BRITISH STANDARD

BS EN 2446:2008

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

ICS 49.025.10

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 2446:2008.

The UK participation in its preparation was entrusted to Technical Committee ACE/61, Metallic materials for aerospace purposes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2009

ISBN 978 0 580 63179 5

Amendments/corrigenda issued since publication

Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 2446

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.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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.

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 MPa ≤ R_m ≤ 1 300 MPa
Bars
D_e ≤ 25 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.* 1)

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

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

1) Published as ASD Prestandard at the date of publication of this standard.

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 °C ≤ θ ≤ 860 °C / OQ + Temper θ ≥ 530 °C
6.2	Delivery condition code	A	U
7	Use condition	Hardened and tempered	Hardened and tempered
	Heat treatment	Delivery condition + 840 °C ≤ θ ≤ 860 °C / OQ + Temper θ ≥ 530 °C	Delivery condition

Characteristics

8.1	Test sample(s)			See EN 4700-2.			
8.2	Test piece(s)			See EN 4700-2.			
8.3	Heat treatment			Softened	Hardened and tempered	Reference [a] See line 29 Bar: D = 16 mm	
9	Dimensions concerned		mm	≤ 25			
10	Thickness of cladding on each face		%	–			
11	Direction of test piece			–			
12	T	Temperature	θ °C	Ambient			
13	T	Proof stress	$R_{p0,2}$ MPa*	–	≥ 930	≥ 930	
14	T	Strength	R_m MPa*	–	1 100 ≤ R_m ≤ 1 300	1 100 ≤ R_m ≤ 1 300	
15	T	Elongation	A %	–	≥ 10	≥ 10	
16	T	Reduction of area	Z %	–	–	–	
17	Hardness			HB ≤ 217 HV ≤ 228 [b]	331 ≤ HB ≤ 388 350 ≤ HV ≤ 408 [b]	331 ≤ HB ≤ 388	
18	Shear strength		R_c MPa*	–			
19	Bending		k –	–			
20	Impact strength		KV J	–	≥ 25	≥ 25	
21	C	Temperature	θ °C	–			
22	C	Time	h	–			
23	C	Stress	σ_a MPa*	–			
24	C	Elongation	a %	–			
25	C	Rupture stress	σ_R MPa*	–			
26	C	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
95	Marking inspection	–	See EN 4700-2.					
96	Dimensional inspection	–	See EN 4700-2.					
98	Notes	–	* 1 MPa = 1 N/mm^2. [a] Optional test. [b] HV for $D_e \leq 5$ mm.					
99	Typical use	–	Low alloy general purpose steel.					

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

This page has been intentionally left blank

BSI - British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001 Email: orders@bsigroup.com You may also buy directly using a debit/credit card from the BSI Shop on the Website http://www.bsigroup.com/shop

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact Information Centre. Tel: +44 (0)20 8996 7111 Fax: +44 (0)20 8996 7048 Email: info@bsigroup.com

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001 Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsigroup.com/BSOL

Further information about BSI is available on the BSI website at http://www.bsigroup.com.

Copyright

BSI Group
Headquarters 389
Chiswick High Road,
London, W4 4AL, UK
Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/
standards