

## Technical Delivery Conditions – Broaching

### 1. General

To ensure smooth order processing, some basic points must be observed:

#### Order placement/shipping:

- Each delivery must be accompanied by an order/delivery note as well as a standard-compliant drawing.
- Shipment of the workpieces must be in crane- or stackable containers and, if necessary, in suitable packaging.
- Return shipment will be carried out in the same manner as delivery, unless expressly agreed otherwise.
- After broaching, the workpieces will be slightly contaminated with broaching oil and chips and will not be deburred.

### 2. Materials

In general, almost all common materials can be processed by broaching. Specifically:

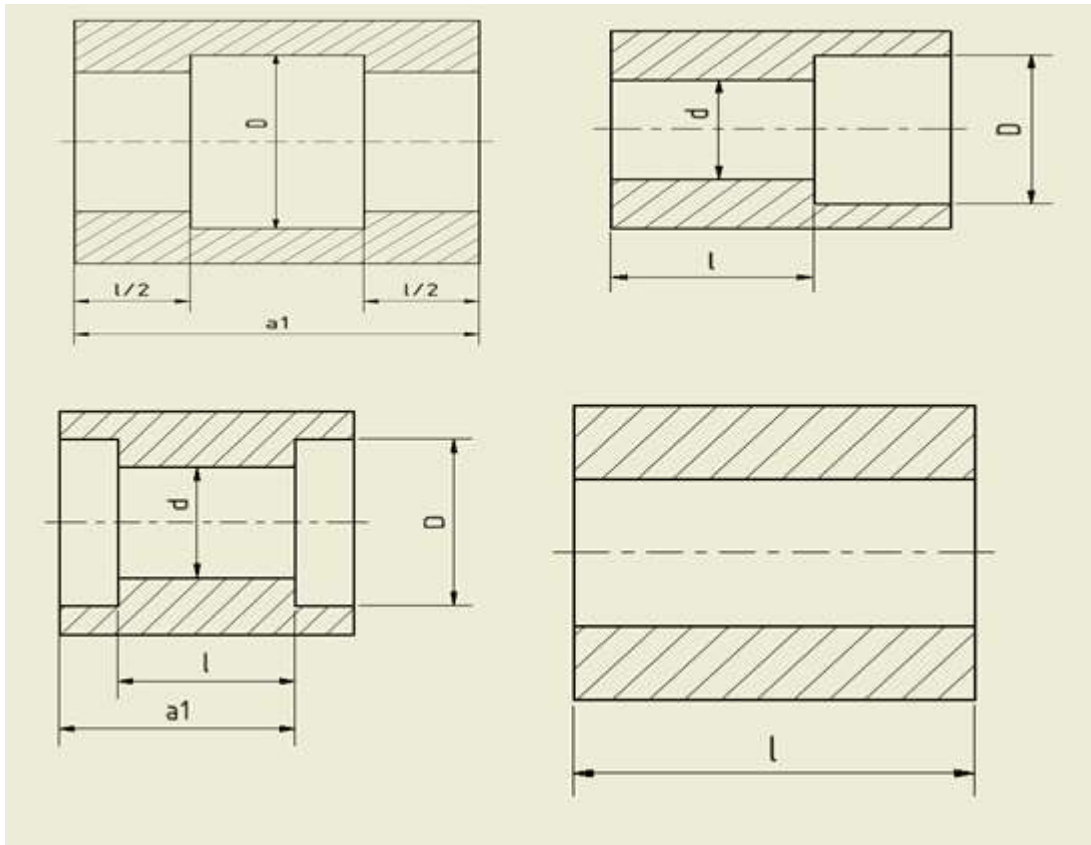
- Case-hardened, tempered, and constructional steels, unalloyed, with 0.1 – 0.6 % carbon content, preferably in normalized condition with a strength of 550 – 720 N/mm<sup>2</sup>.
- Tempered steels in quenched and tempered condition with a strength of 800 – 1,000 N/mm<sup>2</sup>.
- Unalloyed and alloyed steels with more than 0.6 % carbon content in annealed condition.
- High-alloy, stainless, and acid-resistant steels with limitations (consultation may be required).
- Cast iron, all types such as GG, GGG, GT.
- Non-ferrous metals such as aluminum alloys, bronze, brass.
- Plastics.

Notes:

- The material must be specified in the order, and a mating part or inspection gauge must be provided.
- For strengths above 1,000 N/mm<sup>2</sup>, prior consultation is required.
- Workpieces must be free of scale and must not exhibit cold hardening in the broaching area caused by blunt cutting tools.
- For castings, the casting skin must be removed from the bore and end faces.

### 3. Workpiece Geometry / Machining Sequence

- Cutting and impact-free machining of the broaching area and locating surfaces.
- If several parts are to be stacked and broached simultaneously, both locating surfaces must be plane-parallel.
- Pre-drilling according to list, tolerance H8.
- Maximum broaching length (machining length) according to list.
- For deviating broaching lengths, please consult us or design longer workpieces according to the following examples.



#### Pilot hole tolerance H8

**l** = maximum broaching length

**a1** = shank holding length

**d** = Pilot hole diameter

**D** = maximum profile outside diameter + approx. 1 mm safety

#### Notes:

- Broaching is an extremely precise machining process. However, concentricity tolerance between the broached profile and the outside contour can only be maintained to a limited extent due to system constraints.
- For high concentricity accuracy, we recommend producing with machining allowance, then after broaching, clamping in the broached profile and machining to final dimension.

## 4. Profile Position

- Profile positions relative to outside contours/bores must be indicated with tolerances on the drawing.
- For production, an appropriate auxiliary fixture is usually required; in some cases, production according to scribed lines may be possible.
- Position by outside dimension: approx.  $\pm 5^\circ$
- Position by stop: approx.  $\pm 2^\circ$

**5. Thin-walled workpieces** tend to deform; therefore, special workpiece fixtures may be required.

## 6. Slotting

- Slotting is only performed with a supplied mating part.
- If no mating part is supplied and rework is required, this will be charged separately.

## 7. Broaching Tools

- In principle, we do **not provide any guarantee** for tool life or tool quantities for broaching tools.