
gepef
Expander Sealing Plugs

SEALING PLUGS

Expander sealing plugs replace threaded plugs for sealing manufacturing holes with diameters from 3 mm to 22 mm in:
Hydraulic manifolds, valves, pistons, steering systems, injection pumps, brake systems, compressors, and similar components.
Installation is quick and simple, without the need for threads or sealing compounds, ensuring perfect sealing.

EXOE Serie - Operating Pressures up to 450 bar

EXORV Serie - Operating Pressures up to 500 bar

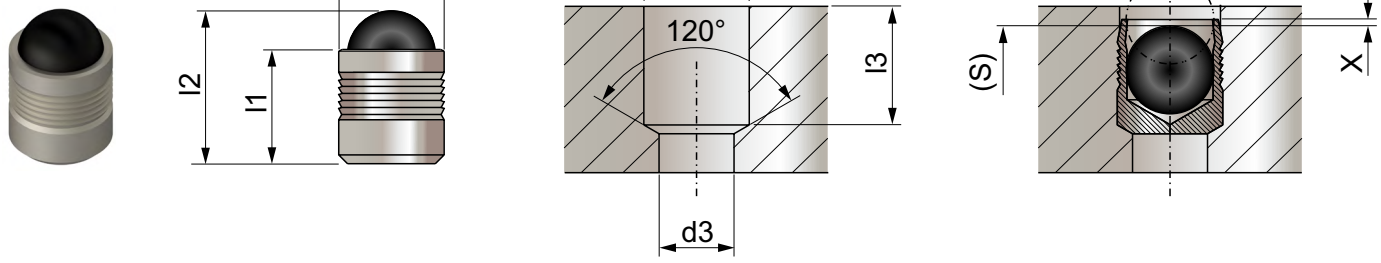
Diameters
3mm up to 22mm

Materials
Carbon Steel
Aluminum
Stainless Steel

Maximum Operating Pressure
Up to 800 bar / 11603 PSI

Surface Treatment
White trivalent passivation (chromium VI free)

EXOE Series



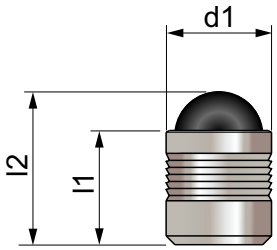
EXOE Series								
Code	d1	l1	l2 ~Ref.	d2 +0,1	d3 max.	l3 min.	S ~Ref.	X ±0,2
EXOE-030	3	3,6	4,6	3	2,2	3,4	1,2	0,4
EXOE-040	4	4	5,2	4	3,3	3,8	1,5	0,2
EXOE-050	5	5,5	7,1	5	4,3	5,3	2	0,4
EXOE-060	6	6,5	8,6	6	5,3	6,3	2,5	0,4
EXOE-070	7	7,5	10,1	7	6,4	7,3	3	0,4
EXOE-080	8	8,5	11,6	8	7,4	8,3	3,5	0,3
EXOE-090	9	10	13,6	9	8,4	9,8	4	0,4
EXOE-100	10	11	15,1	10	9,4	10,8	4,5	0,4
EXOE-120	12	13	17,9	12	10,6	12,8	5,5	0,4
EXOE-140	14	15	20,6	14	12,7	14,5	6,35	0,4
EXOE-160	16	17	23,4	16	14,7	16,5	7	0,6
EXOE-180	18	19	26,4	18	16,7	18,5	8,0	0,6
EXOE-200	20	22	30,1	20	18,7	21,5	9	0,8
EXOE-220	22	25	34	22	20,7	24,5	10	0,8

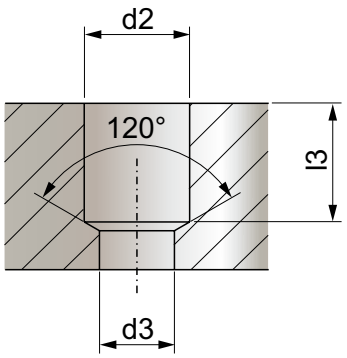
Pressures				
EXOE	ETG-100 AISI 1144	C15Pb 10.403	EM-GJL-250 EN1561	AlCu4Mg1 ENAW-2024-T3
d1 mm	Maximum test pressure *		Maximum working pressure	
3 - 10 12 - 22	1100 bar / 16000 PSI 900 bar / 13000 PSI		350 bar / 5100 PSI 280 bar / 4100 PSI	

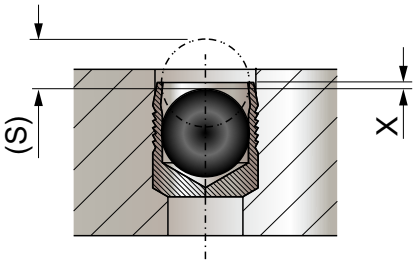
* Intermittent Test Pressure		
EXOE	AiMgSiPb ENAW-6012-T6	G-AiSi7Mg ENAC-42100
d1 mm	Maximum test pressure *	Maximum working pressure
3 - 10 12 - 22	1000 bar / 14500 PSI 800 bar / 11600 PSI	320 bar / 4600 PSI 250 bar / 3600 PSI

Materials
Sleeve: case-hardened steel, trivalent zinc plated
Ball: bearing steel, hardened and tempered

EXOEI Series







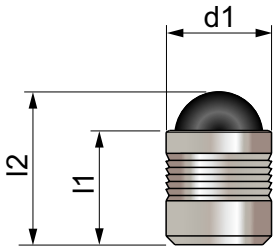
EXOEI Series								
Code	d1	l1	l2 ~Ref.	d2 +0,1	d3 max.	l3 min.	S ~Ref.	X ±0,2
EXOEI-030	3	3,6	4,6	3	2,2	3,4	1,2	0,4
EXOEI-040	4	4	5,2	4	3,3	3,8	1,5	0,2
EXOEI-050	5	5,5	7,1	5	4,3	5,3	2	0,4
EXOEI-060	6	6,5	8,6	6	5,3	6,3	2,5	0,4
EXOEI-070	7	7,5	10,1	7	6,4	7,3	3	0,4
EXOEI-080	8	8,5	11,6	8	7,4	8,3	3,5	0,3
EXOEI-090	9	10	13,6	9	8,4	9,8	4	0,4
EXOEI-100	10	11	15,1	10	9,4	10,8	4,5	0,4
EXOEI-120	12	13	17,9	12	10,6	12,8	5,5	0,4
EXOEI-140	14	15	20,6	14	12,7	14,5	6,35	0,4
EXOEI-160	16	17	23,4	16	14,7	16,5	7	0,6
EXOEI-180	18	19	26,4	18	16,7	18,5	8	0,6
EXOEI-200	20	22	30,1	20	18,7	21,5	9	0,8
EXOEI-220	22	25	34	22	20,7	24,5	10	0,8

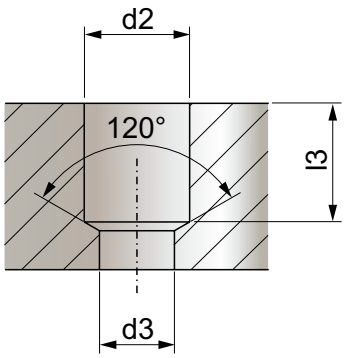
Pressures				
EXOEI	ETG-100 AISI 1144	C15Pb 10.403	EM-GJL-250 EN1561	AlCu4Mg1 ENAW-2024-T3
d1 mm	Maximum test pressure *		Maximum working pressure	
3 - 10 12 - 22	1400 bar / 20300 PSI 1150 bar / 16700 PSI		450 bar / 6500 PSI 350 bar / 5100 PSI	

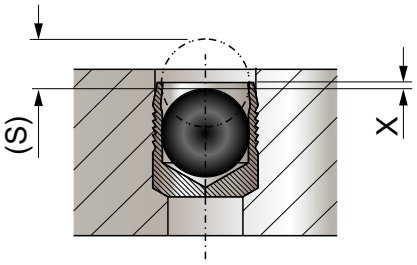
* Intermittent Test Pressure		
EXOEI	AiMgSiPb ENAW-6012-T6	G-AiSi7Mg ENAC-42100
d1 mm	Maximum test pressure *	Maximum working pressure
3 - 10 12 - 22	1200 bar / 17400 PSI 900 bar / 13000 PSI	380 bar / 5500 PSI 280 bar / 4100 PSI

Materials
Sleeve: stainless steel 303, polished
Ball: bearing steel, hardened and tempered

EXOEII Series





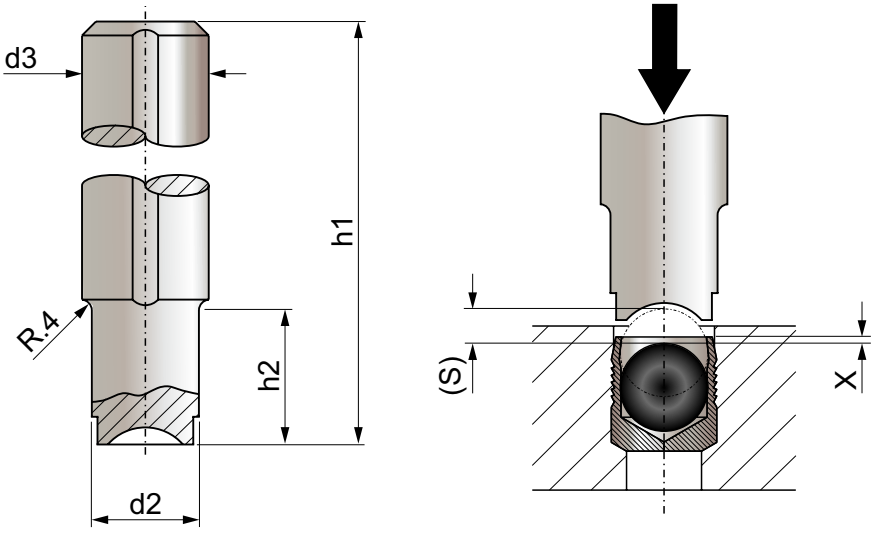


EXOEII Series								
Code	d1	l1	l2 ~Ref.	d2 +0,1	d3 max.	l3 min.	S ~Ref.	X ±0,2
EXOEII-030	3	3,6	4,6	3	2,2	3,4	1,2	0,4
EXOEII-040	4	4	5,1	4	3,3	3,8	1,5	0,2
EXOEII-050	5	5,5	7,1	5	4,3	5,3	2	0,4
EXOEII-060	6	6,5	8,6	6	5,3	6,3	2,5	0,4
EXOEII-070	7	7,5	10,1	7	6,4	7,3	3	0,4
EXOEII-080	8	8,5	11,6	8	7,4	8,3	3,5	0,3
EXOEII-090	9	10	13,5	9	8,4	9,8	4	0,4
EXOEII-100	10	11	15,1	10	9,4	10,8	4,5	0,4
EXOEII-120	12	13	17,8	12	10,6	12,8	5,5	0,4
EXOEII-140	14	15	20,5	14	12,7	14,5	6,35	0,4

Pressures				
EXOEII	ETG-100 AISI 1144	C15Pb 10.403	EM-GJL-250 EN1561	AlCu4Mg1 ENAW-2024-T3
d1 mm	Maximum test pressure *		Maximum working pressure	
3 - 10 12 - 14	1400 bar / 20300 PSI 1000 bar / 14500 PSI		450 bar / 6500 PSI 350 bar / 5100 PSI	

* Intermittent Test Pressure		
EXOEII	AiMgSiPb ENAW-6012-T6	G-AiSi7Mg ENAC-42100
d1 mm	Maximum test pressure *	Maximum working pressure
3 - 10 12 - 14	1200 bar / 17400 PSI 900 bar / 13000 PSI	380 bar / 5500 PSI 280 bar / 4100 PSI

Materials
Sleeve: stainless steel 303
Ball: stainless steel



EXOE / EXOEI / EXOEII Series							
Code	d1	d3 -h9	h1	d2	h2	X ±0,2	S ~Ref.
EX-030	3	10	100	2,8	10	0,4	0,4
EX-040	4	10	100	3,8	10	0,2	0,2
EX-050	5	10	100	4,8	12	0,4	0,4
EX-060	6	10	100	5,8	15	0,4	0,4
EX-070	7	10	100	6,8	18	0,4	0,4
EX-080	8	10	100	7,8	20	0,3	0,3
EX-090	9	14	100	8,8	22	0,4	0,4
EX-100	10	14	100	9,8	25	0,4	0,4
EX-120	12	14	150	11,7	30	0,4	0,4
EX-140	14	20	150	13,7	35	0,4	0,4
EX-160	16	20	150	15,7	40	0,6	0,6
EX-180	18	20	150	17,7	45	0,6	0,6
EX-200	20	25	150	19,7	50	0,8	0,8
EX-220	22	25	150	21,7	55	0,8	0,8

Materials
heat treated tool steel, approx. 50Hrc

INSTALLATION INSTRUCTIONS EXOE / EXOEI / EXOEII SERIES

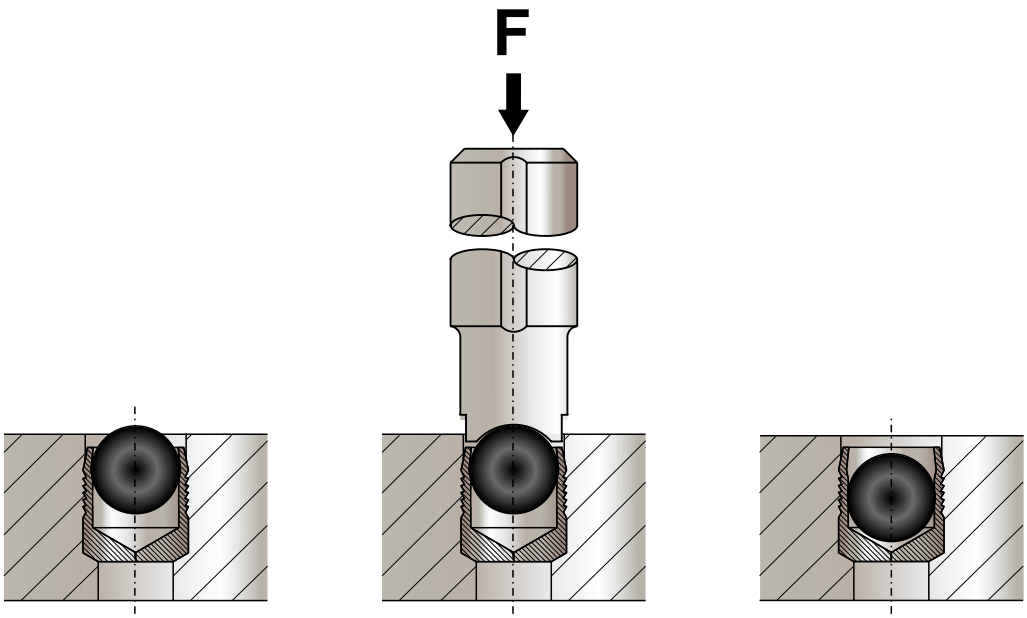
Installation instructions for EXOE / EXOEI / EXOEII series

Drilled Holes

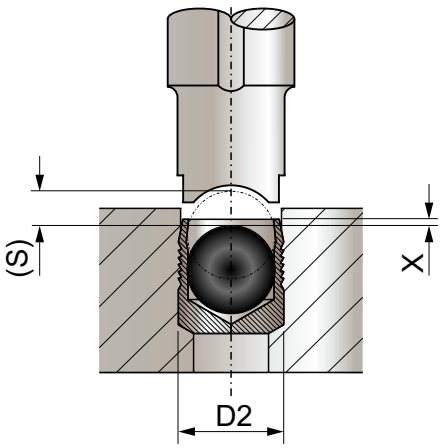
The holes must comply with the specified tolerances and be free from oil, grease, and burrs.
Grooves and score marks must be avoided, as they affect sealing performance.
Circularity tolerance must be maintained within 0.05 mm.
The hole must have a surface roughness of Rz = 10 – 30 µm.

Assembly Operation

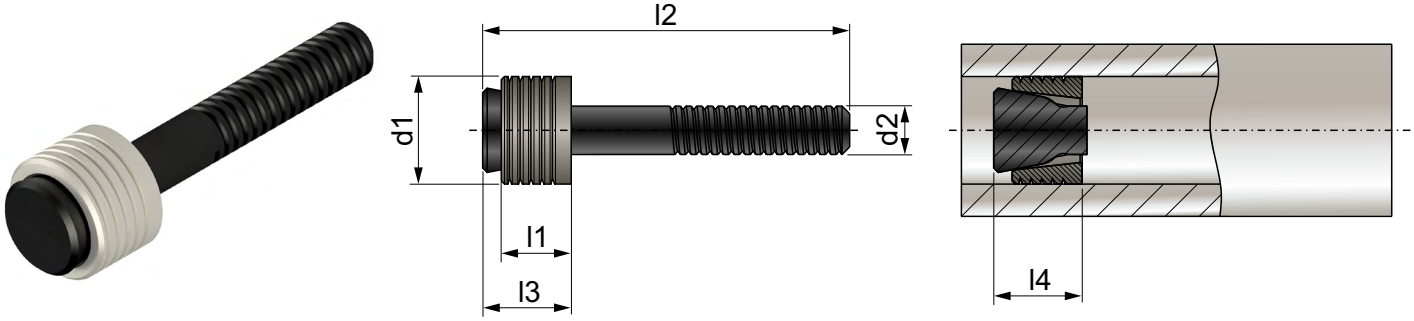
Insert the plug with the ball facing outward; the edge of the bushing must not exceed the external contour of the part.
The base of the bushing must be properly supported during installation.
Press the ball until its upper part is below the edge of the bushing.



EXOE / EXOEI / EXOEII Series														
D2 (mm)		3	4	5	6	7	8	9	10	12	14	16	18	20	22
S (mm)	Stroke	1,2	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,5	6,35	7,0	8,0	9,0	10,0
X (mm) +/-.2	Position of top of ball relative to top of sleeve	0,4	0,2	0,4	0,4	0,4	0,3	0,4	0,4	0,4	0,4	0,6	0,6	0,8	0,8



EXORV Series



EXORV Series							
Code	d1	l1	d2	l2	l3 max.	l4 max.	ØHole ±0,12
EXORV-040	4	4,5	2,5	39	9	6,5	4
EXORV-050	5	5,5	3	41	10	7,5	5
EXORV-060	6	6,5	3,4	43	12	8	6
EXORV-070	7	7,5	4,1	38	14	9	7
EXORV-080	8	8,5	4,2	40	15	10,5	8
EXORV-090	9	9,5	4,5	43	17	11	9
EXORV-100	10	10,5	4,75	45	19	12,5	10

Pressures				
EXORV	ETG-100 AISI 1144	C15Pb 10.403	EM-GJL-250 EN1561	AlCu4Mg1 ENAW-2024-T3
d1 mm	Maximum test pressure *		Maximum working pressure	
4 -10	1600 bar / 23200 PSI		500 bar / 7200 PSI	

* Intermittent Test Pressure		
EXORV	AiMgSiPb ENAW-6012-T6	G-AiSi7Mg ENAC-42100
d1 mm	Maximum test pressure *	Maximum working pressure
4 - 10	1400 bar / 20300 PSI	450 bar / 6500 PSI

Materials
Bushing: Case-hardened steel
Stem: Hardened and tempered steel or cold extrusion steel

INSTALLATION INSTRUCTIONS FOR EXORV SERIES

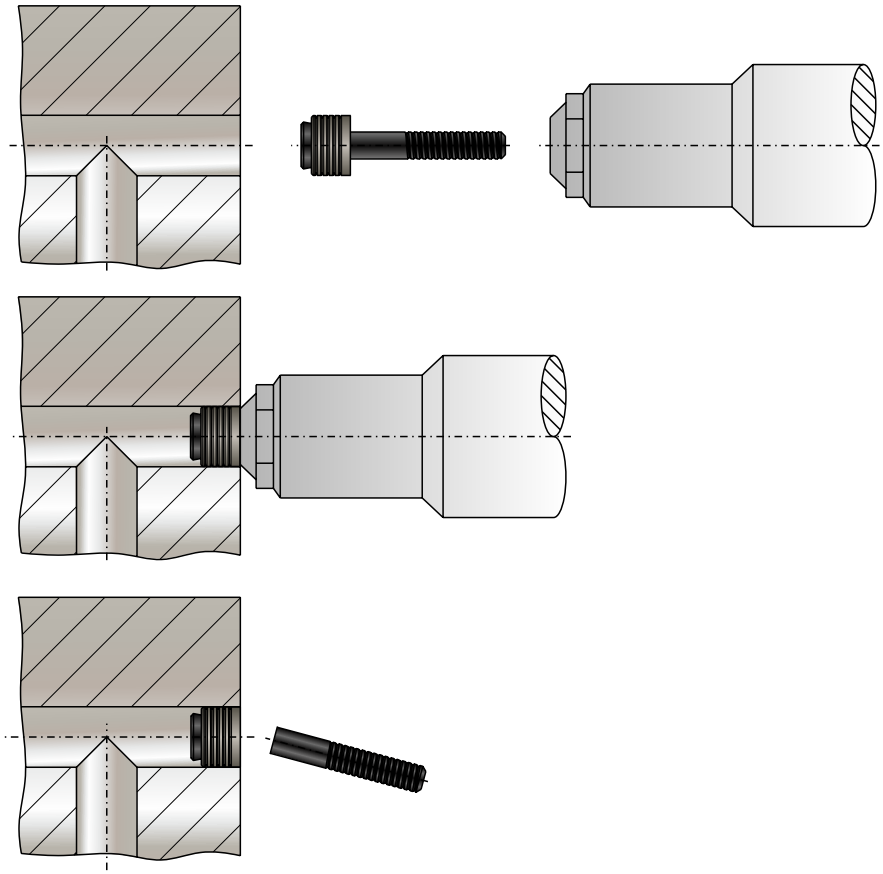
Installation instructions for EXORV series

Hole

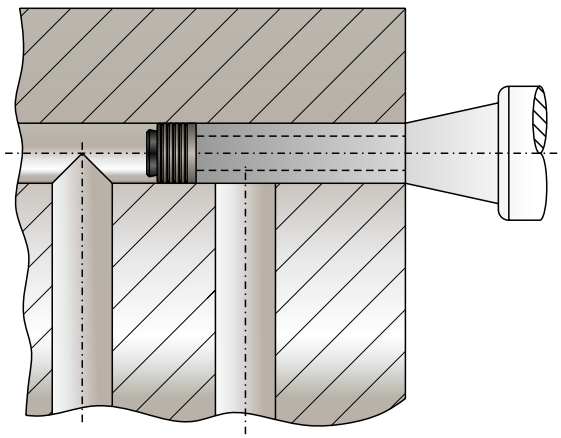
The holes must comply with the specified tolerances and be free from oil, grease, and burrs.
Grooves and score marks must be avoided, as they affect sealing performance.
Circularity tolerance must be maintained within 0.05 mm.
For applications involving high hardness materials.
The hole must have a surface roughness of Rz = 10 – 30 µm.

Operação de Montagem

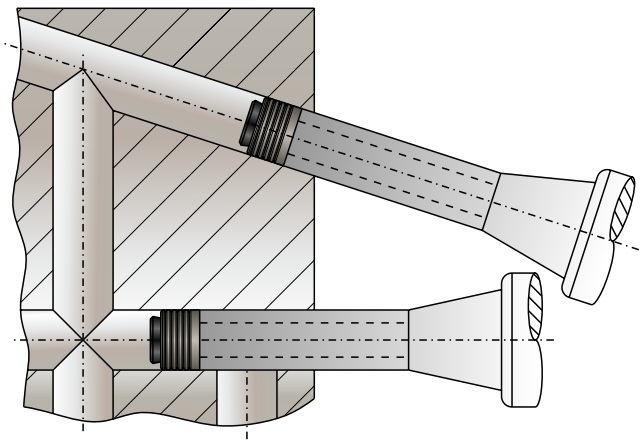
nsert the plug into the installation tool, with the bushing properly supported on the tool tip.
Then insert it into the hole to be sealed and operate the equipment until the pull stem breaks when the predetermined breaking force is reached.



Application between holes



Application in inclined holes

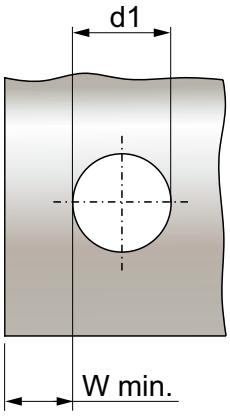


DESIGN GUIDELINES FOR EXPANDER SEALING PLUGS

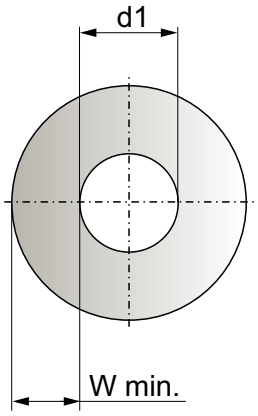
Project instructions

The radial expansion of the GEPEF Sealing Plug causes the housing material around the plug to deform plastically.
A proper minimum wall thickness, or distance from an edge is necessary to optimize the strength of the mechanical connection.
The operating hydraulic pressure, thermal cycling, plug type and characteristics of the base metal must all be considered when determining these values. Please contact GEPEF for additional information.

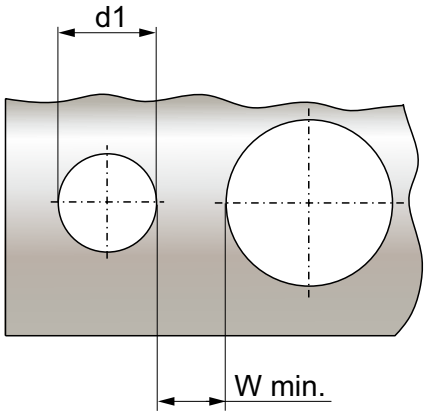
Distance to an external wall



Distance to an exterior wall



Wall thickness between bores



The guidelines for a minimum wall thickness or distance from an edge (Wmin) are expressed below. These minimum values produce only slight deformation on the exterior profile of less than 20µm. This does not affect
the performance of the EIS Sealing Plug. Using Wmin values less than those recommended can cause overloading
of the base material. This can adversely influence the function of the EIS Sealing Plug. Please contact GEPEF for additional information.

W min. Values

Sealing Plug Diameters: **d1 ≥ 4mm: Wmin = fmin * d1**
d1 < 4mm: Wmin = fmin * d1 + 0,5mm

	Materials						
	SAE 1144	SAE 10L15	ASTM A48 Cast steel	ASTM A356 Ductile Steel	2024-T4	6061-T6	356-T6 Cast aluminum
Series	Fator f min.						
EXOE	0,5	0,6	1,0	0,6	0,6	1,0	1,0
EXORV	0,5	0,6	1,0	0,6	1,0	1,0	1,0

INSTRUCTIONS FOR REMOVAL EXPANDER SEALING PLUGS

Instructions for removal sealing plugs EXOE, EXOEI, EXOEII and EXOERV Series

Removal of the EXOE, EXOEI, EXOEII and EXORV series plugs requires simple machining operations using a high speed steel or carbide drill bit. After removal, clean the hole of burrs or bushing remains and remove oil and grease from the hole.
When installing a new obturator in place of the removed one, install one in diameter above the removed measurement.

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