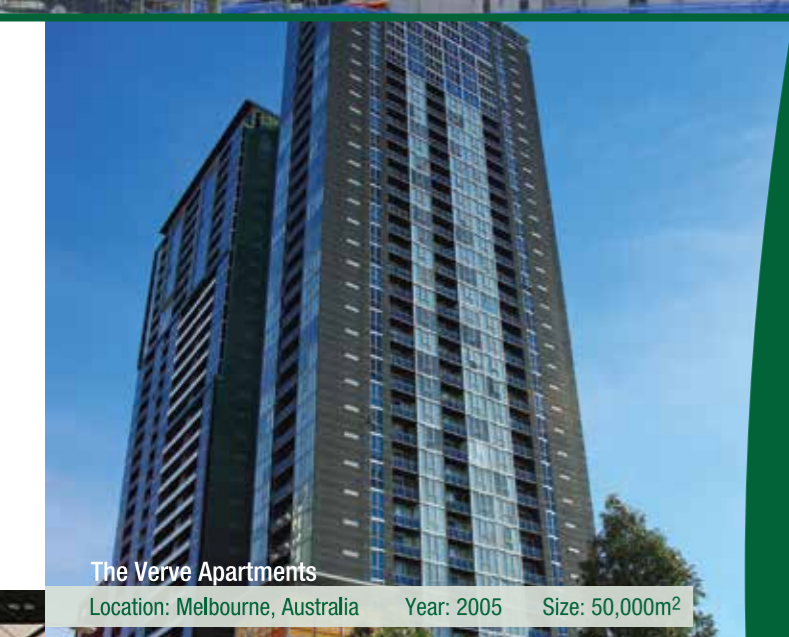




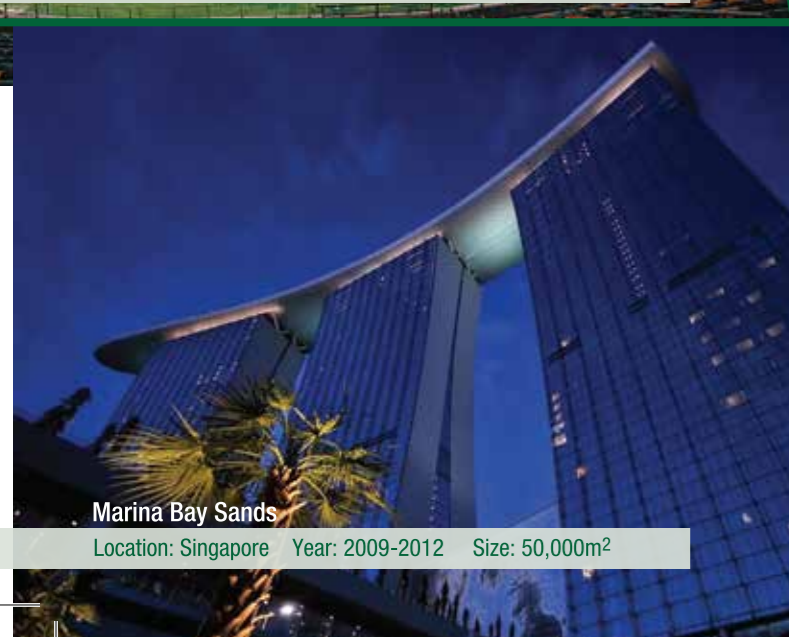
**Gold Coast University Hospital**  
Location: Queensland, Australia Year: 2012 Size: 365,000m<sup>2</sup>



**The Verve Apartments**  
Location: Melbourne, Australia Year: 2005 Size: 50,000m<sup>2</sup>



**The Gabba**  
Location: Melbourne, Australia Year: 2007 Size: 15,000m<sup>2</sup>



**Marina Bay Sands**  
Location: Singapore Year: 2009-2012 Size: 50,000m<sup>2</sup>



**AUSTRALIA: USG Australasia**  
Phone: 1 800 226 215  
Email: info-anz@usg.com.au  
www.fiberock.com.au

**NEW ZEALAND: USG Australasia**  
Phone: 0800 USG 4YOU  
Email: info-anz@usg.co.nz  
www.fiberock.co.nz

**INDIA: USG India Private Limited**  
Phone: +91 11 4080 9937  
Email: ksarkar@usg.com

**KOREA: USG Asia Pacific Holdings Pte Ltd**  
Phone: +82 2 4777 762  
Fax: +82 2 4777 967  
Email: syoon@usg.com.my

**MALAYSIA: USG Asia Pacific Holdings Pte Ltd**  
Phone: +60 3 5633 8980  
Fax: +60 3 5634 4267  
Email: pongch@usgapnn.po.my

**SINGAPORE: Pacific Interiors Supply Pte Ltd**  
Phone: +65 6268 6180  
Fax: + 65 6268 6192  
Email: pisdan@singnet.com.sg

**TAIWAN: USG Asia Pacific**  
Phone: +886 2 2790 9289  
Fax: +886 2 8792 6586  
E-mail: owen@usgtw.com

Distributor:

Subject to change without notice -  
check website for latest version. Copyright 2013.  
Fiberock, Sheetrock, Easy Sand,  
Total Lite, Plus 3, Tuff-Hide are all trademarks owned by,  
or used with permission by USG.  
Publication number: FR/6-13

## Interior Linings



# FIBEROCK®



## Aqua-Tough

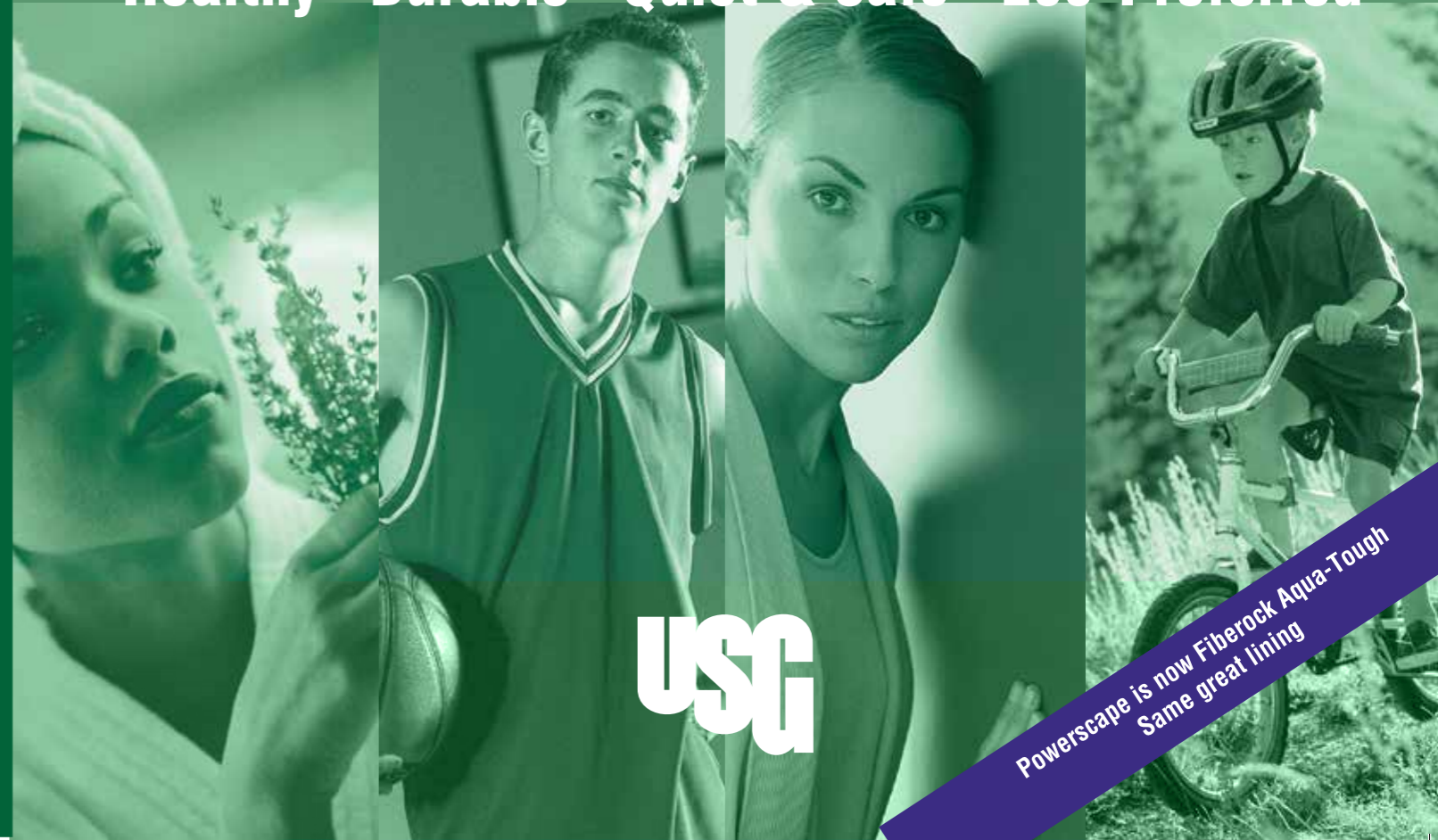
USG Fiberock® interior linings transform basic buildings, into desirable and durable indoor environments.

The only safe and easy-to-install interior lining system that resists: toxic mould, sound, impact, fire and water absorption or seepage into wall cavities.



USG-2011  
GECA 04-2011 v2-  
Panel Boards

### Healthy Durable Quiet & Safe Eco-Preferred



**Powerscape is now Fiberock Aqua-Tough  
Same great lining**

better for life ...naturally

**Warranties & Limitations**

**10 Year Warranty**

USG Interiors Pacific Ltd (USG Australasia) is a wholly owned subsidiary of the USG Corporation in Chicago, USA. USG was incorporated in 1902, invented the paper faced plasterboard sheet and is one of the largest manufacturers of plasterboard systems worldwide. Our Fiberock brand gypsum fibreboard range is an evolution from traditional plasterboard

<p><b>What Is Covered ?</b></p>	<p>Product faults or defects</p> <p>USG Australasia warrants that USG Fiberock Aqua-Tough products will comply with the manufacturer's specifications for a period of ten (10) years from date of installation, subject to conditions set out below.</p> <p>This Warranty only applies where the Fiberock product(s) have been installed and maintained in accordance with the manufacturer's instructions and are not exposed to harmful loads, corrosive conditions or to conditions for which the product was not designed/intended.</p>
<p><b>What Is Not Covered ?</b></p>	<p>USG Fiberock is warranted, subject to use under normal conditions. USG shall not be responsible for any loss resulting from any of the following:</p> <ul style="list-style-type: none"> <li>- Application practices not in accordance with USG's most recently printed instructions and specifications</li> <li>- Products damaged during delivery and while stored at the job site</li> <li>- Failure of the owner to maintain the building with reasonable care</li> <li>- Materials or components not supplied by USG.</li> <li>- Normal wear and tear, or if any repair or replacement work has been undertaken without the express content of USG in writing</li> <li>- Abnormal conditions including abuse, neglect, catastrophe and intermittent or prolonged exposure to water, other elements of nature, or an act of God</li> <li>- Incidental or consequential damages, directly or indirectly sustained, or loss including without limitation any loss of profits</li> </ul>
<p><b>Other Legal Rights</b></p>	<p>This Warranty is not part of a contract between USG Australasia and the building owner. USG shall not be bound by any unauthorised warranty given by the seller of the products or the contractor.</p> <p>This Warranty is in addition to any right you may have under the Competition and Consumer Act 2010, or similar legislation in your jurisdiction.</p> <p>Any provision of this Warranty that is illegal, void, or unenforceable will be ineffective to the extent only of such illegality voidness, or unenforceability and otherwise will not invalidate any other provision of this Warranty.</p>
<p><b>What Will USG Do ?</b></p>	<p>Subject to any requirements imposed by law, if Fiberock products do not comply with the manufacturer's specifications ("defect"), USG will, at its option, repair the defect, replace the Fiberock affected by the defect or refund the purchase price, provided conditions of this Warranty are met.</p> <p>You must allow USG and its employees or agents to have access to the premises at any reasonable time to conduct investigations in relation to any claim under this Warranty</p>
<p><b>How Do I Get Service ?</b></p>	<p>Any claim shall be deemed waived unless made in writing to us within the Warranty period, including a brief description of the problem, within thirty (30) days from the date the problem was, or by reasonable inspection should have been discovered. Photographs and videotape of the problem are often very helpful. Please also include sales receipts, invoice or other evidence indicating the date of installation and send them to us at the relevant address below.</p> <p style="text-align: center;">This Warranty supersedes all previous Warranties</p>



**FIBEROCK®**

**Aqua-Tough**

**BCA and Standards Compliance**

Impact exceeds BCA/NCC Specification C1.8 for soft body (Clause 5(c)), surface indentation (Clause 5(d))

**Plasterboard Installation**

AS/NZS 2589:2008 Gypsum linings – Application and Finishing

**Fire Properties**

Fire Testing reports (BRANZ & CSIRO)

BCA clause C2.7 | AS1530.1 | AS1530.4 | AS/NZS 3837

**Acoustics**

AS/NZS 1276 | AS 1191

**Water Resistance**

AS/NZS 2588/ASTM C473

Proven advanced-technology interior lining system from USG - the world's most innovative wall and ceiling manufacturer.

## Handling and Site Check List

### Storage

USG Fiberock® interior linings must be stored flat on a flat surface, protected from the rain and moisture, and with moisture separation from concrete floors.

### Handling

USG Fiberock linings must be lifted clear of, not dragged across the stack. As abrasive resistance is achieved after final painting applications, care should be taken to protect the sheets both during handling and installation prior to painting.

### Sizing

USG Fiberock linings can be **multi-scored and snapped**, cut with a handsaw, or with a standard power saw (tungsten blade) fitted to a dust extractor unit. Snapper shears can be used for all linings except USG FiberockAqua-Tough™ VHL.

### Dust

Use regular dust masks and extraction units for power tools as needed. Nuisance dust only, no carcinogenic crystalline silica dust health risk.

### Tapers

**All sheets come with factory formed side tapers.** End tapers and additional side tapers to cut edges, can be easily formed on site if required. Form tapers with sandpaper, or electric plane (tungsten blades) fitted to dust extraction unit.

More detailed installation information is available, and should be consulted as follows;

- in USG Fiberock catalogue
- on the web [www.fiberock.com.au](http://www.fiberock.com.au), in the wall & ceiling lining page, installation section.

Call 1800 226 215 for further information and technical assistance as required.

### Fixing

**Pre-drilling for fixings is not required. Fixings heads will bed into the lining itself.**

Fix to timber with screws, nails or staples (nail guns can be used). Fix to steel with screws. Mains power or high voltage screw guns to be used.

### Jointing

Use paper tape, setting compound followed by topping compound in **the same manner as jointing plasterboard**. Tapers are wider and deeper than plasterboard to increase joint strength.

### Painting

Choose a paint system to deliver the desired surface properties. Use abrasion resistant coatings if required. The normal process is to first apply one sealer coat. Complete any remaining patches, and then seal these. Then apply two finishing coats. As with plasterboard, for the best results, back roll with a dry roller immediately after the first top coat, to generate a uniform slight texture.

### Fire & Sound

USG Fiberock fire & sound rated systems must be built in strict accordance to the relevant USG Fiberock system specification single page. USG Fiberock has selected system specification pages, and the full range can be easily downloaded at [www.fiberock.com.au](http://www.fiberock.com.au) from the literature resources page, wall specification section. Or call 1800 226 215 for the pages you require.



## Healthy

- Surface is plaster so there is no layer of paper to feed toxic mould
- Contains no sand or cement, meaning no on-site carcinogenic silica dust risk
- More resistant to water absorption than both fibre cement and wet area plasterboard, reducing the risk of lingering unhealthy dampness

## Durable

- Higher resistance to joint cracking than both plasterboard and fibre cement
- Significantly stronger and stiffer than same thickness standard plasterboard and similar fibre cement lining systems
- Transmits less water than both wet-area plasterboard and fibre cement; keeping wall cavities drier

## Quiet & Safe

- High density to block sound
- Numerous wall designs to provide options for different environments such as health, education, apartments, aged care as well as residential.
- Choices of wall designs to comply with BCA requirements
- Fire resistant systems up to 2 hours

## Eco-Preferred

- Suitable for demounting when no longer required, and subsequent reuse
- Recycled content 95% - certified
- Low embodied energy wall systems
- Resistance to toxic mould formation
- Less site waste. Extra tapers can be easily formed on site if required, so all joints are recessed and reinforced, and initial off-cuts are also used efficiently, rather than becoming waste
- Avoids carcinogenic crystalline silica dust risk on site.

The latest edition of USG Fiberock® literature is always available to view at [www.fiberock.com.au](http://www.fiberock.com.au)

## Table of Contents

Main Section	Page	Box Features	Page
Contents	2	Product Range Table	2
Introduction	3	Acoustics Comfort	5
Healthy Indoor Environments	4 - 5	USG Tuff-Hide® Coatings	7
Durable In-Service Performance	6 - 13	Unique Fiberock® Technology	12
Liberating New Design Freedoms, and Easy Installation	14 - 15	Solid Touch-and-Feel	13
Eco-Preferred	16 - 17	Levels of Finish	15
Design Considerations	18 - 21	Less Mining and Landfill	17
Wall System Specifications	22 - 29	Green star Ratings	19
Installation Details	30 - 37		
Exterior Soffits and Ceiling Installation	38 - 39		
Handling and Site Check List	40		
Warranty	41		

## Product Range, and Key Properties and Main Applications

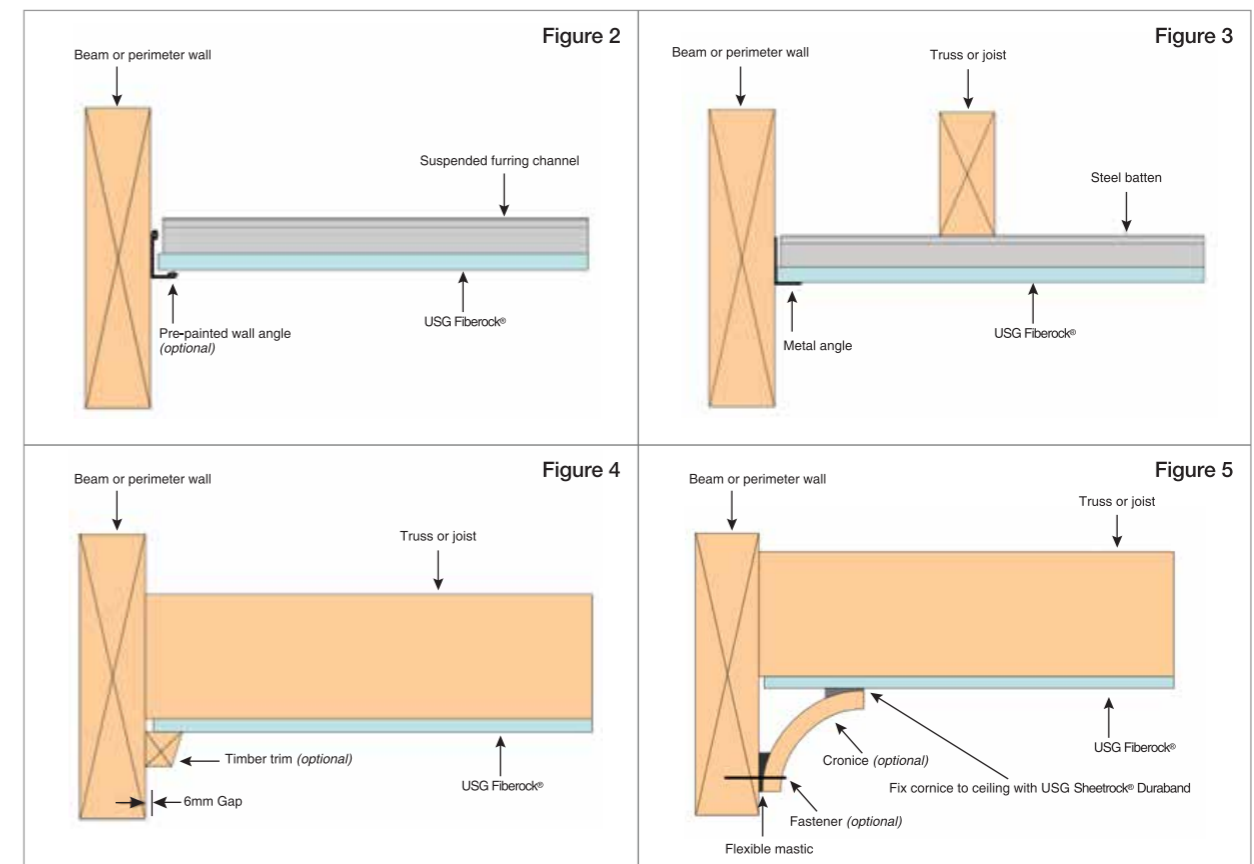
The principle nominal properties of the range of USG Fiberock® products are documented below. Also shown are main applications for each product.

## USG Fiberock® Range & Applications

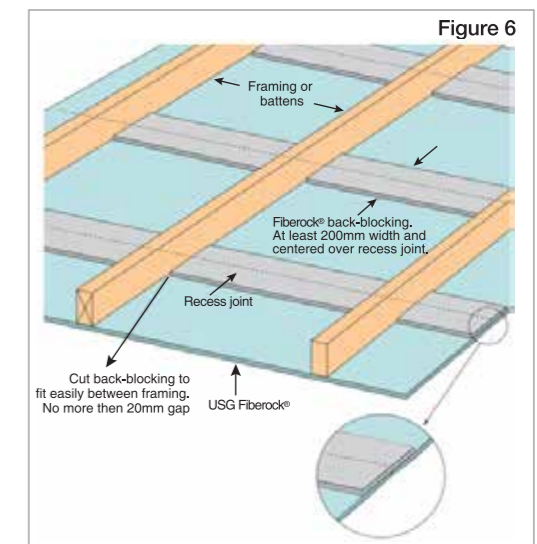
Product Name	Thickness mm	Size mm	Edge TE/SE	Density Kg/m <sup>3</sup>	Weight Kg/m <sup>2</sup>		Main Applications (both dry and wet areas)
Fiberock	13	1200 x 3000	TE	950	12	✓	Interior wall and ceiling linings - widely used in education, medical, aged care, institutions, office, and in quality residential.
Fiberock VHI	13 or 16	1200 x 3000	TE	950	12/15	✓	Interior linings where ultra high impact resistance is needed - containment ceilings, institutional walls.
Fiberock	16	1200 x 3000	TE	950	15	✓	Interior wall and ceiling linings - especially apartment tenancy & corridor walls.
Fiberock	10	1200 x 2700	TE/SE	1000	10	✓	Tile backer wall lining; Lining of eaves, and canopies; Acoustic underlay on framed floors
Fiberock	6.5	900 x 1800	SE	1200	8	✓	Inner layer lining for acoustic walls - especially aged care timber frame structures; Stabilizer layer on framed floors under tiles etc

## Exterior Soffit and Ceiling Installation

- Provide a 6mm gap between the edges of the Fiberock sheets and where it abuts walls, beams, columns and fascias. Ends may be finished with casing beads, wall angles or scotia perimeter trims as in Figures 2-5 below. High corrosive regions may require the use of alternative materials to steel casing beads.



- Screw fix only at 300mm centres maximum, 200mm at sheet ends. Use Type W x 32mm for timber, or Type S or D x 25mm for steel battens.
- Joints not on framing members must be back-blocked as per Figure 6. Form back-blocks from Fiberock, at least 200mm wide and long enough to fit easily between framing members (no more than 20mm gap at either end). Due to Fiberock's paperless face, butt joints on framing members, or back-blocked, can simply be routed/planed to create a recess joint similar to the long factory formed tapered edges, eliminating the recess forming hassles of traditional plasterboard, or raised surface joints. Apply USG Sheetrock Durabond or Easy Sand with a 6mm notched spreader to form beads over the entire face of the back-block strip, at right angles to the joint. (Note: screw fixing during sheet installation will provide additional crack resistance).
- Control joints shall be installed at a maximum of 8.5 metres in both directions, or where there is a structural building control joint.



## Finishing and Painting (Level 4 default minimum, in accordance with AS/NZS 2589 Plasterboard Standard)

- For a full system installation it is recommended to use USG Sheetrock Paper Joint tape and either Sheetrock Durabond (strongest) or Easy Sand setting compounds for first and second coat treatment of joints. Sheetrock Total, Total Lite or UltraLightweight ready-mix compounds are suitable for finishing coats.
- Apply Sheetrock First Coat Primer or Tuff-Hide Primer-Surfacer by airless spray or roll application. Refer to the technical brochures for full application guidelines. Apply two coats of a good quality exterior paint.
- If First Coat or Tuff-Hide are not used, apply a good quality sealer and a minimum of two coats with a good quality paint suitable for exterior conditions in accordance with the paint manufacturer's recommendations.

## Exterior Soffit and Ceiling Installation

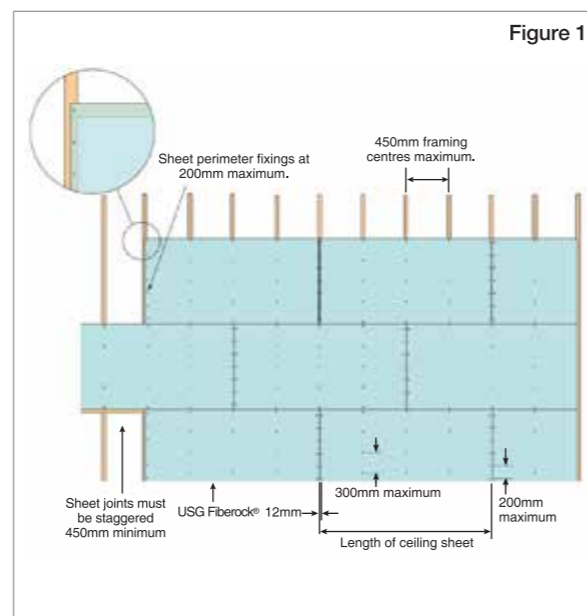


USG Fiberock® linings can be used in ceiling applications, as well as interior walls. This can include exterior areas protected from direct exposure to rain such as alfresco dining, verandas, carports, soffits or eaves that are horizontal or incline down away from the building, as well as interior areas.

This document provides guidelines for the correct installation primarily for exterior areas, as these are subject to more extreme loads and environment conditions and require more fixing and detailing than interior installations. General ceiling installation is covered in the separate 16 page Fiberock Interior Linings Installation Guide.

### Installation

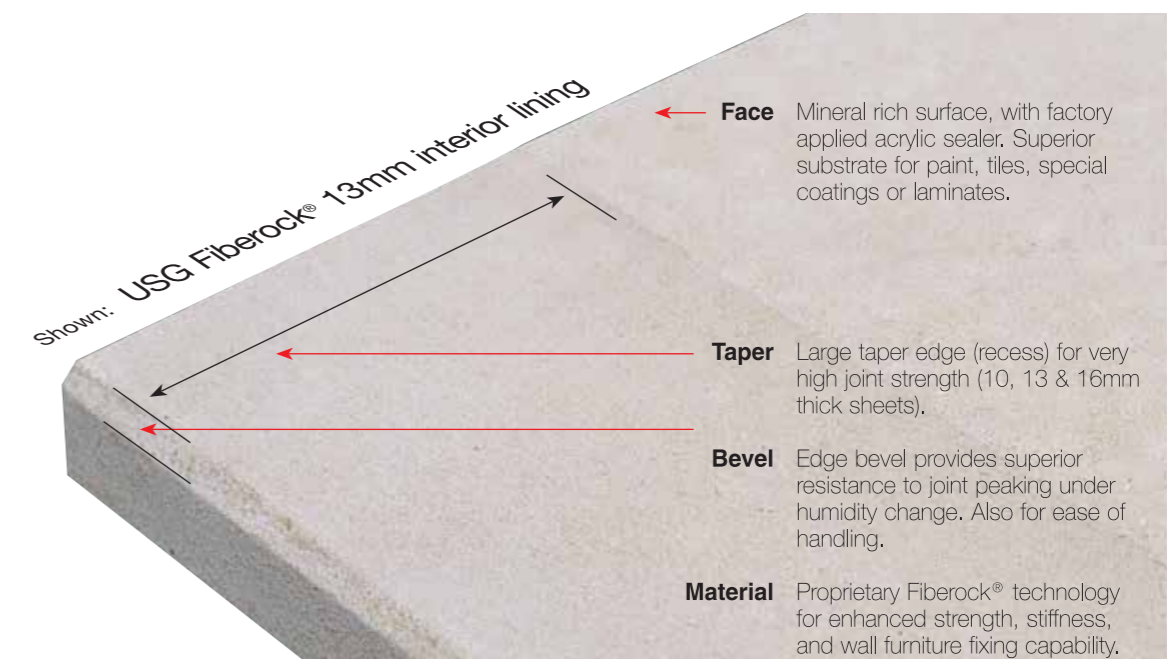
- Trusses, joists other framing or ceiling battens must be installed at 450mm centres maximum. Framing must be provided at sheet ends for support and fixing, both at perimeters and where sheets butt together. Stagger adjacent butt joints. (Figure 1)
- Fiberock sheets are to be installed at right angles to framing members
- Where steel battens are used, these are to be installed in accordance with the batten manufacturer's requirements for exterior applications
- Roof cladding must be completed and sealed before installation
- Provide roofing underlay and adequate cross ventilation to prevent condensation on the back of the lining
- For skillion roof style or high temperature climates, the cavity must be vented to avoid excessive heat build up
- Fascia boards are to extend a minimum of 6mm below the Fiberock or any perimeter trims to provide a drip edge
- Fiberock soffits, eaves and canopies are not to be used around swimming/spa pools or in other enclosed spaces where excessive humidity levels occur, or chlorine gas may accumulate



## Introduction

Imagine working with wallboards that possess the impact toughness of masonry, combined with the design and installation convenience of plasterboard. This elusive ideal, together with leading ecological and health properties, have long been sought by designers, and all those responsible for keeping walls looking good longer.

Now it is reality. Called USG Fiberock® these linings create an entirely new class of highly desirable and durable indoor environments.



This breakthrough interior lining technology turns dreams into reality in four key ways:



### Healthy

Caring for your health by resisting moisture, mould, noise transmission, and being free from carcinogenic crystalline silica dust risk.



### Quiet & Safe

Keeping noise and fire within or from entering.



### Durable

Keeping indoor environments looking good longer, and reducing ongoing maintenance.



### Eco-Preferred

95% recycled, demountable and reusable, leaving more wilderness, desert, and forest to sustain earth ecology and for future generations to enjoy.

Available in Australia since late 2004, Fiberock linings are now the preferred interior lining solution with many leading designers and builders. Application is widespread in buildings for education, health, justice, and aged care. Also in community facilities and eco-offices. More recently, as knowledge of the benefits of this new technology has spread, application has commenced in luxury and eco-homes, and in apartment tenancy and corridor walls.

This brochure is designed to help you understand the unique attributes of Fiberock interior linings, and to provide the information needed for design, specification, BCA (Building Code of Australia) compliance, installation, and when no longer required - demounting for subsequent re-use.

## Healthy Indoor Environments



Caring for your health by resisting moisture, mould, noise transmission, and being free from carcinogenic crystalline silica dust risk.

### How Indoor Environments Affect Your Health

Considering how much of our lives we spend inside built structures, it is easy to understand how the quality of those structures can play a major role in our physical and mental health. In fact a study in the US by the Environmental Protection Agency found that 50% of all illnesses are caused or aggravated by indoor air pollution. Excess noise is also well documented as adverse to good health, productivity, and living comfort. Fiberock is designed to care for your health, by resisting moisture, mould and noise transmission.

### Resisting Moisture Absorption and Lingering Dampness

Because humidity fluctuates with the seasons, moisture in the air varies throughout the year. Most buildings also have periods during the day in which humidity levels are raised by the use of water; such as various cleaning activities, showers, cooking and washing up. These periods require effective moisture management to preserve a healthy environment.

Modern building methods create almost airtight environments which trap moisture inside. We can observe this situation when warm, wet air comes in contact with windows and condensation forms on the glazing. Less noticeable, but more important, is moisture that is absorbed into fabrics and building materials causing them to become damp. This moisture can result in serious mould and mildew health hazards for inhabitants. Apart from being unsightly and causing decay, mould and mildew are suspected triggers for asthma, and can aggravate chronic health problems such as respiratory diseases, colds and allergies.

Compared with other wall linings, Fiberock strongly resists the absorption of water into the lining material, leaving any surface dampness to dry with proper ventilation. Fiberock has robust water repellent properties, it is the ideal wall and ceiling lining material for use right throughout the structure.

### Resisting Toxic Mould and Mildew

Mould requires three key conditions to be present for it to become established, either on walls and ceilings or in wall cavities; moisture, a food source, and mould spores. Of these, mould spores are effectively present everywhere in the air, so to control mould it is necessary to control moisture and potential food sources.

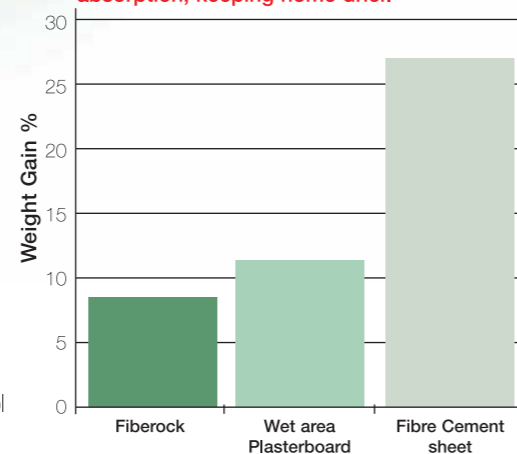
Plasterboard, with its paper face is an ideal food source for mould. Controlling mould on plasterboard relies on surface coatings, and on the effectiveness of any mouldicide chemicals that may be added to the surface or core of the material.

Fibre cement sheet is also known to readily foster mould growth. Moisture can be absorbed into fibre cement, and through it into the wall cavity providing lingering moist growing conditions for mould. Food supply options include its cellulose reinforcement and any dirt that has travelled into the fibre cement sheet along with the moisture.

Fiberock is engineered to provide exceptional resistance to the development of mould. It has no surface paper sheet to act as a food source. It has high resistance to the ingress of moisture and dirt into the sheet meaning that everyday moisture stays on the surface where it can quickly dry.



Weight gain % after 24 hour soak in water  
Fiberock resists severe water soak absorption, keeping home drier.



Mould growing on the face of an alternative wet area lining.

## Universal Wall (with or without Masonry/Concrete Veneer), or Column

The following layer combinations are required to provide the appropriate FRL in accordance with AS 1530.4 – 2005

Table 1. Lining Details

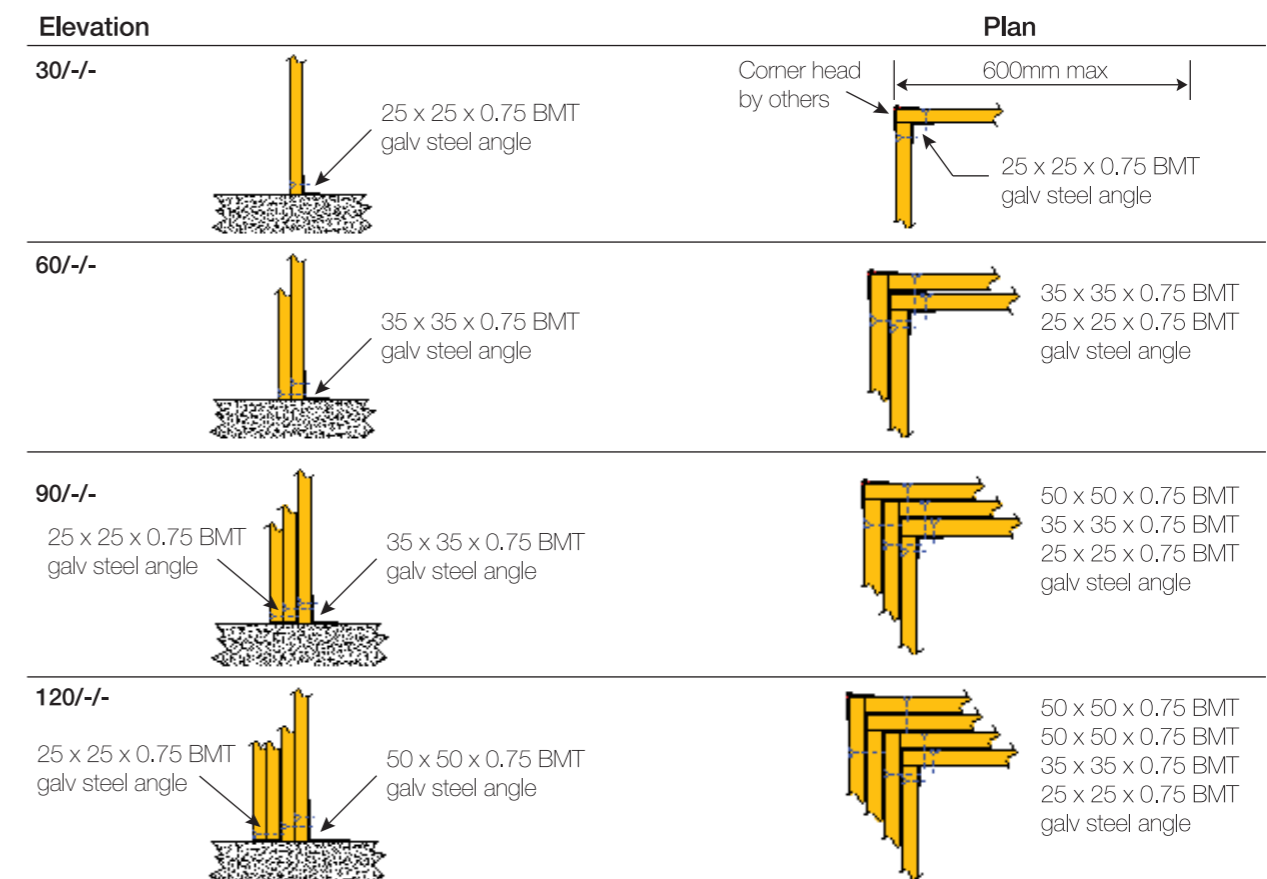
System Code	# of Linings on One Side	FRL Rating - Walls	FRL Rating - Columns
FR30SS1	1 x 16mm Fiberock Aqua-Tough	(30)/30/30	30/ - / -
FR60SS2	2 x 16mm Fiberock Aqua-Tough	(60)/60/60	60/ - / -
FR90SS3	3 x 16mm Fiberock Aqua-Tough	(90)/90/90	90/ - / -
FR120SS4	4 x 16mm Fiberock Aqua-Tough	(120)/120/120	120/ - / -

Table 2. Fastener Details

# of Linings on One Side	Screw Type <sup>1</sup>	Screw Spacing
1 x 16mm Fiberock Aqua-Tough	6g-18 x 25mm	300mm
2 x 16mm Fiberock Aqua-Tough	6g-18 x 25mm (1 <sup>st</sup> layer) 6g-18 x 41mm (2 <sup>nd</sup> layer)	300mm 300mm (off-set from 1 <sup>st</sup> layer)
3 x 16mm Fiberock Aqua-Tough	6g-18 x 25mm (1 <sup>st</sup> layer) 6g-18 x 41mm (2 <sup>nd</sup> layer) 8g-18 x 60mm (3 <sup>rd</sup> layer)	300mm 300mm (off-set from 1 <sup>st</sup> layer) 200mm (off-set from previous layers)
4 x 16mm Fiberock Aqua-Tough	6g-18 x 25mm (1 <sup>st</sup> layer) 6g-18 x 41mm (2 <sup>nd</sup> layer) 8g-18 x 60mm (3 <sup>rd</sup> layer) 6g-6 x 50mm laminating	300mm 300mm (off-set from 1 <sup>st</sup> layer) 200mm (off-set from previous layers)

<sup>1</sup> Bugle head, needle point for steel gauges < 0.8 mm BMT, drill point 0.8 – 2.0 mm BMT

Figure 2. Boxed Protection Details



## Multi-Layer One Sided FRL Construction

### Introduction

USG Fiberock® interior linings can be layered to provide a range of fire ratings for wall systems or protection of building elements with linings on one side only. This can be important where the same lining is preferred to match full USG Fiberock® FRL wall systems.

To maintain fire integrity, details as below must be adhered to, in particular:

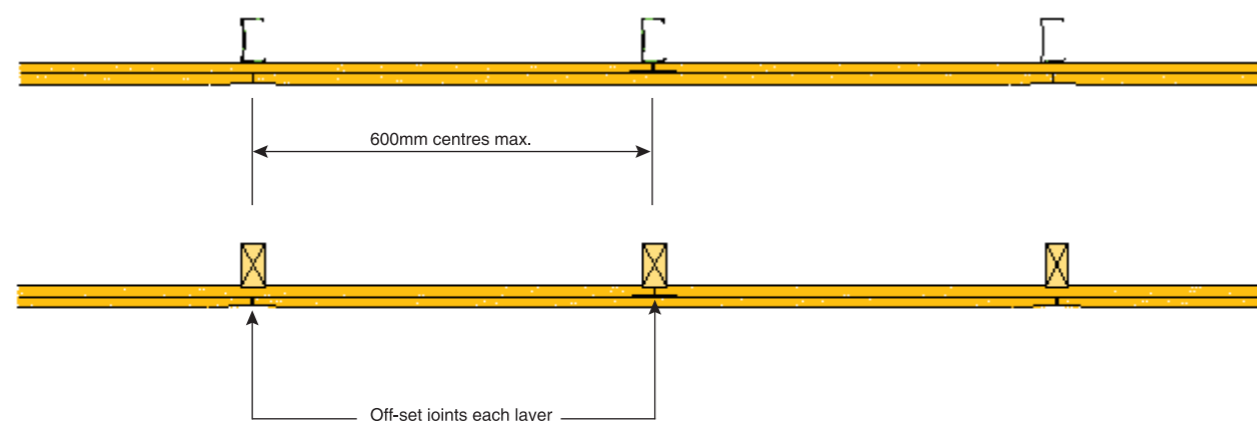
- Screw centres are maximums
- Intumescent fire sealant must be equal to or greater than the specified FRL system
- Metal components are minimums
- Only 16mm thickness Fiberock Aqua-Tough is used in all options

FRL ratings are based on BRANZ report FAR 3590 The Fire Resistance of USG Fiberock Universal Walls and Column Protection. Copy available on request.

### Wall Systems with Linings One Side Only

- Steel or timber studs must meet durability and structural criteria under dead and live loads as specified.
- Frame construction is per normal for FRL systems lined both side. For steel stud walls continuous nogs will be required to resist stud twist under fire conditions. Refer stud manufacturer for quantity and position.
- Stud spacing is at 600mm centres maximum
- Fix tracks to substrate with appropriate fasteners for the type of material being fixed to. Fix at 600mm centres maximum, no less than 20mm or greater than 100mm from ends. Fastener type and spacing may be dependent on other factors such as wind or impact loads. Always use the greater of the two.
- Full sheets shall be used wherever possible to minimise joints
- All joints must be formed over framing
- Suitable steel or timber strapping is required when installing over masonry/concrete type walls (ref Technical Bulletin: Lining Concrete and Masonry Walls)
- Offset recessed joints of multi layers by one stud width (vertical installation) and 300mm minimum (horizontal installation)
- Butt joints if unavoidable must also be offset from previous layer
- Mechanical fasteners only shall be used at centres specified. Construction adhesives are not to be used

Figure 1. Stud Centres and Layer Positioning



## Healthy Indoor Environments

The cellulose reinforcement within Fiberock is not a readily available food source for mould because it is processed under high temperature and pressure and also because it is dispersed throughout the material - away from everyday moisture which remains on the sheet surface. As a result Fiberock is the stand out leader in resistance to mould formation, scoring the top score of 10 in the ASTM D3273 test.

### Safe Material - Free from Carcinogenic Crystalline Silica Dust Risk

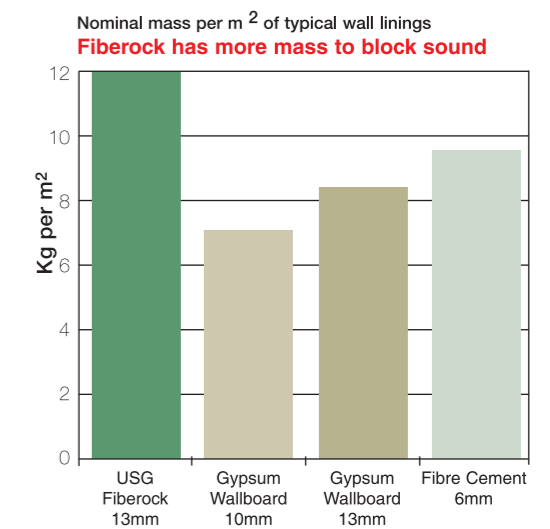
Pollutants which can permeate the air from building products such as wall linings are major concerns for many building contractors and occupants. Because it is free from all known health hazards including respirable crystalline silica and formaldehyde, Fiberock is an ideal choice for all interior linings.

### Efficient Temperature Management

The most comfortable indoor temperature is between 18 and 24 degrees C. For instance, the World Health Organisation recommends temperatures should not drop below 18 degrees C. When temperatures drop below 16 degrees C, there is an increased risk of respiratory disease, along with increased condensation, mould and mildew problems. Fiberock directly assists in the process of efficiently achieving thermal comfort, by enhancing thermal mass. With a specific heat content of approximately 1.1kJ/kg, Fiberock interior linings will absorb heat from the daytime sun. During the night temperature drop this heat is released, moderating indoor temperature fluctuations. Wall system thermal insulation is achieved by the whole wall system, in which the wall cavity and any included insulation materials provide room-to-room and room-to-outside thermal insulation.

### Acoustic Comfort - Freedom to Both Make and Escape Noise

Fiberock is designed to effectively suppress room to room noise transmission creating new levels of freedom for occupants to both make and escape noise. Its extra high mass is the first and most important step to reducing airborne sound transmission. Cracks in wall linings act with sound just like cracks in a boat's hull act with water. If cracks are present the sound will get through. The superior joint strength of Fiberock (see fig. page 6) resists crack formation and as a result ensures ongoing effective acoustic comfort room to room. Designers need to consider all the possible pathways for sound transmission between sound separated regions or rooms. Good design will address these, taking into account doorways, windows, and even such fixtures as electricity outlets. Further acoustic performance information is included on Page 20. Specification pages commencing on page 22 show Fiberock acoustically rated wall systems. Effective sound design will also limit horizontal transmission of sound through the floors (see footbox below). By combining Fiberock on the walls and ceilings, and on framed floors, sound can be mostly contained at source.



### Acoustic Comfort – Boosting Floor Performance

Considerable acoustic benefits can be attained when insulated cavity walls lined with Fiberock are used with framed floors lined with Fiberock acoustic underlay.

#### PARTICLEBOARD OR PLYWOOD FLOORS:

Laying Fiberock 10mm over particleboard or plywood floors not only significantly reduces horizontal and vertical noise flows, it also reduces bounce and vibration creating the sense of a quality platform. This combination also greatly reduces the risk of fire burn down, and provides a solid, dimensionally stable foundation for tiles and other modern final floor finishes. Alternatively, if acoustic sound suppression is not required, using Fiberock 6.5mm flooring stabilizer can achieve a dimensionally stable floor for tiles or other final flooring materials.



## Durable In-Service Performance



Keeping indoor environments looking good longer, and reducing ongoing maintenance.

### Introduction

Achieving a wall system with long lasting good looks requires attention to the following five critical elements:

- Joint Strength
- Indentation Resistance
- Surface Abrasion Resistance
- Impact Resistance
- Ease of Repair

### Joint Strength

The strength of sheet edge to sheet edge jointing is one of the most critical performance parameters for durable wall systems. The force placed on a wall during impact, results (amongst other things) in high stresses on sheet joints.

For this reason Fiberock wall systems are designed with extra joint strength. This is achieved through the following three unique features.

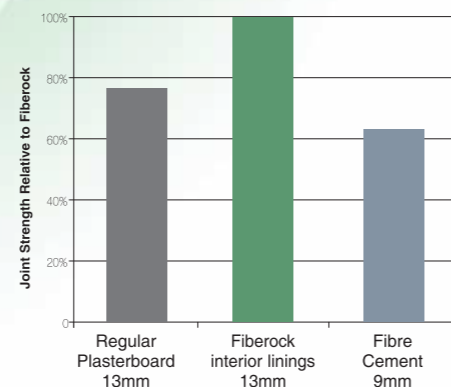
- Enlarged taper dimensions. Fiberock has taper edges of enlarged dimension, when compared with most other panels.
- Stronger surface bonding. The bonding of jointing compound to Fiberock is excellent due to the surface sealer being optimised for adhesion. The bond strength is not limited by any possibility of paper surface delaminating as Fiberock is of homogenous structure.
- No surface wide-set butt-end jointing. There is no need for any weak surface jointing (without taper edges) due to the ability to form additional tapers as required on site during installation.

The relative joint strength for different linings, tested with the manufacturer's recommended jointing materials, is shown along side.

Whilst standard plasterboard compounds (as used above in testing) can be used, for optimum performance and compatibility the following USG products are recommended:

### Comparative joint tensile strength for different lining materials

**Fiberock has extra strong joints to resist unsightly cracking**



**Setting Compounds:** USG Sheetrock® Durabond, or USG Sheetrock® Easy Sand™

**Top Coats:** USG Sheetrock® Total, Total Lite™, or Ultra Lightweight™

## Multi-Layer FRL Construction

USG Fiberock® interior linings can be layered to provide a range of fire ratings for wall systems or protection of building elements. Linings can be installed with sheets all vertical, inner layer vertical/outer horizontal, or all horizontal.

To maintain fire integrity, details as below must be adhered to, in particular:

- Screw types are minimums, and will be suitable for up to 2 x layers of 16mm Fiberock
- Screw centres are maximums
- Sheet overlaps are minimums
- Metal components are minimums
- Do not fasten linings into top and bottom tracks
- Taping and jointing is required on outer layer only

### Horizontal Fixing

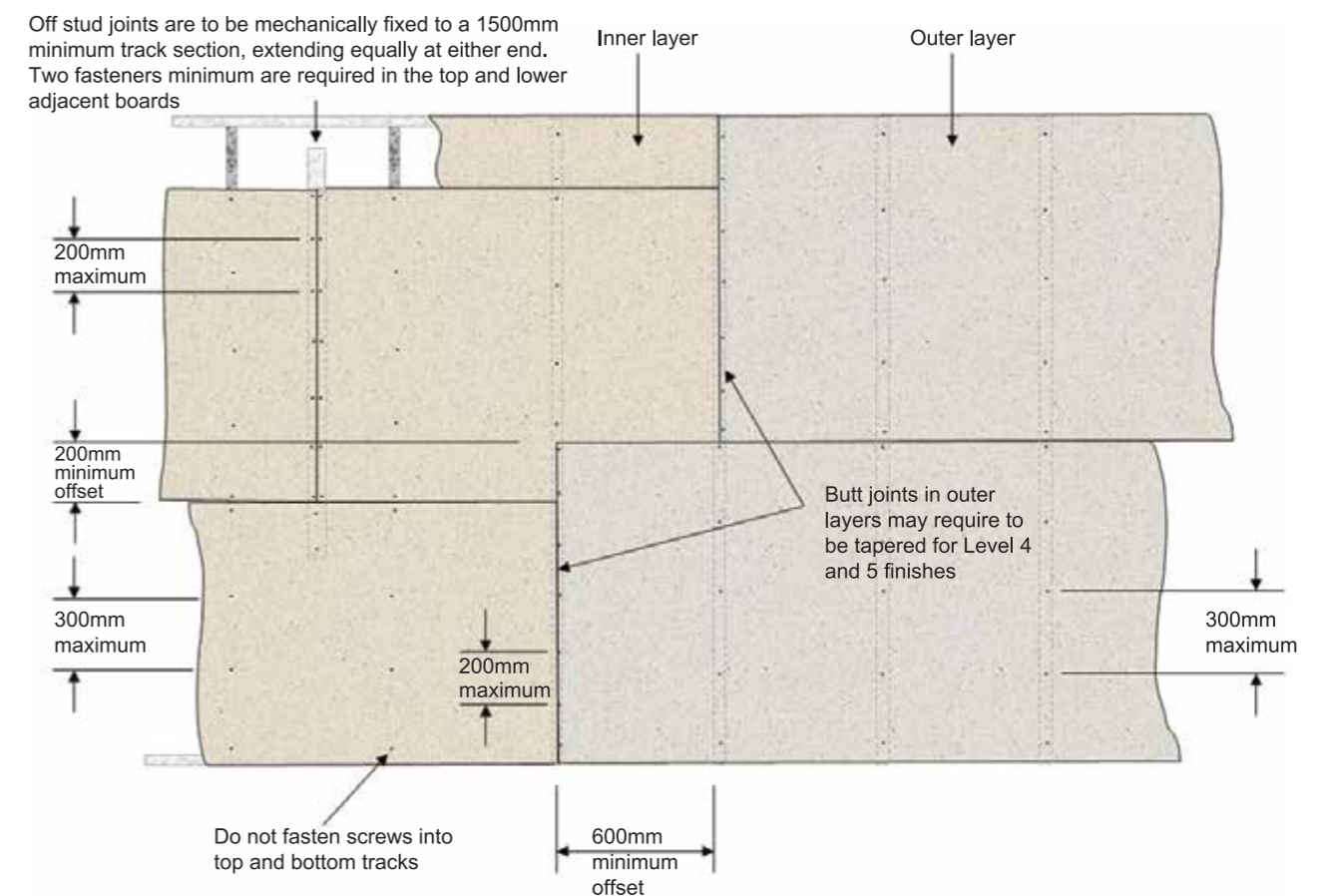
- Inner layer horizontal joints on either side of stud
- Inner layer vertical joints on either side of stud
- Outer layer horizontal joints
- Outer layer vertical joints
- Screw types<sup>1</sup> – inner layer
- Screw types<sup>1</sup> – outer layer
- Screw type – laminating
- Screw centres - inner layers to studs
- Screw centres - inner layers to back-block track
- Screw centres – outer layer vertical joints
- Screw centres – outer layer in field

### Offset (minimum)

- 200mm
- 600mm
- 200mm
- 600mm
- 6g-18 x 25mm
- 6g-18 x 41mm
- 10g-8 x 40mm
- 300mm
- 200mm
- 200mm
- 300mm

<sup>1</sup> Bugle head, needle point for steel gauges < 0.8 mm BMT, drill point 0.8 – 2.0 mm BMT

Figure 1. Horizontal fixing - both layers





## Screw and Glue Fixing to Steel Stud

### Introduction

For non-fire rated and acoustic wall systems, fastening of USG Fiberock® to steel stud framing can utilise a combination of mechanical screws and drywall or construction stud adhesive.

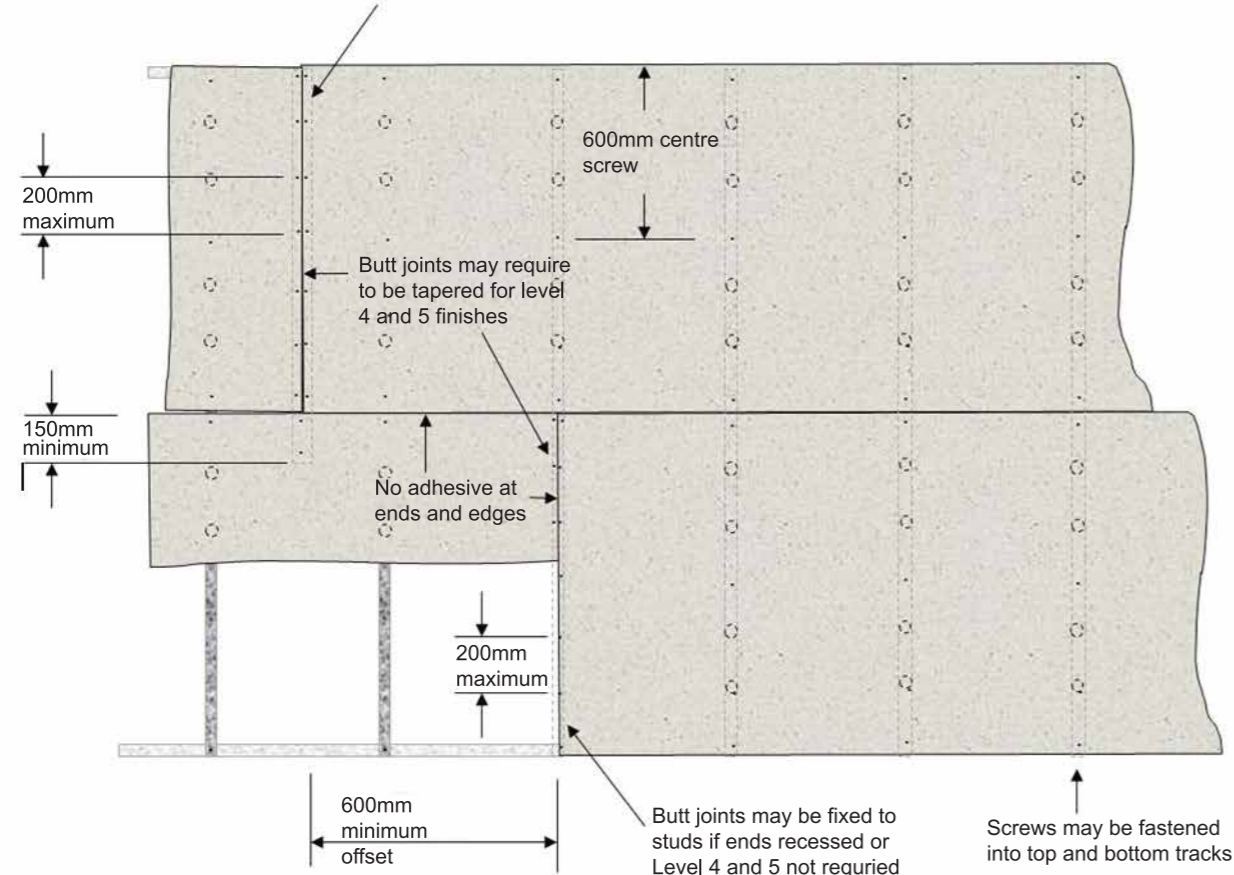
### Single Layer Wall Systems – Horizontal Fixing

Position sheets so the vertical butt ends are between framing. Butt joints are to be back-blocked to standard details or incorporate an alternative method such as steel track as illustrated below.

Butt joints are to be offset by 600mm both on the same side and to opposite sides.

Figure 1. Horizontal fixing - single layers

For Level 5 and 5 finishes, butt joints are to be positioned between studs and either back blocked or mechanically fixed to a track section, extending 150mm minimum over the adjacent board using least two fasteners. Do not use adhesive on this type of joint



## Durable In-Service Performance

### Indentation Resistance

Small, hard objects are the usual cause of indentation damage to walls. These can be carried objects, such as items of luggage, containers, tools and other equipment. Such damage is usually accidental, but if left in a state of disrepair, will attract more and more damage over time. A standard international test has been developed to simulate a very severe small hard body impact. A 1.0 kg steel ball is dropped through an arc to impact upon the lining material. The test reference is ISO 7892:1998 and the draft 2002 ASTM standard (now ASTM C1629) specification for abuse resistant interior panels. Exceeds BCA/NCC Specification C1.8 Clause 5(c).

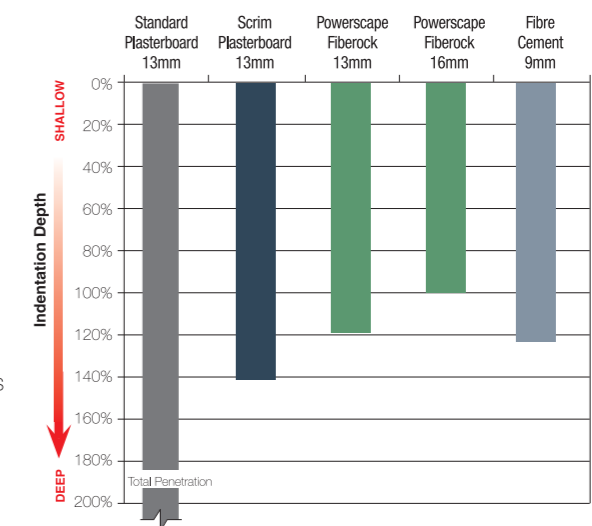
### Surface Abrasion Resistance

Whilst most consequential damage to walls arises from impact, consideration of abrasion damage is also important. The abrasion resistance of any finished wall system depends on the abrasion properties of the applied surface coating (see footbox below), rather than on the abrasion resistance of the lining material itself. This is because once the surface finishing material becomes abraded, further wear would result in dust from the substrate starting to be released. The wall surface has also become unsightly, and needs to be promptly repaired. The abrasion resistance level of the lining material itself will neither speed, nor hinder, this outcome in any way. To increase the wall system abrasion resistance, it is imperative to increase the abrasion resistance of the coating.

The most important property of the lining material is its reliable acceptance of, and good bonding to, the desired coating material. This is true whether the selected abrasion resistant coating is paint, paper or any other applied surface material. Fiberock interior linings, with their mineral rich smooth surface and factory applied clear acrylic sealer, are the ideal wall base on which to apply abrasion resistant finishing coatings. Their factory applied sealer normalises surface suction and aids the effective application of paint, or adhesives for tiles or other laminated surfaces.

### Indentation Relative to 16mm Fiberock interior linings - Small Hard Body Impact Test

Fiberock dented less than all other materials



For this test, four different lining materials have been impacted to enable reliable performance comparisons to be made. Standard 13mm plasterboard is shown first, then plasterboard (scrim reinforced), followed by Fiberock interior linings. For additional comparison the performance of 9mm fibre cement sheet is also recorded.



Fiberock 13mm linings have been installed throughout many blocks of school classrooms in Queensland, as well as in New South Wales, and Victoria. Gymnasiums should use Fiberock VHI, as shown in photo.

### Extra High Abrasion Resistance

Where very high ongoing levels of abrasion resistance are needed, a coating of USG Sheetrock® Tuff-Hide® Primer-Surfacer as part of the final finishing system can be specified.

Tuff-Hide® is a dual-purpose acrylic based coating especially formulated for application over interior linings, and providing in a single spray application what would normally be a two-step process for a Level 5 coating. In addition, one of its main attributes is its cured hardness and resistance to minor bumps, knocks and especially abrasion. This is further enhanced by the high density Fiberock linings providing an extremely rigid base.

This extra tough surface treatment should be complemented with an appropriate finish coat such as waterborne enamel.



Brochures on USG Sheetrock® Tuff-Hide® can be downloaded from [www.fiberock.com.au](http://www.fiberock.com.au) or requested by calling 1800 226 215.

## Durable In-Service Performance

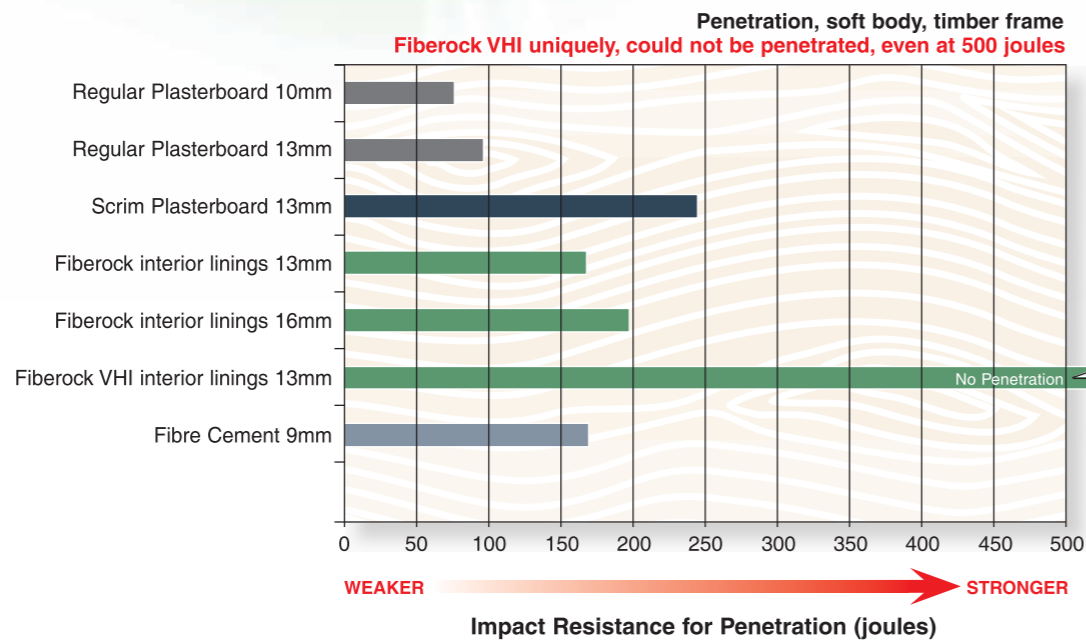
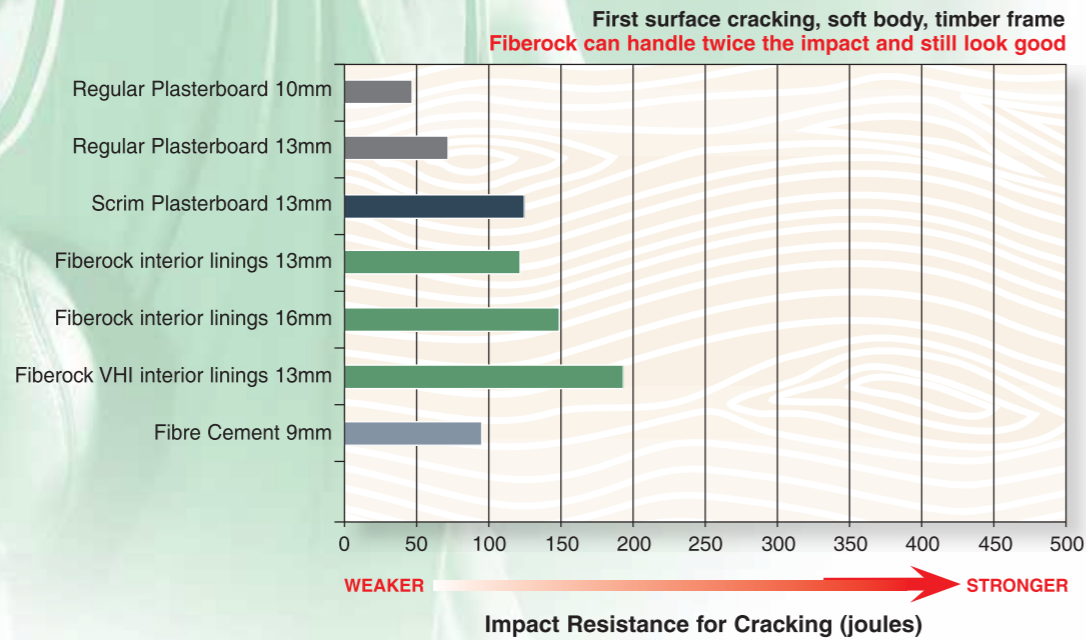
### Impact Performance - Timber Frame

Fiberock outperforms other tested interior linings when used in timber frame wall systems. Performance was examined from both soft and hard body impacts. The impact is repeated with increasing energy levels until failure is noted. Two failure points are important;

- First surface cracking – at which time visual damage to the wall was evident and the performance of the linings would likely have been impaired in terms of resisting further impact. Repair would be necessary at this point.
- Penetration – at which time the lining material was fully penetrated by the impact object. For impacts of this magnitude, where penetration occurs, repairs would typically become more complex and expensive.

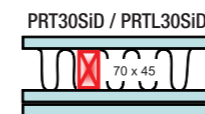
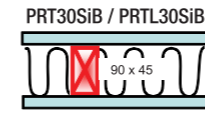
**Soft Body Impact** Soft body testing was completed to BS 5234:1999, and involves a 50kg bag filled with glass beads swung on a rope. The test simulates human body impact. The following graphs show the lowest recorded impact energy for each lining type for tests undertaken with a minimum sample size of three specimens of each lining.

Typical energy exerted by the shoulder of an adult male when impacting a wall at speed is up to 120 joules. Exceeds BCA/NCC Specification C1.8 Clause 5(c)

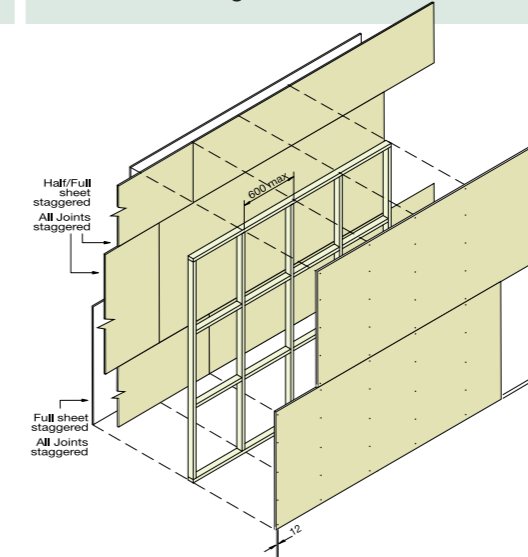


## Wall System Installation - Timber Stud

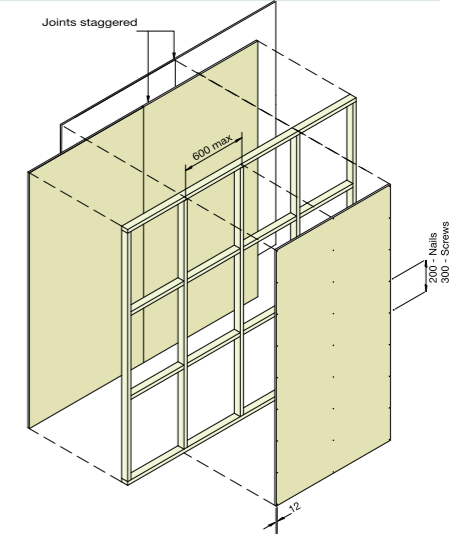
### Single Stud System example



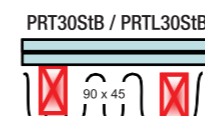
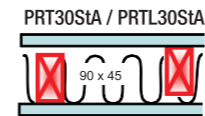
### Single Stud Horizontal fixing



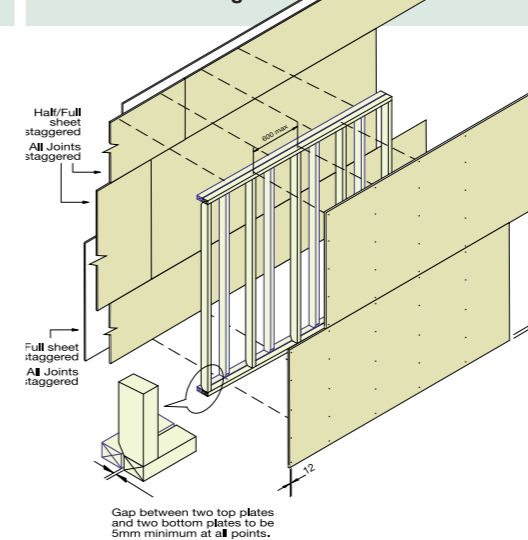
### Single Stud Vertical fixing



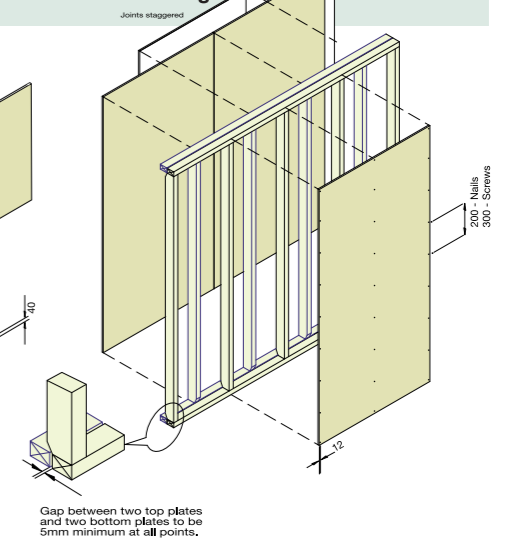
### Staggered Stud System example



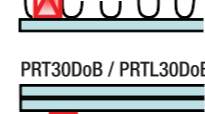
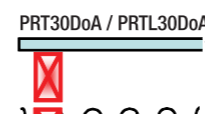
### Staggered Stud Horizontal fixing



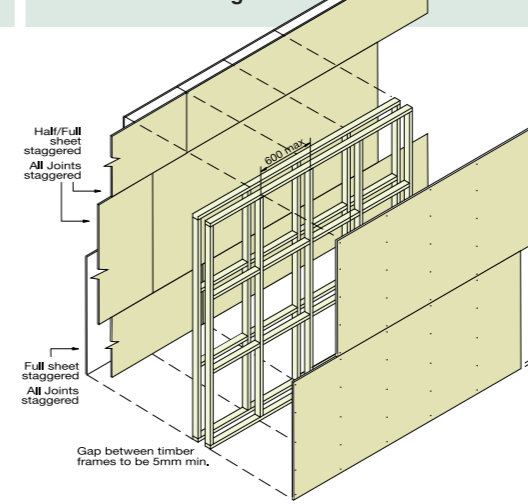
### Staggered Stud Vertical fixing



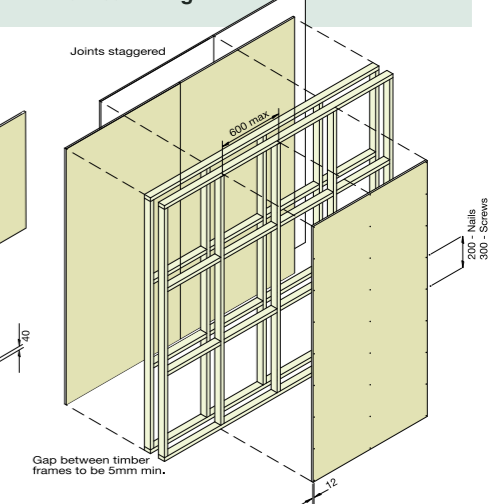
### Double Stud System example



### Double Stud Horizontal fixing



### Double Stud Vertical fixing



## Wall System Installation - Timber Stud

### Lining

One or two layers of USG Fiberock interior lining each side of the timber frame to the system specification.

Vertical or horizontal sheet fixing is permitted. Sheet joints must be formed over framing or back blocked (screw and glue). Sheets shall be touch fitted.

Offset joints between sheets by 600mm (300mm for Staggered Stud systems) on opposite sides of the frame, both vertically and horizontally.

For systems with two layers of Fiberock per side, and where horizontal fixing is preferred for plastering joints, the inner layer may be fixed vertically to simplify offsetting joints.

A 5mm gap shall be left between the linings and the floor. All gaps must be sealed with a fire and/or acoustic sealant aligned to the wall rating.

### Fasteners

#### Single layer side and the inner layer of a two layer side:

13mm Fiberock - 25mm x 6g drywall high thread screws at 300mm centres or 25 x 2.8mm plasterboard nails at 200mm centres.

16mm Fiberock - 32mm x 6g drywall high thread screws at 300mm centres or 30 x 2.8mm plasterboard nails at 200mm centres

#### The outer layer of a two layer side:

51mm x 8g drywall high thread screws at 300mm centres or 50 x 2.8mm plasterboard nails at 200mm centres .

### Services

Holes may be drilled to allow installation of electrical service lines and plumbing supply pipes, subject to fire and acoustic requirements.

### Jointing

All fastener heads stopped and all sheet joints paper tape reinforced and stopped in accordance with the standard procedures for plasterboard. For a complete system and maximum strength, it is recommended to use USG Sheetrock paper tape and compounds.

### Insulation

Sound control insulation shall be a minimum of R 2.0 glasswool or polyester blanket installed between the studs, or just on one side for staggered and double stud walls. Where mineral wool is specified, it shall have a minimum service temperature of 450°C and minimum thickness of 63mm.

### Framing – single stud

F5 or MGP 10 framing.

A minimum stud size to system specification.

Stud spacing at 600mm maximum.

Nogs at 800mm centres maximum for vertical sheet fixing or 1200mm centres maximum for horizontal sheet fixing.

Non Loadbearing Walls – framing dimensions and height as determined by AS1684 stud tables for non-loadbearing walls.

Loadbearing Walls – framing dimensions and height as determined by AS1684 stud tables for loadbearing walls.

### Framing – staggered stud

F5 or MGP 10 framing.

90 x 45 studs are fixed to two 70 x 45 top and bottom plates in true alignment.

Stud spacing at 600mm maximum.

Studs on each side of the partition to be offset by half the stud spacing.

Minimum gap between the 70 x 45 plates is to be 5mm.

Non Loadbearing Walls – framing dimensions and height as determined by AS1684 stud tables for non-loadbearing walls.

Loadbearing Walls – framing dimensions and height as determined by AS1684 stud tables for loadbearing walls.

### Framing – double stud

F5 or MGP 10 framing.

90 x 45 studs (minimum) are fixed to top and bottom plates in true alignment.

Stud spacing at 600mm maximum.

Nogs at 800mm centres maximum for vertical sheet fixing or 1200mm centres maximum for horizontal sheet fixing.

Minimum gap between frames is to be 5mm.

Non Loadbearing Walls – framing dimensions and height as determined by AS1684 stud tables for non-loadbearing walls.

Loadbearing Walls – framing dimensions and height as determined by AS1684 stud tables for loadbearing walls.

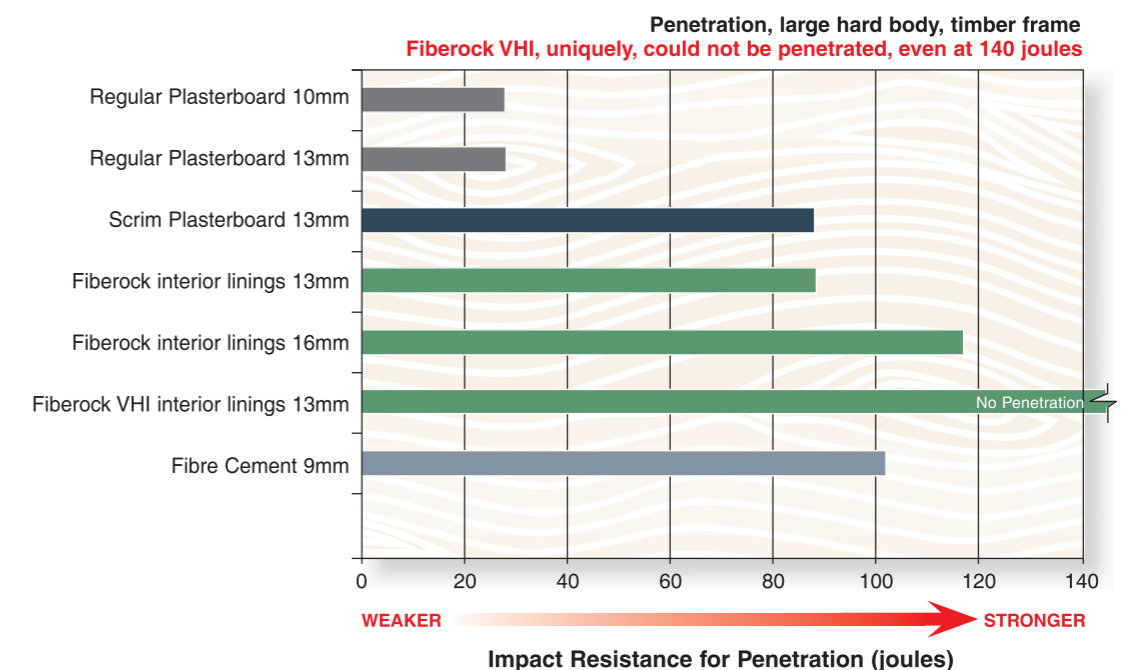
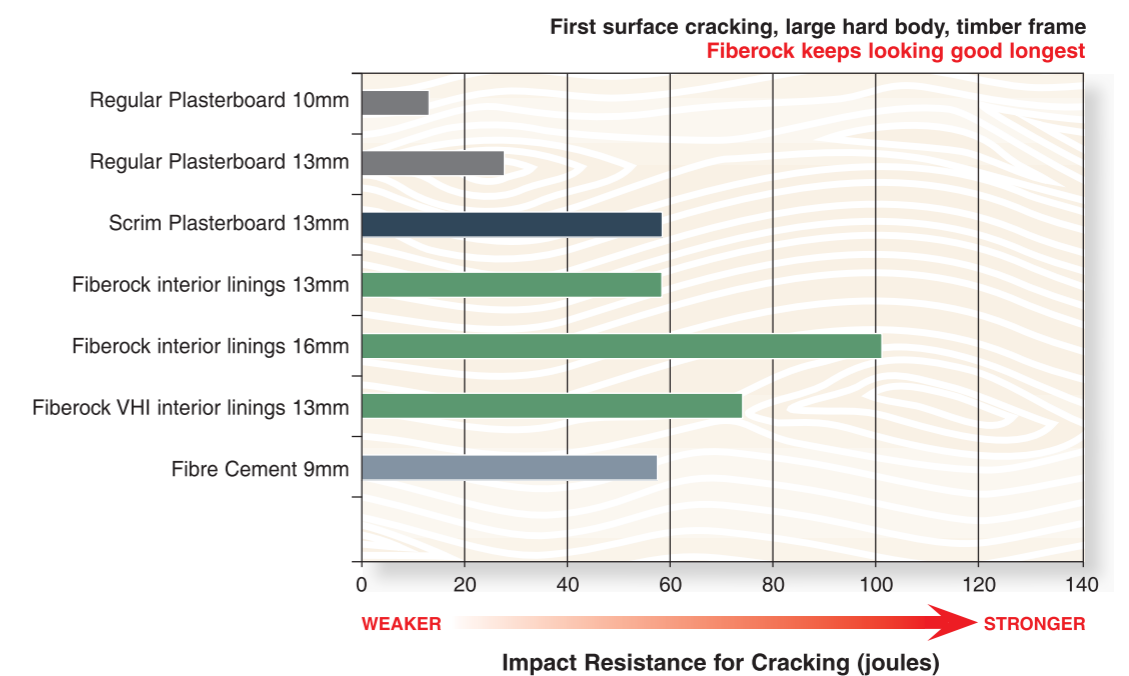
## Durable In-Service Performance

**Hard Body Impact** The test involves a 5.44 kg steel hammer swung on a 3.0m axis against the wall surface with increasing levels of energy. This test replicated the effect of various in-use exposures to either intentional or accidental damage from a large hard object. Again first surface cracking and full penetration were the two points of failure noted. Hard body testing was completed to the draft 2002 ASTM standard specification (now ASTM C1629) for abuse resistant interior panels. The following graphs show the lowest recorded impact energy for each lining type for tests undertaken with a minimum sample size of 3 specimens of each lining.

An example of hard body impact is an intentional solid kick on the wall with a boot, which will result in an impact energy of around 50 or 60 joules.

### Indentation Test

Exceeds BCA/NCC Specification C1.8 Clause 5(d)



## Durable In-Service Performance

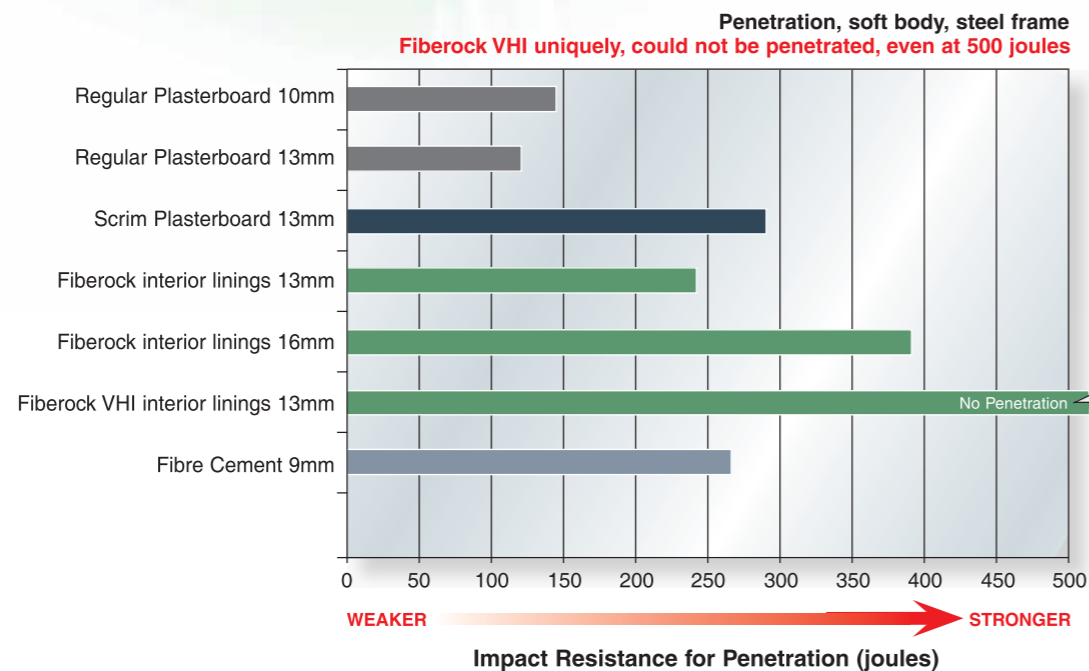
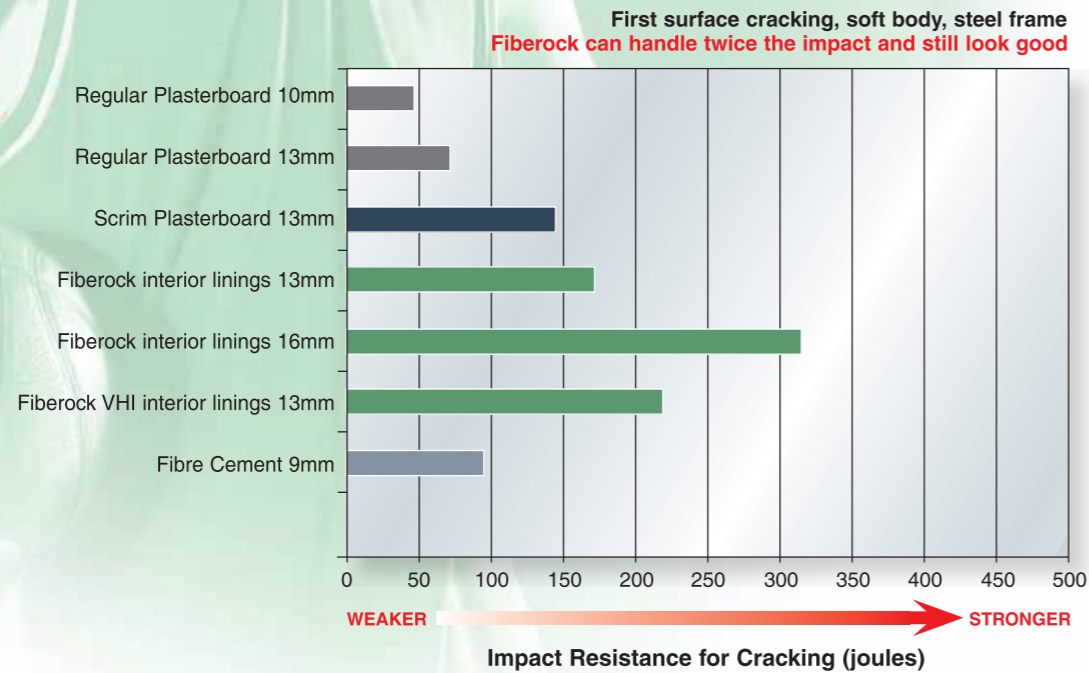
### Impact Performance - Steel Frame

Fiberock outperforms other tested interior linings when used in steel frame wall systems. For this test, performance was examined for impact from both soft and hard bodies. The impacts were repeated with increasing energy levels until failure was noted. Three specimens of each material were tested, with the lowest result being reported. Two failure points are important;

- First surface cracking – at which time visual damage to the wall was evident and the performance of the linings would likely have been impaired in terms of resisting further impact. Repair would be necessary at this point.
- Penetration – at which time the lining material was fully penetrated by the impact object. For impacts of this magnitude, where penetration occurs, repairs would typically become more complex and expensive.

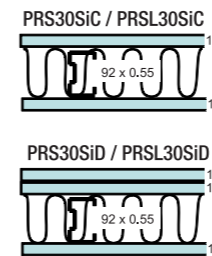
**Soft Body Impact** Soft body testing was completed to BS 5234:1999, and involves a 50kg bag filled with glass beads swung on a rope. The test simulates human body impact. The typical impact energy exerted by an adult male when shoulder barging a wall at speed is up to 120 joules. The following graphs show the lowest recorded impact energy for each lining type for tests undertaken.

Exceeds BCA/NCC Specification C1.8 Clause 5(c)

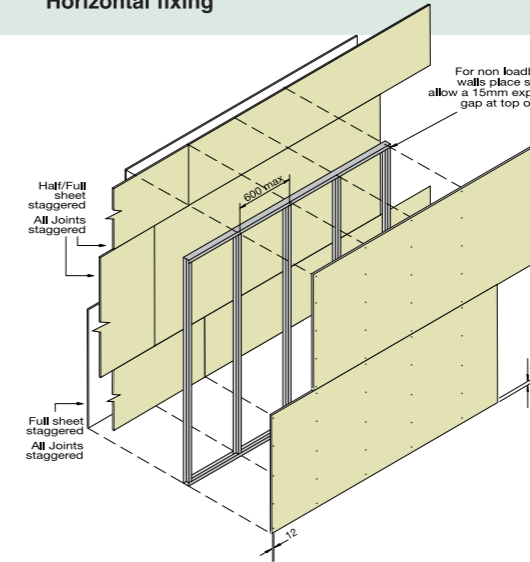


## Wall System Installation - Steel Stud

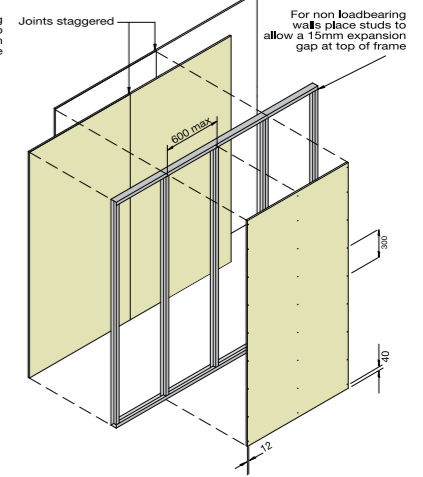
### Single Stud System example



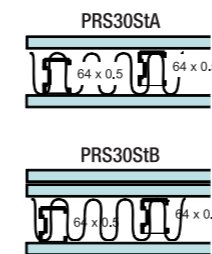
### Single Stud Horizontal fixing



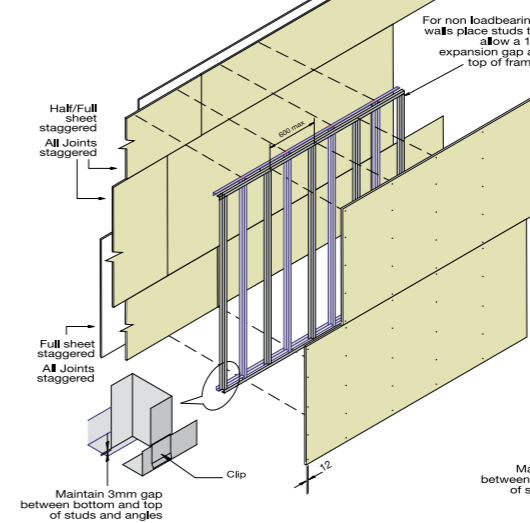
### Single Stud Vertical fixing



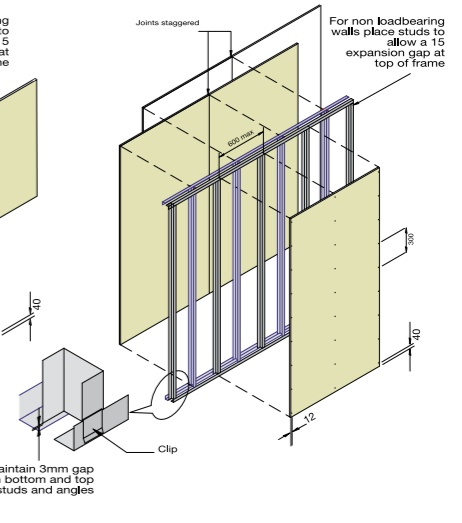
### Staggered Stud System example



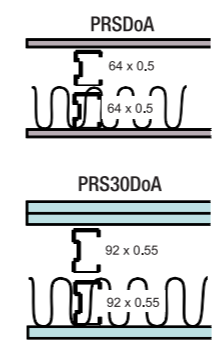
### Staggered Stud Horizontal fixing



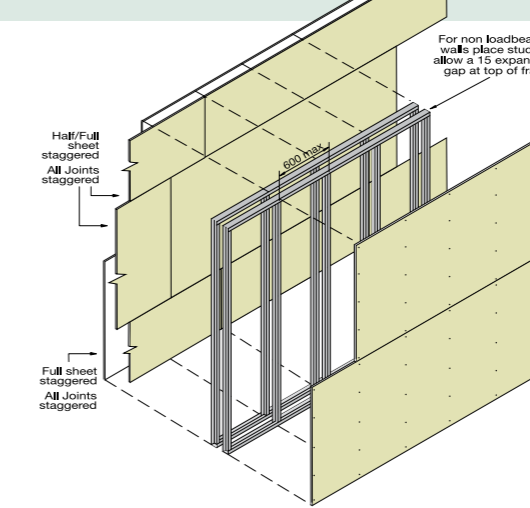
### Staggered Stud Vertical fixing



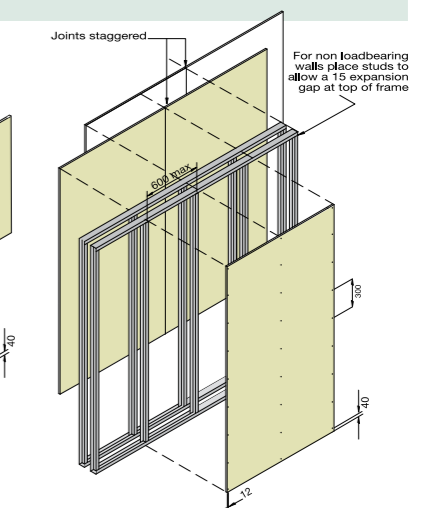
### Double Stud System example



### Double Stud Horizontal fixing



### Double Stud Vertical fixing



## Wall System Installation - Steel Stud

### Lining

One or two layers of USG Fiberock interior lining each side of the steel frame to the system specification.

Vertical or horizontal sheet fixing is permitted. Sheet joints must be formed over framing or back blocked (screw and glue). Sheets shall be touch fitted.

Offset joints between sheets by 600mm (300mm for Staggered Stud systems) on opposite sides of the frame, both vertically and horizontally.

For systems with two layers of Fiberock per side, and where horizontal fixing is preferred for plastering joints, the inner layer may be fixed vertically to simplify offsetting joints.

A 5mm gap shall be left between the linings and the floor. All gaps must be sealed with a fire and/or acoustic sealant aligned to the wall rating.

### Fasteners

(0.55 BMT – 0.9 BMT = needlepoint)  
(0.50 BMT = high thread)

**Single layer side and the inner layer of a two layer side:**  
25mm x 6g drywall screws at 300mm centres

**The outer layer of a two layer side:**  
13mm Fiberock - 41mm x 6g drywall screws at 300mm centres  
16mm Fiberock – 51mm x 7g drywall screws at 300mm centres.  
No fixing to top and bottom channel sections.  
(For FRL walls, 200mm around the perimeters)

### Services

Holes may be drilled or pre-punched in the metal studs to allow installation of electrical service lines and plumbing supply lines.

### Jointing

All fastener heads stopped and all sheet joints paper tape reinforced and stopped in accordance with the standard procedures for plasterboard. For maximum system strength, it is recommended to use USG Sheetrock paper tape and compounds.

### Insulation

Sound control insulation shall be a minimum of R 2.0 glasswool or polyester blanket installed between the studs. Where mineral wool is specified, it shall have a minimum service temperature of 450°C and minimum thickness of 63mm. Mineral wool attached to the sides of steel studs with daubs of Koagrip at 300mm centres.

### Framing – single stud

A minimum stud size to system specification.

Channel runners are fixed to the floor and ceiling/soffit in true alignment. Stud spacing at 600mm maximum.

The studs are held in place by the "grip" of the channel runners. Light locating fasteners that fail at high temperatures, such as single aluminium rivets, may be used. Otherwise positive fixing to either channel must be avoided.

Non Loadbearing Walls – install studs to allow a 15mm gap at the top of the frame. Recommended maximum height is 3000mm, higher walls are subject to specific design.

Loadbearing Walls – the steel frame must be designed to meet the structural criteria for serviceability and strength under dead and live loads. Frame height as determined by specific design.

### Framing – staggered stud

A minimum stud size to system specification.

The 40 x 40 x 0.5mm thick angle runners are fixed to the floor and ceiling/soffit in true alignment.

Stud spacing at 600mm maximum.

The studs are held in place by the Rondo Stud/Track clip to the angle runners. Positive fixing to either angle must be avoided. Studs on each side of the partition to be offset by half the stud spacing.

Non Loadbearing Walls – install studs to allow a 15mm gap at the top of the frame. Recommended maximum height is 3000mm, higher walls are subject to specific design.

### Framing – double stud

A minimum stud size to system specification.

Channel runners are fixed to the floor and ceiling/soffit in true alignment.

Stud spacing at 600mm maximum.

The studs are held in place by the "grip" of the channel runners.

Light locating fasteners that fail at high temperatures, such as single aluminium rivets, may be used. Otherwise positive fixing to either channel must be avoided.

Minimum gap between frames is to be 5mm or 20mm subject to system specification.

Non Loadbearing Walls – install studs to allow a 15mm gap at the top of the frame. Recommended maximum height is 3000mm, higher walls are subject to specific design.

Loadbearing Walls – the steel frame must be designed to meet the structural criteria for serviceability and strength under dead and live loads. Frame height as determined by specific design.

## Durable In-Service Performance

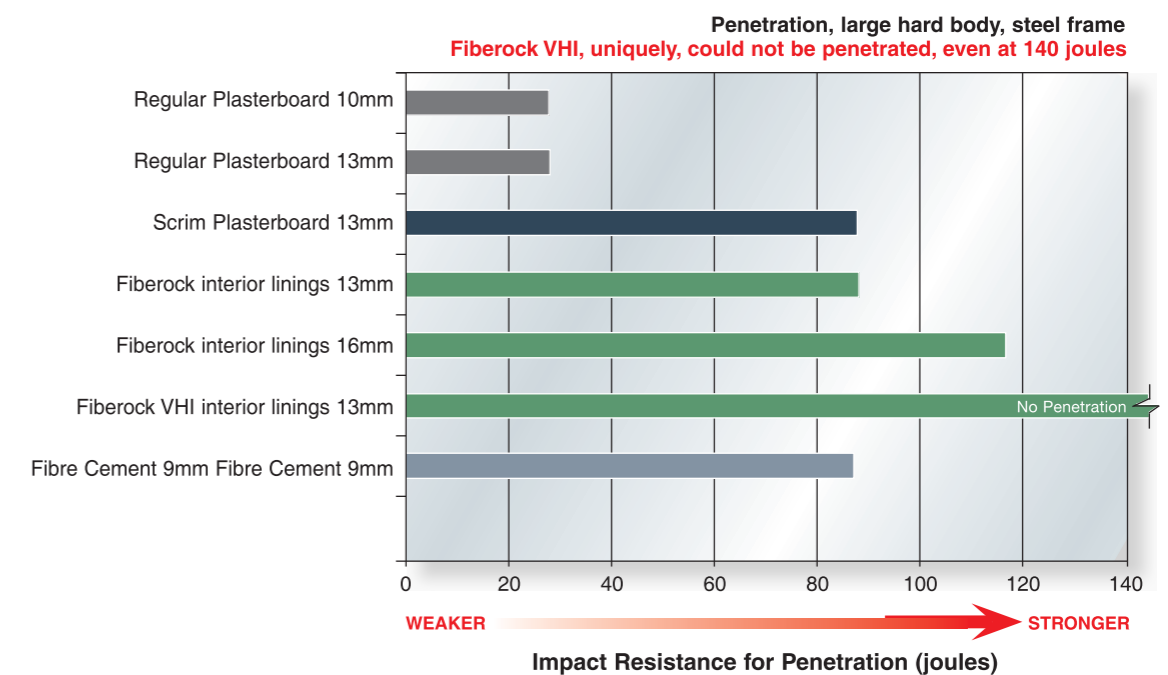
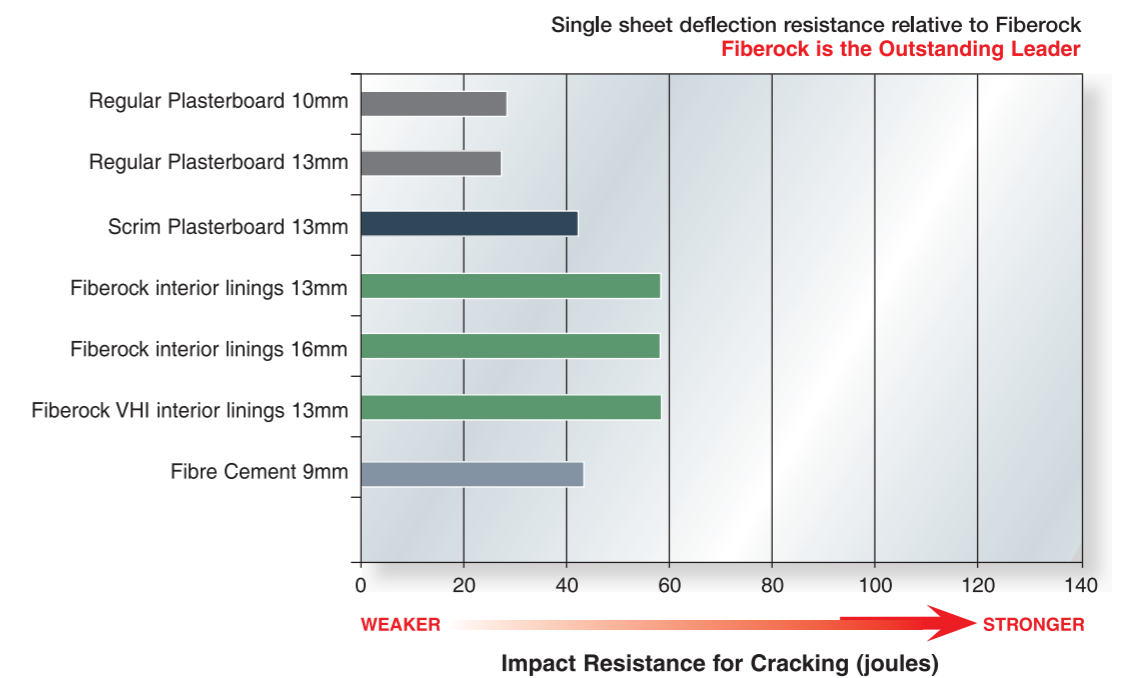
**Hard Body Impact** Hard body testing was completed to the draft 2002 ASTM standard specification for abuse resistant interior panels. The test involved a 5.44 kg steel hammer swung on a 3.0m axis against the wall surface with increasing levels of energy.

This test replicated the effect of various in-use exposures to either intentional or accidental damage from a large hard object. Again first surface cracking and full penetration were the two points of failure noted.

An example of hard body impact is an intentional solid kick on the wall with a boot, which will result in an impact energy of around 50 or 60 joules.

### Indentation Test

Exceeds BCA/NCC Specification C1.8 Clause 5(d)



## Durable In-Service Performance

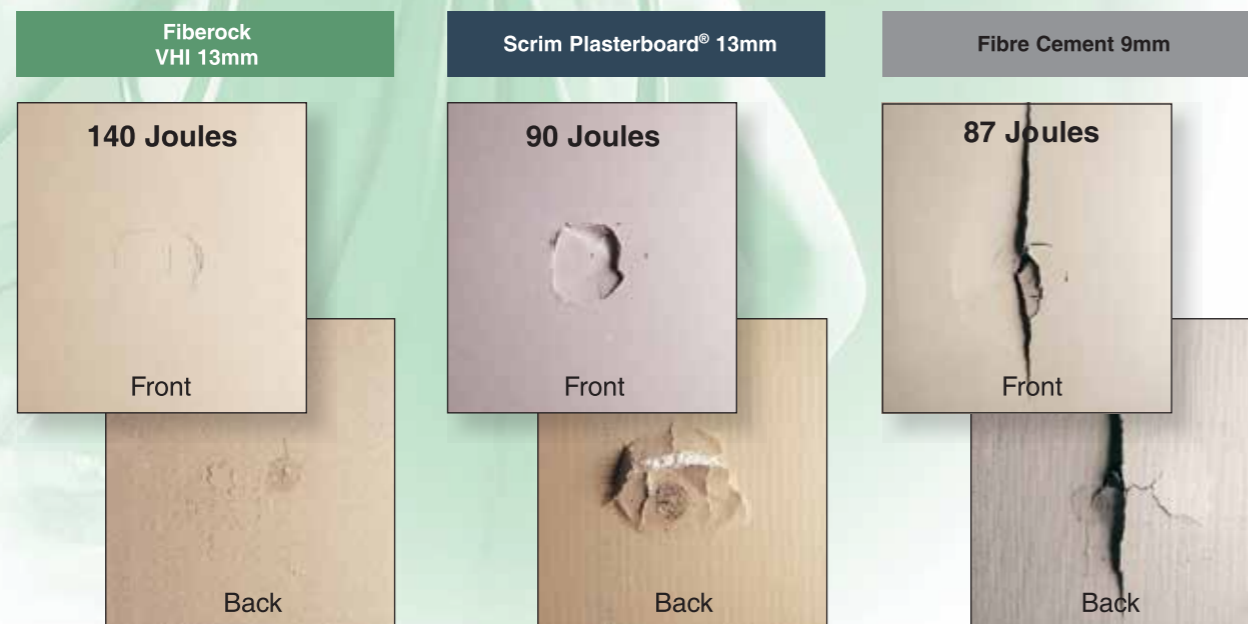
### Ease of Repair - Lower Maintenance Costs

Fiberock interior linings have important features that make repair, if and when needed, generally a straight-forward localised task.

- Fiberock interior linings have no surface paper to scuff, tear or delaminate.
- Fiberock, when it finally fractures under severe impact, typically fails locally. This means that standard drywall repair techniques can be utilised. Unless the impact is extreme, the failure region still maintains its integrity behind the plane of the wall, meaning that there is a reliable surface against which to fill, to complete the repair operation.

In this test programme, none of the test specimens of Fiberock demonstrated any tendency to fracture vertically or to distort the sheet surface. Some other lining materials have this tendency usually resulting in the need to replace a complete sheet along with associated trim materials.

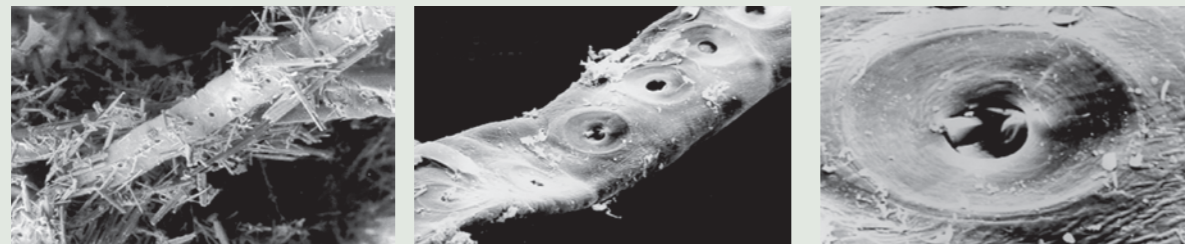
Photographs of typical specimens (front and back) from hard body test series.  
**Fiberock is not only stronger, but also easier to repair if damaged.**



As well as being the standout performance leader in all the key durability consideration elements already reviewed, Fiberock interior linings are also the preferred lining option if and when repairs are needed.

### Unique Fiberock Technology

In the manufacture of Fiberock interior linings a highly refined cellulosic fibre is heated, under pressure, in a ground gypsum rock slurry. During the process volatile materials are removed. The process mineralizes the fibre, with the gypsum rock nucleating into natural apertures in the fibre walls. As a result, exceptional strength and stiffness are achieved. The lining surface is formed by 'floatation'. This process directly creates a smooth mineral rich surface, and avoids fibre fluff typically experienced with many other products that need to be sanded smooth during production. Fiberock interior linings are finished with a factory baked on clear sealer, which creates an even suction for subsequent jointing, painting and other finishing systems.



These three scanning electron microscope images show, with increasing magnification (from left to right), the close bonding of cellulose fibre strands to the gypsum rock crystals, including the formation of gypsum crystals within the natural apertures in the fibres themselves. It is this bonding, achieved through this new patented manufacturing process, that underpins the exceptional impact resistance and durability of Fiberock.

## Timber Frame Wall System Selector

Wall System Code and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
PRT90DoA 	69	61	NLB	-/90/90 FAR2396	2 layers of 13mm on each side	63mm mineral wool with min. service temp. of 450°C	90mm by 45mm or larger	74
PRT90DoB 	69	62	NLB	-/90/90 FAR2396	1 layer each of 13mm and 16mm on each side	R2.0 Glasswool or Polyester Blanket	90 by 45mm or larger	79
PRT120DoA 	71	64		-/120/120 FAR2396	2 layers of 16mm on each side			83

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Timber Frame Wall System Selector

Wall System Code and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
<b>PRT30StB</b> 	61	50	NLB	-/30/30 FAR2396	1 layer of 13mm on one side & 2 layers of 13mm on other side	R2.0 Glasswool or Polyester Blanket	90mm by 45mm stud and 2 each of 70 by 45 top & bottom plates	59
<b>PRT60StB</b> 	61	52	NLB	-/60/60 FAR2396	1 layer of 16mm one side & 1 layer each of 16mm and 13mm other side	R2.0 Glasswool or Polyester Blanket	90mm by 45mm stud and 2 each of 70 by 45 top & bottom plates	63
<b>PRT30DoB</b> 	62	54	NLB	-/30/30 FAR2396	1 layer of 13mm one side & 2 layers of 13mm other side		90mm by 45mm or larger	60
<b>PRT60DoC / PRTL60DoC</b> 	65	58	LB	60/60/60 FAR2396	1 layer of 16mm one side & 2 layers of 16mm other side		90mm by 45mm or larger	67
<b>PRT90StB</b> 	67	56	NLB	-/90/90 FAR2396 FAR2364	2 layers of 13mm each side		63mm mineral wool with min. service temp. of 450°C	73
<b>PRT90StA / PRTL90StA</b> 	67	57	LB	90/90/90 FAR2364	1 layer each of 13mm and 16mm on each side	R2.0 Glasswool or Polyester Blanket	90mm by 45mm stud and 2 each of 70 by 45 top & bottom plates	76
<b>PRT120StA</b> 	69	59	NLB	-/120/120 FAR2396 FAR2364	2 layers of 16mm each side		80	

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Durable In-Service Performance

### Masonry Comparison

In terms of impact resistance, concrete masonry blocks (unfilled) were also tested under the large hard body test method. First cracking was observed at 44 joules, and penetration at 44-58 joules depending on position of impact. This means that Fiberock 13 and 16mm linings have greater hard body impact resistance than masonry, and Fiberock VHI 13mm very much greater penetration resistance.

### Cost Comparison

The following estimated cost comparisons are provided as a general guide only, and hence should not be relied on for design, costing or other purposes without local verification.

- Fiberock 13mm is expected to have a broadly similar product cost to fibre cement 9mm sheet, and to scrim reinforced plasterboard. Large installation efficiency gains and labour savings should be anticipated for Fiberock compared with fibre cement sheet.
- Product cost for Fiberock VHI is expected to often be a little higher than 9mm fibre cement reflecting its superior strength and health features, but due to easier handling, cutting and installation to represent a roughly similar cost on an installed wall system basis.
- Fiberock VHI wall systems are estimated to typically be around half the cost of plastered precast or tilt slab concrete wall systems. They are also expected to be significantly less expensive than plastered masonry walls.

These price guidelines reflect the estimated relative price position that applied at publication date, and prices should be anticipated to vary over time according to the pricing decisions of individual product suppliers, as well as by region.

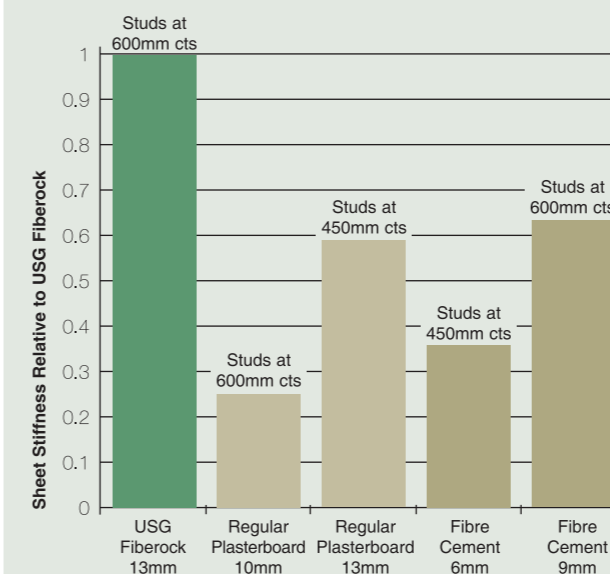
### Enhanced Fire Safety

Fiberock provides excellent fire safety. The absence of a paper surface combined with the mineral core means that it has leading surface fire resistance properties, as well as being an effective room to room fire barrier. See pages 20, 21 and 26-29 for further detail on fire rated wall systems.

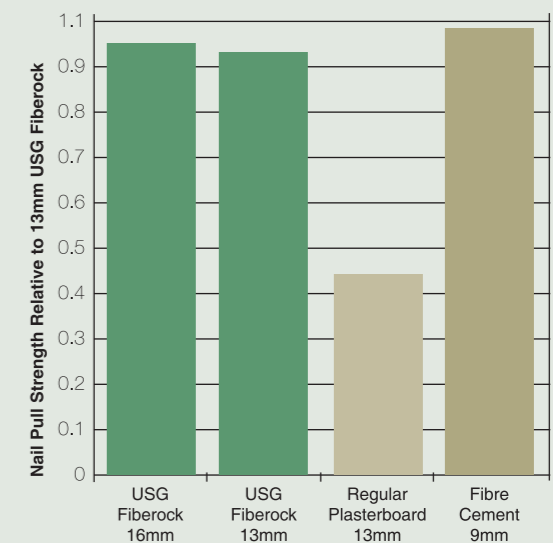
### Solid Touch-and-Feel

When pressing on Fiberock there is very low deflection rather than the flimsiness associated with some other common lining materials. This stiffness adds an unmistakable air of quality to indoor environments. The chart below left shows wall system stiffness. Results are expressed relative to Fiberock on studs at 600mm centres. Clearly there is no longer a need to place studs at 450 centres with standard walls to try to improve stiffness. Using Fiberock at 600 centres will be 400% better than 10mm plasterboard at 600 centres, and almost twice as good as 13mm plasterboard at 450 centres.

#### Single sheet stiffness relative to Fiberock Fiberock is stiffer - the solid leader



#### Nail pull strength relative to Fiberock 13mm Fiberock doubles the nail withdrawal resistance of plasterboard for added bracing and safety



Fiberock's inherent ability to hold nails and other fixings results in much higher wall bracing. This increases structure strength, which is reassuring during heavy wind, and any seismic events.

## Liberating - New Design Freedoms and Easy Installation



Installs and finishes easily like plasterboard, but with an extended range of design and reliable surface finishing flexibilities.

### Best Substrate for Paint, Tile, Vinyl, and Laminates

Until now, fibre cement was the first choice for use under tiles because it had no surface paper to delaminate. And the best choice for paint finishes was plasterboard with its smoother face. Both of these were less than ideal for wallpaper and vinyl finishes. As a result, walls or surfaces utilising multiple finishes created a challenge on site. Fiberock eliminates virtually all surface finish compatibility constraints. It is the ideal substrate for almost any surface finishing material:

- For paint finishes Fiberock provides stronger and flatter joints creating the necessary foundation for a quality finish. The pre-sealed surface provides even suction for the paint resulting in more even coverage.
- For tile finishes the pre-sealed surface gives excellent adhesive bonding and the high dimensional stability reduces any risk of grout or tile popping or cracking.
- For wallpaper and vinyl the pre-sealed surface enhances removal capability when renovating.
- Most laminates can also be bonded to Fiberock as there is no risk of the delamination of any surface paper.



Fiberock is an optimal lining for quality paint surfaces and reliable tile finishes even on the same wall, - providing new creative integrated design freedoms.

### Available in Four Thicknesses

USG linings are available in four thicknesses, to satisfy a wide range of applications:

**13mm** for interior walls and ceilings, in both dry and wet areas; widely used in education, medical, aged care, offices, community & recreation facilities, and also used in retail and residential (premium, eco, and institutional).

**VHI 13mm** same as above but with ultra-high impact resistance, so typically used in institutions & gymnasiums, and for ceilings in containment facilities.

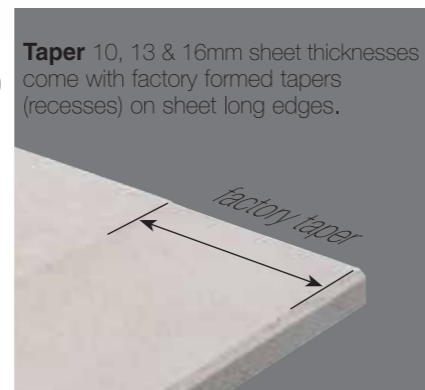
**16mm** for interior walls and ceilings, in both dry and wet areas; predominantly in apartment tenancy and corridor walls, and other applications requiring 1 hour fire rating and high acoustic ratings.

**10mm** suited for interior walls and ceilings, in dry and wet areas, predominantly as a square edge tile backer lining, but also (with factory formed taper edges) for painted surfaces. Also used to line the underside of eaves and canopies which are free from direct rainfall and direct rain splash. Also used as an acoustic underlay on framed ply and particleboard floors.

**6.5mm** suited for use with interior walls in dry and wet areas, as a high acoustic performance inner layer lining; extensively used in timber frame aged care structures, and in other places requiring cost effective acoustic improvement beyond single lining layer wall system performance. Also used as a stabilising layer on framed ply and particleboard floors in preparation for tiles and other floor finishing products.

### Easy to Cut, Fix and Finish

Fiberock linings are gypsum based and hence install easily, in much the same way as plasterboard. Sheets can be sized by score and snap (except VHI 13mm) or wood working power tools can be used (with dust extraction). Fiberock sheets of thickness 10mm, 13mm and 16mm come with factory formed tapers to long edges, and if desired additional tapers can be formed on off-cuts and tapered ends on site, to avoid weak wide-set butt-end jointing. Fixing to steel studs is with drywall screws which seat easily below the surface, and into timber studs with either drywall screws or with nails (gun or hand driven). Setting is carried out with paper tape and two coats of setting compound, following by one coat of finishing compound. Paint and tile finishing is similar to plasterboard. Specify desired level of finish as discussed in the footbox on Page 15. See additional installation and finishing detail on Page 21 of this brochure, and download the Fiberock Installation Guide from [www.fiberock.com.au](http://www.fiberock.com.au)



**Taper** 10, 13 & 16mm sheet thicknesses come with factory formed tapers (recesses) on sheet long edges.

### New Taper Edge Freedoms for Better Joints

Fiberock 10mm, 13mm and 16mm sheets come with factory formed tapers (or recesses) to both long edges of the sheet. Sheet ends, and site cut edges, can be easily tapered on site if desired with a hand plane, or electric plane or router with dust management. Fiberock 10mm sheets come with square edges for optimal performance as a tile backer board. Additional tapers are easily formed on site on sheet edges and or ends, or on parts of sheet edges, where reinforced tapered joints are required for paint or other finishes requiring such jointing. Fiberock 10, 13 and 16mm do not require sealing of any site cut tapers before the commencement of jointing.



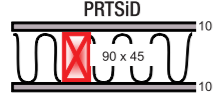
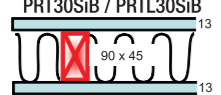
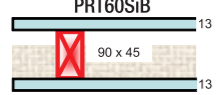
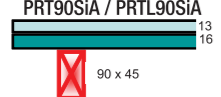
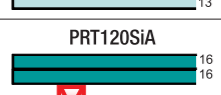
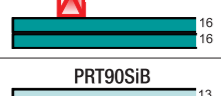
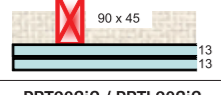
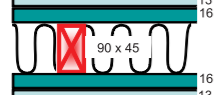
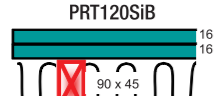
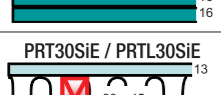
## Timber Frame Wall System Selector

Wall System Code and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
PRT60SIE 	46	42	NLB	-/60/60 FAR2353	1 layer of 13mm one side, & 2 layers of 13mm other side	63mm mineral wool with min. service temp. of 450°C	90mm by 45mm or larger	49
PRT60SID / PRTL60SID 	46	42	LB	60/60/60 FAR2339	1 layer of 16mm one side, & 1 layer of 16mm plus 1 layer of 13mm other side	R2.0 Glasswool or Polyester Blanket		54
PRTSIE / PRTLSIE 	47	41		-/-/-	1 layer of 10mm one side & 1 layer of 13mm plus 1 layer of 6.5mm on other side			40
PRT60SIF / PRTL60SIF 	49	45		60/60/60 FAR2544	1 layer of 13mm plus 1 layer of 6.5mm on each side			53
PRT30StA 	54	44	NLB	-/30/30 FAR2396	1 layer of 13mm each side		90mm by 45mm stud and 2 each of 70 by 45 top & bottom plates	40
PRT60StA / PRTL60StA 	56	47	NLB LB	-/60/60 60/60/60 FAR2418	1 layer of 16mm each side	90mm by 45mm stud and 2 each of 70 by 45 top & bottom plates	50	
PRT30DoA 	56	49	NLB	-/30/30 FAR2396	1 layer of 13mm each side	63mm mineral wool with min. service temp. of 450°C	47	
PRT60DoA 	58	51	NLB	-/60/60 FAR2396	1 layer of 16mm on one side & 1 layer of 13mm on other side		90mm by 45mm or larger	50
PRT60DoB / PRTL60DoB 	58	52	NLB LB	-/60/60 60/60/60 FAR2418	1 layer of 16mm each side		R2.0 Glasswool or Polyester Blanket	52

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>



## Timber Frame Wall System Selector

Wall System Code and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
PRT30SiA / PRTL30SiA 	37	31	NLB LB	-/30/30 FR3242 30/30/30 FAR2236	1 layer of 13 mm each side	No insulation	70mm by 45mm or larger	33
PRT60SiA / PRTL60SiA 	39	32	NLB LB	-/60/60 FAR2339 60/60/60 FAR2339	1 layer of 16 mm each side	No insulation	70mm by 45mm or larger	40
PRTSiD 	42	36	NLB	-/-/-	1 layer of 10 mm each side	R2.0 Glasswool or Polyester Blanket		28
PRT30SiB / PRTL30SiB 	42	37	NLB LB	-/30/30 30/30/30 FAR2396	1 layer of 13 mm each side	63mm mineral wool with min. service temp. of 450°C	90mm by 45mm or larger	35
PRT60SiB 	42	37	NLB	-/60/60 FAR2353				36
PRT90SiA / PRTL90SiA 	43	35	NLB LB	-/90/90 FAR2396 90/90/90 FAR2364	1 layer each of 16mm and 13mm each side	No insulation	66	
PRT120SiA 	43	36	NLB	-/120/120 FAR2364	2 layers of 16mm each side	No insulation	90mm by 45mm or larger	70
PRT90SiB 	45	40			2 layers of 13mm each side	63mm mineral wool with min. service temp. of 450°C		62
PRT90SiC / PRTL90SiC 	45	40	NLB LB	-/90/90 FAR2396 90/90/90 FAR2364	1 layer of 16mm plus 1 layer of 13 mm each sides	No insulation	67	
PRT120SiB 	45	40	NLB	-/120/120 FAR2364	2 layers of 16 mm each side	R2.0 Glasswool or Polyester Blanket	71	
PRT30SiE / PRTL30SiE 	46	41	NLB LB	-/30/30 30/30/30 FAR2396	1 layer of 13mm one side, & 1 layer of 13mm plus 1 layer of 6.5mm other side	No insulation	44	
PRT30SiD / PRTL30SiD 	46	40	NLB LB	-/30/30 30/30/30 FAR2396	1 layer of 13mm one side, & 2 layers of 13mm other side	No insulation	70mm by 45mm or larger	49

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Liberating - New Design Freedoms and Easy Installation

### The Creative Edge

Fiberock offers entirely new possibilities for edge finishing and display. Once again, its uniquely workable properties render the essentially two-dimensional limitations of plasterboard or fibre cement obsolete by adding a third dimension of depth.

Because of plasterboard's make up, exposing the edge is not normally feasible due to roughness in the interfaces between the paper surfaces and the gypsum core. The lack of reinforcement throughout the brittle core also prevents the edge being profiled. This is not the case with Fiberock which can be worked with normal woodworking tools on site. A number of distinctive profiles can be achieved using either routers or planes, opening up many creative possibilities for layered wall and ceiling effects. Edge detailing requires precision machining, and extra attention during finishing.



Fiberock can be adhesively bonded to itself to form contiguous voids or internal windows, with the edge being profiled or left square achieving the look desired.

Negative edge details for ceilings, or ceiling elements are formed accurately, with either square, diagonal or curved edge treatment to complement other detailing in the room.

Alcoves become easy to form accurately with Fiberock for all components. Bond the edges and the back of the alcove to the reverse face of the wall lining, and then rout (using the sides as guide) out the front lining to accurately form the desired corner profile.

### 3D Surface Detailing

Fiberock allows interior designers to explore a new realm of 3D (three dimensional) surface treatments. No longer are walls rigidly flat; with this new material, walls can feature new details that were previously too difficult to achieve or simply not possible. For example:

- A simple site formed surface detail groove at dado height or higher on the wall, can capture the eye and bring focus without spoiling an overall minimalist look.
- Surface profiling applied more expansively, with vertical grooves formed in the wall and moving closer together towards a doorway or void can create movement.
- Patterns or curves can create distinctive personal design statements, create special visual effects, or even align with a brand logo.
- Surface profiles can visually integrate places together, and separate others.
- And, when it is time for a change, the existing profile can be filled and left flat, or be replaced with a fresh surface treatment.

Surface detailing requires precision machining, and extra attention during finishing.



Surface profile grooves, linear or curved, can capture and lead the eye to combine or separate spaces, or make special statements.



### Hang Wall Fixtures in Exactly the Right Place

Gone are the days of knocking on walls or ceilings to locate studs or something of substance to hang pictures, light fittings and other wall furniture. Gone also, are the days of having to hang art in a slightly off centre position because that happens to be where the stud is located.

With Fiberock there is no need for hammer drills to make holes in concrete or brick, and no unsightly chunks of concrete or brick breaking out through imprecise workmanship. Simply screw picture hooks and wall furniture directly into the lining, regardless of where the studs are. Fiberock 13mm linings can take loads of up to 13kg per screw at the screw head, (16mm 16kg, 10mm 10kg).

### Levels of Finish - Getting the Finish You Want

Levels of Finish is an industry tool to assist in specifying the required quality of finish when installing and finishing interior linings. Level 4 and 5 finishes are commonly specified. These levels of finish are detailed in the standard AS/NZS 2589.

Level 4 finish is the generally accepted level of finish for regular domestic construction. It is used where non-critical lighting falls on satin/flat/low sheen paints, or where critical lighting illuminates wallpaper or textured finishes. Level 4 is the default if the level is not specified.

Level 5 finish is used in regions where gloss or semi-gloss paints are specified or where critical lighting conditions occur on satin, flat or low sheen paints.

The key difference between a Level 4 and Level 5 finish is that a Level 5 finish requires that the entire surface is covered with a thin layer of special compound, called a "skim or mist coat" to remove differential surface textures and porosity. USG Sheetrock® Tuff-Hide® Primer-Surfacer (see page 7) was developed specifically for this purpose. Stricter framing and installation requirements must also be addressed for a Level 5 finish.



## Eco Preferred



95% recycled, demountable and reusable, leaving more wilderness, desert, and forest to sustain earth ecology and for future generations to enjoy.

### Introduction

Good Environmental Choice Australia state that around 30% by weight of resources disposed of in landfills is construction and demolition waste. And, further, that a large proportion of this waste is gypsum plasterboard. Fiberock interior linings can deliver superior ecological (see footbox page 17), energy, and safety outcomes, surpassing traditional Australian lining alternatives such as paper-faced plasterboard, fibre cement sheet, and masonry products.

### Outstanding Recycled Content

The Good Environmental Choice plasterboard Standard in Australia requires a minimum recycled content of a very modest 10%. Fiberock linings blitz this, as 95% of their raw materials come from recycled external waste streams:

- 85% is post industrial gypsum, a waste product obtained from an electricity generator. No open cast or underground mining of gypsum is needed for the manufacture of Fiberock linings;
- 10% is recycled cellulose, meaning no trees are harvested for the manufacture of Fiberock linings.

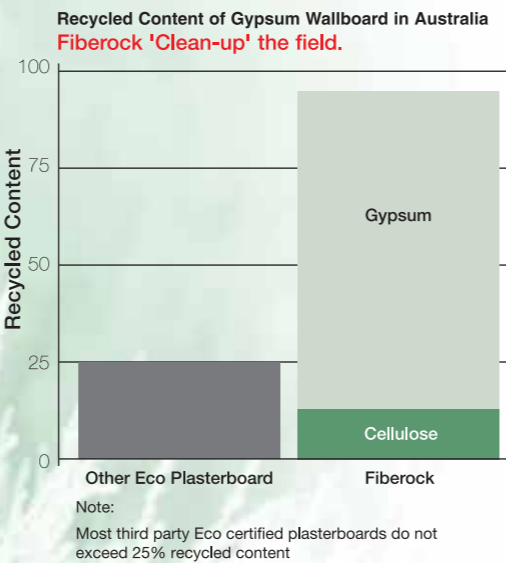
Using Fiberock linings achieves a recycled content almost 10 times greater than the Standard requires.

### Minimisation of Site Waste

Using Fiberock interior linings can reduce site waste. This is due to the ability with Fiberock to reuse off-cuts during installation; machining in extra tapers to off-cuts as needed. With plasterboard, depending on wall design, typically up to 10% of the purchased material ends up not being used for the intended lining purpose. This is because most plasterboard off-cuts do not have taper edges, and hence are not usable as lining material on subsequent wall sections. Some fibre cement off-cuts can be theoretically tapered on site for re-use in subsequent stages, however in practical terms the abrasiveness of the material and its adverse dust characteristics mean that this process is seldom attempted. Again high waste levels to landfill often result.

### Demounting and Reuse Now Possible

Fiberock linings can be demounted and recovered during demolition, and then be reused again on another structure. This is normally impossible with plasterboard and fibre cement as the original tapers in these sheets are not realistically able to be cleaned of jointing materials. Whereas Fiberock linings after demounting can have new edge tapers machined in, making reuse now practical. See the Fiberock linings Installation Instructions for additional details, and also for steps to take during initial installation, to make demounting and reuse an easier task.



After demounting tapers can be easily reformed making reuse possible.

### Embodied Energy Savings - 24-265 MJ/m<sup>2</sup>

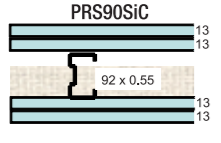
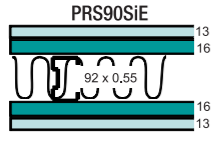
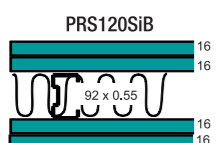
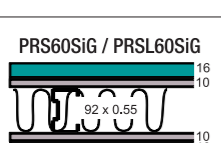
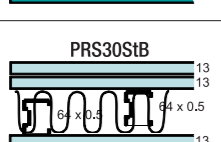
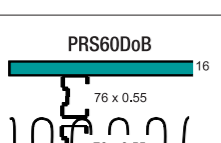
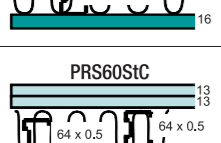
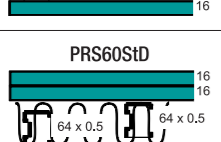
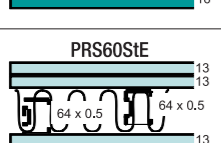
The embodied energy of Fiberock is around 5.5 MJ/kg (cradle to gate)<sup>1</sup>. If it is planned to demount and recycle Fiberock linings once during their lifecycle the embodied energy per use drops to 2.75 MJ/kg. Installing Fiberock 13mm linings, and planning for their eventual demount and reuse, saves around 24MJ/m<sup>2</sup> of energy compared with scrim plasterboard 13mm (see graph next page). Switching double brick walls to Fiberock framed wall systems delivers even greater energy savings. From a wall performance viewpoint this is now feasible (as is the substitution of masonry & concrete walls) in most situations, given the outstanding strength, stiffness, water and fire resistance, and acoustic properties of Fiberock linings.

## Steel Frame Wall System Selector

Wall System Code, and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
PRS30DoA 	62	54		-/30/30 FAR2396	2 layers of 13mm one side, and 1 layer of 13mm on the other	R2.0 glasswool, or polyester blanket	92mm deep by 0.55mm thick or larger, gapped double	42
PRS90SiA 	62	52		-/90/90 FAR2396	2 layers of 13mm each side	63mm mineral wool with min. service temp. of 450°C	64mm deep by 0.5mm thick or larger, staggered	55
PRS120StA 	63	55		-/120/120 FAR2396	2 layers of 16mm each side			63
PRS60DoA 	68	60	NLB	-/60/60 FAR2396	2 layers of 13mm each side	1 layer of R2.0 glasswool, or polyester blanket		55
PRS90DoA 	69	62		-/90/90 FAR2396	1 layer each of 13mm and 16mm each side		92mm deep by 0.55mm thick or larger, gapped double	59
PRS90DoB 	70	63		-/90/90 FAR2396	1 layer each of 13mm and 16mm each side	63mm mineral wool with min. service temp. of 450°C		60
PRS120DoA 	71	64		-/120/120 FAR2396	2 layers of 16mm each side	2.0 glasswool, or polyester		63

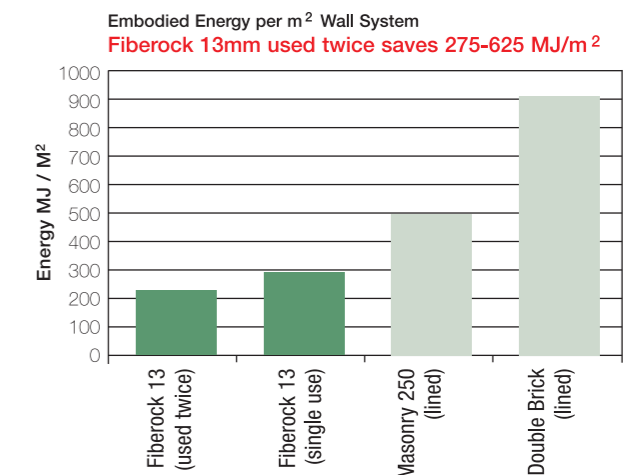
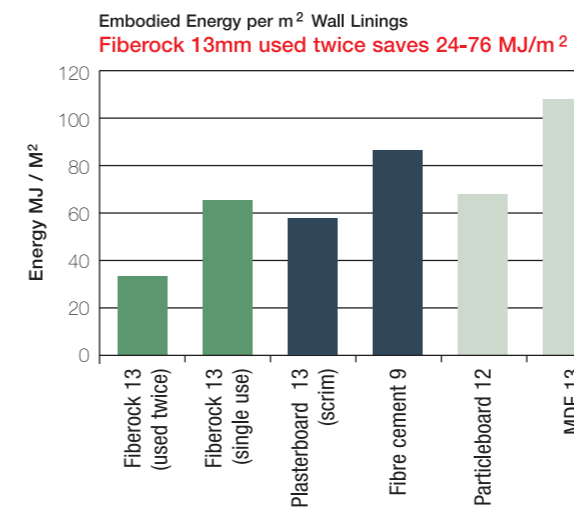
\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Steel Frame Wall System Selector

Wall System Code, and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
 PRS90SiC	56	49		FAR 2364	2 layers of 13mm each side	63mm mineral wool with min. service temp. of 450°C		54
 PRS90SiE	56	50	NLB	-/90/90 FAR 2396	1 layer each of 13 mm and 16mm each side		92mm deep by 0.55mm thick or larger	59
 PRS120SiB	56	51		-/120/120 FAR 2396	2 layers of 16 mm each side			64
 PRS60SiG / PRSL60SiG	57	51	LB		1 layer each of 16mm and 10 mm each side			56
 PRS30SiB	58	50		-/30/30 FAR 2396	2 layers of 13mm one side, and 1 layer the other side		64mm deep by 0.55mm thick or larger, staggered	42
 PRS60DoB	58	51	NLB		1 layer of 16mm each side	R2.0 glasswool, or polyester blanket	76mm deep by 0.55mm thick or larger, gapped double	42
 PRS60SiC	59	50		-/60/60 FAR 2396	2 layers of 13mm on one side, and 1 layer of 16mm on the other side		64mm deep by 0.5mm thick or larger, staggered	44
 PRS60SiD	60	52			2 layers of 16mm on one side, and 1 layer of 16mm on the other			49
 PRS60SiE	61	52			2 layers of 13mm each side			54

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup>; polyester 95mm thick 10kg/m<sup>3</sup>; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Eco Preferred



<sup>1</sup> Fiberock is currently sourced from a plant in the United States to develop the market in Australia sufficiently to warrant local plant establishment. Supply from this US plant involves two non-typical greenhouse gas elements; one a benefit and one detriment. Most of the electric energy applied at this plant is greenhouse gas beneficial, as the closest generator on the supply grid is nuclear, with very low CO<sub>2</sub> emissions. Supply from this plant also involves a temporary energy increment for logistics to Australia, of around 2.5MJ/Kg. A local plant supplying Australia is unlikely to maintain this nuclear energy low CO<sub>2</sub> emission benefit, but neither would it incur the current temporary logistics energy increment. Analysis is on a local plant expected energy basis, which the reader can adjust for the temporary nuclear benefit, and extra logistics energy increment, if deemed appropriate. Embodied energy data for other products sourced from [www.greenhouse.gov.au](http://www.greenhouse.gov.au), product manufacturers' literature, and in the case of plasterboard other studies as well. The [www.greenhouse.gov.au](http://www.greenhouse.gov.au) plasterboard value of 4.4 MJ/Kg seems low compared with other international values, especially when the coastal shipping of gypsum used in Australia is taken into account. So 5.5 MJ/Kg is used for plasterboard.

### New Standard in Safety for Occupants and Installers

The new technology used to manufacture USG Fiberock linings has lifted the safety performance bar for interior linings; turning four key previous limitations of traditional products into new safety features:

**No Carcinogenic dust risk, or onerous clean up requirements** - USG Fiberock has no risk from carcinogenic crystalline silica dust. This makes it easy to install safely, and to undertake subsequent repairs and renovations.

**High resistance to toxic mould** - Fiberock does not have surface paper layers to act as food sources for toxic mould growth, as already discussed on pages 4 and 5.

**Resistant to water absorption and transmission** - A water repelling agent is distributed right throughout the homogeneous structure of Fiberock linings. The superior water resistance of Fiberock, as already discussed on pages 4 and 5, helps to prevent lingering dampness, and associated disease.

**Clean Indoor Air** - Fiberock linings have been tested in Japan for emission of aldehydes, VOCs and TVOCs, and awarded the four-star ministerial approval. This is one of the most demanding clean air tests available, providing peace of mind that a safe and healthy interior environment is being created.

### Key Endorsements

**Good Environmental Choice and Green Building Council** - The applicable products for Good Environmental Choice endorsement is shown on page 2. Good Environmental Choice accreditation links to Green Building Council ratings. Information to assist in the use of the rating tool is shown on page 19.

**Scientific Certification Systems** - The 95% recycled content applies to all Fiberock interior linings sold in Australia. Scientific Certification Systems certify this claim, and the latest entry can be found on their web site, by searching either under USG, or Fiberock.

**Ecospecifier** - Ecospecifier® is a leading group of independent eco-assessment professionals. For more details on Ecospecifier and the USG Fiberock products refer to [www.ecospecifier.org](http://www.ecospecifier.org)

### Using Fiberock Reduces Mining and Landfill Dumping by 1 to 2 Tonne Per Typical Office Sized Room

When Fiberock linings are used in place of plasterboard in Australia:

- Mining of raw gypsum is totally avoided because Fiberock linings are made from waste stream gypsum coming from an electricity generator
- Disposal in landfills is substantially reduced because the electricity generator's waste stream gypsum does not need to be dumped in a landfill

When Fiberock Linings are Used Once

- Around 0.5 tonne less gypsum is mined;
- Around 0.5 tonne less waste stream gypsum is dumped in landfill by the electricity generator.

When Fiberock Linings are Used Twice

(i.e. eventually demounted and used a second time):

- Around 1.0 tonne less gypsum is mined;
- Around 0.5 tonne less waste stream gypsum is sent to landfill by the electricity generator;
- Around 0.5 tonne less demolition plasterboard is disposed of in landfill.

When the effects of whole buildings are considered, substantial reductions in both mining and landfill activity are achieved. These benefits are in addition to the reduction in site waste during installation.

## Design Considerations

### USG Support Services

For assistance with product samples, design and specification, quotation and supply, and installation contact USG on Freephone 1800 226 215.

### Intended Applications

Fiberock linings are engineered for interior wall and ceiling lining applications in places requiring superior eco properties, sound control, solid touch-and-feel, strength, stiffness, dent and impact resistance, fire resistance or for effective furniture fixing capability.

Suitable for use in dry areas and wet areas such as bathrooms, kitchens, laundries, laboratories, garages and toilets. It's outstanding water and mould resistance make it especially suited for demanding applications such as medical, aged care, education, rental and tourist accommodation, and for use in homes where maximum health care is sought.

### Building Code of Australia

Fiberock wall systems described in this brochure exceed the requirements of the Building Code of Australia BCA Section C1.8. In particular:

- Multi-occupancy wall system designs are included which meet acoustic and fire requirements. All acoustic and fire ratings shown in this document are fully supported by expert opinion (available on request) from professional consultants and are based on independent tests for the actual (or a similar) system. Expert opinion is shown in the Building Code of Australia as a suitable way for compliance to be demonstrated;
- Wet area wall design detail and Building Code of Australia compliance requirements are shown in the relevant sections of this document including pages 4, 5.
- Exceeds Soft Body Impact and Surface Indentation requirements to Clause 5(c) and 5(d) respectively (refer pages 8-11)

### Framing, Sheet Size and Layout

Fiberock is suitable for use with timber or steel frames. All framing should be detailed and installed in accordance with the requirements of the Building Code of Australia. Timber framing should be designed in accordance with AS 1684:1999 and steel framing in accordance with manufacturer's specification. Fiberock is available throughout Australia in sheets of dimension shown in the table on page 2. Given that all joints can be tapered, mixed vertical and horizontal layout is also possible, as is fixing with joints off the framing as long as such joints are glued and back blocked.

#### Timber Frames:

- Timber frames must consist of kiln dried F5, MGP 10 or No.1 verified visually graded Radiata Pine studs with a minimum cross-section dimension of 70 by 35 mm. These studs must not be placed at a spacing greater than 600mm centres.
- The timber frames used in impact testing consisted of kiln dried, MGP 10, 90 mm x 45 mm studs placed at 600mm centres in a 2.4 m high wall.
- If fire rated wall design is required, see the requirements for the relevant fire rated wall design later in this brochure.



#### Steel Frames:

- Steel stud frames need to satisfy provisions to BCA/NCC Section B and any additional design loads
- See steel stud manufacturers literature for further steel stud information and performance design parameters



### Key Material Properties (Typical Values from Testing)

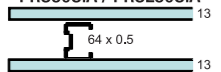
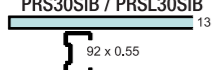
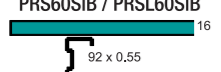
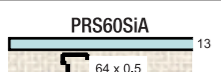
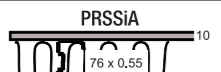
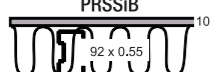
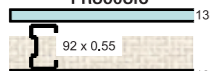
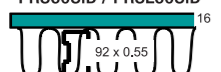
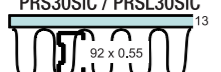

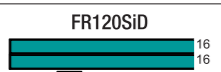
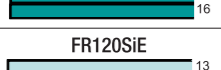

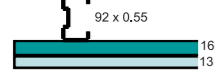
	Modulus of Elasticity (MPa)	Modulus of Rupture (MPa)	Soft Body Impact (Joules)		Hard Body Impact (Joules)		Nail Pull Resistance to ASTM C473 (N)
			First Cracking	Penetration	First Cracking	Penetration	
13mm	3447	5.8	172	245	59	88	860
16mm	3116	6.6	319	392	59	118	890
13mm VHI	3116	8.0	221	> 490	59	> 140	860
10mm	3447	5.9	NA	NA	NA	NA	615

## Steel Frame Wall System Selector

Wall System Code, and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
PRS30SiD / PRSL30SiD 	51	43	NLB LB	-/30/30 30/30/30 FAR2396	1 layer of 13mm on one side, and 2 layers of 13mm on the other side	R2.0 glasswool, or polyester blanket	92mm deep by 0.55mm thick or larger	41
PRS120SiA 	51	44		-/120/120 FAR2311	2 layers of 16mm each side	No insulation		63
PRSDoA 	52	42	NLB		1 layer of 10mm on each side	R2.0 glasswool, or polyester blanket	64mm deep by 0.5mm thick or larger, gapped double	25
PRS30StA 	53	43		-/30/30 FAR2396	1 layer of 13 mm each side		64mm deep by 0.5mm thick or larger, staggered	28
PRS60StB 	53	43		-/60/60 FAR2396	1 layer of 13 mm each side	63mm mineral wool with min. service temp. of 450°C		29
PRS60SiF / PRSL60SiF 	53	46	NLB		1 layer each of 13mm and 6.5mm on one side, and 1 layer of 16mm on the other	R2.0 glasswool, or polyester blanket	92mm deep by 0.55mm thick or larger.	40
PRS90SiB 	54	47		-/90/90 FAR2364	2 layers of 13mm each side	63mm mineral wool with min. service temp. of 450°C	64mm deep by 0.5mm thick or larger	54
FR120DoB 	54	47		-/120/120 FSV1402A	2 layers of 16mm on each side	No insulation	92mm deep by 0.55mm thick or larger, adjacent double	62
PRS60StA 	55	45	NLB	-/60/60 FAR2396	1 layer of 16mm each side		64mm deep by 0.5mm thick or larger, staggered	34
PRS30DoB 	56	46			1 layer of 13mm each side	R2.0 glasswool, or polyester blanket	92mm deep by 0.55mm thick or larger, gapped double	29
PR60SiF 	56	50		-/60/60 FAR2636	1 layer of 13 mm plus 1 layer of 6.5mm each side		64mm deep by 0.55mm thick or larger, staggered	42
PRS60SiE / PRSL60SiE 	56	48	NLB	-/60/60 FAR2636			92mm deep by 0.55mm thick or larger	40

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Steel Frame Wall System Selector

Wall System Code, and Diagram	R <sub>w</sub>	R <sub>w</sub> + C <sub>tr</sub>	Load Capability	Fire Resistance Level	Fiberock Linings	Insulation*	Framing Size	Weight ~ kg/m <sup>2</sup>
PRS30SiA / PRSL30SiA 	39	37	NLB	-/30/30 FAR3242	1 layer of 13 mm each side	No insulation	64mm deep by 0.5mm thick or larger	27
PRS30SiB / PRSL30SiB 	41	37	LB	30/30/30 FAR2396			92mm deep by 0.55mm thick or larger	
PRS60SiB / PRSL60SiB 	42	36	NLB LB	-/60/60 FSV1427A 60/60/60 FAR2311	1 layer of 16 mm each side	No insulation	92mm deep by 0.55mm thick or larger	32
PRS60SiA 	44	33	NLB	-/60/60 FR3291	1 layer of 13 mm each side	63mm mineral wool with min. service temp. of 450°C	64mm deep by 0.5mm thick or larger	28
PRSSiA 	45	33	LB	-	1 layer of 10 mm each side	R2.0 glasswool, or polyester blanket	76mm deep by 0.55mm thick or larger	25
PRSSiB 	46	35					92mm deep by 0.55mm thick or larger.	
PRS60SiC 	47	39	NLB	-/60/60 FR3291 FAR2396	1 layer of 13mm each side	63mm mineral wool with min. service temp. of 450°C		28
PRS60SiD / PRSL60SiD 	47	40	NLB LB	-/60/60 60/60/60 FAR2396	1 layer of 16mm each side	R2.0 glasswool, or polyester blanket	92mm deep by 0.55mm thick or larger.	33
PRS30SiC / PRSL30SiC 	48	41	NLB LB	-/30/30 30/30/30 FAR2396	1 layer of 13mm lining each side			
PRS90SiA 	48	42	NLB	-/90/90 FAR2364	1 layer of 13mm and 1 layer of 16mm each side	No insulation	64mm deep by 0.5mm thick or larger	58
FR120SiD 	48	42		-/120/120 FSV1401A	2 layers of 16mm each side		64mm deep by 0.75mm thick or larger	63
FR120SiE 	49	42		-/120/120 FR5041	2 layer of 13mm each side		92mm deep by 0.55mm thick or larger	53
PRS90SiD 	50	43		-/90/90 FAR2364	1 layer of 13mm and 1 layer of 16mm each side		92mm deep by 0.55mm thick or larger	58
PRS30SiE / PRSL30SiE 	51	43	NLB		1 layer of 13 mm each side, plus 1 layer of 6.5mm on one side	R2.0 glasswool, or polyester blanket	92mm deep by 0.55mm thick or larger	35

\* Minimum density : Glasswool 75mm thick 10kg/m<sup>3</sup> ; polyester 95mm thick 10kg/m<sup>3</sup> ; mineral wool 50mm thick 60kg/m<sup>3</sup>

## Design Considerations

### Use on Ceilings

Fiberock is ideal for use on ceilings, including in demanding interior wet area rooms. Maximum frame spacing is 450mm for 10mm, and 600mm for 13 and 16mm. Humidified sag testing of Fiberock to ASTM C1396 standard showed 0 mm of sag, versus the allowable 5 mm for plasterboard. Also suitable for protected exterior soffits and alfresco applications. For details refer pages 38-39 or Data Sheet FRTB-ES/5-13.

### Fiberock Interior Linings Adjacent to Plasterboard

Fiberock interior linings may be placed adjacent to plasterboard of similar thickness and the joint can be finished conventionally using paper reinforcing tape in the joint. Ensure that both materials have a taper edge for the full length of the joint.

### Attachment of Fixtures

Fiberock provides an excellent foundation material for attaching a wide range of fixtures to the wall. Fiberock often eliminates the need for additional nogs or back blocking for attaching many fixtures and only seldom requires pre-drilling when attaching the fastener.

As a general guide, 13kg of static vertical (or any other direction) load can be supported by Fiberock 13mm when applied at the head of a single screw. With Fiberock 10mm linings 10kg, and Fiberock 16mm linings 16kg.

The screw can be either self tapping or high thread, and of gauge between 6 through 12 (8 gauge high thread is preferred). No pilot holes are needed, and screws should be inserted sufficiently to allow the parallel thread section of the screw to be in contact with the full depth of the Fiberock interior linings.

The following hollow wall (cavity) anchors will provide higher shear loadings when required.

Ramset HW13 M4 (25kg); Hilti HSP-S (29kg); Hilti HD-S M4/12x38 (24kg)

### Green Star Eco Rating Systems – Green Building Council of Australia

USG Australia is a member of the Green Building Council of Australia, and USG Corporation one of the founding members of the Green Building Council in the United States.

The Green Building Council in Australia presently has rating tools, or pilot rating tools, for the following building types:  
• Education • Healthcare • Shopping Centre • Office (new and existing, as well as office interiors).

In summary, the following categories and points (depending on tool) apply: Innovation (up to 5 points); Eco-preferred content 95% (up to 10 points); Durability 10 year warranty (up to 10 points); Designed for Disassembly (up to 10 points).

When using these rating tools, the following properties of Fiberock linings should be given consideration, for inclusion. This information is presented under the Green Rating Tool Heading codes.

**Inn - Innovation** Fiberock products are produced with a proprietary new manufacturing technology to achieve improved eco and health outcomes, versus regular plasterboard and fibre cement. The manufacturing process has many patents. The Environmental choice accreditation (see page 2 for applicable products) makes application for innovation points easy, in some of the tools.

**Man - Waste Management** Using USG Fiberock wall linings will assist with waste reduction management as most sheet off-cuts can have rebates formed on them on site and then be used, rather than going to dump.

**Mat - Walls and Partitions** Fiberock wall linings are independently certified as being made from 95% recycled raw materials content. Additional eco-advantages are documented in [www.ecospecifier.org](http://www.ecospecifier.org) such as outstanding resistance to mould propagation, zero VOC emissions, effectively zero crystalline silica content, and low embodied energy.

**Mat - Materials** Recycled Content Fiberock wall linings are independently certified as being made from 95% recycled raw materials content.

**IEQ - Internal Noise Levels** Fiberock wall linings and wall system designs have documented sound transmission reduction ratings, compliant with the BCA (Building Code of Australia.) In most cases these are superior to same thickness plasterboard due to the stiffness and mass of the Fiberock linings.

**IEQ - Volatile Organic Compounds** The Fiberock products have no VOC emissions. The products are pre-coated in the factory with an acrylic sealer creating a surface suited for use with most low and non VOC paints and adhesives.

**IEQ - Formaldehyde Minimisation** The Fiberock products do not emit formaldehyde as they use an inorganic, rather than organic, binder, and normally use mechanical fixings rather than adhesives.

**IEQ - Mould Prevention** All Fiberock sheets achieve the maximum score of 10 in the demanding ASTM D3273 mould propagation tests – outperforming fibre cement and wet area plasterboard.

**Ene - Energy Improvement** (i) The use of timber framed structures with particleboard or plywood floors to replace high embodied energy concrete construction is sometimes made possible if Fiberock 10mm is used to stiffen the floor, improve acoustics, and reduce fire burn down risk. (ii) Thermal mass is improved by using Fiberock linings instead of plasterboard.

The thermal mass of Fiberock linings is approximately 1.1 kJ/kg. (iii) The use of Fiberock linings has lower embodied energy than most concrete and fibre cement wall systems, and can also be better than plasterboard (particularly if product demounting and reuse is included), as discussed earlier on page 17.

## Design Considerations

### Use in Wet Rooms

When specifying Fiberock for use in wet rooms, the details shown on the separate wet area brochures\* should be followed, and the following points should be noted:

**Finishing Materials** In all areas of wet rooms (other than those subjected to regular direct water flows) the normal full choice of finishing materials applies, including paint, wallpaper and tiles, all of which can be used on the same wall. When used to line shower cubicles, or in shower over bath applications, Fiberock must be faced with ceramic tiles, or alternatively with heat welded flexible sheet vinyl.

**Special Framing Requirements for Wet Rooms** In wet rooms ensure that additional nogs are included as shown in the wet room design detail drawings which follow. Nogs must be included: adjacent to pipe penetrations; between all studs above bath flanges and preformed shower bases; behind sink and tub flashings; and to support towel rails, grab rails and wall basin brackets with Fiberock 10mm linings, and for Fiberock 13mm and 16mm linings where the applied load will be greater than 13kg per screw at the screw head.

### Overall Moisture Control

No matter what interior lining material is used attention is needed to moisture management during all stages of the construction cycle. Moisture needs to be controlled through effective design, good construction practice, and ongoing maintenance. This will include:

- Protection of Fiberock from water during transportation to ensure dry delivery to site.
- Use of water-protected site storage, with linings laid flat, and elevated from the floor.
- Installation to building structure when full weather protection (roof, exterior cladding, windows etc) is in place.
- Maintaining ventilation when moisture is introduced to the job site such as through wet cement or drying paint.
- Treating water infiltration from any source with urgency. Stopping leaks as soon as they appear.
- Creating building exteriors (roof, cladding, doors and windows) with multiple barriers to water intrusion, and providing drainage and drying to avoid trapping moisture.

The key to minimising moisture problems and mould growth is controlling moisture, as products alone can not control moisture or prevent mould.

### Enhanced Acoustic Performance

Fiberock is very effective at reducing sound transmission, as it combines high mass with very high stiffness. This means for instance that;

- A **medical, education, or office** facility, or **residence** seeking enhanced acoustic privacy, whilst sticking with simple single steel studs and a single lining layer each side, can now achieve  $R_w$  46 using Fiberock 10mm linings, or  $R_w$  47 using Fiberock 13mm linings - see page 22.
- A typical **apartment intertenancy** or corridor wall requiring  $R_w + C_{tr}$  of 50, (and fire -/60/60), simply utilises a single layer of Fiberock 16mm on each side of 76mm double steel studs, and regular R2.0 insulation; whereas plasterboard solutions typically have either more layers of linings, or an extra wide cavity, or both, to reach this high acoustic performance level - see page 31.
- An **aged care** occupancy steel stud separation wall requiring  $R_w$  45 minimum, simply utilises single steel 92mm studs, and one layer of Fiberock 13mm lining each side with regular insulation - see page 23.
- An **aged care** occupancy timber stud separation wall requiring  $R_w$  45, simply utilises 90mm single timber studs with three layers of linings; 1 x 13mm on one side, and 1 x 6.5mm and 1 x 13mm on the other side - see page 26

Because all USG Fiberock linings are suited to both dry and wet areas, there is no need to change lining type specification in wet areas, or to add a layer of fibre cement as is done in other competing systems. Less complexity means less product cost, less stock on site, less chance for site mistakes, and less rework. USG Fiberock Acoustic wall system designs are shown on pages 22-29 of this book.

### Enhanced Fire Safety

Fiberock provides excellent fire safety. The absence of a paper surface combined with the mineral core means that it has leading surface fire resistance properties, as well as being an effective room to room fire barrier. Tested performance is as follows:

**Surface Properties** The Building Code of Australia Section 96 specification C1.10a requires that a material used as a finish, surface, lining or attachment to a wall or ceiling must be a Group 1, 2 or 3 material. In addition buildings not fitted with a sprinkler system must have a smoke growth rate index of not more than 100, or an average specific extinction area less than 250 m<sup>2</sup>/kg. Fiberock is a Group 1 material. The average specific extinction area in independent testing was reported at 32 m<sup>2</sup>/kg, which is clearly well under the 250m<sup>2</sup>/kg limit. BRANZ report FAR2265 details these results. For reference, under the previous regulations, Fiberock had ignitability, spread of flame and heat evolved indexes of 0, and a smoke developed index of 0-1.

**Fire Resistance** Most Fiberock wall specifications in the following pages have a minimum of 30 minutes of fire resistance (except PRSSiB on page 27) for the protection of occupants and structure. The wall system design table, on Pages 22-29 of this book outline an extensive range of wall designs using Fiberock with fire resistance ratings of up to 2 hours. BRANZ report FAR 2396 applies to these wall designs.

The system designs for fire rated walls utilise the specification number codes at the top of page 21.

**Non-combustible** Suitable as a smoke wall as per Specification C2.5 of the BCA and meets the non-combustible requirements of AS/NZS 1530.1.

## Design Considerations

FR/FR Fiberock® interior linings

30 Fire Resistance Level (Minutes) FRL

T Timber Frame wall S = Steel Frame wall

Si Single Stud S1 Staggered Stud (Discontinuous)

L Loadbearing (notation used only for loadbearing)

Ds Double Stud (Discontinuous)

### Finishing

Fiberock is the ideal substrate to use underneath all typical modern wall finishing materials, enabling just one internal lining material to be used on site. The particular advantages of Fiberock as a substrate for jointing and for selected finishing materials are as follows:

**Jointing** Fiberock is jointed in the same manner as plasterboard, and using the same jointing materials. These should be selected according to personal preference and experience, and to maintain a high safety profile. As all edges of Fiberock are either factory tapered or can be site tapered there is no need for difficult and potentially unsightly raised surface joints to be used.

**Paint** Fiberock is ideal for use with high quality paint finishes. These should be applied following the paint manufacturer's recommendations for plasterboard, and a pigmented oil based sealer or equivalent is recommended for areas that will be exposed to moisture. Backrolling (with a 'dry' roller) should be carried out after application of the first coat of paint, whether applied by spray or roller. By using Fiberock as substrate, a better quality of finish can be achieved due to stronger joints to resist cracking, and an absence of raised surface joints. The superior finish is also due to the pre-sealed surface providing even paint suction across the sheet. The stiffness of Fiberock also helps to minimise out of plane areas in the wall caused by minor variations in stud alignment. Skim coating or specialist Level 5 products like Sheetrock Tuff-Hide should be completed prior to painting when a Level 5 high quality finish is required (see footbox on page 15).

**Tile** Fiberock's surface coating is optimised for the reliable bonding of tile adhesives, and of waterproof membranes when these are needed in direct water flow areas. Fiberock is of homogenous structure so there is no surface paper to delaminate under moist conditions, and it has excellent mould resistance to fight potential mould growth beneath tiles. Although widely compatible with construction adhesives, good trade practice should be followed, including all adhesives being tested for compatibility prior to use.

**Wall Vinyl** Apply to Fiberock in the same manner used for plasterboard. Stripping of wall vinyl from Fiberock is much easier than from plasterboard, when renovating.

**Laminates** When special laminate surfaces such as low pressure melamine veneers or carpet are desired for aesthetic or functional reasons, these materials can be reliably bonded to the Fiberock. Although widely compatible with construction adhesives, good trade practice should be followed, including all adhesives being tested for compatibility prior to use.

### Installation Summary

Fiberock linings are installed, jointed and finished in a similar manner to plasterboard. Note the following added features:

- Sheets can be horizontally or vertically fixed. It is recommended that joints between sheets that are not supported with framing be back blocked (screw and glue) to improve joint strength;
- Can be fixed to timber frames with staples as well as nails (hand or power driven) and screws; or screws to steel frames;
- This product is much stronger than plasterboard, but other than Fiberock VHI, can be scored and snapped. Sheets can also be cut and shaped with traditional woodworking tools such as hand saws, drills, rasps, jig saws, sabre saws etc; using dust collection as necessary. For convenience and speed, some installers (especially of Fiberock VHI) choose to cut sheets to size using an 18 volt cordless low RPM thin blade power saw (e.g. DeWALT DW939 165 mm cordless saw). This helps to minimise dust generation. Specialist contractors will likely choose portable dust extractors and power tools including saws and planes (for tapers) from manufacturers such as Festool;
- In order to achieve flat strong sheet to sheet joints everywhere Fiberock has been engineered to allow the formation on site of tapers to sheets ends, and to cut sides, as needed. Several methods are available to form these tapers. If only a few are needed then coarse sandpaper or a hand plane (ideally rebate) can be readily used. A Fiberock blade for a rasp is also effective. If a greater number of rebates need to be formed then powered tools can be used, in which case a portable dust extraction unit should also be used. Particularly suitable equipment for this task includes the Festool powered plane and dust extraction unit. Routers also form good rebates. In all cases a rebate of similar profile to that on sheet edges should be formed, and the slightly rough surface that results will assist with bonding to the joint compound. Contact USG staff for additional assistance, if required;
- Joint with paper tape and two coats of setting compound, followed by finishing compound;
- Can be painted (see notes above), and tiled with confidence due to its high surface integrity;
- Polyurethane adhesive can be used on edge to edge and face to edge joints in alcoves etc for strong rigid connection. The above is only a summary of relevant installation points. The full installation instructions and specification pages for fire and acoustic rated systems should be consulted for detailed installation procedures\*.

\*Either download from [www.fiberock.com.au](http://www.fiberock.com.au), or call Australia free phone 1800 226 215 for a copy.