



# SLOVENSKI STANDARD

## SIST EN 4627:2023

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Nadomešča:

SIST EN 4627:2014

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**Aeronavtika - Jeklo X4CrNiMo16-5-1 (1.4418) - Taljeno - Utrjeno in mehko žarjeno - Izkovki - De ≤ 200 mm - 1150 MPa ≤ Rm ≤ 1300 MPa**

Aerospace series - Steel X4CrNiMo16-5-1 (1.4418) - Air melted - Hardened and tempered - Forgings - De ≤ 200 mm - 1 150 MPa ≤ Rm ≤ 1 300 MPa

Luft- und Raumfahrt - Stahl X4CrNiMo16-5-1 (1.4418) - Lufterschmolzen - Gehärtet- und angelassen - Schmiedestücke - De ≤ 200 mm - 1 150 MPa ≤ Rm ≤ 1 300 MPa

Série aérospatiale - Acier X4CrNiMo16-5-1 (1.4418) - Élaboré à l'air - Trempé et revenu - Pièces forgées ou matricées - De ≤ 200 mm - 1 150 MPa ≤ Rm ≤ 1 300 MPa

**Ta slovenski standard je istoveten z: EN 4627:2022**

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**ICS:**

49.025.10	Jekla	Steels
77.140.85	Železni in jekleni kovani izdelki	Iron and steel forgings

**SIST EN 4627:2023**

**en,fr,de**



EUROPEAN STANDARD

EN 4627

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2022

ICS 49.025.10

Supersedes EN 4627:2014

English Version

Aerospace series - Steel X4CrNiMo16-5-1 (1.4418) - Air  
melted - Hardened and tempered - Forgings -  $D_e \leq 200$  mm  
-  $1\ 150\ \text{MPa} \leq R_m \leq 1\ 300\ \text{MPa}$

Série aérospatiale - Acier X4CrNiMo16-5-1 (1.4418) -  
Élaboré à l'air - Trempé et revenu - Pièces forgées ou  
matricées -  $D_e \leq 200$  mm -  $1\ 150\ \text{MPa} \leq R_m \leq 1\ 300\ \text{MPa}$

Luft- und Raumfahrt - Stahl X4CrNiMo16-5-1 (1.4418)  
- Lufterschmolzen - Gehärtet- und angelassen -  
Schmiedestücke -  $D_e \leq 200$  mm -  $1\ 150\ \text{MPa} \leq R_m \leq 1\ 300\ \text{MPa}$

This European Standard was approved by CEN on 22 August 2022.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## European foreword

This document (EN 4627:2022) 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, prior to its presentation to CEN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

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.

This document supersedes EN 4627:2014.

This document is a technical revision of EN 4627:2014.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this document: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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**EN 4627:2022 (E)**

## **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.

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## 1 Scope

This document specifies the requirements relating to:

Steel X4CrNiMo16-5-1 (1.4418)  
Air melted  
Hardened and tempered  
Forgings  
 $D_e \leq 200$  mm  
 $1\ 150\ \text{MPa} \leq R_m \leq 1\ 300\ \text{MPa}$

for aerospace applications.

NOTE Other common designations:

- AIR: Z 8 CND 17-04.
- Only the chemical composition according to this document is 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*

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

EN 4629, *Aerospace series — Steel X4CrNiMo16-5-1 (1.4418) — Air melted — Softened — Forging stock —  $D_e \leq 300$  mm*

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

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

AMS 2315,<sup>1)</sup> *Determination of Delta Ferrite Content*

ASTM A604,<sup>1)</sup> *Standard Practice for Macroetch Testing of Consumable Electrode Remelted Steel Bars and Billets*

ASTM E340,<sup>2)</sup> *Standard Practice for Macroetching Metals and Alloys*

ASTM E381,<sup>2)</sup> *Standard Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings*

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<sup>1)</sup> Published by: SAE International (US), <https://www.sae.org/>.

EN 4627:2022 (E)

### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology 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/>

### 4 Requirements

See Table 1.

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

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		Forgings									
4.2	Method of production		Forged from forging stock EN 4629									
4.3	Limit dimension(s)	mm	$D_e \leq 200$									
5	Technical specification		EN 4700-006									

6.1	Delivery condition		Annealed					Hardened + Tempered				
	Heat treatment		—					1 010 °C ≤ $\theta$ ≤ 1 060 °C/PQ, OQ or WQ <sup>c</sup> + Tempered 375 °C ≤ $\theta$ ≤ 405 °C or Tempered 480 °C ≤ $\theta$ ≤ 550 °C				
6.2	Delivery condition code		A					U				
7	Use condition		Hardened					Delivery condition				
	Heat treatment		Delivery condition + 1 010 °C ≤ $\theta$ ≤ 1 060 °C/PQ, OQ or WQ <sup>c</sup> + Tempered 375 °C ≤ $\theta$ ≤ 405 °C or Tempered 480 °C ≤ $\theta$ ≤ 550 °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) and Procedure D (machined from forging)					
8.2	Test piece(s)		See EN 4700-006.					See EN 4700-006.				
8.3	Heat treatment		Annealed		Use condition		Use condition					
9	Dimensions concerned	mm	$a$ or $D \leq 200$		$25 \leq a$ or $D \leq 30$		$a$ or $D \leq 200$					
10	Thickness of cladding on each face	%	—					—				
11	Direction of test piece		—		L		L		LT <sup>d</sup>			
12	Temperature	$\theta$	°C		Ambient		Ambient		Ambient		Ambient	
13	Proof stress	$R_{p0,2}$	MPa		—		≥ 900		≥ 900			
14	Strength	$R_m$	MPa		—		1 150 ≤ $R_m$ ≤ 1 300		1 150 ≤ $R_m$ ≤ 1 300			
15	Elongation	A	%		—		≥ 14		≥ 14		≥ 8	
16	Reduction of area	Z	%		—		—		—		—	
17	Hardness	HBW		≤ 293		341 ≤ HBW ≤ 401		341 ≤ HBW ≤ 401				
18	Shear strength	$R_c$	MPa		—		—					
19	Bending	k	—		—		—					
20	Impact strength <sup>a</sup>	KV	J	—		≥ 100 J at 20 °C Notch direction $T \geq 60$ J at –30 °C Notch direction $T$ (see line 98)		≥ 100 J at 20 °C Notch direction $T \geq 60$ J at –30 °C Notch direction $T$ (see line 98)		≥ 50 J at 20 °C Notch direction $L \geq 20$ J at –30 °C Notch direction $L$ (see line 98)		
				—		—		—				
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, c, d									

## EN 4627:2022 (E)

30	Microstructure	—	EN 4700-006
		1	See AMS 2315.
		7	The $\delta$ ferrite content shall not exceed 5 %, and austenite shall not exceed 10 %.
34	Grain size	—	EN 4700-006
		1	See EN ISO 643.
		7	$G \geq 5$
44	External imperfections Visual testing (VT)	—	EN 4700-006
50	Inclusion content	—	EN 4700-006
		1	See EN 2951.
		7	Category 2
51	Macrostructure (grain flow)	—	EN 4700-006
		1	See ASTM A604/ASTM E340/ASTM E381.
61	Internal imperfections Ultrasonic testing (UT)	—	EN 4700-006
		1	See EN 4050-4.
		7	Class 2
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95	Marking inspection	—	EN 4700-006
96	Dimensional inspection	—	EN 4700-006
98	Notes	—	<p>a After agreement between manufacturer and purchaser, a more stringent impact strength should be required (e.g. <math>\geq 50</math> J at <math>-40</math> °C direction <math>L</math> and <math>\geq 20</math> J at <math>-40</math> °C direction <math>T</math>).</p> <p>b For specific welding applications (e.g. with high-power beam), and after agreement between manufacturer and purchaser, <math>S + P</math> should be equal or less than 0,023 %.</p> <p>c Air quenching may be used for <math>D_e \leq 20</math> mm.</p> <p>d Testing is performed only when the dimension of the part allows it.</p>
99	Typical use	—	—