



# SLOVENSKI STANDARD

## SIST EN 3813:2014

01-februar-2014

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**Aeronavtika - Titanova zlitina TI-P64001 (Ti-6Al-4V) - Žarjeno - Palice in žice za kovane vezne elemente - De ≤ 50 mm**

Aerospace series - Titanium alloy TI-P64001 (Ti-6Al-4V) - Annealed - Bar and wire for forged fasteners - De ≤ 50 mm

Luft- und Raumfahrt - Titanlegierung TI-P64001(Ti-6Al-4V) - Geglüht - Stangen und Drähte zum Warmstauchschmied für Verbindungselemente - De ≤ 50 mm

Série aérospatiale - Alliage de titane TI-P64001 (Ti-6Al-4V) - Recuit - Barre et fil pour éléments de fixations forgées - De ≤ 50 mm

<https://standards.iteh.ai/catalog/standards/sist/d86d95fe-1b47-4bc6-88c7-5823b3c184b5/sist-en-3813-2014>

**Ta slovenski standard je istoveten z: EN 3813:2013**

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**ICS:**

49.025.30 Titan Titanium

**SIST EN 3813:2014 en**

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EUROPEAN STANDARD

EN 3813

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2013

ICS 49.025.30

English Version

## Aerospace series - Titanium alloy TI-P64001 (Ti-6Al-4V) - Annealed - Bar and wire for forged fasteners - $De \leq 50$ mm

Série aérospatiale - Alliage de titane TI-P64001 (Ti-6Al-4V)  
- Recuit - Barre et fil pour éléments de fixations forgées -  
 $De \leq 50$  mm

Luft- und Raumfahrt - Titanlegierung TI-P64001(Ti-6Al-4V)  
- Geglüht - Stangen und Drähte zum  
Warmstauchschiessen für Verbindungselemente -  $De \leq 50$   
mm

This European Standard was approved by CEN on 10 March 2011.

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.

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

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## Foreword

This document (EN 3813:2013) 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.

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.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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EN 3813:2013 (E)

## 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 4500-004.

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## 1 Scope

This standard specifies the requirements relating to:

Titanium alloy Ti-6Al-4V  
Annealed  
Bar and wire for forged fasteners  
 $D_e \leq 50$  mm

for aerospace applications.

## 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 2032-2, *Aerospace series — Metallic materials — Part 2: Coding of metallurgical condition in delivery condition*

EN 3114-002, *Aerospace series — Test method — Microstructure of ( $\alpha + \beta$ ) titanium alloy wrought products — Part 002: Microstructure of bars, sections, forging stock and forgings*

EN 4050-004, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 004: Acceptance criteria*

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

EN 4500-004, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 004: Specific rules for titanium and titanium alloys*

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*

## EN 3813:2012 (E)

1	Material designation		Titanium alloy Ti-6Al-4V										
2	Chemical composition %	Element	Al	V	O + 2N	N	H	Fe	C	Y	Others		Ti
											Each	Total	
		min.	5,50	3,50	–	–	–	–	–	–	–	–	–
max.	6,75	4,50	0,25	0,03	0,008 0	0,30	0,08	0,005 0	0,10	0,40			
3	Method of melting		See EN 4800-002 and EN 4800-004.										
4.1	Form		Bar and wire										
4.2	Method of production		Wrought										
4.3	Limit dimension(s)	mm	$D_e \leq 50$										
5	Technical specification		EN 4800-002 and EN 4800-004										

6.1	Delivery condition		Annealed									
	Heat treatment		$700\text{ °C} \leq \theta \leq 790\text{ °C} / 1\text{ h} \leq t \leq 2\text{ h} / \text{AC}$ or in inert atmosphere									
6.2	Delivery condition code		U <sup>a</sup>									
7	Use condition		Delivery condition									
	Heat treatment		–									

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Characteristics  
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8.1	Test sample(s)		See EN 4800-002 and EN 4800-004. Location for test sample <sup>b</sup>									
8.2	Test piece(s)		See EN 4800-002 and EN 4800-004.									
8.3	Heat treatment		Use condition 3c184b5/sist-en-3813-2014 See line 29.									
9	Dimensions concerned	mm	$D_e \leq 50$			$D_e < 25$			$D_e \geq 25$			
10	Thickness of cladding on each face	%	–									
11	Direction of test piece		See EN 4800-002 and EN 4800-004.									
12	Temperature	$\theta$	°C		Ambient							
13	Proof stress	$R_{p0,2}$	MPa		$\geq 860$			$\geq 1\ 030$			$\geq 965$	
14	T Strength	$R_m$	MPa		$\geq 930$			$\geq 1\ 100$			$\geq 1\ 030$	
15	Elongation	A	%		$\geq 8$			$\geq 8$			$\geq 8$	
16	Reduction of area	Z	%		$\geq 25$			$\geq 20$			$\geq 20$	
17	Hardness		–									
18	Shear strength	$R_c$	MPa		–			$\geq 690$			$\geq 660$	
19	Bending	k	–		–							
20	Impact strength		–									
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									



29	Reference heat treatment	–	930 °C ≤ $\theta$ ≤ 960 °C / t ≥ 30 min / quenched in agitated water Recommendation: $\theta$ = beta transus – 30 °C + 460 °C ≤ $\theta$ ≤ 550 °C / 4 h ≤ t ≤ 8 h / AC				
30	Microstructure	–	See EN 4800-002 and EN 4800-004.				
		1	EN 3114-002				
		7	$D_e$ (mm)	Acceptable microstructure	Not acceptable microstructure		
			≤ 50		From 2 T 1 to 2 T 12	From 2 T 13 to 2 T 15	
					From 2 L 1 to 2 L 7	From 2 L 8 to 2 L 15	
	From 2 T 100 to 2 T 103			From 2 T 104 to 2 T 201			
	2 A 1	–					
		–	From 2 T 200 to 2 T 201				
44	External defects	–	See EN 4800-002 and EN 4800-004.				
61	Internal defects	–	See EN 4800-002 and EN 4800-004.				
		1	EN 4050-004				
		7	Class 5				
74	Surface contamination	–	See EN 4800-002 and EN 4800-004.				
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95	Marking inspection	–	See EN 4800-002 and EN 4800-004.				
96	Dimensional inspection	–	See EN 4800-002 and EN 4800-004.				
98	Notes	–	<sup>a</sup>	See EN 2032-2.			
			<sup>b</sup>	The location of the test specimen shall be the centre of the product for products with $D_e < 25$ mm. For products with $D_e > 25$ mm, location of test specimen shall be the mid-radius.			
99	Typical use	–	Forged fasteners				