



# SLOVENSKI STANDARD SIST EN 2451:2020

01-februar-2020

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**Aeronavtika - Jeklo 31Ni10 - 1230 MPa ≤ Rm ≤ 1420 MPa - Izkovki - De ≤ 40 mm**

Aerospace series - Steel 31Ni10 - 1 230 MPa ≤ Rm ≤ 1 420 MPa - Forgings - De ≤ 40 mm

Luft- und Raumfahrt - Stahl 31Ni10 - 1 230 MPa ≤ Rm ≤ 1 420 MPa - Gesenk- und Freiformschmiedestücke - De ≤ 40 mm

Série aérospatiale - Acier 31Ni10 - 1 230 MPa ≤ Rm ≤ 1 420 MPa - Pièces forgées ou matricées - De ≤ 40 mm

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**Ta slovenski standard je istoveten z: EN 2451:2019**  
SIST EN 2451:2020  
<http://standards.itteh.ai/catalog/standards/sist/en-2451-2019/19a-4c3c-8b5c-70eb83f473f5/sist-en-2451-2020>

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**ICS:**

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

**SIST EN 2451:2020**

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EUROPEAN STANDARD

EN 2451

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2019

ICS 49.025.10

English Version

## Aerospace series - Steel 31Ni10 - $1\ 230\ \text{MPa} \leq R_m \leq 1\ 420\ \text{MPa}$ - Forgings - $D_e \leq 40\ \text{mm}$

Série aérospatiale - Acier 31Ni10 -  $1\ 230\ \text{MPa} \leq R_m \leq 1\ 420\ \text{MPa}$  - Pièces forgées ou matricées -  $D_e \leq 40\ \text{mm}$

Luft- und Raumfahrt - Stahl 31Ni10 -  $1\ 230\ \text{MPa} \leq R_m \leq 1\ 420\ \text{MPa}$  - Gesenk- und Freiformschmiedestücke -  $D_e \leq 40\ \text{mm}$

This European Standard was approved by CEN on 4 February 2019.

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

CEN members are the national standards bodies of 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, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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## European foreword

This document (EN 2451:2019) 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 June 2020, and conflicting national standards shall be withdrawn at the latest by June 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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, Turkey and the United Kingdom.

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EN 2451:2019 (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 31Ni10  
 $1\,230\text{ MPa} \leq R_m \leq 1\,420\text{ MPa}$   
Forgings  
 $D_e \leq 40\text{ mm}$

for aerospace applications.

ASD-STAN designation: FE-PL73.

## 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 2157-2, *Aerospace series — Steel — Forging stock and forgings — Technical specification — Part 2: Forging stock*

## 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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## 4 Requirements

See Table 1.

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## EN 2451:2019 (E)

Table 1 — Requirements for steel 31Ni10 —  $1\ 230\ \text{MPa} \leq R_m \leq 1\ 420\ \text{MPa}$ 

1	Material designation		Steel 31Ni10							
2	Chemical composition %	Element	C	Si	Mn	P	S	Cr	Mo	Ni
		min.	0,27	0,15	0,45	—	—	0,50	0,45	2,30
		max.	0,35	0,35	0,70	0,025	0,020	0,80	0,65	2,80
3	Method of melting		Air melted							
4.1	Form		Forgings							
4.2	Method of production		—							
4.3	Limit dimension(s)	mm	$D_e \leq 40$							
5	Technical specification		EN 2157-2							

6.1	Delivery condition	Softened		Hardened and tempered	
	Heat treatment	—		840 °C ≤ $\theta$ ≤ 860 °C/OQ + Temper $\theta \geq 520$ °C	
6.2	Delivery condition code	—			
7	Use condition	Hardened and tempered		Hardened and tempered	
	Heat treatment	Delivery condition 840 °C ≤ $\theta$ ≤ 860 °C/OQ + Temper $\theta \geq 520$ °C		Delivery condition	

## iTeh STANDARD PREVIEW Characteristics

8.1	Test sample(s)		(standards.iteh.ai)							
8.2	Test piece(s)		—							
8.3	Heat treatment		Softened				Hardened and tempered			
9	Dimensions concerned	mm	≤ 40							
10	Thickness of cladding on each face	%	—							
11	Direction of test piece		—							
12	Temperature	$\theta$	°C	Ambient						
13	Proof stress	$R_{p0,2}$	MPa*	—				≥ 1 080		
14	T Strength	$R_m$	MPa*	—				1 230 ≤ $R_m$ ≤ 1 420		
15	Elongation	A	%	—				≥ 9		
16	Reduction of area	Z	%	—				≥ 40		
17	Hardness		HB ≤ 248 HV ≤ 261 <sup>a</sup>				363 ≤ HB ≤ 415 383 ≤ HV ≤ 440 <sup>a</sup>			
18	Shear strength	$R_c$	MPa*	—						
19	Bending	k	—	—						
20	Impact strength		—				≥ 20			
21	Temperature	$\theta$	°C	—						
22	Time		h	—						
23	Stress	$\sigma_a$	MPa*	—						
24	C Elongation	a	%	—						
25	Rupture stress	$\sigma_R$	MPa*	—						
26	Elongation at rupture	A	%	—						
27	Notes (see line 98)		*, a							



31	Hardenability (Jominy test)	—	Distance in mm	6	10	16	25	40
			HRC min.	49	48	48	47	47
95	Marking inspection	—	—					
96	Dimensional inspection	—	—					
98	Notes	—	* 1 MPa = 1 N/mm <sup>2</sup> . a HV for $D_e \leq 5$ mm.					
99	Typical use	—	Low alloy general purpose steel.					
100	—	Product qualification	—	—				
				Qualification programme to be agreed between manufacturer and purchaser.				

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