Likely fire performance of timber elements when protected with Ff88 intumescent paint

Assessment Report

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Client: Firefree Coatings, Inc

Commercial-in-confidence

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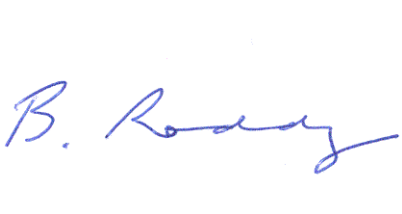		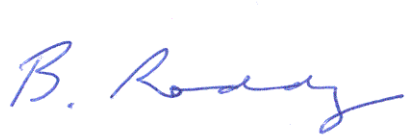
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Executive summary

This report provides the re-assessment of this Division on the likely performance of timber elements if they were tested in accordance with AS 1530.4-2005 when protected with by Ff88 intumescent paint.

Based on the test data of various protected timber sections it is the opinion of this Division that 1600 microns of Ff88 intumescent paint is equivalent to

$$10\left(\frac{698}{\delta}\right)^2 \text{ mm, where } \delta = \text{the density of the timber (kg/m}^3\text{)},$$

of additional timber to all painted surfaces if the timber was subjected to the standard fire test specified in AS 1530.4-2005.

Likely fire performance of timber elements when protected with Ff88 intumescent paint

1 Introduction

This report provides the re-assessment of this Division on the likely performance of timber elements if they were tested in accordance with AS 1530.4-2005 when protected with by Ff88 intumescent paint.

2 Supporting Data

2.1 Test data from CSIRO test numbered FS 3949/3079

On 6 November 2007 this Division conducted a pilot-scale test on four samples of nominally 90-mm x 45-mm Douglas Fir timber sections. One section was unprotected, one was protected by 800 microns of Ff88, one by 1200 microns of Ff88 and one by 1600 microns of Ff88 (dry film thicknesses). The timber sections were subject to four sided exposure to the standard heating curve and were instrumented with a thermocouple in the centre, one thermocouple 10-mm below the surface of the long side and one 10-mm below the surface on the short side and two additional surface mounted thermocouples, one on the long side and one on the short side.

3 Proposal

The proposal is to analyse the likely fire performance of structural timber elements coated with Ff88 intumescent paint.

4 Analysis

Figure 1 (Appendix A), shows the temperature recorded by the thermocouples located at the centre of the timber section. You can see from this the progressive improvement of performance with the increase in thickness of the Ff88 intumescent paint. The analysis will centre on the effectiveness of the 1600 micron thickness and its relationship to the char rates stipulated in AS 1720.4 as the most practical improvement.

The measured timber density was 698 kg/m^3 and this, based on clause 2.4 of AS 1720.4 would give this timber a notional charring rate of 0.56 mm/min. At this rate the char would reach the centre, a depth of 23 mm from the side, at approximately 41 minutes. The same temperature for the timber protected by 1600 microns was 59 minutes.

Thus 1600 microns of Ff88 is equivalent to approximately 10-mm depth of 698 kg/m³ density timber. Using the same analysis 800 microns proved to be equivalent to a 3.5-mm depth of the same timber and 1200 microns equivalent to a 5.6-mm depth.

Using equation 2.1 from AS 1720.4 to determine a relationship to timber density would thus result in Ff88 intumescent paint being equivalent to 10 x (698/δ)² mm of timber of density δ kg/m³.

5 Conclusion

Based on the test data of various protected timber sections it is the opinion of this Division that 1600 microns of Ff88 intumescent paint is equivalent to

$$10\left(\frac{698}{\delta}\right)^2 \text{ mm, where } \delta = \text{the density of the timber (kg/m}^3\text{)},$$

of additional timber to all painted surfaces if the timber was subjected to the standard fire test specified in AS 1530.4-2005.

6 Term of validity

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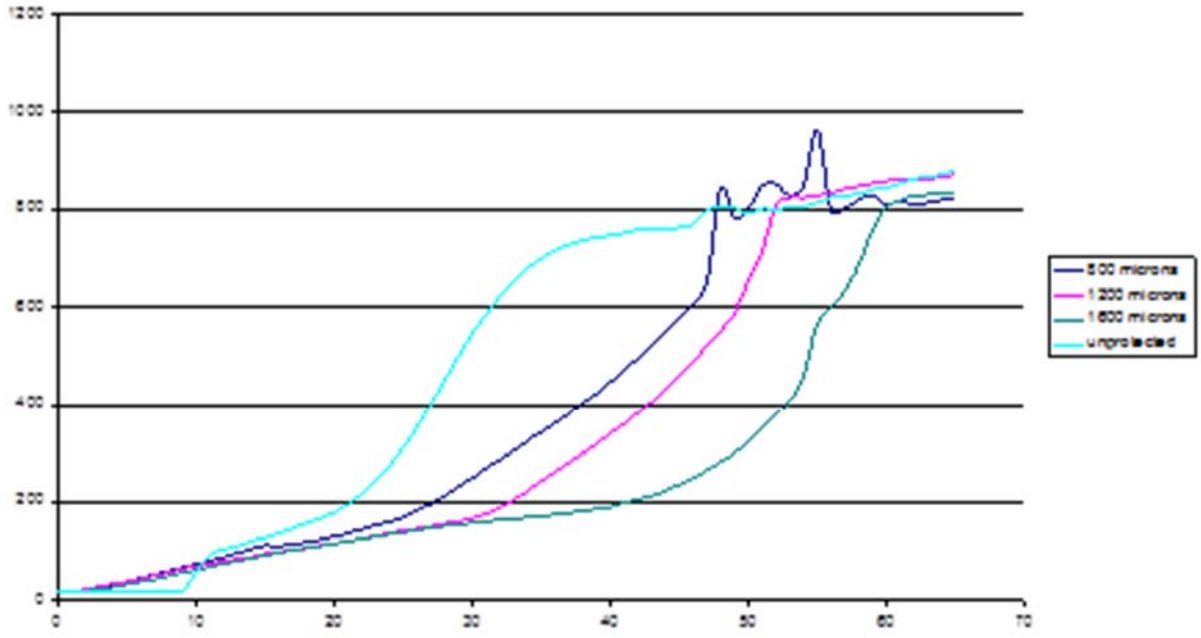
Appendix A

Figure 1. Temperaure recorded at the Centre of the Timber Section



References

The following informative documents are referred to in this Report:

AS 1530.4-2005	Methods for fire tests on building materials, components and structures Part 4: Fire-resistance tests of elements of construction.
FS 3949/3079	CSIRO test conducted on 6 November 2007.

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