Expander® Sealing Plug, EH 22880. - Constructional Guidelines / Assembly Instructions

Component Requirements (22880.0004 - 22880.0072)

Drilling Holes

- The counterbore relation d_2/d_3 has to be according to the catalogue specification.
- Roundness tolerances have to be within t = 0,05 mm.
- With hard materials (see picture 1) the drilling roughness has to be R_z=10 to 30 µm.
- Drilling tolerance d_1= +0,1 mm.
- Longitudinal rifles and spiral grooves have to be avoided as they have a negative influence on the sealing.
- **Drilling holes have to be kept absolutely free from oil, grease and chips.**

Roundness Tolerance

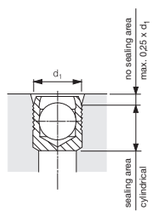
To achieve a secure functioning of the Expander® Sealing Plugs in respect to pressure effectiveness and sealing, a roundness tolerance of t = 0,05 mm has to be adhered to.

Drilling Tolerance

The drilling tolerance is + 0,1 mm.

Drilling Conicity

Within the active sealing area, the drilling hole has to be cylindrical.The drilling hole entrance may be conical up to 0,25 x d_1 as this zone does not have any primary influence on the sealing function.



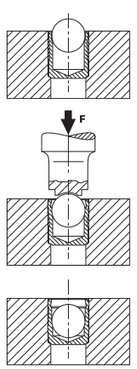
Galvanic Corrosion

An eventual contact corrosion has to be considered.

Assembly Instructions

Mounting Procedure

- The Expander® Sealing Plug has to be inserted into the counterbore hole with the ball facing out. The upper sleeve edge must not protrude the working piece. Mounting dimensions given in the catalogue have to be considered.
- When having only a small or no counterbore hole at all the sleeve bottom has to be supported sufficiently.
- Press in the ball by means of a press or setting die until the upper crown is lying underneath the sleeve edge. Respective standard values for stroke s and dimension x can be seen from the table below.



Tools:

For the assembly of Expander® Sealing Plugs, please use setting dies according to the catalogue specification.

Disassembly:

It is possible to disassemble the Expander® Sealing Plug.
To do this, the balls (hardness approx. 45 HRC) have to be drilled out with a hard metal tipped drill.

Disassembly Process:

1. Drill out the Expander® Sealing Plug
   up to Ø 6 mm: directly in **one** step
   greater than Ø 6 mm: in **several** steps
2. Redrill the bore hole to the Expander® Sealing Plug to the **diameter of the next model in size** according to the standard data sheet.
3. Clean the bore and free it from chips and possible leftovers of the body (do not use oil and grease).
4. Insert new Expander® Sealing Plug.

Attention:

After the disassembly, always insert the next diameter in size Expander® Sealing Plug!

Component Requirements (22880.0404 - 22880.0420):

Drilling Holes

- Roundness tolerances have to be within t = 0,05 mm.
- With hard materials the drilling roughness has to be R_z=10 to 30 µm.
- Drilling tolerance d_1= +0,12 mm.
- Longitudinal rifles and spiral grooves have to be avoided as they have a negative influence on the sealing.
- **Drilling holes have to be kept absolutely free from oil, grease and chips.**

Roundness Tolerance

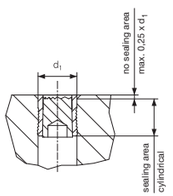
To achieve a secure functioning of the Expander® Sealing Plugs in respect to pressure effectiveness and sealing, a roundness tolerance of t = 0,05 mm has to be adhered to.

Drilling Tolerance

The drilling tolerance d_1 = +0,12 mm.

Drilling Conicity

Within the active sealing area, the drilling hole has to be cylindrical.The drilling hole entrance may be conical up to 0,25 x d_1 as this zone does not have any primary influence on the sealing function.



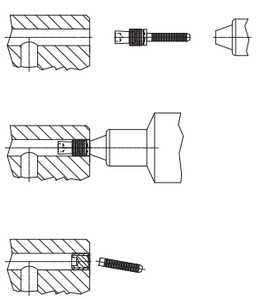
Galvanic Corrosion

An eventual contact corrosion has to be considered.

Assembly Instructions

Mounting Procedure

- The Expander® Sealing Plug with pull-anchor has to be flush mounted into the body of the assembling tool.
- The Expander® Sealing Plug has to be mounted into the bore hole to be sealed. The assembly operation has to be activated until the pull-anchor breaks when having achieved the nominal breaking load.



Attention:

- The assembly of the Expander® Sealing Plug has to be effected only in a clean working environment.
- The anchor and sleeve of the Sealing Plug must neither be cleaned nor greased.

Tools:

For a failure-free assembly of the Expander® Sealing Plug please use the original tools and the appropriate equipment according to the catalogue specification.

Disassembly:

It is possible to disassemble the Expander® Sealing Plug type with pull-anchor.

Disassembly Process:

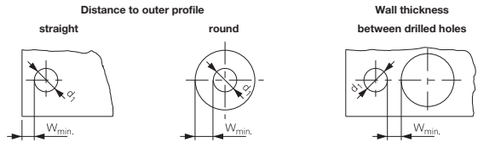
1. Strike back the anchor inside of the body with the help of the punch.
2. Drill out the body and remove the struck anchor.
3. Redrill the bore hole to the Expander® Sealing Plug to the **diameter of the next model in size** according to the standard data sheet.
4. Clean the bore and free it from chips and possible leftovers of the body (do not use oil and grease).
5. Insert new Expander® Sealing Plug.

Attention:

After the disassembly, always insert the next diameter in size Expander® Sealing Plug!

Wall Thicknesses / Edge Distances (EH 22880.)

The Expander® Sealing Plug is anchored to the basic material by radial expansion of the body. Depending on the basic materials' characteristics forces resulting from this type of anchorage as well as the hydraulic pressures and temperature loads will necessitate minimum wall thicknesses and edge distances.



For standard values of minimum wall thicknesses and edge distances (W_{min}) refer to table.

Calculation of Standard Values:

Diameter of Expander® Sealing Plug

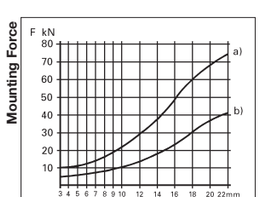
$d_1 \geq 4$ mm: $W_{min} = f_{min} \times d_1$

$d_1 < 4$ mm: $W_{min} = f_{min} \times d_1 + 0,5$

	Description	ETG -100 AISI 1144	C 15 Pb 1.0403	GG - 25 DIN 1691	GGG - 50 DIN 1693	AlCuMg2 3.1354	AlMgSiPb 3.0615	G-AlSi7Mg 3.2371
Basic material	Average tensile strength Rm N/mm²	1000	560	250	500	480	340	300
	Min. breaking elongation A5 / %	6	6	-	7	8	8	4
	Average permanent elongation limit $R_{p\,0,2}$ N/mm²	865	300	-	320	380	300	250
		Factor $f_{min.}$						
Body from stainless steel		0,6	0,8	1,0	0,8	0,8	1,0	1,0
Body from steel		0,5	0,6	1,0	0,6	0,6	1,0	1,0
Pull-anchor type		0,5	0,6	1,0	0,6	0,6	1,0	1,0

Mounting / Assembly Forces

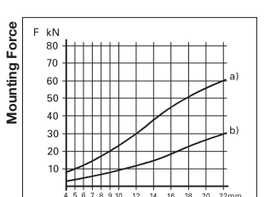
Expander® Sealing Plug
Body from stainless steel
Art. No.
22880.0053 to 22880.0072



Diameter of drilling hole
d_2

Measured in steel having a tensile strength of R_m = 1000 N/mm2. When using basic materials with lower tensile strengths values are lower.

Expander® Sealing Plug
Body from steel
Art. No.
22880.0004 to 22880.0022



Diameter of drilling hole
d_2

a) Force at min. drilling tolerance
b) Force at max. drilling tolerance.

Anchorage Principle (EH 22880.)

There is a direct connection between the necessary drilling roughness required and both, the hardness and the tensile characteristics of the basic material. Depending on the mounting combination of sealing plug and basic material, anchorage can either take place via the rifle profile of the Expander® body (automatic anchorage) or via the surface roughness of the drilling hole.

Attention: Depending on the type of Expander® Sealing Plug and the hardness of the basic material a bore roughness of Rz = 10-30 µm has to be adhered to.

Expander® Sealing Plug
Art. No. 22880.0004 to 22880.0072

Requirements to achieve maximum operation reliability

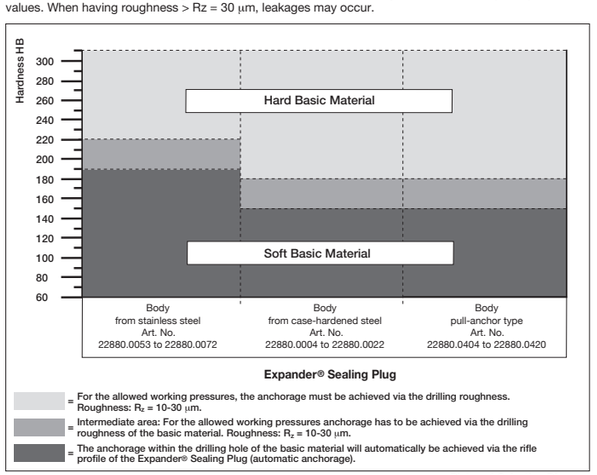
- Drilling tolerance d_1 = + 0,10 mm,
- Consideration of counterbore hole relations,
- Roundness tolerance t = 0,05 mm,
- Longitudinal rifles and spiral grooves that may have a negative influence on the sealing effectiveness have to be avoided,
- Drilling holes have to be free from oil and grease.

Expander® Sealing Plug, pull-anchor type
Art. No. 22880.0404 to 22880.0420

Requirements to achieve maximum operation reliability

- Drilling tolerance d_1 = + 0,12 mm,
- Roundness tolerance t = 0,05 mm,
- Longitudinal rifles and spiral grooves that may have a negative influence on the sealing effectiveness have to be avoided,
- Drilling holes have to be free from oil and grease.

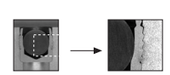
Note:
In case where an automatic anchorage is not possible when building in the Expander® Sealing Plug into a hard basic material a drilling roughness of > Rz= 10-30 µm is necessary to achieve the required pressure values. When having roughness > Rz = 30 µm, leakages may occur.



Picture 1 Selection Diagram

Anchorage by Rifle Profile (Automatic Anchorage)

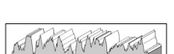
Example:
Expander® Sealing Plug made from case-hardened steel HB = 180; in aluminium alloy HB = 90



Example:
Expander® Sealing Plug, pull-anchor type from case-hardened steel HB = 180; in aluminium alloy HB = 90

Anchorage by Bore Roughness:

Required Roughness Design
An ideal bore roughness for the anchor can be achieved by using a twist drill or countersink.



Undesirable Roughness Design
Friction will cause a smooth roughness profile that is not desired.