



SLOVENSKI STANDARD
SIST EN 4631:2008
01-marec-2008

Aeronavtika - Jeklo FE-PM 3504 (X4CrNiMo16-5-1) - Taljeno - Utrjeno in mehko
žarjeno - Palica - De =< 200 mm - 900 MPa =< Rm =< 1 050 MPa

Če je potrebno, se lahko uporabijo dodatni pogoji, ki jih določijo proizvajalci jekla. Če se uporabijo dodatni pogoji, morajo biti skladni s pogoji, ki jih določijo proizvajalci jekla.

Številni podatki, ki jih določijo proizvajalci jekla, morajo biti skladni s pogoji, ki jih določijo proizvajalci jekla. Če se uporabijo dodatni pogoji, morajo biti skladni s pogoji, ki jih določijo proizvajalci jekla.

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Učinkovitost jekla FE-PM 3504 (X4CrNiMo16-5-1) - Taljeno - Utrjeno in mehko žarjeno - Palica - De =< 200 mm - 900 MPa =< Rm =< 1 050 MPa je odvisna od pogojev, ki jih določijo proizvajalci jekla.

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Ta slovenski standard je istoveten z: EN 4631:2007

ICS:

49.025.10

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en

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ICS 49.025.10

English Version

**Aerospace series - Steel FE-PM 3504 (X4CrNiMo16-5-1) - Air
melted - Hardened and tempered - Bar - $De \leq 200$ mm - 900
MPa $\leq R_m \leq 1\ 050$ MPa**

Série aérospatiale - Acier FE-PM 3504 (X4CrNiMo16-5-1) -
Élaboré à l'air - Trempé et revenu - Barres - $De \leq 200$ mm -
900 MPa $\leq R_m \leq 1\ 050$ MPa

Luft- und Raumfahrt - Stahl FE-PM 3504 (X4CrNiMo16-5-1)
- Lufterschmolzen - Gehärtet- und angelassen - Stangen -
 $De \leq 200$ mm - 900 MPa $\leq R_m \leq 1\ 050$ MPa

This European Standard was approved by CEN on 23 June 2007.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

This document (EN 4631:2007) 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

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Introduction

This 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 standard has been prepared in accordance with EN 4500-5.

1 Scope

This standard specifies the requirements relating to:

Steel FE-PM 3504 (X4CrNiMo16-5-1)
Air melted
Hardened and tempered
Bar
 $D_e \leq 200$ mm
 $900 \text{ MPa} \leq R_m \leq 1\,050 \text{ MPa}$

for aerospace applications.

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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 2002-8, *Aerospace series — Metallic materials — Test methods — Part 8: Micrographic determination of grain size.* ¹⁾

EN 2043, *Aerospace series — Metallic materials — General requirements for semi-finished product qualification (excluding forgings and castings).* ¹⁾

EN 2951, *Aerospace series — Metallic materials — Test method — Micrographic determination of content of non-metallic inclusions.* ¹⁾

EN 4050-4, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 4: Acceptance criteria.* ¹⁾

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

EN 4500-5, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 5: Specific rules for steels.* ¹⁾

EN 4700-2, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 2: Bar and section.* ¹⁾

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

EN 4631:2007 (E)

1	Material designation		Steel FE-PM 3504 (X4CrNiMo16-5-1)									
2	Chemical composition %	Element	C	Si	Mn	p ^a	S ^a	N	Cr	Mo	Ni	Fe
		min.	–	–	–	–	–	≥ 0,020	15,00	0,80	4,00	Base
		max.	0,06	0,70	1,50	0,030	0,005	–	17,00	1,50	6,00	
3	Method of melting		Air melted									
4.1	Form		Bar									
4.2	Method of production		–									
4.3	Limit dimension(s)	mm	$D_e \leq 200$ mm									
5	Technical specification		EN 4700-2									

6.1	Delivery condition		Annealed				Hardened and tempered			
	Heat treatment		–				1 010 °C ≤ θ ≤ 1 060 °C / OQ or WQ ^b + Tempered 580 °C ≤ θ ≤ 610 °C			
6.2	Delivery condition code		W				U			
7	Use condition		Hardened and tempered				Hardened and tempered			
	Heat treatment		1 010 °C ≤ θ ≤ 1 060 °C / OQ or WQ ^b + Tempered 580 °C ≤ θ ≤ 610 °C				Delivery condition			

Characteristics

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8.1	Test sample(s)		–				–			
8.2	Test piece(s)		–				–			
8.3	Heat treatment		Annealed				Delivery condition			
9	Dimensions concerned	mm	$D_e \leq 200$				$D_e \leq 75$		$75 \leq D_e \leq 200$	
10	Thickness of cladding on each face	%	–				–		–	
11	Direction of test piece		–				L		LT	
12	Temperature	θ	°C		Ambient				Ambient	
13	Proof stress	R _{p0,2}	MPa		–				≥ 700	
14	T Strength	R _m	MPa		–				900 ≤ R _m ≤ 1 050	
15	Elongation	A	%		–				≥ 16	
16	Reduction of area	Z	%		–				–	
17	Hardness		≤ 293 HB				269 ≤ HB ≤ 331		269 ≤ HB ≤ 331	
18	Shear strength	R _c	MPa		–				–	
19	Bending	k	–		–				–	
20	Impact strength		–				≥ 120 J at 20 °C Notch direction T ≥ 70 J at – 40 °C Notch direction T		≥ 60 J at 20 °C Notch direction L ≥ 35 J at – 40 °C Notch direction L	
21	Temperature	θ	°C		–				–	
22	Time		h		–				–	
23	Stress	σ_a	MPa		–				–	
24	Elongation	a	%		–				–	
25	Rupture stress	σ_R	MPa		–				–	
26	Elongation at rupture	A	%		–				–	
27	Notes (see line 98)		–				a, b			

30	Microstructure	–	See EN 4700-2.
		7	The δ ferrite content shall not exceed 5 %
34	Grain size	–	See EN 4700-2.
		7	$G \geq 5$ or finer
			EN 2002-8
44	External defects	–	See EN 4700-2.
50	Cleanliness/inclusion content (micro cleanness)	–	See EN 4700-2.
		7	EN 2951 category 2.
61	Internal defects	–	See EN 4700-2.
		7	EN 4050-4 class 2
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95	Marking inspection	–	See EN 4700-2.
96	Dimensional inspection	–	See EN 4700-2.
98	Notes	–	<p>^a For specific welding applications (e.g. high power beam), and after agreement between manufacturer and purchaser, S+P should be inferior or equal to 0,023 %.</p> <p>^b Air quenching may be used for $D_e \leq 20$ mm.</p>
99	Typical use	–	–

100	-	Product qualification	-	See EN 2043.
				Qualification programme to be agreed between manufacturer and purchaser.
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