BRITISH STANDARD

BS EN
4537-2:2009

Aerospace series — Bushes, flanged in corrosion-resisting steel with self-lubricating liner, elevated load

Part 2: Dimensions and loads — Inch series

ICS 49.035

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 4537-2:2009.

The UK participation in its preparation was entrusted to Technical Committee ACE/12, Aerospace fasteners and fastening systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Série aérospatiale - Bagues, à épaulement en acier résistant à la corrosion à garniture autolubrifiante, charge élevée - Partie 2: Dimensions et charges - Série en inches

Luft- und Raumfahrt - Buchsen mit Flansch aus korrosionsbeständigem Stahl mit selbstschmierender Beschichtung, erhöhte Belastung - Teil 2: Maße und Belastungen - Inch Reihe

This European Standard was approved by CEN on 24 April 2009.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 4537-2:2009) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies the characteristics of flanged bushes in corrosion resisting steel with self-lubricating liner elevated load for aerospace applications.

The bushes are intended for use in fixed or moving parts of the aircraft structure and control mechanisms.

They shall be used in the temperature range – 55 °C to 163 °C.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2311, *Aerospace series — Bushes with self-lubricating liner — Technical specification*

EN 2424, *Aerospace series — Marking of aerospace products*

EN 3161, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted — Solution treated and precipitation treated — Bar — a or D ≥ 200 mm — R_m ≥ 930 MPa* [1)]

TR 4475, *Aerospace series — Bearings and mechanical transmissions for airframe applications — Vocabulary* [2)]

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 8075, *Aerospace — Surface treatment of hardenable stainless steel parts*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in TR 4475 apply.

4 Requirements

4.1 Configuration, dimensions and mass

According to Figures 1 and 2 and Tables 1, 2, 4 and 5. Dimensions apply after surface treatment. Dimensions and tolerances are expressed in millimetres (inches).

General tolerances shall be ISO 2768-m in accordance with ISO 2768-1.

4.2 Surface roughness

According to Figures 1 and 2.

1) Published as ASD Prestandard at the date of publication of this standard.

2) Published as ASD Technical Report at the date of publication of this standard.

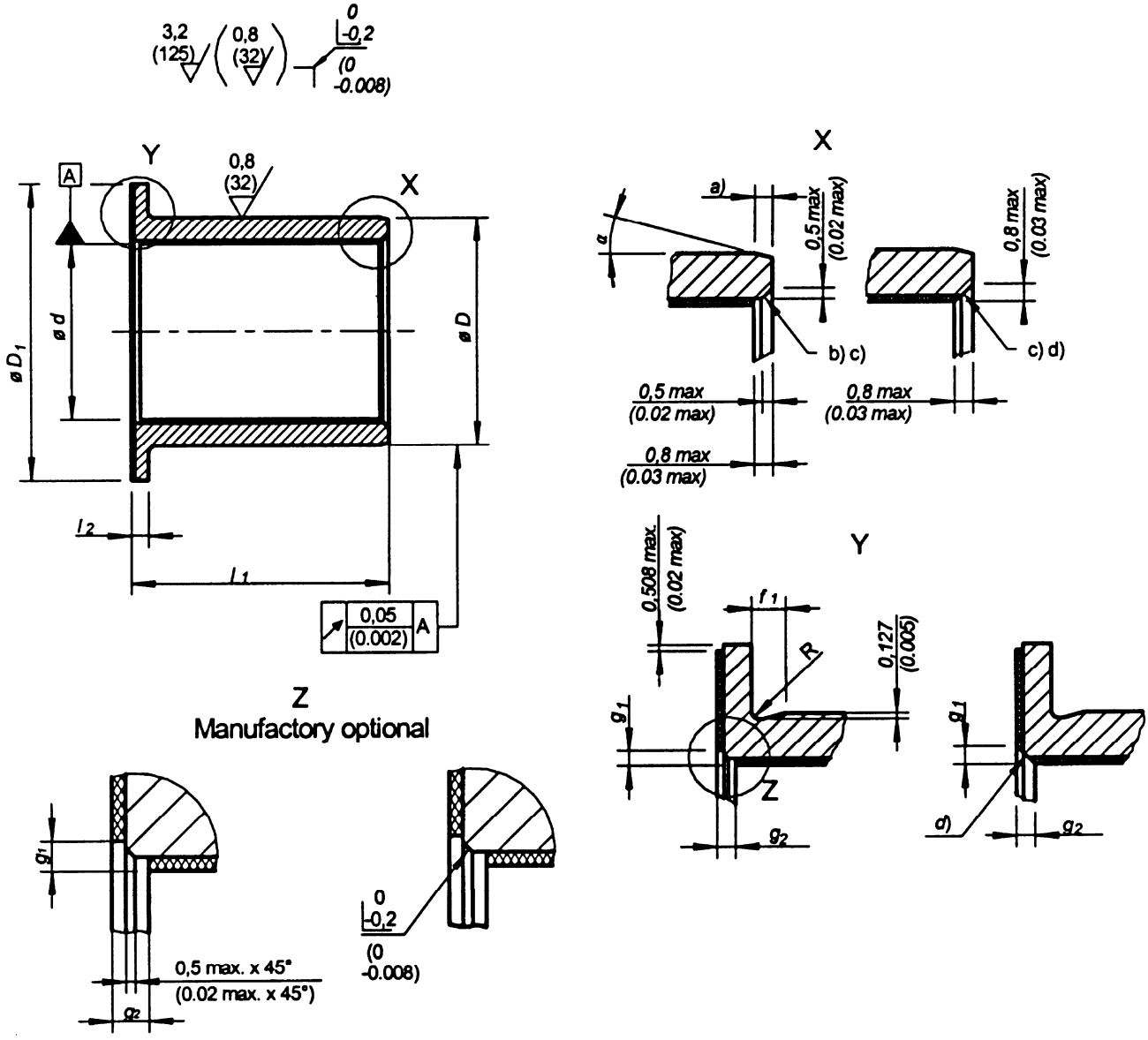
4.3 Materials

Bush: Stainless steel according to EN 3161.

Liner: Self-lubricating wear resistant material consistent with the requirements of EN 2311.

4.4 Surface treatment

Code T: Passivation according to ISO 8075.



Key

[a] Chamfer machined before bonding

[b] Chamfer or radius at manufacturers option

[c] Chamfer machined after bonding

[d] Manufactory optional

Figure 1 — Configuration — Type D

Table 1 — Dimensions and tolerances — Type D

Diameter code [a]	d Nominal diameter	d $^{0}_{-0,025}$ ($^{0}_{-0.0010}$)	D $^{0}_{-0,013}$ $^{0}_{-0.0005}$	D_1 $^{0}_{-0,51}$ ($^{0}_{-0.020}$)	g_1 max.	g_2 max.	l_2 $^{0}_{-0,13}$ ($^{0}_{-0.005}$)	f_1 [b] max.	a	α ± 2°	R $^{+0,25}_{0}$ ($^{+0.010}_{0}$)
04	6,350 (0.2500)	6,388 (0.2515)	9,550 (0.3760)	19,05 (0.750)	0,70 (0.028)	0,70 (0.028)	1,60 (0.063)	1,20 (0.047)	0,50 to 0,70 (0.020 to 0.030)	15°	0,13 (0.005)
05	7,938 (0.3125)	7,976 (0.3140)	11,140 (0.4386)	20,64 (0.813)							
06	9,525 (0.3750)	9,563 (0.3765)	12,730 (0.5012)	22,23 (0.875)							
07	11,113 (0.4375)	11,151 (0.4390)	14,321 (0.5638)	23,81 (0.938)							
08	12,700 (0.5000)	12,738 (0.5015)	15,913 (0.6265)	25,40 (1.000)							
09	14,288 (0.5625)	14,326 (0.5640)	17,506 (0.6892)	28,58 (1.125)							
10	15,875 (0.6250)	15,913 (0.6265)	20,681 (0.8142)	31,75 (1.250)							
11	17,463 (0.6875)	17,501 (0.6890)	22,268 (0.8767)	34,93 (1.375)							
12	19,050 (0.7500)	19,088 (0.7515)	23,858 (0.9393)	38,10 (1.500)							
14	22,225 (0.8750)	22,263 (0.8765)	27,038 (1.0645)	41,28 (1.625)	1,00 (0.039)	1,00 (0.039)					
16	25,400 (1.0000)	25,438 (1.0015)	30,221 (1.1898)	44,45 (1.750)							
18	28,575 (1.1250)	28,613 (1.1265)	33,396 (1.3148)	47,63 (1.875)			2,39 (0.094)				
20	31,750 (1.2500)	31,788 (1.2515)	36,571 (1.4398)	50,80 (2.000)							
22	34,925 (1.3750)	34,963 (1.3765)	39,746 (1.5648)	53,98 (2.125)							
24	38,100 (1.5000)	38,138 (1.5015)	44,508 (1.7523)	57,15 (2.250)							
26	41,275 (1.6250)	41,313 (1.6265)	47,683 (1.8773)	60,33 (2.375)							
28	44,450 (1.7500)	44,488 (1.7515)	50,858 (2.0023)	63,50 (2.500)							
32	50,800 (2.0000)	50,838 (2.0015)	57,208 (2.2523)	69,85 (2.750)							

[a] Diameter code corresponds to nominal diameter d in 1/16 inch.

[b] Min. length code 010 or higher.

Table 2 — Mass — Type D

Dia-meter code [a]	Length code [b]														
	006	007	008	009	010	011	012	014	016	018	020	022	024	028	032
	l_1 $^{-0,10}_{-0,40}$ ($^{-0.004}_{-0.016}$)														
	4,76 (0.188)	5,56 (0.219)	6,35 (0.250)	7,14 (0.281)	7,94 (0.313)	8,73 (0.344)	9,53 (0.375)	11,11 (0.438)	12,70 (0.500)	14,29 (0.563)	15,88 (0.625)	17,46 (0.688)	19,05 (0.750)	22,23 (0.875)	25,40 (1.000)
	Mass in kg/1 000 pieces ≈														
04	4,13	4,38	4,62	4,87	5,11	5,36	5,60	—	—	—	—	—	—	—	—
05	4,72	5,02	5,31	5,61	5,90	6,19	6,49	7,08	7,67	—	—	—	—	—	—
06	5,31	5,66	6,00	6,34	6,69	7,03	7,37	8,06	8,75	9,43	—	—	—	—	—
07	5,90	6,30	6,69	7,08	7,47	7,87	8,26	9,04	9,83	10,62	11,40	—	—	—	—
08	6,50	6,94	7,38	7,82	8,27	8,71	9,15	10,03	10,92	11,80	12,69	13,57	14,46	—	—
09	7,95	8,45	8,94	9,43	9,92	10,41	10,91	11,89	12,88	13,86	14,84	15,83	16,81	—	—
10	10,78	11,63	12,48	13,32	14,17	15,02	15,87	17,57	19,26	20,96	22,66	24,35	26,05	29,44	—
11	—	—	14,47	15,39	16,32	17,24	18,16	20,00	21,85	23,69	25,54	27,38	29,22	32,91	36,60
12	—	—	16,62	17,62	18,61	19,61	20,60	22,60	24,59	26,58	28,57	30,57	32,56	36,54	40,53
14	—	—	18,69	19,84	20,98	22,13	23,27	25,56	27,85	30,14	32,43	34,72	37,01	41,59	46,17
16	—	—	20,77	22,07	23,36	24,65	25,95	28,54	31,13	33,72	36,30	38,89	41,48	46,66	51,84
18	—	—	—	—	31,28	32,73	34,17	37,05	39,94	42,82	45,71	48,59	51,47	57,24	63,01
20	—	—	—	—	—	—	37,26	40,44	43,62	46,80	49,98	53,16	56,34	62,70	69,06
22	—	—	—	—	—	—	40,36	43,83	47,31	50,78	54,26	57,73	61,21	68,16	75,11
24	—	—	—	—	—	—	49,52	54,64	59,76	64,88	70,00	75,12	80,24	90,48	100,72
26	—	—	—	—	—	—	—	—	64,08	69,59	75,11	80,62	86,13	97,16	108,19
28	—	—	—	—	—	—	—	—	68,40	74,31	80,22	86,12	92,03	103,84	115,66
32	—	—	—	—	—	—	—	—	77,04	83,74	90,43	97,13	103,82	117,21	130,59

continued

Table 2 *(concluded)*

Diameter code [a]	Length code [b]												
	036	**040**	**044**	**048**	**052**	**056**	**060**	**064**	**068**	**072**	**076**	**080**	**088**
	l_1 $^{-0,10}_{-0,40}$ ($^{-0.004}_{-0.016}$)												
	28,58 (1.125)	31,75 (1.250)	34,93 (1.375)	38,10 (1.500)	41,28 (1.625)	44,45 (1.750)	47,63 (1.875)	50,80 (2.000)	53,98 (2.125)	57,15 (2.250)	60,33 (2.375)	63,50 (2.500)	69,85 (2.750)
	Mass in kg/1 000 pieces ≈												
04	—	—	—	—	—	—	—	—	—	—	—	—	—
05	—	—	—	—	—	—	—	—	—	—	—	—	—
06	—	—	—	—	—	—	—	—	—	—	—	—	—
07	—	—	—	—	—	—	—	—	—	—	—	—	—
08	—	—	—	—	—	—	—	—	—	—	—	—	—
09	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—	—
14	50,75	55,32	—	—	—	—	—	—	—	—	—	—	—
16	57,02	62,19	67,37	—	—	—	—	—	—	—	—	—	—
18	68,78	74,55	80,32	86,09	91,85	—	—	—	—	—	—	—	—
20	75,42	81,78	88,14	94,50	100,85	107,21	—	—	—	—	—	—	—
22	82,06	89,01	95,96	102,91	109,86	116,81	123,76	130,71	—	—	—	—	—
24	110,96	121,20	131,44	141,68	151,92	162,16	172,40	182,64	192,88	—	—	—	—
26	119,22	130,24	141,27	152,30	163,32	174,35	185,38	196,41	207,43	218,46	—	—	—
28	127,47	139,28	151,10	162,91	174,73	186,54	198,35	210,17	221,98	233,80	245,61	257,42	—
32	143,98	157,37	170,76	184,14	197,53	210,92	224,31	237,69	251,08	264,47	277,86	291,24	318,02

[a] Diameter code corresponds to nominal diameter d in 1/16 inch.

[b] Length code corresponds to length l_1 in 1/32 inch.

Table 3 — Loads — Type D

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
04	006	4,02	1,92	77,34
	007	6,76	3,24	
	008	9,50	4,55	
	009	12,25	5,86	
	010	14,99	7,18	
	011	17,73	8,49	
	012	20,48	9,80	
05	006	5,02	2,40	86,63
	007	8,44	4,04	
	008	11,86	5,68	
	009	15,29	7,32	
	010	18,71	8,96	
	011	22,14	10,60	
	012	25,56	12,24	
	014	32,41	15,52	
	016	39,26	18,80	
06	006	6,01	2,88	95,92
	007	10,12	4,84	
	008	14,23	6,81	
	009	18,33	8,78	
	010	22,44	10,74	
	011	26,55	12,71	
	012	30,65	14,67	
	014	38,87	18,61	
	016	47,08	22,54	
	018	55,29	26,47	
07	006	7,01	3,36	105,20
	007	11,80	5,65	
	008	16,59	7,94	
	009	21,38	10,23	
	010	26,16	12,53	
	011	30,95	14,82	
	012	35,74	17,11	
	014	45,32	21,70	
	016	54,89	26,28	
	018	64,47	30,86	
	020	74,05	35,45	
08	006	8,01	3,83	114,49
	007	13,48	6,45	
	008	18,95	9,07	
	009	24,42	11,69	
	010	29,89	14,31	
	011	35,36	16,93	
	012	40,83	19,55	
	014	51,77	24,78	
	016	62,71	30,02	
	018	73,65	35,26	
	020	84,59	40,50	
	022	95,53	45,73	
	024	106,47	50,97	
09	006	9,01	4,31	151,96
	007	15,16	7,26	
	008	21,31	10,20	
	009	27,46	13,15	
	010	33,61	16,09	
	011	39,77	19,04	
	012	45,92	21,98	
	014	58,22	27,87	
	016	70,52	33,76	
	018	82,83	39,65	
	020	95,13	45,54	
	022	107,43	51,43	
	024	119,74	57,32	
10	006	10,01	4,79	194,53
	007	16,84	8,06	
	008	23,67	11,33	
	009	30,51	14,60	
	010	37,34	17,88	
	011	44,17	21,15	
	012	51,01	24,42	
	014	64,67	30,96	
	016	78,34	37,50	
	018	92,01	44,05	
	020	105,67	50,59	
	022	119,34	57,13	
	024	133,01	63,68	
	028	160,34	76,76	
11	008	26,03	12,46	242,22
	009	33,55	16,06	
	010	41,06	19,66	
	011	48,58	23,26	
	012	56,09	26,86	
	014	71,13	34,05	
	016	86,16	41,25	
	018	101,19	48,44	
	020	116,22	55,64	
	022	131,25	62,83	
	024	146,28	70,03	
	028	176,34	84,42	
	032	206,40	98,81	
12	008	28,40	13,59	295,00
	009	36,59	17,52	
	010	44,79	21,44	
	011	52,99	25,37	
	012	61,18	29,29	
	014	77,58	37,14	
	016	93,97	44,99	
	018	110,36	52,84	
	020	126,76	60,68	
	022	143,15	68,53	

continued

Table 3 *(continued)*

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
12	024	159,54	76,38	295,00
	028	192,33	92,08	
	032	225,12	107,77	
14	008	33,12	15,86	327,20
	009	42,68	20,43	
	010	52,24	25,01	
	011	61,80	29,59	
	012	71,36	34,16	
	014	90,48	43,32	
	016	109,60	52,47	
	018	128,72	61,62	
	020	147,84	70,78	
	022	166,96	79,93	
	024	186,08	89,09	
	028	224,32	107,39	
	032	262,56	125,70	
	036	300,80	144,01	
	040	339,05	162,32	
16	008	37,84	18,12	359,39
	009	48,77	23,35	
	010	59,69	28,58	
	011	70,61	33,81	
	012	81,54	39,04	
	014	103,38	49,49	
	016	125,23	59,95	
	018	147,08	70,41	
	020	168,93	80,87	
	022	190,77	91,33	
	024	212,62	101,79	
	028	256,31	122,71	
	032	300,01	143,63	
	036	343,70	164,55	
	040	387,40	185,46	
	044	431,09	206,38	
18	010	54,95	26,31	391,58
	011	67,24	32,19	
	012	79,53	38,07	
	014	104,10	49,84	
	016	128,67	61,60	
	018	153,25	73,37	
	020	177,82	85,13	
	022	202,40	96,90	
	024	226,97	108,66	
	028	276,12	132,19	
	032	325,27	155,72	
	036	374,41	179,25	
	040	423,56	202,78	
	044	472,71	226,31	
	048	521,86	249,84	
	052	571,01	273,36	

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
20	012	88,35	42,30	423,78
	014	115,65	55,37	
	016	142,95	68,44	
	018	170,25	81,51	
	020	197,55	94,58	
	022	224,85	107,65	
	024	252,15	120,72	
	028	306,76	146,86	
	032	361,36	173,00	
	036	415,96	199,14	
	040	470,56	225,28	
	044	525,16	251,42	
	048	579,76	277,56	
	052	634,37	303,70	
	056	688,97	329,84	
22	012	97,17	46,52	455,97
	014	127,20	60,90	
	016	157,23	75,27	
	018	187,26	89,65	
	020	217,28	104,02	
	022	247,31	118,40	
	024	277,34	132,77	
	028	337,40	161,53	
	032	397,45	190,28	
	036	457,51	219,03	
	040	517,56	247,78	
	044	577,62	276,53	
	048	637,67	305,28	
	052	697,73	334,03	
	056	757,78	362,78	
	060	817,84	391,53	
	064	877,89	420,28	
24	012	106,00	50,75	488,16
	014	138,75	66,43	
	016	171,51	82,11	
	018	204,26	97,79	
	020	237,02	113,47	
	022	269,77	129,15	
	024	302,53	144,83	
	028	368,03	176,19	
	032	433,54	207,56	
	036	499,05	238,92	
	040	564,56	270,28	
	044	630,07	301,64	
	048	695,58	333,00	
	052	761,09	364,37	
	056	826,60	395,73	
	060	892,10	427,09	
	064	957,61	458,45	
	068	1 023,12	489,81	

continued

Table 3 *(concluded)*

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
26	016	185,79	88,94	520,36
	018	221,27	105,93	
	020	256,75	122,92	
	022	292,23	139,90	
	024	327,71	156,89	
	028	398,67	190,86	
	032	469,64	224,83	
	036	540,60	258,81	
	040	611,56	292,78	
	044	682,52	326,75	
	048	753,49	360,73	
	052	824,45	394,70	
	056	895,41	428,67	
	060	966,37	462,64	
	064	1 037,34	496,62	
	068	1 108,30	530,59	
	072	1 179,26	564,56	
28	016	200,06	95,78	552,55
	018	238,27	114,07	
	020	276,48	132,36	
	024	352,90	168,95	
	028	429,31	205,53	
	032	505,73	242,11	
	036	582,14	278,70	
	040	658,56	315,28	
	044	734,98	351,86	
	048	811,39	388,45	
	052	887,81	425,03	
	056	964,22	461,62	
	060	1 040,64	498,20	
	064	1 117,06	534,78	
	068	1 193,47	571,37	
	072	1 269,89	607,95	
	076	1 346,30	644,53	
	080	1 422,72	681,12	
32	016	228,62	109,45	616,94
	018	272,28	130,35	
	020	315,94	151,26	
	022	359,60	172,16	
	024	403,27	193,06	
	028	490,59	234,87	
	032	577,91	276,67	
	036	665,24	318,48	
	040	752,56	360,28	
	044	839,88	402,09	
	048	927,21	443,89	
	052	1 014,53	485,70	
	056	1 101,85	527,50	
	060	1 189,18	569,31	
	064	1 276,50	611,12	
	068	1 363,82	652,92	
	072	1 451,15	694,73	
	076	1 538,47	736,53	
	080	1 625,79	778,34	
	088	1 800,44	861,95	

NOTE Requirements to achieve ultimate loads are:

— solid shaft

— rigid clamping on both sides

— uniform load

— permissible bending stress: 1 350 MPa

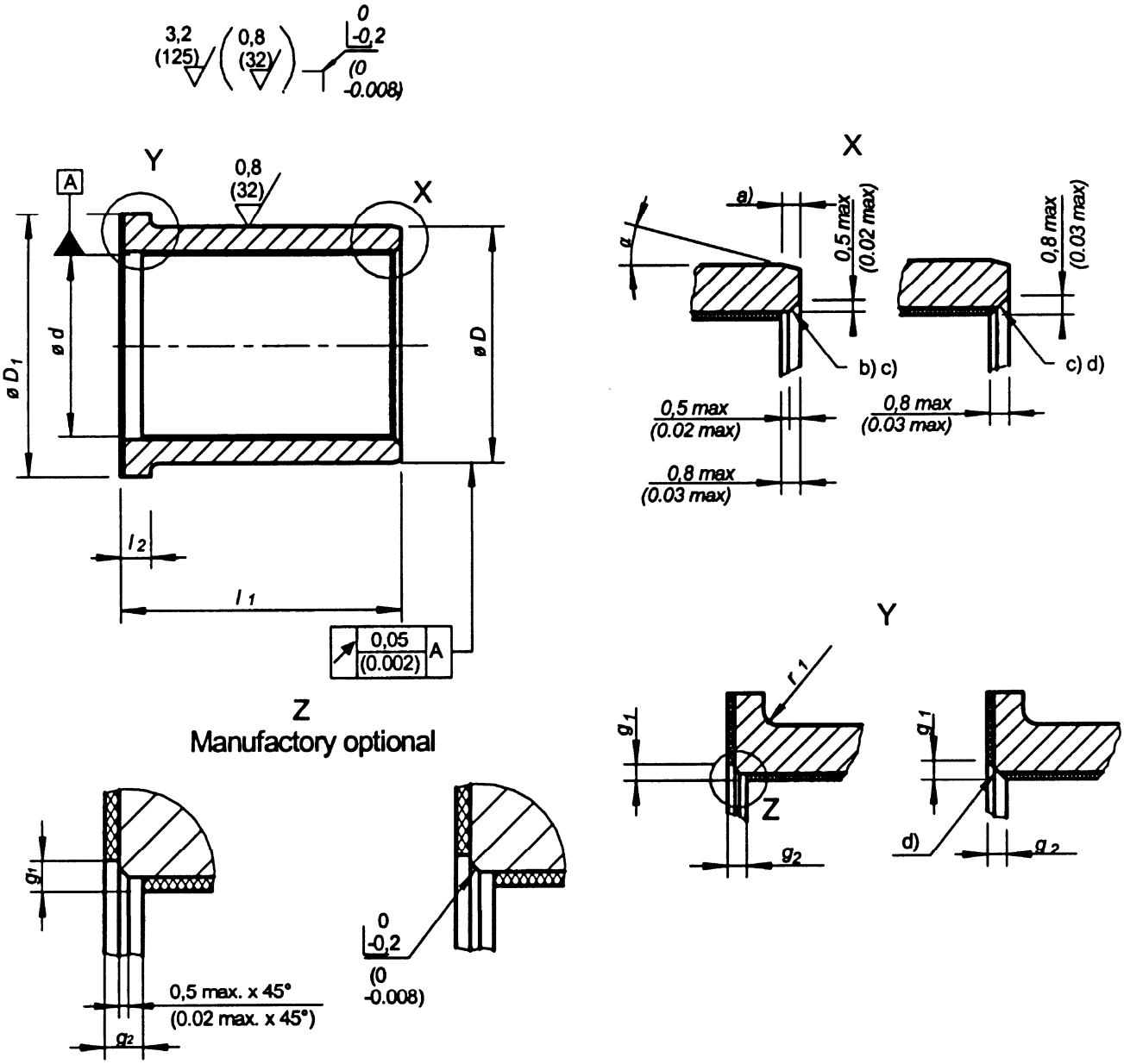
— permissible shear stress: 1 200 MPa

[a] Diameter code corresponds to nominal diameter d in 1/16 inch

[b] $C_S = 0{,}541\ d\ (l_1 - l_{2\ max.} - 1{,}2 - 0{,}8)$; based on a unit pressure of 541 MPa.

[c] $C_{25} = 0{,}259\ d\ (l_1 - l_{2\ max.} - 1{,}2 - 0{,}8)$; based on a unit pressure of 259 MPa.

[d] $C_a = 0{,}34\ [(D_1 - 1{,}5)^2 - (d + 2{,}5)^2]$; based on a unit pressure of 430 MPa.



Key

[a] Chamfer machined before bonding

[b] Chamfer or radius at manufacturers option

[c] Chamfer machined after bonding

[d] Manufactory optional

Figure 2 — Configuration — Type F

Table 4 — Dimensions and tolerances — Type F

Diameter code [a]	d Nominal diameter	d $^{0}_{-0,025}$ ($^{0}_{-0.001}$)	D $^{0}_{-0,013}$ $^{0}_{-0.0005}$	D_1 $^{0}_{-0,51}$ ($^{0}_{-0.020}$)	g_1 max.	g_2 max.	l_2 $^{0}_{-0,13}$ ($^{0}_{-0.005}$)	r_1 ± 0,13 (± 0.005)	a	α ± 2°
04	6,350 (0.2500)	6,388 (0.2515)	9,550 (0.3760)	12,70 (0.500)	0,70 (0.028)	0,70 (0.028)	1,60 (0.063)	0,25 (0.010)	0,50 to 0,75 (0.020 to 0.030)	15°
05	7,938 (0.3125)	7,976 (0.3140)	11,140 (0.4386)	14,29 (0.563)				0,50 (0.020)		
06	9,525 (0.3750)	9,563 (0.3765)	12,730 (0.5012)	15,88 (0.625)				0,65 (0.026)		
07	11,113 (0.4375)	11,151 (0.4390)	14,321 (0.5638)	19,05 (0.750)						
08	12,700 (0.5000)	12,738 (0.5015)	15,913 (0.6265)	22,23 (0.875)						
10	15,875 (0.6250)	15,913 (0.6265)	20,681 (0.8142)	25,40 (1.000)						
11	17,463 (0.6875)	17,501 (0.6890)	22,268 (0.8767)	26,99 (1.063)						
12	19,050 (0.7500)	19,088 (0.7515)	23,858 (0.9393)	28,58 (1.125)						
14	22,225 (0.8750)	22,263 (0.8765)	27,038 (1.0645)	31,75 (1.250)	1,00 (0.039)	1,00 (0.039)				
16	25,400 (1.0000)	25,438 (1.0015)	30,221 (1.1898)	34,93 (1.375)						
18	28,575 (1.1250)	28,613 (1.1265)	33,396 (1.3148)	41,28 (1.625)			2,39 (0.094)			
20	31,750 (1.2500)	31,788 (1.2515)	36,571 (1.4398)	44,45 (1.750)						
22	34,925 (1.3750)	34,963 (1.3765)	39,746 (1.5648)	47,63 (1.875)						
24	38,100 (1.5000)	38,138 (1.5015)	44,508 (1.7523)	50,80 (2.000)						
28	44,450 (1.7500)	44,488 (1.7515)	50,858 (2.0023)	57,15 (2.250)						
32	50,800 (2.0000)	50,838 (2.0015)	57,208 (2.2523)	63,50 (2.500)						

[a] Diameter code corresponds to nominal diameter d in 1/16 inch.

Table 5 — Mass — Type F

Dia-meter code [a]	Length code [b]														
	006	007	008	009	010	011	012	014	016	018	020	022	024	028	032
	l_1 $^{-0,10}_{-0,40}$ ($^{-0.004}_{-0.016}$)														
	4,76 (0.188)	5,56 (0.219)	6,35 (0.250)	7,14 (0.281)	7,94 (0.313)	8,73 (0.344)	9,53 (0.375)	11,11 (0.438)	12,70 (0.500)	14,29 (0.563)	15,88 (0.625)	17,46 (0.688)	19,05 (0.750)	22,23 (0.875)	25,40 (1.000)
	Mass in kg/1 000 pieces ≈														
04	2,16	2,40	2,65	2,89	3,14	3,38	3,63	—	—	—	—	—	—	—	—
05	2,55	2,84	3,14	3,43	3,73	4,02	4,31	4,90	5,49	—	—	—	—	—	—
06	2,94	3,29	3,63	3,97	4,32	4,66	5,00	5,69	6,38	7,06	—	—	—	—	—
07	3,90	4,30	4,69	5,08	5,47	5,87	6,26	7,04	7,83	8,61	9,40	—	—	—	—
08	5,01	5,46	5,90	6,34	6,78	7,23	7,67	8,55	9,44	10,32	11,21	12,09	12,98	—	—
10	7,22	8,07	8,92	9,77	10,62	11,46	12,31	14,01	15,71	17,40	19,10	20,80	22,49	25,89	—
11	—	—	9,65	10,58	11,50	12,42	13,34	15,19	17,03	18,87	20,72	22,56	24,41	28,09	31,78
12	—	—	10,39	11,39	12,39	13,38	14,38	16,37	18,36	20,36	22,35	24,34	26,33	30,32	34,30
14	—	—	11,87	13,02	14,16	15,31	16,45	18,74	21,03	23,32	25,61	27,90	30,19	34,77	39,35
16	—	—	13,36	14,65	15,95	17,24	18,54	21,13	23,72	26,30	28,89	31,48	34,07	39,25	44,43
18	—	—	—	—	23,03	24,47	25,91	28,80	31,68	34,56	37,45	40,33	43,22	48,99	54,75
20	—	—	—	—	—	—	28,42	31,59	34,77	37,95	41,13	44,31	47,49	53,85	60,21
22	—	—	—	—	—	—	30,92	34,39	37,87	41,34	44,82	48,29	51,77	58,72	65,67
24	—	—	—	—	—	—	39,49	44,61	49,73	54,85	59,97	65,09	70,21	80,45	90,69
28	—	—	—	—	—	—	—	—	57,20	63,10	69,01	74,92	80,82	92,64	104,45
32	—	—	—	—	—	—	—	—	64,66	71,35	78,05	84,74	91,43	104,82	118,21

continued

Table 5 *(concluded)*

Diameter code [a]	Length code [b]												
	036	**040**	**044**	**048**	**052**	**056**	**060**	**064**	**068**	**072**	**076**	**080**	**088**
	l $^{-0,10}_{-0,40}$ ($^{-0.004}_{-0.016}$)												
	28,58 (1.125)	31,75 (1.250)	34,93 (1.375)	38,10 (1.500)	41,28 (1.625)	44,45 (1.750)	47,63 (1.875)	50,80 (2.000)	53,98 (2.125)	57,15 (2.250)	60,33 (2.375)	63,50 (2.500)	69,85 (2.750)
	Mass in kg/1 000 pieces ≈												
04	—	—	—	—	—	—	—	—	—	—	—	—	—
05	—	—	—	—	—	—	—	—	—	—	—	—	—
06	—	—	—	—	—	—	—	—	—	—	—	—	—
07	—	—	—	—	—	—	—	—	—	—	—	—	—
08	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—	—
14	43,93	48,51	—	—	—	—	—	—	—	—	—	—	—
16	49,60	54,78	59,96	—	—	—	—	—	—	—	—	—	—
18	60,52	66,29	72,06	77,83	83,60	—	—	—	—	—	—	—	—
20	66,57	72,93	79,29	85,65	92,01	98,37	—	—	—	—	—	—	—
22	72,62	79,57	86,52	93,47	100,42	107,37	114,32	121,27	—	—	—	—	—
24	100,93	111,17	121,41	131,65	141,90	152,14	162,38	172,62	182,86	—	—	—	—
28	116,26	128,08	139,89	151,71	163,52	175,33	187,15	198,96	210,78	222,59	234,40	246,22	—
32	131,60	144,98	158,37	171,76	185,15	198,53	211,92	225,31	238,70	252,08	265,47	278,86	305,63

[a] Diameter code corresponds to nominal diameter d in 1/16 inch.

[b] Length code corresponds to length l_1 in 1/32 inch.

Table 6 — Loads — Type F

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
04	006	4,02	1,92	15,68
	007	6,76	3,24	
	008	9,50	4,55	
	009	12,25	5,86	
	010	14,99	7,18	
	011	17,73	8,49	
	012	20,48	9,80	
05	006	5,02	2,40	18,16
	007	8,44	4,04	
	008	11,86	5,68	
	010	18,71	8,96	
	011	22,14	10,60	
	012	25,56	12,24	
	014	32,41	15,52	
	016	39,26	18,80	
06	006	6,01	2,88	20,64
	007	10,12	4,84	
	008	14,23	6,81	
	009	18,33	8,78	
	010	22,44	10,74	
	011	26,55	12,71	
	012	30,65	14,67	
	014	38,87	18,61	
	016	47,08	22,54	
	018	55,29	26,47	
07	006	7,01	3,36	41,09
	007	11,80	5,65	
	008	16,59	7,94	
	009	21,38	10,23	
	010	26,16	12,53	
	011	30,95	14,82	
	012	35,74	17,11	
	014	45,32	21,70	
	016	54,89	26,28	
	018	64,47	30,86	
	020	74,05	35,45	
08	006	8,01	3,83	66,64
	007	13,48	6,45	
	008	18,95	9,07	
	009	24,42	11,69	
	010	29,89	14,31	
	011	35,36	16,93	
	012	40,83	19,55	
	014	51,77	24,78	
	016	62,71	30,02	
	018	73,65	35,26	
	020	84,59	40,50	
	022	95,53	45,73	
	024	106,47	50,97	
10	006	10,01	4,79	78,41
	007	16,84	8,06	
	008	23,67	11,33	
	009	30,51	14,60	
	010	37,34	17,88	
	011	44,17	21,15	
	012	51,01	24,42	
	014	64,67	30,96	
	016	78,34	37,50	
	018	92,01	44,05	
	020	105,67	50,59	
	022	119,34	57,13	
	024	133,01	63,68	
	028	160,34	76,76	
11	007	18,52	8,87	84,29
	008	26,03	12,46	
	009	33,55	16,06	
	010	41,06	19,66	
	011	48,58	23,26	
	012	56,09	26,86	
	014	71,13	34,05	
	016	86,16	41,25	
	018	101,19	48,44	
	020	116,22	55,64	
	022	131,25	62,83	
	024	146,28	70,03	
	028	176,34	84,42	
12	008	28,40	13,59	90,17
	009	36,59	17,52	
	010	44,79	21,44	
	011	52,99	25,37	
	012	61,18	29,29	
	014	77,58	37,14	
	016	93,97	44,99	
	018	110,36	52,84	
	020	126,76	60,68	
	022	143,15	68,53	
	024	159,54	76,38	
	028	192,33	92,08	
	032	225,12	107,77	
14	008	33,12	15,86	101,94
	009	42,68	20,43	
	010	52,24	25,01	
	011	61,80	29,59	
	012	71,36	34,16	
	014	90,48	43,32	
	016	109,60	52,47	
	018	128,72	61,62	
	020	147,84	70,78	

continued

Table 6 *(continued)*

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
14	022	166,96	79,93	101,94
	024	186,08	89,09	
	028	224,32	107,39	
	032	262,56	125,70	
	036	300,80	144,01	
	040	339,05	162,32	
16	008	37,84	18,12	113,71
	009	48,77	23,35	
	010	59,69	28,58	
	011	70,61	33,81	
	012	81,54	39,04	
	014	103,38	49,49	
	016	125,23	59,95	
	018	147,08	70,41	
	020	168,93	80,87	
	022	190,77	91,33	
	024	212,62	101,79	
	028	256,31	122,71	
	032	300,01	143,63	
	036	343,70	164,55	
	040	387,40	185,46	
	044	431,09	206,38	
18	010	54,95	26,31	207,37
	011	67,24	32,19	
	012	79,53	38,07	
	014	104,10	49,84	
	016	128,67	61,60	
	018	153,25	73,37	
	020	177,82	85,13	
	022	202,40	96,90	
	024	226,97	108,66	
	028	276,12	132,19	
	032	325,27	155,72	
	036	374,41	179,25	
	040	423,56	202,78	
	044	472,71	226,31	
	048	521,86	249,84	
	052	571,01	273,36	
20	012	88,35	42,30	225,95
	014	115,65	55,37	
	016	142,95	68,44	
	018	170,25	81,51	
	020	197,55	94,58	
	022	224,85	107,65	
	024	252,15	120,72	
	028	306,76	146,86	
	032	361,36	173,00	
	036	415,96	199,14	
	040	470,56	225,28	
	044	525,16	251,42	
20	048	579,76	277,56	225,95
	052	634,37	303,70	
	056	688,97	329,84	
22	012	97,17	46,52	244,52
	014	127,20	60,90	
	016	157,23	75,27	
	018	187,26	89,65	
	020	217,28	104,02	
	022	247,31	118,40	
	024	277,34	132,77	
	028	337,40	161,53	
	032	397,45	190,28	
	036	457,51	219,03	
	040	517,56	247,78	
	044	577,62	276,53	
	048	637,67	305,28	
	052	697,73	334,03	
	056	757,78	362,78	
	060	817,84	391,53	
	064	877,89	420,28	
24	012	106,00	50,75	263,10
	014	138,75	66,43	
	016	171,51	82,11	
	018	204,26	97,79	
	020	237,02	113,47	
	022	269,77	129,15	
	024	302,53	144,83	
	028	368,03	176,19	
	032	433,54	207,56	
	036	499,05	238,92	
	040	564,56	270,28	
	044	630,07	301,64	
	048	695,58	333,00	
	052	761,09	364,37	
	056	826,60	395,73	
	060	892,10	427,09	
	064	957,61	458,45	
	068	1 023,12	489,81	
28	016	200,06	95,78	300,25
	018	238,27	114,07	
	020	276,48	132,36	
	022	314,69	150,65	
	024	352,90	168,95	
	028	429,31	205,53	
	032	505,73	242,11	
	036	582,14	278,70	
	040	658,56	315,28	
	044	734,98	351,86	
	048	811,39	388,45	
	052	887,81	425,03	

continued

Table 6 *(concluded)*

Diameter code [a]	Length code	Permissible radial load	Radial load	Axial static load
		kN		
		Static C_s [b]	Dynamic C_{25} [c]	C_a [d]
28	056	964,22	461,62	300,25
	060	1 040,64	498,20	
	064	1 117,06	534,78	
	068	1 193,47	571,37	
	072	1 269,89	607,95	
	076	1 346,30	644,53	
	080	1 422,72	681,12	
32	016	228,62	109,45	337,40
	018	272,28	130,35	
	020	315,94	151,26	
	022	359,60	172,16	
	024	403,27	193,06	
	028	490,59	234,87	
	032	577,91	276,67	
	036	665,24	318,48	
	040	752,56	360,28	
	044	839,88	402,09	
	048	927,21	443,89	
	052	1 014,53	485,70	
	056	1 101,85	527,50	
32	060	1 189,18	569,31	337,40
	064	1 276,50	611,12	
	068	1 363,82	652,92	
	072	1 451,15	694,73	
	076	1 538,47	736,53	
	080	1 625,79	778,34	
	088	1 800,44	861,95	

NOTE Requirements to achieve ultimate loads are:
— solid shaft
— rigid clamping on both sides
— uniform load
— permiss ble bending stress: 1 350 MPa
— permiss ble shear stress: 1 200 MPa.

[a] Diameter code corresponds to nominal diameter d in 1/16 inch.

[b] $C_S = 0{,}541\ d\ (l_1 - l_{2\ max.} - 1{,}2 - 0{,}8)$; based on a unit pressure of 541 MPa.

[c] $C_{25} = 0{,}259\ d\ (l_1 - l_{2\ max.} - 1{,}2 - 0{,}8)$; based on a unit pressure of 259 MPa.

[d] $C_a = 0{,}34\ [(D_1 - 1{,}5)^2 - (d + 2{,}5)^2]$; based on a unit pressure of 430 MPa

5 Designation

EXAMPLE

Description block | **Identity block**

BUSH | **EN4537-2D04T006**

Number of this standard

Type (see Figures 1 and 2)

Diameter code (see Tables 1 and 4)

Surface treatment (see 4.4)

Length code (see Tables 2 and 5)

NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

6 Marking

According to EN 2424 for diameter code < 08 or length code < 008: style G

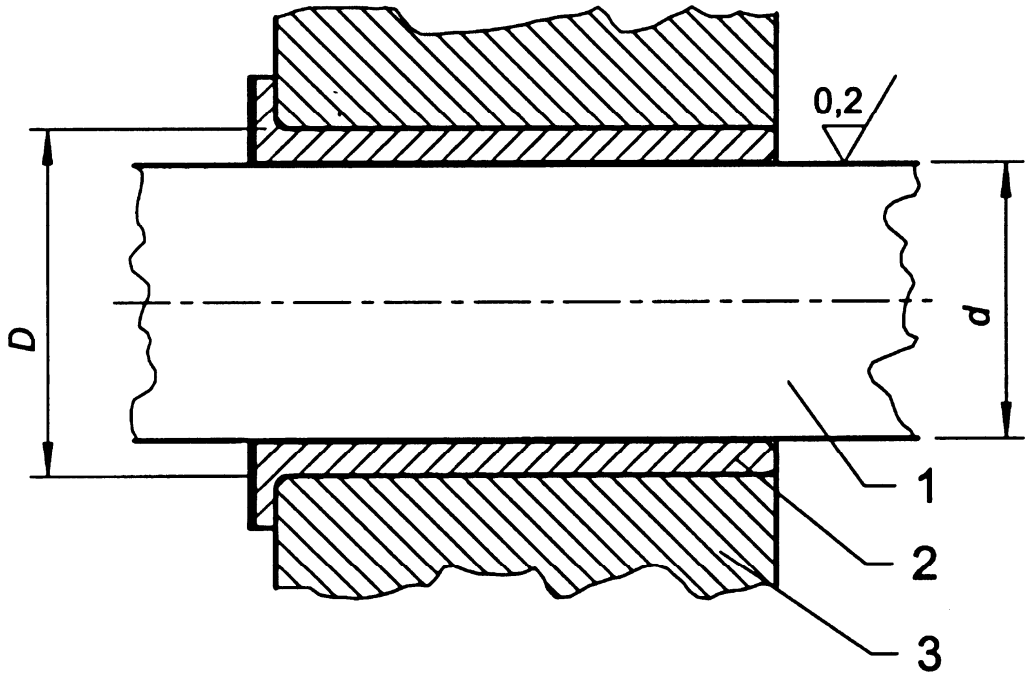
for diameter code ≥ 08 and length code ≥ 008: style A

7 Technical specification

According to EN 2311.

8 Design recommendation

Bushes defined by this standard are intended to be installed by interference fit methods (see Figure 3). Therefore, the loads given in Tables 3 and 6 can only be ensured if the following mounting is applied.



Key

1 Shaft diameter d f6
2 Bush
3 Housing diameter D H6

Figure 3 — Install recommendation

Hardness of the shaft: 50 HRC min. Surface roughness of the shaft: according to Figure 3.

The reduction in nominal diameter d (see Figures 1 and 2), due to interference fit of the bush in the housing, has been taken into account when selecting tolerances for the shaft: f6 (clearance fit).

When applied in actual usage, the coefficient of friction under load could be different from that defined in EN 2311 since it depends on the following shaft definitions: materials, hardness, surface finish, surface treatment and installation conditions.

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