

# COMBI

**Front and back  
deburring combined  
with drilling and  
countersinking.**

## COMBI Tools

- Introduction
- Tool & Blades
- Programming



**HEULE**

TOOL CORPORATION

CombiCAT.99.06

# Introduction to the COMBI Tool

The COMBI tool is a unique innovation from the leader in front and back deburring tools. Heule has combined proven throw-away style drill inserts with its patented SNAP chamfering system to create a single tool. This tool offers several machining operations in one machine cycle saving time, money, and space.

Simple tools combine the drilling and chamfering operations. More complex tools combine drilling, countersinking, spotfacing, and back chamfering. The compact SNAP system allows for through coolant with any tool.

## Tool Sizes

The throw-away style inserts are available from Ø9.5mm to 35mm (3/8" to 1-3/8"). With back chamfers from 0.75mm x 45° on the smallest tools to 1.5mm x 45° on the larger tools.

Drill inserts are available in three materials which includes cobalt steel, K20 (C2) carbide, and P40 (C5) carbide with various coatings such as TiN, TiCN, and TiAlN.

## Tool Selection

1. The bore diameter determines the tool size and the order number.
2. The chamfer diameter determines the blade size and the blade order number.
3. The material and bore Ø determine the drill insert

**For example:**

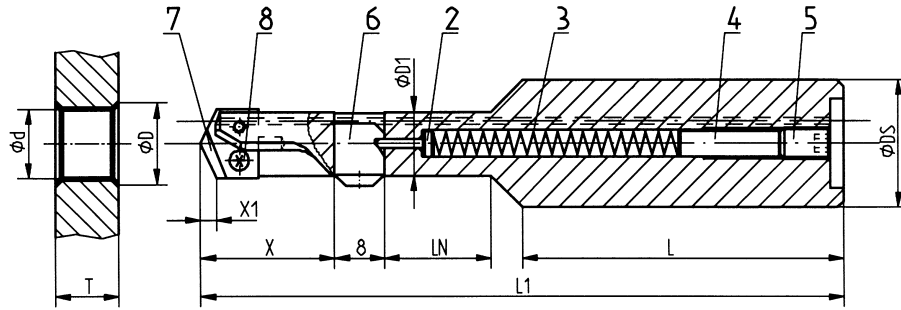
Bore Ød=22mm, Chamfer 0.5 x 45° (ØD=23mm), Material is aluminum.

Tool Order Number: GH-Q-O-3469

Blade Order Number: GH-Q-M-03772

Drill Insert Number: GH-1C21T-22

# COMBI Drill Chamfer Tools Ø9.5-Ø12.0mm



## Spare Parts:

| Pos. | Description              | Order #     |
|------|--------------------------|-------------|
| 2    | Control Bolt, Ø1.5       | GH-Q-E-0002 |
| 3    | Spring, Ø3.7 x Ø0.5 x 48 | GH-H-F-0007 |
| 4    | Distance Pin, Ø4x16      | GH-Q-E-0021 |
| 5    | Set Screw, M5x8, DIN913  | GH-H-S-0119 |

| Pos. | Description                          | Order #     |
|------|--------------------------------------|-------------|
| 6    | Chamfer Insert                       | see below   |
| 7    | Drill Insert                         | See page 8  |
| 8    | Ød=9.5-11.0 Torx Screw, M2.0x4.0 T6  | GH-H-S-0070 |
|      | Ød=11.1-12.0 Torx Screw, M2.0x4.7 T6 | GH-H-S-0071 |

## Complete Tool Holder:

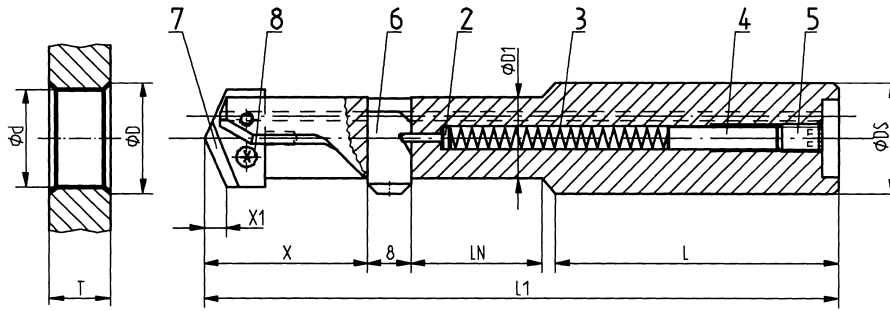
| COMBI Drill-chamfer tools |                  |                     |      |      |      |    |       |     |    | Order Number |                 |
|---------------------------|------------------|---------------------|------|------|------|----|-------|-----|----|--------------|-----------------|
| Bore Depth<br>T           | Bore Range<br>Ød | Chamfer Range<br>ØD | ØD1  | X    | X1   | LN | L1    | ØDS | L  | With Coolant | Without Coolant |
|                           |                  |                     |      |      |      |    |       |     |    | GH-Q-O-      | GH-Q-O-         |
| 12                        | 9.5-10.2         | 10.0-11.5           | 9.4  | 21.3 | 2.30 | 17 | 102.3 | 20  | 50 | <b>3441</b>  | <b>3041</b>     |
| 12                        | 10.2-11.0        | 10.5-12.5           | 10.0 | 21.3 | 2.45 | 17 | 102.3 | 20  | 50 | <b>3445</b>  | <b>3045</b>     |
| 12                        | 11.1-12.0        | 11.5-13.5           | 10.8 | 21.3 | 2.70 | 17 | 102.3 | 20  | 50 | <b>3449</b>  | <b>3049</b>     |

## Chamfer Inserts, Carbide-TiN, 90°

| Bore Range | Max Chamfer | Insert Number |
|------------|-------------|---------------|
| Ød         | ØD          | GH-Q-M        |
| 9.5-10.0   | 10.0        | 03723         |
| 9.5-10.5   | 10.5        | 03724         |
| 9.5-11.0   | 11.0        | 03725         |
| 10.0-11.5  | 11.5        | 03726         |

| Bore Range | Max Chamfer | Insert Number |
|------------|-------------|---------------|
| Ød         | ØD          | GH-Q-M        |
| 10.5-12.0  | 12.0        | 03727         |
| 11.0-12.5  | 12.5        | 03728         |
| 11.5-13.0  | 13.0        | 03729         |
| 12.0-13.5  | 13.5        | 03730         |

# COMBI Drill Chamfer Tools Ø12.0-20.0mm



**Spare Parts:**

| Pos. | Description                      | Order #     |
|------|----------------------------------|-------------|
| 2    | Control Bolt, Ø1.5               | GH-Q-E-0002 |
| 3    | Spring, Ø3.7 x Ø0.5 x 48         | GH-H-F-0007 |
| 4    | Ød=12.0-12.9 Distance Pin, Ø4x16 | GH-Q-E-0021 |
|      | Ød=13.0-15.0 Distance Pin, Ø4x16 | GH-Q-E-0021 |
|      | Ød=15.0-17.6 Distance Pin, Ø4x20 | GH-Q-E-0022 |
|      | Ød=17.7-20.0 Distance Pin, Ø4x25 | GH-Q-E-0023 |
| 5    | Set Screw, M5 x 8, DIN913        | GH-H-S-0119 |

| Pos. | Description                           | Order #     |
|------|---------------------------------------|-------------|
| 6    | Chamfer Insert                        | see below   |
| 7    | Drill Insert                          | See page 8  |
| 8    | Ød=12.0-12.9 Torx Screw, M2.0x4.7 T6  | GH-H-S-0071 |
|      | Ød=13.0-15.0 Torx Screw, M2.5x5.6 T7  | GH-H-S-0066 |
|      | Ød=15.0-17.8 Torx Screw, M2.5x6.75 T7 | GH-H-S-0067 |
|      | Ød=17.8-20.0 Torx Screw, M3.0x7.5 T9  | GH-H-S-0068 |

**Complete Tool Holder:**

| COMBI Drill-chamfer tools |                  |                     |      |      |     |    |       |     |    | Order Number |                 |
|---------------------------|------------------|---------------------|------|------|-----|----|-------|-----|----|--------------|-----------------|
| Bore Depth<br>T           | Bore Range<br>Ød | Chamfer Range<br>ØD | ØD1  | X    | X1  | LN | L1    | ØDS | L  | With Coolant | Without Coolant |
|                           |                  |                     |      |      |     |    |       |     |    | GH-Q-O       | GH-Q-O          |
| 14                        | 12.0-12.9        | 12.5-15.0           | 11.8 | 24.3 | 2.9 | 18 | 104.8 | 20  | 50 | <b>3453</b>  | <b>3053</b>     |
| 16                        | 13.0-15.0        | 13.5-17.0           | 12.8 | 26.8 | 3.3 | 18 | 107.3 |     |    | <b>3457</b>  | <b>3057</b>     |
| 18                        | 15.0-17.6        | 15.5-19.5           | 14.8 | 29.8 | 4.0 | 24 | 115.8 |     |    | <b>3461</b>  | <b>3061</b>     |
| 20                        | 17.7-20.0        | 19.5-22.0           | 17.5 | 34.6 | 4.4 | 22 | 125.6 | 25  | 56 | <b>3465</b>  | <b>3065</b>     |

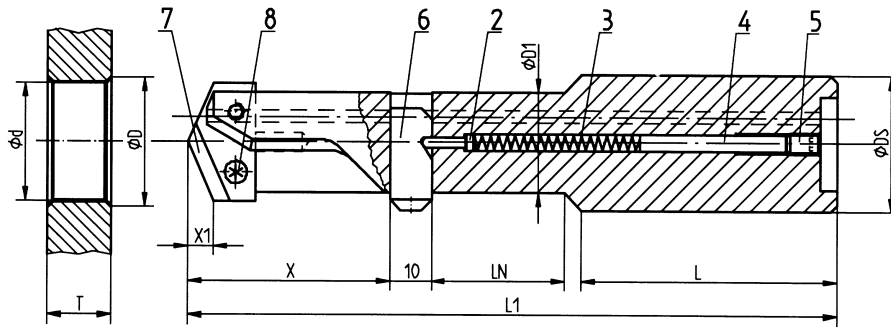
**Chamfer Inserts, Carbide-TiN, 90°**

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 12.0-12.5        | 12.5              | 03740                   |
| 12.0-13.0        | 13.0              | 03741                   |
| 12.0-13.5        | 13.5              | 03742                   |
| 12.0-14.0        | 14.0              | 03743                   |
| 12.5-14.5        | 14.5              | 03744                   |
| 13.0-15.0        | 15.0              | 03745                   |
| 13.5-15.5        | 15.5              | 03746                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 14.0-16.0        | 16.0              | 03747                   |
| 14.5-16.5        | 16.5              | 03748                   |
| 15.0-17.0        | 17.0              | 03749                   |
| 15.5-17.5        | 17.5              | 03750                   |
| 16.0-18.0        | 18.0              | 03751                   |
| 16.5-18.5        | 18.5              | 03752                   |
| 17.0-19.0        | 19.0              | 03753                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 17.5-19.5        | 19.5              | 03754                   |
| 18.0-20.0        | 20.0              | 03755                   |
| 18.5-20.5        | 20.5              | 03756                   |
| 19.0-21.0        | 21.0              | 03757                   |
| 19.5-21.5        | 21.5              | 03758                   |
| 20.0-22.0        | 22.0              | 03759                   |

# COMBI Drill Chamfer Tools Ø20.0-35.0mm



**Spare Parts:**

| Pos. | Description                      | Order #     |
|------|----------------------------------|-------------|
| 2    | Control Bolt, Ø2.5               | GH-Q-E-0003 |
| 3    | Spring, Ø4.3 x Ø0.6 x 52         | GH-H-F-0011 |
| 4    | Ød=20.0-24.3 Distance Pin, Ø4x25 | GH-Q-E-0023 |
|      | Ød=24.4-30.0 Distance Pin, Ø4x35 | GH-Q-E-0025 |
|      | Ød=30.0-35.0 Distance Pin, Ø4x40 | GH-Q-E-0026 |

| Pos. | Description                           | Order #     |
|------|---------------------------------------|-------------|
| 5    | Set Screw, M5x8, DIN913               | GH-H-S-0119 |
| 6    | Chamfer Insert                        | see below   |
| 7    | Drill Insert                          | See page 8  |
| 8    | Ød=20.0-24.0 Torx Screw, M3.0x9.0 T9  | GH-H-S-0069 |
|      | Ød=24.0-35.0 Torx Screw, M4.0x9.5 T15 | GH-H-S-0072 |

**Complete Tool Holder:**

| COMBI Drill-chamfer tools |                  |                     |      |      |     |      |       |     |    | Order Number |                 |
|---------------------------|------------------|---------------------|------|------|-----|------|-------|-----|----|--------------|-----------------|
| Bore Depth<br>T           | Bore Range<br>Ød | Chamfer Range<br>ØD | ØD1  | X    | X1  | LN   | L1    | ØDS | L  | With Coolant | Without Coolant |
|                           |                  |                     |      |      |     |      |       |     |    | GH-Q-O       | GH-Q-O          |
| 24                        | 20.0-24.3        | 21.0-27.0           | 19.8 | 39.6 | 5.3 | 28.0 | 136.6 | 25  | 56 | 3469         | 3069            |
| 30                        | 24.4-30.0        | 25.0-33.0           | 24.2 | 48.6 | 6.6 | 32   | 155.6 | 32  | 60 | 3473         | 3073            |
| 38                        | 30.0-35.0        | 31.0-38.0           | 29.8 | 59.6 | 7.8 | 40.0 | 171.6 |     |    | 3477         | 3077            |

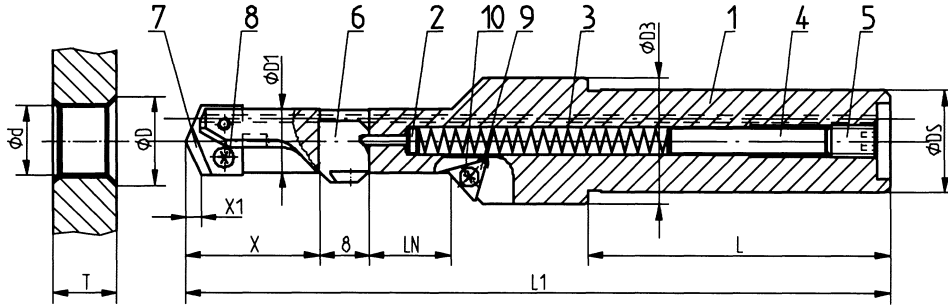
**Chamfer Inserts, Carbide-TiN, 90°**

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 18.0-21.0        | 21.0              | 03770                   |
| 19.0-22.0        | 22.0              | 03771                   |
| 20.0-23.0        | 23.0              | 03772                   |
| 21.0-24.0        | 24.0              | 03773                   |
| 22.0-25.0        | 25.0              | 03774                   |
| 23.0-26.0        | 26.0              | 03775                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 24.0-27.0        | 27.0              | 03776                   |
| 25.0-28.0        | 28.0              | 03777                   |
| 26.0-29.0        | 29.0              | 03778                   |
| 27.0-30.0        | 30.0              | 03779                   |
| 28.0-31.0        | 31.0              | 03780                   |
| 29.0-32.0        | 32.0              | 03781                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 30.0-33.0        | 33.0              | 03782                   |
| 31.0-34.0        | 34.0              | 03783                   |
| 32.0-35.0        | 35.0              | 03784                   |
| 33.0-35.0        | 36.0              | 03785                   |
| 34.0-35.0        | 37.0              | 03786                   |
| 35.0             | 38.0              | 03787                   |

# COMBI Drill Countersink Chamfer Ø9.5-12



**Spare Parts:**

| Pos. | Description              | Order #     |
|------|--------------------------|-------------|
| 2    | Control Bolt, Ø1.5       | GH-Q-E-0002 |
| 3    | Spring, Ø3.7 x Ø0.5 x 48 | GH-H-F-0007 |
| 4    | Distance Pin, Ø4x25      | GH-Q-E-0023 |
| 5    | Set Screw, M5x8, DIN913  | GH-H-S-0119 |
| 6    | Chamfer Insert           | see below   |

| Pos. | Description                         | Order #     |
|------|-------------------------------------|-------------|
| 7    | Drill Insert                        | See page 8  |
| 8    | Ød=9.5-11.0 Torx Screw, M2.0x4.0 T6 | GH-H-S-0070 |
|      | Ød=11.1-12.0 Torx Screw, M2.0x.7 T6 | GH-H-S-0071 |
| 9    | Indexable Insert                    | see below   |
| 10   | Torx Screw, M2.0x3.8 T6             | GH-H-S-2000 |

**Complete Tool Holder:**

| COMBI Drill-chamfer tools |           |           |      |      |      |      |       |     |    | Order Number |                 |
|---------------------------|-----------|-----------|------|------|------|------|-------|-----|----|--------------|-----------------|
| Bore                      | Bore      | Chamfer   |      |      |      |      |       |     |    | With Coolant | Without Coolant |
| T                         | Ød        | ØD        | ØD1  | X    | X1   | LN   | L1    | ØDS | L  | GH-Q-O-      | GH-Q-O-         |
| 12                        | 9.5-10.2  | 10.0-11.5 | 9.4  | 21.3 | 2.30 | 12.8 | 112.3 | 16  | 48 | <b>3641</b>  | <b>3241</b>     |
| 12                        | 10.2-11.0 | 10.5-12.5 | 10.0 | 21.3 | 2.45 | 13.0 | 112.3 |     |    | <b>3645</b>  | <b>3245</b>     |
| 12                        | 11.1-12.0 | 11.5-13.5 | 10.8 | 21.3 | 2.70 | 14.2 | 112.3 |     |    | <b>3649</b>  | <b>3249</b>     |

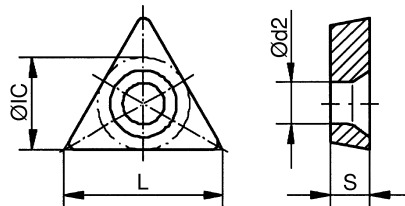
**Chamfer Inserts, Carbide-TiN, 90°**

| Bore Range | Max Chamfer | Insert Number |
|------------|-------------|---------------|
| Ød         | ØD          | GH-Q-M        |
| 9.5-10.0   | 10.0        | 03723         |
| 9.5-10.5   | 10.5        | 03724         |
| 9.5-11.0   | 11.0        | 03725         |
| 10.0-11.5  | 11.5        | 03726         |

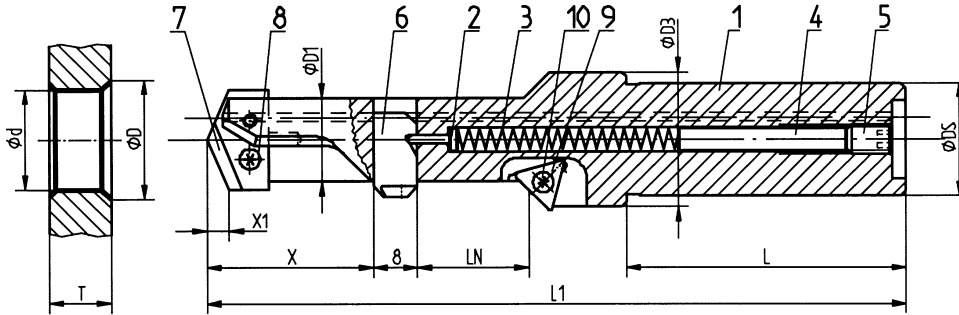
| Bore Range | Max Chamfer | Insert Number |
|------------|-------------|---------------|
| Ød         | ØD          | GH-Q-M        |
| 10.5-12.0  | 12.0        | 03727         |
| 11.0-12.5  | 12.5        | 03728         |
| 11.5-13.0  | 13.0        | 03729         |
| 12.0-13.5  | 13.5        | 03730         |

**Indexable Inserts for Forward Countersinking**

| Bore Range |      |     |      |     | Order Number |         |
|------------|------|-----|------|-----|--------------|---------|
| Ød         | ØIC  | L   | S    | Ød2 | Cermet       | Carbide |
| 9.5-11.9   | 3.97 | 6.8 | 1.59 | 2.2 | GH-H-P-0131  | N+A     |



# COMBI Drill Countersink Chamfer Ø12-20



## Spare Parts:

| Pos. | Description                      | Order #     |
|------|----------------------------------|-------------|
| 2    | Control Bolt, Ø1.5               | GH-Q-E-0002 |
| 3    | Spring, Ø3.7 x Ø0.5 x 48         | GH-H-F-0007 |
| 4    | Ød=12.0-12.9 Distance Pin, Ø4x30 | GH-Q-E-0024 |
|      | Ød=13.0-15.0 Distance Pin, Ø4x30 | GH-Q-E-0024 |
|      | Ød=15.0-17.6 Distance Pin, Ø4x30 | GH-Q-E-0024 |
|      | Ød=17.7-20.0 Distance Pin, Ø4x40 | GH-Q-E-0026 |
| 5    | Set Screw, M5 x 8, DIN913        | GH-H-S-0119 |
| 6    | Chamfer Insert                   | see below   |

| Pos. | Description                           | Order #     |
|------|---------------------------------------|-------------|
| 7    | Drill Insert                          | see page 8  |
| 8    | Ød=12.0-12.9 Torx Screw, M2.0x4.7 T6  | GH-H-S-0071 |
|      | Ød=13.0-15.0 Torx Screw, M2.5x5.6 T7  | GH-H-S-0066 |
|      | Ød=15.0-17.8 Torx Screw, M2.5x6.75 T7 | GH-H-S-0067 |
|      | Ød=17.8-20.0 Torx Screw, M3.0x7.5 T9  | GH-H-S-0068 |
| 9    | Indexable Insert                      | see below   |
| 10   | Ød=12.0-15.0 Torx Screw, M2.0x5.5 T6  | GH-H-S-0050 |
|      | Ød=15.0-20.0 Torx Screw, M2.5x5.5 T7  | GH-H-S-0051 |

## Complete Tool Holder:

| COMBI Drill-chamfer tools |                  |                     |      |      |     |      |       |     |     |    | Order Number |                 |
|---------------------------|------------------|---------------------|------|------|-----|------|-------|-----|-----|----|--------------|-----------------|
| Bore Depth<br>T           | Bore Range<br>Ød | Chamfer Range<br>ØD | ØD1  | X    | X1  | LN   | L1    | ØD3 | ØDS | L  | With Coolant | Without Coolant |
|                           |                  |                     |      |      |     |      |       |     |     |    | GH-Q-O       | GH-Q-O          |
| 14                        | 12.0-12.9        | 12.5-15.0           | 11.8 | 24.3 | 2.9 | 15   | 119.8 | 24  | 20  | 50 | <b>3653</b>  | <b>3253</b>     |
| 16                        | 13.0-15.0        | 13.5-17.0           | 12.8 | 26.8 | 3.3 | 17   | 122.3 |     |     |    | <b>3657</b>  | <b>3257</b>     |
| 18                        | 15.0-17.6        | 15.5-19.5           | 14.8 | 29.8 | 4.0 | 20   | 125.3 |     |     |    | <b>3661</b>  | <b>3261</b>     |
| 20                        | 17.7-20.0        | 19.5-22.0           | 17.5 | 34.6 | 4.4 | 22.5 | 140.6 | 28  | 25  | 56 | <b>3665</b>  | <b>3265</b>     |

## Chamfer Inserts, Carbide-TiN, 90°

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 12.0-12.5        | 12.5              | 03740                   |
| 12.0-13.0        | 13.0              | 03741                   |
| 12.0-13.5        | 13.5              | 03742                   |
| 12.0-14.0        | 14.0              | 03743                   |
| 12.5-14.5        | 14.5              | 03744                   |
| 13.0-15.0        | 15.0              | 03745                   |
| 13.5-15.5        | 15.5              | 03746                   |

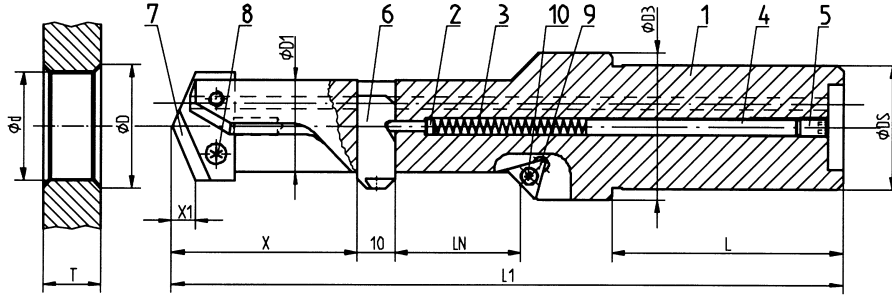
| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 14.0-16.0        | 16.0              | 03747                   |
| 14.5-16.5        | 16.5              | 03748                   |
| 15.0-17.0        | 17.0              | 03749                   |
| 15.5-17.5        | 17.5              | 03750                   |
| 16.0-18.0        | 18.0              | 03751                   |
| 16.5-18.5        | 18.5              | 03752                   |
| 17.0-19.0        | 19.0              | 03753                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 17.5-19.5        | 19.5              | 03754                   |
| 18.0-20.0        | 20.0              | 03755                   |
| 18.5-20.5        | 20.5              | 03756                   |
| 19.0-21.0        | 21.0              | 03757                   |
| 19.5-21.5        | 21.5              | 03758                   |
| 20.0-22.0        | 22.0              | 03759                   |

## Indexable Inserts for Forward Countersinking

| Bore Range |      |      |      |     | Order Number |             |
|------------|------|------|------|-----|--------------|-------------|
| Ød         | ØIC  | L    | S    | Ød2 | Cermet       | Carbide-TiN |
| 12.0-14.9  | 5.56 | 9.6  | 2.38 | 2.5 | GH-H-P-0132  | GH-H-P-0128 |
| 15.0-19.9  | 6.35 | 11.0 | 2.38 | 2.8 | GH-H-P-0133  | GH-H-P-0130 |

# COMBI Drill Countersink Chamfer Ø20-35



**Spare Parts:**

| Pos. | Description                      | Order #     |
|------|----------------------------------|-------------|
| 2    | Control Bolt, Ø2.5               | GH-Q-E-0003 |
| 3    | Spring, Ø4.3 x Ø0.6 x 52         | GH-H-F-0011 |
| 4    | Ød=20.0-24.3 Distance Pin, Ø4x40 | GH-Q-E-0026 |
|      | Ød=24.4-30.0 Distance Pin        | GH-Q-E-0029 |
|      | Ød=30.0-35.0 Distance Pin        | GH-Q-E-0030 |

| Pos. | Description                           | Order #     |
|------|---------------------------------------|-------------|
| 5    | Set Screw, M5x8, DIN913               | GH-H-S-0119 |
| 6    | Chamfer Insert                        | see below   |
| 7    | Drill Insert                          | see page 8  |
| 8    | Ød=20.0-24.0 Torx Screw, M3.0x9.0 T9  | GH-H-S-0069 |
|      | Ød=24.0-35.0 Torx Screw, M4.0x9.5 T15 | GH-H-S-0072 |

**Complete Tool Holder:**

| COMBI Drill-chamfer tools |                  |                     |      |      |     |      |       |     |     |    | Order Number |                 |
|---------------------------|------------------|---------------------|------|------|-----|------|-------|-----|-----|----|--------------|-----------------|
| Bore Depth<br>T           | Bore Range<br>Ød | Chamfer Range<br>ØD | ØD1  | X    | X1  | LN   | L1    | ØD3 | ØDS | L  | With Coolant | Without Coolant |
|                           |                  |                     |      |      |     |      |       |     |     |    | GH-Q-O       | GH-Q-O          |
| 24                        | 20.0-24.3        | 21.0-27.0           | 19.8 | 39.6 | 5.3 | 27.0 | 136.6 | 30  | 25  | 56 | <b>3669</b>  | <b>3269</b>     |
| 30                        | 24.4-30.0        | 25.0-33.0           | 24.2 | 48.6 | 6.6 | 32   | 155.6 | 38  |     |    | <b>3673</b>  | <b>3273</b>     |
| 38                        | 30.0-35.0        | 31.0-38.0           | 29.8 | 59.6 | 7.8 | 40.0 | 171.6 | 42  | 32  | 60 | <b>3677</b>  | <b>3277</b>     |

**Chamfer Inserts, Carbide-TiN, 90°**

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 18.0-21.0        | 21.0              | 03770                   |
| 19.0-22.0        | 22.0              | 03771                   |
| 20.0-23.0        | 23.0              | 03772                   |
| 21.0-24.0        | 24.0              | 03773                   |
| 22.0-25.0        | 25.0              | 03774                   |
| 23.0-26.0        | 26.0              | 03775                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 24.0-27.0        | 27.0              | 03776                   |
| 25.0-28.0        | 28.0              | 03777                   |
| 26.0-29.0        | 29.0              | 03778                   |
| 27.0-30.0        | 30.0              | 03779                   |
| 28.0-31.0        | 31.0              | 03780                   |
| 29.0-32.0        | 32.0              | 03781                   |

| Bore Range<br>Ød | Max Chamfer<br>ØD | Insert Number<br>GH-Q-M |
|------------------|-------------------|-------------------------|
| 30.0-33.0        | 33.0              | 03782                   |
| 31.0-34.0        | 34.0              | 03783                   |
| 32.0-35.0        | 35.0              | 03784                   |
| 33.0-35.0        | 36.0              | 03785                   |
| 34.0-35.0        | 37.0              | 03786                   |
| 35.0             | 38.0              | 03787                   |

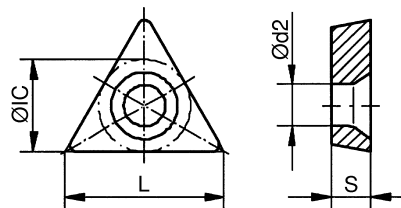
**Indexable Inserts for Forward Countersinking**

| Bore Range |      |      |      |     | Order Number |             |
|------------|------|------|------|-----|--------------|-------------|
| Ød         | ØIC  | L    | S    | Ød2 | Cer0et       | Carbide-TiN |
| 20.0-35.0  | 6.35 | 11.0 | 2.38 | 2.8 | GH-H-P-0133  | GH-H-P-0130 |

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# Selection of Drill Inserts

## Cutting Material

| Material         | Designation |
|------------------|-------------|
| HSS              | 15          |
| Carbide C2 (K20) | C2          |
| Carbide C5 (P40) | C5          |

## Series Designation

The series number is determined by the bore diameter. The series number effects the drill blade as well as the tork screws for securing the drill blades. Drilling inserts of different diameters can be interchanged within the same series.

| Bore Range | Series |
|------------|--------|
| 9.5-11.0   | Y      |
| 11.1-12.9  | Z      |
| 13.0-17.6  | 0      |
| 17.7-24.3  | 1      |
| 24.4-35.0  | 2      |

## Coatings

| Coating | Designation |
|---------|-------------|
| TiN     | T           |
| TiCN    | N           |
| TiAlN   | A           |

## Torx-Screws for spade Drill Inserts

| Bore Ø    | Description    | Order Number |
|-----------|----------------|--------------|
| 9.5-11.0  | M2 4.0 T6      | GH-H-S-0070  |
| 11.1-12.9 | M2 x 4.7 T6    | GH-H-S-0071  |
| 13.0-14.9 | M2.5 x 5.6 T7  | GH-H-S-0066  |
| 15.0-17.6 | M2.5 x 6.75 T7 | GH-H-S-0067  |
| 17.7-19.9 | M3 x 7.5 T9    | GH-H-S-0068  |
| 20.0-24.3 | M3 x 9.0 T9    | GH-H-S-0069  |
| 24.4-35.0 | M4 x 9.5 T15   | GH-H-S-0072  |

# Spade Drill Inserts

## Order Number Example

Application requires drilling a Ø15.5mm bore in cast iron part with a carbide-TiN insert.

### GH - C2 O T - 15.5

- GH- prefix for all order numbers
- C2 choice of carbide for cast iron
- O Series designation for bore diameter
- T designation for TiN coating
- 15.5 specification of the bore diameter

## Reccomendations

If concerned about tool operation use HSS drill inserts. HSS-TiN offers the following advantages:

- Higher toughness.
- Longer tool life with the TiN coating.
- HSS-TiN is universally applicable.

# Feed and Speed

## HSS Drill Inserts

|                      | Brinell | HSS-     |        | Feed (IPR)             |                     |                     |                       |
|----------------------|---------|----------|--------|------------------------|---------------------|---------------------|-----------------------|
|                      |         | ft / min | ft/min | 9.5-12.5<br>.375".492" | 13-17<br>.512".670" | 18-24<br>.709".945" | 25-35<br>.984".1.378" |
| Free Machining Steel | 100-150 | 200      | 280    | .007                   | .010                | .013                | .016                  |
|                      | 150-200 | 180      | 260    | .007                   | .010                | .013                | .016                  |
|                      | 200-250 | 160      | 240    | .006                   | .010                | .013                | .016                  |
| Low Carbon Steel     | 85-125  | 170      | 250    | .006                   | .009                | .012                | .015                  |
|                      | 125-175 | 160      | 240    | .006                   | .009                | .012                | .015                  |
|                      | 175-225 | 150      | 225    | .005                   | .008                | .010                | .014                  |
| Medium carbon steel  | 125-175 | 160      | 240    | .006                   | .009                | .012                | .015                  |
|                      | 175-225 | 150      | 225    | .005                   | .008                | .010                | .014                  |
|                      | 225-275 | 140      | 210    | .005                   | .008                | .010                | .014                  |
| Alloy Steel          | 125-175 | 150      | 225    | .006                   | .008                | .010                | .014                  |
|                      | 175-225 | 140      | 210    | .005                   | .008                | .010                | .014                  |
|                      | 225-275 | 130      | 180    | .005                   | .007                | .010                | .014                  |
| High strength alloy  | 225-300 | 80       | 110    | .005                   | .007                | .009                | .010                  |
|                      | 300-350 | 60       | 85     | .004                   | .007                | .009                | .010                  |
| structural steel     | 100-150 | 140      | 210    | .006                   | .010                | .012                | .014                  |
|                      | 150-250 | 120      | 170    | .005                   | .009                | .010                | .012                  |
| high temp alloy      | 140-220 | 30       | 40     | .003                   | .007                | .008                | .010                  |
|                      | 220-310 | 25       | 35     | .003                   | .006                | .007                | .008                  |
| Stainless Steel      | 135-185 | 75       | 105    | .006                   | .008                | .009                | .011                  |
|                      | 185-275 | 60       | 90     | .005                   | .007                | .008                | .010                  |
| Tool Steel           | 150-200 | 80       | 110    | .004                   | .006                | .008                | .010                  |
|                      | 200-250 | 60       | 90     | .004                   | .006                | .008                | .010                  |
| Aluminum             | 30      | 600      | 850    | .008                   | .013                | .016                | .020                  |
|                      | 180     | 300      | 450    | .008                   | .013                | .016                | .018                  |
| Cast Iron            | 120-150 | 170      | 250    | .007                   | .012                | .016                | .020                  |
|                      | 150-200 | 150      | 225    | .006                   | .011                | .014                | .018                  |
|                      | 200-220 | 130      | 195    | .006                   | .009                | .012                | .016                  |

### SNAP Chamfer Inserts

| Material              | IPR         | SFM     |
|-----------------------|-------------|---------|
| Aluminum              | 0.006-0.012 | 210-400 |
| Brass                 | 0.006-0.014 | 210-400 |
| Low Carbon Steels     | 0.004-0.008 | 150-210 |
| Med Carbon Steels     | 0.004-0.009 | 130-180 |
| Free Machining Alloys | 0.004-0.006 | 100-160 |

# Feed and Speed

## Carbide Drill Inserts

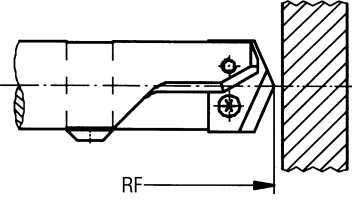
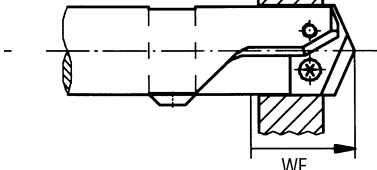
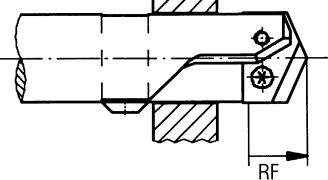
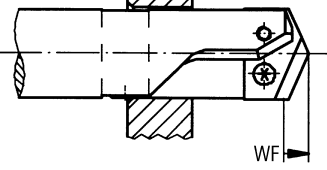
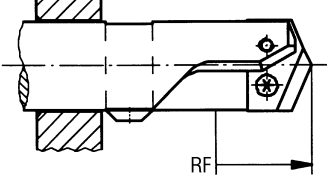
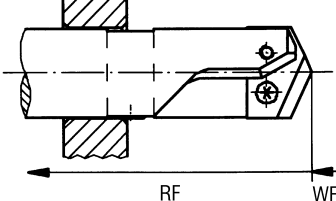
|                      | Brinell Hardness              | Carbide Grade | Feed (IPR)<br>Bore Size, Ød |                      |                      |                      |                      |
|----------------------|-------------------------------|---------------|-----------------------------|----------------------|----------------------|----------------------|----------------------|
|                      |                               |               | TiN                         | ft/min               | 9.5-12.5             | 13-17                | 18-24                |
| Free Machining Steel | 100-150<br>150-200<br>200-250 | C5            | 320<br>280<br>260           | .006<br>.006<br>.005 | .009<br>.008<br>.008 | .012<br>.011<br>.010 | .015<br>.013<br>.012 |
| Low Carbon Steel     | 85-125<br>125-175<br>175-225  | C5            | 300<br>260<br>240           | .006<br>.005<br>.004 | .008<br>.008<br>.007 | .010<br>.010<br>.008 | .014<br>.014<br>.012 |
| Medium carbon steel  | 125-175<br>175-225<br>225-275 | C5            | 260<br>240<br>220           | .005<br>.005<br>.004 | .008<br>.007<br>.007 | .010<br>.008<br>.008 | .014<br>.012<br>.012 |
| Alloy Steel          | 125-175<br>175-225<br>225-275 | C5            | 250<br>230<br>210           | .005<br>.005<br>.004 | .008<br>.007<br>.007 | .010<br>.009<br>.009 | .013<br>.012<br>.012 |
| High strength alloy  | 225-300<br>300-350            | C5            | 160<br>140                  | .005<br>.004         | .007<br>.006         | .008<br>.007         | .010<br>.009         |
| structural steel     | 100-150<br>150-250            | C5            | 240<br>200                  | .006<br>.005         | .010<br>.008         | .011<br>.009         | .012<br>.011         |
| high temp alloy      | 140-220<br>220-310            | C2            | 80<br>60                    | .003<br>.003         | .006<br>.005         | .007<br>.006         | .009<br>.008         |
| Stainless Steel      | 135-185<br>185-275            | C2            | 160<br>120                  | .006<br>.005         | .008<br>.007         | .009<br>.008         | .011<br>.010         |
| Tool Steel           | 150-200<br>200-250            | C5            | 160<br>120                  | .003<br>.003         | .005<br>.005         | .007<br>.007         | .009<br>.009         |
| Aluminum             | 30<br>180                     | C2            | 1200<br>800                 | .008<br>.007         | .013<br>.011         | .016<br>.014         | .020<br>.018         |
| Cast Iron            | 120-150<br>150-200<br>200-220 | C2            | 320<br>270<br>240           | .006<br>.005<br>.005 | .009<br>.008<br>.007 | .011<br>.010<br>.008 | .015<br>.014<br>.012 |

## SNAP Chamfer Inserts (cont.)

| Material            | IPR         | SFM     |
|---------------------|-------------|---------|
| Stainless Steels    | 0.002-0.005 | 90-140  |
| Gray Cast Iron      | 0.004-0.008 | 150-220 |
| Nodular Cast Iron   | 0.003-0.007 | 150-220 |
| Short Chipping Iron | 0.003-0.007 | 100-150 |
| Nickel Based Alloys | 0.001-0.003 | 20-50   |

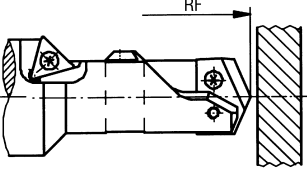
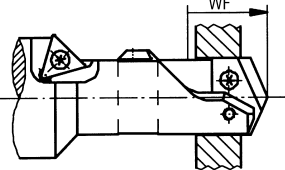
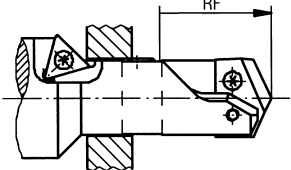
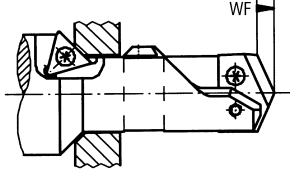
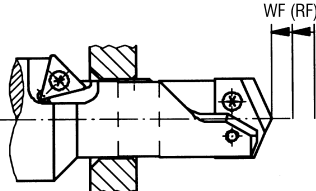
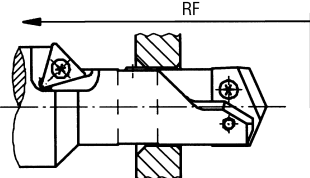
# Programming Instructions

## Drill Chamfer Tool

|   |  |
|---|--|
|    | <p>Step 1.<br/>In Rapid Feed (RF) move the tool to within clearance distance of the workpiece .</p>  |
|    | <p>Step 2.<br/>In forward Working Feed (WF) feed the tool through the workpiece until the hole is drilled and the spade drill insert is clear of the bore.</p>                               |
|   | <p>Step 3.<br/>With rapid feed, move the tool so the SNAP blade is within clearance of the workpiece top surface or burr.</p>  |
|  | <p>Step 4.<br/>With working feed, cut the top chamfer. Continue feeding until the SNAP blade is completely retracted into the tool body.</p>   |
|  | <p>Step 5.<br/>Use rapid feed to position the SNAP blade on the far side of the part. Position the tool so the SNAP blade is completely extended and clear of the part or burr.</p>          |
|  | <p>Step 6.<br/>With back working feed, cut the back chamfer. When the SNAP blade is completely within the tool and clear of the back surface, the tool can be extracted with rapid feed.</p> |

# Drill Countersink Chamfer Tool

# Programming Instructions

|   |   |
|---|---|
|    | <p>Step 1.<br/>In Rapid Feed (RF) move the tool to within clearance distance of the workpiece .</p>   |
|    | <p>Step 2.<br/>In forward Working Feed (WF) feed the tool through the workpiece until the hole is drilled and the spade drill insert is clear of the bore.</p>  |
|   | <p>Step 3.<br/>With rapid feed, move the tool so the indexable insert is within clearance distance of the top of the workpiece or burr.</p>   |
|  | <p>Step 4.<br/>With working feed, cut the top countersink. Continue feeding until the required countersink size is achieved.</p>  |
|  | <p>Step 5.<br/>If necessary, use rapid backward feed to position the SNAP insert within clearance distance of the back surface of the workpiece or burr. The back chamfer can then be cut in working backward feed.</p> |
|  | <p>Step 6.<br/>When the SNAP insert is clear of the back surface and completely retracted in the tool body the tool can be retracted from the workpiece using rapid backward feed.</p>                                  |

**Represented By:**

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