



# SLOVENSKI STANDARD

## SIST EN 2285:2017

01-julij-2017

Nadomešča:  
SIST EN 2285:2001

---

**Aeronavtika - Drsne puše iz aluminijeve zlitine s samomazalno oblogo - Mere in obremenitve**

Aerospace series - Bushes, plain, aluminium alloy, with self-lubricating liner - Dimensions and loads

Luft- und Raumfahrt - Buchsen ohne Flansch aus Aluminium-Legierung mit selbstschmierender Beschichtung - Maße und Belastung

Série aérospatiale - Bagues cylindriques en alliage d'aluminium à garniture autolubrifiante - Dimensions et charges

**Ta slovenski standard je istoveten z: EN 2285:2017**

---

**ICS:**

49.025.20	Aluminij	Aluminium
49.030.99	Drugi vezni elementi	Other fasteners

**SIST EN 2285:2017** en,fr,de

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 2285:2017

<https://standards.iteh.ai/catalog/standards/sist/b30b2e8c-a024-4e3e-b0f4-1a08d208dc1f/sist-en-2285-2017>

EUROPEAN STANDARD

**EN 2285**

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2017

ICS 49.030.99

Supersedes EN 2285:1989

English Version

## Aerospace series - Bushes, plain, aluminium alloy, with self-lubricating liner - Dimensions and loads

Série aérospatiale - Bagues cylindriques en alliage d'aluminium à garniture autolubrifiante - Dimensions et charges

Luft- und Raumfahrt - Buchsen aus Aluminium-Legierung mit selbstschmierender Beschichtung - Maße und Belastungen

This European Standard was approved by CEN on 2 January 2017.

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

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>		Page
European foreword.....		3
<b>1</b>	<b>Scope .....</b>	<b>4</b>
<b>2</b>	<b>Normative references .....</b>	<b>4</b>
<b>3</b>	<b>Required characteristics .....</b>	<b>4</b>
<b>3.1</b>	<b>Configuration — Dimensions — Masses .....</b>	<b>4</b>
<b>3.2</b>	<b>Surface roughness .....</b>	<b>4</b>
<b>3.3</b>	<b>Materials.....</b>	<b>4</b>
<b>3.4</b>	<b>Surface treatment.....</b>	<b>5</b>
<b>4</b>	<b>Designation.....</b>	<b>8</b>
<b>5</b>	<b>Marking.....</b>	<b>8</b>
<b>6</b>	<b>Technical specification.....</b>	<b>8</b>
<b>7</b>	<b>Design recommendation.....</b>	<b>9</b>
<b>Annex A (informative) Standard evolution form.....</b>		<b>10</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 2285:2017

<https://standards.iteh.ai/catalog/standards/sist/b30b2e8c-a024-4e3e-b0f4-1a08d208dc1f/sist-en-2285-2017>

## European foreword

This document (EN 2285:2017) 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 European 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 November 2017, and conflicting national standards shall be withdrawn at the latest by November 2017.

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 2285:1989.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

[SIST EN 2285:2017](https://standards.iteh.ai/catalog/standards/sist/b30b2e8c-a024-4e3e-b0f4-1a08d208dc1f/sist-en-2285-2017)

<https://standards.iteh.ai/catalog/standards/sist/b30b2e8c-a024-4e3e-b0f4-1a08d208dc1f/sist-en-2285-2017>

**EN 2285:2017 (E)****1 Scope**

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

The bushes are intended for operation within the temperature range of  $-55\text{ °C}$  to  $121\text{ °C}$  and assembly with an interference fit into fixed and moving aerospace parts.

**2 Normative references**

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

EN 2086, *Aerospace series — Aluminium alloy AL-P2618A — T851 — Hand and die forgings —  $a \leq 150\text{ mm}$*

EN 2101, *Aerospace series — Chromic acid anodizing of aluminium and wrought aluminium alloys*

EN 2284, *Aerospace series — Sulphuric acid anodizing of aluminium and wrought aluminium alloys*

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

EN 2701, *Aerospace series — Aluminium alloy (2024) — Solution treated, water quench, cold worked and naturally aged (T3) — Drawn tube for structures —  $0,6 \leq a \leq 12,5\text{ mm}^1$*

EN 2704, *Aerospace series — Aluminium alloy AL-P2024 — AlCu4Mg1 — T3511 — Drawn bars —  $D_e \leq 75\text{ mm}^2$*

**3 Required characteristics****3.1 Configuration — Dimensions — Masses**

Configuration: according to Figure 1.

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

Dimensions apply after surface treatment.

**3.2 Surface roughness**

According to Figure 1.

**3.3 Materials**

Bush: Aluminium alloy according to EN 2086, EN 2701 or EN 2704.

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

1) Published as ASD-STAN Standard at the date of publication of this European Standard. <http://www.asd-stan.org/>

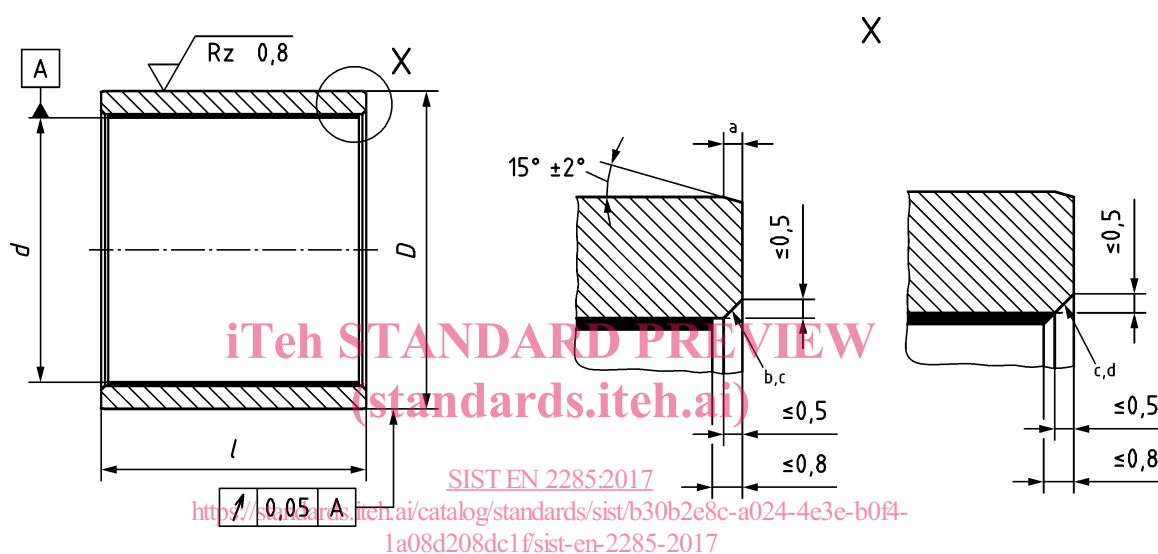
2) Published as ASD-STAN Prestandard at the date of publication of this European Standard. <http://www.asd-stan.org/>

## 3.4 Surface treatment

Table 1 — Surface treatment

Treatment	Remarks	Code
Chromic acid anodizing according to EN 2101 Type A or Sulphuric acid anodizing according to EN 2284 Type A.	Pre-treatment for painting	no code
Chromic acid anodizing according to EN 2101 Type B or Sulphuric acid anodizing according to EN 2284 Type B.	Corrosion – Protection	R

Dimensions in millimetres



## Key

- a 0,50 to 0,75
- b chamfer machined before bonding
- c chamfer or radius at manufacturer's option
- d chamfer machined after bonding

Figure 1 — Configuration and dimensions

Table 2 — Dimensions and tolerances

Dimensions in millimetres

$\varnothing d$		$\varnothing D$		$L$																	
Nominal-size	Tolerances $\mu\text{m}$	Nominal-size	Tolerances $\mu\text{m}$	$-0,1$ $-0,4$																	
				6	8	10	12	15	16	18	20	22	25	28	30	32	35	40	45	50	
				Mass in kg/1 000 pieces																	
6	+22 +4	10	+24 +15	0,9*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8	+27 +5	12	+29 +18	1,1	1,4*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10		14		1,3	1,7	2,1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12	+33 +6	16	+35 +22	1,5	2,0*	2,5	3,0*	-	-	-	-	-	-	-	-	-	-	-	-	-	
15		19		-	2,4	3,0*	3,6	4,6*	-	-	-	-	-	-	-	-	-	-	-	-	
16		20		-	2,6	3,2	3,8	4,8	5,1	-	-	-	-	-	-	-	-	-	-	-	-
18		22		-	-	3,6	4,3	5,5	-	6,6	-	-	-	-	-	-	-	-	-	-	-
20	+40 +7	25	+42 +26	-	-	5,0	6,0*	7,5	-	-	10,0*	-	-	-	-	-	-	-	-	-	
22		26		-	-	-	5,1	6,4*	-	-	8,5	9,4*	-	-	-	-	-	-	-	-	
25		30		-	-	-	7,4	9,2*	-	-	12,5	13,5	15,3*	-	-	-	-	-	-	-	
28		34		-	-	-	-	12,4	-	-	16,6	18,2	20,7	23,2	-	-	-	-	-	-	
30		36		-	-	-	-	13,3	15,7*	19,5	22,1	-	26,5*	-	-	-	-	-	-	-	
32	+48 +9	38	+51 +32	-	-	-	-	-	-	18,7	20,5	23,5	-	28,0	29,9	-	-	-	-		
35		42		-	-	-	-	-	-	24,0*	26,5	30,1	-	36,0	-	42,2*	-	-	-		
40		48		-	-	-	-	-	-	-	31,0	-	39,0	-	46,9*	-	54,9	62,8*	-		
45		52		-	-	-	-	-	-	-	38,0	-	45,6	-	53,1*	60,7	68,2*	-			
50		58		-	-	-	-	-	-	-	-	48,7	-	58,2	-	67,7	77,3*	86,8	96,4*		

Only bushes whose masses lie within the bold lines are standard.  
The recommended sizes are indicated by \*.



Table 3 — Loads

$\emptyset d$	$L$	Permissible radial load		$\emptyset d$	$L$	Permissible radial load		$\emptyset d$	$L$	Permissible radial load	
		Static $C_s^a$	Dynamic $C_{25}^b$			Static $C_s^a$	Dynamic $C_{25}^b$			Static $C_s^a$	Dynamic $C_{25}^b$
mm	mm	kN	kN	mm	mm	kN	kN	mm	mm	kN	kN
6	6	4,9	4,1	20	15	53,6	44,7	32	30	184,6	153,8
8	6	6,6	5,5		20	20	74,2		61,8	32	32
	8	9,9	8,3	22	12	45,3	37,7	35	20	129,8	108,2
10	6	8,2	6,8		15	58,9	49,1		22	144,2	120,2
	8	12,4	10,3		20	81,6	68,0		25	165,8	138,2
10	10	16,5	13,8	22	90,6	75,5	30		201,9	168,3	
	12	6	9,9	8,3	25	12	51,5	42,9	35	237,9	198,3
8		14,8	12,3	15		67,0	55,8	40	20	148,3	123,6
10		19,8	16,5	20		92,7	77,3		25	189,5	157,9
12		24,7	20,6	22		103,0	85,8		30	230,7	192,3
12	24,7	20,6	25	118,5		98,8	35		271,9	226,6	
15	8	18,5	15,4	28	25	118,5	98,8	45	40	313,1	260,9
	10	24,7	20,6		15	75,0	62,5		25	213,2	177,7
	12	30,9	25,8		20	103,8	86,5		30	259,6	216,3
	15	40,2	33,5		22	115,4	96,2		35	305,9	254,9
16	8	19,8	16,5		25	132,7	110,6		40	352,3	293,6
	10	26,4	22,0	28	150,0	125,0	45	398,5	332,1		
	12	33,0	27,5	30	150,0	125,0	50	25	236,9	197,4	
	15	42,5	35,7	15	80,3	66,9		30	288,4	240,3	
	16	45,1	38,4	20	111,2	92,7		35	339,9	283,3	
	16	45,1	38,4	22	123,6	103,0		40	391,4	326,2	
18	10	29,7	24,8	30	25	142,1	118,4	45	442,9	369,1	
	12	37,1	30,9		30	173,0	144,2	50	494,4	412,0	
	15	48,2	40,2		15	85,7	71,4	32	—	—	
	18	59,3	49,4		20	118,7	98,9				
20	10	33,0	27,5	22	131,8	109,8					
	12	41,2	34,3	25	151,6	126,3					

<sup>a</sup>  $C_s = 0,206 d (L - 2)$  [kN] — Based on a unit pressure of 206 MPa.

<sup>b</sup>  $C_{25} = \frac{C_s}{1,2}$  [kN]

Definitions of all loads are given in EN 2311.