6.4 Column and Beam Fire Protection

Column and beam protection systems consist of **fire**shield and **shaft**liner layers protecting structural timber, steel or concrete. This enables the structural members to maintain their load carrying capacity in the event of a fire.

This section details the most common methods to encase timber, steel or concrete columns and beams to achieve a structural fire resistance level.

The FRL (Fire Resistance Level) for structural protection systems do not require the Integrity and Insulation ratings. They are expressed with only first number for structural adequacy and two dashes, for example 90/–/–

Steel and concrete protection systems limit the temperature directly beneath the plasterboard to 550°C. Timber protection systems limit char to less than 4mm.

Refer to *AS/NZS 1170.0:2002 Structural design actions Clause 4.2.4* for combinations of actions in a fire event.

For more information, refer to Section 2.3 Fire Resistance.

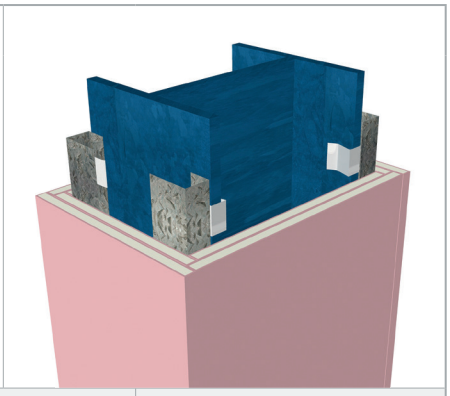
SFP1 - SFP9

- Steel column or beam encased in either **fire**shield or **shaft**liner

[Option 1] Plasterboard screwed to light gauge steel framing fixed to structural steel

[Option 2] Plasterboard directly fixed to structural steel

fireshield can be substituted with **multi**shield or **tru**rock



FRL	System	Plasterboard Lining	Plasterboard Thickness (mm)
30/ – / – Fire Report FC14029	SFP1	1 layer of 13mm **fire**shield	13
60/ – / – Fire Report FC14029	SFP2	1 layer of 16mm **fire**shield	16
60/ – / – Fire Report FC14029	SFP3	2 layers of 13mm **fire**shield	26
60/ – / – Fire Report FC14029	SFP4	1 layer of 25mm **shaft**liner	25
90/ – / – Fire Report FC14029	SFP5	2 layers of 16mm **fire**shield	32
120/ – / – Fire Report FC14029	SFP6	3 layers of 13mm **fire**shield	39
120/ – / – Fire Report FC14029	SFP7	1 layer of 13mm **fire**shield plus 1 layer of 25mm **shaft**liner	38
180/ – / – Fire Report FC14029	SFP8*	4 layers of 16mm **fire**shield	64
180/ – / – Fire Report FC14029	SFP9*	1 layer of 13mm **fire**shield plus 2 layers of 25mm **shaft**liner	63

*SFP8 and SFP9 can be installed as walls or bulkheads up to 1200mm wide with an FRL of 180/180/180. Fire Report 4522.

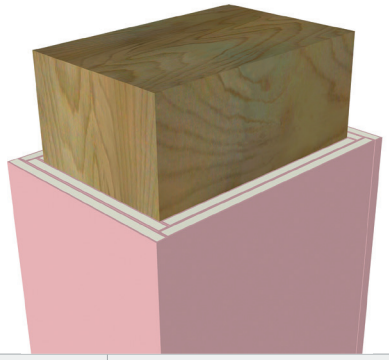
SFP10 - SFP30

- Timber column or beam (minimum dimensions 100 x 100mm) encased in either **fire**shield or **shaft**liner

[Option 1] Plasterboard screwed to light gauge steel framing fixed to structural timber

[Option 2] Plasterboard directly fixed to structural timber

fireshield can be substituted with **multi**shield or **tru**rock



FRL	System	Plasterboard Lining	Plasterboard Thickness (mm)
30/ – / – Fire Report FC14029	SFP10	1 layer of 13mm **fire**shield	13
60/ – / – Fire Report FC14029	SFP11	2 layers of 13mm **fire**shield	26
60/ – / – Fire Report FC14029	SFP12	1 layer of 25mm **shaft**liner	25
90/ – / – Fire Report FC14029	SFP13	3 layers of 13mm **fire**shield	39
90/ – / – Fire Report FC14029	SFP14	1 layer of 13mm **fire**shield plus 1 layer of 25mm **shaft**liner	38
120/ – / – Fire Report FC14029	SFP15	3 layers of 16mm **fire**shield	48
180/ – / – Fire Report FC14029	SFP16	4 layers of 16mm **fire**shield	64

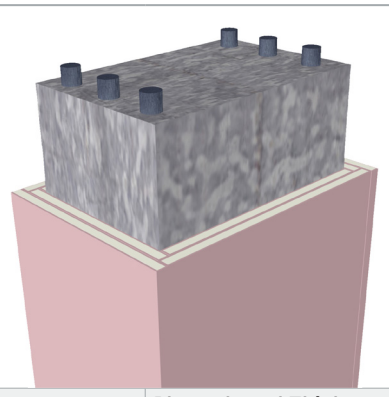
SFP20 - SFP24

- Concrete column encased in **fire**shield

[Option 1] Plasterboard screwed to light gauge steel framing fixed to concrete

[Option 2] Plasterboard fixed to concrete directly with Tapcon countersunk screws

fireshield can be substituted with **multi**shield or **tru**rock



FRL	System	Plasterboard Lining	Plasterboard Thickness (mm)
Concrete Structural Adequacy + 30/ – / – Fire Report FC14029	SFP20	1 layer of 13mm **fire**shield	13
Concrete Structural Adequacy + 60/ – / – Fire Report FC14029	SFP21	1 layer of 16mm **fire**shield	16
Concrete Structural Adequacy + 90/ – / – Fire Report FC14029	SFP22	2 layers of 16mm **fire**shield	32
Concrete Structural Adequacy + 120/ – / – Fire Report FC14029	SFP23	3 layers of 13mm **fire**shield	39
Concrete Structural Adequacy + 180/ – / – Fire Report FC14029	SFP24	4 layers of 16mm **fire**shield	64

General Requirements

	Fire Rated
Only joint the face layer. As a minimum, use paper tape with either masta**base**, masta**longset**, masta**line**, masta**tape-in** or masta**lite** applied in one or two coats to the thickness of two coats.	✓
Use fire sealant on all gaps and around perimeter.	✓
Check the NCC Volume One, Section C1.8 for additional requirements for columns such as filling any void solid up to 1.2m high, or to provide further damage protection.	✓
Protect intersecting framing members to the column or beam with 450mm of the plasterboard protection system or Promat Promaseal® Supawrap 40.	✓
Fix items such as top hats through the plasterboard into the column or beam using maximum 12g screws.	✓
Mitred and folded corners are permitted for single layer systems only.	✓

Framing

	Fire Rated
Install steel framing members at maximum 300mm centres in the horizontal plane (bottom of beams) and maximum 600mm centres in the vertical plan (columns and, top and sides of beams). Steel framing may be screwed, welded or riveted to the column or beam.	✓
Install steel framing at each end of the column/beam and behind first layer butt joints.	✓
Use Table 1 for furring channels onto columns and Section 5.1 for furring channels onto beams. Alternatively for top hats, refer to Section 4.5 for columns or Section 5.5 for beams.	✓

Table 1 Furring Channel Anchor Spacing to Columns

Framing Member	Columns
13mm Recessed Furring Channel	900mm
18mm Furring Channel (FC18)	900mm
28mm Furring Channel (FC28)	900mm

Anchors for furring channel must also be fixed 100mm maximum from ends.

Plasterboard Layout

	Fire Rated
Stagger butt joints by 300mm minimum on adjoining sheets and between layers.	✓
Stagger recessed edges by 300mm minimum between layers.	✓

Plasterboard Fixing

	Fire Rated
Use the 'Screw Only Method'. Stud adhesive is not permitted.	✓
Drive screws to just below the sheet surface, taking care not to break the paper linerboard. For over-driven screws, install another screw 20mm away. Leave or remove the over-driven screw and patch.	✓
Laminating screws can be used to fix butt joints in the second, third and fourth layers.	✓
Fix plasterbooard to a column or beam using maximum 12g screws.	✓

Screw Type and Minimum Size for the Installation of Plasterboard to Steel

Plasterboard Thickness	1st Layer	2nd Layer	3rd Layer	4th Layer
13mm	6g x 25mm screw	6g x 41mm screw	7g x 57mm screw or 10g - 38mm laminating screws	-
16mm	6g x 32mm screw	6g x 45mm screw	8g x 65mm screw or 10g - 38mm laminating screws	10g - 38mm laminating screws
25mm	6g x 41mm screw	-	-	-
13mm + 25mm + 25mm	6g x 25mm screw	7g x 50mm screw	10g - 50mm laminating screws	-

For steel ≤ 0.75mm BMT, use fine thread needle point screws.
For steel ≥ 0.75mm BMT, use fine thread drill point screws.

Screw Type and Minimum Size for the Installation of Plasterboard to Timber

Plasterboard Thickness	1st Layer	2nd Layer	3rd Layer	4th Layer
13mm	6g x 40mm screw	8g x 50mm screw	10g - 38mm laminating screws	-
16mm	6g x 45mm screw	8g x 60mm screw	10g - 38mm laminating screws	10g - 38mm laminating screws
25mm	8g x 50mm screw	10g - 50mm laminating screws	-	-
13mm + 25mm	6g x 40mm screw	8g x 65mm screw	-	-

10g x 38mm Laminating screws may be used as detailed in installation diagrams.

Screw Type and Minimum Size for the Installation of Plasterboard to Concrete

Plasterboard Thickness	1st Layer	2nd Layer	3rd and 4th Layer
13mm	10g - 32mm tapcon screw	10g - 45mm tapcon screw	10g - 38mm laminating screws
16mm	10g - 32mm tapcon screw	10g - 45mm tapcon screw	10g - 38mm laminating screws

For concrete use tapcon screws with countersunk head.

FIGURE 1 Steel Column or Beam
Screw Only Method

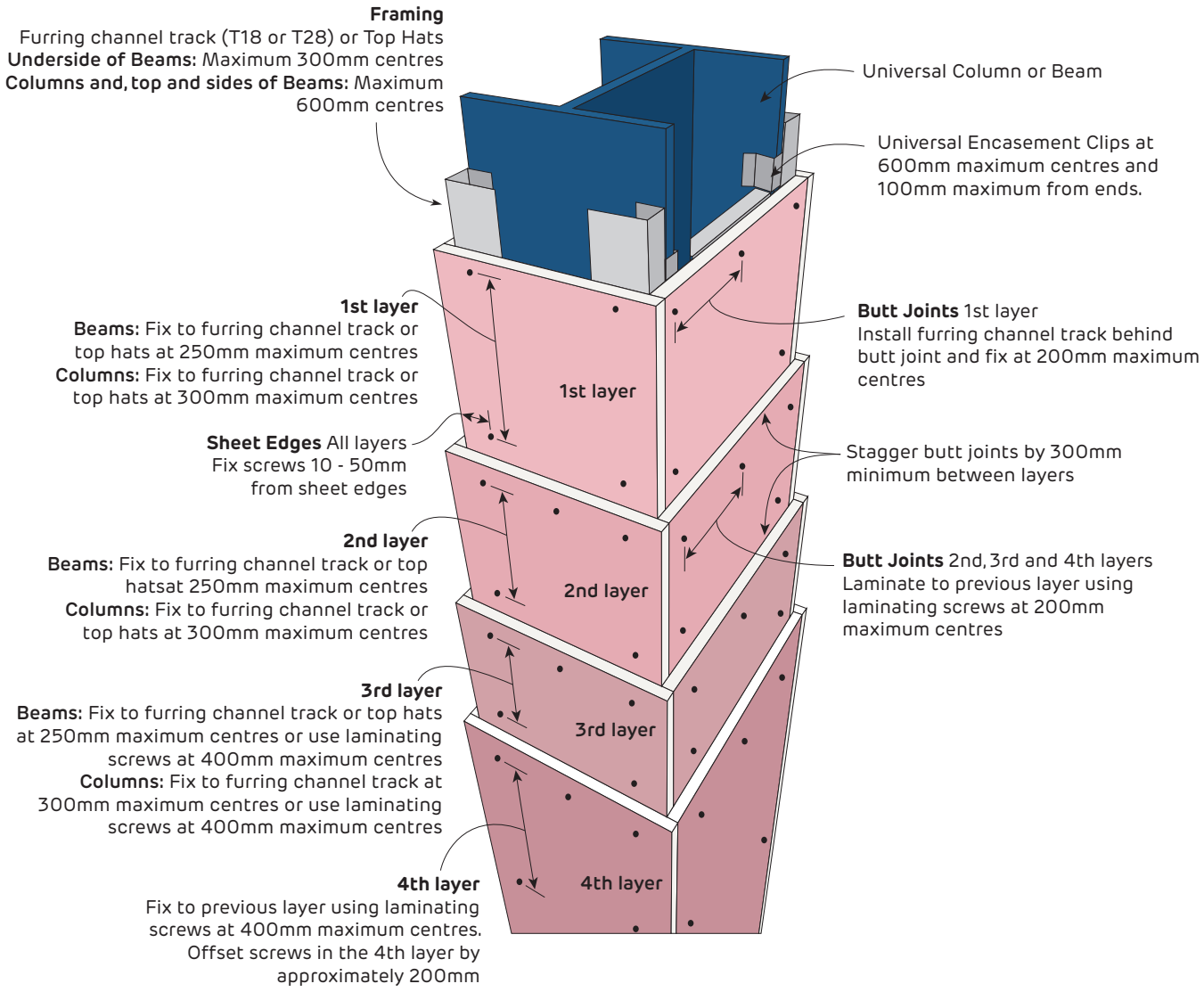


FIGURE 2 Timber Column or Beam
Screw Only Method

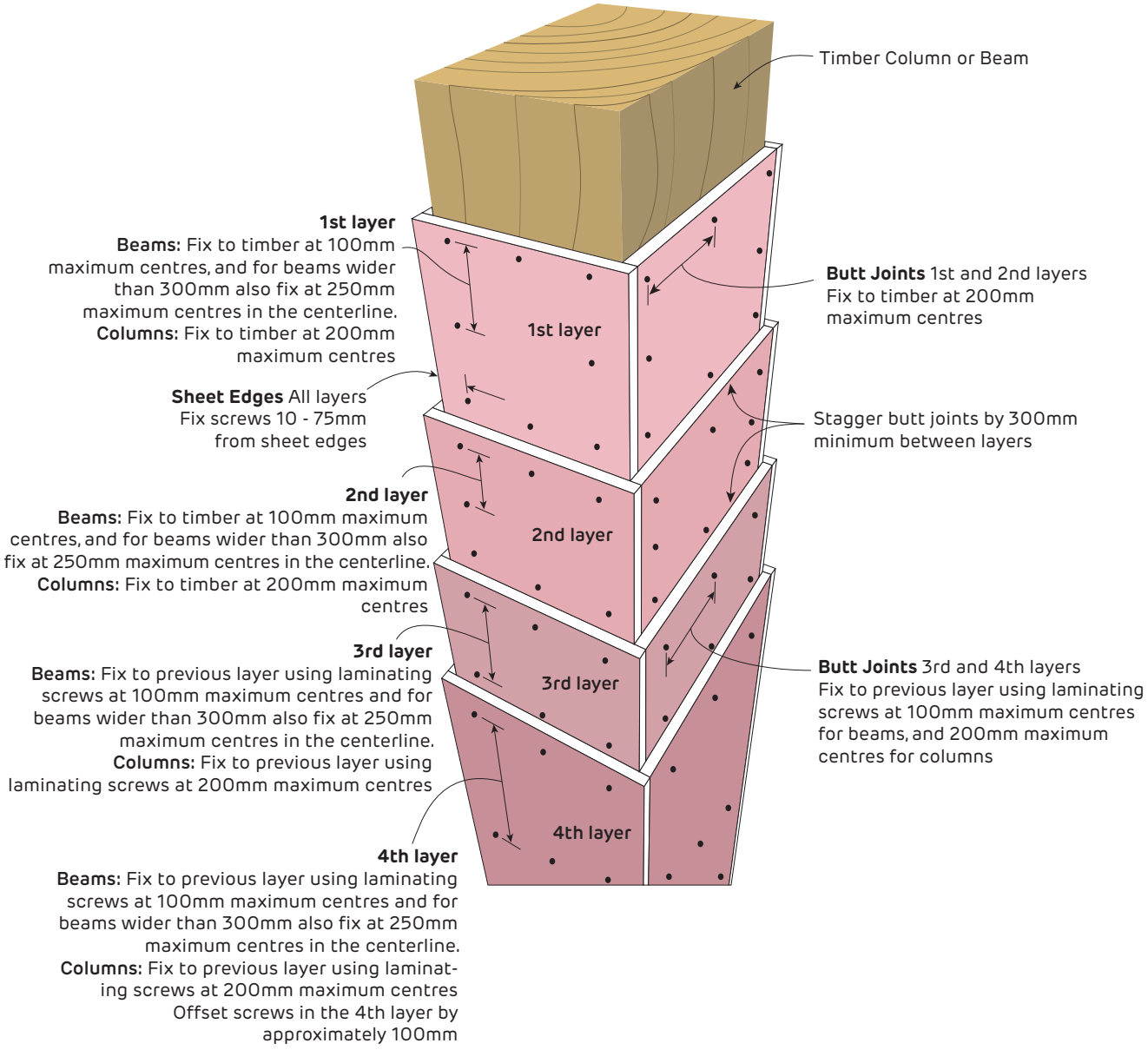
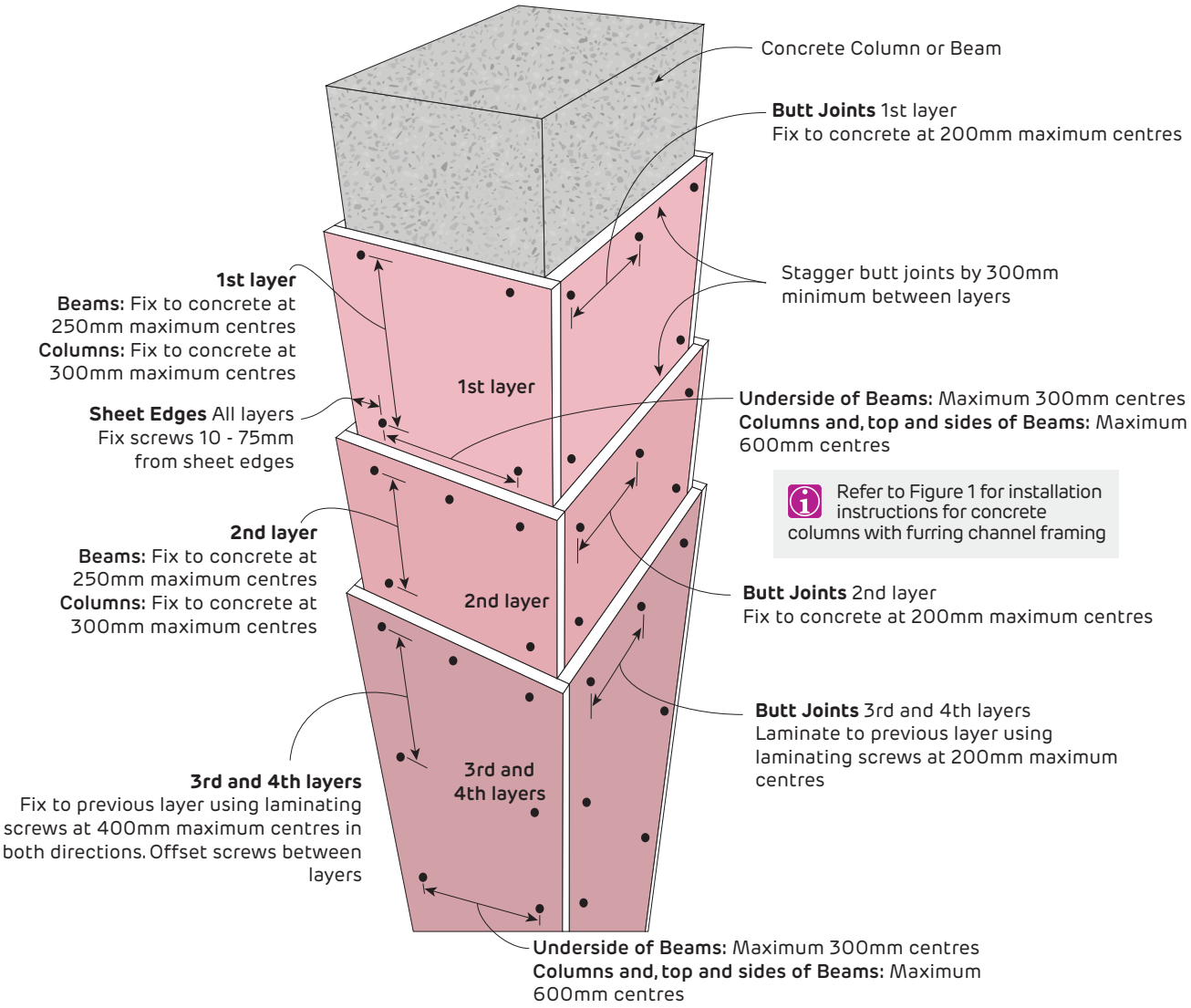


FIGURE 3 Concrete Column or Beam
Screw Only Method



Fire Rated
Details for Steel Column and Beam Fire Protection

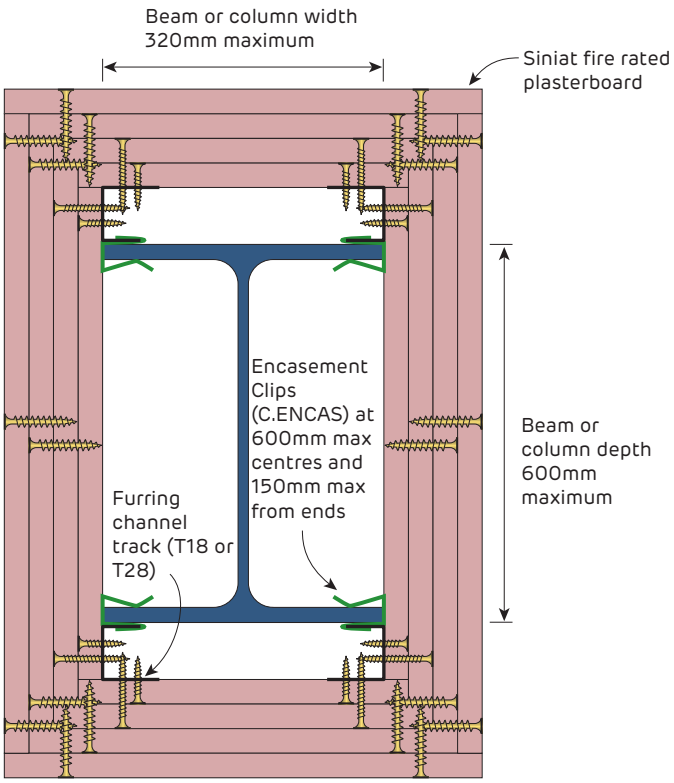


FIGURE 4 4 Sided Protection for I-Beam/Column
Plan or Section

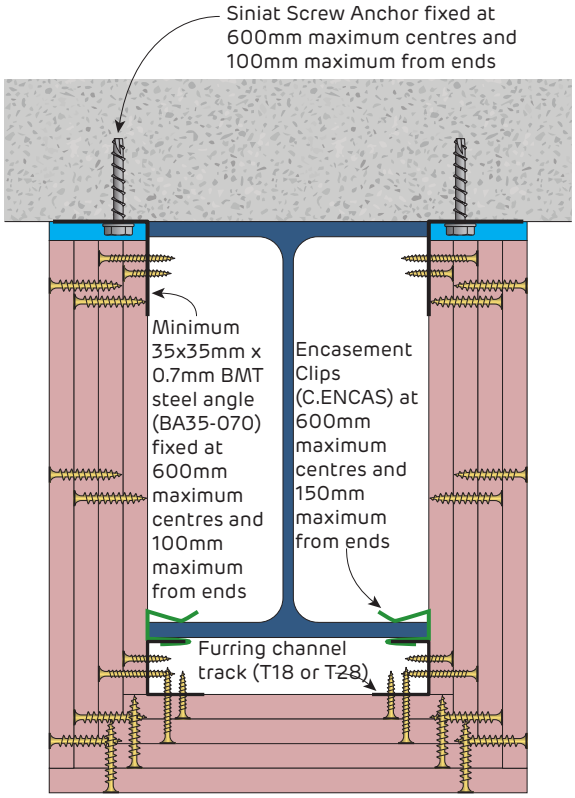
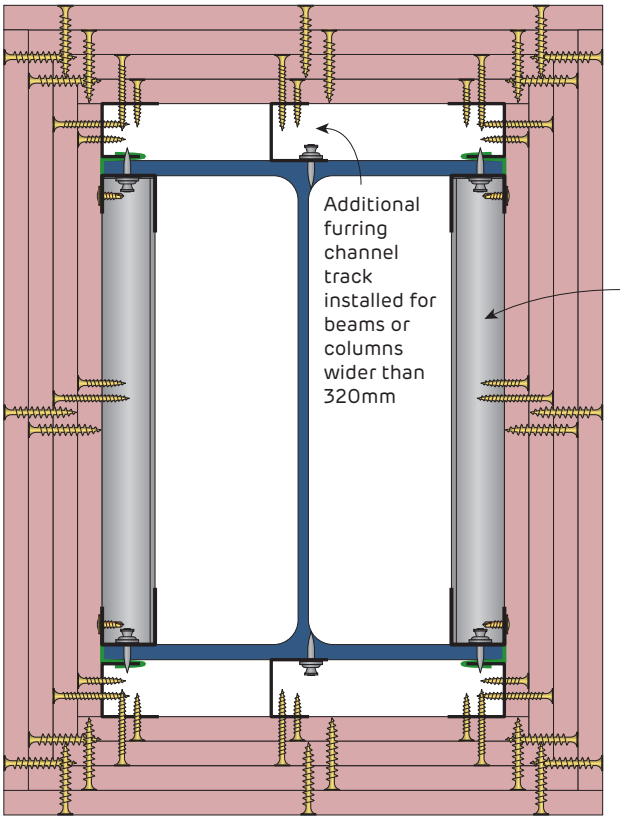


FIGURE 5 3 Sided Protection for I-Beam/Column
Plan or Section



For corner gaps up to 3mm, fill with either Bindex Fire and Acoustic sealant or Mastabase jointing compound. Fill any other gaps with Bindex sealant to maintain integrity.

FIGURE 6 4 Sided Protection for I-Beam/Column
Plan or Section

Fire Rated
Details for Steel Column and Beam Fire Protection

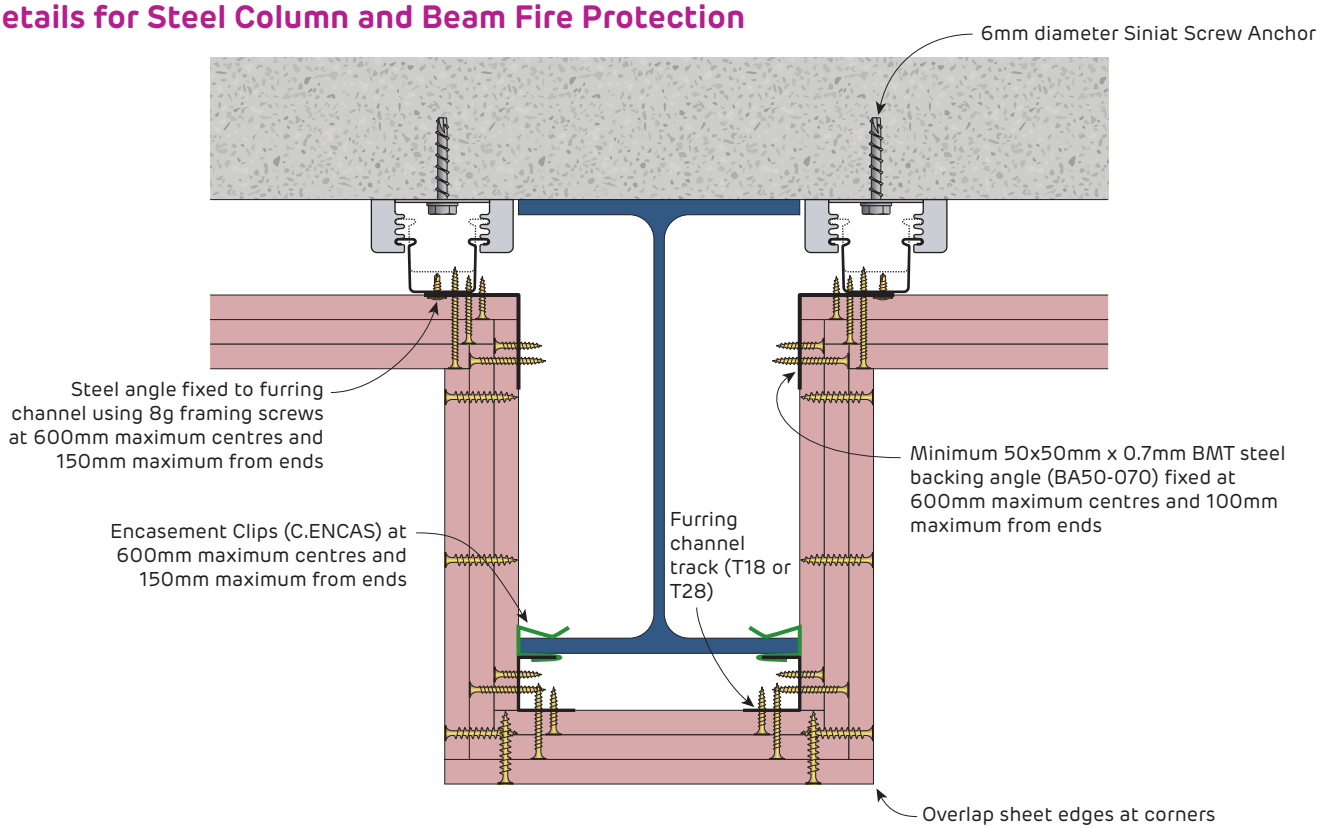


FIGURE 7 3 Sided Protection for I-Beam to Ceiling
Section

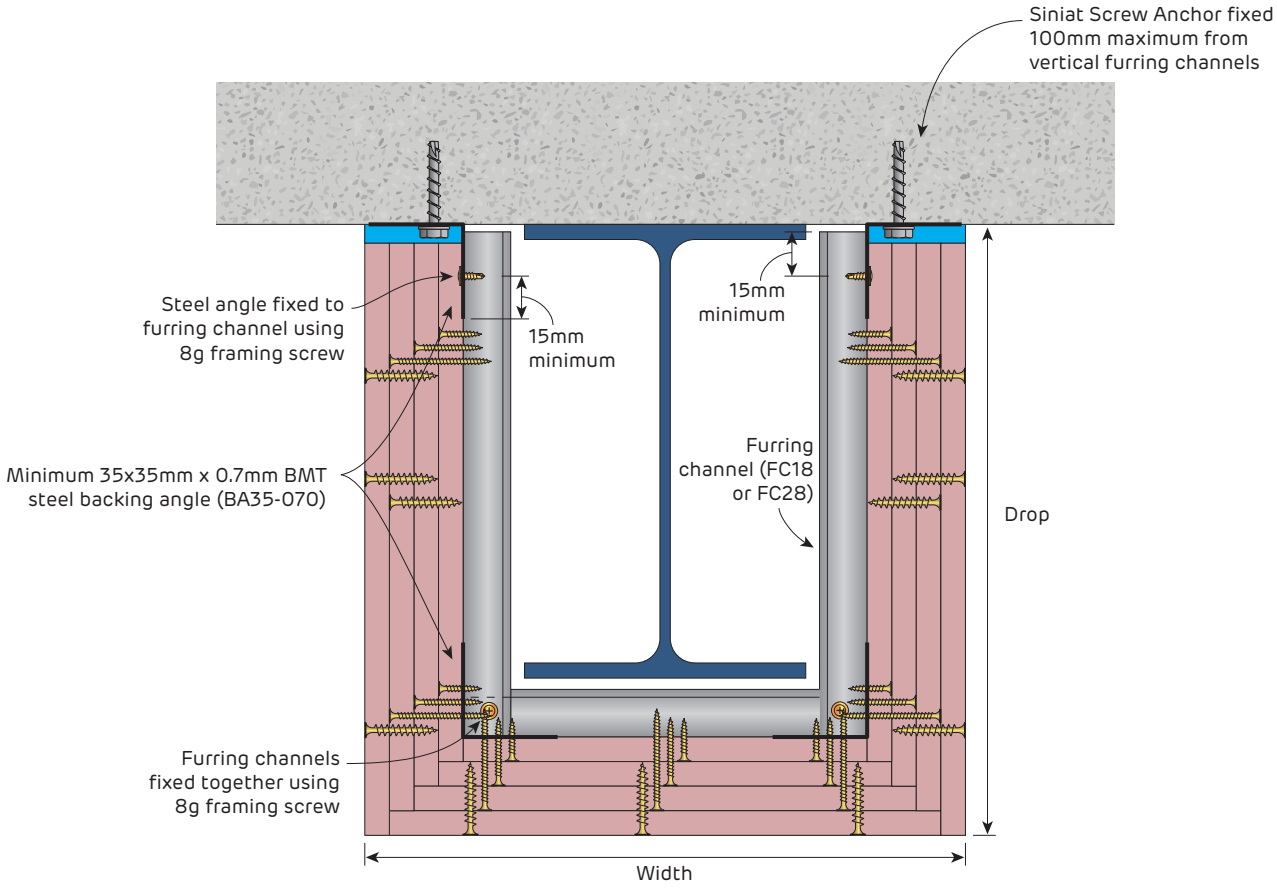


FIGURE 8 U-Shaped Bulkhead
Section

Fire Rated
Details for Steel Column and Beam Fire Protection

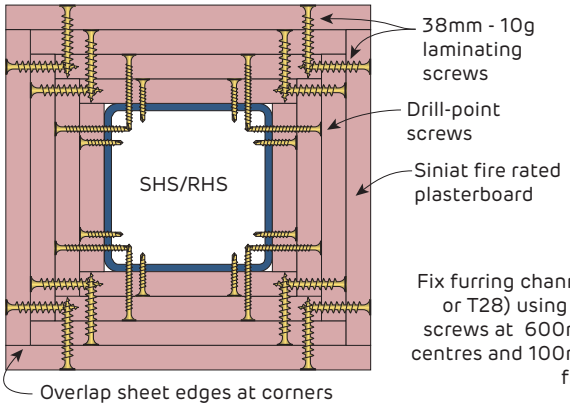


FIGURE 9 4 Sided Protection for SHS / RHS
Plan or Section

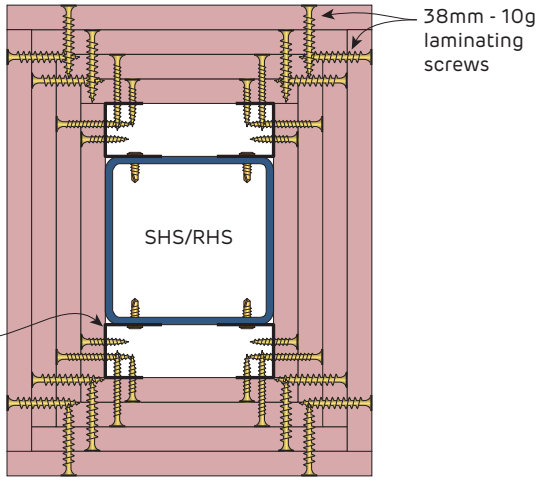


FIGURE 10 4 Sided Protection for SHS / RHS
Plan or Section

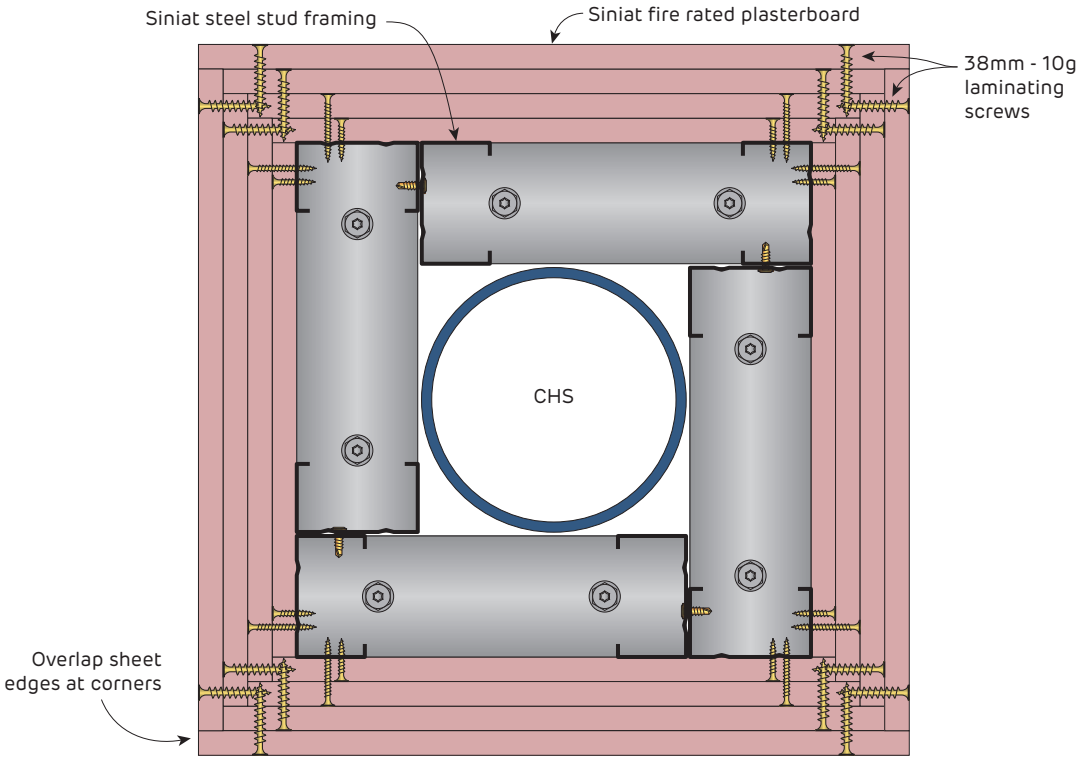


FIGURE 11 4 Sided Protection for CHS
Plan

For corner gaps up to 3mm, fill with either Bindex Fire and Acoustic sealant or Mastabase jointing compound. Fill any other gaps with Bindex sealant to maintain integrity.

Fire Rated
Details for Timber Column and Beam Fire Protection

For corner gaps up to 3mm, fill with either Bindex Fire and Acoustic sealant or Mastabase jointing compound. Fill any other gaps with Bindex sealant to maintain integrity.

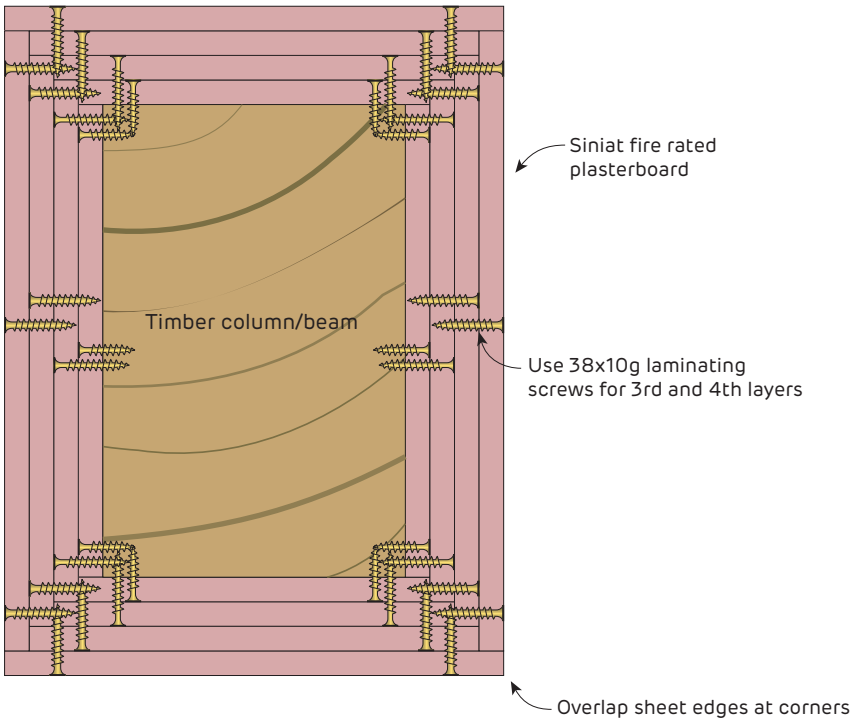


FIGURE 12 4 Sided Protection Timber Column/Beam
Plan or Section

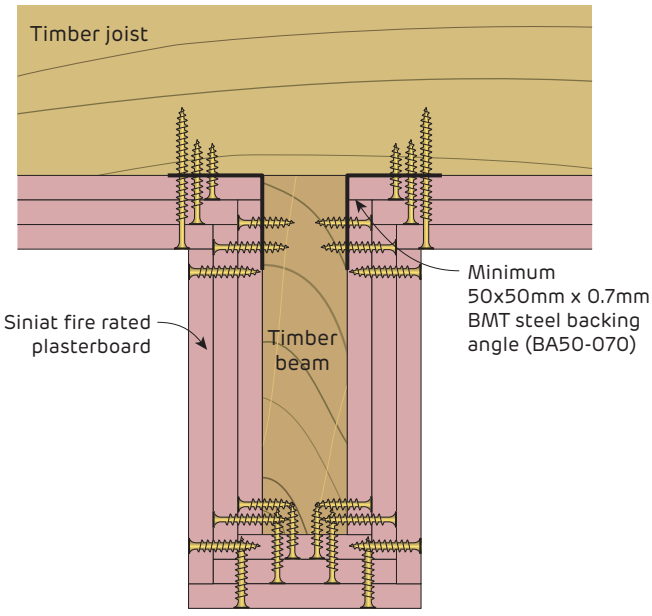


FIGURE 13 3 Sided Protection Timber Beam
Section

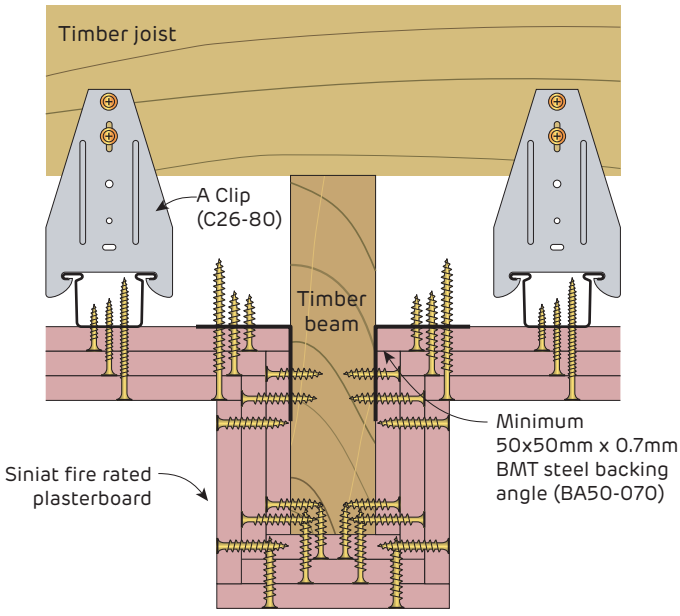
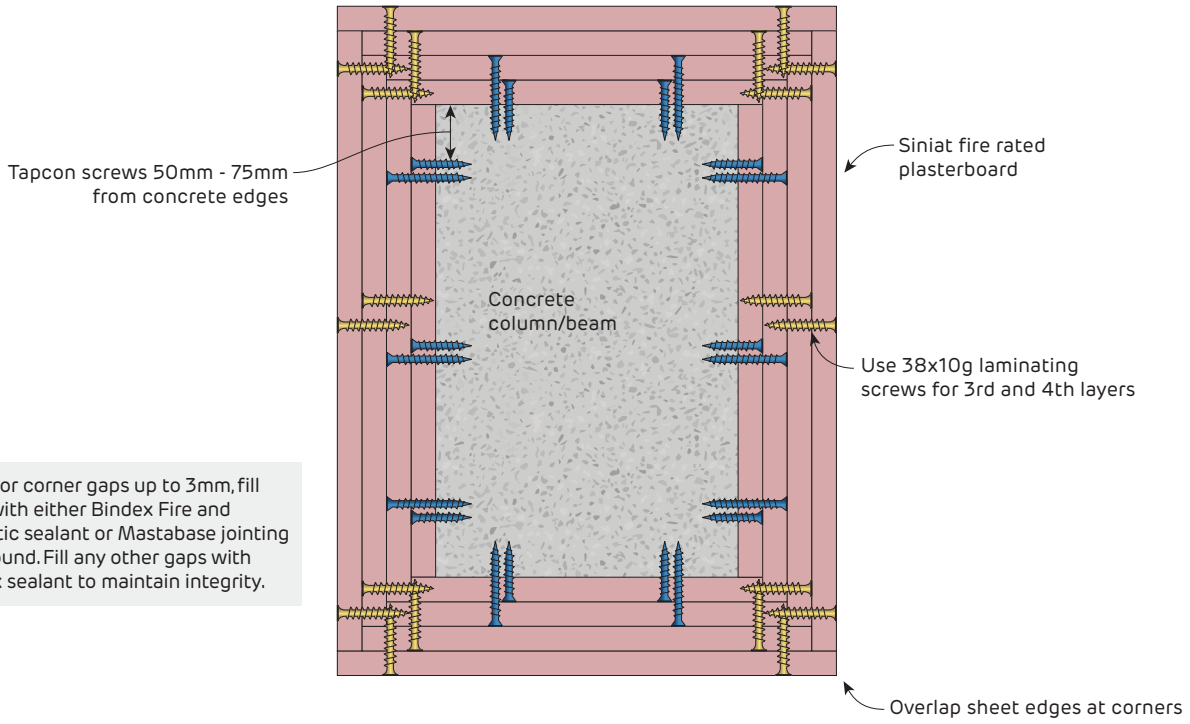


FIGURE 14 3 Sided Protection for Timber Beam to Ceiling
Section

Fire Rated
Details for Concrete Column and Beam Fire Protection



For corner gaps up to 3mm, fill with either Bindex Fire and Acoustic sealant or Mastabase jointing compound. Fill any other gaps with Bindex sealant to maintain integrity.

FIGURE 15 4 Sided Protection Concrete Column/Beam
Plan

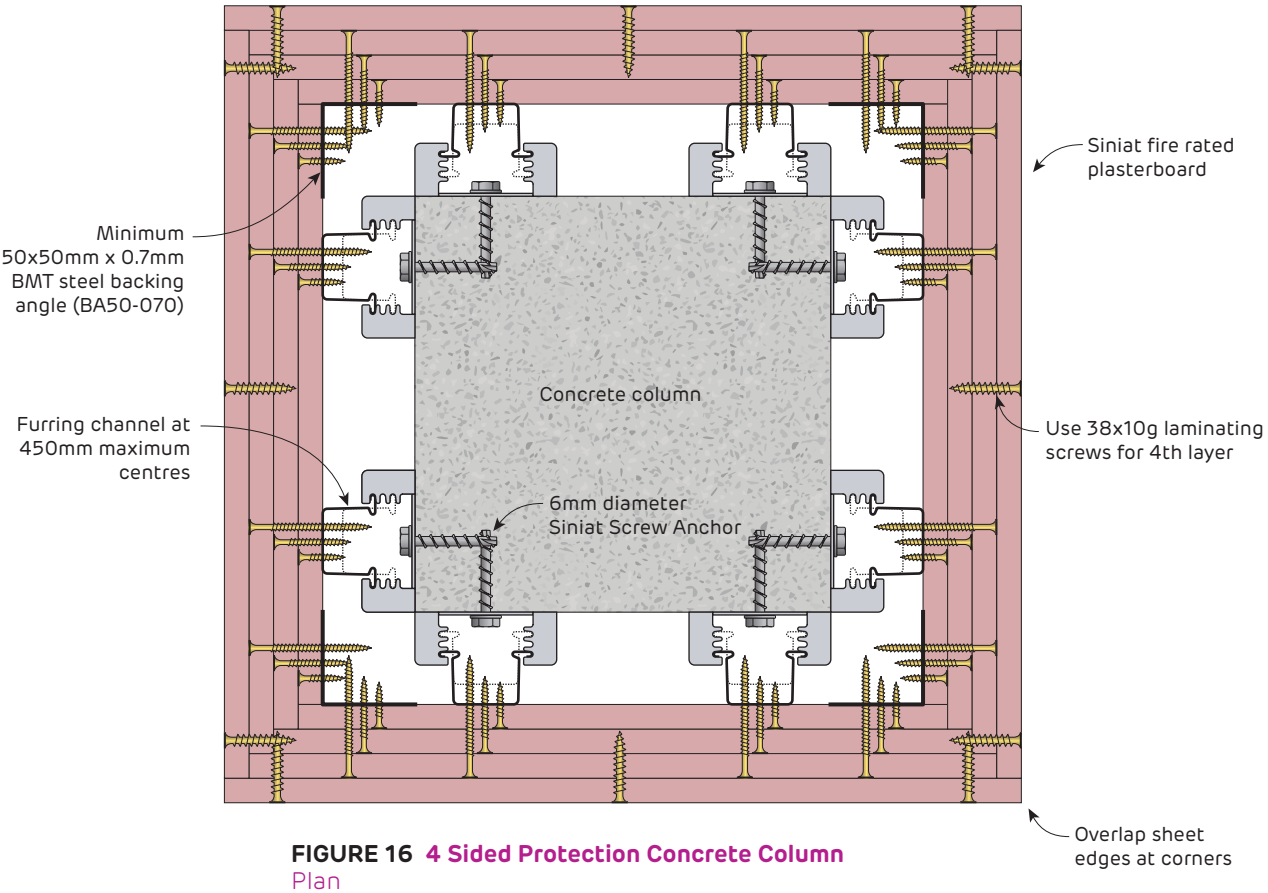


FIGURE 16 4 Sided Protection Concrete Column
Plan