



# Health environments

Building Solutions for Active Spaces

# Contents

## 1. Introduction

Our approach	2
Building for the future	3

## 2. Fire Design Considerations

Internal spread of flame	5
Elements of structure	6
Compartmentation	6
Fire hazard areas	6
Hospital Street	7
Openings in floors and compartment walls	7
Protected / fire-fighting shafts	7
Fire-rated ceiling membranes	8
Cavity barriers	8
Fire-stopping	8

## 3. Acoustic Design Considerations

Acoustic zoning (HTM 2045 criteria)	10
Selection of partitions (HTM 56 criteria)	12
Selection of suspended ceilings (HTM 60 criteria)	12
Flanking sound transmission	14
Reverberation time	15

## 4. Other Design Considerations

Strength and stability	16
Heavyweight fixings	17
Movement	17
Hygrothermal performance	18
Biological attack	18
Radiological protection	18
Services accommodation	19
Partial height partitions	19
Partial boarded partitions	20
Soffit linings	20
Finishes	20

## 5. Specification Solutions

Fire protection to structural steel	21
Fire resistant external wall linings	22
Fire protected shafts, service risers and stairwalls	23
Partitions and walls	24
Suspended ceilings	25

## 6. Construction Details

Key detailing	26
---------------	----



# HealthSpec

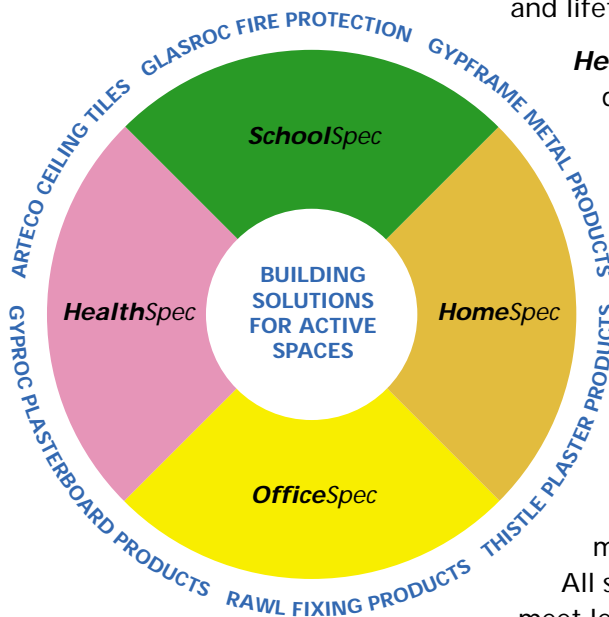
*HealthSpec* is part of the British Gypsum *Building Solutions for Active Spaces* range of products and systems, a portfolio of systems developed by British Gypsum to provide architects, specifiers and builders with leading edge solutions and technical information. We are committed to market leading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





## Our approach

**HealthSpec** 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 health environments. 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.



**HealthSpec** considers the legislative and key design drivers which need to be taken into account in order to specify the appropriate internal elements. 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.



## Building for the future

The NHS reforms have led to greater local freedom in commissioning healthcare buildings of quality, durability and style. Whilst a pre-requisite in planning a hospital is that it should be fit for purpose, it is also important that flexibility is in-built to cope with future challenges and that the facility has a well-designed internal environment to motivate and uplift staff and patients alike. British Gypsum systems can help to satisfy these criteria and at the same time address the key issues of sustainable development and whole-life building costs.

Sustainable development was defined in the Brundland Report (1987) as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The use of lightweight building systems can make an important contribution to the environmental sustainability of the building.

The concept of whole-life costs takes into account the environmental impact of the manufacture, installation, service life and ultimate disposal of products used. British Gypsum systems are designed to perform in all of these aspects:

### **Innovative manufacturing technology**

At the centre of the manufacturing processes is the use of leading-edge technology to minimise energy consumption and use of raw materials.

### **Efficient use of raw materials**

Synthetic gypsum produced as a by-product of the cleansing of Power Station flues has been extensively used thereby conserving valuable natural gypsum resources. Plasterboard liners are made from 100% recycled paper, and waste produced during plasterboard manufacture is re-used. The steel used in the manufacture of Gypframe metal systems contains a high proportion of recycled material, which significantly reduces the embodied energy.

### **Effective handling and transport**

Lightweight building systems give rise to handling efficiencies. Through extensive product development, British Gypsum has been able to improve on these efficiencies with lighter weight Gyproc plasterboards and Gypframe metal components which are up to 10% lighter without compromising strength. Isowool insulation is also more efficient to transport than alternative products.



## **Reducing the impact of site installation**

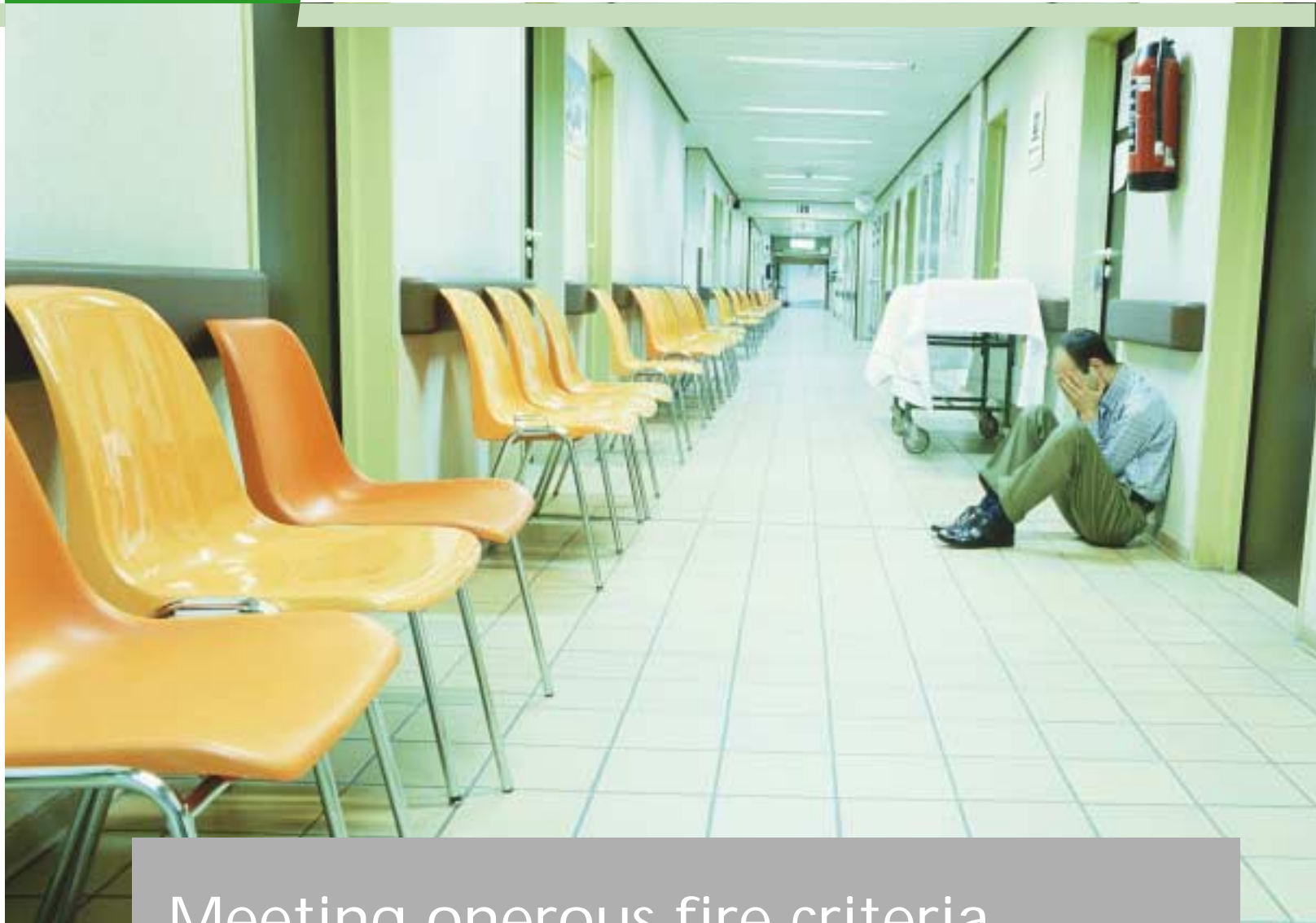
During the construction phase the systems are easy to handle and produce minimal chemical or particulate emissions during assembly. Standardising performance specifications can further reduce site wastage. British Gypsum has pioneered the recycling of plasterboard site waste and extensive trials are currently underway. Through the Drywall Academy network, British Gypsum is able to provide training to installers to ensure that the systems are built using the most efficient techniques.

## **Durable service life**

In use, British Gypsum systems provide effective acoustic and fire protection without emitting VOCs. They are durable and provide surfaces which are easy to maintain throughout the service life of the building. For example, the **Casoprano** range of ceiling tiles resist damage and are easy to redecorate with water based paints. **GypWall ULTRA** and **GypWall ROBUST** partitions offer exceptional strength so minimising the risk of accidental damage.

## **Safe disposal**

All major components are readily recyclable on disposal.



## Meeting onerous fire criteria

Hospitals by their very nature contain people who are at greater risk from fire than in other buildings. The guidance given in this section is based on the recommendations of Firecode HTM 81 Fire precautions in new hospitals, published by HMSO.

### Internal spread of flame

The surface finish applied to walls and ceilings can contribute to the spread of a fire. Some finishes will transfer fire from one area to another very quickly by "surface spread of flame". This not only makes the fire difficult to control, but provides additional fuel which will increase the severity of the fire. Surface finishes which can be effectively tested for "surface spread of flame" are rated for performance by reference to the method specified in *BS476: Part 7: 1997* under which

materials or products are classified 1, 2, 3 or 4, with Class 1 being the highest. Products may also be classified as Class 0, providing they meet criteria defined in The Building Regulations covering performance to both *BS476: Part 6* and *Part 7*.

Wall and ceiling finishes should meet the classifications in Table 1.

**Table 1 Limitations on wall and ceiling finishes**

Location	Walls	Ceilings
Circulation spaces	Class 0	Class 0
Other room	Class 0	Class 1
Small rooms (max 4m <sup>2</sup> )	Class 1	Class 1

**Notes:**

The limitations on surface finishes do not apply to:  
 i) the demountable sanitary "back panels" commonly used in hospitals to provide access for maintenance behind wash hand basins, toilets, showers, etc.  
 ii) rooms providing a specialist function (for example audiology booths) where other functional criteria dictate the surface finish.

British Gypsum plasterboard linings, suspended ceiling boards and tiles are designated materials of limited combustibility within national Building Regulations. Their surfaces are designated Class 0 as a result of tests to *BS 476: Part 6: 1989* and *BS 476: Part 7: 1997*. **Glasroc FireCase S** and **Gyproc Multi-Board** are non-combustible when tested to *BS 476: Part 4: 1970 (1984)*.

## Elements of structure

Elements of structure include the structural frames, beams, columns, loadbearing walls (internal and external), floor structures and gallery structures. The period of fire resistance required in healthcare buildings is given in Table 2.

Refer to 5. Specification Solutions, for British Gypsum specifications. Table 1 gives the cladding selector chart for **Glasroc FireProtect** and Table 2 the cladding selector chart for **Glasroc FireCase S**. The designer

**Table 2. Fire resistance required for elements of structure**

Hospital construction	Unsprinklered	Sprinklered
Single-storey	30 minutes	30 minutes
Top floor no more than 12m above ground	60 minutes	60 minutes
Top floor between 12m and 30m above ground	90 minutes	60 minutes
Top floor over 30m above ground	120 minutes	90 minutes
Basements no more than 10m deep	60 minutes	60 minutes
Basements over 10m deep	90 minutes	60 minutes

**Note:**

Elements of structure in relation to basements include the ground floor slab.

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 Table 3. The chart applies to universal beams and columns. For castellated sections add 25% to the lining thickness and scale this up to the next board thickness.

## Compartmentation

Within patient access areas, compartmentation is used to divide a storey into places of temporary safety, which may be used for patient refuge. In addition, compartmentation will prevent the rapid fire spread throughout the building and reduce the chance of fires becoming large. The maximum area of a compartment should not exceed:

**2000m<sup>2</sup> in a multi-storey hospital**

**3000m<sup>2</sup> in a single storey hospital**

The minimum period of fire resistance (integrity and insulation) provided by the compartment walls should be:

**single storey hospitals 30 minutes<sup>1</sup>**

**sprinklered hospitals up to 12 m above ground level 30 minutes**

**all other hospitals 60 minutes**

<sup>1</sup> Except where this conflicts with Table 3

All compartment floors are considered to form an element of structure and are therefore covered by Table 2.

## Fire hazard areas

For most building types it is normally required to protect escape routes with fire resisting walls, ceilings and doors (protected corridors). In hospitals this is not considered acceptable since the excessive number of fire-resisting doors, all fitted with self-closing devices, would be a hindrance to staff and patients during the everyday running of the hospital. For this reason the technique advocated for hospitals is to identify and segregate fire hazard rooms by at least 30 minutes fire-resisting construction. Examples of fire hazard rooms are chemical stores, cleaners' rooms, clothes storage, dayrooms, disposal rooms, laboratories, lift motor rooms, linen stores, patient bedrooms (provided for elderly people, those suffering from mental illness and people with learning difficulties), staff changing and locker rooms, store rooms, ward kitchens, X-ray film and record stores, and laundry areas.

Where sprinklers are installed there is no requirement to enclose fire hazard rooms in fire resisting construction.

Recommendations for the location and fire separation of fire hazard departments in relation to patient access areas are given in Table 3.

**Table 3: Fire hazard department location and fire separation**

Hazard department	Patient access area	
	Normal dependency	Very high dependency
Atrium	See FPN 8 <sup>1</sup>	
Boilerhouse	60 + auto suppression <sup>2</sup>	See Note 3
Central staff change	60 <sup>4</sup>	60 + auto suppression <sup>2</sup>
Central stores	60 + auto suppression <sup>2</sup>	See Note 3
Commercial enterprises	See FPN 5 <sup>5</sup>	
Central sterile supplies or hospital sterilising & disinfecting unit	60 <sup>4</sup>	60 + auto suppression <sup>2</sup>
Flammable store	60 + auto suppression <sup>2</sup>	See Note 3
Health records	60 <sup>4</sup>	60 + auto suppression <sup>2</sup>
Laundry	60 + auto suppression <sup>2</sup>	See Note 3
Main electrical switchgear	60 + auto suppression <sup>2</sup>	See Note 3
Main kitchens	60 + auto suppression <sup>2</sup>	See Note 3
Main stores	60 + auto suppression <sup>2</sup>	See Note 3
Medical gas stores <sup>6</sup>	60 + auto suppression <sup>2</sup>	See Note 3
Pathology	60 <sup>4</sup>	60 + auto suppression <sup>2</sup>
Pharmaceutical (manufacturing)	60 <sup>4</sup>	60 + auto suppression <sup>2</sup>
Refuse collection/incineration	60 + auto suppression <sup>2</sup>	See Note 3
Works	60 + auto suppression <sup>2</sup>	See Note 3

**Notes:**

- <sup>1</sup> FPN8 Firecode document covering Atria on hospital premises.
- <sup>2</sup> Preferably separate; however, if adjacent should be separated by 60 minute imperforate construction together with auto-suppression in the hazard department. The imperforate construction should comply with the guidance given in HTM 81 in respect of external fire spread and space separation (paragraphs 6.63 to 6.76).
- <sup>3</sup> Should not be located adjacent to very high dependency departments.
- <sup>4</sup> May be adjacent but should always be separated by 60 minute fire-resisting construction. 60 minutes fire resistance may be reduced under certain circumstances, i.e. if sprinklers are fitted.
- <sup>5</sup> FPN 5 Firecode document covering Commercial enterprises on hospital premises.
- <sup>6</sup> Medical gas stores should always be located in a separate building. Refer to HTM 2022 – ‘Medical gas pipeline systems’.

## Hospital Street

In the design of hospitals, the concept of the Hospital Street as the main communication route is widely used. The Hospital Street provides an essential link between the hospital departments and stairways and lifts. It is the main circulation route for staff, patients and visitors. A Hospital Street should be constructed as a fire compartment that connects final exits, stairways and enclosures and department entrances. It has two functions from a fire safety aspect:

- it will serve the fire brigade as a fire-fighting bridgehead
- if the spread of fire within a department cannot be brought under control, the occupants of

the department affected may be evacuated via the Hospital Street to parts of the hospital not affected by the fire.

## Openings in floors and compartment walls

Services can act as mechanisms of fire spread in buildings. It is therefore essential that adequate provision is 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 of individual services penetrations can be minimised. Services passing through a partition should be kept to a minimum and all perimeter junctions between fire resisting partitions and other structural elements should be fire-stopped. British Gypsum’s **Glasroc FireStoppers** range of products has been purpose-designed and tested for use in drywall systems – refer to ‘Fire-stopping’ later in this section.

## Protected/fire-fighting shafts

Openings in floors for stairways, lifts, escalators and pipes and ducts, not complying 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, load bearing capacity) as the compartment floor. Table 4 gives the specific periods of fire resistance required for protected shafts and fire-fighting shafts.

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. British Gypsum’s **ShaftWall** system fulfils this purpose – refer to ‘5. Specification Solutions, Fire protected shafts, service risers and stairwalls’, for specifications which satisfy the requirements set out in Table 4. It should be noted, however, that when **ShaftWall** is fire tested from the room side, the full period of fire resistance is not achieved in terms of insulation due to the temperature rise on the exposed metal framing.

**Table 4 Specific periods of fire resistance for protected shafts and fire-fighting shafts**

Part of building	Load-bearing capacity (minutes)	Integrity (minutes)	Insulation (minutes)	Method of exposure
Protected shaft	60	60	60	Each side separately
Fire-fighting shafts:	120	120	120	From side remote from shaft
a) construction separating the shaft from the building	60	60	60	From shaft side
b) construction separating fire-fighting stairway from fire-fighting lift shaft and fire-fighting lobby	60	60	60	Each side separately

Relaxation is normally granted from the approving Authority on the basis that no combustible materials are likely to be stored adjacent to the structure.

## Fire-rated ceiling membranes

The preferred arrangement in healthcare buildings is one in which fire-resisting partitions pass through suspended ceilings to the soffit of the structural floor above, and suspended ceilings play no part in protecting the structure. The only way to avoid this requirement is to install fire-resisting ceiling membranes within each room. British Gypsum's **CasoLine MF** ceiling system can fulfil this purpose – refer to '5. Specification Solutions'.

## Cavity barriers

Concealed spaces or cavities in the construction of a building may permit the rapid spread of fire and smoke. It is possible for fire and smoke to be transferred to areas remote from the seat of the fire by way of uninterrupted concealed spaces. For this reason it is essential that fire-resisting barriers are provided to restrict the size of these concealed spaces.

In hospitals, the sub-division provided through the requirements for hazard protection, sub-compartmentation, and compartmentation, is such that

generally the additional sub-division of ceiling voids for cavity barriers is not required. The exception to this is where sub-compartment walls, and walls to fire hazard rooms, are terminated at 30 minute fire-resisting ceilings. Irrespective of the above, there is a requirement to prevent the inter-connection of horizontal and vertical cavities.

Guidance on the construction and fixing of cavity barriers is provided in Appendix E of HTM 81. British Gypsum partition systems can be constructed to sub-divide the partition cavity at pre-determined intervals and close cavities at junctions such as a partition T junction. Solutions are also available to construct timber or steel framed cavity barriers lined with **Gyproc Multi-Board** or **FireLine** board to close cavities above suspended ceilings, if required. Refer to The White Book, [F10](#).

## Fire-stopping

Effective fire-stopping is essential if individual hospital building elements and junctions are to meet their specified levels of fire protection. It is also a requirement of HTM 81. **Glasroc FireStoppers** are specifically designed and tested for use with plasterboard systems. They have been tested utilising draft European Standard prEN 1366-3 and provide substantiated solutions up to 120 minutes fire resistance.

When carrying out fire-stopping operations it is important that they are properly co-ordinated with the drylining and service installation trades. The location and routing of service penetrations should be pre-planned and the requirements for framed openings fully considered. Where deflection heads are specified adequate provision will be required for fire-stopping at the partition head. Some typical service penetration details are shown in '6. Construction Details, Figures 1, 2 and 3'; typical deflection head details are shown in Figures 4 and 5.



## Satisfying Health Technical Memorandum and related requirements

Much research has been conducted over the years into the adverse effects of noise on people. It appears that ill people, such as patients in hospital, have a lower threshold for noise and suffer more adverse effects than healthy people do. These effects include poor quality and quantity of sleep that is vital to recovery, and adverse physiological responses to noise, which in turn, hinder healing. In addition, excessive levels of noise can cause staff to make more mistakes and work less effectively.

Hospitals and healthcare facilities face a number of major problems, both practical and financial, and come in for much criticism.

Whilst good acoustical design and quieter wards will not totally eliminate such problems, it has been shown that quieter hospitals can help increase patient recovery speed and therefore reduce the associated costs of treating a patient in hospital. Lower levels of noise may also help contribute to better staff performance and thus reduce staff costs.

Clients may well strive to meet the requirements of HTM 2045 Acoustics – Design considerations, but must recognise that there may be implications or limitations for other disciplines. For example, is it more important to have a sterile operating theatre or to achieve a

certain reverberation time? Until ultra-clean acoustic absorbent panels are available, then clearly this acoustic consideration comes second, but that does not mean that the acoustic design criteria is incorrect. Without adequate acoustic control, a hospital can become difficult to work in, stressful for patients, limit flexibility and usage of valuable space and even break the patient/doctor confidentiality if conversation can be overheard. If not designed and built to a suitable acoustic standard, expensive remedial work is likely to be required. Often, in this scenario, it is practically impossible to attain the desired standard.

**Acoustic zoning  
(HTM 2045 criteria)**

The level of sound insulation required between adjacent spaces can be calculated using the principles outlined in HTM 2045 and is based on the following considerations for the relevant areas:

- the subjective privacy requirements
- the mechanical services noise levels.

In all cases, the most stringent privacy requirements and services' noise levels should be used as the basis for determining the level of sound insulation required.

When voices are raised, the sound level in the source room can be increased by up to 20 dB. Therefore, to achieve the same level of privacy, the performance of the separating elements needs to be increased. Hence for different voice effort, say a patient screaming in a maternity ward, the required weighted apparent sound reduction index of the dividing partition could be increased by 20 dB (see Table 5 – Voice effort).

Where noise creating departments are part of a main building, care must be taken to separate them as far as possible from sensitive areas such as wards. In particular, when the main kitchen, which is a constant source of both impact and airborne noise throughout the day, has to form part of the main complex, it should preferably be sited below, and not above sensitive areas to facilitate the insulation of equipment and machinery and to reduce the spread of impact noise.

Special attention must be paid to both siting and internal planning of units such as children's wards, maternity units, nursery wards, accident and emergency

departments, and out-patient departments, some of which are generators of noise and some of which require protection from noise. It has been found, for example, that the noise level in a nursery can be as high as 80dB at night. High maximum noise levels are likely to be encountered, for example, in a delivery room, which should have sufficient privacy between units to minimise distress during labour.

Noise can easily spread through a building via the corridors and the use of acoustically absorbent ceilings will help to reduce this transmission. British Gypsum **Arteco** ceiling tiles provide solutions – refer to '5. Specification Solutions, Suspended ceilings'. Noise can also be transmitted through the mechanical services installation where ductwork penetrates partitions and floor/ceilings. Crosstalk attenuators need to be provided in these penetrations to maintain privacy.

Table 5 is based on the approach given in HTM 2045 and gives guidance on the level of performance required to separate various areas within a healthcare environment.

Partition and ceiling system specifications are given in '5. Specification Solutions', which meet the requirements for acoustic zones (1-7) listed in Table 6 Acoustic zoning. The minimum sound insulation requirement for each zone is given in Table 7. In compiling Table 6, the corrections given in Table 5 have been applied to allow for the voice effort required within each space. It should be noted that the level of performance required is substantially higher than that which would be required if HTM 56 was used as the design guide.

**Table 5. Voice effort**

Space	Voice effort correction (dB)
Maternity, Nursery, Accident and Emergency	+ 20
Multi-bed ward	+ 10
Operating theatre, single-bed ward, private office, meeting and consultation room, lecture theatre	+ 5
General office	+ 5
Staff room	+ 5
Laboratory	+ 5
Corridor, wash room, toilet, kitchen	+ 10
Waiting room	+ 10
Recreation room, cafeteria	+ 10

**Table 6. Acoustic zoning**

Room activity	Adjacent space activity								
	Maternity, nursery, Accident and Emergency*	Multi-bed ward	Operating theatre, single bed ward, private office, meeting and consultation room, lecture theatre	General office	Staff room	Laboratory	Corridor*, wash room*, toilet*, kitchen *	Waiting room	Recreation room*, cafeteria *
Maternity, nursery, Accident and Emergency*	6	6	7	5	4	3	4	4	4
Multi-bed ward	6	4	5	3	3	3	4	4	4
Operating theatre, single bed ward, private office, meeting and consultation room, lecture theatre	7	5	4	4	4	4	5	5	5
General office	5	3	4	2	2	2	3	3	3
Staff room	4	3	4	2	1	1	2	2	2
Laboratory	3	3	4	2	1	1	1	1	1
Corridor*, wash room*, toilet*, kitchen*	4	4	5	3	2	1	1	2	1
Waiting room	4	4	5	3	2	1	2	2	2
Recreation room*, cafeteria*	4	4	5	3	2	1	1	2	2

**Note:**

\* these areas are heavy circulation areas and it is highly recommended that a severe duty partition system is selected in these applications

**Table 7. Grades of performance required**

Acoustic separation zone	1	2	3	4	5	6	7
Minimum sound insulation value required $R_w$ dB for walls and floors	40	45	50	55	60	65	70
Minimum sound insulation value required $D_{nCw}$ for ceilings	35	40	45	50	55	60	65



Table 8 Activity space acoustic requirements within HTM 56

Airborne sound insulation matrix	Consulting rooms	Examination rooms	Treatment rooms	Speech therapy rooms <sup>1</sup>	Offices	Seminar rooms	Single-bed wards	Multi-bed wards	Day rooms	Nurseries	Toilets and bathrooms	Utility rooms	Ward pantries	Plant motor rooms
Consulting room	D	D		E	D	E	D	F	F		E		E	
Examination rooms	D	D	F	E	D	D	D	F	F		E		E	
Treatment rooms		F	D		F	E		E	D	D	E	D	E	
Speech therapy rooms <sup>1</sup>	E	E		E	E	F	E				F		F	
Offices	D	D	F	E	E	D	D	E	E	F	D	F	D	
Seminar rooms	E	D	E	F	D	C	E	D	D	E	D	E	C	
Single-bed wards	D	D		E	D	E	D	F	F		E		E	
Multi-bed wards	F	F	E		E	D	F	D	D	E	E	E	D	
Day rooms	F	F	D		E	D	F	D	C	D	E	D	D	
Nurseries			D		F	E		E	D	D	E	D	E	
Toilets and bathrooms	E	E	E	F	D	D	E	E	E	E	D	E	D	
Utility rooms			D		F	E		E	D	D	E	D	E	
Ward pantries	E	E	E	F	D	C	E	D	D	E	D	E	C	
Plant motor rooms														A

Notes:

<sup>1</sup> Speech therapy rooms excluding Audiometry

Relationships between activity spaces indicated by  in the above matrix should be “designed out” because satisfactory sound insulation of a dividing partition may require special construction.

It should be noted that when selecting the sound insulation between two spaces, the level of performance achieved in practice will not be governed completely by the specified partition. It is important to consider flanking transmission via any indirect paths which may be present between the two spaces.

Table 9 Partition grades within HTM 56

Grade	Minimum airborne weighted sound reduction index R <sub>w</sub> dB
A	no requirement
B	33
C	38
D	43
E	48
F	53

### Selection of partitions (HTM 56 criteria)

As an alternative to using the guidance in HTM 2045, designers have the option of using HTM 56 Partitions.

The matrix of activity spaces in Table 8 has been compiled to assist the design team in determining a suitable sound insulation grade for some common partition situations in clinical areas. These relate only to the partition between any two adjacent spaces.

Table 9 summarises the acoustic requirements for each of the partition grades A – F. British Gypsum partition specifications, which match the requirements for acoustic grades A – F, are given in ‘5. Specification Solutions, Partitions’.

### Selection of suspended ceilings (HTM 60 criteria)

HTM 60 sets out six performance categories which relate user requirements for ceiling membranes in the various hospital activity spaces, to the physical and performance characteristics of ceilings. Refer to Table 10, Categories of performance. For a detailed list of which activity areas relate to the different performance categories, refer to HTM 60. As an indicator, a brief listing of typical activity areas against the various performance categories is given in ‘5. Specification Solutions, Table 10’. The HTM 60 categories provide a convenient reference for clients, building designers, specifiers and ceiling system manufacturers.

In terms of cleaning and decoration, HTM 60 sets out four categories of cleaning routine, A – D, as shown in Table 11. The table applies to all ceilings including those with factory applied finishes and those with site applied decorative treatment. Wet cleaning is usually by hot water containing a mild, non-abrasive detergent. Where machine cleaning is being considered the machine manufacturer should be consulted at an early stage to ensure that the ceiling membrane and proposed ceiling procedures are compatible. Ceilings should also be capable of withstanding any of the disinfectants in general NHS use.

Refer to '5. Specification solutions, Suspended ceilings', for British Gypsum products and systems solutions meeting the HTM 60 criteria. Generally, where an exposed grid ceiling is preferred, **Casoprano roc** is widely specified in ward areas where it provides an economical tile solution fitted into **CasoLine GRID**. **Gyprex** tiles can cope with a more aggressive cleaning regime and are used in kitchen and food preparation areas. **Casotec ALPHA** is suitable for high humidity conditions such as shower rooms and hydrotherapy units. Where a concealed grid ceiling is preferred, **CasoLine MF** fulfils this purpose.

**Table 10 Categories of performance within HTM 60**

Physical and performance characteristics	Categories of ceiling performance					
	1	2	3	4	5	6
<b>Soffit</b>						
smooth	/	/	/	Y	Y	Y
textured				Y	Y	Y
imperforate	/	/	/	Y	/	Y
perforated				Y		Y
jointless	/	Y	Y	Y	Y	Y
jointed		Y	Y	Y	Y	Y
<b>Humidity</b>						
normal	/		/	/	/	/
high		/				
<b>Cleaning</b>						
A	/					
B		/				
C			/		/	
D				/		/

KEY / indicates essential requirement Y indicates options

**Notes:**

**Physical characteristics of soffit:**

**Smooth** – no coarser than a brush applied matt emulsion paint on a flat plastered surface without projections, indents or holes.

**Textured** – a surface other than smooth.

**Imperforate** – without holes through the membrane.

**Perforated** – having a pattern of pre-formed holes into or through the membrane.

**Jointless** – either having no joints or having joints which are completely sealed so that the whole of the finish is impervious and will prevent the collection of dirt and bacteria.

**Jointed** – other than jointless.

**Humidity:**

**Normal humidity** – 25% to 65% relative humidity over an air temperature range of 10°C to 25°C.

**High humidity** – 25% to 100% relative humidity over an air temperature range of 10°C to 30°C.

**Cleaning:**

Refer to Table 11.

**Table 11 Cleaning regimes within HTM60**

Type	Frequency	Action
A	Daily	By hand with a wet mop or cloth, or by machine spraying water at mains pressure with removal by suction
B	Quarterly	By hand with a damp mop or cloth, or by machine spraying water at pump pressure with removal by suction
C	Quarterly	By hand with a damp mop or cloth
D	Annually	By Industrial suction machine



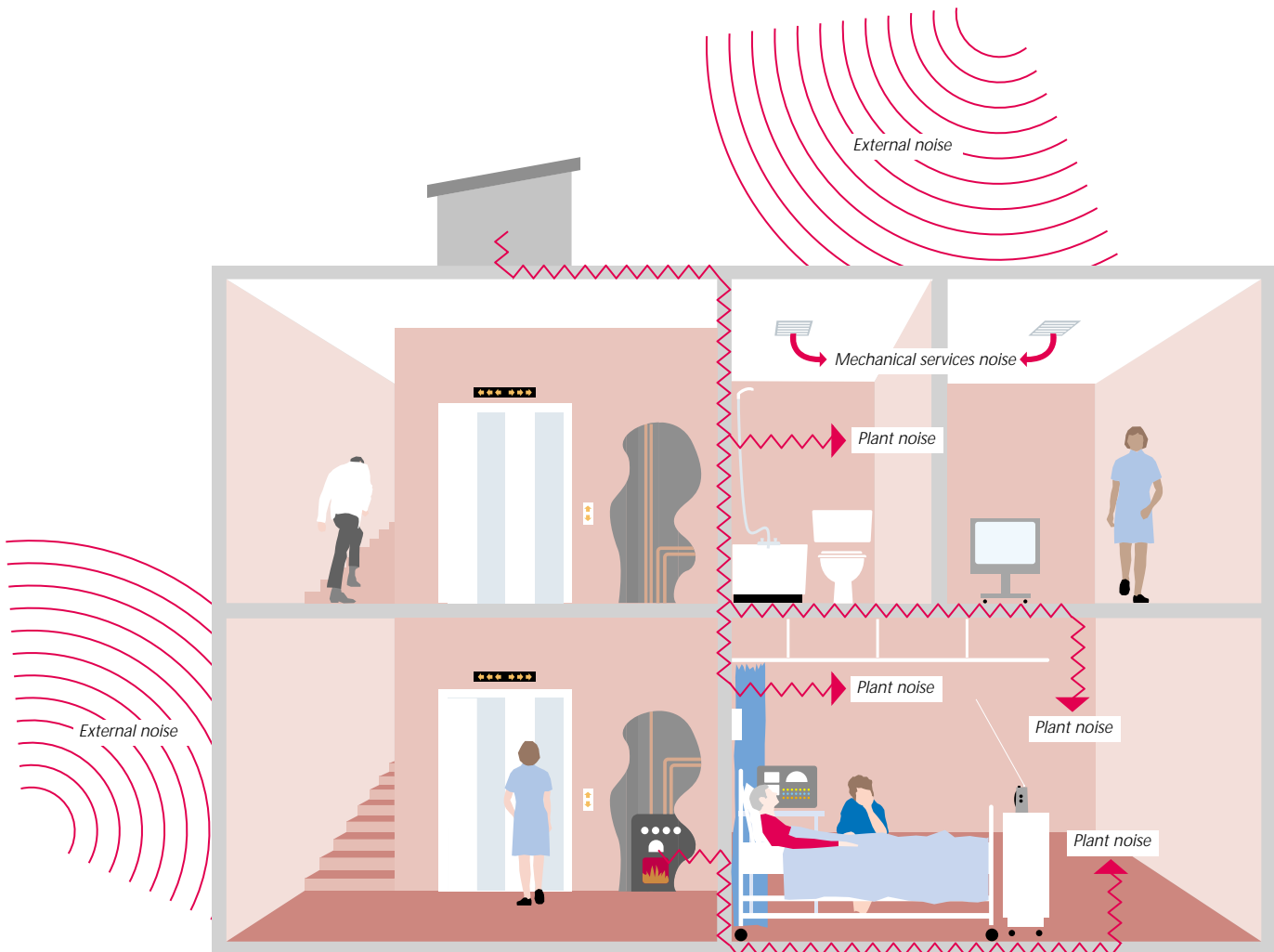
## Flanking sound transmission

Sound is transmitted between rooms both directly by the shortest route – for example through a partition between the source and the receiving room – and indirectly, by any other path such as windows, flanking walls or corridors. Indirect or flanking sound transmission is defined as sound from a source room to an adjacent receiving room but not via the common partition. It is essential to know the relative amounts of sound transmitted via

the direct and indirect paths if appropriate sound insulation measures are to be taken. The weakest path is always the critical one.

Fig. 1 shows typical sound transmission paths for exterior and interior generated noise.

Figure 1 Noise generation and transmission paths



## Reverberation time

Internal surface finishes should be selected such that the reverberation times (RT) at all frequencies between 125 Hz and 4 kHz are within the ranges shown in Fig. 2. However, at the 125 Hz octave band the RT may be allowed to rise to 2.5 times the mean value.

The RT of a room can be calculated by use of the following formula:

$$T_{60} = 0.163 \times V/A, \text{ where:}$$

$T_{60}$  is the reverberation time (seconds)

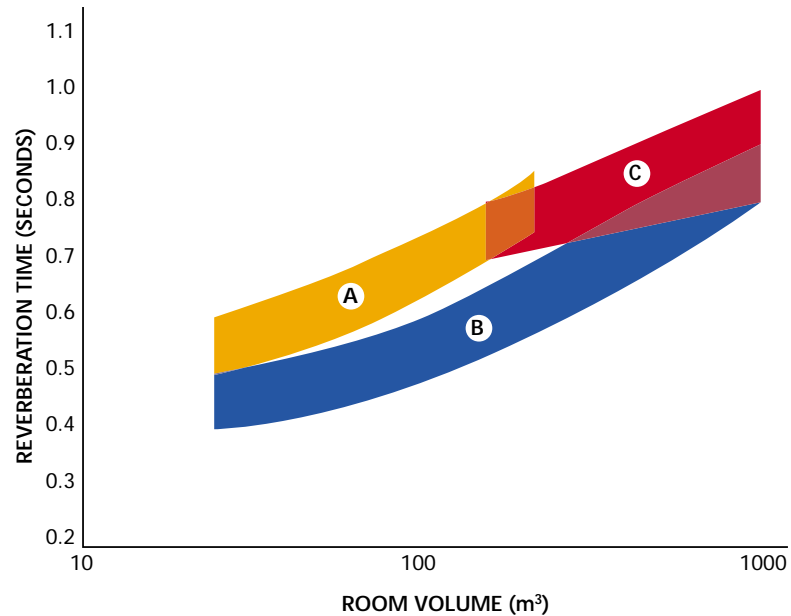
$V$  is the room volume ( $m^3$ )

$A$  is the total acoustic absorption ( $m^2$ )

The appropriate RT for a specific room also depends on the room function. For example, a lecture theatre (band C) needs a reasonably long RT so that speech is intelligible. Fig. 2 gives recommended RT values for different room functions and different volumes. For example, a ward  $100m^3$  in volume should have an RT of approximately 0.5 seconds.

British Gypsum **Casoline GRID** suspended ceilings with acoustic tiles can meet the requirements for areas A, B and C in Fig. 2 subject to cleaning and disinfection limitations on the use of perforated tiles. Refer to 'Selection of suspended ceilings (HTM 60 criteria)' earlier, the detailed guidance given in HTM 60 and to '5. Specification Solutions, Suspended ceilings'.

Figure 2 Reverberation times



Key

A – Private offices, meeting rooms, consulting rooms

B – Operating theatres, single and multi-bed wards, waiting rooms, laboratories, wash rooms, kitchens, staff or recreation rooms, general offices

C – Lecture theatres





## Ensuring that all performance parameters are achieved

### **Strength and stability**

Some areas within healthcare environments are subject to greater wear and tear, because of high foot traffic or intense use, and require refurbishment sooner than the rest of the building. These areas include corridors, wards, day rooms, lobbies, locker rooms and all public areas.

Creating an environment to reduce wear and tear is achieved through a combination of design, building practices and the use of purpose designed linings and surface finishes. High impact resistant plasterboard – **Gyproc DuraLine XL** and **UltraLine**, should be used to increase the durability of the wall surfaces and, as a minimum standard, heavy duty

partitions should be specified. In high circulation areas it is recommended that severe duty is specified e.g corridors, toilets, wash rooms, etc. The corners and junctions of partitions can be protected by **Gyproc Styletrim** aluminium profiles.

Protection against mechanical damage should be considered in all areas where the partitions might be subjected to hard body impact from mobile equipment.

Refer to Table 12 Surface protection requirements.

**Table 12. Surface protection requirements.**

Purpose	Type	Height above finished floor level	Location
Surface protection	Buffer rails	800mm – 1000mm	Main corridors, trolley bays, ward kitchens, main kitchens, bed heads
Arris protection	Corner guards	Floor level to at least 1000mm	Areas where trolleys or heavy mobile equipment are likely to be used.
		Floor level to at least 2000mm	Areas where high mobile equipment e.g. linen trolleys, are likely to be used

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. If inadequate, these can be a substantial contributory cause of damage. All **GypWall** partitions are tested fully in accordance with *BS 5234: Part 2*, including crowd pressure requirements.

## Heavyweight fixings

Where there is substantial penetration of services through the partition, it is common in hospitals to fit a plywood ground between studs to take the required fixings. The ground can be located between studs, see '6. Construction Detailing, Fig. 6'. Otherwise, heavyweight fixings can be supported from metal fixing channel or timber noggings located between and adequately fixed to studs (see '6. Construction Detailing, Fig. 7', for Gypframe Fixing Channel detailing). Medium to heavyweight fixings can be made directly into the plasterboard lining using appropriate fixings. Table 13 shows fixing devices which are suitable for the different weight fixing categories. The ultimate load values are given in Table 14.

## Movement

Deflection of upper floor and roof slabs can sometimes cause appreciable stress in partitions. Where such deflection is likely to occur, the partition to structural soffit junction detail must be designed to accommodate movement whilst still complying with any fire or acoustic performance requirements. A typical deflection head detail for

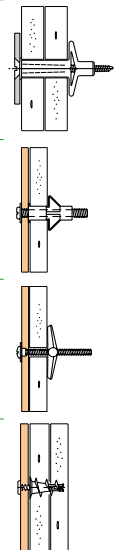
**Table 13 Fixing devices for different weight categories**

Construction	Heavy (water heaters)	Fixtures med/heavy (radiators, wall cupboards)	Med/light (fittings)	Med/light (mirrors)	Light (small pictures)
GypWall partitions	D or E	C + I	H	J + K	A + B

Key: See Table 14.

**Table 14 Ultimate load values<sup>1</sup>**

Reference	General fixing method	Fixing device	Typical failure load value kN
A	Screw into plasterboard	Gyproc Drywall Screw	0.11
		No. 10 woodscrew	0.13
B	Steel pin and hook into plasterboard	Steel pin and hook	0.17
		Double pin and hook	0.33
C	Self-drill screw into metal studs	Gyproc Drywall Screw into Gyproframe S 50 stud	0.76
D	Woodscrew into timber noggings/batten	No. 12 woodscrew into timber noggings in stud cavity	4.96
E	Self-drill screw into Fixing Channel on the face of studs	Gyproc Jack-Point Screw	1.17
		No. 10 self-tapping screw	1.92
H	Rivet anchor / toggle	Rawlplug Polly-toggle (short) with No. 8 woodscrew into single layer plasterboard	0.50
		Rawlplug Polly-toggle (long) with No. 8 woodscrew into double layer plasterboard	0.80
I	Steel cavity fixing	Rawlpug M4x40 interset fixing with M4 bolt into single layer plasterboard	0.60
		Rawlpug M6x55 interset fixing with M6 bolt into double layer plasterboard	0.90
J	Cavity toggle	Rawlpug M3 Spring Toggle with M3 bolt into single layer plasterboard	0.60
		Rawlpug M3 Spring Toggle with M3 bolt into double layer plasterboard	0.90
K	Self-drill fixing	Rawlplug Metal self-drill fixing with No. 8 woodscrew into single layer plasterboard	0.20
		Rawlplug Metal self-drive fixing with No.8 woodscrew into double layer plasterboard	0.30



**Notes:**

<sup>1</sup> The pull-out loads given are based on average values achieved by the fixings in laboratory tests or as quoted by the manufacturer. The values are expressed as the typical tensile load, with failure usually caused by breakdown of the base material. To establish a permissible working load a number of influencing factors should be taken into consideration, i.e. type of load, spacing between fixings, edge distance, etc. A safety factor of 4 is considered to be suitable for the majority of situations to determine a suitable working load. The designer should be make specific reference to Rawlplug product data.

a 60 minute fire-rated **GypWall** partition accommodating up to 15mm of downward deflection is shown in '6. Construction Detailing Fig. 4'. Additional attention to detailing will be required in order to optimise sound insulation performance. Fig. 5 shows a good practice solution incorporating steel angles either side of the head and sealed to the structure, which results in only a 1-2dB loss in performance.

Similarly, where partitions cross a movement joint in a structural floor or roof slab, they should be provided with a movement joint at the same point, and be capable of the same range of movement as the floor or roof joint. **Gyproc Control Joint** provides a solution – refer to '6. Construction Detailing, Fig. 8', showing location of control joints in a double boarded **GypWall** partition.

## Hygrothermal performance

Partitions for general use in areas of **normal** humidity (with their finishes), should be capable of withstanding 25% to 65% relative humidity over a temperature range of 10°C to 25°C, and intermittent contact with water and water vapour. Partitions for use in areas of **high** humidity (with their finishes), should be capable of withstanding 25% to 100% relative humidity over a temperature range of 10°C to 25°C, and sustained contact with water and water vapour.

The temperature ranges apply to indoor ambient air temperatures in occupied buildings. More onerous conditions may be encountered in the vicinity of heating and cooking appliances where rapid changes from 0°C to 25°C have been known to coincide with humidity levels down to 25% relative humidity.

British Gypsum plasterboards will satisfy all normal humidity requirements. In areas of high relative humidity, and also in areas subject to intermittent contact with water including kitchens, hydrotherapy departments, toilets, washrooms and tiled wet use areas, the use of **Gyproc Moisture Resistant board** or **Gyproc Multi-Board** is recommended. Water vapour resistance can also be achieved by applying two coats of **Gyproc Drywall Sealer** to the face of standard plasterboards after installation and jointing.

**CasoLine GRID** exposed grid suspended ceiling system is suitable for use in conditions up to 90% RH. For conditions above 90% RH or having an aggressive atmosphere, a fully protected polyester coated non-corrosive system is available. **Casotec** tiles are suitable for use in high humidity conditions up to 100% RH at 28°C (tests to *BS 8290: Part 2: 1991*).

Where vapour control is required to prevent moisture passing through a cavity, e.g. non-perforated boards fitted into a **CasoLine MF** concealed grid suspended ceiling or lining/partition cavity with a steel framed external wall, the use of **Gyproc Duplex** plasterboard is recommended. This board has a metalised polyester vapour control membrane laminated onto the back face (as defined in *BS 1230*).

## Biological attack

Partitions should not comprise materials which promote or sustain the growth of fungi, micro-organisms, or insects. Gyproc plasterboards are suitable for all applications. **GypWall** partitions, when appropriately detailed, are therefore suitable for use in kitchen, larder, wash up or similar use areas.

## Radiological protection

Where shielding of electrical equipment is required, e.g. plant rooms, control centres and intensive care units, plasterboard laminated with KPF foil can be used. For shielding against X-rays, proprietary lead-lined plasterboards can provide the required level of protection. The lead-lined boards are normally fixed as the inner layer in a **GypWall** partition, with an additional lead infill strip being incorporated into the studs at panel joints and screw fixings to maintain continuity of lead along the joints and thus maintain the integrity of X-ray shielding. Advice on the thickness of lead required can be obtained from the National Radiological Protection Board or Hospital Physicist. For guidance on sourcing suitable board products, contact British Gypsum.

An alternative to the use of lead-lined plasterboards to provide X-ray shielding is the use of British Gypsum **Thistle X-ray** plaster. The plaster is suitable for use on masonry backgrounds and contains barytes aggregates. The performance of **Thistle X-ray** plaster has been measured by the National Radiological Protection Board, and the lead equivalence values are given in Table 15.

**Table 15 Thistle X-ray plaster – lead equivalence**

Thickness of plaster (mm)	X-ray tube potential					
	50kV	75kV	100kV	125kV	150kV	200kV
15	0.77	1.96	1.87	1.16	0.83	0.68
20	1.03	2.62	2.50	1.55	1.10	0.90
25	1.29	3.27	3.12	1.94	1.38	1.13

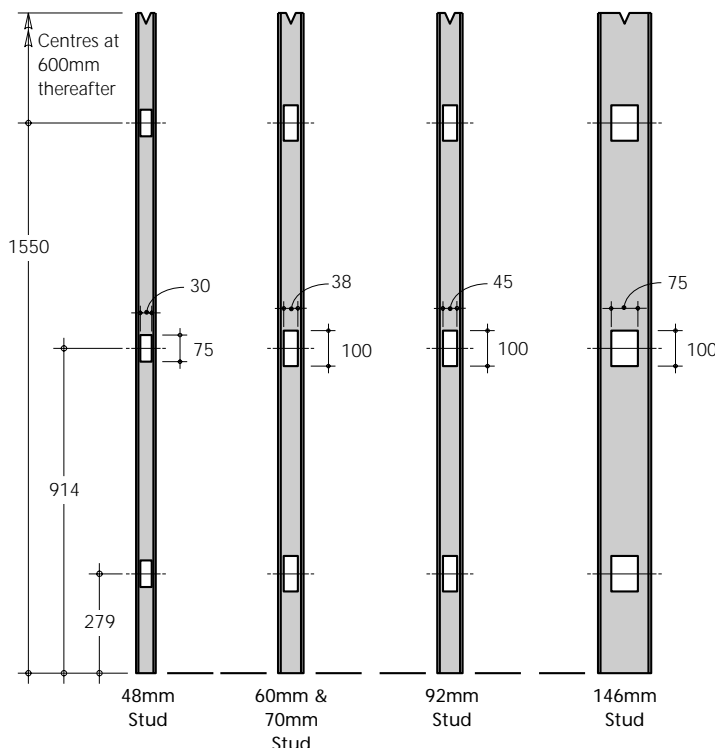
## Services accommodation

Whilst ducts and dampers are normally supported from the structure, in many situations it is possible to support these individual services from the partition or shaftwall. British Gypsum has successfully carried out fire resistance tests on an Advanced Air 1475mm x 1200mm damper weighing 57.7kg supported by a **GypWall** metal stud partition and also by **ShaftWall**. A test report and BRE Assessment are available. Contact British Gypsum for further details.

The partition cavity will accommodate electrical and piped services although the diameter of services running horizontally will be limited by the width of the stud cut-outs. Refer to Fig. 3 – Service cut-outs. Where more space is required the use of **GypWall QUIET** or **GypWall AUDIO** twin-frame constructions allow services to be routed between the braced studs.

The specification of socket boxes and switches needs attention to detailing if the fire resistance of the partition is to be maintained. Refer to '6. Construction Detailing, Figs. 9 and 10' for solutions to maintain up to 60 minutes and over 60 minutes fire resistance respectively.

**Figure 3 Service cut-outs in Gypframe studs (all dimensions in mm)**



Access to services should be provided for the purpose of maintenance and repair. **Gyproc Proflex Access Panels** have been purpose designed to provide access through metal framed systems including **GypLyner iwl** wall lining, **ShaftWall** and **CasoLine MF** suspended ceilings. The panels are fully substantiated and can provide fire resistance up to 120 minutes. Refer to The White Book, **f15**. If, for any reason, it is not possible to provide access to services, pipes should be installed in unjointed lengths. Pipes and conduits should generally be held securely in position by fixings within the cavity.

## Partial height partitions

**GypWall FREEZONE** has been developed to ease the accommodation of major ceiling service runs in healthcare buildings. Previous solutions involved cutting away supporting studs and framework, which can seriously impair structural performance. **GypWall FREEZONE** is a purpose designed, fully tested, post and transom system based on extra strength 70S15 floor to soffit posts installed at standard 3m centres. The posts are connected by a horizontal 74C12 transom, set at a height to allow services to pass above it. The space between floor and transom is then simply infilled using the appropriate **GypWall** partition system selected to provide the wall performance required. Refer to '6. Construction Detailing, Fig. 11'. In situations where fire resistance is also required then an appropriate ceiling membrane should be installed each side of the partition.

## Partial boarded partitions

When specifying a partially boarded partition the designer should obtain guidance from British Gypsum. The following general guidelines apply:

- The effective maximum height of the partition will be reduced, although the use of a **CasoLine MF** ceiling membrane will act as a brace for the partition.
- No more than one third of the partition should be unboarded.
- Extra Deep Flange Channel (EDC) must be used at the soffit and each stud must be fixed to the extra deep channel. Where deflection is specified special detailing is required.
- Gypframe stud should be used to support board free-ends.
- A cavity barrier will be required to close the partition.

## Soffit linings

Multi-storey or basement car parks may require soffit linings. HTM 81 gives specific guidance on the additional requirements for car parks in respect of containing fire spread (low risk) and providing adequate ventilation. Where durable soffit linings are specified, **Gyproc Multi-Board** will form a basic lining and **Glasroc SoffitLine** provides a thermal lining. Both linings have inherent moisture resistance, are non-combustible and are suitable for semi-exposed situations. They also provide a benefit in poorly lit areas due to their good light reflectance properties.

## 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 sound insulation performance criteria. Linings and junctions can be further enhanced using cornices and aluminium trims. The following points should be considered:

**Jointing** – Gyproc jointing materials produce a smooth, continuous, crack-free lining surface ready for priming and final decoration. A range of specifications is available to suit the board type, method of application, and site preference. Refer to The White Book, **n15**. The use of **Gyproc PaintLess** joint cement reduces the contrast between the jointed areas and the plasterboard liner which benefits subsequent decoration.

**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.

**Delayed finishing** – where a delay between drylining and decoration is expected, the use of **Gyproc UltraLine** minimises the risk of UV staining to the plasterboard surface and thus improves the final appearance.

**Wet use areas** – where ceramic tiles are applied to plasterboard linings in areas of intermittent wet use, e.g. showers, **Gyproc** moisture resistant boards should be specified as the

lining. Refer to The White Book, **n20**. Ceramic tiles up to 12.5mm thick with a maximum weight of 32kg/m<sup>2</sup> can be applied using thin bed adhesives. Stud framing centres should be reduced to 400mm.

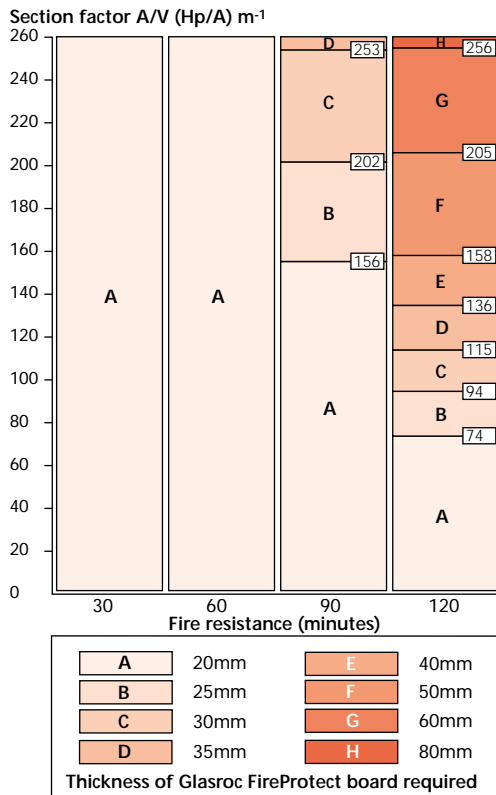
**Cornices** – **Gyproc Cove** or **Cornice** profiles will relieve the plain, boxy look at wall/concealed grid ceiling junctions. In large areas the profiles can be used in combination with steps or bulk heads.

**Recessed detailing** – edge and door reveals can be achieved using **Gyproc Styletrim** BGM 105/106 (edges) and BGM 116 (doors). Recessed skirting can be formed using **Gyproc Styletrim** BGM 107. Refer to The White Book, **n30**.

**Impact resistance** – in high traffic areas **Gyproc UltraLine** will provide severe duty single layer partitions and linings. Consider using **Gyproc DuraLine xl** or **UltraLine** boards as the face layer in multiple board linings (refer to '5. Specification Solutions, Partitions'). **Gyproc Styletrim** Hollows (BGM 109) and Rounds (BGM 110) provide added protection at corners. **Styletrim Bullnose** (BGM 112) protects stop-ends and **Styletrim Skirting** (BGM 107) provides added protection against foot traffic and low level impacts, scuffs and scrapes.

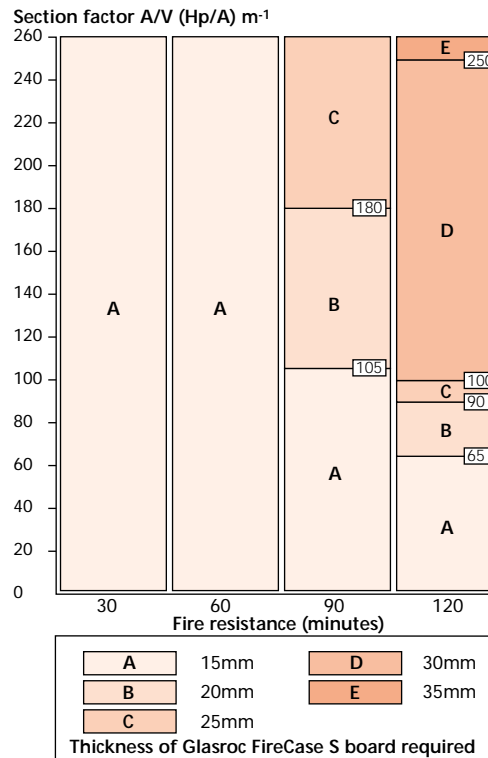
## Fire protection to structural steel

**Table 1 Cladding selector chart for the FireProtect system - failure temperature 550°C**

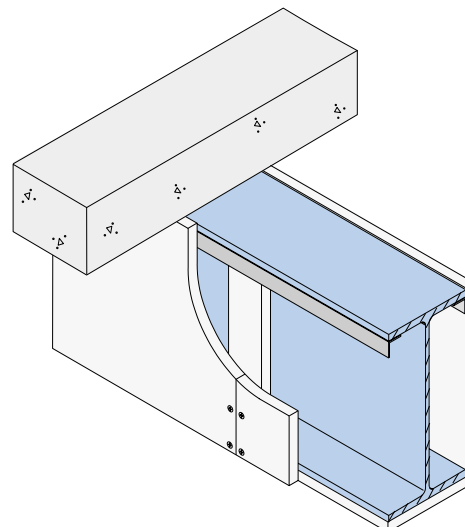
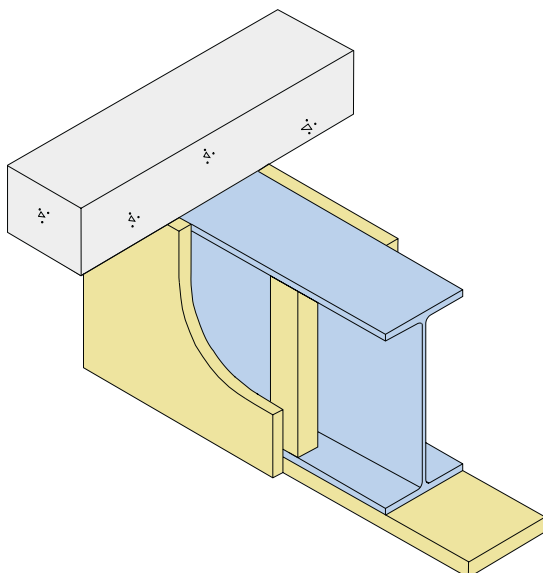


**Specification clause:** NBS work section K10 with assistance of British Gypsum Specification Guide SG 1096  
**Substantiation:** Report D120010 refers

**Table 2 Cladding selector chart for the FireCase system - failure temperature 550°C**



**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



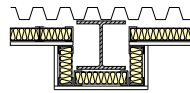
**Table 3 Section factor A/V (Hp/A) values**

Serial size mm	Mass / metre kg	3 sides m <sup>-1</sup>	4 sides m <sup>-1</sup>
<b>Universal beams</b>			
457 x 191	98	90	105
	89	100	115
	82	105	125
	74	115	135
	67	130	150
457 x 152	82	105	120
	74	115	130
	67	125	145
	60	140	160
	52	160	180
406 x 178	74	105	125
	67	115	140
	60	130	155
	54	145	170
406 x 140	46	160	185
	39	190	220
356 x 171	67	105	125
	57	125	145
	51	135	165
	45	155	185
356 x 127	39	170	195
	33	195	225
305 x 165	54	115	140
	46	130	160
	40	150	180

305 x 127	48	125	145
	42	140	160
	37	155	180
305 x 102	33	175	200
	28	200	225
	25	225	260
254 x 146	43	120	150
	37	140	170
	31	160	200
<b>Universal columns</b>			
305 x 305	283	30	40
	240	35	45
	198	40	50
	158	50	65
	137	55	70
	118	60	85
	97	75	100
254 x 254	167	40	50
	132	50	65
	107	60	75
	89	70	90
	73	80	110
203 x 203	86	60	80
	71	70	95
	60	80	110
	52	95	125
	46	105	140
152 x 152	37	100	135
	30	120	160
	23	155	205

## Fire resistant external wall linings

**Table 4 GypLyner wall forming wall linings to structural steel in association with external sheet cladding<sup>1</sup>**



**Specification:** Single or double layer board to one side of a Gypframe I Stud framework<sup>4</sup> 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/m <sup>2</sup>	Fire resistance <sup>3</sup> mins		Duty rating	Performance substantiation report
		integrity	insulation <sup>2</sup>		
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	UB216500
2 x 12.5mm Gyproc FireLine	21	90	60	Severe	B216027
2 x 15mm Gyproc FireLine	26	90	60	Severe	B216028

### Notes

- 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.
- 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.
- 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<sup>-1</sup>. Refer to the data below.
- Heights up to 7200mm are possible. Refer to The White Book, [b21](#), Maximum heights table.


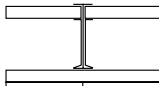
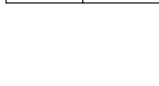
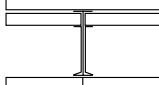
### Fire protection to structural steel

	Lining thickness mm	Fire resistance <sup>5</sup> mins	Section factor A/V (Hp/A) m <sup>-1</sup>
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	90	Up to 200
	2 x 15	90	Up to 260
Gyproc FireLine	2 x 15	120	Up to 110

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

## Fire protected shafts, service risers and stairwalls

Table 5 Fire protected shafts, service risers and stairwalls

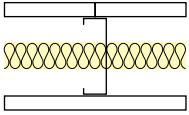
Construction	Nominal overall thickness mm	Approx. weight kg/m <sup>2</sup>	Rec'd max. height <sup>1</sup> mm	Fire resistance <sup>2,3</sup> minutes	No insulation	Laboratory sound insulation <sup>3</sup> 100 - 3150Hz, R <sub>w</sub> dB Sealed structure + 25mm Isowool 1200	
	<b>ShaftWall</b>						
70mm I Stud framework with one layer of 15mm Gyproc FireLine <b>Performance substantiation report: Based on A306001/010</b>	87	30	4200	60	39	42	
	70mm I stud framework with two layers of 12.5mm Gyproc FireLine <b>Performance substantiation report: Based on A306002/012</b>	97	39	4400	90	40	44
	70mm I stud framework with two layers of 15mm Gyproc FireLine <b>Performance substantiation report: Based on A306003/023</b>	102	43	4500	120	42	45
	<b>StairWall</b>						
70mm I stud framework with one layer of 12.5mm Gyproc FireLine on each side <b>Performance substantiation report: Based on A306046/048</b>	97	39	4400	90	42	45	
70mm I stud framework with one layer of 15mm Gyproc FireLine on each side <b>Performance substantiation report: Based on A306047/049</b>	102	43	4400	120	42	47	

**Notes:**

- Based on a limiting deflection of L/240 at 200Pa. In practice the maximum height will be dependent upon the allowable deflection (i.e. L/125, L/240, L/360) and the specified air pressure (generally in the range 200 - 650Pa). Refer to The White Book [a30](#) for full performance data or contact British Gypsum with the deflection and pressure criteria to be satisfied.
- The temperature of exposed metal may exceed the requirements of *BS 476: Part 22: 1987* within the fire test period, and therefore relaxation should be sought from the approving Authority on the basis that no combustible materials are likely to be stored adjacent to the structure. In situations where the full period of insulation is required, contact British Gypsum.
- The fire resistance and sound insulation performances are for imperforate walls incorporating tapered edge boards with all joints taped and filled according to British Gypsum's recommendations.

## Partitions and walls

Table 6 Partitions and walls

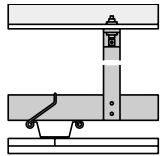


Partition type	Acoustic Zone		Thickness mm	Fire resistance minutes	Lab sound 100-3150Hz R <sub>w</sub> dB	Partition duty
	HTM 2045	HTM 56				
GypWall robust: Gypframe (70S70) Stud with Gyproc DuraLine xl each side <b>Performance substantiation report: Q606025</b>	1	C	98	30	41	Heavy
GypWall: Gypframe (70S70) Stud with 2 x 12.5mm Gyproc Wallboard each side <b>Performance substantiation report: A206026</b>	2	D	122	60	45	Severe
GypWall ultra: Gypframe (70AS50) AcouStud with Gyproc UltraLine each side <b>Performance substantiation report: UA206A501</b>	2	D	102	60	45	Severe
GypWall robust: (70S70) + 25mm Isowool 1200 <b>Performance substantiation report: Q606019</b>	2	D	98	60	47	Heavy
GypWall: Gypframe (70S70) Stud with 2 x 12.5mm Gyproc SoundBloc each side <b>Performance substantiation report: A206166</b>	3	E	122	60	50	Severe
GypWall robust: Gypframe (70AS50) AcouStud + 50mm Isowool 1200 in cavity with DuraLine xl each side <b>Performance substantiation report: Q606A027</b>	3	E	98	60	50	Heavy
GypWall ultra: Gypframe (70AS50) AcouStud + 50mm Isowool in cavity with Gyproc UltraLine each side <b>Performance substantiation report: UA206A500</b>	3	E	102	60	50	Severe
GypWall: Gypframe (70S70) Stud + 25mm Isowool 1200 in cavity with 2 x 15mm Gyproc Wallboard each side <b>Performance substantiation report: A206048</b>	3	E	132	90	50	Severe
GypWall: Gypframe (70S70) Stud + 25mm Isowool 1200 in cavity with 2 x 12.5mm Gyproc SoundBloc each side <b>Performance substantiation report: A206198</b>	3	E	122	60	52	Severe
GypWall ultra: Gypframe (146AS50) AcouStud with Gyproc UltraLine each side <b>Performance substantiation report: UA206A503</b>	3	E	178	60	50	Severe
GypWall robust: Gypframe (146AS50) AcouStud + 50mm Isowool 1200 in cavity with Gyproc DuraLine xl each side <b>Performance substantiation report: Q606A037</b>	4	>F	174	60	55	Heavy
GypWall ultra: Gypframe (146AS50) AcouStud + 50mm Isowool 1200 in cavity with Gyproc UltraLine each side <b>Performance substantiation report: UA206A502</b>	4	>F	178	60	55	Severe
GypWall (70S70) with 2x15mm Gyproc SoundBloc each side + 50mm Isowool 1200 <b>Performance substantiation report: A206231</b>	4	>F	132	90	56	Severe
GypWall robust: Gypframe (70AS50) AcouStud + 25mm Isowool 1200 in cavity with inner layer 12.5mm Gyproc SoundBloc, outer layer Gyproc Duraline xl <b>Performance substantiation report: Q606A038</b>	4	>F	123	90	58	Severe
GypWall robust: Gypframe (70AS50) AcouStud + 50mm Isowool 1200 in cavity with inner layer 15mm Gyproc SoundBloc, outer layer Gyproc Duraline xl <b>Performance substantiation report: Q606A039</b>	5	>F	132	90	60	Severe
GypWall robust: Gypframe (146AS50) AcouStud + 100mm Isowool 1200 in cavity with inner layer 15mm Gyproc SoundBloc, outer layer Gyproc Duraline xl <b>Performance substantiation report: Q606A040</b>	6	>F	204	90	65	Severe
GypWall audio: Gypframe 2 x (92S10) Studs + 100mm Isowool 1000 in cavity with inner layer 12.5mm Gyproc SoundBloc, outer layer Gyproc Duraline xl <b>Performance substantiation report: Q326004</b>	6	>F	300	90	67	Severe
GypWall audio: Gypframe 2 x (92S10) Studs + 100mm Isowool 1000 in cavity with inner layer 19mm Gyproc Plank, outer layer Gyproc DuraLine xl <b>Performance substantiation report: Q326003</b>	7	>F	300	90	70	Severe

## Suspended ceilings

**Table 7 Suspended ceilings – Concealed grid, fire-rated ceiling membranes**

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



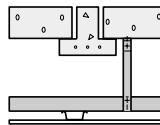
**Specification:** Fire protection to steel beams<sup>1</sup> supporting concrete floors.

Ceiling Boards	Approx weight kg/m <sup>2</sup>	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

- <sup>1</sup> 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<sup>-1</sup> 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.

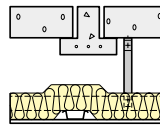
**Table 8 Suspended ceilings – Concealed grid, fire-rated ceiling membranes**

CasoLine MF ceiling providing sound insulation to concrete floors<sup>1</sup>



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

Ceiling Boards <sup>2</sup>	Approx weight kg/m <sup>2</sup>	Floor depth mm	Lab sound (100-3150 Hz) airborne R <sub>a</sub> dB	impact L <sub>w</sub> 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 <sup>2</sup>	Approx weight kg/m <sup>2</sup>	Floor depth mm	Lab sound (100-3150 Hz) airborne R <sub>a</sub> dB	impact L <sub>w</sub> 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

- <sup>1</sup> Normal fixing centres for MF5s and MF7s (450 and 1200mm respectively).  
<sup>2</sup> Other Gyproc board specifications are available. Contact British Gypsum for guidance.

**Table 9 Suspended ceilings/Exposed grid**

CasoLine GRID

Ceiling tile	Acoustic zone	Absorption coefficient α <sub>w</sub>	Fire resistance <sup>1</sup> minutes	Humidity tolerance
CasoLine FINA, ROC, BIANCA, STAR, FORTE	1	–	30	Normal
CasoLine FINA, ROC, BIANCA, STAR + 100mm Isowool 1000	2	–	30	Normal
CasoLine VOICE	–	0.55	–	Normal
Casotec	1	–	60	Severe
Decogips (all styles)	1	–	30	Normal
Decogips (all) + 100mm Isowool 1000	2	–	30	Normal
Gyprex SATINSPAR	1	–	–	Normal
Gyptone BASE 31 and BASE 33	1	–	–	Normal
Gyptone QUATTRO 20, 22, 55 + 100mm Isowool 1000	1	–	–	Normal
Gyptone POINT 12	1	0.40	–	Normal
Gyptone QUATTRO 22	1	0.45	–	Normal
Gyptone LINE 4, 8; QUATTRO 20, 55; POINT 11, 15	1	0.65	–	Normal

**Notes:**

- <sup>1</sup> Fire resistance value quoted is in terms of *BS 476: Part 23* protection to steel beams supporting a concrete floor, and does not cover the system for use as a ceiling membrane.

**Table 10 Suspended ceilings – HTM 60 criteria**

**Solutions**

Performance category	CasoLine MF concealed grid - board options	CasoLine GRID exposed grid - board options
1	N/A	N/A
2	N/A	Casotec <sup>1</sup>
3	Wallboard, SoundBloc FireLine, Multi-Board	Gyprex Casoprano <sup>2</sup> Casotec <sup>1</sup>
4 / 6	Wallboard, SoundBloc FireLine, Multi-Board Gyptone boards	Gyprex Casoprano <sup>2</sup> Decogips Gyptone tiles and planks <sup>2</sup> Casotec <sup>1</sup>
5	Wallboard, SoundBloc FireLine, Multi-Board	Gyprex Casoprano <sup>2</sup> Decogips Casotec <sup>1</sup>

**Activity areas**

Minimum performance category <sup>3</sup>	Activity area
1	Treatment rooms (major), Operating theatres and Intensive care
2	Treatment rooms (resuscitation), Toilets and Bathrooms
3	Treatment rooms (general), Pantries, Examination rooms
4	Circulation spaces
5	Speech therapy, Single-bed and Multi-bed wards, Day rooms, Nurseries, Utility rooms
6	Consulting rooms, Offices, Seminar rooms, Plant motor rooms

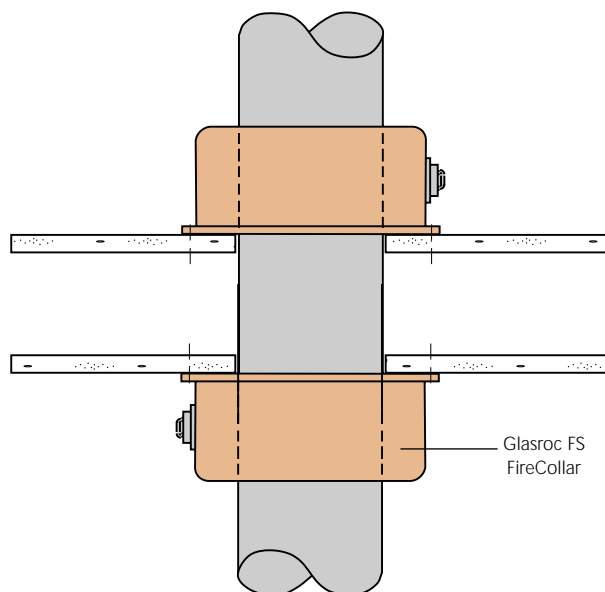
**Notes:**

- <sup>1</sup> Casotec tiles are suitable for use in high humidity conditions (up to 100% RH at 28°C) in areas such as shower rooms and hydrotherapy units
- <sup>2</sup> Casoprano voice and perforated Gyptone tiles and planks provide sound absorption

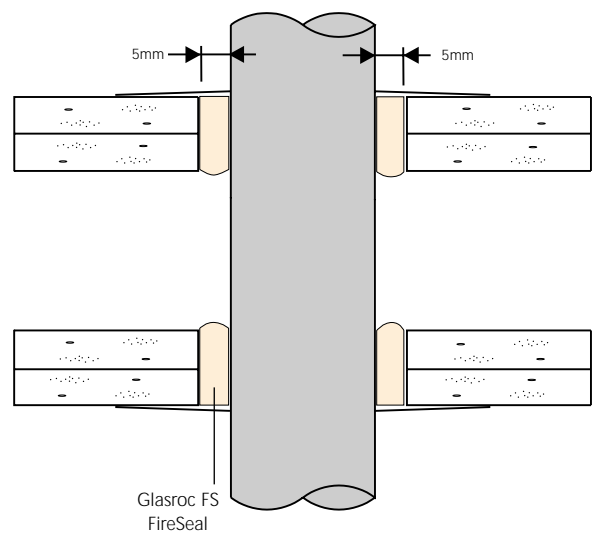
- <sup>3</sup> Activity areas with their minimum performance categories adapted from HTM 60

## 6. Construction Details

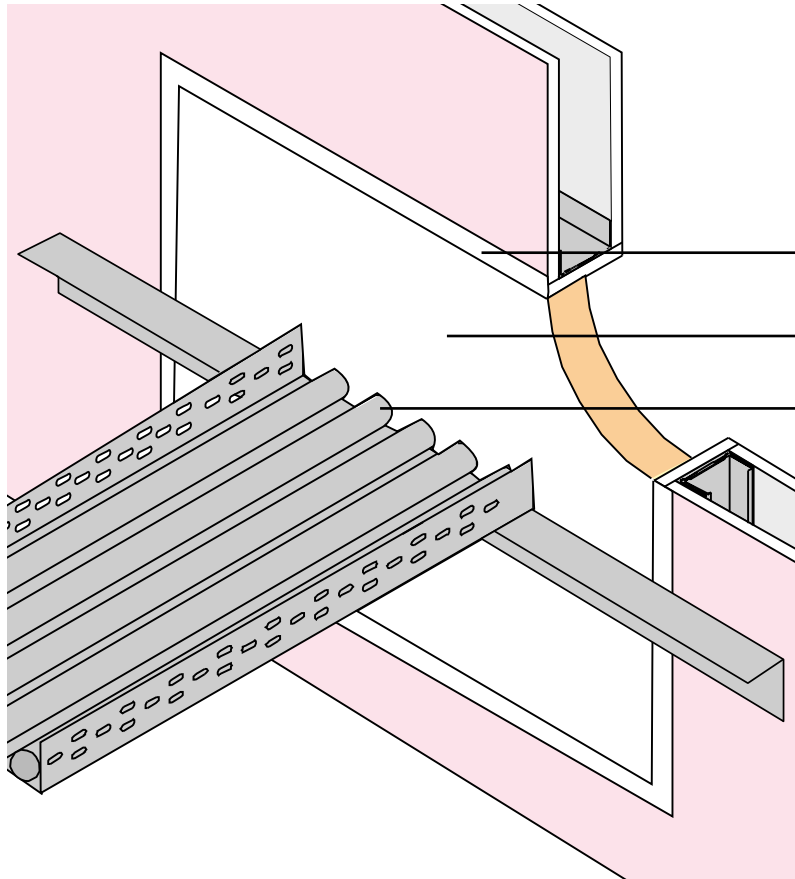
### Key detailing



**Figure 1 uPVC combustible pipe penetration fitted with Glasroc FS FireCollar**



**Figure 2 Steel pipe penetration**



**Figure 3 Cable tray and trunking  
- 120 minutes fire resistance**

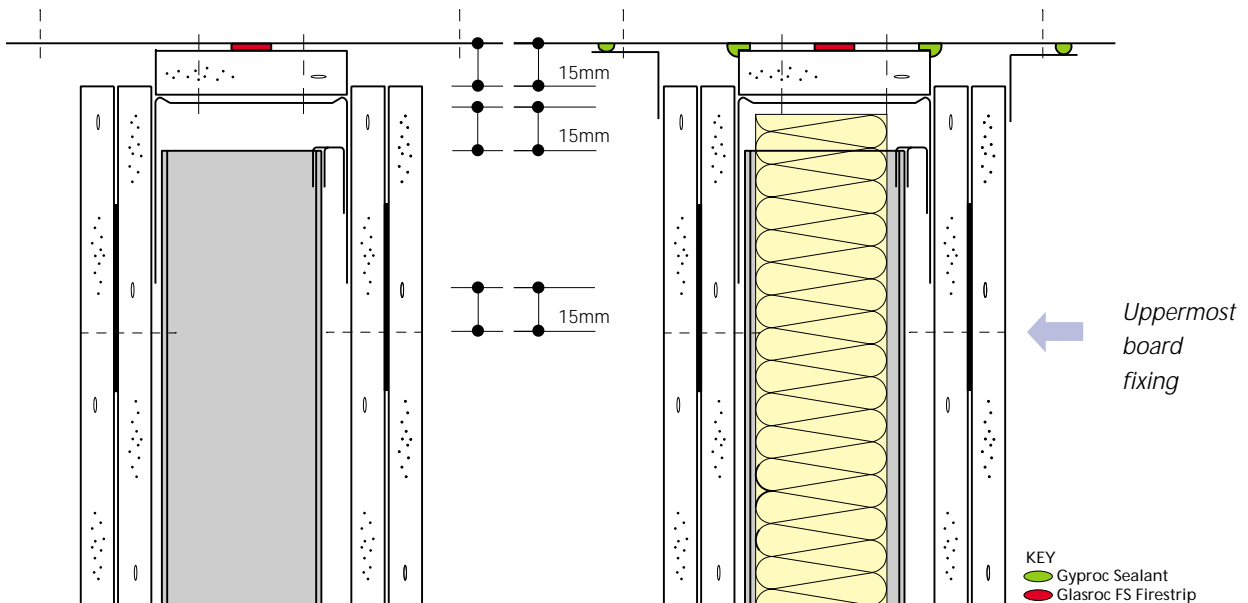
25mm Glasroc FS FireCoat

Glasroc FS FireBarrier

All gaps around services are fully sealed with Glasroc FS FireSeal

**Figure 4 60 minute fire-rated deflection head, 15mm downward deflection**

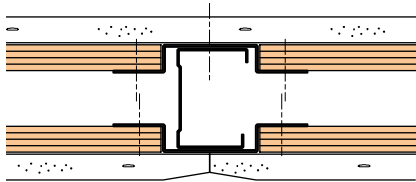
**Figure 5 60 minutes fire-rated deflection head with minimal loss in acoustic performance. Accommodates 15mm downward deflection**



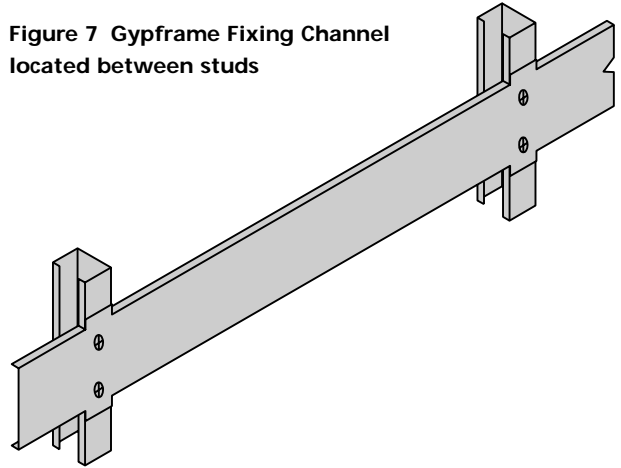
Uppermost board fixing

KEY  
Gyproc Sealant  
Glasroc FS Firestrip

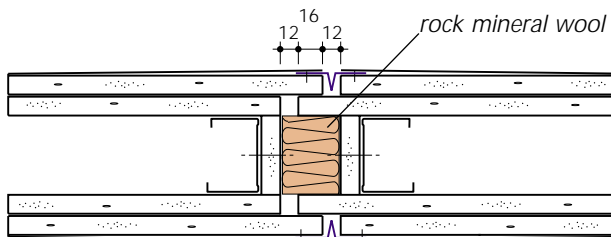
**Figure 6 Method of supporting plywood grounds**



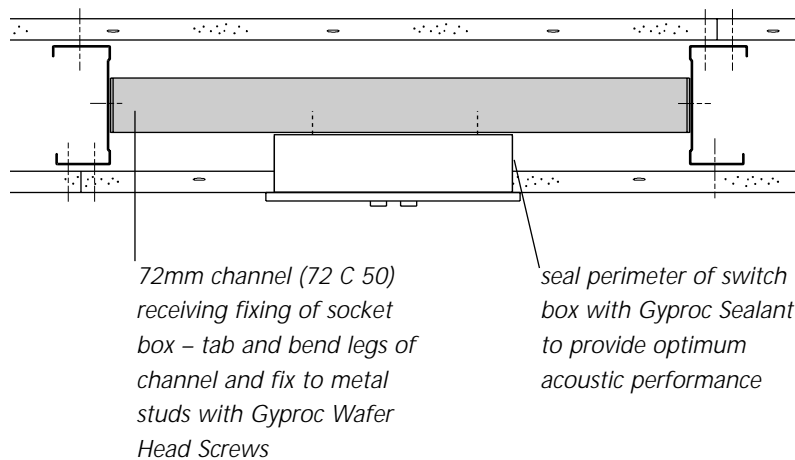
**Figure 7 Gypframe Fixing Channel located between studs**



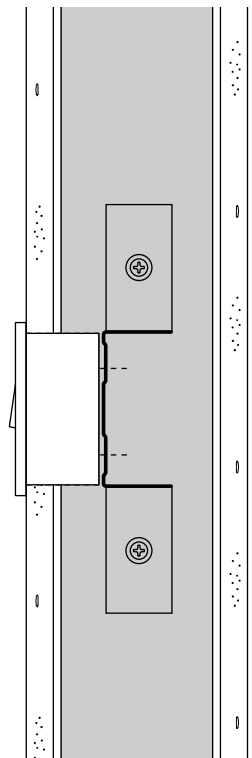
**Figure 8 Gypframe Control Joint in a double boarded GypWall partition**



**Figure 9a Socket box/switch detail providing up to 60 minutes fire resistance (plan view)**

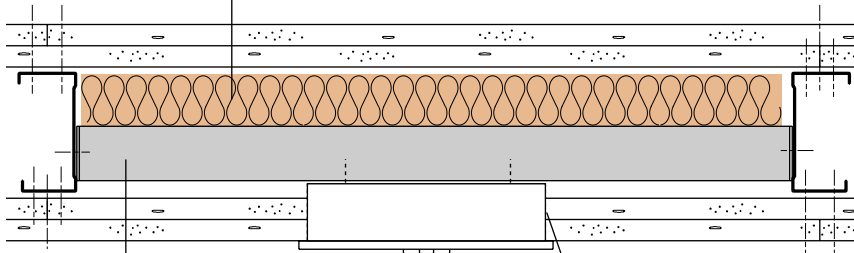


**Figure 9b Socket box/switch detail providing up to 60 minutes fire resistance (cross section view)**



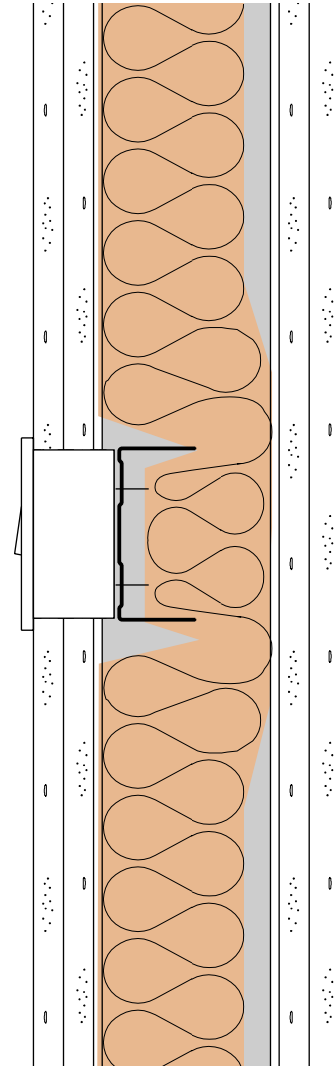
**Figure 10a Socket box/switch detail providing over 60 minutes fire resistance (plan view)**

*rock mineral wool (80kg/m<sup>3</sup>)  
backing to socket box*

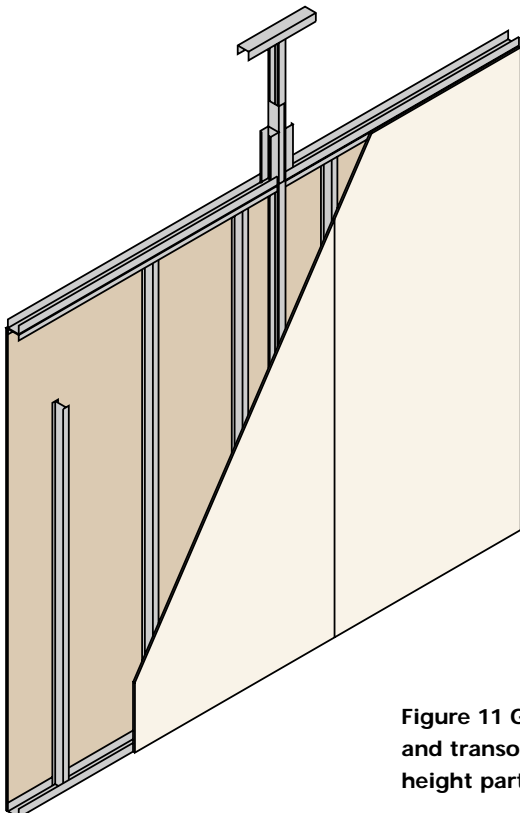


*72mm channel (72 C 50)  
receiving fixing of socket  
box – tab and bend legs of  
channel and fix to metal  
studs with Gyproc Wafer  
Head Screws*

*seal perimeter of switch  
box with Gyproc Sealant  
to provide optimum  
acoustic performance*



**Figure 10b Socket box/switch detail providing over 60 minutes fire resistance (cross section view)**



**Figure 11 GypWall FREEZONE post and transom system for partial height partitions.**