BRITISH STANDARD AEROSPACE SERIES

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2684:2004

Aluminium alloy AL-P7010-T7651 — Plate — 6 mm < a ⩽ 140 mm

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ICS 49.025.20

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English version

Aerospace series - Aluminium alloy AL-P7010- - T7651 - Plate - 6 mm < a ≤ 140 mm

Série aérospatiale - Alliage d'aluminium AL-P7010- - T7651 - Tôle épaisse - 6 mm < a ≤ 140 mm

Luft- und Raumfahrt - Aluminiumlegierung AL-P7010- - T7651 - Platten - 6 mm < a ≤ 140 mm

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Foreword

This document (EN 2684:2004) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 AECMA, 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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

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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 standard specifies the requirements relating to:

Aluminium alloy AL-P7010-
T7651
Plate
6 mm < *a* ≤ 140 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 4400-1, *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 AECMA Prestandard at the date of publication of this standard

1	Material designation		Aluminium alloy AL-P7010-												
2	Chemical composition %	Element	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Zr	Ti	Others		Al
													Each	Total	
		min.	–	–	1,5	–	2,1	–	–	5,7	0,10	–	–	–	Base
		max.	0,12	0,15	2,0	0,10	2,6	0,05	0,05	6,7	0,16	0,06	0,05	0,15	
3	Method of melting		–												
4.1	Form		Plate												
4.2	Method of production		Rolled												
4.3	Limit dimension(s)	mm	$6 < a \leq 140$												
5	Technical specification		EN 4400-1												

6.1	Delivery condition	W51	T7651
	Heat treatment	470 °C ≤ θ ≤ 485 °C / WQ θ ≤ 40 °C + 1,5 % ≤ controlled stretched ≤ 3 %	470 °C ≤ θ ≤ 485 °C [a] / WQ θ ≤ 40 °C + 1,5 % ≤ controlled stretched ≤ 3 % + 115 °C ≤ θ ≤ 125 °C / 4 h ≤ t ≤ 24 h [a] + 165 °C ≤ θ ≤ 175 °C / 6 h ≤ t ≤ 15 h [a]
6.2	Delivery condition code	W	U
7	Use condition	T7651	T7651
	Heat treatment	Delivery condition + 115 °C ≤ θ ≤ 125 °C / 4 h ≤ t ≤ 24 h [a] + 165 °C ≤ θ ≤ 175 °C / 6 h ≤ t ≤ 15 h [a]	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	$6 < a \leq 12,5$		$12,5 < a \leq 25$		$25 < a \leq 40$			$40 < a \leq 60$		
10	Thickness of cladding on each face		%	–		–		–			–		
11	Direction of test piece			L	LT	L	LT	L	LT	ST	L	LT	ST
12	T	Temperature	θ	°C	Ambient		Ambient		Ambient			Ambient				
13	T	Proof stress	$R_{p0,2}$	MPa	≥ 450	≥ 450	≥ 450	≥ 450	≥ 450	≥ 450	≥ 415	≥ 445	≥ 440	≥ 400
14	T	Strength	R_m	MPa	≥ 525	≥ 525	≥ 525	≥ 525	≥ 515	≥ 515	≥ 490	≥ 515	≥ 515	≥ 490
15	T	Elongation	A	%	A_{50mm} ≥ 8	A_{50mm} ≥ 6	≥ 8	≥ 6	≥ 7	≥ 5	≥ 3 [b]	≥ 7	≥ 5	≥ 3 [b]
16	T	Reduction of area	Z	%	–									

continued

9	Dimensions concerned		mm	$60 < a \leq 80$			$80 < a \leq 100$			$100 < a \leq 120$			$120 < a \leq 140$		
10	Thickness of cladding on each face		%	–			–			–			–		
11	Direction of test piece			L	LT	ST	L	LT	ST	L	LT	ST	L	LT	ST
12	T	Temperature	θ	°C	Ambient			Ambient			Ambient			Ambient		
13	T	Proof stress	$R_{p0,2}$	MPa	≥ 440	≥ 435	≥ 390	≥ 435	≥ 430	≥ 390	≥ 430	≥ 430	≥ 380	≥ 430	≥ 425	≥ 370
14	T	Strength	R_m	MPa	≥ 505	≥ 510	≥ 480	≥ 500	≥ 505	≥ 480	≥ 495	≥ 500	≥ 470	≥ 490	≥ 495	≥ 460
15	T	Elongation	A	%	≥ 6	≥ 5	≥ 3 [b]	≥ 6	≥ 5	≥ 2,5 [c]	≥ 6	≥ 5	≥ 2,5 [c]	≥ 5	≥ 4	≥ 2,5 [c]
16	T	Reduction of area	Z	%	–											
17	Hardness			–												
18	Shear strength		R_c	MPa	–											
19	Bending		k	–	–											
20	Impact strength				–											
21	C	Temperature	θ	°C	–											
22	C	Time		h	–											
23	C	Stress	σ_a	MPa	–											
24	C	Elongation	a	%	–											
25	C	Rupture stress	σ_R	MPa	–											
26	C	Elongation at rupture	A	%	–											
27	Notes (see line 98)				a,b,c											

32	Electrical conductivity	–	See EN 4400-1.			
		7	$\gamma \geq 22{,}5$ MS/m	Acceptable		
			21,5 MS/m $\leq \gamma <$ 22,5 MS/m	Acceptable if $R_{p0,2}$ LT $\leq R_{p0,2}$ min. LT + 70 MPa or if stress corrosion test is acceptable.		
			$\gamma <$ 21,5 MS/m	Not acceptable		
39	Stress corrosion	–	See EN 4400-1.			
		6	σ = 175 MPa			
		7	t ≥ 20 d			
40	Fracture toughness (K_{IC})	–	See EN 4400-1.			
		2	The "capability clause" applies.			
		7	Dimensions mm	L-T MPa $\sqrt{m}$	T-L MPa $\sqrt{m}$	S-L MPa $\sqrt{m}$
			25 < *a* ≤ 50	≥ 28	≥ 25	–
			50 < *a* ≤ 75	≥ 27	≥ 25	≥ 23
			75 < *a* ≤ 100	≥ 26	≥ 24	≥ 23
			100 < *a* ≤ 140	≥ 25	≥ 23	≥ 22
44	External defects	–	See EN 4400-1.			
47	Notch/yield ratio R_e/ $R_{p0,2}$	–	See EN 4400-1.			
49	Exfoliation corrosion	–	See EN 4400-1.			
		7	Exfoliation shall not be greater than that of grade EB.			
61	Internal defects	–	See EN 4400-1.			
82	Batch uniformity	–	See EN 4400-1.			
95	Marking inspection	–	See EN 4400-1.			
96	Dimensional inspection	–	See EN 4400-1.			
98	Notes	–	[a] Artificial ageing may be carried out using the following alternative single stage method : heating to a temperature of 165 °C ≤ θ ≤ 175 °C at a rate not exceeding 20 °C / h and soaking at this temperature for 6 h ≤ t ≤ 15 h. [b] Or $A_{4D} \geq 3{,}5$ if required by the purchaser [c] Or $A_{4D} \geq 3$ if required by the purchaser			
99	Typical use	–	–			

100	–	Product qualification	–	See EN 4400-1.
				Qualification programme to be agreed between manufacturer and purchaser.

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