
Aeronavtika - Jeklo FE-PM1505 (X1CrNiMoAlTi12-9-2) - Izkovki a ali D Ø150 mm - Rm Ø1 300 MPa, taljeni z vakuumsko indukcijo in pretaljeni s talilno elektrodo, Ĥarjeni v topilu in utrjeni

Aerospace series - Steel FE-PM1505 (X1CrNiMoAlTi12-9-2) - Vacuum induction melted and consumable electrode remelted - Solution treated and precipitation treated - Forgings - a or D Ø150 mm - Rm Ø1 300 MPa

Luft- und Raumfahrt - Stahl FE-PM1505 (X1CrNiMoAlTi12-9-2) - Vakuuminduktionserschmolzen und mit selbstverzehrende Elektrode umgeschmolzen - LösungsgeglĤht und ausgehĤgert - SchmiedestĤcke - a oder D Ø150 mm - Rm Ø1 300 MPa

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S°rie a°rospatiale - Acier FE-PM1505 (X1CrNiMoAlTi12-9-2) - ¢labor° sous vide par induction et refondu ©l° lectrode consommable - Mis en solution et vieilli - Pi±ces forg°es et pi±ces matric°es - a ou D Ø150 mm - Rm Ø1 300 MPa

Ta slovenski standard je istoveten z: EN 4471:2007

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Steels

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4471

July 2007

ICS 49.025.10

English Version

**Aerospace series - Steel FE-PM1505 (X1CrNiMoAlTi12-9-2) -
Vacuum induction melted and consumable electrode remelted -
Solution treated and precipitation treated - Forgings - a or D ≤
150 mm - Rm ≥ 1 300 MPa**

Série aérospatiale - Acier FE-PM1505 (X1CrNiMoAlTi12-9-2) - Élaboré sous vide par induction et refondu à l'électrode consommable - Mis en solution et vieilli - Pièces forgées et pièces maticées - a ou D ≤ 150 mm - Rm ≥ 1 300 MPa

Luft- und Raumfahrt - Stahl FE-PM1505 (X1CrNiMoAlTi12-9-2) - Vakuuminduktionserschmolzen und mit selbstverzehrende Elektrode umgeschmolzen - Lösungsgeglüht und ausgelagert - Schmiedestücke - a oder D ≤ 150 mm - Rm ≥ 1 300 MPa

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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

EN 4471:2007 (E)**Foreword**

This document (EN 4471:2007) 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 January 2008, and conflicting national standards shall be withdrawn at the latest by January 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-PM1505 (X1CrNiMoAlTi12-9-2)
Vacuum induction melted and consumable electrode remelted
Solution treated and precipitation treated
Forgings
 a or $D \leq 150$ mm
 $R_m \geq 1\,300$ 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 4258, *Aerospace series — Metallic materials — General organization of standardization — Links between types of EN standards and their use.*

EN 4346, *Aerospace series — Steel FE-PM1505 (X1CrNiMoAlTi12-9-2) — Vacuum induction melted and consumable electrode remelted — Softened — Forging stock — a or $D \leq 300$ mm.* ¹⁾

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

EN 4700-6, *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.

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1	Material designation		Steel FE-PM1505 (X1CrNiMoAlTi12-9-2)											
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Ti	N ₂	Fe
		min.	–	–	–	–	–	11,50	1,85	8,50	0,60	0,28	–	Base
		max.	0,015	0,10	0,10	0,010	0,005	12,50	2,15	9,50	0,80	0,37	0,010	
3	Method of melting		Vacuum induction melted and consumable electrode remelted											
4.1	Form		Forgings											
4.2	Method of production		Forged from forging stock EN 4346											
4.3	Limit dimension(s)	mm	a or $D \leq 150$											
5	Technical specification		EN 4700-6											

6.1	Delivery condition		Solution treated				Solution treated and precipitation treated							
	Heat treatment		$820\text{ °C} \leq \theta \leq 860\text{ °C}$ / OQ, AQ or WQ + cooling to $\theta \leq 20\text{ °C}$				$820\text{ °C} \leq \theta \leq 860\text{ °C}$ / OQ, AQ or WQ + cooling to $\theta \leq 20\text{ °C}$ + $525\text{ °C} \leq \theta \leq 545\text{ °C}$ / $t \geq 4\text{ h}$ / AC							
6.2	Delivery condition code		W				U							
7	Use condition		Solution treated and precipitation treated				Delivery condition							
	Heat treatment		Solution treated + $525\text{ °C} \leq \theta \leq 545\text{ °C}$ / $t \geq 4\text{ h}$ / AC				–							

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Characteristics

8.1	Test sample(s)			See EN 4700-6.		
8.2	Test piece(s)			See EN 4700-6.		
8.3	Heat treatment			SIST EN 4471-2009 https://standards.iteh.ai/catalog/standards/sist/a3c79804-b16c-4939-912c-411e8e65c1b3/sist-en-4471-2009		
9	Dimensions concerned	mm	Delivery condition a or $D \leq 150$		Use condition a or $D \leq 150$ ^a	
10	Thickness of cladding on each face	%	–		–	
11	Direction of test piece		–		L	
12	Temperature	θ	°C		–	
13	Proof stress	R _{p0,2}	MPa		–	
14	T Strength	R _m	MPa		–	
15	Elongation	A	%		–	
16	Reduction of area	Z	%		–	
17	Hardness		≤ 363 HB		≥ 380 HB	
18	Shear strength	R _c	MPa		–	
19	Bending	k	–		–	
20	Impact strength		–		KV ≥ 50 J ; Notch direction T + KV ≥ 20 J, at – 40 °C ; Notch direction T	
21	Temperature	θ	°C		KV ≥ 40 J ; Notch direction L + KV ≥ 15 J, at – 40 °C ; Notch direction L	
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			

34	Grain size	–	See EN 4700-6.
		7	$G \geq 6$
44	External defects	–	See EN 4700-6.
61	Internal defects	–	See EN 4700-6.
		7	Class 5
82	Batch uniformity	–	See EN 4700-6.
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95	Marking inspection	–	See EN 4700-6.
96	Dimensional inspection	–	See EN 4700-6.
98	Notes	–	^a 75 mm ≤ <i>a</i> or <i>D</i> ≤ 150 mm may be tested in L or T direction.
99	Typical use	–	–

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

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