Technical information for sealing plugs

Sealing plugs are used to effectively block holes and other openings. They are used primarily in bores in fluid technology applications to prevent the leakage of fluids.

They are usually installed manually using an insertion pin. Their simple design also permits them to be easily integrated into an automated production process.

A counterbored hole is required for fitting. The sealing plug is pressed into the hole up to the step. The ball of the sealing plug is pressed into the sleeve using a setting punch. This then expands the sleeve, causing the serrated profile of the sleeve to press into the host material of the respective component, thus creating a tight and pressure-resistant metallic seal.

Overview

Group	Image	Sleeve material	Ball material	Max pressure bar	Sizes Ø
28080		Steel	Steel	345	3 - 22mm
28080-01		Stainless steel	Steel	448	3 - 22mm
28080-02		Stainless steel	Stainless steel	448	3 - 14mm

Pressure capacity

Host material	28080 (steel sleeve, steel ball)													
	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø22
Steel SAE1144	345 bar / 5000 psi working pressure 1100 bar / 16000 psi test pressure								275 bar / 4000 psi working pressure 896 bar / 13000 psi test pressure					
Free-cutting steel SAE10L15														
Cast Iron ASTM A48														
Ductile iron ASTM A256														
Aluminium alloy 2024-T4														
Aluminium alloy 6061 T6	310 bar / 4500 psi working pressure 1000 bar / 14500 psi test pressure								241 bar / 3500 psi working pressure 793 bar / 11500 psi test pressure					
Cast aluminium. 356-T6														

Host material	28080-01 (stainless steel sleeve, steel ball)													
	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø22
Steel SAE1144	207 bar / 3000 psi working pressure 690 bar / 10000 psi test pressure								172 bar / 2500 psi working pressure 552 bar / 8000 psi test pressure					
Free-cutting steel SAE10L15														
Cast Iron ASTM A48														
Ductile iron ASTM A256														
Aluminium alloy 2024-T4														
Aluminium alloy 6061 T6	138 bar / 2000 psi working pressure 517 bar / 7500 psi test pressure								103 bar / 1500 psi working pressure 345 bar / 5000 psi test pressure					
Cast aluminium. 356-T6														

Pressure capacity

Host material	28080-01 (Stainless steel sleeve stainless steel ball)													
	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø22
Steel SAE1144	207 bar / 3000 psi working pressure 690 bar / 10000 psi test pressure								172 bar / 2500 psi working pressure 552 bar / 8000 psi test pressure					
Free-cutting steel SAE10L15														
Cast Iron ASTM A48														
Ductile iron ASTM A256														
Aluminium alloy 2024-T4														
Aluminium alloy 6061 T6	138 bar / 2000 psi working pressure 517 bar / 7500 psi test pressure								103 bar / 1500 psi working pressure 345 bar / 5000 psi test pressure					
Cast aluminium. 356-T6														

Installation guidelines

Bore

The counterbored hole D2/D3 must comply with the data sheet dimensions. To ensure that the sealing plugs function reliably in terms of pressure performance and tightness, the concentricity tolerance of t = 0.05 mm must be observed. The tolerance for hole D2 is +0.1 mm. The hole must be cylindrical within the active sealing area of the sealing plug. The bore entry may be chamfered up to 0.25 x D2, since this area has no primary influence on the sealing function (Fig. 1).

- Counterbored hole D2/D3 in accordance with data sheet (Fig. 2)
- Hole tolerance D2 = +0.1 mm (Fig. 2)
- Concentricity tolerance within t = 0.05 (Fig. 3)
- Hole surface finish is Rz 10 to 30 µm (especially by hardened materials)
- Longitudinal and spiral grooves should be avoided. These have a negative influence on the seal.
- The hole must be absolutely free of oil, grease and swarf.

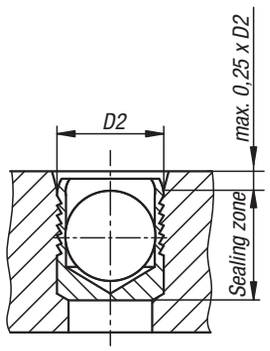


Abb.1

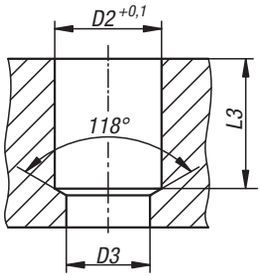


Abb.2

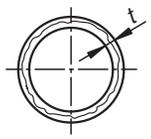


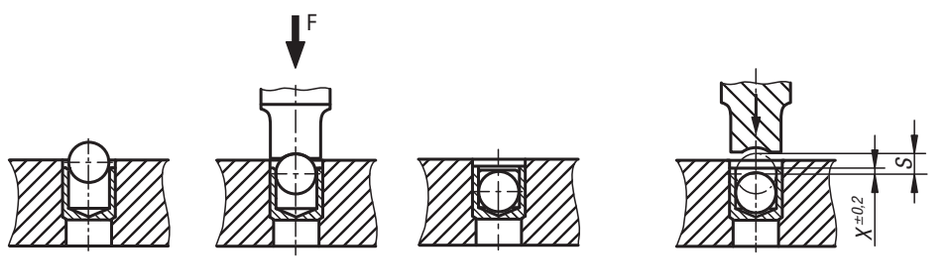
Abb.3

Galvanic corrosion

There is a possibility of contact corrosion between the sleeve and the host material.

Installation procedure

Insert the sealing plug with the ball facing upwards into the counterbored hole. The upper edge of the sleeve must not extend beyond the outer contour. The installation dimensions in the data sheet must be observed. Press in the ball using a press or setting punch until the upper edge of the ball is below the edge of the sleeve. Corresponding reference values for the setting distance S and the dimension X can be found in the data sheet. Only the installation tools recommended for the respective diameters may be used.

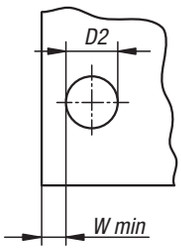


1. 2. 3.

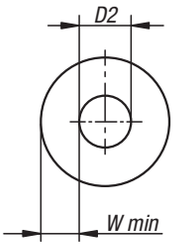
Wall thicknesses and border distances

The sealing plug is anchored to the host material by radial expansion of the sleeve, which is in the semi-plasticity range. For this reason, the wall thickness and the distance to the outer face play a crucial role. The resulting forces, as well as the hydraulic pressures and temperature stresses, must therefore be taken into account. The guide values for minimum wall thicknesses and border distances (Wmin) take these factors into account. If these values are adhered to, only slight deformations of ≤ 20 µm are to be expected on the outer contour of the host material which however, do not impair the function of the sealing plug. If the minimum dimension (Wmin) is not adhered to, there is a risk of overstraining the host material, which can impair the function of the sealing plug. In such cases, tests must be carried out.

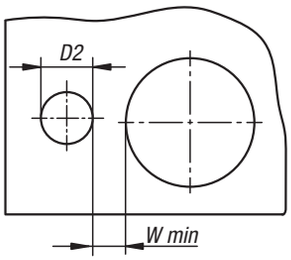
Distance to outer contour: flat



Distance to outer contour: round



Wall thickness between holes



Benchmark calculation

D2 ≥ 4 mm: W min = F min x D2
D2 < 4 mm: W min = F min x D2 + 0.5 mm

Host material	Factor F min		
	28080 Steel sleeve Steel ball	28080-01 Stainless steel sleeve Steel ball	28080-02 Stainless steel sleeve Stainless steel ball
Steel SAE1144	0,5	0,6	0,6
Free-cutting steel SAE10L15	0,6	0,8	0,8
Cast Iron ASTM A48	1,0	1,0	1,0
Ductile iron ASTM A256	0,6	0,8	0,8
Aluminium alloy 2024-T4	0,6	0,8	0,8
Aluminium alloy 6061 T6	1,0	1,0	1,0
Cast aluminium. 356-T6	1,0	1,0	1,0

Removal process

The balls have a hardness of ca. 45 HRC and can be drilled out using a carbide drill.

- Drill out ≤ 6 mm sealing plugs in a single operation and then enlarge the hole to the next largest diameter as per the data sheet.
- Drill out > 6 mm diameter sealing plugs in several stages, finally drilling out to the next largest hole diameter according to the data sheet.
- Remove any swarf from the hole and clean (oil and grease free)
- Insert a new sealing plug (always use a sealing plug with the next larger diameter)