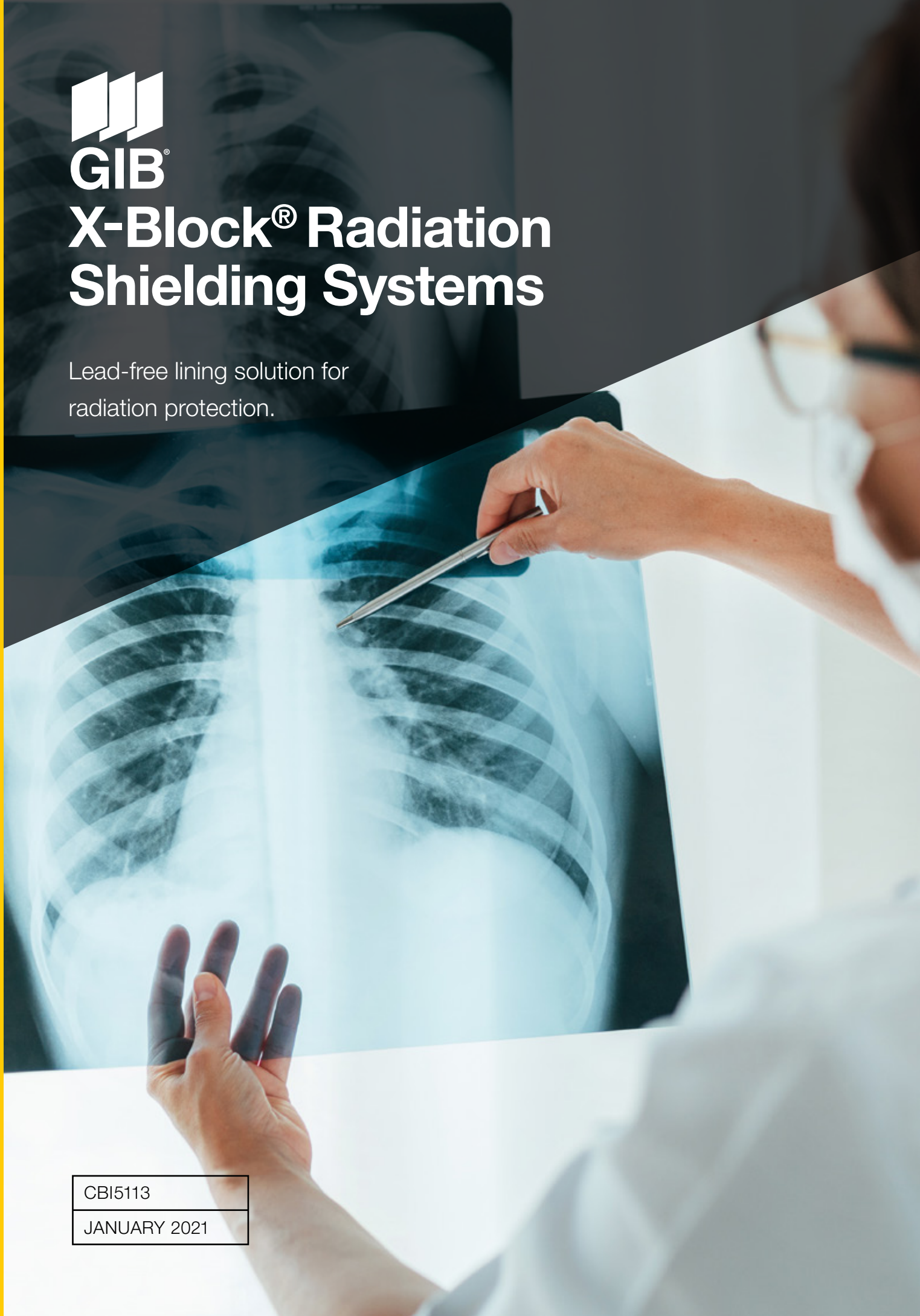




X-Block[®] Radiation Shielding Systems

Lead-free lining solution for radiation protection.



CBI5113

JANUARY 2021

NATIONAL SUPPORT

VISIT: Winstone Wallboards Limited
37 Felix Street, Penrose 1061,
Auckland, New Zealand
POST: PO Box 12 256, Penrose 1642,
Auckland, New Zealand
PHONE: +64 9 633 0100
EMAIL: info@gib.co.nz
WEB: gib.co.nz

GIB® HELPLINE

0800 100 442

Helping you find the right system for your project.

This guide was developed to help navigate through the design and construction challenges of hospital and healthcare X-ray facilities to provide specific lead free lining solution for x-ray protection.

Throughout, this document will direct you to specific support and systems literature for technical assistance and details. The GIB® Helpline is always available where our technical team of builders and engineers can provide GIB® specification assistance.

CONTENTS

Introduction	1
Cost effective X-ray protection with GIB X-Block®	4
Sustainability and the environment	5
GIB® Plasterboard — a green building material	5
Certifications	5
Waste recycling	5
Local manufacture	5
GIB X-Block® lead-free X-ray protection	6
Lead equivalence value tables	7
Radiation shielding	8
Summary of guidelines	9
Compliance with the New Zealand Building Code	10
Other relevant standards	10
GIB X-Block® Plasterboard	11
GIB X-Block® Jointing Compound™	11
GIB X-Block® Radiation Shielding Systems	12
GBX1A — timber or steel framed wall	12
GBX2A — timber or steel framed wall	14
GBX2B — timber or steel framed wall	16
GBX3A — timber or steel framed wall	18
GBX3B — timber or steel framed wall	20
GBXFC2 — floor/ceiling	22
GBX1A construction details	24
GBX2A construction details	26
GBX2B construction details	28
GBX3A construction details	30
GBX3B construction details	32
Frequently asked questions	34



COST EFFECTIVE X-RAY PROTECTION WITH GIB X-BLOCK®

- A specialist system consisting of 13mm GIB X-Block® containing Barytes working in combination with a jointing system that is designed to provide protection from X-ray radiation.
- Suitable for use in radiography departments, medical facilities, dental clinics and veterinary practices.
- Achieves an effective radiation barrier without the use of lead, unlike traditional X-ray lining systems.
- Eliminates complex and costly installation procedures associated with lead based lining systems.
- Easier to achieve a uniform appearance throughout a facility matching other GIB® Plasterboard systems.
- Performs other critical functions such as noise control and fire resistance ratings.
- Ideal for renovations or conversions of timber, steel and/or concrete construction where increased X-ray shielding is required.
- Tested at the Bavarian State Office for Weights and measures Bureau of Standards Munich laboratory in accordance with internationally accepted criteria.
- Shown in laboratory and site tests to exceed the requirements for a primary barrier when installed as a three layer system.
- Exceeds the requirements for a secondary barrier when installed as a two layer system.
- The GIB X-Block® System is the subject of an invention covered by New Zealand Patent No. 517385 and Australian Patent No. 2003206481.

SUSTAINABILITY AND THE ENVIRONMENT

Winstone Wallboards is committed to a holistic view of sustainability: environmental, social and economic.

- We manufacture products that are good for the environment.
- We actively consider the full life cycle of our products and support recycling initiatives both from our manufacturing and general construction waste.
- We innovate systems and solutions that keep people safe and protected in buildings.
- We support jobs and growth within our communities.

GIB® PLASTERBOARD — A GREEN BUILDING MATERIAL

GIB® plasterboard is a sustainable, non-toxic, compostable and infinitely recyclable product made from natural gypsum and 100% recycled paper. GIB® plasterboards do not use fly ash, a derivative of coal extraction, as a bulk filler* in place of naturally occurring gypsum. Due to this, unlike many imported alternatives, a range of GIB® plasterboards are considered Red List Free, certified through Declare.

**Note: 10mm GIB Aqualine® board uses less than 0.7% fly ash as a processing agent, not as a bulk filler.*

CERTIFICATIONS

Declare

Winstone Wallboards has Declare certification for a range of our plasterboards. Considered one of the most advanced sustainability certifications in the built environment, Declare is like a nutritional label for building products, offering specifiers, contractors and building users insight into the ingredients used in the manufacture of building products.

Global Greentag

A range of GIB® plasterboards have also achieved Global Greentag certification, one of the world's most robust, trusted and widely recognised eco-labels.

Environmental Product Declaration (EPD)

Winstone Wallboards has been the first and only plasterboard manufacturer in Australasia to publish an Environmental Product Declaration (EPD). The EPD quantifies the environmental performance of GIB® plasterboard including its carbon footprint, embodied energy and other environmental data. Projects utilising GIB® plasterboard will qualify for full Green Star points due to Winstone Wallboards holding an EPD for six or more products. The EPD for GIB® plasterboard is available on the GIB® website. Visit gib.co.nz to download these certifications.

WASTE RECYCLING

Winstone Wallboards works closely with local waste companies on initiatives to recycle plasterboard waste. Green Gorilla has introduced a plasterboard recycling service in Auckland. Plasterboard is collected separately from general building and construction waste, the waste volumes and tonnages are recorded and reported per project for builders and their customers, which allow plasterboard recovery statistics to be provided as part of total site landfill diversion and environmental reporting for Green Star and Homestar accreditation. In Christchurch, plasterboard manufacturing waste is processed with offcuts shredded and screened to return it to gypsum form. The recycled gypsum is supplied as a soil conditioner to farmers, orchards and vineyards.

LOCAL MANUFACTURE

GIB® plasterboard and compounds are manufactured in New Zealand*. We have complete oversight of our factory conditions and the teams who work in our manufacturing plants. Our decision to manufacture locally supports local jobs and directly supports the country's economy.

**Note: GIB Barrierline® plasterboard is manufactured to Winstone Wallboards' specific specification locally or from a reputable overseas manufacturer.*

GIB X-BLOCK® LEAD-FREE X-RAY PROTECTION

Medical X-ray diagnostic rooms require the use of protective barriers to shield operators and occupants of adjacent areas against unacceptable levels of radiation. Radiation exposure may arise from direct exposure to the X-ray beam (primary beam) or by X-rays scattering from the patient, equipment or other fixtures.

Protection usually takes the form of X-ray absorbing sheet material on the walls of the room in which equipment is operated, together with suitably shielded doors and windows. The level of protection required depends on the occupancy of the adjacent areas, the frequency of use of the X-ray equipment, the intensity and energy of the X-rays being generated, and the direction of the primary X-ray beam.

Lead has been the traditional material used for X-ray protection. Shielding for diagnostic X-ray rooms is specified in terms of the thickness of lead necessary for appropriate protection. Other materials, such as GIB X-Block®, which contains barytes, also provide X-ray protection, and performance is measured in terms of 'lead equivalence'. Lead equivalence of GIB X-Block® varies with X-ray energy, with a greater thickness of GIB X-Block® being necessary at higher X-ray energies.

The lead equivalence must be appropriate to the kilovoltages used in the room. To assist in determining the required thickness of GIB X-Block®, the tables show the lead equivalence of GIB X-Block® at different X-ray energies.

A minimum lead equivalence of 1.0mm at 100 kVp is usually required for walls of general diagnostic X-ray rooms. Shielding of not less than 2.0mm lead equivalence is required where the primary X-ray beam may be routinely directed towards adjacent occupied areas. Specialised X-ray rooms may use higher energy X-rays and/or have greater use than general rooms; thus additional shielding may be necessary. For example, for CT rooms shielding is commonly specified as 1.5mm lead equivalent at 120 to 140 kVp.

Advice on X-ray protection for a particular installation must be sought from a Qualified Health Physicist (QHP) to ensure the requirements for occupational and public protection are met. Winstone Wallboards can supply a list of New Zealand QHPs and assist with the selection of cost effective X-ray protection systems that meet your specific needs.

THE LEAD EQUIVALENCE VALUES (LEVS) ARE EVALUATED UNDER APPLICATION OF BROAD BEAM GEOMETRY (BBG) ACCORDING TO IEC 61331-1:2014*. BBG CONSIDERS SCATTER RADIATION FROM MATERIALS

BROAD BEAM GEOMETRY LEAD EQUIVALENCE VALUE LEV mm PB				
13MM GIB X-BLOCK® LEAD EQUIVALENCE (mm)				
X-Ray energy	1 layer	2 layers	3 layers	4 layers
80 kVp	0.70	1.69	2.72	3.50
100 kVp	0.68	1.46	2.21	2.99
120 kVp	0.57	1.10	1.59	2.08
150 kVp	0.49	0.84	1.16	1.47

THE LEAD EQUIVALENCE VALUES (LEVS) ARE EVALUATED UNDER APPLICATION OF NARROW BEAM GEOMETRY (NBG) ACCORDING TO IEC 61331-1:2014*

NARROW BEAM GEOMETRY LEAD EQUIVALENCE VALUE LEV mm PB				
13MM GIB X-BLOCK® LEAD EQUIVALENCE (mm)				
X-Ray energy	1 layer	2 layers	3 layers	4 layers
80 kVp	0.82	1.80	2.82	3.50
100 kVp	0.78	1.52	2.24	2.99
120 kVp	0.61	1.11	1.58	2.05
150 kVp	0.49	0.82	1.12	1.42

Testing Authority:
 Bavarian State Office for Weights and Measures
 Bureau of Standards Munich
 Test laboratory for temperature, density, radiation and sound
 Franz Schrank Road 11
 80638 Munich

Test Report No. P-004420

*IEC 61331-1:2014
 Protective devices against diagnostic medical X-radiation
 Part 1: Determination of attenuation properties of materials.

RADIATION SHIELDING

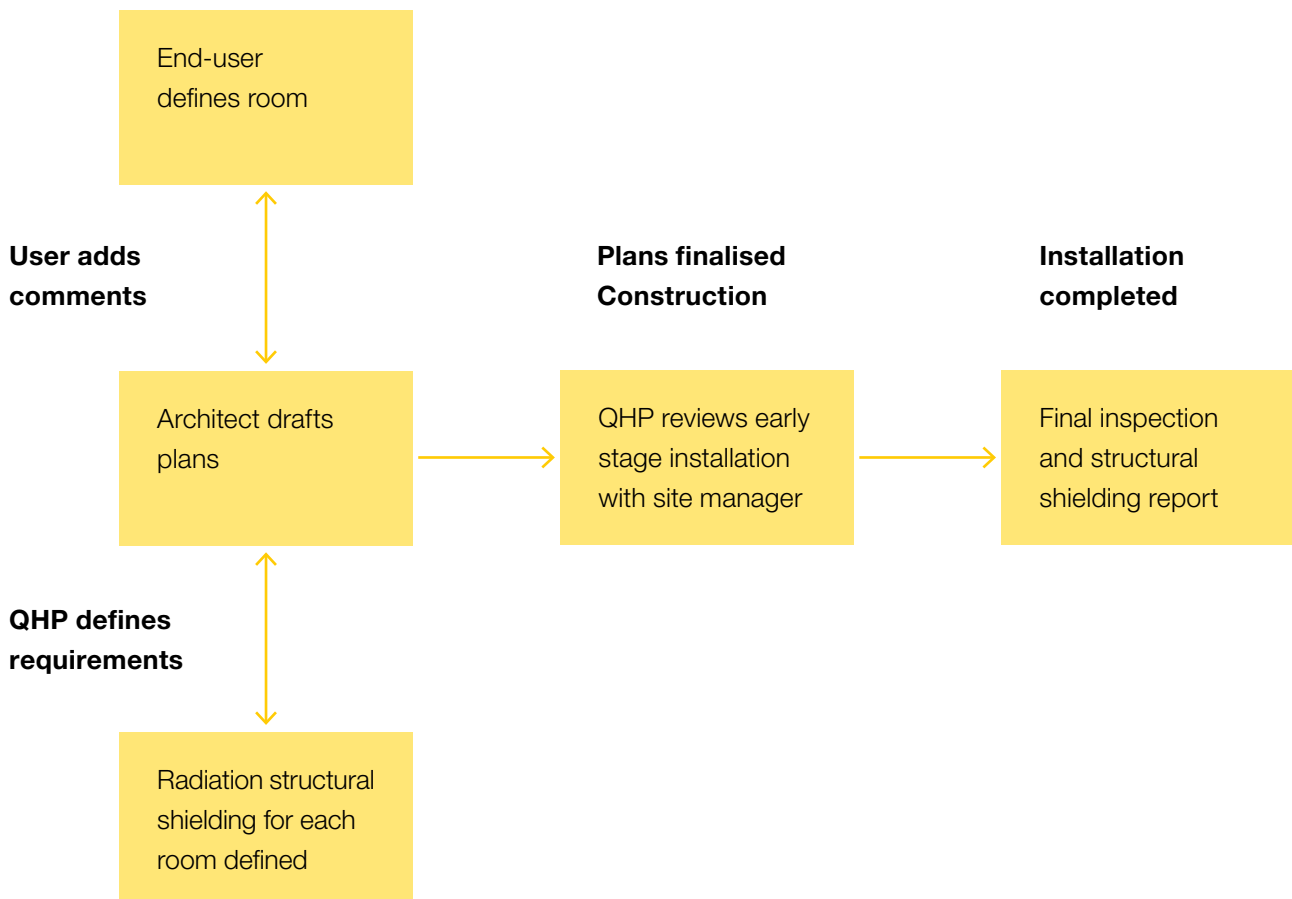
Medical X-ray diagnostic rooms require radiation shielding by means of protective barriers. The Qualified Health Physicist (QHP) for the facility must approve all shielding specifications and their final installation because every installation will have specific requirements with respect to aspects such as:

- The type of X-ray equipment.
- The location of X-ray equipment within the room.
- The types of procedures performed in the room.
- The use of the areas surrounding the X-ray room.
- Regulatory requirements with respect to dose constraints.
- Number of patients per week (work flow).

The height of a protective barrier depends on circumstances but must reach 2.1 metres in all cases. The GIB X-Block® lining system provides full height room protection.

When the X-ray facility is constructed the continuity of the barrier across joints and penetrations is paramount. This document provides a number of standard details ensuring continuity of protection.

Suggested workflow for the design and installation of radiation shielding.



SUMMARY OF GUIDELINES

PRIMARY BARRIER

A primary barrier is one that intercepts the direct (primary) beam of an X-ray tube. Primary barriers are often built into mammography, CT and fluoroscopy machines and so secondary barrier protection only is usually required for the room construction elements.

In general a primary barrier is required for:

- Any surface routinely in the direct line of the X-ray beam, including parts of the walls, floor and/or ceiling (as appropriate) of an X-ray room as well as behind chest stands or wall buckys. The barrier needs to extend at least 300mm beyond each boundary of the area normally exposed to the primary X-ray beam.

An acceptable primary barrier is shown by laboratory and site test to have a minimum lead equivalent of 2mm at an X-ray energy level of 100 kVp.

SECONDARY BARRIER

A secondary barrier is one that shields from scattered X-rays (mainly from the patient) only. The following are examples of areas typically requiring a secondary barrier:

- X-ray room walls and doors into the room, including changing room and toilet doors.
- The floor and/or ceiling (as appropriate) of an X-ray room if in a multi-storey building.
- Operator barriers, including both the body of the barrier and the viewing window.

For general diagnostic rooms, an acceptable secondary barrier is shown by laboratory and site test to have a minimum lead equivalent of 1mm at an X-ray energy level of 100 kVp.

For CT rooms an acceptable secondary barrier is shown by laboratory and site test to have a minimum lead equivalent of 1.5mm at an X-ray energy level of 100 kVp.

Mammography rooms operate at lower energies and less shielding is required. In this case internal walls lined on each side with one layer of 10mm GIB® Plasterboard meet the requirements for a secondary barrier.

Note: Most QHPs recommend a higher shielding requirement.

COMPLIANCE WITH NEW ZEALAND BUILDING CODE

STRUCTURE – CLAUSE B1

The design and material specification for steel and timber framing used in GIB X-Block® systems must be in accordance with the performance requirements of NZBC B1 – Structure.

DURABILITY – CLAUSE B2

When installed and maintained in normal conditions of dry internal use GIB X-Block® systems have a serviceable life in excess of 50 years and satisfy the requirement of NZBC Clause B2 – Durability.

SPREAD OF FIRE – CLAUSE C3

GIB X-Block® Plasterboard systems provide passive fire protection in accordance with the requirements of NZBC Clause C3 – Spread of Fire. When GIB X-Block® is substituted into fire rated systems in place of the equivalent thickness GIB® Standard Plasterboard, the fire resistance rating of the system is maintained. (Ref to GIB® Fire Rated Systems GBTL30b; GBS30).

Comparative testing has established that the integrity performance of GIB X-Block® Plasterboard is similar to the same thickness GIB Fyrelite®. However, the increased density of GIB X-Block® results in higher conductivity and an earlier insulation failure. For specific fire requirements please phone the GIB® Helpline on 0800 100 442.

HAZARDOUS BUILDING MATERIALS – CLAUSE F2

GIB X-Block® Plasterboard and jointing compound meets the provisions of NZBC Clause F2 – Hazardous Building Materials. At no stage during handling, installation, or serviceable life do these products constitute a health hazard.

Dust resulting from the sanding of stopping compounds may be a respiratory irritant and the use of a suitable facemask is required.

AIRBORNE AND IMPACT SOUND – CLAUSE G6

GIB Noise Control® Systems can be used to provide ratings for Sound Transmission Class (STC) in accordance with the requirements of NZBC Clause G6 – Airborne and Impact Sound.

When GIB X-Block® Plasterboard is substituted into GIB Noise Control® systems in place of the equivalent thickness GIB Noiseline®, the STC rating of that system will be maintained. For specific noise control requirements please phone the GIB® Helpline on 0800 100 442.

OTHER RELEVANT STANDARDS

AS/NZS 4543.1:1999 Protective devices against medical X-radiation, Part 1: Determination of attenuation properties of materials, broad beam method with minor modifications to geometry and beam qualities [IEC 61331-1:2014].

BS 476 Parts 4,6,7,20,21,22 and 23. Fire tests on building materials and structures.

ISO 6308, AS/NZS 2588, ASTM C1396, 1530, 2589.1, AS/NZ ISO 9001:2008.

GIB X-BLOCK® PLASTERBOARD

GIB X-Block® Plasterboard has been tested by Bavarian State Office for Weights and Measures, Bureau of Standards Munich.

- 13mm GIB X-Block® has been shown to exceed the requirements for a 1mm lead equivalent at 100 kVp installed as a double layer on one side of a steel or timber frame (GBX2A) or as a single layer on each side of a steel or timber frame (GBX2B).
- 13mm GIB X-Block® has been shown to exceed the requirements for a 2mm lead equivalent at 100 kVp installed as a 3 layer system on one side of a steel or timber frame (GBX3A), or a single layer on one side and 2 layers on the other side of the frame (GBX3B).
- 13mm GIB X-Block® has been shown to exceed the requirements for a 1mm lead equivalent ceiling at 100 kVp installed as a double layer on either timber or steel battens (GBXFC2).

Detailed system specifications are given in this brochure.

GIB X-Block® Plasterboard features a lead-free modified core formulated to limit the passage of potentially harmful X-rays. The board is manufactured with tapered edges allowing conventional jointing techniques using specifically formulated GIB X-Block® Jointing Compound™.

Sheet thickness	Sheet length*	Sheet weight
13mm	2,400mm	49kg
13mm	3,000mm	61kg

* Other lengths are available on request depending on required quantity.

HANDLING AND STORAGE

- GIB X-Block® Plasterboard must be stored under cover, stacked flat and clear of the floor with sufficient support to avoid sagging.
- GIB X-Block® must be handled as a finishing material.
- Cracked and damaged sheets must not be used.

GIB X-BLOCK® JOINTING COMPOUND™

We recommend the use of GIB X-Block® Jointing Compound, a jointing compound specifically designed to give lead equivalent joints on walls and ceilings using GIB X-Block® Plasterboard. GIB X-Block® Jointing Compound™ is applied to all joints, including joints on inner layers of two layer systems, to prevent the penetration of X-rays at joints.

Alternatively GIB X-Block® Plasterboard sheets may be protected using the conventional method of placing lead strips or GIB X-Block® Plasterboard strips at least 200mm in width behind the joints. In two layer systems use GIB X-Block® Jointing Compound with paper tape for jointing of the top layer. In addition cover all fasteners on the outer layer with at least two coats of GIB X-Block® Jointing Compound to prevent leakage of X-ray energy at these points.

GIB X-Block® Jointing Compound™ is available in 25kg bags. Each bag contains enough product for approximately 110 lineal metres of joints or 90m² of board.

GIB X-Block® Jointing Compound™ has the following benefits:

- Eliminates the need for backing joints with lead strips.
- Even protection throughout the joint.
- Excellent adhesion produces a high strength joint when used in conjunction with paper tape or GIB RocTape®.
- Can be finished with any of the other premium finishing compounds in the GIB® range. To achieve a high standard of finish in preparation for painting or wall covering, the final coat should be a GIB® finishing compound.
- Product can be mixed to the desired consistency on site.
- Can be identified by its brown colour.

GBX1A — Timber or steel framed wall

13mm GIB X-Block® lead equivalence under application of broad beam geometry

X-ray energy	1 layer
80 kVp	0.70mm
100 kVp	0.68mm

13mm GIB X-Block® lead equivalence under application of broad beam geometry

X-ray energy	1 layer
120 kVp	0.57mm
150 kVp	0.49mm

Specification number	Performance	Specifications
GBX1A-S	STC 44 Rw 44 FRR refer page 10	LB/NLB Non load bearing Lining 1 x 13mm GIB X-Block® one side / 1 x 13mm GIB® Plasterboard other side Framing Steel
GBX1A-T	STC 42 Rw 42 FRR refer page 10	LB/NLB Load bearing Lining 1 x 13mm GIB X-Block® one side / 1 x 13mm GIB® Plasterboard other side Framing Timber

LINING

X-ray room side

1 layer of 13mm GIB X-Block®. Vertical fixing only permitted.

All joints must be formed over framing with linings fixed hard to floor.

Other side

13mm GIB® Plasterboard as specified depending on the function required.

Note: The STC and RW values stated above are where R1.8 (75mm) Pink® Batts® glasswool insulation is installed between the studs.

JOINTING

Inner layer

Stop all GIB X-Block® sheet joints, using only GIB X-Block® Jointing Compound™ flushed out between the tapered edges.

Outer layers first coat

The joints must be reinforced using only GIB® paper tape or GIB RocTape® and GIB X-Block® Jointing Compound™. Ensure that compound is pushed into the gap between sheets. Conventional topping compounds are used to complete the jointing process.

STEEL FRAMING

- Steel stud dimensions to be 63 x 34 x 0.55mm minimum with a 6mm return and spaced at 600mm centres maximum.
- Steel channel dimension to be 63 x 30 x 0.55mm nominal.

Note: In fire rated situations, the steel studs must be placed to allow a 15mm expansion gap at the top of the frame.

FASTENING THE LINING FOR STEEL FRAMING

Fasteners

25mm x 6g GIB® Grabber® Self Tapping Drywall screws.

Fastener centres

300mm centres up each stud, 12mm from the sheet edges.

No fasteners to the top and bottom channels.

TIMBER FRAMING

- Framing shall comply with relevant building code and design requirements.
- Nogs are to be set at 800mm centres maximum.
- The moisture content of the timber framing shall be 18% or less at the time of lining.

FASTENING THE LINING FOR TIMBER FRAMING

Fasteners

41mm x 6g GIB® Grabber® High Thread Drywall screws.

Fastener centres

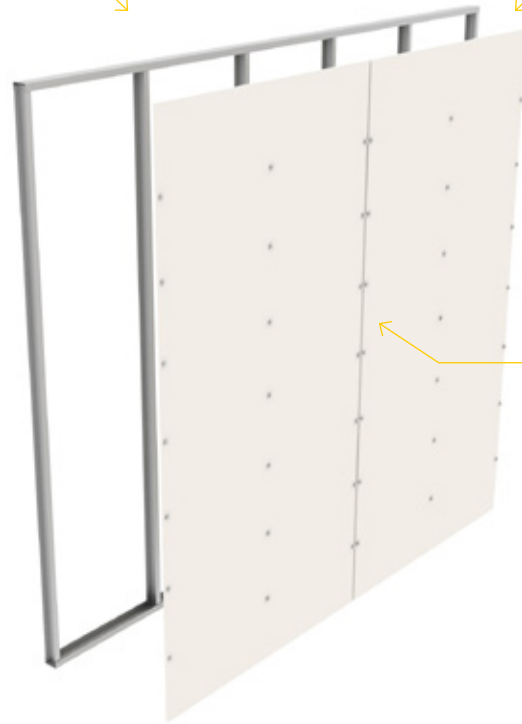
300mm centres around the sheet perimeter and 12mm from the sheet edges.

Single screws at 300mm centres to the intermediate studs.



One layer 13mm
GIB® Plasterboard

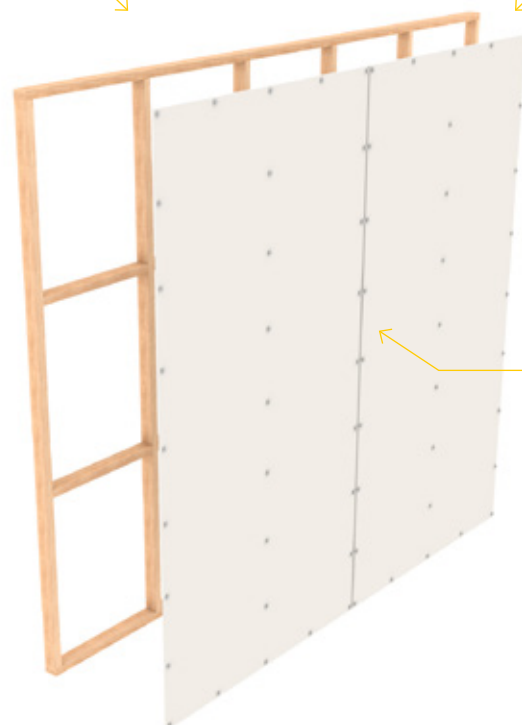
One layer 13mm
GIB X-Block®



2mm gap filled with GIB
X-Block® Jointing Compound™

One layer 13mm
GIB® Plasterboard

One layer 13mm
GIB X-Block®



2mm gap filled with GIB
X-Block® Jointing Compound™

GBX2A — Timber or steel framed wall

13mm GIB X-Block® lead equivalence under application of broad beam geometry	
X-ray energy	2 layers
80 kVp	1.69mm
100 kVp	1.46mm

13mm GIB X-Block® lead equivalence under application of broad beam geometry	
X-ray energy	2 layers
120 kVp	1.10mm
150 kVp	0.84mm

Specification number	Performance	Specifications
GBX2A-S	STC 54 Rw 54 FRR refer page 10	LB/NLB Non load bearing Lining 2 x 13mm GIB X-Block® one side / 1 x 13mm GIB® Plasterboard other side Framing Steel
GBX2A-T	STC 48 Rw 48 FRR refer page 10	LB/NLB Load bearing Lining 2 x 13mm GIB X-Block® one side / 1 x 13mm GIB® Plasterboard other side Framing Timber

LINING

X-ray room side

2 layers of 13mm GIB X-Block®. Vertical fixing only permitted.

Vertical joints of the outer layer are offset by 600mm from those of the inner layer. Sheet joints shall be formed with a 2mm gap.

All joints must be formed over framing with linings fixed hard to floor.

Other side

13mm GIB® Plasterboard as specified depending on the function required.

Note: The STC and RW values stated above are where R1.8 (75mm) Pink® Batts® glasswool insulation is installed between the studs.

JOINTING

Inner layer

Stop all GIB X-Block® sheet joints, using only GIB X-Block® Jointing Compound™ flushed out between the tapered edges (paper tape not required on the inner layer).

Outer layers first coat

The joints must be reinforced using only GIB® paper tape or GIB RocTape® and GIB X-Block® Jointing Compound™. Ensure that compound is pushed into the gap between sheets. Conventional topping compounds are used to complete the jointing process.

STEEL FRAMING

— Steel stud dimensions to be 63 x 34 x 0.55mm minimum with a 6mm return and spaced at 600mm centres maximum.

— Steel channel dimension to be 63 x 30 x 0.55mm nominal.

Note: In fire rated situations, the steel studs must be placed to allow a 15mm expansion gap at the top of the frame.

FASTENING THE LINING FOR STEEL FRAMING

Fasteners

Inner layer — 25mm x 6g GIB® Grabber® Self Tapping Drywall screws.

Outer layer — 41mm x 6g screws as above.

Fastener centres

Inner and Outer layers 300mm centres up each stud, 12mm from the sheet edges.

No fasteners to the top and bottom channels.

TIMBER FRAMING

— Framing shall comply with relevant building code and design requirements.

— Nogs are to be set at 800mm centres maximum.

— The moisture content of the timber framing shall be 18% or less at the time of lining.

FASTENING THE LINING FOR TIMBER FRAMING

Fasteners

Inner layer — 41mm x 6g GIB® Grabber® High Thread Drywall screws.

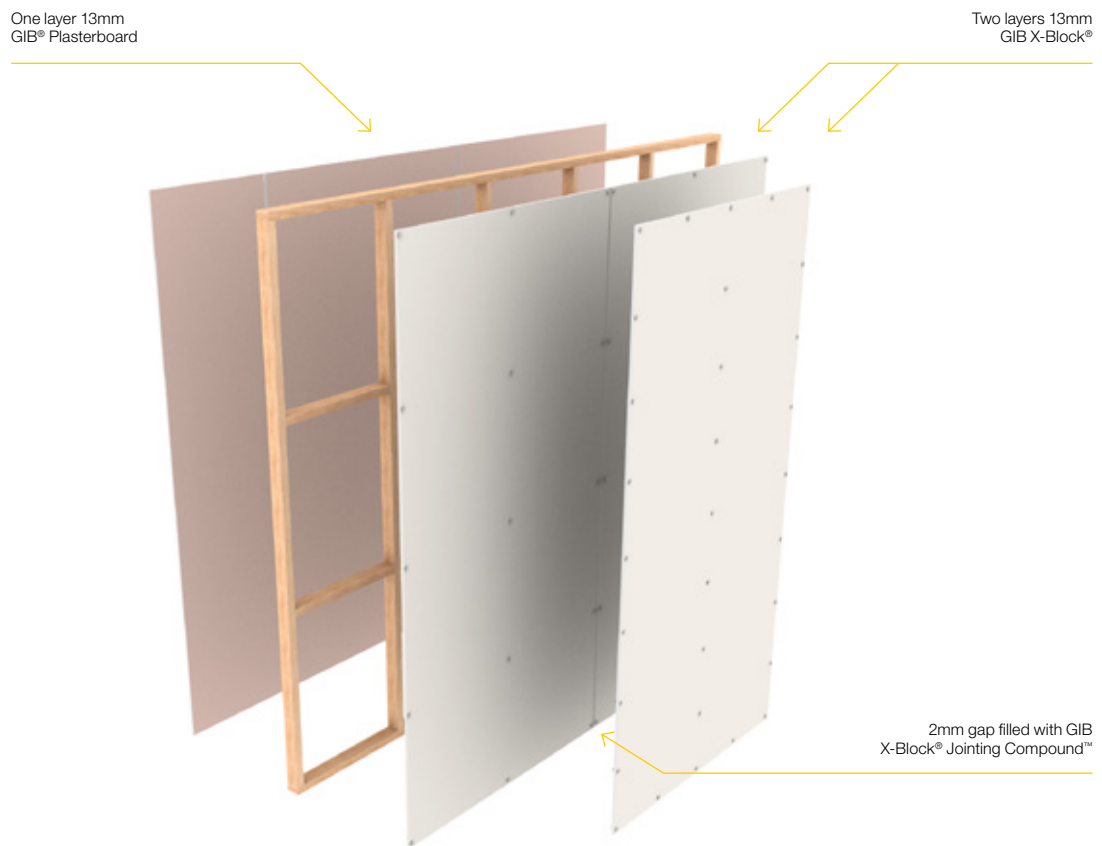
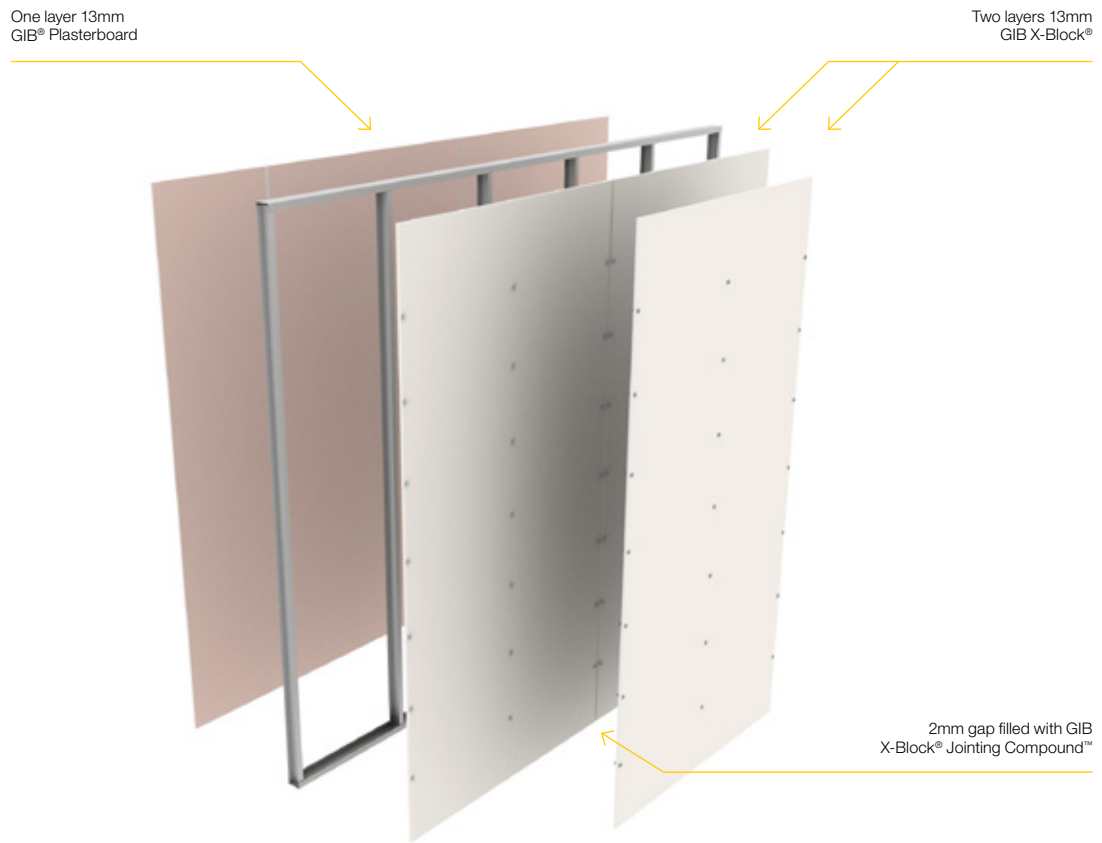
Outer layer — 51mm x 7g screws as above.

Fastener centres

Inner layer — 600mm centres up each stud and to the top and bottom plates.

Outer layer — 300mm centres around the sheet perimeter and 12mm from the sheet edges.

Single screws at 300mm centres to the intermediate studs.



GBX2B — Timber or steel framed wall

13mm GIB X-Block® lead equivalence under application of broad beam geometry	
X-ray energy	2 layers
80 kVp	1.69mm
100 kVp	1.46mm

13mm GIB X-Block® lead equivalence under application of broad beam geometry	
X-ray energy	2 layers
120 kVp	1.10mm
150 kVp	0.84mm

Specification number	Performance	Specifications
GBX2B-S	STC 52	LB/NLB Non load bearing
	Rw 52	Lining 1 x 13mm GIB X-Block® one side / 1 x 13mm GIB X-Block® other side
	FRR refer page 10	Framing Steel
GBX2B-T	STC 46	LB/NLB Load bearing
	Rw 46	Lining 1 x 13mm GIB X-Block® one side / 1 x 13mm GIB X-Block® other side
	FRR refer page 10	Framing Timber

LINING

1 layer of 13mm GIB X-Block® each side of the frame. Vertical fixing only permitted.

Offset joints between sheets by 600mm on opposite sides of the frame.

All joints must be formed over framing with linings fixed hard to floor.

Sheet joints shall be formed with a 2mm gap.

Note: The STC and RW values stated above are where R1.8 (75mm) Pink® Batts® glasswool insulation is installed between the studs.

JOINTING

Use only GIB X-Block® Jointing Compound™. The joints must be reinforced using only GIB® paper tape or GIB RocTape®. Ensure that compound is pushed into the gap between the sheets. Conventional topping compounds are used to complete the jointing process.

STEEL FRAMING

— Steel stud dimensions to be 63 x 34 x 0.55mm minimum with a 6mm return and spaced at 600mm centres maximum.

— Steel channel dimension to be 63 x 30 x 0.55mm nominal.

Note: In fire rated situations, the steel studs must be placed to allow a 15mm expansion gap at the top of the frame.

FASTENING THE LINING FOR STEEL FRAMING

Fasteners

25mm x 6g GIB® Grabber® Self Tapping Drywall screws.

Fastener centres

300mm centres up each stud, 12mm from the sheet edges.

No fasteners to the top and bottom channels.

TIMBER FRAMING

— Framing shall comply with relevant building code and design requirements.

— Nogs are to be set at 800mm centres maximum.

— The moisture content of the timber framing shall be 18% or less at the time of lining.

FASTENING THE LINING FOR TIMBER FRAMING

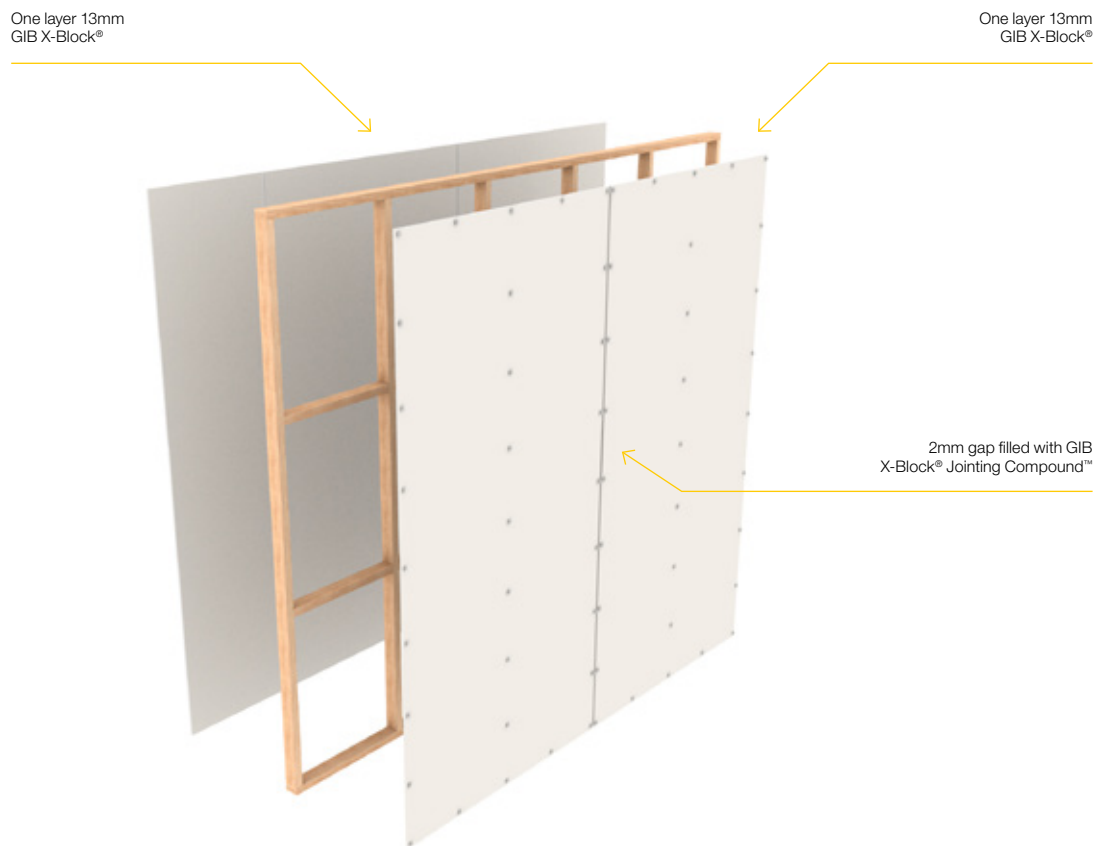
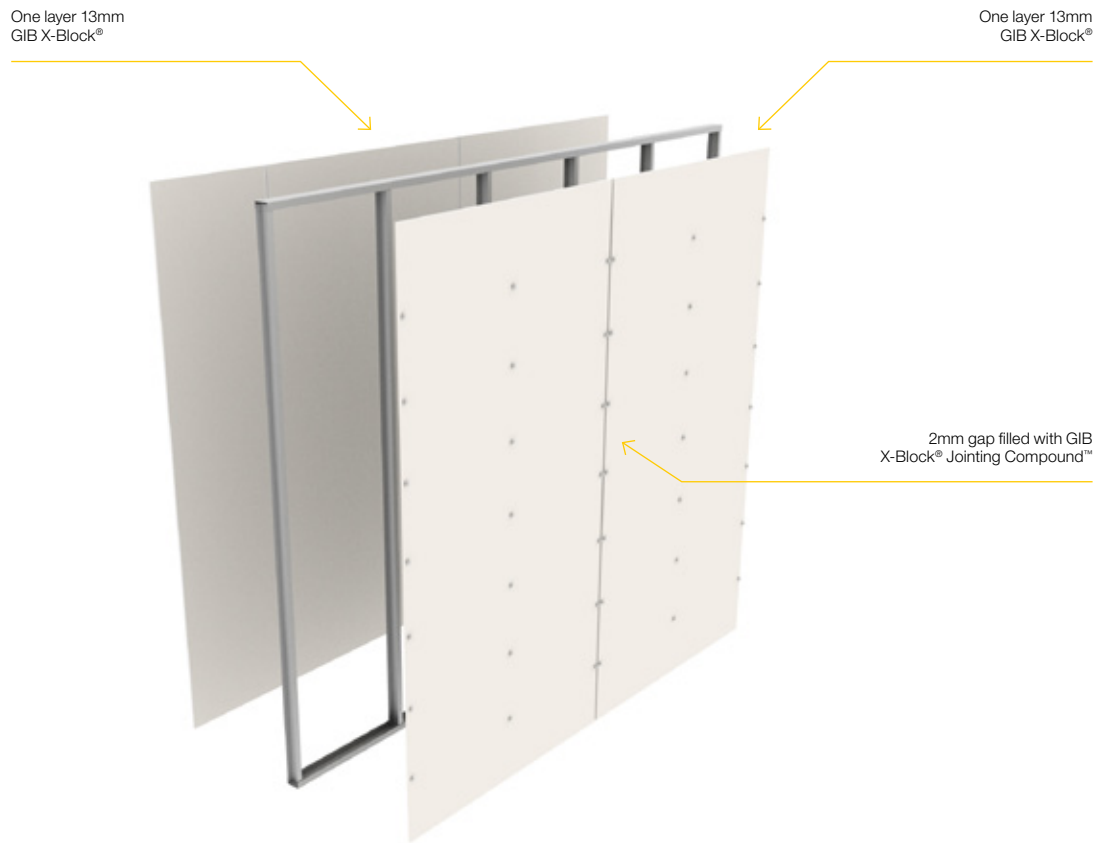
Fasteners

41mm x 6g GIB® Grabber® High Thread Drywall screws.

Fastener centres

300mm centres around the sheet perimeter and 12mm from the sheet edges.

Single screws at 300mm centres to the intermediate studs.



GBX3A — Timber or steel framed wall

13mm GIB X-Block® lead equivalence under application of broad beam geometry

X-ray energy	2 layers
80 kVp	2.72mm
100 kVp	2.21mm

13mm GIB X-Block® lead equivalence under application of broad beam geometry

X-ray energy	2 layers
120 kVp	1.59mm
150 kVp	1.16mm

Specification number	Performance	Specifications
GBX3A-S	STC 57 Rw 57 FRR refer page 10	LB/NLB Non load bearing Lining 3 x 13mm GIB X-Block® one side / 1 x 13mm GIB® Plasterboard other side Framing Steel
GBX3A-T	STC 51 Rw 51 FRR refer page 10	LB/NLB Load bearing Lining 3 x 13mm GIB X-Block® one side / 1 x 13mm GIB® Plasterboard other side Framing Timber

LINING

X-ray room side

3 layers of 13mm GIB X-Block®. Vertical fixing only permitted.

Vertical joints of the outer layer are offset by 600mm from adjacent layers.

All joints must be formed over framing with linings fixed hard to floor. Sheet joints shall be formed with a 2mm gap.

Other side

13mm GIB® Plasterboard as specified depending on the function required.

Note: The STC and RW values stated above are where R1.8 (75mm) Pink® Batts® glasswool insulation is installed between the studs.

JOINTING

Inner and middle layer

Stop all GIB X-Block® sheet joints, using only GIB X-Block® Jointing Compound™ flushed out between the tapered edges (paper tape not required on the inner layers).

Outer layer first coat

The joints must be reinforced using only GIB® paper tape or GIB RocTape® and GIB X-Block® Jointing Compound™. Ensure that compound is pushed into the gap between the sheets. Conventional topping compounds are used to complete the jointing process.

STEEL FRAMING

— Steel stud dimensions to be 63 x 34 x 0.55mm minimum with a 6mm return and spaced at 600mm centres maximum.

— Steel channel dimension to be 63 x 30 x 0.55mm nominal.

Note: In fire rated situations, the steel studs must be placed to allow a 15mm expansion gap at the top of the frame.

FASTENING THE LINING FOR STEEL FRAMING

Fasteners

Inner layer — 25mm x 6g GIB® Grabber® Self Tapping Drywall screws.

Middle layer — 41mm x 6g screws as above.

Outer layer — 51mm x 7g screws as above.

Fastener centres

All layers 300mm centres up each stud, 12mm from the sheet edges.

No fasteners to the top and bottom channels.

TIMBER FRAMING

— Framing shall comply with relevant building code and design requirements.

— Nogs are to be set at 800mm centres maximum.

— The moisture content of the timber framing shall be 18% or less at the time of lining.

FASTENING THE LINING FOR TIMBER FRAMING

Fasteners

Inner layer — 41mm x 6g GIB® Grabber® High Thread Drywall screws.

Middle layer — 51mm x 7g screws as above.

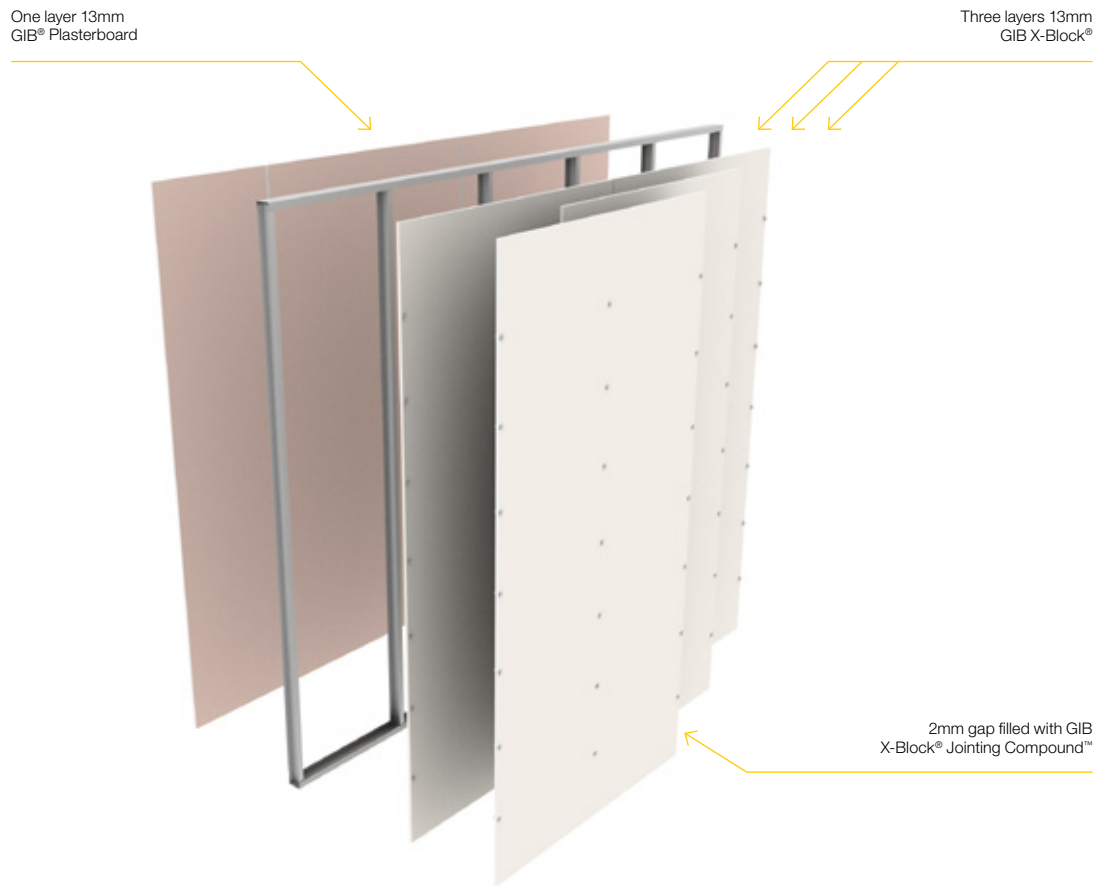
Outer layer — 57mm x 7g screws as above.

Fastener centres

Inner layer — 600mm centres up each stud and to the top and bottom plates.

Middle and outer layer — 300mm centres around the sheet perimeter and 12mm from the sheet edges.

Single screws at 300mm centres to the intermediate studs.



GBX3B — Timber or steel framed wall

13mm GIB X-Block® lead equivalence under application of broad beam geometry

X-ray energy	2 layers
80 kVp	2.72mm
100 kVp	2.21mm

13mm GIB X-Block® lead equivalence under application of broad beam geometry

X-ray energy	2 layers
120 kVp	1.59mm
150 kVp	1.16mm

Specification number	Performance	Specifications
GBX3B-S	STC 56 Rw 56 FRR refer page 10	LB/NLB Non load bearing Lining 2 x 13mm GIB X-Block® one side / 1 x 13mm GIB X-Block® other side Framing Steel
GBX3B-T	STC 50 Rw 50 FRR refer page 10	LB/NLB Load bearing Lining 2 x 13mm GIB X-Block® one side / 1 x 13mm GIB X-Block® other side Framing Timber

LINING

One side

2 layers of 13mm GIB X-Block®.

Where double layer linings occur the vertical joints of the outer layer are offset by 600mm from those of the inner layer. All joints must be formed over framing with linings fixed hard to floor.

Other side

1 layer of 13mm GIB X-Block®.

Vertical fixing only permitted. Offset joints 600mm from opposite side of framing. All joints must be formed over framing with linings fixed hard to floor.

Sheet joints shall be formed with a 2mm gap.

Note: The STC and RW values stated above are where R1.8 (75mm) Pink® Batts® glasswool insulation is installed between the studs.

JOINTING

Inner layers

Stop all GIB X-Block® sheet joints, using only GIB X-Block® Jointing Compound™ flushed out between the tapered edges (paper tape not required on the inner layer).

Outer layers first coat

The joints must be reinforced using only GIB® paper tape or GIB RocTape® and GIB X-Block® Jointing Compound™. Ensure that compound is pushed into the gap between the sheets. Conventional topping compounds are used to complete the jointing process.

STEEL FRAMING

— Steel stud dimensions to be 63 x 34 x 0.55mm minimum with a 6mm return and spaced at 600mm centres maximum.

— Steel channel dimension to be 63 x 30 x 0.55mm nominal.

Note: In fire rated situations, the steel studs must be placed to allow a 15mm expansion gap at the top of the frame.

FASTENING THE LINING FOR STEEL FRAMING

Fasteners

Inner layer and single layers — 25mm x 6g GIB® Grabber® Self Tapping screws.

Outer layer — 41mm x 6g screws as above.

Fastener centres

All layers — 300mm centres up each stud, 12mm from the sheet edges.

No fasteners to the top and bottom channels.

TIMBER FRAMING

— Framing shall comply with relevant building code and design requirements.

— Nogs are to be set at 800mm centres maximum.

— The moisture content of the timber framing shall be 18% or less at the time of lining.

FASTENING THE LINING FOR TIMBER FRAMING

Fasteners

Inner layer and single layers — 41mm x 6g GIB® Grabber® High

Thread Drywall screws.

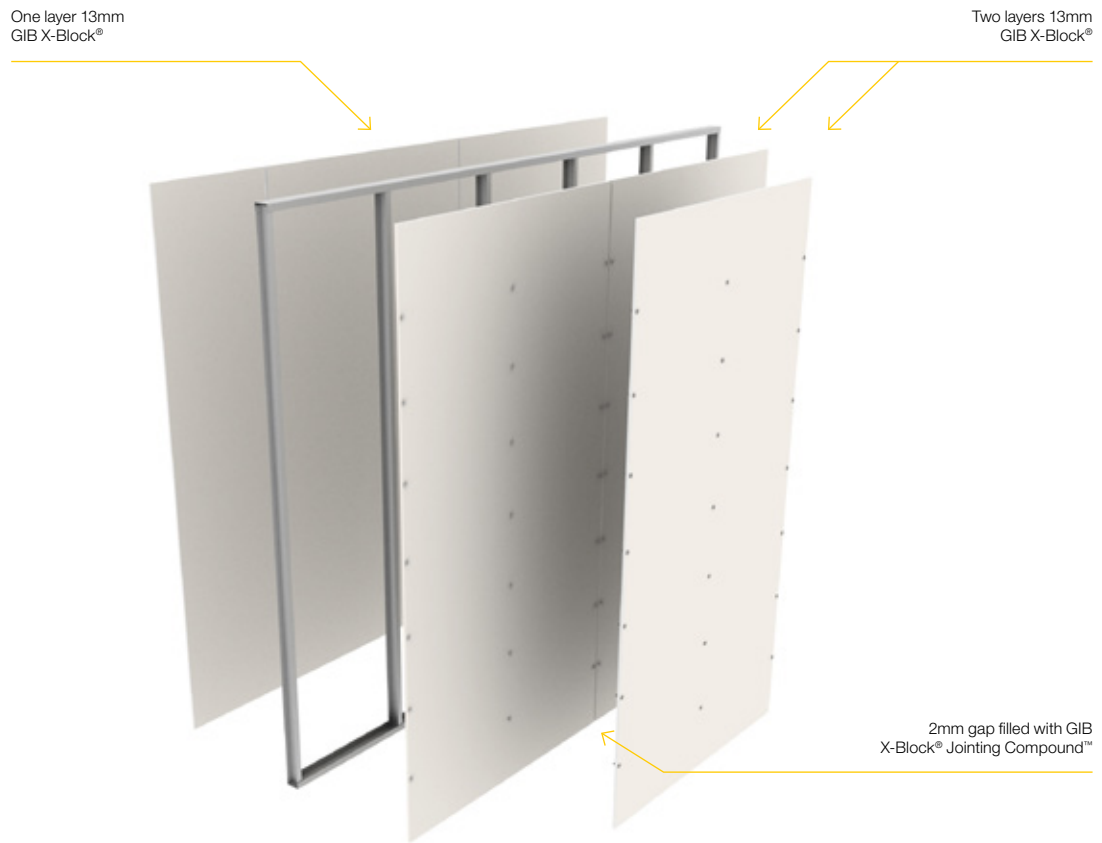
Outer layer — 51mm x 7g screws as above.

Fastener centres

Inner layer — 600mm centres up each stud and to the top and bottom plates.

Outer and single layers — 300mm centres around the sheet perimeter and 12mm from the sheet edges.

Single screws at 300mm centres to the intermediate studs.



GBXFC2 — Floor/ceiling

13mm GIB X-Block® lead equivalence under application of broad beam geometry	
X-ray energy	2 layers
80 kVp	1.69mm
100 kVp	1.46mm

13mm GIB X-Block® lead equivalence under application of broad beam geometry	
X-ray energy	2 layers
120 kVp	1.10mm
150 kVp	0.84mm

Specification number	Performance	Specifications
GBXFC2-S	STC 54 Rw 54 FRR refer page 10	LB/NLB Non load bearing Lining 2 x 13mm GIB X-Block® ceiling side / prescribed flooring other side Ceiling Battens Steel
GBXFC2-T	STC 48 Rw 48 FRR refer page 10	LB/NLB Load bearing Lining 2 x 13mm GIB X-Block® ceiling side / prescribed flooring other side Ceiling Battens Timber

CEILING LINING

2 layers of 13mm GIB X-Block® fixed at right angles to the battens. Offset longitudinal sheet joints between layers by 600mm. All sheet end butt joints shall occur on the battens and are also offset between the first and second layers. Sheet joints shall be formed with a 2mm gap.

Note: The STC and RW values stated above are where R1.8 (75mm) Pink® Batts® glasswool insulation is installed between the studs.

JOINTING

Inner layer

Stop all GIB X-Block® sheet joints, using only GIB X-Block® Jointing Compound™ flushed out between the tapered edges (paper tape not required on the inner layer).

Outer layers first coat

The joints must be reinforced using only GIB® paper tape or GIB RocTape® and GIB X-Block® Jointing Compound™. Ensure that compound is pushed into the gap between the sheets. Conventional topping compounds are used to complete the jointing process.

FLOOR FRAMING

Floor joists shall comply with NZS 3604 and be spaced at 600mm centres maximum and have a depth of 200mm minimum.

Alternative floor framing

Use either Origin® I-beams or CHH Hybeam® HJ series designed for strength and serviceability, no less than 240mm deep and spaced at no more than 600mm. Nogs fixed on the flat to receive edges of flooring material shall be 100 x 50mm minimum. Consult the beam manufacturer regarding construction of the solid blocking contained in floor/ceiling to wall junctions.

Flooring

Minimum flooring shall be nominal 20mm particleboard or minimum 17mm structural plywood fixed to the manufacturer's instructions.

CEILING BATTENS

Ceiling battens shall be GIB® Rondo® steel or 75mm x 50mm timber battens spaced at 600mm centres maximum.

FASTENING THE LINING FOR STEEL BATTENS

Fasteners

Inner layer — 25mm x 6g GIB® Grabber® Self Tapping screws.

Outer layer — 41mm x 6g screws as above.

Fastener centres (both layers)

200mm centres along each batten and along sheet end butt joints.

Place fasteners no closer than 12mm to the sheet edges.

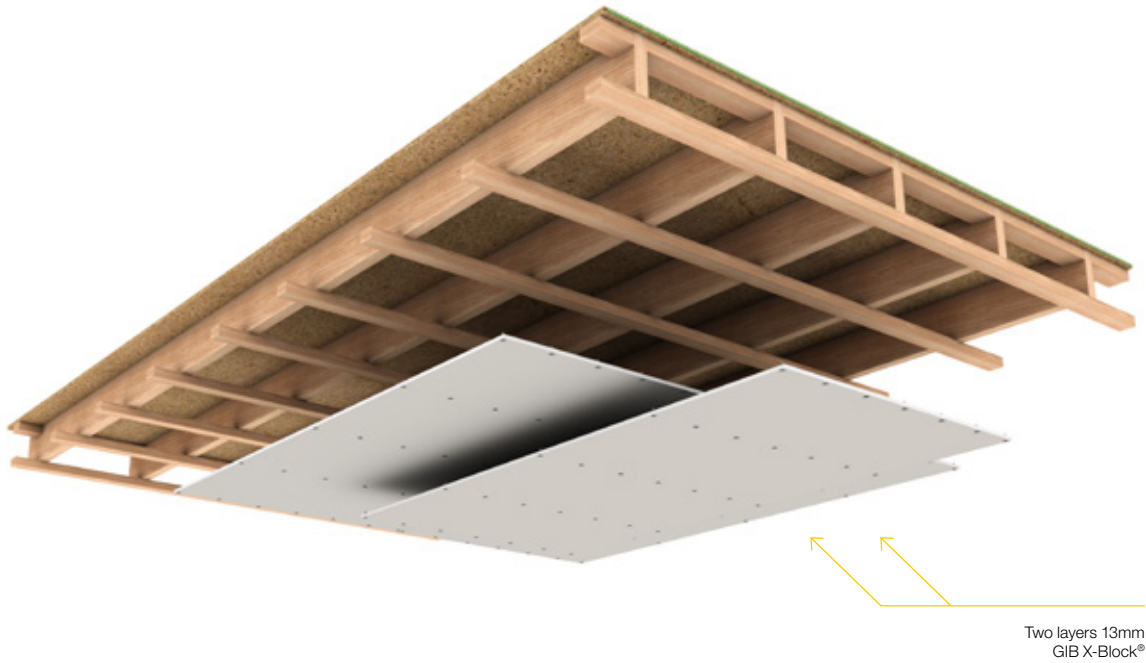
Note: Adhesive fixing is not permitted.

FASTENING THE LINING FOR TIMBER BATTENS

Fasteners

Inner layer — 32mm x 6g GIB® Grabber® High Thread Drywall screws.

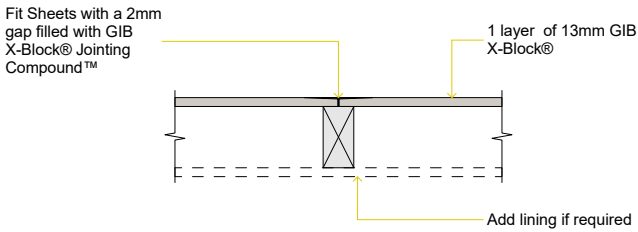
Outer layer — 51mm x 7g screws as above.



GBX1A – Construction Details

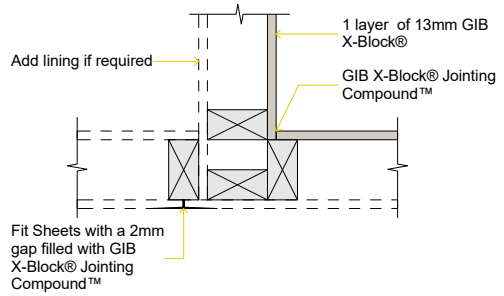
Suitable for use between X-ray rooms and non-protected spaces.

Detail 1 – Typical section



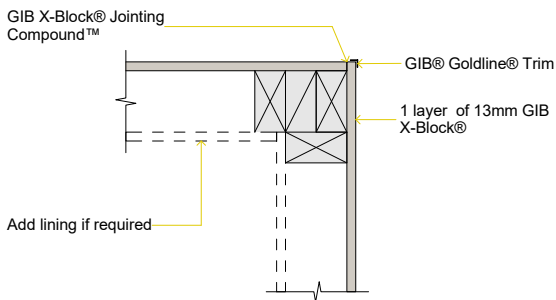
GXB 001

Detail 2 – T junction



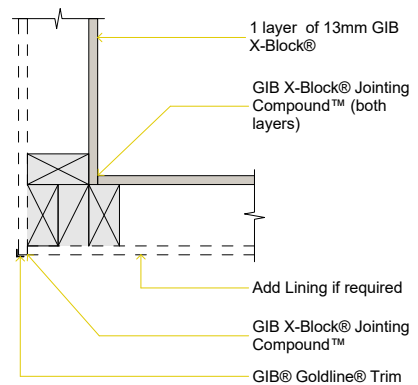
GXB 002

Detail 3 – External corner



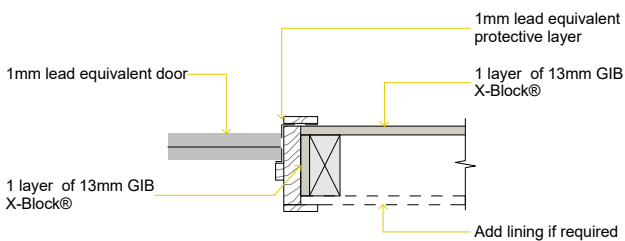
GXB 003

Detail 4 – Internal corner



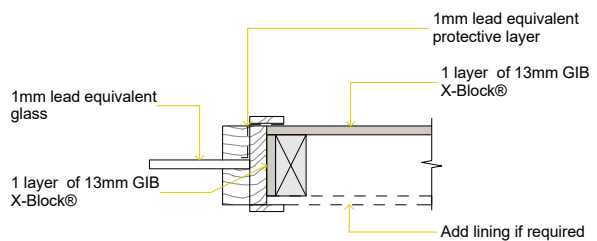
GXB 004

Detail 5 – Door jamb



GXB 005

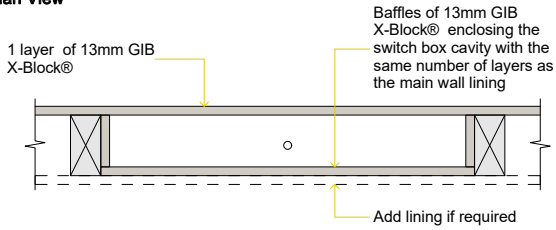
Detail 6 – Window jamb



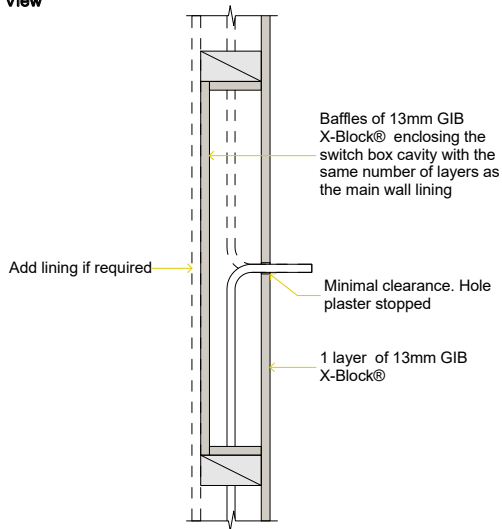
GXB 006

Detail 7/8 – Plan and section view pipe penetration

Plan View



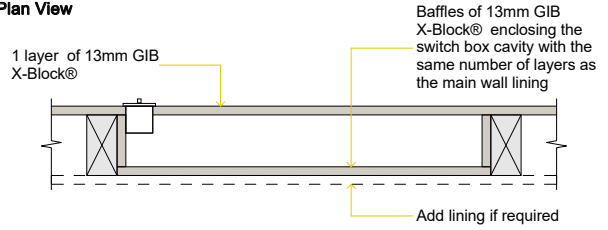
Section View



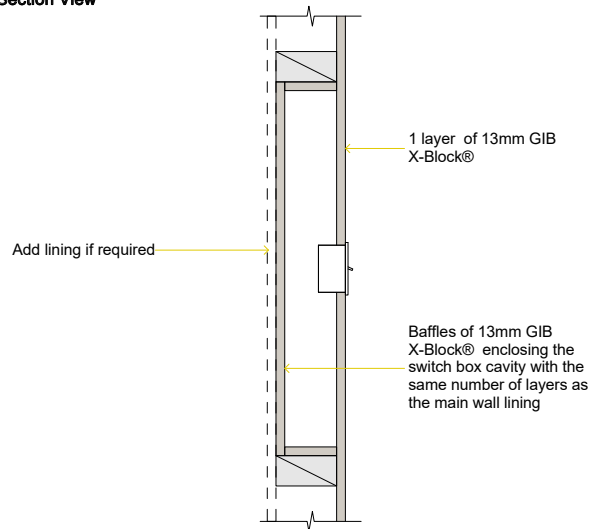
GXB 007

Detail 9/10 – Plan and section view switch boxes

Plan View

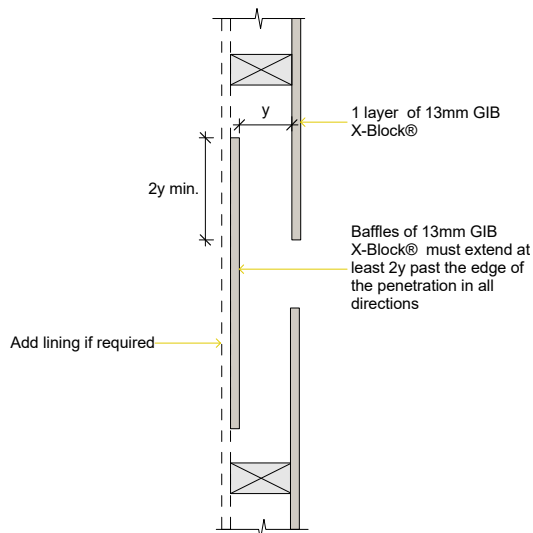


Section View



GXB 008

Detail 11 – Plan view penetration (non fire rated systems)

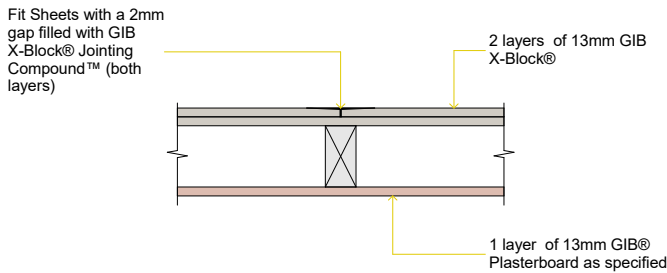


GXB 009

GBX2A – Construction Details

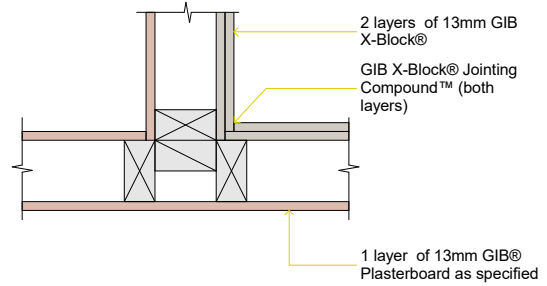
Suitable for use between X-ray rooms and non-protected spaces.

Detail 1 – Typical section



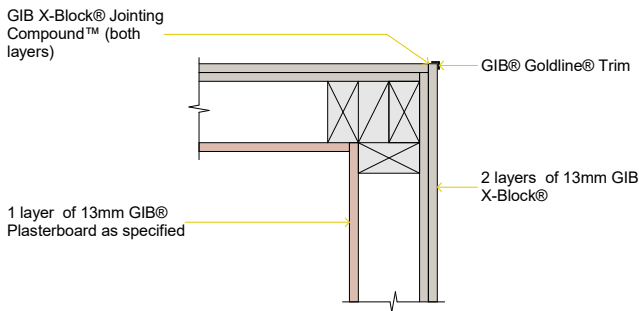
GXB 010

Detail 2 – T junction



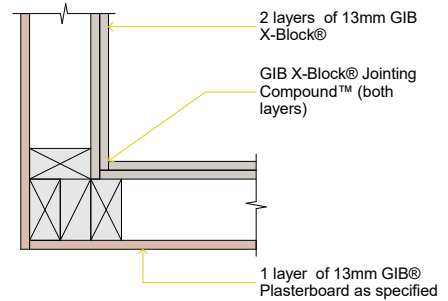
GXB 011

Detail 3 – External corner



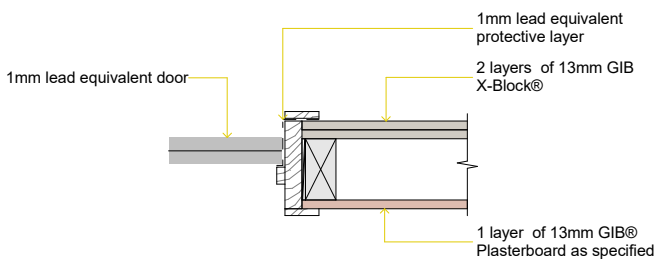
GXB 012

Detail 4 – Internal corner



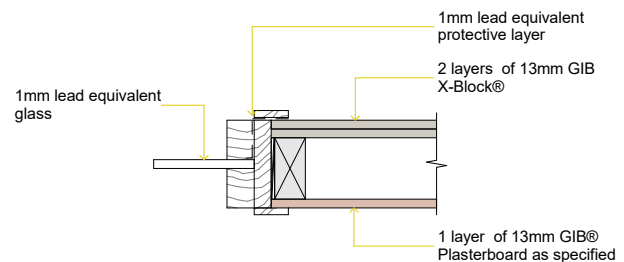
GXB 013

Detail 5 – Door jamb



GXB 014

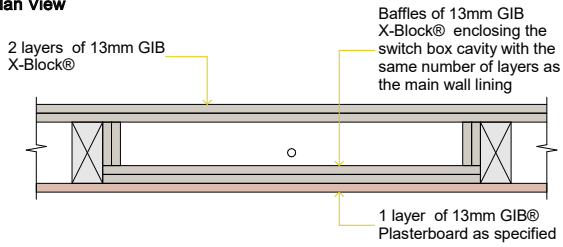
Detail 6 – Window jamb



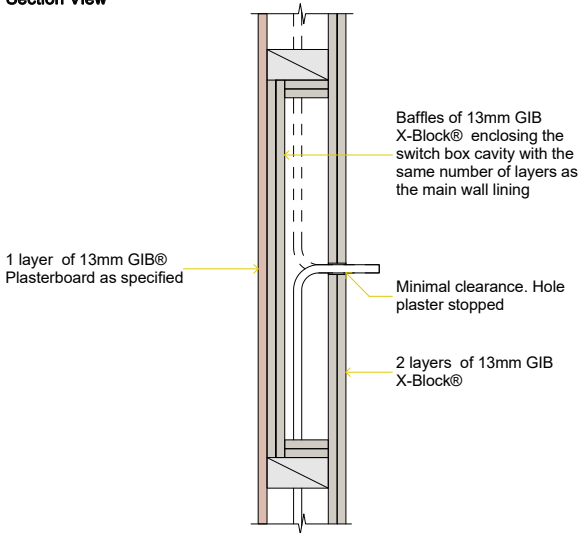
GXB 015

Detail 7/8 – Plan and section view pipe penetration

Plan View



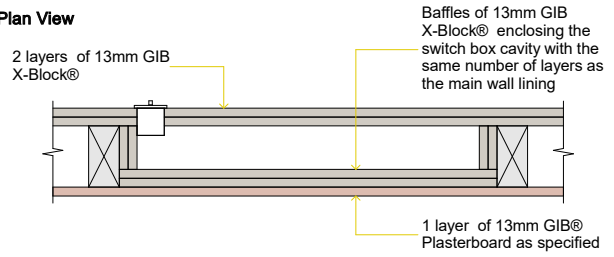
Section View



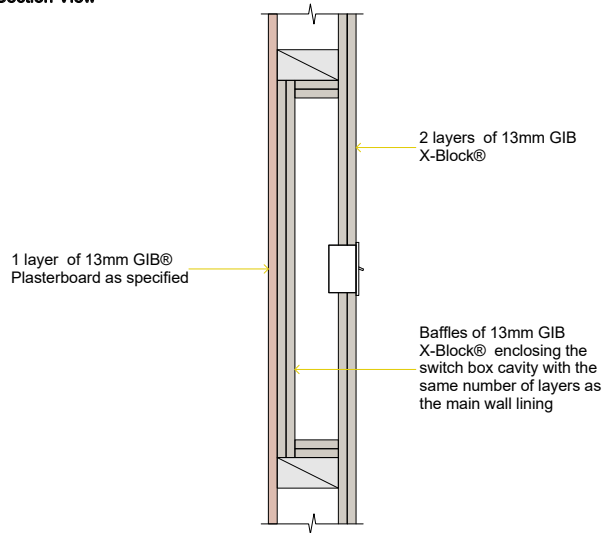
GXB 016

Detail 9/10 – Plan and section view switch boxes

Plan View

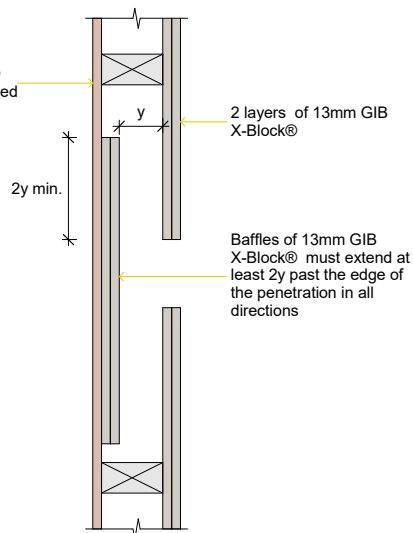


Section View



GXB 017

Detail 11 – Plan view penetration (non fire rated systems)

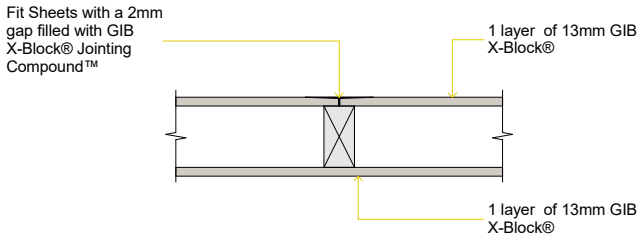


GXB 018

GBX2B – Construction Details

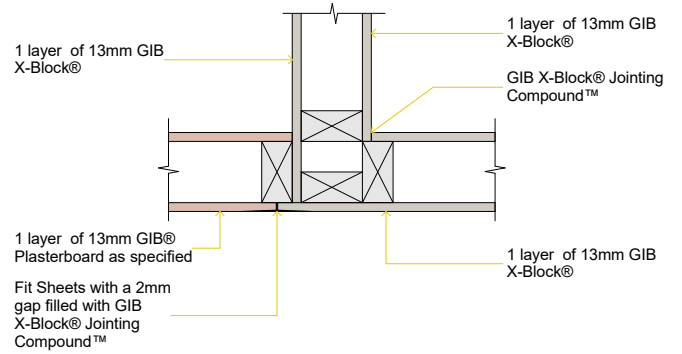
Suitable for use between X-ray rooms and non-protected spaces.

Detail 1 – Typical section



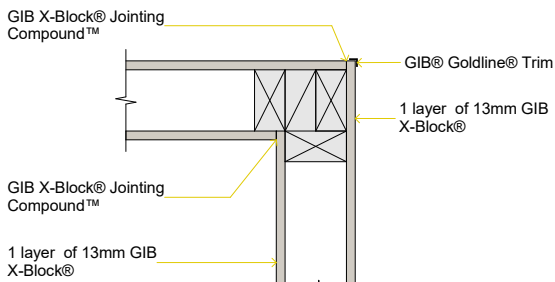
GXB 019

Detail 2 – T junction



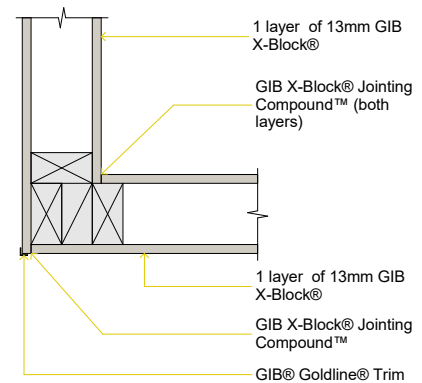
GXB 020

Detail 3 – External corner



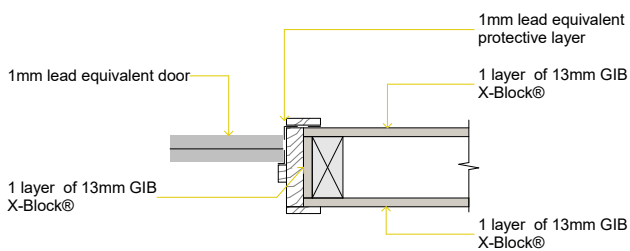
GXB 021

Detail 4 – Internal corner



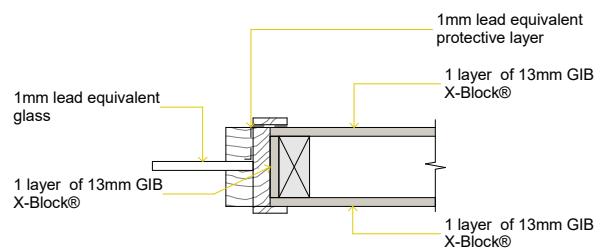
GXB 022

Detail 5 – Door jamb



GXB 023

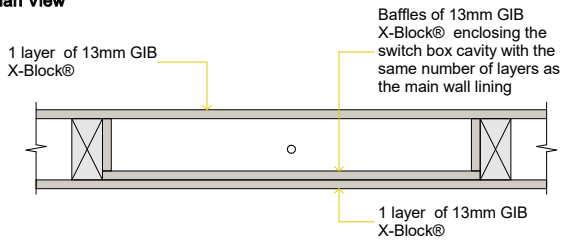
Detail 6 – Window jamb



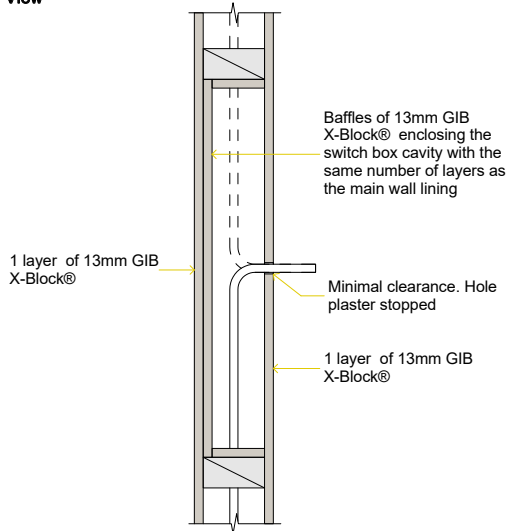
GXB 024

Detail 7/8 – Plan and section view pipe penetration

Plan View



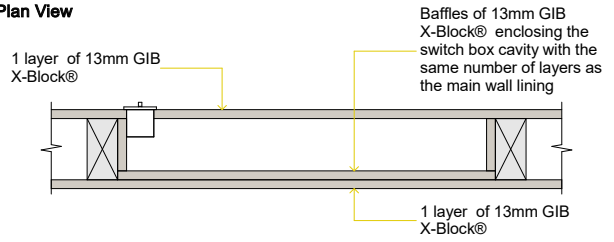
Section View



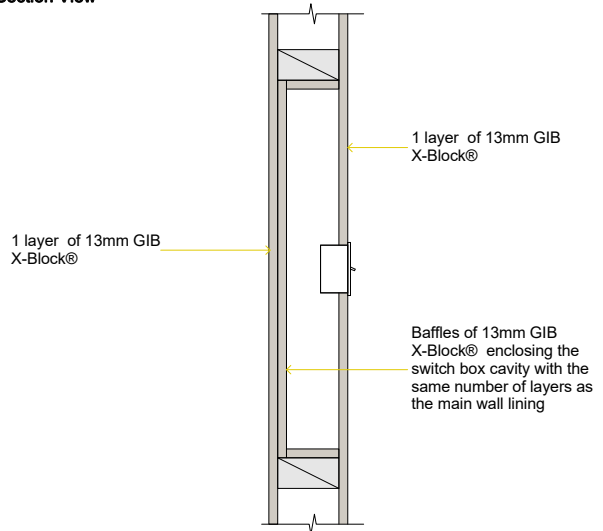
GXB 025

Detail 9/10 – Plan and section view switch boxes

Plan View

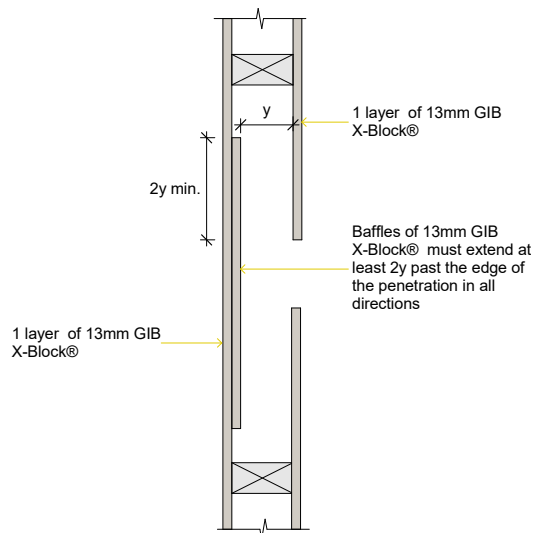


Section View



GXB 026

Detail 11 – Plan view penetration (non fire rated systems)

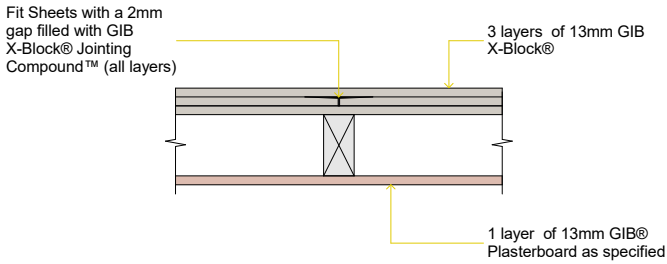


GXB 027

GBX3A – Construction Detail

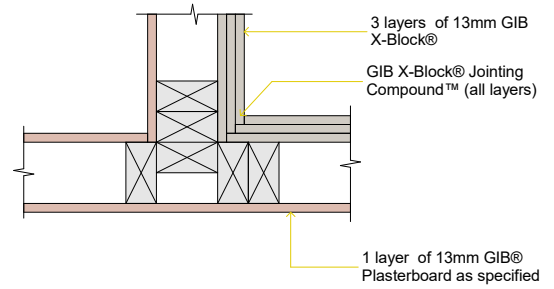
Suitable for use between X-ray rooms and non-protected spaces.

Detail 1 – Typical section



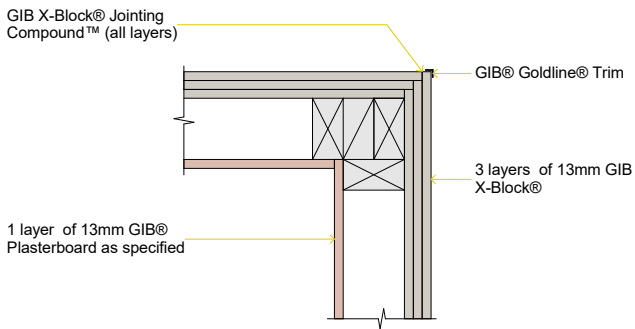
GXB 028

Detail 2 – T junction



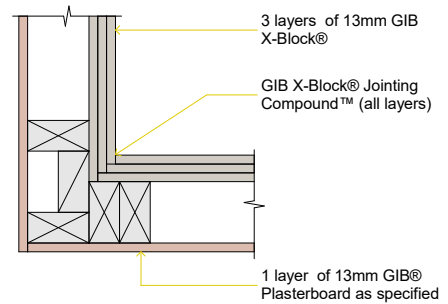
GXB 029

Detail 3 – External corner



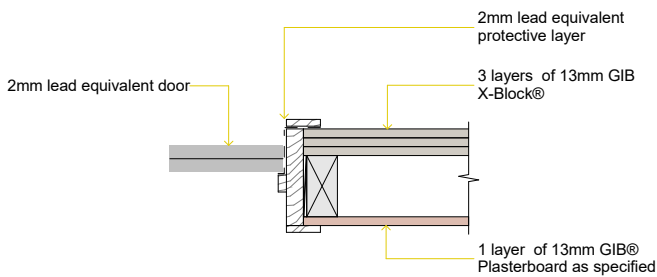
GXB 030

Detail 4 – Internal corner



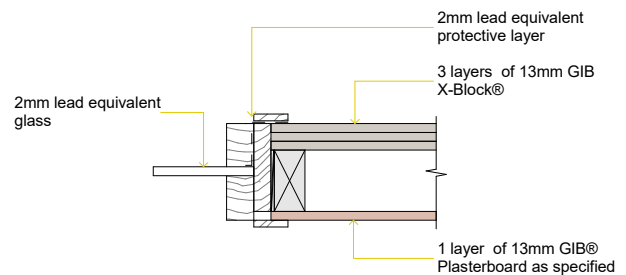
GXB 031

Detail 5 – Door jamb



GXB 032

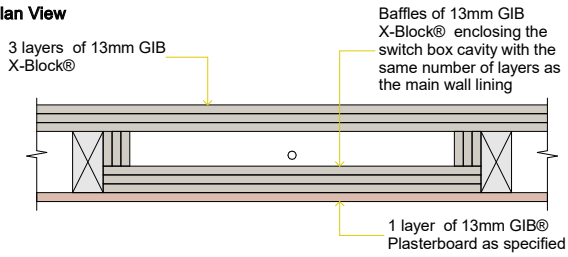
Detail 6 – Window jamb



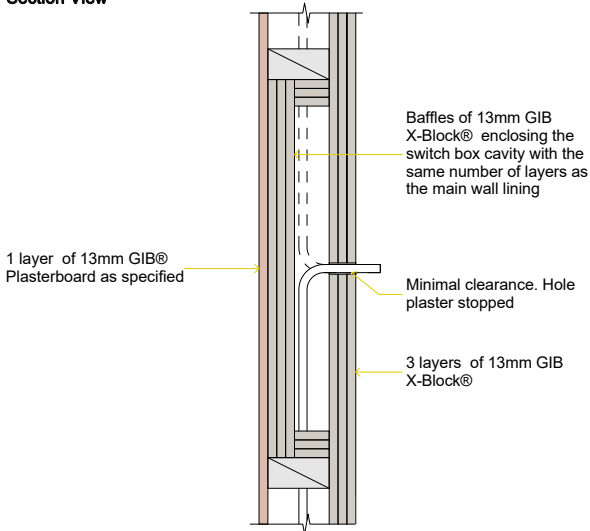
GXB 033

Detail 7/8 – Plan and section view pipe penetration

Plan View



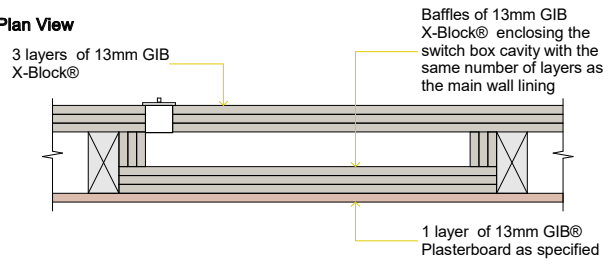
Section View



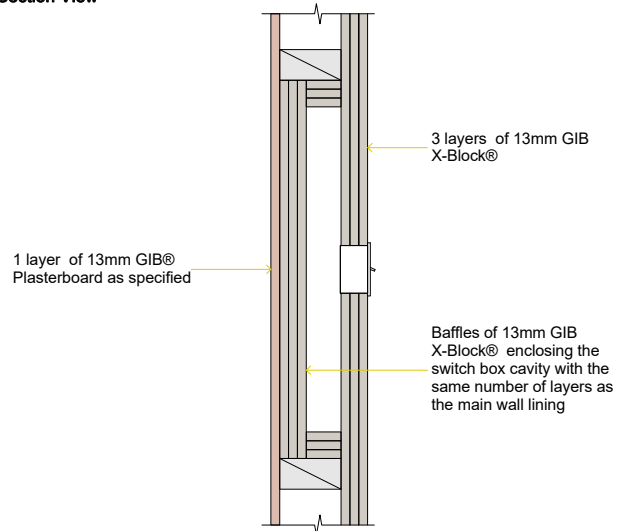
GXB 034

Detail 9/10 – Plan and section view switch boxes

Plan View

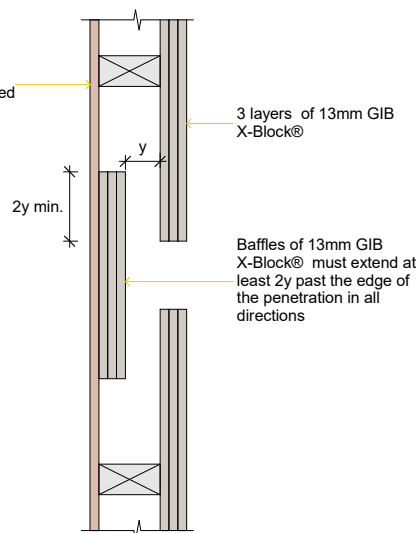


Section View



GXB 035

Detail 11 – Plan view penetration (non fire rated systems)

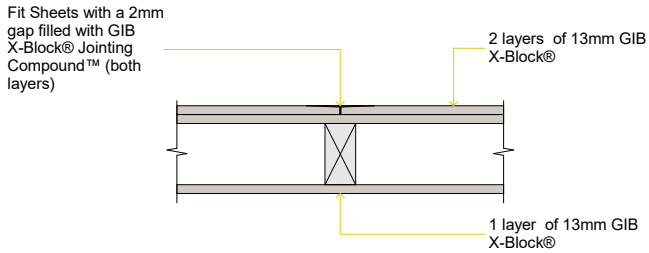


GXB 036

GBX3B – Construction Details

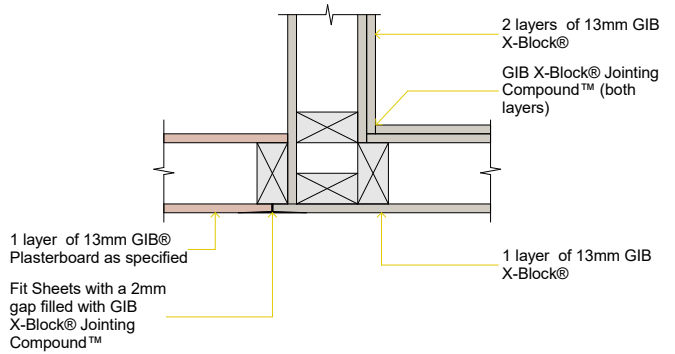
Suitable for use in partitions within X-ray rooms.

Detail 1 – Typical section



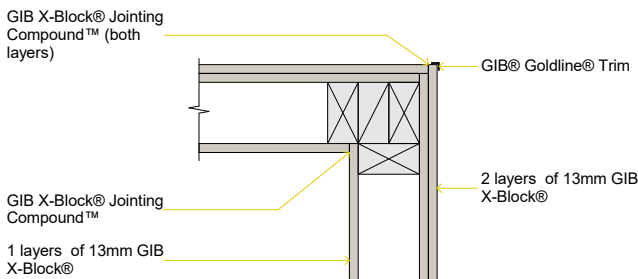
GXB 037

Detail 2 – T junction



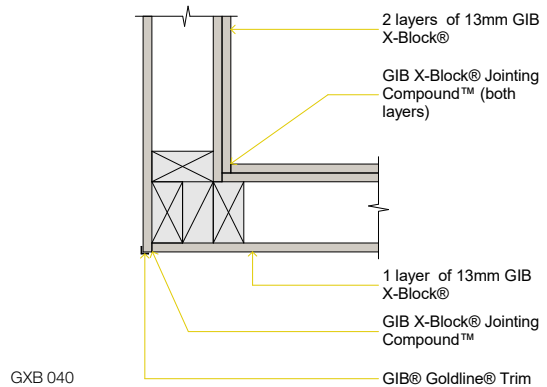
GXB 038

Detail 3 – External corner



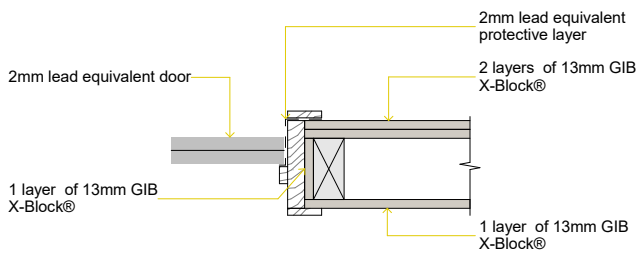
GXB 039

Detail 4 – Internal corner



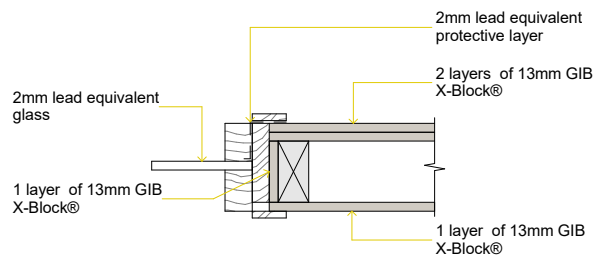
GXB 040

Detail 5 – Door jamb



GXB 041

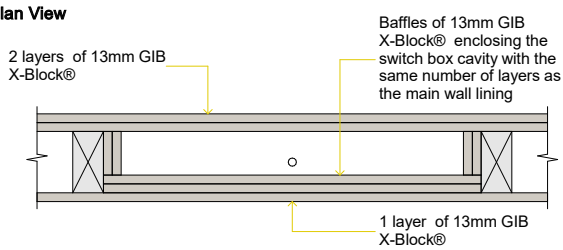
Detail 6 – Window jamb



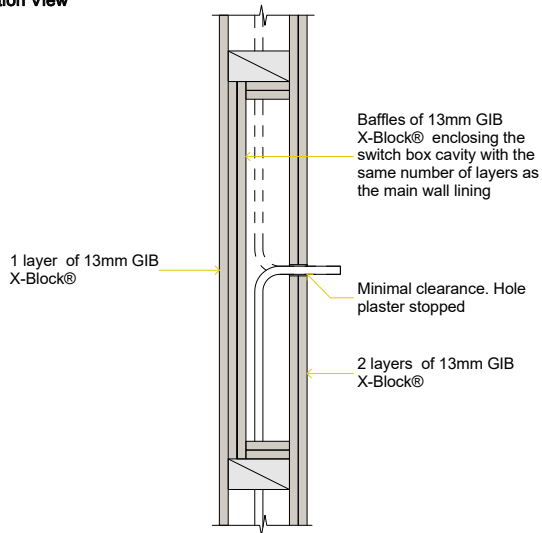
GXB 042

Detail 7/8 – Plan and section view pipe penetration

Plan View



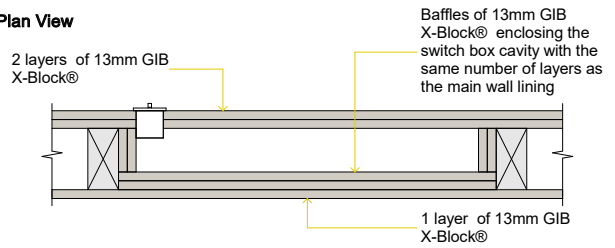
Section View



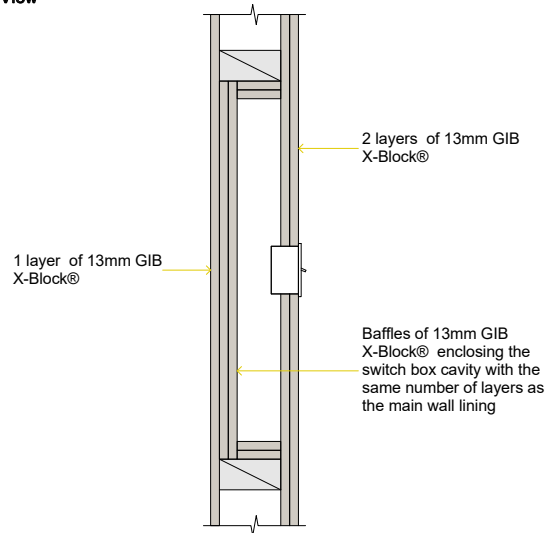
GXB 043

Detail 9/10 – Plan and section view switch boxes

Plan View

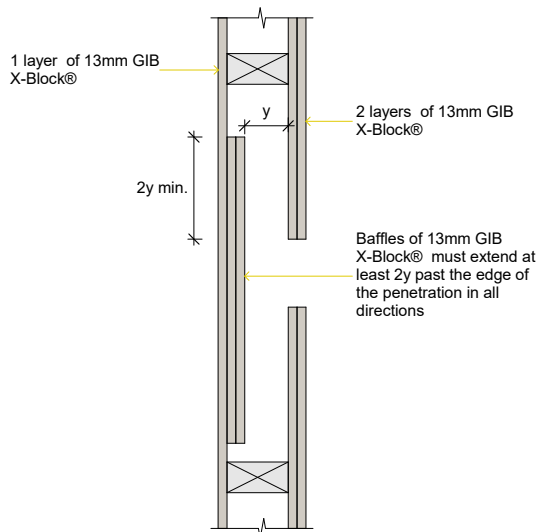


Section View



GXB 044

Detail 11 – Plan view penetration (non fire rated systems)



GXB 045

What is GIB X-Block®?

GIB X-Block® is Gypsum based plasterboard with high levels of Barytes designed to provide lead-free X-ray protection.

Where is GIB X-Block® used?

In medical X-ray diagnostic rooms requiring protective barriers to shield operators and occupants of adjacent areas against unacceptable levels of radiation. Radiation exposure may arise from direct exposure to X-ray beams (primary beams) or by X-rays scattering from the patient, equipment or other fixtures.

What are the alternatives?

Lead can be applied to the back of the plasterboard or other wall lining materials prior to installation, GIB X-Block® provides a lead-free lining solution.

Why would I want to use GIB X-Block® and not lead lined plasterboard?

There are potential health issues with using lead such as handling and disposing of the waste lead. GIB X-Block® is lighter in weight, easier to handle and provides a lead-free lining solution. Also GIB X-Block® Systems may offer a more cost effective solution to radiation shielding than other options.

How is the performance of lead lined plasterboard and GIB X-Block® measured?

Shielding for diagnostic X-ray rooms tends to be specified in terms of the thickness of lead required for appropriate protection. GIB X-Block® provides X-ray and gamma ray protection, with performance measured in 'lead equivalence'. The lead equivalence must be appropriate to the kilovoltages used in the room. The table on page 7 shows the lead equivalence of GIB X-Block® at different X-ray energies.

How will we know what energy levels are required?

Advice on X-ray protection for a particular installation must be sought from a Qualified Health Physicist [QHP] to ensure the requirements for occupational and public protection are met. A minimum lead equivalence of 1.0mm at 100 kVp is usually required for walls of general diagnostic X-ray rooms. Shielding of not less than 2.0mm lead equivalence is required where the primary X-ray beam may be routinely directed towards adjacent occupied areas. Specialised X-ray rooms may use higher energy X-rays and/or have greater use than general rooms; thus additional shielding may be necessary.

What if the requirements are higher?

Where shielding of high strength X-ray machinery is required, lead lined plasterboard may be the only product that can be used. Consult a QHP to ensure that the requirements for radiation shielding are met.

What are Primary X-ray Shielding and Secondary X-ray Shielding?

Primary Shielding is the protection of X-ray from the machine being used, the machine will have some form of protection built in to ensure that the X-ray is guided from the machine to the patient and not leak through other areas. Secondary Shielding is the protection of people outside the X-ray room, i.e. the wall around the room lined with GIB X-Block®.

Is X-ray protection required on the ceiling of the room being treated?

X-ray shielding may be required on the floors and/or ceilings (as required) of an X-ray room of a multi-storey building. Consult a QHP to ensure that the requirements for radiation shielding are met.

When multi-layers are used does the inner layer require plastering and what type of compound is used?

All joints should be filled using GIB X-Block® Jointing Compound™, a joint compound specifically designed to give lead equivalent joints on walls and ceilings using GIB X-Block® plasterboard. GIB X-Block® Jointing Compound™ is applied to all joints, including the joints on inner layers of multi-layer systems, to prevent the penetration of X-rays through joints.

Is there an issue where the X-ray can travel down the screw or nail head thus causing the system to fail?

No, this is not an issue. Metal screws have a greater density than the board and do not themselves provide a radiation path through the board. All fastener heads should be finished and any gaps sealed with GIB X-Block® Jointing Compound™.

Will GIB X-Block® plasterboard and Jointing Compound™ work for every application?

In most applications the GIB X-Block® system will suffice however consult a QHP to ensure that the requirements for radiation shielding are met.

GIB X-Block® Radiation Shielding Systems January 2021

Winstone Wallboards Ltd accepts no liability if the GIB X-Block® Systems are not designed and installed in strict accordance with instructions contained in this publication.

USE ONLY THE CURRENT SPECIFICATION

This publication may be superseded by a new publication. Winstone Wallboards Ltd. accepts no liability for reliance upon publications that have been superseded. You should check the GIB® website to ensure you are using the current publication. If you are unsure whether this is the current publication, simply call the GIB® Helpline on 0800 100 442.

SUBSTITUTION

GIB X-Block® Systems have been specifically designed and tested to achieve the stated performance levels. To maintain the GIB® Product and System Warranty, all components detailed in this publication must be used when specifying and installing GIB X-Block®.

TRADEMARKS

The names GIB®, GIB Fyreline®, GIB Ultraline®, GIB Toughline®, GIB Braceline® / GIB Noiseline®, GIB Aqualine®, GIB X-Block®, GIB Weatherline®, GIB Nail®, GIB Tradeset®, GIB Plus 4®, GIB-Cove®, GIB Lite Blue®, GIBFix®, GIB Quiet Stud®, GIB Rail®, GIB Barrierline®, GIB Soundseal®, GIB Clip®, the colour mauve for GIB Toughline®, the colour blue for GIB Braceline®, the colour pink for GIB Fyreline®, the colour green for GIB Aqualine®, the colour purple for GIB Weatherline® and the shield device are registered trademarks of Fletcher Building Holdings Limited.

COPYRIGHT

Copyright© Winstone Wallboards Ltd 2021. All of the material contained in this brochure, including all text, tables, charts, graphs, drawings, images and diagrams are protected by copyright. These materials may not be reproduced, adapted or transmitted in any form by any process, without the permission of Winstone Wallboards Ltd.

Copyright© Winstone Wallboards Ltd, 2021.



FOR MORE INFORMATION VISIT

gib.co.nz

OR CALL THE GIB® HELPLINE

0800 100 442