

FIRE ASSESSMENT REPORT

FC10266-01-4

FIRE RESISTANCE OF TRAFALGAR GROUP FYREBOX MAXI, MINI, MINI ROUND, SLAB MOUNT AND CAST IN PENETRATION SYSTEMS

CLIENT

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ASSESSMENT OBJECTIVE

To assess the fire resistance of Trafalgar Group's FyreBOX Maxi, FyreBOX Mini, FyreBOX Mini Round, Slab mount and Cast in fire protection systems with various penetrations and installed into various elements of construction if tested in accordance with AS 1530.4:2014 with reference to AS 4072.1:2005 (Amendment No. 1) and the heating conditions and criteria of BS 476: Part 20: 1987.

CONCLUSION

It is considered that the FyreBOX Maxi, FyreBOX Mini Round/square, Slab mount and Cast in fire protection systems would achieve the stated fire resistance levels as stated in Table 2 to Table 19 in the various elements and various penetrations if tested in accordance with AS 1530.4: 2014 and heating conditions and criteria of BS 476: Part 20: 1987.

With reference to the above tables the following apply:

- The FRL of the specific configuration will be the lowest FRL of the element, FyreBOX or penetration.
- Where the FyreBOX is blank the FRL will be the lower of the FyreBOX or element.
- Any combination of penetrations may be installed through the FyreBOX however the FRL will be limited to the lowest performing penetration, FyreBOX or element.

Further to this it is considered the established fire resistance of the FyreBOXes would not be prejudiced with the following variations:

- The FyreBOX Maxi and FyreBOX Cast in can be made in any size up to a maximum 125 mm x 1,250 mm on the condition that the same thickness of intumescent is maintained and positioned to the four inside faces of the sleeve.
- The depth of the FyreBOX may be extended on the condition the sleeve to each side of the element is between 30 mm to 90 mm or as tested.
- The FyreBOX may be positioned as close as flange to flange for the Cast in units only or separated by a minimum of 30 mm by a maxilite panel on the condition the element has been suitably designed to accommodate the opening size.
- Where cable trays are to be used they can be up to a maximum width of 1,000 mm. The cable tray must be installed as tested with any gaps sealed with FyrePEX intumescent sealant or Fyreflex sealant.
- The FyreBOX may be installed at angles within an element on the condition the installation gaps remain as tested.
- Where it is not possible to centre the FyreBOX within the element additional Maxilite panels may be used to locally thicken the element to centre the FyreBOX within the combined element depth.
- Cast-in FyreBOX Mini round or square modules are expected to perform at least as well as the Maxi modules.
- FyreBOX Mini modules can be installed with any of the following mounting flanges 15 mm x 15 mm, 15 mm x 30 mm or for annular gaps from 20 mm to 40 mm use flange size of 15 mm x 50 mm. The gap must be filled with Fyreflex sealant backed with intumescent foam and the flange overlap the opening in the element by at least 10 mm.

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- For FyreBOXes installed in horizontal elements the 40 mm thick intumescent foam is installed to the unexposed face only (except as noted in Table 19).
- For slab mount FyreBOXes penetrations can be installed at any angle before entering the FyreBOX on the condition that the TWrap extends at least 300 mm from the FyreBOX.
- Slab mount FyreBOXes may be installed against steel decking with any small ridges filled with a bead of FyreFLEX sealant.
- Where 25 mm thick TWrap is specified 38 mm thick Fyrewrap Elite 1.5 can substituted.
- FyreFLEX sealant or FyrePEX sealant maybe used to seal any gaps between the foam and cable tray/penetrations in the FyreBOX systems.
- FyreBOXs may be installed in two and three sided installations.
- Appendix D2 Group B cables as tested may be PVC sheathed or LSZH retardant jacketed telecommunication cables.

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.

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CONTENTS

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branz.nz | 1222 Moonshine Rd, RD1, Porirua 5381, Private Bag 50 908, Porirua 5240, New Zealand | Phone +64 4237 1170 | branz@branz.co.nz

FIGURES

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TABLES

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DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	REVIEW DATE	DESCRIPTION
1	15 July 2020	15 July 2030	Initial Issue
2	4 August 2020	4 August 2030	To incorporate and supersede FC10266-002
3	21 October 2020	21 October 2030	To include reference to BS 476: Part 20: 1987
4	13 December 2022	13 December 2032	To include additional test information and system details. (BRANZ ref: FC15916)

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1. INTRODUCTION

This report gives BRANZ's assessment on the fire resistance of Trafalgar Group's FyreBOX Maxi, FyreBOX Mini, FyreBOX Mini Round, Slab mount and cast in fire protection systems with various penetrations and installed into various elements of construction in accordance with AS 1530.4:2014 and the heating conditions and criteria of BS 476: Part 20: 1987.

Figure 1 to Figure 72 provide general and installation details for the penetration systems in various elements and configurations.

2. BACKGROUND

The Trafalgar Group have commissioned a number of fire resistance tests on their FyreBOX systems in a variety of configurations and element types. The following reports are referenced as background for this assessment; FP 5954, FP 6009, FP 6033, FP 6251, FSP 1729, FSP 1753, FSP 1913, FSP 1952, FSP 2230, FSP 2251, FSV 1840, FSV 2163, 51894600.1, 51894700.1, 51894800.1, 51894900.1, 51895000.1, FRT180323, FRT 190003a, FRT 190220, FRT 190407, FRT 200116 and FRT 200117, FRT 200257, FRT 200337, FRT220112, TR-F49.01, FAS210132, FAS210067.

For specific details on the tested configuration and results refer to the relevant test reports.

3. DISCUSSION

3.1 BS 476: Part 20: 1987 vs AS 1530.4:2014

BS 476: Part 20: 1987 follows the same time/temperature curve as that specified in AS 1530.4:2014 however does specify slightly different furnace thermocouples. Based on the thermal response of the thermocouples used in the fire resistance testing referenced in Section 2 it is expected the fire exposure to be no less severe had they been tested in accordance with BS 476: Part 20: 1987.

The furnace pressure is not specified in BS 476 for penetrations therefore it is considered adopting the methodology of an international test standard like AS 1530.4:2014 is appropriate.

The Integrity failure criteria is similar between test standards with both defining flaming or glowing of a cotton pad, 6 mm x 150 mm or 25 mm diameter gap gauges. It is therefore expected a similar Integrity performance would have been achieved had the tests referenced in Section 2 been undertaken generally in accordance with BS 476: Part 20: 1987.

The maximum Insulation failure criteria of 180 °C is the same between test standards however BS 476 does not have a specific section with regards to testing of penetration systems and location of instrumentation. It is therefore considered adopting the methodology of an international test standard like AS 1530.4:2014 is appropriate. Therefore is considered the systems tested in Section 2 would achieve a similar Insulation performance had they been tested generally in accordance with BS 476: Part 20: 1987.

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3.2 System details

3.2.1 FyreBOX Maxi

The FyreBOX Maxi consists of a steel sleeve nominally 1.1 mm base metal thickness (BMT) x 250 mm (minimum) with 40 mm thick intumescent foam each side and four layers of 1.8 mm thick intumescent strips secured to the inside face of the sleeve with steel Z profile sections. The FyreBOX is installed centrally within the element and secured in place with steel flanges secured to the element. Where the FyreBOX includes penetrations the intumescent foam is cut to fit around any penetrations and any gaps sealed with FyrePEX or Fyreflex sealant.

The FyreBOX Maxi is available up to 125 mm x 1,250 mm wide. They can be installed as a single module or double module either double stack (one above the other) or end to end. Double modules shall be separated by at least a 30 mm thick panel of Maxilite.

3.2.2 FyreBOX Mini

The FyreBOX Mini is similar to the Maxi but smaller and supplied as a square 100 mm x 100 mm or round in 100 mm diameter or 150 mm diameter. The FyreBOX Mini is installed with steel flanges and intumescent foam to each side.

3.2.3 FyreBOX Cast In

The Cast-in FyreBOX is similar to the Maxi but with a different sleeve design and available in sizes from 125 mm x 150 mm up to 125 mm x 1,250 mm. The 40 mm thick intumescent foam is positioned to the unexposed (top) face only.

3.2.4 FyreBOX Slab Mount

The FyreBOX slab Mount consists of a Maxi FyreBOX variant but secured to the underside of a concrete slab and centrally mounted within a fire rated wall. The slab mount is available in sizes up to 125 mm x 1,250 mm.

3.3 Element details

3.3.1 General element details

The FyreBOXes have been tested or are assessed in the following elements as given in Table 1. The table includes the nominal fire resistance rating (FRL) of the elements.

Table 1: Summary of elements

Element	Minimum specification	Nominal FRL
Plasterboard	13 mm Fire grade each face of minimum 64 mm deep stud	-/60/60
	13 mm Fire grade each face of minimum 92 mm deep stud	-/60/60
	16 mm Fire grade each face of minimum 64 mm deep stud	-/90/90
	2 x 13 mm Fire grade each face of minimum 64 mm deep stud	-/120/120
Shaft wall (plasterboard)	25 mm shaftliner + 16 mm Fire grade 64 mm or 92 mm steel stud	-/60/60
	25 mm shaftliner + 2 x 13 mm Fire grade 64 mm steel stud	-/90/90
	25 mm shaftliner + 2 x 16 mm Fire grade 64 mm steel stud	-/120/120
Laminated (plasterboard)	3 x 13 mm Fire grade laminated locally thickened with 30 mm Maxilite panel	-/90/90
	3 x 16 mm Fire grade laminated locally thickened with 30 mm Maxilite panel	-/120/120
Laminated COREX	2 x 15 mm A1 COREX locally thickened with 60 mm Maxilite panel	-/60/60
	2 x 20 mm A1 COREX locally thickened with 60 mm Maxilite panel	-/90/90
	2 x 25 mm A1 COREX locally thickened with 60 mm Maxilite panel	-/120/120
AlphaPanel	35 mm AlphaPanel + 13 mm standard or fire grade plasterboard + framing (wall minimum 88 mm overall) locally thickened with 60 mm Maxilite panel	-/60/60
	35 mm AlphaPanel + 16 mm fire grade plasterboard + framing (wall minimum 91 mm overall) locally thickened with 60 mm Maxilite panel	-/90/90 60/60/60
	35 mm AlphaPanel + 13 mm fire grade plasterboard (laminated wall 48 mm overall) locally thickened with 60 mm Maxilite panel	-/60/60
	35 mm AlphaPanel + 16 mm fire grade plasterboard (laminated wall 51 mm overall) locally thickened with 60 mm Maxilite panel	-/90/90
	2 x 35 mm AlphaPanel (wall minimum 116 mm overall) locally thickened with 60 mm Maxilite panel	-/120/120 90/90/90
	35 mm AlphaPanel with framing/13 mm standard plasterboard on each side (wall minimum 200 mm overall)	-/60/60
Masonry Concrete	120 mm thick wall or floor slab	120/120/120
	180 mm thick wall or floor slab	240/240/240
Hebel AAC	75 mm panel	-/90/90
	75 mm panel + plasterboard	-/120/120
Walsc AAC	75 mm panel	-/90/90
Speedpanel	51 mm panel + 30 mm Maxilite panel	-/60/60
	64 mm panel	-/90/90
	78 mm panel	-/120/120
Maxilite	60 mm panel (single layer or laminated) installed as tested or otherwise approved	-/240/240
Plasterboard Floor/ceiling	1 x 16 mm Fire grade plasterboard, timber flooring, minimum 500 mm cavity and 60 mm Maxilite panel	30/30/30 (RISF 30)
	1 x 13 mm + 1 x 16 mm Fire grade plasterboard, timber flooring, minimum 500 mm cavity and 60 mm Maxilite panel	60/60/60 (RISF 60)
	2 x 16 mm Fire grade plasterboard, timber flooring, minimum 500 mm cavity and 60 mm Maxilite panel	90/90/90 (RISF 60)
	3 x 16 mm Fire grade plasterboard, timber flooring, minimum 500 mm cavity and 60 mm Maxilite panel	120/120/120 (RISF 60)

Note as per AS 1530.4:2014, Permissible variations, Section 10.12.2 (d) results obtained for framed wall systems may be applied to concrete, masonry or solid gypsum blocks of greater or equal thickness. Therefore where a FyreBOX installation applies to a plasterboard wall system it may also be installed into a concrete, masonry or solid gypsum block wall of equal or greater thickness.

3.3.2 Timber framed plasterboard walls

The fire rated framed plasterboard wall test data referenced in Section 2 consisted of steel framed plasterboard walls. Where the FyreBOX penetrates the wall the opening is framed out and then lined with the same thickness of plasterboard as the wall lining.

During fire exposure steel stud walls tend to deflect more than the equivalent timber framed plasterboard wall which can cause the exposed face plasterboard to degrade earlier than a timber framed wall. While timber framing is combustible the opening in the wall is protected with the same thickness of plasterboard as the wall lining so is not directly exposed to furnace conditions. It is therefore considered that if the FyreBOXes were installed into the equivalent timber framed plasterboard wall the established fire resistance would be no less than in steel framed walls.

3.4 FyreBOX analysis

3.4.1 FyreBOX Maxi vs Mini

A comparison has been undertaken of the design and tested performance of the FyreBOX Maxi and Mini's. From an analysis of the opening size of the various FyreBOXes vs volume of intumescent it is determined that the Mini (square/round) have at least the same or higher volume of intumescent than the Maxi. The one exception to this is the 125 mm x 125 mm FyreBOX Maxi however the majority of the available test data is from the 350 mm or wider. Based on this it is considered that the FyreBOX Mini square (100 mm x 100 mm) or circular (100 mm or 150 mm) would perform at least as well as the FyreBOX Maxi. It is also considered where penetrations are approved for the Maxi they would achieve at least the same fire performance if installed in the FyreBOX Mini.

3.4.2 FyreBOX Maxi 350 mm wide to 1,250 mm wide

A number of FyreBOX Maxi's have been tested in sizes ranging from 125 mm wide up to 1,100 mm wide. In reviewing the test data and types of penetrations installed there does not appear to be an appreciable difference in performance across the range of widths tested. Where Integrity failures have occurred, these are attributed to the installation details of the penetrations and gaps around cable trays/penetrations and the foam not being properly sealed. In subsequent testing where any gaps between the foam and cable tray/penetration were sealed with Fyreflex sealant the penetrations have maintained the Integrity criteria for up to 240 minutes.

Based on the test data it is considered a minor increase in width up to a maximum of 1,250 mm wide would not be expected to prejudice the established fire resistance of the FyreBOX Maxi's. On the condition that the element has been suitably designed to accommodate an opening of that size without comprising the performance of the element or FyreBOX.

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3.4.3 FyreBOX Cast-in

In fire resistance test FP 5954 a number of prototype cast-in FyreBOXes were tested with a variety of penetrations in a 120 mm thick concrete slab including one that was 1,250 mm wide. During the test of the 1,250 mm wide FyreBOX it was noted that one side pulled away from the concrete contributing to an Integrity failure after 72 minutes. After the test the specimen was examined and redesigned. In Exova fire resistance test No. 51894600.1 a 700 mm wide cast-in FyreBOX was tested in a 175 mm thick concrete slab. The FyreBOX was tested with an Appendix D power and communication cables configurations and maintained the Integrity criteria for 160 minutes and insulation for 48 minutes.

Based on the performance of the revised cast-in FyreBOX it is considered if the FyreBOX is increased in width to a maximum of 1,250 mm wide it would not compromise the fire resistance before at least 120 minutes.

3.4.4 FyreBOX Retro-fit Cast-in

In fire resistance test FRT200257 a retro-fit cast-in FyreBOX was tested in a nominal 120 mm thick concrete slab. The Retro-fit is similar to the standard Cast-in FyreBOX except has a hinge to one corner and is installed in an existing hole in a floor slab. Once the FyreBOX is placed in position, mild steel Z-sections are secured to the top of the slab and then the remaining hole in the slab filled with FyreSET mortar.

The retro-fit cast-in FyreBOX tested in FRT200257 included a number of pipe and cable penetrations and TWrap up to 450 mm from the slab. The penetration achieved an FRL of -/120/120 and there were no significant observations relating to the FyreBOX during the test. Based on this test it is considered the performance of the retro-fit cast-in FyreBOX is sufficiently similar to the standard cast-in FyreBOX that it would be expected to achieve the same fire resistance performance up to at least 120 minutes.

3.4.5 FyreBOX slab mount

The FyreBOX slab-mount consists of a FyreBOX Maxi variant installed in the middle of a fire rated wall and secured to the underside of a concrete slab with masonry anchors. The annular gap between the wall and FyreBOX is filled with Fyreflex sealant and a 30 mm x 30 mm fillet of Fyreflex is applied to the three sides of the FyreBOX on each side of the wall. In fire resistance tests FSP 1729 and FSP 1753 nominal 350 mm wide slab mount FyreBOXes were tested with various penetrations. Both maintained the Integrity criteria for the 121 minute duration of the test and the Insulation performance was consistent with other penetrations tested in FyreBOX Maxi's.

Based on the tested performance of the FyreBOX slab-mount and other FyreBOX Maxi testing it is considered the FyreBOX slab-mount can be increased in width to a maximum of 1,250 mm without prejudicing the fire resistance of the FyreBOX at least 120 minutes. On the condition the element is suitably designed to accommodate an opening of this size without compromising the performance of the element or FyreBOX.

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3.5 Elements and blank FyreBOXes

In Table 2 and Table 3 is a summary of the element types considered as part of this assessment. This represents the minimum specification for the floor and wall construction respectively. For example for a 60 minute plasterboard wall additional layers of plasterboard may be used or deeper studs as long as the construction of the element has achieved the stated fire resistance rating (FRL) by test or assessment.

Also included in Table 2 and Table 3 is the FRL's of a FyreBOX when installed without any penetrations (blank). The Integrity performance of the FyreBOXes have been demonstrated for up to at least 120 minutes. The Insulation performance is generally subject to the element thickness and rating period. Where the FyreBOXes include penetrations and TWrap the insulation performance can be increased as discussed in subsequent sections.

Table 2: Blank FyreBOX without penetrations in concrete floor slabs and a floor/ceiling

Element (minimum specification)	Element FRL	Retrofit (Maxi/Mini) FRL	Cast in FRL
120 mm concrete floor slab	120/120/120	-/120/60	-/120/60*
180 mm concrete floor slab	240/240/240	-/120/60	-/120/60*
Floor/ceiling with minimum 500 mm cavity, timber floor, ceiling 1 x 16 mm fire rated plasterboard, 60 mm Maxilite panel	30/30/30 [RISF 30]	-/30/30 [RISF 30]	NA
Floor/ceiling with minimum 500 mm cavity, timber floor, ceiling 1 x 13 mm + 1 x 16 mm fire rated plasterboard, 60 mm Maxilite panel	60/60/60 [RISF 60]	-/60/60 [RISF 60]	NA
Floor/ceiling with minimum 500 mm cavity, timber floor, ceiling 2 x 16 mm fire rated plasterboard, 60 mm Maxilite panel	90/90/90 [RISF 60]	-/90/90 [RISF 60]	NA
Floor/ceiling with minimum 500 mm cavity, timber floor, ceiling 3 x 16 mm fire rated plasterboard, 60 mm Maxilite panel	120/120/120 [RISF 60]	-/120/120 [RISF 60]	NA

* With a 20 mm x 20 mm fillet of Fyreflex sealant to the concrete slab and sleeve of the cast in FyreBOX with achieve an FRL of -/120/120. The maximum sleeve height is limited to 45 mm above the slab.

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Table 3: Blank FyreBOX (Maxi/Mini/Slab Mount) without penetrations in walls.

Element (minimum specification)	Element FRL	FyreBOX FRL
13 mm plasterboard each face of minimum 64 mm deep stud	-/60/60	-/60/30
13 mm plasterboard each face of minimum 92 mm deep stud	-/60/60	-/60/60
16 mm plasterboard each face of minimum 64 mm deep stud	-/90/90	-/90/30*
2 x 13 mm plasterboard each face of minimum 64 mm deep stud	-/120/120	-/120/60
25 mm shaftliner + 16 mm plasterboard Fire grade 64 mm steel stud	-/60/60	-/60/30
25 mm shaftliner + 16 mm plasterboard Fire grade 92 mm steel stud	-/60/60	-/60/30
25 mm shaftliner + 2 x 13 mm Fire grade 64 mm steel stud	-/90/90	-/90/30
25 mm shaftliner + 2 x 16 mm Fire grade 64 mm steel stud	-/120/120	-/120/30
Laminated 3 x 13 mm Fire grade laminated locally thickened with 30 mm Maxilite panel	-/90/90	-/90/30
Laminated 3 x 16 mm Fire grade laminated locally thickened with 30 mm Maxilite panel	-/120/120	-/120/30
Laminated 2 x 15 mm A1 COREX locally thickened with 60 mm Maxilite	-/60/60	-/60/30
Laminated 2 x 20 mm A1 COREX locally thickened with 60 mm Maxilite	-/90/90	-/90/30
Laminated 2 x 25 mm A1 COREX locally thickened with 60 mm Maxilite	-/120/120	-/120/30
35 mm AlphaPanel + 13 mm standard or fire grade plasterboard + framing (wall minimum 88 mm overall) locally thickened with 60 mm Maxilite	-/60/60	-/60/30
35 mm AlphaPanel + 16 mm fire grade plasterboard + framing (wall minimum 91 mm overall) locally thickened with 60 mm Maxilite	-/90/90 60/60/60	-/90/30
35 mm AlphaPanel + 13 mm standard or fire grade plasterboard (laminated wall 48 mm overall) locally thickened with 60 mm Maxilite	-/60/60	-/60/30
35 mm AlphaPanel + 16 mm fire grade plasterboard (laminated wall 51 mm overall) locally thickened with 60 mm Maxilite panel	-/90/90	-/90/30
2 x 35 mm AlphaPanel + steel framing (wall minimum 116 mm overall)	-/120/120 90/90/90	-/120/30
35 mm AlphaPanel with framing/13 mm standard plasterboard on each side (wall minimum 200 mm overall)	-/60/60	-/60/60
120 mm Concrete/Masonry	120/120/120	-/120/60
180 mm Concrete/Masonry	240/240/240	-/120/60
75 mm panel AAC (Hebel)	-/90/90	-/90/30
75 mm panel AAC (Hebel) + 30 mm Maxilite	-/90/90	-/90/60
75 mm Walsc panel	-/90/90	-/90/30
75 mm Walsc panel + 30 mm Maxilite	-/90/90	-/90/60
51 mm Speedpanel + 30 mm Maxilite	-/60/60	-/60/0
64 mm Speedpanel + 30 mm Maxilite	-/90/90	-/90/0
78 mm Speedpanel	-/120/120	-/120/30
60 mm Maxilite panel	-/240/240	-/120/30

* Slab mount FyreBOX FRL -/90/60

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3.6 Floor elements – Fire rated concrete slabs

Table 4 is a summary of penetrations installed into FyreBOXes when installed into a concrete floor slab. The FRL's listed are the maximum for the penetration system but is also subject to the FRL of the element it is installed into. Where the penetration and element have different FRL's the lower of the two shall apply to the installation.

The elements considered are as follows:

- Concrete floor slab minimum thickness 120 mm with an FRL of 120/120/120
- Concrete floor slab minimum thickness 190 mm with an FRL of 240/240/240

TWrap is to be installed up to at least 300 mm from the surface of the slab unless noted otherwise.

Table 4: FyreBOXes in concrete floor slabs with penetrations of various thicknesses

Service	FyreBOX FRL		TWrap FRL
	120 mm	190 mm	
Plastic pipes			
Rigid or flexible uPVC conduits up to 32 mm OD	-/120/30	-/120/30	-/120/120
PEX pipes up to 32 mm OD	-/120/0	-/120/0	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/0	-/120/120[1]
uPVC pipes up to 80 mm OD	-/120/0	-/120/0	-/120/120
Metal pipes			
Copper up to 42 mm OD	-/120/0	-/120/0	-/120/120[1]
Copper pipes up to 100 mm OD	-/120/0	-/120/0	-/120/120[2]
Steel pipes up to 50 mm OD	-/120/0	-/120/0	-/240/120[1]
Steel pipes up to 100 mm OD	-/120/0	-/120/0	-/120/120[2]
Metal pipes insulated			
Copper pipe up to 50 mm OD with FR insulation[9]	-/120/30	-/120/30	-/120/120
Stainless steel pipe up to 50 mm OD with EPS or PE insulation and rockwool[9]	-/120/30	-/240/30	-/240/240
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation with 10 mm OD cable	-/120/30	-/120/30	-/120/120[1]
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation with 10 mm OD cable	-/120/30	-/120/30	-/120/120[1]
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Up to 10 x TPS	-/120/30	-/120/30	-/120/120
Up to 2 x 19 mm 3C + E	-/120/30	-/240/30	-/240/120
Up to 6 x 19 mm 3C + E	-/120/30	-/120/30	-/120/120
Appendix D1 Group A power cables	-/120/30	-/120/30	-/120/60[3] (min 190 mm slab)
			-/120/90[1] (min 190 mm slab)
			-/120/120[4]
			-/120/120[6]
16 mm^2 Power cable up to 20 mm OD	-/120/30	-/120/30	-/120/120[5]

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Service	FyreBOX FRL		TWrap FRL
	120 mm	190 mm	
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Bundles up to 4 x 240 mm² single core + optional 120 mm² earth cable[8]	-/90/30	-/90/30	-/90/90
Bundles up to 4 x 16 mm² 4C + E[8]	-/90/30	-/90/30	-/90/90
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Up to 150 x CAT 6	-/120/30	-/120/30	-/120/120
Up to 5 x CAT 6	-/120/30	-/240/30	-/240/120
NBN Fibre optic cable	-/120/30	-/120/30	-/120/120
Appendix D2 Group B comms cables	-/120/30	-/120/30	-/120/60[3]
			-/120/120[5]
			-/120/120[7] (min 190 mm slab)

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the floor slab. If used cable tray to be discontinuous to achieve Insulation performance.

2 TWrap minimum 600 mm from the FyreBOX foam with FyreBOX wrapped 450 mm from slab. See Figure 17.

3 With cable tray continuous through penetration.

4 Twrap up to 600 mm (from foam), loose fibre packed around cables and tray up to 300 mm from FyreBOX and FyreBOX also wrapped to 300 mm from slab.

5 TWrap minimum 500 mm from slab and loose fill around cables/tray up to 300 mm from FyreBOX.

6 TWrap minimum 600 mm from slab. If used cable tray to be discontinuous to achieve Insulation performance.

7 TWrap minimum 450 mm from slab.

8 Aluminium cable bundles spaced 50 mm apart when installed on a cable tray.

9 Optional heat trace cable under pipe insulation for up to 120 minutes Integrity.

Table 5 is a summary of penetrations installed into Cast in (including Retro-fit able) FyreBOXes when installed into a concrete floor slab. The FRL's listed are the maximum for the penetration system but is also subject to the FRL of the element it is installed into. Where the penetration and element have different FRL's the lower of the two shall apply to the installation. The elements considered are as follows:

- Concrete floor slab minimum thickness 120 mm with an FRL of 120/120/120
- Concrete floor slab minimum thickness 190 mm with an FRL of 240/240/240

TWrap is to be installed up to at least 300 mm from the surface of the slab unless noted otherwise.

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Table 5: Cast in FyreBOXes in concrete floor slabs with penetrations of various thicknesses

Service	FyreBOX FRL		TWrap FRL
	120 mm	190 mm	
Plastic pipes			
Rigid or flexible uPVC conduits up to 32 mm OD	-/120/60	-/120/60	-/120/120
PEX pipes up to 32 mm OD	-/120/0	-/120/0	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/0	-/120/120[1]
uPVC pipes up to 80 mm OD	-/120/0	-/120/0	-/120/120
Metal pipes			
Copper up to 42 mm OD	-/120/0	-/120/0	-/120/120[1]
Copper pipes up to 100 mm OD	-/120/0	-/120/0	-/120/120[2]
Steel pipes up to 50 mm OD	-/120/0	-/120/0	-/240/120[1]
Steel pipes up to 100 mm OD	-/120/0	-/120/0	-/120/120[2]
Metal pipes insulated			
Copper pipe up to 50 mm OD with FR insulation[9]	-/120/60	-/120/60	-/120/120
Stainless steel pipe up to 50 mm OD with EPS or PE insulation and rockwool[9]	-/120/60	-/240/60	-/240/240
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation with 10 mm OD cable	-/120/60	-/120/60	-/120/120[1]
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation with 10 mm OD cable	-/120/60	-/120/60	-/120/120[1]
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Up to 10 x TPS	-/120/60	-/120/60	-/120/120
Up to 2 x 19 mm 3C + E	-/120/60	-/240/60	-/240/120
Up to 6 x 19 mm 3C + E	-/120/30	-/120/30	-/120/120
Appendix D1 Group A power cables	-/120/30	-/120/30	-/120/60[3] (min 190 mm slab)
	-/120/30	-/120/30	-/120/90[1] (min 190 mm slab)
	-/120/30	-/120/30	-/120/120[4]
	-/120/30	-/120/30	-/120/120[6] (min 190 mm slab)
16 mm² Power cable up to 20 mm OD	-/120/30	-/120/30	-/120/120[5]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Bundles up to 4 x 240 mm² single core + optional 120 mm² earth cable[8]	-/90/30	-/90/30	-/90/90
Bundles up to 4 x 16 mm² 4C + E[8]	-/90/30	-/90/30	-/90/90
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Up to 150 x CAT 6	-/120/60	-/120/60	-/120/120
Up to 5 x CAT 6	-/120/60	-/240/60	-/240/120
NBN Fibre optic cable	-/120/30	-/120/30	-/120/120
Appendix D2 Group B comms cables	-/120/60	-/120/60	-/120/90
			-/120/120[5]
	-/120/60	-/120/60	-/120/120[7] (min 190 mm slab)

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Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the floor slab. If used cable tray to be discontinuous to achieve Insulation performance.

2 TWrap minimum 600 mm from the FyreBOX foam with FyreBOX wrapped 450 mm from slab. See Figure 17.

3 With cable tray continuous through penetration.

4Twrap up to 600 mm (from foam), loose fibre packed around cables and tray up to 300 mm from FyreBOX and FyreBOX also wrapped to 300 mm from slab.

5 TWrap minimum 500 mm from slab and loose fill around cables/tray up to 300 mm from FyreBOX.

6 TWrap minimum 600 mm from slab. If used cable tray to be discontinuous to achieve Insulation performance.

7 TWrap minimum 450 mm from slab.

8 Aluminium cable bundles spaced 50 mm apart when installed on a cable tray.

9 Optional heat trace cable under pipe insulation for up to 120 minutes Integrity.

3.7 Wall elements – FRL -/60/60

Table 6 is a summary of penetrations installed into FyreBOXes when installed into the following fire rated walls:

Group 1

- Fire rated plasterboard wall consisting of minimum 13 mm fire rated plasterboard with minimum 64 mm deep studs with an established FRL of -/60/60.
- Shaftliner wall minimum 25 mm + 16 mm fire rated plasterboard with an established FRL of -/60/60 including penetrations through party-wall style systems with the same plasterboard configuration at the head of the wall as shown in Figure 42. The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with TWrap (refer to Figure 73).
- 51 mm Speedpanel with an established FRL of -/60/60 locally thickened at the location of the penetration with minimum 30 mm Maxilite panel.
- Laminated 2 x 15 mm A1 COREX plasterboard wall with an established FRL of -/60/60 locally thickened with 60 mm Maxilite panel. The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap to each side (including the FyreBOX flange). For FyreBOX Maxi and Slab Mount, the framed opening shall be lined with the same thickness as the wall lining (refer to Figure 74).
- 35 mm AlphaPanel with framing and lined with 13 mm standard or fire grade plasterboard (minimum wall thickness 88 mm). The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap (including the FyreBOX flange). For FyreBOX Maxi and Slab Mount, the framed opening shall be lined with minimum 13 mm thick plasterboard (refer to Figure 75).
- 35 mm AlphaPanel laminated with 13 plasterboard (wall thickness 48 mm). The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap (including the FyreBOX flange), refer to Figure 78.

Group 2

- Fire rated plasterboard wall consisting of minimum 13 mm fire rated plasterboard with minimum 92 mm deep studs with an established FRL of -/60/60.
- 35 mm AlphaPanel with framing and lined with 13 mm standard or fire grade plasterboard on each side (minimum wall thickness 200 mm). For FyreBOX Maxi and

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Slab Mount, the framed opening shall be lined with minimum 13 mm thick plasterboard (refer to Figure 77).

TWrap is to be installed up to at least 300 mm from the surface of the wall on each side unless noted otherwise.

Table 6: Penetration summary for FRL -/60/60 walls

Service	FyreBOX FRL		TWrap FRL
	Group 1	Group 2	
Plastic pipes			
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/60/30	-/60/60	-/60/60
PEX pipes up to 20 mm OD	-/60/30	-/60/60	-/60/60
PEX pipes up to 32 mm OD	-/60/30	-/60/60	-/60/60[1]
PEX pipes up to 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/60/30	-/60/60	-/60/60
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/60/30	-/60/60	-/60/60
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/60/30	-/60/60	-/60/60
GasPEX (PEX-AL-PEX) 32 mm OD	-/60/0	-/60/0	-/60/60[1]
GasPEX (PEX-AL-PEX) 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/60/30	-/60/60	-/60/60
cPVC sprinkler pipes up to 40 mm OD	-/60/0	-/60/0	-/60/60
cPVC sprinkler pipes up to 60 mm OD	-/60/30	-/60/60	-/60/60
Metal pipes			
Copper up to 32 mm OD	-/60/0	-/60/0	-/60/60
Copper 32 mm to 50 mm OD	-/60/0	-/60/0	-/60/60
Steel pipes up to 60 mm OD	-/60/30	-/60/60	-/60/60
Metal pipes insulated			
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[2]	-/60/30	-/60/30	-/60/60
Copper pipe up to 50 mm OD with FR insulation[2]	-/60/30	-/60/60	-/60/60
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[2]	-/60/30	-/60/60	-/60/60
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE[2] insulation	-/60/30	-/60/60	-/60/60
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR[2] insulation	-/60/30	-/60/60	-/60/60
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
12 x TPS	-/60/30	-/60/60	-/60/60
Appendix D1 Group A power cables	-/60/30	-/60/30	-/60/60
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Bundles up to 3 x 240 mm^2 28 mm OD	-/60/30	-/60/30	-/60/60
Bundles up to 4 x 120 mm^2	-/60/30	-/60/30	-/60/60
Bundles up to 9 x 70 mm^2 17 mm OD	-/60/30	-/60/30	-/60/60
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Appendix D2 Group B comms cables	-/60/30	-/60/60	-/60/60
Up to 3 x RG6 cables	-/60/30	-/60/60	-/60/60
NBN Fibre optic cable	-/60/30	-/60/60	-/60/60

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Notes:
1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 Optional heat trace cable under pipe insulation.

Wall elements – FRL -/90/90

Table 7 is a summary of penetrations installed into FyreBOXes when installed into the following fire rated walls:

- Fire rated plasterboard wall consisting of minimum 16 mm fire rated plasterboard with minimum 64 mm deep studs with an established FRL of -/90/90.
- Shaftliner wall minimum 25 mm + 2 x 13 mm fire rated plasterboard with an established FRL of -/90/90.
- Laminated 2 x 20 mm A1 COREX plasterboard wall with an established FRL of -/90/90 locally thickened with 60 mm Maxilite panel. The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap to each side (including the FyreBOX flange). For FyreBOX Maxi and Slab Mount, the framed opening shall be lined with the same thickness as the wall lining (refer to Figure 74).
- 35 mm AlphaPanel with framing and lined with 16 fire grade plasterboard (minimum wall thickness 91 mm). The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap (including the FyreBOX flange). For FyreBOX Maxi and Slab Mount, the framed opening shall be lined with minimum 16 mm thick plasterboard (refer to Figure 75).

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 7: plasterboard walls with an FRL of -/90/90

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/90/60	-/90/90
PEX pipes up to 20 mm OD	-/90/60	-/90/90
PEX pipes up to 32 mm OD	-/90/60	-/90/90[1]
PEX pipes up to 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/60	-/90/90
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/90/60	-/90/90
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/90/60	-/90/90
GasPEX (PEX-AL-PEX) 32 mm OD	-/90/0	-/90/90[1]
GasPEX (PEX-AL-PEX) 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/30	-/90/90
cPVC sprinkler pipes up to 40 mm OD	-/90/0	-/90/90
cPVC sprinkler pipes up to 60 mm OD	-/90/60	-/90/90
Metal pipes		
Copper up to 25 mm OD	-/90/0	-/90/90
Copper up to 32 mm OD	-/90/0	-/90/90
Copper 32 mm to 50 mm OD	-/90/0	-/90/90
Steel pipes up to 60 mm OD	-/90/30	-/90/90
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[2]	-/90/30	-/90/90
Copper pipe up to 50 mm OD with FR insulation[2]	-/90/30	-/90/90
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[2]	-/90/30	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[2]	-/90/30	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[2]	-/90/30	-/90/90
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/90/30	-/90/90
Appendix D1 Group A power cables	-/90/30	-/90/90
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/90/30	-/90/90
Bundles up to 4 x 120 mm^2	-/90/30	-/90/90
Bundles up to 9 x 70 mm^2 17 mm OD	-/90/30	-/90/90
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/90/30	-/90/90
Up to 3 x RG6 cables	-/90/30	-/90/90
NBN Fibre optic cable	-/90/30	-/90/90

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 Optional heat trace cable under pipe insulation.

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Table 8 is a summary of penetrations installed into FyreBOXes when installed into the following fire rated walls:

- 75 mm Hebel/AAC panel, 75 mm Walsc/AAC panel or other minimum 75 mm AAC panel with an established FRL of -/90/90.

At the location of the penetration the wall can be locally thickened with minimum 30 mm thick Maxilite panel to increase the insulation performance. Referred to as '+ 30 mm Maxilite' in Table 8 below.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

Table 8: AAC panel walls with an FRL of -/90/90

Service	FyreBOX FRL	+30 mm Maxilite	TWrap FRL
Plastic pipes			
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/90/30	-/90/60	-/90/90
PEX pipes up to 20 mm OD	-/90/30	-/90/60	-/90/90
PEX pipes up to 32 mm OD	-/90/30	-/90/60	-/90/90[1]
PEX pipes up to 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/30	-/90/60	-/90/90
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/90/30	-/90/60	-/90/90
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/90/30	-/90/60	-/90/90
GasPEX (PEX-AL-PEX) 32 mm OD	-/90/0	-/90/0	-/90/90[1]
GasPEX (PEX-AL-PEX) 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/30	-/90/60	-/90/90
cPVC sprinkler pipes up to 40 mm OD	-/90/0	-/90/0	-/90/90
cPVC sprinkler pipes up to 60 mm OD	-/90/30	-/90/60	-/90/90
Metal pipes			
Copper up to 25 mm OD	-/90/0	-/90/0	-/90/90
Copper up to 32 mm OD	-/90/0	-/90/0	-/90/90
Copper 32 mm to 50 mm OD	-/90/0	-/90/0	-/90/90
Steel pipes up to 60 mm OD	-/90/30	-/90/60	-/90/90
Metal pipes insulated			
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[2]	-/90/30	-/90/60	-/90/90
Copper pipe up to 50 mm OD with FR insulation[2]	-/90/30	-/90/60	-/90/90
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[2]	-/90/30	-/90/60	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[2]	-/90/30	-/90/60	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[2]	-/90/30	-/90/60	-/90/90
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
12 x TPS	-/90/30	-/90/60	-/90/90
Appendix D1 Group A power cables	-/90/30	-/90/30	-/90/90
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Bundles up to 3 x 240 mm^2 28 mm OD	-/90/30	-/90/30	-/90/90
Bundles up to 4 x 120 mm^2	-/90/30	-/90/30	-/90/90
Bundles up to 9 x 70 mm^2 17 mm OD	-/90/30	-/90/30	-/90/90

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Service	FyreBOX FRL	+30 mm Maxilite	TWrap FRL
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)			
Appendix D2 Group B comms cables	-/90/30	-/90/60	-/90/90
Up to 3 x RG6 cables	-/90/30	-/90/60	-/90/90
NBN Fibre optic cable	-/90/30	-/90/60	-/90/90

Notes:
1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 Optional heat trace cable under pipe insulation.

3.8 Wall element – laminated FRL -/90/90

Table 9 is a summary of penetrations installed into FyreBOXes when installed the following fire rated walls:

- Into a laminated plasterboard wall. Consisting of minimum three layers of 13 mm fire rated plasterboard with an established FRL of -/90/90.
- 35 mm AlphaPanel laminated with 16 mm fire grade plasterboard (wall thickness 51 mm). The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap (including the FyreBOX flange), refer to Figure 78.

At the location of the penetration the wall is to be locally thickened with minimum 60 mm thick Maxilite panel.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 9: Laminated wall plasterboard wall with an FRL of -/90/90

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/90/30	-/90/90
PEX pipes up to 20 mm OD	-/90/30	-/90/90
PEX pipes up to 32 mm OD	-/90/30	-/90/90[1]
PEX pipes up to 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/30	-/90/90
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/90/30	-/90/90
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/90/30	-/90/90
GasPEX (PEX-AL-PEX) 32 mm OD	-/90/0	-/90/90[1]
GasPEX (PEX-AL-PEX) 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/30	-/90/90
cPVC sprinkler pipes up to 40 mm OD	-/90/0	-/90/90
cPVC sprinkler pipes up to 60 mm OD	-/90/30	-/90/90
Metal pipes		
Copper up to 32 mm OD	-/90/0	-/90/90
Copper 32 mm to 50 mm OD	-/90/0	-/90/90
Steel pipes up to 60 mm OD	-/90/30	-/90/90
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[2]	-/90/30	-/90/90
Copper pipe up to 50 mm OD with FR insulation[2]	-/90/30	-/90/90
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[2]	-/90/30	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[2]	-/90/30	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[2]	-/90/30	-/90/90
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/90/30	-/90/90
Appendix D1 Group A power cables	-/90/30	-/90/90
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/90/30	-/90/90
Bundles up to 4 x 120 mm^2	-/90/30	-/90/90
Bundles up to 9 x 70 mm^2 17 mm OD	-/90/30	-/90/90
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/90/30	-/90/90
Up to 3 x RG6 cables	-/90/30	-/90/90
NBN Fibre optic cable	-/90/30	-/90/90

Notes:
1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.
2 Optional heat trace cable under pipe insulation.

3.9 Wall element – 64 mm Speedpanel FRL -/90/90

Table 10 is a summary of penetrations installed into FyreBOXes when installed into 64 mm Speedpanel with an established FRL of -/90/90.

At the location of the penetration the wall is to be locally thickened with minimum 60 mm thick Maxilite panel.

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TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

Table 10: 64 mm Speedpanel with an FRL of -/90/90

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/90/0	-/90/90
PEX pipes up to 20 mm OD	-/90/0	-/90/90
PEX pipes up to 32 mm OD	-/90/0	-/90/90[1]
PEX pipes up to 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/0	-/90/90
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/90/0	-/90/90
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/90/0	-/90/90
GasPEX (PEX-AL-PEX) 32 mm OD	-/90/0	-/90/90[1]
GasPEX (PEX-AL-PEX) 32 mm OD insulated with E-Flex ST insulation 19 mm thick	-/90/0	-/90/90
cPVC sprinkler pipes up to 40 mm OD	-/90/0	-/90/90
cPVC sprinkler pipes up to 60 mm OD	-/90/0	-/90/90
Metal pipes		
Copper up to 32 mm OD	-/90/0	-/90/90
Copper 32 mm to 50 mm OD	-/90/0	-/90/90
Steel pipes up to 60 mm OD	-/90/0	-/90/90
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[2]	-/90/0	-/90/90
Copper pipe up to 50 mm OD with FR insulation[2]	-/90/0	-/90/90
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[2]	-/90/0	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[2]	-/90/0	-/90/90
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[2]	-/90/0	-/90/90
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/90/0	-/90/90
Appendix D1 Group A power cables	-/90/0	-/90/90
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm[2] 28 mm OD	-/90/0	-/90/90
Bundles up to 4 x 120 mm[2]	-/90/0	-/90/90
Bundles up to 9 x 70 mm[2] 17 mm OD	-/90/0	-/90/90
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/90/0	-/90/90
Up to 3 x RG6 cables	-/90/0	-/90/90
NBN Fibre optic cable	-/90/0	-/90/90

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 Optional heat trace cable under pipe insulation.

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3.10 Wall elements – FRL -/120/120

Table 11 is a summary of penetrations installed into FyreBOXes when installed into the following fire rated walls:

- Fire rated plasterboard wall consisting of minimum two layers of 13 mm fire rated plasterboard with minimum 64 mm deep studs with an established FRL of -/120/120.
- Shaftliner wall minimum 25 mm + 2 x 16 mm fire rated plasterboard with an established FRL of -/120/120.
- Laminated 2 x 25 mm A1 COREX plasterboard wall with an established FRL of -/120/120 locally thickened with 60 mm Maxilite panel. The FyreBOX penetration must be locally thickened with 60 mm Maxilite panel on one side of the wall unless the entire penetration is wrapped with 450 mm TWrap to each side (including the FyreBOX flange). For FyreBOX Maxi and Slab Mount, the framed opening shall be lined with the same thickness as the wall lining (refer to Figure 74).
- 35 mm AlphaPanel each side of steel framing (minimum wall depth 116 mm), refer to Figure 76.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 11: Plasterboard walls with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/60	-/120/120
PEX pipes up to 20 mm OD	-/120/60	-/120/120
PEX pipes up to 32 mm OD	-/120/60	-/120/120[1]
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/120/60	-/120/120
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/120/60	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
cPVC sprinkler pipes up to 40 mm OD	-/120/0	-/120/120
cPVC sprinkler pipes up to 60 mm OD	-/120/60	-/120/120
Metal pipes		
Copper up to 25 mm OD	-/120/0	-/120/120
Copper up to 32 mm OD	-/120/0	-/120/120
Copper 32 mm to 50 mm OD	-/120/0	-/120/120
Steel pipes up to 60 mm OD	-/120/60	-/120/120
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/60	-/120/120
Copper pipe up to 50 mm OD with FR insulation[4]	-/120/60	-/120/120
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[4]	-/120/60	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/60	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/60	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/120/60	-/120/120
Appendix D1 Group A power cables	-/120/60	-/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/120/30	-/120/120
Bundles up to 4 x 120 mm^2	-/120/30	-/120/120
Bundles up to 9 x 70 mm^2 17 mm OD	-/120/30	-/120/120
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/120/60	-/120/120[2]
Up to 3 x RG6 cables	-/120/60	-/120/120
NBN Fibre optic cable	-/120/60	-/120/120

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 400 mm.

3 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 600 mm.

4 Optional heat trace cable under pipe insulation.

Table 12 is a summary of penetrations installed into FyreBOXes when installed into the following fire rated walls:

- Minimum three layers of 16 mm fire rated plasterboard with an established FRL of -/120/120 and locally thickened with minimum 60 mm Maxilite panel.

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TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

Table 12: Laminated plasterboard wall with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/30	-/120/120
PEX pipes up to 20 mm OD	-/120/30	-/120/120
PEX pipes up to 32 mm OD	-/120/30	-/120/120[1]
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/120/30	-/120/120
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/120/30	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
cPVC sprinkler pipes up to 40 mm OD	-/120/0	-/120/120
cPVC sprinkler pipes up to 60 mm OD	-/120/30	-/120/120
Metal pipes		
Copper up to 32 mm OD	-/120/0	-/120/120
Copper 32 mm to 50 mm OD	-/120/0	-/120/120
Steel pipes up to 60 mm OD	-/120/30	-/120/120
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/30	-/120/120
Copper pipe up to 50 mm OD with FR insulation[4]	-/120/30	-/120/120
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[4]	-/120/30	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/30	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/30	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/120/30	-/120/120
Appendix D1 Group A power cables	-/120/30	-/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/120/30	-/120/120
Bundles up to 4 x 120 mm^2	-/120/30	-/120/120
Bundles up to 9 x 70 mm^2 17 mm OD	-/120/30	-/120/120
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/120/30	-/120/120[2]
Up to 3 x RG6 cables	-/120/30	-/120/120
NBN Fibre optic cable	-/120/30	-/120/120

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 400 mm.

3 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 600 mm.

4 Optional heat trace cable under pipe insulation.

Table 13 is a summary of penetrations installed into FyreBOXes when installed into a 75 mm Hebel/AAC panel or other AAC panel with plasterboard facing with an established FRL of -/120/120.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 13: 75 mm Hebel/AAC with plasterboard with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/30	-/120/120
PEX pipes up to 20 mm OD	-/120/30	-/120/120
PEX pipes up to 32 mm OD	-/120/30	-/120/120[1]
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/120/30	-/120/120
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/120/30	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
cPVC sprinkler pipes up to 40 mm OD	-/120/0	-/120/120
cPVC sprinkler pipes up to 60 mm OD	-/120/30	-/120/120
Metal pipes		
Copper up to 32 mm OD	-/120/0	-/120/120
Copper 32 mm to 50 mm OD	-/120/0	-/120/120
Steel pipes up to 60 mm OD	-/120/30	-/120/120
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/30	-/120/120
Copper pipe up to 50 mm OD with FR insulation[4]	-/120/30	-/120/120
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[4]	-/120/30	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/30	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/30	-/120/120
Power cables		
12 x TPS	-/120/30	-/120/120
Appendix D1 Group A power cables	-/120/30	-/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/120/30	-/120/120
Bundles up to 4 x 120 mm^2	-/120/30	-/120/120
Bundles up to 9 x 70 mm^2 17 mm OD	-/120/30	-/120/120
Comms cables		
Appendix D2 Group B comms cables	-/120/30	-/120/120[2]
Up to 3 x RG6 cables	-/120/30	-/120/120
NBN Fibre optic cable	-/120/30	-/120/120

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 400 mm.

3 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 600 mm.

4 Optional heat trace cable under pipe insulation.

Table 14 is a summary of penetrations installed into FyreBOXes when installed into a 60 mm thick Maxilite panel (single or multiple layers) with an established FRL of -/120/120 or greater.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 14: Minimum 60 mm thick Maxilite panel with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/30	-/120/120
PEX pipes up to 20 mm OD	-/120/30	-/120/120
PEX pipes up to 32 mm OD	-/120/30	-/120/120[1]
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/120/30	-/120/120
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/120/30	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
cPVC sprinkler pipes up to 40 mm OD	-/120/0	-/120/120
cPVC sprinkler pipes up to 60 mm OD	-/120/30	-/120/120
Metal pipes		
Copper up to 32 mm OD	-/120/0	-/120/120
Copper 32 mm to 50 mm OD	-/120/0	-/120/120
Steel pipes up to 60 mm OD	-/120/30	-/120/120
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/30	-/120/120
Copper pipe up to 50 mm OD with FR insulation[4]	-/120/30	-/120/120
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[4]	-/120/30	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/30	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/30	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/120/30	-/120/120
Appendix D1 Group A power cables	-/120/30	-/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/120/30	-/120/120
Bundles up to 4 x 120 mm^2	-/120/30	-/120/120
Bundles up to 9 x 70 mm^2 17 mm OD	-/120/30	-/120/120
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/120/30	-/120/120[2]
Up to 3 x RG6 cables	-/120/30	-/120/120
NBN Fibre optic cable	-/120/30	-/120/120

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 400 mm.

3 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 600 mm.

4 Optional heat trace cable under pipe insulation.

Table 15 is a summary of penetrations installed into FyreBOXes when installed into a 78 mm Speedpanel with an established FRL of -/120/120.
TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 15: 78 mm Speedpanel with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/0	-/120/120
PEX pipes up to 20 mm OD	-/120/0	-/120/120
PEX pipes up to 32 mm OD	-/120/0	-/120/120[1]
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/120/0	-/120/120
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/120/0	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
cPVC sprinkler pipes up to 40 mm OD	-/120/0	-/120/120
cPVC sprinkler pipes up to 60 mm OD	-/120/0	-/120/120
Metal pipes		
Copper up to 32 mm OD	-/120/0	-/120/120
Copper 32 mm to 50 mm OD	-/120/0	-/120/120
Steel pipes up to 60 mm OD	-/120/0	-/120/120
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/0	-/120/120
Copper pipe up to 50 mm OD with FR insulation[4]	-/120/0	-/120/120
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation[4]	-/120/0	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/0	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/0	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/120/0	-/120/120
Appendix D1 Group A power cables	-/120/0	-/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/120/0	-/120/120
Bundles up to 4 x 120 mm^2	-/120/0	-/120/120
Bundles up to 9 x 70 mm^2 17 mm OD	-/120/0	-/120/120
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/120/0	-/120/120[2]
Up to 3 x RG6 cables	-/120/0	-/120/120
NBN Fibre optic cable	-/120/0	-/120/120

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 400 mm.

3 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 600 mm.

4 Optional heat trace cable under pipe insulation.

Table 16 is a summary of penetrations installed into FyreBOXes when installed into a 120 mm thick Masonry or concrete wall with an established FRL of -/120/120.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 16: 120 mm thick Masonry or concrete wall with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/60	-/120/120
PEX pipes up to 20 mm OD	-/120/60	-/120/120
PEX pipes up to 32 mm OD	-/120/60	-/120/120[1]
GasPEX (PEX-AL-PEX) up to 20 mm OD	-/120/60	-/120/120
GasPEX (PEX-AL-PEX) up to 25 mm OD	-/120/60	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
cPVC sprinkler pipes up to 40 mm OD	-/120/0	-/120/120
cPVC sprinkler pipes up to 60 mm OD	-/120/60	-/120/120
Metal pipes		
Copper up to 32 mm OD	-/120/0	-/120/120
Copper 32 mm to 50 mm OD	-/120/0	-/120/120
Steel pipes up to 60 mm OD	-/120/60	-/120/120
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/60	-/120/120
Copper pipe up to 50 mm OD with FR insulation[4]	-/120/60	-/120/120
Copper pipes up to 20 mm with 38 mm Rockwool-type insulation	-/120/60	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/60	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/60	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
12 x TPS	-/120/60	-/120/120
Appendix D1 Group A power cables	-/120/60	-/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 3 x 240 mm^2 28 mm OD	-/120/30	-/120/120
Bundles up to 4 x 120 mm^2	-/120/30	-/120/120
Bundles up to 9 x 70 mm^2 17 mm OD	-/120/30	-/120/120
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Appendix D2 Group B comms cables	-/120/60	-/120/120[2]
Up to 3 x RG6 cables	-/120/60	-/120/120
NBN Fibre optic cable	-/120/0	-/120/120

Notes:

1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.

2 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 400 mm.

3 TWrap is to be installed as loose fill (foil removed) around the cables and tray up to 300 mm from the FyreBOX. TWrap is then installed around the FyreBOX and services from the element to at least 600 mm.

4 Optional heat trace cable under pipe insulation.

Table 17 is a summary of penetrations installed into FyreBOXes when installed into a 180 mm thick Masonry or concrete wall with an established FRL of -/240/240 or 240/240/240.

TWrap is to be installed up to at least 300 mm from the surface of the wall on each face of the wall unless stated otherwise.

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Table 17: 180 mm masonry or concrete wall with an FRL of -/240/240

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 25 mm OD (with or without cables).	-/240/120	NA
Metal pipes		
Copper up to 50 mm OD	-/240/0	-/240/120
Steel pipes up to 60 mm OD	-/240/60	-/240/120
Metal pipes insulated		
Copper pipe up to 32 mm OD with 25 mm FR insulation	-/240/60	NA
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm FR insulation	-/240/120	NA
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation	-/240/120	NA
Power cables		
5 x 19 mm OD 3C +E cables	-/240/120	NA
Appendix D1 Group A power cables	-/240/60	NA
Comms cables		
20 x Cat 6 cable	-/240/120	NA
Appendix D2 Group B comms cables	-/240/60	NA

NA = Not Applicable and is outside the scope of this assessment.

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3.11 Floor/ceiling elements – FRL up to -/120/120

Table 18 is a summary of penetrations installed into FyreBOXes when installed into a fire rated plasterboard floor/ceiling systems with an established FRL of up to -/120/120 or 120/120/120.

A minimum 60 mm thick Maxilite panel is secured to the underside of the plasterboard ceiling lining and through fixed to framing. The FyreBOX is installed through the Maxilite panel and ceiling lining and independently supported from the ceiling suspension system. Where a resistance to incipient spread of fire is required (RISF) the FyreBOX and penetrations are to be wrapped with TWrap at least nominally 300 mm from the ceiling lining (or as specified in Table 18). Where the penetrations penetrate the timber flooring the holes are to be sealed with Fyreflex sealant. The ceiling cavity is to be a minimum of 500 mm high.

The FyreBOX system and penetrations are to be independently supported from the ceiling system. It is therefore considered that when installed in other similar fire rated floor/ceiling systems it would not be expected to prejudice the fire resistance of the floor/ceiling system. It is considered the FyreBOX system as tested can be installed in the following plasterboard floor/ceiling configurations:

- Floor/ceilings with established FRL of (30)/30/30 with an RISF of 30 minutes and minimum thickness of 16 mm.
- Floor/ceilings with established FRL of (60)/60/60 with an RISF of 60 minutes and minimum thickness of 29 mm.
- Floor/ceilings with established FRL of (90)/90/90 with an RISF of 60 minutes and minimum thickness of 32 mm.
- Floor/ceilings with established FRL of (120)/120/120 with an RISF of 60 minutes and minimum thickness of 48 mm.

Other floor/ceiling systems that have achieve the required FRL and has a ceiling lining at least that stated above or thicker are also considered suitable. The ceiling lining thickness defined above is a minimum. The timber flooring shall be a minimum of 19 mm thick.

Table 18 is a summary of penetrations and their FRL in a fire rated floor/ceiling with an FRL of (120)/120/120 and a ceiling at least 48 mm thick. For other fire rated floor/ceiling systems with a lower FRL and/or RISF the FRL/RISF shall be the lesser of the floor/ceiling and penetration system.

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Table 18: Plasterboard floor/ceiling system - FRL (120)/120/120 and RISF of 60 minutes

Service	FyreBOX FRL	TWrap FRL +RISF 60[1]
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD	-/120/120	-/120/120
PEX pipes up to 32 mm OD	-/120/120	-/120/120
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/120	-/120/120
uPVC pipes up to 80 mm OD	-/120/120	-/120/120
Metal pipes		
Copper up to 42 mm OD	-/120/0	-/120/120
Copper pipes up to 100 mm OD	-/120/0	-/120/120[2]
Steel pipes up to 50 mm OD	-/120/0	-/240/120
Steel pipes up to 100 mm OD	-/120/0	-/120/120[2]
Metal pipes insulated		
Copper pipe up to 50 mm OD with FR insulation	-/120/120	-/120/120
Stainless steel pipe up to 50 mm OD with EPS or PE insulation and rockwool	-/120/120	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation with 10 mm OD cable	-/120/120	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation with 10 mm OD cable	-/120/120	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Up to 10 x TPS	-/120/120	-/120/120
Up to 2 x 19 mm 3C + E	-/120/120	-/120/120
Up to 6 x 19 mm 3C + E	-/120/120	-/120/120
Appendix D1 Group A power cables	-/120/30	-/120/60 -/120/120[3]
Aluminium Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Bundles up to 4 x 240 mm² single core + optional 120 mm² earth cable	-/90/30	-/90/90
Bundles up to 4 x 16 mm² 4C + E	-/90/30	-/90/90
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Up to 150 x CAT 6	-/120/120	-/120/120
NBN Fibre optic cable	-/120/120	-/120/120
Appendix D2 Group B comms cables	-/120/30	-/120/60 -/120/120[4]

Notes:

1 Where RISF is required the FyreBOX shall be wrapped along with the penetrations.

2 Twrap individually wrapped around pipes 600 mm high from foam.

3 Twrap 600 mm high from foam.

4 Twrap 450 mm high from foam.

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3.12 60 mm thick Maxilite Floor Panel – FRL up to -/120/120

Table 19 is a summary of penetrations installed into FyreBOXes when installed into a 60 mm thick Maxilite floor panel (single or multiple layers) with an established FRL of -/120/120 or greater.

TWrap is to be installed up to at least 300 mm from the surface of the floor panel or as noted below. 40 mm Intumescent foam and mounting flanges are to be installed on both sides of the FyreBOX.

Table 19: Minimum 60 mm thick Maxilite Floor Panel with an FRL of -/120/120

Service	FyreBOX FRL	TWrap FRL
Plastic pipes		
Rigid or flexible uPVC conduits up to 32 mm OD (with or without cables).	-/120/0	-/120/120
PEX pipes up to 32 mm OD	-/120/0	-/120/120[1]
GasPEX (PEX-AL-PEX) 32 mm OD	-/120/0	-/120/120[1]
uPVC pipes up to 80 mm OD	-/120/0	-/120/120
Metal pipes		
Copper up to 42 mm OD	-/120/0	-/120/120[1]
Copper up to 100 mm OD	-/120/0	-/120/120[2]
Steel pipes up to 60 mm OD	-/120/0	-/120/120[1]
Steel pipes up to 100 mm OD	-/120/0	-/120/120[2]
Metal pipes insulated		
Copper pipe up to 50 mm OD with PE insulation up to 20 mm[4]	-/120/0	-/120/120
Stainless steel pipe up to 50 mm OD with EPS or PE insulation and rockwool[4]	-/120/0	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 13 mm PE insulation[4]	-/120/0	-/120/120
Paircoil pipes (up to 9.5 mm and 19 mm) with up to 20 mm FR insulation[4]	-/120/0	-/120/120
Power cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Up to 12 x TPS	-/120/0	-/120/120
Up to 2 x 19 mm 3C + E	-/120/0	-/120/120
Comms cables (when not installed on cable trays, multiple discrete bundles may be installed)		
Up to 10 x CAT6 cables	-/120/0	-/120/120

Notes:
1 TWrap is to be installed up to at least 450 mm from the surface of the wall on each side.
2 Twrap individually wrapped around pipes 600 mm high from foam.
3 Optional heat trace cable under pipe insulation.

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3.13 FyreBOX depth

The FyreBOXes are a standard depth nominally 250 mm. To allow for thicker elements and to ensure the sleeve is sufficiently long to accommodate the mounting angles it is proposed to increase the sleeve length. The tested length is between 30 mm to 90 mm projecting from the barrier. On the condition that the sleeve outside the element is within the same range as tested it is considered increasing the overall sleeve depth would not prejudice the fire resistance of the FyreBOXes.

3.14 FyreBOX position

Cast in FyreBOXes have been tested in a concrete slab within 100 mm (flange touching) of each other without any indication that the close proximity between units influenced the fire performance. In addition to this two FyreBOXes have been tested in a plasterboard wall with a 30 mm thick Maxilite board separating the two units for 120 minutes. Based on the tested performance and on the condition the element is designed to support the penetrations, multiple FyreBOXes can be installed in a single opening.

3.15 Cable trays or ladders

A number of cable trays from 300 mm to 900 mm wide have been tested with a combination of cables and pipes in FyreBOXes. In addition similar penetrations have been tested without cable trays. Based on the available test data the addition of a cable tray does not prejudice the fire performance of the penetration on the condition all gaps between the tray and foam are sealed with FyrePEX/Fyreflex intumescent sealant.

Based on the performance of the penetrations with and without cable trays it is considered if the cable tray is up to a maximum of 1,000 mm wide it would not be expected to prejudice the established fire resistance of the tested penetrations in FyreBOXes.

3.16 Installation orientation

FyreBOXes have been tested in both vertical wall elements and horizontal floor slabs for up to 240 minutes. There may be situations where the penetration is required to be installed at an angle in the element. On the condition that the installation details are the same as tested (other than angle) and gaps between the element/penetration no greater than tested it is considered it would not prejudice the fire resistance performance as tested.

3.17 FyreBOX not centred

For situations where the FyreBOX cannot be positioned centred in the element it is proposed to install a Maxilite panel to provide local thickening around the penetration. The Maxilite panel is to be secured to the face of the element and any gaps sealed with Fyreflex sealant. It is considered that the addition of the Maxilite panel allowing the penetration to be centered within the combined thickness of the element/panel would not prejudice the fire resistance of the FyreBOX. The fire performance is limited to that of the element or penetration.

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3.18 Cast-in FyreBOX Mini

3.18.1 Mini Cast-in

It is proposed to supply cast-in Mini FyreBOXes. As discussed in section 3.4.1 it was determined the Mini FyreBOXes perform at least as well as the Maxi FyreBOXes. It is therefore considered that a cast-in Mini FyreBOX would also perform as well as the Maxi cast-in FyreBOX.

3.18.2 Flush-set Cast-in

In situations where the Cast-in FyreBOX is installed with the top of the casing flush with the top of the concrete slab or it is less than standard practice (40 mm above the slab) it is proposed to install a mild steel angle nominally 25 mm x 40 mm x 0.9 mm thick. The 25 mm leg shall be positioned against the concrete and secured to the slab with masonry anchors. See Figure 72 for construction details. The angle may consist of four individual angles secured next to the casing or a single folded angle. It is considered this variation would not prejudice the fire resistance performance as tested.

3.19 FyreBOX Mini mounting plate

The Mini FyreBOX is typically installed in the element with a nominal 5 mm wide annular gap filled with Fyreflex sealant. On each face of the FyreBOX a mild steel angle flange is then installed around the the FyreBOX and secured in place. There are three types of mounting flange. The first is nominally 15 mm x 15 mm, the revised is nominally 15 mm (to FyreBOX) x 30 mm and the third 15 mm x 50 mm. In all installations the flange overlaps the opening in the element by a minimum of 10 mm all the way around the FyreBOX.

In CSIRO fire resistance test FSP 1729 a 125 mm x 125 mm Mini FyreBOX was tested with updated flanges in a steel stud plasterboard wall lined with 16 mm fire rated plasterboard. The opening in the wall was nominally 145 mm x 145 mm and the opening was not lined with plasterboard or framing. The annular gap was sealed with Fyreflex sealant to the depth of the plasterboard and covered by flanges nominally 50 mm x 25 mm (to FyreBOX sleeve).

In CSIRO fire resistance test FSV 1840 a 100 mm and 150 mm diameter Mini FyreBOXes were tested with a 20 mm wide annular gap. There were no significant observations made in relation to the mounting flanges and the performance of the tested specimens were consistent with specimens with the smaller flange/annular gap. Based on this it is considered the revised mounting flanges would not prejudice the fire performance of the FyreBOX Minis.

3.20 Annular gaps for FyreBOXes

In Exova fire resistance test No. 51894900.1 a 700 mm wide FyreBOX Maxi was tested in a 175 mm thick concrete wall. The annular gap between the concrete and FyreBOX was nominally 7 mm to three sides and filled with Fyreflex sealant to a depth of nominally 15 mm. On the fourth side the concrete had been cut out with a 100 mm diameter core drill to make an uneven edge up to 40 mm high. The annular gap was filled with intumescent foam and then sealed with Fyreflex sealant to a depth of 15 mm. The uneven gaps were completely covered by the mounting flanges on each side of the wall.

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In the above fire resistance test there were no significant observations relating to how the FyreBOX was installed in relation to the size of the annular gaps. Based on this it is considered gaps up to 40 mm wide and plugged with intumescent foam and Fyreflex sealant up to at least 15 mm thick would not prejudice the established fire resistance of the FyreBOXes (Maxi and Mini) on the condition the mounting flanges cover the annular gap by at least 10 mm.

3.21 Horizontal elements – Foam

The supporting test data on FyreBOXes in floor slabs were tested with the nominal 40 mm thick intumescent foam positioned above the intumescent biased to the unexposed face. No foam was installed below the intumescent except for in Exova fire resistance test No. 51894700 where the element was nominally 60 mm thick Maxilite. Except for Table 19 for horizontal elements the intumescent foam is only required on the unexposed face of the FyreBOX.

3.22 Slab mount penetrations

3.22.1 90 degree penetrations

For slab mount FyreBOXes the penetrations are wrapped with TWrap nominally 300 mm each side of the wall. In situations where space is restricted the penetrations may exit the FyreBOX then turn 90 degrees less than 300 mm from the FyreBOX. It is considered as long as the penetrations are wrapped with TWrap a distance of at least 300 mm from the barrier it would not prejudice the fire resistance of the slab mount FyreBOX or penetration.

3.22.2 Steel decking floor slabs

It is proposed to install the Slab mount FyreBOX to the underside of a steel deck of a concrete floor slab which may have small ridges (5 mm in height or less). The Slab mount FyreBOX is to be installed as normal with a bead of FyreFLEX sealant between the FyreBOX casing and steel deck. Where there is a ridge in the deck the hole shall be filled with FyreFLEX sealant at least 20 mm deep to each side. See Figure 66 for details. It is considered this variation would not prejudice the established fire resistance of the Slab mount FyreBOX.

3.22.3 Oversized hole in wall

In some situations the size of the opening in the wall may be oversize for the Slab mount FyreBOX installation. Figure 69 and Figure 70 provide details for how to reduce the opening size in the wall with Maxilite panel. Where the opening height needs to be reduced a panel of Maxilite up to 60 mm thick x the same size as the FyreBOX casing shall be installed above the FyreBOX and secured to the slab with the FyreBOX casing.

Where the opening width in the element is to be reduced the Maxilte panel shall be secured back to the wall framing/solid fixing and cut to suit the wall depth. FyreFLEX shall be used to fill any gaps and the FyreBOX installed as per standard practice. It is considered this variation would not prejudice the established fire resistance of the Slab mount FyreBOX.

3.22.4 Stepped slabs

In situations where the sofit above the FyreBOX is at different heights each side of the fire rated wall element the higher side can be lowered to match the other side with a Maxilite panel (Figure 71). The Maxilite is to be sized to match the FyreBOX casing and when installed the

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FyreBOX shall be installed as per standard practice with the fixing through the casing extending through the Maxilite panel and nominally 50 mm into the concrete above. It is considered this variation would not prejudice the established fire resistance of the Slab mount FyreBOX.

3.22.5 Shaftwall Party Wall Systems

In CSIRO fire resistance test FSP 2230 a Slab mount FyreBOX was tested with a laminated plasterboard wall consisting of 25 mm Shaftliner and 16 mm Fire rated plasterboard with TWrap on both sides. The FyreBOX with penetrations achieved an FRL of -/90/90. See Figure 73 for details. It is considered where the central fire barrier consists of at least 41 mm thick plasterboard and is installed with TWap each side would not prejudice the fire resistance of the wall for up to at least an FRL of -/90/90 subject to the fire rating of the wall system.

3.23 TWrap vs Fyrewrap Elite 1.5

TWrap is nominally 25 mm thick has been tested with a number of penetrations. An alternative wrap is available which is 38 mm thick Fyrewrap Elite 1.5. It is considered that the thicker Fyrewrap would perform at least as well as the same length of TWrap and can be used where TWrap is specified.

3.24 Sealant

In fire resistance test 51894900 a 700 mm wide FyreBOX Maxi was tested in a concrete wall with Appendix D power and communications cable penetrations. Any gaps around the foam/cable tray and between the foam/penetrations were sealed with Fyreflex sealant. The FyreBOX achieved an FRL of -/240/60. Based on this result it is considered that Fyreflex or FyrePEX sealant may be used to seal any gaps between the foam and cable tray/penetrations in the Trafalgar FyreBOX systems covered in this report.

3.25 Minimum size FyreBOX Maxi

The FyreBOX Maxi has been tested or assessed from 125 mm x 125 mm up to 125 mm x 1,250 mm. It is proposed that FyreBOX Maxi could be smaller than 125 mm x 125 mm for example 65 mm x 120 mm. On the condition that the amount of intumescent remains the same (ratio of intumescent vs area) or better and positioned on the four inside faces of the box it is considered a reduction in size would not reduce the fire resistance of the FyreBOX Maxi.

It is considered this would also apply to the Slab mount system.

3.26 Two and Three Sided Installations

In some situations the FyreBOX may be installed at an intersection between a fire rated floor and wall (two sided installation see Figure 66) or next to another wall (three sided installation see Figure 68). In these situations it is not possible to install the Twrap or flanges to all four sides of the FyreBOX.

For situations where the standard four sided flange cannot be installed a 2 or 3 sided flange shall be used and installed as usual. Where there is no flange the FyreBOX casing shall be secured to the element of construction. Fyreflex sealant shall be used to seal any gaps between the FyreBOX casing and fire rated element. This is similar to the slab mount FyreBOX and therefore considered would not prejudice the fire resistance of the FyreBOXes.

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Where the FyreBOX and penetrations are also installed with Twrap to four sides it is considered a similar approach to the slab mount installation can be applied where the Twrap is secured to the element of construction on the 2 or 3 sides of the FyreBOX not in contact with the fire rated element.

3.27 Appendix D2 Group B cables

In AS 1530.4:2014 the Appendix D2 group B cable configuration consists of a pack of 60 (10 x 6) pair telecommunication cables. Trafalgar have tested a number of PVC sheathed Group B telecommunication cables. In fire resistance test 51894900 LSZH retardant jacketed Group B cable set was tested in a FyreBOX and maintained the Integrity criteria for the 241 minute duration of the test. In reviewing the temperature data there does not appear to be a significant difference in performance between PVC sheathed or LSZH retardant jacketed Group B cable sets. It is therefore considered PVC sheathed or LSZH retardant jacketed telecommunication cables may be used.

3.28 Figures

Figure 1 to Figure 17 provide general information and installation details for the FyreBOX Maxi in various element types.

Figure 18 to Figure 22 provide general information and installation details for the FyreBOX Cast-in with various elements.

Figure 23 to Figure 35 provide general information and installation details for the FyreBOX Mini square and round modules in various elements.

Figure 36 to Figure 56 provide general information and installation details for the Slab mount module in various elements.

Figure 57 to Figure 65 provides installation details for specific installations.

Figure 66 provides installation details for steel decking.

Figure 67 and Figure 68 provides installation details for two and three sided installations respectively.

Figure 69 and Figure 70 provides installation details for oversized openings in the walls for Slab mount modules.

Figure 71 provides installation details for Slab mount modules where the slab above is stepped.

Figure 72 provides installation details for Cast-I FyreBOXes where the casing is less than 40 mm above the concrete slab.

Figure 73 provides installation details for a Slab mount module installed with a Shaftliner party wall type wall system where the FyreBOX is wrapped with TWrap.

Where discrepancies occur between the drawings and the text/tables, the text/tables shall take precedence.

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4. CONCLUSION

It is considered that the FyreBOX Maxi, FyreBOX Mini Round/square, Slab mount and Cast in fire protection systems would achieve the stated fire resistance levels as stated in Table 2 to Table 19 in the various elements and various penetrations if tested in accordance with AS 1530.4: 2014 and heating conditions and criteria of BS 476: Part 20: 1987.

With reference to the above tables the following apply:

- The FRL of the specific configuration will be the lowest FRL of the element, FyreBOX or penetration.
- Where the FyreBOX is blank the FRL will be the lower of the FyreBOX or element.
- Any combination of penetrations may be installed through the FyreBOX however the FRL will be limited to the lowest performing penetration, FyreBOX or element.

Further to this it is considered the established fire resistance of the FyreBOXes would not be prejudiced with the following variations:

- The FyreBOX Maxi and FyreBOX Cast in can be made in any size up to a maximum 125 mm x 1,250 mm on the condition that the same thickness of intumescent is maintained and positioned to the four inside faces of the sleeve.
- The depth of the FyreBOX may be extended on the condition the sleeve to each side of the element is between 30 mm to 90 mm or as tested.
- The FyreBOX may be positioned as close as flange to flange for the Cast in units only or separated by a minimum of 30 mm by a maxilite panel on the condition the element has been suitably designed to accommodate the opening size.
- Where cable trays are to be used they can be up to a maximum width of 1,000 mm. The cable tray must be installed as tested with any gaps sealed with FyrePEX intumescent sealant or Fyreflex sealant.
- The FyreBOX may be installed at angles within an element on the condition the installation gaps remain as tested.
- Where it is not possible to centre the FyreBOX within the element additional Maxilite panels may be used to locally thicken the element to centre the FyreBOX within the combined element depth.
- Cast-in FyreBOX Mini round or square modules are expected to perform at least as well as the Maxi modules.
- FyreBOX Mini modules can be installed with any of the following mounting flanges 15 mm x 15 mm, 15 mm x 30 mm or for annular gaps from 20 mm to 40 mm use flange size of 15 mm x 50 mm. The gap must be filled with Fyreflex sealant backed with intumescent foam and the flange overlap the opening in the element by at least 10 mm.
- For FyreBOXes installed in horizontal elements the 40 mm thick intumescent foam is installed to the unexposed face only (except as noted in Table 19).
- For slab mount FyreBOXes penetrations can be installed at any angle before entering the FyreBOX on the condition that the TWrap extends at least 300 mm from the FyreBOX.
- Slab mount FyreBOXes may be installed against steel decking with any small ridges filled with a bead of FyreFLEX sealant.
- Where 25 mm thick TWrap is specified 38 mm thick Fyrewrap Elite 1.5 can substituted.

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- FyreFLEX sealant or FyrePEX sealant maybe used to seal any gaps between the foam and cable tray/penetrations in the FyreBOX systems.
- FyreBOXs may be installed in two and three sided installations.
- Appendix D2 Group B cables as tested may be PVC sheathed or LSZH retardant jacketed telecommunication cables.

Figure 1 FyreBOX Maxi – Overview

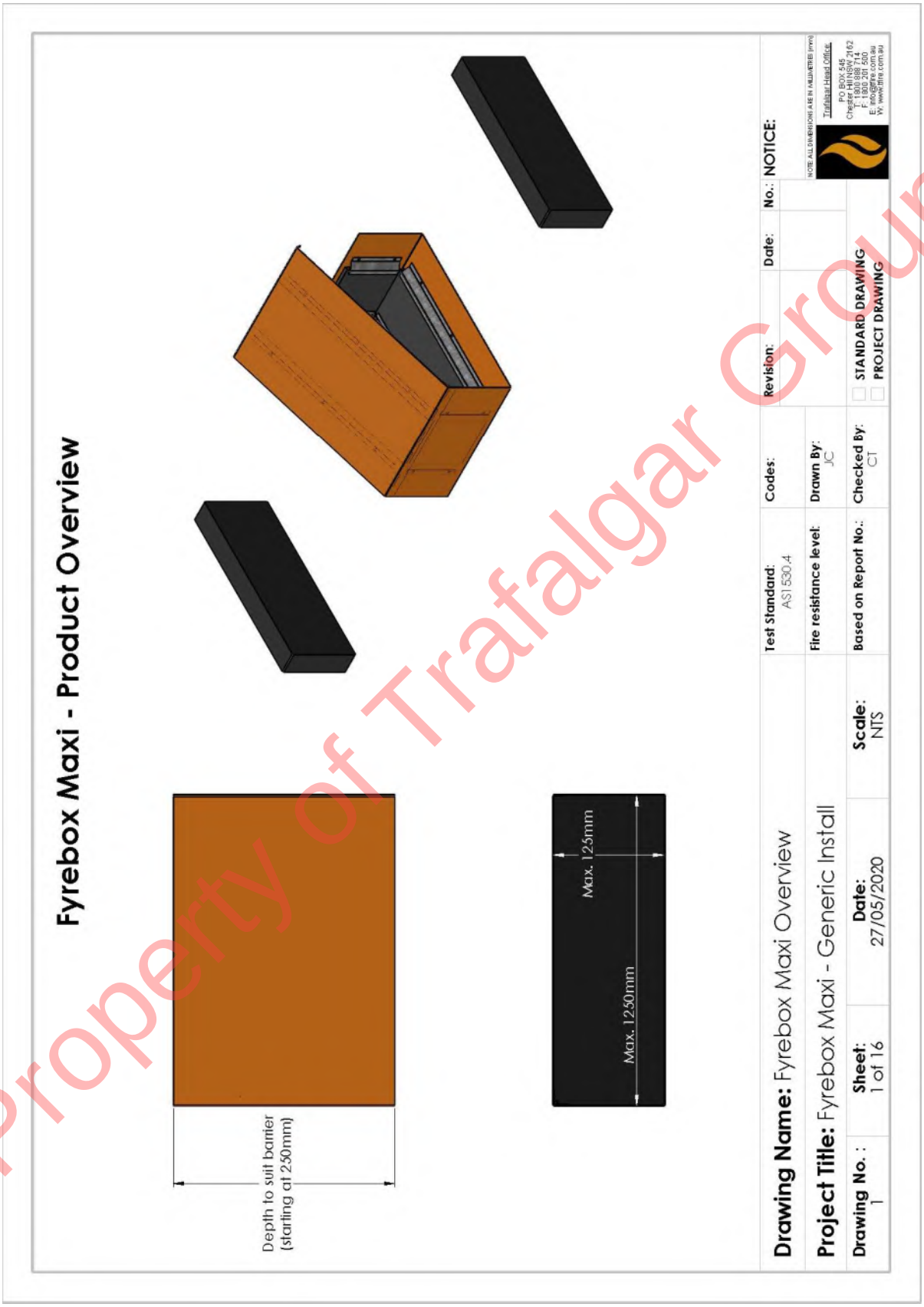

Figure 2 FyreBOX Maxi – Installation overview

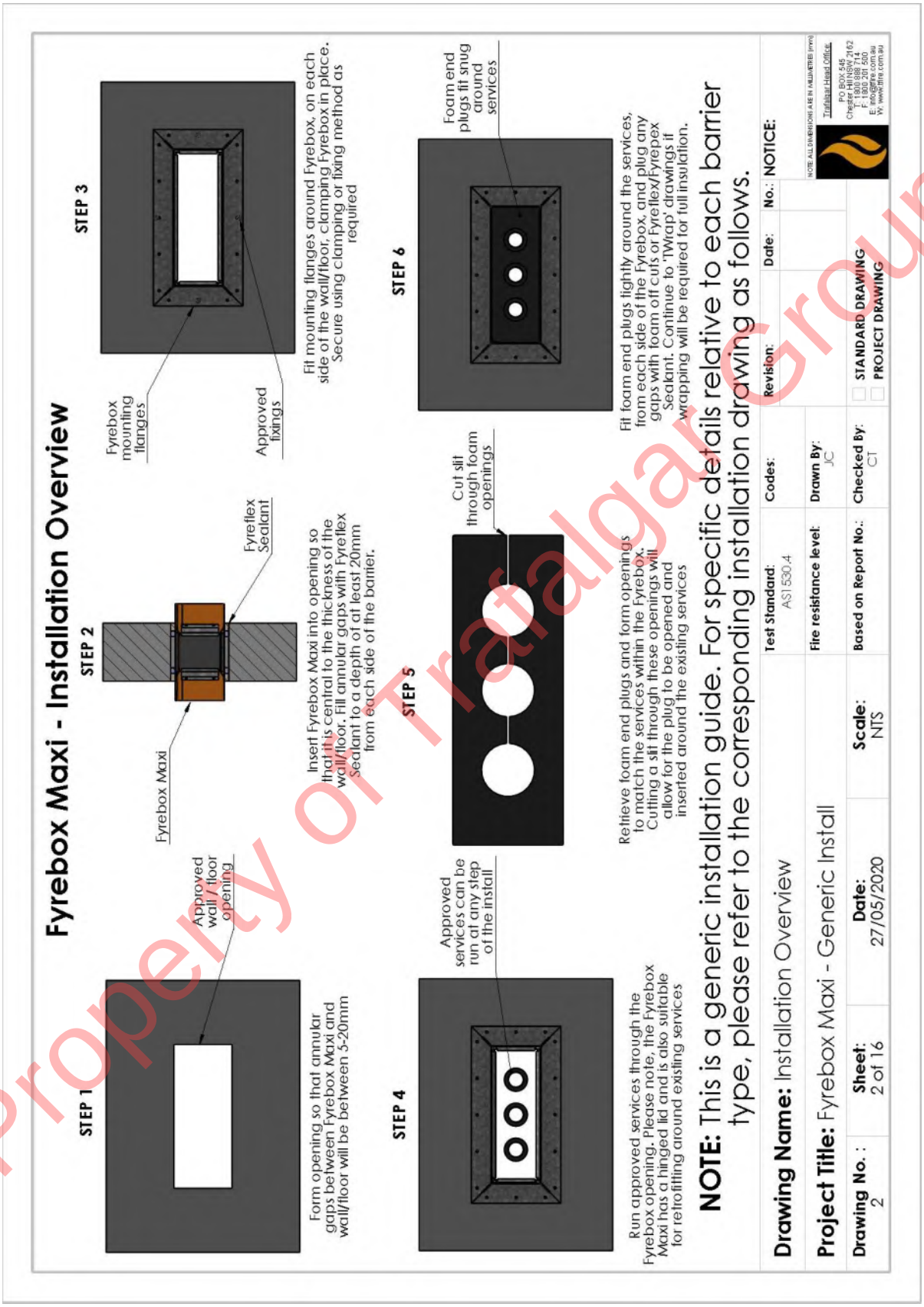

Figure 3 FyreBOX Maxi – Annular gaps

Figure 4 FyreBOX Maxi – Concrete/masonry walls

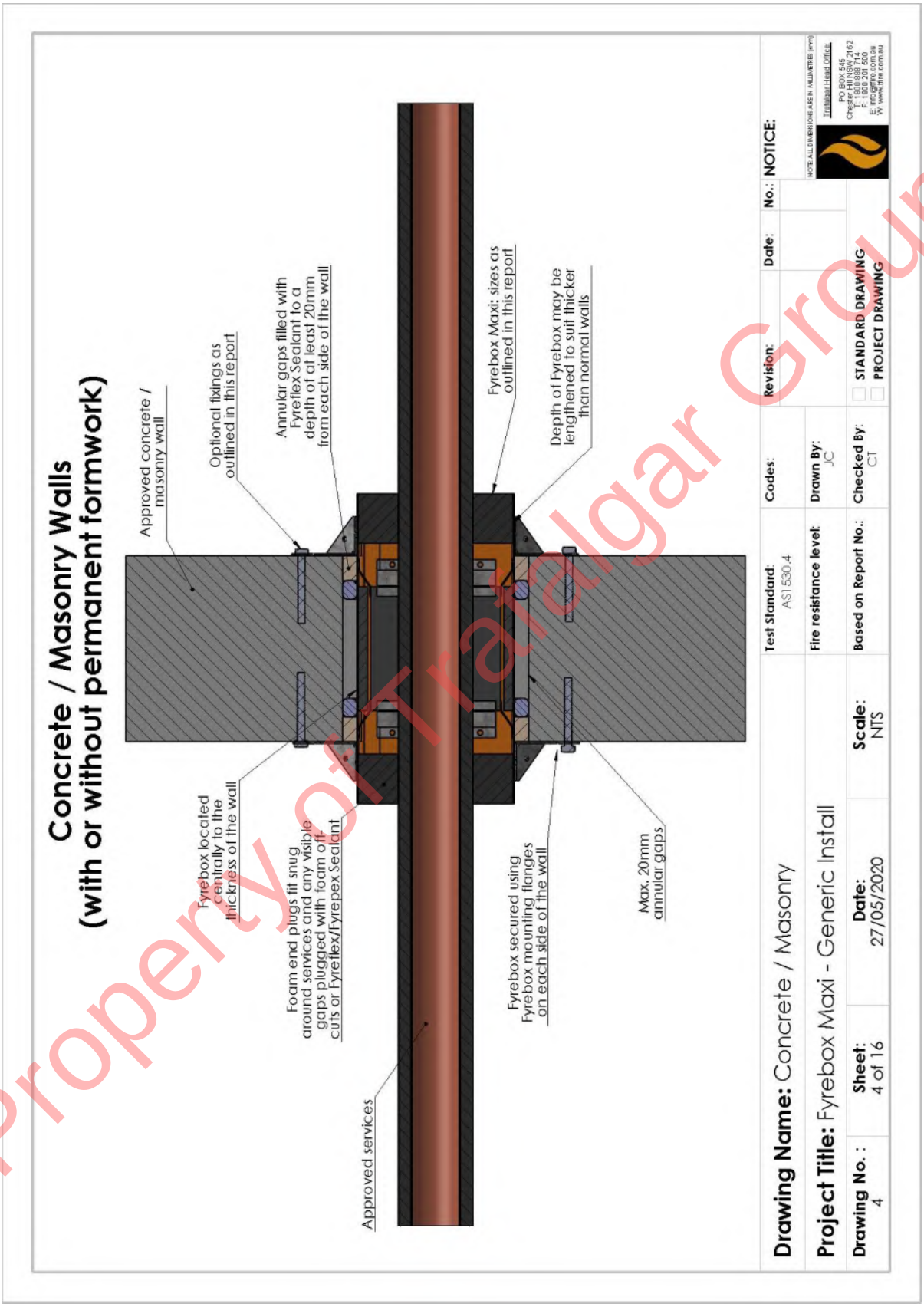

Figure 5 FyreBOX Maxi – Plasterboard walls

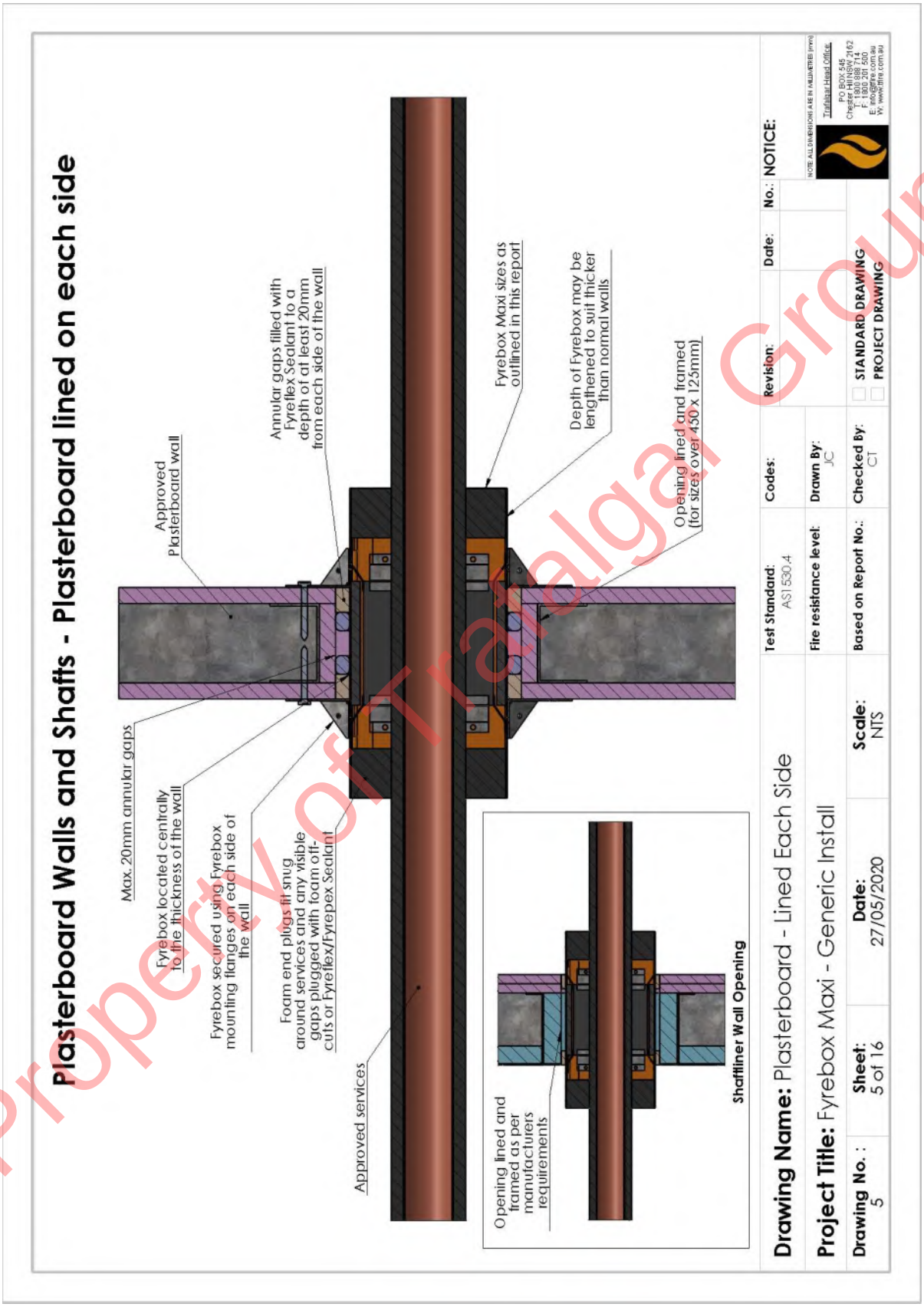

Figure 6 FyreBOX Maxi – Laminated plasterboard walls

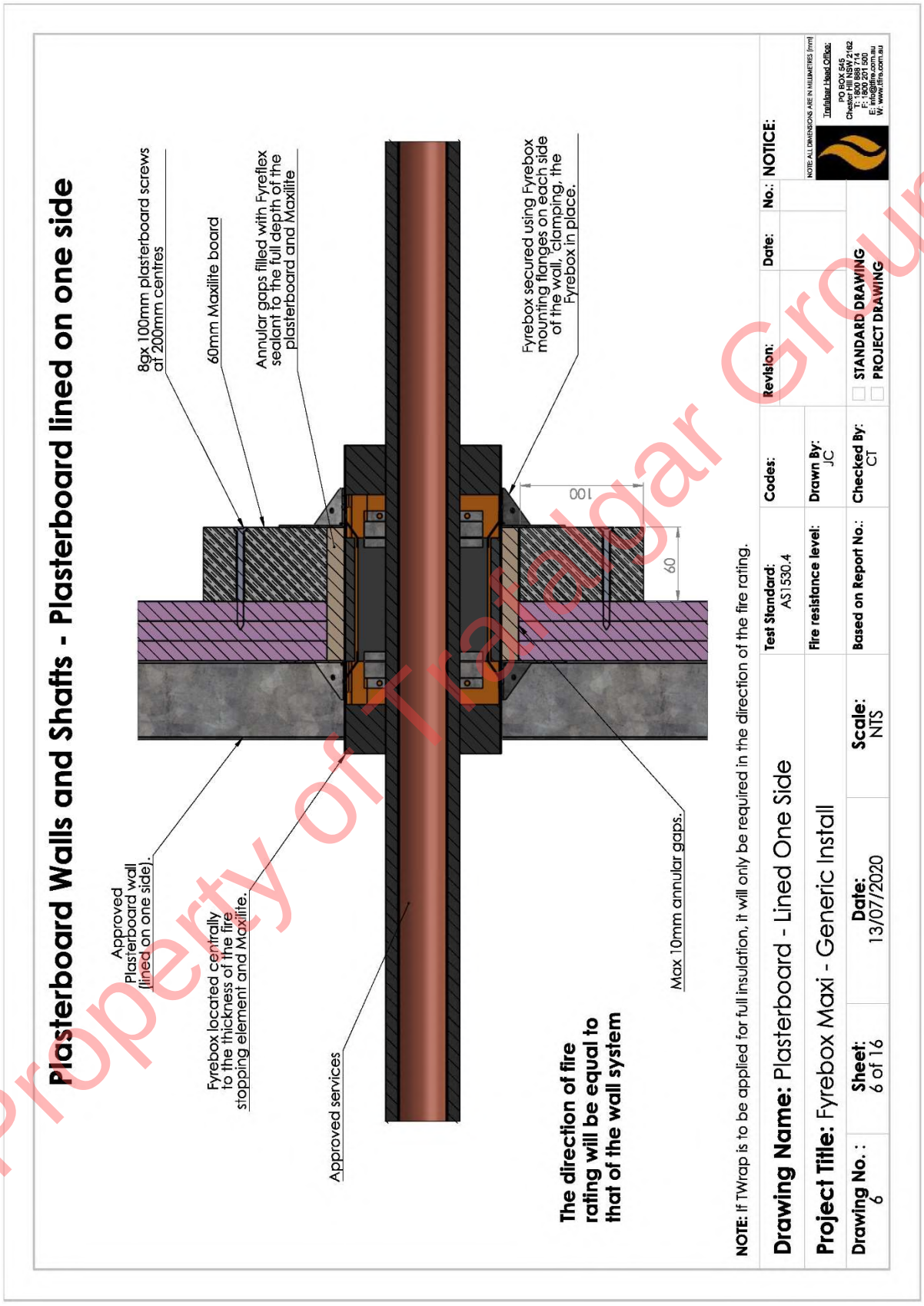

Figure 7 FyreBOX Maxi – AAC openings in walls part 1

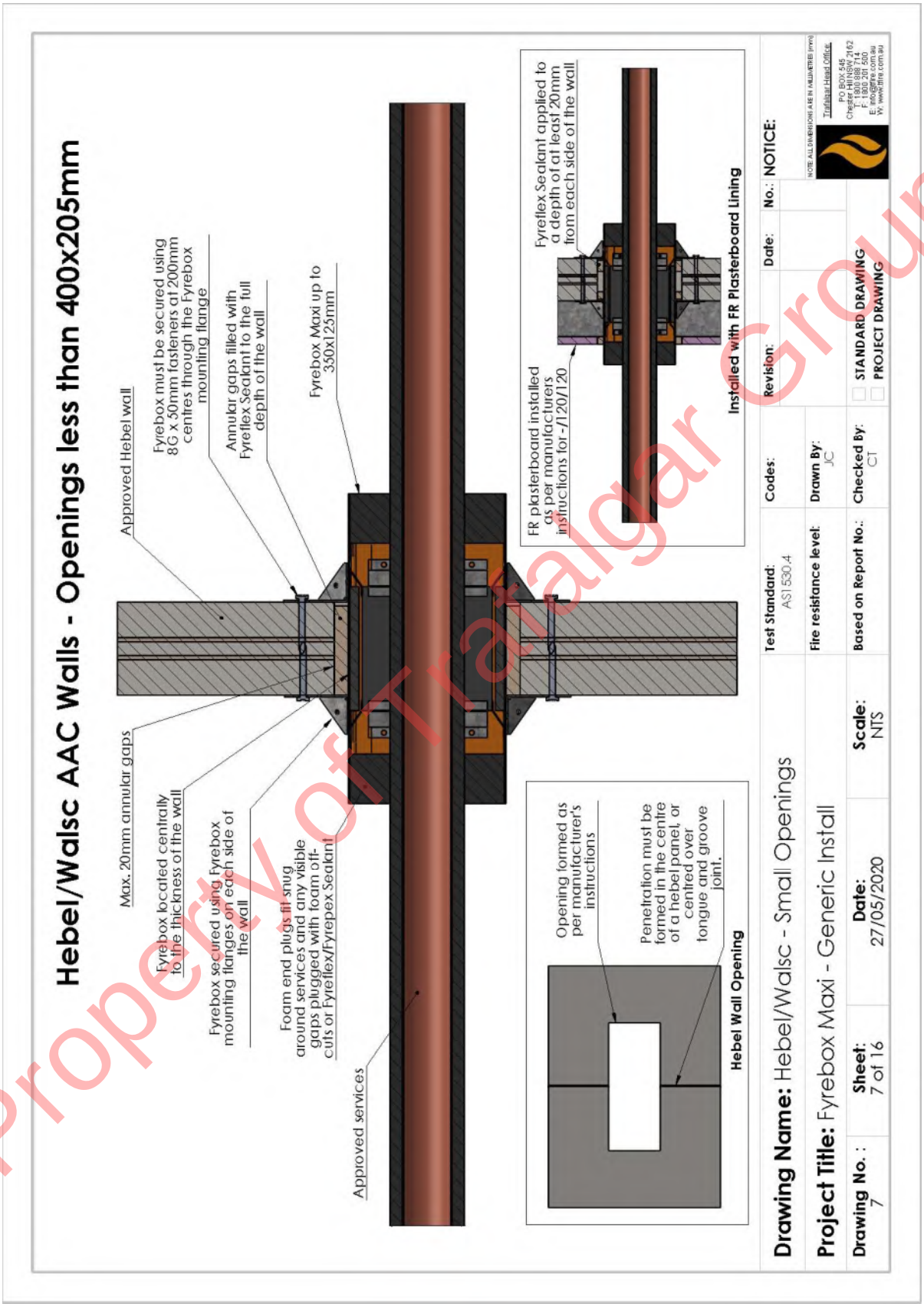

Figure 8 FyreBOX Maxi – AAC openings in walls part 2

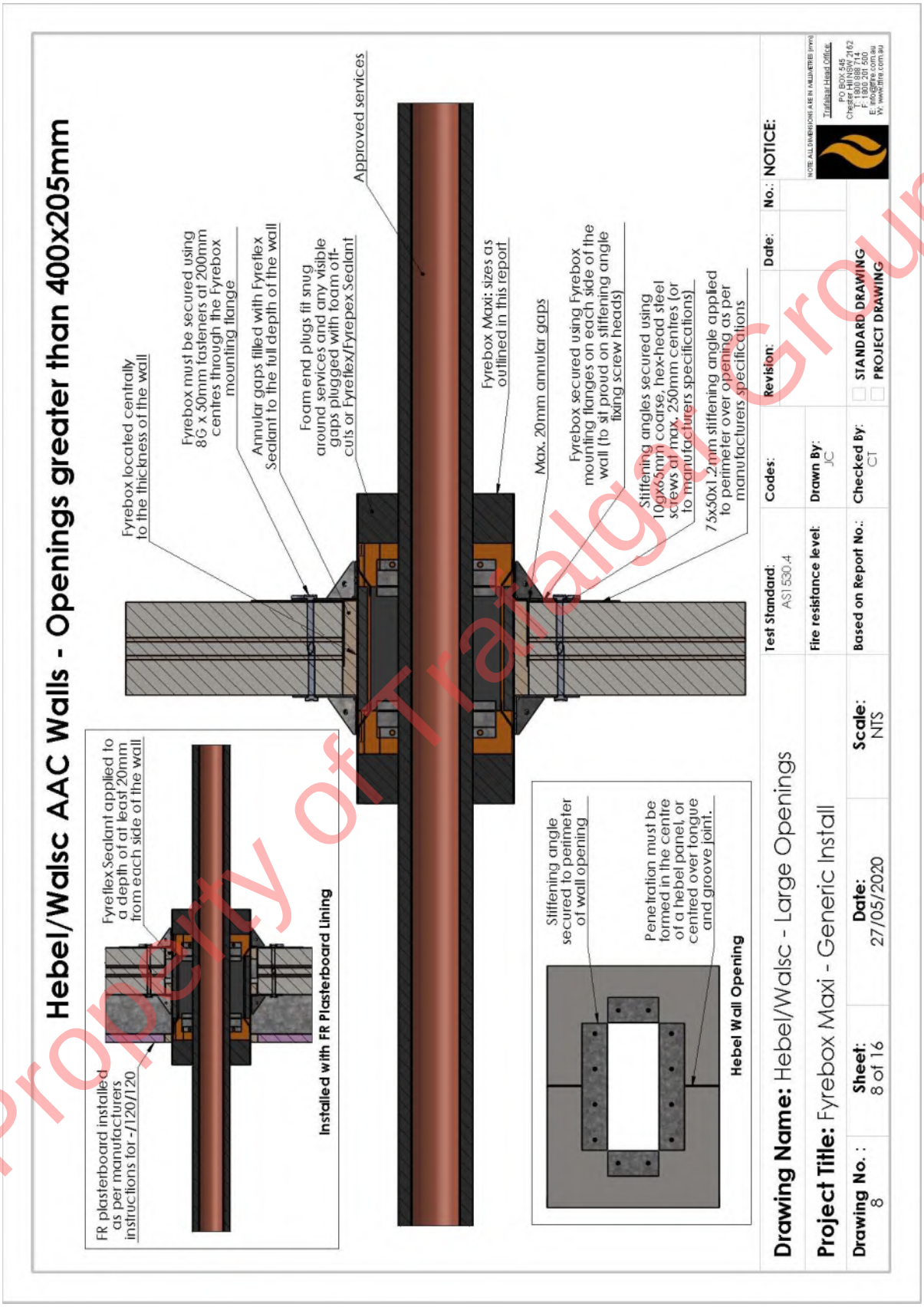

Figure 9 FyreBOX Maxi – 78 mm Speedpanel

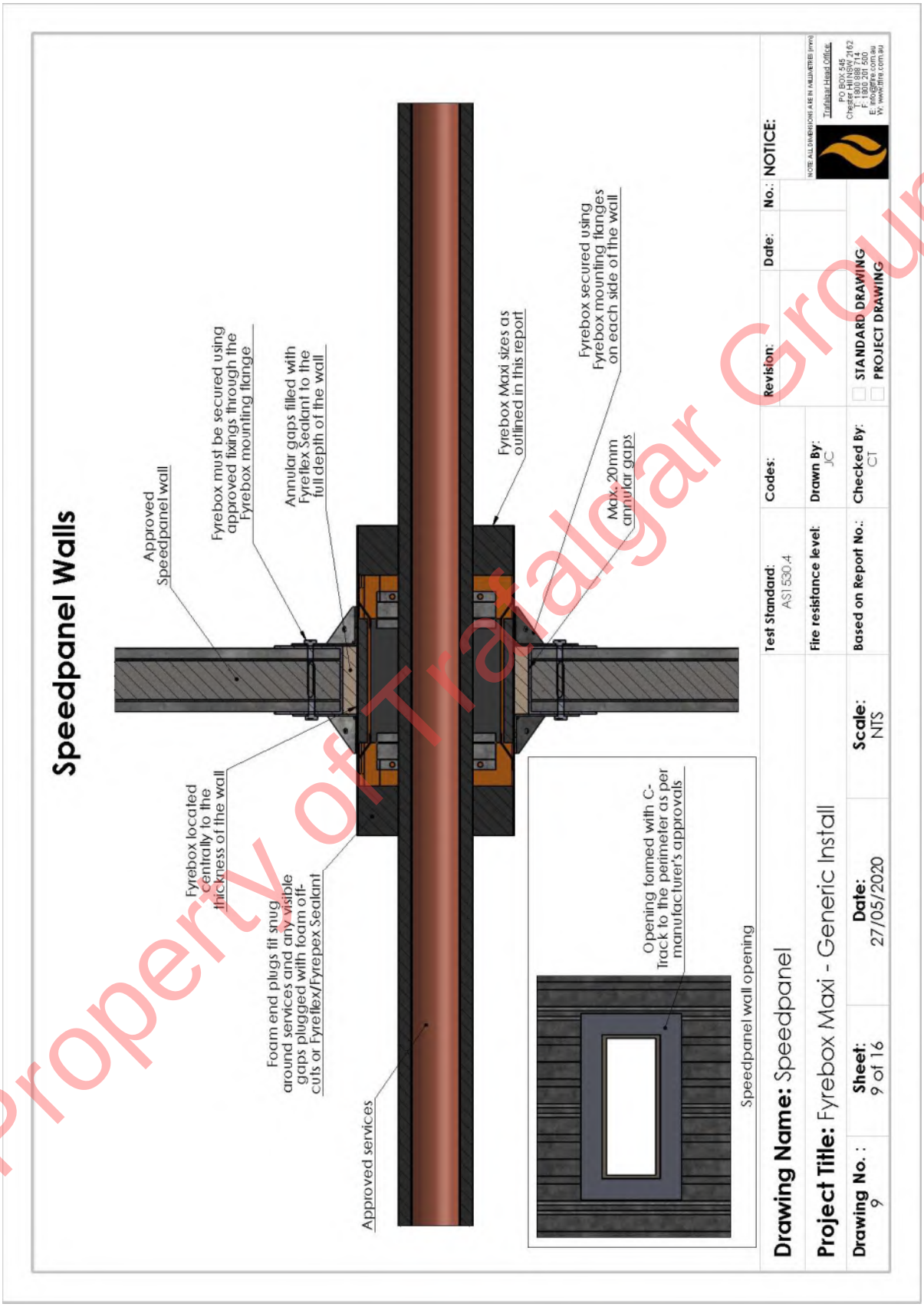

Figure 10 FyreBOX Maxi – less than 78 mm thick Speedpanel

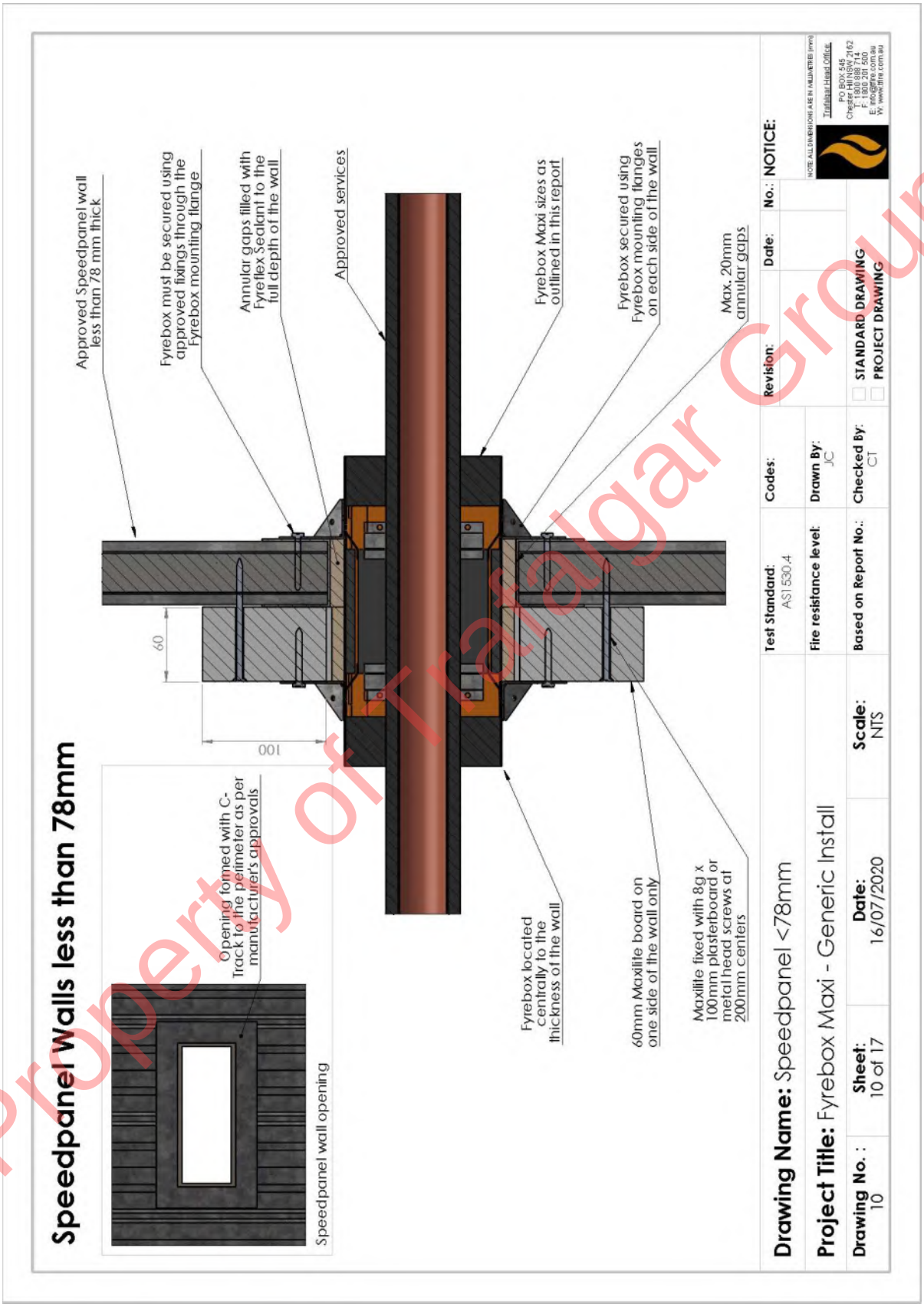

Figure 11 FyreBOX Maxi – Concrete slabs

Figure 12 FyreBOX Maxi – Maxilite panel

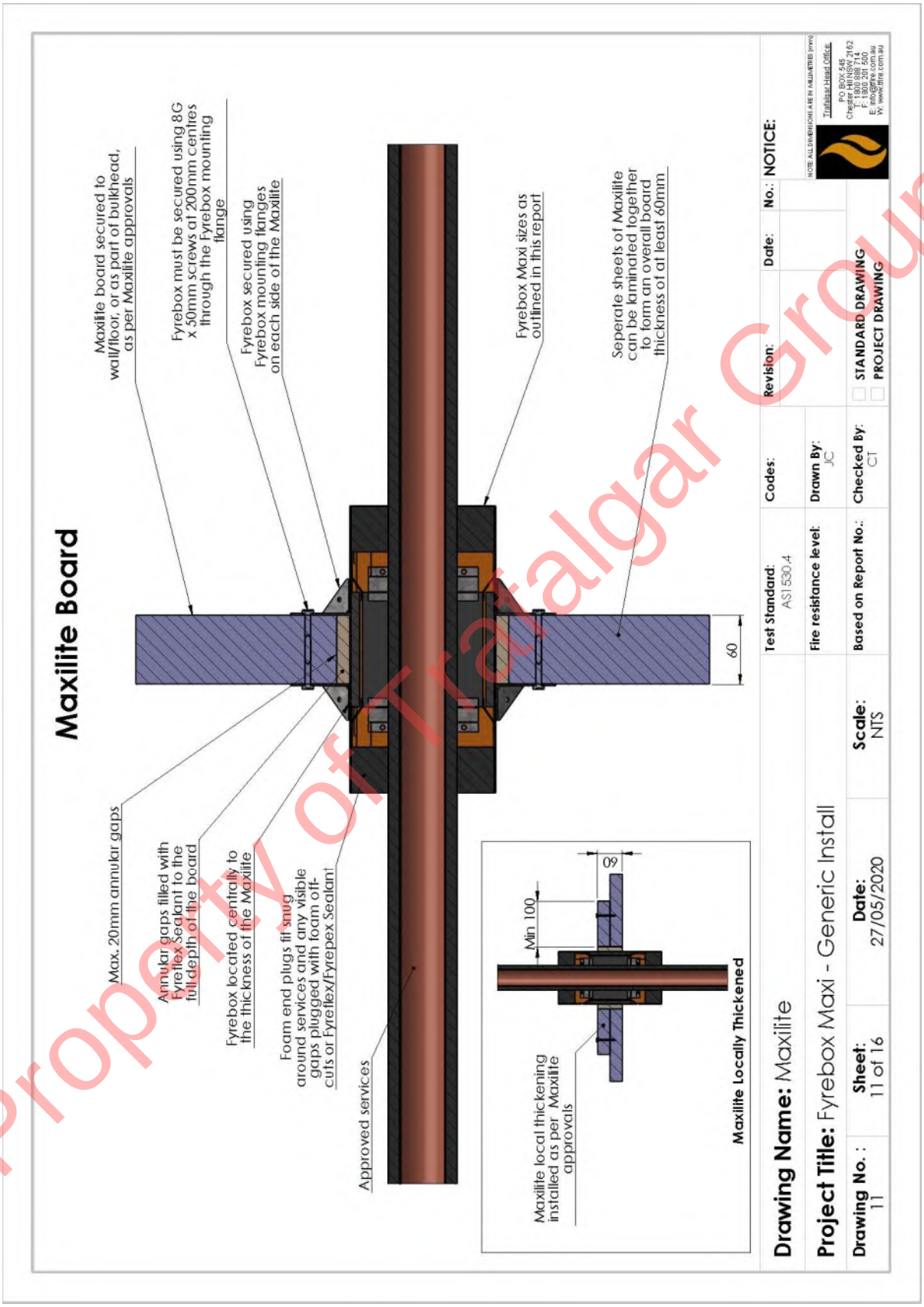

Figure 13 FyreBOX Maxi – TWrap standard wall details

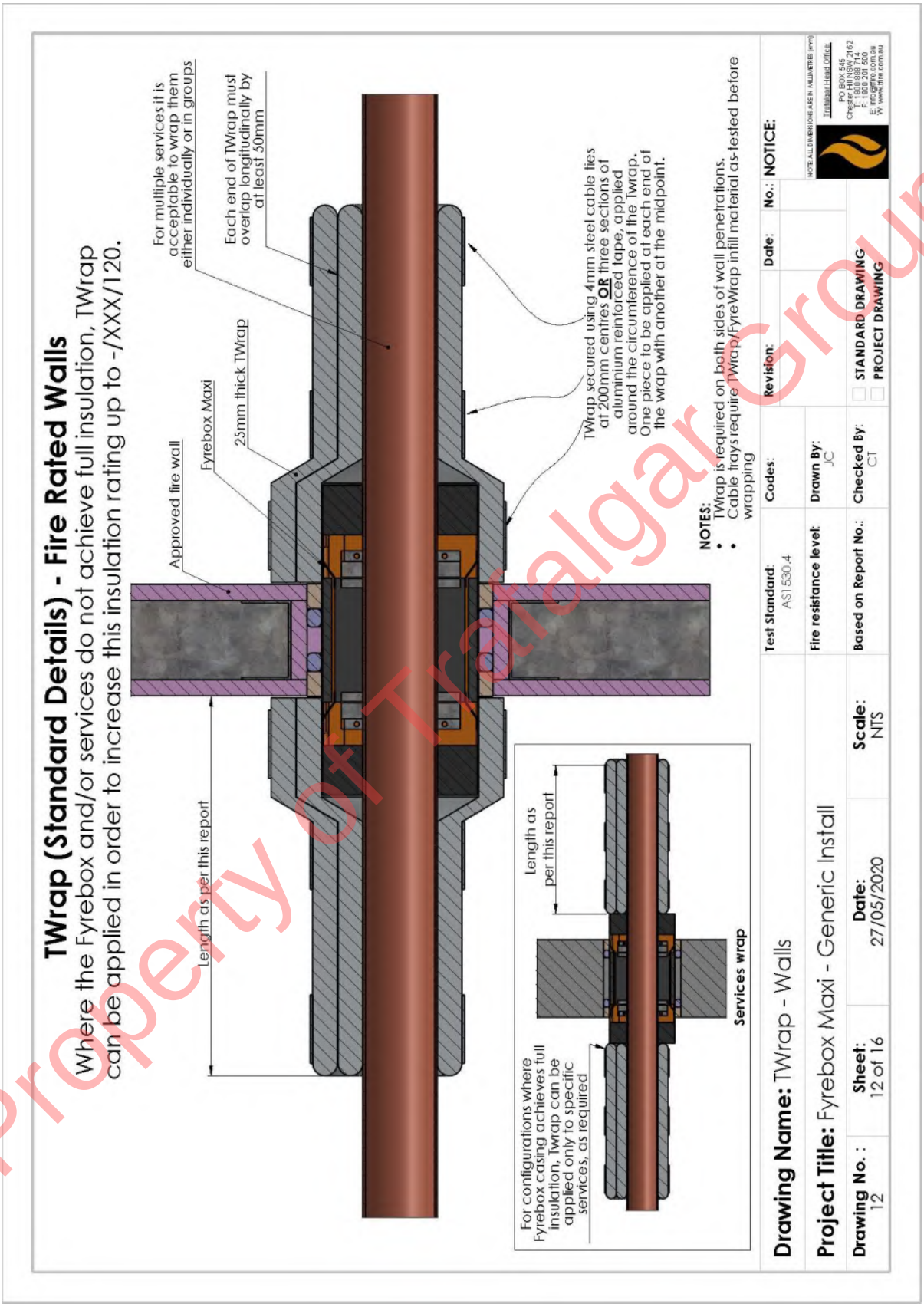

Figure 14 FyreBOX Maxi – TWrap standard floor details

Figure 15 FyreBOX Maxi – Stacked FyreBOXes

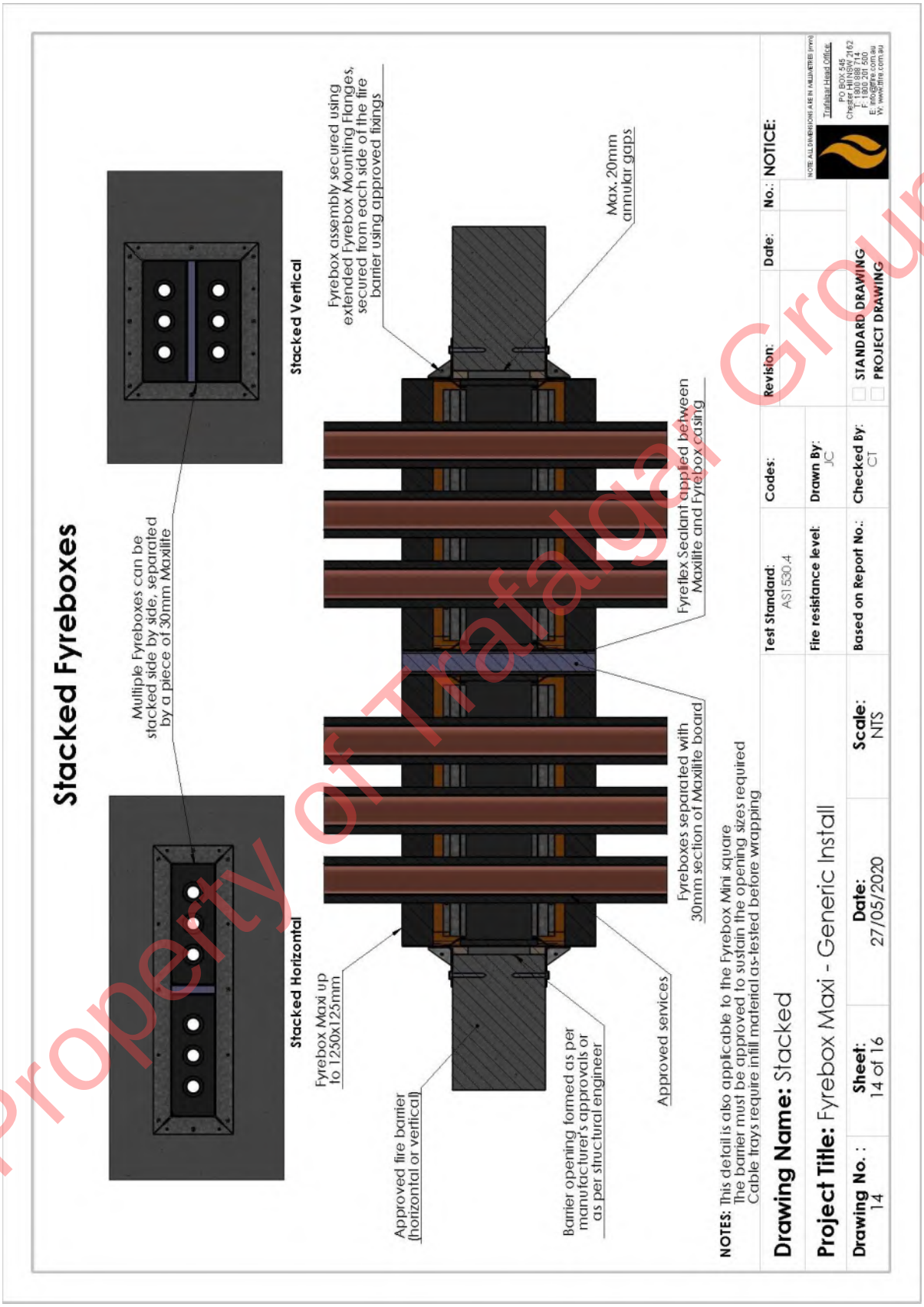

Figure 16 FyreBOX Maxi – Stacked FyreBOXes TWrap

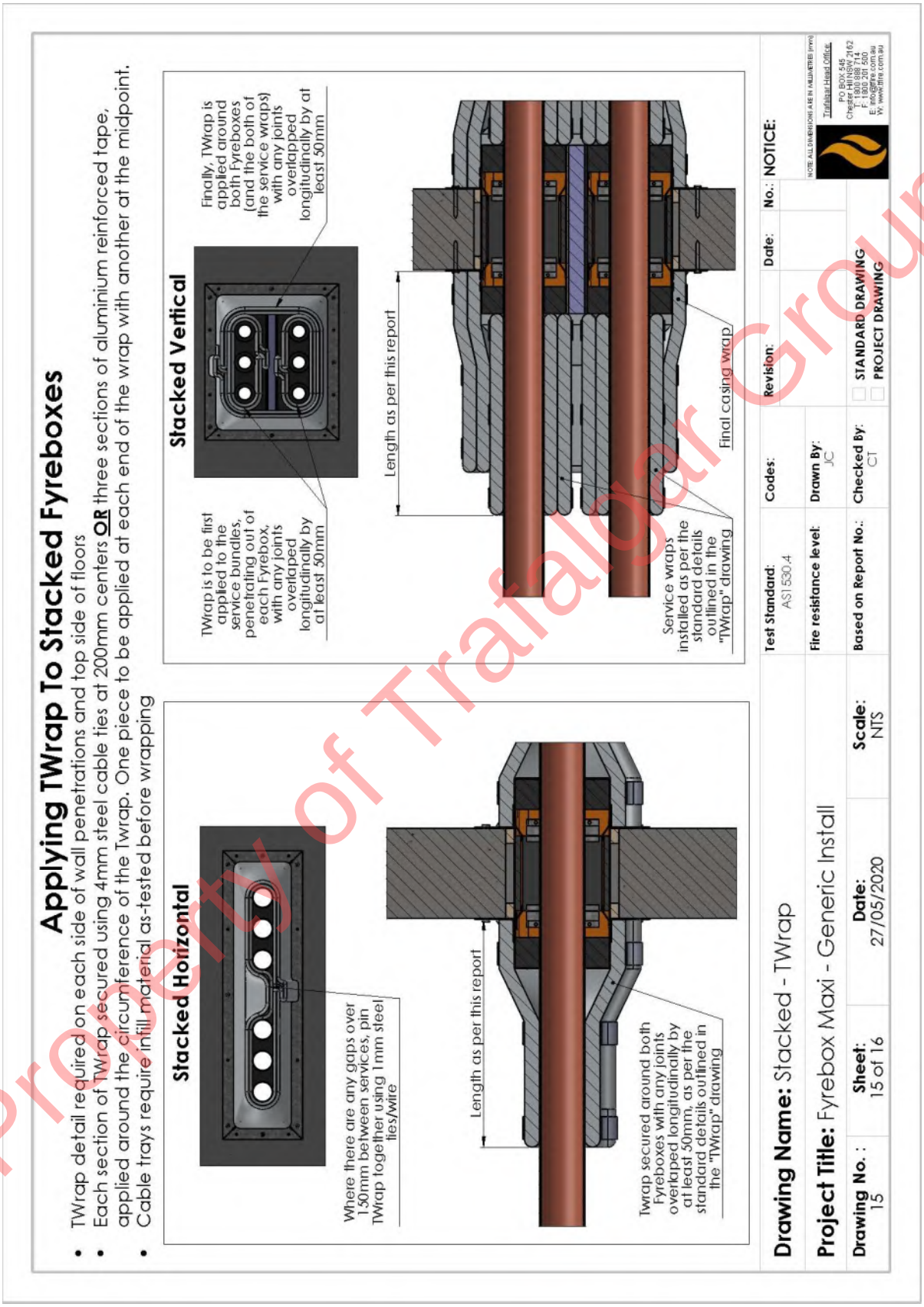

Figure 17 FyreBOX Maxi – TWrap to metal pipes above NB50

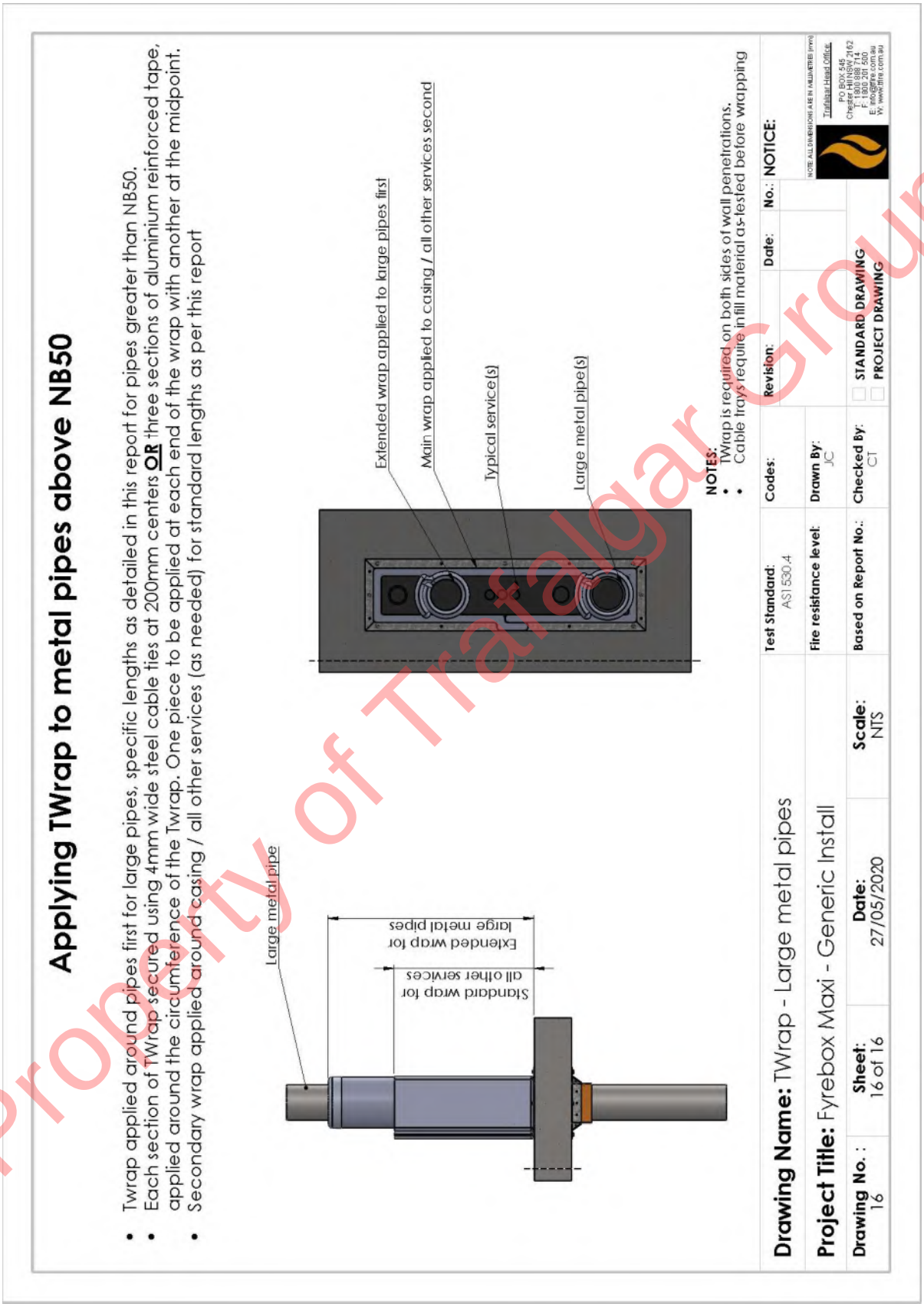

Figure 18 FyreBOX Cast In – Overview

Figure 19 FyreBOX Cast In – Installation Overview

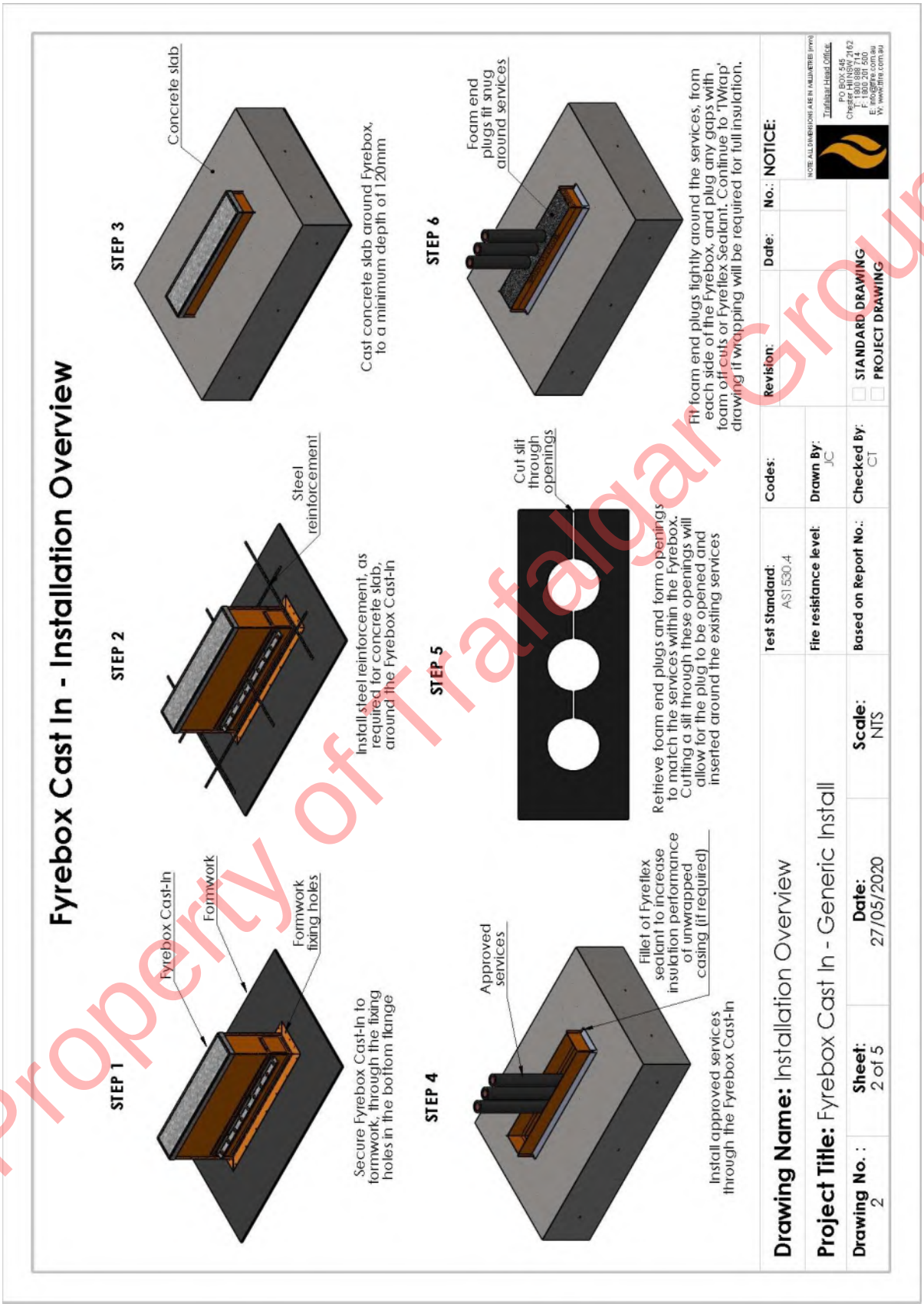

Figure 20 FyreBOX Cast In – Concrete slabs

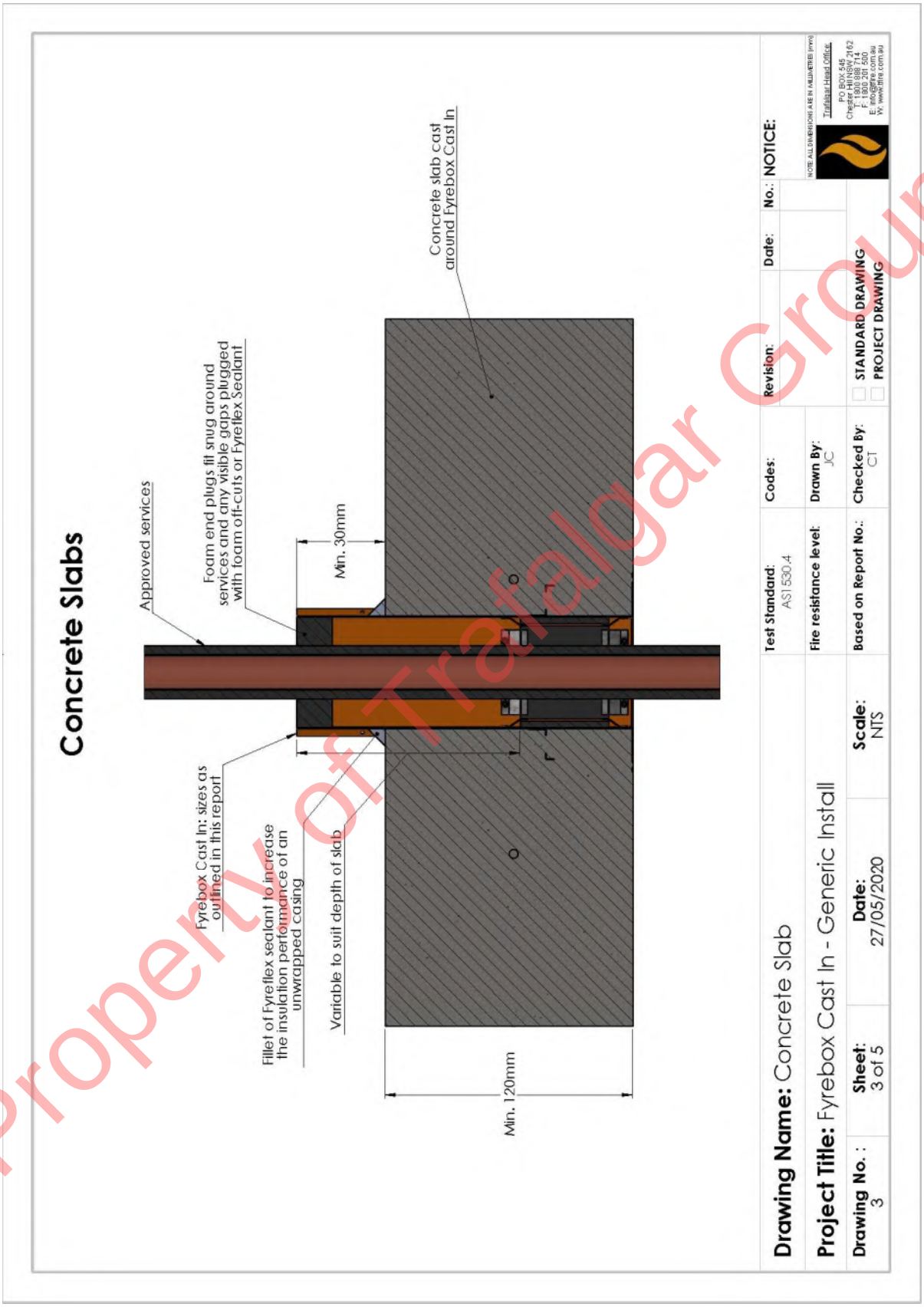

Figure 21 FyreBOX Cast In – Bondek slabs

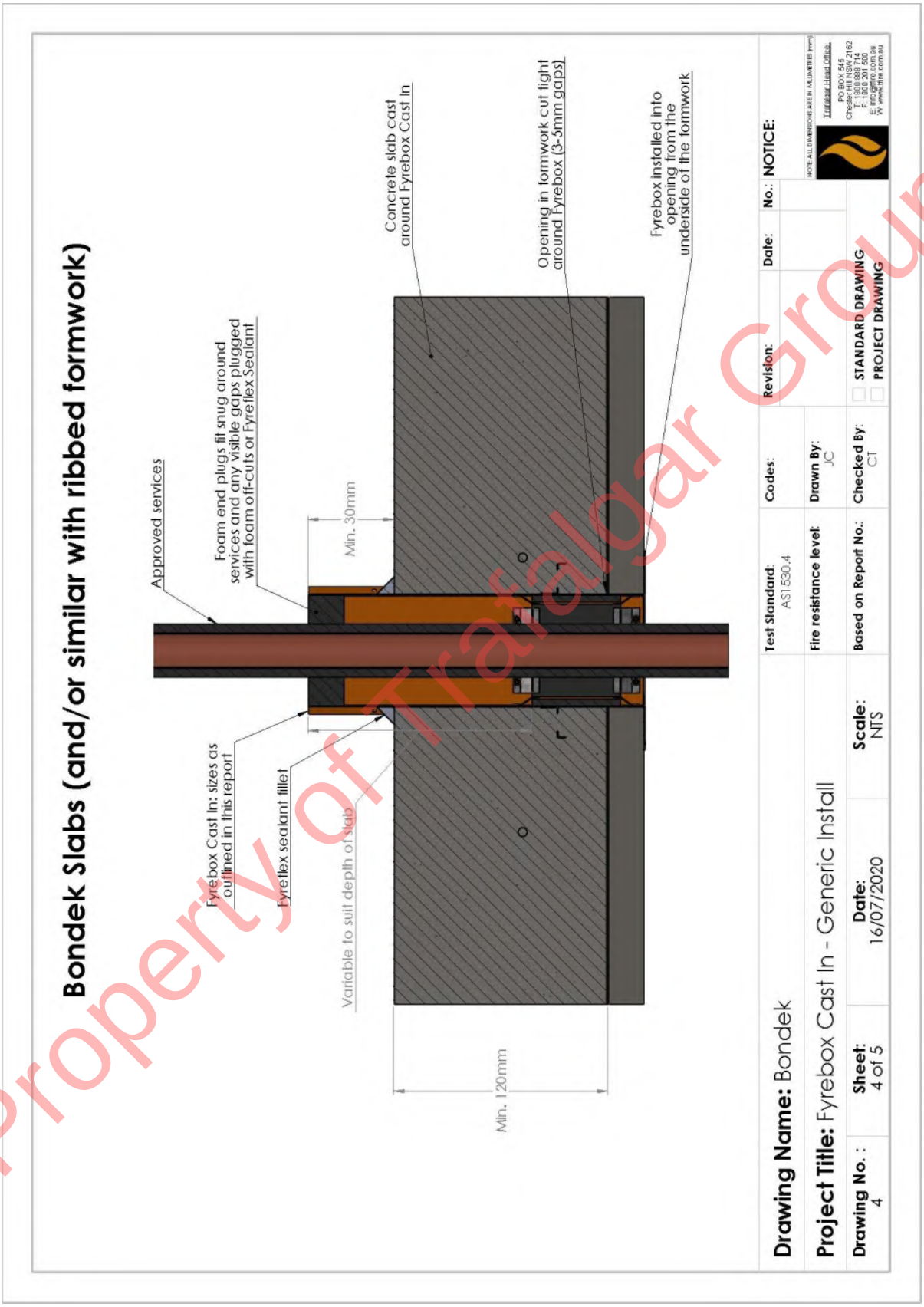

Figure 22 FyreBOX Cast In – TWrap installation

Figure 23 FyreBOX Mini – Product Overview

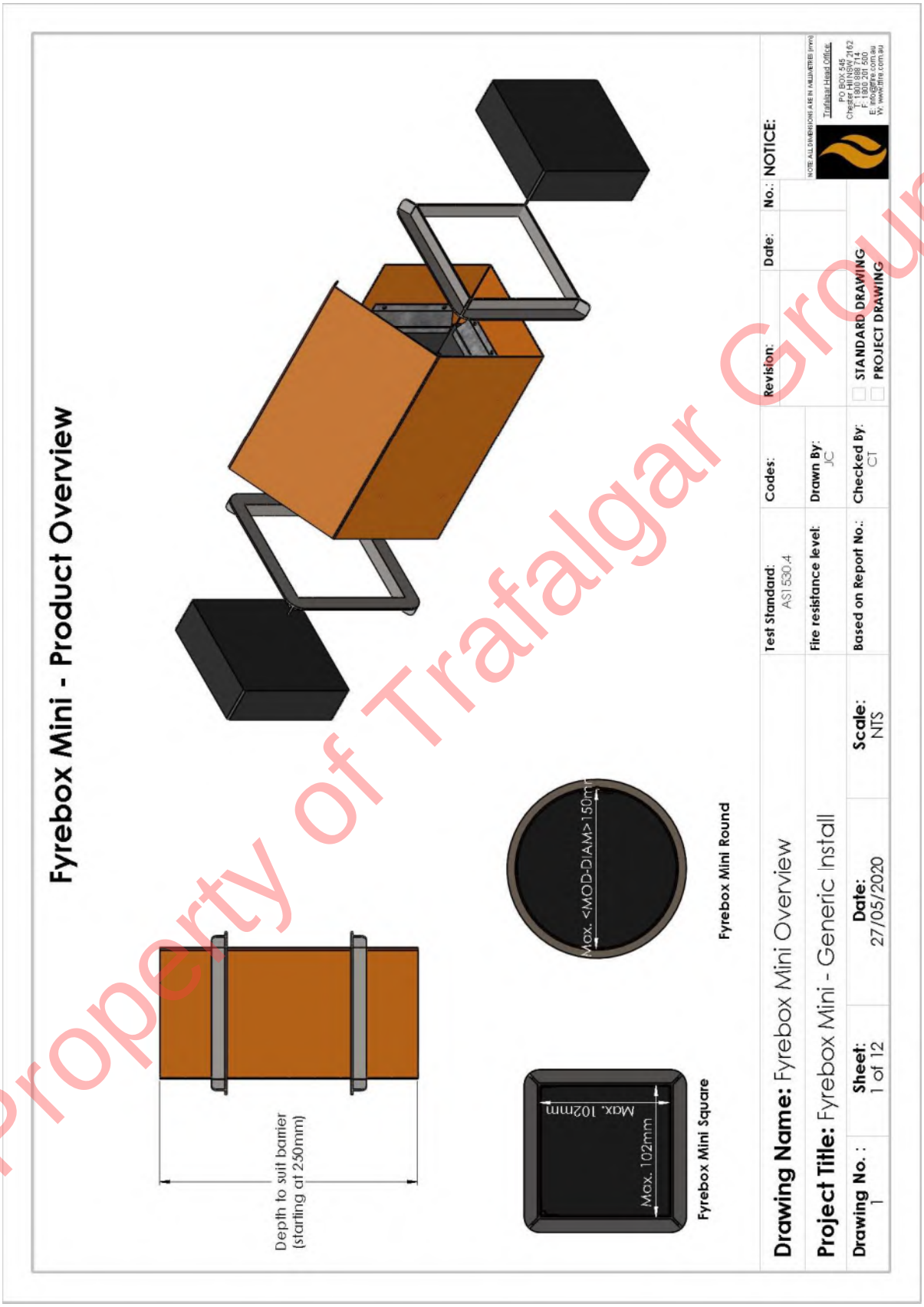

Figure 24 FyreBOX Mini – Annular gaps

Figure 25 FyreBOX Mini – Installation Overview

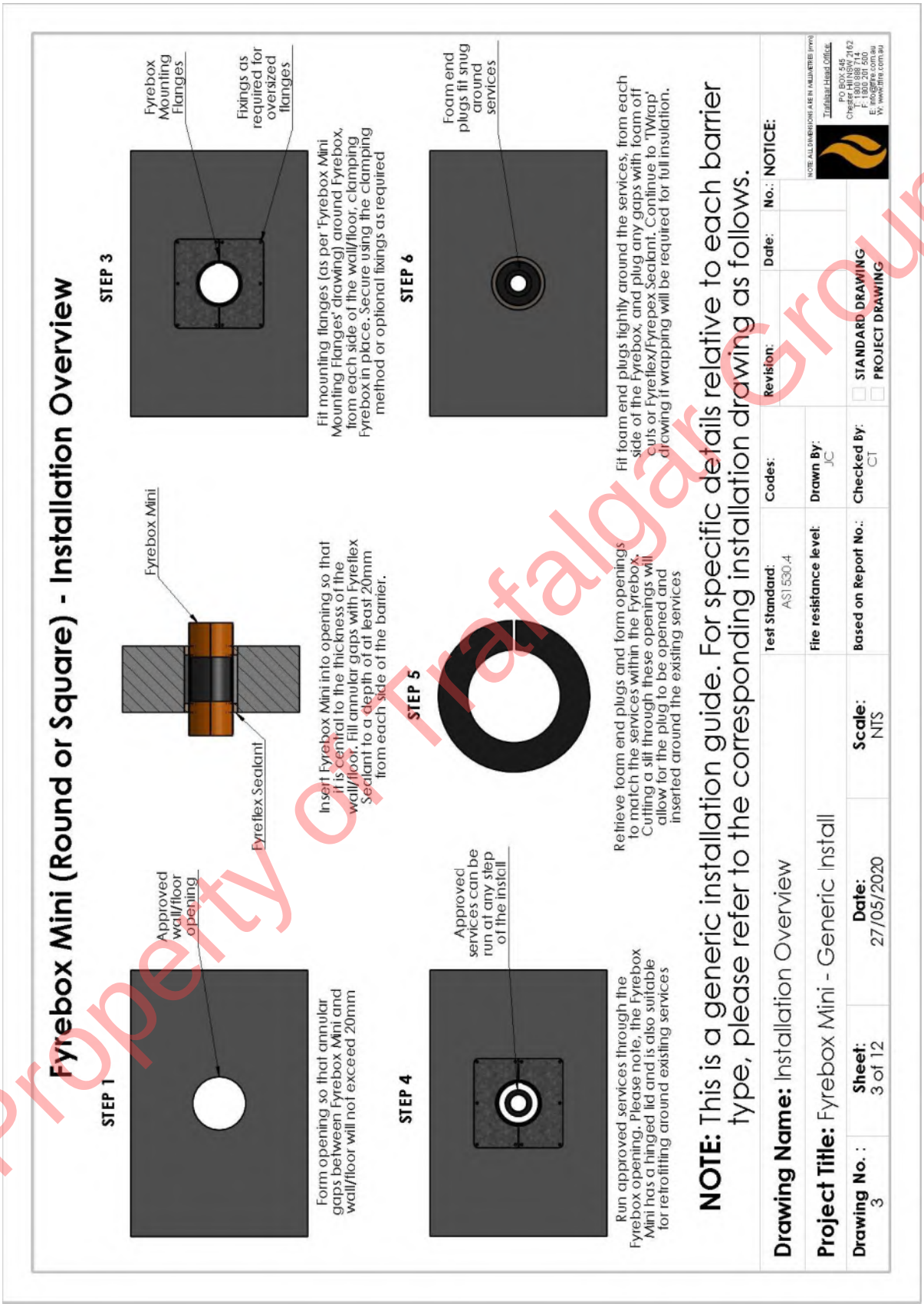

Figure 26 FyreBOX Mini – Concrete/Masonry walls

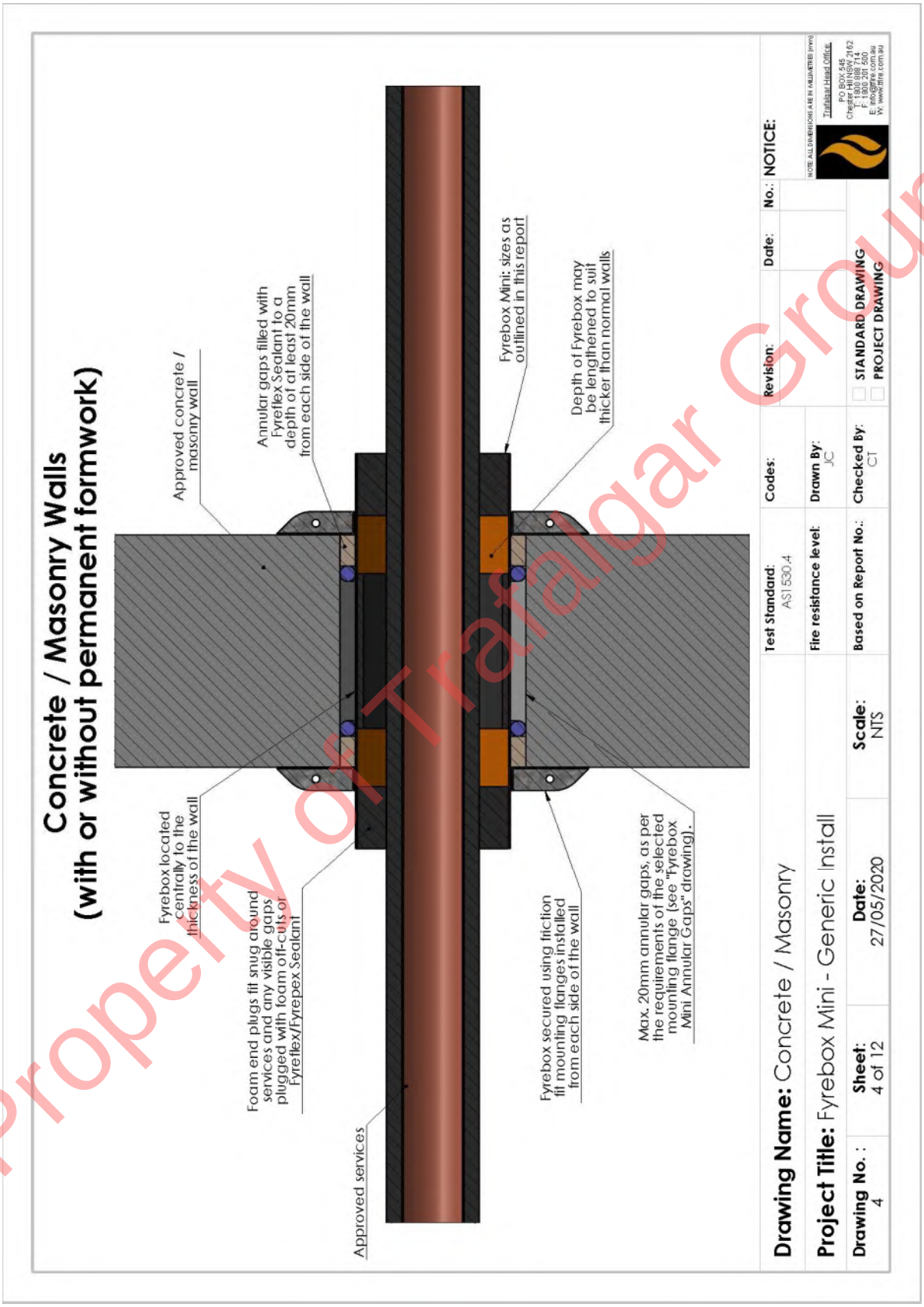

Figure 27 FyreBOX Mini – Plasterboard walls Part 1

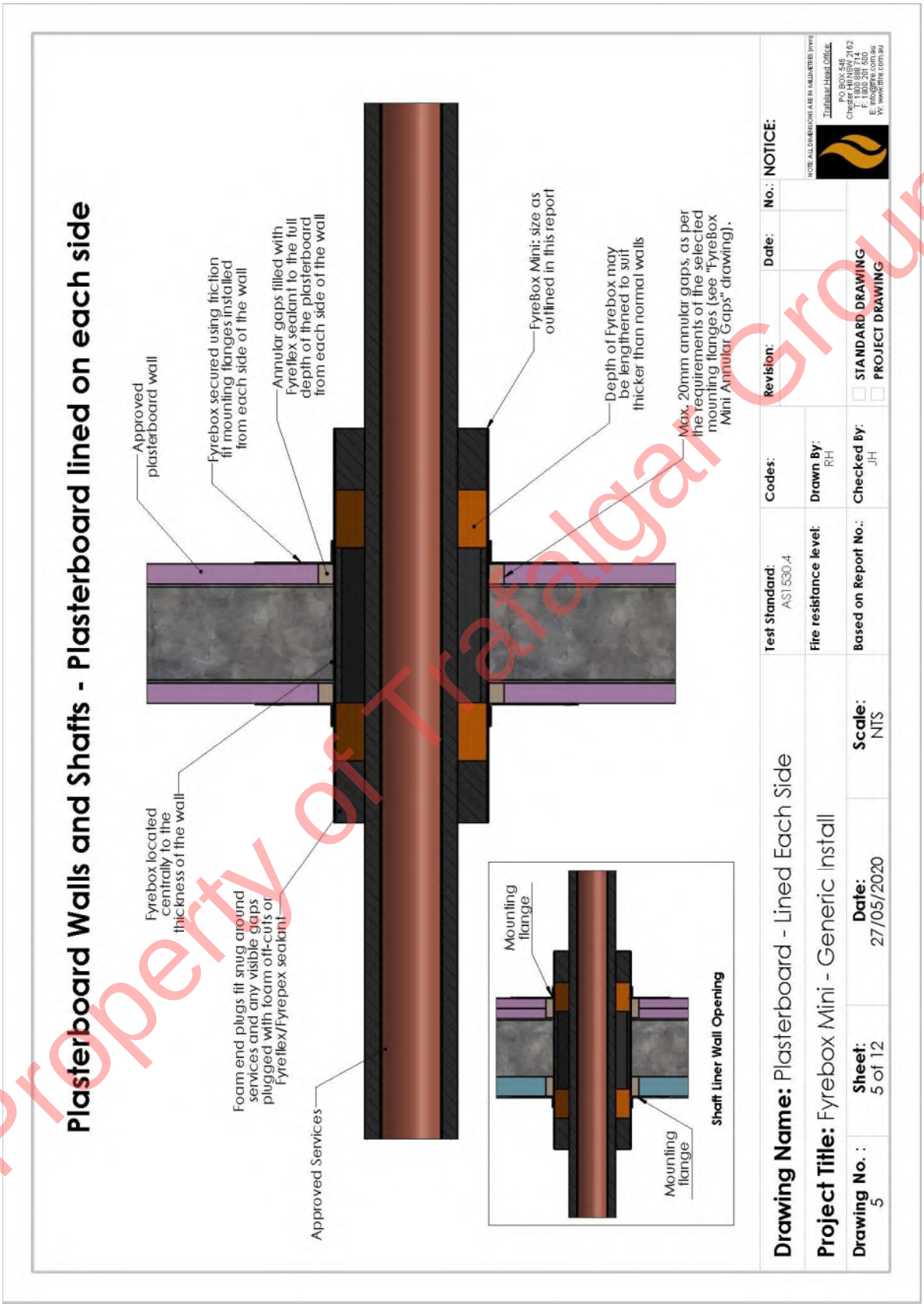

Figure 28 FyreBOX Mini – Plasterboard walls Part 2

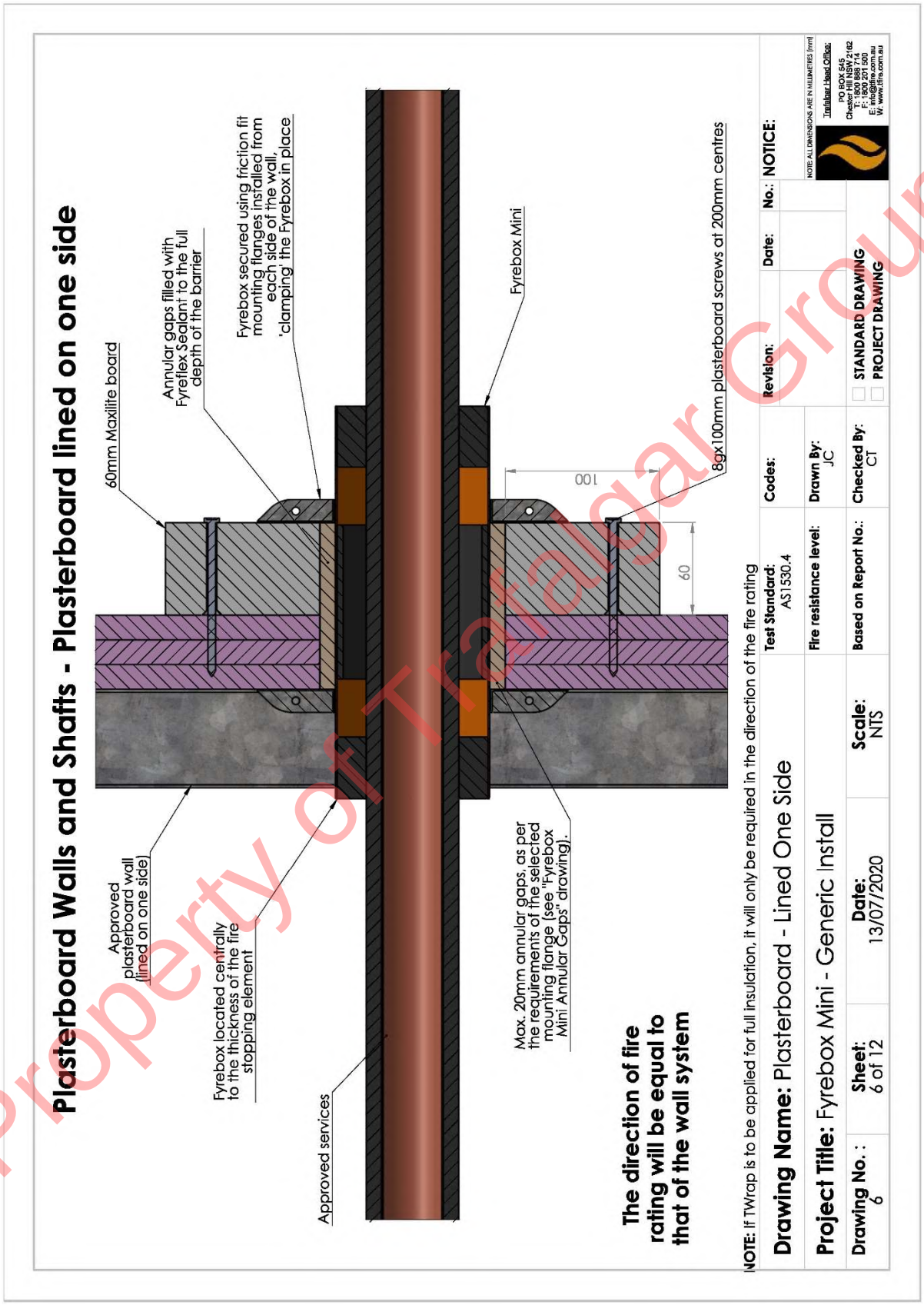

Figure 29 FyreBOX Mini – AAC walls

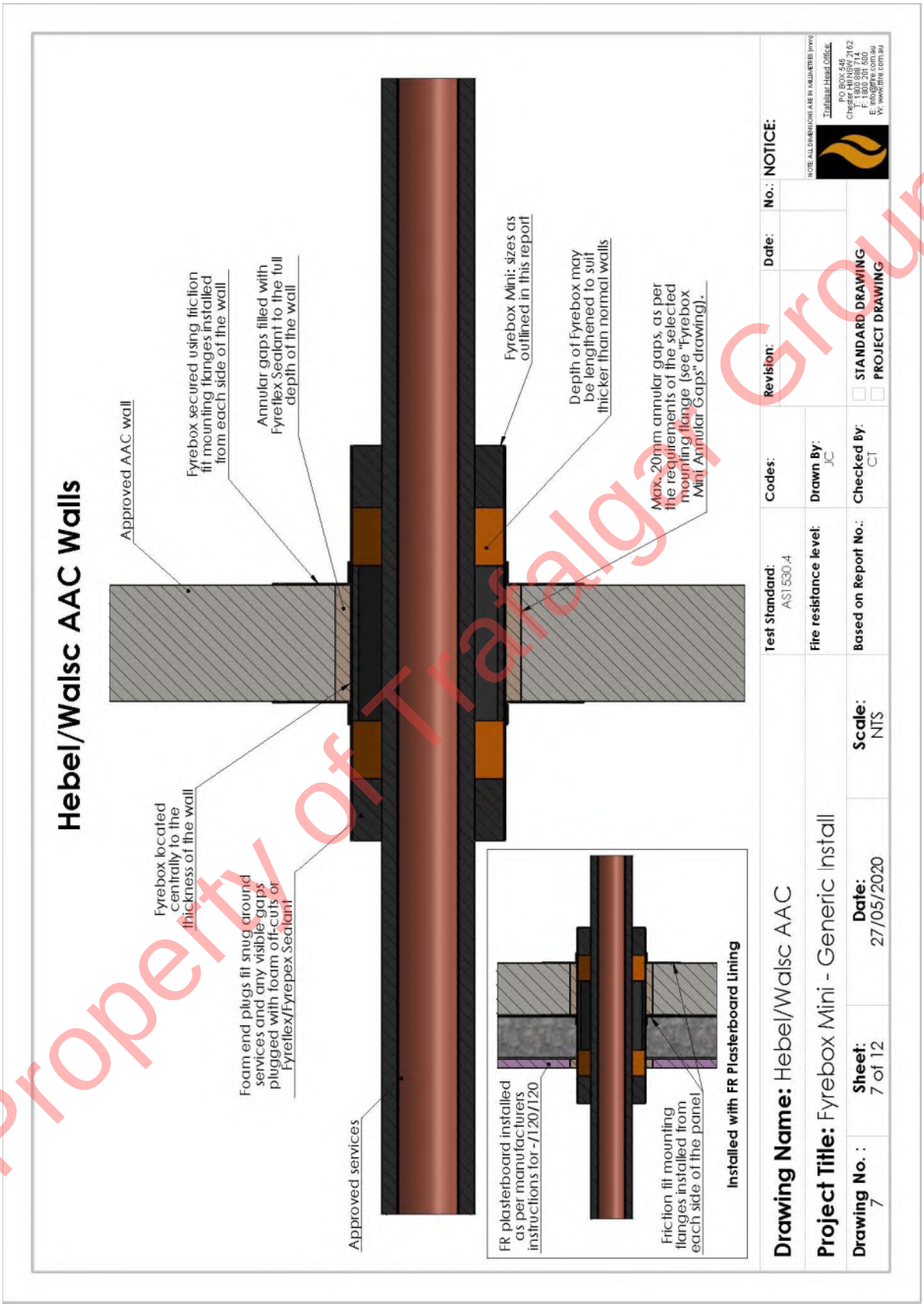

Figure 30 FyreBOX Mini – 78 mm Speedpanel walls

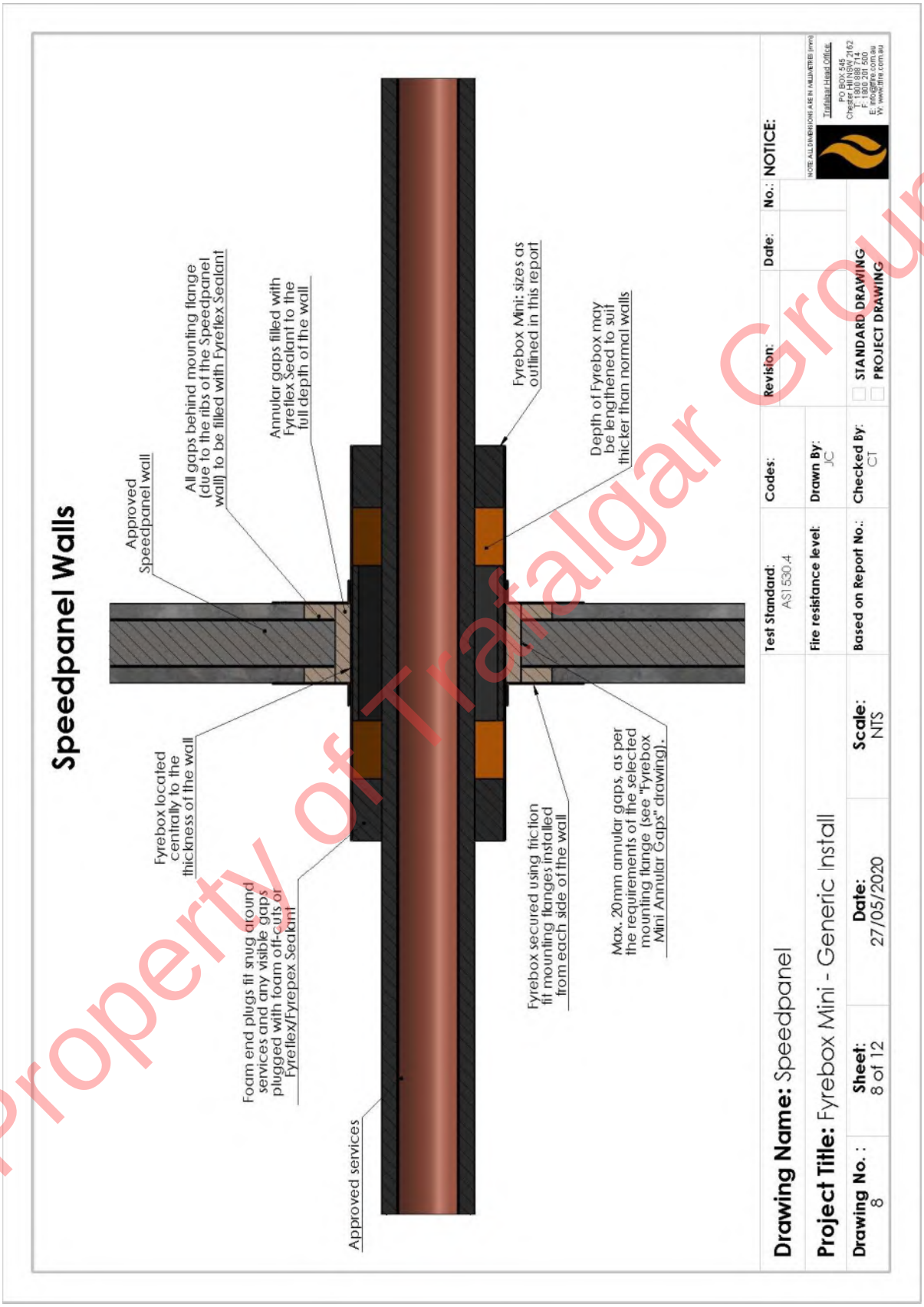

Figure 31 FyreBOX Mini – Less than 78 mm thick Speedpanel walls

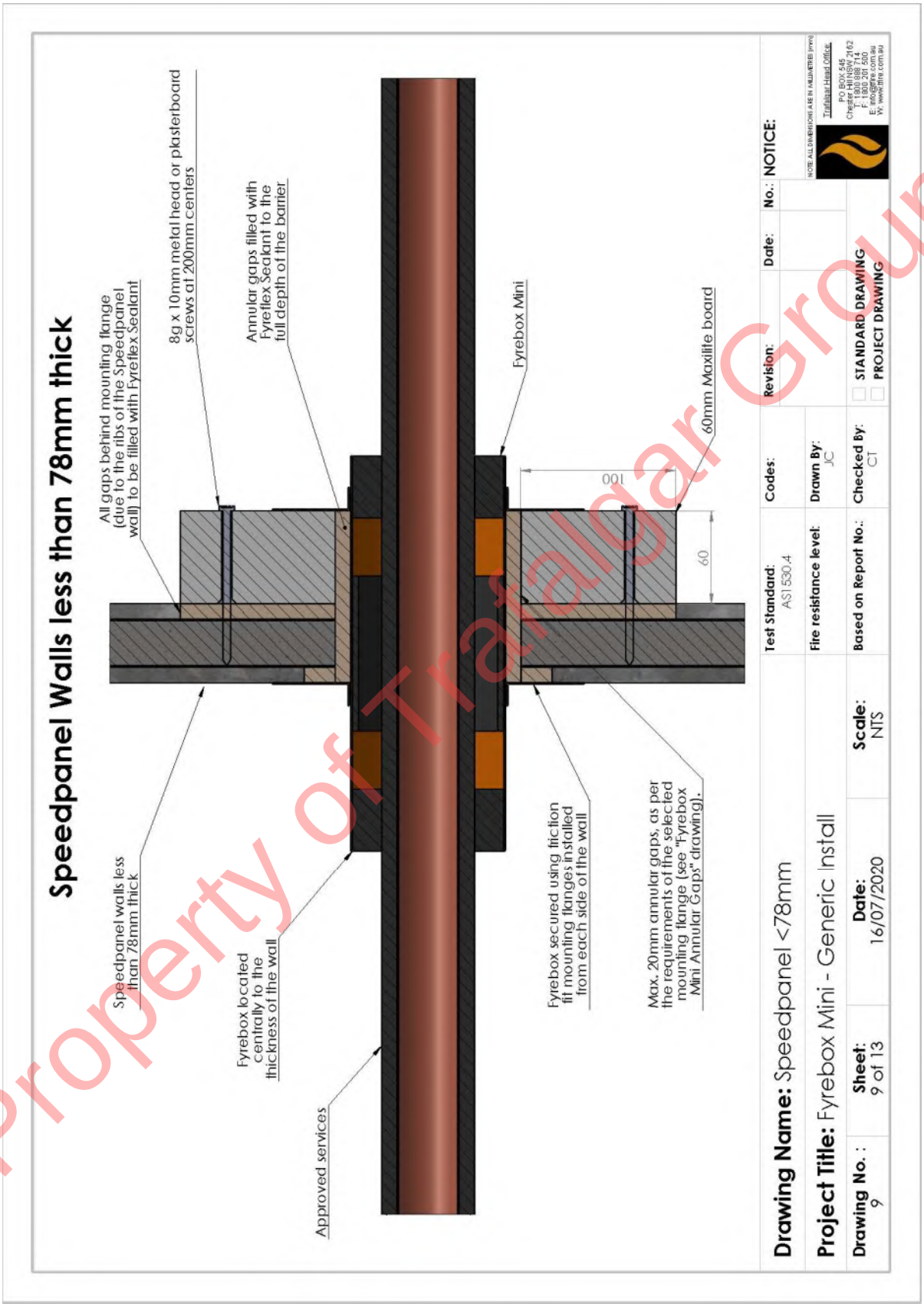

Figure 32 FyreBOX Mini – Concrete slabs

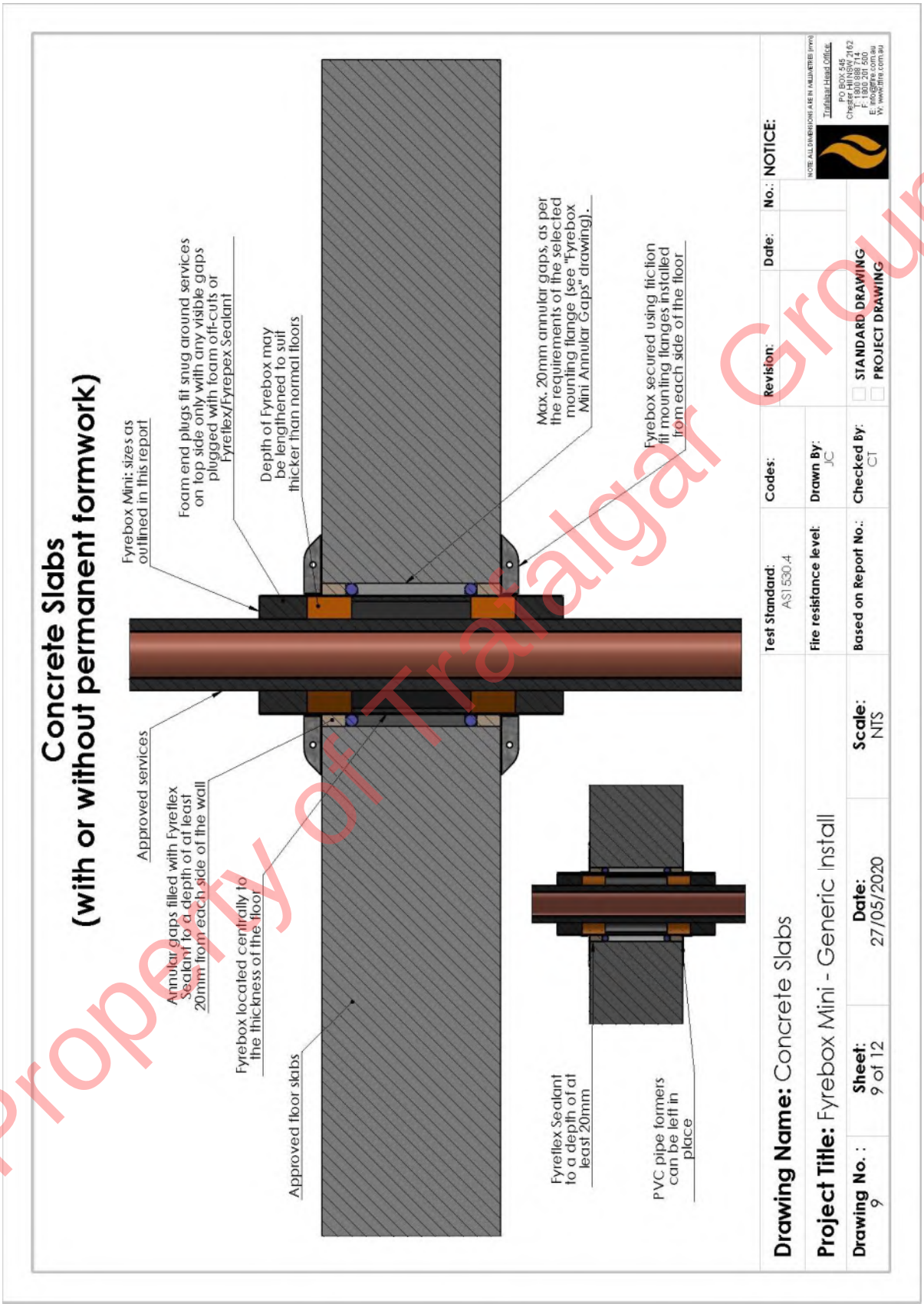

Figure 33 FyreBOX Mini – Maxilite panel up-grade

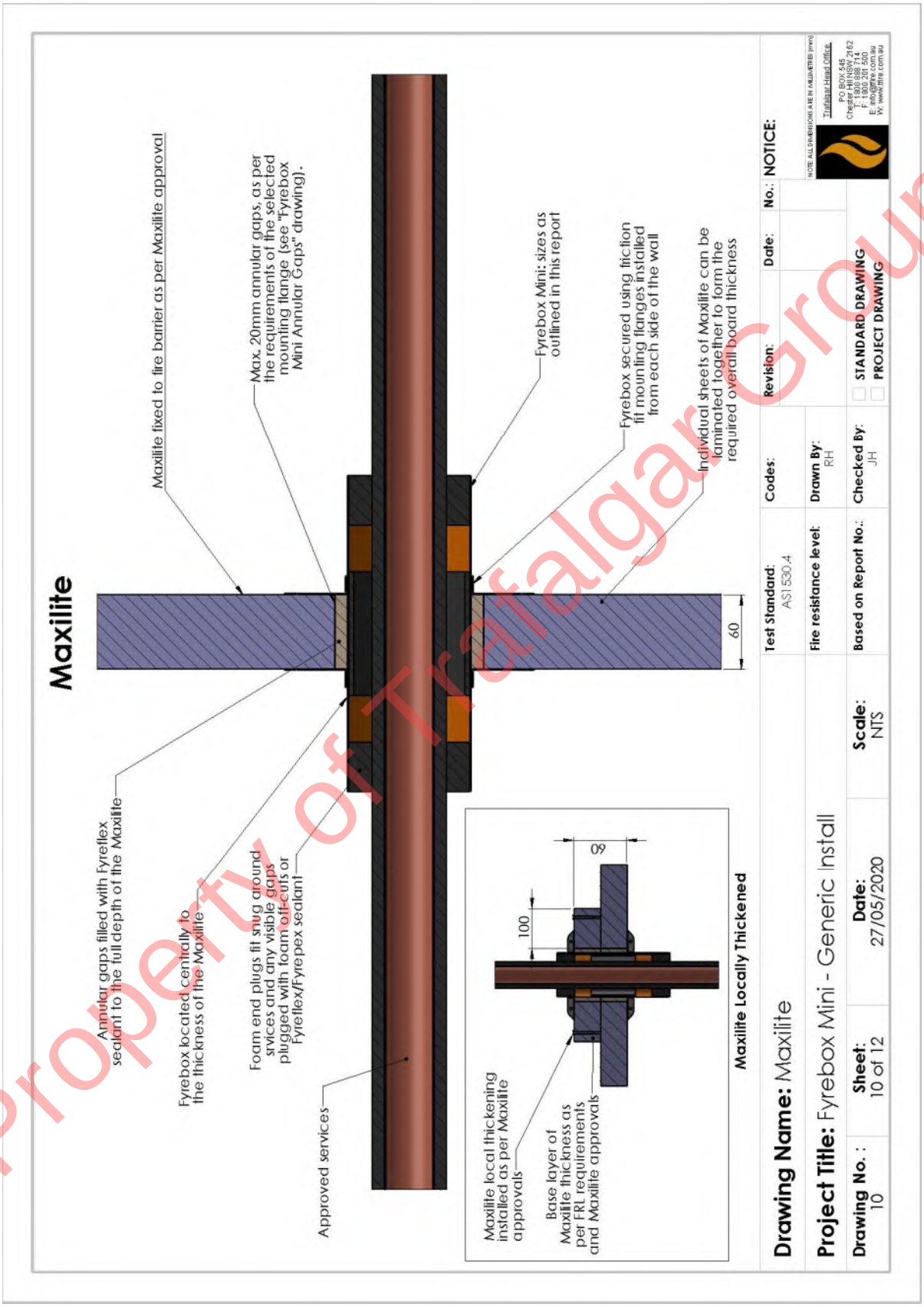

Figure 34 FyreBOX Mini – TWrap upgrade walls

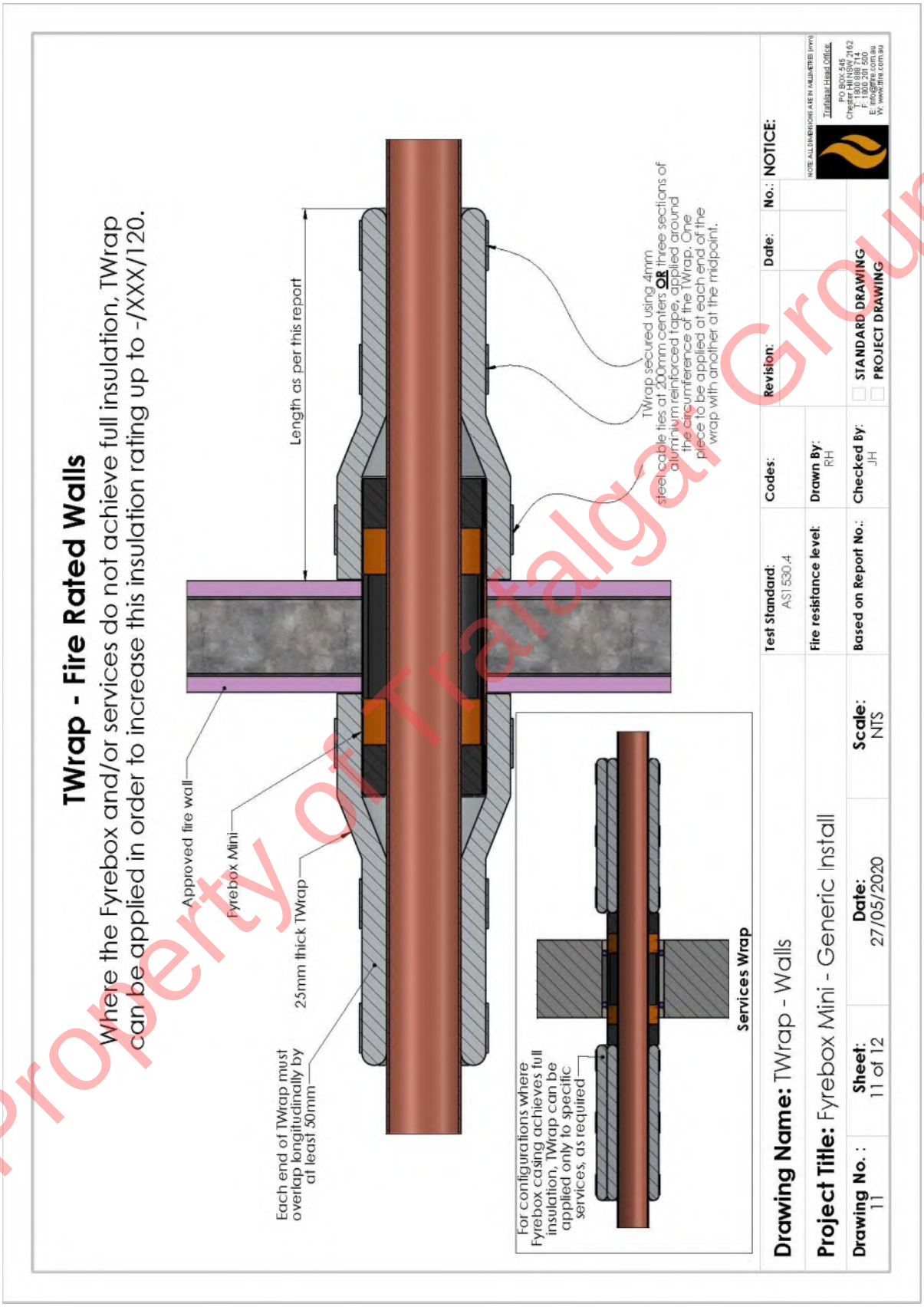

Figure 35 FyreBOX Mini – TWrap upgrade floors

Figure 36 FyreBOX Slab Mount – Product Overview

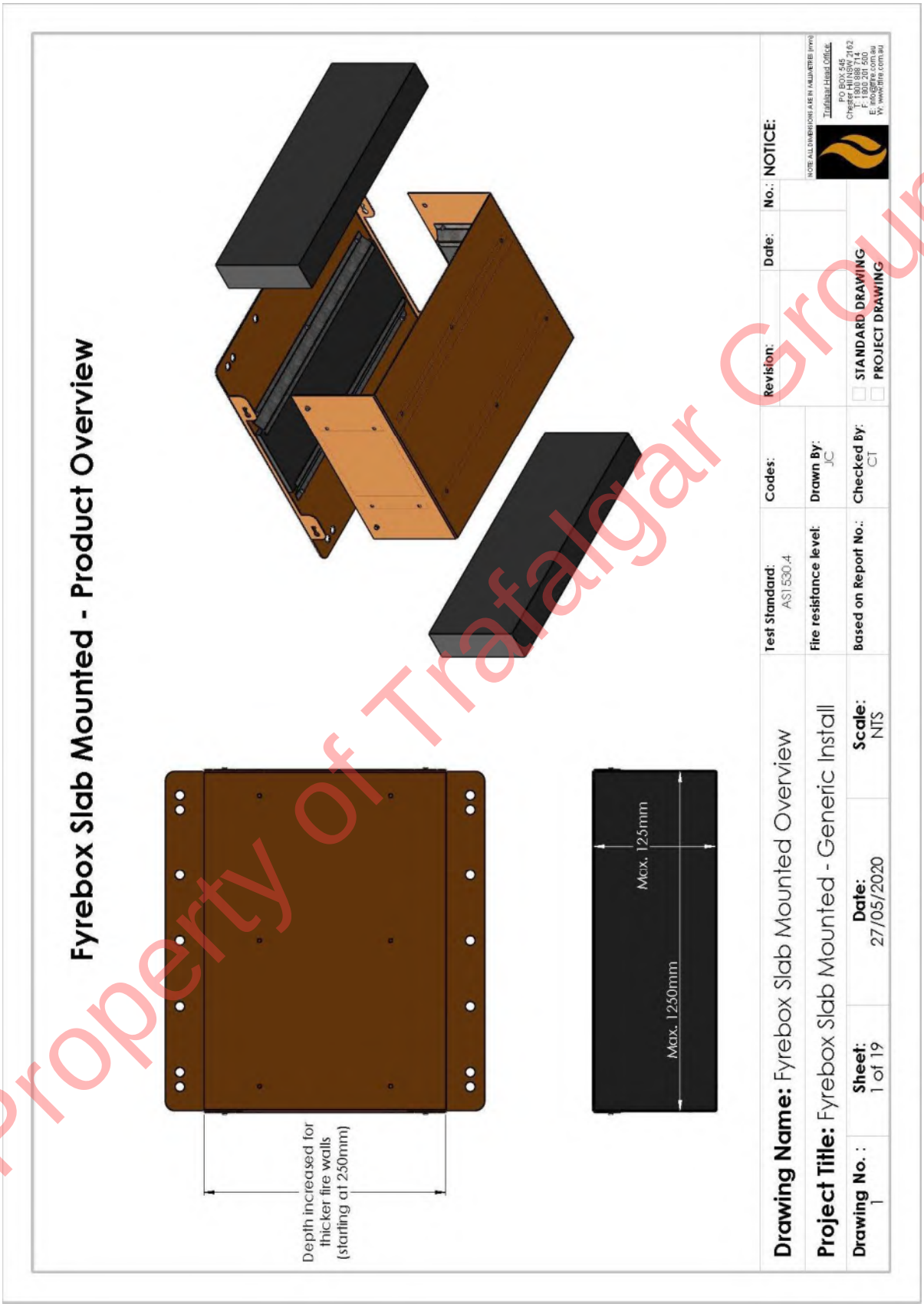

Figure 37 FyreBOX Slab Mount – Installation Overview

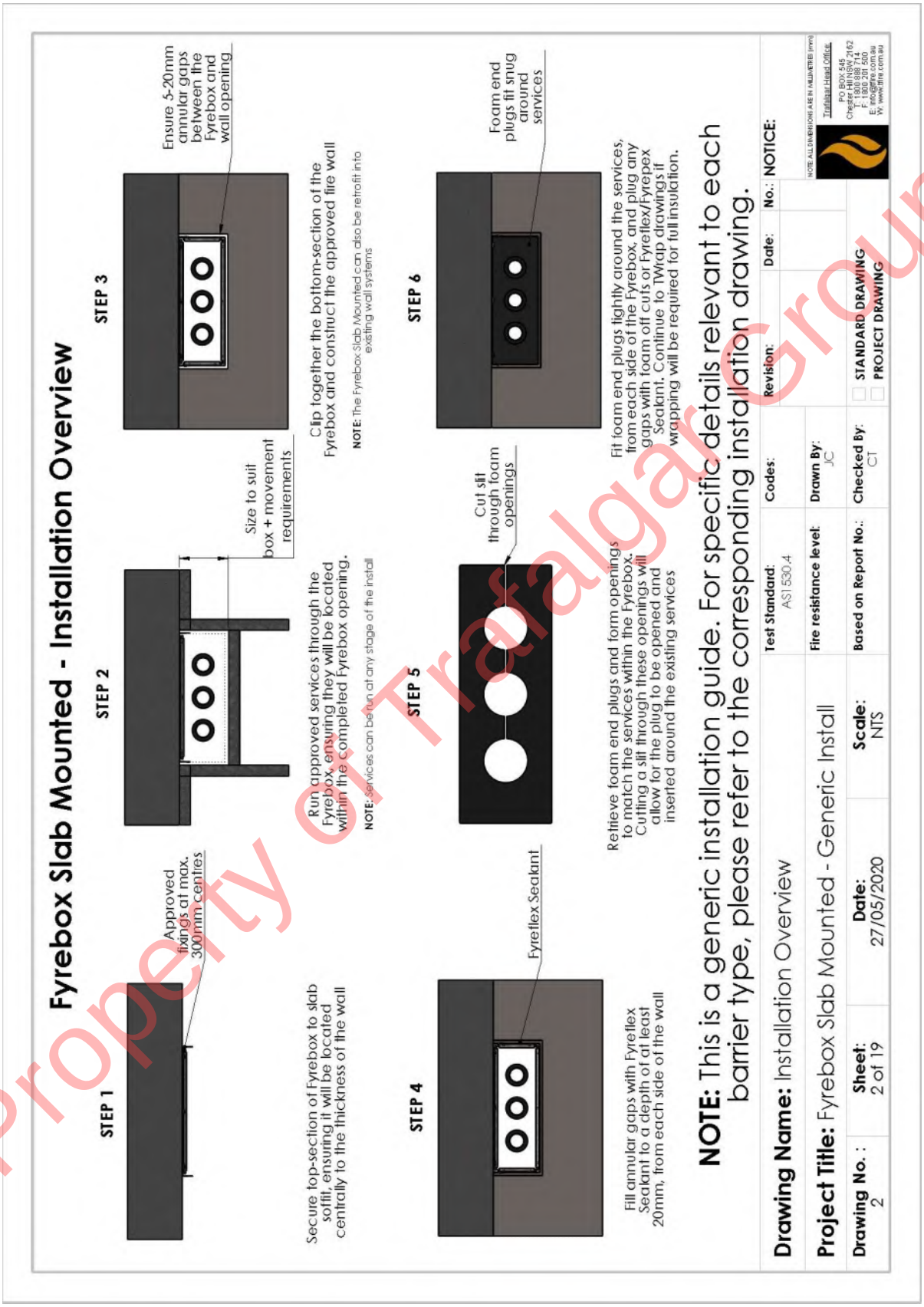

Figure 38 FyreBOX Slab Mount – With plasterboard walls Part 1

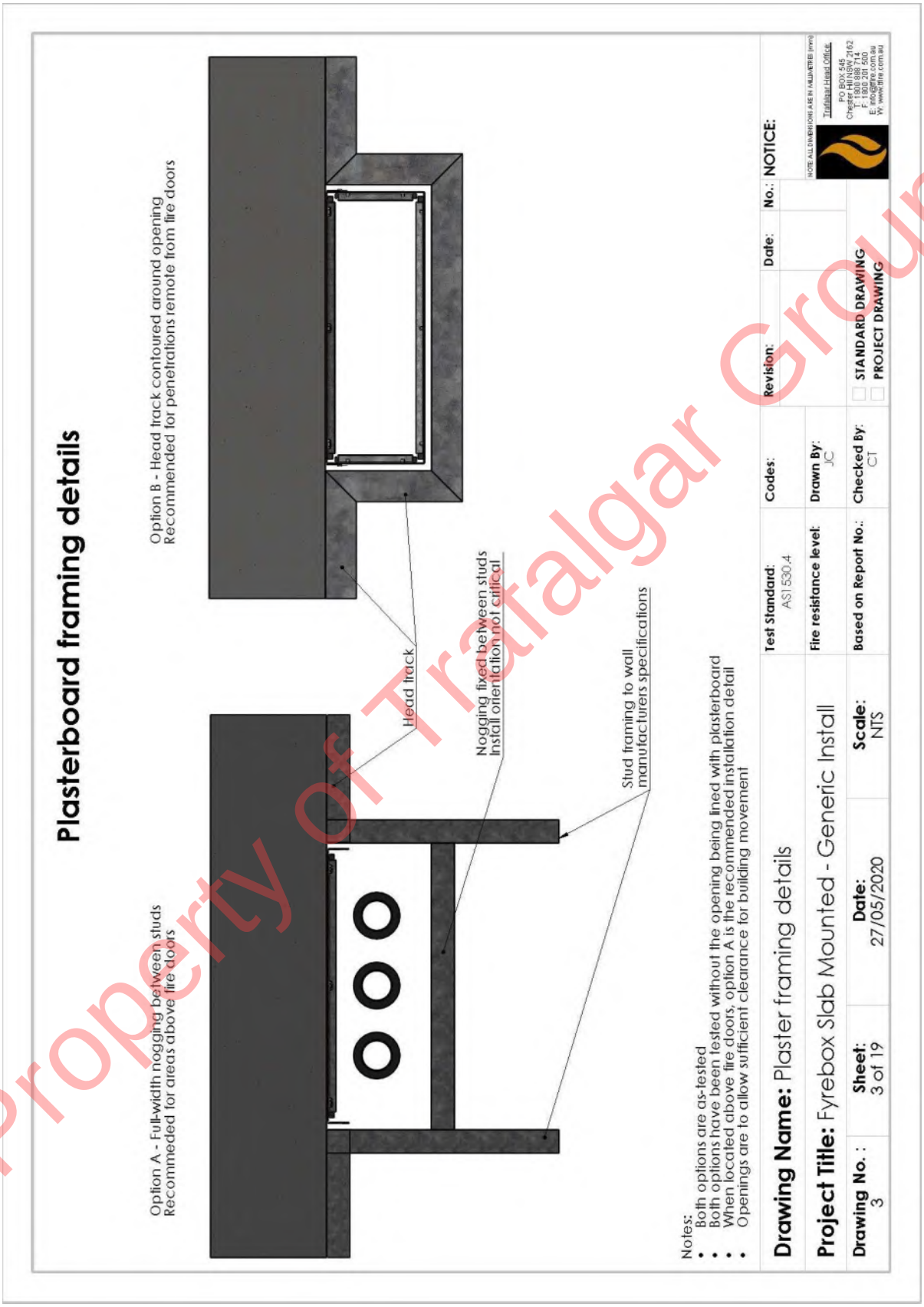

Figure 39 FyreBOX Slab Mount – With plasterboard walls Part 2

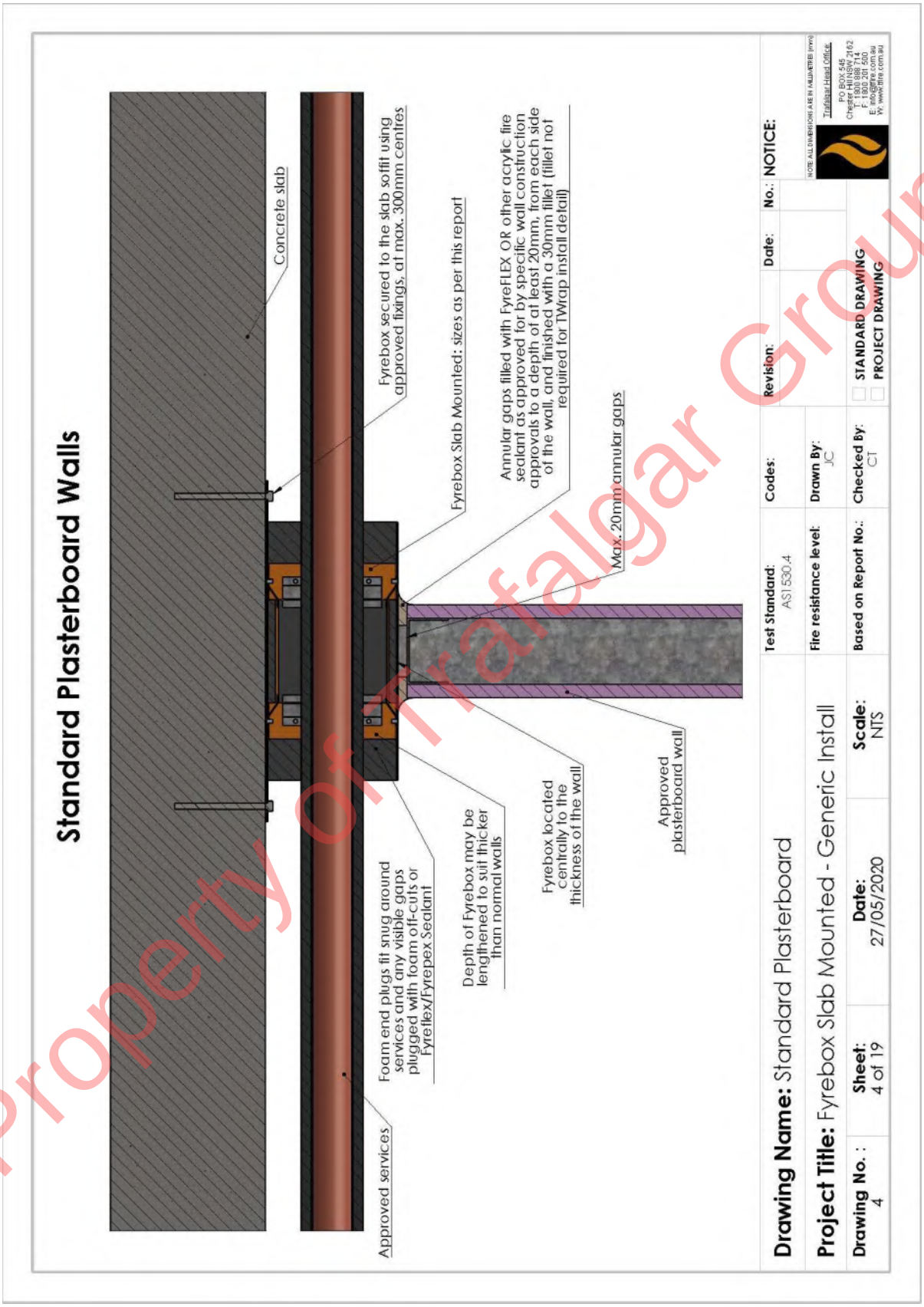

Figure 40 FyreBOX Slab Mount – Built from one side only

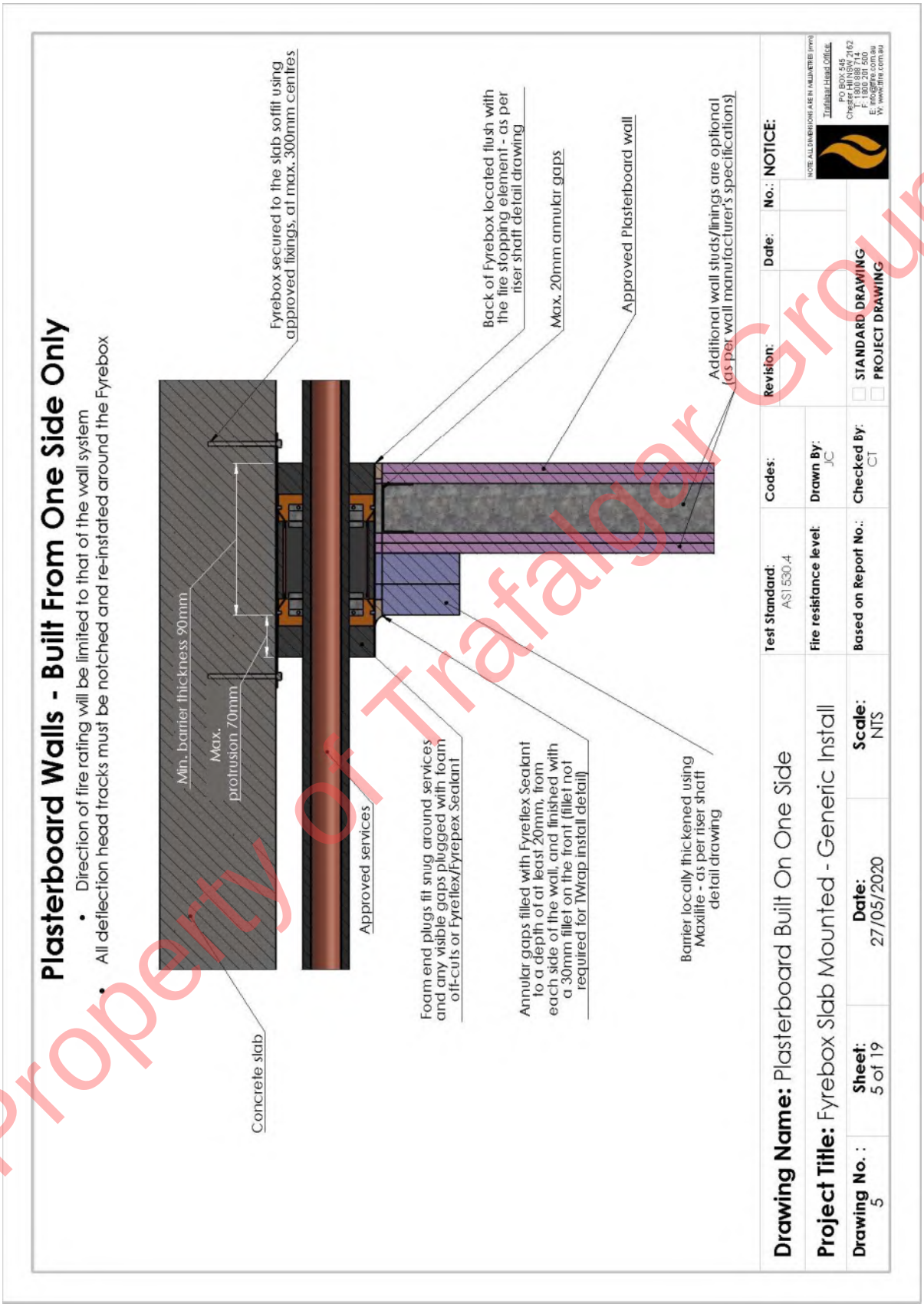

Figure 41 FyreBOX Slab Mount – Shaftliner walls

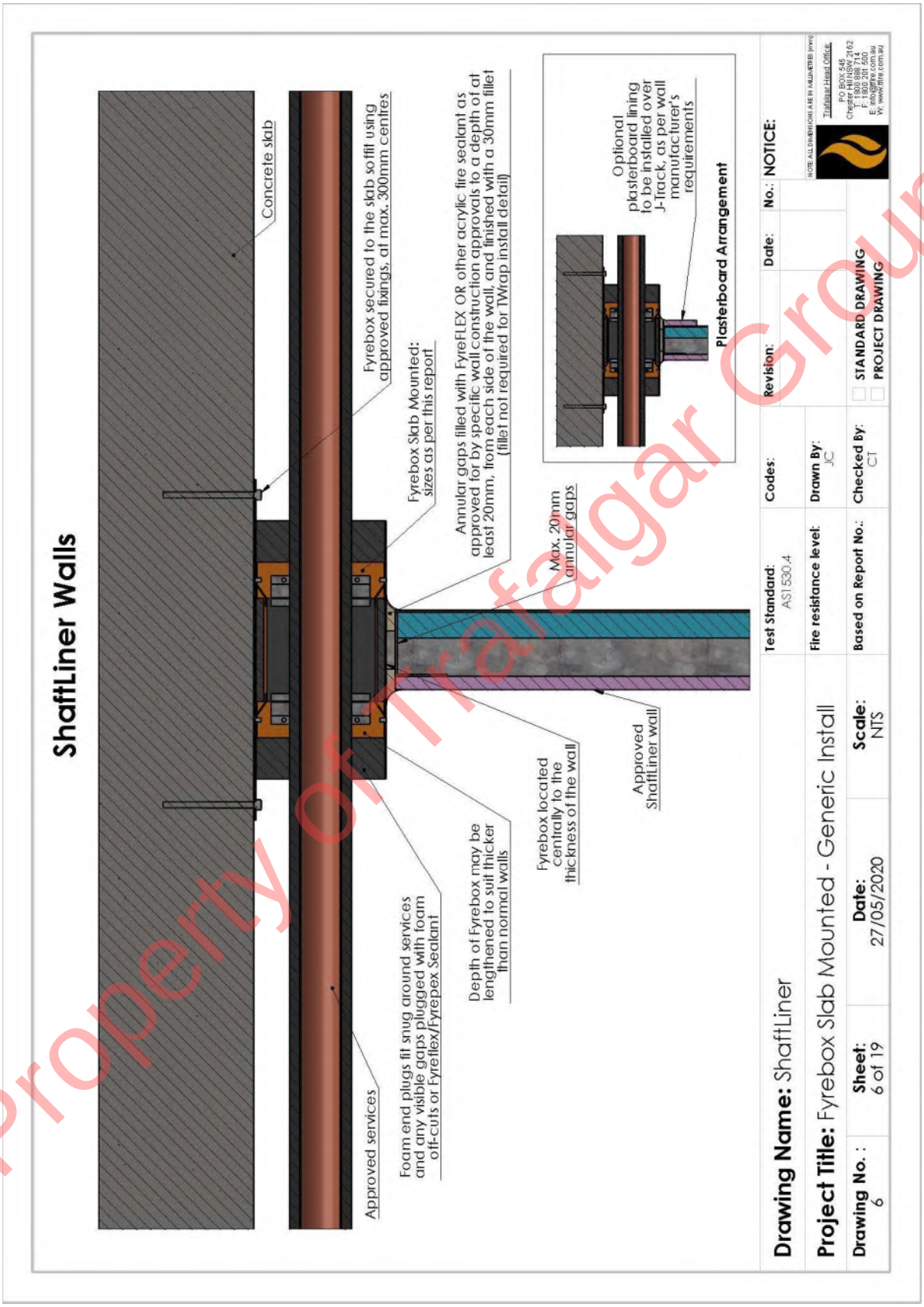

Figure 42 FyreBOX Slab Mount – Shaftliner walls 2

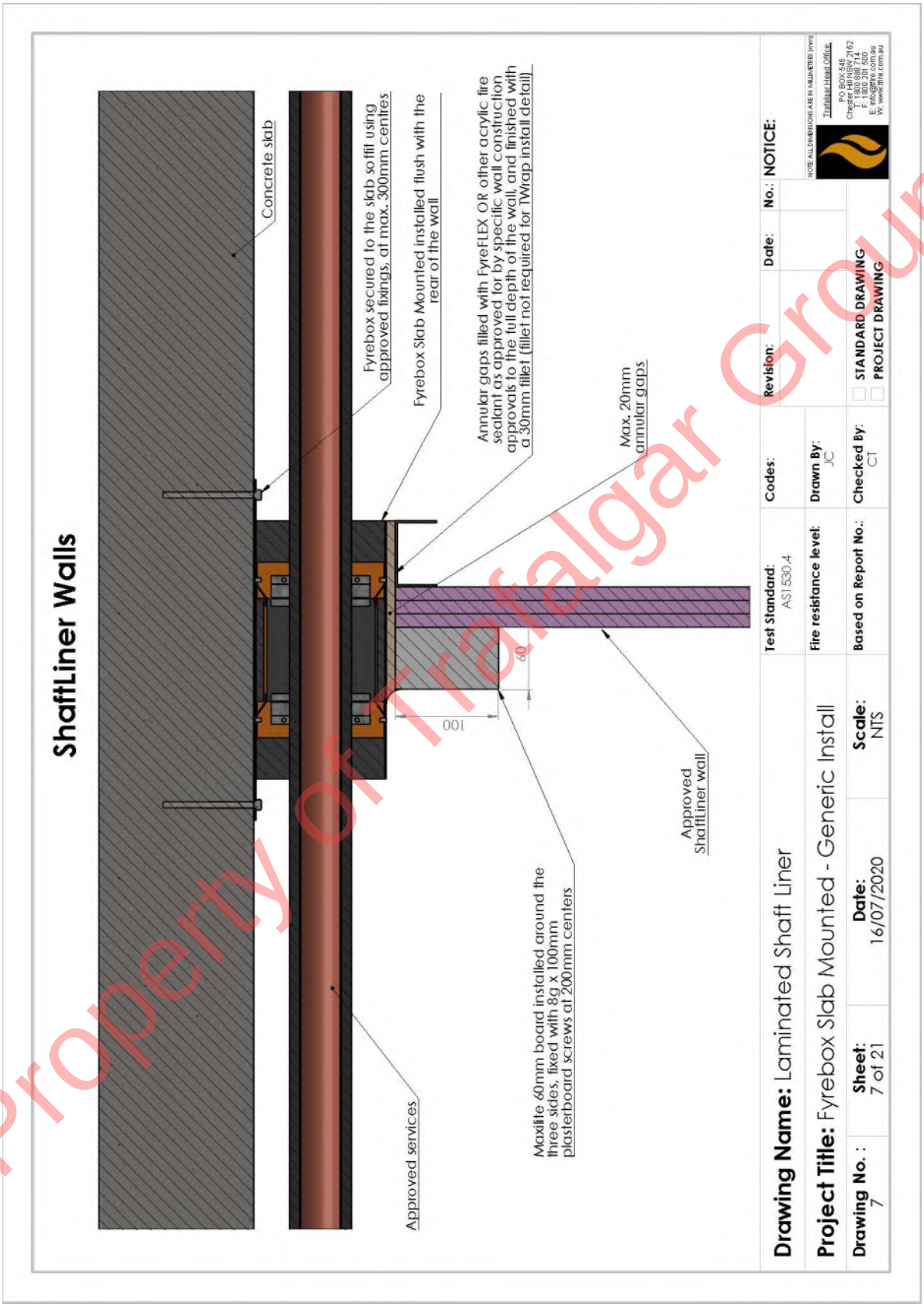

Figure 43 FyreBOX Slab Mount – With AAC walls Part 1

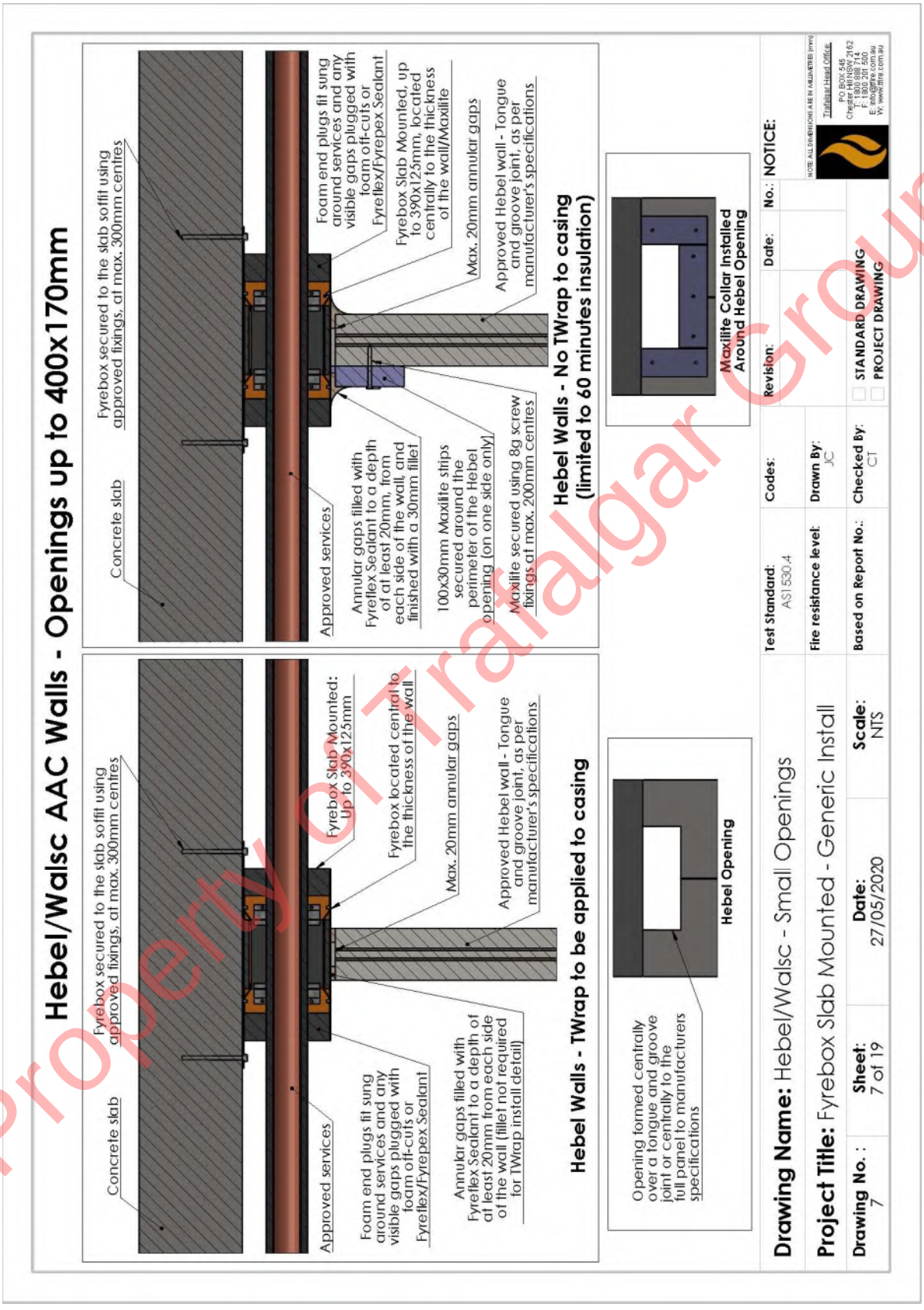

Figure 44 FyreBOX Slab Mount – With AAC walls Part 2

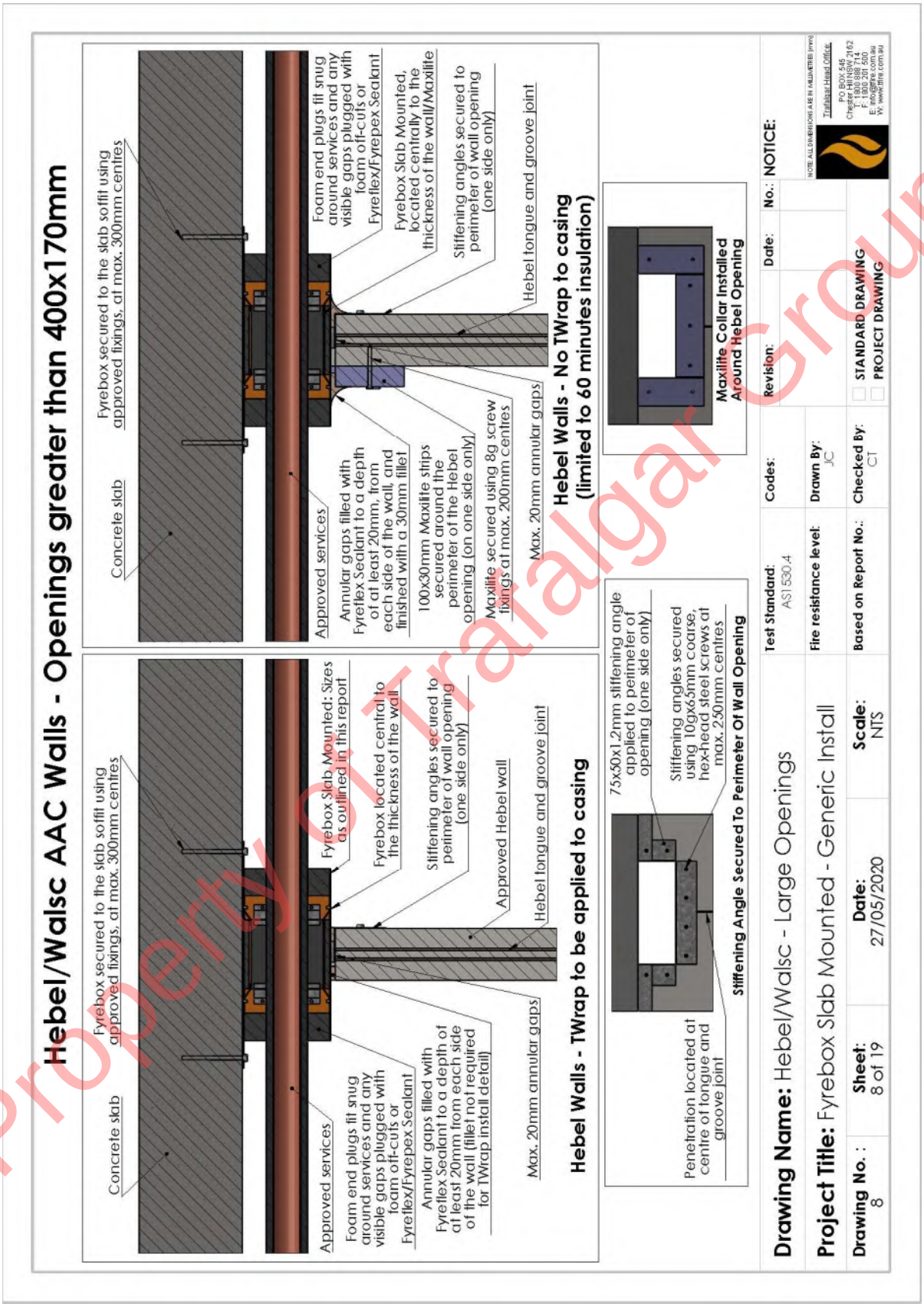

Figure 45 FyreBOX Slab Mount – With AAC walls Part 3

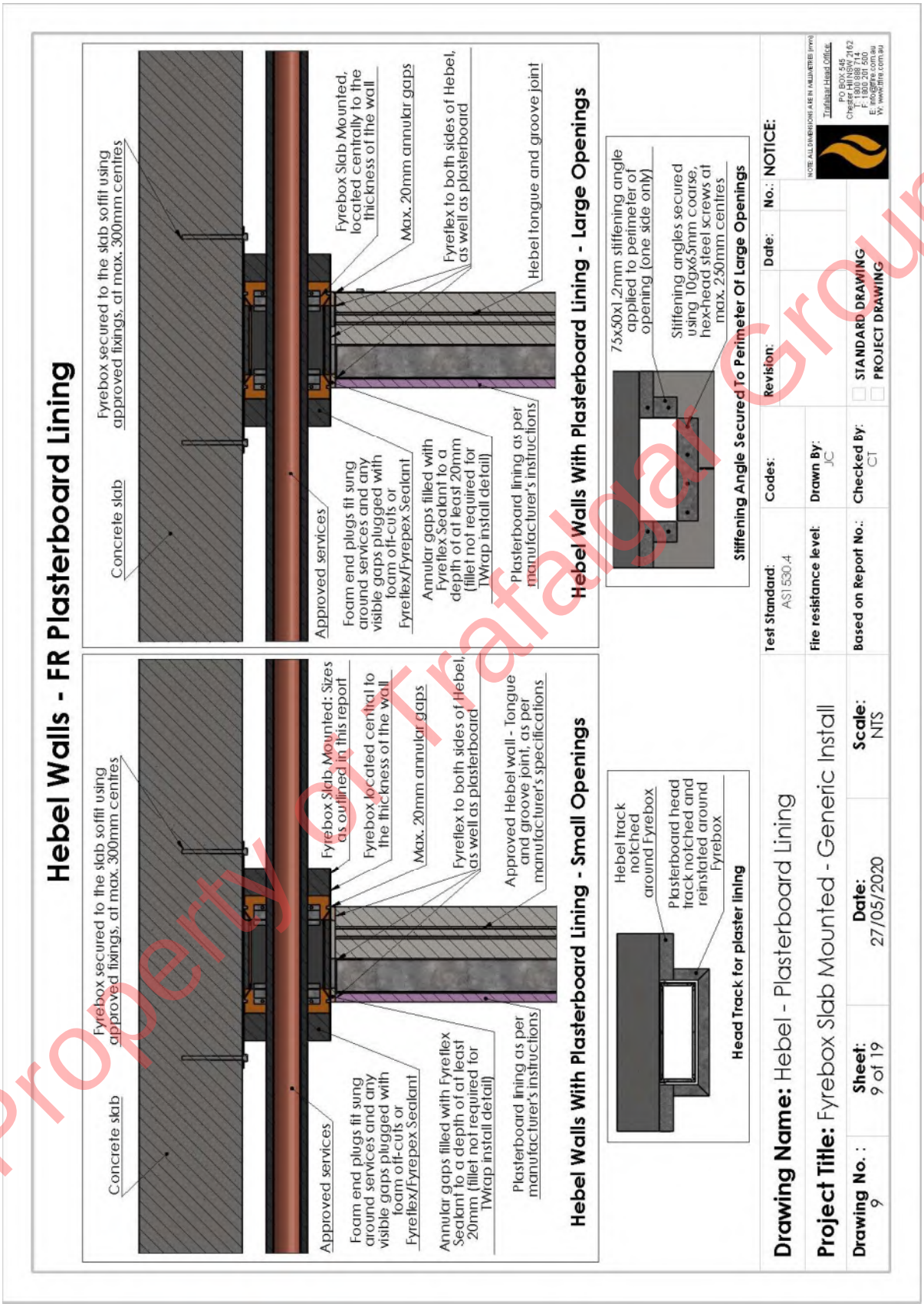

Figure 46 FyreBOX Slab Mount – With 78 mm Speedpanel

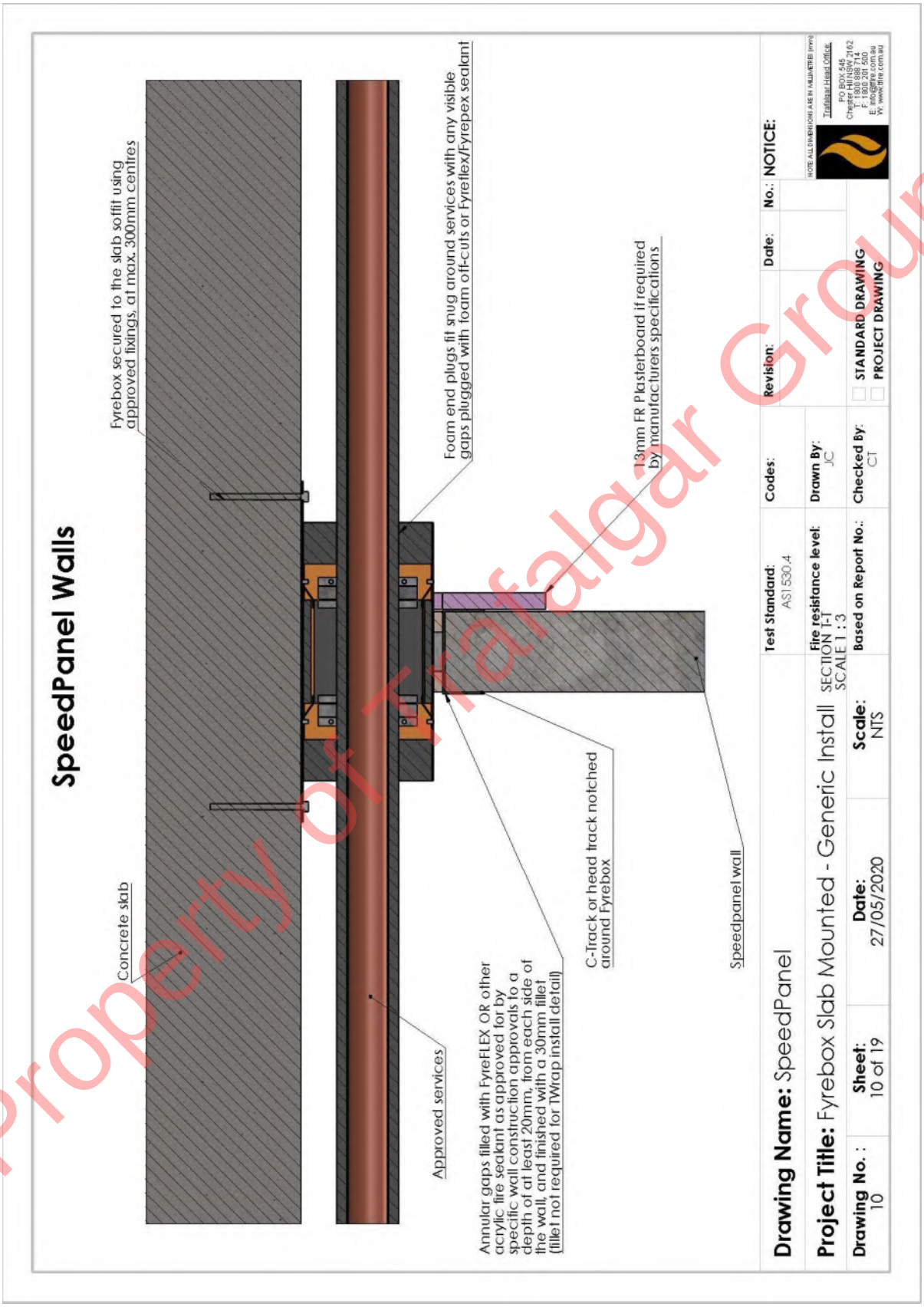

Figure 47 FyreBOX Slab Mount – Less than 78 mm thick Speedpanel

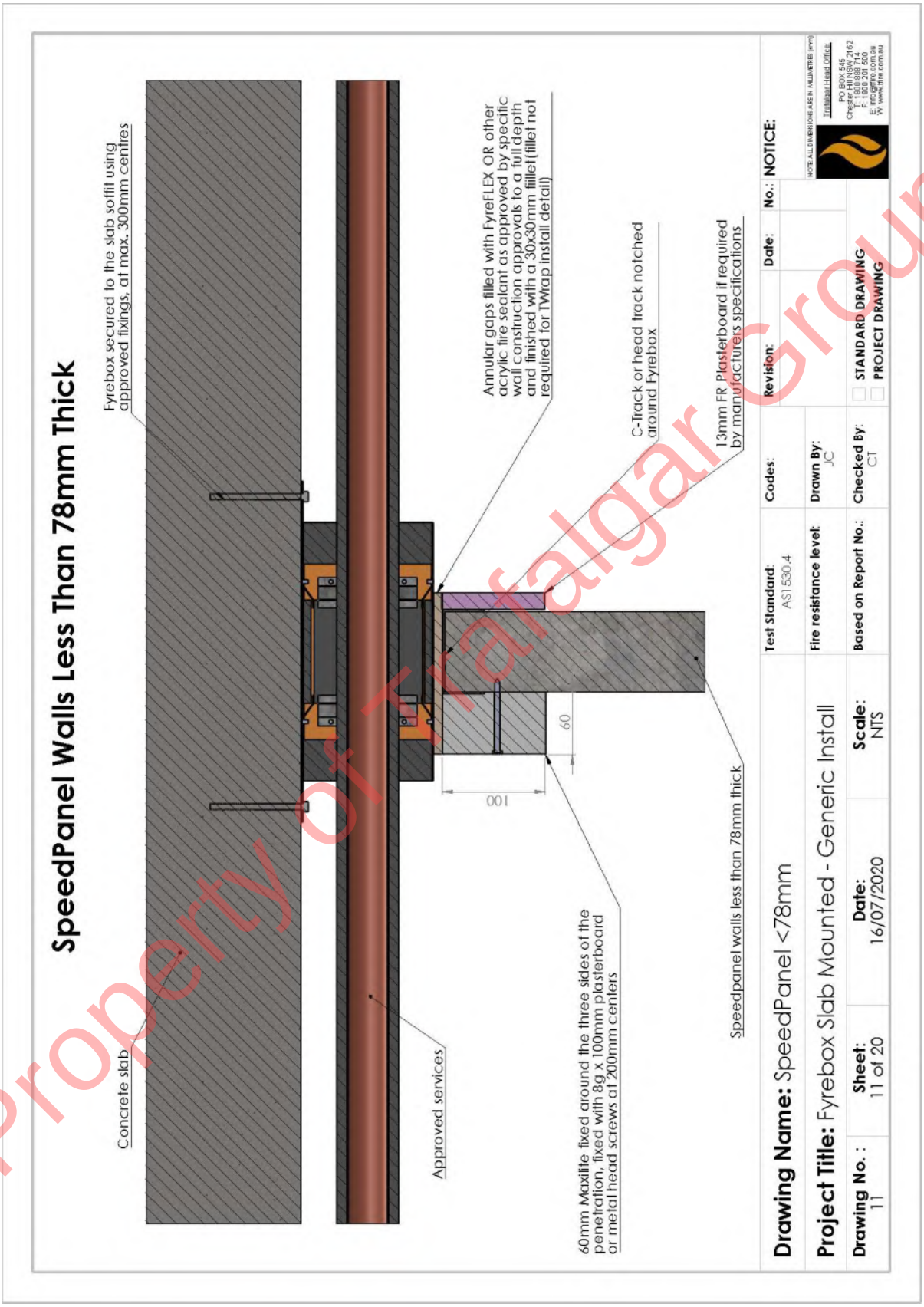

Figure 48 FyreBOX Slab Mount – With Concrete/Masonry walls

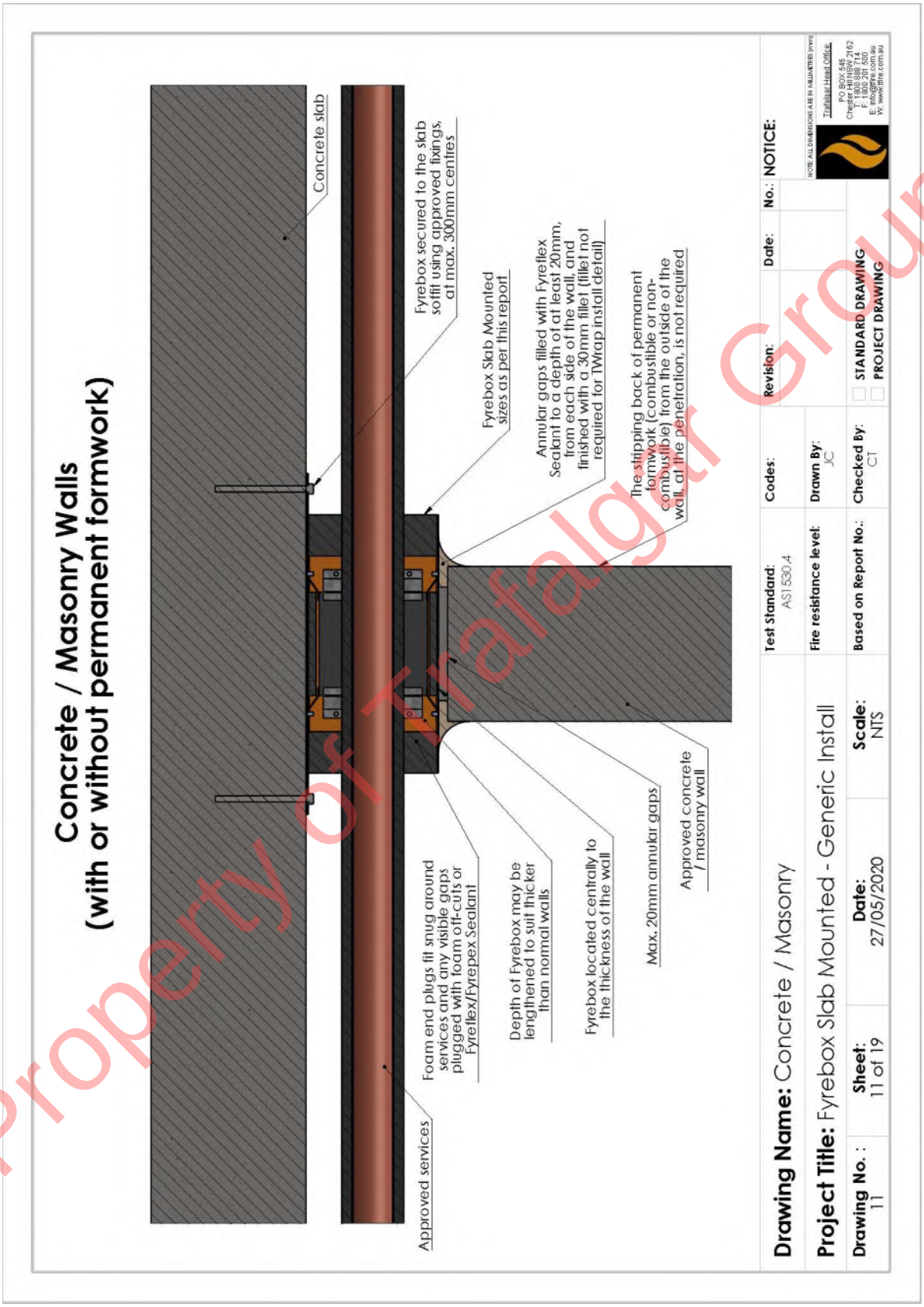

Figure 49 FyreBOX Slab Mount – With a Maxilite panel upgrade

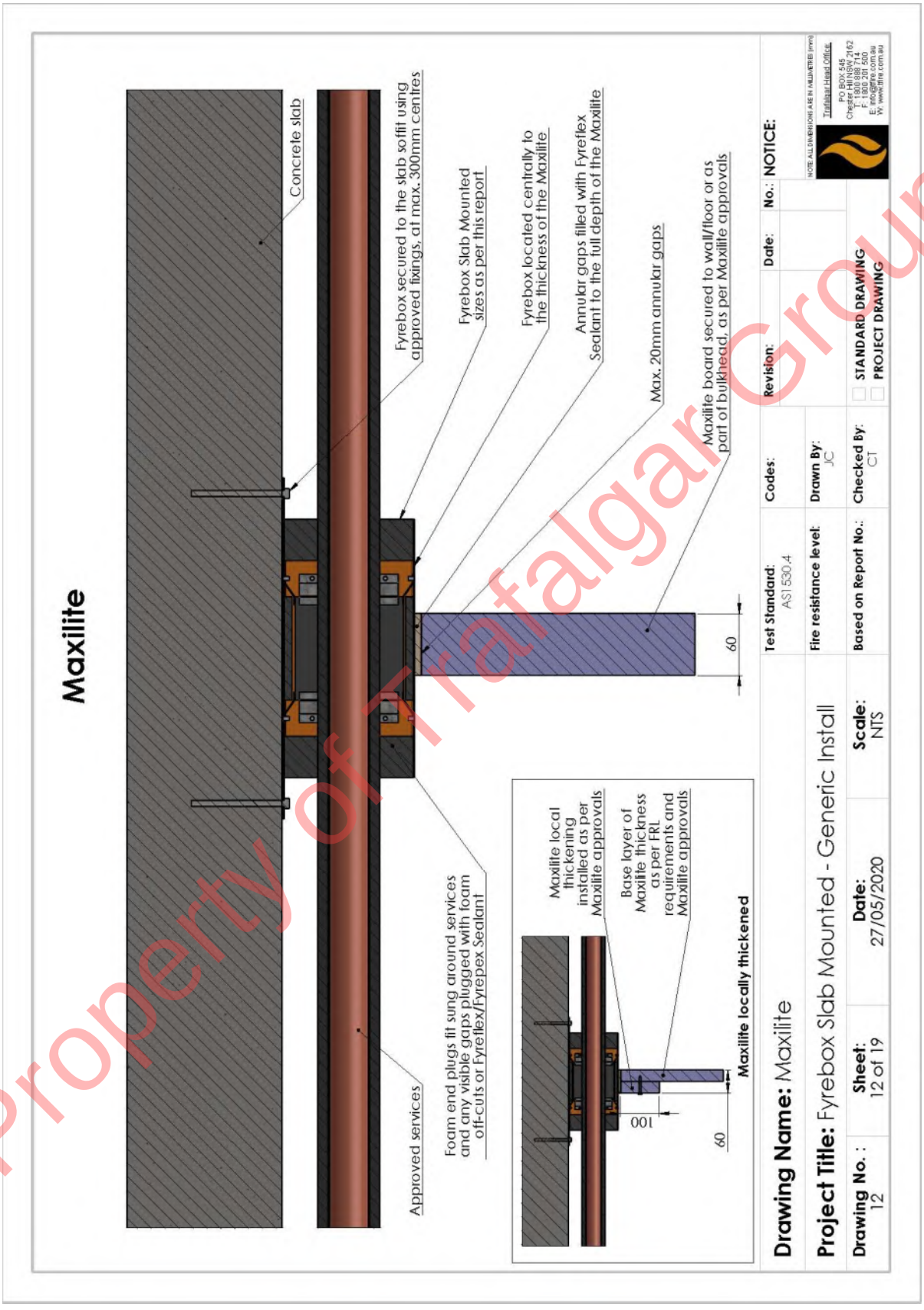

Figure 50 FyreBOX Slab Mount – TWrap upgrade Part 1

Figure 51 FyreBOX Slab Mount – TWrap upgrade Part 2

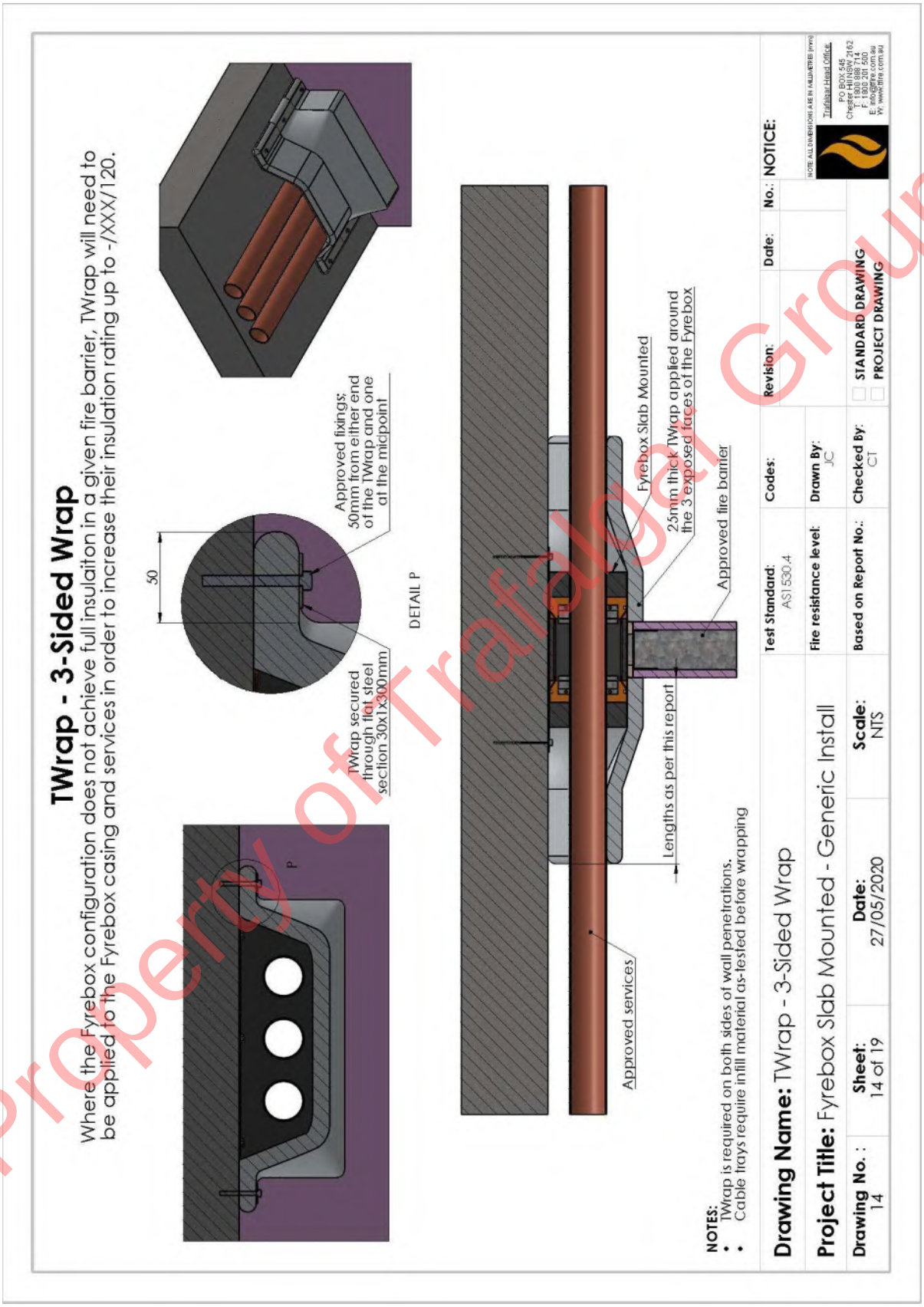

Figure 52 FyreBOX Slab Mount – Stacked Horizontal

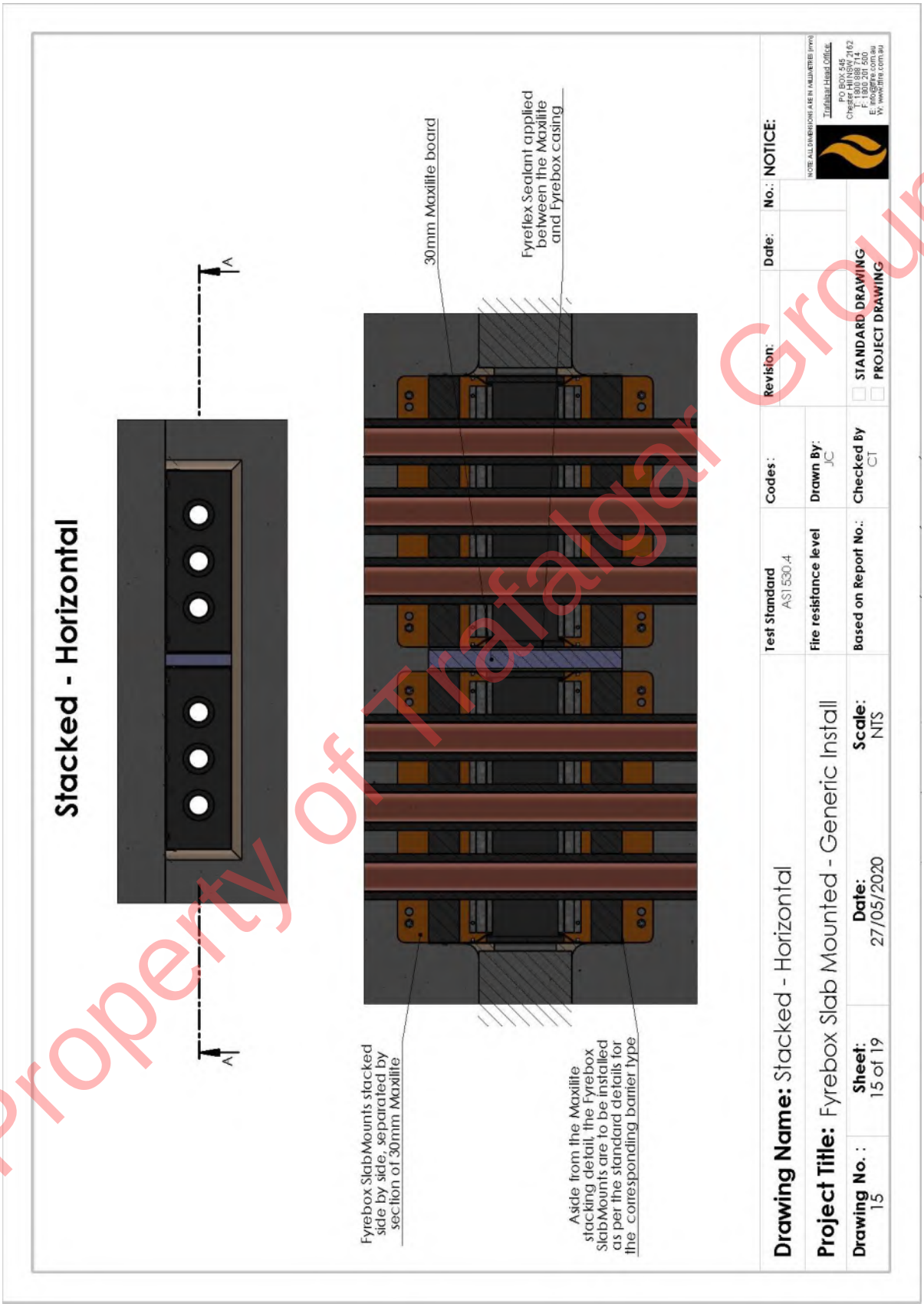

Figure 53 FyreBOX Slab Mount – Stacked Vertical

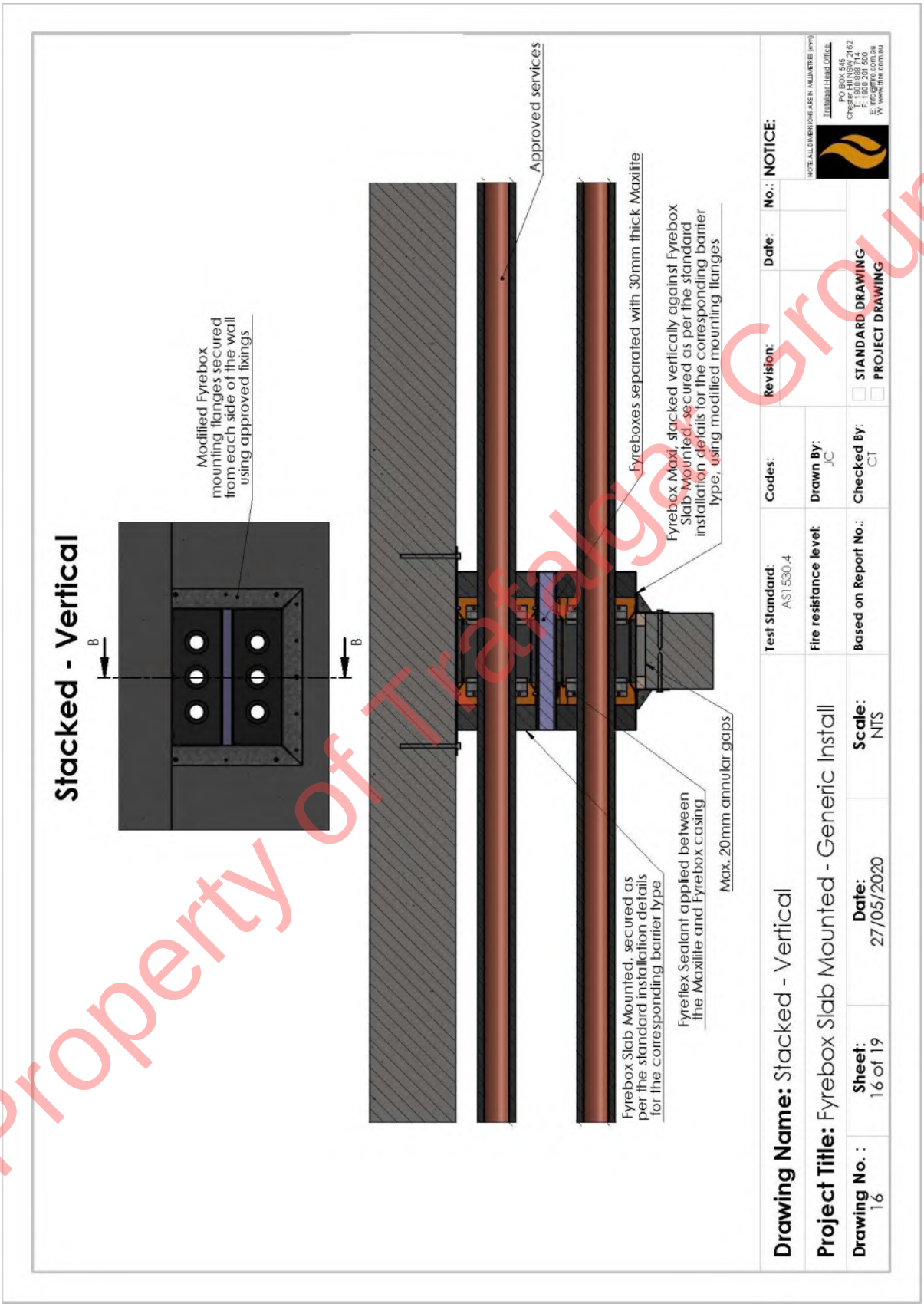

Figure 54 FyreBOX Slab Mount – TWrap upgrade stacked horizontal

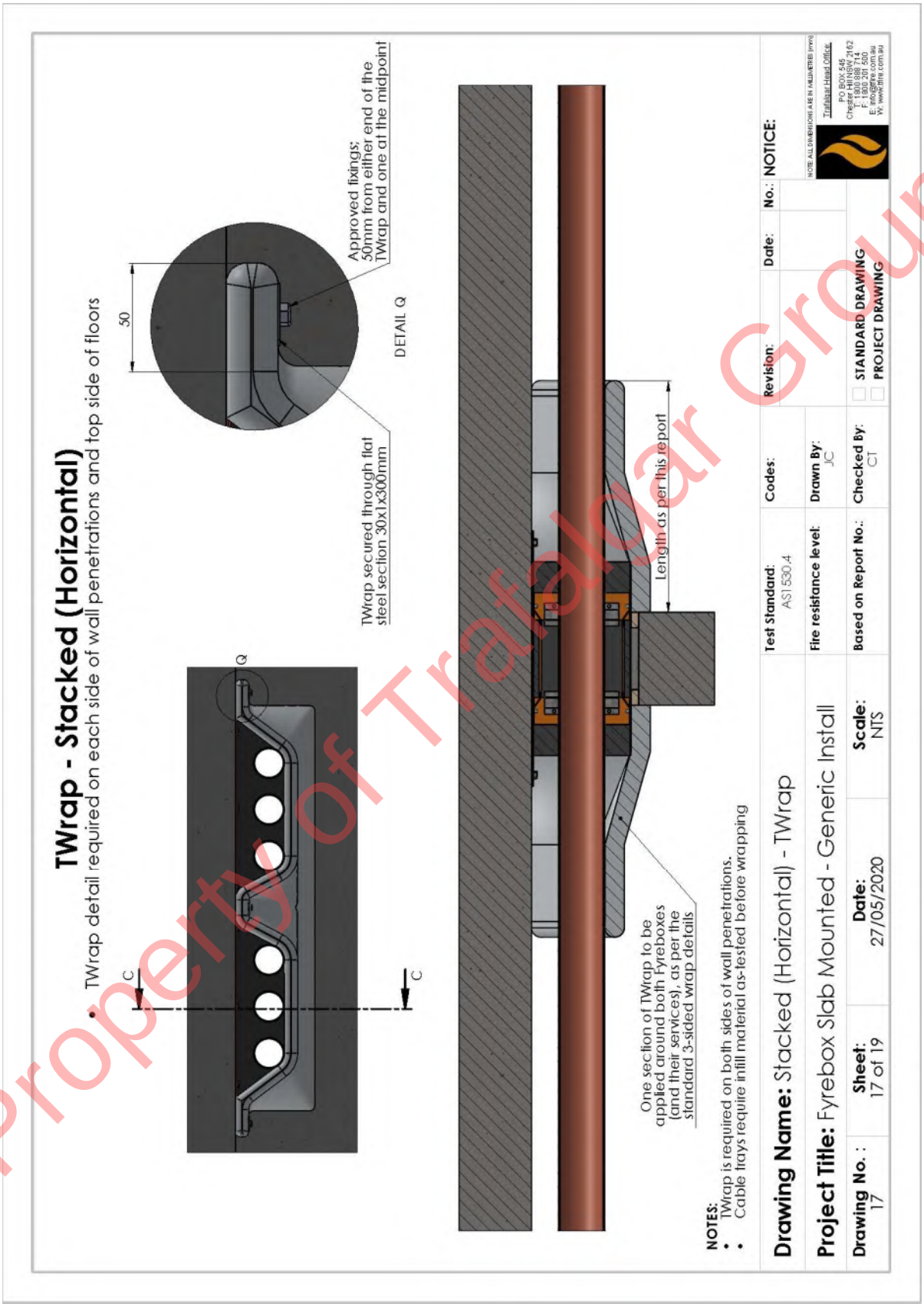

Figure 55 FyreBOX Slab Mount – TWrap upgrade stacked vertical

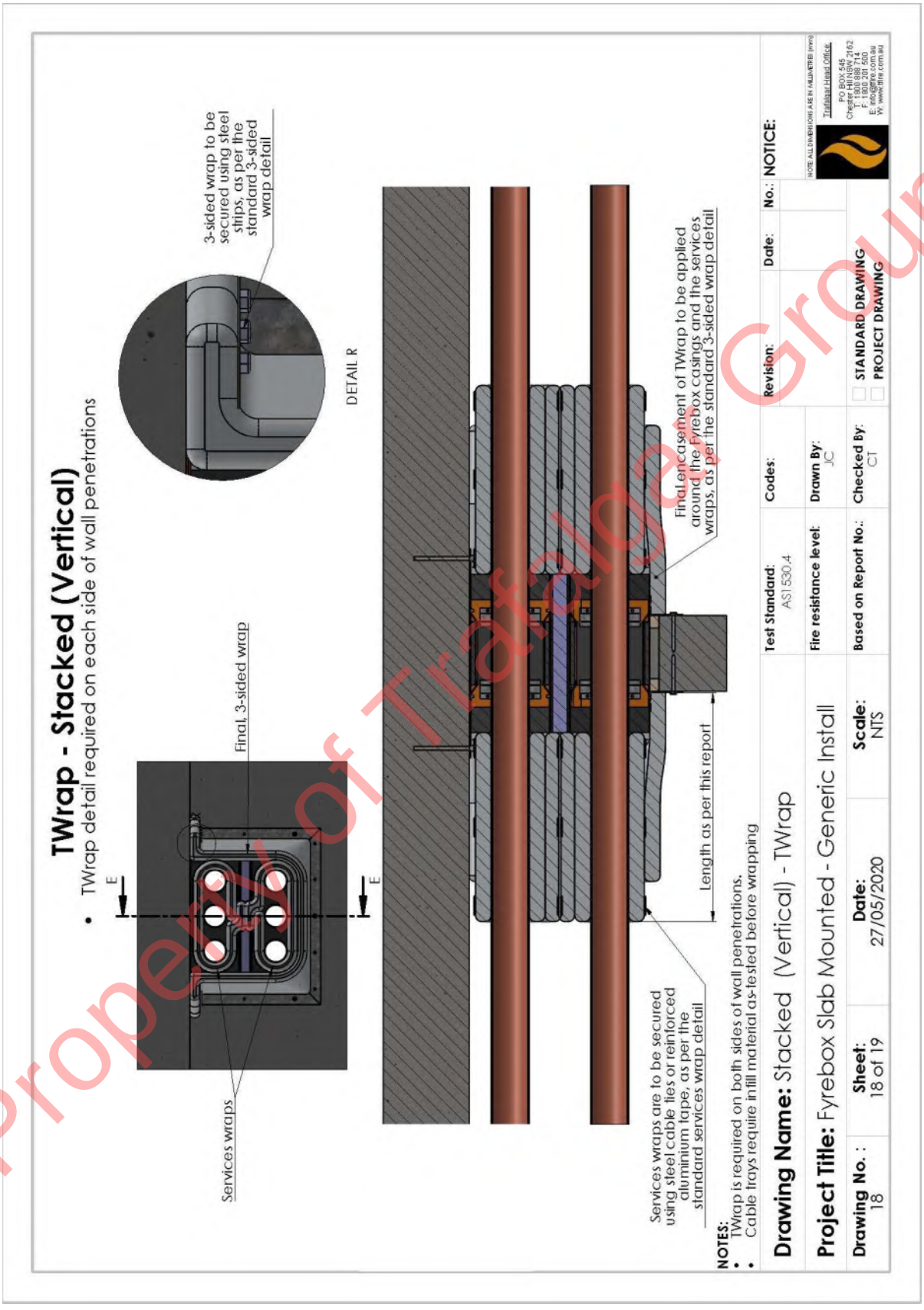

Figure 56 FyreBOX Slab Mount – Riser Shaft detail

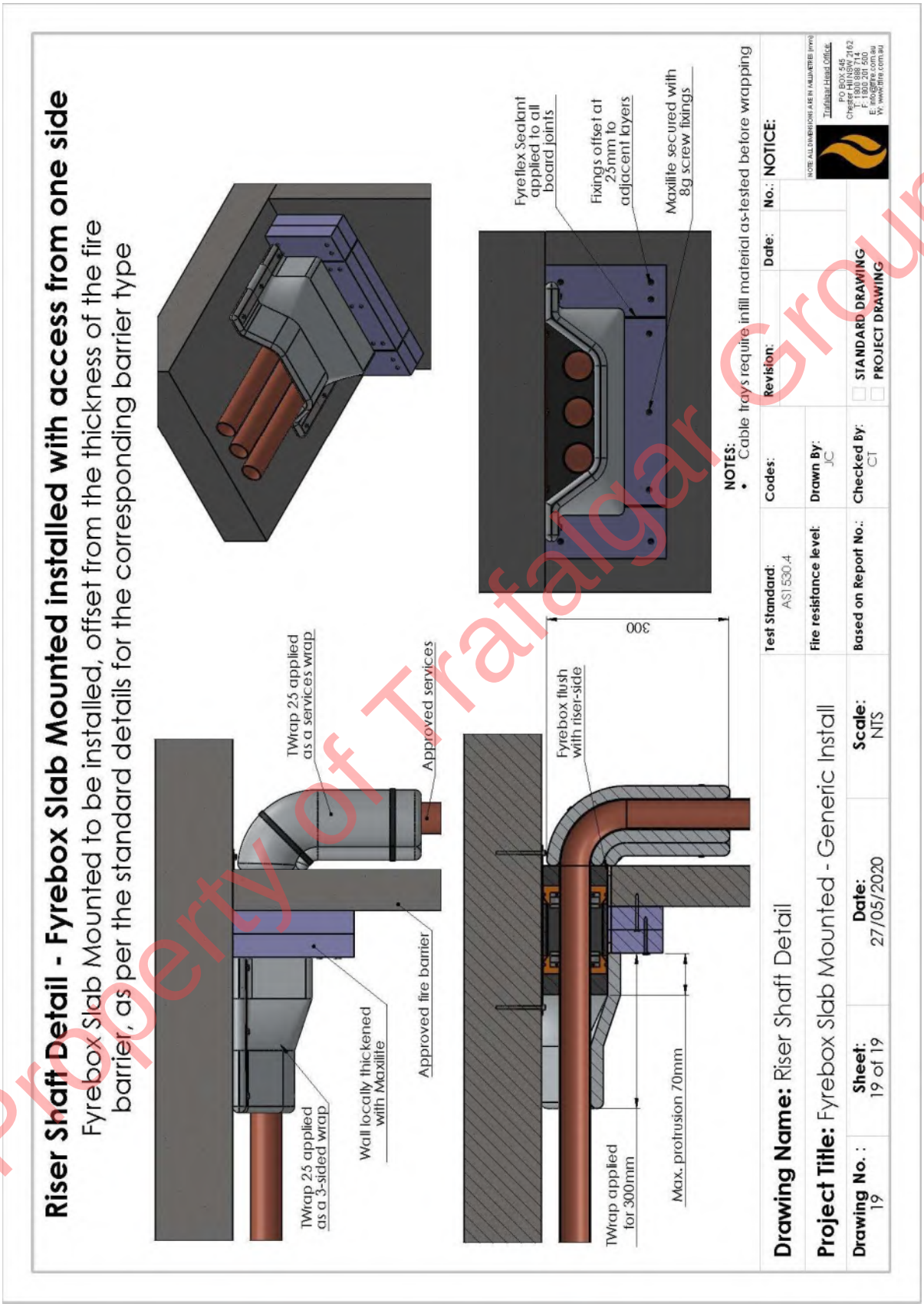

Figure 57 Install Variations – Approved fixings

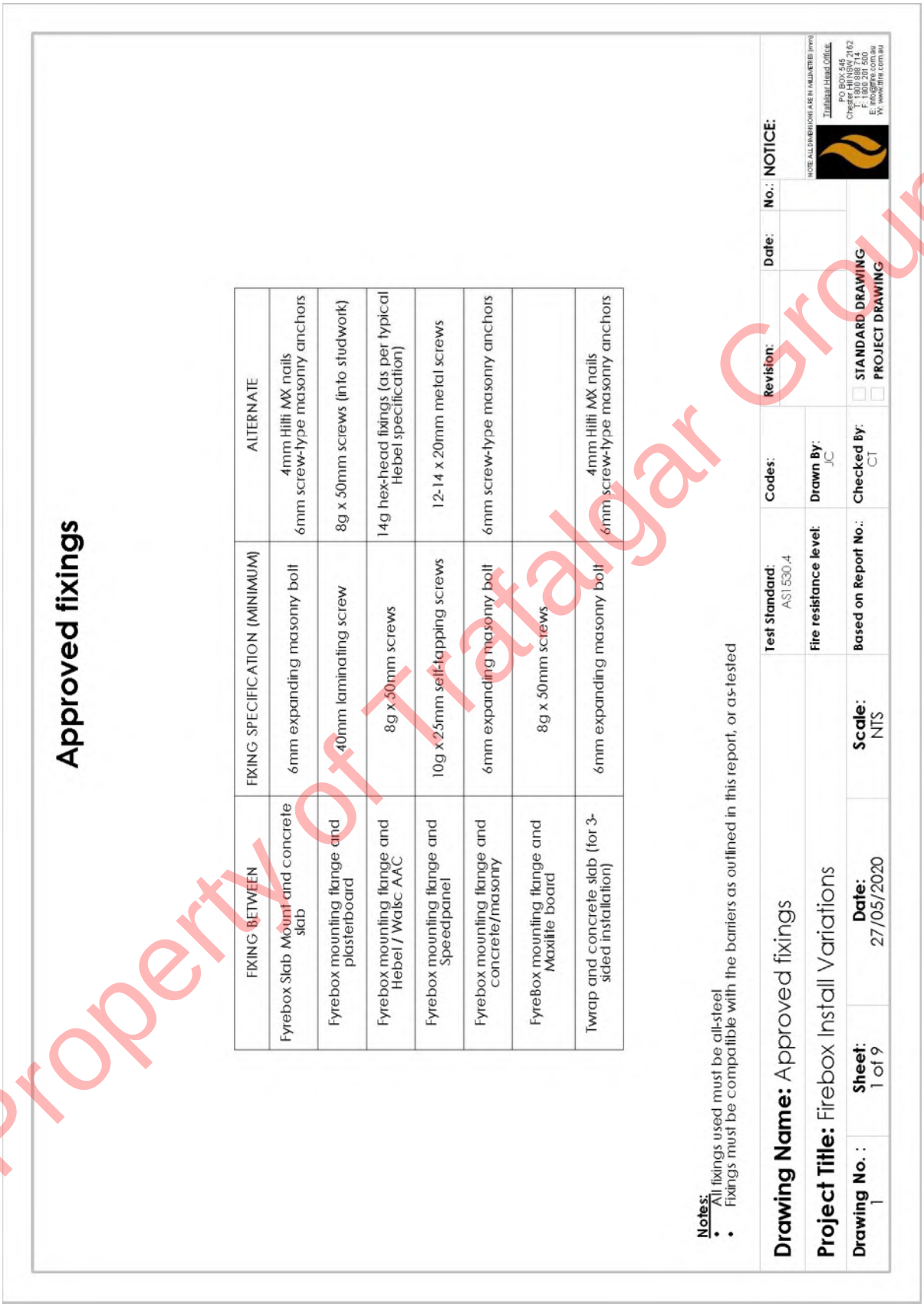

Figure 58 Install Variations – Close proximity floors

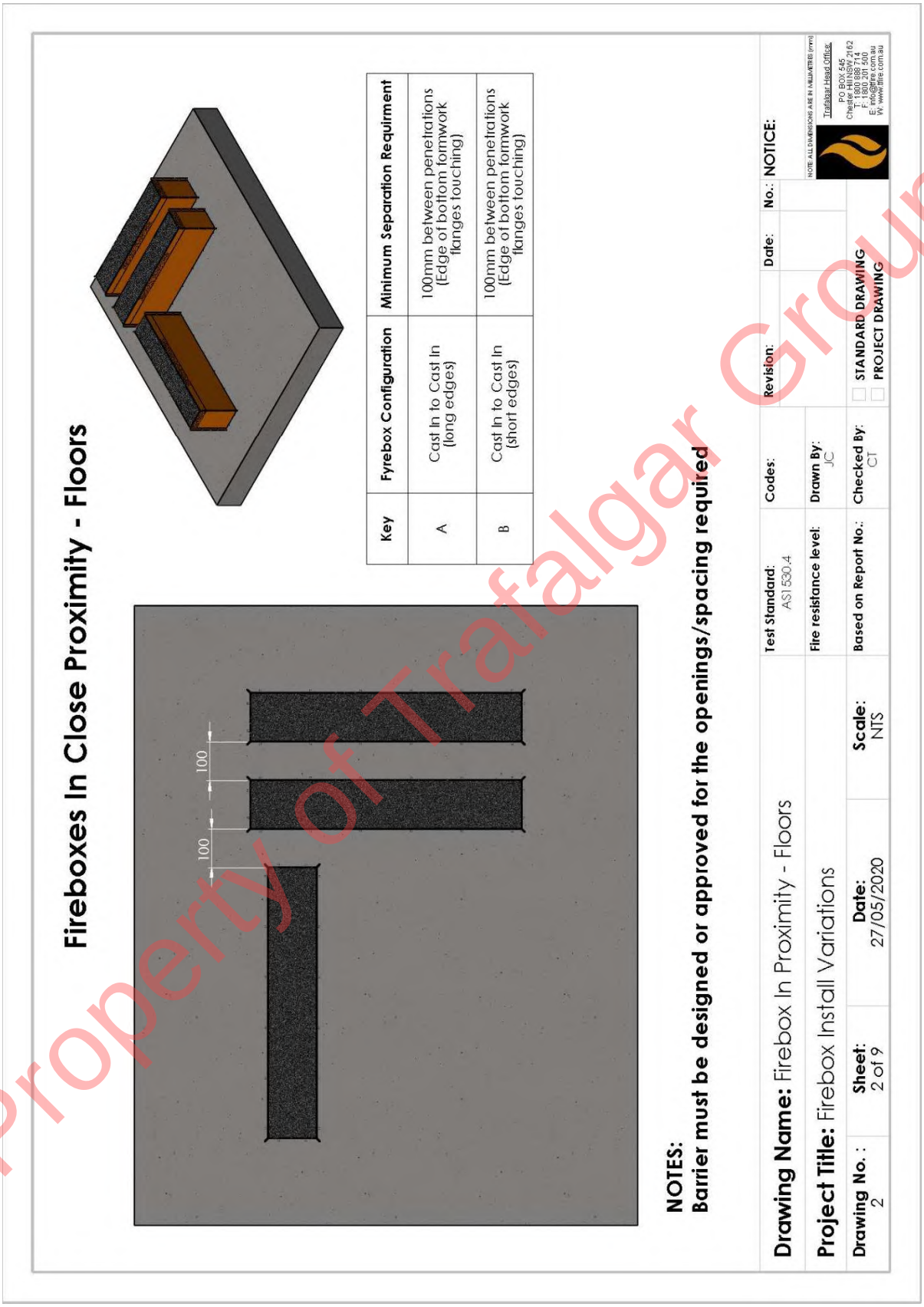

Figure 59 Install Variations – Close proximity walls

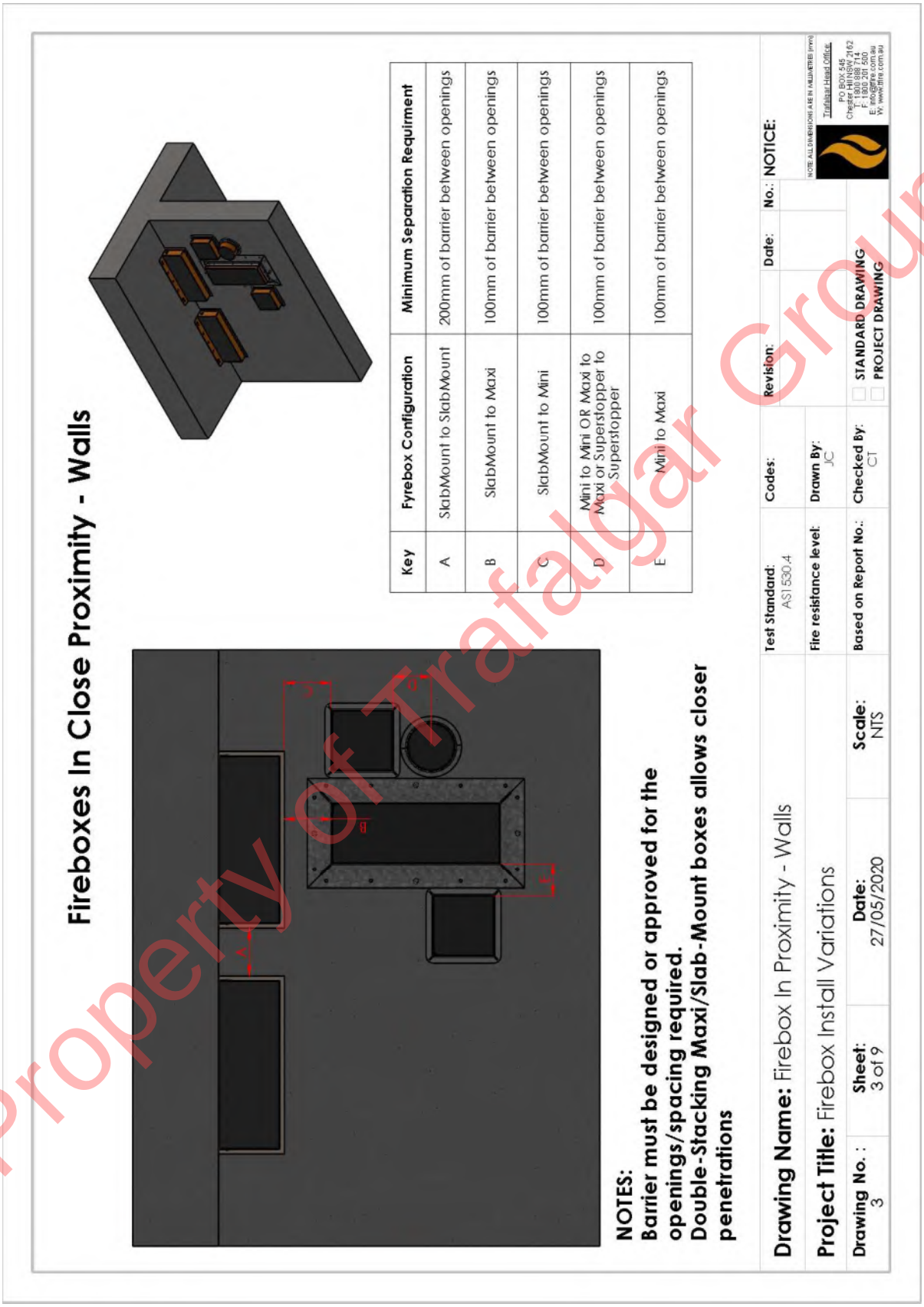

Figure 60 Install Variations – Oversize annular gaps

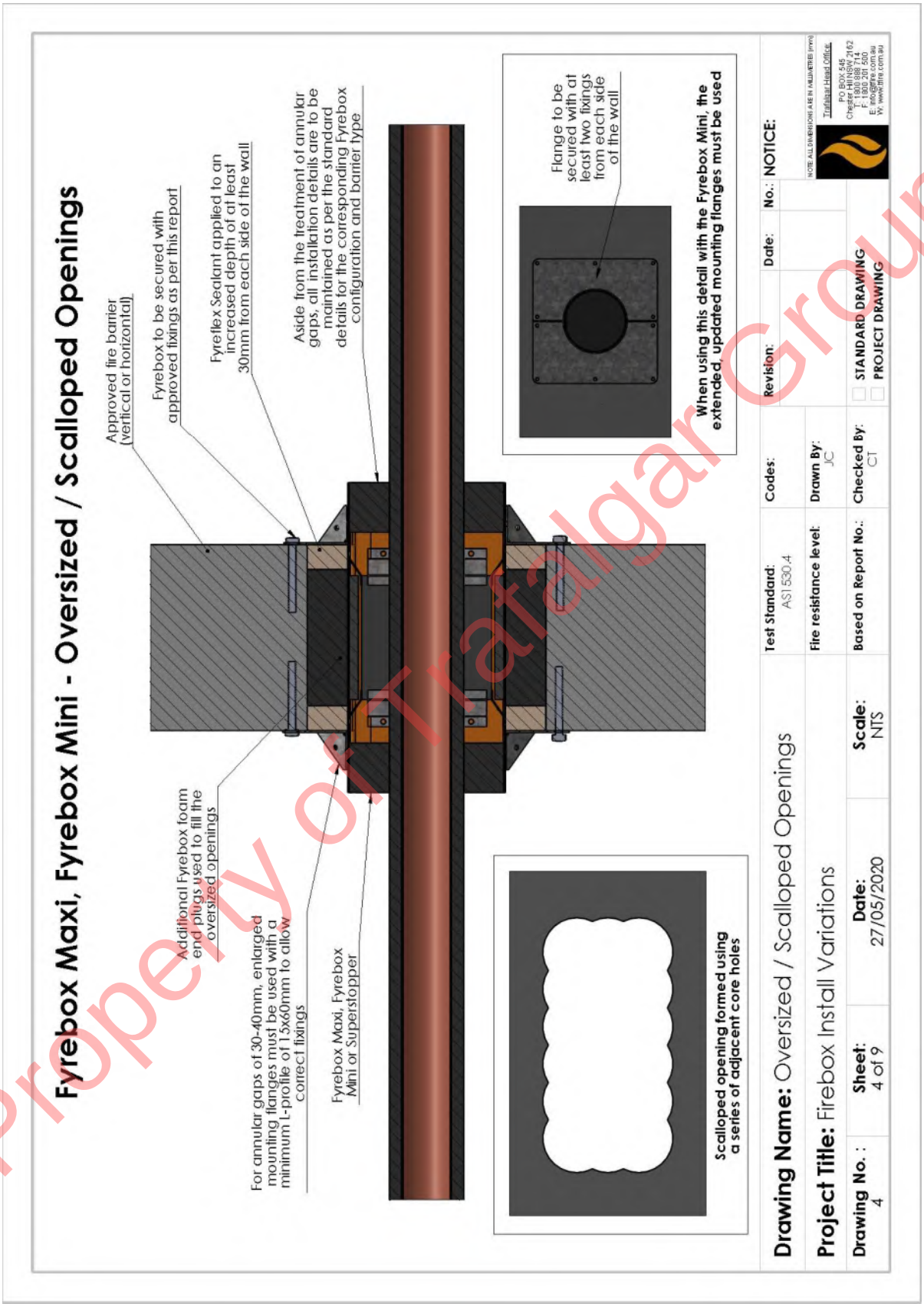

Figure 61 Install Variations –Bottom mounting flange and no bottom foam

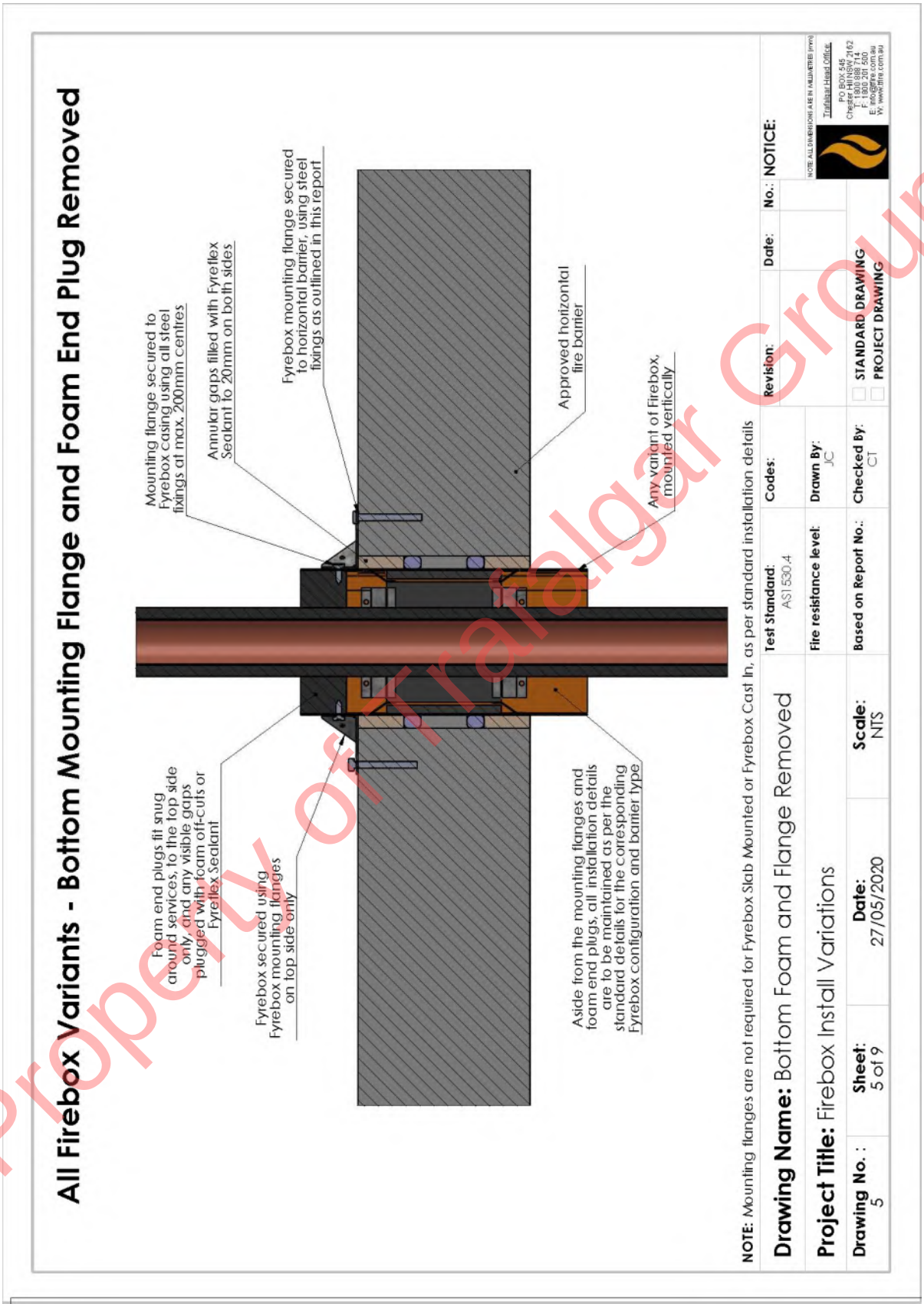

Figure 62 Install Variations – Casing wrap

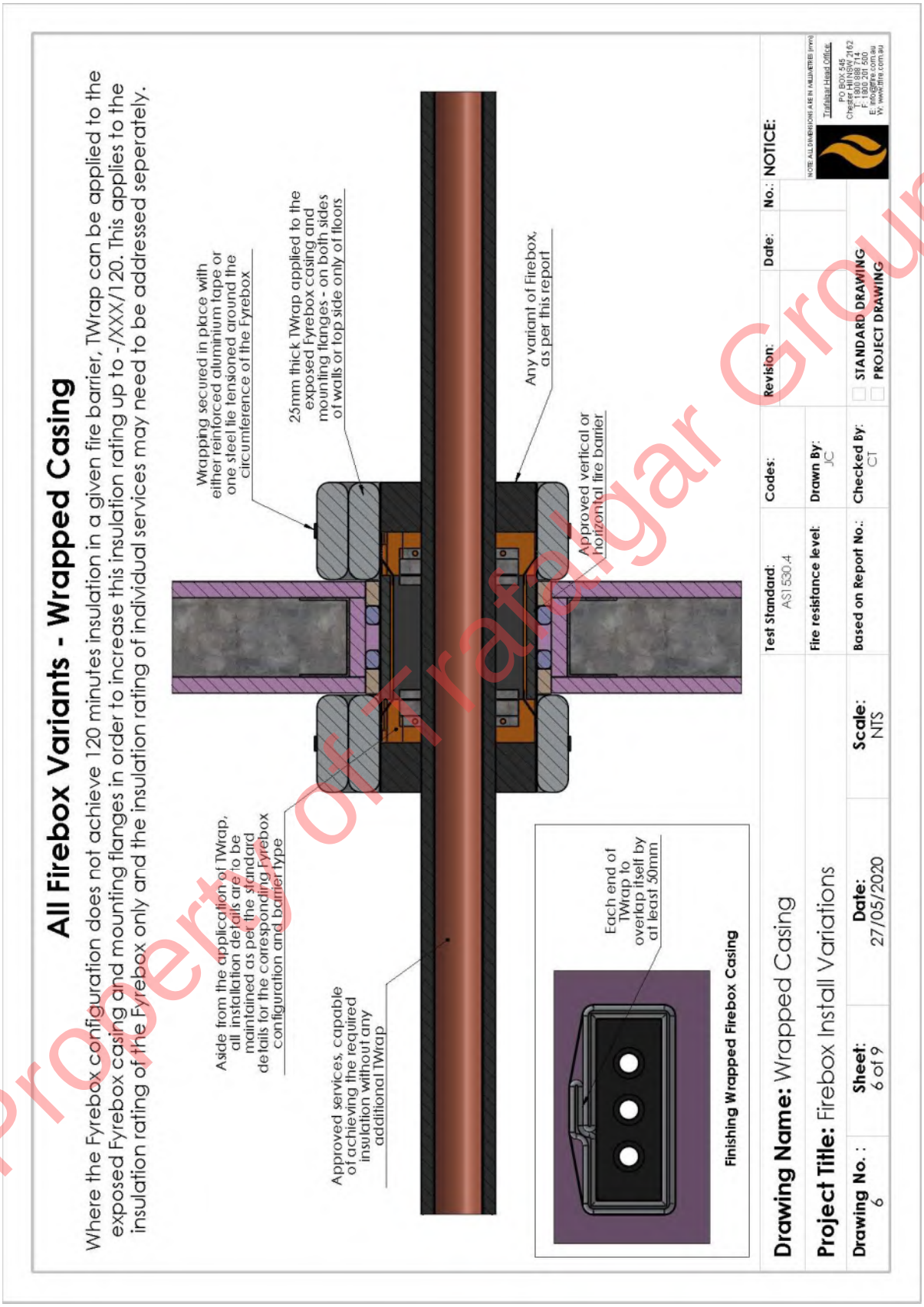

Figure 63 Install Variations – Chilled water pipes

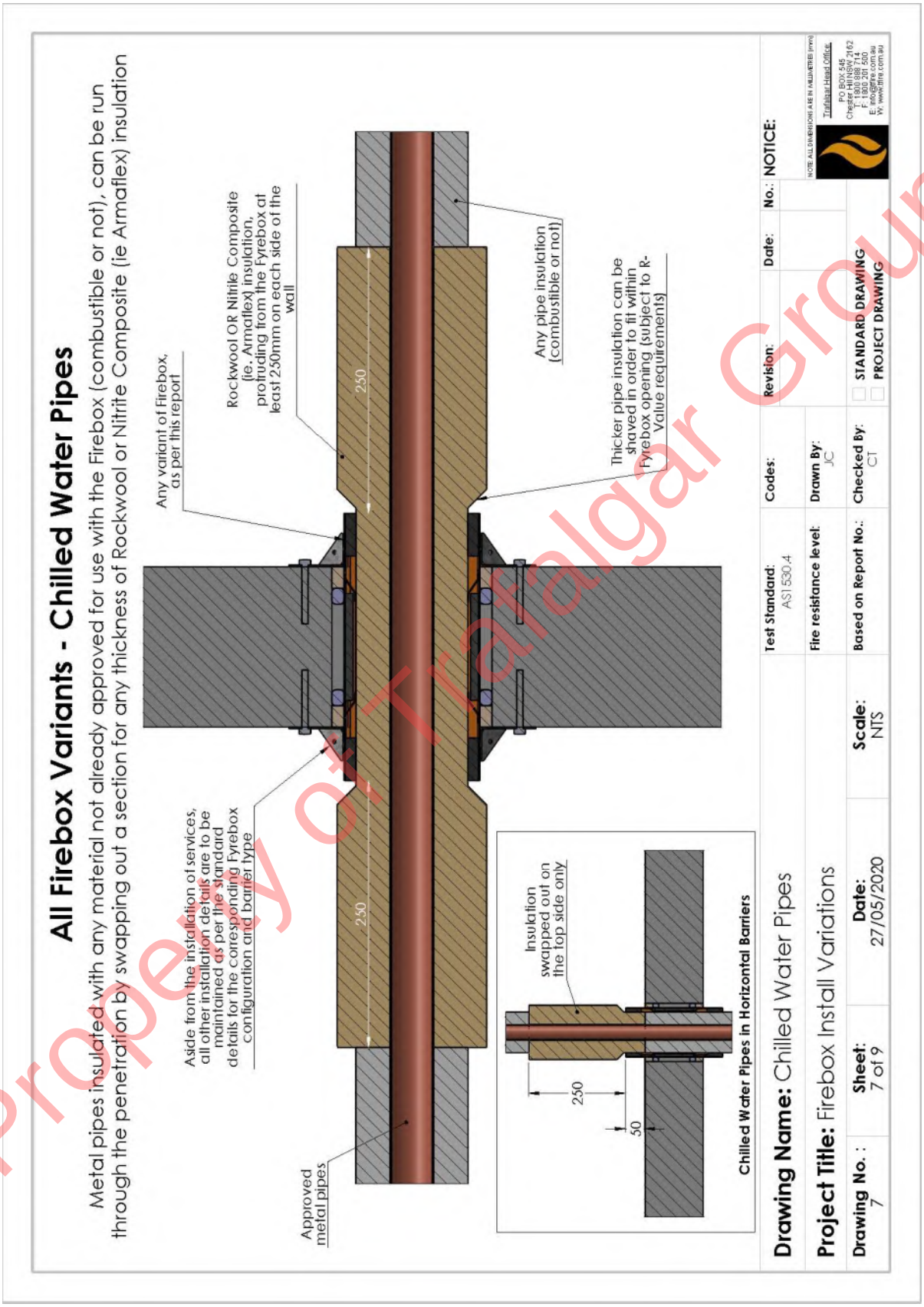

Figure 64 Install Variations – Installation angle

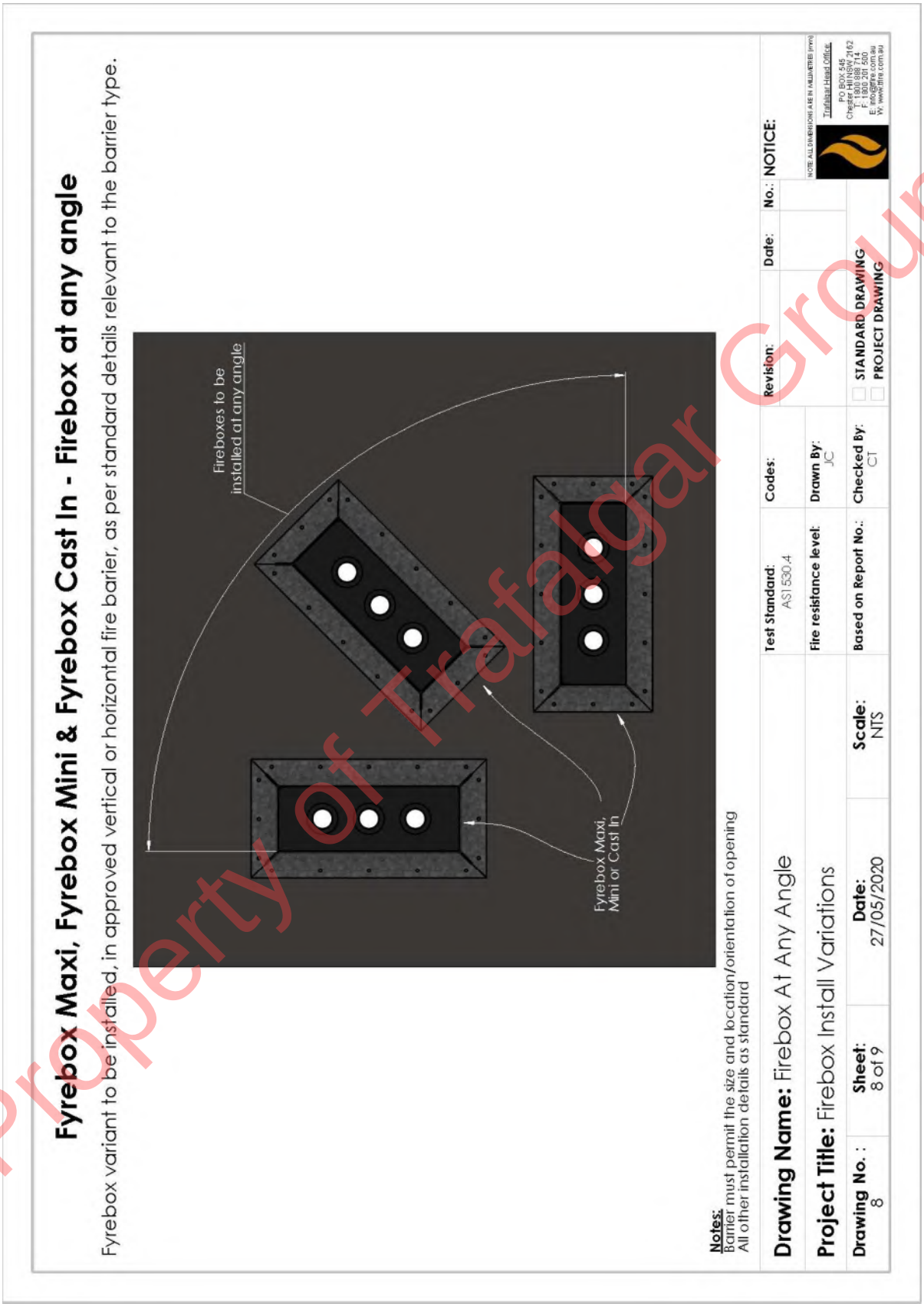

Figure 65 Install Variations – Maxilite panel centering

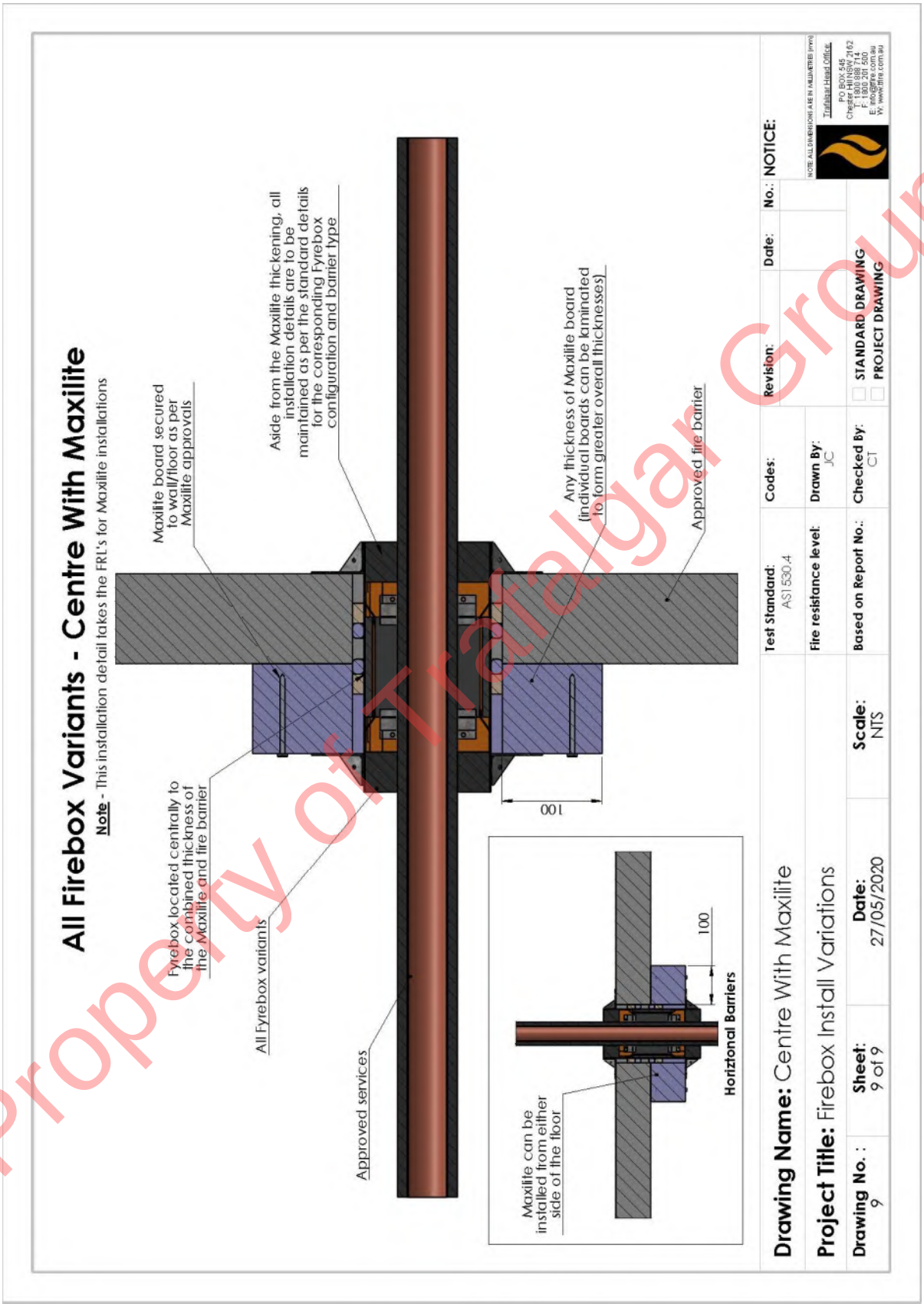

Figure 66 Install Variations – Slab mount with steel deck

Figure 67 Install Variations – Two sided installation

Figure 68 Install Variations – Three sided installation

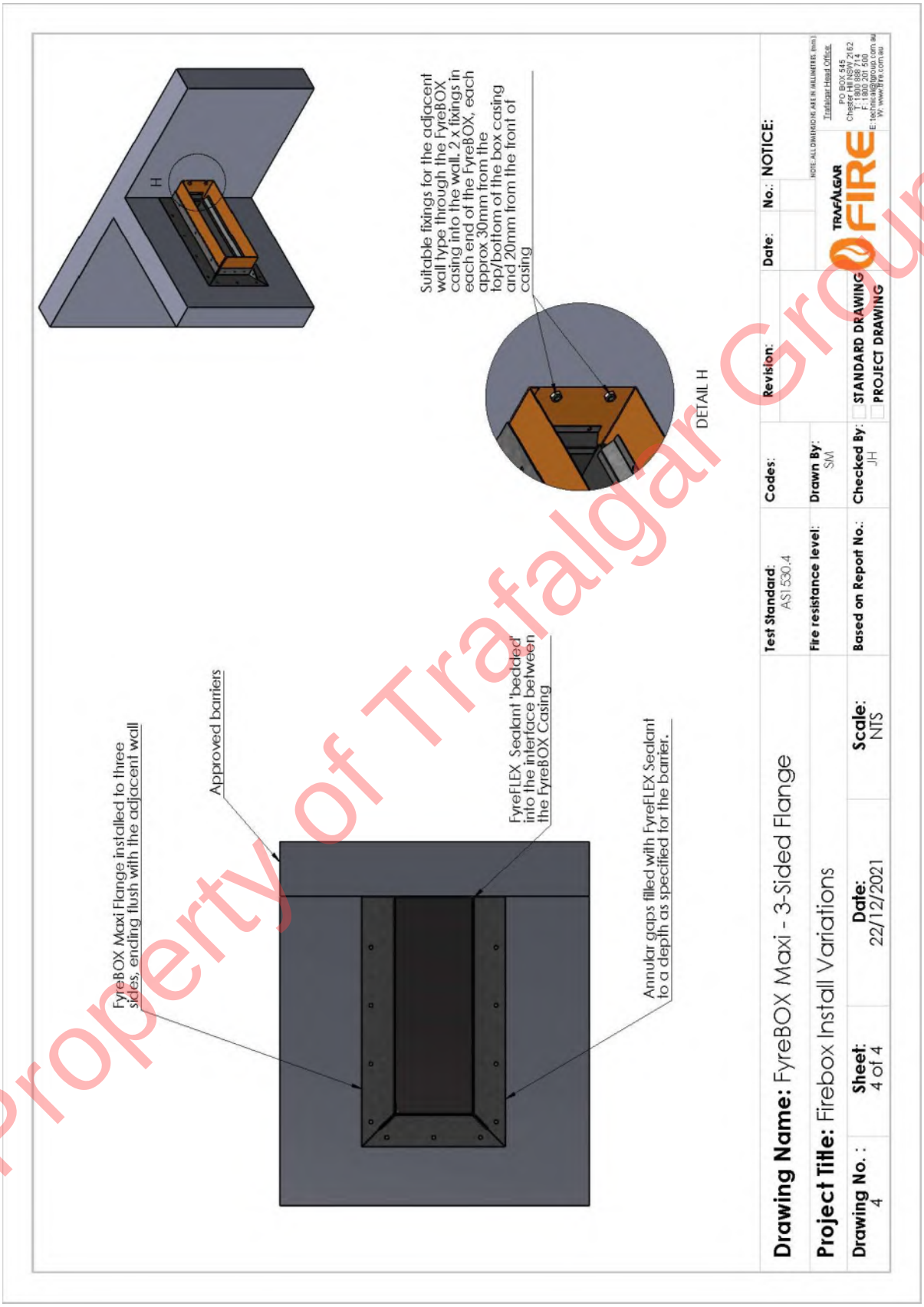

Figure 69 Install Variations – Slab Mount – Oversized Drawing 1

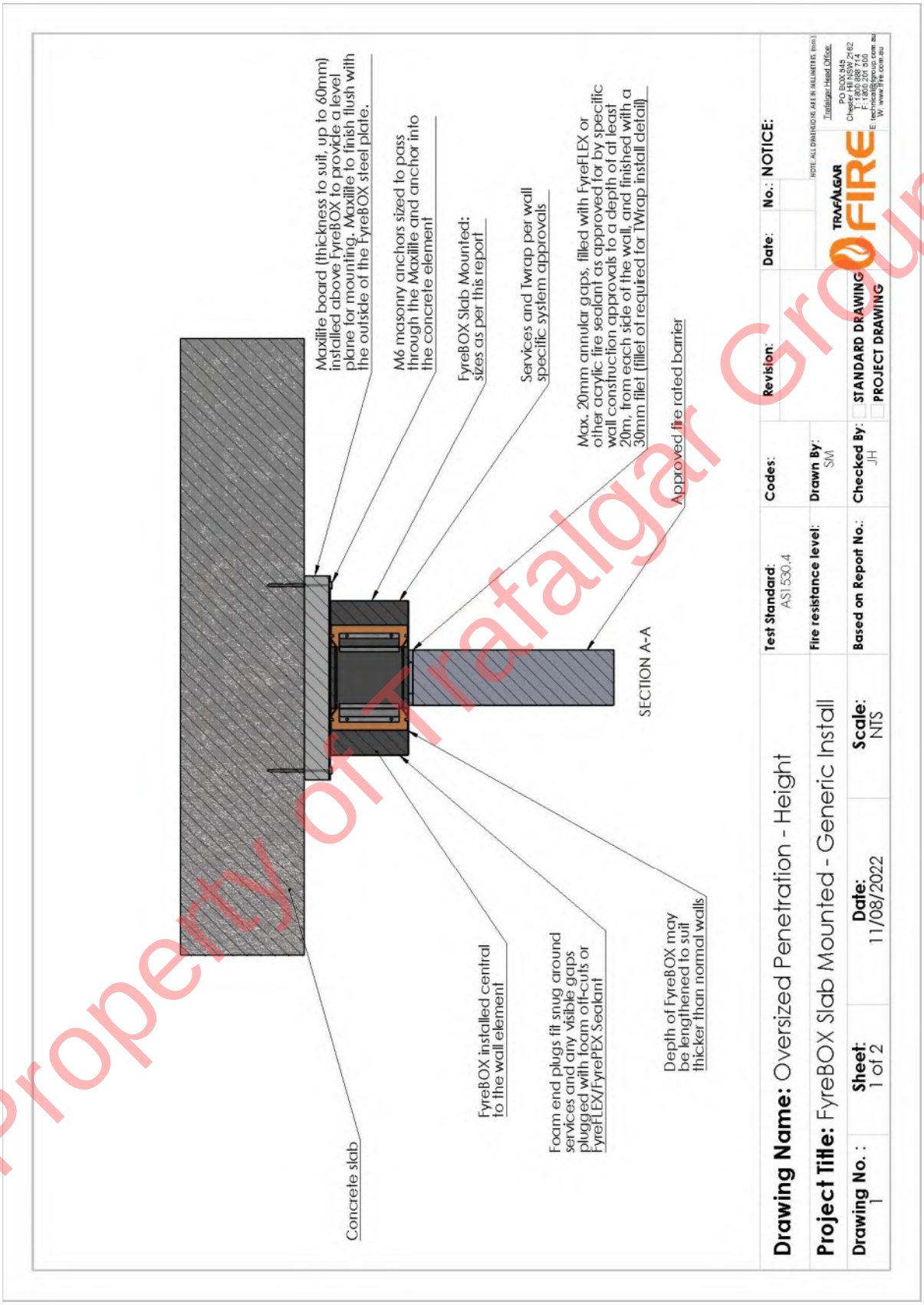

Figure 70 Install Variations – Slab Mount – Oversized Drawing 2

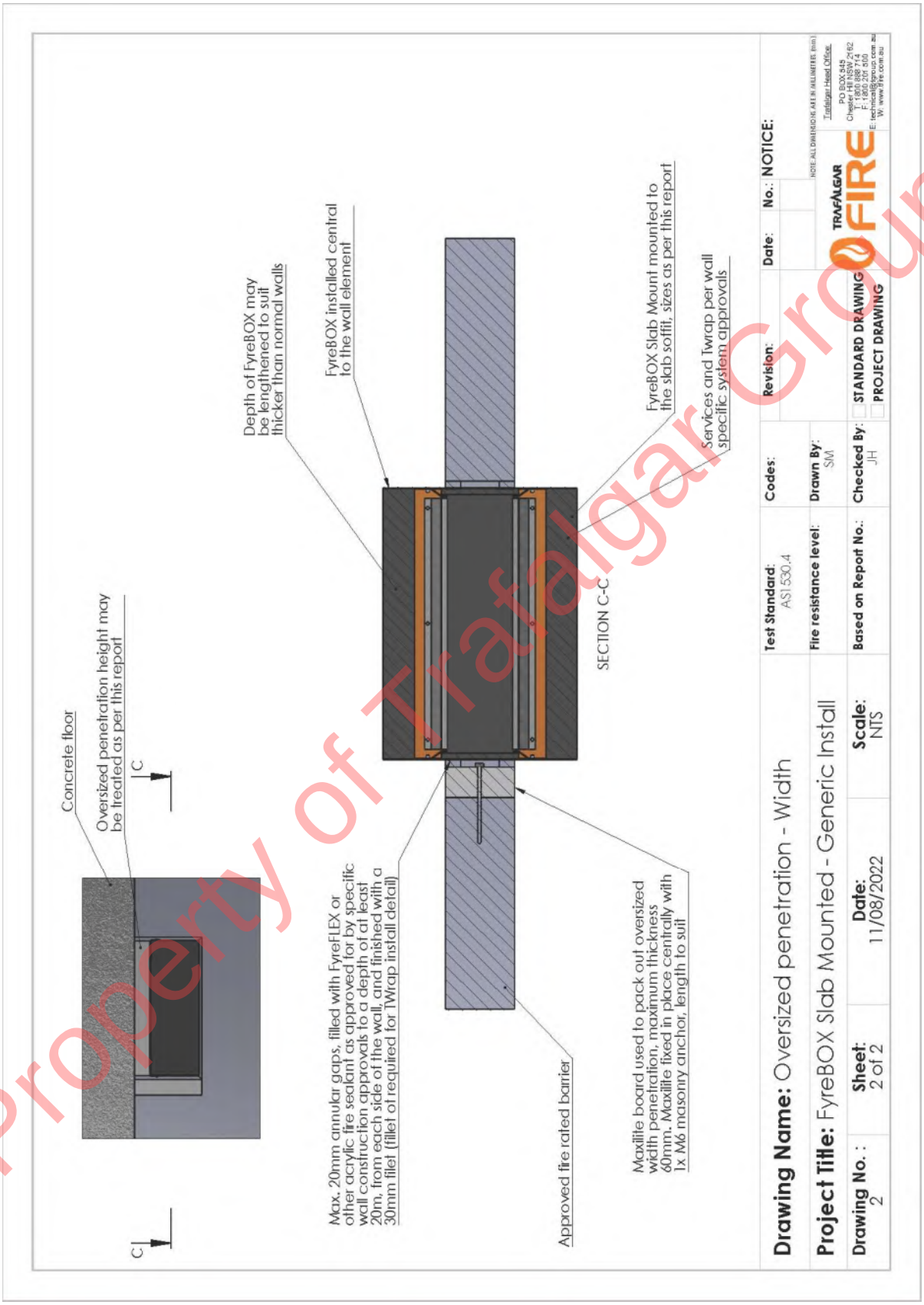

Figure 71 Install Variations – Slab Mount – Stepped Slab

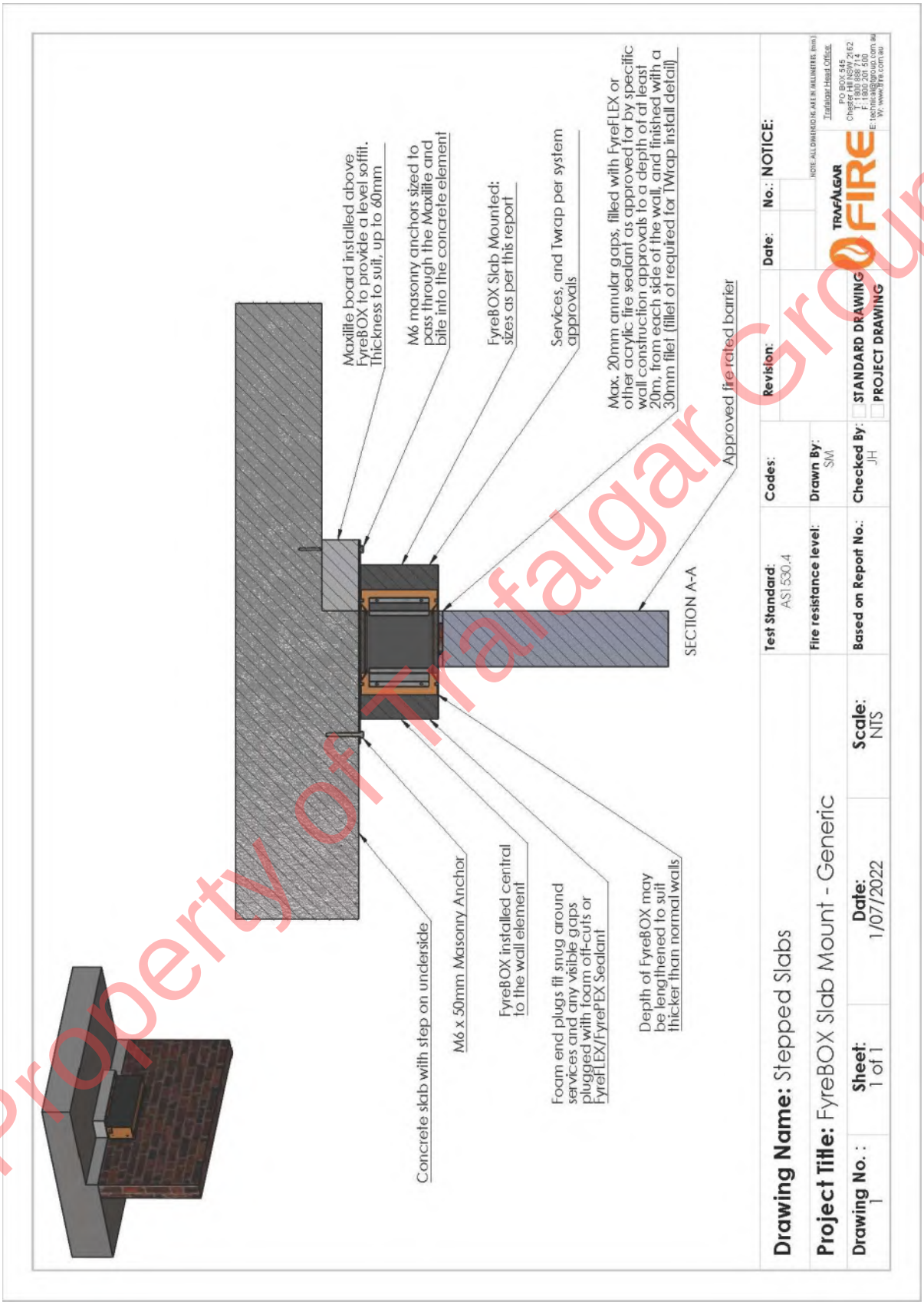

Figure 72 Install Variations – Cast-in Flush-set

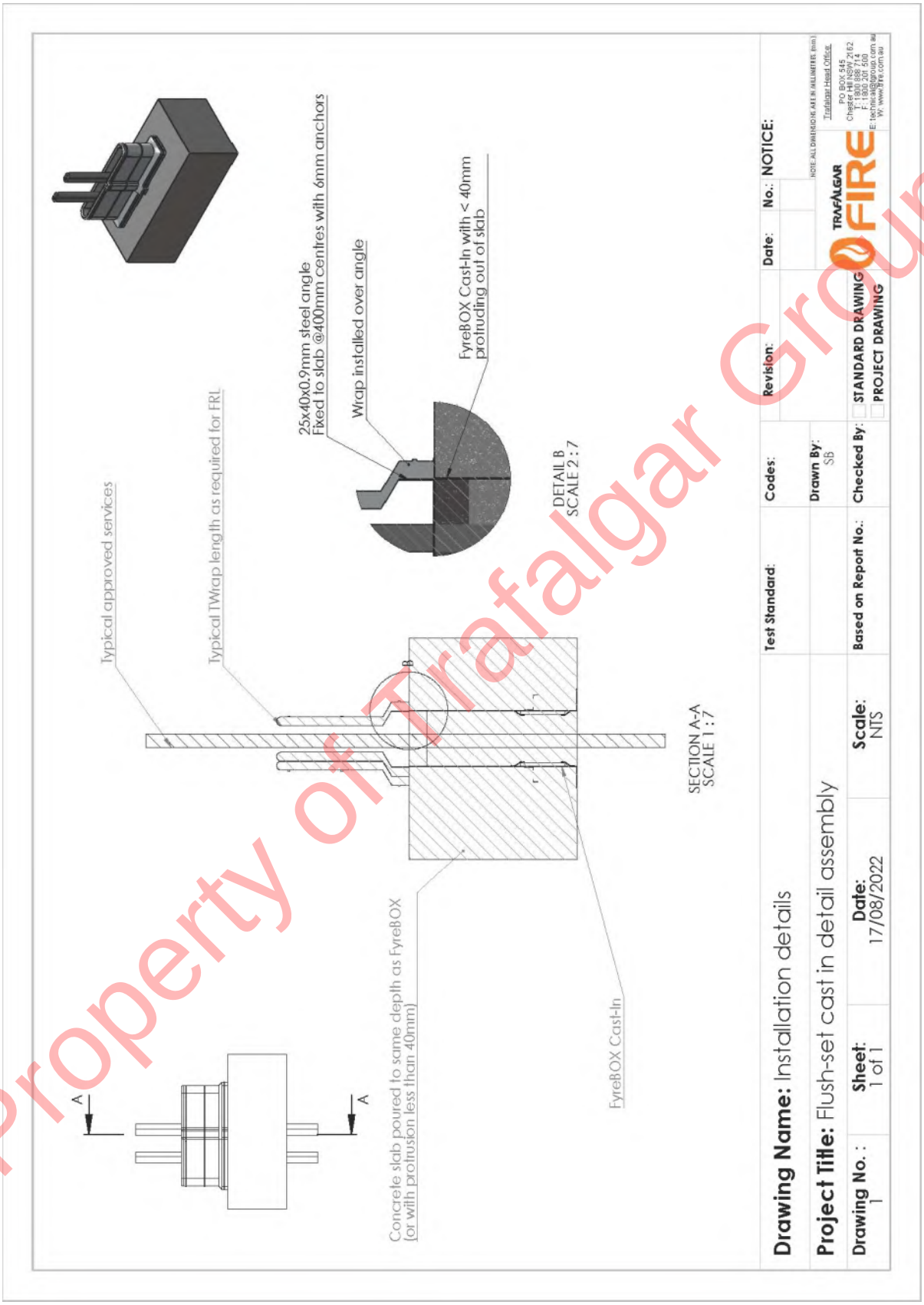

Figure 73 Install Variations – Slab Mount – Shaftliner Party Wall

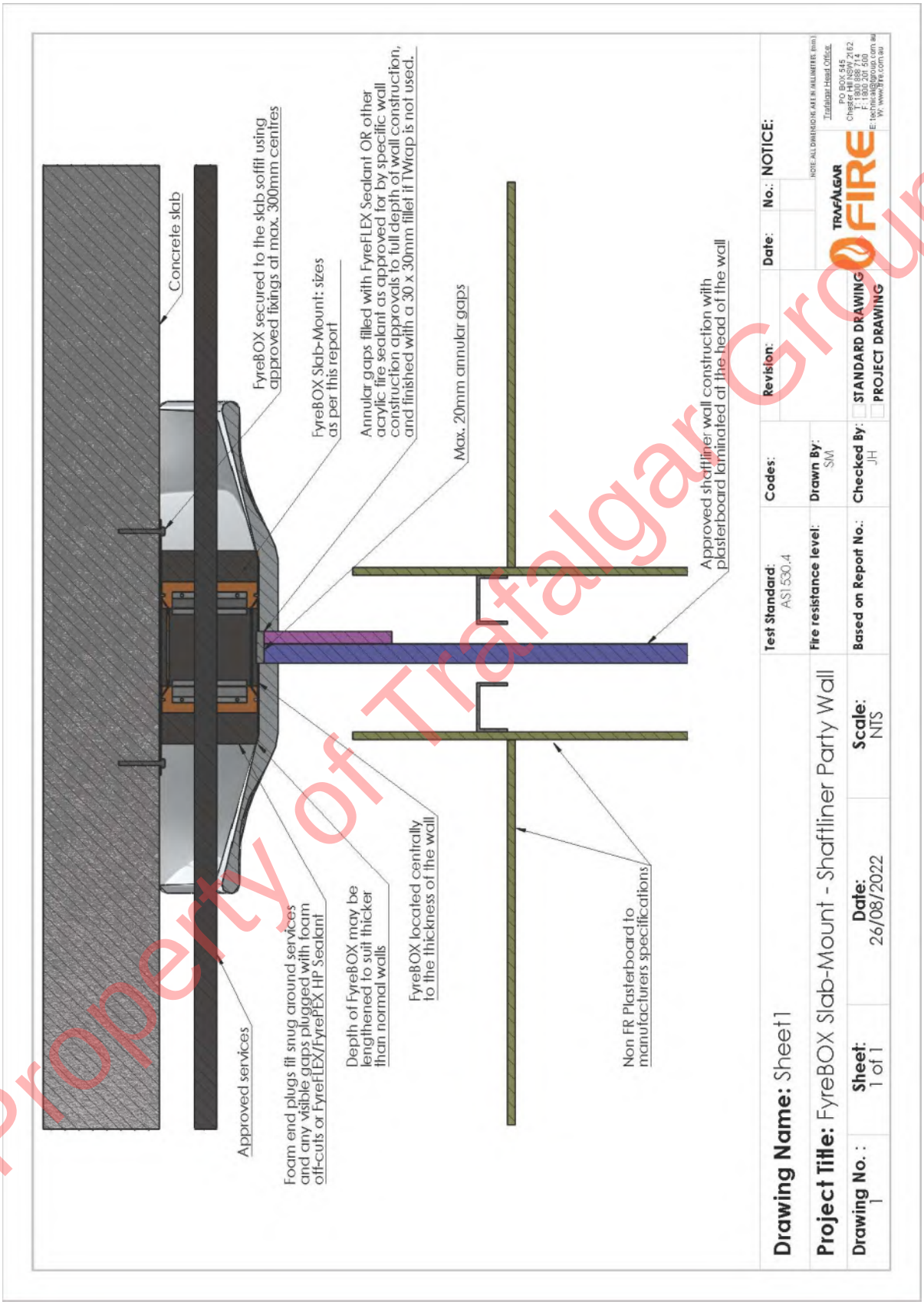

Figure 74 Install Details – Corex Wall System

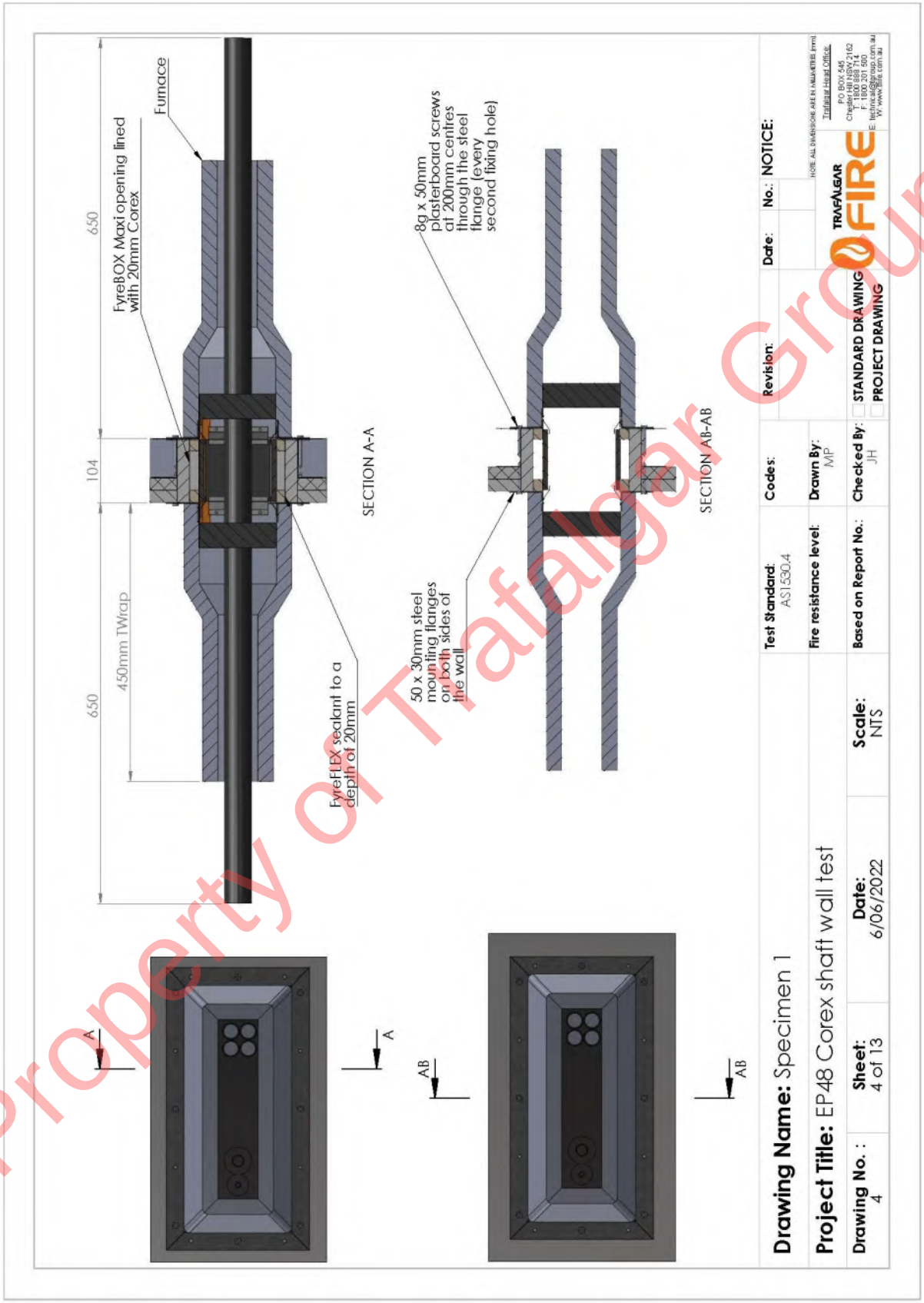

Figure 75 Install Details – FyreBOX Slab Mount - AlphaPanel/Plasterboard System

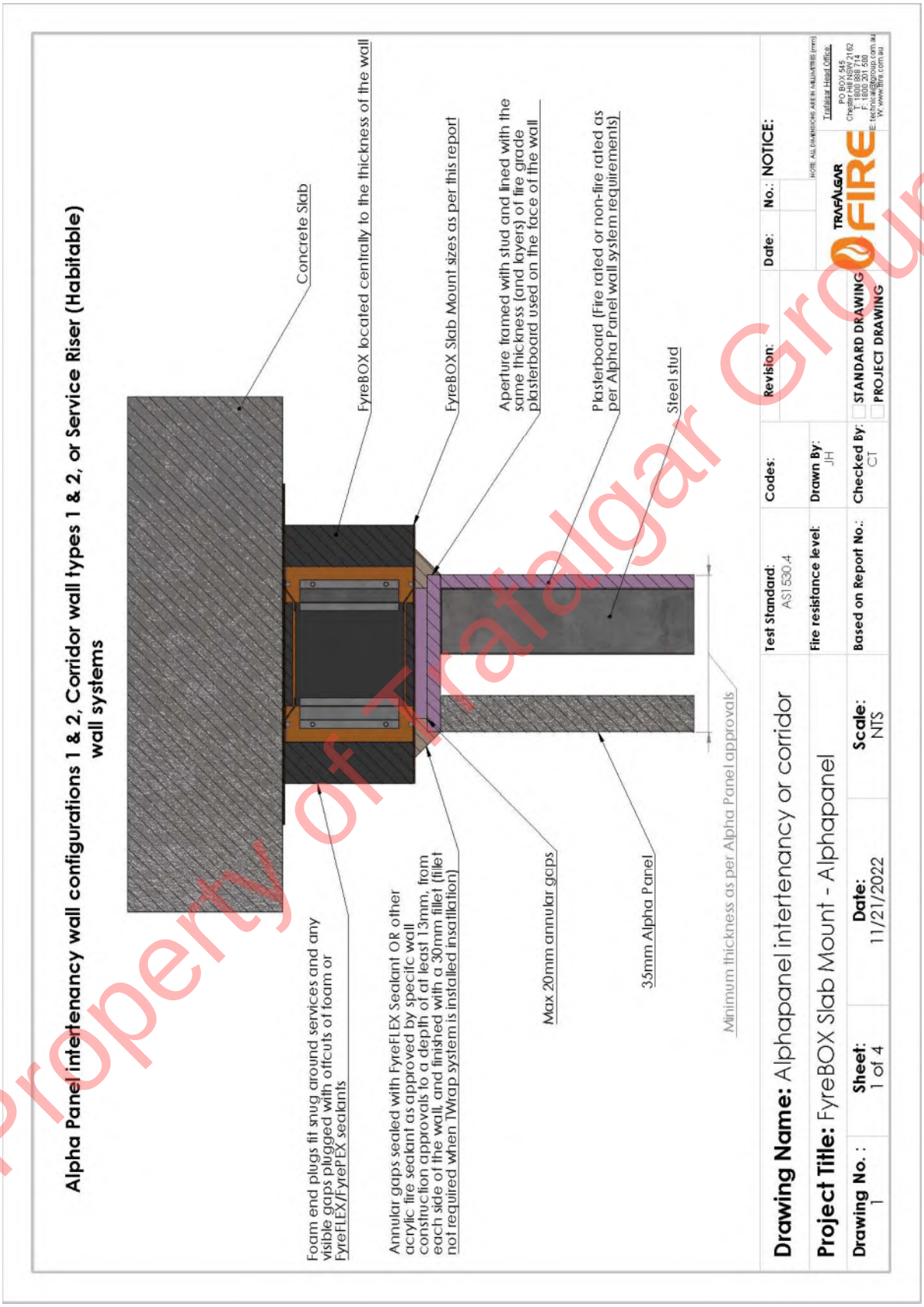

Figure 76 Install Details – FyreBOX Slab Mount - AlphaPanel System

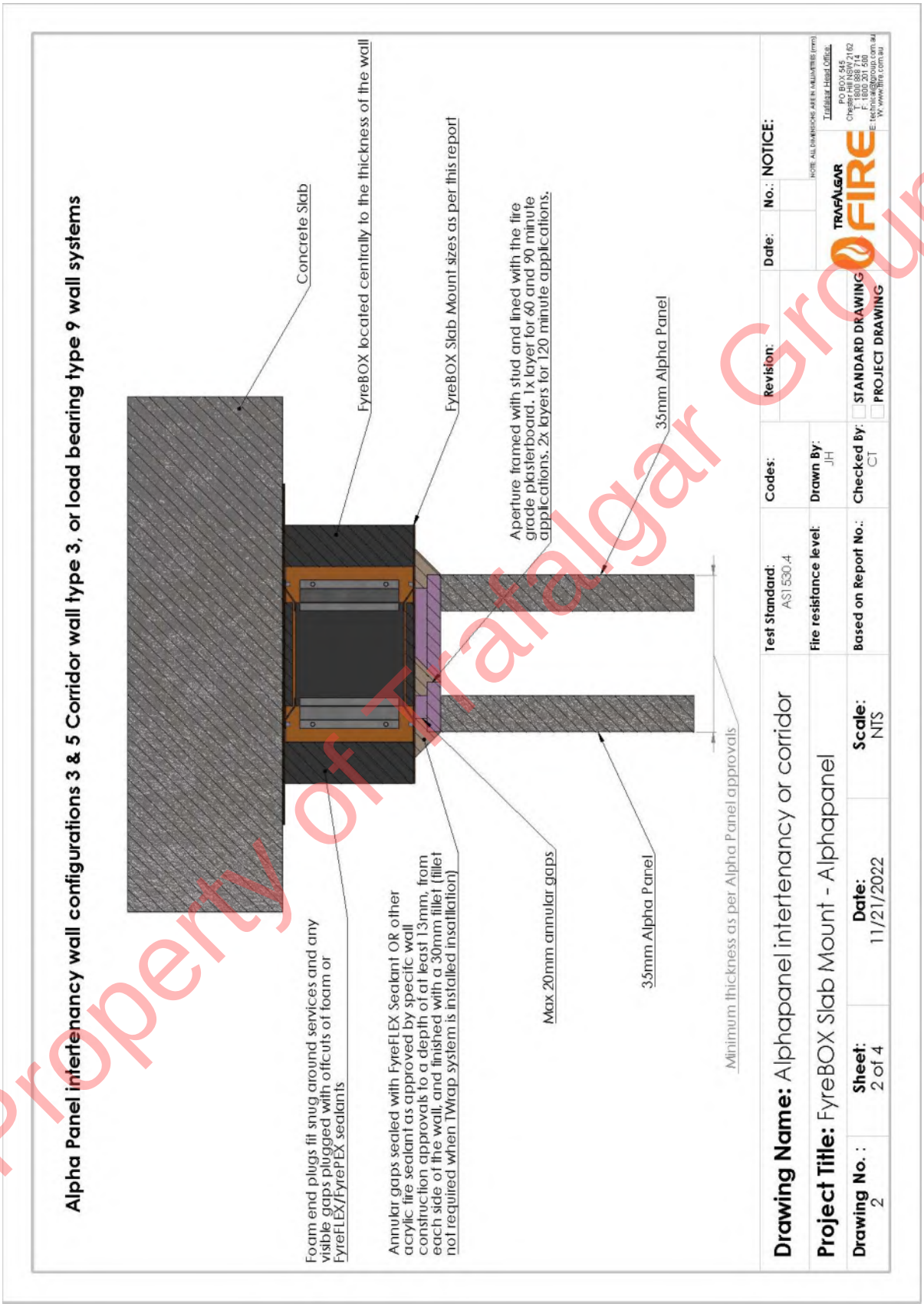

Figure 77 Install Details – FyreBOX Slab Mount - AlphaPanel with Plasterboard each side

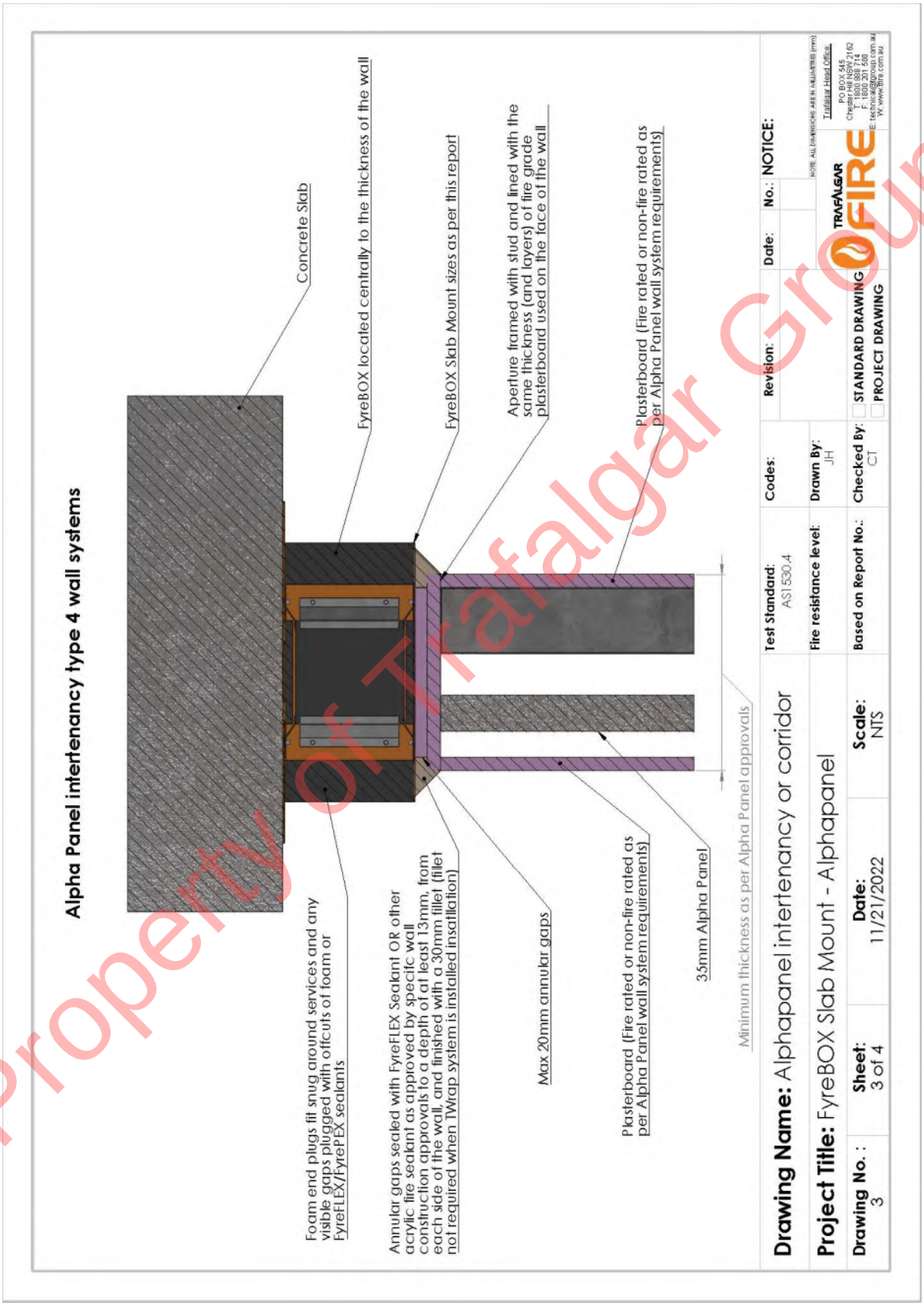

Figure 78 Install Details – FyreBOX Slab Mount - AlphaPanel System Laminated