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SIST EN 2446:2009

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EUROPEAN STANDARD

EN 2446

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2008

ICS 49.025.10

English Version

**Aerospace series - Steel FE-PL1503 (35CrMo4) - 1 100 MPa ≤  
Rm ≤ 1 300 MPa - Bars - De ≤ 25 mm**

Série aérospatiale - Acier FE-PL1503 (35CrMo4) - 1 100  
MPa ≤ Rm ≤ 1 300 MPa - Barres - De ≤ 25 mm

Luft- und Raumfahrt - Stahl FE-PL1503 (35CrMo4) - 1 100  
MPa ≤ Rm ≤ 1 300 MPa - Stangen - De ≤ 25 mm

This European Standard was approved by CEN on 24 August 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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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 2446:2008 (E)****Foreword**

This document (EN 2446:2008) 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of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

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.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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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-PL1503 (35CrMo4)  
 $1\ 100\ \text{MPa} \leq R_m \leq 1\ 300\ \text{MPa}$   
 Bars  
 $D_e \leq 25\ \text{mm}$

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 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.* <sup>1)</sup>

EN 4700-2, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 2: Bar and section.* <sup>1)</sup>

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts.*

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<sup>1)</sup> Published as ASD Prestandard at the date of publication of this standard.

## EN 2446:2008 (E)

1	Material designation		Steel FE-PL1503 (35CrMo4)								
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni	Fe
		min.	0,30	0,15	0,50	–	–	0,90	0,15	–	Base
		max.	0,37	0,40	0,80	0,025	0,020	1,20	0,30	0,40	
3	Method of melting		Air melted								
4.1	Form		Bars								
4.2	Method of production		–								
4.3	Limit dimension(s)	mm	$D_e \leq 25$								
5	Technical specification		EN 4700-2								

6.1	Delivery condition	Softened	Hardened and tempered
	Heat treatment	–	$840\text{ °C} \leq \theta \leq 860\text{ °C}$ / OQ + Temper $\theta \geq 530\text{ °C}$
6.2	Delivery condition code	A	U
7	Use condition	Hardened and tempered	Hardened and tempered
	Heat treatment	Delivery condition + $840\text{ °C} \leq \theta \leq 860\text{ °C}$ / OQ + Temper $\theta \geq 530\text{ °C}$	Delivery condition

Characteristics  
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8.1	Test sample(s)		See EN 4700-2.									
8.2	Test piece(s)		See EN 4700-2.									
8.3	Heat treatment		Softened	SIST EN 2446:2009 <a href="https://standards.iteh.ai/catalog/standards/sist/en-2446-2009-821c-143d3c578dd0/sist-en-2446-2009">https://standards.iteh.ai/catalog/standards/sist/en-2446-2009-821c-143d3c578dd0/sist-en-2446-2009</a>				Hardened and tempered				Reference <sup>a</sup> See line 29 Bar: $D = 16\text{ mm}$
9	Dimensions concerned	mm	$\leq 25$									
10	Thickness of cladding on each face	%	–									
11	Direction of test piece		–									
12	Temperature	$\theta$	°C		Ambient							
13	Proof stress	$R_{p0.2}$	MPa*		–	$\geq 930$			$\geq 930$			
14	T Strength	$R_m$	MPa*		–	$1\ 100 \leq R_m \leq 1\ 300$			$1\ 100 \leq R_m \leq 1\ 300$			
15	Elongation	A	%		–	$\geq 10$			$\geq 10$			
16	Reduction of area	Z	%		–	–			–			
17	Hardness		HB $\leq 217$ HV $\leq 228$ <sup>b</sup>			331 $\leq$ HB $\leq$ 388 350 $\leq$ HV $\leq$ 408 <sup>b</sup>			331 $\leq$ HB $\leq$ 388			
18	Shear strength	$R_c$	MPa*		–							
19	Bending	k	–		–							
20	Impact strength	KV	J		–	$\geq 25$			$\geq 25$			
21	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)		a, b									

29	Reference heat treatment	–	Hardened and tempered + (850 ± 10) °C / OQ + Temper (550 ± 5) °C					
31	Hardenability (Jominy test)	–	Distance (mm)	5	9	15	25	40
			HRC min.	48	45	40	32	28
			HRC max.	57	56	53	48	43
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95	Marking inspection	–	See EN 4700-2.					
96	Dimensional inspection	–	See EN 4700-2.					
98	Notes	–	* 1 MPa = 1 N/mm <sup>2</sup> . <sup>a</sup> Optional test. <sup>b</sup> HV for $D_e \leq 5$ mm.					
99	Typical use	–	Low alloy general purpose steel.					

## EN 2446:2008 (E)

100	-	Product qualification	-	See EN 9133.
				Qualification programme to be agreed between manufacturer and purchaser.
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