

Background and theory





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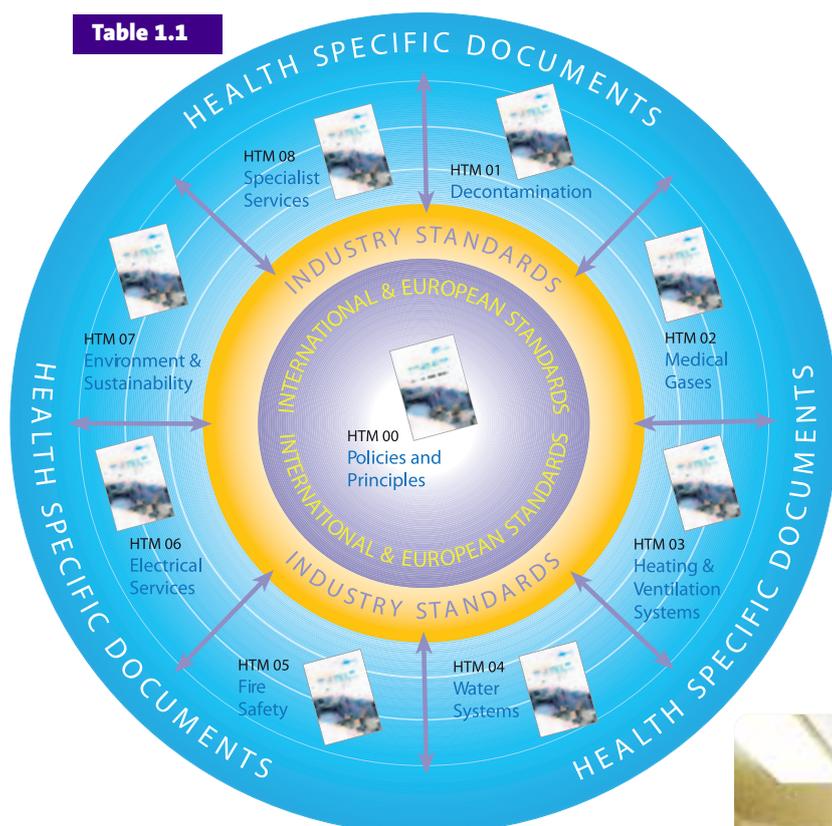
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Introduction

The changing face of healthcare in the United Kingdom will place even greater emphasis on the need for estates and services to provide the capability to meet the clinician's needs and the patient's aspirations in the 21st Century.

A strategic approach to creating the resilience required in the NHS Estate has prompted a review of the Health Technical Memorandum (HTM) documents that will provide the appropriate guidance within nine core subject areas, as shown in **Table 1.1**.

Table 1.1



Source: HTM 08-01 – Acoustics

As the UK's leading supplier of internal wall and ceiling systems, British Gypsum is dedicated to the provision of innovative treatment and care environments that encourage rest and recovery.

British Gypsum works closely with specifiers, contractors and clients to ensure that its range of systems provide consistently high quality environments that offer the best whole-life value for money.

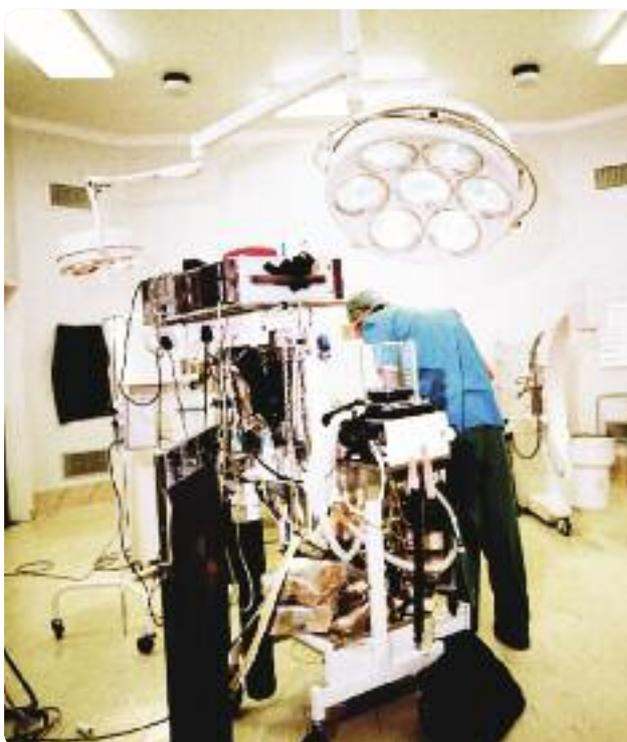
This guide details a portfolio of drylining systems developed specifically to meet the requirements of modern healthcare buildings.

It also takes the specifier through the regulations and guidance that should be taken into account in order to specify the appropriate internal solution to meet and exceed the requirements.

All constructions that feature in this guide have been extensively tested and have a proven track record in healthcare buildings. It is important to note that the system solutions and specifications presented in this guide are intended for guidance purposes and are British Gypsum's interpretation of regulatory and guidance requirements. The guide should be read in conjunction with the Health Technical Memorandums, Health Building Notes, and Building Regulations Approved Documents (or the Scottish Technical Standards for Scotland).

This guide includes solutions for:

- Internal partitions – airborne sound insulation between spaces, fire resistance and duty ratings
- Wall linings – sound insulation and thermal performance
- Separating floors and ceilings – airborne and impact sound insulation between spaces and fire resistance
- Acoustic ceilings – reverberation time and acoustic absorption
- Encasements – fire protection





SpecSure®

Unique to British Gypsum, the SpecSure® lifetime system warranty is designed to give you total confidence that the systems you have chosen will meet the most rigorous of building requirements.

All of our systems are developed using the highest quality components designed to work together, and are specially developed to give you a lifetime of confidence.

SpecSure® is more than just a performance warranty. It means that the British Gypsum systems you specify:

- ▶ Have a guaranteed lifetime performance.
- ▶ Have the technical expertise and experience of the UK's leading drywall specialists behind it.
- ▶ Have been tested in UKAS-accredited fire, acoustic and structural test laboratories.
- ▶ Have been site tested to demonstrate installation integrity and simplicity.
- ▶ Will be supported at every stage of the project by the UK's leading on and off-site technical support personnel.
- ▶ Will perform to published parameters throughout the life of each system.
- ▶ Will be repaired or replaced by British Gypsum in the unlikely event of system failure attributed to unsatisfactory product / system performance.



Acoustics

Good acoustic design is fundamental to the quality of healthcare buildings. The control of unwanted noise improves patient privacy, dignity and sleep patterns; all key conditions for healing. Good acoustic design also increases the morale and comfort of healthcare professionals.

This guide was developed in conjunction with the guidance provided in the **Health Technical Memorandum HTM 08-01: Acoustics**. HTM 08-01 covers the acoustic design criteria that are important for healthcare premises. This guide will lead you through the acoustic requirements for each internal element, providing solutions for:

- Sound insulation between rooms
- Attenuation of external sound to reduce the effects on the individuals within the building
- The control of reverberation through the properties of acoustically absorptive materials

Each section of this guide will explain the calculation process to arrive at the acoustic requirement for the specific building element, according to HTM 08-01. British Gypsum recommends that a qualified acoustic consultant be appointed to check all acoustic specifications, details and calculations made.

Applying Thistle Multi-Finish to certain GypWall partition systems

Applying 2mm Thistle Multi-Finish to both sides of certain GypWall partitions has a positive effect on the sound insulation rating. This is effective on partitions that are limited by their high frequency performance (coincidence region).

The application of Thistle Multi-Finish also adds mass to the partition which has a positive effect on the mid-frequency region of the spectrum.

For more information on the principles of acoustics, please refer to HTM 08-01, *BS 8233 – The code of practice for sound insulation and noise reduction for buildings*, and the British Gypsum **WHITE BOOK** Basic principles section, available to download from www.british-gypsum.com

Fire prevention and resistance

Healthcare buildings are complex by nature and present particularly challenging environments when it comes to fire safety and planning, where patients have a high dependence on the staff for their wellbeing.

There are about 6,000 fires every year in NHS buildings and fire safety engineering has to consider a wide range of environments and uses including large hospitals, ambulatory units, diagnostic and treatment centres etc. It is necessary to greatly reduce the risk of fires occurring in healthcare buildings and when a fire does occur, reduce the risk of it spreading.

Guidance comes from FIRECODE, which has undergone a review and replacement - under the guidance of the National Fire Policy Advisory Group (NFPAG) - of existing HTMs. The new suite of FIRECODES is set out in **Table 1.2**.

Building Regulations Approved Document B

All new building work in healthcare premises is subject to approval under the building regulations.

B2: To ensure fire spread over the internal linings of the buildings is inhibited.

B3: To ensure the stability of buildings in the event of a fire; to ensure that there is sufficient degree of fire separation within buildings and between adjoining buildings to inhibit the unseen spread of fire and smoke in concealed spaces in buildings.

For Scotland, section 2 of the non-domestic Technical Handbook is relevant.

The fire resistance and sound insulation performances in this guide are for imperforate partitions, walls and ceilings incorporating boards with joints taped and filled, or skimmed according to British Gypsum's recommendations. The quoted performances are achieved only if British Gypsum components are used throughout, and the Company's fixing recommendations are strictly observed.

Health Technical Memorandum 05-02

Health Technical Memorandum 05-02 came into effect from April 2007 and is a code of practice that recognises the special requirements of fire precautions in the design of healthcare premises. The document provides guidance on the design of fire precautions in new healthcare buildings and major extensions to existing healthcare buildings.

Table 1.2 - FIRECODES

HTM 05	
01	Managing healthcare fire safety
02	Guidance in support of functional provisions
03	Operational provisions
• Part A	General fire precautions
• Part B	Fire detection and alarm systems
• Part C	Textiles and furnishings
• Part D	Commercial enterprises
• Part E	Escape lifts
• Part F	Arson prevention
• Part G	Laboratories
• Part H	Reducing unwanted fire signals
• Part L	Fire statistics

Source: HTM 05

Sustainability

Sustainable design of healthcare buildings

The Government has focused its capital investment in healthcare buildings on the creation of advanced, eco-efficient buildings, which allow for significant savings on running costs as well as a reduced impact on the environment.

British Gypsum recognises that manufacturing and construction is often perceived to make heavy demands on the environment. We have committed to minimising our impact on valuable natural resources, striving to provide products and systems that enable customers to build in a more sustainable and responsible way.

Delivering sustainable buildings relies on the balancing of social, environmental and economic objectives. Our sustainability programme highlights the importance of environmental management, it focuses on the conservation of the environment and natural resources through a managed programme of waste reduction, pollution prevention, energy efficiency and the manufacture of sustainable construction products and systems. Although environmental management is a key concern our programme also covers the social and economic pillars of sustainability.

Waste hierarchy process



Source: Environment Agency

Waste management

In developing a waste management strategy, the waste hierarchy framework has become the cornerstone for sustainable waste management, setting out the order in which options for waste management should be considered based on environmental impact.

Waste costs are usually calculated based on the costs to recycle or send to landfill. There are, however, a number of hidden costs that need to be taken into account including:

- Initial material costs
- Labour cost to load excess material into the building
- Labour cost to remove waste from the building

The total cost of waste is a lot higher than the cost of removal. As a result, British Gypsum works closely with customers to eliminate and reduce waste before it enters the site. Some of the many ways British Gypsum can help include:

Eliminate: Best practice design assistance at specification stage, installer training and value engineering.

Reduce: Designing out waste in specifications (see *Detail 13 - Alternative door frame to satisfy BS 5324: Parts 1 & 2: 1992 - Heavy and Severe Duty* on page 49), the use of bespoke product sizes and on-site technical support.

Re-use: Reduced board types on-site making off-cuts easier to use.

Recycle: Recycling and reclamation through the Plasterboard Recycling Service.

Environmental Management - ISO 14001: 2004

As part of our drive to continuously improve our performance, we have invested significant resource in developing environmental management systems; ISO 14001: 2004 certified to International Organisation for Standardisation.

In preparation for Integrated Pollution Prevention and Control regulations in 2006, we developed our environmental management systems to bring them in line with the internationally accepted ISO 14001 standard. In November 2008 British Gypsum became the first plaster and plasterboard manufacturer to achieve ISO 14001: 2004 certification across all of its manufacturing and mining sites in the UK.

This certification emphasises the stringent environmental standards maintained across the business and will enable British Gypsum to support customers by clearly demonstrating its use of sustainable construction products as advocated by BREEAM, the Code for Sustainable Homes and the BRE Green Guide.

Part of British Gypsum's sustainability strategy is to optimise the use of recycled and reclaimed raw materials in the manufacture of products, designing them to minimise unnecessary waste, and to provide facilities to reclaim and recycle post-consumer waste.

Recycled content of plasterboard

British Gypsum's gypsum-based plasterboards and ceiling products have a very high recycled content, as detailed below:

- The products are manufactured using gypsum sourced largely as synthetic DSG (desulphogypsum), a by-product of the flue gas desulphurisation process at coal-fired power stations.
- Plasterboard is a highly sustainable product; new plasterboard may have a recycled content of almost 90% and nearly all plasterboard is 90% recyclable after use. As a result, plasterboard often has the highest recycled content of any construction products in new buildings.
- Although the maximum for recycled plasterboard content into remanufacture is currently at 18% it is possible this figure will improve in the future as new recycling technology and techniques become available.
- The paper liners on our plasterboards are made from 97% recycled paper and cardboard.



Plasterboard Recycling Service

British Gypsum leads the UK drywall industry in recycling plasterboard waste, reducing the pressure on landfill and preserving gypsum reserves. We are the only gypsum company with dedicated plasterboard recycling facilities in the UK. The British Gypsum Plasterboard Recycling Service is responsible for recycling over 75% of all the plasterboard waste recycled into new plasterboard in the UK.

We have invested heavily to expand the availability of our service, which not only significantly reduces waste handling costs and saves precious raw materials, but also improves site safety for the contractor through better site housekeeping.

We have also been instrumental in the development of the Ashdown Agreement working with the GPDA¹ and WRAP², delivering a voluntary commitment by UK plasterboard manufacturers to significantly reduce, and ultimately eliminate, plasterboard manufacturing waste to landfill.

For more information, please contact the Plasterboard Recycling Service Customer Service Centre -
T: 0800 6335040.

¹ Gypsum Products Development Association.

² Waste Resources Action Programme.

The Building Research Establishment Environmental Assessment Method (BREEAM) for Healthcare

This method was created to ensure that construction projects meet high standards of environmental performance without prescribing specific designs. BREEAM: healthcare 2008 superseded NEAT as of 1st July 2008 as the recognised environmental assessment tool for healthcare buildings. All compliance requirements are inspected by BRE licenced assessors.

BREEAM building assessments are high on the agenda of the regulatory organisations that have a stakehold interest in the healthcare sector.

Since 1st July 2008, the Department of Health has required, as part of the Outline of Business Case approval, that as a minimum, all new builds achieve Excellent and all refurbishments achieve Very Good rating under BREEAM: healthcare.



Table 1.3 - BREEAM healthcare rating scale

BREEAM rating	Score required (Design stage & Post Construction Review)
UNCLASSIFIED	<30
PASS	≥30
GOOD	≥45
VERY GOOD	≥55
EXCELLENT	≥70
OUTSTANDING	≥85

Source: BREEAM: healthcare 2008 Assessor Manual

BREEAM: healthcare can be used to assess all healthcare buildings containing medical facilities, and at different stages of their lifecycle:

- New-build
- Major refurbishments
- Extensions
- Existing buildings in operation

The draft Strategy for Sustainable Construction Consultation Paper (July 2007) states the long-term objective that 100% of new-build projects on government estate achieve a BREEAM rating of 'EXCELLENT'. See Table 1.3 for more information.

Points can be obtained for many of the BREEAM criteria through the incorporation of British Gypsum systems. Table 1.4 refers to the same key areas.

Table 1.4

Credit reference

Solutions and support

Maximum potential credits

Man 11 Ease of maintenance	<ul style="list-style-type: none"> • Durable solutions such as GypWall EXTREME and Thistle Durafinish will improve planned maintenance cycles 	1
Hea 2 Indoor air quality	<ul style="list-style-type: none"> • ACTIVair products could contribute towards points as part of an indoor air quality and testing plan 	2
Hea 13 Acoustic performance meeting or exceeding the requirements of HTM 08-01	<ul style="list-style-type: none"> • High acoustic performance floor, ceiling and partition systems • UKAS accredited test data for all systems. • Specification assistance 	2
Ene 1 Reduction of CO ₂ emissions	<ul style="list-style-type: none"> • Air tightness detailing assistance. • External envelope performance improvement 	15
Mat 1 Materials specification (major building elements)	<ul style="list-style-type: none"> • Green Guide ratings are available on www.thegreenguide.org.uk 	6
Mat 5 Responsible sourcing of materials	<ul style="list-style-type: none"> • Gyproc plasterboards, Glasroc specialist boards, Thistle plasters and core products have been certified to BES 6001 'Responsible Sourcing of Construction Products' achieving a 'Very Good' • British Gypsum is fully ISO 14001:2004 certified across all mining, manufacturing and central functions 	3
Mat 6 Insulation	<ul style="list-style-type: none"> • Green Guide ratings for insulation • 80% recycled content 	2
Mat 7 Designing for robustness	<ul style="list-style-type: none"> • Single layer Severe Duty solutions (GypWall ROBUST and GypWall EXTREME) 	1
Wst 1 Construction waste management	<ul style="list-style-type: none"> • Plasterboard Recycling Service • Reduced waste details • Single board specifications 	3

Source: BREEAM: healthcare 2008 Assessor Manual

Robustness of design

Most areas within healthcare buildings, due to their very nature, are subject to intensive use that can result in significant damage to the surroundings, whilst regular, unplanned maintenance can be disruptive to critical areas. Therefore, when designing internal spaces, the use of durable materials has a significant impact on whole life costs and leads to more predictable maintenance cycles. The Building Regulations do not specifically detail requirements for strength and robustness of partitions, however, according to HTM 56: Partitions, walls should be capable of meeting the requirements of BS 5234 to the appropriate duty category.

Performance requirements for partitions BS 5234 - Partition Grading

BS 5234 comprises two parts – Part 1 - Design and installation requirements, and Part 2 - Specification for performance requirements for strength and robustness in relation to end use categories. The standard covers performance aspects such as stiffness, crowd pressure, impacts, anchorages and door slamming resistance.

Please note: In order to claim a partition duty, a designated performance level must be achieved for all elements in the test – see **Table 1.5** below for examples of room type in each category.

All British Gypsum partitioning systems are fully tested to BS 5234: Part 2: 1992.

GypWall **CLASSIC** systems, incorporating Gyproc SoundBloc or Gyproc FireLine, achieve Heavy Duty to BS 5234 using a single layer 15mm lining. This provides an extremely cost effective solution for the majority of situations.

Severe Duty can be achieved in a single layer using GypWall **ROBUST**, incorporating Gyproc DuraLine. This system is tried and tested in healthcare facilities throughout the UK.

With whole-life costs increasingly being considered, GypWall **ROBUST** offers additional durability over single layer GypWall **CLASSIC** systems without the need for additional board layers.

In 2007, British Gypsum launched GypWall **EXTREME**, the ultimate impact resistant partition for use where additional durability is required above and beyond Severe Duty. It is able to cope with the rigours of intensive, high traffic spaces within healthcare buildings where blockwork has traditionally been specified.

It is also suited for mental healthcare environments due to its ability to resist deliberate attack.

Please refer to **Section 2 – Selecting partitions** for specific solutions to meet duty requirements.



Table 1.5 – BS 5234: Part 2: 1992

Partition Duty	Category	Examples
Light	Adjacent space only accessible to persons with high incentive to exercise care. Small chance of accident occurring or of misuse	
Medium	Adjacent space moderately used, primarily by persons with some incentive to exercise care. Some chance of accident occurring or of misuse	Offices
Heavy	Adjacent space frequently used by the public and others with little incentive to exercise care. Chances of accident occurring or of misuse	Ancillary circulation areas
Severe	Adjacent space intensively used by the public and others with little incentive to exercise care. Prone to vandalism and abnormal rough use	Major circulation areas

Source: BS 5234: Part 2

GypWall systems for specific Duty requirements

Heavy

GypWall CLASSIC single boarded solutions



Key facts

- Range of stud options to match performance requirements
- Acoustic stud option for enhanced acoustic performance
- Fully satisfies *BS 5234: Parts 1 and 2* for both strength and robustness requirements up to Heavy Duty
- 30 - 60 minutes fire resistance to BS and EN standards¹
- Accommodates services within stud cavity
- Stud options for additional height

¹ Please consider Severe and Severe Plus solutions where additional fire, acoustic or duty performance is required.

Severe

GypWall ROBUST single boarded solutions, and GypWall CLASSIC double boarded solutions



Key facts

- High impact resistance
- Fully satisfies *BS 5234: Parts 1 and 2* for both strength and robustness requirements to Severe Duty in a single layer
- Single layer solutions can achieve 60 minutes fire resistance to EN standards
- Double layer solutions can achieve up to 120 minutes fire resistance to EN standards
- Stud options for additional height
- Achieves high levels of sound insulation

Severe plus

GypWall EXTREME and GypWall EXTREME/ROBUST hybrid solutions



Key facts

- Tested far beyond the performance requirements of *BS 5234: Part 2: 1992* Severe Duty (please see **Section 3 - Mental health partitioning** for more information)
- Capable of securing heavy fixings on a single layer without the need for additional patressing²
- Achieves Severe Duty to *BS 5234* with a single 12.5mm board lining
- Excellent resistance to deliberate attack
- Reduces maintenance lifecycle costs
- Excellent acoustic performance
- Extremely cost effective system combining Gyproc plasterboards and Rigidur H
- Hybrid system ideal for corridor applications

² Dependent on fixing and geometry of the object.

Protection to partitions and linings

Healthcare buildings are intensely used facilities where patient health and wellbeing are the key priorities. During daily use, many areas are subjected to glancing blows and direct impacts from patients, staff and mobile equipment. HTM 56 states that protection against mechanical damage should be considered in all areas where the partitions may be subjected to hard body impact from mobile equipment. Additional protection above and beyond that provided by the partition should be designed in, see Table 1.6.

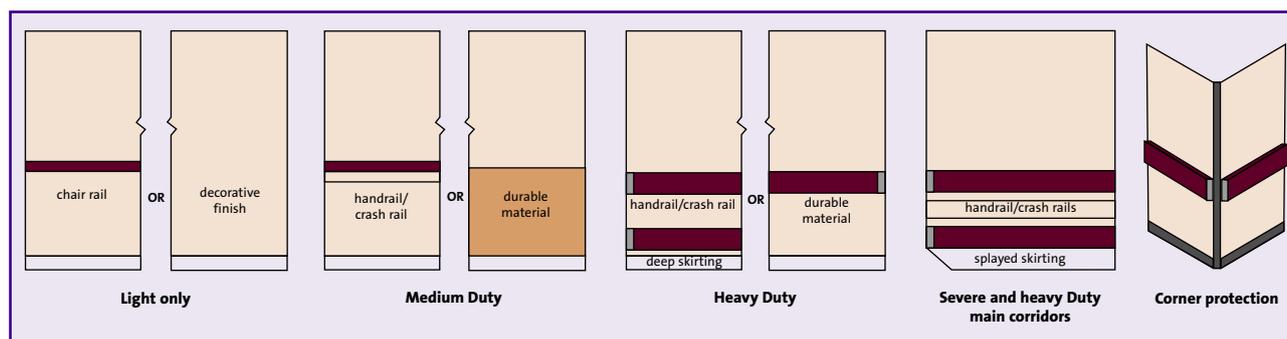
In addition to the guidance set out in HTM 56, HTM 69 – Protection contains guidance for the use of design teams on the avoidance of damage in healthcare buildings. HTM 69 uses the categories set out in *BS 5234: Partitions*, described earlier in this section, and recommends additional protection for each Duty Rating to protect the systems used, see Table 1.7.

Please refer to HTM 69 for specific guidance on material type and typical dimensions of additional protection.

Purpose	Type	Height above FFL	Locations
Surface protection	Buffer rails	800mm to 1000mm	Main corridors, trolley bays, ward kitchens, main kitchens, bedheads
Arris protection	Corner guards	FFL to at least 1000mm	Areas where trolleys or heavy mobile equipment are likely to be used
		FFL to at least 2000mm	Areas where high mobile equipment e.g. linen trolleys are likely to be used

Source: HTM 56

Table 1.7 - Types of protection according to category of damage risk (HTM 69: Protection)



High performance finishes

Thistle Durafinish is a gypsum finish plaster specially formulated for increased resistance to accidental damage, enabling significantly improved maintenance cycles and lower long-term cost in heavy traffic areas of many types of healthcare buildings.



For more information, please refer to pages 76 and 77, or the **WHITE BOOK** – Finishing systems and decorative effects, or the Thistle Durafinish Product Data Sheet, available to download from www.british-gypsum.com



Fixing to GypWall linings

Introduction

There are a wide variety of fixing devices suitable for securing fixtures and fittings to British Gypsum systems. Generally, the choice of individual fixing devices will depend on the type of system, the loading requirements, and the general level of use. This section gives recommendations on the selection of generic devices and proprietary fixings.

When using drylined walls, there is normally a cavity to be bridged between the boards and the background. The fixing device should be long enough to allow for this and to penetrate adequately into the solid wall or background. When timber or metal framed partitions are used, lightweight fixtures can be made directly to the partition linings.

Medium weight fixtures should be made into the studs, or to Gypframe 99 FC 50 Fixing Channels. Heavyweight fixtures (as defined by BS 5234) such as wash basins, wall cupboards and shelving should be fixed to Gypframe 150 FC 90 Fixing Channels. Gypframe 150 FC 90 Fixing Channels have been designed to suit Gypframe 'C' Studs, 'I' Studs, AcouStuds and Gypliner GL1 Lining Channels at 600mm, 400mm or 300mm centres. Tests have shown that Gypframe 150 FC 90 Fixing Channel can exceed the requirements of BS 5234: Part 2: 1992 Annex K&L.

A Gypframe Service Support Plate should be used to provide support to 18mm plywood patresses fitted

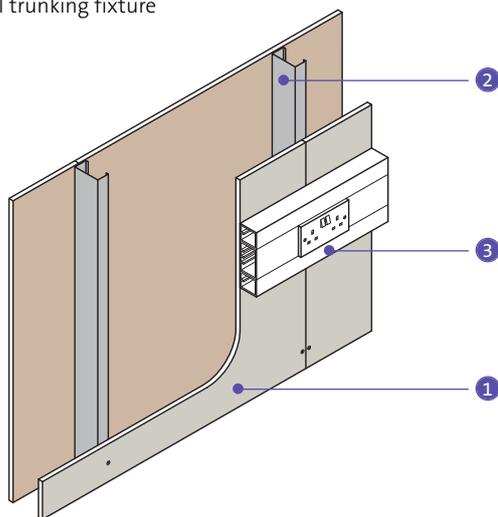
between stud centres.

GypWall **EXTREME**, using Rigidur H, offers additional fixing strength to reduce the need for patressing. Please see the Product Data Sheet: 'Glasroc Rigidur H for commercial applications' for more information, available to download from www.british-gypsum.com

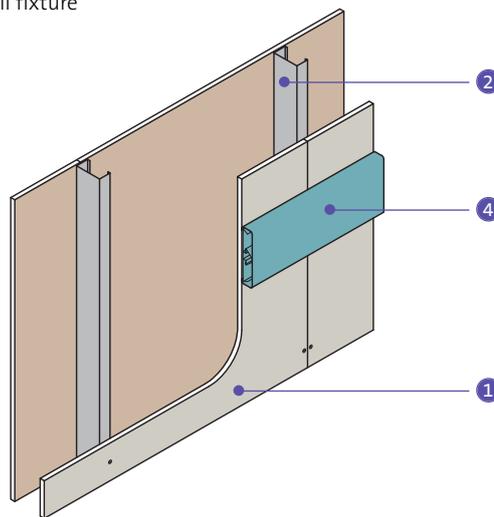


Construction details

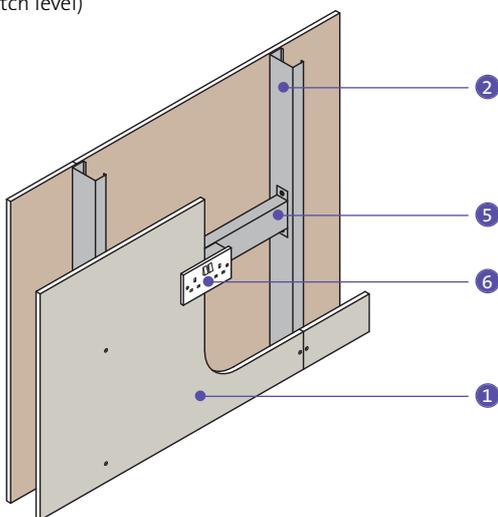
1 Electrical trunking fixture



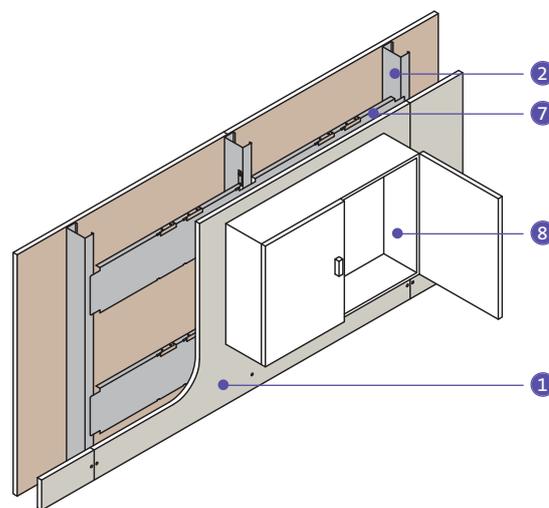
2 Crash rail fixture



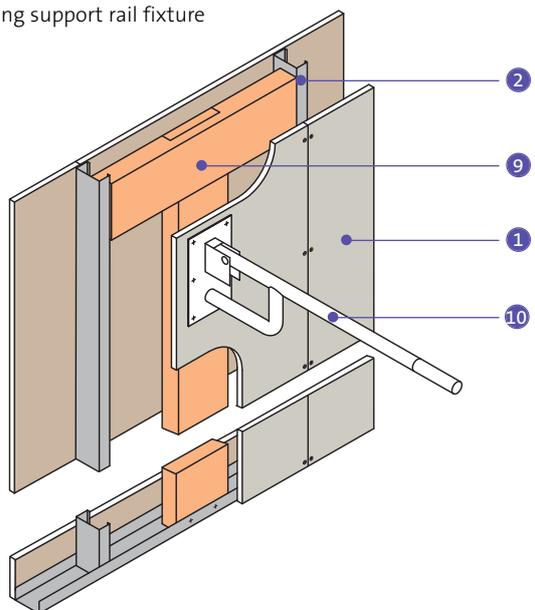
3 Electrical socket box (for installation no higher than standard light switch level)



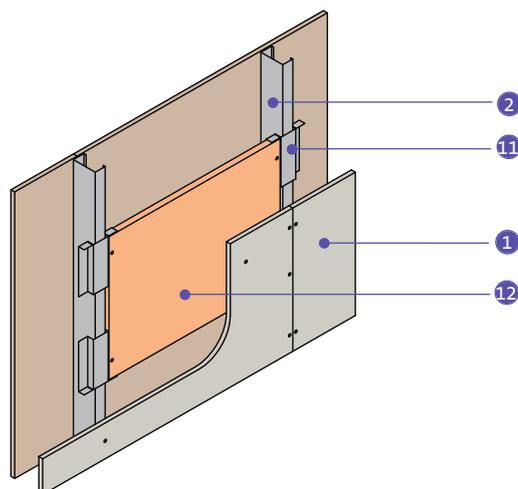
4 Wall cupboard fixture



5 Folding support rail fixture



6 Gypframe Service Support Plate



- 1 Gyprock plasterboard or Glasroc F specialist board
- 2 Gyprock 'C' Stud
- 3 Electrical trunking
- 4 Crash rail
- 5 Gypframe channel tabbed, bent and fixed to studs with Gyprock Wafer Head Drywall Screws
- 6 Metal back socket box

- 7 Gypframe 150 FC 90 Fixing Channel fixed to studs with Gyprock Wafer Head Drywall Screws
- 8 Wall cupboard
- 9 150 x 50mm timber suitably fixed to studs and channel
- 10 Folding support rail
- 11 Gypframe Service Support Plate
- 12 18mm plywood

Fixings

The example fixing devices, typical safe working loads and typical failure loads given in Table 1.8 relate to the installation of single fixtures. It is important to ensure that the drylining system specified is capable of supporting the loads, particularly if installing multiple fixtures. For further advice please contact the British Gypsum Drywall Academy.

Table 1.8 – Example fixing devices and typical safe working loads

System	Lightweight fixtures up to 3kg (e.g. socket)	Lightweight to medium fixtures 4-8kg (e.g. small mirror)	Medium weight fixtures 9-20kg (e.g. shelf)	Medium to heavy fixtures 21-50kg (e.g. cupboard)	Heavy fixtures 51-100kg (e.g. basin)
ShaftWall	A	B or C	D, E or I	G, H or I	K or H
GypWall systems ¹					
GyPlyner iWL					
Timber stud	A	B or C	K or D	K	K
Drilyner	A	B	F	L	L
GyPlyner UNIVERSAL wall	A	B or C	D or E	J, K or L	K or L
Reference	Typical SWL ² (typical failure load)	Description	Detail		
A	3kg (12kg)	No. 10 woodscrew into Gyproc plasterboard			
B	4kg (16kg)	Steel picture hook and masonry nail into Gyproc plasterboard			
C	6kg (24kg)	Metal self-drive screws into single layer Gyproc plasterboard			
	8kg (32kg)	Metal self-drive screws into double layer Gyproc plasterboard			
D	12kg (48kg)	Steel expanding cavity fixing, e.g. M5 x 40, into Gyproc plasterboard (board thicknesses up to 12.5mm)			
	18kg (72kg)	Steel expanding cavity fixing, e.g. M5 x 65, into Gyproc plasterboard (board thicknesses from 15mm to 28mm)			
E	19kg (76kg)	Gyproc Drywall Screw fixed through Gyproc plasterboard into 0.5mm Gypframe metal stud / Gypframe 99 FC 50 Fixing Channel			
F	20kg (140kg)	Heavy Duty plastic plug fixed through Gyproc plasterboard into masonry with 55mm minimum penetration			
G	30kg (120kg)	Gyproc Jack-Point Screws fixed through Gyproc plasterboard into minimum 0.9mm Gypframe metal stud / Gypframe 150 FC 90 Fixing Channel			
H	50kg (200kg)	No. 12 self-tapping screws fixed through Gyproc plasterboard into minimum 0.9mm Gypframe metal stud / Gypframe 150 FC 90 Fixing Channel			
I	40kg (160kg)	Steel expanding metal cavity fixing, e.g. M4 x 40, through Gyproc plasterboard into 0.9mm Gypframe metal stud / Gypframe 150 FC 90 Fixing Channel (board thicknesses up to 12.5mm)			
	50kg (200kg)	Steel expanding metal cavity fixing, e.g. M4 x 65, through Gyproc plasterboard into 0.9mm Gypframe metal stud / Gypframe 150 FC 90 Fixing Channel (board thicknesses from 15 to 28mm)			
	50kg (200kg)	Steel expanding metal cavity fixing, e.g. M5 x 65, fixing through Gyproc plasterboard into plywood supported by Gypframe Service Support Plate			
J	60kg (240kg)	8mm steel frame fixing fixed through Gyproc plasterboard into masonry with minimum 55mm penetration			
K	120kg (480kg)	No. 12 self-tapping screw fixed through Gyproc plasterboard into timber sub-frame			
L	130kg (520kg)	M8 steel bolt / anchor fixed through Gyproc plasterboard into masonry with minimum 55mm penetration			

¹ For GypWall QUIET SF, ensure that the fixings do not bridge the Gypframe RB1 Resilient Bars, otherwise the acoustic performance may be compromised.

² Safe Working Load (SWL) - a safety factor of 4 (steel fixings) and 7 (plastic fixings) has been used.

NB For technical assistance on above fixings please contact the fixings manufacturer. The suitability of the fixing must be confirmed by the building designer / fixing manufacturer. Reference can also be made to the Construction Fixing Association (CFA) guidance note 'Fixing For Plasterboard', which is currently under review by the CFA and can be accessed at www.fixingscfa.co.uk. When specifying a fixing to / through Gyproc Thermaline laminates, please give consideration to the thickness and compressibility of the insulation to ensure that the fixing used is fit for purpose. The information within Table 1.8 does not take into consideration any additional forces that may be applied whether it be accidental, abuse or otherwise.

The example fixing devices, typical safe working loads and typical failure loads given in Table 1.8 relate to the installation of single fixtures. It is important to ensure that the drylining system specified is capable of supporting the loads, particularly if installing multiple fixtures.

Additional example fixing devices and typical safe working loads when fixing into Rigidur H (GypWall EXTREME) and including 12.5mm Gyproc WallBoard, 15mm Gyproc SoundBloc and 15mm Gyproc DuraLine for comparison where appropriate, are shown in the table below:

Table 1.9 – Example fixing devices and typical safe working loads for GypWall EXTREME

Reference	Typical SWL ¹ (typical failure load)	Description	Detail
B	17kg (68kg)	Steel picture hook and masonry nail into 12.5mm Rigidur H	
	18kg (72kg)	Steel picture hook and masonry nail into 15mm Rigidur H	
M	7kg (49kg)	Fischer PD nylon plug and screw into 12.5mm Gyproc WallBoard	
	10kg (70kg)	Fischer PD nylon plug and screw into 15mm Gyproc SoundBloc	
	11kg (77kg)	Fischer PD nylon plug into 15mm Gyproc DuraLine	
	20kg (140kg)	Fischer PD nylon plug and screw into 12.5mm or 15mm Rigidur H	
N	21kg (147kg)	Fischer UX (8 x 50) nylon plug and screw into 12.5mm Rigidur H	
	27kg (189kg)	Fischer UX (8 x 50) nylon plug and screw into 15mm Rigidur H	
A	15kg (60kg)	No. 10 woodscrew into 12.5mm or 15mm Rigidur H	
O	17kg (68kg)	Fischer HM8 x 55 steel cavity fixing into 15mm Gyproc SoundBloc	
	20kg (80kg)	Fischer HM8 x 55 steel cavity fixing into 15mm Gyproc DuraLine	
	49kg (196kg)	Fischer HM8 x 55 steel cavity fixing into 15mm Rigidur H	
P	58kg (232kg)	Fischer KD6 steel cavity fixing into 12.5mm Rigidur H	
	74kg (296kg)	Fischer KD6 steel cavity fixing into 15mm Rigidur H	

¹ Safe Working Load (SWL) - a safety factor of four (steel fixings) and seven (plastic fixings) has been used.

NB For technical assistance on above fixings please contact the fixings manufacturer. The suitability of the fixing must be confirmed by the building designer / fixing manufacturer. Reference can also be made to the Construction Fixing Association (CFA) guidance note 'Fixing For Plasterboard', which is currently under review by the CFA and can be accessed at www.fixingscfa.co.uk

The information within **Table 1.9** does not take into consideration any additional forces that may be applied whether it be accidental, abuse or otherwise.

The example fixing devices, typical safe working loads and typical failure loads given in **Table 1.9** relate to the installation of single fixtures. It is important to ensure that the drylining system specified is capable of supporting the loads, particularly if installing multiple fixtures.

Finishes

Performance of finishes for partitions

Health Technical Memorandum 56 - Partitions (HTM 56), section 3, provides six performance categories that relate to user requirements for wall finishes in healthcare buildings, please see Table 1.10.

Physical and performance characteristics	Categories of performance of finishes					
	1	2	3	4	5	6
Impervious	●	●	●	●		
Jointless	●	●	●			
Smooth	●	●	●	●		
Moisture resistance						
High humidity		●		●		
Normal humidity	●		●		●	●

Source: HTM 56

- Impervious – able to resist the penetration of water, solutions containing detergents, disinfectants and other liquids likely to be encountered in healthcare buildings.
- Jointless – without joints, or having joints which are sealed by methods and materials which make the whole surface impervious and prevent the collection of dirt and bacteria in the joint.
- Smooth – no coarser than brush-applied matt emulsion paint on a flat plastered surface without projections, indents or holes part-way through the material.
- Moisture resistance:
 - High humidity – 25% to 100% relative humidity over an air temperature range of 10°C to 30°C, and able to withstand sustained contact with water and water vapour.
 - Normal humidity – 25% to 65% relative humidity over an air temperature range of 10°C to 25°C, and able to withstand intermittent contact with water and water vapour.

Table 1.11 states the wall finishes required in each of the categories. The finishes listed are the minimum acceptable for each of the categories, and options are provided so that the specifier can consider requirements relating to durability; resistance to fungal and bacterial attack, and resistance to cracking and abrasion.

In addition to continued supply, finishes should be selected on balance considering capital cost as well as maintenance costs.

British Gypsum products and systems contribute significantly to the durability of the partition.

Thistle Durafinish is a hardwearing plaster that has been developed specifically for hardworking buildings, to help maintain the appearance of finished partitions, and reduce damage caused by daily use. **GypWall ROBUST** provides single layer Severe Duty performance for improved impact resistance. **GypWall EXTREME** has been developed for intensely used, high traffic areas and provides an extremely dense surface that resists gouging, glancing blows and direct impacts to reduce the risk of unplanned maintenance and reduce the risk of the partition becoming a harbour for microbe growth.

Table 1.11 describes the applied finishes required to meet the criteria in Table 1.10.

Wall finish	Categories of performance of finishes					
	1	2	3	4	5	6
Liquid coverings						
Epoxy coating	●	●	●	●		
Paint:						
Emulsion – matt, silk					●	●
Oil –						
Gloss	●	●	●	●	●	●
Semi-gloss, eggshell					●	●
Vinyl - gloss					●	●
Polyurethane coating	●	●	●	●		
Spray elastomeric vinyl compound	●	●	●	●		
Spray paint (multi-colour) gloss	●	●	●	●		
Flexible pre-formed coverings						
Cloth-backed vinyl covering	●	●	●	●		
Paper-backed vinyl					●	●
PVC sheet (1mm thick with welded joints)	●	●	●	●		
Wallpaper						●
Wallpaper with spongeable surface					●	●
Hard pre-formed coverings						
Ceramic tiles –						
Cement grouting				●		
Epoxy grouting	●	●	●			
Plastic laminate with sealed joints	●	●	●			

Source: HTM 56

Appendix A of HTM 56 details the requirement by room type for the specifier.

Acoustic ceilings – finishes

HTM 60: Ceilings, provides performance categories relating to characteristics of a ceiling membrane. Please see **Table 1.12**.

There are six physical characteristics of the soffit, described below:

- 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. It is important to note that a jointless ceiling membrane may be one which uses a lay in grid ceiling system where each tile is sealed (i.e. mastic) on the rear of the tile to the grid.
- Jointed – other than jointless.

There are two performance characteristics relating to humidity and spread of flame, described below:

- Humidity:
 - Normal humidity: able to withstand 25% - 65% relative humidity over an air temperature range of 10°C to 25°C
 - High humidity: able to withstand 25% - 100% relative humidity over an air temperature range to 10°C to 30°C

● Surface spread of flame:

The Building Regulations (2000) set out the following requirements for buildings in Purpose Group 2:

- Ceilings of circulation spaces and shafts are required to be Class 0
- Ceilings of all other rooms are required to be not less than Class 1

Please refer to **Section 6 – Selecting acoustic ceilings** for solutions by category.



Table 1.12 - Physical and performance characteristics

Physical and performance characteristics	Categories of ceiling performance					
	1	2	3	4	5	6
Soffit:						
Smooth	●	●	●	▲	▲	▲
Textured				▲	▲	▲
Imperforate	●	●	●	▲	●	▲
Perforated				▲		▲
Jointless	●	▲	▲	▲	▲	▲
Jointed		▲	▲	▲	▲	▲
Humidity:						
Normal	●		●	●	●	●
High		●				
Spread of flame:						
Class 1	●	●	●		●	●
Class 0				●		

● – Essential requirement ▲ – Options

Source: HTM 60: Ceilings

Cleaning regime

The publication 'National standards of cleanliness for the NHS', dated April 2001, states cleaning frequencies for different functional areas.

All British Gypsum acoustic ceilings can be cleaned with a damp cloth and mild detergent. In addition, all Casoprano, Gyptone and Rigitone ceiling tiles, planks and board systems can be repainted with any suitable emulsion colour paint using a short-haired roller, extending the life of the product almost indefinitely.

Indoor air quality

We typically spend 80% of our time indoors, in schools, offices, hospitals and our homes. Clean air is something we assume we have in the buildings in which we live, work and learn, yet impurities found in the air can cause health problems and a reduction in our general well-being.

Clean air on the other hand can speed up patient recovery in hospitals, reduce absence at work and increase pupils' concentration at school.

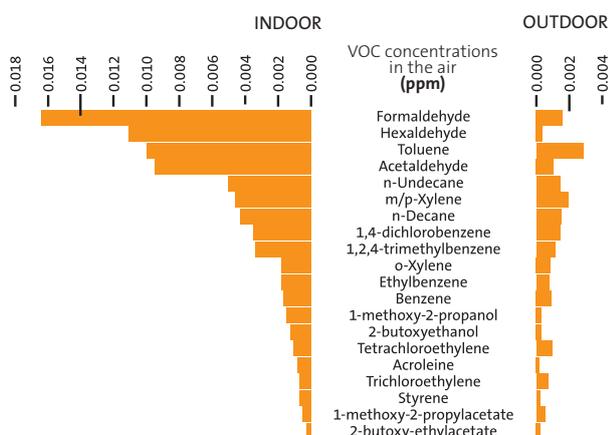
Volatile organic compounds (VOCs)

Although we don't notice them, pollutants called volatile organic compounds (VOCs) including formaldehyde are often present in the air we breathe – naturally emitted from furniture, carpets, paints, varnishes, cleaning products and building materials.

VOCs have an initial boiling point of less than or equal to 250°C. They are emitted as a gas from a liquid or solid and enter the surrounding air. VOCs are numerous and varied. They include both human-made and naturally occurring chemical compounds. Formaldehyde (CH₂O) is both the highest concentration and highest risk VOC. Refer to figure 1 – VOC concentration.

Studies have shown that the air indoors can have concentrations of VOCs many times higher than the outdoor air. The increased focus on the reduction of energy consumption is leading to more airtight buildings, which means the quality of air is becoming even more critical. Refer to figure 1 – VOC concentration. Studies have shown that ventilation systems are only about 30% effective at removing VOCs from the air indoors.

2 VOC concentration comparison, indoor vs outdoor



Source: Indoor Air Quality Observatory (OQAI)

Some of the health problems VOCs can cause

People often complain about health problems after extended periods of time spent indoors. Studies have shown that many of these symptoms can be attributed to VOCs:

- Headaches
- Nausea
- Lack of concentration
- Eye irritation
- Fatigue
- Breathing problems

The World Health Organisation (WHO) concerns about formaldehyde (which is a common VOC) in relation to human health are well published (WHO guidelines for indoor air quality: selected pollutants; 2010). All current regulation focuses on VOC emissions at project handover, and in reducing the VOC content of construction products.

Legislation and guidance

However, academic and evidence based design is increasingly highlighting that the major issue with VOCs is post handover / during building use.

Building regulations and guidance relating to VOCs:

- Building Regulations Approved Document F (ventilation)
- Building Bulletin 101 (education)
- BRE Digest 464 Part 2
- BRE Environmental Assessment Method (BREEAM) (indoor air quality)
- Health Technical Memorandum (HTM)03-01
- Leadership in Energy and Environmental Design (LEED) (indoor air quality)

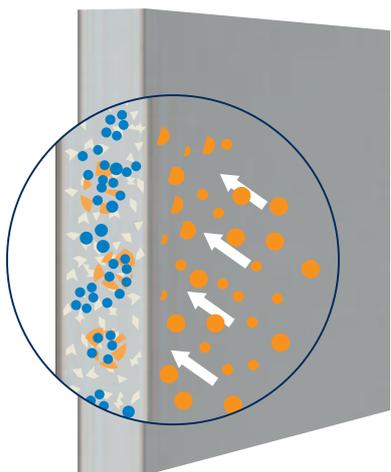
You can't see or smell VOCs. Therefore there is no way of knowing what concentrations you are being exposed to on a daily basis.

ACTIVair technology

ACTIVair is a new technology added to certain British Gypsum products. It is designed specially to decompose formaldehyde into non-harmful inert compounds, thus eliminating the risk of re-emission. It is tested to capture and convert 70% of formaldehyde. Refer to figure 2 – ACTIVair technology.

Improving the indoor air quality is a major consideration amongst clients and building occupants, most notably those concerned with sustainability and health and wellbeing. Good clean air can reduce health problems as well as enhancing our healthy living in both our work and living spaces.

2 **ACTIVair** technology



ACTIVair technology:

- Decomposes 70% of formaldehyde making indoor spaces healthier¹
- Uniquely captures and converts formaldehyde, removing the risk of re-emission even if the product is damaged or at end of life
- Will continue to work for at least 50 years
- Works though an emulsion paint finish
- Is fully recyclable through the British Gypsum closed loop Plasterboard Recycling Scheme (PRS) - Plasterboard only
- Has no impact on the installation or performance of the products or systems they are included in with regards to fire, acoustics, thermal or durability compared to standard versions of the products

¹ In a controlled test environment

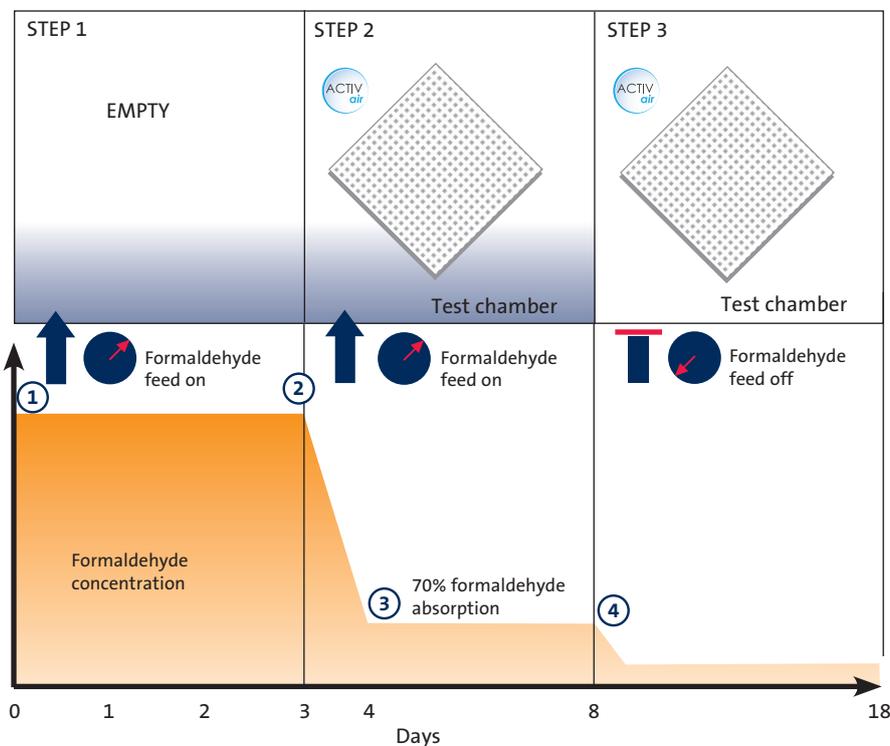
1. Formaldehyde molecules (●) in the air are absorbed by the plasterboard
2. **ACTIVair** technology (↘) converts them into inert compounds
3. The inert compounds (●) remain locked in the plasterboard

The effectiveness of **ACTIVair** technology has been tested by the accredited Eurofins and VITO laboratories to ISO 16000-23. The test shows that **ACTIVair** decomposes 70% of the formaldehyde in a controlled test environment. Refer to figure 3 – **ACTIVair** test principle.

When using **ACTIVair** products aim to have coverage in each room on the walls and/or ceiling equivalent to the m² area of the floor.

ACTIVair technology

3 **ACTIVair** test principle



ACTIVair test principle

- 1 Formaldehyde was fed into the empty test chamber at a constant level
- 2 On day 3, a sample of a product containing **ACTIVair** technology was introduced to the test chamber
- 3 After 24 hours, **ACTIVair** technology had absorbed 70% of the formaldehyde in the chamber, with a continued in-feed of formaldehyde
- 4 Formaldehyde feed was stopped on day 8, and levels were further reduced as they continued to be absorbed by **ACTIVair** technology

