
Aeronavtika - Jeklo FE-PM1505 (X1CrNiMoAlTi12-9-2) - Palice a ali D Ø150 mm - Rm Ø1200 MPa, taljene z vakuumsko indukcijo in pretaljene s talilno elektrodo, Ĥarjene v topilu in utrjene

Aerospace series - Steel FE-PM1505 (X1CrNiMoAlTi12-9-2) - Vacuum induction melted and consumable electrode remelted - Solution treated and precipitation treated - Bar - a or D Ø150 mm - Rm Ø1 200 MPa

Luft- und Raumfahrt - Stahl FE-PM1505 (X1CrNiMoAlTi12-9-2) - vakuuminduktionserschmolzen und mit selbstverzehrender Elektrode umgeschmolzen - LösungsgeglÄht und ausgeĤrtet - Stangen - a oder D Ø150 mm - Rm Ø1 200 MPa

[SIST EN 4467:2009](https://standards.iteh.ai/catalog/standards/sist/1789a51f-2947-4364-bf57-19056a305b0a/sist-en-4467-2009)

S°rie a° rospatiale - Acier FE-PM1505 (X1CrNiMoAlTi12-9-2) - a labor° sous vide par induction et refondu ©l° lectrode consommable - Mis en solution et vieilli - Barres - a ou D Ø150 mm - Rm Ø1 200 MPa

Ta slovenski standard je istoveten z: EN 4467:2007

ICS:

49.025.10 Jekla

Steels

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EN 4467:2007 (E)**Foreword**

This document (EN 4467:2007) 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of an identical text or by endorsement, at the latest by January 2008, and conflicting national standards shall be withdrawn at the latest by January 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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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
Bar
 a or $D \leq 150$ mm
 $R_m \geq 1\,200$ 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 2043, *Aerospace series — Metallic materials — General requirements for semi-finished product qualification (excluding forgings and castings)*. ¹⁾

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

EN 4436, *Aerospace series — Steel — Test methods — Determination of δ ferrite content*. ¹⁾

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

EN 4700-2, *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.

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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		Bar											
4.2	Method of production		–											
4.3	Limit dimension(s)	mm	a or $D \leq 150$											
5	Technical specification		EN 4700-2											

6.1	Delivery condition		Solution treated				Solution treated and precipitation treated							
	Heat treatment		820 °C ≤ θ ≤ 860 °C / OQ, AQ or WQ + cooling to $\theta \leq 20$ °C				820 °C ≤ θ ≤ 860 °C / OQ, AQ or WQ + cooling to $\theta \leq 20$ °C + 540 °C ≤ θ ≤ 560 °C / $t \geq 4$ h / AC							
6.2	Delivery condition code		W				U							
7	Use condition		Solution treated and precipitation treated				Delivery condition							
	Heat treatment		Delivery condition + 540 °C ≤ θ ≤ 560 °C / $t \geq 4$ h / AC				–							

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Characteristics

8.1	Test sample(s)				(standards.itch.at) See EN 4700-2.					
8.2	Test piece(s)				See EN 4700-2.					
8.3	Heat treatment				SIST EN 4467-2009 https://standards.itec.org/catalog/standards/sist/1789a51f-2947-4334-b0d0-7f2767a8c0/sist-en-4467-2009 Delivery condition Use condition					
9	Dimensions concerned		mm	a or $D \leq 150$		a or $D \leq 150$ ^a		$75 \leq a$ or $D \leq 150$ ^a		
10	Thickness of cladding on each face		%	–		–		–		
11	Direction of test piece				–		L		T	
12	T	Temperature	θ	°C	–		Ambient		Ambient	
13		Proof stress	R _{p0,2}	MPa	–		$\geq 1\ 100$		$\geq 1\ 100$	
14		Strength	R _m	MPa	–		$\geq 1\ 200$		$\geq 1\ 200$	
15		Elongation	A	%	–		≥ 12		≥ 10	
16		Reduction of area	Z	%	–		≥ 50		≥ 45	
17	Hardness				≤ 363 HB		≥ 360 HB		≥ 360 HB	
18	Shear strength		R _c	MPa	–		–		–	
19	Bending		k	–	–		–		–	
20	Impact strength				–		KV ≥ 90 J ; Notch direction T + KV ≥ 30 J, at – 40 °C ; Notch direction T		KV ≥ 90 J ; Notch direction L + KV ≥ 30 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					

30	Microstructure	1	EN 4436		
		2	One per cast		
		3	Corresponding to ingot top		
		7	The δ -ferrite content shall not exceed 2 %		
34	Grain size	–	See EN 4700-2.		
		7	$G \geq 6$		
44	External defects	–	See EN 4700-2.		
		1	Visual		
50	Cleanliness / inclusion content (micro-cleanness)	–	See EN 4700-2.		
		7	Category 5		
51	Macrostructure	–	See EN 4700-2.		
		7	Class	Condition	Severity
			1	Freckles	A
			2	White spots	A
			3	Radial segregation	A
			4	Ring pattern	B
61	Internal defects	–	See EN 4700-2.		
		6	a or $D \leq 100$ mm may be tested either on the product or at an earlier stage of manufacturing.		
		7	Class 5		
			STANDARD PREVIEW (standards.iteh.ai) SIST EN 4467:2009 https://standards.iteh.ai/catalog/standards/sist/1789a51f-2947-4364-bf57-cf7b3767a8c0/sist-en-4467-2009		
95	Marking inspection	–	See EN 4700-2.		
96	Dimensional inspection	–	See EN 4700-2.		
98	Notes	–	^a 75 mm $\leq a$ or $D \leq 150$ mm may be tested in L or T direction.		
99	Typical use	–	–		

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

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