SLOVENSKI STANDARD

SIST EN 4629:2008

01-marec-2008

Aeronavtika - Jeklo FE-PM 3504 (X4CrNiMo16-5-1) - Taljeno - Utrjeno in mehko žarjeno - Material za kovanje - De =< 300 mm

Aerospace series - Steel FE-PM 3504 (X4CrNiMo16-5-1) - Air melted - Hardened and tempered - Forging stock - De Ò300 mm

Luft- und Raumfahrt - Stahl FE-PM 3504 (X4CrNiMo16-5-1) - Lufterschmolzen - Gehª rtet - und angelassen - Schmiedest¿cke - De Ò300 mm

S®rie a®rospatiale - Acier FE-PM 3504 (X4CrNiMo16-5-1) - £labor®¨ l'air - Tremp®et revenu - Demi-produits pour forgeage - De Ò300 mm

Ta slovenski standard je istoveten z: EN 4629:2007

ICS:

49.025.10

SIST EN 4629:2008 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4629

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English Version

Aerospace series - Steel FE-PM 3504 (X4CrNiMo16-5-1) - Air melted - Hardened and tempered - Forging stock - De ≤ 300 mm

Série aérospatiale - Acier FE-PM 3504 (X4CrNiMo16-5-1) - Élaboré à l'air - Trempé et revenu - Demi-produits pour forgeage - De ≤ 300 mm

Luft- und Raumfahrt - Stahl FE-PM 3504 (X4CrNiMo16-5-1) - Lufterschmolzen - Gehärtet- und angelassen - Schmiedestücke - De ≤ 300 mm

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 4629:2007) 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.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
Forging stock
$D_e \leq 300$ mm

for aerospace applications.

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 2957, *Aerospace series — Method of preparation of forged samples.* [1)]

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

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

EN 4700-5, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 5: Specific rules for steel.* [2)]

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

2) In preparation at the date of publication of this standard.

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		Forging stock									
4.2	Method of production		–									
4.3	Limit dimension(s)	mm	$D_e \leq 300$ mm									
5	Technical specification		EN 4700-5									

6.1	Delivery condition	Softened
	Heat treatment	–
6.2	Delivery condition code	U
7	Use condition	Delivery condition
	Heat treatment	–

Characteristics

8.1	Test sample(s)			See EN 4700-5.	Reforged sample in accordance to EN 2957 or cut from forging stock	
8.2	Test piece(s)			See EN 4700-5.	–	
8.3	Heat treatment			Delivery condition	See line 29.	
9	Dimensions concerned		mm	$D_e \leq 300$ mm	$D_e \leq 300$ mm	
10	Thickness of cladding on each face		%	–	–	
11	Direction of test piece			–	L	TL
12	T	Temperature	θ °C	Ambient	Ambient	Ambient
13	T	Proof stress	$R_{p0,2}$ MPa	–	≥ 700	≥ 700
14	T	Strength	R_m MPa	–	900 / 1 050	900 / 1 050
15	T	Elongation	A %	–	≥ 16	≥ 12
16	T	Reduction of area	Z %	–	–	–
17	Hardness			HB ≤ 293	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	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		

29	Reference heat treatment	–	Hardened and tempered 1 010 °C ≤ θ ≤ 1 060 °C / OQ or WQ + 580 °C ≤ θ ≤ 610 °C
30	Microstructure	–	See EN 4700-5.
		7	The δ ferrite content shall not exceed 5 %.
34	Grain size	–	See EN 4700-5.
		7	G ≥ 5 or finer
			EN 2002-8
44	External defects	–	See EN 4700-5.
50	Cleanliness/inclusion content (micro cleanness)	1	See EN 4700-5.
		7	EN 2951 category 2
51	Macrostructure	–	See EN 4700-5.
61	Internal defects	–	See EN 4700-5.
		7	EN 4050-4 class 2
95	Marking inspection	–	See EN 4700-5.
96	Dimensional inspection	–	See EN 4700-5.
98	Notes	–	[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 %.
99	Typical use	–	–

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