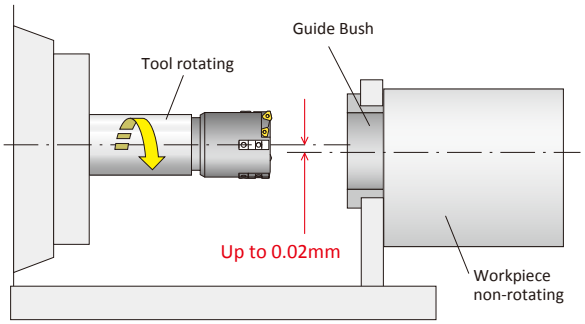
## Notes for Setting Up STS

### 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



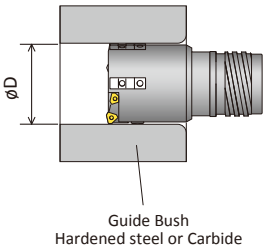

- Can be applied when the workpiece and the tool axis are not in line.
- Keep the alignment between guide bush and spindle within 0.02 mm.

## 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

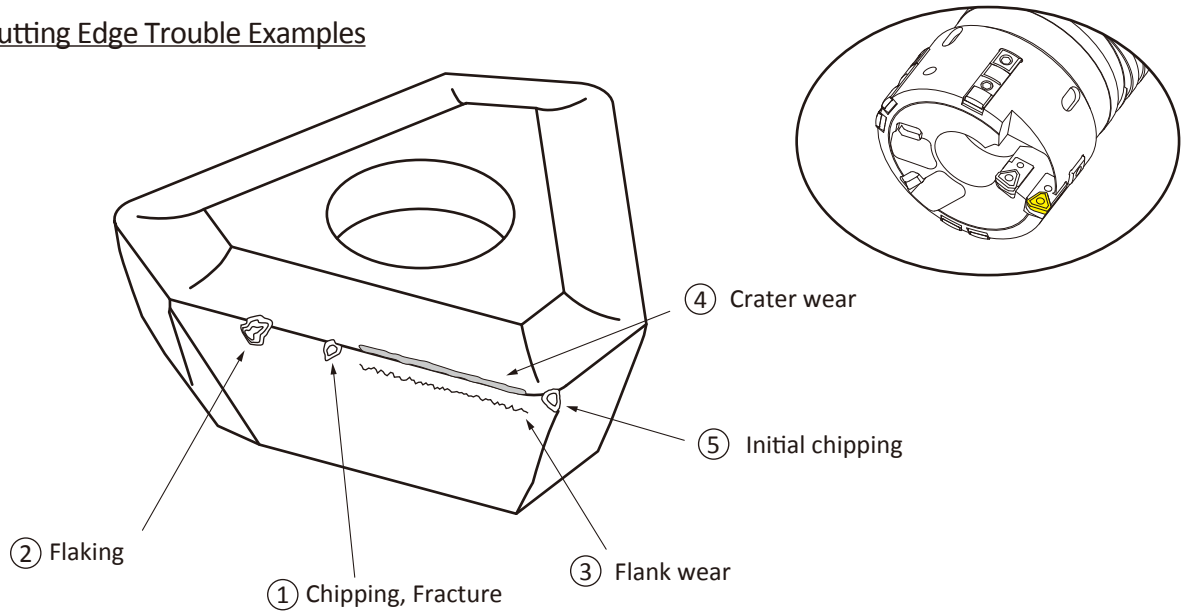
The coolant must be filtered in order to protect the guide pads and the surface finish.

### 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




(Peripheral Insert)

| | Problem | Causes | Solutions | |
|---|---|---|---|---|
| | | | Grade | Cutting Conditions / Other |
| 1 | Chipping, Fracture | • Excessive vibration or shock<br>• Built-Up-Edge separated | • Use tougher grade | • Reduce feed rate<br>• Remove vibration |
| 2 | Flaking | • Excessive vibration or shock | • Use tougher grade | • Reduce feed rate<br>• Remove vibration |
| 3 | Flank wear | • Cutting speed too high<br>• Inadequate tool toughness | • Use higher wear resistant grade<br>• Use coated grade | • Reduce cutting speed<br>• Reduce feed rate<br>• Use proper cutting fluid |
| 4 | Crater wear | • Cutting speed too high<br>• Feed rate too high<br>• Inadequate tool toughness | • Use higher wear resistant grade<br>• Use coated grade | • Reduce cutting speed<br>• Reduce feed rate<br>• Use proper cutting fluid |
| 5 | Initial chipping | • Guide bush or pilot hole is improper size<br>• Misalignment | • Use tougher grade | • Adjust or change guide bush or pilot hole<br>• Reduce feed rate<br>• Correct misalignment |

# 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.

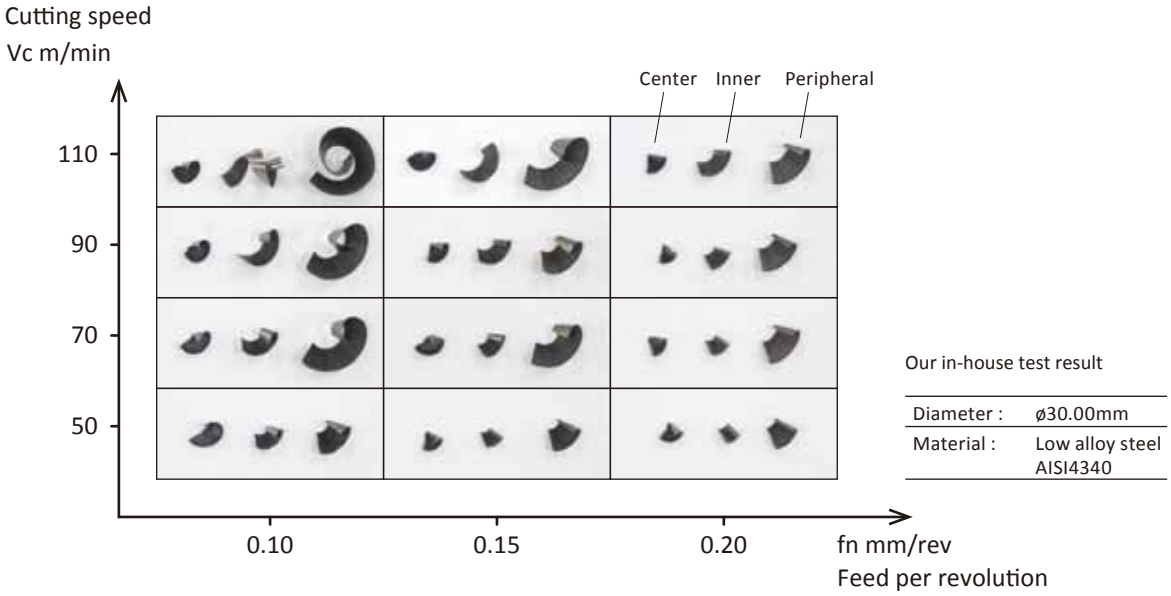
## Chip formation

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.

## 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.

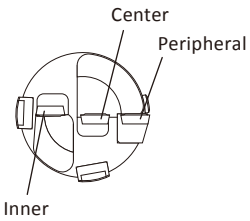
Below picture shows chip formation by cutting speed and feed. Shorter chips are obtained by reducing cutting speed or increasing feed.




Our in-house test result

| | |
|---|---|
| Diameter : | ø30.00mm |
| Material : | Low alloy steel AISI4340 |

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

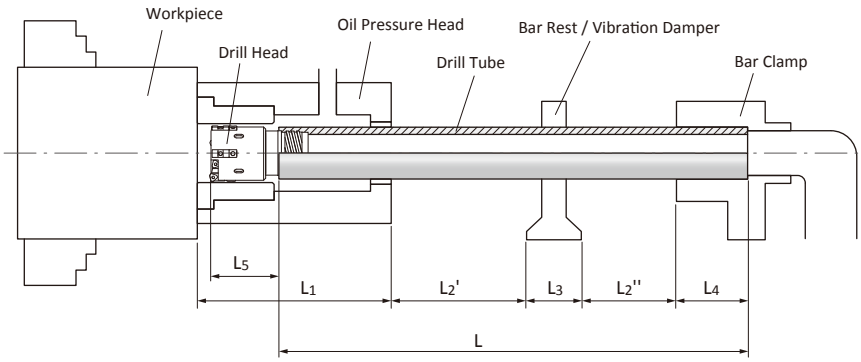


# Calculation of special length tube

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

STS Single Tube System



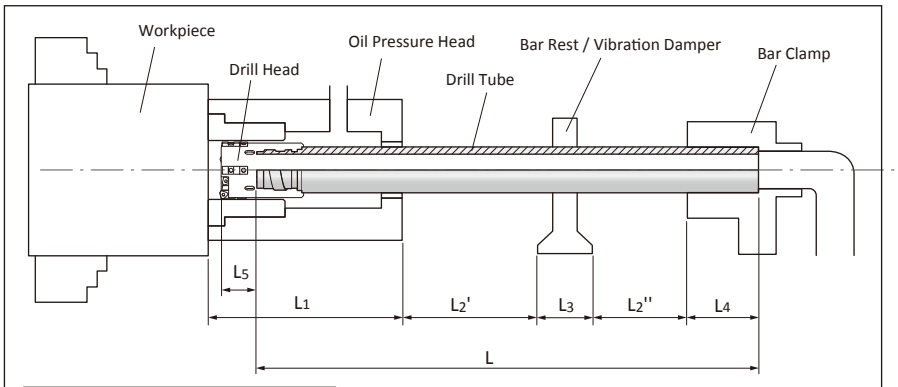

| | | |
|---|---|---|
| L | = | Drill tube length |
| $L_1$ | = | Oil pressure head length |
| $L_2$ | = | Drilling depth ($L_2' + L_2''$) |
| $L_3$ | = | Bar rest / vibration damper length |
| $L_4$ | = | Drill tube clamping length |
| $L_5$ | = | End of drill tube to tip of peripheral insert |

**Drill Tube Length $L = L_1 + L_2 + L_3 + L_4 - L_5$**

* Two start thread is for dia 15.59 and less.

## UB Single start Outer thread connection

STS Single Tube System

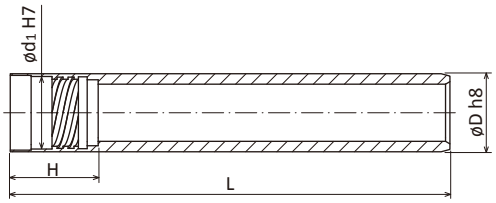



| | | |
|---|---|---|
| L | = | Drill tube length |
| $L_1$ | = | Oil pressure head length |
| $L_2$ | = | Drilling depth ($L_2' + L_2''$) |
| $L_3$ | = | Bar rest / vibration damper length |
| $L_4$ | = | Drill tube clamping length |
| $L_5$ | = | End of drill tube to tip of peripheral insert |

**Drill Tube Length $L = L_1 + L_2 + L_3 + L_4 - L_5$**

# ST Inner thread connection

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





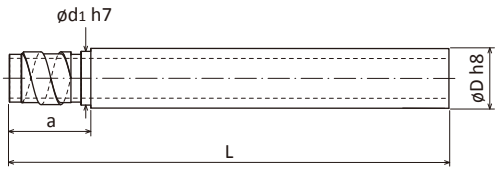
| Drill Range (mm) | Code | L (mm) 1600 | L (mm) 2600 | L (mm) Special Length | Dimensions (mm) D | d1 | H |
|---|---|---|---|---|---|---|---|
| 12.60 - 13.60 | ST0094 | ● | | ○ | 11 | 9.6 | 22 |
| 13.61 - 14.60 | ST0095 | ● | | ○ | 12 | 10.6 | 22 |
| 14.61 - 15.59 | ST0096 | ● | | ○ | 13 | 11.6 | 22 |
| 15.60 - 16.70 | ST0097 | ● | | ○ | 14 | 12.6 | 21 |
| 16.71 - 17.70 | ST0098 | ● | ● | ○ | 15 | 13.6 | 21 |
| 17.71 - 18.90 | ST0099 | ● | ● | ○ | 16 | 14.5 | 22 |
| 18.91 - 20.00 | ST0000 | ● | ● | ○ | 17 | 15.5 | 22 |
| 20.01 - 21.80 | ST00 | ● | ● | ○ | 18 | 16 | 27.5 |
| 21.81 - 24.10 | ST01 | | ● | ○ | 20 | 18 | 30 |
| 24.11 - 26.40 | ST02 | | ● | ○ | 22 | 19.5 | 30 |
| 26.41 - 28.70 | ST03 | | ● | ○ | 24 | 21 | 30 |
| 28.71 - 31.00 | ST04 | | ● | ○ | 26 | 23.5 | 33 |
| 31.01 - 33.30 | ST05 | | ● | ○ | 28 | 25.5 | 33 |
| 33.31 - 36.20 | ST06 | | ● | ○ | 30 | 28 | 33 |
| 36.21 - 39.60 | ST07 | | ● | ○ | 33 | 30 | 40 |
| 39.61 - 43.00 | ST08 | | ● | ○ | 36 | 33 | 40 |
| 43.01 - 47.00 | ST09 | | ● | ○ | 39 | 36 | 40 |
| 47.01 - 51.70 | ST10 | | ● | ○ | 43 | 39 | 40 |
| 51.71 - 56.20 | ST11 | | ● | ○ | 47 | 43 | 44 |
| 56.21 - 60.60 | ST12 | | ● | ○ | 51 | 47 | 44 |
| 60.61 - 65.00 | ST13 | | | ○ | 56 | 51 | 44 |
| 65.00 - 66.99 | ST14 | | | ○ | 56 | 52 | 75 |
| 67.00 - 72.99 | ST15 | | | ○ | 62 | 58 | 75 |

| Drill Range (mm) | Code | L (mm) Special Length | Dimensions (mm) D | d1 | H |
|---|---|---|---|---|---|
| 73.00 - 79.99 | ST16 | ○ | 68 | 63 | 75 |
| 80.00 - 86.99 | ST17 | ○ | 75 | 70 | 97 |
| 87.00 - 99.99 | ST18 | ○ | 82 | 77 | 97 |
| 100.00 - 111.99 | ST19 | ○ | 94 | 89 | 97 |
| 112.00 - 123.99 | ST20 | ○ | 106 | 101 | 118 |
| 124.00 - 135.99 | ST21 | ○ | 118 | 113 | 118 |
| 136.00 - 147.99 | ST22 | ○ | 130 | 125 | 118 |
| 148.00 - 159.99 | ST23 | ○ | 142 | 137 | 139 |
| 160.00 - 171.99 | ST24 | ○ | 154 | 149 | 139 |
| 172.00 - 183.99 | ST25 | ○ | 166 | 161 | 139 |
| 184.00 - 195.99 | ST26 | ○ | 178 | 173 | 144 |
| 196.00 - 207.99 | ST27 | ○ | 190 | 185 | 144 |
| 208.00 - 219.99 | ST28 | ○ | 202 | 197 | 144 |
| 220.00 - 231.99 | ST29 | ○ | 214 | 208 | 164 |
| 232.00 - 243.99 | ST30 | ○ | 226 | 220 | 164 |
| 244.00 - 255.99 | ST31 | ○ | 238 | 232 | 164 |
| 256.00 - 267.99 | ST32 | ○ | 250 | 244 | 184 |
| 268.00 - 279.99 | ST33 | ○ | 262 | 256 | 184 |
| 280.00 - 291.99 | ST34 | ○ | 274 | 268 | 184 |
| 292.00 - 303.99 | ST35 | ○ | 286 | 280 | 204 |
| 304.00 - 315.99 | ST36 | ○ | 298 | 292 | 204 |
| 316.00 - 328.00 | ST37 | ○ | 310 | 304 | 204 |

- Please indicate the length (L) when ordering. Ordering example for drill dia. ø60.00 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





| Drill Range (mm) | Code | L (mm) Special Length | Dimensions (mm) D | d1 | a |
|---|---|---|---|---|---|
| 14.50 - 15.00 | UB12-1 | ○ | 12 | 11.5 | 23 |
| 15.01 - 15.50 | UB12-2 | ○ | 12 | 11.8 | 23 |
| 15.51 - 16.00 | UB13-1 | ○ | 13 | 12.4 | 23 |
| 16.01 - 16.50 | UB13-2 | ○ | 13 | 12.7 | 23 |
| 16.51 - 17.25 | UB14-1 | ○ | 14 | 13.4 | 23 |
| 17.26 - 18.00 | UB14-2 | ○ | 14 | 13.7 | 23 |
| 18.01 - 19.00 | UB15 | ○ | 15 | 14.4 | 23 |
| 19.01 - 19.99 | UB16.5 | ○ | 16.5 | 15.4 | 23 |
| 20.00 - 21.99 | UB18 | ○ | 18 | 16.5 | 26 |
| 22.00 - 24.99 | UB20 | ○ | 20 | 19 | 26 |
| 25.00 - 26.99 | UB22 | ○ | 22 | 20 | 26 |
| 27.00 - 29.99 | UB24 | ○ | 24 | 22 | 26 |
| 30.00 - 31.99 | UB26 | ○ | 26 | 24 | 26 |
| 32.00 - 33.99 | UB28 | ○ | 28 | 26 | 26 |
| 34.00 - 36.99 | UB30 | ○ | 30 | 27 | 41 |
| 37.00 - 39.99 | UB33 | ○ | 33 | 30 | 41 |
| 40.00 - 43.99 | UB36 | ○ | 36 | 33 | 41 |
| 44.00 - 46.99 | UB39 | ○ | 39 | 37 | 41 |
| 47.00 - 51.99 | UB43 | ○ | 43 | 41 | 41 |
| 52.00 - 56.99 | UB47 | ○ | 47 | 44 | 41 |
| 57.00 - 60.99 | UB51 | ○ | 51 | 49 | 41 |
| 61.00 - 67.99 | UB56 | ○ | 56 | 53 | 41 |

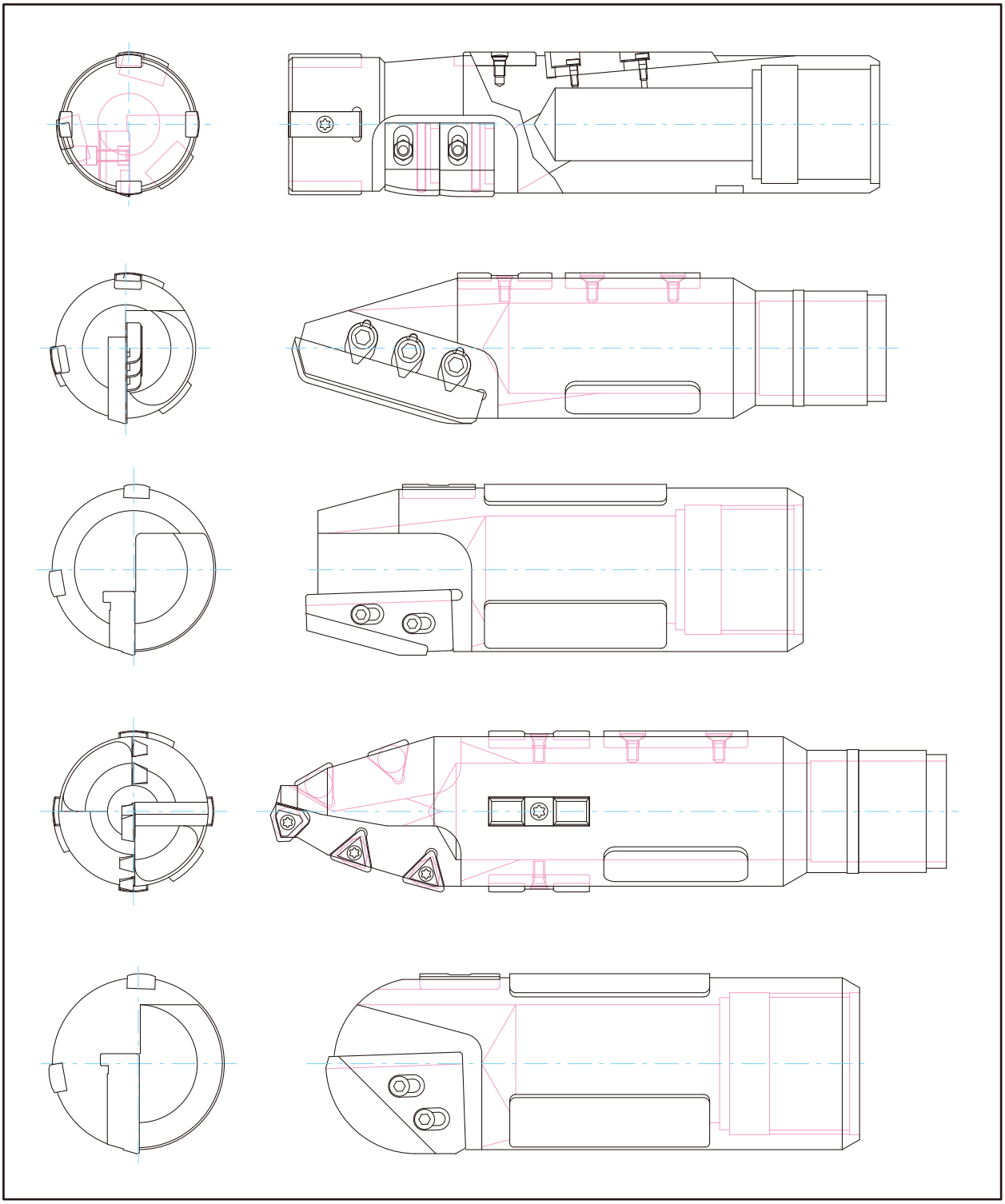
| Drill Range (mm) | Code | L (mm) Special Length | Dimensions (mm) D | d1 | a |
|---|---|---|---|---|---|
| 68.00 - 74.99 | UB62 | ○ | 62 | 59 | 41 |
| 75.00 - 80.99 | UB68 | ○ | 68 | 65 | 71 |
| 81.00 - 90.99 | UB75 | ○ | 75 | 71 | 71 |
| 91.00 - 98.99 | UB82 | ○ | 82 | 79 | 71 |
| 99.00 - 110.99 | UB94 | ○ | 94 | 90 | 71 |
| 111.00 - 122.99 | UB106 | ○ | 106 | 102 | 71 |
| 123.00 - 134.99 | UB118 | ○ | 118 | 114 | 71 |
| 135.00 - 148.99 | UB130 | ○ | 130 | 126 | 71 |
| 149.00 - 161.99 | UB142 | ○ | 142 | 139 | 71 |
| 162.00 - 173.99 | UB154 | ○ | 154 | 151 | 86 |
| 174.00 - 185.99 | UB166 | ○ | 166 | 163 | 86 |
| 186.00 - 197.99 | UB178 | ○ | 178 | 175 | 86 |
| 198.00 - 209.99 | UB190 | ○ | 190 | 187 | 86 |
| 210.00 - 221.99 | UB202 | ○ | 202 | 199 | 86 |
| 222.00 - 233.99 | UB214 | ○ | 214 | 211 | 86 |
| 234.00 - 245.99 | UB226 | ○ | 226 | 223 | 86 |
| 246.00 - 257.99 | UB238 | ○ | 238 | 235 | 86 |
| 258.00 - 269.99 | UB250 | ○ | 250 | 247 | 121 |
| 270.00 - 281.99 | UB262 | ○ | 262 | 259 | 121 |
| 282.00 - 293.99 | UB274 | ○ | 274 | 271 | 121 |
| 294.00 - 305.99 | UB286 | ○ | 286 | 283 | 121 |

- Please indicate the length (L) when ordering. Ordering example for drill dia. ø60.00 mm and drill tube length 2600 mm: UB51X2600

○ : Special length

# Special Tooling

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) | |
| Drill Tube Dia.(ø) | |
| Quantity | |
| Request Delivery date | |

Description of your sytem in use:

Please sketch your drilling application

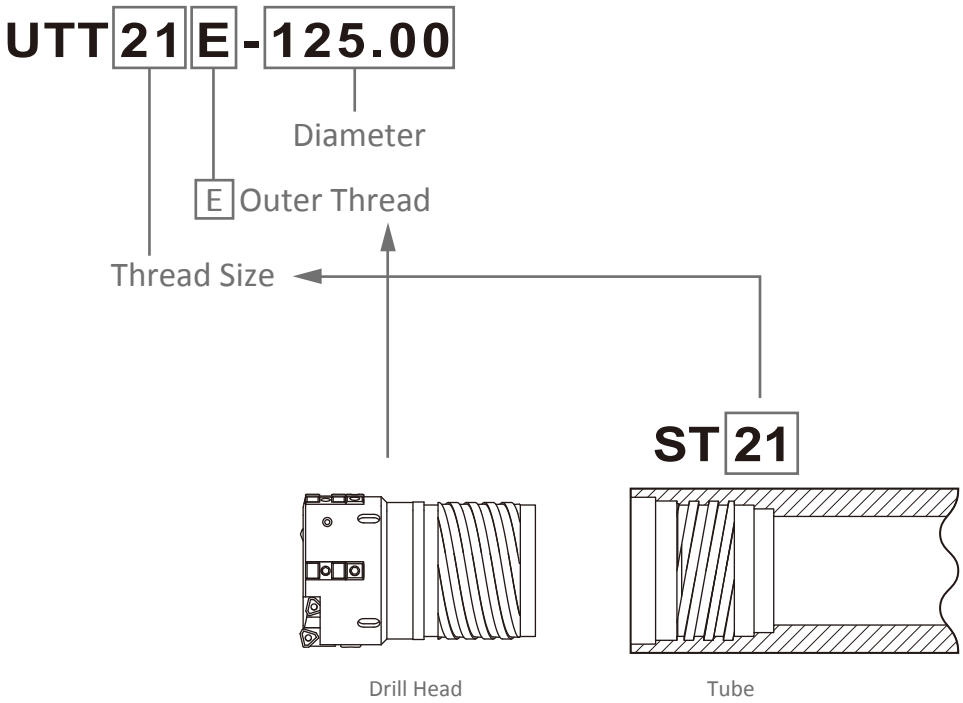
# Order Sheet (Drill Head)

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

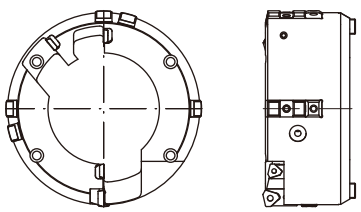
| | |
|---|---|
| Drill Head Dia.(ø) | |
| Drill Tube Dia.(ø) | |
| Drill Head code | |
| Quantity | |
| Request Delivery Date | |

Ordering example:
for drill head dia.ø125.00 ／ STS outer thread UTT21E-125.00

CHECK! ☐ Thread size




Flange type also available upon request. Please contact us for more details.



# 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** | **MBU** |  | 8.00 - 14.79 | IT9 | 2μm | Brazed Tips | • Higher productivity and better surface finish than gundrill<br>• Good chip breaking with 3 step cutting edge design |
| | **UTE** |  | 12.60 - 20.00 | IT9 | 2μm | | • Higher productivity and better surface finish than gundrill<br>• Good chip breaking with 3 step cutting edge design<br>• First recommendation for dia ø12.60 - 15.59mm |
| | **BTU** |  | 12.60 - 65.00 | IT9 | 2μm | | • First recommendation for dia ø15.60 or more<br>• Good chip breaking with 3 cutting edges (ø12.60 - 15.59mm has 2 cutting edges)<br>• Covers all materials with various carbide grade combinations |
| | **KUSTS** |  | 38.00 - 247.99 | IT10 | 3μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |
| | **0124** |  | 30.00 - 65.00 | IT11 | 3μm | | • Direct mount type - No diameter setting necessary<br>• Improved productivity and safety in deep hole drilling |
| **Inner Thread** | **KUSTS** |  | 38.00 - 245.99 | IT10 | 3μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |
| | **0124** |  | 30.00 - 65.00 | IT11 | 3μm | | • Direct mount type - No diameter setting necessary<br>• Improved productivity and safety in deep hole drilling |

### Counterboring

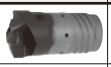
| Thread Type | Code | Appearance | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture | Feature |
|---|---|---|---|---|---|---|---|
| **Outer Thread** | **KUSTR** |  | 25.00 - 291.99 | IT10 | 1-2μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |
| **Inner Thread** | **KUSTR** |  | 25.00 - 293.99 | IT10 | 1-2μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |

### Trepanning

| Thread Type | Code | Appearance | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture | Feature |
|---|---|---|---|---|---|---|---|
| **Outer Thread** | **UTT** |  | 100.00 - 328.00 | IT10 | 1-2μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |
| **Inner Thread** | **UTT** |  | 100.00 - 305.99 | IT10 | 1-2μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |

## DTS Double Tube System

### Solid Drilling

| Thread Type | Code | Appearance | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture | Feature |
|---|---|---|---|---|---|---|---|
| **Outer Thread** | **ETU** |  | 18.40 - 65.00 | IT9 | 2μm | Brazed Tips | • Good chip breaking with 3 cutting edges<br>• Covers all materials with various carbide grade combinations |
| | **KUDTS** |  | 38.00 - 183.99 | IT10 | 3μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |
| | **0124** |  | 30.00 - 65.00 | IT11 | 3μm | | • Direct mount type - No diameter setting necessary<br>• Improved productivity and safety in deep hole drilling |

### Counterboring

| Thread Type | Code | Appearance | Diameter Range (mm) | Hole Tolerance | Surface Finish(Ra) | Fixture | Feature |
|---|---|---|---|---|---|---|---|
| **Outer Thread** | **KUDTR** |  | 25.00 - 183.99 | IT10 | 1-2μm | Indexable Inserts | • Cartridge type - Diameter finely adjustable<br>• Covers wide application area with various options |

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 temperate 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 griding.
- When brazing the carbide tool materials, use the proper temperature to prevent falling off or breaking of the tip.

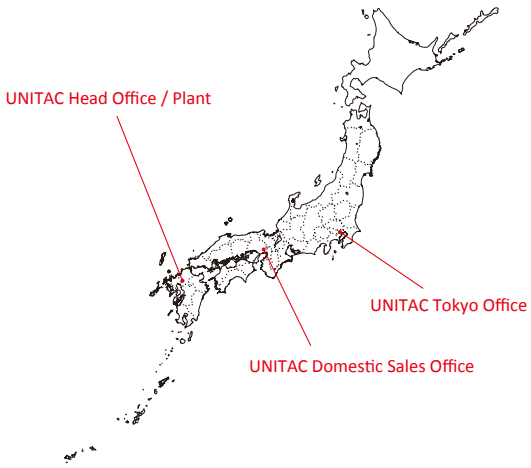
# Precaution for using cutting tools

| 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.




UNITAC
Member IMC Group

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

IMC
INT'L METALWORKING COMPANIES


***Head Office / Kurume Plant*** 3-7-57 MIYANOJIN KURUME FUKUOKA 839-0801
TEL +81-942-33-4159 FAX +81-942-27-9940

***Domestic Sales*** 3-23-21 MINAMIMUKONOSO AMAGASAKI 661-0033
TEL +81-6-6432-8403 FAX +81-6-6432-4091

***Web site*** (English) http://www.unitacinc.com
(Japanese) http://www.unitac.co.jp
E-mail : j-sales@unitac.co.jp


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

CERTIFIED MANAGEMENT SYSTEM JQA ISO 9001
JQA-QM6991
KYUSHU PLANT

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