



FIRE ASSESSMENT REPORT

FC20442-01-1

FIRE RESISTANCE OF HB FULLER FULAFLEX™ FR SEALANT AS CONTROL JOINTS IN FIRE RATED WALLS IN ACCORDANCE WITH AS 1530.4:2014 AND FOR COMPLIANCE WITH AS 4072.1-2005

CLIENT

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ASSESSMENT OBJECTIVE

To assess the fire resistance of H.B. Fuller FulaFlex™ FR sealant fire rated control joints in accordance with AS 1530.4:2014 and with reference to AS 4072.1-2005 (including Amendment No. 1) Section 4, when installed in fire rated plasterboard, concrete or masonry walls.

CONCLUSION

It is considered that the H.B. Fuller FulaFlex™ FR sealant fire rated control joints would be expected to achieve the stated FRL if tested in accordance with AS 1530.4:2014 with reference to AS 4072.1-2005 (including Amendment No. 1) Section 4, as stated in the following table.

Summary of FulaFlex™ FR Sealant Control Joints in Fire Rated Walls

Fire Rated Wall Configuration	Minimum Wall Thickness	Maximum Joint Width	Minimum Sealant Depth	FRL
Vertical Plasterboard-to-Plasterboard Control Joints (sealant backed with backing rod)				
1 x 13 mm/ 1 x 13 mm	90 mm	20 mm	13 mm	-/60/60
1 x 13 mm/ 1 x 13 mm +P35	90 mm	20 mm	22 mm	-/60/60
1 x 16 mm/ 1 x 16 mm	96 mm	20 mm	16 mm	-/90/90
1 x 16 mm/ 1 x 16 mm +P35	96 mm	20 mm	22 mm	-/90/90
2 x 13 mm/ 2 x 13 mm	116 mm	20 mm	26 mm	-/120/120
2 x 13 mm/ 2 x 13 mm + P35	116 mm	20 mm	22 mm	-/120/120
2 x 16 mm/ 2 x 16 mm	128 mm	20 mm	26 mm	-/180/180
3 x 13 mm/ 3 x 13 mm	142 mm	20 mm	26 mm	-/180/180
Vertical (perimeter) or Horizontal (top or bottom) Plasterboard-to-Concrete/Masonry Control Joints (sealant backed with framing or framing + bond breaker tape)				
1 x 13 mm* to Concrete/Masonry	90 mm	40 mm	13 mm	-/60/60
1 x 16 mm* to Concrete/Masonry	96 mm	40 mm	16 mm	-/90/90
Vertical (perimeter) or Horizontal (top or bottom) Plasterboard-to-Concrete/Masonry Control Joints (sealant backed with backing rod or framing or framing + bond breaker tape)				
2 x 13 mm* to Concrete/Masonry	116 mm	40 mm	16 mm	-/120/120
2 x 16 mm* to Concrete/Masonry	128 mm	20 mm	26 mm	-/180/180
3 x 13 mm* to Concrete/Masonry	142 mm	20 mm	26 mm	-/180/180

* Lining on both sides of the fire rated wall.

Client supplied drawings of the control joint configurations shown above are shown in Figure 1 to Figure 8.

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It is considered the control joints may be installed with the following variations:

- The fire rated wall may be constructed using steel or timber framing according to the lining manufacturer's specification.
- The fire rated wall framing may be increased in depth.
- The fire rated plasterboard facings may be increased in thickness.
- For plasterboard-to-concrete/masonry control joints, the wall lining shall overlap the perimeter framing by a minimum of 10 mm.
- Equivalent alternative fire rated plasterboard walls (including, but not limited to Knauf Gypsum, CSR or Siniat) which have an established fire resistance rating by test or assessment in accordance with AS 1530.4:2014.
- In concrete or masonry walls of the same minimum wall thickness as stated above. The walls shall be built to comply with the concrete or masonry standard as appropriate.
- FulaFlex™ FR sealant may be used as an alternative to stopping compound for recess and butt joints. All joints must be backed with either framing sections or plasterboard, see Figure 9.
- 1 mm thick Fosroc Bond Breaker tape or equivalent polyethylene film Bond Breaker tape may be used in any control joint configuration where the framing would be the backing material for the sealant.

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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1. INTRODUCTION

This report gives BRANZ's assessment on the fire resistance of H.B. Fuller FulaFlex™ FR sealant control joints in fire rated plasterboard walls if tested in accordance with AS 1530.4:2014 with reference to AS 4072.1-2005 (including Amendment No. 1) Section 4.

2. BACKGROUND

In Warringtonfire Australia Pty Ltd fire resistance test FRT190398 a number of control joints were tested in a nominal 64 mm deep steel stud framed plasterboard wall in accordance with AS 1530.4:2014. The wall was divided vertically and lined with two different thicknesses of fire rated plasterboard. Specimen B and C were tested with a single layer of 16 mm Firestop plasterboard to each face. Specimen D and E were tested with a single layer of 13 mm Firestop plasterboard to each face. Specimens B and D were vertical control joints in the body of the wall. Specimen C and E were horizontal control joints at the perimeter of the wall. H.B. Fuller FulaFlex™ FR sealant was applied to each face of the wall and either backed by the perimeter steel framing or an open cell backing rod.

See Table 1 for a summary of the tested control joints and results.

Table 1: Summary of Fire Resistance Test FRT190398

Specimen	Control Joint Configuration	Sealant Backing	Joint Width	Sealant Depth	FRL*
B	1 x 16 mm/1 x 16 mm	Backing rod	15 mm	16 mm	-/120/90
C	1 x 16 mm/Perimeter blockwork	Framing	20 mm	16 mm	-/90/90
D	1 x 13 mm/1 x 13 mm	Backing rod	15 mm	13 mm	-/90/60
E	1 x 13 mm/Perimeter blockwork	Framing	20 mm	13 mm	-/90/60**

* Specimen B and C were tested in a separating element with an established FRL of 90 minutes. Specimen D and E were tested in a separating element with an established FRL of 60 minutes. The FRL shown are what was reported. The specimen FRL cannot exceed the FRL of the supporting construction.

** Specimen E did not satisfy the minimum length requirements of AS 1530.4:2014 therefore no FRL was reported. The FRL shown above is given acknowledging the departure from the standard requirement.

In Warringtonfire Australia Pty Ltd fire resistance test No. 56967300.1 a number of control joints were tested in a nominal 64 mm deep steel stud framed plasterboard wall in accordance with AS 1530.4:2014. The wall was divided vertically and lined with two layers of 13 mm Firestop plasterboard to each face. Specimen A was a vertical control joint between the two wall sections. Specimen B was a horizontal control joint at the perimeter of the wall. H.B. Fuller FulaFlex™ FR sealant applied to each face of the wall and either backed by the perimeter steel framing or an open cell backing rod.

See Table 2 for a summary of the tested control joints and results.

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Table 2: Summary of Fire Resistance Test EWFA 56967300.1

Specimen	Control Joint Configuration	Sealant Backing	Joint Width	Sealant Depth	FRL*
A	2 x 13 mm/2 x 13 mm +P35	Backing rod and framing	19 mm	20 mm	-/120/120
B	2 x 13 mm/ Perimeter plasterboard	Framing	20 mm	26 mm	-/180/120

* The specimens were tested in a separating element with an established FRL of 120 minutes. The FRL shown are what was reported. The specimen FRL cannot exceed the FRL of the supporting construction.

In BRANZ fire resistance FP18716-01, a number of control joints were tested in a nominal 64 mm deep steel stud framed plasterboard wall in accordance with AS 1530.4:2014. The wall was divided vertically and lined with a single layer of 16 mm Firestop plasterboard to each face on one half and a single layer of 13 mm Firestop plasterboard to each face on the other half. H.B. Fuller Firesound® sealant applied to each face of the wall backed by an open cell backing rod.

See Table 3 for a summary of the tested control joints and results.

Table 3: Summary of Fire Resistance Test FP18716-01

Specimen	Control Joint Configuration	Sealant Backing	Joint Width	Sealant Depth	FRL*
B	1 x 16 mm/1 x 16 mm +P35	Backing rod	20 mm	22 mm	-/90/90
C	1 x 13 mm/ 1 x 13 mm +P35	Backing rod	20 mm	22 mm	-/60/60

* Specimen B was tested in a separating element with an established FRL of 90 minutes. Specimen C was tested in a separating element with an established FRL of 60 minutes. The specimen FRL cannot exceed the FRL of the supporting construction.

In BRANZ fire resistance test FR21125-01 a number of perimeter edge seals were tested in accordance with AS 1530.4:2014 in a nominally 96 mm thick steel stud, plasterboard lined wall. The wall was lined with a single layer of 16 mm thick Firestop plasterboard on each face and was provided with one horizontal and one vertical, 1,100 mm long perimeter edge seal, (on both faces of the wall). The edge seals were sealed with FulaFlex™ FR. Prior to the application of the sealant on Specimen B, a layer of 1 mm thick Fosroc Bond Breaker tape was installed to the framing.

See Table 4 for a summary of the tested control joints and results.

Table 4: Summary of Fire Resistance Test FR21125-01

Specimen	Control Joint Configuration	Orientation	Sealant Backing	Joint Width	Sealant Depth	FRL*
A	1 x 16 mm/ Perimeter blockwork	Horizontal (top)	Framing	40 mm	16 mm	-/90/90
B**	1 x 16 mm/ Perimeter blockwork	Vertical	Framing	20 mm	16 mm	-/90/90

* The specimens were tested in a separating element with an established FRL of 90 minutes. The specimen FRL cannot exceed the FRL of the supporting construction.

** Fosroc Bond Breaker tape applied to framing prior to sealant application.

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3. DISCUSSION

3.1 Compliance with NCC 2025

This report has been prepared to meet the NCC 2022 deemed-to-satisfy (DTS) provision Specification 1 which states:

"S1C2 Rating"

A building element meets the requirements of this Specification if—

(b) it is identical with a prototype that has been submitted to the Standard Fire Test, or an equivalent or more severe test, and the FRL achieved by the prototype without the assistance of an active fire suppression system is confirmed in a report from an Accredited Testing Laboratory which—

(i) describes the method and conditions of the test and the form of construction of the tested prototype in full; and

(ii) certifies that the application of restraint to the prototype complied with the Standard Fire Test; or

(c) it differs in only a minor degree from a prototype tested under (b) and the FRL attributed to the building element is confirmed in a report from an Accredited Testing Laboratory which—

(i) certifies that the building element is capable of achieving the FRL despite the minor departures from the tested prototype; and

(ii) describes the materials, construction and conditions of restraint which are necessary to achieve the FRL;

In accordance the NCC 2025 S1C2 (b), the fire resistance tests referenced in Section 2 were equivalent or more severe, without the assistance of an active fire suppression system, than the standard fire test AS 1530.4:2014. It is considered that in accordance with NCC 2025 S1C2 (c) the differences between the tested prototype and the proposed variations in this report are minor.

This assessment report may be used to demonstrate compliance with the requirements for evidence of suitability under NCC A5G3 (1) d.

3.2 H.B. Fuller FulaFlex™ FR Sealant Control Joints

3.2.1 General

H.B. Fuller have commissioned a number of fire resistance tests on control joints in fire rated plasterboard walls. The configurations tested and considered in this report are as follows:

- Within the body of a plasterboard wall where each vertical edge is framed and lined with fire rated plasterboard.
- Along the vertical edge of a plasterboard wall where the perimeter frame butts up against a concrete/masonry column/fire rated wall.
- Along the top of the plasterboard wall where the head track is secured to the underside of a concrete slab.
- Along the bottom of the plasterboard wall where the bottom track is secured to a concrete floor slab.

Each configuration will be discussed in the following sections.

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3.2.2 Plasterboard-to-Plasterboard Control Joints

The Plasterboard-to-Plasterboard control joint consists of an open slot between two framing sections which are lined with fire rated plasterboard. An open cell backing rod is inserted into the slot from both sides at the required depth and the joint is then sealed on both sides with H.B. Fuller FulaFlex™ FR Sealant.

A summary of the tested plasterboard-to-plasterboard control joints is shown in Table 5.

Table 5: Summary of Plasterboard-to-Plasterboard Control Joints

Test No.	Plasterboard Lining	Sealant Backing	Joint Width	Sealant Depth	Integrity minutes	Insulation minutes*
FRT190398	1 x 16 mm	Backing rod	15 mm	16 mm	120 NF	92
FRT190398	1 x 13 mm	Backing rod	15 mm	13 mm	94 NF**	72

NF= No Failure.

* Insulation failure recorded by thermocouples positioned on the seal only.

** Specimen sealed with ceramic blanket.

As shown in Table 5, the specimen installed in the 16 mm thick lined wall maintained Integrity for the 120 minute test duration while the specimen installed in the 13 mm thick wall was sealed after a duration of 94 minutes without any observed Integrity failures. Both specimens maintained Insulation for a duration exceeding the FRL of the walls that they were installed in. To enable an increase of maximum joint width, additional data from similar tested configurations is discussed below.

In FRT190398, two 20 mm wide specimens (Specimen C and E) were tested as horizontal plasterboard-to-concrete control joints. Specimen C was installed above a wall lined with one layer of 16 mm thick fire rated plasterboard while Specimen E was installed above a wall lined one layer of 13 mm thick fire rated plasterboard. The sealant depth was full lining thickness.

Specimen E did not satisfy the dimension requirements of the standard; it was less than 1,000 mm long. However, as the unexposed face instrumentation provided complied with the requirements of a compliant sized control joint, it is considered that the thermal data recorded is suitable to be used for increase of maximum width.

Both specimens were tested as horizontal plasterboard-to-concrete control joints and not plasterboard-to-plasterboard control joints, therefore it should be expected that the presence of the concrete element above the specimens would be beneficial with regards to Insulation performance due to the increased thermal mass of the concrete versus degradation of the plasterboard during calcination.

It should also be noted that the horizontal plasterboard-to-concrete control joints would have been subjected to a higher furnace pressure due to the furnace pressure gradient being set to be 15 Pa at mid height of the vertical joints summarized in Table 5.

When comparing the times of Insulation failure, the plasterboard-to-concrete specimens achieved significantly longer Insulation results than the corresponding plasterboard-to-plasterboard specimens. The difference between the 16 mm deep specimens was 10 minutes and for the 13 mm deep specimens, a 180 K temperature rise was recorded by a thermocouple on the seal of the plasterboard-to-plasterboard specimen after a duration of 72 minutes, the maximum temperature recorded by a thermocouple on the seal of the plasterboard-to-concrete specimen after a duration of 90 minutes was 141 K.

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Both of the specimens maintained Integrity for at least 90 minutes.

Based on the performance of the 20 mm wide horizontal plasterboard-to-concrete control joints and the comparison of Insulation performance with the 15 mm wide plasterboard-to-plasterboard control joints discussed above, it is reasonable to expect that a 20 mm wide x board thickness deep plasterboard-to-plasterboard control joint would achieve an FRL equal to the wall it is installed in for up to -/90/90 FRL. For FRLs beyond -/90/90, additional testing from similar tested configurations is discussed below.

In FR21125-01, a 40 mm wide x 16 mm deep horizontal plasterboard-to-concrete control joint was tested in a wall lined with one layer of 16 mm thick plasterboard. The test demonstrated that the specimen was able to maintain Integrity for the 120 minute test duration and maintain Insulation for 115 minutes, despite being installed in a wall with an established 90/90/90 FRL.

This test result, which surpassed the FRL of the wall by a significant margin, provides confidence that had the test been conducted with a wall with an established 120/120/120 FRL, the horizontal plasterboard-to-concrete specimen would have also achieved a -/120/120 FRL.

In EWFA 56967300.1, a 20 mm wide x 26 mm deep horizontal plasterboard-to-plasterboard control joint was tested in a wall lined with two layers of 13 mm thick plasterboard. The test demonstrated that the specimen was able to maintain Integrity for the 181 minute test duration and maintained Insulation for 174 minutes, despite being installed in a wall with an established 120/120/120 FRL.

This test result, which surpassed the FRL of the wall by a significant margin, provides confidence that had the test been conducted with a wall with an established 180/180/180 FRL, the horizontal plasterboard-to-plasterboard specimen would have also achieved a -/180/180 FRL.

As previously discussed, a plasterboard-to-concrete control joint would be expected to maintain Insulation for a longer period than a plasterboard-to-plasterboard control joint, therefore a conservative approach to an assessment for a -/120/120 FRL has been adopted.

The -/60/60 and the -/90/90 plasterboard-to-plasterboard control joint configurations both require a sealant depth equal to the lining thickness of the wall. For a 120/120/120 FRL wall, it is expected that the lining thickness would increase compared to a 90/90/90 FRL wall, a typical 120/120/120 FRL wall would be lined on each face with two layers of 13 mm thick fire rated plasterboard, therefore by maintaining the sealant depth to be equal to the lining thickness requirement, the sealant depth for -/120/120 FRL would be increased to 26 mm.

The 20 mm wide x 26 mm deep horizontal plasterboard-to-plasterboard specimen tested in EWFA 56967300.1 was located at the head of the two x 13 mm thick plasterboard lined wall. Between the head framing section and the perimeter block of the specimen frame, three layers of 13 mm thick plasterboard were installed. It is expected that this arrangement would be beneficial to the Insulation performance of a control joint compared to a standard plasterboard-to-plasterboard control joint due to the presence of a larger mass of plasterboard in the vicinity of the control joint.

For a 180/180/180 FRL wall, again it is expected that the total lining thickness would increase compared to a 120/120/120 FRL wall, a typical 180/180/180 FRL wall would be lined on each face with either two layers of 16 mm thick or three layers of 13 mm thick fire rated plasterboard (64 mm/78 mm of plasterboard) compared to 52 mmm of plasterboard (two x 13 mm thick layers of plasterboard) as tested.

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Due to Insulation failure of the tested specimen occurring after a duration of 174 minutes and no observed Integrity failures for the 181 minute test duration, it is reasonable to expect that with the increase in total thickness of plasterboard and increased airgap depth between the sealant and framing on both sides of the wall, a sealant depth of 26 mm would achieve at least a 180 minute Insulation result if tested in a wall with an established 180/180/180 FRL.

It is therefore considered the following configurations would be expected to maintain the fire resistance of the plasterboard wall as stated:

- Wall lined with one layer of 13 mm fire rated plasterboard can be up to 20 mm wide x 13 mm deep. FRL -/60/60.
- Wall lined with one layer of 16 mm fire rated plasterboard can be up to 20 mm wide x 16 mm deep. FRL -/90/90.
- Wall lined with two layers of 13 mm fire rated plasterboard can be up to 20 mm wide x 26 mm deep. FRL -/120/120.
- Wall lined with two layers of 16 mm fire rated plasterboard can be up to 20 mm wide x 26 mm deep. FRL -/180/180.
- Wall lined with three layers of 13 mm fire rated plasterboard can be up to 20 mm wide x 26 mm deep. FRL -/180/180.

3.2.3 Plasterboard-to-Concrete/Masonry Control Joints

The plasterboard-to-concrete/masonry control joint consists of the plasterboard's perimeter framing being secured to the concrete/masonry element which could be a fire rated wall or column, or the underside of a concrete slab, or the bottom of the wall.

When the plasterboard is installed, a gap is provided between the edge of the board and concrete/masonry element. The gap is either filled to the full depth of the plasterboard thickness when backed by framing, or an open cell backing rod inserted and filled to the required depth with H.B. Fuller FulaFlex™ FR Sealant.

A summary of the tested plasterboard-to-concrete/masonry control joints is shown in Table 6.

Table 6: Summary of Plasterboard-to-Concrete/Masonry Control Joints

Test No.	Plasterboard Lining	Sealant Backing	Joint Orientation	Joint Width	Sealant Depth	Integrity minutes	Insulation minutes*
FR21125-01	1 x 16 mm	Framing	Horizontal (top)	40 mm	16 mm	120 NF	115
FR21125-01	1 x 16 mm	Framing	Vertical	20 mm	16 mm	120 NF	120 NF
EWFA 56967300.1	2 x 13	Framing	Horizontal (top)	20 mm	26 mm	181 NF	174

NF = No Failure.

* Insulation failure recorded by thermocouples positioned on the seal only.

In the fire resistance test FR21125-01, summarised in Table 6, the plasterboard-to-concrete/masonry control joints were installed against the perimeter block of the specimen frame, above the wall and at one vertical edge.

It is considered that this is sufficiently similar to the expected performance of a concrete or masonry element that the results can be applied to either concrete or masonry. It is expected that the concrete or masonry element will be built in accordance with the appropriate standard which defines the FRL of the element.

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For the purposes of the test, the specimens were installed such that the plasterboard lining overlapped the edge of the framing section by a minimum of 10 mm, the framing section used for the 40 mm wide horizontal specimen was a RONDO 64 DH track (0.7 mm BMT x 50 mm deep), the framing section used for the 20 mm wide vertical specimen was RONDO 64 stud (0.5 BMT x 32 mm deep).

As shown in Table 6, the plasterboard-to-concrete/masonry control joints installed in the wall lined with one layer of 16 mm plasterboard both maintained Integrity for the 120 minute test duration and maintained Insulation for at least 115 minutes despite the element having an established 90/90/90 FRL. Of the Insulations failures recorded, it was only on the 40 mm wide horizontal control joint installed above the wall were a thermocouple located on the seal exceeded the 180 K maximum rise criterion.

Furthermore, it was noted in the test observations that the deterioration of the element from 110 minutes onwards significantly accelerated the temperature rise recorded on the control joints.

Based on these test results, it would be reasonable to expect a 40 mm wide x 13 mm deep plasterboard-to-concrete/masonry control joint to achieve at least a -/60/60 FRL if tested in a 60/60/60 FRL wall. For a -/120/120 FRL, it would also be reasonable to expect a 40 mm wide x 16 mm deep plasterboard-to-concrete/masonry control joint to achieve at least a -/120/120 FRL if tested in a 120/120/120 FRL wall.

For a -/180/180 FRL, the 20 mm wide x 26 mm deep horizontal plasterboard-to-plasterboard control joint tested in EWFA 56967300.1 maintained Insulation for 174 minutes when installed in a wall with an established 120/120/120 FRL, it would also be reasonable to expect a 20 mm wide x 26 mm deep plasterboard-to-concrete/masonry control joint to achieve at least a -/180/180 FRL if tested in a 180/180/180 FRL wall.

It is therefore considered the following configurations would be expected to maintain the fire resistance of the plasterboard-to-concrete/masonry junctions in both horizontal and vertical orientations as stated:

- Wall lined with one layer of 13 mm fire rated plasterboard can be up to 40 mm wide x 13 mm deep. FRL -/60/60.
- Wall lined with one layer of 16 mm fire rated plasterboard can be up to 40 mm wide x 16 mm deep. FRL -/90/90.
- Wall lined with two layers of 13 mm fire rated plasterboard can be up to 40 mm wide x 16 mm deep. FRL -/120/120.
- Wall lined with two layers of 16 mm fire rated plasterboard can be up to 20 mm wide x 26 mm deep. FRL -/180/180.
- Wall lined with three layers of 13 mm fire rated plasterboard can be up to 20 mm wide x 26 mm deep. FRL -/180/180.

3.2.4 Control Joints with RONDO P35 Control Joint Cover

The Rondo P35 control joint cover consists of 0.4 mm BMT mild steel angles with a PVC connector which can be positioned over a control joint. The dimensions of the PVC connector prevent unexposed face thermocouple attachment.

In fire resistance test EWFA No. 56967300.1, a control joint with a P35 control joint cover was tested in a steel framed wall lined with two layers of 13 mm Firestop plasterboard. The control joint was 19 mm wide with 20 mm depth of FulaFlex™ FR sealant on each face.

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In fire resistance test No. FP18716-01, P35 control joint covers were tested in walls lined with one layer of 13 mm and one layer of 16 mm Firestop plasterboard. The control joints were 20 mm wide x 22 mm deep and were sealed with Firesound® sealant on each face.

A summary of the tested plasterboard-to-plasterboard with P35 control joints is shown in Table 7.

Table 7: Summary of Plasterboard-to-Plasterboard Control Joints with Rondo P35

Sealant Type	Plasterboard Lining	Sealant Backing	Joint Width	Sealant Depth	Integrity minutes	Insulation minutes
FulaFlex™ FR	2 x 13 mm + P35	Backing rod	19 mm	20 mm	171	133
Firesound®	1 x 13 mm + P35	Backing rod	20 mm	22 mm	132 NF	94
Firesound®	1 x 16 mm + P35	Backing rod	20 mm	22 mm	132 NF	115

NF = No Failure.

As shown in Table 7, the FulaFlex™ FR control joint tested in EWFA 56967300.1 maintained Integrity and Insulation for significantly longer durations than the established 120/120/120 FRL of the wall in which it was installed. It is reasonable to expect that an increase to the maximum joint width from 19 mm to 20 mm, in conjunction with an increase of the minimum joint depth from 20 mm to 22 mm would not be detrimental to the fire resistance, and if a 20 mm wide x 22 mm deep specimen including a Rondo P35 control joint cover was tested, a -/120/120 FRL would be achieved.

The Firesound® control joints tested in FP18716-01 both maintained Integrity and Insulation for significantly longer durations than the established FRLs of the walls in which they were installed in. The testing of FulaFlex™ FR and Firesound® sealant control joints has been compared and the performance of the sealants, when tested in the same wall type is deemed to be sufficiently similar that the comparative performance of the P35 control joint cover can be applied to FulaFlex™ FR Sealant control joints in the same wall type.

Based on the above analysis it is considered that the FulaFlex FR™ Sealant control joint with a Rondo P35 control joint cover would not prejudice the FRL of single or multiple layer fire rated plasterboard walls as stated:

- Wall lined with one layer of 13 mm fire rated plasterboard can be up to 20 mm wide x 22 mm deep. FRL -/60/60.
- Wall lined with one layer of 16 mm fire rated plasterboard can be up to 20 mm wide x 22 mm deep. FRL -/90/90.
- Wall lined with two layers of 13 mm fire rated plasterboard can be up to 20 mm wide x 22 mm deep. FRL -/120/120.

3.3 Bond Breaker Tape

The vertical 20 mm wide x 16 mm deep plasterboard-to-concrete control joint tested in FR21125-01 (Specimen B) was provided with a layer of 1 mm thick, Fosroc Bond Breaker tape which was applied to the framing prior to the application of the sealant.

The test demonstrated that the inclusion of the Bond Breaker tape had no detrimental effect on the fire resistance of the specimen when compared to the other specimen tested without the bond breaker tape. It is therefore considered that 1 mm thick Fosroc Bond Breaker tape may be used in any control joint configuration where the framing would be the backing material for the sealant.

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The Fosroc Bond Breaker tape is a polyethylene film type, self-adhesive debonding tape of which there are numerous commercially available equivalents. Based on the absence of observable detrimental effects on the fire resistance of the control joint specimen tested with 1 mm thick Fosroc Bond Breaker tape in FR21125-01, it is considered that the tested 1 mm thick Fosroc Bond Breaker tape may be substituted for equivalent polyethylene film type debonding tape.

3.4 Wall Construction Variations

3.4.1 Concrete or Masonry Wall Control Joints

The control joints referenced in Section 2 were tested in a plasterboard wall or the junction between plasterboard/block. In AS 1530.4:2014 section 10.12 permissible variations, 10.12.2 Separating elements it states the following:

(c) Results obtained from framed wall systems may be applied to the performance of a system in concrete, masonry or solid gypsum blocks of greater or equal thickness to that of the tested prototype.

Therefore the control joints discussed in this report may be installed in concrete or masonry walls of the same thickness as tested and be expected to achieve the same FRL in accordance with AS 1530.4:2014. Based on the tested walls the minimum concrete/masonry wall thickness is:

- 60 minute walls not less than 90 mm
- 90 minute walls not less than 96 mm
- 120 minute walls not less than 116 mm
- 180 minute walls not less than 128 mm

It is expected that the concrete/masonry walls will comply with the appropriate standard which defines the FRL of the wall and may have additional requirements and increased wall thickness to that given above.

3.4.2 Plasterboard Framed Wall Variations

Section 10.12.2 of AS 1530.4:2014 states the following permissible variations for penetrations tested in framed walls.

(d) Results obtained from framed wall systems may be applied to similar walls having studs of the same material with sizes greater than the tested prototype.

(e) Results obtained from a prototype test may be applied to framed wall systems of similar construction but having thicker facings of the same material applied to the studs.

In summary the control joints discussed in this report may be installed into steel framed plasterboard walls with deeper studs and/or thicker fire rated plasterboard facings and be expected to achieve the same FRL in accordance with AS 1530.4:2014.

The fire testing referenced in Section 2 was undertaken with Knauf Gypsum fire rated plasterboard and system specifications. It is considered the H.B. Fuller control joints discussed in this report would be expected to achieve the same FRL if installed in other brands (for example, but not limited to CSR or Siniat) of fire rated plasterboard walls with the following conditions:

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- The fire rated plasterboard lining must be the same thickness or thicker than tested.
- The minimum steel framing shall not be less than nominally 64 mm deep and the overall wall thickness not less than that described in this report.
- The fire rated plasterboard wall shall have an established fire resistance rating by test or assessment, in accordance with AS 1530.4:2014.
- For plasterboard-to-concrete/masonry control joints, the minimum lining to framing overlap is 10 mm; or greater if specified in the specific technical literature of the fire rated plasterboard system.

3.4.3 Timber Framing

The fire testing referenced in Section 2 was undertaken on specimens constructed using steel studs and track members. It is acknowledged that steel framing is a more onerous material than timber due to the movement induced by thermal expansion during heating which is greatly reduced with timber which generally behaves in a more stable and predictable manner during fire exposure.

Furthermore, timber framing will not conduct or radiate heat as significantly as steel framing, therefore it can be reasonably considered that the control joint specimens tested in tests referenced in Section 2 would achieve at least the same test results if the construction they were installed in was timber framed.

Therefore, the control joints discussed in this report may be installed in timber framed walls of the same thickness as tested and be expected to achieve the same FRL in accordance with AS 1530.4:2014.

3.4.4 Recess and Butt Joints

It has been proposed that for recess and butt joints in the plasterboard linings, FulaFlex™ FR sealant may be used as an alternative stopping material to standard stopping compounds and jointing tape. The tests referenced in Section 2 have demonstrated the ability of FulaFlex™ FR sealant to maintain its adhesion and its low risk of ignition for up to 180 minutes during fire exposure. In contrast, a two coat, standard tape and stop application would likely be burnt away after 30 to 45 minutes fire exposure.

It is reasonable to expect that FulaFlex™ FR sealant would provide at least the same level of protection for recess joints and butt joints as a standard stopping compound with jointing tape and would not be detrimental to the established FRL of a plasterboard lined fire resistant wall.

4. CONCLUSION

It is considered that the H.B. Fuller FulaFlex™ FR sealant fire rated control joints would be expected to achieve the stated FRL if tested in accordance with AS 1530.4:2014 with reference to AS 4072.1-2005 (including Amendment No. 1) with reference to Section 4, as stated in Table 8 below.

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Table 8: Summary of FulaFlex™ FR Sealant Control Joints in Fire Rated Walls

Fire Rated Wall Configuration	Minimum Wall Thickness	Maximum Joint Width	Minimum Sealant Depth	FRL
Vertical Plasterboard-to-Plasterboard Control Joints (sealant backed with backing rod)				
1 x 13 mm/ 1 x 13 mm	90 mm	20 mm	13 mm	-/60/60
1 x 13 mm/ 1 x 13 mm +P35	90 mm	20 mm	22 mm	-/60/60
1 x 16 mm/ 1 x 16 mm	96 mm	20 mm	16 mm	-/90/90
1 x 16 mm/ 1 x 16 mm +P35	96 mm	20 mm	22 mm	-/90/90
2 x 13 mm/ 2 x 13 mm	116 mm	20 mm	26 mm	-/120/120
2 x 13 mm/ 2 x 13 mm + P35	116 mm	20 mm	22 mm	-/120/120
2 x 16 mm/ 2 x 16 mm	128 mm	20 mm	26 mm	-/180/180
3 x 13 mm/ 3 x 13 mm	142 mm	20 mm	26 mm	-/180/180
Vertical (perimeter) or Horizontal (top or bottom) Plasterboard-to-Concrete/Masonry Control Joints (sealant backed with framing or framing + bond breaker tape)				
1 x 13 mm* to Concrete/Masonry	90 mm	40 mm	13 mm	-/60/60
1 x 16 mm* to Concrete/Masonry	96 mm	40 mm	16 mm	-/90/90
Vertical (perimeter) or Horizontal (top or bottom) Plasterboard-to-Concrete/Masonry Control Joints (sealant backed with backing rod or framing or framing + bond breaker tape)				
2 x 13 mm* to Concrete/Masonry	116 mm	40 mm	16 mm	-/120/120
2 x 16 mm* to Concrete/Masonry	128 mm	20 mm	26 mm	-/180/180
3 x 13 mm* to Concrete/Masonry	142 mm	20 mm	26 mm	-/180/180

* Lining on both sides of the fire rated wall.

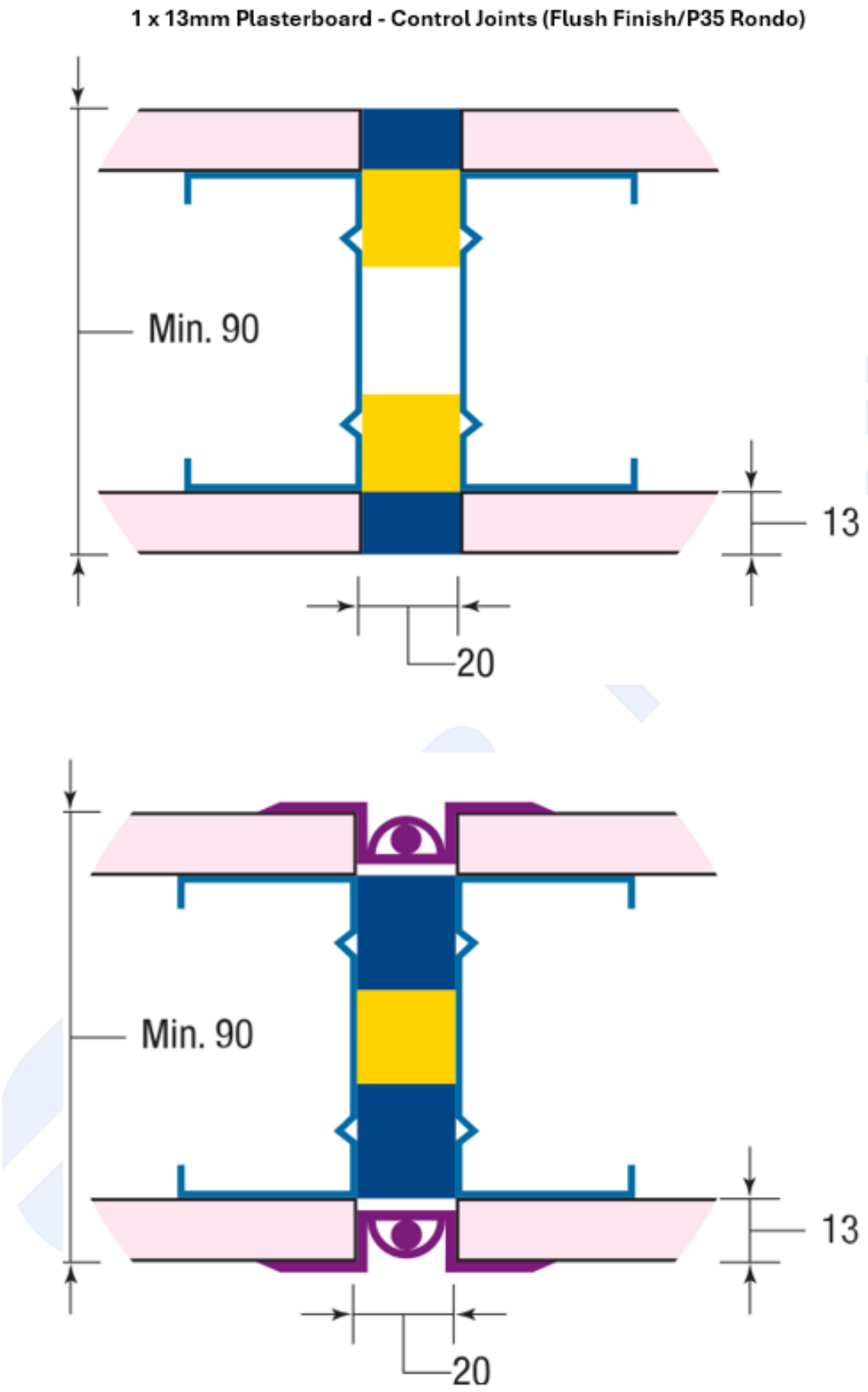
Client supplied drawings of the control joint configurations shown above are shown in Figure 1 to Figure 8.

It is considered the control joints may be installed with the following variations:

- The fire rated wall may be constructed using steel or timber framing according to the lining manufacturer's specification.
- The fire rated wall framing may be increased in depth.
- The fire rated plasterboard facings may be increased in thickness.
- For plasterboard-to-concrete/masonry control joints, the wall lining shall overlap the perimeter framing by a minimum of 10 mm.
- Equivalent alternative fire rated plasterboard walls (including, but not limited to Knauf Gypsum, CSR or Siniat) which have an established fire resistance rating by test or assessment in accordance with AS 1530.4:2014.
- In concrete or masonry walls of the same minimum wall thickness as stated above. The walls shall be built to comply with the concrete or masonry standard as appropriate.
- FulaFlex™ FR sealant may be used as an alternative to stopping compound for recess and butt joints. All joints must be backed with either framing sections or plasterboard, see Figure 9.
- 1 mm thick Fosroc Bond Breaker tape or equivalent polyethylene film Bond Breaker tape may be used in any control joint configuration where the framing would be the backing material for the sealant.

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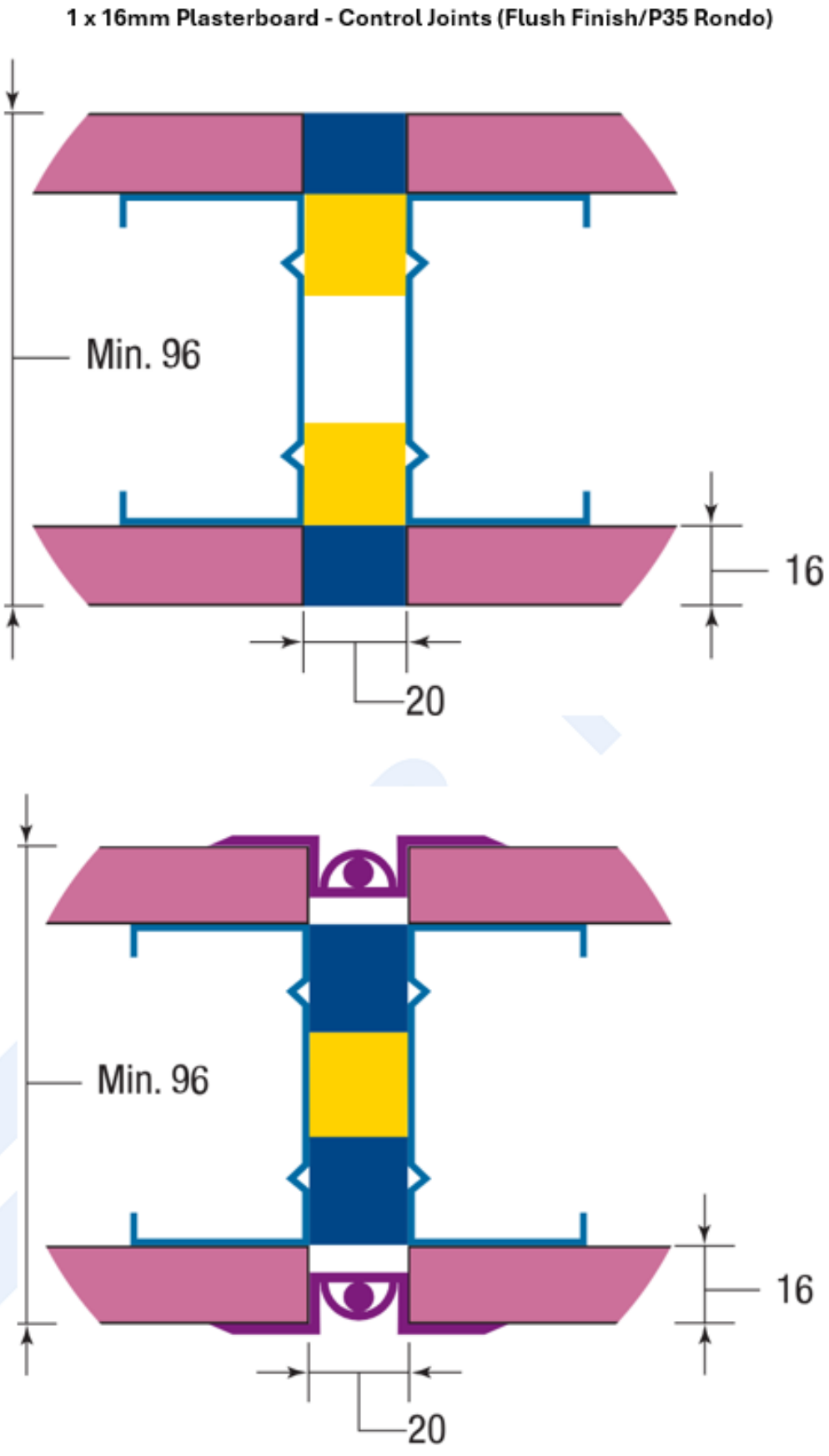
Figure 1: Plasterboard-to-Plasterboard - 1 x 13 mm



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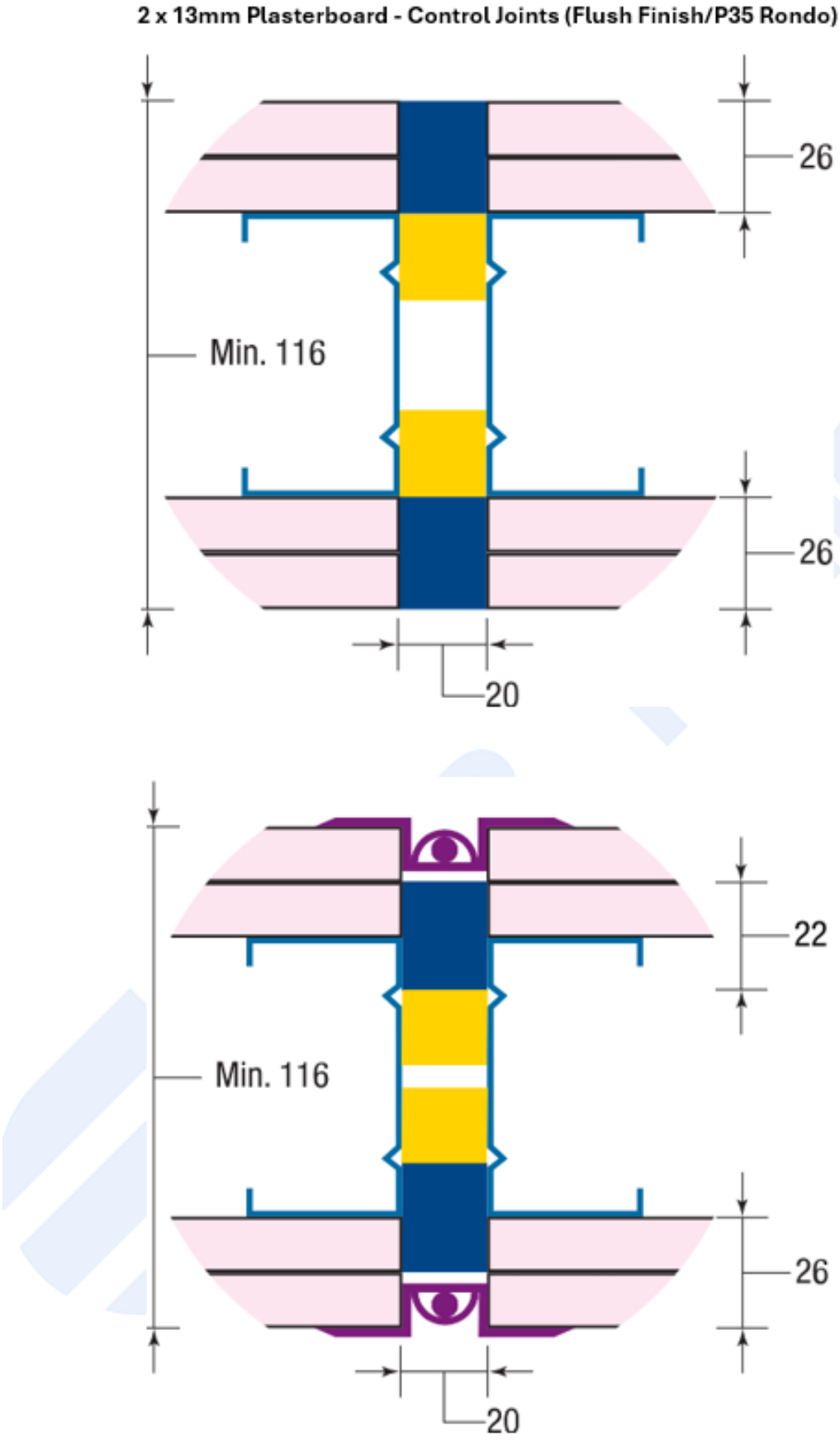
Figure 2: Plasterboard-to-Plasterboard - 1 x 16 mm



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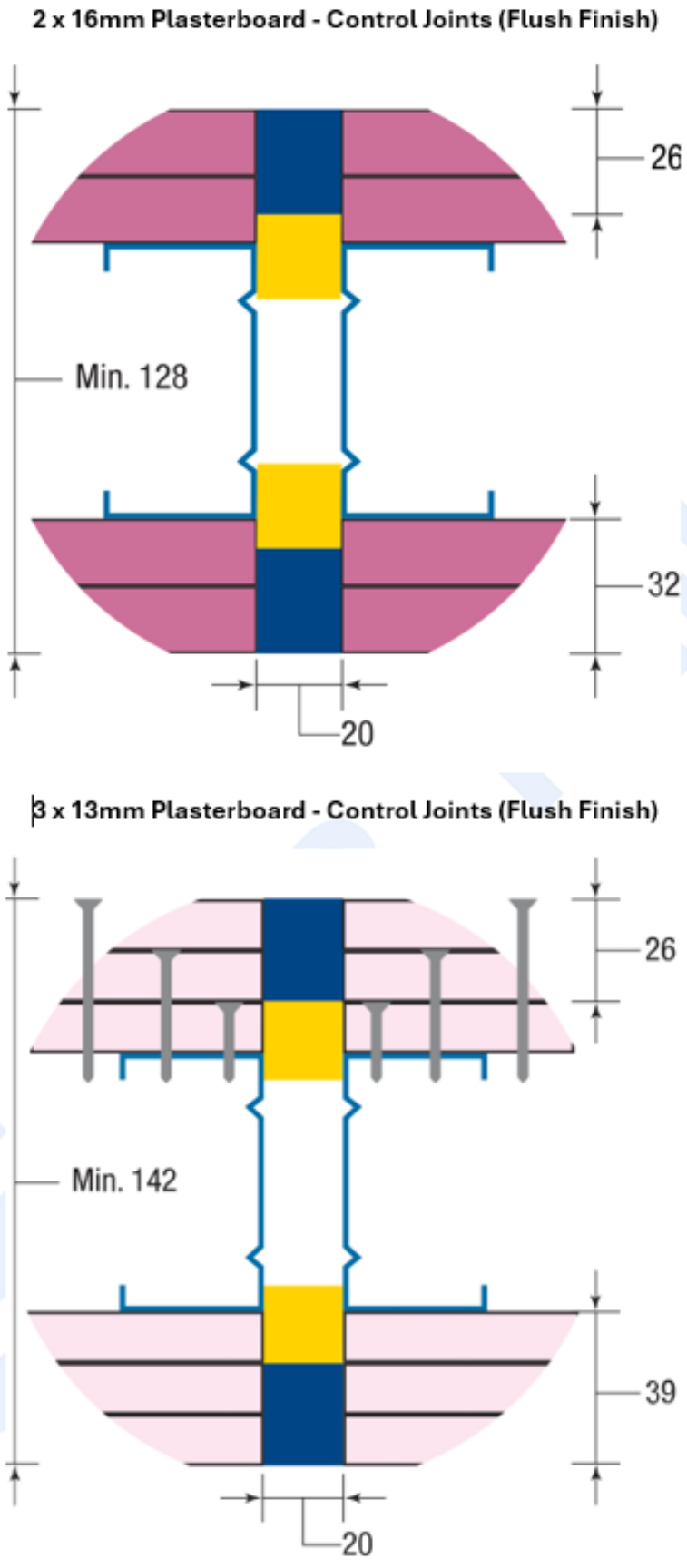
Figure 3: Plasterboard-to-Plasterboard - 2 x 13 mm



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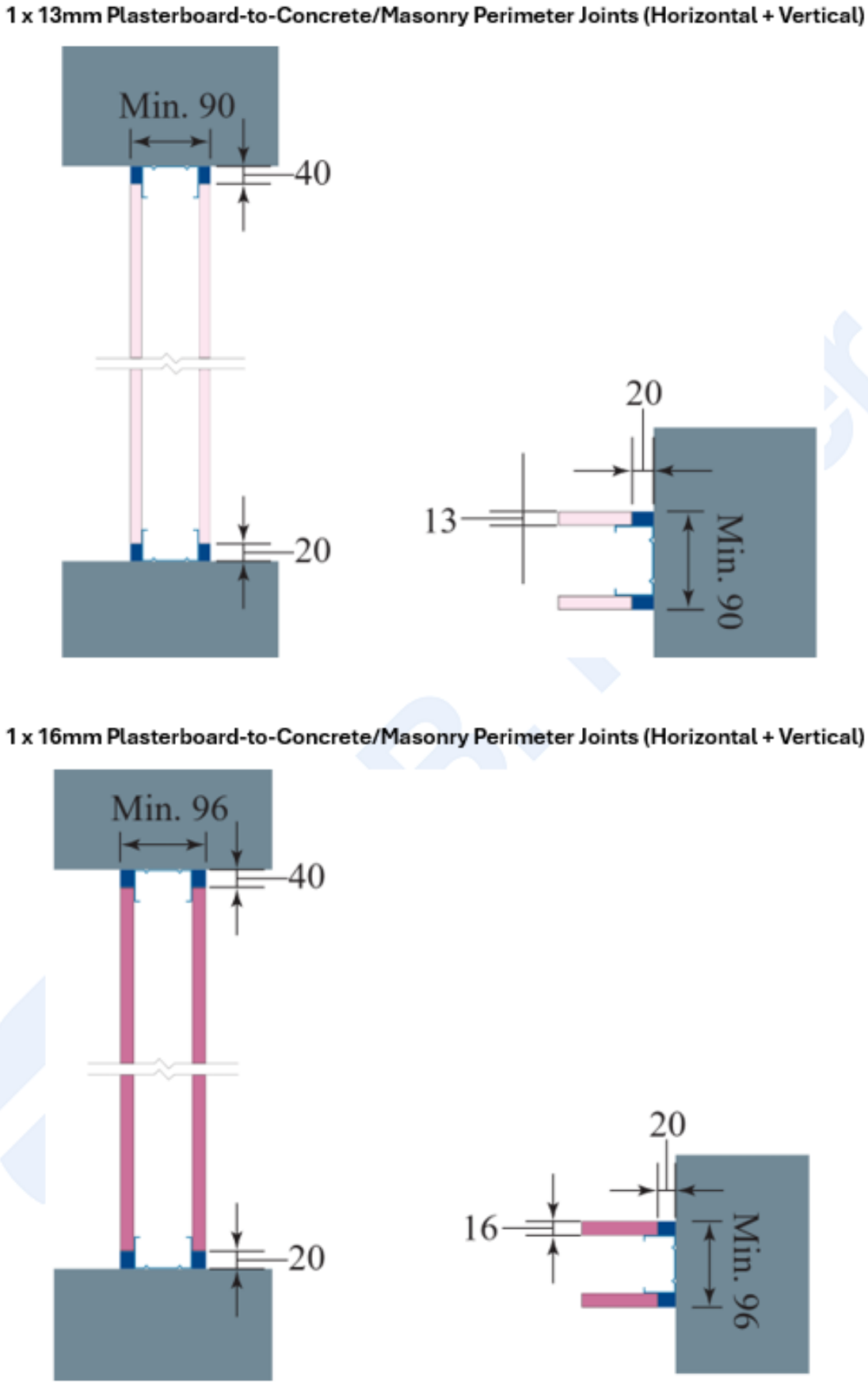
Figure 4: Plasterboard-to-Plasterboard - 2 x 16 mm and 3 x 13 mm



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Figure 5: Plasterboard-to-Concrete/Masonry - 1 x 13 mm and 1 x 16 mm

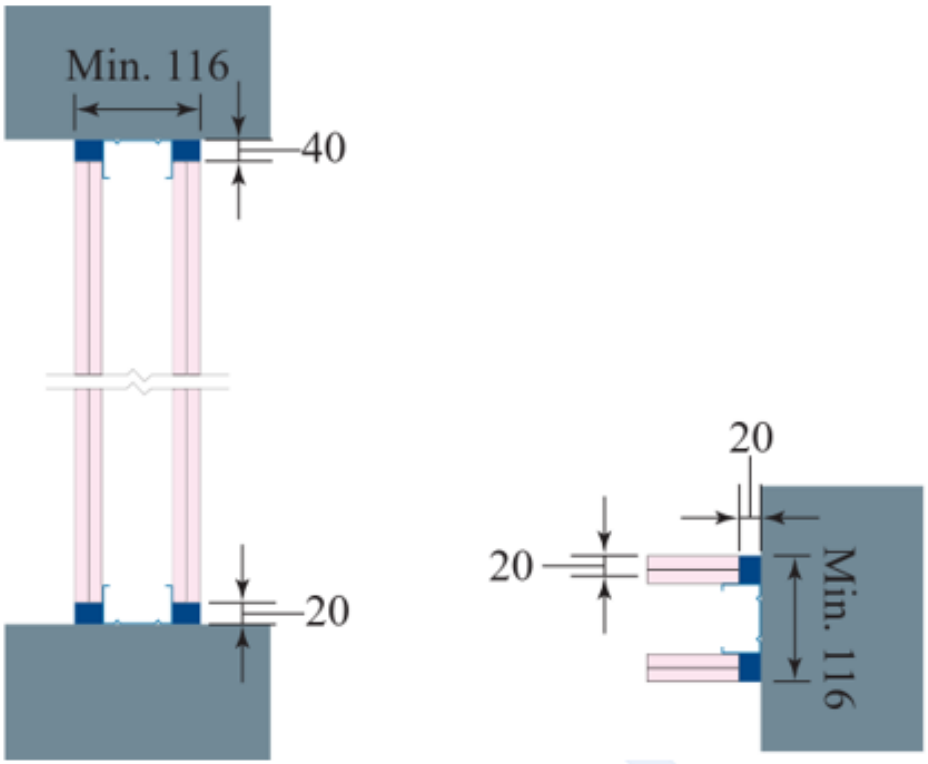


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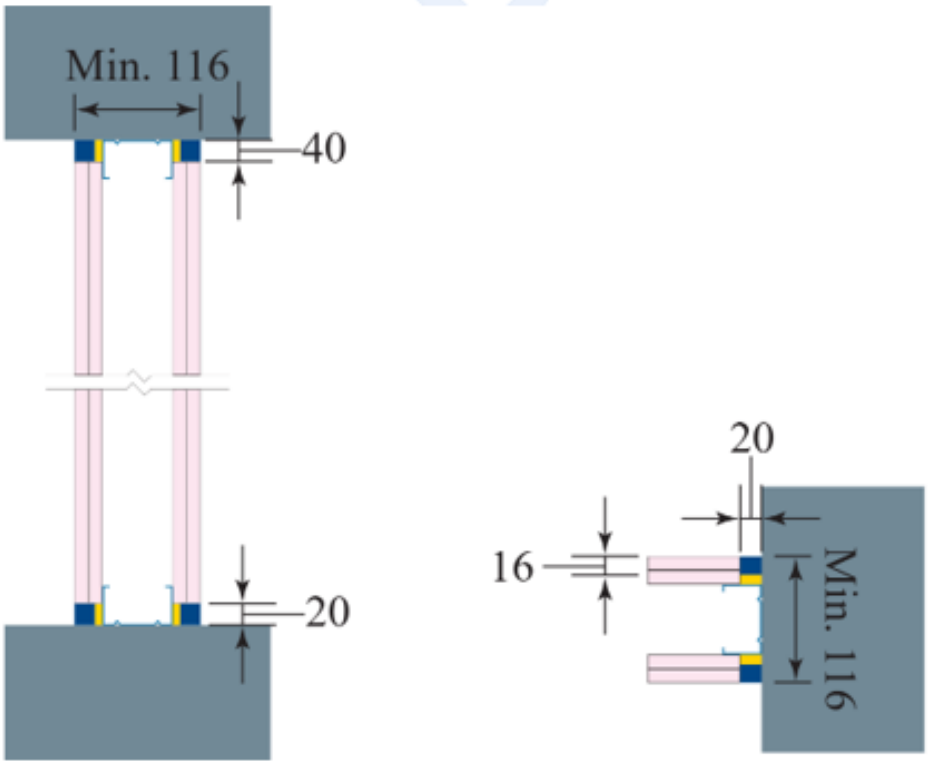
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Figure 6: Plasterboard-to-Concrete/Masonry - 2 x 13 mm

2 x 13mm Plasterboard-to-Concrete/Masonry Perimeter Joints (Horizontal + Vertical)



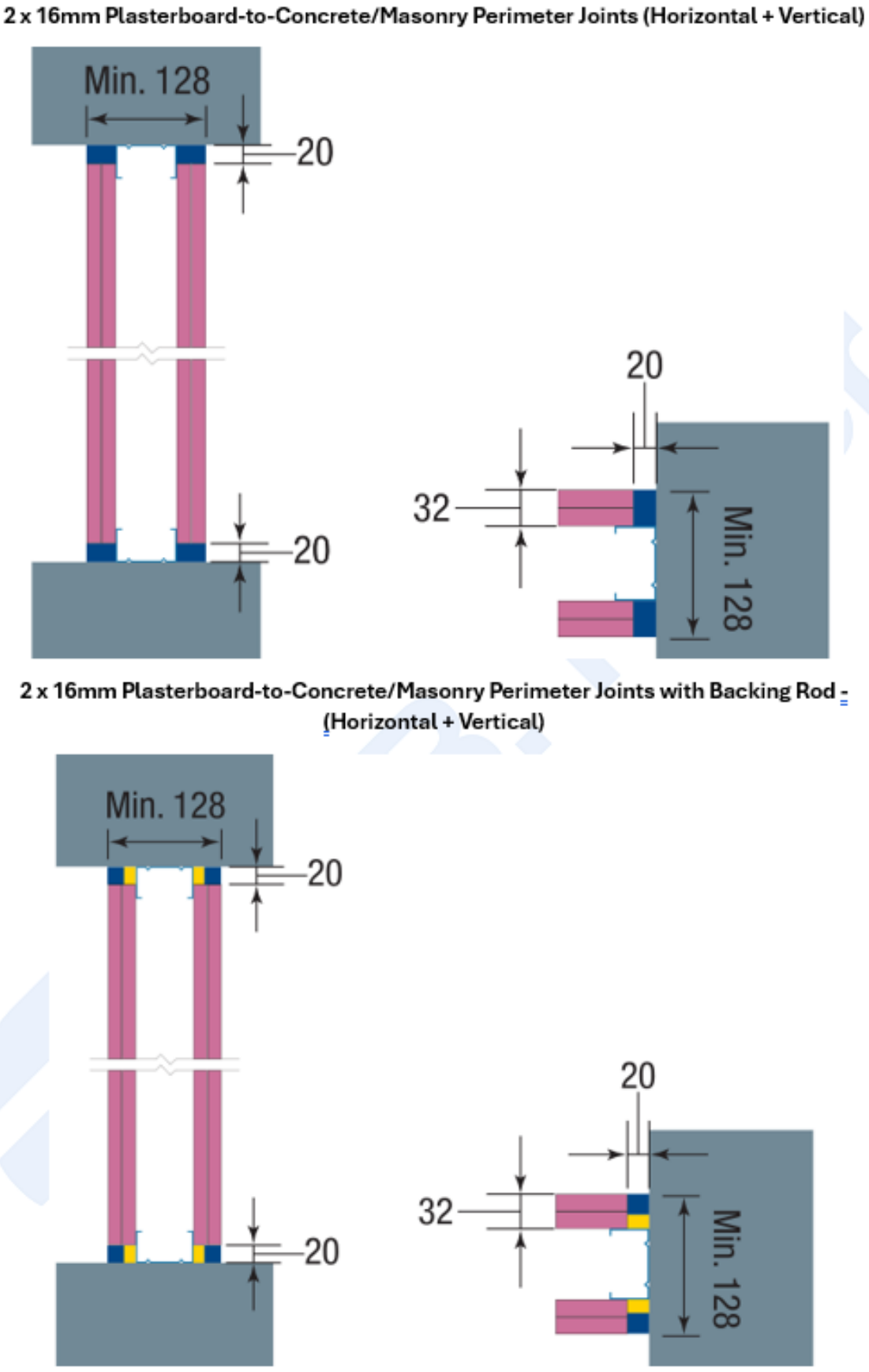
2 x 13mm Plasterboard-to-Concrete/Masonry Perimeter Joints with Backing Rod - (Horizontal + Vertical)



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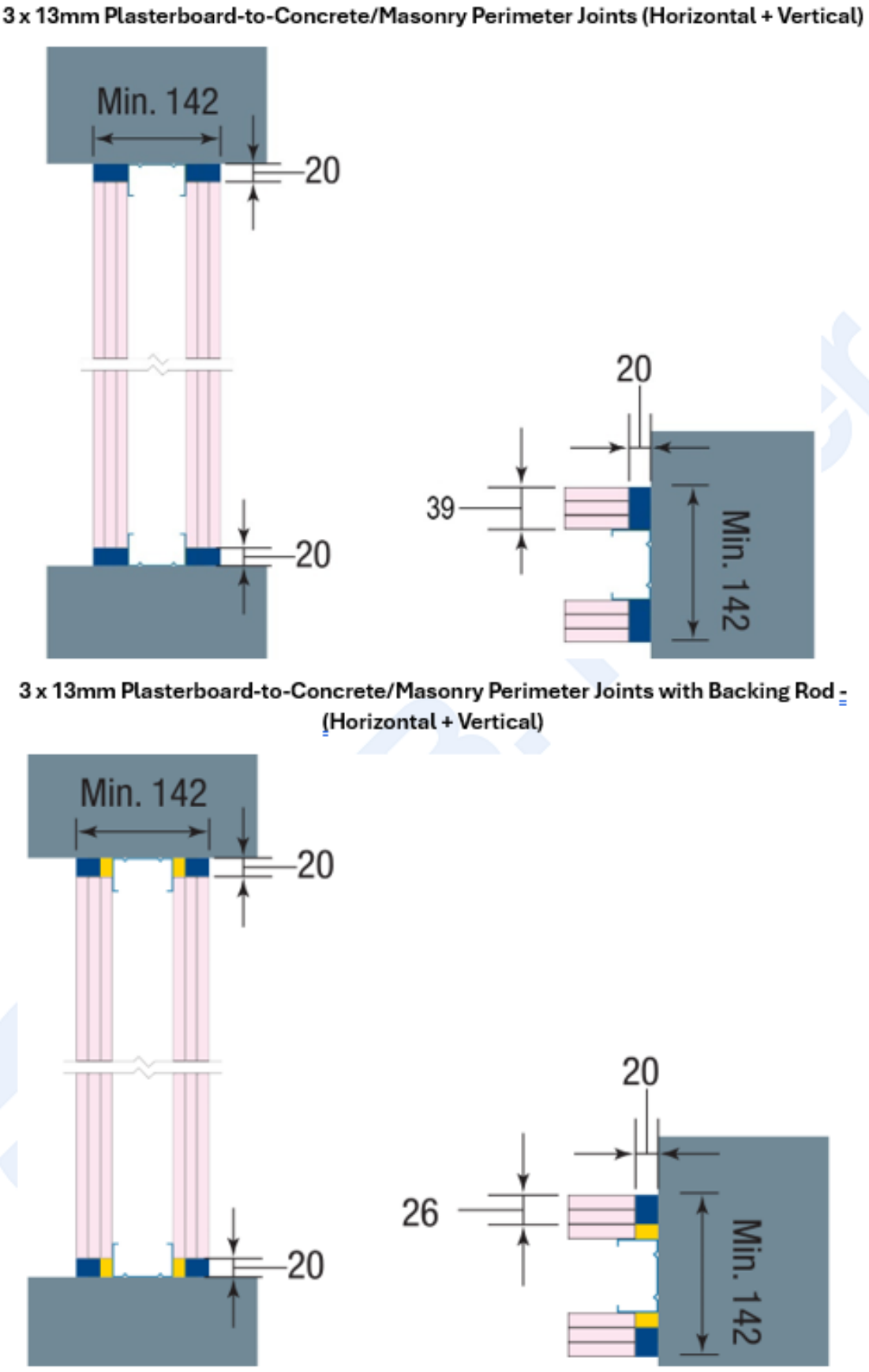
Figure 7: Plasterboard-to-Concrete/Masonry - 2 x 16 mm



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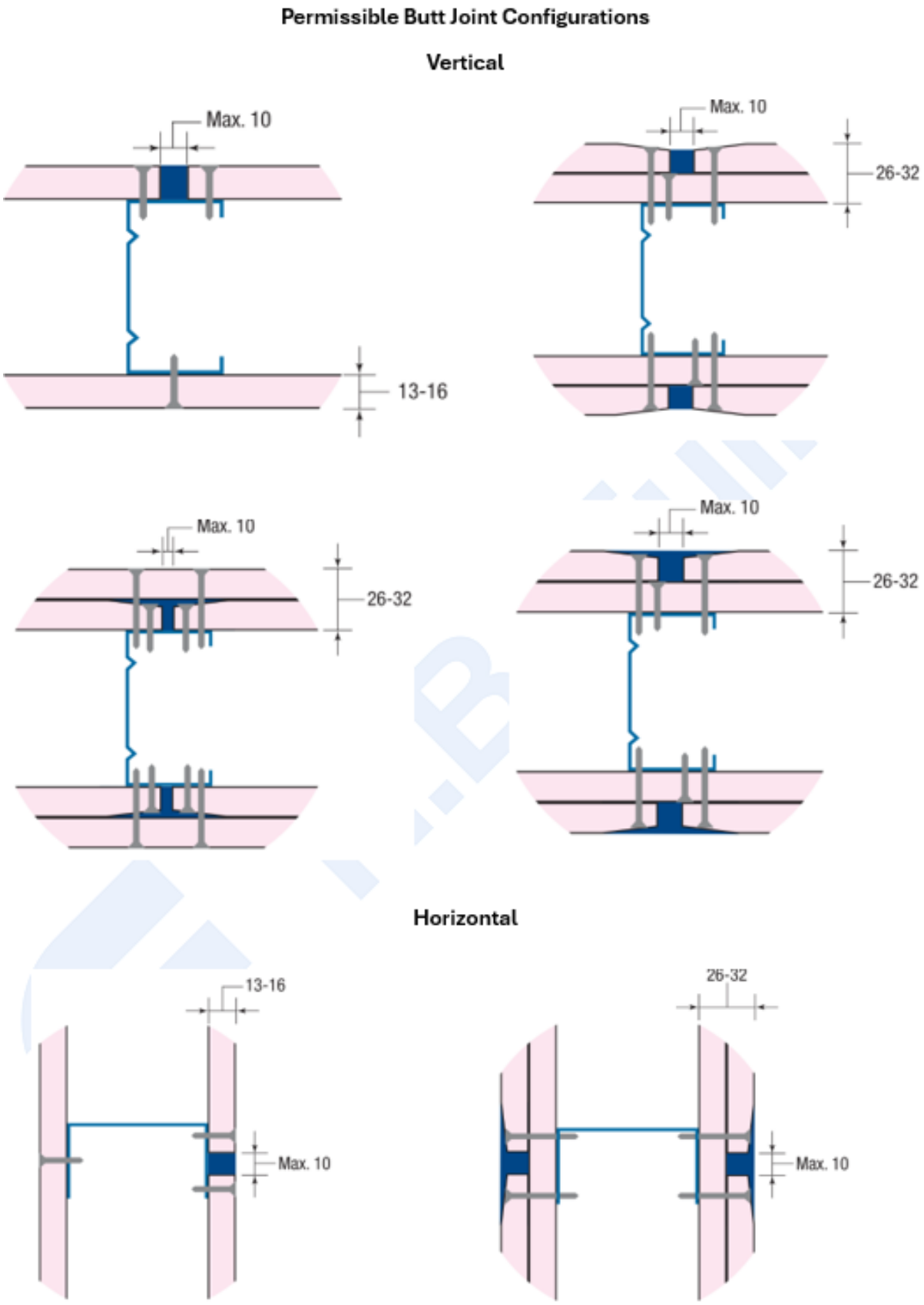
Figure 8: Plasterboard-to-Concrete/Masonry - 3 x 13 mm



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Figure 9: Recess and Butt Joints



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