SLOVENSKI STANDARD
SIST EN 2960:2020

01-maj-2020

Aeronavtika - Toplotno odporne zlitine na nikljevi osnovi (Ni-P101HT) - Hladno preoblikovana in topilno žarjena - Palice za obdelavo pritrdilnih elementov - 3 mm ≤ D ≤ 50 mm

Aerospace series - Heat resisting nickel base alloy (Ni-P101HT) - Cold worked and solution treated - Bar for machining for fasteners - 3 mm ≤ D ≤ 50 mm

Luft- und Raumfahrt - Hochwarmfeste Nickellegierung (Ni-P101HT) - Kaltverfestigt und lösungsgeglüht - Stangen zur spanabhebenden Formgebung für Verbindungselemente - 3 mm < oder D ≤ 50 mm

Série aérospatiale - Alliage résistant à chaud base nickel (Ni-P101HT) - Écroui et mis en solution - Barre pour usinage pour fixations - 3 mm ≤ D ≤ 50 mm

Ta slovenski standard je istoveten z: **EN 2960:2020**

ICS:

49.025.99	Drugi materiali	Other materials

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EUROPEAN STANDARD

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English Version

Aerospace series - Heat resisting nickel base alloy (NI-P101HT) - Cold worked and solution treated - Bars for machining for fasteners - 3 mm ≤ D ≤ 50 mm

Série aérospatiale - Alliage résistant à chaud base nickel (NI-P101HT) - Écroui et mis en solution - Barres pour usinage pour fixations - 3 mm ≤ D ≤ 50 mm

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

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European Foreword

This document (EN 2960:2020) 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of an identical text or by endorsement, at the latest by September 2020, and conflicting national standards shall be withdrawn at the latest by September 2020.

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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 4500-003.

1 Scope

This document specifies the requirements relating to:

Heat resisting nickel base alloy (NI-P101HT)
Cold worked and solution treated
Bars for machining for fasteners
3 mm ≤ *D* ≤ 50 mm

for aerospace applications.

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 2344, *Aerospace series — Round bars, machined in heat resisting alloys — Diameter 10 mm ≤ D ≤ 180 mm — Dimensions*

EN 2369, *Aerospace series — Wires, heat resisting alloys — Diameter 0,2 mm ≤ D ≤ 8 mm — Dimensions*

EN 2600, *Aerospace series — Designation of metallic semi-finished products — Rules*

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

EN 4700-004, *Aerospace series — Steel and heat resisting alloys — Wrought products — Technical specification — Part 004: Wire*

EN 4800-002, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 002: Bar and section*

EN 4800-004, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 004: Wire*

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.

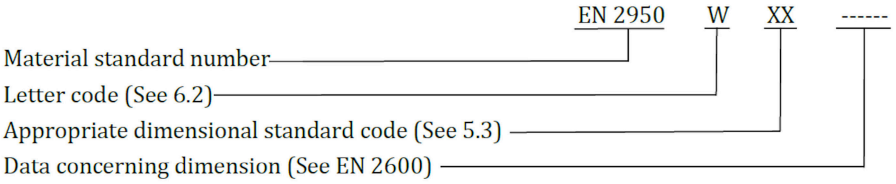
Table 1 — Requirements for heat resisting nickel base alloy (NI-P101HT)

1	Material designation		Heat resisting nickel base alloy (NI-P101HT)									
2	Chemical composition %	Element	C	Si	Mn	P	S	Ag	Al	B	Bi	Co
		min.	0,02	—	—	—	—	—	1,2	0,003	—	12,0
		max.	0,10	0,15	0,10	0,015	0,008	(5)	1,6	0,010	(1)	15,0
		Element	Cr	Cu	Fe	Mo	Pb	Ti	Zr	Ca	Mg	Ni
		min.	18,0	—	—	3,5	—	2,8	0,02	—	—	Base
		max.	21,0	0,10	2,0	5,0	(10)	3,3	0,08	0,01	0,01	
3	Method of melting		Vacuum melted and consumable electrode remelted									
4.1	Form		Bars for machining									
4.2	Method of production		Cold worked – Straightened and ground									
4.3	Limit dimension(s)	mm	$3 \leq D \leq 50$									
5	Technical specification		EN 4700-002, EN 4700-004, EN 4800-002, EN 4800-004									
			EN 2344					EN 2369				

6.1	Delivery condition	10 % ≤ cold worked ≤ 30 % reduction temperature $\theta \leq$ 870 °C
	Heat treatment	Solution treated 1 010 °C ≤ $\theta \leq$ 1 080 °C/1 h/AC, equivalent or faster
6.2	Delivery condition code	*W*
7	Use condition	Solution treated stabilised and precipitation treated
	Heat treatment	Delivery condition + 850 °C /4 h /AC, equivalent or faster + 760 °C /16 h /AC, equivalent or faster

Characteristics

8.1	Test sample(s)				—	—
8.2	Test piece(s)				—	—
8.3	Heat treatment				Delivery condition	Condition of use
9	Dimensions concerned			mm	$3 \leq D \leq 50$	
10	Thickness of cladding on each face			%	—	—
11	Direction of test piece				—	—
12	T	Temperature	θ	°C	—	Ambient
13	T	Proof stress	$R_{p0,2}$	MPa*	—	≥ 800
14	T	Strength	R_m	MPa*	—	≥ 1 210
15	T	Elongation	A	%	—	≥ 13
16	T	Reduction of area	Z	%	—	≥ 18
17	Hardness		HV		≤ 385	≥ 350 ≤ 485
18	Shear strength		R_c	MPa*	—	—
19	Bending		k	–	—	—
20	Impact strength				—	—
21	C	Temperature	θ	°C	—	730
22	C	Time		h	—	≥ 23
23	C	Stress	σ_a	MPa*	—	—
24	C	Elongation	a	%	—	—
25	C	Rupture stress	σ_R	MPa*	—	520
26	C	Elongation at rupture	A	%	—	≥ 5
27	Notes (see line 98)				*, a	

34	Grain size	—	Predominantly recrystallized grain size 3 or finer with isolated grain up to 0,25 mm (maximum dimension) allowed
95	Marking inspection	—	—
96	Dimensional inspection	—	—
97	Designation	—	The rules governing the designation of semi-finished products are indicated in standard EN 2600.When the codified designation is used, the identification code shall be as follows: 
98	Notes	—	* 1 MPa = 1 N/mm². a Combination notched/unnotched test piece or separate notched and smooth test pieces. Rupture shall occur in the unnotched portion of the combined test piece. If separate test pieces are used, the time to rupture of the notched test piece shall exceed that of the unnotched test piece.
99	Typical use	—	Nuts, bolts and studs for engines.

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