SLOVENSKI STANDARD
oSIST prEN 4631:2021

01-september-2021

Aeronavtika - Jeklo X4CrNiMo16-5-1 (1.4418) - Taljeno - Utrjeno in mehko žarjeno - Palice - De =< 200 mm - 900 MPa =< Rm =< 1050 MPa

Aerospace series - Steel X4CrNiMo16-5-1 (1.4418) - Air melted - Hardened and tempered - Bars - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

Luft- und Raumfahrt - Stahl X4CrNiMo16-5-1 (1.4418) - Lufterschmolzen - Gehärtet- und angelassen - Stangen - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

Série aérospatiale - Acier X4CrNiMo16 (1.4418) - Élaboré à l'air - Trempé et revenu - Barres - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

Ta slovenski standard je istoveten z: prEN 4631

ICS:

49.025.10 Jekla Steels

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EUROPEAN STANDARD

NORME EUROPÉENNE

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Will supersede EN 4631:2013

English Version

Aerospace series - Steel X4CrNiMo16-5-1 (1.4418) - Air melted - Hardened and tempered - Bars - De ≤ 200 mm - 900 MPa ≤ Rm ≤ 1 050 MPa

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 4631:2021) 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 document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 4631:2013.

Introduction

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

1 Scope

This document specifies the requirements relating to:

Steel X4CrNiMo16-5-1 (1.4418)

Air melted

Hardened and tempered

Bars

$D_e \leq 200$ mm

900 MPa $\leq R_m \leq$ 1 050 MPa

for aerospace applications.

NOTE Other common designations:

AIR: Z 8 CND 17-04.

Only the chemical composition of this document must be considered.

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 2950, *Aerospace series — Test method — Wrought heat resisting alloys semi-finished products and parts — Conditions for macrographic and micrographic examination — Atlas of structures and defects*

EN 2951, *Aerospace series — Metallic materials — Micrographic determination of content of non-metallic inclusions*

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

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

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

EN ISO 643, *Steels — Micrographic determination of the apparent grain size*

AMS 2315, *Determination of delta ferrite content*[1)]

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:

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

1) Published by SAE International (US) Society of Automotive Engineers (http://www.sae.org/).

4 Requirements

See Table 1.

Table 1 — Requirements for steel X4CrNiMo16-5-1 (1.4418) — Bars

1	Material designation		Steel X4CrNiMo16-5-1 (1.4418)									
2	Chemical composition %	Element	C	Si	Mn	P [b]	S [b]	N	Cr	Mo	Ni	Fe
		min.	—	—	—	—	—	0,020	15,00	0,80	4,00	Base
		max.	0,06	0,70	1,50	0,030	0,005	—	17,00	1,50	6,00	
3	Method of melting		Air melted									
4.1	Form		Bars									
4.2	Method of production		—									
4.3	Limit dimension(s)	mm	$D_e \leq 200$									
5	Technical specification		EN 4700-002									

6.1	Delivery condition	Annealed	Hardened and tempered
	Heat treatment	—	1 010 °C ≤ θ ≤ 1 060 °C/PQ, OQ or WQ [c] + 550 °C ≤ θ ≤ 620 °C [d]
6.2	Delivery condition code	*A*	*U*
7	Use condition	Hardened and tempered	Delivery condition
	Heat treatment	Delivery condition + 1 010 °C ≤ θ ≤ 1 060 °C/PQ, OQ or WQ [c] + 550 °C ≤ θ ≤ 620 °C	—

Characteristics

8.1	Test sample(s)			See EN 4700-002.		
8.2	Test piece(s)			See EN 4700-002.		
8.3	Heat treatment			Annealed	Use condition	
9	Dimensions concerned		mm	$D_e \leq 200$	$D_e \leq 75$	$75 \leq D_e \leq 200$
10	Thickness of cladding on each face		%	—	—	—
11	Direction of test piece			—	*L*	*LT*
12	T	Temperature θ	°C	Ambient	Ambient	Ambient
13	T	Proof stress $R_{p0,2}$	MPa	—	≥ 700	≥ 700
14	T	Strength R_m	MPa	—	$900 \leq R_m \leq 1\,050$	$900 \leq R_m \leq 1\,050$
15	T	Elongation *A*	%	—	≥ 16	≥ 12
16	T	Reduction of area *Z*	%	—	—	—
17	Hardness	HBW		≤ 293	269 ≤ HBW ≤ 331	269 ≤ HBW ≤ 331
18	Shear strength	R_c	MPa	—	—	—
19	Bending	*k*	—	—	—	—

20	Impact strength [a]		KV	J	—	≥ 120 J at 20 °C Notch direction T ≥ 80 J at –30 °C Notch direction T (see line 98)	≥ 80 J at 20 °C Notch direction L ≥ 40 J at –30 °C Notch direction L (see line 98)
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, c, d		
30	Microstructure				—	EN 4700-002	
					1	See AMS 2315.	
					7	The δ ferrite content shall not exceed 5 %, and austenite shall not exceed 10 %.	
34	Grain size				—	EN 4700-002	
					1	See EN ISO 643.	
					7	$G \geq 5$	
44	External imperfections (visual testing-VT)				—	EN 4700-002	
					7	Visual	
50	Inclusion content				—	EN 4700-002	
					7	EN 2951, Category 2	
51	Macrostructure (grain flow)				—	EN 4700-002	
					1	See EN 2950.	
61	Internal imperfections (ultrasonic testing-UT)				—	EN 4700-002	
					1	See EN 4050-1.	
					7	EN 4050-4, Class 2	
95	Marking inspection				—	EN 4700-002	
96	Dimensional inspection				—	EN 4700-002	
98	Notes				—	[a] After agreement between manufacturer and purchaser a more stringent impact strength should be required (e.g. ≥ 70 J at –40 °C direction L and ≥ 35 J at –40 °C direction T), [b] For specific welding applications (e.g. high power beam), and after agreement between manufacturer and purchaser, S + P should be equal or less than 0,023 %. [c] Air quenching may be used for D_e ≤ 20 mm. [d] The temperature range may be increased subject to agreement between the customer and the supplier.	
99	Typical use				—	—	

100	—	Product qualification	—	EN 4700-002
				Qualification programme to be agreed between manufacturer and purchaser.