The Building Test Centre
Fire Acoustics Structures

Assessment Number **BTC 15346FA**

A FIRE TEST ASSESSMENT ON A BRITISH GYPSUM GYPWALL ROBUST / EXTREME HYBRID PARTITION CLAD WITH A SINGLE LAYER OF 15mm GYPROC DURALINE ON ONE SIDE AND A DOUBLE LAYER OF 15mm GYPROC WALLBOARD AND 12.5mm GLASROC RIGIDUR H ON THE OTHER, CONDUCTED IN ACCORDANCE WITH F.T.S.G. RESOLUTION No. 82 /PFPF GUIDE.

Assessment Date: 9th July 2007

www.btconline.co.uk

Applicant: **British Gypsum Limited**
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A FIRE TEST ASSESSMENT ON A BRITISH GYPSUM GYPWALL ROBUST / EXTREME HYBRID PARTITION CLAD WITH A SINGLE LAYER OF 15mm GYPROC DURALINE ON ONE SIDE AND A DOUBLE LAYER OF 15mm GYPROC WALLBOARD AND 12.5mm GLASROC RIGIDUR H ON THE OTHER, CONDUCTED IN ACCORDANCE WITH F.T.S.G. RESOLUTION No. 82 /PFPF GUIDE.

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DETAILS OF THE REQUEST

It is required to assess the following construction for 30 minutes fire resistance performance if tested in accordance with BS EN 1364-1: 1999 and exposed to fire from either direction. The construction method is the same for either quilt specification.

Gypframe 72C50 Standard Flange Floor & Ceiling Channels are fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70AS50 AcouStuds are positioned at 600mm centres between the channels. The right-hand stud viewed from the unexposed face is not fixed to the test frame and the gap between the stud and the frame lining is filled with a 25mm rock mineral fibre gasket.

At the left-hand end a Gypframe 70AS50 AcouStud is used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

A layer of insulation is positioned in the cavity as described in table 1.

The framework is clad with a single layer of 15mm Gyproc DuraLine on one side and a double layer of board, comprising an inner layer of 15mm Gyproc WallBoard and an outer layer of 12.5mm Glasroc Rigidur H, on the other. All vertical joints are staggered between board layers.

The single layer of 15mm Gyproc DuraLine is fixed around the perimeter of the board and to intermediate stud positions using 32mm Gyproc drywall screws at 300mm centres.

The inner layer of 15mm Gyproc WallBoard is fixed around the perimeter of the boards with 32mm Gyproc drywall screws at 300mm centres.

The outer layer of 12.5mm Glasroc Rigidur H is fixed around the perimeter of the board and to intermediate stud positions with 40mm Glasroc Rigidur screws at 300mm centres.

Horizontal joints are located at 2400mm from the base of the specimen on both sides of the partition. Gypframe GFS1 Fixing Strap is used behind the horizontal joints.

All joints are finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads are spotted using Gyproc Joint Filler.

	Insulation thickness and type
System One	None
System Two	50mm Isover Acoustic Partition Roll

Table 1. Quilt specifications for assessed constructions.

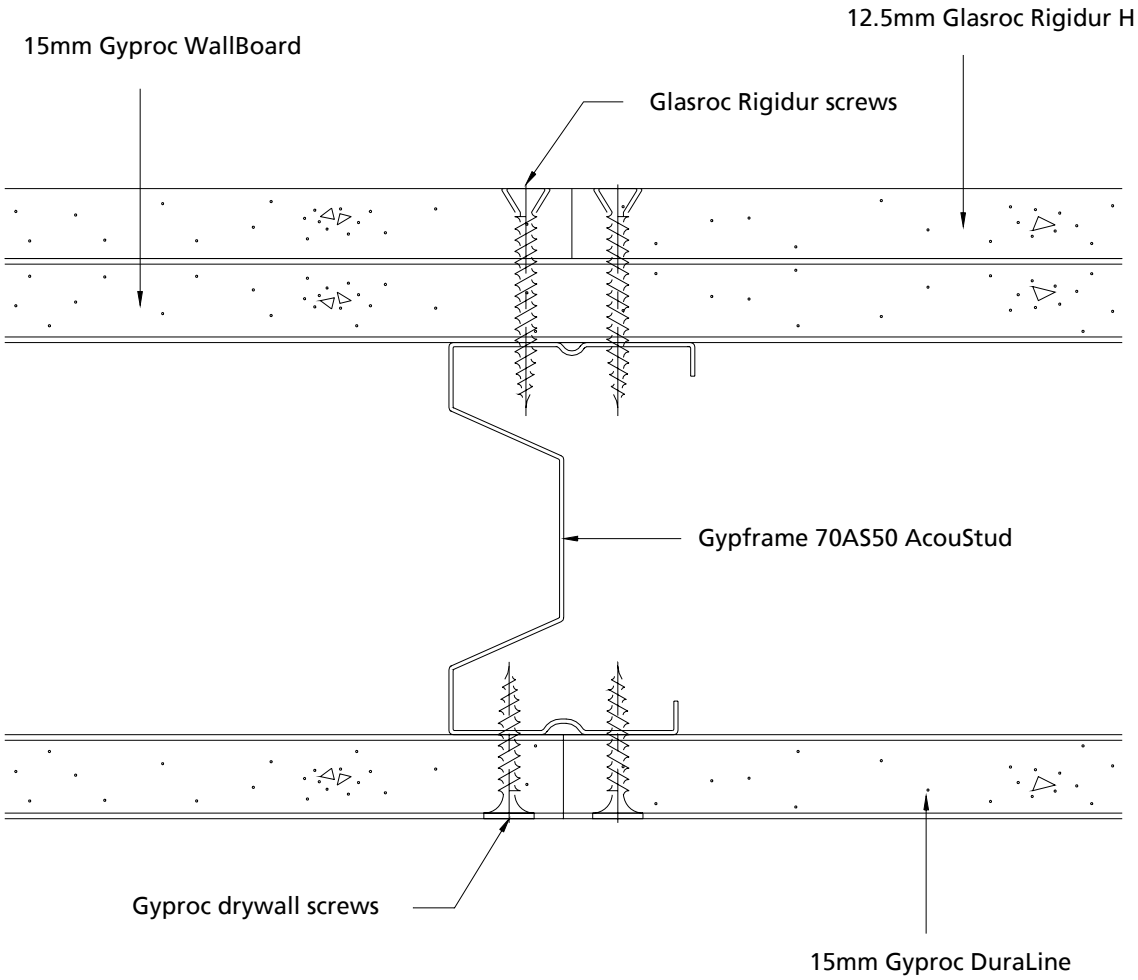

Figure 1. Cross sectional view through proposed partition system 1.

THE ASSESSORS

The Building Test Centre operates as an independent accredited test house for the construction industry. The Building Test Centre has unrivalled experience in the development of drywall systems. The Building Test Centre is UKAS accredited under No. 0296 for fire resistance, reaction to fire, acoustic and structural testing. The Building Test Centre is wholly owned by British Gypsum Limited a major manufacturer of building products.

The Building Test Centre is a founder member of the Fire Test Study Group an organisation comprising the UKAS accredited fire test laboratories conducting fire testing in the UK primarily for building control approval. The aim of the group is to ensure a common interpretation of test standards by all laboratories.

ASSESSMENT AUTHORISATION

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Assessment Date 9th July 2007.

This assessment is not valid unless it incorporates the Declaration by Applicant form duly signed by the applicant.

TEST EVIDENCE

The test evidence used in this assessment has been used under the authorisation of the test report owner and has been used with their permission (see pages 18 and 19). Furthermore, the test evidence has been reviewed in accordance with Annex D of the PFPF guide to ensure that the test reports are still valid.

BTC 12728F

A fire resistance test on a British Gypsum GypWall partition clad with a single layer of 15mm Gyproc FireLine conducted in accordance with BS EN 1364-1: 1999

The specimen was constructed in a concrete lined steel restraint frame having an opening of 3000mm high x 3000mm wide.

Gypframe 72C50 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70S50 'C' Studs were positioned at 600mm centres between the channels. The right-hand stud viewed from the unexposed face was not fixed to the test frame and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket.

At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

The framework was clad each side with a single layer of 15mm Gyproc FireLine. The layer of board was fixed around the perimeter of the board and to intermediate stud positions using 25mm Gyproc drywall screws. All vertical joints were staggered between layers.

Horizontal joints were located at 2700mm from the base of the specimen on both sides of the partition. Gypframe GFS1 Fixing Strap was used behind the horizontal joints.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	71 minutes
Insulation	64 minutes

Applicant: British Gypsum Limited

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 19th May 2003 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

BTC 12729F

A fire resistance test on a British Gypsum GypWall partition clad with a single layer of 15mm Gyproc FireLine and 50mm Isover Acoustic Partition Roll conducted in accordance with BS EN 1364-1: 1999

The specimen was constructed in a concrete lined steel restraint frame having an opening of 3000mm high x 3000mm wide.

Gypframe 72C50 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70S50 'C' Studs were positioned at 600mm centres between the channels. The right-hand stud viewed from the unexposed face was not fixed to the test frame and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket.

At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

50mm Isover Acoustic Partition Roll was positioned in the cavity.

The framework was clad each side with a single layer of 15mm Gyproc FireLine. The layer of board was fixed around the perimeter of the board and to intermediate stud positions using 25mm Gyproc drywall screws. All vertical joints were staggered between layers.

Horizontal joints were located at 2700mm from the base of the specimen on both sides of the partition. Gypframe GFS1 Fixing Strap was used behind the horizontal joints.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	80 minutes
Insulation	67 minutes

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 21st May 2003 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

BTC 13708F

A fire resistance test on a British Gypsum GypWall partition clad with a single layer of 15mm Gyproc DuraLine conducted in accordance with BS EN 1364-1: 1999

The specimen was constructed in a concrete lined steel restraint frame having an opening of 3000mm high x 3000mm wide.

Gypframe 72DC60 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70S50 'C' Studs were positioned at 600mm centres between the channels. The right-hand stud viewed from the unexposed face was not fixed to the test frame and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket.

At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

The framework was clad each side with a single layer of 15mm Gyproc DuraLine. The layer of board was fixed around the perimeter of the board and to intermediate stud positions using 25mm Gyproc drywall screws. All vertical joints were staggered between layers.

Horizontal joints were located at 2400mm from the base of the specimen on both sides of the partition. Gypframe GFT1 Fixing 'T' was used behind the horizontal joints.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	72 minutes
Insulation	62 minutes

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 10th January 2005 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

Applicant: British Gypsum Limited

BTC 13769F

A fire resistance test on a British Gypsum GypWall partition clad with a single layer of 15mm Gyproc DuraLine and 2 x 25mm Isowool Acoustic Partition Rolls conducted in accordance with BS EN 1364-1: 1999

The specimen was constructed in a refractory concrete lined steel restraint frame having an opening of 4200mm high x 3000mm wide.

Gypframe 72DC60 Deep Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings. Gypframe 70I50 'I' Studs were positioned at 600mm centres between the channels. The right hand stud viewed from unexposed face was not fixed to the perimeter test frame, and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket. At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

2 x 25mm thick Isowool Acoustic Partition Rolls (1200) were positioned the cavity.

The framework was lined both sides with a single layer of 15mm Gyproc DuraLine board. The boards were fixed around the perimeter and within the field of the board with 32mm Gyproc drywall screws at 300mm centres. All vertical joints were staggered.

Horizontal joints were positioned 600mm and 3000mm from the base on both the exposed and unexposed faces of the construction. A Gypframe GFS1 Fixing Strap was used behind the horizontal board joints.

All joints were taped and filled using Gyproc Paper Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	75 minutes
Insulation	63 minutes

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 7th March 2005 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

BTC 14869F

A fire resistance test on a British Gypsum GypWall EXTREME partition clad with an inner layer of 15mm Gyproc WallBoard and an outer layer of 12.5mm Glasroc Rigidur H conducted in accordance with BS EN 1364-1: 1999

The test specimen was constructed in a refractory concrete lined steel restraint frame having an overall opening of 3000mm (high) x 3000mm (wide).

Gypframe 72C50 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70AS50 AcouStuds were positioned at 600mm centres between the channels. The studs were extended to 3000mm height by overlapping the studs by 600mm and screw fixing twice through each flange using 13mm Gyproc Wafer Head Jack-Point Screws. The right hand stud viewed from unexposed face was not fixed to the perimeter test frame, and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket.

At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

The framework was clad with an inner layer of 15mm Gyproc WallBoard and an outer layer of 12.5mm Glasroc Rigidur H.

The inner layer of was fixed around the perimeter of the boards with 32mm Gyproc drywall screws at 300mm centres.

The outer layer was fixed around the perimeter and within the field of the board with 40mm Glasroc S screws at 300mm centres. All vertical joints were staggered between layers.

The inner layer horizontal joints were positioned at 600mm from the base on both sides of the partition. The outer layer horizontal joints were positioned 2400mm from the base on both sides of the partition. Gypframe GFS1 Fixing Strap was used behind the outer layer horizontal joint.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	104 minutes
Insulation	82 minutes

Applicant: British Gypsum Limited

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 4th December 2006 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

BTC 15041F

A fire resistance test on a British Gypsum GypWall partition clad with a double layer of 15mm Gyproc WallBoard conducted in accordance with BS EN 1364-1: 1999

The specimen was constructed in a concrete lined steel restraint frame having an opening of 3000mm high x 3000mm wide.

Gypframe 72C50 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70S50 'C' Studs were positioned at 600mm centres between the channels. The right-hand stud viewed from the unexposed face was not fixed to the test frame and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket.

At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

The framework was clad each side with a double layer of 15mm Gyproc WallBoard. The inner layer of boards was fixed around the perimeter of the board with 32mm Gyproc drywall screws at 300mm centres. The outer layer of boards was fixed around the perimeter of the boards and to intermediate stud positions using 42mm Gyproc drywall screws. All vertical joints were staggered between layers.

The inner layer horizontal joints were positioned at 600mm from the base on both sides of the partition. The outer layer horizontal joints were positioned 2400mm from the base on both sides of the partition. Gypframe GFS1 Fixing Strap was used behind the outer layer horizontal joint.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	96 minutes
Insulation	81 minutes

Applicant: British Gypsum Limited

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 19th February 2007 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

BTC 12078F

A fire resistance test on a British Gypsum GypWall partition clad with a double layer of 15mm Gyproc WallBoard conducted in accordance with BS EN 1364-1: 1999

The specimen was constructed in a concrete lined steel restraint frame having an opening of 5000mm high x 3000mm wide.

Gypframe 72DC60 Standard Flange Floor & Ceiling Channels were fixed to the head and base of the test aperture at 600mm centres with 60mm fire resistant fixings.

Gypframe 70S50 'C' Studs were positioned at 600mm centres between the channels. Each 5000mm length of stud comprised one 3000mm long Gypframe 70S50 and one 2600mm long section, overlapped by 600mm and screw fixed together through each flange using 2 x 13mm Gyproc Wafer Head Drywall Screws.

The right-hand stud viewed from the unexposed face was not fixed to the test frame and the gap between the stud and the frame lining was filled with a 25mm rock mineral fibre gasket. At the left-hand end a Gypframe 70S50 'C' Stud was used to fix the partition to the test frame with 60mm fire resistant fixings at 600mm centres.

The framework was clad each side with a double layer of 15mm Gyproc WallBoard. The inner layer of boards was fixed around the perimeter of the board with 25mm Gyproc drywall screws at 300mm centres. The outer layer of boards was fixed around the perimeter of the boards and to intermediate stud positions using 42mm Gyproc drywall screws. All vertical joints were staggered between layers.

The inner layer horizontal joints were positioned at 2400mm from the base on both sides of the partition. The outer layer horizontal joints were positioned 3000mm from the base on both sides of the partition. Gypframe GFS1 Fixing Strap was used behind the outer layer horizontal joint.

All joints were finished using Gyproc Joint Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The tested construction achieved the following results:

Integrity	88 minutes
Insulation	80 minutes

The test was carried out in accordance with BS EN 1364-1: 1999. The test was carried out on the 22nd May 2002 at The Building Test Centre. The test was carried out on behalf of British Gypsum Limited.

DISCUSSION

With non-loadbearing metal frame partition constructions, the duration of fire performance is governed by the level of protection offered by the exposed face linings and the support provided to these linings by the steel framework and fixings.

The constructions detailed under DETAILS OF THE REQUEST are a combination of the linings on the partition systems BTC 14869F and BTC 13708F described above. To determine whether the system would achieve the required fire resistance performance test evidence from both tests needs to be examined.

The duration of fire performance is dependent upon the ability of the exposed linings to remain in position. The exposed observations from BTC 14869F show sections of the outer layer board fell after 42 minutes and sections of the inner exposed face layer fell after 48 minutes. The exposed face observations from BTC 13708F show sections of the exposed face only fell after 75 minutes; 13 minutes after insulation failure was recorded.

The difference in board fall times indicates that the double layer combination of 15mm Gyproc WallBoard and 12.5mm Glasroc Rigidur H has a lower fire resistance performance compared to a single layer of 15mm Gyproc DuraLine. Therefore, the more onerous direction for the proposed construction detailed under the DETAILS OF THE REQUEST would be with the double layer on the exposed face.

The linings must also prevent heat transfer through the partition so the thermal conductivity of the linings must also be considered to ensure the above assumption is correct.

By comparing the internal stud temperatures from both tests it is possible to determine the thermal conductivity and validate the above assumption. The stud temperatures were measured at mid height and on the flange nearer the exposed face, the web and the flange nearer the unexposed face.

The stud temperatures recorded in BTC 13708F were higher than those measured in BTC 14869F up to 50 minutes (8 minutes after board fall was observed), which suggests the above assumption is not true. But when more of the boards fell away the internal thermocouples in BTC 14869F suddenly increased to temperatures greater than 800°C whereas it took a further 25 minutes for the same temperatures to be recorded by the internal thermocouples in BTC 13708F.

By taking into consideration the board fall times and internal thermocouple measurements it can be concluded that the more onerous direction of testing is with the double layer on the exposed face. Therefore the same fire resistance performance can only be claimed for tests conducted in the other direction, e.g. with 15mm Gyproc DuraLine on the exposed face.

To determine the unexposed face temperature had not exceeded a rise of 180°C at 30 minutes, the temperatures of the unexposed face flange from BTC 14869F and BTC 13708F were compared to the temperature recorded on the unexposed face for the opposite board lining, e.g. the unexposed face temperature recorded in BTC 13708F was found for the unexposed flange temperature measured in BTC 14869F.

After 30 minutes the unexposed flange temperature for BTC 14869F was 94°C, this corresponds to an unexposed face temperature of 53°C for BTC 13708F. Similarly for BTC 13708F the unexposed flange temperature was 219°C which corresponds to 51°C on the unexposed face of BTC 14869F.

Therefore it can be concluded that if the constructions detailed under DETAILS OF THE REQUEST were tested in accordance with BS EN 1364-1: 1999 from either direction the partitions would satisfy the 30 minutes fire resistance requirement.

System 2 detailed under DETAILS OF THE REQUEST includes 50mm Isover Acoustic Partition Roll in the cavity. BTC 12728F and BTC 12729F describe fire resistance tests on similar constructions with and without insulation positioned in the cavity. By comparing the fire resistance performances of the two partitions – 64 minutes vs. 67 minutes respectively - the test evidence shows the inclusion of the insulation material had no detrimental effect. Therefore 30 minutes fire resistance performance would still be achieved with the inclusion of 50mm Isover Acoustic Partition Roll in the cavity.

Both constructions detailed under the DETAILS OF THE REQUEST have a fire height of 4200mm for a fire resistance rating of 30 minutes. To determine if the combination of board types and number of board layers would affect the required fire height, comparisons have to be made with similar performing partitions tested either at or beyond the required fire height.

A single layer partition lined with 15mm Gyproc DuraLine was fire tested at a height of 4200mm (BTC 13769F refers). The partition achieved 63 minutes, thus the same height can be claimed for 30 minutes fire resistance.

BTC 14869F is comparable to BTC 15041F in terms of fire resistance performance (82 minutes vs. 81 minutes), measured deflection (up to 30 minutes) and construction. Additionally the same construction as BTC 15041F has been tested at an extended height of 5000mm and achieved 80 minutes – BTC 12078F refers. Therefore it can be assumed that a partition lined with the same board specification as BTC 14869F would achieve 30 minutes fire resistance at a height of 4200mm.

From the above discussions it can be concluded that the constructions proposed under DETAILS OF THE REQUEST would achieve a fire resistance performance of 30 minutes at a height of 4200mm when tested in accordance with BS EN 1364-1: 1999.

CONCLUSION

In view of the foregoing evidence, it is our opinion that if the constructions described under DETAILS OF THE REQUEST were subjected to fire resistance testing, in accordance with BS EN 1364-1: 1999, they would provide the following periods of fire:

Integrity:	**30 minutes**
Insulation:	**30 minutes**

LIMITATIONS

This assessment addresses itself solely to the ability of the partition system described to satisfy the criteria of the fire resistance test and does not imply any suitability for use with respect to other unspecified criteria.

This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available to the assessing authority the assessment will be unconditionally withdrawn and the applicant will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. The assessment is valid initially for a period of five years after which time it is recommended that it be submitted to the assessing authority for re-appraisal. The opinions and interpretations expressed in this assessment are outside the scope of UKAS accreditation.

DECLARATION BY THE APPLICANT

We the undersigned confirm that we have read and complied with the obligations placed on us by FTSG Resolution No. 82.

We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which this assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be subjected to a fire test to the Standard against which this assessment is being made.

We are not aware of any information that could adversely affect the conclusion of this assessment.

If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

Signed: ..... Print Name .....

For and behalf of British Gypsum Limited.

AUTHORITY FOR USE OF TEST EVIDENCE

Test Report Numbers: BTC 12728F, BTC 12729F, BTC 13708F, BTC 13769F, BTC 14869F, BTC 15041F and BTC 12078F

We the undersigned agree to the above Test Reports being used as supporting evidence for the following assessment:

A FIRE TEST ASSESSMENT ON A BRITISH GYPSUM GYPWALL ROBUST / EXTREME HYBRID PARTITION CLAD WITH A SINGLE LAYER OF 15mm GYPROC DURALINE ON ONE SIDE AND A DOUBLE LAYER OF 15mm GYPROC WALLBOARD AND 12.5mm GLASROC RIGIDUR H ON THE OTHER, CONDUCTED IN ACCORDANCE WITH F.T.S.G. RESOLUTION No. 82 /PFPF GUIDE.

Assessment client: British Gypsum Limited

Signed: ..... Print Name .....

Job Title: .....

Department: .....

For and behalf of **British Gypsum Limited**