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EWFA CERTIFICATE OF ASSESSMENT	CERTIFICATE No : SFC 28750-00	Page 1 of 1
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Report Sponsor	Certificate Issue Date	Product Name
Projex Group Pty Ltd 2/1 Military Road Matraville NSW 2036 Australia	03/09/2013	Model "T" Link-Seal® modular seal system

Assessment Report Reference	Referenced Standard	Report Issue Date	Report Validity Date
EWFA 28750-00	AS1530.4-2005 AS4072.1-2005	03/09/2013	30/09/2018

Introduction
The element of construction described below was assessed by this laboratory on behalf of the report sponsor in accordance with the stated test standard and achieved the results stated below. Refer to the referenced test report(s) or Regulatory Information Reports for a complete description of the assessed construction.

Description of Assessed Construction and Performance	
Assessed Construction	FRL
<p>The assessed construction comprises a Ø 275mm × 10mm thick steel pipe penetrated through a 200mm thick precast cement block. Silicone (Grey) rubber Model "T" Link-Seal® modular seal system is installed surrounding the steel pipe perimeter and is flushed along the unexposed surface of precast cement block.</p> <p>Refer to the referenced assessment report for a complete description of the assessed construction.</p>	-/120/-

Conditions/Validity
<ul style="list-style-type: none"> THIS CERTIFICATE IS PROVIDED FOR GENERAL INFORMATION ONLY AND DOES NOT COMPLY WITH THE REGULATORY REQUIREMENTS FOR EVIDENCE OF COMPLIANCE. Reference should be made to the relevant test report or regulatory information report to determine the applicability of the test result to a proposed installation. Full details of the constructions and justification for the conclusions given, along with the validity statements, are given in the assessment reports. The assessment report or short form assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the performance of the actual products supplied. It is intended to provide a brief outline of the above referenced assessment reports and not to replace them. The conclusions in this certificate of assessment relate to the configurations as detailed, and should not be applied to any other configuration. The conclusions expressed in this document assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all conditions. Full copies of the assessment and relevant test reports may be obtained from the sponsor.

TESTING AUTHORITY	Exova Warringtonfire Aus Pty Ltd						
Address	Suite 2002a, Level 20, 44 Market Street, Sydney NSW 2000, Australia						
Phone / Fax	+61 (0)2 8270 7600 / +61 (0)2 9299 6076						
ABN	81 050 241 524						
Email / Home Page	www.exova.com						
Authorisation	<table> <tr> <td>Prepared By:</td><td>Reviewed By:</td></tr> <tr> <td></td><td></td></tr> <tr> <td>S. Hu</td><td>K. G. Nicholls</td></tr> </table>	Prepared By:	Reviewed By:			S. Hu	K. G. Nicholls
Prepared By:	Reviewed By:						
S. Hu	K. G. Nicholls						



ASSESSMENT REPORT

The likely fire resistance performance of an
Ø275mm steel pipe penetrating a 200mm
thick concrete wall protected with Model "T"
Link-Sea® modular seal system if tested in
accordance with AS1530.4-2005 and
assessed in accordance with AS4072.1-
2005

EWFA Report No:

28750-00

Report Sponsor:

Projex Group Pty Ltd
2/1 Military Road
Matraville NSW 2036
Australia

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CONTACT INFORMATION

Exova Warringtonfire Aus Pty Ltd - ABN 81 050 241 524

NATA Registered Laboratory

Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia

T: +61 (0)3 9767 1000
F: +61 (0)3 9767 1001

New South Wales

Suite 2002a, Level 20,
44 Market Street
Sydney NSW 2000
Australia

T: +61 (0)2 8270 7600
F: +61 (0)2 9299 6076

Victoria

Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia

T: +61 (0)3 9767 1000
F: +61 (0)3 9767 1001

Queensland

Northpoint, Unit 29, Level 6
231 North Quay
Brisbane QLD 4000
Australia

T: +61 (0)7 3238 1700
F: +61 (0)7 3211 4833

CONTENTS

1	INTRODUCTION	4
2	TESTED PROTOTYPES	4
3	VARIATION TO TESTED PROTOTYPES	4
4	REFERENCED TEST PROCEDURES.....	4
5	FORMAL ASSESSMENT SUMMARY	5
6	DIRECT FIELD OF APPLICATION	5
7	REQUIREMENTS.....	5
8	VALIDITY.....	5
9	AUTHORITY	6
9.1	Applicant Undertakings and Conditions of Use	6
9.2	General Conditions of Use	6
9.3	Authorisation on behalf of Exova Warringtonfire Aus Pty Ltd	6
9.4	Date of Issue	6
9.5	Expiry Date	6
APPENDIX A	SUMMARY OF SUPPORTING DATA	7
A.1	Test Report – No. 719186476-MEC10-IHN	7
APPENDIX B	- ASSESSMENT OF SPECIFIC VARIATIONS	8
B.1	Relevance of NO. 719186476-MEC10-IHN Test Data to AS1530.4-2005	8

1 INTRODUCTION

This report presents an assessment of the fire resistance performance of an Ø275mm steel pipe penetrating a 200mm thick concrete wall protected with Model "T" Link-Seal® modular seal system if tested in accordance with AS1530.4-2005 and assessed in accordance with AS4072.1-2005.

The tested systems are described in Section 2 and are subject to the proposed variations described in Section 3 if tested in accordance with the referenced test method 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 is based on a fire resistance test report No. 719186476-MEC10-IHN was sponsored by Pipeline Seal and Insulator, Inc. and was conducted by TUV SUD PSB Pte Ltd.

The test specimen reported in No. 719186476-MEC10-IHN comprised a 200mm thick precast cement block wall incorporating a Ø275mm x 10mm thick steel pipe protected with Model "T" Link-Seal® modular seal system and tested in accordance with BS 476: Part 20: 1987.

Permission has been granted by Pipeline Seal and Insulator, Inc. for the referenced report No. 719186476-MEC10-IHN to be used for the purpose of this assessment.

3 VARIATION TO TESTED PROTOTYPES

The proposed construction shall be as tested in test report No. 719186476-MEC10-IHN though the performance shall be evaluated against the requirements of AS1530.4-2005 and AS4072.1-2005 as appropriate to penetrations.

4 REFERENCED TEST PROCEDURES

This report is prepared with reference to the requirements of AS1530.4-2005 and AS4072.1-2005 as appropriate to penetrations.

5 FORMAL ASSESSMENT SUMMARY

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

FRL: -/120/-

6 DIRECT FIELD OF APPLICATION

The application of the results of this assessment is for steel pipe in walls exposed either side.

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 AS1530.4.

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 fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all conditions.

Because of the nature of fire 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 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:

Reviewed by:



S. Hu



K. G. Nicholls

9.4 DATE OF ISSUE

3/09/2013

9.5 EXPIRY DATE

30/09/2018

APPENDIX A SUMMARY OF SUPPORTING DATA

A.1 TEST REPORT – NO. 719186476-MEC10-IHN

A.1.1 Report Sponsor

A.1.1.1 Pipeline Seal and Insulator, Inc., 6525 Goforth Street, Houston, TX 77021, U.S.A

A.1.2 Test Laboratory

A.1.2.1 TUV SUD PSB Pte Ltd, 2 Science Park Drive, #04-01/05, the Franklin, Singapore 118223.

A.1.3 Test Date

A.1.3.1 The test was conducted on 5th October 2010.

A.1.4 Test standards prescribed

A.1.4.1 The test was conducted in accordance with BS 476: Part 20: 1987.

A.1.5 General description of tested specimens

A.1.5.1 The tested assembly comprised a piece of steel pipe with a diameter 275mm x 10mm thick x 2000mm long penetrated through core hole of a 200mm thick precast cement block. The pipe penetrated 500mm into furnace from the block and was blanked off with a welded steel end plate which was 300mm x 300mm x 6mm thick on the fire side. The remaining length of steel pipe protruded on the unexposed side through a nominal 335mm diameter core hole was supported by vertical steel stands.

A.1.5.2 Silicone (Grey) rubber Model "T" Link-Seal® modular seal system was installed surrounding the steel pipe perimeter and flushed along the unexposed surface of precast cement block.

A.1.6 Instrumentation

A.1.6.1 This was accordance with BS 476: Part 20: 1987.

A.1.7 Test Results

A.1.7.1 The test was discontinued after a period of 132 minutes.

A.1.7.2 The test specimen maintained integrity performance for 132 minutes without the formation of gaps, fissures or the like that would warrant the application of a cotton pad.

A.1.7.3 At 25 minutes, the maximum temperature rise above initial temperature on the unexposed face of the steel pipe penetration was 187K.

A.1.7.4 The calculated pressure in the furnace was 5Pa at the head of the specimen.

APPENDIX B - ASSESSMENT OF SPECIFIC VARIATIONS

B.1 RELEVANCE OF NO. 719186476-MEC10-IHN TEST DATA TO AS1530.4-2005

B.1.1 General

B.1.1.1 The fire resistance test NO. 719186476-MEC10-IHN was conducted in accordance with BS 476 Part 20: 1987, which differs from AS1530.4-2005.

B.1.1.2 The differences in test method considered capable of significantly altering specimen performance are discussed below,

B.1.2 Furnace Temperature Measurement

B.1.2.1 The furnace thermocouples specified in AS1530.4-2005 are type K, mineral insulated metal sheathed (MIMS) with a stainless steel sheath having a wire of diameter of less than 1.0mm and an overall diameter of 3mm. The measuring junction protrudes at least 25mm from the supporting heat resistant tube.

B.1.2.2 The furnace thermocouples specified in AS1530.4-2005 are type K, mineral insulated metal sheathed (MIMS) with a stainless steel sheath having a wire of diameter of less than 1.0mm and an overall diameter of 3mm. The measuring junction protrudes at least 25mm from the supporting heat resistant tube.

B.1.2.3 The furnace thermocouple types in BS 476: Part 20: 1987 shall be one of the following two types:

- Bare nickel chromium/nickel aluminium wires, 0.75mm to 1.5mm in diameter, welded or crimped together at their ends and supported and insulated from each other in a twin bore porcelain insulator except that the wires for 25mm approximately from the weld/crimp shall be exposed and separated from each other by at least 5mm. (replace or recalibrate after 6hrs of usage).
- Nickel chromium/nickel aluminium wire contained within a mineral insulation and in a heat resisting steel sheath of diameter 1.5mm, the hot junctions being electrically insulated from the sheath. The thermocouple hot junction shall project 25mm from a porcelain insulator. The assembly shall have a response time on cooling in air of not greater than 30s.

B.1.2.4 The relative location of the furnace thermocouples to the exposed face of the specimen, for both AS1530.4-2005 and BS 476: Part 20: 1987, is 100mm +10mm.

B.1.3 Furnace Temperature Regime

B.1.3.1 The furnace temperature regime for fire resistance tests conducted in accordance with AS1530.4-2005 is the same as that specified in BS476.20-1987.

B.1.3.2 The parameters outlining the accuracy of control of the furnace temperature in AS1530.4-2005 and BS476.20-1987 are not appreciably different.

B.1.4 Furnace Pressure Regime

B.1.4.1 It is a requirement of AS1530.4-2005 that for penetrations in vertical elements, a furnace gauge pressure of 15Pa is established at the height of the centreline of the lowest penetration.

B.1.4.2 For BS 476: Part 20: 1987, no specific requirement is given for services and a neutral axis is either maintained at a height of 1m or a pressure of 20Pa is established at the head of the specimen.

B.1.4.3 The test report did not state the furnace pressure however it is stated in the report during the test, with commencement of heating the specimen, the furnace temperature and pressure were controlled to comply with the requirements specified in BS 476 Part 20: 1987: Clause 3.1 and 3.2 respectively.

B.1.4.4 Based on this statement it is taken that the furnace pressure in test NO. 719186476-MEC10-IHN was around 5Pa at the head of the specimen. The pressure condition therefore was less

than prescribed by AS1530.4-2005 and this could have affected the integrity performance of the specimen particularly after gaps formed in the specimen.

B.1.5 Specimen Temperature Measurement

B.1.5.1 The specimen thermocouple specification is generally the same for AS1530.4-2005 and BS476.20-1987.

B.1.5.2 BS476.20-1987 has no specific provision for the location of thermocouples on penetration seals, though thermocouples were attached in accordance with prEN 1366 Part 3: 1998 in the referenced test.

B.1.5.3 AS1530.4-2005 prescribes thermocouples to be placed in the following locations:

- At least three on the surface of the seal, with one thermocouple for each 0.3 m² of surface area, up to a maximum of five, uniformly distributed over the area (one thermocouple being located at the centre of the seal).
- On the surface of the seal 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.
- On the surface of the separating element 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.
- If the seal is recessed on the unexposed side, thermocouples shall only be fitted to the seal when the joint width is greater than or equal to 12mm.

B.1.5.4 The insulation performance of this specimen is taken as zero so the significance of these differences is not important to the fire resistance level.

B.1.6 Integrity Performance Criteria

B.1.6.1 The integrity criteria for AS1530.4-2005 and BS476.20-1987 are not appreciably different.

B.1.7 Insulation Performance Criteria

B.1.7.1 Apart from the variation in specimen thermocouple locations, the insulation criteria for AS1530.4-2005 and BS476.20-1987 are not appreciably different.

B.1.8 Specimen

B.1.8.1 AS1530.4-2005 specifies that metal pipes shall be capped on the fire side and shall project 500mm minimum on the exposed side and 500mm on the unexposed side of the supporting construction, of which at least 200mm must extend beyond the extremities of the penetration sealing system (any coating, wrapping or other protection to the service). The pipe shall be capped on the exposed side only by welding, gluing or mechanically fixing a disc or cap of the same material as the pipe, onto the end of the pipe or ceramic/mineral fibre disc.

B.1.8.2 The referenced test was configured in such a way that the penetration into and out of the furnace for the steel pipe was 500mm and 1300mm respectively. This variation will result in lower unexposed side pipe temperature than for specimen configured in strict accordance with AS1530.4-2005.

B.1.8.3 As insulation performance is being sought for this specimen it is considered it will not have a significant effect on the integrity performance.

B.1.8.4 The metal pipe tested in the reference test NO. 719186476-MEC10-IHN was blanked off with a welded steel end plate, 300mm x 300mm x 6mm thick. The end plate was larger but thinner than the tested metal pipe specimen. It is considered the thinner end plate will conduct more heat from the furnace through the pipe and hence be more onerous than if it were as specified in AS1530.4-2005.

B.1.8.5 Based on the above it is confirmed the specimen arrangement can be used for the determination of integrity though not insulation if tested in accordance with AS1530.4-2005.

B.1.9 Application of Test Data to AS1530.4-2005

- B.1.9.1 The variations in furnace heating regimes, furnace thermocouples and the responses of the different thermocouple types to the furnace conditions are not expected to have significant effect on the outcome of the referenced fire resistance tests.
- B.1.9.2 With reference to test observations of test NO. 719186476-MEC10-IHN, there was no visible smoke emission and glowing evident recorded and it is therefore considered likely to have warranted the application of a cotton pad, and hence the effect of the furnace pressure on the integrity performance is unlikely to be significant up to 120 minutes.
- B.1.9.3 Considering the variations on specimen projection length and end cap, it is considered that the test configuration would be significantly hotter on the non-fire side if tested with the required extension into and out of the furnace. It is therefore considered the result is suitable for the determination of integrity, though not suitable for the determination of the insulation performance.
- B.1.9.4 Based on the above, it is considered the performance of the tested metal pipe services in accordance with AS1530.4-2005 for integrity performance up to 120 minutes.