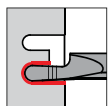




## Cutting insert for axial grooving bores, full radius slots

Series no. 25198

25202



- grooving depth up to 5 mm

for tool holders type GH104/GB104 see from page 18

Tool material

Solid carbide

Type GA 104

GA 104

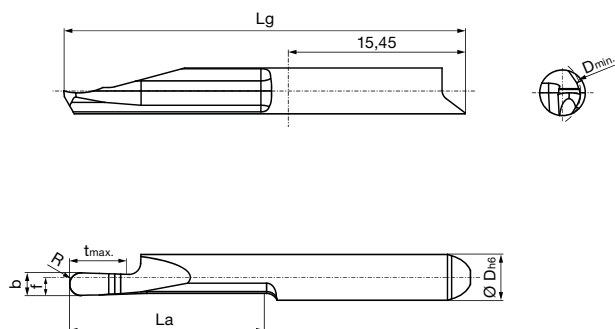
Coating



nano-A

uncoated

Cutting data page 214



Right hand version shown  
Left hand version mirror image



Cutting direction



| Code no. | Description            | D min | b    | R    | f    | t max | La    | Lg    | D h6 |
|----------|------------------------|-------|------|------|------|-------|-------|-------|------|
|          |                        | mm    | mm   | mm   | mm   | mm    | mm    | mm    | mm   |
| 4.001    | GA104.0100.050.12.60.R | 6.00  | 1.00 | 0.50 | 1.60 | 2.00  | 12.00 | 30.00 | 4.00 |
| 4.002    | GA104.0100.050.17.60.R | 6.00  | 1.00 | 0.50 | 1.60 | 2.00  | 17.00 | 35.00 | 4.00 |
| 4.003    | GA104.0150.075.12.60.R | 6.00  | 1.50 | 0.75 | 1.60 | 3.00  | 12.00 | 30.00 | 4.00 |
| 4.004    | GA104.0150.075.17.60.R | 6.00  | 1.50 | 0.75 | 1.60 | 3.00  | 17.00 | 35.00 | 4.00 |
| 4.005    | GA104.0200.100.12.60.R | 6.00  | 2.00 | 1.00 | 1.60 | 5.00  | 12.00 | 30.00 | 4.00 |
| 4.006    | GA104.0200.100.17.60.R | 6.00  | 2.00 | 1.00 | 1.60 | 5.00  | 17.00 | 35.00 | 4.00 |

Series no. 25199

25203

Cutting direction



| Code no. | Description            | D min | b    | R    | f    | t max | La    | Lg    | D h6 |
|----------|------------------------|-------|------|------|------|-------|-------|-------|------|
|          |                        | mm    | mm   | mm   | mm   | mm    | mm    | mm    | mm   |
| 4.001    | GA104.0100.050.12.60.L | 6.00  | 1.00 | 0.50 | 1.60 | 2.00  | 12.00 | 30.00 | 4.00 |
| 4.002    | GA104.0100.050.17.60.L | 6.00  | 1.00 | 0.50 | 1.60 | 2.00  | 17.00 | 35.00 | 4.00 |
| 4.003    | GA104.0150.075.12.60.L | 6.00  | 1.50 | 0.75 | 1.60 | 3.00  | 12.00 | 30.00 | 4.00 |
| 4.004    | GA104.0150.075.17.60.L | 6.00  | 1.50 | 0.75 | 1.60 | 3.00  | 17.00 | 35.00 | 4.00 |
| 4.005    | GA104.0200.100.12.60.L | 6.00  | 2.00 | 1.00 | 1.60 | 5.00  | 12.00 | 30.00 | 4.00 |
| 4.006    | GA104.0200.100.17.60.L | 6.00  | 2.00 | 1.00 | 1.60 | 5.00  | 17.00 | 35.00 | 4.00 |



# SYSTEM 104

## MICRO-PRECISION TOOLS



Round shank holder

from page 18



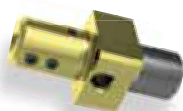
Square shank holder

from page 25



Modular holder

from page 27



Star holder

page 30

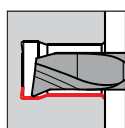


Round shank holder

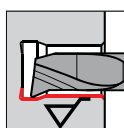
Broaching

page 63

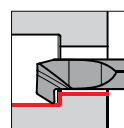
Tool holder



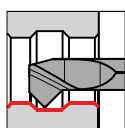
Boring out  
and profiling, Type GT  
from page 32



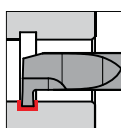
Boring out,  
with Wiper, Type GJ  
page 45



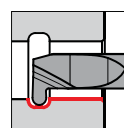
Back boring  
and profiling, Type GT  
from page 46



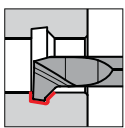
Boring out  
and chamfering, Type GT  
page 48



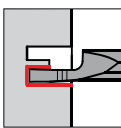
Internal grooving,  
straight slots, Type GE  
page 49



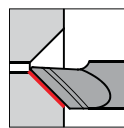
Internal grooving,  
full radius slots, Type GE  
page 51



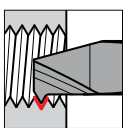
Internal pre-grooving  
and chamfering, Type GV  
page 52



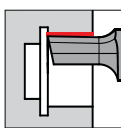
Axial grooving bores,  
Type GA  
from page 53



Axial chamfering  
bores, Type GA  
page 57



Internal threading,  
Type GG  
from page 58



Broaching,  
Type GN  
from page 64

Cutting inserts from hole-Ø 0.7 mm



| Machining                                                                                                                                                                                                                                             | Feed range<br>f (IPR) | Point radius<br>R (mm)                                                                                               | Cutting depth<br>a <sub>p</sub> (in)                                                                           | General formulas                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|    | 0.0008 - 0.0031       | R 0.05 (0.002in)<br>R 0.10 (0.004in)<br>R 0.15 (0.006in)<br>R 0.20 (0.008in)<br>R 0.25 (0.010in)<br>R 0.30 (0.012in) | 0.0008 - 0.0028<br>0.0020 - 0.0059<br>0.0031 - 0.0079<br>0.0047 - 0.0098<br>0.0051 - 0.0110<br>0.0067 - 0.0138 | Cutting speed (SFM)<br>RPM x Dia. / 3.82 = SFM          |
|    | 0.0004 - 0.0012       |                                                                                                                      |                                                                                                                | Revolutions per minute (RPM)<br>SFM x 3.82 / Dia. = RPM |
|    | 0.0004 - 0.0020       |                                                                                                                      | Rule of thumb:<br>a <sub>p</sub> ~ r                                                                           | Feed rate (IPM)<br>IPR x RPM = IPM                      |

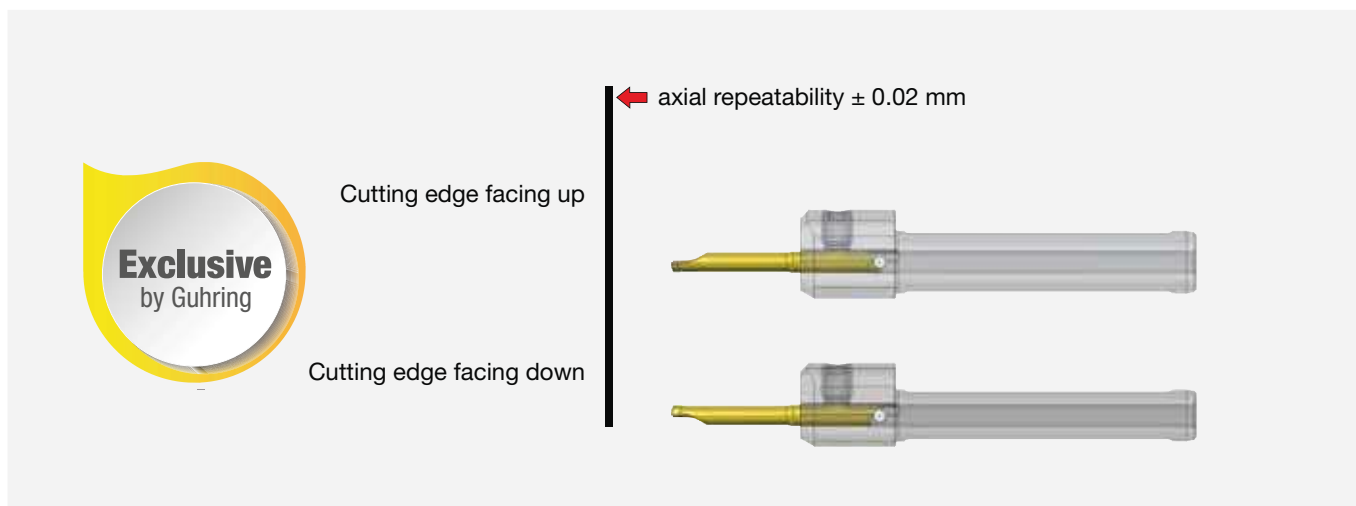
Guide values for feed and cutting depths

| ISO | Material                                   |                                    | Material examples/<br>material number                  | Tensile<br>strength<br>(N/mm <sup>2</sup> ) | Brinell<br>hardness<br>(HB) | Cutting speed SFM<br>(surface feet / min) |             |               |
|-----|--------------------------------------------|------------------------------------|--------------------------------------------------------|---------------------------------------------|-----------------------------|-------------------------------------------|-------------|---------------|
|     |                                            |                                    |                                                        |                                             |                             | TiN<br>Ⓢ                                  | nano-A<br>Ⓢ | uncoated<br>○ |
| P   | Carbon steel                               | C ≤ 0.15 %                         | 11SMn30+C / 1.0715<br>C15 / 1.0401                     | 500<br>600                                  | 150<br>180                  | 65-525                                    | 165-655     | 50-295        |
|     |                                            | C ≥ 0.15-0.45 %                    | S235JR (ST37-2) / 1.0037<br>Ck22 / 1.1151              | 400<br>600                                  | 120<br>180                  |                                           |             |               |
|     |                                            | C > 0.45 %                         | S355JO (St52-3) / 1.0553<br>C60 / 1.0601               | 600<br>900                                  | 180<br>270                  | 65-295                                    | 165-525     | -             |
|     | Low-alloyed steel<br>(alloy content ≤ 5%)  | annealed                           | 16MnCr5 / 1.7131<br>18CrNi8 / 1.5920                   | 650<br>650                                  | 200<br>200                  | 65-525                                    | 165-590     | 50-230        |
|     |                                            | heat-treatable                     | 25CrMoV4 / 1.7218<br>42CrMo4V / 1.7225                 | 900<br>1100                                 | 270<br>320                  | -                                         | 100-395     | -             |
|     | High-alloyed steel<br>(alloy content > 5%) | annealed                           | X37CrMoV5-1 / 1.2343<br>X153CrMoV12 / 1.2379           | 750<br>850                                  | 220<br>250                  | 80-295                                    | 130-460     | -             |
|     |                                            | heat-treatable                     | 55NiCrMoV7 / 1.2714                                    | 1200                                        | 350                         | -                                         | 100-330     | -             |
|     | Cast steel                                 | un-alloyed, low-alloyed            | GS52 / 1.0552                                          | 600                                         | 180                         | 65-395                                    | 100-590     | -             |
|     |                                            | high-alloyed                       | GX40CrNiSi22-10 / 1.4826                               | 750                                         | 220                         | -                                         | 100-295     | -             |
| M   | Stainless steel                            | martensitic, ferritic, tempered    | X14CrMoS17 / 1.4104<br>X4CrNiMo16-5-1 / 1.4418         | 800<br>1000                                 | 240<br>300                  | 65-230                                    | 100-295     | -             |
|     |                                            |                                    | X5CrNi18-10 / 1.4301<br>X2CrNiMo17-12-2 / 1.4404       | 650                                         | 200                         | 65-300                                    | 100-360     | -             |
|     |                                            | austenitic, ferritic (Duplex)      | X2CrNiMoCuN25-6-3 / 1.4507<br>X2CrNiMoN25-7-4 / 1.4410 | 850                                         | 250                         | -                                         | 100-330     | -             |
|     |                                            |                                    |                                                        |                                             |                             |                                           |             |               |
| K   | Grey cast iron                             | low tensile strength               | EN-GJL-200 (GG20) / 0.6020                             |                                             | 180                         | 100-490                                   | 100-590     | 100-295       |
|     |                                            | high tensile strength              | EN-GJL-400 (GG40) / 0.6040                             |                                             | 260                         | 100-395                                   | 100-490     | 100-230       |
|     | Spheroidal graphite<br>iron                | low tensile strength               | EN-GJS-400-15 (GGG40) / 0.7040                         |                                             | 160                         | 100-425                                   | 100-525     | -             |
|     |                                            | high tensile strength              | EN-GJS-700-2 (GGG70) / 0.7070                          |                                             | 260                         | 100-360                                   | 100-460     | -             |
|     | Malleable cast iron                        | low tensile strength               | EN-GJMW-350-4 (GTW35) / 0.8035                         |                                             | 125                         | 100-425                                   | 100-525     | -             |
|     |                                            | high tensile strength              | EN-GJMB-550-4 (GTS55) / 0.8155                         |                                             | 250                         | 100-360                                   | 100-460     | -             |
| N   | Al-alloys                                  | non-heat-treatable <12% Si         | EN-AW-2017 (AlCuMg1) / 3.1325                          |                                             | 60                          | 100-1805                                  | 100-1805    | 100-820       |
|     |                                            | heat-treatable <12% Si             | EN-AW-6082 (AlMgSi1) / 3.2315                          |                                             | 100                         | 100-1310                                  | 100-1310    | 100-590       |
|     | Al-cast-alloys                             | non-heat-treatable <12% Si         | AlSi9Cu3 / 3.2163                                      |                                             | 80                          | 100-1805                                  | 100-1805    | 100-820       |
|     |                                            | heat-treatable <12% Si             | AlSi10Mg / 3.2383                                      |                                             | 100                         | 100-1310                                  | 100-1310    | 100-590       |
|     | Copper alloys                              | brass, lead alloy                  | CuZn39Pb2 (MS58) / 2.0380                              | 400                                         | 120                         | 100-1310                                  | 100-1310    | 100-590       |
|     |                                            | bronze                             | CuSn6 / 2.1020                                         | 500                                         | 150                         | 100-240                                   | 100-240     | 100-590       |
| S   | Heat resistant alloys,<br>super alloys     | NiFe-base, annealed                | NiCr15Fe (Alloy600) / 2.4816                           | 700                                         |                             | -                                         | 50-230      |               |
|     |                                            | NiFe-base, hardened                |                                                        | 950                                         |                             | -                                         | 50-165      |               |
|     |                                            | NiCo-base, annealed                | NiMo16Cr15W (Alloy C-276) / 2.4819                     | 800                                         |                             | -                                         | 50-165      |               |
|     |                                            | NiCo-base, cast                    |                                                        | 1100                                        |                             | -                                         | 30-130      | -             |
|     |                                            | NiCo-base, hardened                | NiCr19NbMo (Alloy718) / 2.4668                         | 1200                                        |                             | -                                         | 30-115      |               |
|     | Titanium-alloys                            | annealed                           | Ti6Al4V / 3.7164                                       | 900                                         |                             | -                                         | 15-165      |               |
|     |                                            | hardened                           |                                                        | 1200                                        |                             | -                                         | 30-115      |               |
| H   | Hardened steels                            | Heat-treatable steel               |                                                        |                                             | > 52 HRC                    | -                                         | 65-130      | -             |
|     |                                            | Heat-treatable/case hardened steel |                                                        |                                             | > 59 HRC                    | -                                         | 30-100      | -             |
|     |                                            | Heat-treatable/case hardened steel |                                                        |                                             | > 62 HRC                    | -                                         | (CBN)       | -             |

The specified values must be adapted to the machine and machining conditions.

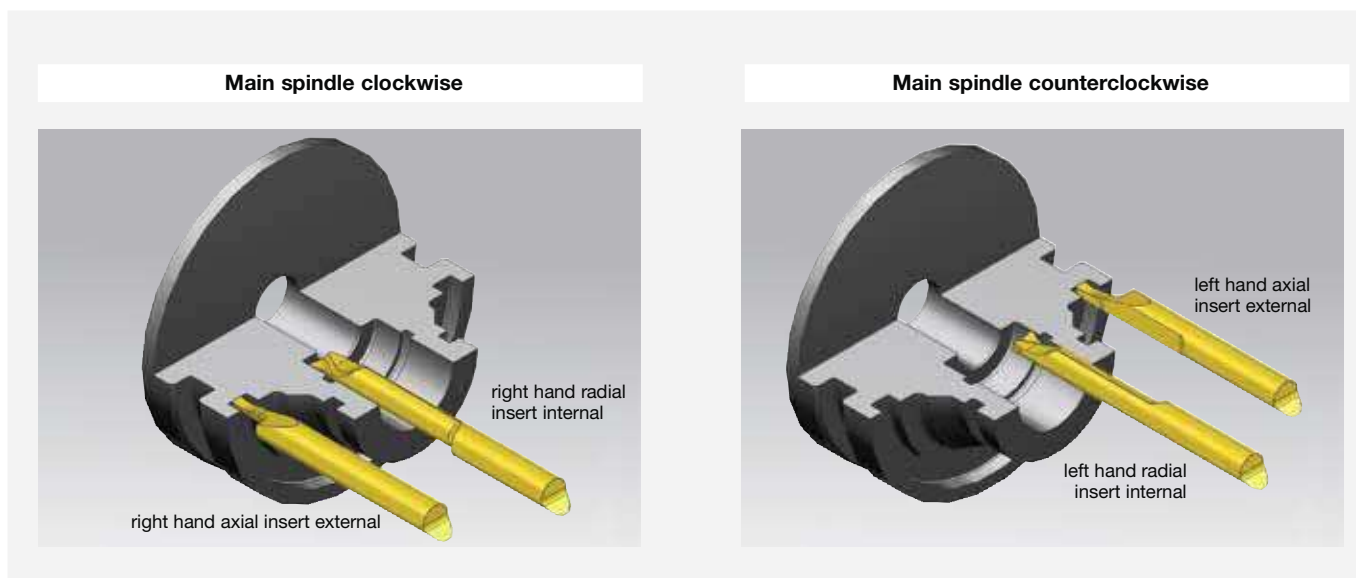


## System 104/106/108/110 Positioning and clamping



Gühring's system 104/106/108/110 is unique in terms of insert positioning and clamping: The position between cutting edge facing up and cutting edge facing down can be changed by keeping the same length position without loosening the holder.

## Definition of the cutting edge position





# Troubleshooting

| Subject                  |                                     | Solution |                |               |                        |               |       |                 |               |                    |               |                               |         |
|--------------------------|-------------------------------------|----------|----------------|---------------|------------------------|---------------|-------|-----------------|---------------|--------------------|---------------|-------------------------------|---------|
|                          |                                     | Feed     | Feed at centre | Cutting speed | RH/LH edge orientation | Corner radius | Wiper | Width of groove | Tool clamping | Workpiece clamping | Tool overhang | Centre height of cutting edge | Coolant |
| Related to wear          | Edge chipping                       | ⬇️       | ⬇️             |               |                        | ⬆️            |       |                 | 🔍             | 🔍                  | 🔍             | 🔍                             |         |
|                          | Build up edge                       |          |                | ⬆️            |                        |               |       |                 |               |                    |               |                               | 👍       |
|                          | Flank wear                          | 🔍        | ⬇️             | ⬇️            |                        | ⬆️            |       |                 |               |                    |               | 🔍                             | 👍       |
|                          | Plastic deformation                 | ⬇️       | ⬆️             | ⬇️            |                        | ⬆️            |       |                 |               |                    |               |                               | 👍       |
| Related to the component | Vibrations                          | ⬆️       |                | ⬇️            |                        | ⬇️            |       | ⬇️              | 🔍             | 🔍                  | ⬇️            | 🔍                             |         |
|                          | Burrs                               |          | ⬇️             |               | 👍                      | ⬇️            |       |                 |               |                    |               | 🔍                             | 👍       |
|                          | Surface                             | ⬇️       | ⬇️             | ⬆️            |                        | ⬆️            | 👍     | ⬆️              | 🔍             | 🔍                  | ⬇️            | 🔍                             | 👍       |
|                          | Long chips (no chip breakage)       | ⬆️       |                | ⬆️            |                        |               |       |                 |               |                    |               |                               | 👍       |
|                          | (too) short chips, compressed chips | ⬇️       |                |               |                        |               |       |                 |               |                    |               |                               |         |



decrease values (large impact)



increase values (large impact)



decrease values (low impact)



increase values (low impact)



check



apply