Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park
North Ryde NSW 2113
PO Box 310, North Ryde NSW 2113, Australia
Telephone: (02) 9490 5444 • Facsimile: (02) 9490 5555 • ABN 41 687 119 230

Our ref: FCO-1206/4096

L & A Fazzini Manufacturing Pty Ltd
23-25 Wentworth Street
GREENACRE NSW 2190

Attention: Mr. Lorenzo Fazzini

FIRE PERFORMANCE OF ROOF/CEILING SYSTEM
Assessment Number FCO-1206
Your email of 19 January.

INTRODUCTION

As requested we have re-analysed the data referenced by you on the likely fire performance of your roof/ceiling systems.

The information included

- our sponsored investigation report numbered 1589 on a roof/ceiling system tested on 14 July 1982;
- our sponsored investigation report numbered 81 on a floor/ceiling system tested on 18 October 1966;
- our sponsored investigation report numbered 20 on a roof/ceiling system tested on 18 January 1966;
- our sponsored test reports numbered FSH 0092, FSH 0230 and FSH 0236 on spray protected duct systems;
- test data on material comparison testing conducted on 14 December 1988;
- your letter of 3 November 1995 incorporating specifications of the proposed roof/ceiling system; and
- your drawing entitled “60/60/60 FRL CEILING SYSTEM TO METAL ROOF - TYPICAL CROSS SECTION” dated 26 October 1995.

We have retained these documents for reference.

You have requested this Division to re-assess the likely fire-resistance performance of various roof/ceiling systems incorporating different thicknesses of sprayed insulation.

ANALYSIS

On 14 July 1982 this Division conducted a full-scale fire-resistance test on a roof/ceiling system. The system comprised a ceiling system of expanded metal lath sprayed with 60-mm of Vermitex 7 suspended under a metal-deck roof. The system achieved fire-resistance levels (FRL) of 240/240/240. Performance with regard to the incipient spread of fire was not measured at the time of the test although a thermocouple located in the ceiling air space recorded a temperature of approximately 157°C at 240 minutes.

Additional test data relevant to the determination of incipient spread of fire was obtained from the three ductwork tests reported in FSH 0092, FSH 0230 and FSH 0236. The results from this testing is shown in Table 1, below.

Table 1 - Summary of test results on ductwork systems.

Test	Duct Size	Protection Thickness	Fire Direction	Orientation	Fire Performance
FSH 0092	1200 x 600	97	internal	vertical	241/241/178
	1200 x 600	68	internal	vertical	241/241/180
	1200 x 600	96	internal	horizontal	241/241/241
	1200 x 600	71	internal	horizontal	241/241/220
	1200 x 600	64	external	horizontal	241/241/175
	1200 x 600	89	external	horizontal	241/241/241
FSH 0230	2400 x 600	66	internal	vertical	226/226/82
	1600 x 600	62	external	horizontal	226/226/138
	2400 x 600	63	internal	horizontal	226/223/66
FSH 0236	2400 x 600	69	internal	vertical	188/188/133
	2400 x 600	68	internal	horizontal	188/188/56
	750 x 600	78	external	horizontal	188/188/188
	750 x 750	75	internal	horizontal	188/188/127

The important data to be extracted from these results is the thermal conductivity of the sprayed insulation when subjected to the Standard fire conditions. This can be used to assess the likely performance of the ceiling systems when considering the Incipient Spread of Fire criterion. Using a regression analysis on the relevant data resulted in the following table for the thickness required to achieve incipient spread of fire.

Incipient Spread of Fire (minutes)	Thickness (mm)
60	25
90	30
120	40
180	63
240	86

The proposed systems use various thicknesses of sprayed material to achieve the required fire-resistance levels. These thicknesses range from 25-mm for 60/60/60 to 60-mm for 240/240/240. As stated earlier the system reported in SI 1589 achieved 240/240/240 with the stipulated 60-mm of sprayed material. There was a significant margin of safety in achieving this result. Comparing this result with the results of the ductwork tests shows that there is also a significant conservatism in the proposed systems. This conservatism is appropriate to an extrapolation process.

CONCLUSION

Based on the test data and extrapolation procedure referenced above it is the opinion of this Division that the proposed roof/ceiling systems as detailed in the attached specification and drawing would be able to achieve the fire-resistance levels detailed in Table 2, below, provided that the spray thickness and mesh requirements of Table 2 are also satisfied.

Table 2 - System spray thicknesses and mesh requirements

FRL	VERMITEX AF or 7 (mm)		
	STANDARD	INCIPIENT	LAYERS OF MESH
60/60/60	25	25	1
90/90/90	25	30	1
120/120/120	32	40	1
180/180/180	50	63	2
240/240/240	60	86	2

Furthermore, based on the same analysis it is the opinion of this Division that the following systems would be capable of achieving the stipulated FRL's if tested to AS 1530.4-2005.

Table 3 - Addition floor/ceiling and roof/ceiling systems

FRL	Description
180/180/180	50-mm thickness of Vermitex AF or Vermitex 7 sprayed in two layers as detailed in SI 1589 under a timber floor with the ceiling direct fixed or suspended
60/60/60	25-mm thickness of Vermitex AF or Vermitex 7 sprayed onto one layer of self furring expanded metal lath with the lath attached to timber joist by 75-mm galvanised clouts (hardwood) or 88-mm galvanised clouts (softwood) under an existing fibrous plaster ceiling

TERM OF VALIDITY

This assessment/report will lapse on 31 August 2018. Should you wish us to re-examine this opinion with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this opinion in the light of new knowledge.

Yours faithfully,

Mario Lara
Assessments Engineer

Brett Roddy
Team Leader, Fire Testing
and Assessments

20 August 2013

APPENDIX A

CONSTRUCTION SPECIFCATIONS

MATERIALS

Vermitex "AF"
A vermiculite cementitious material mill mixed by L & A Fazzini Manufacturing Pty Ltd. Sealed Envelope dated the 3rd of March 1989.

VERMITEX "7"
A vermiculite cementitious material mill mixed by L & A Fazzini Manufacturing Pty Ltd.

Expanded Metal Lath
FL-13 as manufactured by Lysaght Building Industries.

Angle Hanger Bracket
Rondo Part Number 247, galvanised.

Bracket Screw type
Hexagonal head type 17 x 10g x 65-mm.

FIXING INSTRUCTIONS

Steel purlins must not exceed 1200-mm centres or provisions must be made for primary channel to reduce the span of the secondary furring channel.

Fix Rondo furring channel at 300 mm centres by means of Rondo Part No. 332 or similar. Screw fix Lysaght mesh with No. 8 x 12-mm Hex head screws at centres not exceeding 200-mm.

Fix Rondo Part No. 247 at required centres with hex head screws type 17 x 10g x 65 mm. Screws must be securely fixed to purlins ie no load must be suspended from the furring channels.

The sheets must have a minimum of 38-mm side lap 50-mm end lap.

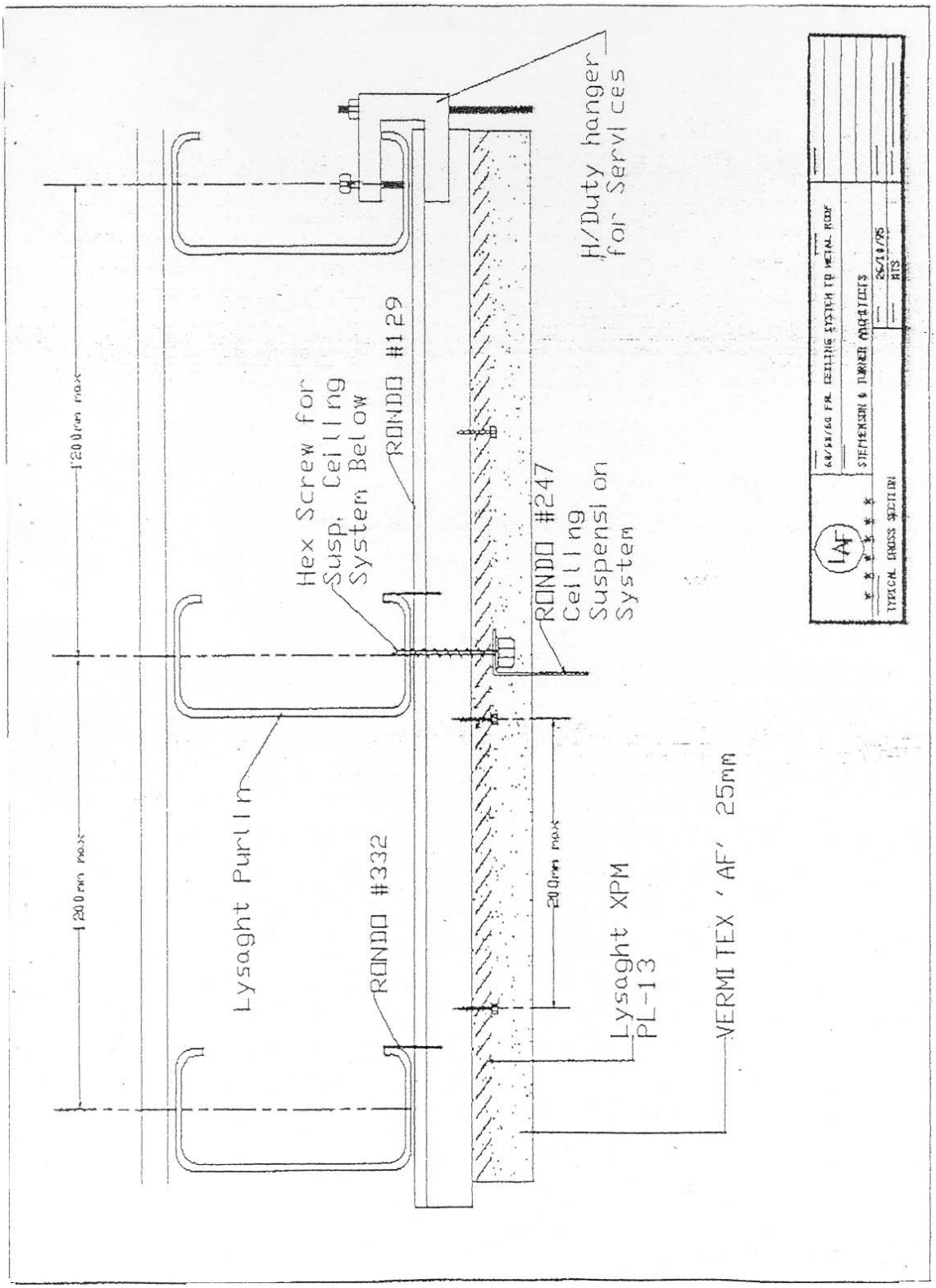
APPLICATION OF VERMITEX “AF” OR VERMITEX 7

Before any spraying operations can commence protection must be provided to all surfaces that do not require spraying. Vermitex AF/7 must be mixed with only clean water added to it. Vermitex AF/7 must be built up in light coats. First coat is not to exceed 6 to 10-mm. Successive coats may range between 10 and 15-mm depending on time elapsed between applications. Excessive thickness of first coat may result in loss of adhesion and detachment of subsequent coats. Vermitex “AF” must be returned to walls with a 38-mm radius.

LIGHT FITTING RECESS

Wherever Light Fitting Recesses are required, the pre-fabricated metal box will be fixed between purlins which will have been sheathed with plasterboard strips. The light fitting recess is built out of 0.7-mm galvanised flat iron and pop riveted together with steel rivets.

Install box before fixing mesh. Apply Vermitex as mentioned above, building up thickness to 25-mm.


H/Duty hanger for Services
Hex Screw for Susp. Ceiling System Below
RONDO #129
RONDO #247
Ceiling Suspension System
Lysaght Purlin
RONDO #332
Lysaght XPM PL-13
VERMITEX 'AF' 25mm
1200mm max
1200mm max
200mm max
TYPICAL CROSS SECTION
SIEMENSON & TURNER ARCHITECTS
26/10/95
1:5