SLOVENSKI STANDARD
SIST EN 2135:2018

01-marec-2018

Aeronavtika - Jeklo FE-PL61 - Naogljičeno, utrjeno in mehko žarjeno - Palica - De ≤ 40 mm

Aerospace series - Steel FE-PL61 - Carburized, hardened and tempered - Bar - De ≤ 40 mm

Luft- und Raumfahrt - Stahl FE-PL61 - Aufgekohlt, gehärtet und angelassen - Stangen - De ≤ 40 mm

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Série aérospatiale - Acier FE-PL61 - Cémenté, trempé et revenu - Barres - De ≤ 40 mm

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Ta slovenski standard je istoveten z: EN 2135:2017

ICS:

49.025.10 Jekla Steels

SIST EN 2135:2018 en,fr,de

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 2135

December 2017

ICS 49.025.10

English Version

Aerospace series - Steel FE-PL61 - Carburized, hardened and tempered - Bar - De ≤ 40 mm

Série aérospatiale - Acier FE-PL61 - Cémenté, trempé et revenu - Barres - De ≤ 40 mm

Luft- und Raumfahrt - Stahl FE-PL61 - Aufgekohlt, gehärtet und angelassen - Stangen - De ≤ 40 mm

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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

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

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SIST EN 2135:2018

Contents Page

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(standards.iteh.ai)

SIST EN 2135:2018
https://standards.iteh.ai/catalog/standards/sist/4fd00fca-5cc7-44e3-a79b-2416309e4882/sist-en-2135-2018

SIST EN 2135:2018

European foreword

This document (EN 2135:2017) 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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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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SIST EN 2135:2018

1 Scope

This European Standard specifies the requirements relating to:

Steel FE-PL61
Carburized, hardened and tempered
Bar
$D_e \leq 40$ mm

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 2157-1, *Aerospace series — Steel — Forging stock and forgings — Technical specification — Part 1: General requirements*

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*

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EN 4700-002, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 002: Bar and section*

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3 Requirements

See Table 1.

SIST EN 2135:2018

Table 1 — Requirements for steel FE-PL61

1	Material designation		Steel FE-PL61						
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Ni
		min.	0,10	0,15	0,35	–	–	0,60	2,75
		max.	0,16	0,40	0,65	0,025	0,020	0,90	3,25
3	Method of melting		Air melted						
4.1	Form		Bar						
4.2	Method of production		–						
4.3	Limit dimension(s)	mm	$D_e \leq 40$						
5	Technical specification		EN 4700-002						

6.1	Delivery condition	Softened
	Heat treatment	–
6.2	Delivery condition code	A
7	Use condition	Carburized, hardened and tempered
	Heat treatment	Delivery condition + carburized 880 °C ≤ θ ≤ 920 °C + 810 °C ≤ θ ≤ 830 °C/OQ + 140 °C ≤ θ ≤ 190 °C

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https://standards.iteh.ai/catalog/standards/sist/4d00fca-3ec7-44e3-a79b-2416309e4882/sist-en-2135-2018

					Characteristics			
8.1	Test sample(s)				–	D = 11 mm	D = 16 mm	Bars: D = 16 mm
8.2	Test piece(s)				–	Simulated case hardening test [a]		Reference [b] (see line 29)
8.3	Heat treatment				Softened	Hardened and tempered – Bar		–
9	Dimensions concerned			mm	≤ 40	≤ 16	16 ≤ D_e ≤ 40	–
10	Thickness of cladding on each face			%	–			
11	Direction of test piece				L			
12	T	Temperature	θ	°C	Ambient temperature			
13	T	Proof stress	$R_{p0,2}$	MPa*	–	≥ 730	≥ 630	≥ 730
14	T	Strength	R_m	MPa*	–	≥ 930	≥ 830	930 ≤ R_m ≤ 1 230
15	T	Elongation	A	%	–	≥ 11	≥ 11	≥ 11
16	T	Reduction of area	Z	%	–			
17	Hardness				HB ≤ 217 HV ≤ 228 [c]	HB ≥ 277	HB ≥ 248	HB ≥ 277
18	Shear strength		R_c	MPa*	–			
19	Bending		k	–	–			
20	Impact strength				–	≥ 40	≥ 35	≥ 40
21	C	Temperature	θ	°C				
22	C	Time		h				
23	C	Stress	σ_a	MPa*				
24	C	Elongation	a	%				
25	C	Rupture stress	σ_R	MPa*				
26	C	Elongation at rupture	A	%				
27	Notes (see line 98)				*, a, b, c			

SIST EN 2135:2018

28	–	–	–					
29	Reference heat treatment	–	Hardened and tempered 820 °C ± 10 °C/OQ + tempered 190 °C ± 5 °C					
28	Hardenability (Jominy test)	–	Distance in mm	5	9	15	25	40
			HRC min.	31	28	22	–	–
			HRC max.	44	41	36	31	28
95	Marking inspection	–	–					
96	Dimensional inspection	–	–					
98	Notes	–	[a] One bar per batch. [b] Optional test. [c] HV for $D_e \leq 5$ mm.					
99	Typical use	–	Case hardening steel: Bell pivot					

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