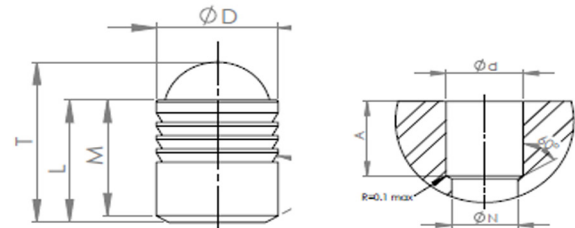


Ball Expansion Plugs

Machined to precise tolerances and exacting quality control standards



- High pressure plugs
- One single piece
- Metric and Imperial sizes available
- Standard length
- Interchangeable with other products
- Simple drilling
- Fast installation
- Instant mechanical expansion
- High sealing capacity
- No sealants required



METRIC SIZES STANDARD LENGTH MM

Part Number	Plug Dimensions					Hole Dimensions		
	D	L	M	T	Grooves No.	d +0,1 0	A Min.	N Max.
BEPMS003	3,00	3,18	2,79	4,10	3	3,00	3,40	2,20
BEPMS004	4,00	4,00	3,70	5,20	3	4,00	3,80	3,30
BEPMS005	5,00	5,50	5,20	6,95	5	5,00	5,30	4,30
BEPMS006	6,00	6,50	6,20	8,70	6	6,00	6,30	5,30
BEPMS007	7,00	7,50	7,20	10,10	7	7,00	7,30	6,40
BEPMS008	8,00	8,50	8,20	11,80	8	8,00	8,30	7,40
BEPMS009	9,00	10,00	9,70	13,50	9	9,00	9,80	8,40
BEPMS010	10,00	11,00	10,70	14,70	10	10,00	10,80	9,40
BEPMS012	12,00	13,00	12,70	17,10	12	12,00	12,80	10,60
BEPMS014	14,00	15,00	14,40	20,80	10	14,00	14,50	12,70
BEPMS016	16,00	17,00	16,40	23,70	10	16,00	16,50	14,70
BEPMS018	18,00	19,00	18,40	26,30	12	18,00	18,50	16,70
BEPMS020	20,00	22,00	21,40	30,50	12	20,00	21,50	18,70
BEPMS022	22,00	25,00	24,40	34,20	12	22,00	24,50	20,70

Table 1

INCH SIZES STANDARD LENGTH MM								
Part Number	Plug Dimensions					Hole Dimensions		
	D	L	M	T	Grooves No.	d	A	N
						+0,1 0	Min.	Max.
BEPES118	3,00	3,18	2,79	4,09	3	3,00	2,90	2,31
BEPES156	3,97	4,09	3,78	5,33	3	3,97	3,78	3,30
BEPES187	4,76	5,59	5,28	6,86	4	4,76	5,78	4,06
BEPES218	5,55	5,59	5,28	7,11	5	5,55	5,28	4,83
BEPES250	6,35	6,58	6,27	8,64	6	6,35	6,27	5,59
BEPES281	7,14	7,59	7,29	10,16	7	7,14	7,29	6,35
BEPES312	7,94	8,59	8,28	11,68	8	7,94	8,28	7,14
BEPES343	8,73	10,08	9,78	13,21	9	8,73	9,38	7,92
BEPES375	9,53	10,08	9,78	13,72	9	9,53	9,78	8,71
BEPES406	10,32	11,10	10,80	14,97	10	10,32	10,80	9,53
BEPES437	11,11	13,08	12,78	17,27	12	11,11	12,78	10,31
BEPES468	11,90	13,08	12,78	18,03	12	11,90	12,78	11,10
BEPES562	14,29	15,09	14,48	20,83	14	14,29	14,48	12,95
BEPES625	15,88	16,99	16,41	23,11	16	15,88	16,48	14,27
BEPES687	17,46	19,00	18,39	26,16	18	17,46	18,47	15,88
BEPES750	19,05	22,00	21,39	29,97	20	19,05	21,46	17,48
BEPES875	22,23	24,99	24,38	34,29	22	22,23	24,46	20,65

Table 2

INCH SIZES SHORT LENGTH MM - LOW PRESSURE								
Part Number	Plug Dimensions					Hole Dimensions		
	D	L	M	T	Grooves No.	d	A	N
						+0,1 0	Min.	Max.
BEPSS093	2,38	2,49	1,98	3,05	3	2,38	2,06	1,78
BEPSS125	3,18	3,18	2,79	4,06	3	3,18	2,87	2,54
BEPES156	3,97	3,16	2,79	4,32	3	3,97	2,87	3,30
BEPES187	4,76	4,75	4,24	6,10	4	4,76	4,32	4,06
BEPES218	5,55	4,75	4,24	6,35	4	5,55	4,32	4,83
BEPES250	6,35	5,72	4,90	7,62	5	6,35	4,98	5,59
BEPES281	7,14	6,48	5,84	8,89	6	7,14	5,66	6,35
BEPES312	7,94	7,11	6,40	9,91	7	7,94	6,48	7,14
BEPES343	8,73	7,80	6,91	10,92	7	8,73	6,99	7,92
BEPES406	10,32	9,27	7,75	13,21	9	10,32	7,82	9,53

Table 3

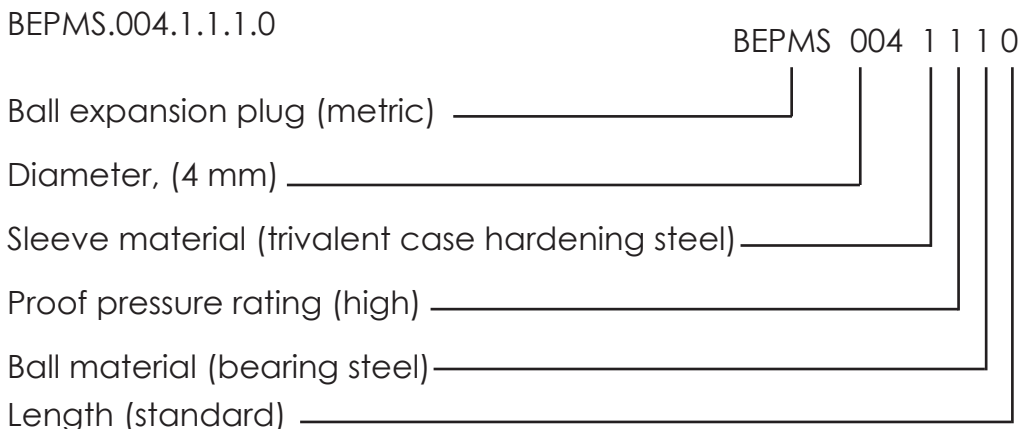
Materials

Material	Sleeve	Ball	Pressure	Type
111	Trivalent case hardening steel, zinc plated passivated	Bearing steel HRc ≥ 55, heat treated, anticorrosion treatment	High Pressure	Standard
311	Stainless steel AISI 303	Bearing steel HRc ≥ 55, heat treated, anticorrosion treatment	High Pressure	Standard
313	Stainless steel AISI 303	Stainless steel AISI 420C	High Pressure	Standard
414	Stainless steel AISI 316	Stainless steel AISI 316	Low Pressure	On request
523	Aluminium	Stainless steel AISI 420C	Low Pressure	On request

Part Numbering System

- Ball plug type Metric = BEPMS, Inch = BEPES
- Diameter 3 to 22 mm
- Sleeve material 1=trivalent case hardening steel, 3=AISI 303, 4=AISI 316, 5=Aluminium
- Proof pressure rating 1=high 2=low
- Ball material 1=bearing steel, 3=AISI 420C, 4=AISI 316
- Length 0=standard length, 1=short length

Code Example



Pressure Resistance

Base Material	Pressure Bar	Plugs Material					
		111		311		313	
		3-10	12-22	3-10	12-22	3-10	12-22
High strength steel ETG-100 AISI 1144	Test Pressure	1200	900	1500	1150	1500	1000
	Working Pressure	350	280	450	350	450	350
Free machining case Hard steel C15Pb DIN 1.0403	Test Pressure	1200	900	1500	1150	1500	1000
	Working Pressure	350	280	450	350	450	350
Cast Iron GG-25 DIN 1691	Test Pressure	1200	900	1500	1150	1500	1000
	Working Pressure	350	280	450	350	450	350
Ductile Cast Iron GGG-50 DIN 1691	Test Pressure	1200	900	1500	1150	1500	1000
	Working Pressure	350	280	450	350	450	350
Aluminum alloy Al Cu Mg 2 DIN 3.1354/AA2024	Test Pressure	1200	900	1500	1150	1500	100
	Working Pressure	350	280	450	350	450	350
Aluminum alloy Al Mg Si Pb DIN 3.0625/~AA6262	Test Pressure	1100	800	1300	900	1300	900
	Working Pressure	320	250	380	280	380	280
Cast Al alloy G-Al Si 7 Mg DIN 3.2371/AA356-T6	Test Pressure	1100	800	1300	900	1300	900
	Working Pressure	320	250	380	280	380	280

Test Conditions: Hole Tolerance 0/+0,1 mm
Roughness Ra μm 1,6 Rz μm 6,3

Mechanical expansion and sealing capacity

Mechanical expansion takes place when the ball is pressed into the hole. The sleeve expands into the hole, sealing is achieved because of its high expansion capacity.

The holes' surface finish must be rough, low roughness reduces the plugs retention capacity.

Hardness of the plug must be higher than the base material. When the hardness of the plug is lower, increased roughness is essential.

Recommended hole roughness: min. $R_a \geq \mu\text{m } 2,5$ / $R_z \geq \mu\text{m } 10$
max $R_a \leq \mu\text{m } 6,3$ / $R_z \leq \mu\text{m } 30$

Base Material Hardness

Base Material	Hardness (min.) HB
High Strength Steel ETG-100 /44SMn28 AISI 114	280
Case Hardening Steel C15Pb 1.0403	180
Grey Cast Iron GG-25 EN 1561	160
Ductile Cast Iron GGG-50 EN 1563	170
Aluminum alloy AlCu4Mg 1 EN AW-2024-T3 / AA2024	120
Aluminum Alloy AlMgSiPb EN AW-6012-T6/AA6012T6	80
Cast Aluminium Alloy G-AISI 7 Mg EN AC-42100/AA356	80

Ball Expansion Plug Hardness

Plug Type	Hardness (min.) HB
BEP/313	260
BEP/311	260
BEP/111	230