



Reaction-to-fire test report

Test standard: AS 1530.1:1994 (R2016)

Test sponsor: Maccim Fastenings Pty Ltd

Product: Aluminium alloy 6063

Job number: RTF200379




Test dates: 17 & 18 November 2020

Revision: R1.0

Warringtonfire Australia: accredited for compliance with ISO/IEC 17025 – Testing



Quality management

Revision	Date	Information about the report			
R1.0	9 December 2020	Description	Initial issue.		
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1. Introduction

This report documents the findings of the reaction to fire properties of aluminium alloy 6063 tested in accordance with AS 1530.1:1994 (R2016). The testing was undertaken on 17 & 18 November 2020.

Warringtonfire Australia did the test at the request of the test sponsor listed in Table 1.

Table 1 Test sponsor details

Test sponsor	Address
Maccsim Fastenings Pty Ltd	10 Wonderland Drive Eastern Creek NSW 2766 Australia

2. Test specimen

The description of the specimen in Table 2 has been prepared from the information provided by the test sponsor, unless otherwise specified. Table 3 details of the specimen geometry.

Warringtonfire was not involved in sampling or selecting the specimens. All measurements – unless indicated – were measured by Warringtonfire.

Table 2 Product description


Item	Detail
Product	Aluminium alloy 6063
General description	Aluminium alloy 6063 with a T5 temper used for aluminium packers. The test material, aluminium alloy, was received as discs that were stacked up to make cylinders for testing.
Photograph of specimen	
As received density	2690 kg/m ³
Density after conditioning	2690 kg/m ³
Colour	Reflective grey/silver

Table 3 Specimen geometry

Parameter	Unit	Specimen number				
		1	2	3	4	5
Diameter	mm	45.0	45.0	45.0	45.0	45.0
Height	mm	50.3	50.2	50.3	50.3	50.4
Volume	cm ³	80.0	80.0	80.0	80.0	80.0

3. Test procedure

Table 4 details the test procedure for this reaction to fire test.

Table 4 Test procedure

Item	Detail
Statement of compliance	The test was performed in accordance with the requirements of AS 1530.1:1994 (R2016).
Variations	A suitable alternative insulating material was used to fill the annular space between the furnace tubes, as specified in clause 4.2 of ISO 1182:2010. During five of the tests, the thermocouples did not reach equilibrium. The tests were ended after 3600 seconds as described in section 7.4.7 of ISO 1182:2010.
Pre-test conditioning	The specimens were conditioned inside a ventilated oven maintained at a temperature of 60 ± 5 °C for 24 hours. The specimens were then cooled to room temperature in a desiccator until immediately prior to testing.
Number of tests	Five
Test operator	Anthony Rosamilia

4. Test measurements and results

Table 5 shows the results of the reaction to fire test.

Table 5 Test results

Parameter	Symbol	Unit	Results					Arithmetic mean = $\sum \text{results}/5$
			1	2	3	4	5	
Cumulative total of duration of flaming (> 5 s)		s	0	0	0	0	0	0
Test duration		s	3600	3600	3600	3600	3600	3600
Specimen mass								
Initial	m_{si}	g	215.6	214.7	215.4	215.4	216.5	
Final	m_{sf}	g	215.3	214.0	214.7	215.2	215.1	
Mass loss	$\Delta m = [(m_{si} - m_{sf})/m_{si}] \times 100$	%	0.1	0.3	0.3	0.1	0.6	0.3
Furnace thermocouple temperatures								
Initial	T_{fi}	°C	750.2	746.3	746.1	752.8	751.5	
Maximum	T_{fm}	°C	753.5	750.0	749.3	756.7	762.0	
Final	T_{ff}	°C	749.1	741.4	746.4	749.9	759.2	
Temperature rise	$\Delta T_f = T_{fm} - T_{ff}$	°C	4.4	8.6	2.9	6.8	2.8	5.1
Specimen centre thermocouple temperatures								
Maximum	T_{cm}	°C	N/A – Please refer to Section 4.1					
Final	T_{cf}	°C						
Temperature rise	$\Delta T_c = T_{cm} - T_{cf}$	°C						
Specimen surface thermocouple temperatures								
Maximum	T_{sm}	°C	N/A – Please refer to Section 4.1					
Final	T_{sf}	°C						
Temperature rise	$\Delta T_s = T_{sm} - T_{sf}$	°C						

4.1 Test observations

Observations of any significant behaviour of the specimen during the tests are summarised below.

- The samples starting melted during the test – at approximately 35 minutes into the test.
- The specimens were no longer in contact with the specimen surface and centre thermocouples specimens by tests' end.
- As the specimen centre and specimen surface thermocouples were no longer in contact with the specimens, the data from these thermocouples are unreliable.

4.2 Combustibility

The material is not deemed combustible according to the test criteria for combustibility specified in clause 3.4 of AS 1530.1:1994 (R2016).

A comparison between the failure criteria and the corresponding results determined from testing is presented in Table 6.

Table 6 Summary of results

Combustibility Performance Criteria	Measured value	Unit	Result
Mean duration of sustained flaming > 0 s	0	s	Pass
Mean furnace thermocouple temperature rise $\Delta T_f > 50$ °C	5.1	°C	Pass
Mean specimen surface thermocouple temperature rise $\Delta T_s > 50$ °C	-	°C	N/A

5. Application of test results

5.1 Test limitations

These test results relate only to the behaviour of the test specimens of the material under the particular conditions of the test and they are not intended to be the sole criterion for assessing the potential fire hazard of the material in use.

Any significant variation with respect to size, construction details, loads, stresses, edge or end conditions is not addressed by this report. Any differences in composition of the product may significantly affect the performance and will therefore invalidate the test results. It is recommended that any proposed variation to the tested configuration should be referred to the test sponsor. The test sponsor should then obtain appropriate documentary evidence of compliance from Warringtonfire or another accredited testing authority.

The supplier of the product is responsible for ensuring that the product which is supplied for use is identical to the specimens that were tested.

5.2 Uncertainty of measurements

Because of the nature of reaction to fire testing and the consequent difficulty in quantifying the uncertainty of measurements obtained from a reaction to fire test, it is not possible to provide a stated degree of accuracy of the result.

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