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**Aeronavtika - Jeklo FE-PM1503 (X3CrNiMoAl 13-8-2) - Vakuumsko indukcijsko taljeno in pretaljeno s taljivo elektrodo - Topilno žarjeno in izločevalno utrjeno - Palice za obdelavo - a ali  $D \leq 150$  mm -  $1200 \text{ MPa} \leq R_m \leq 1400 \text{ MPa}$**

Aerospace series - Steel FE-PM1503 (X3CrNiMoAl 13-8-2) - Vacuum induction melted and consumable electrode remelted - Solution treated and precipitation treated - Bar for machining - a or  $D \leq 150$  mm -  $1\ 200 \text{ MPa} \leq R_m \leq 1\ 400 \text{ MPa}$

Luft- und Raumfahrt - Stahl FE-PM1503 (X3CrNiMoAl 13-8-2) - Vakuuminduktionserschmolzen und mit selbstverzehrender Elektrode umgeschmolzen - Lösungsgeglüht und ausgelagert - Stangen zur spanenden Bearbeitung - a oder  $D \leq 150$  mm -  $1\ 200 \text{ MPa} \leq R_m \leq 1\ 400 \text{ MPa}$

[https://standards.iteh.ai/catalog/standards/sist/f0697036-0e89-4910-9061-](https://standards.iteh.ai/catalog/standards/sist/f0697036-0e89-4910-9061-d2bd961ba2db/sist-en-3357-2019)

Série aérospatiale - Acier FE-PM1503 (X3CrNiMoAl 13-8-2) - Élaboré sous vide par induction et refondu à l'électrode consommable - Mis en solution et vieilli - Barres pour usinage - a ou  $D \leq 150$  mm -  $1\ 200 \text{ MPa} \leq R_m \leq 1\ 400 \text{ MPa}$

**Ta slovenski standard je istoveten z: EN 3357:2019**

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**ICS:**

49.025.10      Jekla      Steels

**SIST EN 3357:2019**      en,fr,de

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EUROPEAN STANDARD

EN 3357

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2019

ICS 49.025.10

English Version

**Aerospace series - Steel FE-PM1503 (X3CrNiMoAl 13-8-2)  
- Vacuum induction melted and consumable electrode  
remelted - Solution treated and precipitation treated - Bar  
for machining - a or D ≤ 150 mm - 1 200 MPa ≤ Rm ≤ 1 400  
MPa**

Série aérospatiale - Acier FE-PM1503 (X3CrNiMoAl 13-8-2) - Élaboré sous vide par induction et refondu à l'électrode consommable - Mis en solution et vieilli - Barres pour usinage - a ou D ≤ 150 mm - 1 200 MPa ≤ Rm ≤ 1 400 MPa

Luft- und Raumfahrt - Stahl FE-PM1503 (X3CrNiMoAl 13-8-2) - Vakuuminduktionserschmolzen und mit selbstverzehrender Elektrode umgeschmolzen - Lösungsgeglüht und ausgehärtet - Stangen zur spanenden Bearbeitung - a oder D ≤ 150 mm - 1 200 MPa ≤ Rm ≤ 1 400 MPa

**iTeh STANDARD PREVIEW**

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 3357:2019) 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 December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

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

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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EN 3357:2019 (E)

## Introduction

This document is part of the series of metallic material standards for aerospace applications. The general organization of this series is described in EN 4258.

This document has been prepared in accordance with EN 4500-005.

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## 1 Scope

This document specifies the requirements relating to:

Steel FE-PM1503 (X3CrNiMoAl 13-8-2)  
 Vacuum induction melted and consumable electrode remelted  
 Solution treated and precipitation treated  
 Bar for machining  
 $a$  or  $D \leq 150$  mm  
 $1\ 200\ \text{MPa} \leq R_m \leq 1\ 400\ \text{MPa}$

for aerospace applications.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2003-7, *Aerospace series — Steel — Test methods — Part 7: Macrographic test* <sup>1)</sup>

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

EN 4050-1, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 1: General requirements*

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 'delta' ferrite content* <sup>1)</sup>

EN 4500-005, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 005: Specific rules for steels*

EN 4700-002, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 002: Bar and section*

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

## 4 Requirements

See Table 1.

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1) Published as ASD-STAN Prestandard at the date of publication of this standard by AeroSpace and Defence industries Association of Europe - Standardization (ASD-STAN), <http://www.asd-stan.org/>

Table 1 — Requirements for Steel FE-PM1503

1	Material designation		Steel FE-PM1503 (X3CrNiMoAl 13-8-2)										
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni	Al	N <sub>2</sub>	Fe
		min.	-	-	-	-	-	12,25	2,0	7,5	0,90	-	Base
		max.	0,05	0,10	0,10	0,010	0,008	13,25	2,5	8,5	1,35	0,010	
3	Method of melting		Vacuum induction melted and consumable electrode remelted										
4.1	Form		Bar for machining										
4.2	Method of production		-										
4.3	Limit dimension(s)	mm	$a$ or $D \leq 150$										
5	Technical specification		EN 4700-002										

6.1	Delivery condition		Solution treated					Solution treated and precipitation treated				
	Heat treatment		900 °C ≤ $\theta$ ≤ 950 °C / $t \geq 30$ min / AC, OQ or WQ + cool to $\theta \leq 15$ °C					900 °C ≤ $\theta$ ≤ 950 °C / $t \geq 30$ min / AC, OQ or WQ + cool to $\theta \leq 15$ °C 545 °C ≤ $\theta$ ≤ 575 °C / $t = 4$ h / AC				
6.2	Delivery condition code		W					U				
7	Use condition		Solution treated and precipitation treated					Delivery condition				
	Heat treatment		Delivery condition 545 °C ≤ $\theta$ ≤ 575 °C / $t = 4$ h / AC					-				

## Characteristics

8.1	Test sample(s)		See EN 4700-002.											
8.2	Test piece(s)		See EN 4700-002.											
8.3	Heat treatment		Solution treated					Use condition						
9	Dimensions concerned	mm	$a$ or $D \leq 150$					$a$ or $D \leq 150$						
10	Thickness of cladding on each face	%	-					-						
11	Direction of test piece		-					L		T				
12	Temperature	$\theta$	°C		-					Ambient		Ambient		
13	Proof stress	$R_{p0,2}$	MPa		-					≥ 1 140		≥ 1 140		
14	T	Strength	$R_m$	MPa		-					1 200 ≤ $R_m$ ≤ 1 400		1 200 ≤ $R_m$ ≤ 1 400	
15		Elongation	$A$	%		-					≥ 10		≥ 10	
16		Reduction of area	$Z$	%		-					≥ 50		≥ 45	
17		Hardness		≤ 363 HB					38 ≤ HRC ≤ 43		38 ≤ HRC ≤ 43			
18	Shear strength	$R_c$	MPa		-									
19	Bending	$k$	-		-									
20	Impact strength		-					KV ≥ 40J; Notch direction T		KV ≥ 20J; Notch direction L				
21	C	Temperature	$\theta$	°C										
22		Time	h											
23		Stress	$\sigma_a$	MPa										
24		Elongation	$a$	%										
25		Rupture stress	$\sigma_R$	MPa										
26		Elongation at rupture	$A$	%										
27	Notes (see line 98)		-											



30	Microstructure	-	See EN 4700-002.			
		1	See EN 4436.			
		7	The $\delta$ -ferrite content shall not exceed 2 %.			
34	Grain size	-	See EN 4700-002.			
		7	Dimensions (mm)	Grain size number	% of area	
			$a$ or $D \leq 80$ mm	$G \geq 5$	$\geq 95$	
				$3 \leq G \leq 5$	$\leq 5$	
		$80 \text{ mm} < a$ or $D \leq 150$ mm	$G < 3$	Not acceptable		
			$G \geq 4$	$\geq 95$		
			$3 \leq G \leq 4$	$\leq 5$		
		$G < 3$	Not acceptable			
44	External defects	-	See EN 4700-002.			
50	Cleanliness/inclusion content (micro-cleanness)	-	See EN 4700-002.			
		7	Category 5			
51	Macrostructure	-	See EN 4700-002.			
		1	EN 2003-7			
		7	Class	Condition	Severity	
			1	Freckles	A	
			2	White spots	A	
			3	Radial segregation	A	
4	Ring pattern	B				
61	Internal defects	-	See EN 4700-002.1-			
		1	EN 4050-1			
		6	$a$ or $D \leq 100$ mm may be tested either on the product or at an earlier stage of manufacture			
		7	Class 3			
95	Marking inspection	-	See EN 4700-002.			
96	Dimensional inspection	-	See EN 4700-002.			
98	Notes	-	-			
99	Typical use	-	-			