SLOVENSKI STANDARD

SIST EN 4630:2008

01-marec-2008

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

Aerospace series - Steel FE-PM 3504 (X4CrNiMo16-5-1) - Air melted - Hardened and tempered - Forgings - De Ò200 mm - 900 MPa ÒRm Ò1 050 MPa

Luft- und Raumfahrt - Stahl FE-PM 3504 (X4CrNiMo16-5-1) - Lufterschmolzen - Gehª rtet - und angelassen - Schmiedest¿cke - De Ò200 mm - 900 MPa ÒRm Ò1 050 MPa

S®rie a®rospatiale - Acier FE-PM 3504 (X4CrNiMo16-5-1) - £labor®¨ l'air - Tremp®et revenu - Pi¯ces forg®es - De Ò200 mm - 900 MPa ÒRm Ò1 050 MPa

Ta slovenski standard je istoveten z: EN 4630:2007

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EUROPEAN STANDARD

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English Version

Aerospace series - Steel FE-PM 3504 (X4CrNiMo16-5-1) - Air melted - Hardened and tempered - Forgings - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

Série aérospatiale - Acier FE-PM 3504 (X4CrNiMo16-5-1) - Élaboré à l'air - Trempé et revenu - Pièces forgées - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

Luft- und Raumfahrt - Stahl FE-PM 3504 (X4CrNiMo16-5-1) - Lufterschmolzen - Gehärtet- und angelassen - Schmiedestücke - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

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

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Ref. No. EN 4630:2007: E

Foreword

This document (EN 4630:2007) 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.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
Forgings
$D_e \leq 200$ mm
900 MPa $\leq R_m \leq$ 1 050 MPa

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 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 4629, *Aerospace series — Steel FE-PM 3504 (X4CrNiMo16-5-1) — Air melted — Hardened and tempered — Forging stock —* $D_e \leq 300$ *mm.*

EN 4700-6, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 6: Pre-production and production forgings.* [2]

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		Forgings									
4.2	Method of production		Forged from forging stock EN 4629									
4.3	Limit dimension(s)	mm	$D_e \leq 200$ mm									
5	Technical specification		EN 4700-6									

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

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	T	Temperature	θ °C	Ambient	Ambient	Ambient
13		Proof stress	$R_{p0,2}$ MPa	–	≥ 700	≥ 700
14		Strength	R_m MPa	–	900 / 1 050	900 / 1 050
15		Elongation	A %	–	≥ 16	≥ 12
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	C	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		

34	Grain size	–	See EN 4700-6.
		7	G ≥ 5 or finer
			EN 2002-8
44	External defects	–	See EN 4700-6.
51	Macrostructure (Grain flow)	–	See EN 4700-6.
61	Internal defects	–	See EN 4700-6.
		7	EN 4050-4 class 2
95	Marking inspection	–	See EN 4700-6.
96	Dimensional inspection	–	See EN 4700-6.
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 %. [b] Air quenching may be used for $D_e \leq 20$ mm.
99	Typical use	–	–

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