

BS EN 4725:2014



BSI Standards Publication

**Aerospace series — Aluminium
alloy AL-P2024- Al Cu4Mg1 —
T351 — Plate — 6 mm < a ≤
150 mm**

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National foreword

This British Standard is the UK implementation of EN 4725:2014.

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.

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EUROPEAN STANDARD

EN 4725

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2014

ICS 49.025.20

English Version

**Aerospace series - Aluminium alloy AL-P2024- Al Cu4Mg1 -
T351 - Plate - 6 mm < a ≤ 150 mm**

Série aérospatiale - Alliage d'aluminium AL-P2024- Al
Cu4Mg1 - T351 - Tôles épaisses - 6 mm < a ≤ 150 mm

Luft- und Raumfahrt - Aluminiumlegierung AL-P2024- Al
Cu4Mg1 - T351 - Platten - 6 mm < a ≤ 150 mm

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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Foreword

This document (EN 4725:2014) 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of an identical text or by endorsement, at the latest by May 2015, and conflicting national standards shall be withdrawn at the latest by May 2015.

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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 European Standard specifies the requirements relating to:

Aluminium alloy AL-P2024- Al Cu4Mg1
T351
Plate
 $6 \text{ mm} < a \leq 150 \text{ mm}$

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 4050-4, *Aerospace series — Test method for metallic materials — Ultrasonic inspection of bars, plates, forging stock and forgings — Part 4: Acceptance criteria*

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

EN 4400-1, *Aerospace series — Aluminium and aluminium alloy wrought products — Technical specification — Part 1: Plate*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. (<http://www.asd-stan.org/>)

1	Material designation	Aluminium alloy AL-P2024- Al Cu4Mg1 – T351											
2	Chemical composition %	Element	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others		Al
											Each	Total	
		min.	–	–	3,8	0,30	1,2	–	–	–	–	–	–
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	Plate											
4.2	Method of production	Rolled											
4.3	Limit dimension(s)	mm	6 < a ≤ 150										
5	Technical specification	EN 4400-1											

6.1	Delivery condition	T351										
	Heat treatment	490 °C ≤ θ ≤ 500 °C / WQ θ ≤ 40 °C + 1,5 % ≤ controlled stretched ≤ 3 % + age at room temperature t ≥ 5 days										
6.2	Delivery condition code	U										
7	Use condition	T351										
	Heat treatment	Delivery condition										

Characteristics												
8.1	Test sample(s)	See EN 4400-1.										
8.2	Test piece(s)	See EN 4400-1.										
8.3	Heat treatment	Use condition										

9	Dimensions concerned	mm	6 < a ≤ 10			10 < a ≤ 25			25 < a ≤ 40			40 < a ≤ 60		
10	Thickness of cladding on each face	%	–			–			–			–		
11	Direction of test piece		L	LT	L	LT	L	LT	ST	L	LT	ST		
12	Temperature	θ °C	Ambient			Ambient			Ambient			Ambient		
13	Proof stress	R _{p0,2} MPa	≥ 325	≥ 290	≥ 325	≥ 290	≥ 325	≥ 300	≥ 260	≥ 325	≥ 300	≥ 270		
14	Strength	R _m MPa	≥ 450	≥ 440	≥ 430	≥ 430	≥ 430	≥ 430	≥ 380	≥ 430	≥ 420	≥ 380		
15	Elongation	A %	≥ 12	≥ 12	≥ 12	≥ 12	≥ 12	≥ 10	≥ 4	≥ 10	≥ 8	≥ 4		
16	Reduction of area	Z %	–											

continued

9	Dimensions concerned	mm	60 < a ≤ 80			80 < a ≤ 100			100 < a ≤ 120			120 < a ≤ 150		
10	Thickness of cladding on each face	%	–			–			–			–		
11	Direction of test piece		L	LT	ST	L	LT	ST	L	LT	ST	LT		
12	Temperature	θ °C	Ambient			Ambient			Ambient			Ambient		
13	Proof stress	R _{p0,2} MPa	≥ 325	≥ 300	≥ 260	≥ 310	≥ 280	≥ 260	≥ 300	≥ 270	≥ 245	≥ 262		
14	Strength	R _m MPa	≥ 425	≥ 415	≥ 360	≥ 420	≥ 400	≥ 360	≥ 380	≥ 380	≥ 350	≥ 379		
15	Elongation	A %	≥ 10	≥ 7	≥ 4	≥ 9	≥ 7	≥ 3,5	≥ 8	≥ 7	≥ 3	≥ 4		
16	Reduction of area	Z %	–											

17	Hardness	HBW	120 for information only									
18	Shear strength	R _c MPa	–									
19	Bending	k	–									
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)		–									

32	Electrical conductivity	–	See EN 4400-1.	
		7	$\gamma \leq 19,5 \text{ MS/m}$	Acceptable
44	External defects	–	See EN 4400-1.	
61	Internal defects	–	See EN 4400-1.	
		7	EN 4050-4 – Class 3 for $12 \text{ mm} \leq a \leq 80 \text{ mm}$ and Class 2 for $a > 80 \text{ mm}$	
82	Batch uniformity (Material verification)	–	See EN 4400-1.	
		1	Electrical conductivity	
95	Marking inspection	–	See EN 4400-1.	
96	Dimensional inspection	–	See EN 4400-1.	
98	Notes	–	–	
99	Typical use	–	–	

100	–	Product qualification	–	See EN 4400-1.				
	39	Stress corrosion	–	See EN 4400-1.				
			3	40 mm < a ≤ 100 mm				
			4	LT		ST		
			6	250 MPa (30 d)		50 MPa (20 d)		
			7	No failure				
	40	Fracture toughness	–	See EN 4400-1.				
			3	40 mm < a ≤ 60 mm				
			4	LT		T-L		
			7	≥ 34 MPa √m		≥ 32 MPa √m		
	46	Fatigue	–	See EN 4400-1.				
			7	σ max. (MPa)	Number of cycles	R	K _t	Direction
				300	≥ 1 × 10 ⁴	0.1	2.5	LT
				245	≥ 3 × 10 ⁴			
				180	≥ 1 × 10 ⁵			
				145	≥ 3 × 10 ⁵			
			120	≥ 1 × 10 ⁶				
	71	Crack propagation	–	See EN 4400-1.				
	2		Specimens taken in LT direction					
	7		ΔK MPa √m R = 0,1	10	15	20	30	
da/dN mm/cycle		≤ 1,5 × 10 ⁻⁴	≤ 5 × 10 ⁻⁴	≤ 1,5 × 10 ⁻³	≤ 5 × 10 ⁻²			

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