



SLOVENSKI STANDARD
SIST EN 3354:2014

01-februar-2014

Aeronavtika - Titanova zlitina Ti-6Al-4V - Žarjena - Pločevina za superplastično preoblikovanje - $a \leq 6$ mm

Aerospace series - Titanium alloy Ti-6Al-4V - Annealed - Sheet for superplastic forming - $a \leq 6$ mm

Luft- und Raumfahrt - Titanlegierung Ti-6Al-4V - Geglüht - Bleche für superplastisches Umformen - $a \leq 6$ mm

Série aérospatiale - Alliage de titane Ti-6Al-4V - Recuit - Tôles pour formage superplastique - $a \leq 6$ mm

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Ta slovenski standard je istoveten z: EN 3354:2013

ICS:

49.025.30 Titan

Titanium

SIST EN 3354:2014

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 3354

January 2013

ICS 49.025.30

English Version

Aerospace series - Titanium alloy Ti-6Al-4V - Annealed - Sheet for superplastic forming - $a \leq 6$ mm

Série aéronautique - Alliage de titane Ti-6Al-4V - Recuit -
Tôles pour formage superplastique - $a \leq 6$ mm

Luft- und Raumfahrt - Titanlegierung Ti-6Al-4V - Geglüht -
Bleche für superplastisches Umformen - $a \leq 6$ mm

This European Standard was approved by CEN on 23 December 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.

CEN members are the national standards bodies of 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 United Kingdom.

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Foreword

This document (EN 3354:2012) 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 3354:2013 (E)

Introduction

This European 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 European Standard has been prepared in accordance with EN 4500-004.

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1 Scope

This European Standard specifies the requirements relating to:

Titanium alloy Ti-6Al-4V
Annealed
Sheet for superplastic forming
 $a \leq 6$ 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 2002-8, *Aerospace series — Metallic materials — Test methods — Part 8: Micrographic determination of grain size* ¹⁾

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

EN 2338, *Aerospace series — Sheets, hot rolled in titanium and titanium alloys — Thickness 0,8 mm $\leq a \leq 6$ mm — Dimensions*

EN 3114-004, *Aerospace series — Test method — Microstructure of ($\alpha + \beta$) titanium alloy wrought products — Part 004: Microstructure of sheet for superplastic forming*

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 4800-001, *Aerospace series — Titanium and titanium alloys — Technical specification — Part 001: Plate, sheet and strip*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

1) Published as ASD-STAN Prestandard at the date of publication of this standard (www.asd-stan.org).

EN 3354:2013 (E)

1	Material designation		Titanium alloy Ti-6Al-4V											
2	Chemical composition %	Element	Al	V	O	N	O + 2N	H	Fe	C	Y	Others		Ti
												Each	Total	
		min.	5,50	3,50	–	–	–	–	–	–	–	–	–	–
max.	6,75	4,50	0,20	0,03	0,25	0,008 0	0,30	0,08	0,005 0	0,10	0,40			
3	Method of melting		See EN 4800-001.											
4.1	Form		Sheet											
4.2	Method of production		Rolled											
4.3	Limit dimension(s)	mm	$a \leq 6$											
5	Technical specification		EN 2338 - EN 4800-001											

6.1	Delivery condition		Annealed										
	Heat treatment		$690\text{ °C} \leq \theta \leq 840\text{ °C} / t \geq 30\text{ min} / \text{AC}$ or cool in inert atmosphere										
6.2	Delivery condition code		U ^a										
7	Use condition		Delivery condition										
	Heat treatment		–										

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Characteristics
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8.1	Test sample(s)		See EN 4800-001.												
8.2	Test piece(s)		See EN 4800-001.												
8.3	Heat treatment		Use condition												
9	Dimensions concerned	mm	$a \leq 0,6$				$0,6 < a \leq 1,6$				$1,6 < a \leq 6$				
10	Thickness of cladding on each face	%	–				–				–				
11	Direction of test piece		L and LT				L and LT				L and LT				
12	Temperature	θ	°C		Ambient				Ambient				Ambient		
13	Proof stress	$R_{p0,2}$	MPa		≥ 870				≥ 870				≥ 870		
14	T Strength	R_m	MPa		$925 \leq R_m \leq 1\ 180$				$925 \leq R_m \leq 1\ 180$				$925 \leq R_m \leq 1\ 180$		
15	Elongation	A	%		$A_{50\text{ mm}} \geq 6$				$A_{50\text{ mm}} \geq 8$				$A_{50\text{ mm}} \geq 10$		
16	Reduction of area	Z	%		–				–				–		
17	Hardness		–												
18	Shear strength	R_c	MPa		–										
19	Bending	k	–		L: 4,5 ; $\alpha = 105^\circ$ LT: 2,25 ; $\alpha = 105^\circ$				L: 5 ; $\alpha = 105^\circ$ LT: 2,25 ; $\alpha = 105^\circ$						
20	Impact strength		–												
21	Temperature	θ	°C		–										
22	Time		h		–										
23	Stress	σ_a	MPa		–										
24	Elongation	a	%		–										
25	Rupture stress	σ_R	MPa		–										
26	Elongation at rupture	A	%		–										
27	Notes (see line 98)		a												

30	Microstructure	–	See EN 4800-001.	
		1	EN 3114-004	
		3	L-ST and LT-ST section	
		5	$\theta = 930 \text{ }^\circ\text{C} \pm 10 \text{ }^\circ\text{C} / t = 30 \text{ min} / \text{WQ}$	
		6	The microstructure shall show a two phase microstructure with primary $\alpha \geq 40 \%$	
		7	Acceptable microstructure	Unacceptable microstructure
			4L1B to 4L7B	4L8B to 4L12B
			No grain boundary α , blocky α , α stringers or β fleck.	
34	Grain size	–	See EN 4800-001.	
		1	EN 2002-8	
		3	L-ST and LT-ST section	
		5	$\theta = 930 \text{ }^\circ\text{C} \pm 10 \text{ }^\circ\text{C} / t = 30 \text{ min} / \text{AC}$	
		7	$G \geq 10$	
44	External defects	–	See EN 4800-001.	
61	Internal defects	–	See EN 4800-001.	
63	Superplastic forming capability	–	To be agreed between manufacturer and purchaser	
64	Surface condition roughness	–	See EN 4800-001.	
		1	ISO 4288	
		2	Each sheet, "capability clause" applies	
		7	$R_a \leq 0,6 \text{ } \mu\text{m}$	
74	Surface contamination	–	See EN 4800-001.	
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95	Marking inspection	–	See EN 4800-001.	
96	Dimensional inspection	–	See EN 4800-001.	
98	Notes	–	^a According to EN 2032-2.	
99	Typical use	–	–	