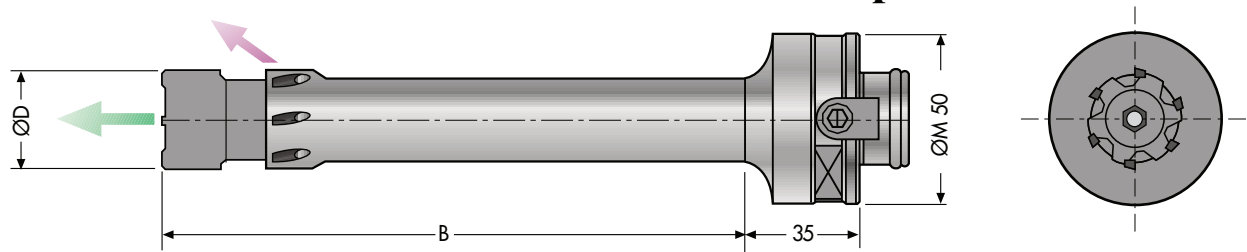


HEADS MANDRELS

Series 7000-MM with Modular Composit shank



| Mandrel code without head & screw | ØD mm | B mm | Locking screw fixed heads | | Locking screw expanding heads | |
|-----------------------------------|---------------|------|---------------------------|-------------|-------------------------------|-------------|
| | | | Through holes | Blind holes | Through holes | Blind holes |
| 7000-MM-001 | 11,80 - 12,60 | 65 | 7000-VI-001 | 7001-VI-001 | 7000-VI-012 | 7001-VI-012 |
| | 12,61 - 13,60 | | | | 7000-VI-013 | 7001-VI-013 |
| | 13,61 - 14,60 | | | | 7000-VI-014 | 7001-VI-014 |
| 7000-MM-002 | 14,61 - 15,60 | 80 | 7000-VI-002 | 7001-VI-002 | 7000-VI-015 | 7001-VI-015 |
| | 15,61 - 16,60 | | | | 7000-VI-016 | 7001-VI-016 |
| | 16,61 - 17,60 | | | | 7000-VI-017 | 7001-VI-017 |
| 7000-MM-003 | 17,61 - 18,60 | 90 | 7000-VI-003 | 7001-VI-003 | 7000-VI-018 | 7001-VI-018 |
| | 18,61 - 19,60 | | | | 7000-VI-019 | 7001-VI-019 |
| | 19,61 - 20,60 | | | | 7000-VI-020 | 7001-VI-020 |
| | 20,61 - 21,60 | | | | 7000-VI-021 | 7001-VI-021 |
| 7000-MM-004 | 21,61 - 22,60 | 100 | 7000-VI-004 | 7001-VI-004 | 7000-VI-022 | 7001-VI-022 |
| | 22,61 - 23,60 | | | | 7000-VI-023 | 7001-VI-023 |
| | 23,61 - 24,60 | | | | 7000-VI-024 | 7001-VI-024 |
| | 24,61 - 25,60 | | | | 7000-VI-025 | 7001-VI-025 |
| | 25,61 - 26,60 | | | | 7000-VI-026 | 7001-VI-026 |
| 7000-MM-005 | 26,61 - 27,60 | 110 | 7000-VI-005 | 7001-VI-005 | 7000-VI-027 | 7001-VI-027 |
| | 27,61 - 28,60 | | | | 7000-VI-028 | 7001-VI-028 |
| | 28,61 - 29,60 | | | | 7000-VI-029 | 7001-VI-029 |
| | 29,61 - 30,60 | | | | 7000-VI-030 | 7001-VI-030 |
| | 30,61 - 31,60 | | | | 7000-VI-031 | 7001-VI-031 |
| | 31,61 - 32,60 | | | | 7000-VI-032 | 7001-VI-032 |
| 7000-MM-006 | 32,61 - 33,60 | 120 | 7000-VI-006 | 7001-VI-006 | 7000-VI-033 | 7001-VI-033 |
| | 33,61 - 34,60 | | | | 7000-VI-034 | 7001-VI-034 |
| | 34,61 - 35,60 | | | | 7000-VI-035 | 7001-VI-035 |
| | 35,61 - 36,60 | | | | 7000-VI-036 | 7001-VI-036 |
| | 36,61 - 37,60 | | | | 7000-VI-037 | 7001-VI-037 |
| | 37,61 - 38,60 | | | | 7000-VI-038 | 7001-VI-038 |
| | 38,61 - 39,60 | | | | 7000-VI-039 | 7001-VI-039 |
| | 39,61 - 40,60 | | | | 7000-VI-040 | 7001-VI-040 |
| 7000-MM-007 | 40,61 - 41,60 | 120 | 7000-VI-007 | 7001-VI-007 | 7000-VI-041 | 7001-VI-041 |
| | 41,61 - 42,60 | | | | 7000-VI-042 | 7001-VI-042 |
| | 42,61 - 43,60 | | | | 7000-VI-043 | 7001-VI-043 |
| | 43,61 - 44,60 | | | | 7000-VI-044 | 7001-VI-044 |
| | 44,61 - 45,60 | | | | 7000-VI-045 | 7001-VI-045 |

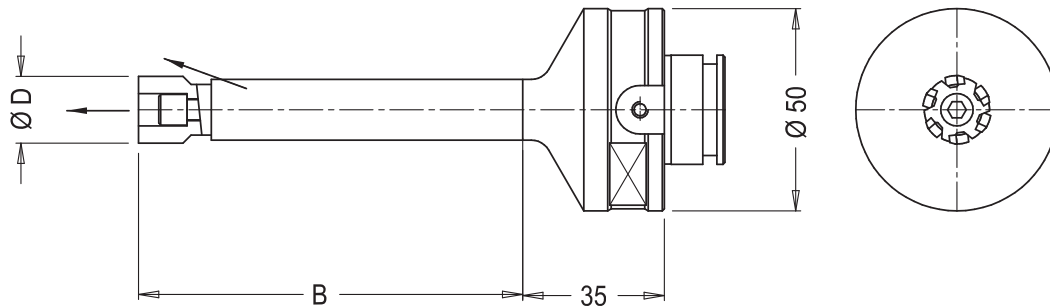
All mandrels are provided with radial through tool coolant.

1st note through hole reaming - order adjustment screw to suit through holes.

2nd note blind hole reaming - order adjustment screw to suit blind holes. That drilled screws allows central through tool coolant.

HEADS MANDRELS MANDRINI PORTA - TESTINE

Series 7000-MM with Modular "Composit" shank Serie 7000-MM con attacco modulare "Composit"



| MANDREL CODE WITHOUT HEAD & SCREW CODICE MANDRINO SENZA TESTINA E VITE | Ø D MM | B MM | LOCKING SCREW FIXED HEADS VITE BLOCCAGGIO TESTINE FISSE | | LOCKING SCREW EXPANDIND HEADS VITE BLOCCAGGIO TESTINE ESPANSIBILI | |
|---|---------------|---------|--|----------------------------|--|----------------------------|
| | | | THROUGH HOLES FORI PASSANTI | BLIND HOLES FORI CIECHI | THROUGH HOLES FORI PASSANTI | BLIND HOLES FORI CIECHI |
| 7000-MM-001 | 11,80 - 12,60 | 65 | 7000-VI-001 | 7001-VI-001 | 7000-VI-012 | 7001-VI-012 |
| | 12,61 - 13,60 | | | | 7000-VI-013 | 7001-VI-013 |
| | 13,61 - 14,60 | | | | 7000-VI-014 | 7001-VI-014 |
| 7000-MM-002 | 14,61 - 15,60 | 80 | 7000-VI-002 | 7001-VI-002 | 7000-VI-015 | 7001-VI-015 |
| | 15,61 - 16,60 | | | | 7000-VI-016 | 7001-VI-016 |
| | 16,61 - 17,60 | | | | 7000-VI-017 | 7001-VI-017 |
| 7000-MM-003 | 17,61 - 18,60 | 90 | 7000-VI-003 | 7001-VI-003 | 7000-VI-018 | 7001-VI-018 |
| | 18,61 - 19,60 | | | | 7000-VI-019 | 7001-VI-019 |
| | 19,61 - 20,60 | | | | 7000-VI-020 | 7001-VI-020 |
| | 20,61 - 21,60 | | | | 7000-VI-021 | 7001-VI-021 |
| 7000-MM-004 | 21,61 - 22,60 | 100 | 7000-VI-004 | 7001-VI-004 | 7000-VI-022 | 7001-VI-022 |
| | 22,61 - 23,60 | | | | 7000-VI-023 | 7001-VI-023 |
| | 23,61 - 24,60 | | | | 7000-VI-024 | 7001-VI-024 |
| | 24,61 - 25,60 | | | | 7000-VI-025 | 7001-VI-025 |
| | 25,61 - 26,60 | | | | 7000-VI-026 | 7001-VI-026 |
| 7000-MM-005 | 26,61 - 27,60 | 110 | 7000-VI-005 | 7001-VI-005 | 7000-VI-027 | 7001-VI-027 |
| | 27,61 - 28,60 | | | | 7000-VI-028 | 7001-VI-028 |
| | 28,61 - 29,60 | | | | 7000-VI-029 | 7001-VI-029 |
| | 29,61 - 30,60 | | | | 7000-VI-030 | 7001-VI-030 |
| | 30,61 - 31,60 | | | | 7000-VI-031 | 7001-VI-031 |
| | 31,61 - 32,60 | | | | 7000-VI-032 | 7001-VI-032 |
| 7000-MM-006 | 32,61 - 33,60 | 120 | 7000-VI-006 | 7001-VI-006 | 7000-VI-033 | 7001-VI-033 |
| | 33,61 - 34,60 | | | | 7000-VI-034 | 7001-VI-034 |
| | 34,61 - 35,60 | | | | 7000-VI-035 | 7001-VI-035 |
| | 35,61 - 36,60 | | | | 7000-VI-036 | 7001-VI-036 |
| | 36,61 - 37,60 | | | | 7000-VI-037 | 7001-VI-037 |
| | 37,61 - 38,60 | | | | 7000-VI-038 | 7001-VI-038 |
| | 38,61 - 39,60 | | | | 7000-VI-039 | 7001-VI-039 |
| | 39,61 - 40,60 | | | | 7000-VI-040 | 7001-VI-040 |
| 7000-MM-007 | 40,61 - 41,60 | 120 | 7000-VI-007 | 7001-VI-007 | 7000-VI-041 | 7001-VI-041 |
| | 41,61 - 42,60 | | | | 7000-VI-042 | 7001-VI-042 |
| | 42,61 - 43,60 | | | | 7000-VI-043 | 7001-VI-043 |
| | 43,61 - 44,60 | | | | 7000-VI-044 | 7001-VI-044 |
| | 44,61 - 45,60 | | | | 7000-VI-045 | 7001-VI-045 |

All mandrels are provided with radial through tool coolant.

1st note through hole reaming - order adjustment screw to suit through holes

2nd note blind hole reaming - order adjustment screw to suit blind holes. That drilled screw allows central through tool coolant.

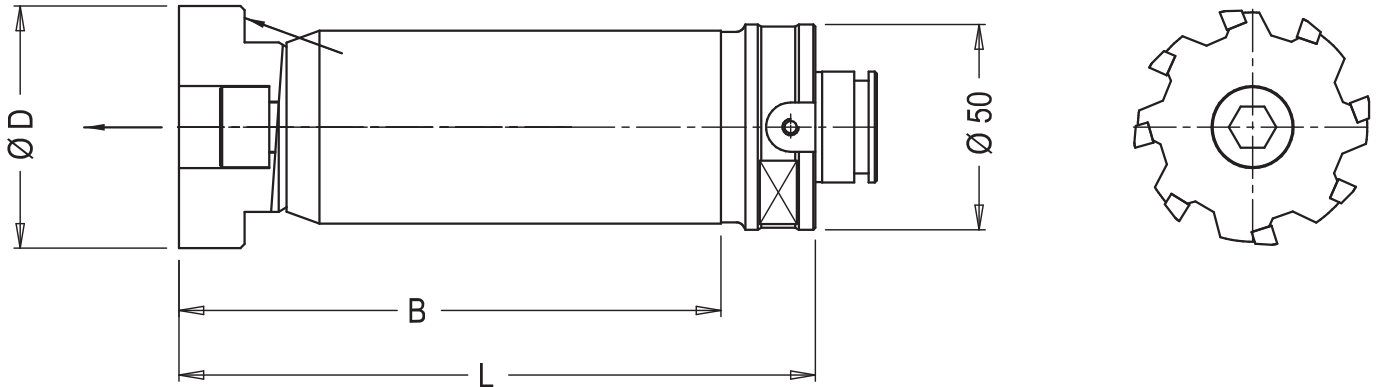
I mandrini sono tutti previsti con adduzione radiale del refrigerante.

nota 1 se si alesava un foro passante, ordinare vite per foro passante.

nota 2 se si alesava un foro cieco, ordinare vite per foro cieco. Tale vite forata, consente la refrigerazione assiale.

HEADS MANDRELS MANDRINI PORTA - TESTINE

**Series 7000-MM with Modular "Composit" shank
Serie 7000-MM con attacco modulare "Composit"**



| MANDREL CODE WITHOUT HEAD & SCREW CODICE MANDRINO SENZA TESTINA E VITE | Ø D MM | B MM | L MM | LOCKING SCREW FIXED HEADS VITE BLOCCAGGIO TESTINE FISSE | | NUMBER OF TEETH NUMERO TAGLIENTI |
|---|--|---------|---------|--|----------------------------|--|
| | | | | THROUGH HOLES FORI PASSANTI | BLIND HOLES FORI CIECHI | |
| 7000-MM-007 | 45,61 - 46,60 46,61 - 47,60 47,61 - 48,60 48,61 - 49,60 49,61 - 50,60 | 120 | 155 | 7000-VI-007 | 7001-VI-007 | 8 8 8 8 8 |
| 7000-MM-008 | 50,61 - 51,60 51,61 - 52,60 52,61 - 53,60 53,61 - 54,60 54,61 - 55,60 55,61 - 56,60 56,61 - 57,60 57,61 - 58,60 58,61 - 59,60 59,61 - 60,60 | 120 | 155 | 7000-VI-008 | 7001-VI-008 | 8 8 8 8 8 8 8 8 8 8 |

All mandrels are provided with radial through tool coolant.

1st note through hole reaming - order adjustment screw to suit through holes

2nd note blind hole reaming - order adjustment screw to suit blind holes. That drilled screw allows central through tool coolant.

I mandrini sono tutti previsti con adduzione radiale del refrigerante.

nota 1 se si alesa un foro passante, ordinare vite per foro passante.

nota 2 se si alesa un foro cieco, ordinare vite per foro cieco. Tale vite forata, consente la refrigerazione assiale.

HEADS

TECHNICAL INFORMATION AND CUTTING PARAMETERS

Hard metal brazed carbide coated TiN-TiCN-TiAlN (our ref. TIN-TIC-TIA)

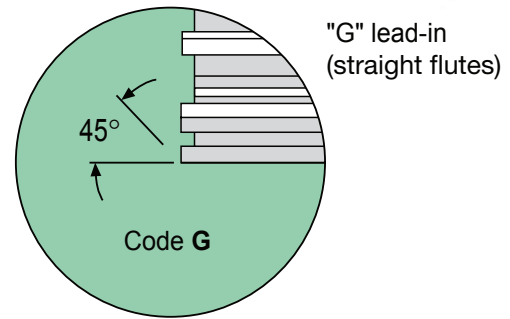
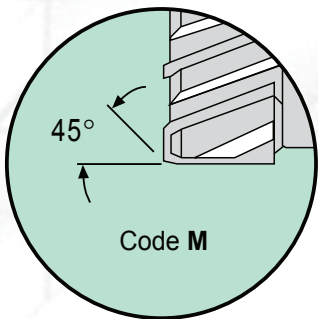
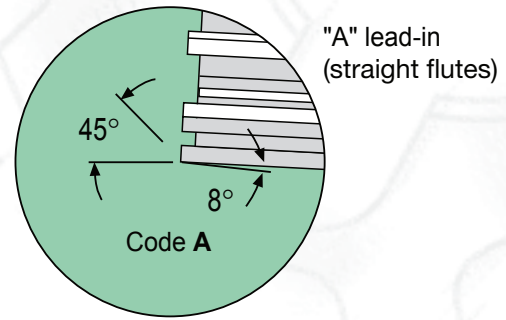
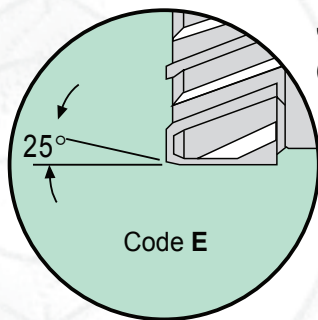
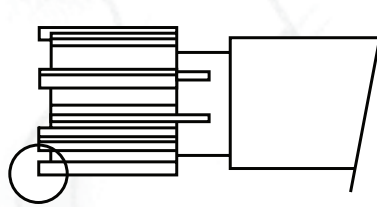
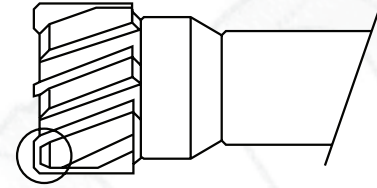
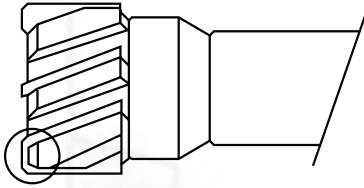
Cermet brazed carbide (our ref. AVC)

| MATERIAL TO WORK | N/mm ² | HEAD Ø mm | STOCK ALLOWANCE Ø mm | HARD METAL K | H.M. coated TiN - TiCN TiAlN | CERMET | STRAIGHT FLUTES | LEFT HAND HELICAL FLUTES |
|---|-------------------------------------|---------------|----------------------|--|------------------------------|---------------------|-----------------|--------------------------|
| | | | | SURFACE SPEED m/min | SURFACE SPEED m/min | SURFACE SPEED m/min | FEED mm/rev | FEED mm/rev |
| Mild Steel Unalloyed Low alloyed | Up to 600 | 11,80 - 21,60 | 0,15 - 0,25 | 10 - 20 | 60 - 80 | 90 - 300 | 0,25 - 0,60 | 0,50 - 1,00 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,30 - 0,80 | 0,60 - 1,20 |
| Structural steel Fused Metal | Greater than 600 | 11,80 - 21,60 | 0,15 - 0,25 | 7 - 15 | 40 - 70 | 80 - 200 | 0,30 - 0,60 | 0,40 - 0,80 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,40 - 0,80 | 0,50 - 1,00 |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,50 - 0,90 | 0,60 - 1,20 |
| | | | | | | | | |
| Alloy steel Stainless steel | 400 - 1000 | 11,80 - 21,60 | 0,15 - 0,25 | 6 - 10 | 30 - 50 | 60 - 150 | 0,30 - 0,60 | 0,40 - 0,80 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,40 - 0,80 | 0,50 - 1,00 |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,50 - 0,90 | 0,60 - 1,20 |
| | | | | | | | | |
| Strongly alloy steel Steel with manganese | 800 - 1500 | 11,80 - 21,60 | 0,15 - 0,25 | 4 - 8 | 15 - 30 | 60 - 120 | 0,25 - 0,50 | 0,30 - 0,60 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,30 - 0,60 | 0,40 - 0,80 |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,40 - 0,70 | 0,50 - 1,00 |
| | | | | | | | | |
| Grey cast iron Spheroidal cast iron (pearlitic) Malleable cast iron | Up to 200 HB Greater than 200 HB | 11,80 - 21,60 | 0,15 - 0,25 | ≤ 200 HB 20 - 40 ≥ 200 HB 15 - 30 | 50 - 70 | | 0,20 - 0,60 | 0,50 - 1,00 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,30 - 0,70 | 0,60 - 1,20 |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,40 - 0,80 | 0,80 - 1,60 |
| | | | | | | | | |
| Spheroidal cast iron (ferritic) | 300 - 700 | 11,80 - 21,60 | 0,15 - 0,25 | 10 - 15 | 30 - 50 | 60 - 120 | 0,20 - 0,60 | 0,50 - 1,00 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,30 - 0,70 | 0,60 - 1,20 |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,40 - 0,80 | 0,80 - 1,60 |
| | | | | | | | | |
| Copper and alloys Brass | Up to 500 | 11,80 - 21,60 | 0,15 - 0,25 | 60 - 200 | 100 - 200 | | 0,20 - 0,40 | |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,30 - 0,60 | |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,40 - 0,80 | |
| | | | | | | | | |
| Bronze Bronze phosphorous | Up to 600 | 11,80 - 21,60 | 0,15 - 0,25 | 20 - 40 | 80 - 160 | 100 - 300 | 0,30 - 0,60 | 0,40 - 1,00 |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,50 - 1,20 | |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,60 - 1,50 | |
| | | | | | | | | |
| Alluminium and light alloys | Up to 500 | 11,80 - 21,60 | 0,15 - 0,25 | 20 - 200 | | | 0,30 - 0,60 | |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,40 - 1,00 | |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,40 - 1,00 | |
| | | | | | | | | |
| Titanium and alloys | | 11,80 - 21,60 | 0,15 - 0,25 | 6 - 15 | 20-60 | | 0,20 - 0,40 | |
| | | 21,61 - 39,60 | 0,20 - 0,40 | | | | 0,30 - 0,50 | |
| | | 39,61 - 45,59 | 0,30 - 0,40 | | | | 0,40 - 0,60 | |
| | | | | | | | | |

HIGH FEED REAMERS & HEADS CUTTING GEOMETRY

• High feed reamer

- Left hand helical flutes cutting ring (from \varnothing 32,60 up to 200,59)



N.B.

Lead-in **E** is standard and suitable for the most part of materials: cast iron, steel and aluminium.
Lead-in **M** can have a better penetration on steel with surface hardness greater than 200 HB.

Approach angles

| MATERIAL TO WORK | TENSILE STRENGTH | APPROACH ANGLE* |
|--|---|-----------------|
| Iron and mild steel (C < 0,2%) | 50 Kg / mm ² | G - A - E |
| Mild steel (C 0,2 < 0,3%) | 60 Kg / mm ² | N - A - E |
| Mild steel (C 0,3 < 0,4%) | 70 Kg / mm ² | N - A - E |
| Mild steel (C 0,4 < 0,5%) | 80 Kg / mm ² | N - A - E |
| Alloy steel | ≤ 80 Kg / mm ² | G - N - A - E |
| Alloy steel | 90 Kg / mm ² | G - N - E |
| Alloy steel | 100 Kg / mm ² | G - N - M |
| Alloy steel | > 100 Kg / mm ² | G - N - M |
| Stainless and refractory steel | from 50 Kg / mm ² to 90 Kg / mm ² | G - N - M |
| Grey, spheroidal and malleable cast iron | from 150 HB to 320 HB | G - N - E |
| Titanium and titanium alloy | | T - E |
| Tempered steel | 48 - 64 HRc | G - N - M |
| Pure copper | | G - N - E |
| Electrolytic copper | | G - N - E |
| Brass / Bronze | | G - N - E |
| Aluminium alloy < 10% Si | | G - A - E |
| Aluminium alloy > 11% Si | | G - E |
| Magnesium alloy | | G - A - E |
| Thermoplastic material | | G - E |
| Thermosetting resins | | G - E |
| Stiffened synthetic material | | G - E |

* Do not use negative lead-in on blind holes

Negative lead-in "N" can be used on large range of materials: please apply to our technical department.

Usually ex-stock: - single lead-in G

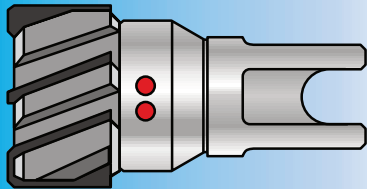
HEADS

from diameter 11,80 to 45,60 mm

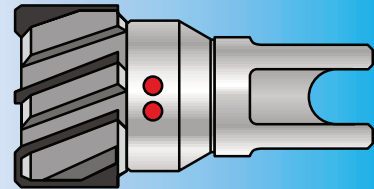
FIXED HEADS

EXPANDING HEADS

Series 7700

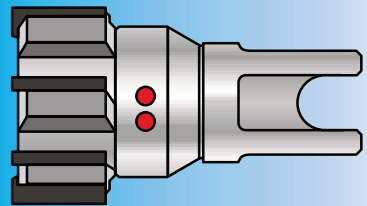


Series 7705

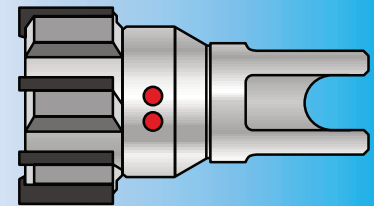


LEFT HAND HELICAL FLUTES

Series 7400



Series 7405



STRAIGHT FLUTES

CODE DESCRIPTION
6 CUTTINGS HEADS

| Code | Description |
|----------------|---|
| xxxx - KLx - Ø | Hard metal cutting edges K05/K10 |
| xxxx - KNx - Ø | Hard metal cutting edges K05/K10 TIN-coated |
| xxxx - KCx - Ø | Hard metal cutting edges K05/K10 TiCN-coated |
| xxxx - KAx - Ø | Hard metal cutting edges K05/K10 TiAlN-coated |
| xxxx - SVx - Ø | Cermet cutting edges P10/P15 |
| xxxx - SNx - Ø | Cermet cutting edges P10/P15 TIN-coated |
| xxxx - SCx - Ø | Cermet cutting edges P10/P15 TiCN-coated |
| xxxx - SAx - Ø | Cermet cutting edges P10/P15 TiAlN-coated |

Diameter and tolerance

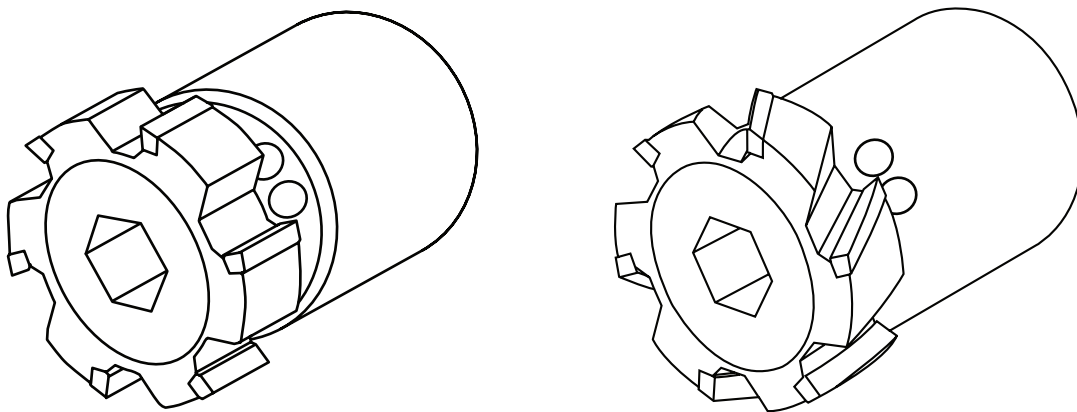
Lead-in (see page 9-10)

Series: 7700 Fixed heads left hand helical flutes
 7705 Expanding heads left hand helical flutes
 7400 Fixed heads straight flutes
 7405 Expanding heads straight flutes

HEADS INSTRUCTIONS

1) Diameter measurement

The diameter of the heads is measured with a micrometer. To avoid micro chipping of the cutting edges, we would recommend the use of a comparator style micrometer with at least $2\mu\text{m}$ resolution. The cutting edges are of an asymmetric design with two cutting edges exactly 180° opposed to allow setting. These are marked with a coloured dimple (see diagram below). Measurement must be taken from the front of the cutting edges only.



2) Tolerance

All the heads are ground to the requested diameter and set to nominal tolerance for expanding heads and $2/3$ of minimum tolerance for fixed heads.

3) Expanding heads adjustment

When the size reaches its lower tolerance the head can be adjusted to compensate for wear to the cutting edges.

This operation can be repeated several times until the surface finish of the hole deteriorates to an unacceptable level.