



BRANZ

1222 Moonshine Road
Judgeford RD1
Porirua 5381
New Zealand
T +64 4 237 1170
F +64 4 237 1171
branz@branz.co.nz
www.branz.co.nz



FIRE ASSESSMENT REPORT

FAR 4205 ISSUE 2

FIRE RESISTANCE OF STEEL DUCTS PROTECTED WITH TRAFALGAR FYREWRAPE FOR EXTERNAL FIRE EXPOSURE

CLIENT

Fire Containment Pty Ltd
T/A Trafalgar Fire Containment Solutions
26a Ferndell Street
South Granville
NSW 2142
Australia

PROJECT NUMBER:

FC 4205

ISSUE DATE:

16 July 2014

PAGE:

1 of 10

THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

- Issued to FireStop Center for use as evidence of compliance for the NZBC -

ASSESSMENT SUMMARY

Objective

To assess the fire resistance level for external exposure of horizontal or vertical steel ducts protected with one or two layers of nominal 38 mm thick Trafalgar Fyrewrap, in accordance with AS 1530.4 2005

Conclusion

It is considered that horizontal or vertical steel ducts protected with one layer of nominal 38 mm thick Trafalgar Fyrewrap, passing through walls or floors having at least -/120/120 FRL, all as described in this report, would achieve at least 120/120/120 FRL if tested in accordance with AS 1530.4-2005.

It is considered that horizontal or vertical steel ducts protected with two layers of nominal 38 mm thick Trafalgar Fyrewrap, passing through walls or floor having at least -/180/180 FRL, all as described in this report, would achieve at least 180/180/180 FRL if tested in accordance with AS 1530.4-2005.

Where the FRL of the wall or floor through which the duct passes is less than the nominal FRL of the duct, the FRL of the duct is limited as described in sections 3.2.2 and 3.2.3 of this report.

LIMITATION

This report is subject to the accuracy and completeness of the information supplied.

BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

This assessment report may only be quoted or reproduced in full.

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.



REPORT NUMBER:	ISSUE DATE:	PAGE:
FAR 4205 ISSUE 2	16 July 2014	2 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

CONTENTS

SIGNATORIES	4
DOCUMENT REVISION STATUS	4
1. INTRODUCTION	5
2. BACKGROUND	5
3. DISCUSSION	6
3.1 Proposed Construction	6
3.2 Analysis.....	7
3.2.1 General	7
3.2.2 Walls.....	7
3.2.3 Concrete Floors	8
4. CONCLUSION	8

APPENDIX

Appendix A - Client Supplied Drawings.....	9
--	---

Property of Trafalgar Group




REPORT NUMBER:	ISSUE DATE:	PAGE:
FAR 4205 ISSUE 2	16 July 2014	3 of 10




THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

SIGNATORIES



Author

J. J. King
Senior Fire Testing Engineer



Reviewer

E. Soja
Senior Fire Safety Engineer

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	DESCRIPTION
1	10 February 2014	Initial Issue
2	16 July 2014	Revised to allow different wall types



REPORT NUMBER:

FAR 4205

ISSUE DATE:

16 July 2014

PAGE:

4 of 10

THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

1. INTRODUCTION

This report gives BRANZ's assessment of the fire resistance of steel ducts, passing through concrete or masonry or steel framed, plasterboard lined walls, or concrete floors, protected with one or two layers of nominal 38 mm thick Trafalgar Fyrewrap. The ducts are assessed with respect to fire on the outside of the duct.

2. BACKGROUND

In Intertek fire resistance test No 11269631SAT-005 two nominally 1,224 mm square ducts constructed from 22 gauge steel, protected with one layer of Trafalgar Fyrewrap, were tested in accordance with AS 1530.4-2005 for external fire exposure. Duct "A" was protected with 2 inch (50 mm) thick Fyrewrap and Duct "B" was protected with 1.5 inch (38 mm) thick Fyrewrap. The Fyrewrap was wrapped around the ducts and held in place with steel pins and speed clips on the bottom, and with steel bands at each transverse Fyrewrap joint, at the mid-width of the centre band of Fyrewrap, and nominally 3 inches (75 mm) from the wall penetrations.

The ducts were installed to pass through a concrete enclosure such that they passed through the 4.5 inch (114 mm) thick end walls of the enclosure. The ducts had steel reinforcing frames and steel support channels suspended from the roof of the enclosure with steel threaded rods.

A nominal 25 x 25 x 5 mm steel angle stiffening frame was located around the duct at the centre of the penetration through the wall, fixed to the duct with 4 mm steel rivets at 6 inch (150 mm) centres.

The gap around the duct at the wall penetration was 2 inches (50 mm) at top and sides, 4 inches (100 mm) at the bottom. The gap was packed with Fyrewrap material with the encapsulating material removed, leaving nominally 1/8 inch (3 mm) on each side of the wall to be filled with LCI Intumescent Firestop Sealant.

Duct "A" achieved 180 minutes Structural Adequacy, Integrity and Insulation, with no failure.

Duct "B" achieved 180 minutes Structural Adequacy and Integrity, 178 minutes Insulation.



REPORT NUMBER:
FAR 4205 ISSUE 2

ISSUE DATE:
16 July 2014

PAGE:
5 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

3. DISCUSSION

3.1 Proposed Construction

It is proposed that steel ducts may be constructed generally similarly to those tested in the above referenced test, wrapped with one or two layers of nominal 38 mm Fyrewrap installed similarly to the tested wrap, for a fire resistance level (FRL) of up to 120/120/120 with a single layer, or up to 180/180/180 with two layers.

The wall may be of concrete or masonry, or steel framed and lined with plasterboard. The wall is to have been previously tested or assessed to have a FRL as is required for the duct. The wall need not be loadbearing as the duct is self-supporting.

For plasterboard lined walls the opening is to be framed on all sides with steel framing similar to the wall studs.

The clearance between the duct and the inside face of the wall opening is to be a maximum of 30 mm. Nominal 75 x 75 x 1.6 mm steel angles are to be fixed to the duct and to the wall on each side of the wall opening. The clearance gap is to be filled with Fyrewrap with the encapsulating material removed.

The single layer or outer layer of Fyrewrap is to extend over the face of the wall at least 100 mm from the outer face of the duct wrap, and be fixed to the wall.

The Fyrewrap is to be applied to the duct in transverse bands, with the ends of each band overlapping by at least 75 mm, with the joint taped with aluminium foil tape. For horizontal ducts the joint is to be formed on the top of the duct.

Butt joints are to be formed between adjacent bands of Fyrewrap, taped with aluminium foil tape. For the single layer or outer layer the joint is to be covered by a 150 mm wide strip of Fyrewrap, taped with aluminium foil tape.

The Fyrewrap is to be fixed to the bottom duct surface using welded steel pins and speed clips at nominally 300 mm centres in both directions, starting within 50 mm of the penetration collar angle and each edge of the duct. Steel straps are to be used at each Fyrewrap joint, at the centre of each full width band of Fyrewrap, and within 75 mm of the wall on each side.

The proposed details are outlined on Trafalgar drawings FW2-A-BRANZ to FW2-C-BRANZ, attached to this report.

It is also proposed that vertical ducts of similar construction and similarly protected may pass through concrete floors using a similar penetration detail. For vertical ducts the Fyrewrap is to be fixed to the duct with welded pins and speed clips on all sides of the duct, in addition to steel bands as for horizontal ducts.

The floor is to have been previously tested or assessed to have a FRL as is required for the duct.



REPORT NUMBER:
FAR 4205 ISSUE 2

ISSUE DATE:
16 July 2014

PAGE:
6 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

3.2 Analysis

3.2.1 General

As tested there was no failure of either duct associated with the Fyrewrap.

As the proposed two layer system has substantially greater thickness of Fyrewrap than either of the tested ducts it is expected that at least equivalent performance would be achieved.

The proposed single layer system for up to 120/120/120 FRL has the same thickness of Fyrewrap as Duct "B" as tested, which achieved a substantial margin over the required FRL. Therefore the proposed single layer system is expected to achieve up to 120 minutes Structural Adequacy, Integrity and Insulation.

The proposed method of attaching the Fyrewrap to horizontal ducts is similar to the method used for the ducts tested and is expected to perform similarly.

For vertical ducts it is expected that the proposed pins and speed clips will retain the Fyrewrap in place around the duct, and the general performance will be similar to the horizontal ducts tested.

3.2.2 Walls

As tested, the failure of insulation was on the wall close to the penetration. It is noted that the thickness of concrete was less than would normally be used for 180 minutes insulation. If the wall had been of suitable thickness to achieve 180 minutes insulation it is unlikely that the insulation failure as observed would have occurred. The extension of the outer layer of Fyrewrap onto the face of the wall will assist in improving the insulation performance compared to the tested performance.

Where 120 minutes insulation is required a wall suitable for this insulation performance is also expected to achieve the required insulation at the penetration.

At the penetration the stiffening frame within the wall opening is to be replaced with a frame on each side of the wall. This is expected to provide at least equivalent stiffness to the duct as for the tested ducts.

The gap between the duct and the inside face of the opening is reduced from approximately 50 mm to a maximum of 30 mm. Although it is not proposed to use an intumescent sealant over the face of the Fyrewrap packing to the joint, it is considered that the reduced width of the gap and the provision of steel angles covering the gap, together with the extension of the Fyrewrap over the face of the wall, adequately compensate for the absence of the intumescent seal.

There is a potential path for heat to enter the wall cavity via the inside face of the wall opening. The combined effect of the Fyrewrap on the fire exposed side of the wall and between the duct surface and the inside face of the opening is considered to be at least equivalent to extending the wall lining around the inside face of the opening.



REPORT NUMBER:

FAR 4205 ISSUE 2

ISSUE DATE:

16 July 2014

PAGE:

7 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

Therefore no additional lining is considered necessary at the inside face of the opening.

In order to achieve the full nominal FRL of the duct the wall needs to have at least the same FRL for integrity and insulation as the duct.

Where a duct is installed through a wall having a FRL less than the nominal FRL of the duct, the Structural Adequacy of the duct is limited to the greater of the Structural Adequacy and Integrity ratings of the wall. The Integrity and Insulation of the duct are limited to the Integrity and Insulation of the wall.

3.2.3 Concrete Floors

In BRANZ's experience the performance of ducts in the vertical orientation is expected to be at least equivalent to a similarly protected duct in the horizontal orientation. Therefore the vertical ducts protected with Fyrewrap as described in this report are expected to achieve up to 120 or 180 minutes for Structural Adequacy, Integrity and Insulation for single and two layer Fyrewrap systems respectively.

Where the FRL of the floor is less than the nominal FRL of the duct, the duct is limited to the same FRL as the floor.

4. CONCLUSION

It is considered that horizontal or vertical steel ducts protected with one layer of nominal 38 mm thick Trafalgar Fyrewrap, passing through walls or floors having at least -/120/120 FRL, all as described in this report, would achieve at least 120/120/120 FRL if tested in accordance with AS 1530.4-2005.

It is considered that horizontal or vertical steel ducts protected with two layers of nominal 38 mm thick Trafalgar Fyrewrap, passing through walls or floor having at least -/180/180 FRL, all as described in this report, would achieve at least 180/180/180 FRL if tested in accordance with AS 1530.4-2005.

Where the FRL of the wall or floor through which the duct passes is less than the nominal FRL of the duct, the FRL of the duct is limited as described in sections 3.2.2 and 3.2.3 of this report.



REPORT NUMBER:
FAR 4205 ISSUE 2

ISSUE DATE:
16 July 2014

PAGE:
8 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

Appendix A - Client Supplied Drawings

Specification for wall types and fire stopping of penetrations for Fyrewrap						
Wall Specification		Fire Stopping			Fyrewrap Return at Fire Barrier Junction	
Wall Type	Wall Collar Angle	Wall Collar Fixing	Maximum annular duct gap size [mm]	Fire stopping material	Return Dimension [mm]	Wall Fixing
Masonry or Concrete		M8 x 50 mm Concrete Anchors at 300 mm centres		Fill gap with unvoiled Fyrewrap	100	M8 x 70 mm concrete anchor with suitable washer at 300 mm centres
Aerated Concrete (eg. Hebal)	75 x 75 x 1.6	Suitable Aerated Concrete Fixing at 300 mm centres	30			
Fire-rated Plasterboard		M4 x 70 Plasterboard Screws through Stud at 300 mm centres at 300 mm centres				M4 x 70 mm plasterboard screws with suitable washer at 300 mm centres

Specification for floors and fire stopping of penetrations for Fyrewrap						
Wall Specification		Fire Stopping			Fyrewrap Return at Fire Barrier Junction	
Floor Type	Floor Collar Angle	Floor Collar Fixing	Maximum annular duct gap size [mm]	Fire stopping material	Return Dimension [mm]	Wall Fixing
Concrete	75 x 75 x 1.6	M8 x 50 mm Concrete Anchors at 300 mm centres	30	Fill gap with unvoiled Fyrewrap	100	M8 x 70 mm concrete anchor with suitable washer at 300 mm centres

Notes
 This specification is to be read in conjunction with the relevant detailed drawings. Fixings and angles specified are the minimum requirements.

Drawing No.	FW2-A-BRANZ
Title:	Table of Specifications for Penetration Types and Fire Stopping
File Name:	Fyrewrap Specification v4



REPORT NUMBER:
FAR 4205 ISSUE 2

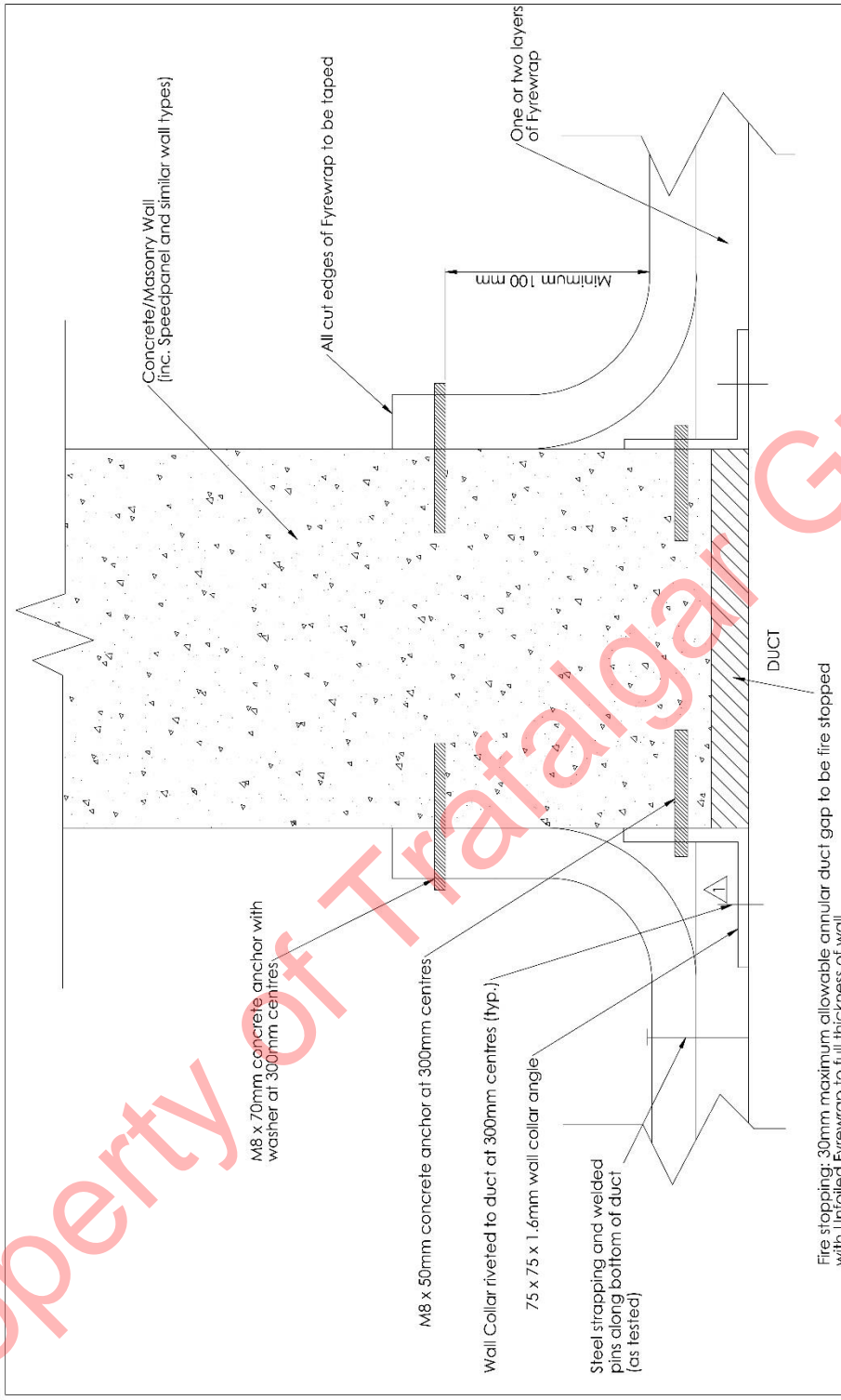
ISSUE DATE:
16 July 2014

PAGE:
9 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT. EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

Property Of Trafalgar Group



REV.	DESCRIPTION	DATE	APPROVED
1	Wall Collar Detail Rev. 1	15/07/2014	JJK

Drawn/checked by:	Checked by:	Date:	Scale:
JJK	JJK	20/07/14	N/S
Approved by:	JR	23/07/14	

Client:	Project:
Trafalgar Head Office: 115/117 31-3301 E: info@trafalgar.com.au P: 0800 300 300 www.trafalgar.com.au	Fyrewrap

Note - Fyrewrap overlaps have not been shown for clarity.

Drawing No. FW2-B-BRANZ

Title: Concrete/Masonry Wall Penetration Detail

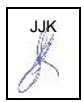
File Name: TRAFALGAR.FYREWAP.CONCRETE.SIDEVIEW



REPORT NUMBER:
FAR 4205 ISSUE 2

ISSUE DATE:
16 July 2014

PAGE:
10 of 10



THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.