



# SLOVENSKI STANDARD

## SIST EN 2222:2018

01-marec-2018

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**Aeronavtika - Jeklo FE-PL31 - Utrjeno in mehko žarjeno - Prosto in utopno kovani izkovki**

Aerospace series - Steel FE-PL31 - Hardened and tempered - Hand and die forgings

Luft- und Raumfahrt - Stahl FE-PL31 - Gehärtet und Angelassen - Gesenk- und Freiformschmiedestücke

Série aérospatiale - Acier FE-PL31 - Trempé et revenu - Pièces forgées et matricées

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**Ta slovenski standard je istoveten z: EN 2222:2017**

SIST EN 2222:2018  
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**ICS:**

49.025.10      Jekla

Steels

**SIST EN 2222:2018**

**en,fr,de**

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EUROPEAN STANDARD

EN 2222

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2017

ICS 49.025.10

English Version

## Aerospace series - Steel FE-PL31 - Hardened and tempered - Hand and die forgings

Série aérospatiale - Acier FE-PL31 - Trempé et revenu -  
Pièces forgées et matricées

Luft- und Raumfahrt - Stahl FE-PL31 - Gehärtet und  
Angelassen - Gesenk- und Freiformschmiedestücke

This European Standard was approved by CEN on 11 September 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.

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

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

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## European foreword

This document (EN 2222:2017) 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 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 June 2018 and conflicting national standards shall be withdrawn at the latest by June 2018.

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.

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.

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EN 2222:2017 (E)

## Introduction

This European Standard is part of the series of EN metallic material standards for aerospace applications. The general organization of this series is described in EN 4258.

This European Standard has been prepared in accordance with EN 4500-005.

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## 1 Scope

This European Standard specifies the requirements relating to:

Steel FE-PL31  
Hardened and tempered  
Hand and die forgings

for aerospace applications.

## 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 2157-2, *Aerospace series — Steel — Forging stock and forgings — Technical specification — Part 2: Forging stock*

EN 4258, *Aerospace series — Metallic materials — General organization of standardization — Links between types of EN standards and their use*

EN 4500-005, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 005: Specific rules for steels*

## 3 Requirements

See Table 1.

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## EN 2222:2017 (E)

Table 1 — Requirements for steel FE-PL31

1	Material designation		Steel FE-PL31							
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni
		min.	0,95	0,15	0,25	-	-	1,35	-	-
		max.	1,10	0,35	0,45	0,030	0,020	1,65	-	0,40
3	Method of melting		Air melted							
4.1	Form		Hand and die forgings							
4.2	Method of production		-							
4.3	Limit dimension(s)	mm	-							
5	Technical specification		EN 2157-2							

6.1	Delivery condition		-							
	Heat treatment		Spheroidised							
6.2	Delivery condition code		-							
7	Use condition		Hardened and tempered							
	Heat treatment		830 °C ≤ $\theta$ ≤ 870 °C/OQ Then temper 150 °C ≤ $\theta$ ≤ 190 °C							

## iTeh STANDARD PREVIEW Characteristics

8.1	Test sample(s)		(standards.iteh.ai)						Disc: $a = 10$ mm	
8.2	Test piece(s)		-						Reference <sup>a</sup>	
8.3	Heat treatment		Spheroidised						See line 29.	
9	Dimensions concerned	mm	- 478f17c9a0f6/sist-en-2222-2018						-	
10	Thickness of cladding on each face	%	-						-	
11	Direction of test piece		-						-	
12	Temperature	$\theta$	°C		-					
13	Proof stress	R <sub>p0,2</sub>	MPa *		-					
14	T Strength	R <sub>m</sub>	MPa *		-					
15	Elongation	A	%		-					
16	Reduction of area	Z	%		-					
17	Hardness		HB ≤ 207			HV ≥ 740 <sup>b</sup> HRC ≥ 61			HV ≥ 740 <sup>b</sup> HRC ≥ 61	
18	Shear strength	R <sub>c</sub>	MPa *		-					
19	Bending	k	-		-					
20	Impact strength		-							
21	Temperature	$\theta$	°C		-					
22	Time		h		-					
23	Stress	$\sigma_a$	MPa *		-					
24	C Elongation	a	%		-					
25	Rupture stress	$\sigma_R$	MPa *		-					
26	Elongation at rupture	A	%		-					
27	Notes (see line 98)		*, a, b							



28	-	-	-
29	Reference heat treatment	-	Hardened and tempered 830 °C ± 10 °C/OQ Then temper 180 °C ± 5 °C
30	Microstructure	-	Carbides shall be fine and non-aligned
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95	Marking inspection	-	-
96	Dimensional inspection	-	-
98	Notes	-	* 1 MPa = 1 N/mm <sup>2</sup> . a Optional test. b Method to be used in case of conflict.
99	Typical use	-	Bearings