

Our Ref: FCO-2779/3836

Obeco Glass Blocks  
823 Botany Road  
ROSEBERY NSW 2018

Attention: Mr Robert Hawke

LIKELY FIRE PERFORMANCE OF GLASS-BLOCK WALL SYSTEM WHEN TESTED TO AS 1530.4

Assessment Number FCO-2779  
Your e-mail of 14 October 2009

INTRODUCTION

We have re-examined the information referenced by you on the likely performance of your glass block wall systems if they were to incorporate an aluminium perimeter frame and steel fixing pins around the perimeter as an alternative to the tested detailing when tested to AS 1530.4-2005. The information included:

- Efectis France test report no. 08-V-064, dated 5 May 2008;
- CSTB test report no. 87.26109, dated 12 July 1990;
- CTICM test report no. 02-V-299, dated 25 November 2002;
- CTICM test report no. 05-V-136, dated 22 August 2005;
- our assessment reports numbered FCO-2156, FCO-2157 and FCO-2202;
- Obeco Glass Block Specification;
- Obeco Glass Block fire rated installation drawings numbered DWG02, DWG11, DWG13, DWG15, and DWG17;
- Obeco Glass Block fire rated fixing detail drawings numbered DWG03, DWG12, DWG14, DWG16, and DWG18;
- NF EN 1363-1 and NF EN 1364-1; and
- AS 1530.4-2005.

We have retained these documents and information.

## ANALYSIS

### ***Efectis France report no. 08-V-064***

On 28 February 2008 Efectis France conducted a full-scale fire-resistance test on a La Rochère “198 Bricks” glass brick wall incorporating 190-mm x 190-mm x 80-mm deep glass bricks. The bricks were laid up in La Rochère supplied bonding material and sand mortar.

The tested partition comprised three vertical panels placed side by side, with rigidity provided by a trellis made from reinforcing steel. The dimensions of the panels were 630-mm wide x 3380-mm high, 1590-mm wide x 3380-mm high, and 600-mm wide x 3380-mm high. The trellis was composed of horizontal reinforcement made up of two metal wires reinforcing each mortar joint between the glass bricks; vertical reinforcement made up of one metal wire reinforcing each mortar joint between the glass bricks; and peripheral reinforcement made up of two metal wires for the horizontal peripheral borders and vertical peripheral borders. The reinforcing metal wire was of 5-mm diameter.

The panels were supported at the top of the partition by fixing lugs made from steel plate of dimensions 140-mm long x 25-mm wide x 4-mm thick associated with a 15-mm x 20-mm steel square whose side is welded on the steel plate. Each lug is fixed by two screws 5-mm diameter x 50-mm long and dowels 8-mm diameter x 50-mm long. The lugs fit into the supporting casings made from galvanised sheet steel of dimensions 150-mm long x 20-mm wide x 20-mm deep. The fixing devices are spaced at 600-mm centres. Lateral support was provided by M12 x 130-mm long galvanised steel pin inserted into the support construction using 16-mm diameter holes. The pins rest in casings made from galvanised sheet steel of dimensions 150-mm long x 20-mm wide x 20-mm deep. The fixing devices are spaced at 600-mm centres. At the base of the partition, support was provided by two galvanised steel corner irons with dimensions of 45-mm x 45-mm x 5-mm. The corner irons are fixed to the support construction using 5-mm diameter x 50-mm long screws at 600-mm centres.

The wall maintained integrity for 61 minutes while the wall was being subjected to the test conditions of NF EN 1363-1, with the specific requirements of NF EN 1364-1 “Fire resistance tests for non-loadbearing elements – Part 1: Walls”, which has the same time-temperature and pressure exposure conditions to that of AS 1530.4. Additionally the observations indicate that the integrity determination for this test was equivalent to that of AS 1530.4.

### ***CSTB report no. 87.26109***

On 12 April 1990 CSTB Scientific and Technical Centre for Building conducted a full-scale fire-resistance test on a La Rochère glass brick wall comprising: a bottom panel of 3010 LC (checked type) 300-mm x 300-mm x 100-mm deep glass bricks, 1020-mm high; a middle panel of 3010 T (transparent type) 300-mm x 300-mm x 100-mm deep glass bricks, 960-mm high; and a top panel of 3010 DC (cloud type) 300-mm x 300-mm x 100-mm deep glass bricks, 1020-mm high. The bricks were laid up in Ciments Francais supplied white cement and sand mortar using 6-mm diameter steel reinforcing bars.

The tested partition was mounted using 80-mm x 4-mm flat steel sheet attached on the periphery of the concrete frame every 250-mm x 40-mm on the non-exposed side using 8-mm diameter plastic dowels and 6-mm diameter x 40-mm long anchor bolts every 250-mm. The bottom and top of the test partition was placed in a 40-mm deep x 110-mm wide rebate, with an interpolation at its base of a 74-mm x 10-mm polyethylene foam flexible compression joint at the bottom of the rebate, and 74-mm x 10-mm polyethylene foam joint between the top of the panel and the concrete. Lateral retention is provided by 80-mm x 4-mm flat steel sheet and placing 12-mm diameter Rockwool cord in the rebate.

The wall maintained integrity for 97 minutes while the wall was being subjected to the test conditions in accordance with the provisions of the order of 21 April 1983 from the French Ministry of the Interior Fire Resistance of a Building Element. This method has the same time-temperature and pressure exposure conditions to that of AS 1530.4. Additionally the observations indicate that the integrity determination for this test was equivalent to that of AS 1530.4.

CSTB report no. also comprises Extension of Classification No. 90/1 that specifies the test result is valid for glass bricks of the same constitution but having dimensions 190-mm x 190-mm x 100-mm.

***CTICM report no. 02-V-299***

On 6 September 2002 CTICM Testing Station conducted a full-scale fire-resistance test on a La Rochère “HALTOFEU 30” type glass brick wall incorporating 190-mm x 190-mm x 100-mm deep glass bricks. The “HALTOFEU 30” bricks were made by assembling two La Rochère “195” type half bricks whose dimensions were 190-mm x 190-mm x 50-mm deep and assembled together by means of beads of Loctite “5375” silicon adhesive on their periphery. The bricks were laid up in Maxit supplied “Maxitherm 815” mortar comprising bonding material, sand, and fillers, and using 5-mm diameter steel reinforcing bars.

The tested partition comprised three horizontal panels placed one on top another, with rigidity provided by a trellis made from reinforcing steel.

The tested partition comprised three horizontal panels placed one on top another, with rigidity provided by a trellis made from reinforcing steel. The dimensions of the lower, middle and upper panels were 2980-mm wide x 1072.5-mm high, 2980-mm wide x 1010-mm high, and 2980-mm wide x 867.5-mm high respectively. The trellis was composed of horizontal reinforcement made up of three metal wires reinforcing each mortar joint between the glass bricks; vertical reinforcement made up of two metal wires reinforcing each mortar joint between the glass bricks; and peripheral reinforcement steel made up of six metal wires for the horizontal peripheral borders and four metal wires for the vertical peripheral borders. The reinforcing metal wire was of 5-mm diameter.

The partition was held by a 125-mm x 60-mm rebate in the supporting masonry on the fire-exposed side, and 80-mm x 50-mm steel flats fixed to the masonry with FBN 16/10 (Fischer) steel studs on the unexposed side. The bottom edge of the partition rested on 80-mm x 8-mm rubber supporting seal. On the periphery, expansion was allowed for by 94-mm x 10-mm foam seal positioned between the panels and the masonry. On the fire-exposed side, the rebate was fitted with mineral wool strips and sealed using fire-rated silicone sealant. On the non-fire side, 35-mm x 5-mm foam seal was placed between the panels and the steel flats.

The wall maintained insulation for 31 minutes and integrity for 84 minutes while the wall was being subjected to the test conditions of NF EN 1363-1, with the specific requirements of NF EN 1364-1, which has the same time-temperature and pressure exposure conditions to that of AS 1530.4. Additionally the observations indicate that the insulation and integrity determinations for this test were equivalent to that of AS 1530.4.

***CTICM report no. 05-V-136***

On 3 May 2005 CTICM Testing Station conducted a full-scale fire-resistance test on a La Rochère "TF 60a" type glass brick wall incorporating 190-mm x 190-mm x 150-mm deep glass bricks. The "TF 60a" bricks were made by assembling three La Rochère "195T" type half bricks whose dimensions were 190-mm x 190-mm x 50-mm deep and assembled together by means of strips of Soudal "120251" silicon adhesive on their periphery and connecting strips of S.H.D. "8582" 35-mm wide adhesive cloth covered the assembly. The bricks were laid up in Maxit supplied "Maxitherm 815" mortar comprising bonding material, sand, and fillers, and using 5-mm diameter steel reinforcing bars.

The tested partition comprised four vertical panels placed side by side, with rigidity provided by a trellis made from reinforcing steel. The dimensions of the two end panels was 662.5-mm wide x 2980-mm high, and the dimensions of the two middle panels was 805-mm wide x 2980-mm high. The trellis was composed of horizontal reinforcement made up of two metal wires reinforcing each mortar joint between the glass bricks; vertical reinforcement made up of three metal wires reinforcing each mortar joint between the glass bricks; and peripheral reinforcement made up of four metal wires for the horizontal peripheral borders and six metal wires for the vertical peripheral borders. The reinforcing metal wire was of 5-mm diameter.

The partition was held by a 180-mm x 60-mm rebate in the supporting masonry on the fire-exposed side, and 120-mm x 50-mm steel flats fixed to the masonry with 8-mm diameter steel dowels at 620-mm centres on the unexposed side. The bottom edge of the partition rested on 80-mm x 8-mm rubber supporting seal. On the periphery, expansion was allowed for by 74-mm x 10-mm foam seal positioned between the panels and the masonry. On the fire-exposed side, the rebate was fitted with a 30-mm diameter mineral wool flange and sealed using fire-rated silicone sealant. On the non-fire side, 35-mm x 5-mm foam seal was placed between the panels and the steel flats.

The wall maintained insulation for 62 minutes and integrity for 115 minutes while the wall was being subjected to the test conditions of NF EN 1363-1, with the specific requirements of NF EN 1364-1, which has the same time-temperature and pressure exposure conditions to that of AS 1530.4. Additionally the observations indicate that the insulation and integrity determinations for this test were equivalent to that of AS 1530.4.

***CSIRO letter of assessment numbered FCO-2156***

On 3 September 2007 this Division issued a letter of assessment stating that based on the test results provided it is the opinion of the Division that a proposed glass-block wall system as reported in test certificate number 3982/6800 –Mp-, assessed in our report numbered FCO-2115, and constructed as detailed in the attached drawing would be capable of achieving fire-resistance levels (FRL) of -/60/- if tested in accordance with AS 1530.4-1997.

The proposed glass block wall system was to incorporate an aluminium perimeter frame and steel fixing pins around the perimeter as an alternative to the specified tested detailing.

***CSIRO letter of assessment numbered FCO-2157***

On 9 April 2008 this Division issued a letter of assessment stating that based on the test results provided it is the opinion of the Division that a proposed glass-block wall system as reported in test certificate number 3982/6800 –Mp-, assessed in our report numbered FCO-2115 and constructed with fully grouted standard bricklayer's mortar would be capable of achieving fire-resistance levels (FRL) of -/60/- if tested in accordance with AS 1530.4-1997.

**CSIRO letter of assessment numbered FCO-2202**

On 9 April 2008 this Division issued a letter of assessment stating that based on the test results provided it is the opinion of the Division that the proposed glass-block wall system as reported in test certificate number 3571/2980-WI/Rm and constructed as detailed in the attached drawing would be capable of achieving fire-resistance levels (FRL) of -/90/- if tested in accordance with AS 1530.4-1997.

The proposed glass block wall systems was to incorporate an aluminium perimeter frame and steel fixing pins around the perimeter as an alternative to the specified tested detailing.

The glass block systems tested in test reports numbered 08-V-064, 87.26109, 02-V-299 and 05-V-136 comprised three pre-built panels installed for the test. The proposed systems are to be installed onsite by mortar lay method, using the reinforcing specified in the tested systems.

The proposed system is to incorporate an aluminium perimeter frame, have steel reinforcing bars encased in every horizontal bed joint and to anchor the panel to the structure by a 6-mm diameter steel pin driven into a 6.5-mm diameter hole at 600-mm centre into the surrounding structure. The depth of the steel is to be a minimum of 50-mm into the surrounding wall and to overlap the existing reinforcing in the blocks by at least 150-mm. Compressible fire approved material is fitted within the channel to allow for expansion under fire conditions.

The proposed system, as outlined, provides similar lateral restraint to that of the tested specimens, while providing some measure of expansion provision.

**OPINION/CONCLUSION**

Based on the test results it is the opinion of the Division that the proposed glass-block wall systems as detailed above and in the attached drawings would be capable of achieving fire-resistance levels (FRL) tabulated below if tested in accordance with AS 1530.4-2005:

<b>Obeco Drawing No.</b>	<b>Glass brick dimensions (mm) and type</b>	<b>Thickness of wall (mm)</b>	<b>Mass of wall (kg/m<sup>2</sup>)</b>	<b>FRL</b>
DWG02 and DWG03	190 x 190 x 80	80	105	-/60/-
DWG11 and DWG12	300 x 300 x 100; and 190 x 190 x 100	100	125	-/90/-
DWG15 and DWG16	190 x 190 x 100 Type TF30	100	160	-/60/30
DWG17 and DWG18	190 x 190 x 150 Type TF60	150	215	-/90/60

Table 1: FRL of Obeco Glass Block Fire Rated wall systems.

Additionally, based on the performance of the wall system as reported in CSTB report numbered 82.26109 comprising one skin of 300-mm x 300-mm x 100-mm thick glass block it is the opinion of this division that the double skin wall system tabulated below would be capable of achieving the specific performance if tested in accordance with AS 1530.4-2005:

<b>Obeco Drawing No.</b>	<b>Glass brick dimensions (mm) and type</b>	<b>Thickness of wall (mm)</b>	<b>Mass of wall (kg/m<sup>2</sup>)</b>	<b>FRL</b>
DWG13 and DWG14	Two skins of 190 x 190 x 100 with air gap	Minimum 250	125 per skin	-/120/-

Table 2: FRL of Obeco Glass Block double-skin Fire Rated wall system.

#### TERM OF VALIDITY

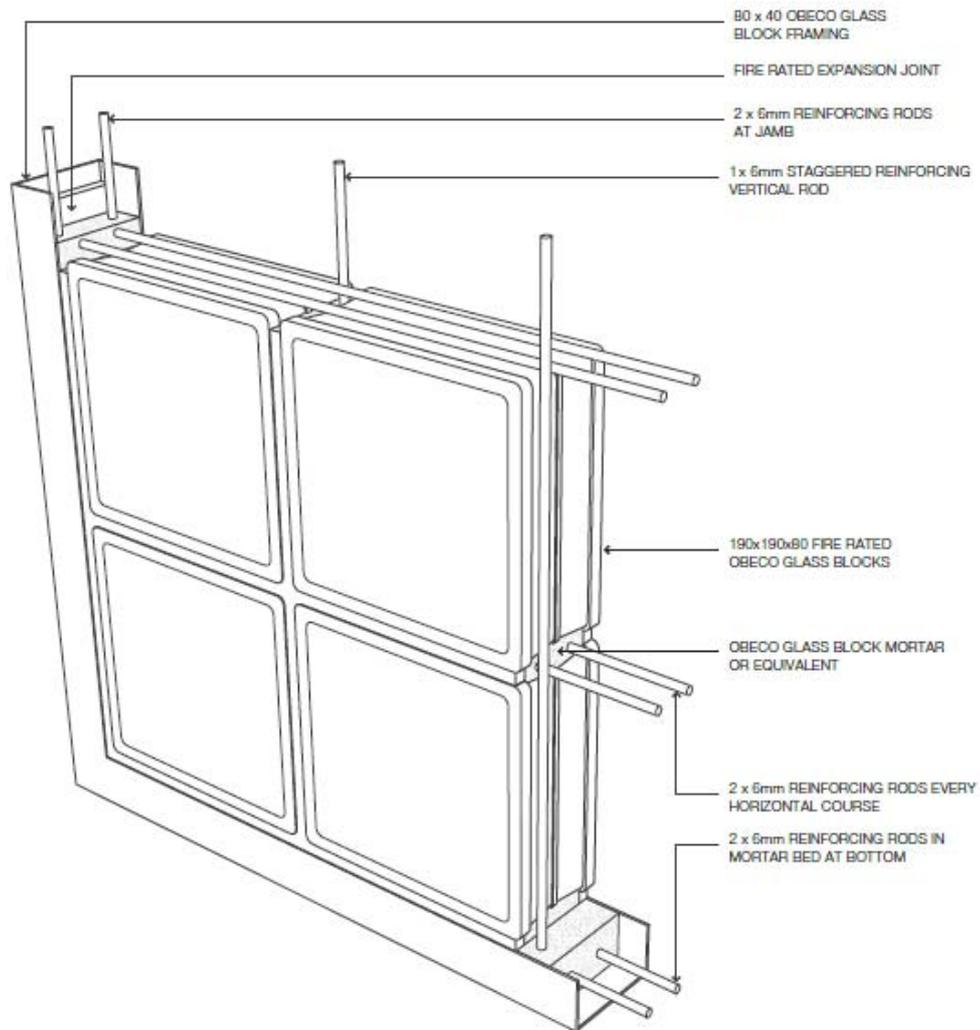
This assessment report will lapse on 31 January 2015. Should you wish us to re-examine this assessment with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this report in the light of new knowledge.

Yours faithfully,

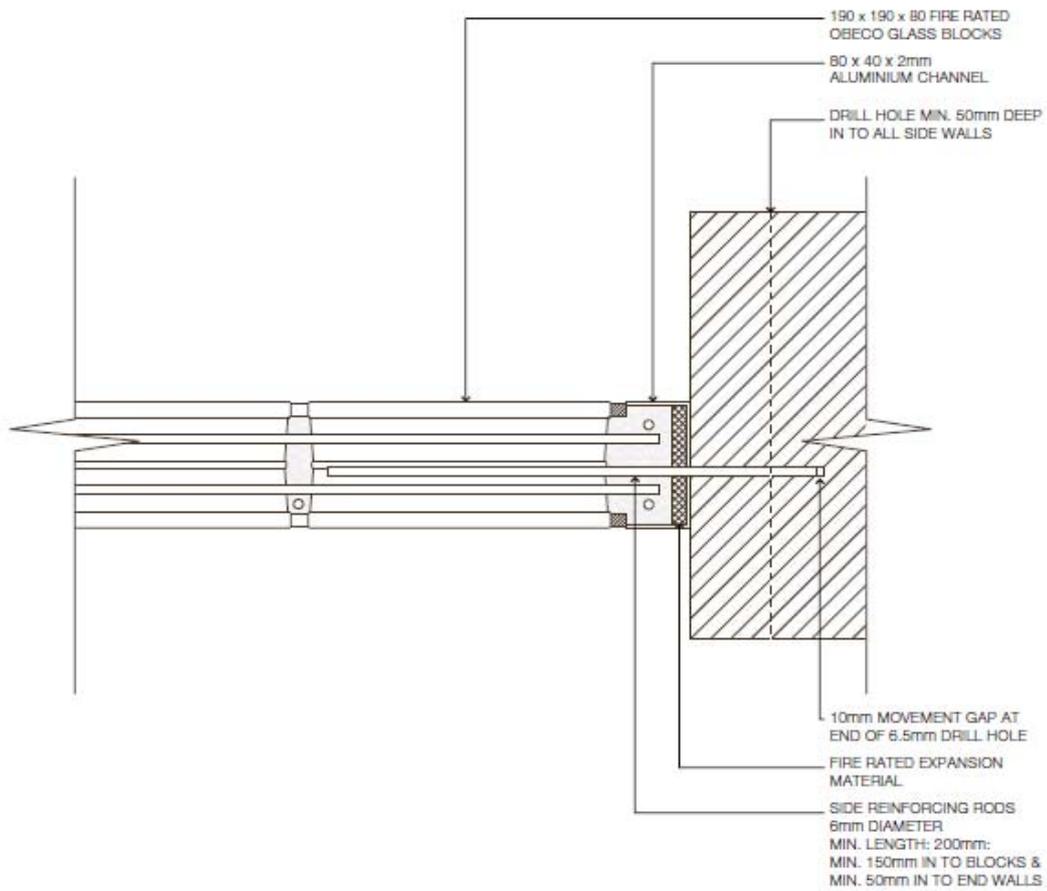


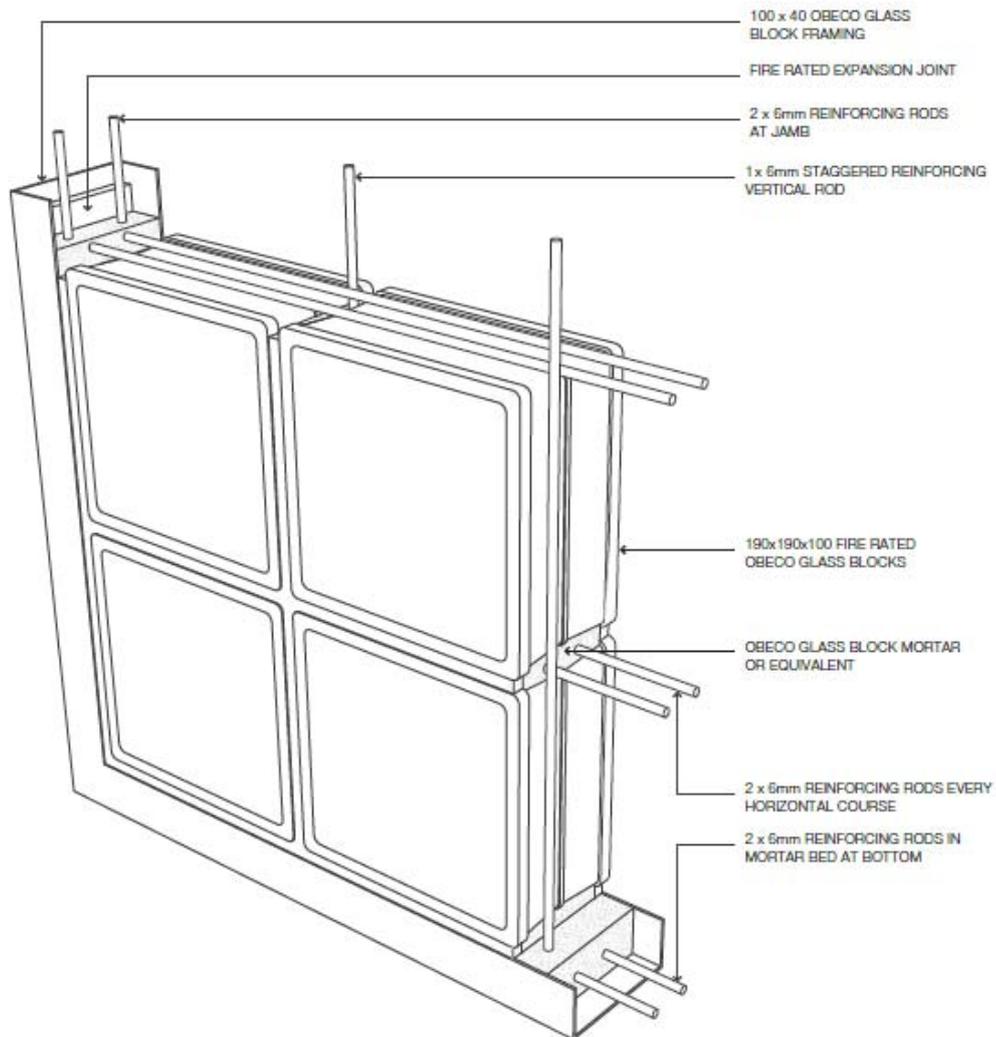
Russell Collins  
For Manager, Fire Testing and Assessments.

15 January 2010

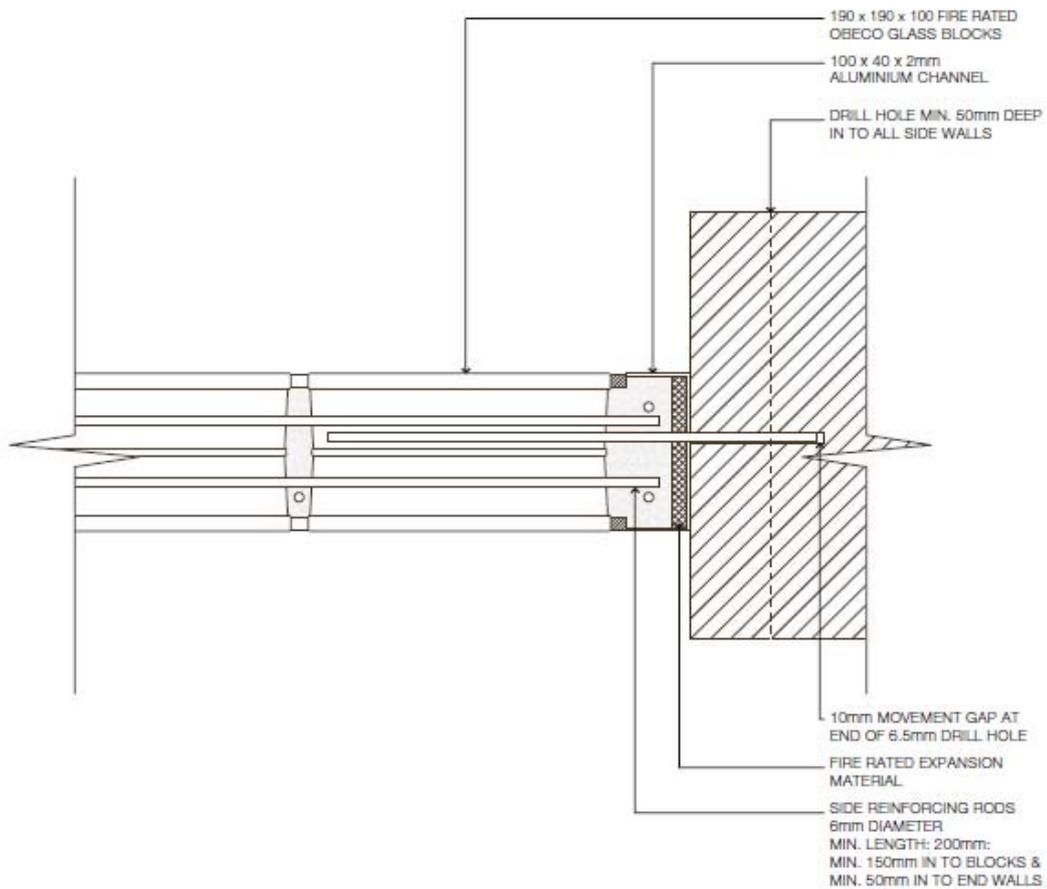


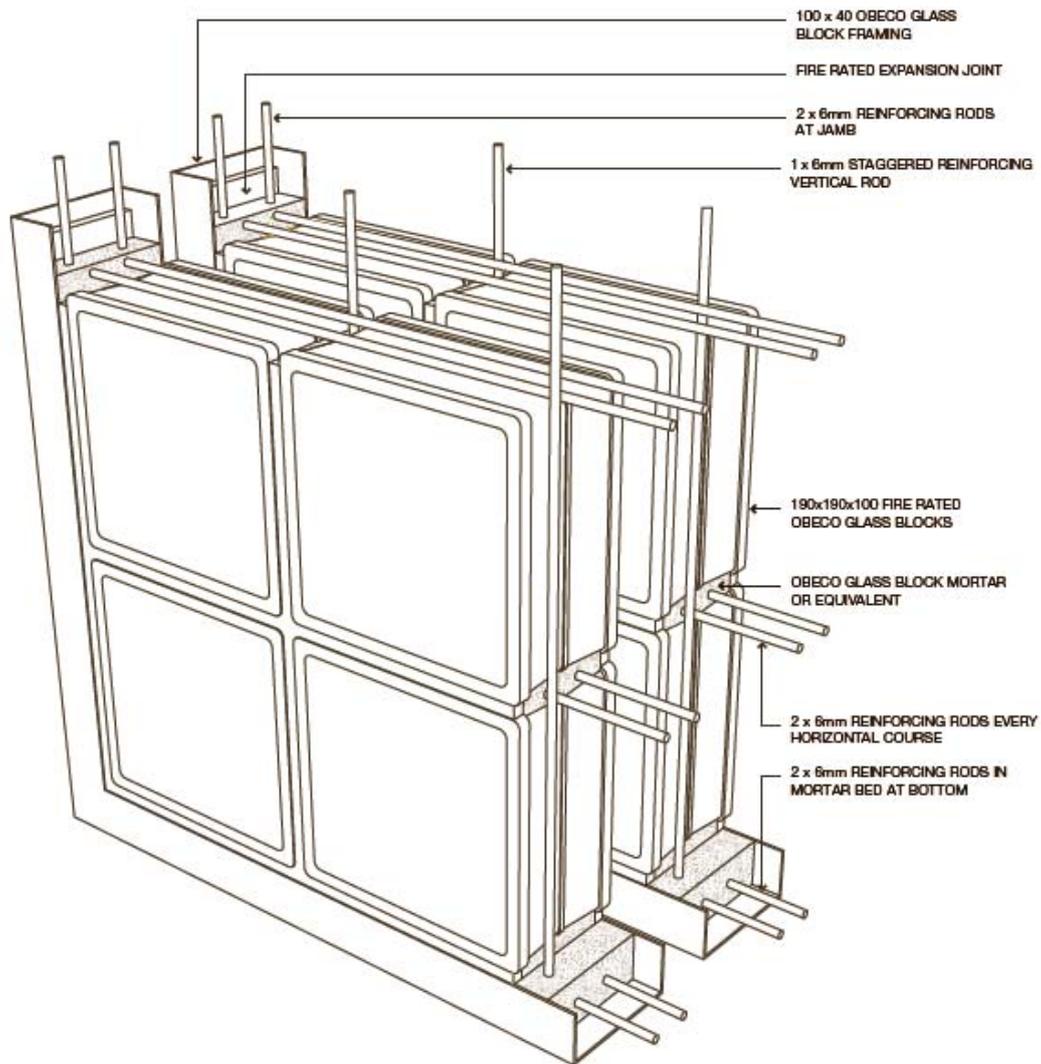
NOTE: SEE DWG03 FOR FIXING DETAIL



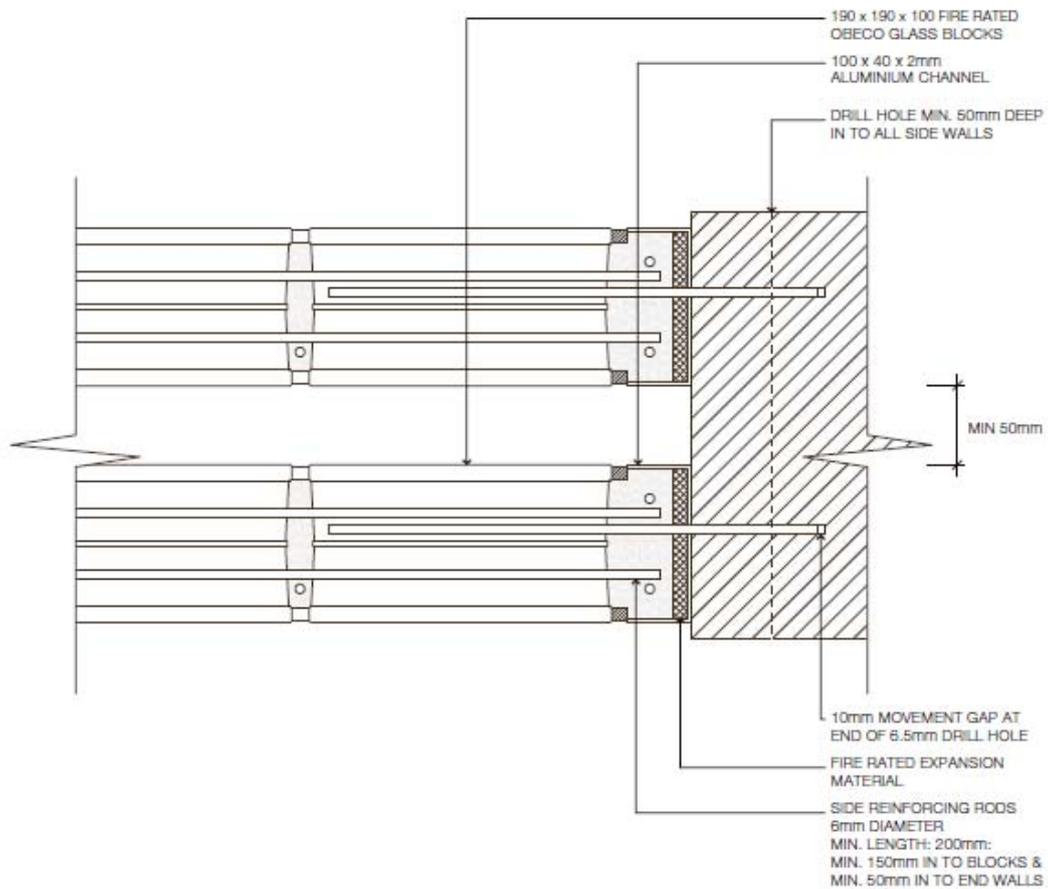


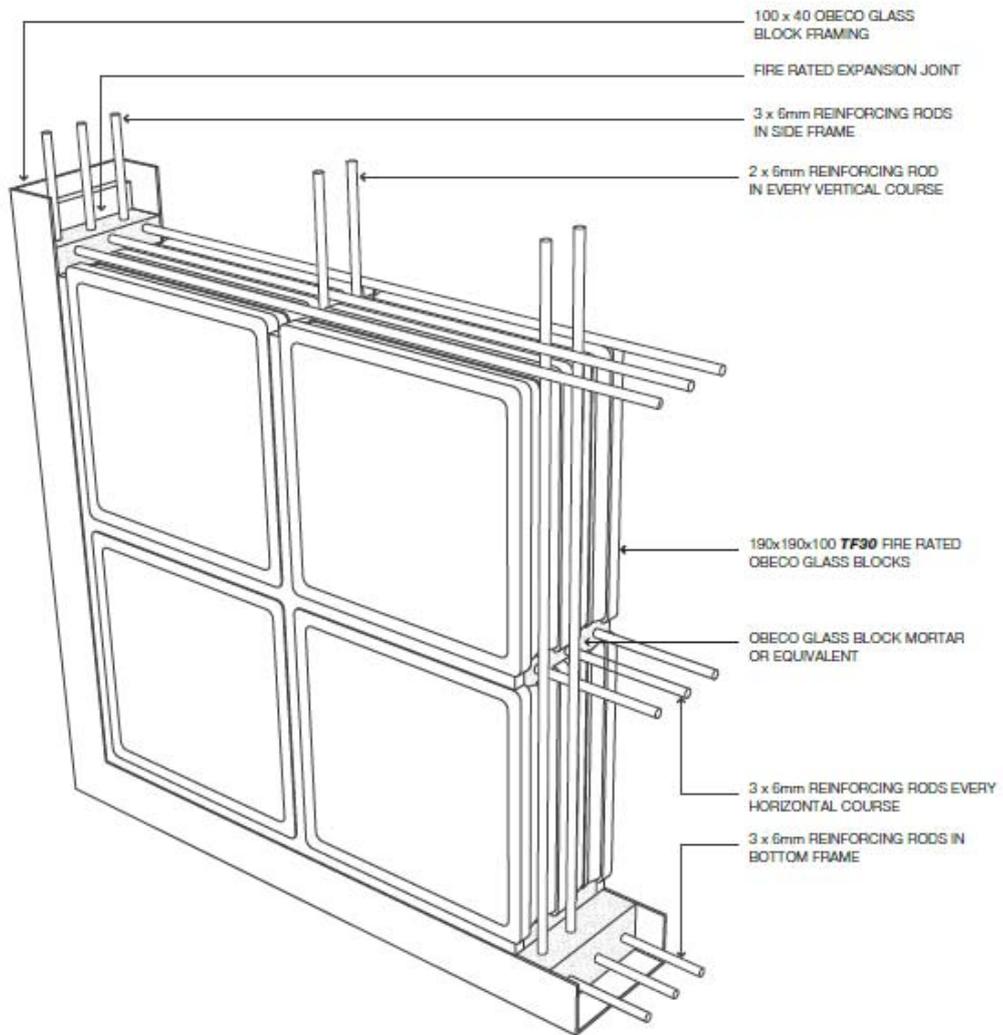
NOTE: SEE DWG12 FOR FIXING DETAIL



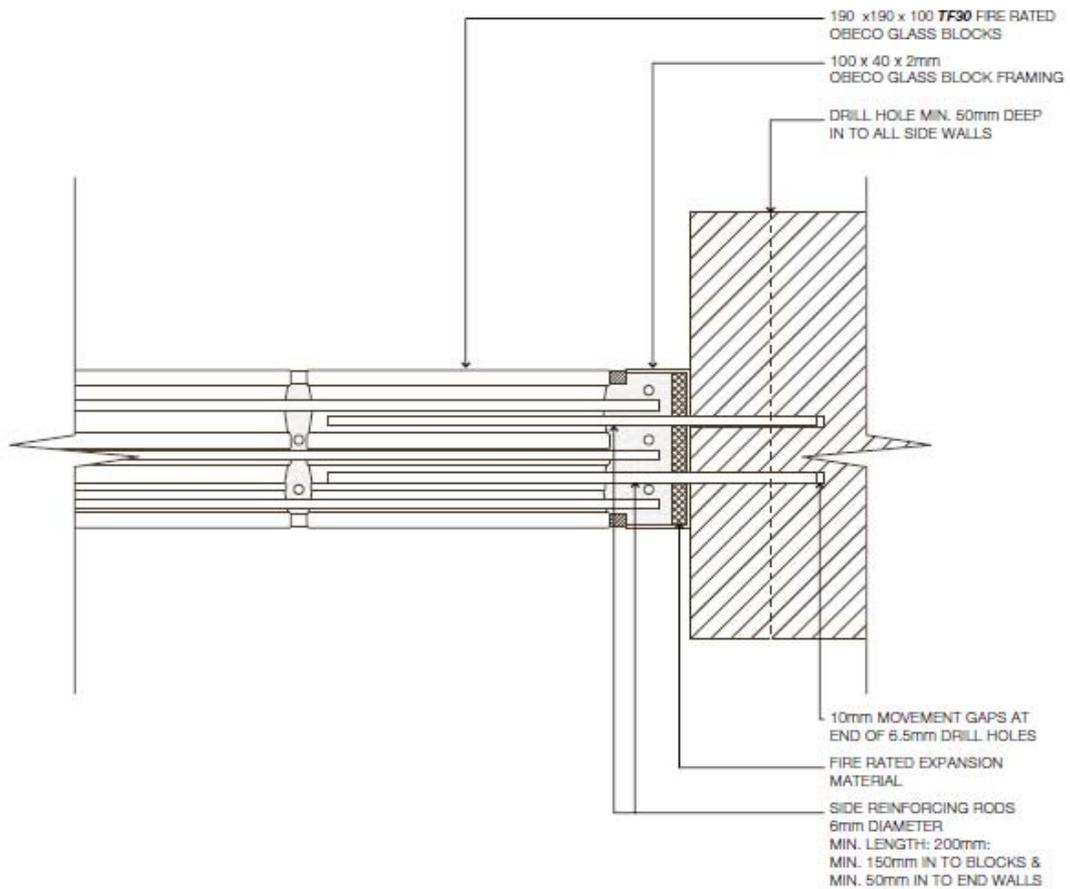


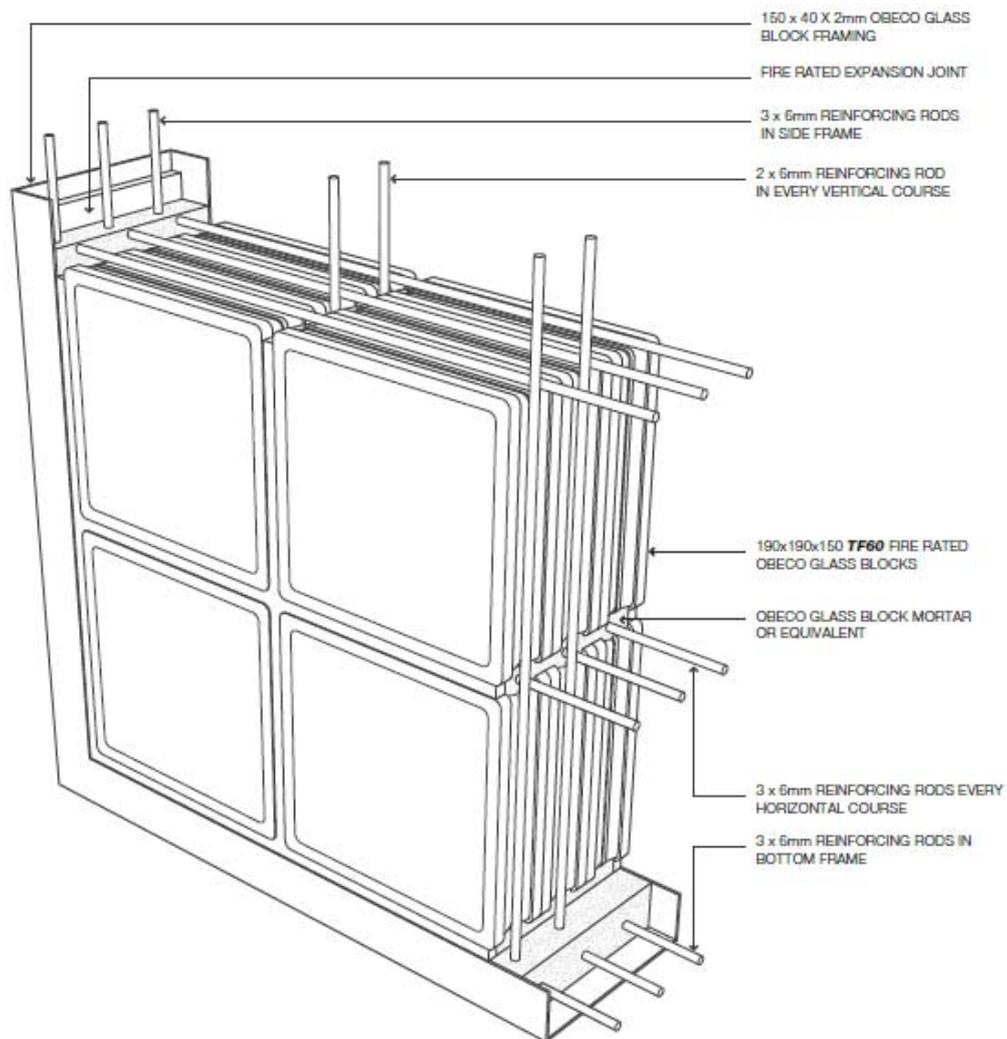
NOTE: THOUGH ONLY SHOWN ON ONE, MARKUP APPLIES TO BOTH SKINS  
SEE DWG14 FOR FIXING DETAIL





NOTE: SEE DWG 16 FOR FIXING DETAIL





NOTE: SEE DWG18 FOR FIXING DETAIL

