

BS EN 2226:2014



BSI Standards Publication

**Aerospace series — Steel  
X105CrMo17 (1.4125) —  
Hardened and tempered —  
Hand and die forgings — De  
≤ 150 mm**

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**National foreword**

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The UK participation in its preparation was entrusted to Technical Committee ACE/61/-/15, Steels for Aerospace Purposes.

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

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EUROPEAN STANDARD

**EN 2226**

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2014

ICS 49.025.10

English Version

**Aerospace series - Steel X105CrMo17 (1.4125) - Hardened and tempered - Hand and die forgings -  $De \leq 150$  mm**

Série aérospatiale - Acier X105CrMo17 (1.4125) - Trempé et revenu - Pièces forgées et matricées -  $De \leq 150$  mm

Luft- und Raumfahrt - Stahl X105CrMo17 (1.4125) - Gehärtet und angelassen - Gesenk- und Freiformschmiedestücke -  $De \leq 150$  mm

This European Standard was approved by CEN on 14 March 2013.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>		Page
Foreword.....		3
Introduction.....		4
1	Scope .....	5
2	Normative references .....	5

## Foreword

This document (EN 2226:2014) 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of an identical text or by endorsement, at the latest by January 2015, and conflicting national standards shall be withdrawn at the latest by January 2015.

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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 4500-003.

## 1 Scope

This European Standard specifies the requirements relating to:

Steel X105CrMo17 (1.4125)  
Hardened and tempered  
Hand and die forgings  
 $D_e \leq 150$  mm

for aerospace applications.

NOTE Other common designation:  
UNS: S44004,  
AISI: 440C, XDBD.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 4500-003, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 003: Specific rules for heat resisting alloys*

EN 4700-006, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 006: Pre-production and production forgings*

1	Material designation		Steel X105CrMo17 (1.4125)								
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni	Fe
		min.	0,95	–	–	–	–	16,0	0,35	–	Base
		max.	1,10	1,00	1,00	0,030	0,020	18,0	0,75	0,50	
3	Method of melting		Air melted								
4.1	Form		Hand and die forgings								
4.2	Method of production		Forged from forging stock, see EN XXXX 1)								
4.3	Limit dimension(s)	mm	$D_e \leq 150$								
5	Technical specification		See EN 4700-006.								

6.1	Delivery condition		Softened								
	Heat treatment		–								
6.2	Delivery condition code		A								
7	Use condition		Hardened and tempered								
	Heat treatment		Delivery condition + (1 030 to 1 070) ± 10 °C / OQ <sup>a</sup> + temper $\theta \geq 140$ °C ± 10 °C								

Characteristics

8.1	Test sample(s)		EN 4700-006 Procedure A, B, C or D	EN 4700-006 Procedure A or B (separately forged)	EN 4700-006 Procedure C (integral)	EN 4700-006 Procedure D (machined from forging)		
8.2	Test piece(s)		See EN 4700-006.					
8.3	Heat treatment		Delivery condition	Use condition				
9	Dimensions concerned	mm	$D \leq 150$	$a$ or $D \leq 25$	$a$ or $D \leq 25$	$25 \leq a$ or $D \leq 150$	$a$ or $D \leq 25$	$25 \leq a$ or $D \leq 150$
10	Thickness of cladding on each face	%	–					
11	Direction of test piece		–					
12	Temperature	$\theta$	°C	Ambient				
13	Proof stress	$R_{p0,2}$	MPa	–				
14	T Strength	$R_m$	MPa	–				
15	Elongation	A	%	–				
16	Reduction of area	Z	%	–				
17	Hardness		HBW $\leq 255$	HV $\geq 650$ or HRC $\geq 58^b$	HV $\geq 650$ or HRC $\geq 58^b$	As agreed between manufacturer and purchaser	HV $\geq 650$ or HRC $\geq 58^b$	As agreed between manufacturer and purchaser
18	Shear strength	$R_c$	MPa	–				
19	Bending	k	–	–				
20	Impact strength	KV	J	–				
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					

1) In preparation at the date of publication of this standard.



30	Microstructure	–	EN 4700-006
		5	Use condition
		7	Carbides shall be fine and non aligned
44	External defects	–	EN 4700-006
		1	Visual inspection
61	Internal defects	–	EN 4700-006
		1	See EN 4050-4.
		7	Category 2
95	Marking inspection	–	EN 4700-006
96	Dimensional inspection	–	EN 4700-006
98	Notes	–	<sup>a</sup> May be sub-zero treated at $-80\text{ °C} \pm 10\text{ °C}$ . <sup>b</sup> Method to be used in case of conflict.
99	Typical use	–	Bearings

100	-	Product qualification	-	-
			Qualification programme to be agreed between manufacturer and purchaser.	
	34	Grain size	-	EN 4700-006
			7	$G \geq 5$



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