SIST

SLOVENSKI STANDARD
SIST EN 2287:2022

01-november-2022

Nadomešča:
SIST EN 2287:2017

Aeronavtika - Drsne puše, navadne, iz korozijsko odpornega jekla s samomazalno oblogo - Mere in obremenitve

Aerospace series - Bush, plain, in corrosion resisting steel with self-lubricating liner - Dimensions and loads

Luft- und Raumfahrt - Buchse ohne Flansch aus korrosionbeständigem Stahl mit selbstschmierender Beschichtung - Maße und Belastungen

Série aérospatiale - Bague cylindrique en acier résistant à la corrosion à garniture autolubrifiante - Dimensions et charges

Ta slovenski standard je istoveten z: **EN 2287:2022**

ICS:

49.025.10	Jekla	Steels
49.030.99	Drugi vezni elementi	Other fasteners

SIST EN 2287:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 2287

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ICS 49.030.99

Supersedes EN 2287:2017

English Version

Aerospace series - Bush, plain, in corrosion resisting steel with self-lubricating liner - Dimensions and loads

Série aérospatiale - Bague cylindrique en acier résistant à la corrosion à garniture autolubrifiante - Dimensions et charges

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This European Standard was approved by CEN on 26 March 2021.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 2287:2022 E

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European foreword

This document (EN 2287:2022) 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 document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, 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 March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.

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

This document supersedes EN 2287:2017.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies the characteristics of plain bushes in corrosion resisting steel with self-lubricating liner and the design recommendation of shafts and housings.

The bushes are intended for operation within the temperature range of −55 °C to 163 °C and assembly with an interference fit into fixed and moving aerospace parts.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3161, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted, solution treated and precipitation treated, bar a or D ≤ 200 mm, Rm ≥ 930 MPa*

EN 3490, *Aerospace series — Steel FE-PM3901 (X15CrNi17-3) — Air melted — Hardened and tempered — Bar for machining — De ≤ 200 mm — 900 MPa ≤ R_m ≤ 1 100 MPa*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

4 Requirements

4.1 Configuration — Dimensions — Masses

Configuration: according to Figure 1.

Dimensions, masses: according to Figure 1 and Table 1.

4.2 Surface roughness

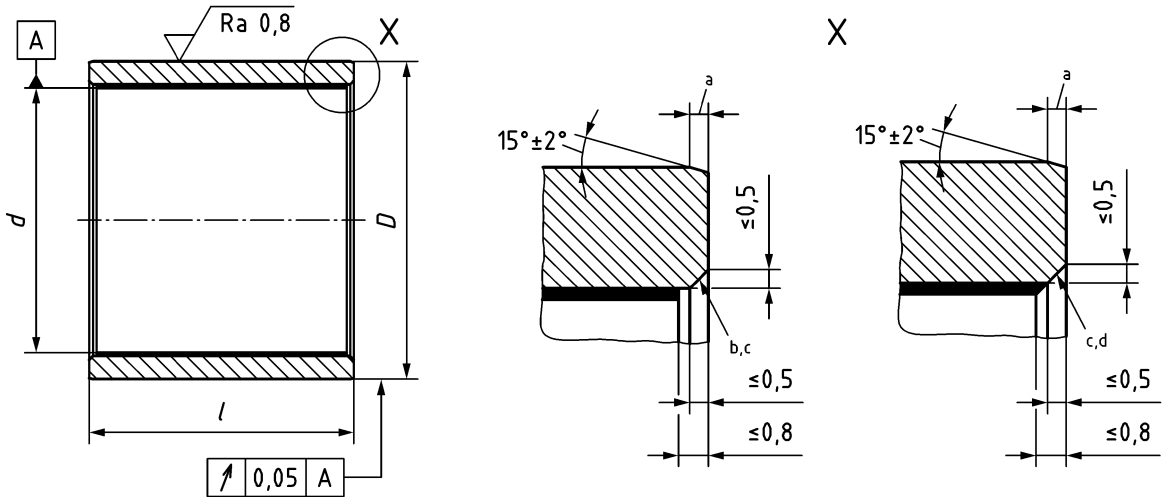
According to Figure 1.

4.3 Materials

Bush: Steel according to EN 3490 or EN 3161.

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

Dimensions in millimetres



Key

a 0,50 mm to 0,75 mm

b chamfer machined before bonding

c chamfer or radius at manufacturer's option

d chamfer machined after bonding

Figure 1 — Dimensions

Table 1 — Dimensions and masses

Dimensions in millimetres

⌀ *d*		⌀ *D*		*l* −0,1/−0,4															
Nominal size	**Tolerances** µm	**Nominal size**	**Tolerances** µm	6	8	10	12	15	16	18	20	22	25	28	30	32	35	40	45	50
				Mass kg/1 000 pieces																
6	+22 +4	10	+24 +15	2,4*																
8	+27 +5	12	+29 +18	3,0	4,0*															
10		14		3,5	4,7	5,9*														
12	+33 +6	16		4,1	5,5*	6,9	8,3*													
15		19	+35 +22		6,7	8,4*	10,1	12,6*												
16		20			7,1	8,9	10,7	13,4	14,3											
18		22				9,9	11,8	14,8		17,8										
20	+40 +7	25				13,9	16,7*	20,9			27,8*									
22		26					14,2	17,8*			23,7	26,1*								
25		30					20,4	25,5*			34,0	37,4	42,5*							
28		34	+42 +26					34,5			46,0*	50,6	57,5	64,4						
30		36						36,7			49,0	53,8	61,2		73,4*					
32	+48 +9	38						39,0			51,9	57,1	64,9		77,90	83,1				
35		42									66,6*	73,5	83,6		100,3		117,0*			
40		48									87,0		103,8		130,0*		152,2	174,0*		
45		52	+51 +32										105,0		126,0		147,0*	168,0	189,0*	
50		58											133,5		160,2		186,9	214,0*	240,3	267,0*

NOTE 1 Only bushes whose masses lie within the bold lines are standard.

NOTE 2 The recommended sizes are indicated by *.

Table 2 — Loads

⌀ *d*	*l*	Permissible radial load		⌀ *d*	*l*	Permissible radial load		⌀ *d*	*l*	Permissible radial load	
		Static	Dynamic			Static	Dynamic			Static	Dynamic
		C_s[a]	C_{25}[b]			C_s[a]	C_{25}[b]			C_s[a]	C_{25}[b]
mm	mm	kN	kN	mm	mm	kN	kN	mm	mm	kN	kN
6	6	10,3	4,1	20	15	111,8	44,7	32	30	385,3	153,8
8	6	13,8	5,5		20	154,8	61,8		32	412,8	164,8
	8	20,6	8,3	22	12	94,6	37,7	35	20	270,9	108,2
10	6	17,2	6,8		15	123,0	49,1		22	301,0	120,2
	8	25,8	10,3		20	170,3	68,0		25	346,0	138,2
	10	34,4	13,8		22	189,2	75,5		30	421,4	168,3
12	6	20,6	8,3	25	12	107,5	42,9		35	496,7	198,3
	8	31,0	12,3		15	139,8	55,8	40	20	309,6	123,6
	10	41,3	16,5		20	193,5	77,3		25	395,6	157,9
	12	51,6	20,6		22	215,0	85,8		30	481,6	192,3
15	8	38,7	15,4		25	247,3	98,8		35	567,6	226,6
	10	51,6	20,6	28	15	156,5	62,5		40	653,6	260,9
	12	64,5	25,8		20	216,7	86,5	45	25	445,1	177,7
	15	83,9	33,5		22	240,8	96,2		30	541,8	216,3
16	8	41,3	16,5		25	276,9	110,6		35	638,6	254,9
	10	55,0	22,0		28	313,0	125,0		40	735,3	293,6
	12	68,8	27,5	30	15	167,7	66,9		45	832,1	332,1
	15	89,4	35,7		20	232,2	92,7	50	25	494,5	197,4
	16	96,3	38,4		22	258,0	103,0		30	602,0	240,3
18	10	61,9	24,8		25	296,7	118,4		35	709,5	283,3
	12	77,4	30,9		30	361,2	144,2		40	817,0	326,2
	15	100,6	40,2	32	15	178,9	71,4		45	924,5	369,1
	18	123,8	49,4		20	247,7	98,9		50	1032,0	412,0
20	10	68,8	27,5		22	275,2	109,8				
	12	86,0	34,3		25	315,5	126,3				

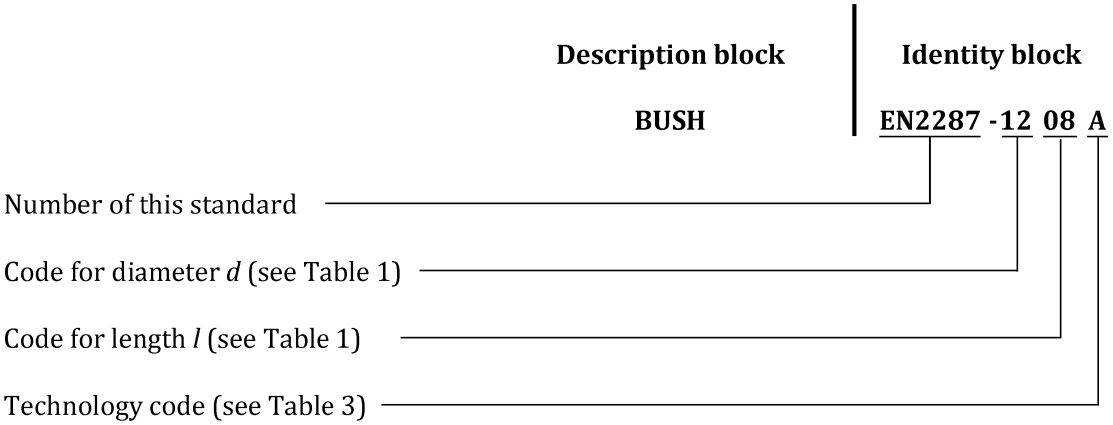
NOTE 1 Definitions of all loads are given in EN 2311.

[a] $C_s = 0{,}43\ d\ (l \text{ and } 2)$ [kN] – Based on a unit pressure of 430 MPa.

[b] $C_{25} = \frac{C_s}{2{,}5}$ [kN].

5 Designation

EXAMPLE



NOTE The number of characters is constant, Zero (0) is inserted to the left of the figure when the diameter *d* or length *l* is less than 10.

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

Parts manufactured before the issue of this standard shall be accepted without technology code.

Table 3 — Technology codes

Technology code	Technology
A	Bonded fabric liner
B	Injection moulded liner
without code	Both technologies can be used at user's convenience

6 Marking

In addition to the manufacturer's own marking, each bush and its package shall be marked with the identity block specified in Clause 4 of this document.

The technology used by the manufacturer shall be stated within the identity block.

Marking position and method are at manufacturer's option and shall not have any detrimental effect on the bush.

Bushes which are too small to be marked with the full information required shall have this on the package only.

7 Technical specification

According to EN 2311.