BS EN 3528:2013

BSI Standards Publication

Aerospace series – Steel X2NiCoMo18-8-5 (1.6359) – Vacuum induction melted and vacuum arc remelted – Solution treated and precipitation treated – Bar – a or D ≤ 150 mm – 1 750 MPa ≤ Rm ≤ 2 000 MPa

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National foreword

This British Standard is the UK implementation of EN 3528:2013.

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.

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

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English Version

Aerospace series - Steel X2NiCoMo18-8-5 (1.6359) - Vacuum induction melted and vacuum arc remelted - Solution treated and precipitation treated - Bar - a or D ≤ 150 mm - 1 750 MPa ≤ Rm ≤ 2 000 MPa

Série aérospatiale - Acier X2NiCoMo18-8-5 (1.6359) - Elaboré sous vide par induction et refondu par arc sous vide - Mis en solution et vieilli - Barres - a ou D ≤ 150 mm - 1 750 MPa ≤ Rm ≤ 2 000 MPa

Luft- und Raumfahrt - Stahl X2NiCoMo18-8-5 (1.6359) - Vakuuminduktionserschmolzen und vakuumlichtbogenumgeschmolzen - Lösungsgeglüht und ausgelargert - Stangen - a oder D ≤ 150 mm - 1 750 MPa ≤ Rm ≤ 2 000 MPa

This European Standard was approved by CEN on 11 February 2012.

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

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Contents

Page

Foreword

This document (EN 3528:2013) 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of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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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 4500-005.

1 Scope

This standard specifies the requirements relating to:

Steel X2NiCoMo18-8-5 (1.6359)
Vacuum induction melted and vacuum arc remelted
Solution treated and precipitation treated
Bar
a or *D* ≤ 150 mm
1 750 MPa ≤ R_m ≤ 2 000 MPa

for aerospace applications.

NOTE Other common designation:
UNS: K92890,
Marage 250,
AECMA: FE-PA95,
ASD-STAN: FE-PM2701,
AIR: E-Z2NKD18,
BS: S 162.

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 2043, *Aerospace series — Metallic materials — General requirements for semi-finished product qualification (excluding forgings and castings)* [1)]

EN 2951, *Aerospace series — Metallic materials — Test method — Micrographic determination of content of non-metallic inclusions* [1)]

EN 4050-4, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 4: Acceptance criteria*

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

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*

1) Published as ASD-STAN Prestandard at the date of publication of this standard (www.asd-stan.org).

1	Material designation		Steel X2NiCoMo18-8-5 (1.6359)										
2	Chemical composition %	Element	C	Si	Mn	P	S	Mo	Ni	Al	Ti	Co	Fe
		min.	–	–	–	–	–	4,60	17,0	0,05	0,30	7,0	Base
		max.	0,03	0,10	0,10	0,010	0,010	5,20	19,0	0,15	0,60	8,5	
3	Method of melting		Vacuum induction melted and vacuum arc remelted										
4.1	Form		Bar										
4.2	Method of production		–										
4.3	Limit dimension(s)	mm	*a or D* ≤ 150										
5	Technical specification		EN 4700-002										

6.1	Delivery condition	Solution treated
	Heat treatment	790 °C ≤ θ ≤ 840 °C / AC
6.2	Delivery condition code	W
7	Use condition	Solution treated + precipitation treated
	Heat treatment	Delivery condition + 465 °C ≤ θ ≤ 495 °C / t ≥ 3 h

Characteristics

8.1	Test sample(s)			See EN 4700-002.		
8.2	Test piece(s)			See EN 4700-002.		
8.3	Heat treatment			Delivery condition	Use condition	
9	Dimensions concerned		mm	*a or D* ≤ 150	*a or D* ≤ 150 [a]	75 ≤ *a or D* ≤ 150 [a]
10	Thickness of cladding on each face		%	–	–	–
11	Direction of test piece			–	L	T
12	T	Temperature	θ °C	–	Ambient	Ambient
13	T	Proof stress	$R_{p0,2}$ MPa	–	≥ 1 650	≥ 1 650
14	T	Strength	R_m MPa	–	1 750 ≤ R_m ≤ 2 000	1 750 ≤ R_m ≤ 2 000
15	T	Elongation	A %	–	≥ 6	≥ 4
16	T	Reduction of area	Z %	–	≥ 40	≥ 25
17	Hardness			HBW ≤ 352	510 ≤ HV ≤ 600	510 ≤ HV ≤ 600
18	Shear strength	R_c	MPa	–	–	–
19	Bending	k	–	–	–	–
20	Impact strength	KV	J	–	≥ 15	≥ 12
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		

34	Grain size	–	EN 4700-002	
		7	Dimension mm	Grain size number
			a or *D* ≤ 75	G ≥ 6; occasional G ≥ 4 permitted
			75 < *a* or *D* ≤ 150	G ≥ 4; occasional G ≥ 2 permitted
44	External defects	–	EN 4700-002	
		1	Visual	
50	Cleanliness inclusion content (micro-cleanness)	–	EN 4700-002	
		1	See EN 2951.	
		7	EN 2951 - Category 5	
61	Internal defects	–	EN 4700-002	
		1	See EN 4050-4.	
		6	*a or D* ≤ 100 mm may be tested either on the product or at an earlier stage of manufacture	
		7	EN 4050-4 - Class 5	
95	Marking inspection	–	EN 4700-002	
96	Dimensional inspection	–	EN 4700-002	
98	Notes	–	[a] 75 mm ≤ *a* or *D* ≤ 150 mm may be tested in L or T direction.	
99	Typical use	–	–	

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

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