



ASSESSMENT REPORT

Assessment of the fire resistance performance of various plastic pipes within plastic conduits embedded in concrete floors when tested in accordance with AS 1530.4-2005 as appropriate for penetrations within floors under fire walls.

EWFA Report No:

39465800.3

Report Sponsor:

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Bella Vista, NSW 2153

And

Cooks Plumbing Supplies

27 Loyalty Road
North Rocks, NSW 2151

Testing. Advising. Assuring.

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1 INTRODUCTION

This report presents an assessment of the fire resistance performance of various plastic pipes embedded in concrete floors when tested in accordance with AS 1530.4-2005 as appropriate for penetrations within floors under fire walls.

AS 1530.4-2005 does not specifically address the testing of penetrations that pass into a floor and then pass under a wall and then reappear through the floor on the opposite side of the wall.

Applications where such a system is considered appropriate include residential buildings where services are distributed from a corridor location within the floor slab to reappear throughout the building.

The tested systems are described in Section 2 with consideration of the variations described in section 3 when tested in accordance with the referenced test methods described in Section 4. The conclusions of the report are summarised in Section 5. The validity of this assessment is conditional on compliance with Sections 7, 8 and 9 of this report.

Summaries of the test data on which this assessment is based are provided in the Appendices together with a summary of the critical issues leading to the assessment conclusions including the main points of argument.

2 TESTED PROTOTYPES

This assessment makes reference to test EWFA 35506000.4 which describes a fire resistance test in general accordance with AS 1530.4-2005 of various plastic pipes embedded in a 180mm concrete slab at mid-depth and encased within various plastic conduit configurations.

The test was undertaken by Exova and sponsored by Boone & Willard Plumbing Pty Ltd and Cooks Plumbing Supplies.

Refer to Appendix A for a summary of the reference test data.

3 VARIATION TO TESTED PROTOTYPES

The proposed construction shall be as tested in EWFA 35506000.4 with consideration of the following variations;

- Clarification of the relevance of the results to AS1530.4-2005
- Distance between separating element and the near edge pipe protrusion is 30mm or more on exposed and unexposed side.
- Length of encapsulation conduit of up to 250mm protruding through slab on exposed and unexposed sides for Ezipex and Ezipex Gas pipes, uPVC and HDEP encapsulation pipes conduits.
- The 50mm diameter uPVC encapsulation pipe shall be filled with any of the following:
 - 1 x 20mm Ezipex Gas
 - 1 x 20mm Ezipex
 - 1 x 16mm Ezipex Gas
 - 1 x 16mm Ezipex
 - 2 x 20mm Ezipex
 - 2 x 20mm Ezipex Gas
 - 2 x 16mm Ezipex

- 2 x 16mm Ezipex Gas
- 1 x 16mm/1 x 20mm Ezipex
- 1 x 16mm/1 x 20mm Ezipex Gas
- 1 x 20mm/1 x 20mm Ezipex Gas/Ezipex
- The 32mm diameter HDPE plastic conduit pipe shall be filled with any of the following
 - 1 x 20mm Ezipex Gas with fire protection sealant
 - 1 x 20mm Ezipex Gas

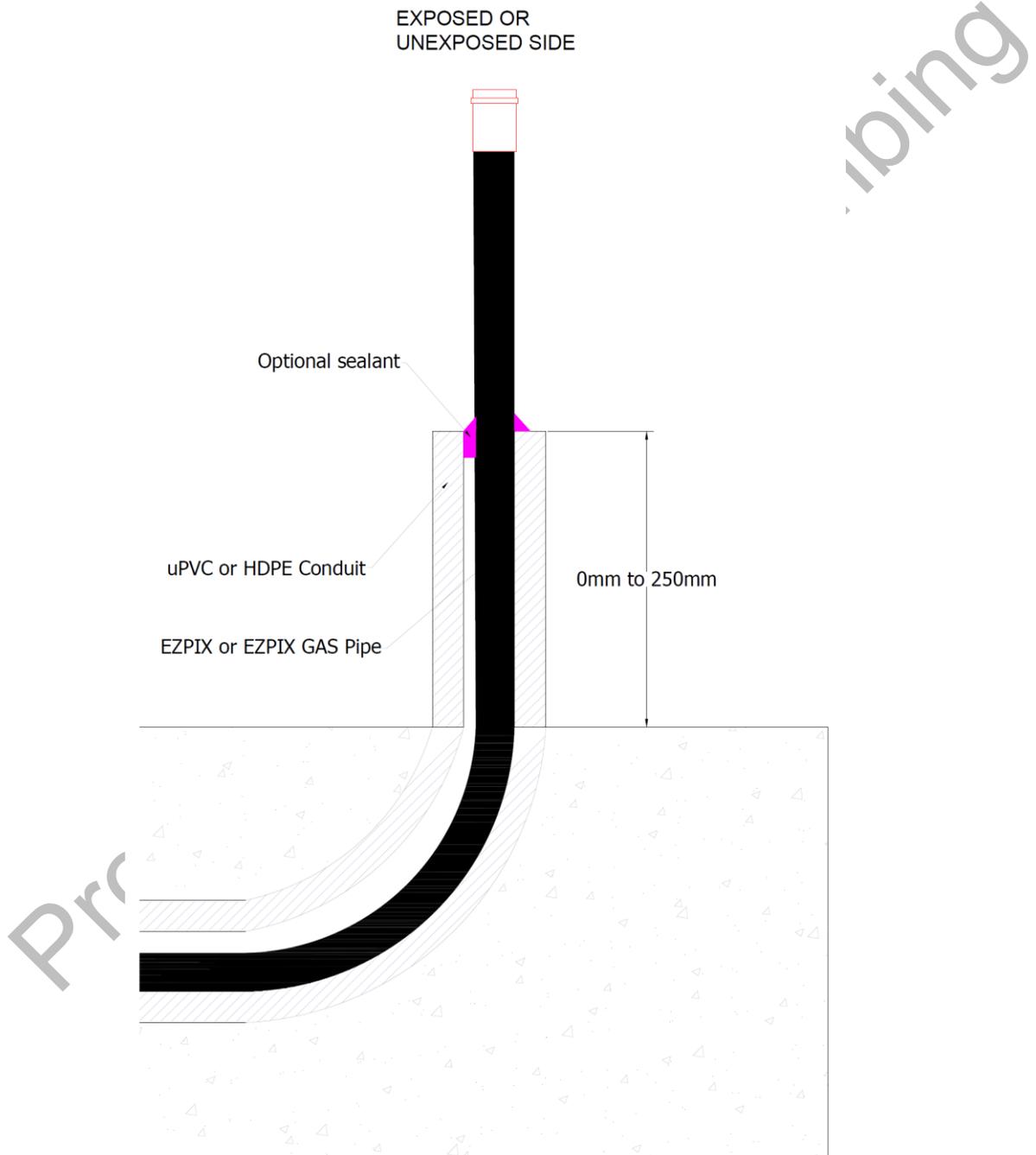


Figure 1 – Encapsulation Pipe Length

4 REFERENCED TEST PROCEDURES

This report is prepared with reference to the requirements of AS1530.4-2005 and AS4072.1-2005 as appropriate for penetration within a floor slab under a wall.

5 FORMAL ASSESSMENT SUMMARY

Based on the discussion presented in this report, it is the opinion of this testing authority that if the specimen described in section 2 had been modified within the scope of section 3, it will achieve the performances as stated below when tested in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7:

FRL: -/120/120

6 DIRECT FIELD OF APPLICATION

The results of this assessment are applicable to wall floor junctions where pipes and conduits pass under the fire walls exposed to fire from either side of wall.

7 REQUIREMENTS

This report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS 1530.4-2005.

Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

8 VALIDITY

This assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the actual products supplied.

The conclusions of this assessment may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

The assessment can therefore only relate only to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture. This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report be reviewed on or, before, the stated expiry date.

The information contained in this report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report.

All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

9 AUTHORITY

9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance, the applicant(s) confirms that:

- to their knowledge the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the Standard against which this assessment is being made, and
- they agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test by a test authority in accordance with the Standard against which this assessment is being made and the results are not in agreement with this assessment, and
- they are not aware of any information that could adversely affect the conclusions of this assessment and if they subsequently become aware of any such information, agree to ask the assessing authority to withdraw the assessment.

9.2 GENERAL CONDITIONS OF USE

This report may only be reproduced in full without modifications by the report sponsor. Copies, extracts or abridgments of this report in any form shall not be published by other organisations or individuals without the permission of Exova Warringtonfire Aus Pty Ltd.

9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

Prepared by:



O. Saad

Reviewed by:



C McLean

9.4 DATE OF ISSUE

22/05/2017

9.5 EXPIRY DATE

30/11/2020

APPENDIX A - SUMMARY OF SUPPORTING DATA

A.1 TEST REPORT – EWFA 35506000.4

A.1.1 Report Sponsor

A.1.1.1 Boone & Willard Plumbing Pty Ltd, Unit 13, 5 Meridian PI Bella Vista, NSW 2153

A.1.1.2 Cooks Plumbing Supplies, 27 Loyalty Road, North Rocks, NSW 2151

A.1.2 Test Laboratory

A.1.2.1 Exova Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia

A.1.3 Test Date

A.1.3.1 The test was conducted on 15th July 2015.

A.1.4 Test standards prescribed

A.1.4.1 The test was conducted in general accordance with AS 1530.4–2005.

A.1.5 Variations to Test Standard

A.1.5.1 AS1530.4-2005 does not include specific requirements for the testing of services which are embedded and travelling horizontally through a concrete floor. For this reason, the test was not in direct compliance with AS 1530.4-2005.

A.1.5.2 Due to the specimen layout being designed to assess the potential for horizontal flame spread through pipes in subfloor spaces and thus departing from the specimens outline in AS 1530.4-2005, there is no direct field of application.

A.1.6 Description of Tested Assembly

A.1.6.1 The test assembly was comprised of a nominal 1600mm wide × 1420mm high × 103mm thick plasterboard wall system constructed over a 1200mm wide × 1510mm long × 180mm thick concrete floor slab. The wall system was restrained on all four edges.

A.1.6.2 The concrete floor slab consisted of 2 layers of metal reinforcement with 32MPa concrete. The EZIPEX and EZIPEX GAS services with their plastic conduits and pipes were cast into the slab when the concrete was poured.

A.1.6.3 The wall system consisted of a 64mm steel frame with two layers of 13mm CSR Fyrchek plasterboard on the exposed side and a single layer of 13mm CSR Fyrchek plasterboard on the unexposed side.

A.1.6.4 The wall was positioned nominally 150mm back from the row of services exiting the slab on the exposed side.

A.1.6.5 The services consisted of Ø16mm and Ø20mm EZIPEX and EZIPEX GAS pipes, encased in multiple conduit configurations and a 50mm uPVC pipe which were protected with various fire protection systems on the exposed face. The pipe penetration systems were embedded such that the straight run was nominally mid-depth of the slab and nominally 1,000mm long. The conduits were trimmed off flush with the top surface of the concrete. The pipes were capped on the exposed side.

Service	Pipe	Encapsulation	Local Fire Stopping
A	Ø16mm EZIPEX	Ø20mm Plastic conduit	Bostik Fireban One
B	Ø16mm EZIPEX	Ø20mm Plastic conduit	None
C	Ø20mm EZIPEX	Ø25mm Plastic conduit	Promaseal CFC Collar
D	Ø20mm EZIPEX	Ø25mm Plastic conduit	None
E	Ø20mm EZIPEX	Ø32mm Plastic conduit	Hilti CP 611A
F	Ø20mm EZIPEX	Ø32mm Plastic conduit	None
G	Ø16mm EZIPEX	Ø25mm Plastic conduit	None
H	Ø16mm EZIPEX GAS	Ø20mm Plastic conduit	None
I	Ø16mm EZIPEX GAS	Ø20mm Plastic conduit	Bostik Fireban One
J	Ø20mm EZIPEX GAS	Ø25mm Plastic conduit	None
K	Ø20mm EZIPEX GAS	Ø25mm Plastic conduit	Promaseal CFC Collar

L	3 x Ø20mm EZIPEX	Ø25mm Plastic conduit	Bostik Fireban One
M	Ø16mm EZIPEX	Ø25mm Plastic conduit and 13mm Armaflex lagging	None
N	Ø20mm EZIPEX	Ø50mm uPVC pipe	Bostik Fireban One

For a detailed description of the tested construction refer to the referenced test report

A.1.7 Instrumentation

A.1.7.1 The test instrumentation was in accordance with AS 1530.4–2005.

A.1.8 Test Results

Service	Criteria	Result
A to N	Integrity	No failure at 120 minutes
	Insulation	No failure at 120 minutes

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APPENDIX B - ASSESSMENT OF SPECIFIC VARIATIONS

B.1 APPLICABILITY OF TEST RESULTS TO AS1530.4-2005 AND AS4072.1-2005

B.1.1 General

B.1.1.1 AS 1530.4-2005 does not specifically address the testing of penetrations that pass into a floor and then pass under a wall and then reappear through the floor on the opposite side of the wall.

B.1.1.2 Applications where such a system is considered appropriate include residential buildings where services are distributed from a corridor location within the floor slab to reappear throughout the building.

B.1.1.3 Based on the above it is considered that the following criteria need to be applied to the penetration systems in order to comply with the intent of AS 1530.4-2005.

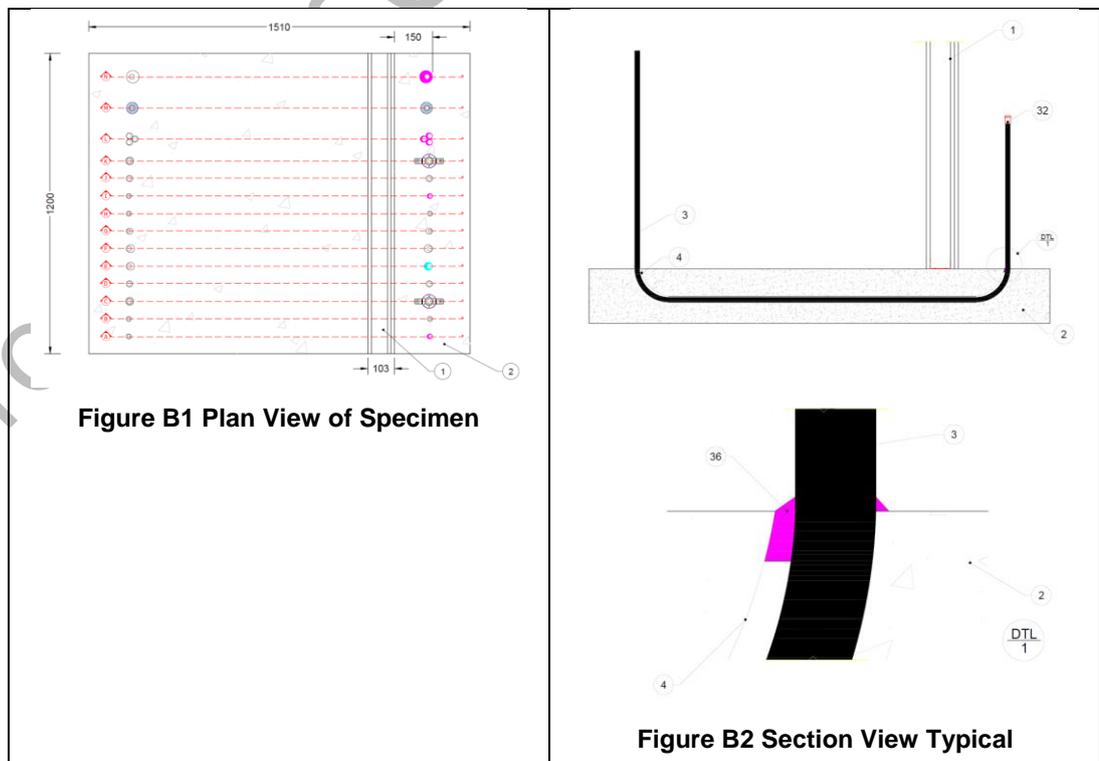
- Insulation criteria as applied to fire resistant walls and service penetrations in AS 1530.4-2005
- Integrity criteria as applied to fire resistant walls and service penetrations in AS 1530.4-2005

B.1.1.4 In order to assess the junction of a wall and floor the furnace pressure shall be set so that the specimen represents the floor wall junction of the proposed construction and have the neutral axis for the furnace pressure set at 500mm from the floor in accordance with AS1530.4-2005 requirements for walls.

B.1.1.5 The application of the above criteria to specimen tested in discussed below.

B.1.2 Applicability of the Results from EWFA 35506000.4

The construction tested comprised a nominal 1600mm wide × 1420mm high × 103mm thick plasterboard wall system constructed over a 1200mm wide × 1510mm long × 180mm thick concrete floor slab. The slab included various conduit and pipe services. As shown in Figure B1 to Figure B4.



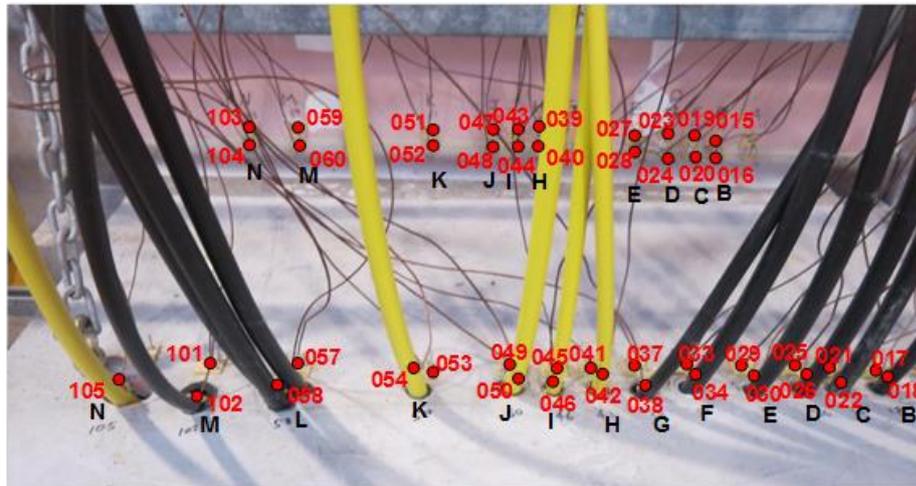


Figure B3: Unexposed side thermocouple location of Service B, C, D, E, H, I, J, K, M and N

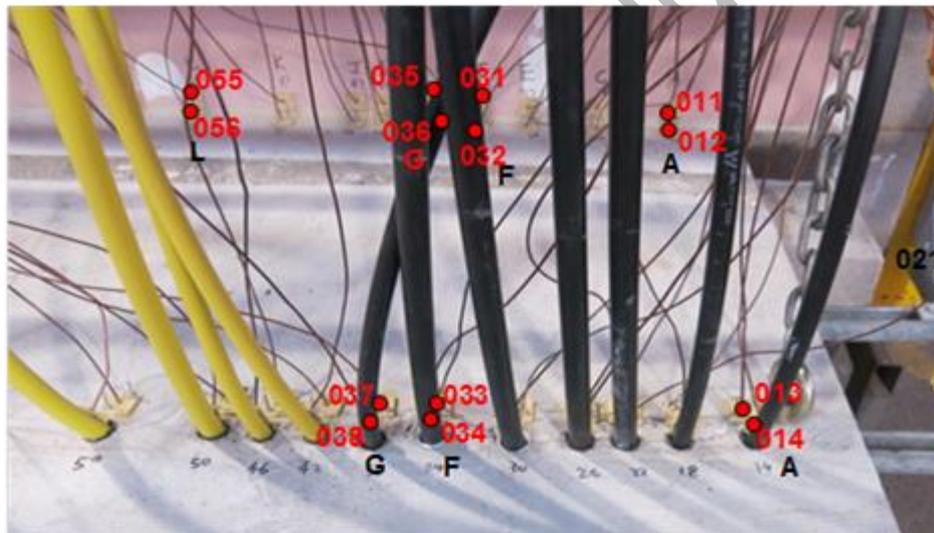


Figure B4 - Unexposed side thermocouple location of Service A, F, G and L

- B.1.2.1 When tested the furnace pressure was set so that the specimen represented the floor wall junction of the proposed construction and had the neutral axis for the furnace pressure set at 500mm from the floor in accordance with AS1530.4-2005 requirements for walls.
- B.1.2.2 The insulation criterion was applied to fire resistant walls and service penetrations in AS 1530.4-2005. The temperature rise measured on the non fire side of the specimen on the service pipe was only 6°C.
- B.1.2.3 The integrity criterion was applied to fire resistant walls and service penetrations in AS 1530.4-2005. There was no integrity failure or any signs of impending fire spread through the pipe system.
- B.1.2.4 Based on the above discussion it is confirmed that the performance of the specimen tested is applicable to the performance of a wall and floor junction if tested in accordance with AS1530.4-2005 as appropriate for penetration within a slab under a fire wall.

B.2 PIPE LOCATION

B.2.1 General

B.2.1.1 The proposed construction shall be as tested in EWFA 35506000.4 Specimen A to N with consideration of the following variations:

- Distance between separating element and the near edge pipe protrusion is 30mm or more on exposed and unexposed side.

B.2.2 Discussion

B.2.2.1 With reference to test EWFA 35506000.4, the proposed construction aims to bring the location of pipe protrusion in concrete slab to 30mm from separating element.

B.2.2.2 It is required that separating element to be otherwise tested or assessed to achieve FRL -/120/120.

B.2.2.3 Upon closer inspection of thermocouple temperatures (015, 016, 019, 020, 023, 024, 027, 028, 029, 039, 040, 043, 044, 047, 048, 051, 052, 059, 060, 103 and 104) located 25mm from the concrete floor slab on the wall system and 25mm from the wall system on the concrete floor slab, it was found that none of these locations failed insulation criteria and the maximum temperature reading 120 minutes into the test was 72°C degrees, which leaves significant safety margin in insulation performance compared with the insulation limits identified in the test standard.

B.2.2.4 The significance of above observation is that the proposed variation location, is similar to where the above readings were observed, and is therefore considered not to detrimentally affect the insulation performance if the pipe and conduit service.

B.2.2.5 With reference to test EWFA 35506000.4, there were no observations at these locations that could have contributed to the integrity failure.

B.2.2.6 In light of the above, the proposed construction is expected to maintain integrity and insulation performance in accordance with AS1530.4-2005 for at least 120 minutes.

B.3 VARIOUS EZIPEX PIPES IN 50MM UPVC ENCAPSULATION PIPE

B.3.1 Proposed Construction

B.3.1.1 The proposed construction shall be as tested in EWFA 35506000.4 Specimen N with consideration of the following variations:

- The 50mm diameter uPVC encapsulation pipe shall be filled with any of the following:
 - 1 x 20mm Ezipex Gas
 - 1 x 20mm Ezipex
 - 1 x 16mm Ezipex Gas
 - 1 x 16mm Ezipex
 - 2 x 20mm Ezipex
 - 2 x 20mm Ezipex Gas
 - 2 x 16mm Ezipex
 - 2 x 16mm Ezipex Gas
 - 1 x 16mm/1 x 20mm Ezipex
 - 1 x 16mm/1 x 20mm Ezipex Gas
 - 1 x 20mm/1 x 20mm Ezipex Gas/Ezipex

B.3.2 Discussion

B.3.2.1 With reference to test EWFA 35506000.4, the proposed single Ezipex and Ezipex Gas pipes were tested within various encapsulation pipes with no discernible difference in performance and with substantial margin. Specimen N included a Ø20mm EZIPEX pipe in a 50mm diameter uPVC encapsulation pipe with Bostik Fireban One sealant. Specimens C to F also included a Ø20mm Ezipex pipe in various sized encapsulation pipes from Ø25mm to Ø32mm. No difference in performance was observed.

B.3.2.2 The proposed construction includes up to 2 x 16mm or 20mm Ezipex Gas or Ezipex pipes within a 50mm diameter uPVC encapsulation pipe. Considering the substantial margin between recorded temperature and failure criteria of the tested specimens, and the various

types of constructions tested, the inclusion of 2 pipes is not expected to reduce integrity or insulation performance of the construction to less than 120 minutes.

B.3.2.3 In light of the above, the proposed construction is expected to maintain integrity and insulation performance in accordance with AS1530.4-2005 for at least 120 minutes.

B.4 EZIPEX GAS PIPES IN 32MM HDPE ENCAPSULATION PIPE

B.4.1 Proposed Construction

B.4.1.1 The proposed construction shall be as tested in EWFA 35506000.4 Specimen F with consideration of the following variations:

- The 32mm diameter HDPE plastic conduit pipe shall be filled with any of the following:
 - 1 x 20mm Ezipex Gas
 - 1 x 20mm Ezipex Gas with fire rated sealant

B.4.2 Discussion

B.4.2.1 With reference to test EWFA 35506000.4, the proposed single Ezipex Gas pipes were tested within various encapsulation pipes with no discernible difference in performance and with substantial margin. Specimen F included a Ø20mm EZIPEX pipe in a 32mm diameter HDPE encapsulation pipe with no sealant. Specimens C to F also included a Ø20mm Ezipex pipe in various sized encapsulation pipes from Ø25mm to Ø32mm. No difference in performance was observed.

B.4.2.2 The proposed construction includes a 20mm Ezipex Gas pipe within a 32mm diameter HDPE encapsulation pipe with or without sealant.

B.4.2.3 Considering the substantial margin between recorded temperature and failure criteria of the tested specimens, and the various types of constructions tested, the inclusion a 20mm Ezipex Gas pipe in 32mm HDPE encapsulation pipe is not expected to reduce integrity or insulation performance of the construction to less than 120 minutes.

B.4.2.4 Upon close inspection of fire performance of all tested EZIPEX and EZIPEX GAS pipes observations, it is noticed that both types of pipes behaved similarly for the duration of at least 120mins of tested.

B.4.2.5 In light of the above, the proposed construction is expected to maintain integrity and insulation performance in accordance with AS1530.4-2005 for at least 120 minutes.

B.5 ASSESSMENT OF PROTRUDING ENCAPSULATION CONDUATE

B.5.1 Proposed construction

B.5.1.1 The proposed construction shall be as tested in EWFA 35506000.4 Specimen F with consideration of the following variations:

- Length of encapsulation pipe to be 0 to 250mm protruding through slab for all conduit sizes and types, all pipe sizes and types on either exposed side, unexposed side or both.

B.5.2 Discussion

B.5.2.1 Upon closer inspection of test observations for all specimens tested, there were no recorded events related to the length of the encapsulating uPVC or HDPE pipes that are considered to have an adverse effect on the fire resistance performance for the duration of up to 120mins into the test.

B.5.2.2 It was observed from examining post-test survey photos that encapsulating pipes on the exposed side had disintegrated

B.5.2.3 Another observation from post-test photos is that encapsulation pipes remained intact and did not fail integrity and insulation.

B.5.2.4 The significance of above observations is that encapsulating pipes disintegration did not travel from the exposed side to the unexposed side for the length of the test and for the length of the encapsulating pipes tested in the slab for types of pipes and encapsulation tested.

- B.5.2.5 It is considered safe to allow encapsulation pipes to protrude up to 250mm either from exposed side, unexposed side or both without adversely affecting fire resistance performance of tested specimens.
- B.5.2.6 In light of the above, the proposed construction is expected to maintain integrity and insulation performance in accordance with AS1530.4-2005 for at least 120 minutes.

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