BS EN 3997:2015

BSI Standards Publication

Aerospace series — Aluminium alloy AL-P2024 — Al Cu4Mg1 — T3 — Sheet and strip — 0,4 mm ≤ a ≤ 6 mm

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 3997:2015. It supersedes BS EN 3997:2007 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/61/-/24, Light Alloys for Aerospace Purposes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2015

ISBN 978 0 580 81514 0

ICS 49.025.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2015.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3997

November 2015

ICS 49.025.20

Supersedes EN 3997:2007

English Version

Aerospace series - Aluminium alloy AL-P2024- Al Cu4Mg1 - T3 - Sheet and strip - 0,4 mm ≤ a ≤ 6 mm

Série aérospatiale - Alliage d'aluminium AL-P2024- Al Cu4Mg1 - T3 - Tôles et bandes - 0,4 mm ≤ a ≤ 6 mm

Luft- und Raumfahrt - Aluminiumlegierung AL-P2024- Al Cu4Mg1 - T3 - Bleche und Bänder - 0,4 mm ≤ a ≤ 6 mm

This European Standard was approved by CEN on 14 March 2013.

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.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword

This document (EN 3997:2015) 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 May 2016, and conflicting national standards shall be withdrawn at the latest by May 2016.

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 3997:2007.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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.

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 4500-2.

1 Scope

This standard specifies the requirements relating to:

Aluminium alloy AL-P2024- Al Cu4Mg1
T3
Sheet and strip
0,4 mm ≤ *a* ≤ 6 mm

for aerospace applications.

2 Normative references

The following referenced documents are indispensable for the application 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 4258, *Aerospace series — Metallic materials — General organization of standardization — Links between types of EN standards and their use*

EN 4400-2, *Aerospace series — Aluminium and aluminium alloy wrought products — Technical specification — Part 2: Sheet and strip* [1)]

EN 4500-2, *Aerospace series — Metallic materials — Rules for drafting and presentation of material standards — Part 2: Specific rules for aluminium, aluminium alloys and magnesium alloys* [1)]

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

1	Material designation		Aluminium alloy AL-P2024- Al Cu4Mg1 – T3										
2	Chemical composition %	Element	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others		Al
											Each	Total	
		min.	–	–	3,8	0,30	1,2	–	–	–	–	–	Base
		max.	0,50	0,50	4,9	0,9	1,8	0,10	0,25	0,15	0,05	0,15	
3	Method of melting		–										
4.1	Form		Sheet and strip										
4.2	Method of production		Rolled										
4.3	Limit dimension(s)	mm	$0,4 \leq a \leq 6$										
5	Technical specification		EN 4400-2										

6.1	Delivery condition	T3
	Heat treatment	490 °C ≤ θ ≤ 500 °C / WQ θ ≤ 40 °C + Slight levelling permitted + age at room temperature t ≥ 5 days
6.2	Delivery condition code	U
7	Use condition	T3
	Heat treatment	Delivery condition

Characteristics

8.1	Test sample(s)			See EN 4400-2.										
8.2	Test piece(s)			See EN 4400-2.										
8.3	Heat treatment			Use condition										
9	Dimensions concerned		mm	$0,4 \leq a \leq 0,8$		$0,8 < a \leq 1,6$		$1,6 < a \leq 3,2$		$3,2 < a \leq 6$				
10	Thickness of cladding on each face		%	–										
11	Direction of test piece			L	LT	L	LT	L	LT	L	LT			
12	T	Temperature	θ	°C	Ambient									
13		Proof stress	$R_{p0,2}$	MPa	≥ 325	≥ 290	≥ 325	≥ 290	≥ 325	≥ 290	≥ 325	≥ 290		
14		Strength	R_m	MPa	≥ 440	≥ 440	≥ 440	≥ 440	≥ 440	≥ 440	≥ 450	≥ 445		
15		Elongation	$A_{50\,mm}$	%	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15	≥ 15		
16		Reduction of area	Z	%	–									
17	Hardness				–									
18	Shear strength		R_c	MPa	–									
19	Bending		k	–	2,5; α = 180°		3; α = 180°		3; α = 180°		4; α = 180°			
20	Impact strength				–									
21	C	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)				–									

38	Intergranular corrosion	–	EN 4400-2			
		7	Dimensions (mm)	$0,4 \leq a \leq 1,6$	$1,6 < a \leq 3,2$	$3,2 < a \leq 6$
			Depth of penetration (µm)	≤ 125	≤ 150	≤ 200
44	External defects	–	EN 4400-2			
82	Batch uniformity (Material verification)	–	EN 4400-2			
		7	Electrical conductivity	γ	MS/m	19 (typical value)
		or				
		7	Hardness	HBW	100 (typical value)	
					δ ≤ 20 per product	Δ ≤ 30 per batch
95	Marking inspection	–	EN 4400-2			
96	Dimensional inspection	–	EN 4400-2			
98	Notes	–	_			
99	Typical use	–	_			

100	–	Product qualification	–	EN 4400-2				
	46	Fatigue	–	EN 4400-2				
			7	σ max. (MPa)	Number of cycles	R	K_t	Direction
				300	≥ 10^4	0.1	2.3	LT
				165	≥ 10^5			
				140	≥ 10^6			
				135	≥ 10^7			
	71	Crack propagation	–	EN 4400-2				
			2	Specimens taken in LT direction				
			7	ΔK MPa $\sqrt{m}$ R = 0,1	10	15	20	30
				da/dN mm/cycle	≤ 10^{-4}	≤ 3.10^{-4}	≤ 10^{-3}	≤ 5.10^{-3}

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™