OfficeSpec

Office environments

Building Solutions for Active Spaces

THE **WHITE BOOK** Sector Guide series

British Gypsum
PURE INNOVATION

Contents

Office*Spec*

Office*Spec* is part of the British Gypsum *Building Solutions for Active Spaces* range of products and systems, a portfolio of systems developed by British Gypsum to provide architects, specifiers and builders with leading edge solutions and technical information. We are committed to market leading innovations in support of our customer needs. ***Office****Spec* makes specifying for office facilities easier and introduces a range of specifications which has been extensively tested and proven for use in commercial facilities.

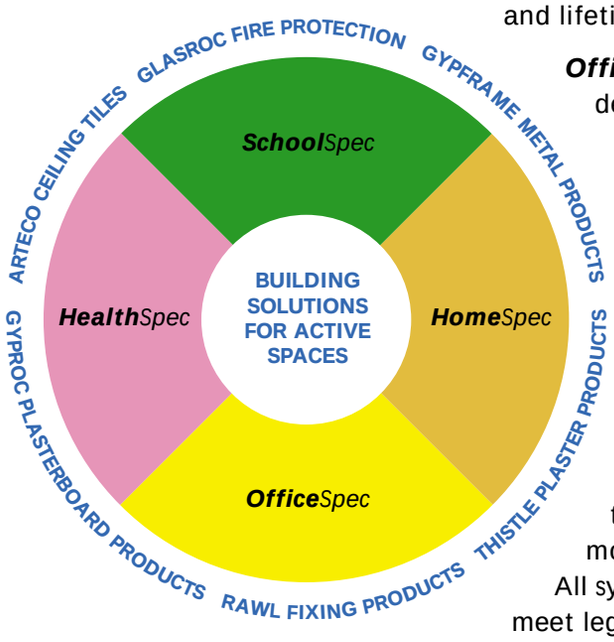
1. Introduction

GYPFRAME METAL PRODUCTS

GYPROC PLASTERBOARD PRODUCTS

Our approach

Office*Spec* is part of a portfolio of British Gypsum *Building Solutions for Active Spaces* which has been created for architects, specifiers, designers and other professionals involved in the provision of office facilities. The guide details the internal elements – partitions, separating walls, linings, floors/ceilings, encasements, etc. – which can be used in specific end-use areas and which impact on the safety and lifetime performance of the building.



Office*Spec* considers the legislative and key design drivers which need to be taken into account in order to specify the appropriate internal element. The requirements for individual elements are fully assessed and specification solutions offered which will match the performance criteria.

British Gypsum products and systems have been fully tested against relevant British and European standards, measuring parameters such as structural performance, fire resistance, acoustics, thermal insulation, impact resistance, moisture resistance and condensation control. All systems are site-proven and engineered to meet legislative and design criteria in the most cost effective way. They are built from established branded products and components – *GYPFRAME, GYPROC, GLASROC, THISTLE, ARTECO and RAWL*.

As market leader and innovator in the industry, British Gypsum has an unrivalled wealth of knowledge and technical know-how. Leading edge technical resources enable the company to provide quality systems backed up by technical support services, system warranties, training and NBS specification clauses. In fact, everything that you need to meet the regulatory performance requirements.

GLASROC FIRE PROTECTION

THISTLE PLASTER PRODUCTS

ARTECO CEILING TILES

RAWL FIXING PRODUCTS

Enhanced working environments

The office of today needs to provide far more than simply workspace. For organisations to retain and get the best from employees, office accommodation needs not only to be highly functional but also to provide a pleasant internal environment. Light, airy open plan areas, office and meeting rooms with good acoustic privacy, welcoming communal facilities, and impressive open reception areas are becoming the norm.

Change, too, is never far away. Office facilities need to be designed for flexibility of use, ease of access and to satisfy current fire safety regulations. PCs, work stations and high speed communication links have to be accommodated and integrated into the internal built environment.

Office*Spec* provides building design guidance to assist specifiers to meet these demands.

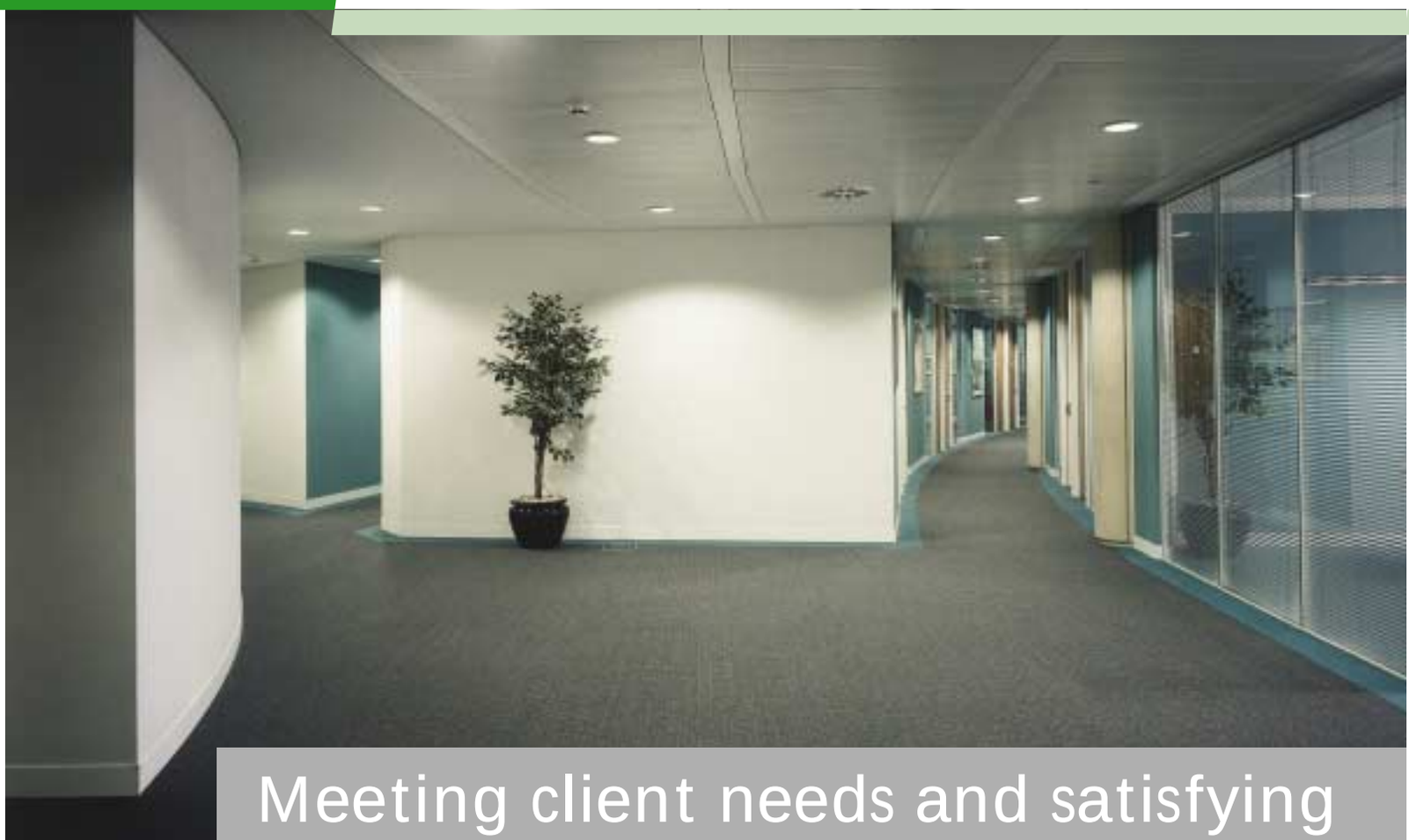
Total solutions

Office*Spec* covers key areas of compartmentation and means of escape in a fire situation, together with the requirement to detail adequate fire-stopping provision. Advice is given for highly visible areas such as atria, where excess height and fire criteria are paramount, and also unseen areas such as service runs and ductwork where stability and fire performance must not be compromised.

Flexibility of internal layout and the ability to extend and upgrade cabling and communication links are pre-requisites in modern offices. British Gypsum **GypWall** solutions are available which offer a cavity width to suit the level of servicing and which will provide the right acoustic conditions for the area of use. By recommending heavy and severe duty **GypWall** partitions, the specifier can detail impact resistant elements to cope with onerous wear and tear, and high traffic conditions.

Suspended ceilings are widely specified in offices. ***Office****Spec* gives guidance on the **Arteco** range of ceiling products including fire-rated **CasoLine MF** concealed grid ceilings as well as decorative/sound absorbing **CasoLine GRID** exposed grid ceilings. Composite wall/suspended ceiling constructions are also considered. British Gypsum system solutions are fully compatible and will accommodate many proprietary solutions, such as factory assembled wash/toilet units, independent plumbing systems and relocatable partition runs.

The total solutions approach ensures that all performance criteria, including aesthetics, life safety, acoustics and durability, can be met.



Meeting client needs and satisfying regulatory requirements

Fire and life safety

Elements of structure

Premature failure of the structure can be prevented by provision for loadbearing elements of structure to have a minimum standard of fire resistance in terms of resistance to collapse or failure of loadbearing capacity. The purpose in providing the structure with fire resistance is threefold, namely:

- to minimise the risk to the occupants, some of whom may have to remain in the building for some time while evacuation proceeds if the building is a large one
- to reduce the risk to fire fighters, who may be engaged on search or rescue operations
- to reduce the danger to people in the vicinity of the building, who might be hurt by falling debris or as a result of the impact of the collapsing structure on other buildings.

Compartmentation

The spread of fire within a building can be restricted by sub-dividing it into compartments separated from one another by walls and/or floors of fire-resisting construction. The object is twofold:

- to prevent rapid fire-spread which could trap occupants in the building
- to reduce the chance of fires becoming large, on the basis that large fires are more dangerous, not only to occupants and fire service personnel, but also to people in the vicinity of the building.

Sub–division is achieved using compartment walls and floors. The building designer also has the option of using sprinklers. Sprinklered

protection means that the building is fitted throughout with an automatic sprinkler system meeting the relevant recommendations of *BS 5306 Fire extinguishing installations and equipment on premises, Part 2, Specification for sprinkler systems*; i.e. the relevant occupancy rating together with the additional requirements for life safety. Some guidance on sprinklered and non-sprinklered systems is given below.

Non-sprinklered
In offices these floors and walls should provide a full 60 minutes fire resistance unless the office has a basement storey more than 10m below ground level, or an upper storey greater than 18m above ground level, in which case 90 minutes fire resistance is required. 30 minutes fire resistance is required if the height of the top floor of the building, or separated part of the building, is not more than 5m above ground (this is increased to a minimum of 60 minutes for compartment walls separating buildings). A building greater than 30m above ground level is not permitted (unless covered by Section 20 Buildings – see page 6).

Sprinklered
In offices these floors and walls should provide a full 60 minutes fire resistance unless the office has a floor more than 18m above ground level in which case 30 minutes fire resistance is required, increased to a minimum of 60 minutes for compartment walls separating buildings. If the building is greater than 30m above ground level the walls and floors should provide 120 minutes fire resistance, reduced to 90 minutes for elements not forming part of the structural frame.

In offices the use of compartment walls and floors is required to be provided in the following circumstances:

- to every floor of the building if it has a floor at a height of more than 30m above ground level
- to the floor of the ground storey if the building has one or more basements
- to the floor of every basement storey except the lowest floor if the basement depth is greater than 10m
- to walls common to two or more buildings
- to walls dividing buildings into separated parts.

In offices there is no limit to the floor area of any one storey in the building or any one storey in a compartment.

Structural fire protection
Structural frames, beams, columns, loadbearing walls (internal and external), floor structures and gallery structures should have at least 60 minutes loadbearing capacity.

The building designer has the option to use sprinklers. Some guidance on sprinklered and non-sprinklered systems is given below.

Non-sprinklered
90 minutes loadbearing capacity is required where a building has a floor at a height above 18m, or a basement 10m or more below ground level. This requirement can be reduced to 60 minutes if the floor is at a height between 5m and 18m above, or the basement not more than 10m below, ground level. 30 minutes fire resistance is acceptable if the floor is at a height of not more than 5m above ground, increased to a minimum of 60 minutes for compartment walls separating buildings. A building greater than 30m above ground level is not permitted (unless covered by Section 20 Buildings – see page 6).

Sprinklered
60 minutes loadbearing capacity is required where a building has a floor between 18m and 30m above ground level. This requirement can be reduced to 30 minutes if the floor is at a height of not more than 18m above ground level, increased to a minimum of 60 minutes for compartment walls separating buildings. If the building is greater than 30m above ground level, the walls, floors and structural frame should provide 120 minutes fire resistance reduced to 90 minutes for elements not forming part of the structural frame.

Escape routes
A general principle to follow when considering facilities for means of escape is that a person confronted by a fire outbreak within a building can turn away from it and make a safe escape.

For most building types it is normally required to protect escape routes with fire resisting walls, ceilings and doors (protected corridors). The measures detailed in Approved Document B1, Section 4, provide means of escape from any point to the storey exit of the floor in question and are intended for guidance on smaller, simpler types of building. The *BS 5588* series of codes give guidance on the needs of larger, more complex or specialised buildings.

Fire-stopping
Services can act as mechanisms of fire spread in buildings. It is therefore essential that adequate provision be made for fire-stopping to maintain the fire integrity of the separating element. If an element that is intended to provide fire separation (and therefore has fire resistance in terms of integrity and insulation) is to be effective, then every joint, or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire-stopping so that the fire resistance is not impaired. By designing service zones through which all services pass, the number

e-mail: BGTechnical.Enquiries@bpb.com

of individual service penetrations can be minimised. Service zones can be sealed after installation of the services using **Glasroc FireStoppers**.

Protected shafts
Openings in floors for stairways, lifts, escalators, and pipes and ducts, which do not comply with the requirements set out previously, should be enclosed in a protected shaft which has the same period of fire resistance (integrity, insulation and, where applicable, loadbearing capacity) as the compartment floor.

The protected shaft should form a complete barrier to fire between the different compartments that the shaft connects and be constructed from materials of limited combustibility. The **ShaftWall** system fulfils this purpose.

Additional protection
Whilst constructing buildings to meet current national Building Regulations makes provision for adequate life safety, passive fire protection can also be used to provide protection to valuable assets and resources.

Section 20 Buildings (London Building Acts (Amendment) Act 1939)
This Act, as amended primarily by the Building (inner London) Regulations 1985, is essentially concerned with the danger arising from fire within certain buildings. Special consideration is necessary by reason of height, cubical extent, and/or use.

Section 20 applies where a building is to be erected with a storey or part of a storey at a greater height than 30m, or 25m if the area of the building exceeds 930m^2.

Recommendations for buildings
- Office buildings should have a fire alarm system that complies with *BS 5839*
- An automatic sprinkler installation in accordance with *BS 5306: Part 2* should be provided throughout all office buildings
- Areas not covered by sprinklers should be provided with a suitable alternative fixed automatic fire extinguishing system in accordance with *BS 5306*
- Office buildings should be provided with hose reels, in accordance with *BS 5306: Part 1* and *BS 5274*, connected to a suitable water supply, and suitable hand fire appliances of approved type, pattern and capacity
- Smoke extraction should be provided from each storey by means of a mechanical smoke extraction system or opening windows
- In buildings controlled by virtue of height, fire fighting shafts equipped with fire fighting stairways, dry (or wet) rising mains and fire fighting lifts, should be provided to serve every storey.

Acoustic requirements

Building acoustics is the science of controlling noise in buildings, including the minimisation of noise transmission from one space to another and the control of noise levels and characteristics within a space.

Noise can be defined as sound which is undesirable. However, the point at which noise becomes obtrusive is very subjective and depends upon the individual.

A better sound environment creates a better working environment. This in turn increases performance. The best defence against noise must be to ensure that proper precautions are taken at the design stage and during construction of a building. This means that the correct acoustic climate must be provided in each space and that noise transmission levels are compatible with usage.

British Gypsum has a range of suspended ceilings and wall linings that can absorb sound and improve the acoustic environment. The products are durable and can be redecorated without affecting their acoustic performance. Acoustic calculations can be made to predict what effect the products will have on the space to assist the selection process.

Ideally, the sound insulation requirements of the building should take into account both internal and external sound transmission. *BS 8233: 1999, Code of Practice - Sound Insulation and Noise Reduction for Buildings*, gives recommendations for the control of noise in and around buildings, and suggests appropriate criteria and limits for different situations.

Other design criteria

At the design stage, consideration should be given to the nature and volume of traffic as defined in *BS 5234*, including crowd pressure and consequent requirements regarding the configuration of circulation routes and corridor and door widths, which if inadequate can be a substantial contributory cause of damage. All **GypWall** partitions are fully tested in accordance with *BS 5234: Part 2* including crowd pressure requirements.

At the design stage, consideration should also be given to the use of durable impact resistant plasterboard linings, such as **Gyproc DuraLine XL** and **Gyproc UltraLine**, buffer rails and corner guards and the necessary provisions for fixing them. **Gyproc Styletrims** also offer impact protection to linings at sensitive areas.

Ensuring a safe, functional building structure

Design of the shell and core in modern commercial office buildings is obviously fundamental to achieving the required internal function and environment. It is also crucial in order to protect life safety and means of escape in the event of a fire. British Gypsum products and systems provide solutions in all key areas of shell and core fabric:

- Protection of structural steelwork using lightweight encasement systems
- Shaftwall and stairwall constructions to provide service-risers and lift shafts
- External wall linings, ceiling and soffit linings
- Support for ductwork, dampers, routing for services and access for maintenance purposes
- Fire-stopping service penetrations to lightweight systems and at junctions with the structure

Fire protection to structural steel

The main purpose of structural fire precautions as required by national Building Regulations is to ensure that, for a reasonable period in the event of a fire, the stability of the building is maintained and the spread of fire and smoke is inhibited. Passive fire protection to structural steelwork can be provided by purpose designed and tested lightweight encasement systems. Up to 120 minute fire protection is required depending on the structural design criteria.

e-mail: BGTechnical.Enquiries@bpb.com

Points to consider

- Sequencing – encasing structural steelwork often proceeds early in the construction phase prior to sealing the external envelope. **Gyproc FireLine** board is available in a moisture resistant grade, **Glasroc FireProtect** has inherent moisture resistance, and **Glasroc FireCase S** claddings are also suitable – if saturated and allowed to dry the **Glasroc FireCase S** boards retain their strength and fire resistance.

- Intersections – the junctions between beams and columns require adequate detailing to maintain the specified levels of fire protection. Fig. 1 shows a junction detail between a **Glasroc FireCase S** column and a **Glasroc FireProtect** beam (refer also to junction details in The White Book 2001, d10).

- Level of fire protection – up to 120 minutes fire resistance can be achieved. Table 1 gives the cladding selector chart for the **FireProtect** system and Table 2 the cladding selector chart for the **FireCase** system. The designer will initially need to ascertain the level of fire resistance required and whether protection is required to 3 or 4 sides. The appropriate A/V factor can be found from tables in The White Book or from other sources. The chart applies to universal beams, columns and joist sections. For castellated sections add 25% to the lining thickness, and scale this up to the next board thickness.
  Note: Solutions are also available for 240 mins fire protection – contact British Gypsum for guidance.

- Oversizing – in instances where the steel section dimensions reduce but where a consistent lining surface is required, the narrower section can be framed out prior to commencement of cladding. Boxing-out of sections to achieve uniform encasements may be required in order to maintain the office module line at doors, windows, etc.

- Junctions – details need careful consideration so as not to compromise the fire resistance of abutting elements. Fig. 2 shows a partition abutment to a **Glasroc FireCase S** column to provide up to 60 minutes fire protection. Fig. 3 shows head and base detailing for the **ShaftWall** system abutting a **Glasroc FireCase S** beam. Direct fixing of fire-rated partitions is possible in certain situations – contact British Gypsum for guidance.

- Splice plates – where column lengths are joined by a splice plate, the encasement needs to accommodate the additional depth. See Fig. 4 for suitable detailing.

- Z bars/flat plate for partitions/ shaftwall head fixings - should be installed prior to commencement of drylining. For off-set fixing suitable detailing will be necessary to fire protect the extended Z bar/flat plate.

Figure 1 Junction between a column clad with Glasroc FireCase S and a beam clad with Glasroc FireProtect

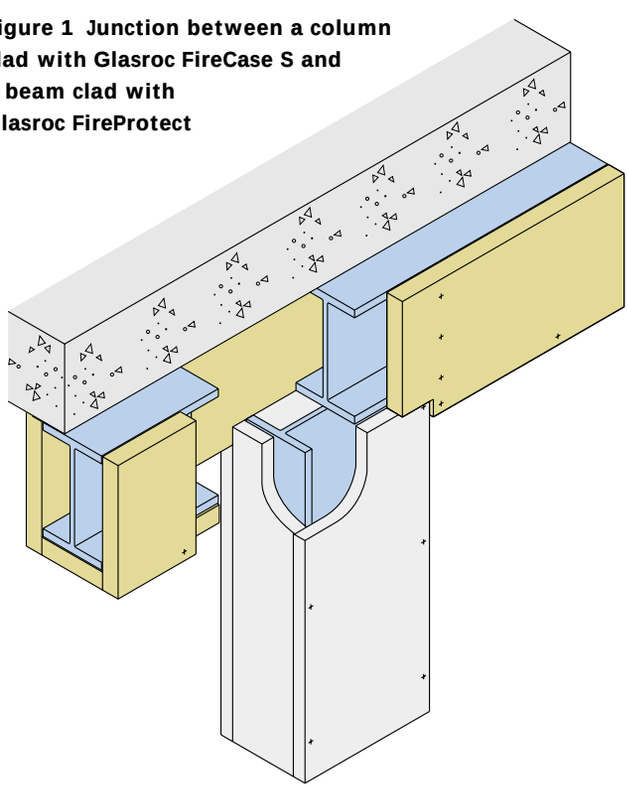


Figure 2 Partition abutment to Glasroc FireCase S column for up to 60 minutes fire resistance

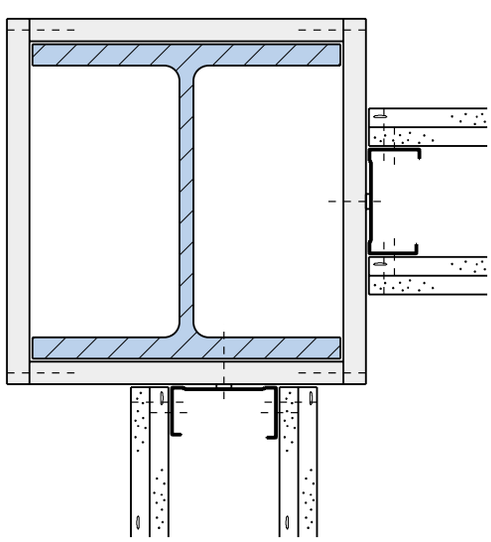


Figure 3 Typical abutment of ShaftWall with a Glasroc FireCase S beam

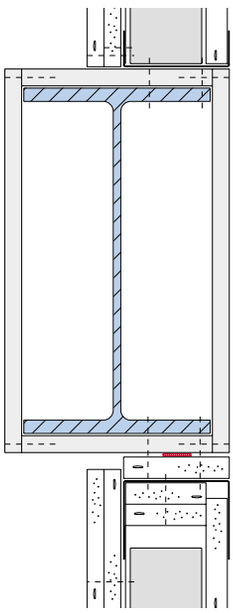
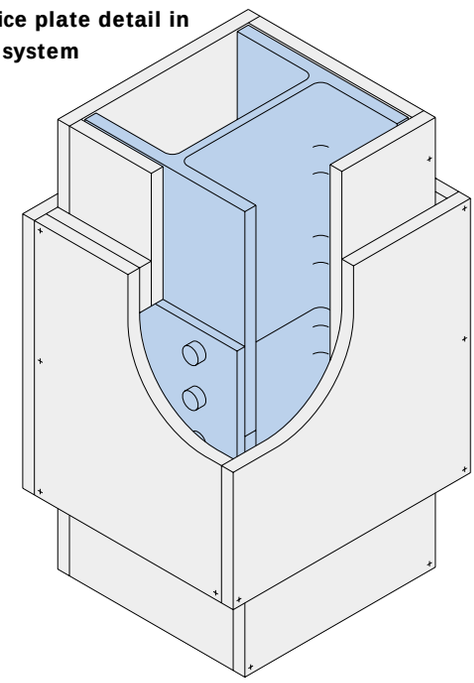
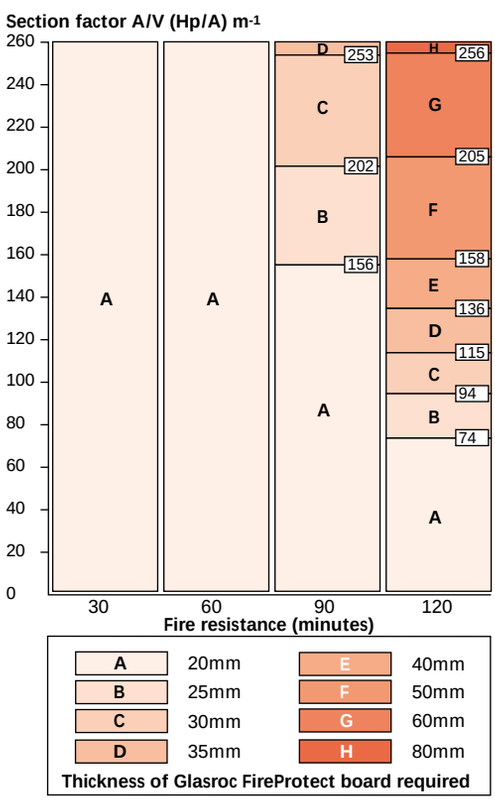


Figure 4 Splice plate detail in the FireCase system



Specification solutions

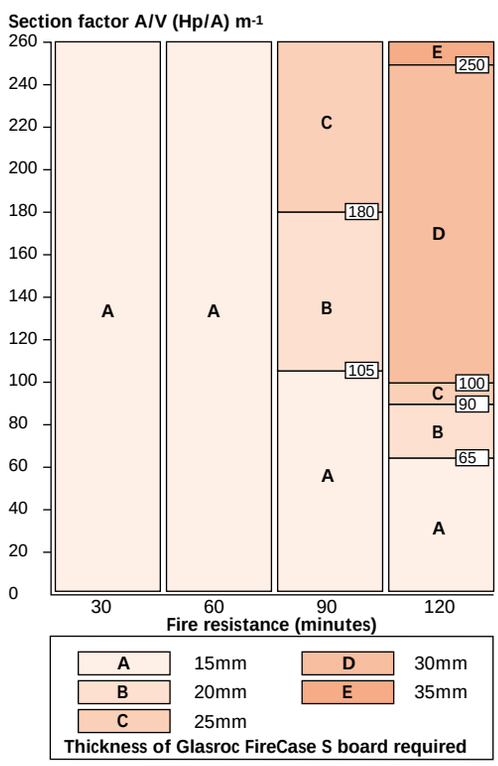
Table 1 Cladding selector chart for the FireProtect system - failure temperature 550ºC



Specification clause: NBS work section K10 with assistance of British Gypsum Specification Guide SG 1096

Substantiation: Report D120010 refers

Table 2 Cladding selector chart for the FireCase system - failure temperature 550ºC



Specification clause: NBS work section K10 with assistance of British Gypsum Specification Guide SG 1095

Substantiation: Report D120001 (screwed system) and D120002 (stapled system) refer

e-mail: BGTechnical.Enquiries@bpb.com

Service risers, lift shafts and stairwells

In addition to specific periods of fire resistance as determined in national Building Regulations, lift shafts are required to be pressurised in order to keep smoke out. Also, high speed lifts will create positive and negative pressure levels within the shaft. The British Gypsum **ShaftWall** system can be readily sealed during installation to meet these requirements.

The system specification will depend on the level of fire resistance required and the limiting height at the stated air pressure. Refer to The White Book, a30, for specification solutions.

Points to consider

- Sequencing – shafts and stairwells are often constructed early in the construction phase prior to sealing the external envelope. **Gyproc FireLine** board is available in a moisture resistant grade and **Gyproc Core Board** has inherent moisture resistance.
- Fire fighting shafts – the **ShaftWall** system meets the requirements set out in *BS 5588 Fire precautions in the design, construction and use of buildings: Part 5 - Code of Practice for firefighting shafts and lifts* by virtue of its severe duty rating and moisture resistant properties.
- Rationalisation of framing – the **ShaftWall** system is available in 60, 70, 92 and 146mm framing widths, which facilitates achieving uniformity with partition and wall framing on site.
- Acoustics – high sound insulation levels are possible, which can be further enhanced using abutting partitions of **Gypframe AcouStud**, **Gypframe Resilient Bar**, **GypWall STAGGERED** and **GypWall AUDIO** twin frame walls clad with **Gyproc SoundBloc**, with Isowool insulation in the stud cavity.
- Movement joints – these can be accommodated in the lining with appropriate detailing. As an alternative to cover strips, a cosmetic lining can be fixed to provide a consistent, uniform surface.
- Construction flexibility – the **ShaftWall** system is a flexible solution which is built from one side only. It can be used to protect plant in-situ as well as for shaft and stairwall applications.
- Lift doors – Metsec roll formed steel stud and channel sections can be used to strengthen lift door framing – contact British Gypsum or Metsec (Tel: 0121 601 6000) for guidance.
- Airshafts and service ducts – the use of pressure conditions in various types of shafts/ducts requires that the boards should be sealed into the framing members using **Gyproc Sealant** in addition to the normal sealing of the framing to adjoining structure. It is essential that these areas are identified at a very early stage of the contract and that other trades are instructed to recognise the need for application of sealant and its replacement if subsequently damaged or removed. In order to maintain the integrity of the pressurised system, **Gyproc Sealant** should be specified for all board-to-board or board-to-metal applications, including the sealing of **Gyproc Core Board** to the framing.

Specification solutions

Refer to The White Book, a30

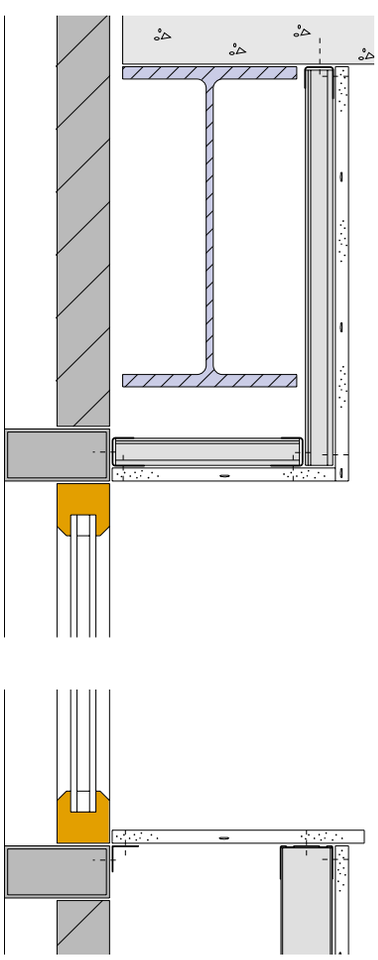
Linings to external walls

British Gypsum **GypLyner** wall lining systems provide sound and thermal insulation performance. They can also meet specific fire resistance requirements, i.e. protection to steel columns in association with profiled steel external cladding.

Points to consider

- Continuous glazing – runs of glazing can be accommodated between the wall lining and bulkhead (see Fig. 5)

Figure 5 CasoLine MF bulkhead and GypLyner IWL wall lining to accommodate continuous glazing



- Rationalisation of framing – **GypLyner IWL** is available in 48, 60, 70, 92 and 146mm I stud framing, which facilitates achieving uniformity with associated metal framed systems.
- Floor space – where the available floor area needs to be maximised, such as for calculation of rentable value, the use of **Gyproc Styletrim** Skirting will provide a recessed skirting to minimise intrusion into the floor area (see Fig. 6). If fire resistance is a requirement, however, careful detailing will be required to maintain performance. Possible solutions are to back the skirting lining with **Glasroc FS FireBarrier** or rock mineral wool. Contact British Gypsum for guidance.
- Concrete staircases – lining with the **GypLyner** system will maximise the available space since the framing can be tied back tight to the structure. Fixing Channel provides a means of fixing hand rails with **Gypframe** GL2 brackets being positioned close to the hand rail mountings.

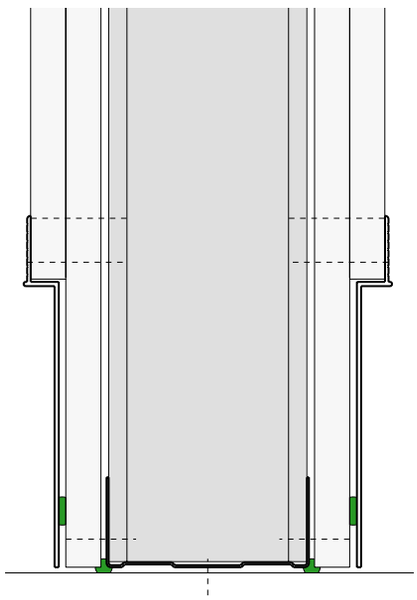
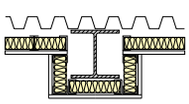


Figure 6 Recessed Gyproc Styletrim Skirting BGM 107 fixed in a GypWall partition.

Note: If the partition is fire-rated consideration must be given to maintaining the specified period of fire resistance.

Specification solutions

Table 3 British Gypsum linings to structural steel columns in association with external sheet steel cladding[1]



Specification: Single or double layer board to one side of Gypframe I Stud framework[4] and 50mm Isowool High Performance Slabs, forming an independent wall to structural steel columns in association with external steel cladding.

Lining (incorporating Isowool 2405 insulation and Gypframe I Studs)	Approx. weight Kg/m²	Fire resistance[3] mins integrity	insulation[2]	Duty rating	Performance substantiation report
2 x 12.5mm Gyproc Wallboard	20	30	30	Severe	B216003
2 x 15mm Gyproc Wallboard	23	30	30	Severe	B216004
12.5mm Gyproc FireLine	12	60	30	Medium	B216025
15mm Gyproc FireLine	14	60	30	Heavy	B216026
15mm Gyproc UltraLine	15	60	30	Severe	B216500
2 x 12.5mm Gyproc FireLine	21	90	60	Severe	B216027
2 x 15mm Gyproc FireLine	26	90	60	Severe	B216028

Notes

1 The fire resistances apply to external walls, whose construction incorporates structural steel sections with a profiled steel cladding, when the inside of the wall is exposed to fire. The figures quoted are for imperforate walls incorporating tapered edge boards with all joints taped and filled according to British Gypsum's recommendations.

2 Where the external wall is more than 1m from the boundary, Building Regulations allow relaxation of the provision for insulation to 15 minutes in certain circumstances.

3 The figures quoted relate to the complete wall structure including the external cladding. The lining offers fire protection to steel columns up to section factor 260m^{-1}. Refer to the data below.

4 Heights up to 7200mm are possible. Refer to The White Book, b21, Maximum heights table.

Fire protection to structural steel

Boards	Lining thickness mm	Fire resistance[5] mins	Sector factor A/V (Hp/A) m^{-1}
Gyproc Wallboard	2 x 12.5	30	Up to 260
Gyproc FireLine	1 x 12.5	30	Up to 260
Gyproc FireLine	1x 12.5	60	Up to 55
Gyproc FireLine	1 x 15	60	Up to 195
Gyproc UltraLine	1 x 15	60	Up to 195
Gyproc Wallboard	2 x 15	60	Up to 260
Gyproc FireLine	2 x 12.5 2 x 15	90 90	Up to 200 Up to 260
Gyproc FireLine	2 x 15	120	Up to 110

5 Based on four sided profile exposure. Protection is afforded to universal column sections as described in *BS 4: Part 1: 1980*.

e-mail: BGTechnical.Enquiries@bpb.com

Ceilings and soffit linings

British Gypsum seamless suspended ceiling systems provide fire-rated ceilings to protect steel beams supporting concrete floors. The ceilings provide up to 120 minutes fire resistance and a level of loading is permissible depending on the board type and framing centres. Refer to The White Book, c10, for specific data on **CasoLine MF**. Where there is high humidity of up to 90% RH in heated buildings, **CasoLine GRID** can be specified. Above 90% RH or in aggressive atmospheric conditions, a fully protected polyester coated non-corrosive system is available. **Arteco Casotec** tiles are suitable for use in conditions up to 100% RH at 28ºC.

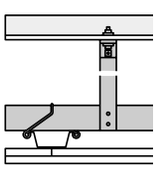
Office developments in towns and cities often include basement car parks which require a durable soffit lining. **Gyproc Multi-Board** forms a basic lining and **Glasroc SoffitLine** provides a thermal lining. Both linings have inherent moisture resistance, are non-combustible and are suitable for use in semi-exposed situations.

Points to consider

- Suspended ceilings – various board and insulation options are available to give the required fire and acoustic performance. Published loading data is based on a limiting deflection of L/400.
- Soffit linings – can be decorated or left as natural surface finish.
- Signage – direction signs can be fixed either through soffit linings directly into the structure (using appropriate fixings) or alternatively into secondary support framing.
- Lighting – car parks are often poorly lit but the good light reflectance of British Gypsum soffit linings will improve the lit environment.

Specification solutions

Table 4 CasoLine MF ceilings providing fire protection to steel beams supporting a concrete floor

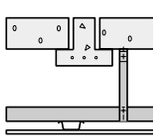


Specification: Fire protection to steel beams[1] supporting concrete floors.

Ceiling Boards	Approx weight kg/m²	MF5 support centres mm	MF7 support centres mm	Fire resistance minutes	Performance substantiation report
Two layers of 12.5mm Gyproc Wallboard	18	450	1200	30	C100013
One layer of 12.5mm Gyproc Fireline	11	450	1200	60	C100014
Two layers of 15mm Gyproc Fireline	25	450	900	120	C100015

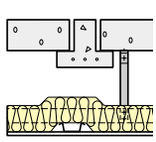
1 Concrete floors as described in *BS 476: Part 23: 1987*. The steel beams subjected to test had a section factor A/V (Hp/A) of 205m^{-1} calculated on the basis of three sided profiled exposure. The suspended ceiling will also provide adequate protection to steel beams with a lower section factor. For beams with a higher section factor, contact British Gypsum for guidance.

Table 5 CasoLine MF ceiling providing sound insulation to concrete floors[1]



Specification: CasoLine MF ceiling hung underneath basic floor to give 240mm cavity.

Ceiling Boards[2]	Approx weight kg/m²	Floor depth mm	Lab sound (100-3150 Hz) airborne R_wdB	impact L_{nw}dB	Performance substantiation report
One layer of 12.5mm Gyproc Wallboard	10	363	56	68	C100016
Two layers of 12.5mm Gyproc Wallboard	19	376	58	66	C100017



Specification: CasoLine MF ceiling hung underneath basic floor to give 240mm cavity, with 80mm Isowool General Purpose Roll (1000) in cavity.

Ceiling Boards[2]	Approx weight kg/m²	Floor depth mm	Lab sound (100-3150 Hz) airborne R_wdB	impact L_{nw}dB	Performance substantiation report
One layer of 12.5mm Gyproc SoundBloc	13	363	61	60	C100018
Two layers of 12.5mm Gyproc SoundBloc	23	376	64	57	C100019

1 Normal fixing centres for MF5s and MF7s (450 and 1200mm respectively).

2 Other Gyproc board specifications are available. Contact British Gypsum for guidance.

Services support and access for maintenance

Whilst ducts and dampers are normally supported from the structure, in many circumstances support for the damper can be provided from the partition or shaftwall. Specific guidance is given here. With regard to services, generally architects and specifiers are becoming more concerned about their location and access. There is increased enforcement by Building Control, and a tougher line being adopted by Insurers to establish that the building element, including penetrations such as access panels, will meet the performance criteria. The **Gyproc Profilex** range of access panels has been designed and tested for use in British Gypsum metal framed drylined systems.

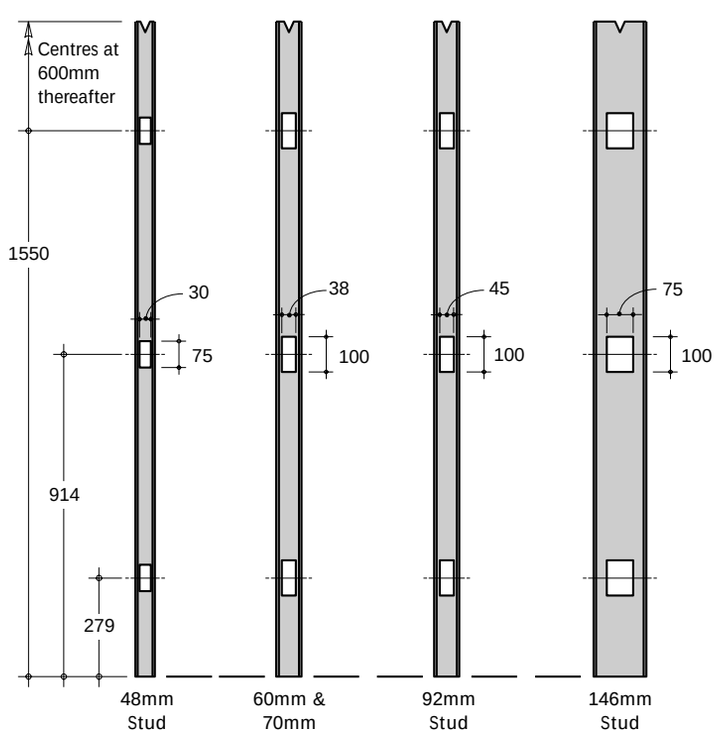
Points to consider

- Damper support – fire tests have been successfully carried out on an Advanced Air 1475mm x 1200mm damper weighing 57.7kg, supported by a **GypWall** partition and also by **ShaftWall**. A British Gypsum test report and BRE Assessment refer. Contact British Gypsum for guidance.
- Sequencing – the installation of services, linings and fire-stopping needs to be properly planned with co-ordination between associated trades. Openings in linings for service penetrations can be framed out at the time of lining installation and all fire-stopping carried out in one operation.
- Stud cut-outs – studs include cut-outs of pre-determined centres to facilitate the inclusion of small service runs. Refer to Fig.7.
- Access panel selection – **Gyproc Profilex** access panels form a complete range of fire and non-fire rated panels for use in British Gypsum framed systems. Refer to The White Book, r70, for details of the range.

Specification solutions

Refer to The White Book, f15.

Figure 7 Service cut-outs (all dimensions in mm)



Factory assembled units/pre-installations

In large office developments, toilet and wash facilities are often grouped together. Due to the nature of these facilities and the requirement for plumbing and mounting heavy sanitary ware, it is often more cost-effective to install factory assembled units directly into the building.

Points to consider

- Ceramic tiling – partitions and walls are generally tiled for hygiene and ease of maintenance. **Gyproc** moisture resistant boards are recommended for intermittent moisture conditions.
- Services – where there is a high level of service installation, twin-frame partition specifications such as **GypWall AUDIO** provide additional cavity width. The use of this wall with pre-plumbing will minimise noise generation.

Specification solutions

Ceramic tiling – refer to The White Book, n20.

Twin frame partition – refer to The White Book, a32.

Fire-stopping

Effective fire-stopping is essential if individual office building elements and junctions are to meet the specified levels of fire protection. British Gypsum offers a dedicated range of **Glasroc FireStoppers** products, specifically designed and tested for use with plasterboard systems, to seal service penetrations and construction gaps.

Until recently there has been no dedicated standard in the UK covering fire resistance testing of penetrations or sealing within drywall systems. The draft European Standard prEN1366-3 specifically covers fire-stopping in drywall systems. All **Glasroc FireStoppers** are tested utilising this standard. **Glasroc FireStoppers** provide cost-effective fire-stopping solutions and are fully substantiated for up to 120 minutes fire resistance.

Points to consider

- Sequencing – fire-stopping operations should be properly co-ordinated with drylining and service installation trades. The location and routing of all service penetrations should be fully pre-planned and the requirements for framed openings in lining systems fully considered.
- Fire-resistance – individual elements of construction will only meet their specified levels of performance if junctions are properly detailed and gaps sealed. Penetration of services requires the use of proprietary fire-stopping systems. **Glasroc FireStopppers** are purpose designed and fully tested for use in drywall systems. Some typical service penetration details are shown in Figures 8, 9 and 10.
- Deflection – the designer needs to consider partition deflection requirements in relation to associated structure. It may be, for instance, that the floor slab has already taken up the dead load deflection prior to installing partitions. **GypWall** partitions can accommodate + and – deflections with suitable head detailing. Since deflection provision represents a significant on-cost, the requirements in practice need to be assessed critically.

Specification solutions

Refer to The White Book, k10, for fire-stopping solutions providing up to 120 minutes fire resistance.

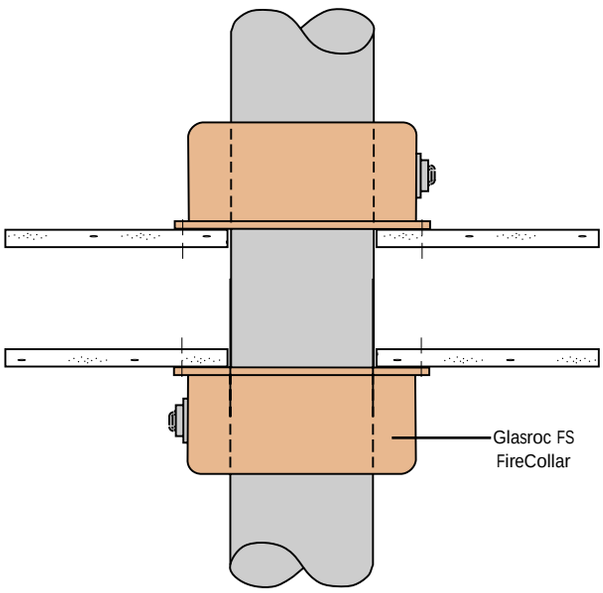


Figure 8 uPVC combustible pipe penetration fitted with Glasroc FS FireCollar

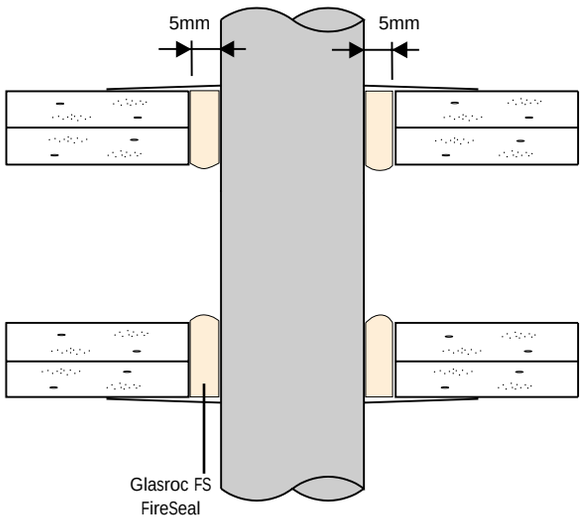


Figure 9 Steel pipe penetration

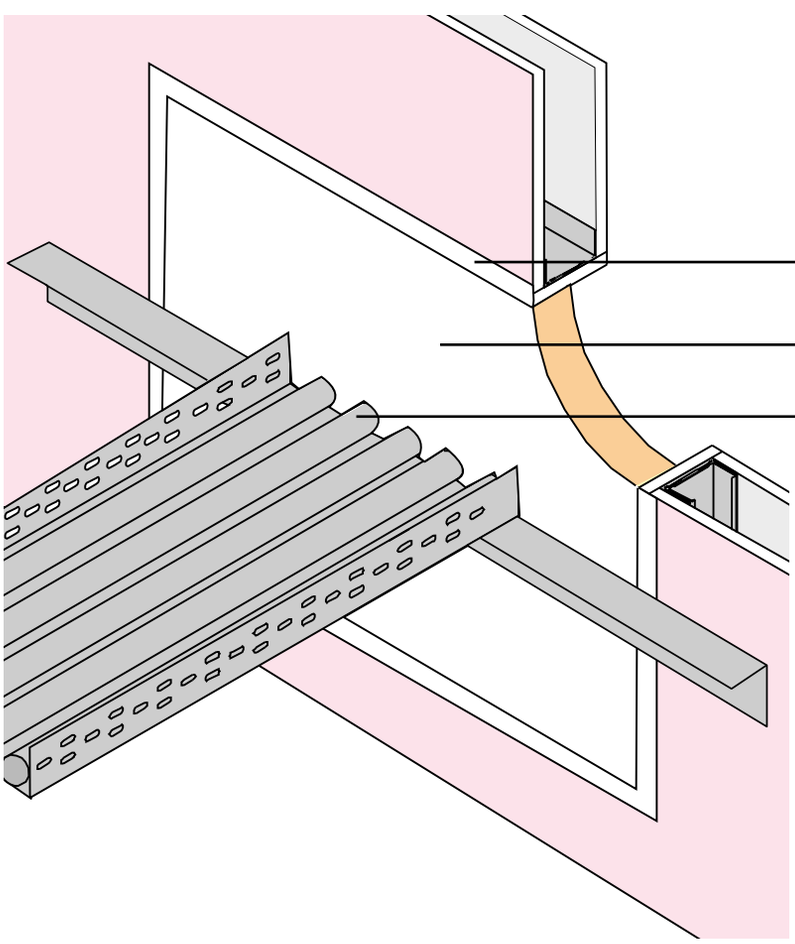


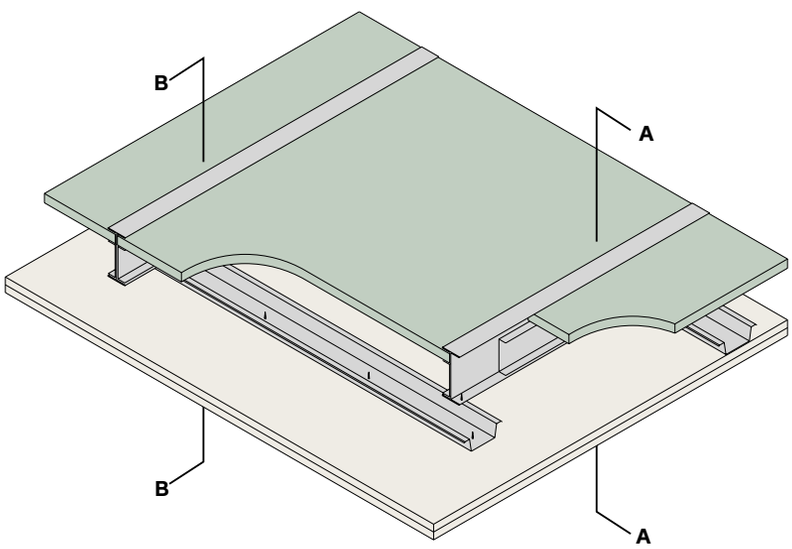
Figure 10 Cable tray and trunking - 120 minutes fire resistance

Achieving the right internal environment

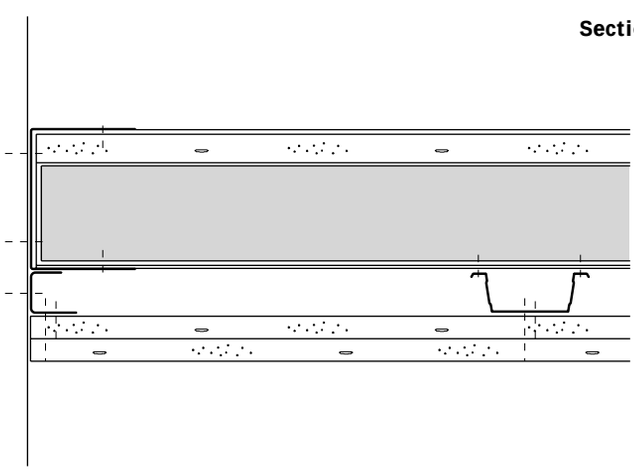
The internal fit-out stage is critical if client needs are to be met whilst at the same time satisfying Building Regulation and related requirements. Close attention to detailing of British Gypsum systems forming the internal building elements is thus a pre-requisite.

- Corridors to facilitate access and ensure adequate means of escape
- Partitions for both space division and to meet performance criteria
- Openings for standard and heavy duty doorsets
- Concealed grid and exposed grid suspended ceilings
- Finishing options

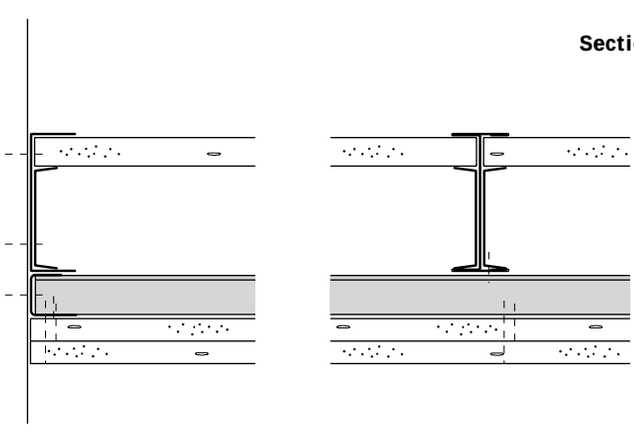
Figure 11 Fire-rated 'cap' or 'lid' for use in escape corridors, formed using ShaftWall and CasoLine MF ceiling components



Section A-A



Section B-B



Corridors

Corridors require particular attention to detail in order to satisfy means of escape criteria in the event of a fire. The corridor walls in combination with the suspended ceiling will need to provide adequate sound insulation performance to individual offices and rooms depending on their classification and usage. High traffic thoroughfares will need linings that give the required degree of durability. The use of **GypWall ROBUST** provides a high impact resistant partition which is capable of achieving high levels of sound insulation. It is ideal for corridor applications in association with a **Gyptone plank** ceiling. Where curved linings are required **GypWall CURVE** and **CasoLine CURVE** provide cost-effective solutions.

Points to consider

- Means of escape – to meet the requirements of Approved Document B, Fire Safety, special provisions will be necessary. One solution not covered in the regulations is the use of a fire-resistant ceiling element to form a fire 'cap' or 'lid'. **ShaftWall** and **CasoLine MF** ceiling system can be detailed to form a suitable solution (see Fig. 11).

- Impact resistance – **GypWall ROBUST** provides a heavy duty partition with high impact resistant linings offering up to R_w51dB sound insulation (see Table 6, page 19).
- Access doors/multiple glazing – banks of doors up to 3m total width can be accommodated in the partition, with suitable detailing, to allow access to complex or multiple services. Runs up to 3m of heavily glazed proprietary partition units can also be accommodated.
- Corridor span – if **Gyptone plank** is used as the ceiling lining the maximum free span is 2.1m giving excellent access to services for maintenance purposes. If the corridor span exceeds this dimension, margin details can be formed either side of the corridor using the **CasoLine MF** system (see Fig. 12).

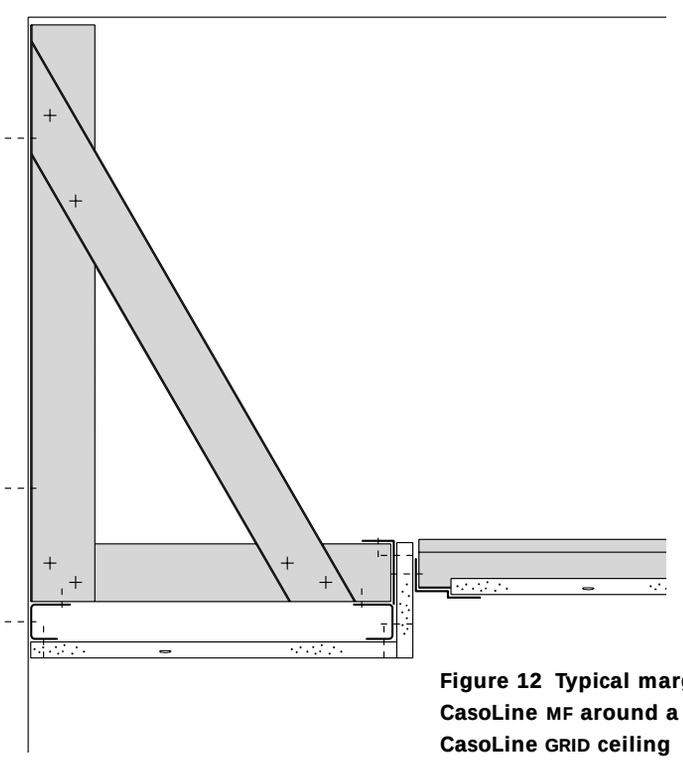


Figure 12 Typical margin of CasoLine MF around a decorative CasoLine GRID ceiling

- Corridor corners – detailing is available from British Gypsum to suit. Typical details for **CasoLine GRID** ceiling interceptions are shown in Fig. 13.
- Ceiling performance – **Gyptone** ceilings provide sound insulation and sound absorption, and can be fixed either in an exposed or concealed grid (**CasoLine GRID** and **CasoLine MF** respectively).
- Curved linings – **GypWall CURVE** and **CasoLine CURVE** facilitate curved linings by utilising pre-formed curved framing and board options to allow bending to specific radii.

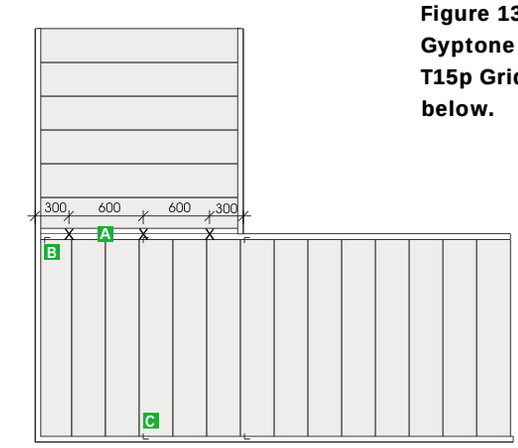
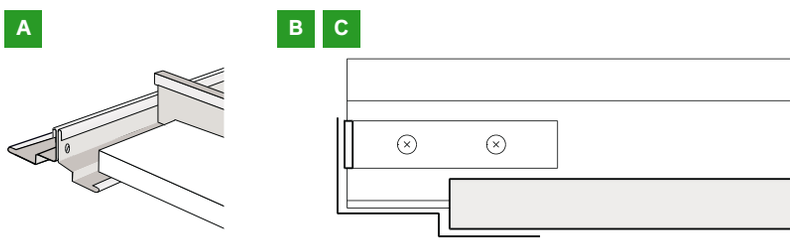


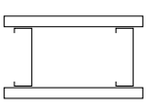
Figure 13 Corridor corners - Gyptone plank laid in Gypframe T15p Grid. See Details A & B C below.



Specification solutions

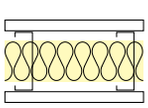
Refer also to The White Book - c12 **CasoLine GRID**, - a20.1 **GypWall CURVE**.

Table 6 GypWall ROBUST performance data



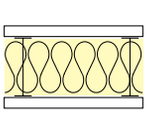
Specification: Basic partition with 13mm Gyproc DuraLine XL each side of Gypframe 70 S 70 studs at 600mm centres

Nominal overall thickness	Approx weight kg/m²	Recommended max. height[1] mm	Fire resistance minutes	Lab sound insulation 100-3150 Hz R_wdB	Partition duty	Performance substantiation report
98	24	4000	30	41	Heavy	Q606025



Specification: As basic partition with 50mm Isowool Acoustic Partition Roll (1200) in the cavity

Nominal overall thickness	Approx weight kg/m²	Recommended max. height[1] mm	Fire resistance minutes	Lab sound insulation 100-3150 Hz R_wdB	Partition duty	Performance substantiation report
98	25	4000	60	48	Heavy	Q606027



Specification: As basic partition with 75mm Isowool High Performance Slab (2405) in the cavity

Nominal overall thickness	Approx weight kg/m²	Recommended max. height mm	Fire resistance minutes	Lab sound insulation 100-3150 Hz R_wdB	Partition duty	Performance substantiation report
98	26	4200	60	51	Heavy	Q606036

1 Maximum height is increased to 4200mm where 70 I 50 studs are used in place of 70 S 70. If greater heights are required, consult British Gypsum.

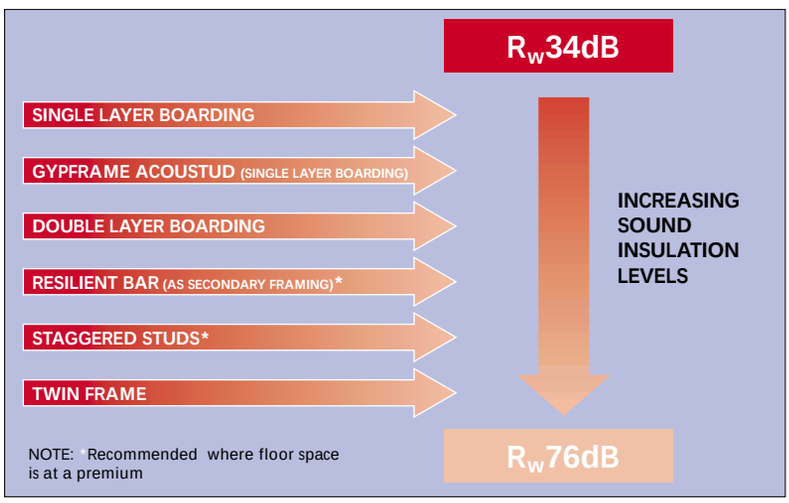


Figure 14 Acoustic performance

Partitions

Fit-out partitions are normally for space division and are therefore not fire-rated. However, where fire resistance is required in specific circumstances such as compartment walls, solutions are available providing up to 120 minutes protection. **GypWall** partitions will also satisfy the acoustic, impact resistance and zoning requirements. Generally acoustic performance is dependent on the lining and framing options as illustrated in Fig. 14.

Points to consider

- Maximising acoustic separation – for optimum performance best practice is to run partitions through to the structural soffit. Where this is not feasible an acceptable result may still be possible subject to standards of construction on site. Fig. 15 shows stages of sound insulation improvement for a composite partition/suspended ceiling construction with (d) being the best practice solution. Test results on a composite **GypWall/CasoLine MF** ceiling construction are given in Table 7.
- Floor space – where available floor area needs to be maximised, such as for calculation of rentable value, the use of **Gyproc Styletrim** Skirting will minimise intrusion into the floor area. Refer to 'Linings to external walls' earlier.
- Raised access floors – door openings above access floors need careful detailing in order to maintain fire and acoustic performance levels. The floor directly underneath the door opening must be adequately supported in order to cater for the additional loading to the floor. The partitions should sub-divide the access floor and be fixed to the floor structure to avoid compromising the room to room acoustic performance.
- Area of use – partitions need to be specified taking account of the acoustic demands of the specific area of use, i.e. private offices, executive offices, open plan offices, meeting rooms, conference centres, break-out areas, call centres, atria and circulation spaces. Refer to *BS 8233 Sound insulation and noise reduction for buildings*. Generally, however, it will be necessary to consider the

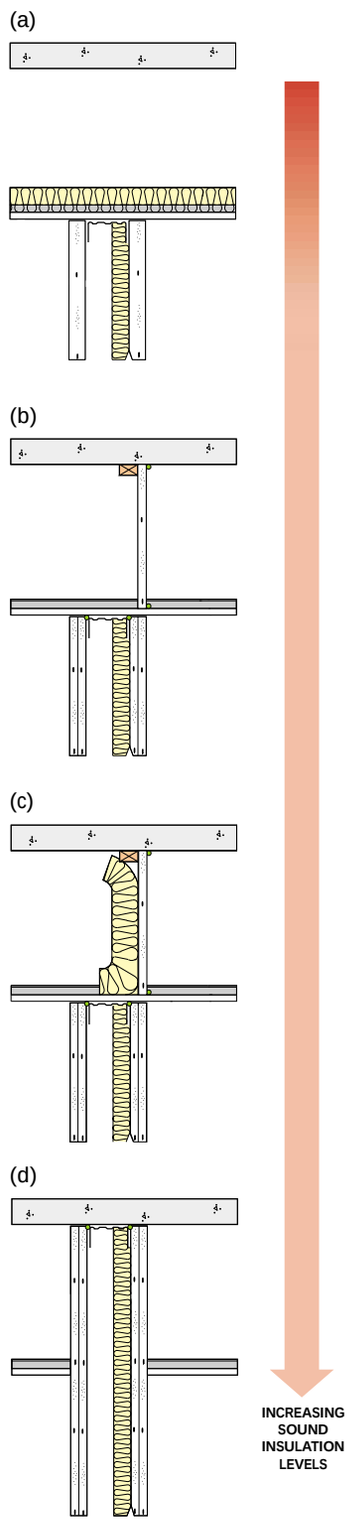
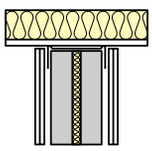


Figure 15 Stages of sound insulation improvement for an acoustic suspended ceiling/partition construction

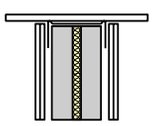
Table 7 Sound insulation of composite partition/suspended ceiling construction

GypWall / CasoLine MF ceiling



Partition construction: 70mm Gypframe studs at 600mm centres. 25mm Isowool 1200 in cavity. Two layers of 12.5mm Gyproc SoundBloc each side. Sound insulation R_w = 52dB

Suspended ceiling construction	Weighted standardised level difference (D_{ntw})	Performance substantiation report number
Double layer 12.5mm Gyproc Wallboard. 80mm Isowool General Purpose Roll (1000) on back.	45	C10J009
Single layer 12.5mm Gyproc Wallboard. 80mm Isowool General Purpose Roll (1000) on back.	45	C10J010



Partition construction: 70mm Gypframe studs at 600mm centres. 25mm Isowool 1200 in cavity. Two layers of 12.5mm Gyproc SoundBloc each side. Sound insulation R_w = 52dB

Suspended ceiling construction	Weighted standardised level difference (D_{ntw})	Performance substantiation report number
Double layer 12.5mm Gyproc Wallboard.	44	C10J011
Single layer 12.5mm Gyproc Wallboard.	45	C10J012

acoustic environment of the complete room, i.e. the partition walls together with sound absorbing suspended ceiling.

- Partition abutments – at partition T junctions or corridor/partition junctions special attention to detailing is required in order to maintain sound insulation performance. Fig. 16 shows an example of good detailing which maintains the continuity of Isowool insulation.
- Deflection – partition head deflection designs may be necessary to accommodate dead or live loads in the supporting floor and/or roof construction. This can be in the form of live loads on intermediate floors creating a ± condition, or a simple minus deflection for dead loads on the structural floors. Deflection heads may also be required at the underside of roof structures subjected to positive and negative pressures. Additional attention to detailing will be required in order to optimise sound insulation performance. Fig. 17 shows a good practice solution incorporating steel angles either side of the head and sealed to the structure, which results in only a 1 – 2 dB loss in acoustic performance.

Figure 16 Partition T junction for maintaining the acoustic performance

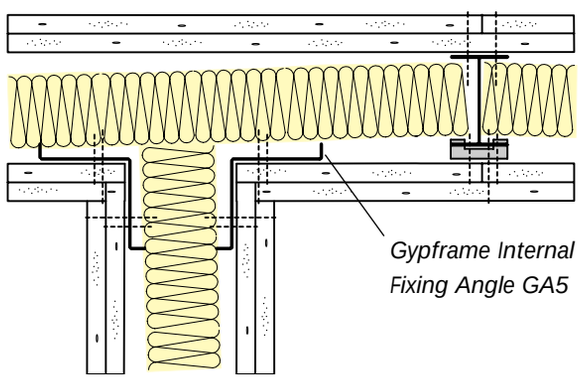
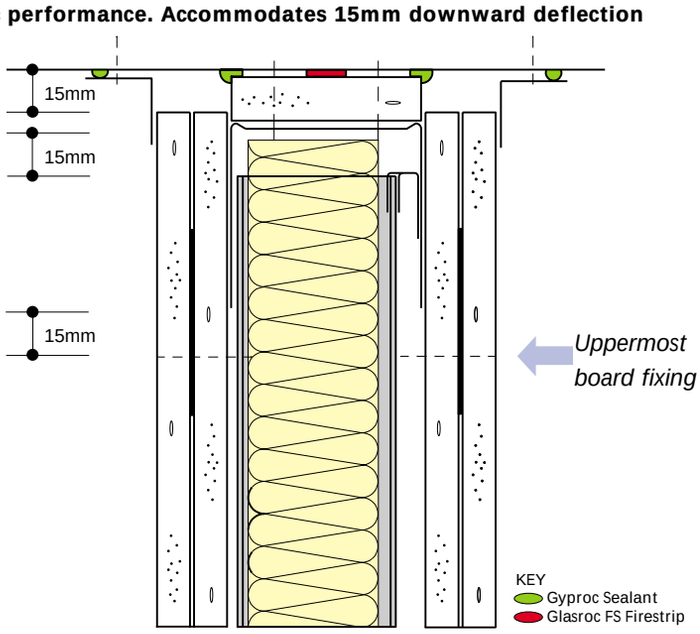


Figure 17 60 minutes fire-rated deflection head with minimal loss in acoustic performance. Accommodates 15mm downward deflection



e-mail: BGTechnical.Enquiries@bpb.com

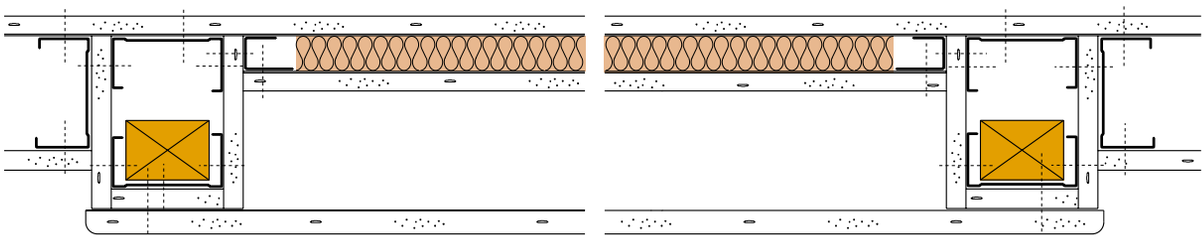


Figure 18 Independent Plumbing System (IPS) located in a GypWall partition (60 minutes fire resistance)

- Curved linings – can be achieved using **GypWall CURVE**.
- IPS – Independent pre-plumbed systems are often specified and it is important to ensure that, when fitted to a fire-rated wall, the fire rating is maintained once the unit is installed. See Fig. 18 for detailing to achieve 60 minutes fire resistance.
- Duty ratings – *BS 5234: Parts 1 & 2: 1992 Code of Practice: Internal non-loadbearing Partitions*, is the standard which helps specifiers to identify which partition duty rating should be used when considering partition and shaftwall specifications (refer to Table 8). In general a medium duty partition is suitable for office environments with heavy duty partitions being specified in public circulation areas. Every British Gypsum partition specification has a duty rating calculated in accordance with the *BS 5234* standard.
- Movement joints – these may be required in long runs of lining and are often positioned to coincide with movement joints in the structure. In practice, the need for movement joints will be reduced or eliminated where there are numerous openings specified, i.e. corridor walls. Where movement joints are required, they can be included in line with the door jamb.

Table 8 Wall grades by categories of duty

Grade	Category of duty	Examples
LIGHT DUTY	Adjacent space only accessible to persons with high incentive to exercise care. Small chance of accident occurring or of misuse.	Domestic accommodation
MEDIUM DUTY	Adjacent space moderately used, primarily by persons with some incentive to exercise care. Some chance of accident occurring and of misuse.	Office accommodation
HEAVY DUTY	Adjacent space frequently used by the public and others with little incentive to exercise care. Chances of accident occurring and of misuse.	Public circulation areas Industrial areas
SEVERE DUTY	Adjacent space intensively used by the public and others with little incentive to exercise care. Prone to vandalism and abnormally rough use.	Major circulation areas Heavy industrial areas

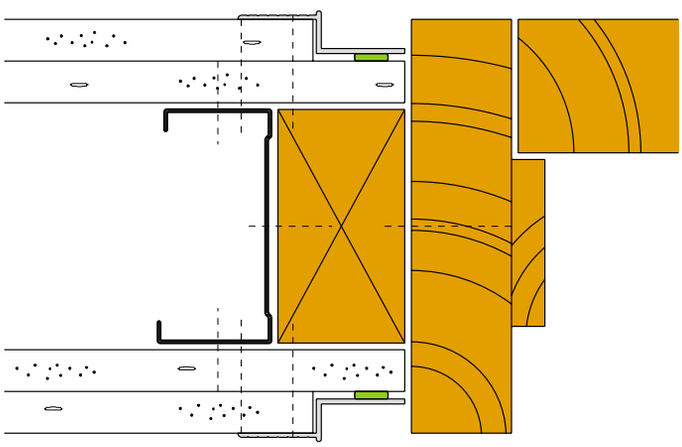
Specification solutions

Table 9 GypWall partition acoustic performance data

Acoustic performance	Systems to consider	Typical areas of use
R_w 65dB+	**GypWall AUDIO**	Division walls between conference facilities, presentation rooms and other areas needing high acoustic separation.
R_w 60-65dB	**GypWall RESILIENT BAR** specifications **GypWall STAGGERED**	Division walls between areas such as interview and meeting rooms needing high levels of privacy but where wall thickness needs to be minimised.
R_w 55-60dB	**Gypframe AcouStud** specifications **GypWall** with double layer 15mm SoundBloc linings	Partitions in executive cellular offices or whenever good acoustic separation is required.
R_w 50-55dB	**Gypframe AcouStud** specifications **GypWall** **GypWall ROBUST**	Corridor areas requiring impact resistance and partitions suitable for cellular offices.
R_w 45-50dB	**Gypframe AcouStud** specifications **GypWall** **GypWall ROBUST** **ShaftWall** and **StairWall**	Corridor areas, partitions for cellular offices and walls providing separation between lift shafts and corridor areas.
Up to R_w 45dB	**Gypframe AcouStud** specifications **GypWall**	Partitions for basic cellular offices.

Note: For details of AcouStud specifications consult British Gypsum. For full details on other GypWall specifications, refer to The White Book, section 3 Partitions and Walls.

Figure 19 Shadow gap around door opening formed using Gyproc Styletrim Door Reveal BGM 116



Door openings

British Gypsum partitions and wall constructions can accommodate a wide range of doors from simple timber leaf to heavy acoustic doorsets, or metal lift door assemblies as in the case of the **ShaftWall** system.

Points to consider

- Duty rating – partition duty ratings cover light, medium, heavy and severe as detailed in *BS 5234*. The rating includes test measurements of door slams. It is important, therefore, that the partition selected will have an adequate duty rating with respect to its area of use and the doorsets to be incorporated. The duty rating categories are shown in Table 8.
- Heavy doorsets – these may be specified to satisfy onerous fire and/or acoustic criteria. Generally the partition will be required to provide additional lateral restraint. British Gypsum can provide guidance on the special detailing required.
- Door detailing – careful consideration should be given to shadow gaps in order to maintain acoustic performance. Refer to Fig. 19 for suitable detailing.

Specification solutions

Refer to The White Book, a20, 'Detailing at Door Frames', for standard and heavy/severe duty detailing. Consult British Gypsum for specific project solutions.

Suspended ceilings

The correct specification of suspended ceiling system is critical in order to maintain fire resistance requirements, minimise degradation of sound insulation, provide the right sound adsorption characteristics, provide access to services, and to satisfy minimum maintenance and aesthetic criteria. British Gypsum offers a choice of ceiling grids and a comprehensive range of perforated and non-perforated tile and ceiling board options.

Points to consider

- Fire resistance – where this is a requirement, and also in situations where a 600mm modular lay-in-grid is too restrictive, **CasoLine MF** concealed grid ceiling should be specified.
- Access and aesthetics – where access for maintenance and/or appearance are of prime importance, **Arteco** ceiling tiles offer a wide choice of perforated and non-perforated linings to achieve the required visual effect. **Arteco** ceiling tiles can also provide sound absorption.
- Large areas – generally **CasoLine MF** concealed grid ceilings are preferred but also provide an option for cellular offices.
- Bulkheads – to avoid cutting boards and to maintain the modular grid appearance, **CasoLine MF** bulkheads can be incorporated at the perimeter of **CasoLine GRID** exposed grid ceilings.
- Lighting – and other perforations will nullify fire resistance performance and may compromise sound insulation. Where a ceiling has to be performance rated one solution is to provide an imperforate **CasoLine MF** ceiling which supports the weight of a **CasoLine GRID** exposed grid decorative ceiling with recessed lighting included.
- Atria – Gyptone boards located on **CasoLine MF** provide an ideal solution for atria wall and ceiling visual effects, and controlling reverberent sound.

Composite ceilings

- Composite ceilings - in some situations an accessible area may be required within a concealed ceiling grid. **CasoLine GRID** T24D1, fitted with concealed/demountable edge D1 **Gyptone** tiles or boards, can be integrated within a **CasoLine MF** concealed grid to provide accessibility together with a decorative feature whilst retaining the overall monolithic appearance.
- Cavity barriers – these will be required to sub-divide ceiling voids as determined by national Building Regulations. British Gypsum solutions are detailed in The White Book, f10 .
- Curved linings – **CasoLine CURVE** provides a curved concealed grid ceiling option incorporating pre-formed support channels to special order. **Gyptone curve LINE 7** can be installed to form the ceiling lining.

Specification solutions
Refer to The White Book – c10 **CasoLine MF** and c12 **CasoLine GRID**.

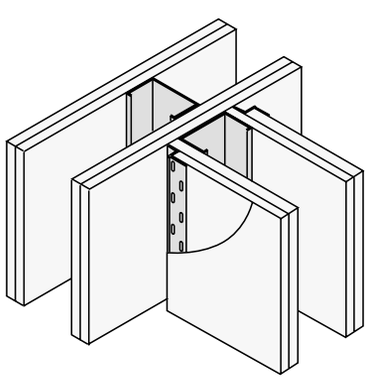
Finishes

British Gypsum board linings require appropriate joint treatment and finishing in order, not only to meet aesthetic requirements for a smooth level surface, but also to form an imperforate element which will meet the fire and acoustic performance criteria. Linings and junctions can be further enhanced using cornices and aluminium trims.

Points to consider

- Concealed linings – where aesthetics are not important partitions above suspended ceilings can be 'fire taped' to satisfy imperforate requirements. It is permissible simply to bed the tape and flush-out the tapers using a gypsum setting material such as **Gyproc Joint Filler** or **Easi-Fill**.
- Priming – following recommended joint treatment, board linings require primer protection using **Gyproc Drywall Primer** prior to applying paint or decorative wallcoverings. Where a vapour control layer is required, two coats of **Gyproc Drywall Sealer** can be applied.
- Cornices – **Gyproc Cove** or **Cornice** profiles will relieve the plain, boxy look at wall/concealed grid ceiling junctions. In large areas the profiles can be used in combination with steps or bulk heads. Typical areas include executive offices, reception areas and corridors.
- Recessed detailing – edge and door reveals can be achieved using **Gyproc Styletrims** BGM 105/106 (edges – see Fig. 20) and BGM 116 (doors). Recessed skirting can be formed using **Gyproc Styletrim** BGM 107 (see Fig. 21).
- Impact resistance – consider using **Gyproc DuraLine XL** or **UltraLine** boards as the face lining. **Gyproc Styletrim** Hollows (BGM109) and Rounds (BGM110) provide added protection at corners. **Styletrim** Bullnose (BGM112) protects stop-ends and **Styletrim** Skirting (BGM107) provides added protection against foot traffic and low level impacts, scuffs and scrapes.

Figure 20 Edge reveal using Gyproc Styletrim BGM 105/106



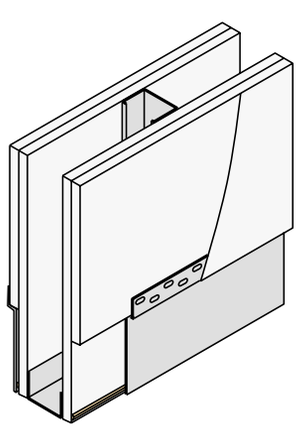


Figure 21 Recessed skirting using Gyproc Styletrim BGM 107

A wealth of project solutions are available from British Gypsum

British Gypsum offers an increasing number of specialist solutions designed to satisfy onerous performance criteria or non-standard applications. A wealth of specific project solutions is also held by the company. They are available to assist specifiers and designers to achieve project solutions using drywall construction.

System examples

- Post and transom – **GypWall** FREEZONE provides a non-fire-rated structural frame system to ease the accommodation of major ceiling service runs in modern office buildings. It is based on a fully tested post and transom framework below which an infill partition can be located.
- Blast resistance – **BlastWall** offers resistance to explosive devices, such as letter bombs, and can be specified in areas such as post rooms. The system has been tested and is approved by Government departments. Specifications are arrived at on an individual basis following consultation with British Gypsum on the performance requirements. A general information leaflet is available from the company – the provision of more specific information is subject to security considerations.
- Intruder resistance – **SecureWall** offers resistance against sustained intruder attack and can be specified where cash tills or safes are located.
- Infill external walling – Metsec roll formed steel stud and channel framing can be fixed between structural members. The frame is generally positioned at the slab edge allowing insulation and external veneers to be installed continuously outside the main structural frame. British Gypsum boards form the internal linings.

Contact British Gypsum or Metsec for guidance.