

Plasterboard Installation Guide

Low Rise Residential Dwellings



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About Knauf

Knauf has manufacturing facilities around the world and offers a wide range of solutions for lightweight construction.

These include metal framing, insulation, plasterboard linings, adhesive, jointing compounds, cornice, wet area sealant along with fire and acoustic sealants.

Knauf's comprehensive range of quality wall and ceiling lining products are developed with specific characteristics to enhance performance and provide fire, water, acoustic and decorative solutions to all construction projects.

Knauf is committed to providing excellent technical service and sales support to continually improve the quality of current products and systems, and to identify innovative products, systems and solutions.

In Australia, Knauf has manufacturing facilities located in Sydney, Melbourne, Bundaberg and Brisbane which supply plasterboard, compounds, cornice and associated products and systems to the Australian building industry through its national distribution network.

PRODUCT PROPERTIES



Water Resistant



Impact Resistant



Sound Resistant



Interior Design



A range of Knauf products are certified by Global GreenTag to GreenRate Level A, a product certification scheme recognised by the GBCA. Level A recognition will achieve 100% of the Green Star points within the relevant materials categories. Any product which features the tag is certified.

Contents

| | | |
|----------|-----------------------------------|----|
| 1 | INTRODUCTION | |
| | Introduction | 4 |
| | Product range and applications | 5 |
| <hr/> | | |
| 2 | BUILDING WITH PLASTERBOARD | |
| | Material properties | 8 |
| | Care and use | 11 |
| <hr/> | | |
| 3 | INSTALLATION | |
| | Levels of finish | 18 |
| | Fasteners | 20 |
| | Ceilings | 22 |
| | Walls | 38 |
| | Wet areas | 46 |
| | Back-blocking | 58 |
| <hr/> | | |
| 4 | FINISHING PLASTERBOARD | |
| | Jointing plasterboard | 64 |
| | Cornice installation | 68 |
| | Painting plasterboard | 70 |
| | Glancing light | 72 |



Introduction

The Australian Standard for installing and finishing plasterboard is AS/NZS 2589-2017, Gypsum linings – Application and finishing.

This Plasterboard Installation Guide includes information on non-fire rated installation of Knauf plasterboard in low rise residential dwellings (Class 1 buildings according to the National Construction Code). It also presents Knauf's recommendations for best practice in plasterboard installation so the desired 'Level of Finish' is obtained for the application.

Unique to Knauf OPAL is the premium solution for walls and ceilings providing superior noise reduction, impact resistance along with optimal aesthetics.





This guide covers the internal application of standard products such as MastaShield and SpanShield as well as details for inclusion of OPAL, WaterShield for wet areas and cornice fixing for decoration. Installation details are also included for typical applications including garage ceilings and external ceilings such as alfresco areas.

Knauf has a wide range of product solutions that can assist in tailoring each project to the needs of both the home owner and trades including specialist plasterboards, compounds and cornice.

The Knauf Knowhow complementary service offer provides specialist technical support advice with regards to how best to use the complete range of Knauf products and systems in your project.












PRODUCT RANGE AND APPLICATION

TABLE 1 Primary Application of Knauf Plasterboards

| Duty | Product | Solution For | Primary Application | |
|---|--------------------|--|---------------------|----------|
| | | | Walls | Ceilings |
| | MastaShield | Standard wall lining | ● | |
| | SpanShield | Standard ceiling lining | | ● |
|  | CurveShield | Designed curved forms | ● | ● |
|  | WaterShield | Wet areas in bathrooms, toilets and laundries | ● | |
|  | OPAL | Sound and impact resistant and Premium Level 4 Finish* | ● | ● |
|  | Designpanel | For aesthetic and acoustic comfort | ● | ● |

*For more information on OPAL technology refer to the latest OPAL Installation Guide on the website





TABLE 2 Knauf Plasterboard Sizes and Weights

| Knauf Plasterboard | Thickness (mm) | Width (mm) | Length (mm) | | | | | | | Weight* (kg/m ²) | Properties |
|--------------------|----------------|------------|-------------|------|------|------|------|------|------|------------------------------|---|
| | | | 2400 | 2700 | 3000 | 3600 | 4200 | 4800 | 6000 | | |
| MastaShield | 10 | 1200 | ● | ● | ● | ● | ● | ● | ● | 6.4 |  Available under the Knauf Carbon Neutral program |
| | | 1350 | | ● | ● | ● | ● | ● | ● | | |
| | 13 | 1200 | ● | ● | ● | ● | ● | ● | 8.4 | | |
| | | 1350 | | | ● | ● | ● | ● | | | |
| SpanShield | 10 | 1200 | | | ● | ● | ● | ● | ● | 7.0 |  |
| | | 1350 | | | | ● | | ● | ● | | |
| WaterShield | 10 | 1200 | ● | ● | ● | ● | ● | | | 7.5 |   Available under the Knauf Carbon Neutral program |
| | | 1350 | | | | ● | | ● | | | |
| | 13 | 1200 | | ● | ● | | | | | 9.4 | |
| SoundShield | 13 | 1200 | | | ● | | | | | 12.3 |   |
| CurveShield | 6.5 | 1200 | | | | ● | | | | 4.9 |   |
| OPAL | 10 | 1200 | | | | | | ● | ● | 8.4 |    |
| | | 1350 | | | | | | ● | ● | | |

*Weights indicated are nominal.

Special sizes available, minimum order quantity and lead times apply.

Square Edge/Recessed Edge and Square Edge/Square Edge available, minimum order quantity and lead times apply.

| Acoustic Walls & Ceiling Linings | Surface Pattern | Thickness (mm) | Size (mm) | Edge Type | Weight* (kg/m ²) | Absorption** (α _w /NRC) | Properties |
|----------------------------------|-----------------|----------------|-------------|--------------|------------------------------|------------------------------------|---|
| | | | | 4 x Recessed | | | |
| Designpanel | G2F | 12.5 | 1200 x 2400 | ● | 8.9 | up to 0.65 |     |
| | Q2F | | 1200 x 2400 | ● | 8.8 | up to 0.70 | |
| | M2F | | 1200 x 2400 | ● | 8.9 | up to 0.60 | |

*Weights indicated are nominal.

**Acoustic absorption is dependent on cavity depth and insulation (minimum cavity of 30mm).

***Alternative perforations patterns available to order.

● Stocked in Australia

● Stocked item in some locations



Building with Plasterboard



| | | |
|------------|--------------------------------------|-----------|
| 2.1 | Material Properties | 8 |
| | Benefits of Lightweight Construction | 9 |
| | Environmental Benefits | 9 |
| | Dimensional Stability | 9 |
| | Fire Resistance | 10 |
| | Thermal Properties | 10 |
| | Safety | 10 |
| 2.2 | Care and Use | 11 |
| | Storage, Delivery and Handling | 12 |
| | Condensation and Ventilation | 13 |
| | Exposure to High Humidity | 14 |
| | Exposure to Excessive Heat | 14 |



| | |
|---|-----------|
| BENEFITS OF LIGHTWEIGHT CONSTRUCTION | 9 |
| ENVIRONMENTAL BENEFITS | 9 |
| DIMENSIONAL STABILITY | 9 |
| FIRE RESISTANCE | 10 |
| THERMAL PROPERTIES | 10 |
| SAFETY | 10 |

Material Properties

Knauf wall and ceiling linings are available with a wide range of properties for different applications from substituting the look and feel of masonry to aesthetic ceiling linings that absorb sound.

Along with providing these solutions, Knauf offers a suite of Knowhow services to help bring your project to life from instant online calculators and system selectors to personal technical advice and all backed by a 10 year Knauf product warranty.

Benefits of Lightweight Construction

Lightweight construction is the efficient use of component materials, to provide an effective composite performance; the result is a vast range of combinations so that the desired performance can be customised.

Lightweight construction is so called because it can achieve high performance while minimising the overall weight and cost of the entire building.

A typical lightweight wall construction consists of timber or Knauf steel framing, insulation and Knauf plasterboard and or other lining board.

Knauf steel studs are an efficient, non-combustible way of providing framing for Knauf plasterboard and other lining materials.

Knauf Earthwool acoustic and thermal insulation enhances the performance of walls and ceilings.

Plasterboard is made from a core of a naturally occurring mineral called gypsum, also known as calcium sulphate dihydrate or $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. The core is sandwiched between two layers of heavy duty recycled paper. The face paper is suitable for painting or wallpaper. Plasterboard has square profile cut ends and long recessed edges to enable easy jointing.

Knauf manufactures plasterboard to strict internal standards which meet or exceed the requirements of AS/NZS 2588:1998, *Gypsum Plasterboard*.

The Australian Standard for plasterboard installation is AS/NZS 2589:2017, *Gypsum linings – Application and finishing*.

Where extreme water resistance is required, Knauf Permarock is a solid, engineered wall and ceiling lining made from inorganic aggregated cement with glass fibre mesh embedded in both the face and back. Available for both indoor and outdoor application, it is the ideal tile substrate and provides a solid and dry foundation for external rendered and painted façades.

Environmental Benefits

Knauf plasterboard is an ideal product for sustainable construction. As a lightweight building material, Knauf plasterboard reduces transport costs and emissions as well as the total weight of buildings. Knauf Plasterboard is 100% recyclable, with low embodied energy, and made largely from a naturally occurring mineral – gypsum. The liner paper used to make Knauf plasterboard is biodegradable and made from recycled paper such as waste newspaper and cardboard.

The Knauf plasterboard manufacturing process operates under strict environmental guidelines:

- Efficient use of energy and water including heat recovery and storm water collection
- Effective collection and monitoring of dust
- Ongoing waste and raw material usage reduction
- Minimisation of plant impact on surroundings

Since 2009 Knauf Australia has introduced a number of initiatives to reduce carbon emissions which has also resulted in the first certified carbon neutral opt in program for plasterboard.

Combining Knauf plasterboard with lightweight framing such as timber or Knauf steel provides a vast array of system performances, which can be efficiently gauged to the precise needs of any project. Knauf's lightweight steel framing is both strong and durable, and like Knauf plasterboard has the potential to be fully recycled at end of life.

For more information refer to:

knaufplasterboard.com.au/sustainability

Dimensional Stability

Plasterboard is dimensionally stable when compared to other building materials. Two measures of dimensional stability are listed below:

- Thermal coefficient of linear expansion (α) = $16.7 \times 10^{-6} / ^\circ\text{C}$, measured unrestrained over the temperature range of $3^\circ\text{C} - 32^\circ\text{C}$
- Hygrometric coefficient of expansion = $6.5 \times 10^{-6} / \% \text{RH}$, measured unrestrained over the Relative Humidity (RH) range of 10% – 90%

Fire Resistance

All plasterboard is naturally fire resistant and is classified as non-combustible according to the National Construction Code (NCC) Volume One, Section C1.9. The core slows down the spread of fire by releasing chemically bound water when heated. This is a similar process to evaporation and aids cooling. Knauf steel is non-combustible and like Knauf plasterboard may be used in Type A construction according to the NCC.

Thermal Properties

THERMAL 'R' VALUE

The R-Value of plasterboard is a measure of its thermal insulation ability. Higher numbers indicate a better insulator. The values for plasterboard are:

10mm plasterboard = 0.059 m².K/W

13mm plasterboard = 0.076 m².K/W

16mm plasterboard = 0.094 m².K/W

Steel conducts heat very well so a thermal break is needed when steel studs are used to construct external walls. Refer to the NCC for further details.

SPECIFIC HEAT CAPACITY

Specific heat capacity is the amount of heat energy required to raise the temperature of 1 kg of material by 1°C.

Plasterboard is 1090 J/kg/K.

Steel is 490 J/kg/K.

Safety

Steel and plasterboard are not classified as hazardous according to the criteria of Safe Work Australia. They are non-toxic and non-flammable.



Safety Data Sheets (SDS) are available at knaufplasterboard.com.au or by calling **1300 724 505**.

Some plastering compounds have safe handling requirements. [Refer to the health and safety information printed on the compound packaging for details].



STORAGE, DELIVERY AND HANDLING 12

CONDENSATION AND VENTILATION 13

EXPOSURE TO HIGH HUMIDITY 14

EXPOSURE TO EXCESSIVE HEAT 14

Care and Use

Storage, Delivery and Handling

Wall and ceiling linings must be kept dry and should be stacked clear of the floor using supports not more than 600mm apart as shown in Figure 1. If outdoor storage is unavoidable, linings and accessories should be fully protected from the weather. Plasterboard that has been exposed to direct sunlight, or has been fixed and left standing unpainted for long periods, may become discoloured. If this happens, it must be sealed with a solvent borne stain sealer undercoat as recommended by the paint manufacturer.

Plasterboard finishing compound must not be left unpainted as it becomes susceptible to moisture absorption and can develop shrinkage defects or become powdery and flake off if painting is attempted. Plasterboard ceilings should not be left unpainted as they may absorb moisture from the atmosphere and sag.

Reduce the possibility of damage to plasterboard, arrange delivery to site immediately before installation. During delivery, care should be taken not to damage recessed edges.

Exposure to excessive humidity during storage can result in plasterboard becoming damp and soft, and may appear defective. In this case allow the plasterboard to dry out and handle with care during installation.

To help protect plasterboard from absorbing humidity:

- Avoid open sources of water such as wet floors
- Wrap the plasterboard with plastic overnight when storing outside
- Provide ventilation
- Install soon after delivery
- Install during dry weather for best results

Store Knauf steel products where they are not in constant contact with water or in wet environments for extended periods. Avoid exposure to airborne contaminants such as sea spray.

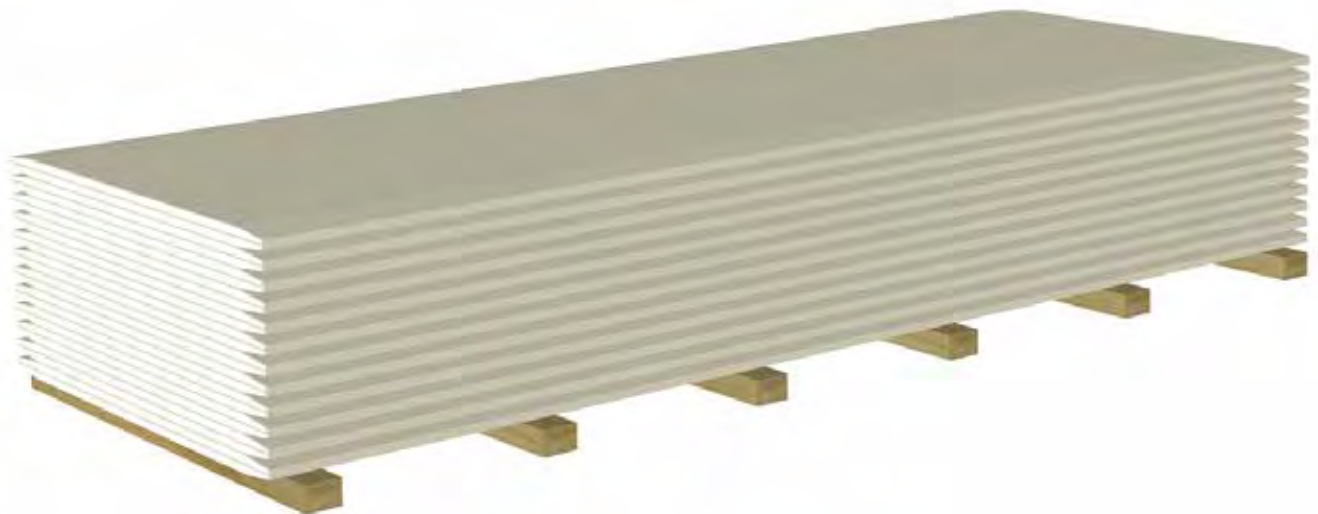


FIGURE 1 Correct pallet storage

Condensation and Ventilation

Plasterboard must not be installed until the building is weatherproof, particularly in coastal areas subject to sea spray. Complete all exterior doors, walls, windows and the roof before installing plasterboard. Prevent rain from entering buildings, avoid water on floors or other sources of open water and allow wet concrete or masonry to dry. These precautions will reduce excessive humidity that may be absorbed by timber or unpainted plasterboard and minimise defects caused by timber shrinkage or moist plasterboard.

Condensation of water onto either the face or back of the plasterboard must be avoided. Insufficient protection from condensation can result in joint distortion, plasterboard sagging, mould growth and fastener popping.

Many inter-related factors must be taken into account to control condensation. Good practice is to make use of wall and ceiling insulation, vapour barriers, and especially ventilation. Ventilation must be considered for the spaces in walls, under floors and in particular under roofs.



To minimise the effects of condensation:

- Use WaterShield to increase protection against moisture
- Use moisture barriers, sarking, and insulation. However, it is important that the right type is selected for the construction type and that it is installed correctly [Refer to the manufacturer's specifications]
- Use foil backed insulation under metal roofs which are susceptible to forming condensation
- Install eave vents, gable vents and roof ventilators in the roof cavity [Refer to Figure 2]
- Remove humidity from bathrooms via an exhaust fan to the outside
- Use a quality paint system to provide protection against paint peeling and condensation soaking into plasterboard and compounds
- Ensure the building design controls condensation on the steel components so they are not constantly wet

In hot and humid climates where the building is air-conditioned below the dew point of the outside air, the wall and ceiling framing members and internal linings should be fully protected by moisture barriers to separate them from the humid external air. The moisture barriers should be thermally insulated to maintain them at a temperature above the dew point.

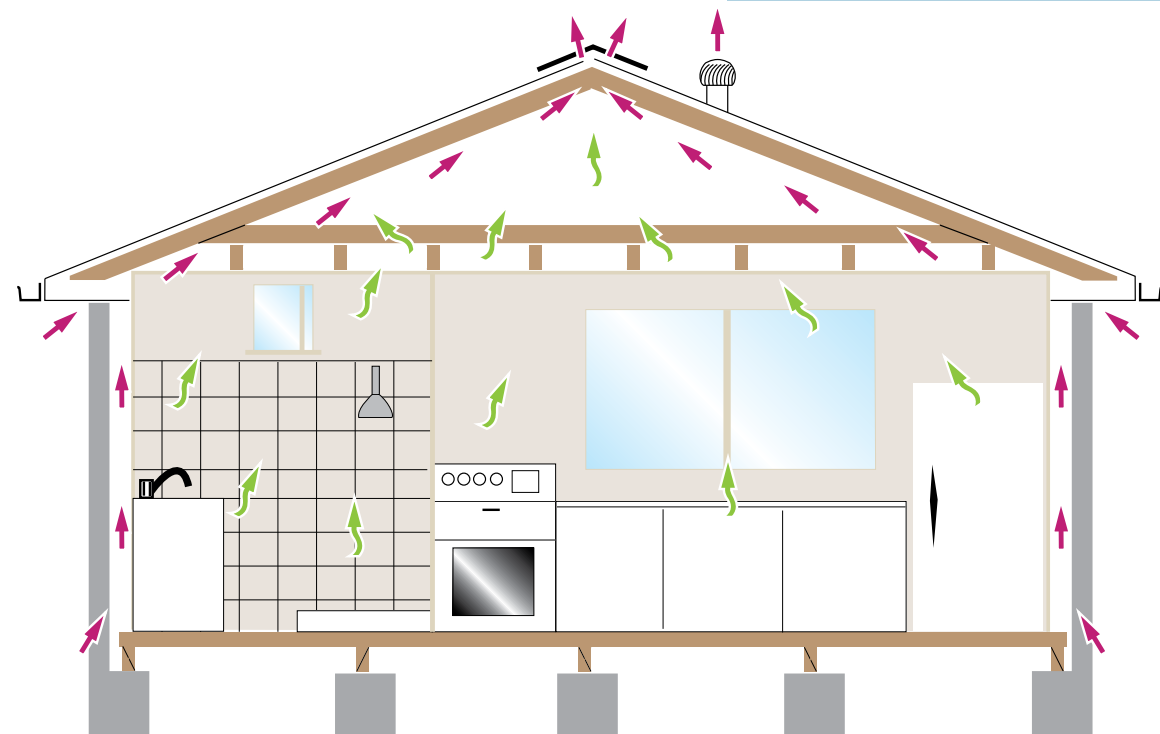


FIGURE 2 Condensation and ventilation

Exposure to High Humidity

Ceilings in rooms such as indoor swimming pools and communal showers are subject to long periods of high relative humidity (above 90%). The use of plasterboard on these ceilings is not guaranteed by Knauf. PermaRock Cement Board Indoor is recommended for these areas.

WaterShield completely covered with a waterproof membrane complying with AS/NZS 4858:2004 may be used for walls in rooms subject to long periods of high relative humidity. Vertical junctions and wall to floor junctions must also be waterproof.

For rooms with intermittent periods of high relative humidity such as bathrooms, WaterShield may be used. In these rooms a source of ventilation is required to enable removal of excess moisture, such as an open window or exhaust fan.

Exposure to Excessive Heat

Plasterboard is an ideal building material for normal ambient temperatures. It is not suitable for long periods at elevated temperatures such as installed near fireplace flues or chimneys. FireShield is no exception. It is designed to slow down a fire, not to resist constant elevated temperatures.

The effect of high temperatures on plasterboard is to chemically dehydrate the core. This process generally begins at around 80°C but can occur at lower temperatures under certain conditions.

AS/NZS 2589:2017, Gypsum linings – Application and finishing, states that plasterboard must not be exposed to temperatures above 52°C for prolonged periods.

Heat generating appliances have installation instructions for the correct distances between plasterboard linings and heat sources. The National Construction Code (NCC) also has requirements for installation of heating appliances.

GLASS OR STAINLESS STEEL SPLASHBACK

AS 5601.1-2013 Gas Installations allows plasterboard to be used behind splashbacks near domestic gas burners as follows:

- Behind ceramic tiles any plasterboard may be used if the ceramic tiles are minimum 5mm thick
- If clearance to glass or stainless steel splashback is 200mm* or more then any plasterboard may be used
- If clearance to glass splashback is less than 200mm* then 10mm plasterboard may be used if the glass is marked as 'toughened safety glass'
- Clearance to stainless steel splashback is less than 200mm* then 6mm fibre cement over 10mm plasterboard may be used if the steel is at least 0.4mm thick

*Clearance is measured from the edge of the nearest burner to the splashback.

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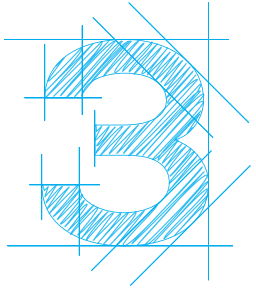


Technical Support

In this way we are able to help and become part of your solution.

For more information visit knaufplasterboard.com.au/knowhow

KNAUF



Installation



| | | |
|------------|---|-----------|
| 3.1 | Levels of Finish | 18 |
| | Australian Standard Requirements | 18 |
| | Level 3 Finish | 19 |
| | Level 4 Finish | 19 |
| | Level 5 Finish | 19 |
| 3.2 | Fasteners | 20 |
| | Fixings | 21 |
| 3.3 | Ceilings | 22 |
| | General Requirements | 23 |
| | Plasterboard Layout | 27 |
| | Plasterboard Fixing | 27 |
| | Garage Ceilings | 33 |
| | External Ceilings | 35 |
| 3.4 | Walls | 38 |
| | General Requirements | 39 |
| | Plasterboard Layout | 40 |
| | Plasterboard Fixing | 40 |
| 3.5 | Wet Areas | 46 |
| | Wet Areas Using Plasterboard | 47 |
| | Definitions | 47 |
| | Wet Area Requirements | 48 |
| | Waterproofing Requirements By Area | 49 |
| | General Requirements | 51 |
| | Framing | 51 |
| | Plasterboard Fixing | 51 |
| | Construction Details | 54 |
| 3.6 | Back-Blocking | 58 |
| | Back-Blocking Requirements | 59 |
| | Back-Blocking Ceiling Recessed Joints | 59 |
| | Back-Blocking Butt Joints On Ceilings And Walls | 59 |



**AUSTRALIAN STANDARD
REQUIREMENTS** 18

LEVEL 3 FINISH 19

LEVEL 4 FINISH 19

LEVEL 5 FINISH 19

Levels of Finish

Plasterboard is finished using jointing compounds, which are sanded and then painted to achieve an even appearance.

No building lining system has a surface that is perfectly flat and totally free of imperfections. By paying attention to framing, plasterboard sheet orientation, paint finishes and lighting conditions, it is possible to attain the perception of flatness.

Careful workmanship is required at each stage of construction to achieve a high quality finish. If faults are not corrected at the earliest opportunity it may be impossible to disguise them afterwards. In addition, there are some key design principles that should be followed to avoid conditions known to highlight imperfections.

Australian Standard Requirements

The plasterboard installation standard AS 2589:2017, *Gypsum linings – Application and finishing*, refers to three 'Levels of Finish' (Levels 3, 4 and 5). The standard nominates Level 4 as the default finish unless otherwise specified. Installation in accordance with Knauf instructions will achieve a Level 4 Finish.

FRAMING REQUIREMENTS FOR EACH LEVEL OF FINISH

Australian Standard 2589 defines allowable deviations in the flatness of the framing surface to achieve the required level of finish. Framing members must have a minimum fixing face width of 32mm for screw fixing and 35mm for nail fixing. Framing should be true, plumb and level. Before installing plasterboard, the frame must be flat enough for the required level of finish. Over a 1.8m straight edge the frame must not deviate more than the values listed in Table 3.

Level 3 Finish

A Level 3 Finish is recommended where no decoration is required such as walls above ceilings and concealed storage areas. The requirements for a Level 3 Finish are:

- Framing as per the requirements in Table 3
- A bedding coat and second coat on all face layer joints and corners

Level 4 Finish

Level 4 is the default finish and is recommended for most applications when lighting is favourable and light colour, matt or low sheen paints are used. The requirements for a Level 4 Finish are:

- Framing and back-blocking as per the requirements in Table 3
- Face layer joints finished as detailed in Section 4.1 Three Coat Jointing System
- A quality three coat paint system as detailed in Section 4.3 Painting Plasterboard


Level 5 Finish

A Level 5 Finish is the highest level of finish defined in the Australian Standard. Installation of the frame and plasterboard, finishing with compounds and the correct application of paint all contribute to a Level 5 Finish. Even if completed correctly, a Level 5 Finish may not result in all surface deviations being concealed, only minimised.

A Level 5 Finish is recommended where gloss, semi-gloss or dark colour paints are used, or in harsh or critical lighting conditions which are referred to as glancing light. Higher standards are required for frame flatness, jointing and back-blocking. It involves coating the entire wall or ceiling to provide an even surface texture and porosity, which helps conceal joints and fixing points. The coating may be sprayed, rolled or trowelled over the surface.

The requirements for a Level 5 Finish are:

- Framing as per requirements in Table 3
- Back-blocking of all ceiling joints and wall butt joints
- Joints finished as detailed in Section 4.1 Three Coat Jointing System
- Application of an additional coating over the entire surface to provide uniform texture and porosity
- A quality three coat paint system as detailed in Section 4.3 Painting Plasterboard



For a premium Level 4 Finish use **OPAL**. [Refer to the latest **OPAL** information on the website]

TABLE 3 Level of Finish Requirements for Non-Fire Rated Systems

| Requirements | Level 3 | Level 4 | Level 5 |
|---|----------|-----------------------|-----------------|
| Back-block recessed joints on ceilings with 3 or more recessed joints | Optional | ✓ ¹ | ✓ |
| Back-block recessed joints on ceilings with less than 3 recessed joints | Optional | Optional ¹ | ✓ |
| Ceiling butt joints permitted on framing members | ✓ | ✗ ² | ✗ ² |
| Wall butt joints permitted on framing members | ✓ | ✗ ² | ✗ ² |
| Minimum number of coats for jointing | 2 | 3 | 3 and Skim Coat |
| Maximum frame deviation of 90% of area (mm) ³ | 4 | 4 | 3 |
| Maximum frame deviation of remaining area (mm) ³ | 5 | 5 | 4 |

1 Back-blocking not required for recessed joints on suspended ceiling with no rigid connection at wall/ceiling junction.
 2 Back-blocking is required on these joints. [For more information, Refer to Section 3.6]
 3 Over a 1.8m straight edge the frame must not deviate by more than these values.



Fasteners

Fixings

FASTENER TYPE AND MINIMUM SIZE FOR THE INSTALLATION OF PLASTERBOARD TO KNAUF STEEL

| Plasterboard Thickness | 1st Layer | 2nd Layer | 3rd Layer |
|------------------------|------------|-------------|-------------|
| 6.5mm | 25mm screw | 25mm screw | – |
| 10mm | 25mm screw | 40mm screw* | – |
| 13mm | 25mm screw | 40mm screw* | 60mm screw* |
| 16mm | 30mm screw | 45mm screw* | 65mm screw* |

For steel ≤ 0.75 mm BMT minimum 6g fine thread needle point screws.

For steel ≥ 0.75 mm BMT minimum 6g fine thread drill point screws.

*38mm – 10g Laminating screws may be used as detailed in installation diagrams.

FASTENER TYPE AND MINIMUM SIZE FOR THE INSTALLATION OF PLASTERBOARD TO SOFTWOOD TIMBER

| Plasterboard Thickness | 1st Layer | 2nd Layer | 3rd Layer |
|------------------------|--|--|---|
| 6.5mm | 30mm x 2.8 galvanised nail or 25mm x 2.8 ring shank nail or 25mm screw | 40mm x 2.8 galvanised nail or 30mm x 2.8 ring shank nail or 30mm screw | – |
| 10mm | 40mm x 2.8 galvanised nail or 30mm x 2.8 ring shank nail or 25mm screw for walls or 30mm screw for ceilings | 50mm x 2.8 galvanised nail or 40mm screw* | – |
| 13mm | 40mm x 2.8 galvanised nail or 30mm x 2.8 ring shank nail or 30mm screw | 50mm x 2.8 galvanised nail or 45mm screw* | 75mm x 3.75 galvanised nail or 65mm screw* |
| 16mm | 50mm x 2.8 galvanised nail or 45mm screw | 65mm x 3.15 galvanised nail or 50mm screw* | 75mm x 3.75 galvanised nail or 65mm screw* |

For timber use minimum 6g needle point screws.

*38mm – 10g Laminating screws may be used as detailed in installation diagrams.

FASTENER TYPE AND MINIMUM SIZE FOR THE INSTALLATION OF PLASTERBOARD TO HARDWOOD TIMBER

| Plasterboard Thickness | 1st Layer | 2nd Layer | 3rd Layer |
|------------------------|--|--|---|
| 6.5mm | 30mm x 2.8 galvanised nail or 25mm x 2.8 ring shank nail or 25mm screw | 30mm x 2.8 galvanised nail or 25mm x 2.8 ring shank nail or 30mm screw | – |
| 10mm | 30mm x 2.8 galvanised nail or 25mm x 2.8 ring shank nail or 25mm screw for walls or 30mm screw for ceilings | 40mm x 2.8 galvanised nail or 35mm screw* | – |
| 13mm | 30mm x 2.8 galvanised nail or 25mm x 2.8 ring shank nail or 30mm screw | 40mm x 2.8 galvanised nail or 40mm screw* | 65mm x 3.15 galvanised nail or 65mm screw* |
| 16mm | 40mm x 2.8 galvanised nail or 30mm screw | 50mm x 2.8 galvanised nail or 45mm screw* | 65mm x 3.15 galvanised nail or 65mm screw* |

For timber use minimum 6g needle point screws.

*38mm – 10g Laminating screws may be used as detailed in installation diagrams.



| | |
|-----------------------------|-----------|
| GENERAL REQUIREMENTS | 23 |
| PLASTERBOARD LAYOUT | 27 |
| PLASTERBOARD FIXING | 27 |
| GARAGE CEILINGS | 33 |
| EXTERNAL CEILINGS | 35 |

Ceilings

General Requirements

Install control joints in plasterboard ceilings at:

- > 12m maximum intervals
- > All control joints in the structure
- > Any change in the substrate material
- > At the junction of a large room and passageway

All ceilings in this section are non-trafficable. Do not walk on plasterboard ceilings!

Limit dead loads on plasterboard ceilings to 2 kg/m² for plasterboard spanning 600mm framing centres.

Limit dead loads on plasterboard ceilings to 2.5 kg/m² for plasterboard spanning 450mm framing centres where the plasterboard can usually span 600mm centres.

Attach ceiling fixtures to framing members only. Ensure the framing is designed to carry any additional load.



- > Compensate for uneven framing by attaching a furring channel system with adjustable direct fix clips
- > Timber trusses may settle or move with changing seasons. Reduce occurrence of plasterboard cracking due to this movement by fixing plasterboard to Knauf furring channel or battens
- > Consider the corrosive effect of sea spray on steel components, select framing and fasteners accordingly

FRAMING

Install additional framing members around openings.

TABLE 4 MAXIMUM SPAN (FRAMING CENTRES) FOR KNAUF PLASTERBOARD

| Knauf Plasterboard Type | For General Areas | For Areas of Intermittent High Humidity eg. Unventilated Bathrooms and External Ceilings |
|-------------------------|-------------------|--|
| 10mm MastaShield | 450mm | 300mm |
| 10mm WaterShield | 450mm | 300mm |
| 10mm SpanShield | 600mm | 450mm |
| 13mm MastaShield | 600mm | 450mm |
| 10mm OPAL | 600mm | 450mm |
| 12.5mm Designpanel | 600mm | - |

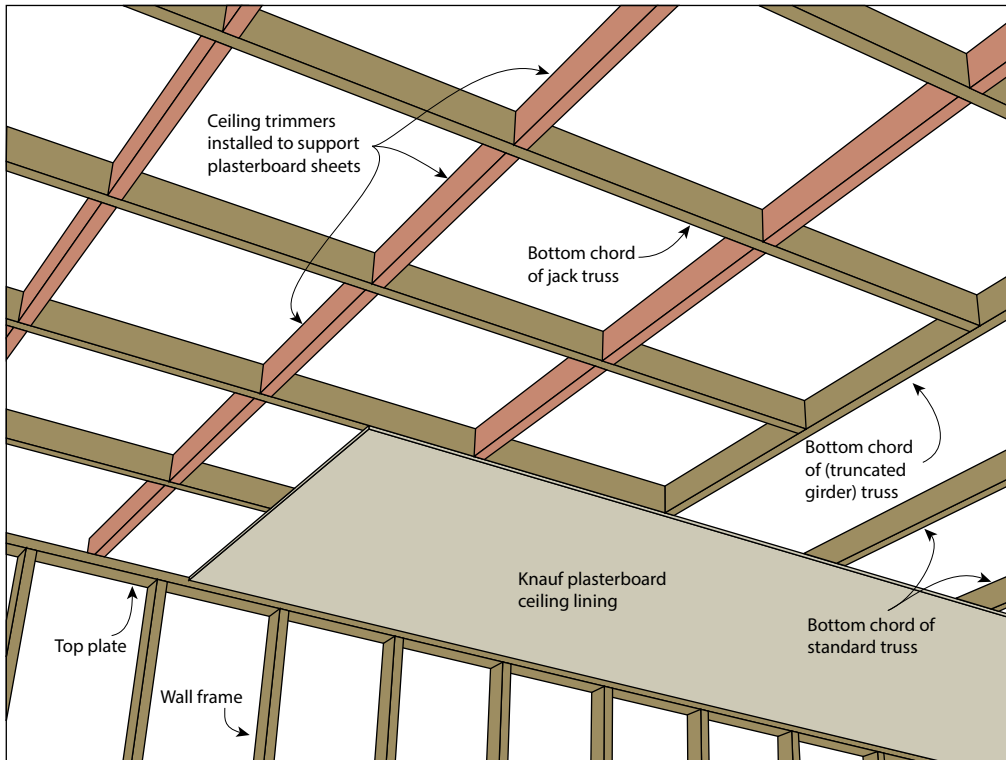


FIGURE 3 Install ceiling trimmers to support Knauf plasterboard at the change of direction of roof framing. Install Knauf plasterboard perpendicular to main roof frame

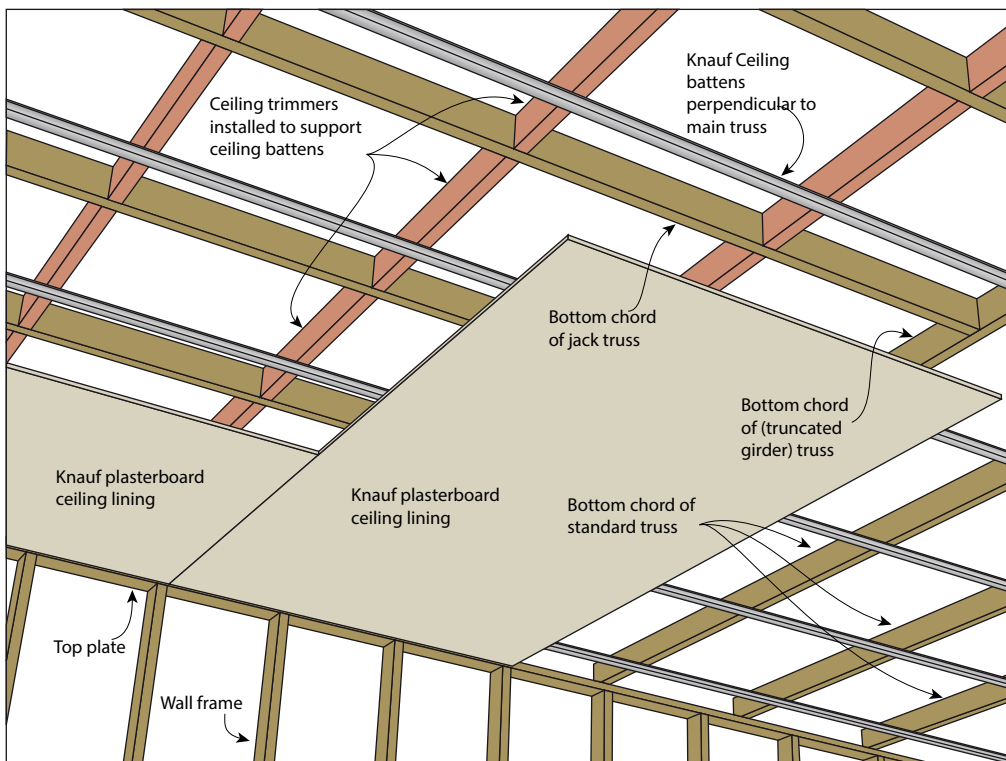


FIGURE 4 Install ceiling trimmers for Knauf ceiling batten systems. Install Knauf plasterboard perpendicular to Knauf ceiling battens

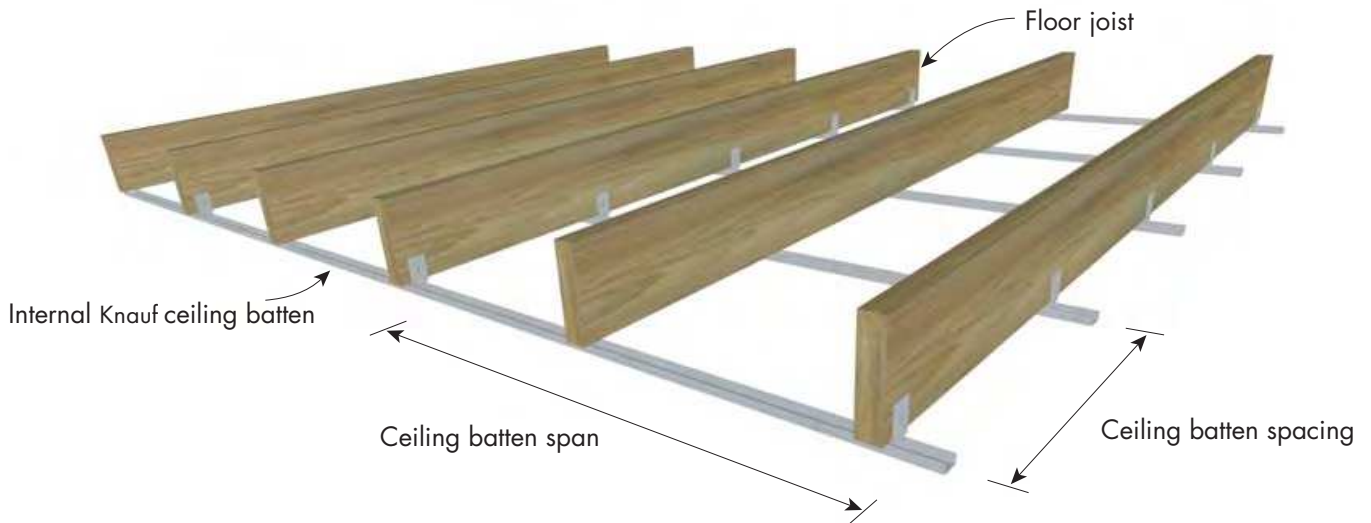


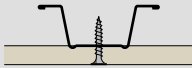
FIGURE 5 Internal Knauf Ceiling Batten Span and Spacing

TABLE 5 KNAUF 16mm DOMESTIC BATTEN INTERNAL CEILING SPAN TABLE

| Knauf 16mm Domestic Batten (AFCDB) Suitable for all 10mm Knauf plasterboards and 13mm Mastashield only. | | | | | | | |
|--|---------------------|-------------------|-------------|-----------------|-----------------------------|-------------|-----------------|
| Wind Zone | Batten Spacing (mm) | Maximum Span (mm) | | | Clip and Anchor Demand (kN) | | |
| | | Single Span | Double Span | 3-or-more Spans | Single Span | Double Span | 3-or-more Spans |
| N1 | 600 | 700 | 940 | 870 | 0.08 | 0.27 | 0.23 |
| | 450 | 770 | 1040 | 950 | 0.07 | 0.22 | 0.18 |
| N2 | 600 | 700 | 900 | 870 | 0.10 | 0.31 | 0.27 |
| | 450 | 770 | 1030 | 950 | 0.08 | 0.27 | 0.22 |
| N3 | 600 | 700 | 760 | 830 | 0.13 | 0.35 | 0.35 |
| | 450 | 770 | 900 | 950 | 0.11 | 0.31 | 0.30 |
| N4 | 600 | 660 | 660 | 710 | 0.17 | 0.41 | 0.41 |
| | 450 | 730 | 760 | 820 | 0.14 | 0.36 | 0.35 |

1. This table is intended for internal use only, and is based upon positive (uplift) and negative (suction) pressures using the internal pressure coefficient (C_{pi}) for the nominated wind zone. The internal pressures calculated have assumed that there are no openings in the building envelope during a high wind event.
2. Tables include self weight, plasterboard and ceiling insulation with a maximum weight of 2.5 kg/m², but is not applicable to additional point loads and live loads.
3. Tables refer to Knauf 16mm Domestic Batten of Base Metal Thickness (BMT) 0.38m of grade G550 steel with Zinalume™ AM150 corrosion protection.
4. Calculations based upon a single span, double span, or 3-or-more spans and designed in accordance with AS/NZS 4600:2005 Cold Formed Steel Structures.
5. Ultimate Load Case 1: 1.2G + 1.2U + Wu (suction). Ultimate Load Case 2: 0.9G + Wu (uplift).
6. Serviceability Load Case 1: G+U, with deflection limited to Span/500. Serviceability Load Case 2: G+U+W_s, with deflection limited to Span/200.
7. Tables have not been checked for earthquake actions.
8. Connections to ceiling substrate must have a minimum 0.41 kN pull-out capacity. Knauf clips CDB26-80 and CDB26-150 meet this demand.

Table 6 KNAUF 22mm CYCLONIC BATTEN INTERNAL CEILING SPAN TABLE

| Knauf 22mm Cyclonic Batten (AFCCB22) Suitable for all 10mm Knauf plasterboards and 13mm Mastashield only. | | | | |  | | |
|--|---------------------|-------------------|-------------|-----------------|---|-------------|-----------------|
| Wind Zone | Batten Spacing (mm) | Maximum Span (mm) | | | Connection Demand (kN) | | |
| | | Single Span | Double Span | 3-or-more Spans | Single Span | Double Span | 3-or-more Spans |
| N1 | 600 | 1070 | 1430 | 1320 | 0.12 | 0.41 | 0.34 |
| | 450 | 1180 | 1580 | 1460 | 0.10 | 0.34 | 0.28 |
| N2 | 600 | 1070 | 1430 | 1320 | 0.15 | 0.49 | 0.41 |
| | 450 | 1180 | 1580 | 1460 | 0.12 | 0.41 | 0.34 |
| N3 | 600 | 1070 | 1410 | 1320 | 0.20 | 0.65 | 0.56 |
| | 450 | 1180 | 1580 | 1460 | 0.16 | 0.55 | 0.46 |
| N4 | 600 | 1010 | 1210 | 1250 | 0.25 | 0.76 | 0.72 |
| | 450 | 1120 | 1400 | 1380 | 0.21 | 0.66 | 0.56 |
| N5 | 600 | 920 | 1030 | 1110 | 0.32 | 0.89 | 0.88 |
| | 450 | 1020 | 1190 | 1260 | 0.27 | 0.78 | 0.75 |
| N6 | 600 | 860 | 900 | 980 | 0.39 | 1.01 | 1.01 |
| | 450 | 940 | 1050 | 1130 | 0.32 | 0.88 | 0.87 |
| C1 | 600 | 1010 | 1030 | 1060 | 0.35 | 0.89 | 0.88 |
| | 450 | 1170 | 1200 | 1220 | 0.30 | 0.77 | 0.76 |
| C2 | 600 | 850 | 870 | 940 | 0.41 | 1.06 | 1.04 |
| | 450 | 980 | 1010 | 1090 | 0.36 | 0.92 | 0.91 |
| C3 | 600 | 710 | 730 | 790 | 0.49 | 1.26 | 1.25 |
| | 450 | 820 | 840 | 910 | 0.43 | 1.09 | 1.08 |
| C4 | 600 | 620 | 630 | 680 | 0.57 | 1.44 | 1.42 |
| | 450 | 710 | 730 | 790 | 0.49 | 1.25 | 1.24 |

1. This table is intended for internal use only, and is based upon positive (uplift) and negative (suction) pressures using the internal pressure coefficient (C_{pi}) for the nominated wind zone. The internal pressures calculated have assumed that there are no openings in the building envelope during a high wind event.
2. Tables include self weight, plasterboard and ceiling insulation with a maximum weight of 2.5 kg/m², but is not applicable to additional point loads and live loads.
3. Tables refer to Knauf 22mm Cyclonic Batten of Base Metal Thickness (BMT) 0.42m of grade G550 steel with Zinalume™ AM150 corrosion protection.
4. Calculations based upon a single span, double span, or 3-or-more spans and designed in accordance with AS/NZS 4600:2005 Cold Formed Steel Structures.
5. Ultimate Load Case 1: 1.2G + 1.2U + Wu (suction). Ultimate Load Case 2: 0.9G + Wu (uplift).
6. Serviceability Load Case 1: G+U, with deflection limited to Span/500. Serviceability Load Case 2: G+U+W_s, with deflection limited to Span/200.
7. Tables have not been checked for earthquake actions.
8. Connections to ceiling substrate must have a minimum Ultimate Limit State pull-out design capacity of 0.75kN per screw. Minimum 2 screws per connection.

Plasterboard Layout

| |
|--|
| Sheet ceilings perpendicular to framing members. |
| Stagger face layer butt joints by 600mm minimum on adjoining sheets and between layers. |
| Stagger recessed edges by 300mm minimum between layers. |
| Follow the back-blocking requirements and butt joint placement for the level of finish selected. [Refer Levels of Finish section] |



- > Sheet ceilings parallel to the light source to reduce the effect of glancing light
- > Minimise butt joints by using the longest sheet possible

Plasterboard Fixing

| |
|---|
| Drive fasteners to just below the sheet surface, taking care not to break the paper linerboard. |
| Use laminating screws to fix floating butt joints in the second layer. |
| Fastener and Adhesive Method |
| Apply MastaGrip Stud Adhesive after the frame is clean, dry, and free from grease, dust and other contaminants. |
| Apply MastaGrip daubs 200mm minimum from fasteners and plasterboard edges. |
| One Third Fastener and Adhesive Method |
| Use the 'One Third Fastener and Adhesive Method' for garage ceilings or as an alternative method in general areas. |
| Fastener Only Method |
| Use the 'Fastener Only Method' for external ceilings or as an alternative method for general areas and garage ceilings. |



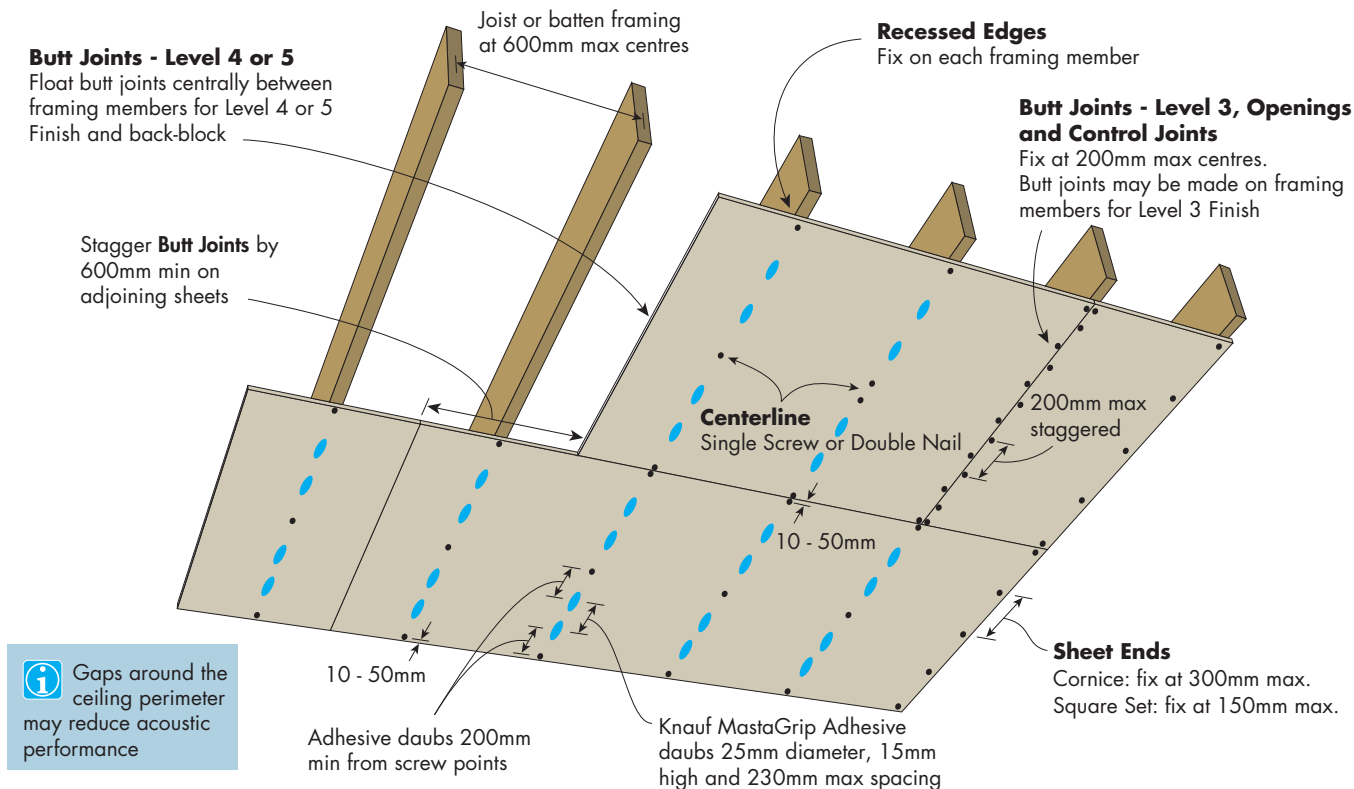
The 'Fastener and Adhesive Method' is recommended for general areas.

MastaGrip will:

- > Minimise fastener popping
- > Reduce the number of fastener heads that may show in glancing light
- > Assist in compensating for frame irregularities

Where practicable, the centre portion of the sheet should be fixed first then proceeding towards the ends and edges. Alternatively, the sheet can be fastened starting at one edge working across the sheet to the other edge.

FIGURE 6 Internal Ceiling - 1 Layer
Fastener and Adhesive Method



FIXING PATTERN TABLE

| Sheet Width | Fixing Pattern |
|-------------|-----------------|
| 600mm | F F F F |
| 900mm | F A F/F A F |
| 1200mm | F A A F/F A A F |
| 1350mm | F A A F/F A A F |

F = One screw or nail

F/F = One screw or double nails

A = One adhesive daub

Note: On 1350mm wide sheets use temporary fasteners until adhesive sets.

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Internal Ceiling Frame Spacing | | |
|--|--|---------|---------|
| | 600mm | 450mm | 300mm |
| 10mm MastaShield 10mm WaterShield | - | N5 / C1 | N6 / C2 |
| 10mm SpanShield 10mm OPAL 13mm MastaShield | N4 | N5 / C1 | N6 / C2 |

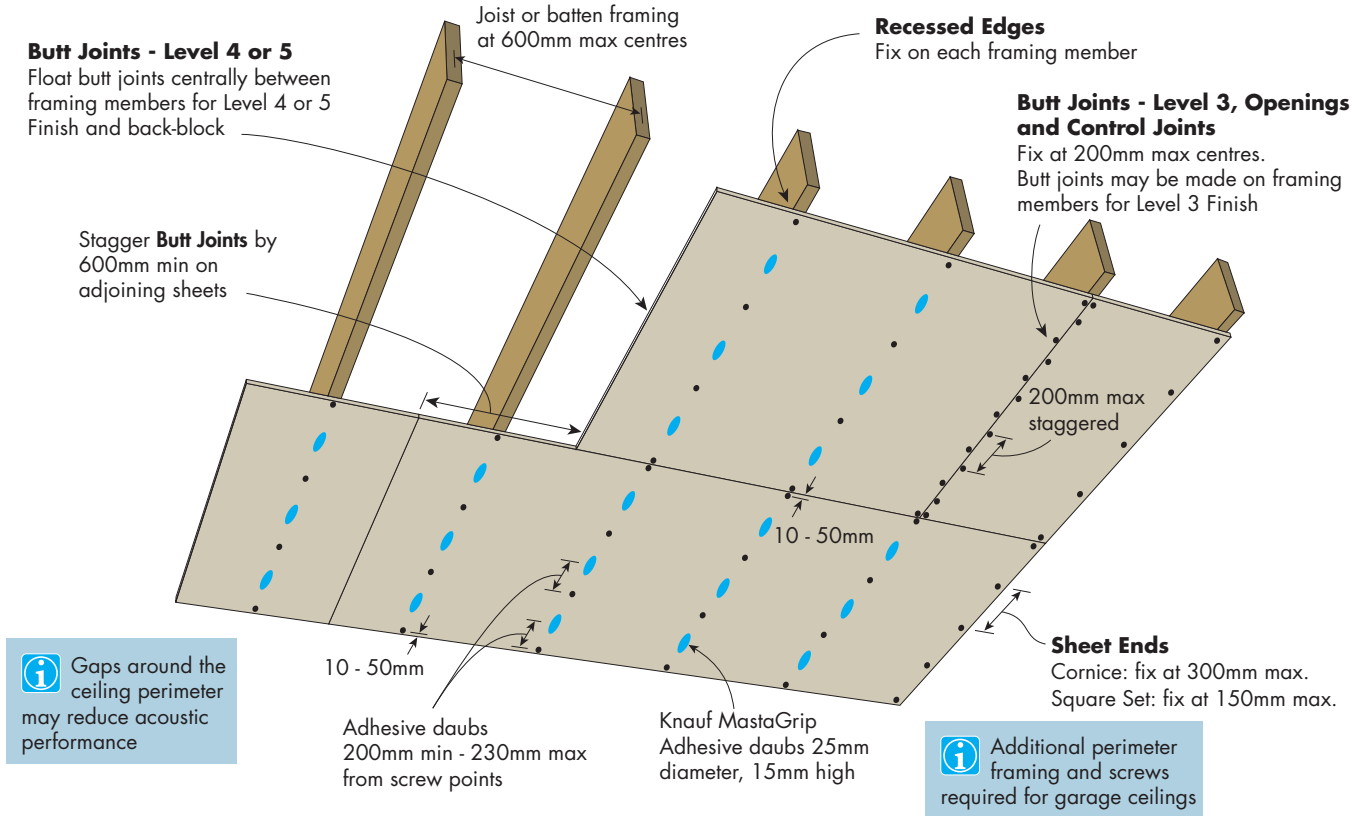
1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.

2. Calculations include a ceiling insulation with maximum weight of 2.5 kg/m² (equivalent to R6.0 EarthWool Ceiling Batt).

3. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.

4. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 7 Internal Ceiling - 1 Layer
One Third Fastener and Adhesive Method



FIXING PATTERN TABLE

| Sheet Width | Fixing Pattern |
|-------------|----------------|
| 600mm | F F F F |
| 900mm | F A F A F |
| 1200mm | F A F A F A F |
| 1350mm | F A F A F A F |

F = One nail or screw
A = One adhesive daub

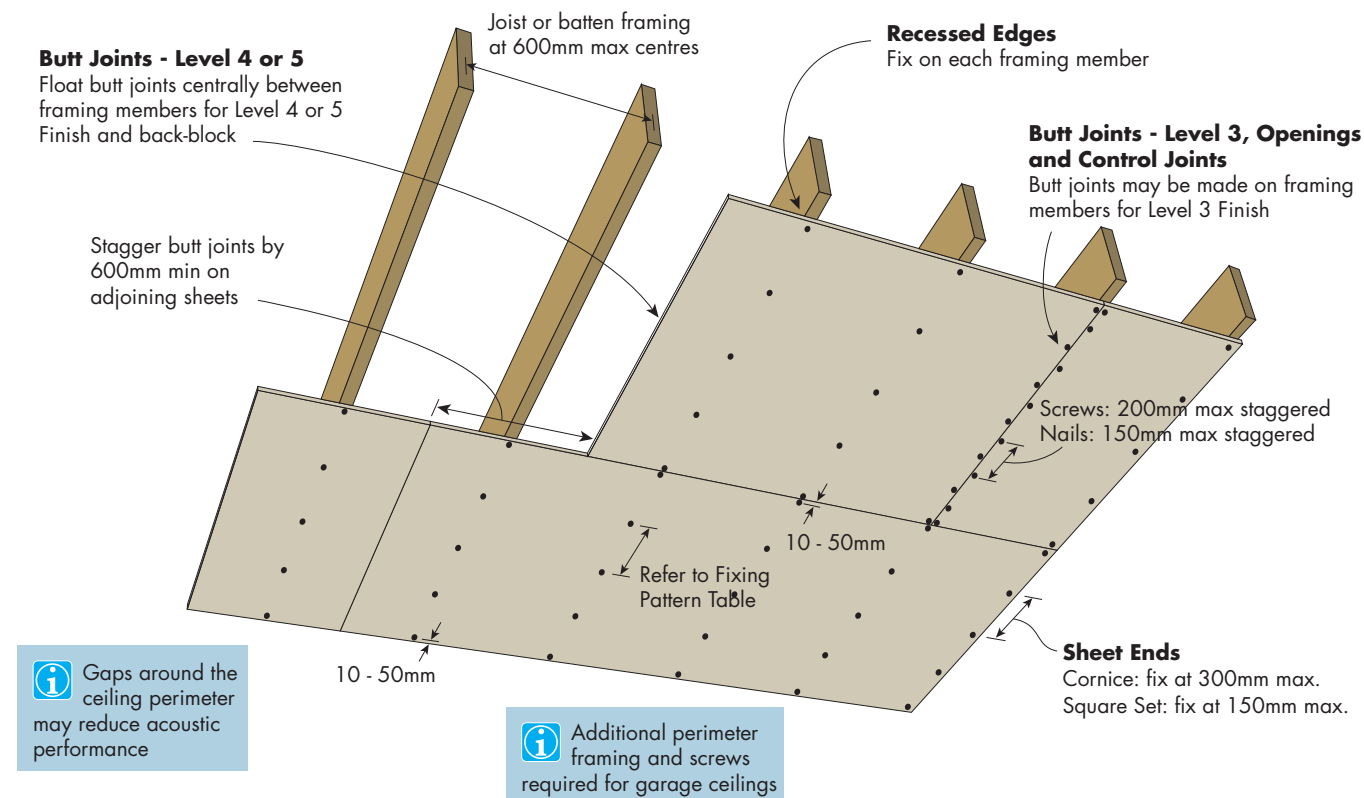
MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Internal Ceiling Frame Spacing | | |
|--|--|---------|---------|
| | 600mm | 450mm | 300mm |
| 10mm MastaShield 10mm WaterShield | - | N5 / C1 | N6 / C2 |
| 10mm SpanShield 10mm OPAL 13mm MastaShield | N4 | N5 / C1 | N6 / C2 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculations include a ceiling insulation with maximum weight of 2.5 kg/m² (equivalent to R6.0 EarthWool Ceiling Batt).
3. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
4. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 8 Internal Ceiling - 1 Layer

Fastener Only Method



FIXING PATTERN TABLE

| Sheet Width | Screw Fixing Pattern | Nail Fixing Pattern | Double Nail Fixing Pattern |
|-------------|----------------------|---------------------|----------------------------|
| 600mm | S S S (3) | N N N N N (5) | N Dn N (3) |
| 900mm | S S S S (4) | N N N N N N (6) | N Dn Dn N (4) |
| 1200mm | S S S S S (5) | N N N N N N N (7) | N Dn Dn Dn N (5) |
| 1350mm | S S S S S S (6) | N N N N N N N N (8) | N Dn Dn Dn Dn N (6) |

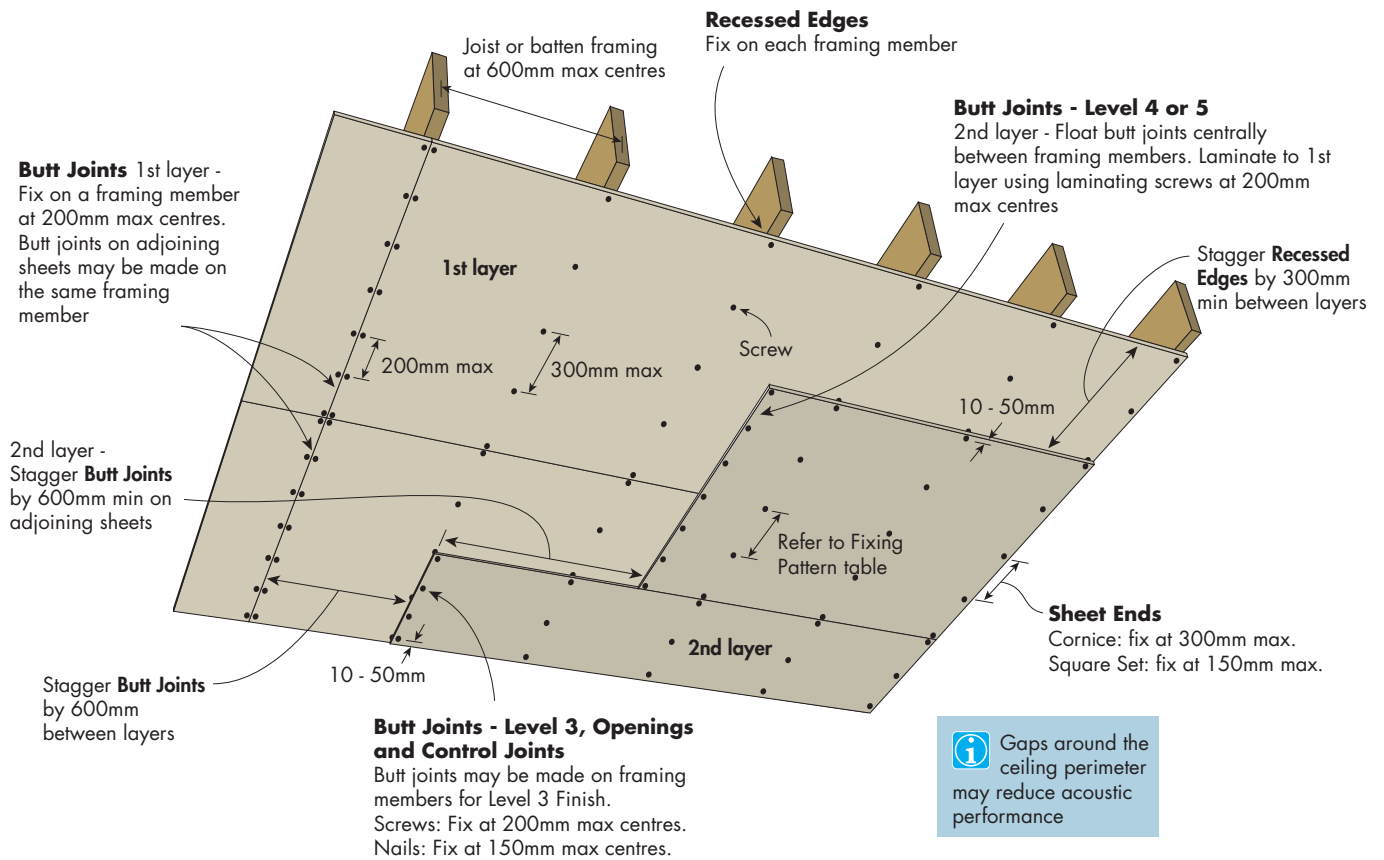
S = One screw
N = One nail
Dn = Double nail

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Internal Ceiling Frame Spacing | | |
|--|--|---------|---------|
| | 600mm | 450mm | 300mm |
| 10mm MastaShield 10mm WaterShield | - | N5 / C1 | N6 / C2 |
| 10mm SpanShield 10mm OPAL 13mm MastaShield | N4 | N5 / C1 | N6 / C2 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculations include a ceiling insulation with maximum weight of 2.5 kg/m² (equivalent to R6.0 EarthWool Ceiling Batt).
3. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
4. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 9 Internal Ceiling - 2 Layers
Fastener Only Method



i Gaps around the ceiling perimeter may reduce acoustic performance

FIXING PATTERN TABLE FOR 2nd LAYER

| Sheet Width | Screw Fixing Pattern | Nail Fixing Pattern | Double Nail Fixing Pattern |
|-------------|----------------------|---------------------|----------------------------|
| 600mm | S S S (3) | N N N N N (5) | N Dn N (3) |
| 900mm | S S S S (4) | N N N N N N (6) | N Dn Dn N (4) |
| 1200mm | S S S S S (5) | N N N N N N N (7) | N Dn Dn Dn N (5) |
| 1350mm | S S S S S S (6) | N N N N N N N N (8) | N Dn Dn Dn Dn N (6) |

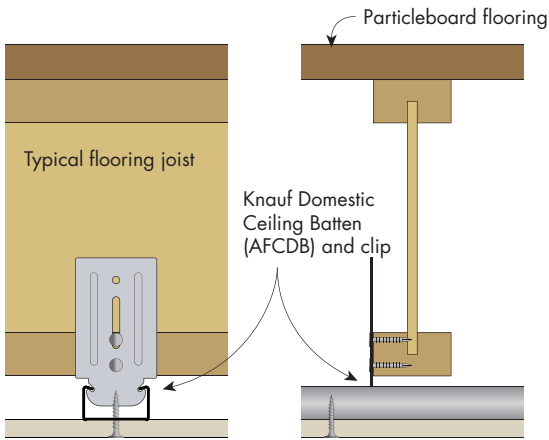
S = One screw
N = One nail
Dn = Double nail

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Internal Ceiling Frame Spacing | | |
|--|--|---------|---------|
| | 600mm | 450mm | 300mm |
| 10mm MastaShield 10mm WaterShield | - | N5 / C1 | N6 / C2 |
| 10mm SpanShield 10mm OPAL 13mm MastaShield | N4 | N5 / C1 | N6 / C2 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculations include a ceiling insulation with maximum weight of 2.5 kg/m² (equivalent to R6.0 EarthWool Ceiling Batt).
3. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
4. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

INTERNAL CEILING CONSTRUCTION SECTION DETAILS
Knauf 16mm Domestic Ceiling Batten



i Suspended ceiling systems like battens installed with clips, do not provide sufficient diaphragm action to transfer wind loads to bracing walls. As such, an alternative method of transferring these loads must be used.

FIGURE 10 Direct Fix Ceiling to Floor Joist
 16mm Domestic Batten and Clip

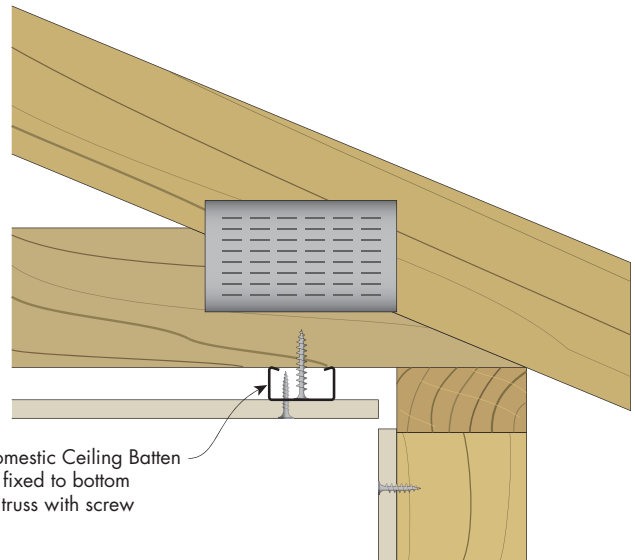


FIGURE 11 Direct Fix Ceiling to Roof Truss
 16mm Domestic Batten fixed directly to trusses

22mm Cyclonic Ceiling Batten

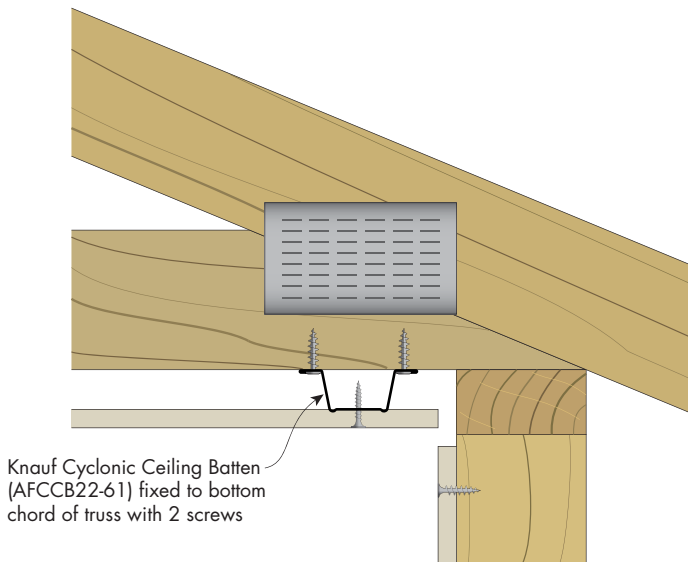


FIGURE 12 Direct Fix Ceiling to Roof Truss
 22mm Cyclonic Batten perpendicular to trusses

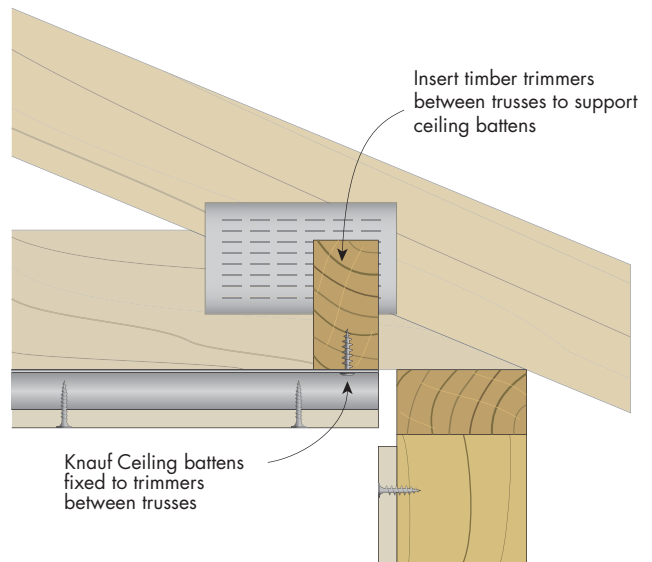


FIGURE 13 Direct Fix Ceiling to Roof Truss
 22mm Cyclonic Batten parallel to trusses

Garage Ceilings

Garage ceilings are subject to conditions that are more demanding than in other parts of the home. This is the case even when garages are located under the same roof as the rest of the home. Garages have large doors that when open let in rain and strong wind. Cars are garaged wet and they are not normally heated spaces. These factors call for a more durable installation to avoid future maintenance issues.

MINIMUM CONDITIONS TO USE PLASTERBOARD IN GARAGE CEILINGS

- The plasterboard framing must be designed for the appropriate wind loading conditions
- The cavity above the plasterboard ceiling must have cross ventilation [Refer to Condensation and Ventilation section]

INSTALLATION REQUIREMENTS FOR GARAGE CEILINGS

- Fix the ceiling sheets using the 'Screw Only Method' or the 'One Third Fixing Method' [Refer to Ceilings section]
- Provide additional framing around perimeter by inserting trimmers between ceiling frames or installing Knauf steel angle [Refer to Figures 17 and 18]
- Fix the perimeter of the sheets using screws at 300mm maximum spacing
- Avoid windy conditions during and immediately after installation to ensure adhesive sets intact
- Back-block all plasterboard joints [Refer to Back-Blocking section]
- Roll or brush on a high quality sealer undercoat designed for exterior use
- Use a premium exterior paint system that includes a mould inhibitor

GARAGE CEILING TO INTERNAL ROOM CEILING CONSTRUCTION SECTION DETAIL

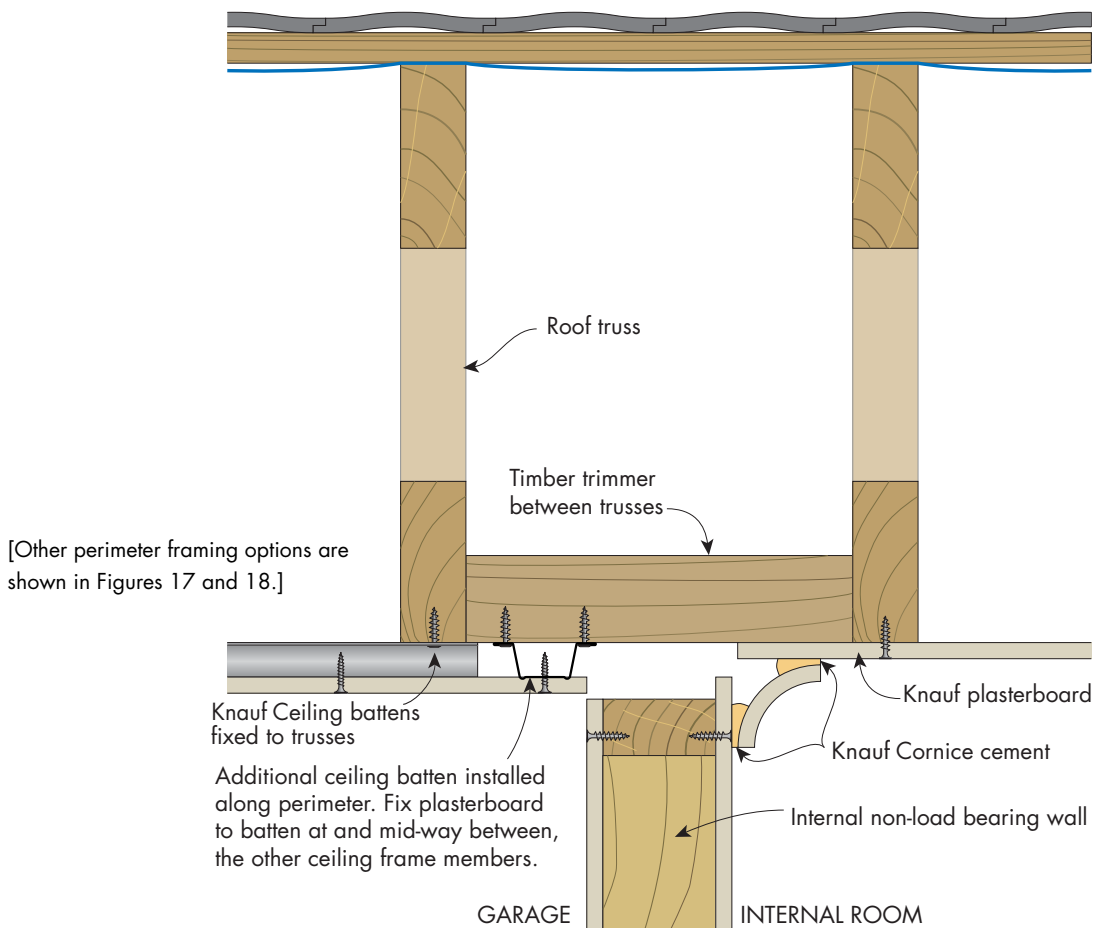
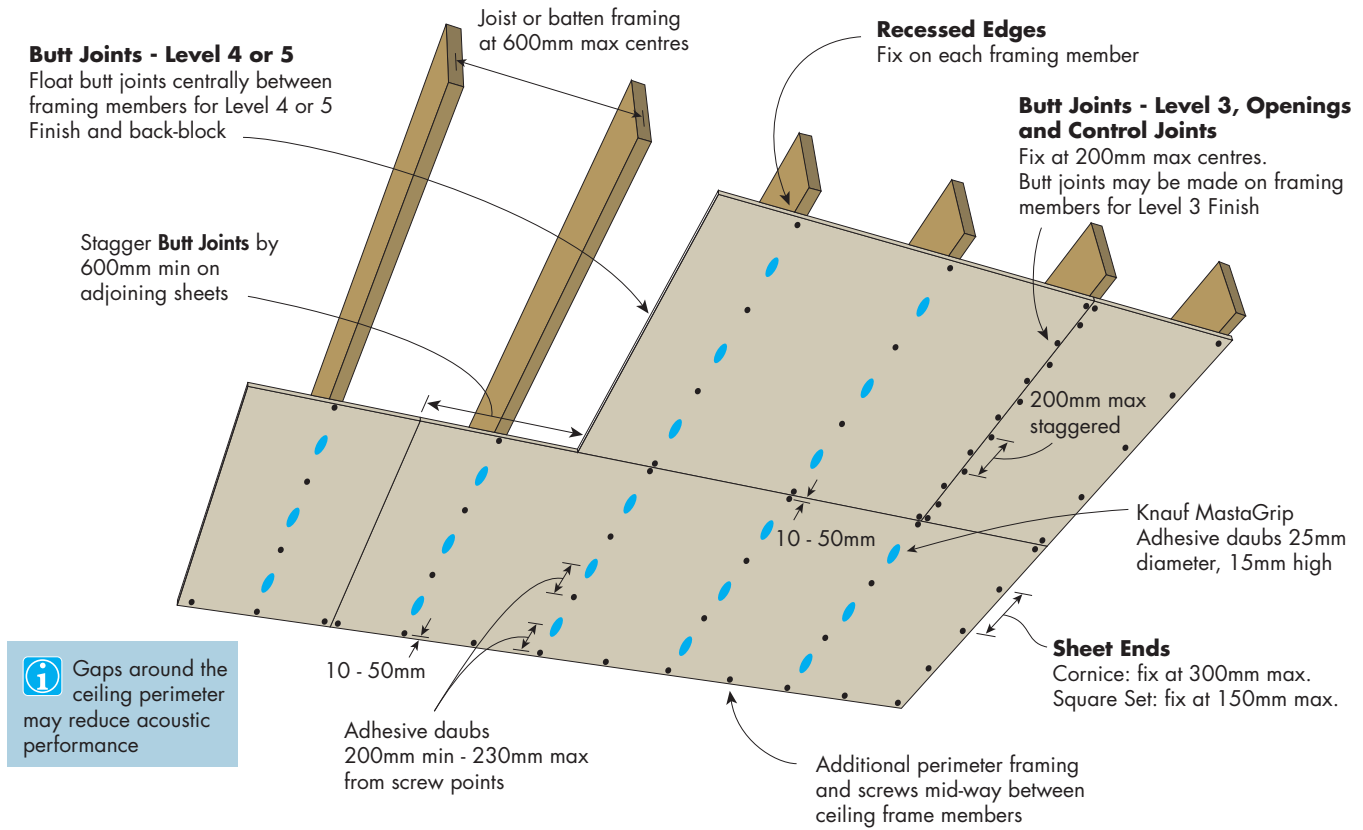


FIGURE 14 Plasterboard Ceiling Perimeter Detail

FIGURE 15 Internal Garage Ceiling - 1 Layer
One Third Fastener and Adhesive Method



FIXING PATTERN TABLE

| Sheet Width | Fixing Pattern |
|-------------|----------------|
| 600mm | F F F F |
| 900mm | F A F A F |
| 1200mm | F A F A F A F |
| 1350mm | F A F A F A F |

F = One nail or screw
A = One adhesive daub

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Internal Ceiling Frame Spacing | | |
|--|--|---------|---------|
| | 600mm | 450mm | 300mm |
| 10mm MastaShield 10mm WaterShield | - | N5 / C1 | N6 / C2 |
| 10mm SpanShield 10mm OPAL 13mm MastaShield | N4 | N5 / C1 | N6 / C2 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculations include a ceiling insulation with maximum weight of 2.5 kg/m² (equivalent to R6.0 EarthWool Ceiling Batt).
3. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
4. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

External Ceilings

External ceilings include alfresco areas, carports, balconies and breezeways with plasterboard installed horizontally or sloping away from the main dwelling.

External ceilings are subjected to harsher conditions than internal ceilings, and therefore they need additional protection from the weather. This extra protection is designed to control the major causes of external ceiling faults which are:

- Condensation on the plasterboard
- Condensation on framing or roof lining and dripping down onto the plasterboard
- Water penetrating the paint system
- Distortion of joints
- Plasterboard sagging
- Mould growth
- Fastener popping

MINIMUM CONDITIONS TO USE PLASTERBOARD IN EXTERNAL CEILINGS

- The plasterboard substrate must be designed for the appropriate loading conditions including wind loading
- The cavity above the plasterboard ceiling must have cross ventilation [*Refer to Section 2.2 for Condensation and Ventilation*]
- Condensation on the back and front of the plasterboard lining must be controlled - use condensation prevention measures such as, adequate roof cavity ventilation and thermal insulation - in particular, foil-backed insulation must be used under a metal roof
- The plasterboard and compounds must not be subjected to any direct water, long periods of high humidity, sea spray or damp conditions
- The plasterboard and compounds must be installed after the roof covering has been completely installed and sealed
- Minimum 100mm clearance from external ceiling lining to lower edge of verandah beam or masonry lintel, otherwise provide protection against wind blown rain

INSTALLATION REQUIREMENTS FOR EXTERNAL CEILINGS

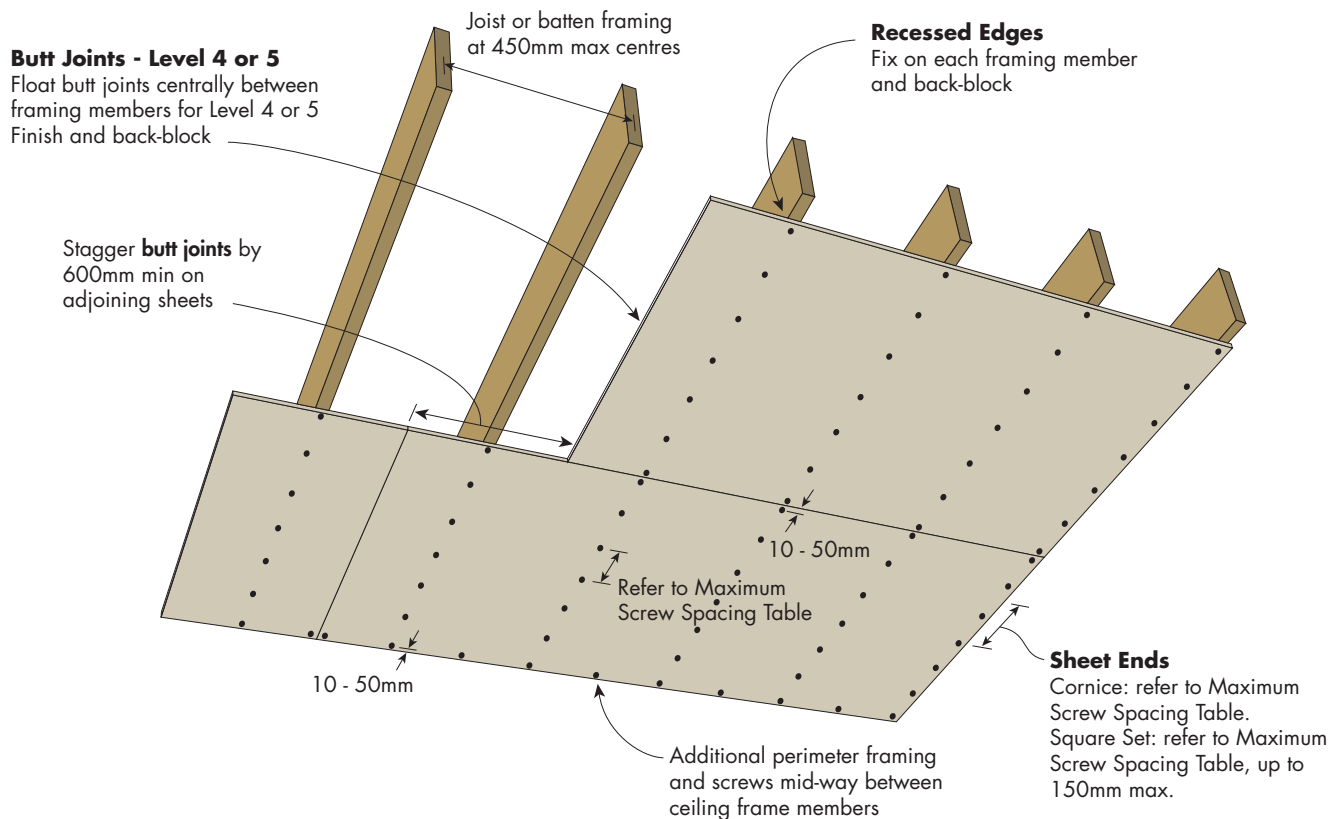
- Use either 10mm SpanShield, 13mm MastaShield, 13mm Watershield or 10mm OPAL
- Ceiling framing at maximum 450mm framing centres
- Provide additional framing around the perimeter by inserting trimmers between ceiling frames or installing Knauf steel angle, or installing additional Knauf ceiling battens
- Fix the ceiling sheets using the 'Screw Only Method'. Nails are not permitted in this application [*Refer to FIGURE 16 for ceiling installation*] - additional screws may be required for high wind areas
- Fix the perimeter of the plasterboard sheets using screws at 300mm maximum spacing
- Install control joints in at 6m maximum intervals.
- Back-block all plasterboard joints [*Refer to Section 3.6*]
- Plaster set joints using two coats of MastaBase or MastaLongset and any Knauf finish coat
- Roll or brush on a high quality sealer undercoat designed for exterior use
- Use a premium exterior paint system that includes a mould inhibitor

Please note that plasterboard must not be installed in eaves or as exterior cladding.



Thermal insulation is recommended directly above the plasterboard. This will minimise the temperature difference between the plasterboard and outside air, limiting ceiling sag and mould formation by reducing condensation on the plasterboard.

FIGURE 16 External Ceiling - 1 Layer
Screw Only Method



MAXIMUM SCREW SPACING TABLE FOR EXTERNAL CEILINGS (mm)

| Plasterboard Type | Wind Zone | Maximum External Ceiling Frame Spacing | |
|---|-----------|--|-------|
| | | 450mm | 300mm |
| 10mm SpanShield 13mm MastaShield 13mm WaterShield | N1 | 300 | 300 |
| | N2 | 250 | 300 |
| | N3 / C1 | 150 | 250 |
| | N4 / C2 | 100 | 150 |
| | N5 / C3 | - | 100 |
| 10mm OPAL | N1 | 300 | 300 |
| | N2 | 300 | 300 |
| | N3 / C1 | 200 | 300 |
| | N4 / C2 | 150 | 250 |
| | N5 / C3 | - | 150 |

1. Wind loads in accordance with AS 4055-2012 *Wind loads for housing*.
2. Calculations include a ceiling insulation with maximum weight of 2.5 kg/m² (equivalent to R6.0 EarthWool Ceiling Batt).
3. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
4. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

GARAGE CEILING AND EXTERNAL CEILING CONSTRUCTION SECTION DETAILS
Plasterboard Ceiling Directly Fixed to Trusses

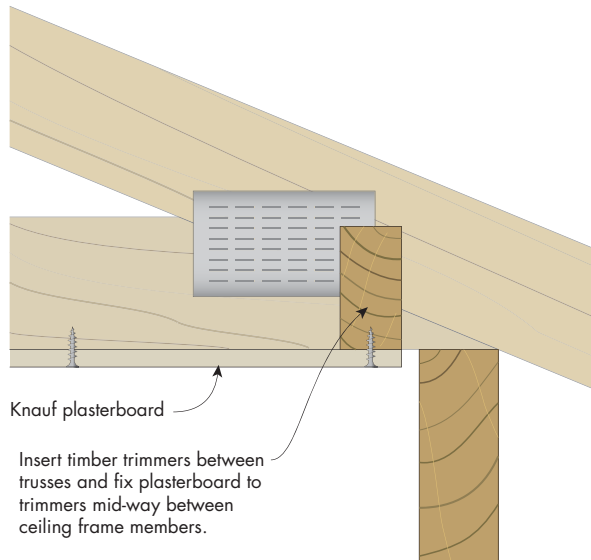


FIGURE 17 Plasterboard Ceiling Fixed to Roof Truss
 With perimeter timber trimmers between trusses

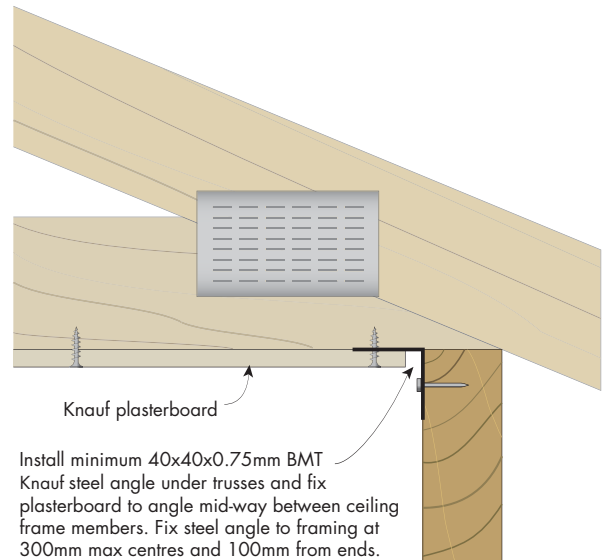


FIGURE 18 Plasterboard Ceiling Fixed to Roof Truss
 Alternative detail with perimeter steel angle

Plasterboard Ceiling Fixed to Battens Under Trusses

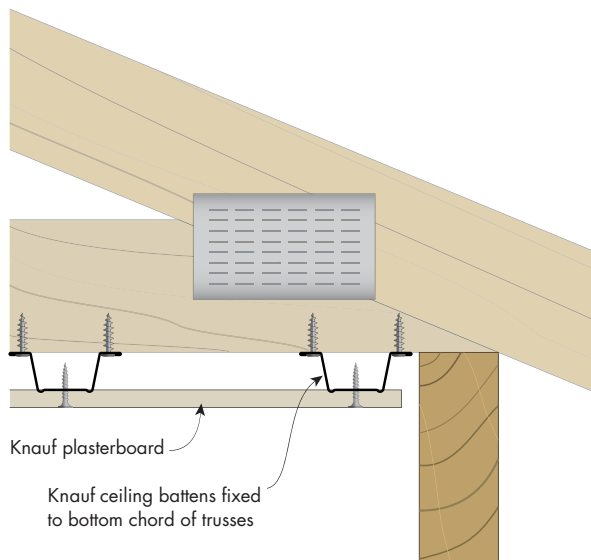


FIGURE 19 Plasterboard Ceiling Fixed to Battens
 Ceiling battens installed perpendicular to trusses

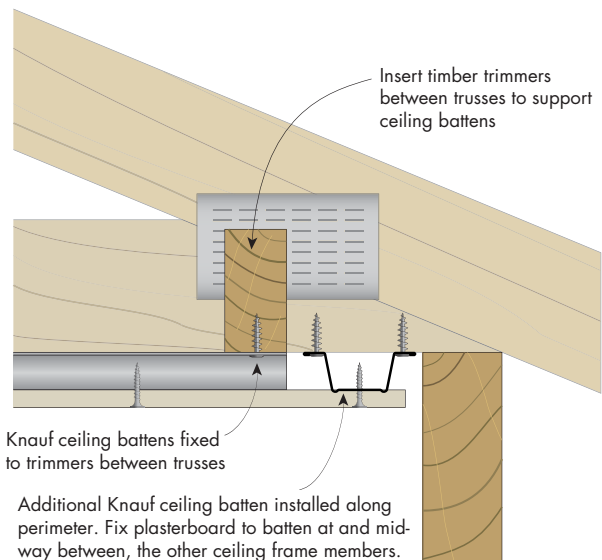


FIGURE 20 Plasterboard Ceiling Fixed to Battens
 Ceiling battens installed parallel to trusses



GENERAL REQUIREMENTS 39

PLASTERBOARD LAYOUT 40

PLASTERBOARD FIXING 40

Walls

General Requirements

Install control joints in timber framed walls:

- > With plasterboard at 12m maximum intervals
- > At all control joints in the structure
- > At any change in the substrate material
- > At the floor line in stairways. Cover gap with a moulding fastened to one edge

FRAMING

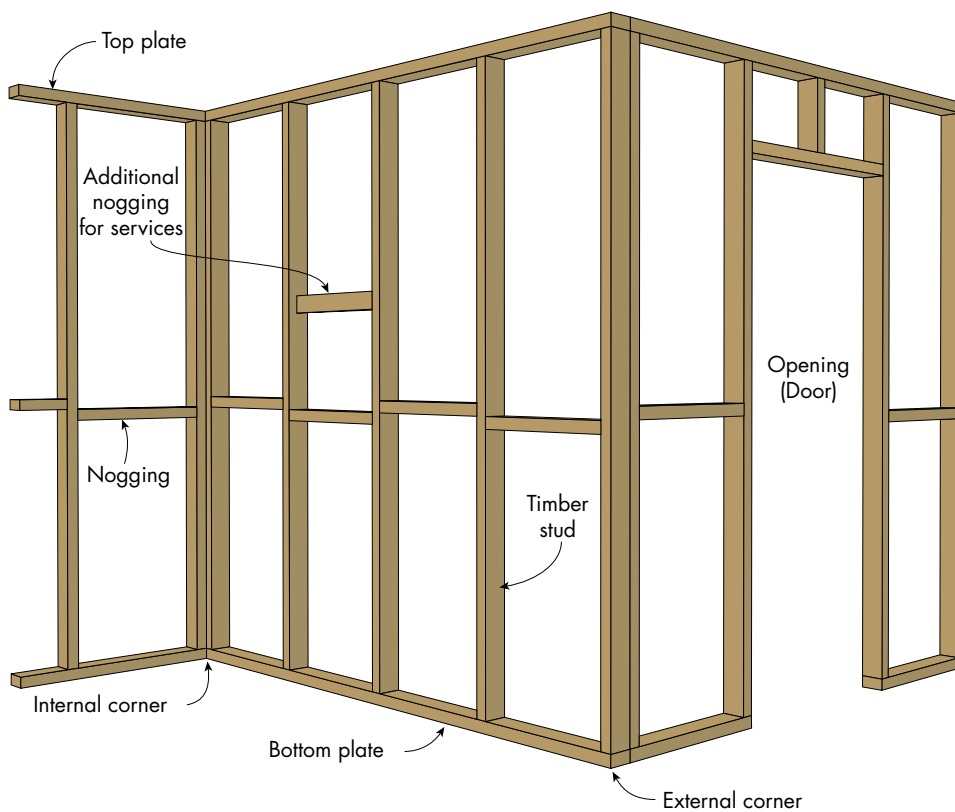


FIGURE 21 Timber Frame Layout

Framing members must be spaced at 600mm maximum centres



> Noggings are permitted to assist the fixing of services

- > Plumbing and electrical services must not protrude beyond the face of the stud
- > Copper Chromium Arsenate (CCA) treated timber must not be used with steel frames

Plasterboard Layout

Vertical joints must be 200mm minimum from the edge of any opening such as windows and doorways to minimise cracking at the joints.

Horizontal Layout

Stagger butt joints by 600mm minimum on adjoining sheets, between layers and on opposite sides of the wall.

First layer butt joints must be backed by a stud or back-blocked.

Stagger recessed edges by 300mm minimum between layers.

Vertical Layout

Stagger butt joints by 600mm minimum on adjoining sheets, between layers and on opposite sides of the wall.

First layer butt joints must be backed by a nogging or back-blocked.

Stagger recessed edges by 300mm minimum between layers and on opposite sides of the wall.



- > Install plasterboard sheets horizontally when practical to reduce the effect of glancing light
- > Minimise butt joints by using long sheets.

Plasterboard Fixing

Drive fasteners to just below the sheet surface, taking care not to break the paper linerboard.

Laminating screws can be used to fix butt joints in the second and third layer.

Fastener and Adhesive Method

Apply **MastaGrip** Stud Adhesive after the frame is clean, dry, and free from grease, dust and other contaminants.

Apply **MastaGrip** daubs 200mm minimum from fastener and plasterboard edges.

Fastener Only Method

Use the 'Fastener Only Method' in tiled areas or as an alternative to the 'Fastener and Adhesive Method' in general areas.



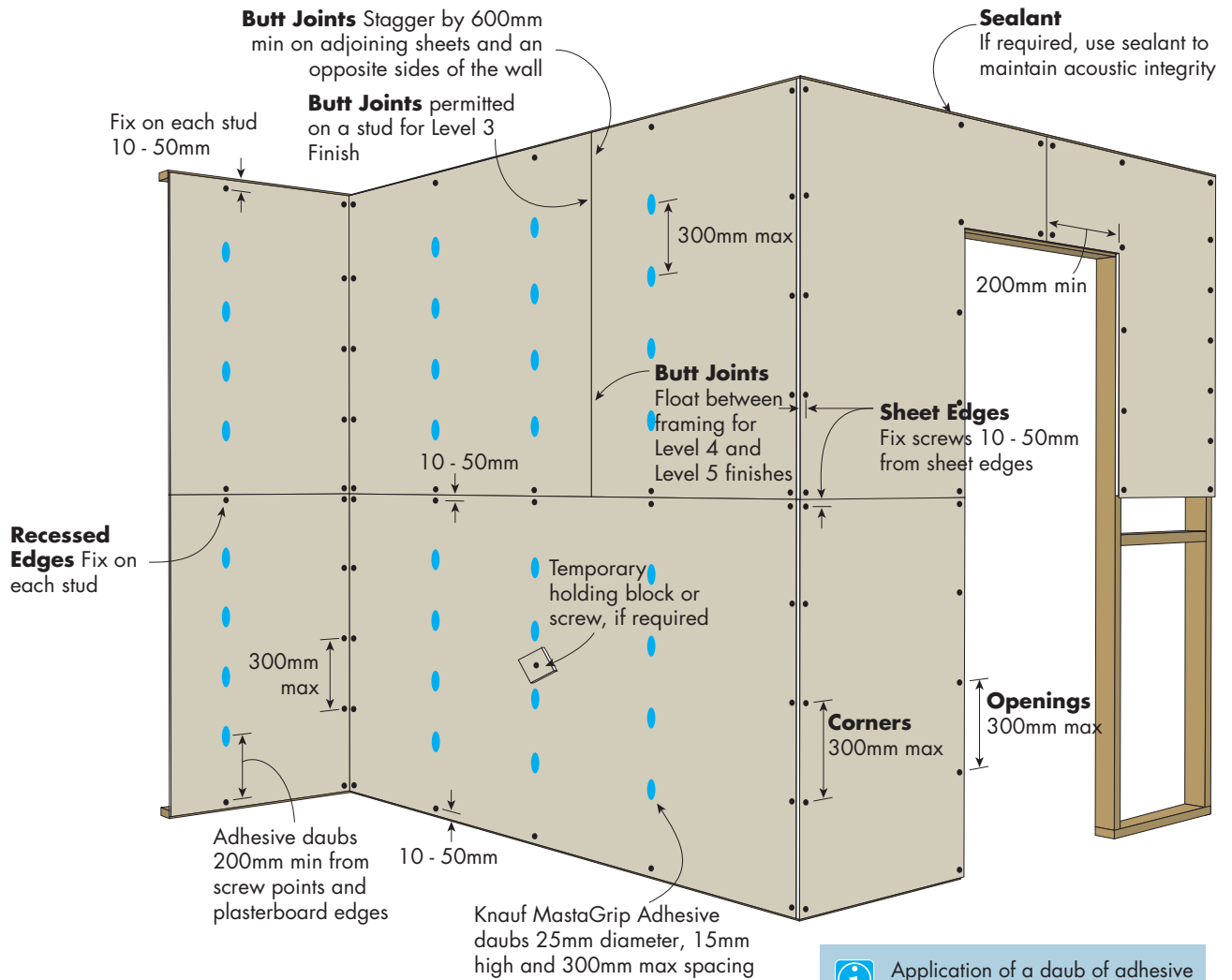
The 'Fastener and Adhesive Method' is recommended for non-fire rated applications.

MastaGrip will:

- > Minimise fastener popping
- > Reduce the number of fastener heads that may show in glancing light
- > Assist in compensating for frame irregularities
- > Reduce rattle noise when applied to bracing straps

Where practicable, the centre portion of the sheet should be fixed first then proceeding towards the ends and edges. Alternatively, the sheet can be fastened starting at one edge working across the sheet to the other edge.

FIGURE 22 Internal Non-Fire Rated Wall - 1 Layer Horizontal Fastener and Adhesive Method



i Application of a daub of adhesive onto steel angle or strap bracing between framing members will minimise the risk of the bracing rattling against the back of the gypsum linings.

FIXING PATTERN TABLE

| Sheet Width | Fixing Pattern |
|-------------|----------------|
| 600mm | F A A F |
| 900mm | F A A A F |
| 1200mm | F A A A A F |
| 1350mm | F A A A A A F |

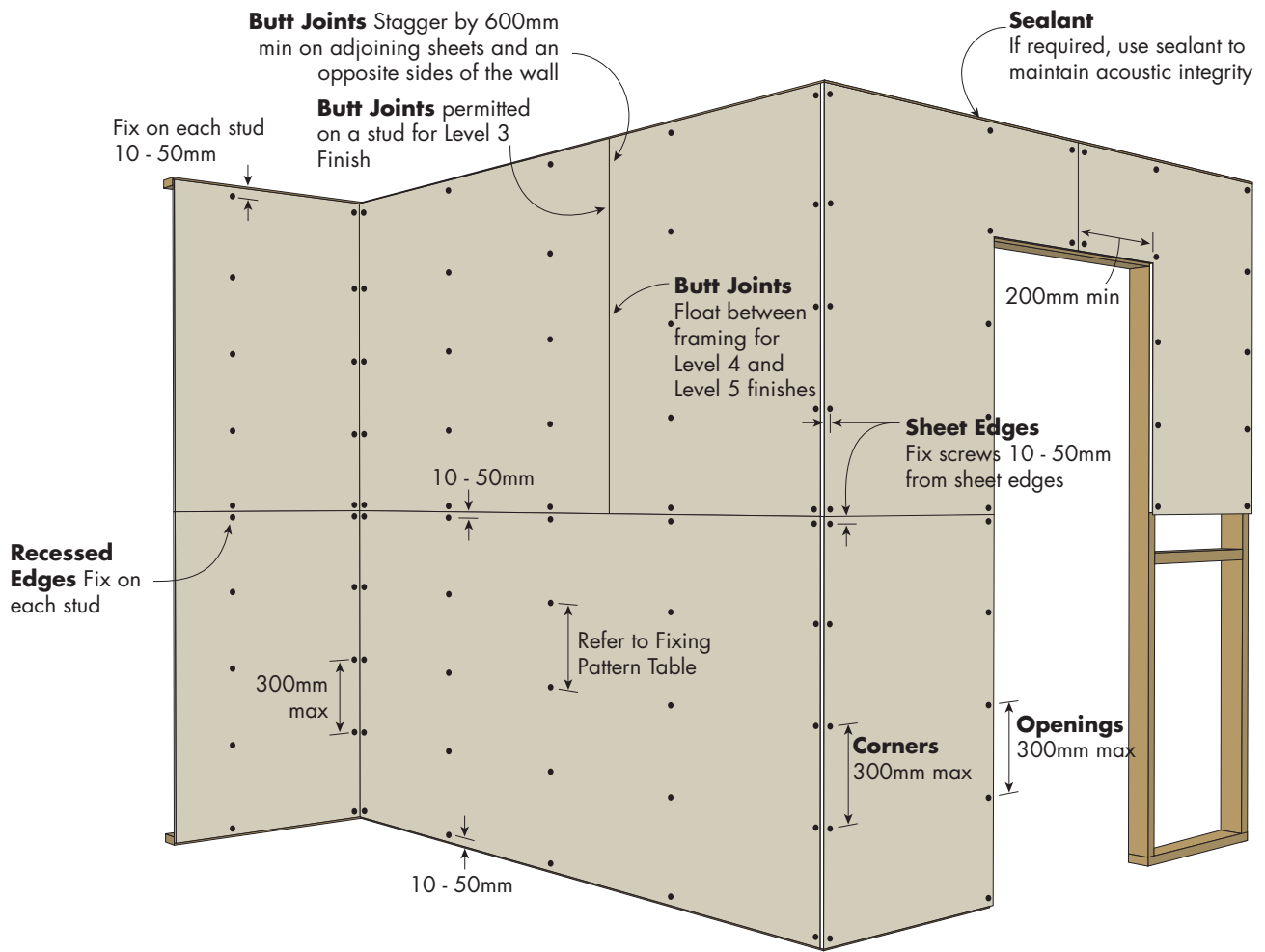
F = One screw or nail
A = One adhesive daub

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Wall Stud Spacing | | |
|------------------------|---------------------------|-------|-------|
| | 600mm | 450mm | 300mm |
| All 10mm plasterboards | N5 / C1 | N6 | C2 |

1. Wind loads in accordance with AS 4055-2012 *Wind loads for housing*.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 23 Internal Non-Fire Rated Wall - 1 Layer Horizontal Fastener Only Method



FIXING PATTERN TABLE

| Sheet Width | Screw Fixing Pattern | Nail Fixing Pattern | Double Nail Fixing Pattern |
|-------------|----------------------|---------------------|----------------------------|
| 600mm | S S S (3) | N N N N (4) | N Dn N (3) |
| 900mm | S S S S (4) | N N N N N (5) | N Dn Dn N (4) |
| 1200mm | S S S S (4) | N N N N N N (6) | N Dn Dn N (4) |
| 1350mm | S S S S S (5) | N N N N N N N (7) | N Dn Dn Dn N (5) |

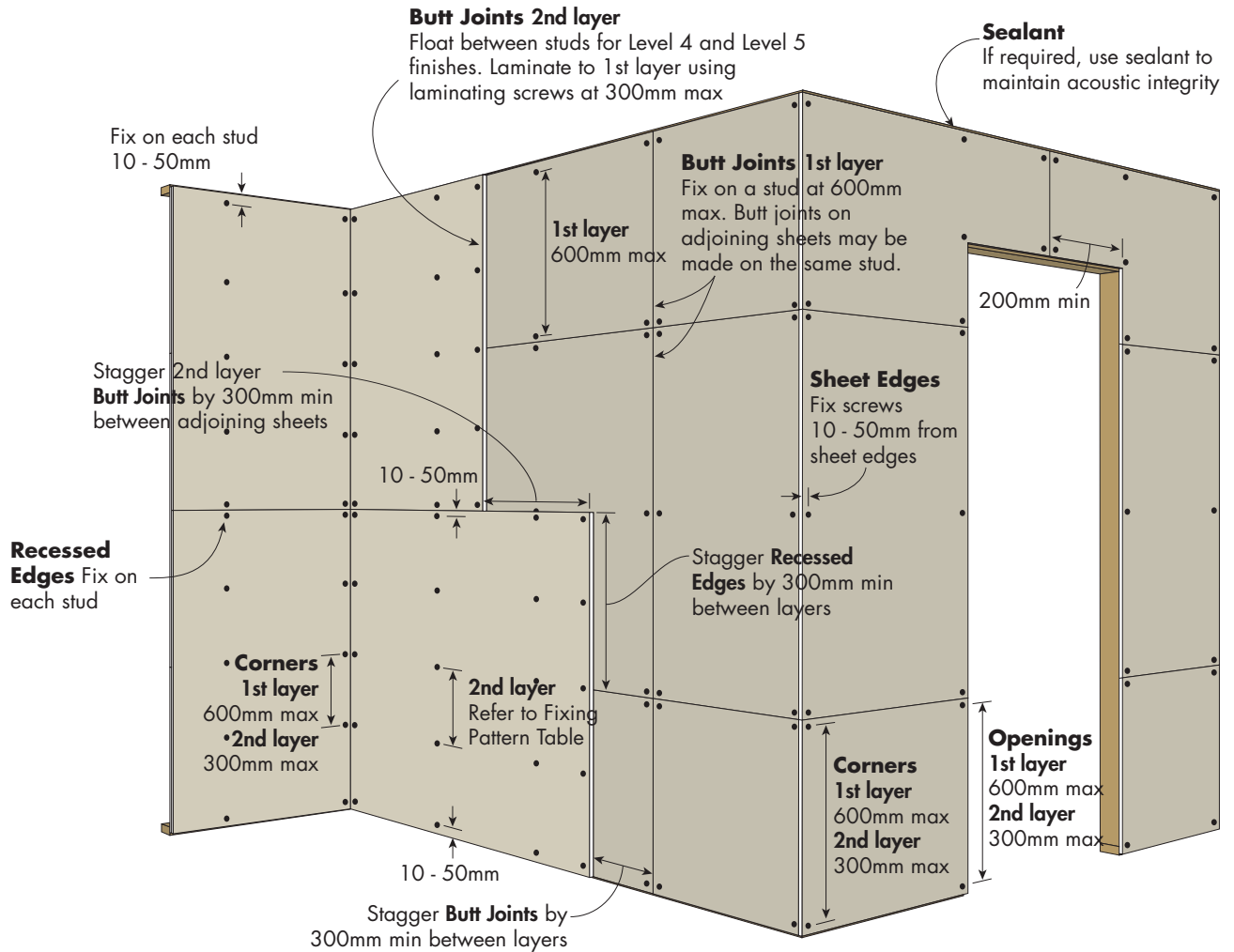
S = One screw
 N = One nail
 Dn = Double nail

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Wall Stud Spacing | | |
|------------------------|---------------------------|-------|---------|
| | 600mm | 450mm | 300mm |
| All 10mm plasterboards | N4 | N4 | N5 / C1 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 24 Internal Non-Fire Rated Wall - 2 Layers Horizontal + Horizontal
Fastener Only Method



FIXING PATTERN TABLE FOR 2nd LAYER

| Sheet Width | Screw Fixing Pattern | Nail Fixing Pattern | Double Nail Fixing Pattern |
|-------------|----------------------|---------------------|----------------------------|
| 600mm | S S S (3) | N N N N (4) | N Dn N (3) |
| 900mm | S S S S (4) | N N N N N (5) | N Dn Dn N (4) |
| 1200mm | S S S S (4) | N N N N N N (6) | N Dn Dn N (4) |
| 1350mm | S S S S S (5) | N N N N N N N (7) | N Dn Dn Dn N (5) |

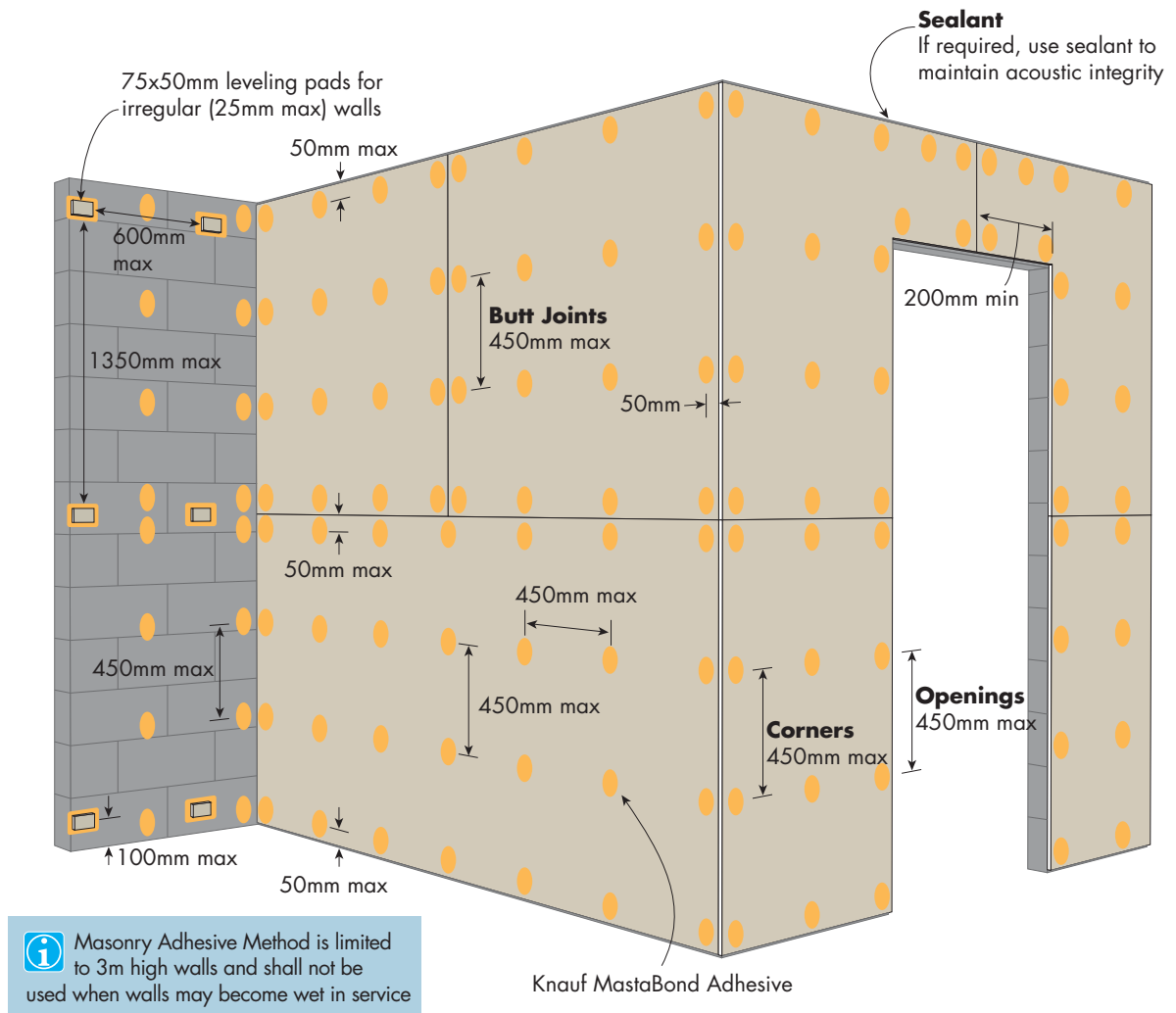
S = One screw
N = One nail
Dn = Double nail

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Wall Stud Spacing | | |
|------------------------|---------------------------|-------|---------|
| | 600mm | 450mm | 300mm |
| All 10mm plasterboards | N4 | N4 | N5 / C1 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 25 Internal Non-Fire Rated Wall - 1 Layer Horizontal
Masonry Adhesive Method



FIXING PATTERN TABLE

| Sheet Width | Fixing Pattern |
|-------------|----------------|
| 600mm | M M M |
| 900mm | M M M |
| 1200mm | M M M M |
| 1350mm | M M M M |

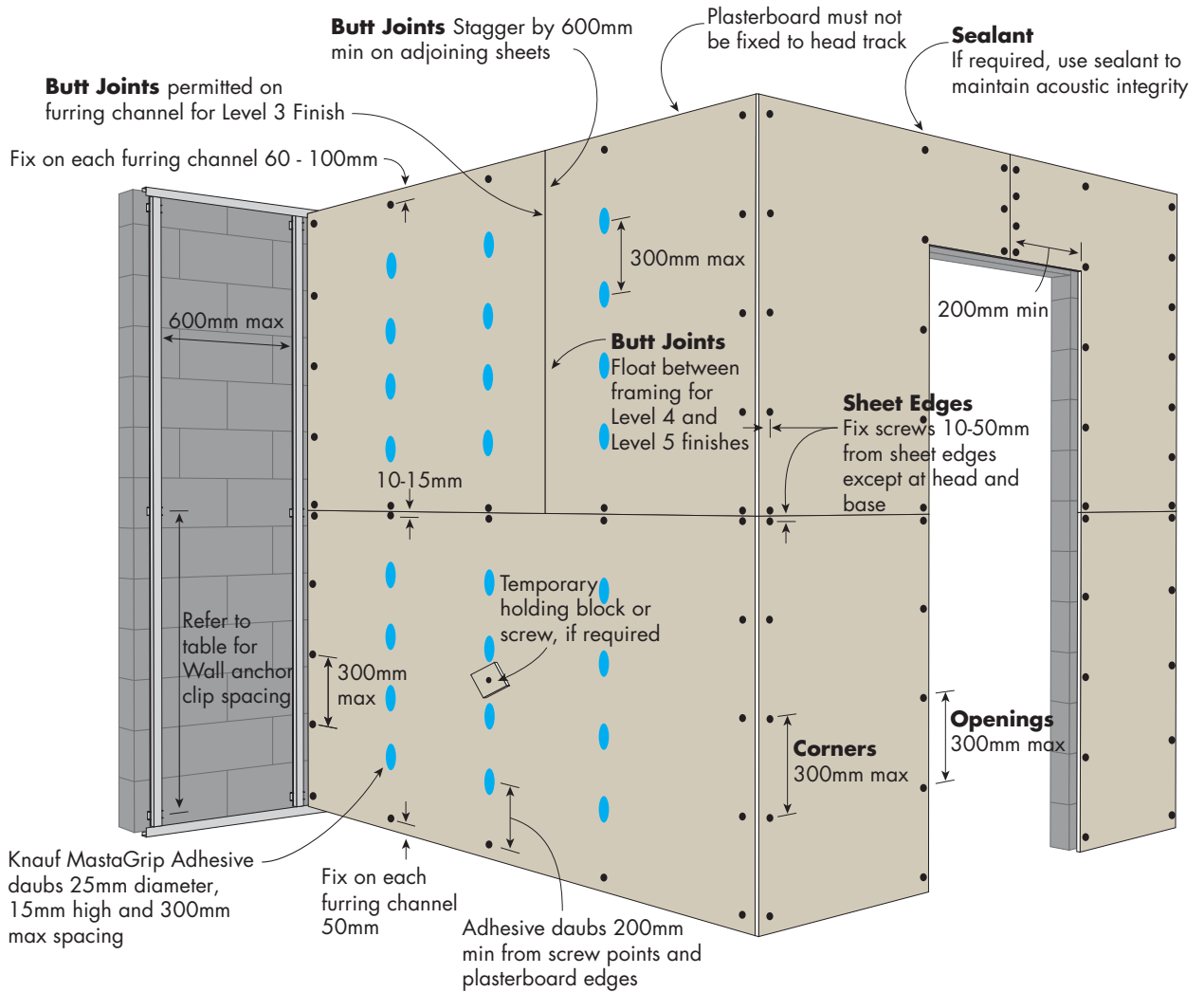
M = MastaBond Masonry Adhesive Daub

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum MastaBond Spacing |
|------------------------|---------------------------|
| | 450mm |
| All 10mm plasterboards | N4 |

1. Wind loads in accordance with AS 4055-2012 *Wind loads for housing*.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 26 Internal Non-Fire Rated Wall - 1 Layer Horizontal
Screw and Adhesive Method over furring channels



FIXING PATTERN TABLE

| Sheet Width | Fixing Pattern |
|-------------|----------------|
| 600mm | F A A F |
| 900mm | F A A A F |
| 1200mm | F A A A A F |
| 1350mm | F A A A A A F |

F = One screw or nail
A = One adhesive daub

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Wall Stud Spacing | | |
|------------------------|---------------------------|-------|-------|
| | 600mm | 450mm | 300mm |
| All 10mm plasterboards | N5 / C1 | N6 | C2 |

1. Wind loads in accordance with AS 4055-2012 *Wind loads for housing*.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.



WET AREAS USING PLASTERBOARD 47

DEFINITIONS 47

WET AREA REQUIREMENTS 48

**WATERPROOFING REQUIREMENTS
BY AREA 49**

GENERAL REQUIREMENTS 51

FRAMING 51

PLASTERBOARD FIXING 51

CONSTRUCTION DETAILS 54

Wet Areas

Wet Areas Using Plasterboard

Australian Standard AS 3740 – *Waterproofing of Wet Areas within Residential Buildings* defines a wet area as ‘an area within a building supplied with water from a water supply system and includes bathrooms, showers, laundries and sanitary compartments.’

Waterproofing of wet areas may be achieved by using water resistant plasterboard such as WaterShield. Wet area ceilings may be non-water resistant Knauf plasterboard.

Some elements of wet area installation will be carried out by a plasterer, and other elements will be completed by trades such as plumbers and tilers. All waterproofing must be carried out by an approved applicator.

Definitions

WATERPROOF MEMBRANE

Waterproof membranes are a layer of material impervious to water that are usually liquid applied. They must comply with AS/NZS 4858:2004, *Wet Area Membranes* and be applied according to the manufacturer’s instructions.

FLASHING

Flashing is a strip or sleeve of impervious material such as a Knauf metal angle or a liquid applied product such as a waterproof membrane. It must provide a barrier to moisture movement.

SHOWER AREA

Shower areas consist of enclosed and unenclosed areas:

- Unenclosed shower areas extend 1500mm horizontally from the shower connection on the wall, up to a height of 1800mm from the finished floor
- Enclosed shower areas are bounded by walls or screens up to a height of 1800mm from the finished floor. Walls or screens include hinged or sliding doors that control the spread of water to within the enclosure

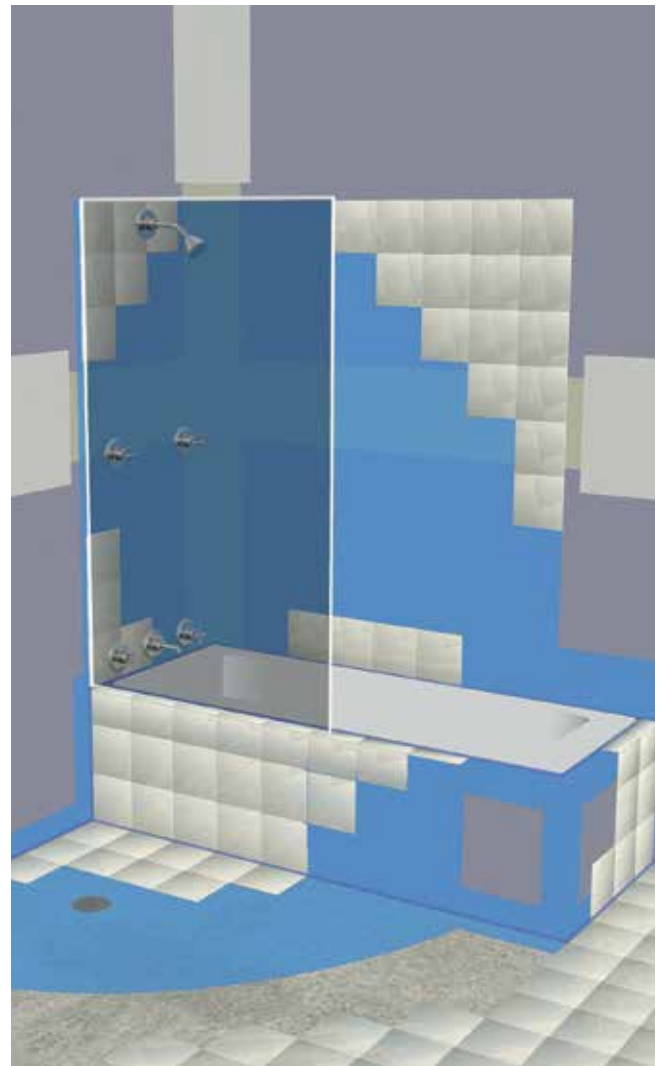


FIGURE 27 Bath with shower



A shower fitted with a frameless glass shower screen or screen over a bath less than 1500mm long is not an enclosed shower.

Wet Area Requirements

Different wet areas require different levels of treatment to protect them from moisture.

WET AREA INSTALLATION REQUIREMENTS

| Area | Level of Risk | Walls | Junctions | Penetrations* |
|---|---------------|-----------------|-------------------------|---------------|
| Shower area | High | Water Resistant | Waterproof | Waterproof |
| Bathrooms | Medium | – | Waterproof [^] | – |
| Areas adjacent to baths and spas | Medium | Water Resistant | Waterproof | Waterproof* |
| Walls adjoining other vessels | Low | Water Resistant | Waterproof | Waterproof* |
| Laundries and WCs | Low | – | Waterproof [^] | – |
| Bathrooms and laundries requiring a floor waste | High | – | Waterproof [^] | Waterproof |

+ Including mechanical fixings or fasteners.

[^] Applies to wall/floor junctions only.

* Horizontal surface waterproof, vertical surface water resistant.



FIGURE 28 Basin

Waterproofing Requirements by Area

Water Resistant Walls

Use **WaterShield** covered with a waterproof membrane and tiles.

For all plasterboard joints, corners and fastener heads use **MastaBase** or **MastaLongset**.

[Refer to waterproof membrane manufacturer for application instructions]

Walls Adjoining Other Vessels

Ensure walls within 75mm of a vessel such as a sink, basin or laundry tub are water resistant to a height of 150mm minimum above the vessel.

Seal all edges where the vessel is fixed to the wall.

Waterproof Penetrations

Use a waterproof sealant or a proprietary flange system to waterproof penetrations.

Waterproof Vertical Junctions (where required)

Use a waterproof membrane as vertical flashing that has a minimum overlap of 40mm to the wall sheeting for each leg.

Wall/Floor Junctions in Shower Areas and Adjacent to Baths and Spas

Use a waterproof membrane on walls to:

- > 150mm minimum above the finished shower floor level or lip of bath
- > And 25mm minimum above the maximum retained water level
- > And with the horizontal leg width a minimum of 50mm.

Wall/Floor Junctions Outside Shower Areas

Use a waterproof membrane or Knauf metal angle as flashing with a vertical leg a minimum of 25mm above the finished floor level with the horizontal leg width a minimum of 50mm.

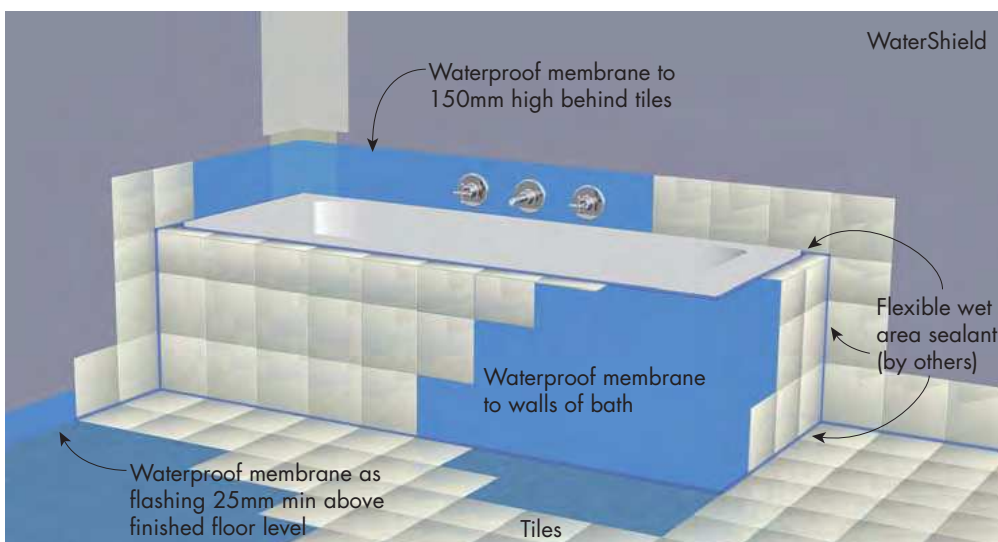


FIGURE 29 Bath (without shower) installation on timber flooring

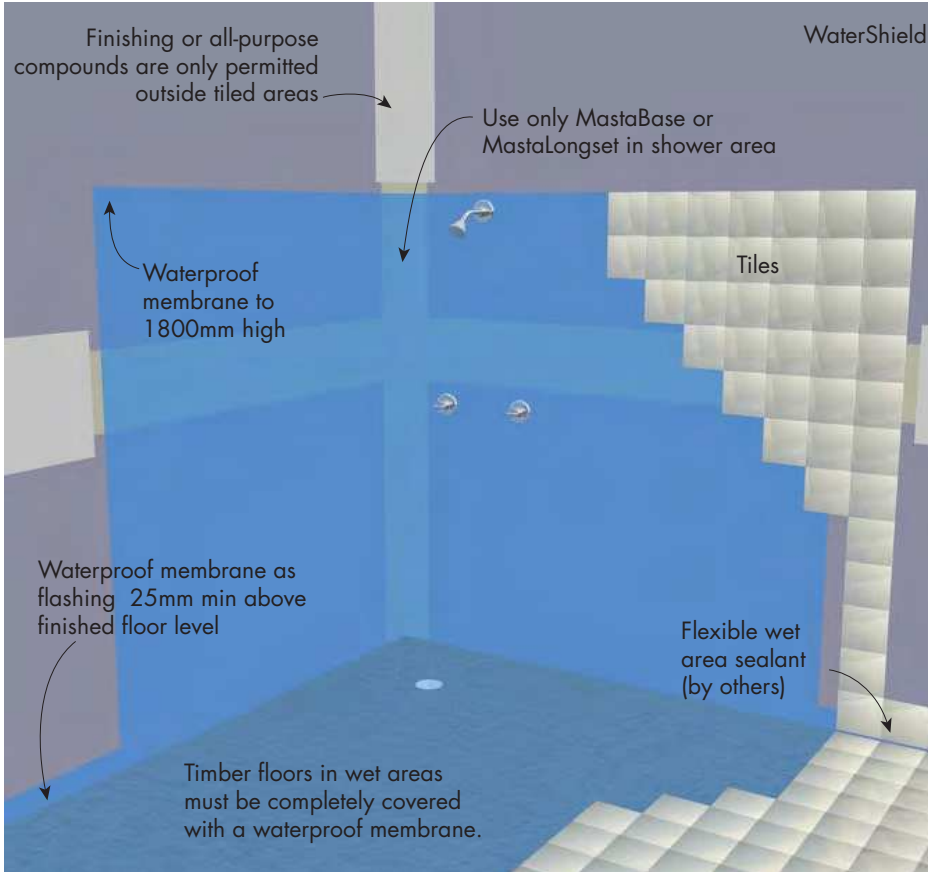


FIGURE 30 Internal in situ tray on timber flooring

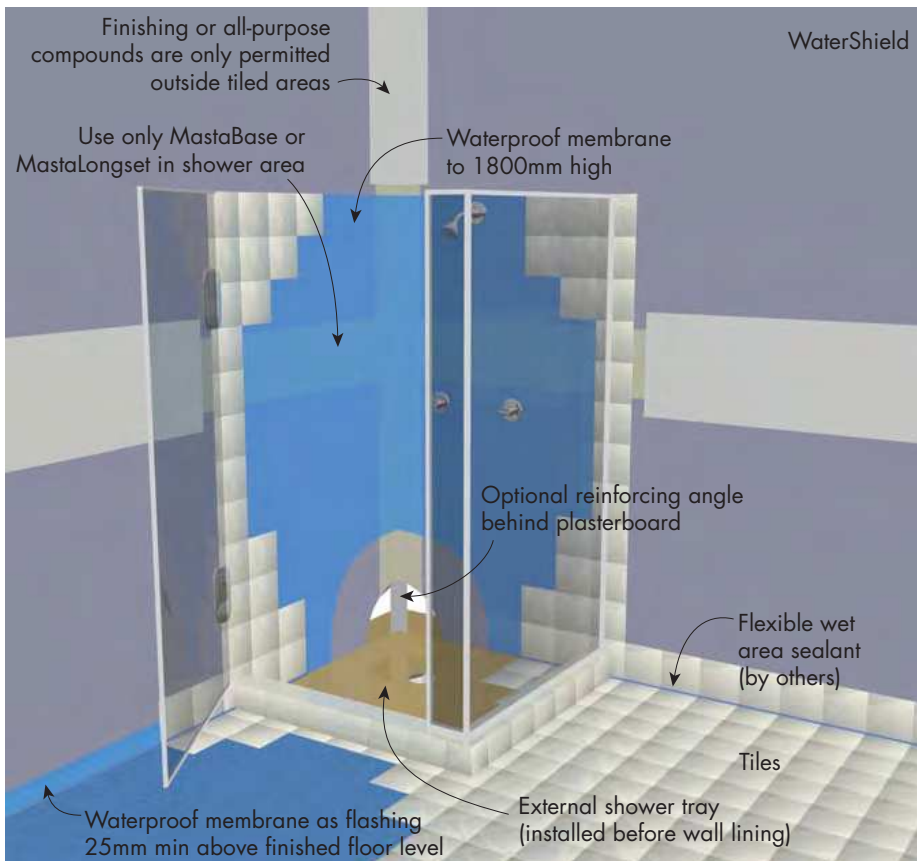


FIGURE 31 External tray for enclosed shower on timber flooring

General Requirements

| |
|---|
| Apply Knauf Wet Area Sealant to all cut edges of WaterShield that may be affected by moisture, including all penetrations and the bottom edge over a preformed shower base. |
| Only use MastaMate Paper Tape and two coats of MastaBase or MastaLongset for jointing in tiled areas. |
| Recess pre-formed shower bases, baths and spas sufficiently into the wall to allow the tiles to pass down the inside perimeter rebate of the shower base. |
| After the installation of tiles, apply a silicone sealant to all wall/floor junctions and vertical corner joints. |
| Attach fixtures to framing members only. |



- > Masonry adhesive and stud adhesive are not permitted in tiled areas
- > Frame movement should be limited at junctions in high risk areas such as showers - for this purpose use timber blocking to connect the two corner studs or install a min. 35 x 35 x 0.7mm Knauf metal angle fixed to the frame in internal corners

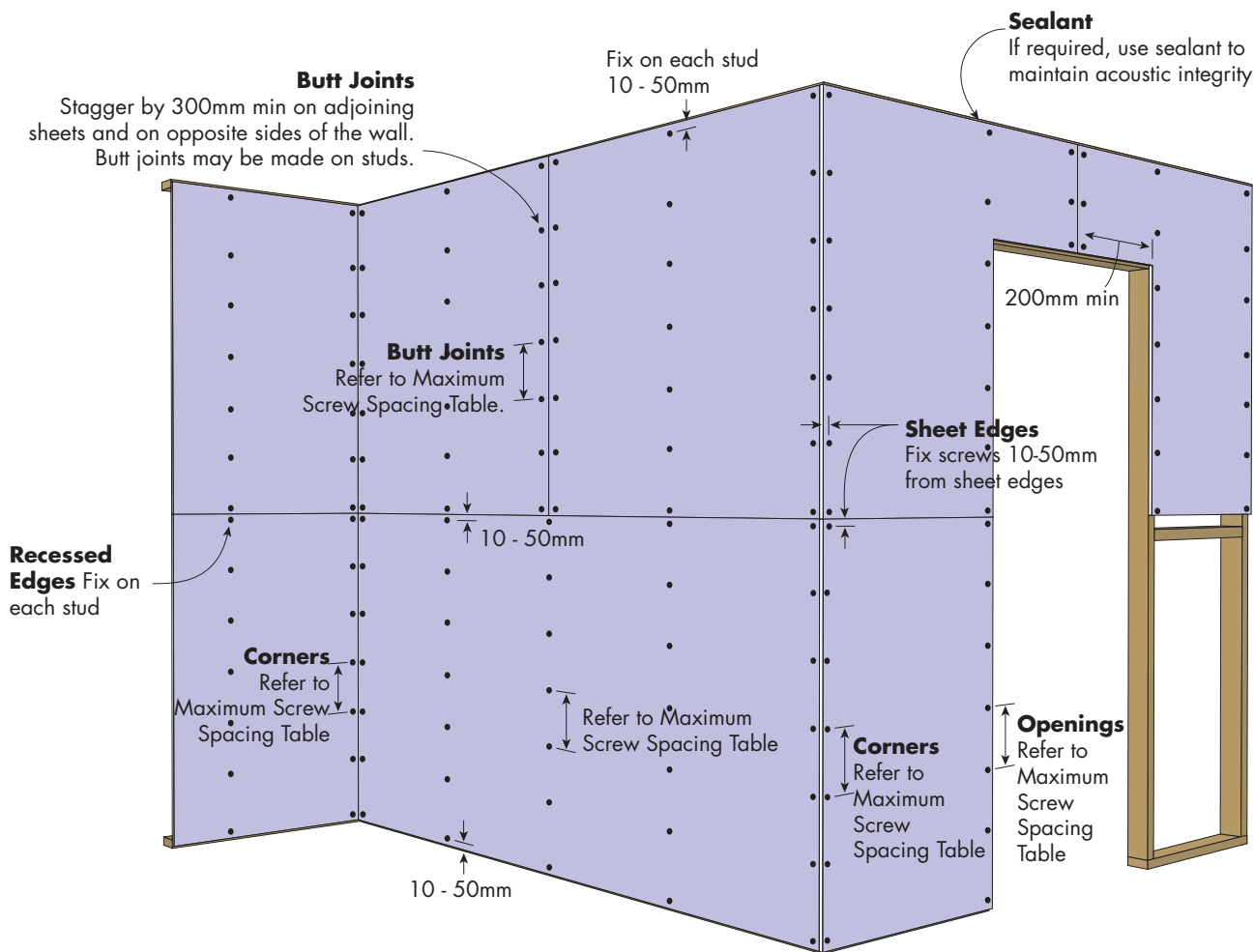
Framing

| |
|---|
| Framing members must be spaced at 600mm maximum centres. |
| Masonry walls lined with tiles on WaterShield must use the furring channel method. |

Plasterboard Fixing

| |
|---|
| Use the 'Fastener Only Method' in tiled areas. Masonry or stud adhesives are not permitted. |
| Drive fasteners to just below the sheet surface, taking care not to break the paper linerboard. |
| Laminating screws can be used to fix butt joints in the second and third layer. |
| Tiles weighing up to 22 kg/m ² (porcelain 9mm thick) may be installed when fasteners are spaced at 200mm maximum centres. |
| Tiles weighing from 22 to 32 kg/m ² may be installed when fasteners are spaced at 200mm maximum centres on studs at 450mm centres, or fasteners spaced at 100mm centres on studs at 600mm maximum centres. |

FIGURE 32 WaterShield in Tiled Areas - 1 Layer Horizontal Fastener Only Method



i For the installation of WaterShield in untiled areas, refer to the internal non-fire rated wall installation figures.

MAXIMUM SCREW SPACING TABLE FOR WET AREAS WALLS (mm)

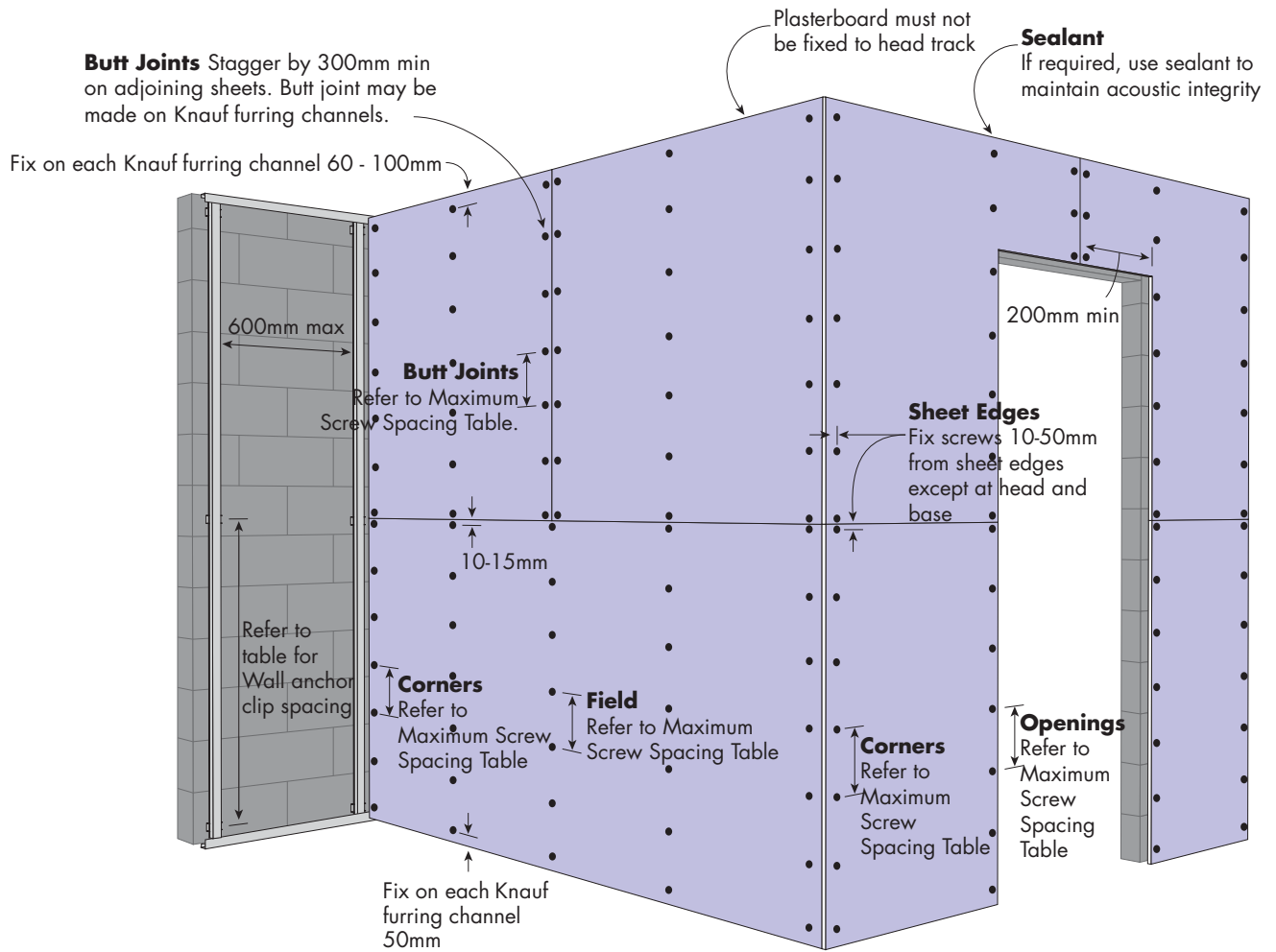
| Tile Weight | Internal Wall Stud Spacing | |
|--|----------------------------|-------|
| | 600mm | 450mm |
| Up to 22 kg/m ² (9mm porcelain) | 200 | 200 |
| 22 to 32 kg/m ² (13mm porcelain) | 100 | 200 |

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Wall Stud Spacing | | |
|------------------------|---------------------------|---------|-------|
| | 600mm | 450mm | 300mm |
| All 10mm plasterboards | N5 / C1 | N6 / C2 | C3 |

1. Wind loads in accordance with AS 4055-2012 Wind loads for housing.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

FIGURE 33 Internal Non-Fire Rated Wall - 1 Layer Horizontal
Screw and Adhesive Method over furring channels



MAXIMUM SCREW SPACING TABLE FOR WET AREAS WALLS (mm)

| Tile Weight | Internal Furring Channel Spacing | |
|--|----------------------------------|-------|
| | 600mm | 450mm |
| Up to 22 kg/m ² (9mm porcelain) | 200 | 200 |
| 22 to 32 kg/m ² (13mm porcelain) | 100 | 200 |

MAXIMUM WIND CLASS TABLE

| Plasterboard Type | Maximum Furring Channel Spacing | | |
|------------------------|---------------------------------|---------|-------|
| | 600mm | 450mm | 300mm |
| All 10mm plasterboards | N5 / C1 | N6 / C2 | C3 |

1. Wind loads in accordance with AS 4055-2012 *Wind loads for housing*.
2. Calculated using rational engineering means with a safety reduction factor of $\Phi_b = 0.8$ for plasterboard bending, and $\Phi_c = 0.65$ for fixing point connections.
3. Calculations do not include the framing which must be independently designed to suit the desired wind zone.

CONSTRUCTION DETAILS
Shower Wall Base in Wet Areas

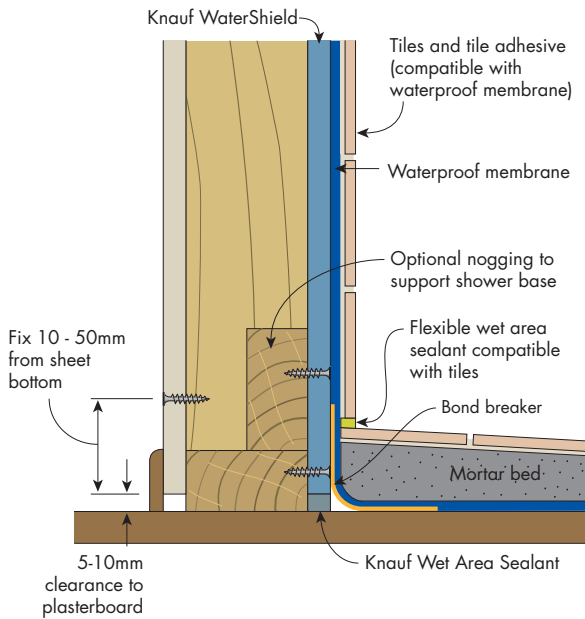


FIGURE 34 Shower Base
Internal in-situ shower tray over particleboard flooring
Class 2 membrane shown - Section

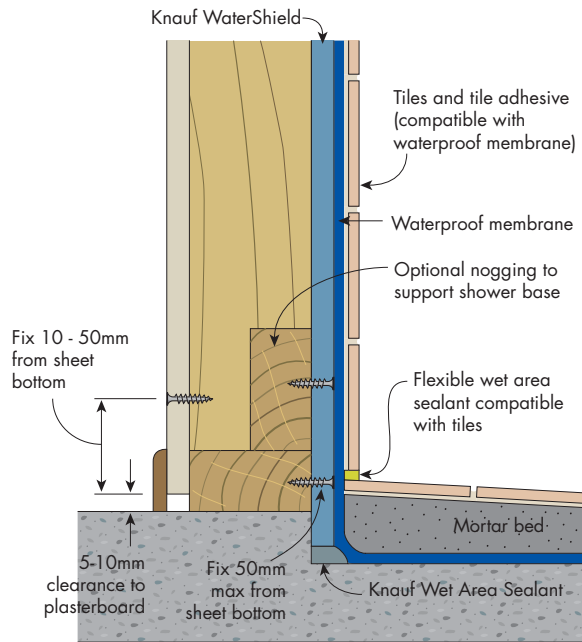


FIGURE 35 Shower Base
Internal in-situ shower tray with slab drop down
Class 3 membrane shown - Section

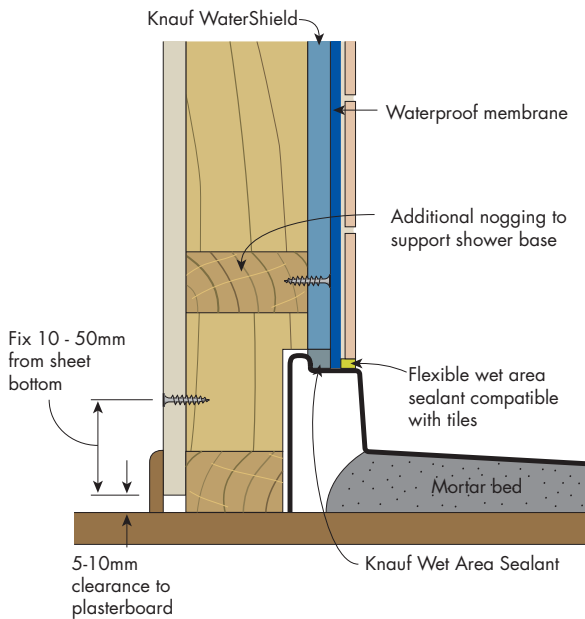


FIGURE 36 Shower Base
Pre-formed shower tray - Section

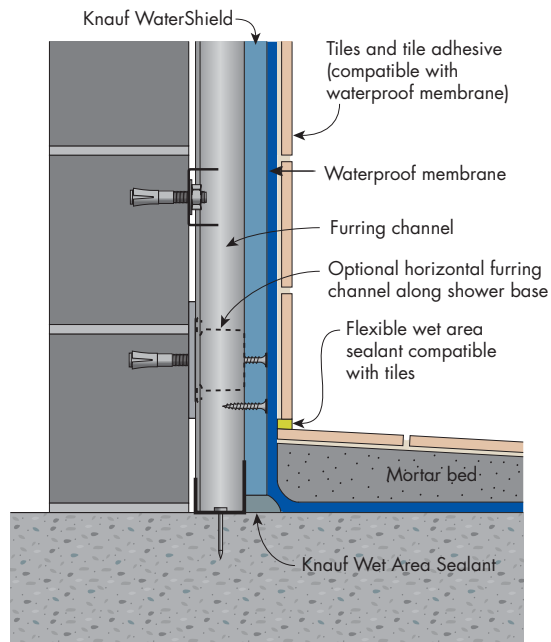


FIGURE 37 Shower Base over Masonry Wall
Internal in-situ shower tray
Class 3 membrane shown - Section

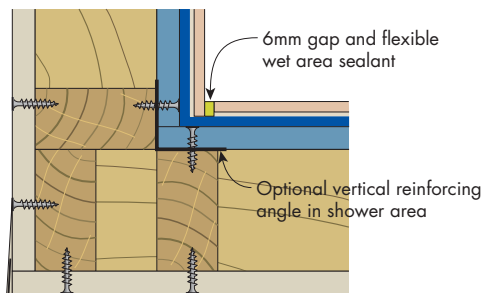


FIGURE 38 Shower Corner
Plan

i Refer to proprietary waterproof membrane manufacturer for specific application instructions.

General Wet Area Detail

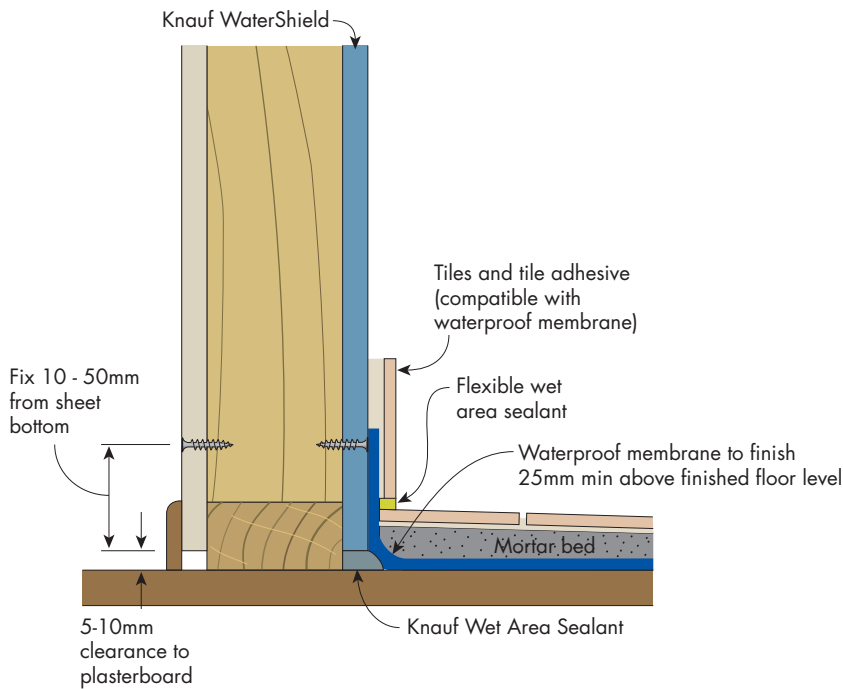


FIGURE 39 Wall Base in General Wet Area

Outside shower
Class 3 membrane shown - Section

Bath Detail

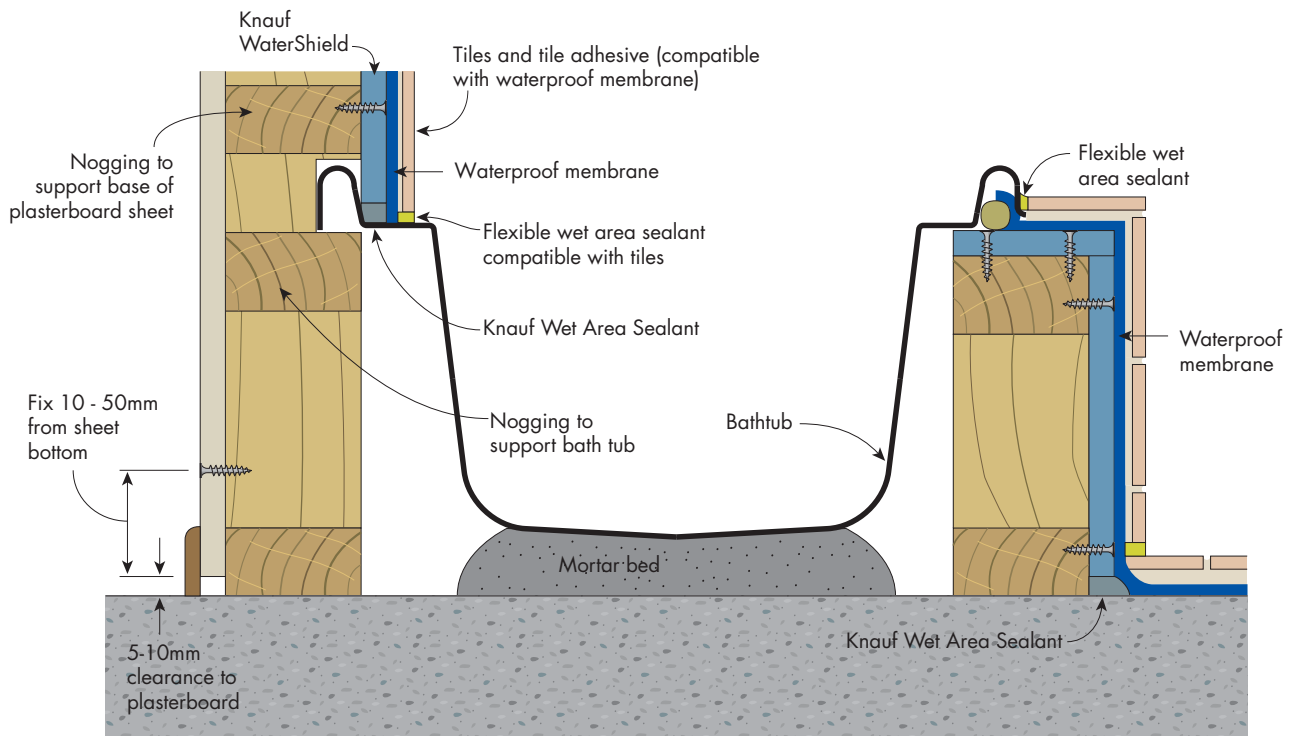



FIGURE 40 Bathtub
Section

 Refer to proprietary waterproof membrane manufacturer for specific application instructions.

Plumbing Penetrations

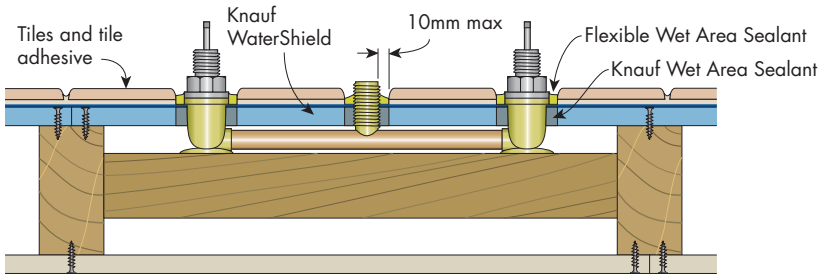


FIGURE 41 Plumbing Penetrations Plan

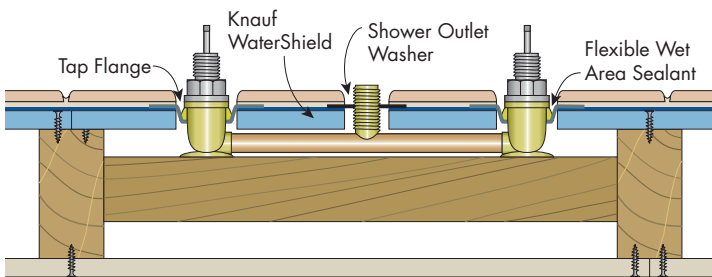


FIGURE 42 Alternative Plumbing Penetrations Proprietary tap flange and shower outlet washer - Plan

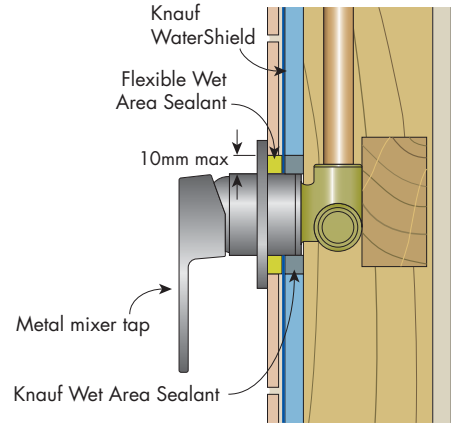


FIGURE 43 Plumbing Penetration Mixer Tap - Section

i Isolate copper and brass fitting from steel framing

DOOR JAMBS

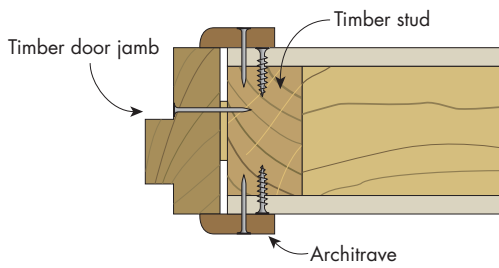


FIGURE 44 Timber Door jamb Plan

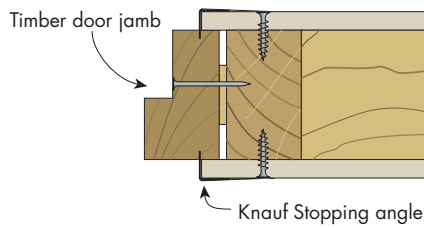


FIGURE 45 Timber Door jamb With Stopping angle - Plan

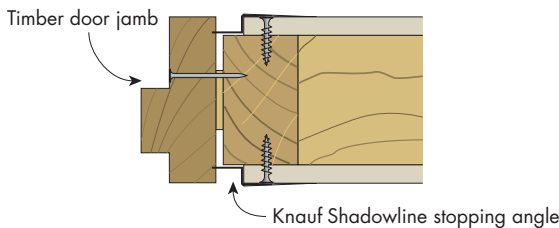


FIGURE 46 Timber Door jamb With Shadowline Stopping Angle - Plan

CONTROL JOINTS CEILING CONTROL JOINTS

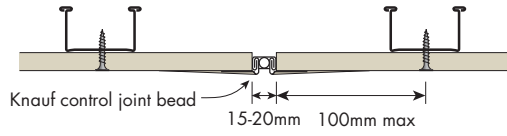


FIGURE 47 Ceiling Control Joint
Parallel to framing members - Section

WALL CONTROL JOINTS

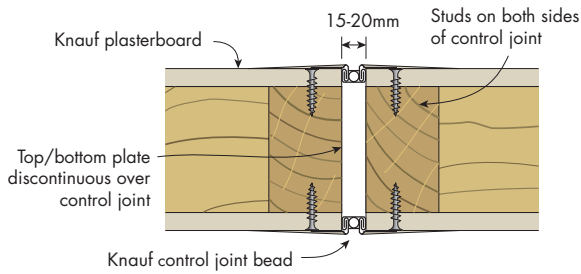


FIGURE 48 Wall Control Joint
Plan

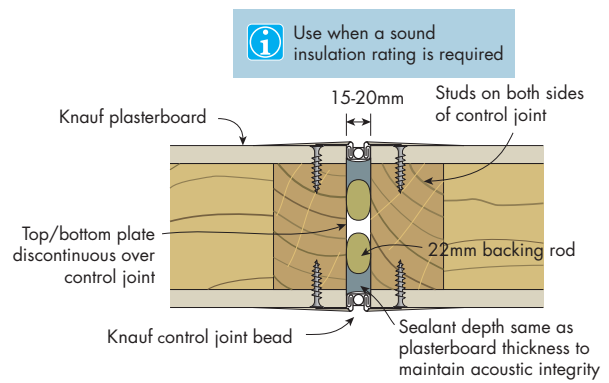


FIGURE 49 Wall Control Joint
Plan

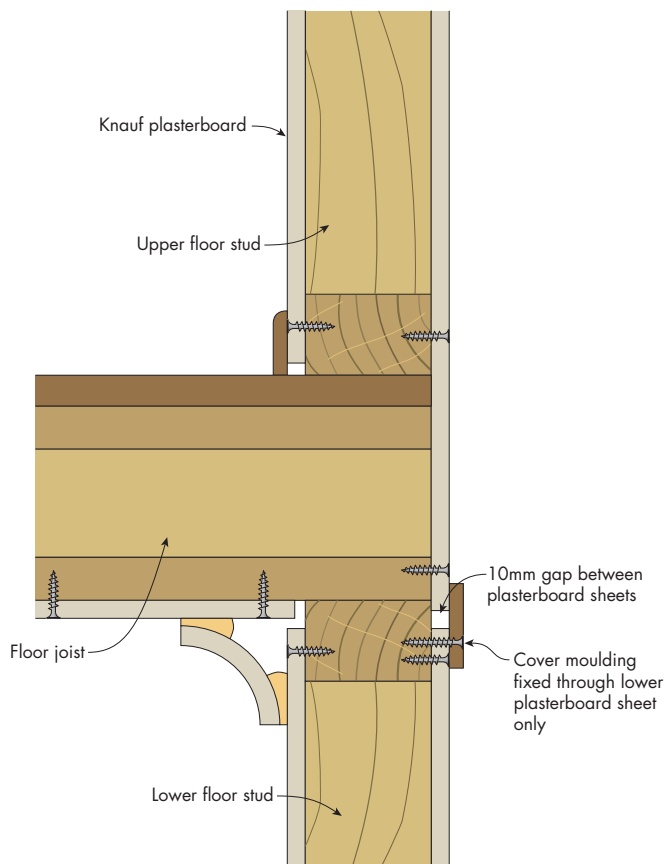


FIGURE 50 Horizontal Control Joint at Mid-floor
Section



BACK-BLOCKING REQUIREMENTS 59

BACK-BLOCKING CEILING RECESSED JOINTS 59

BACK-BLOCKING BUTT JOINTS ON CEILINGS AND WALLS 60

Back-Blocking

Back-blocking is a method for reinforcing plasterboard joints to minimise joint cracking and peaking.

Back-blocked joints use strips of plasterboard adhered to the back of the joint between the framing members. Back-blocking adhesive must be set before commencing jointing.

TABLE 7 Back-Blocking Requirements

| | Back-Blocking Required |
|---|------------------------|
| Butt joints not made on a framing member | ✓ |
| Ceiling joints in balconies and breezeways | ✓ |
| Joints using Mastalite , Mastaline or MastaCoat3 for all three coats except those made over a framing member | ✓ |
| Joints using self-adhesive fibreglass tape except those made over a framing member | ✓ |
| Joints made over a framing member | ✗ |
| Multi-layer systems | ✗ |
| Wall butt joints less than 400mm in length and more than 2 metres above the floor | ✗ |

Back-Blocking Requirements

Each level of finish has specific joint location and back-blocking requirements [Refer to Table 8, Section 4.1].

Back-Blocking Ceiling Recessed Joints

It is strongly recommended to back-block all ceiling recessed joints.

Method

- Ensure the back of the plasterboard is free of dust and dirt
- Cut back-blocking strips 200mm minimum wide

and long enough to fit loosely between the framing members with a gap not greater than 30mm at each end

- Use a notched spreader to apply MastaBlock to the back-blocking strips to form 6mm beads at right angles to the joint
- Apply back-blocking strips firmly to the back of the joint
- Where there is no access to the back of the ceiling, fix the first ceiling sheet, apply MastaBlock to the back-blocking strip and place it midway on the board, then fix the next board
- Allow MastaBlock to set before commencing any jointing

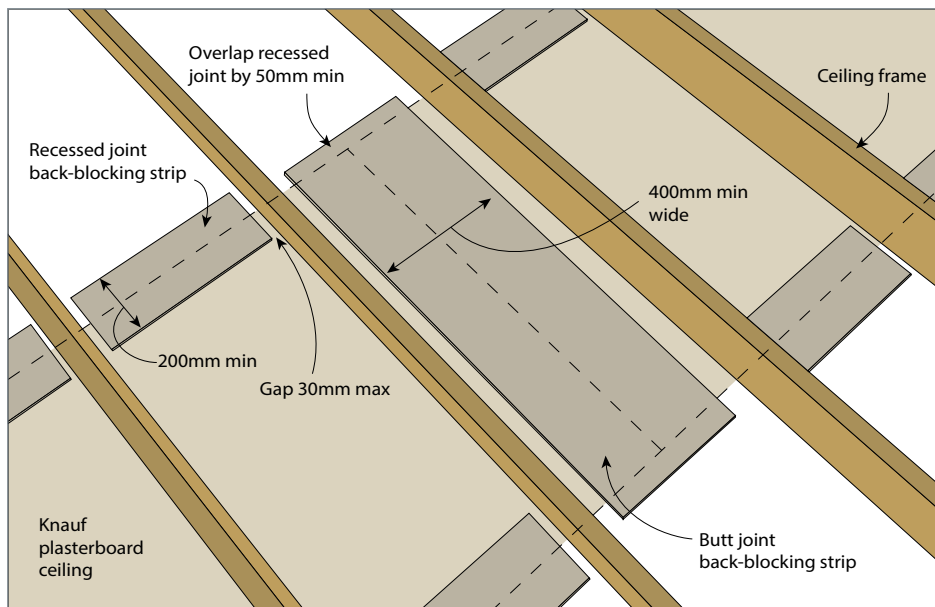


FIGURE 51 Placement of Back-Blocking Strips For Recessed and Butt Joints

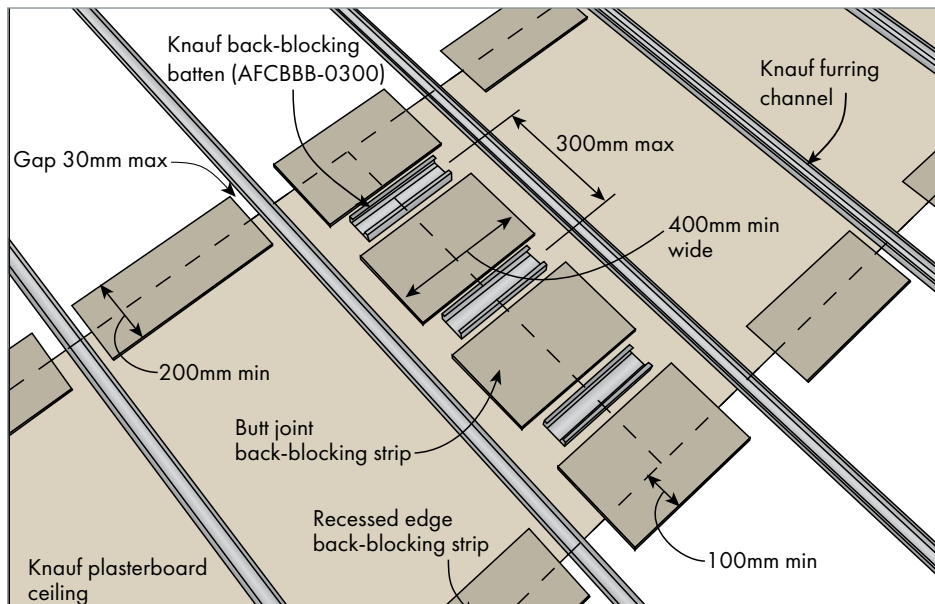


FIGURE 52 Placement of Knauf Back-Blocking Batten and Back-Blocking Strips for Recessed and Butt Joints

Back-Blocking Butt Joints on Ceilings and Walls

Butt joints are more difficult to conceal than recessed joints so they should be minimised. If butt joints are unavoidable, concealing them can be made easier by creating the joint mid-way between framing members, forming a recess and back-blocking. Butt joint requirements differ for each level of finish [Refer to Table 3, Section 3.1].

Method

- Create a recess by using either Knauf back-blocking battens as shown in Figure 3 or packers as shown in Figure 54 and 55
- Ensure the back of the plasterboard is free of dust and dirt
- Cut back-blocking strips 400mm minimum wide and long enough to fit loosely between

the framing members. Back-blocking strips are to overlap recessed joints by 50mm minimum

- Wall butt joints need support for the back-blocking strips as shown in Figure 55
- Use a notched spreader to apply MastaBlock to the back-blocking strips to form 6mm beads at right angles to the joint
- Apply back-blocking strips firmly to the back of the joint
- Where there is no access to the back of the ceiling, fix the first ceiling sheet. Apply MastaBlock to the back-blocking strip and place it midway on the board, then fix the next board
- Allow MastaBlock to set before commencing any jointing
- Where possible, avoid wall butt joints over single doors and cavity sliding doors to minimise joint cracking from vibration

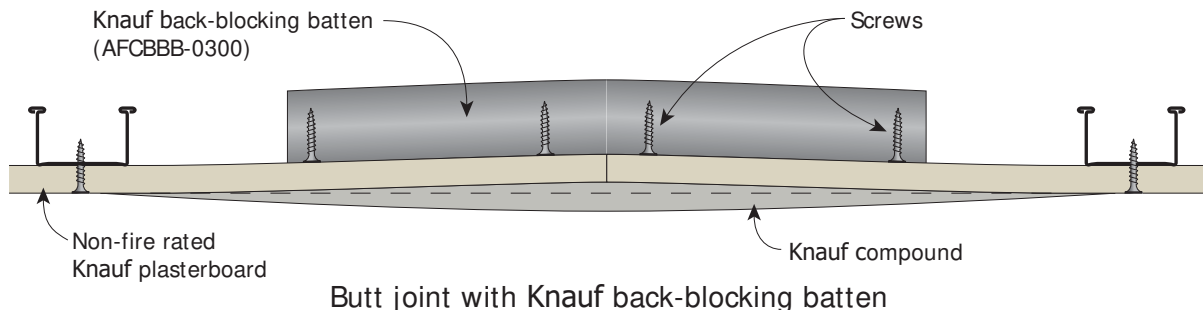


FIGURE 53 Creating a Recess at Butt Joints Using Knauf Back-Blocking Battens – Elevation

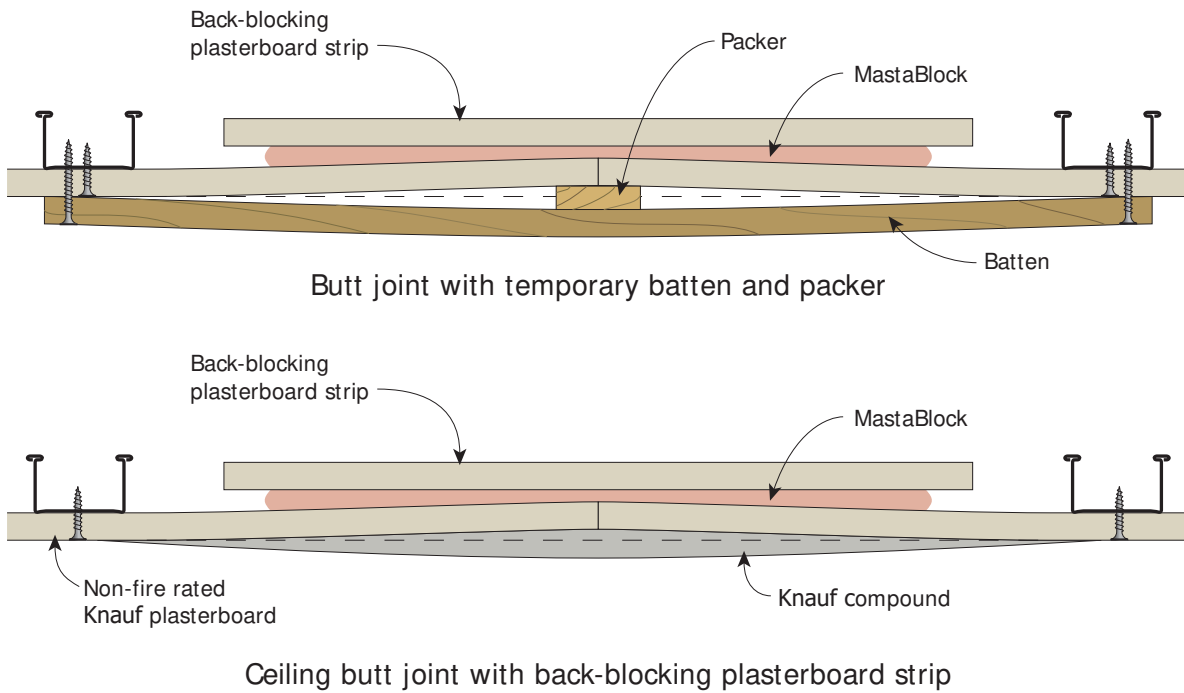


FIGURE 54 Creating a Recess at a Butt Joint – Elevation

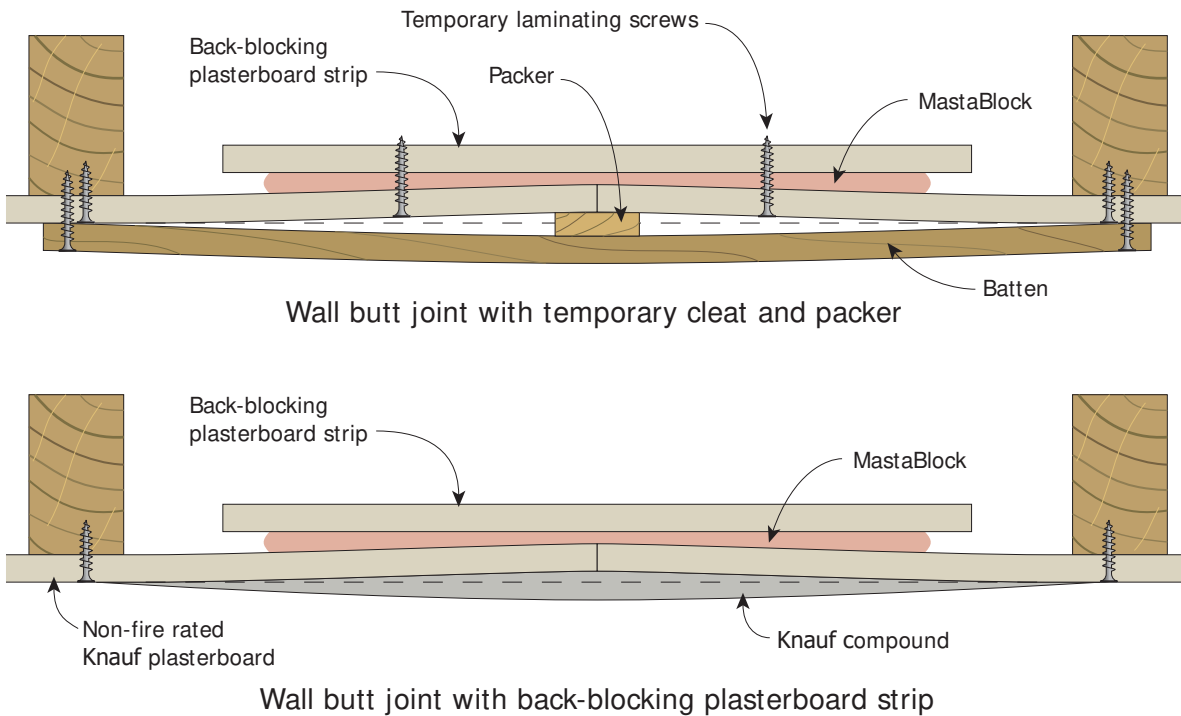
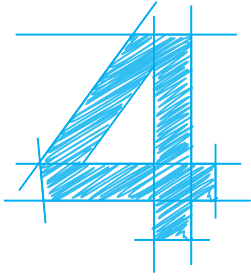


FIGURE 55 Creating a Recess at a Wall Butt Joint Using Laminating Screws – Plan View



Finishing Plasterboard



| | | |
|------------|----------------------------------|-----------|
| 4.1 | Jointing Plasterboard | 64 |
| | Compounds | 65 |
| | Three Coat Jointing System | 66 |
| | Internal and External Corners | 67 |
| 4.2 | Cornice Installation | 68 |
| | Cornice Cement | 69 |
| 4.3 | Painting Plasterboard | 70 |
| | Australian Standard Requirements | 70 |
| | Sealer Undercoat Application | 71 |
| | Paint Application | 71 |
| | Inspection | 71 |
| 4.4 | Glancing Light | 72 |
| | Minimising Glancing Light | 73 |



COMPOUNDS **65**

**THREE COAT
JOINTING SYSTEM** **66**

**INTERNAL AND
EXTERNAL CORNERS** **67**

Jointing Plasterboard

Plasterboard walls and ceilings are jointed using compounds and reinforced with paper tape or corner beads.

All joints, internal and external corners and fastener heads must be evenly finished with compounds and lightly sanded to remove tool marks and ridges prior to decoration.

Compounds

Use Knauf compounds with Knauf plasterboard systems. Performance of all systems in this guide rely on using nominated Knauf compounds.

To achieve the FRL, fire rated systems require, as a minimum, Knauf MastaMate paper tape and two coats of MastaBase/MastaLongset or three coats of MastaLite. Alternatively use Knauf Bindex Fire & Acoustic Sealant as permitted and detailed in the Bindex Technical Data Sheet. External fire rated wall systems with a moisture barrier wall wrap and non-combustible cladding covering the plasterboard do not require jointing.

Joints in wet areas must use paper tape. Areas to be tiled must only use MastaBase or MastaLongset.

Multi-layer systems only require face layer joints to be set.

There are two types of products used for jointing plasterboard: chemical setting compounds and air-drying compounds.

CHEMICAL SETTING COMPOUNDS

Chemical setting compounds are plaster based, supplied in powder form and when combined with water harden by chemical reaction. They create the strongest joint.

Chemical setting compounds can be completely set but still damp. In cold and humid conditions, additional coats of chemical setting compounds can be applied to the joints when the compound is hard but before it is completely dry.

Hot and dry conditions may dry out the compound before it sets resulting in reduced strength and tape adhesion issues. Accelerating and retarding additives must not be used as they can also reduce strength.

Chemical setting compounds (eg. MastaBase, MastaLongset) **must not** be applied over air-drying compounds.

AIR-DRYING COMPOUNDS

Air-drying compounds are premixed and harden by drying out. They are softer than chemical setting compounds, and are designed for easy sanding.

Previous coats of air-drying compound or chemical setting compounds must be completely dry before applying the next coat and before sanding. MastaTape Universal dries strong and is harder to sand.

In cold and humid conditions air-drying compounds may take longer to dry. Ventilation such as open windows or an exhaust fan may be required. Air-drying compounds must not be used in temperatures lower than 10°C.

TABLE 8 Type and Use of Finishing Compounds

| Compounds | Type | Possible Compound Applications | | | Wet Areas Under Tiles | Fire Rated Systems |
|------------------------------|-------------------------|--------------------------------|-----------------|--------|-----------------------|--------------------|
| | | Bedding | Second | Finish | | |
| Bedding Cements | | | | | | |
| MastaBase | Chemical setting powder | ✓ | ✓ | | ✓ | ✓ |
| MastaLongset | Chemical setting powder | ✓ | ✓ | | ✓ | ✓ |
| Finishing Compounds | | | | | | |
| MastaFinish | Air-drying premixed | | | ✓ | ✗ | ✓ |
| MastaGlide | Air-drying premixed | | | ✓ | ✗ | ✓ |
| All Purpose Compounds | | | | | | |
| MastaLite | Air-drying premixed | If back-blocked | If back-blocked | ✓ | ✗ | ✓ |
| MastaCoat3 | Air-drying premixed | If back-blocked | If back-blocked | ✓ | ✗ | ✗ |
| MastaLine | Air-drying premixed | If back-blocked | If back-blocked | ✓ | ✗ | ✗ |
| MastaTape Universal | Air-drying premixed | ✓ | ✓ | ✓ | ✗ | ✓ |

Three Coat Jointing System

The Three Coat Jointing System consists of a Bedding Coat, a Second Coat and a Finish Coat of compound. Level 4 Finish and Level 5 Finish must use the Three Coat Jointing System for all joints and external corners.

Internal corners only require a Bedding Coat and a Finish Coat.



- MastaMate Paper Tape is strongly recommended for all joints.
- Joints made using MastaMate Paper Tape are stronger and less prone to defects than those made with fibreglass tape. For the strongest joint, MastaMate Paper Tape is recommended with two coats of **MastaBase** or **MastaLongset** and a final coat of **MastaFinish**, **MastaGlide**, **MastaLite** or **MastaLine**.
- If fibreglass tape is used, all joints must be back-blocked. Fibreglass tape is not permitted for use in wet areas or fire rated systems.

BEDDING COAT (FIRST COAT)

Method

- Fill any gaps more than 4mm at the joint and allow compound to set and dry
- Using a 150mm broadknife, evenly fill the recess with compound [Refer to Figure 59 for minimum coat widths]
- Place tape along the joint and bed it into the compound, removing excess compound and any air bubbles from behind the tape [Refer to Figures 56 & 57]
- Apply a skim coat of compound over the tape [Refer to Figures 56 & 57]

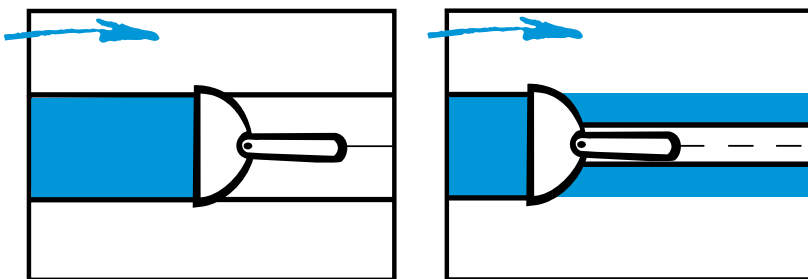
SECOND COAT

Method

- Allow the first coat of compound to set and dry
- Use a 200mm trowel to apply a second coat of compound [Refer to Figures 58 and to Figure 59 for minimum coat widths]
- Feather the joint edges to remove excess



Use broadknives, or a curved trowel for recessed joints and a flat trowel for butt joints on framing members.



FIGURES 56 & 57 Bedding Coat

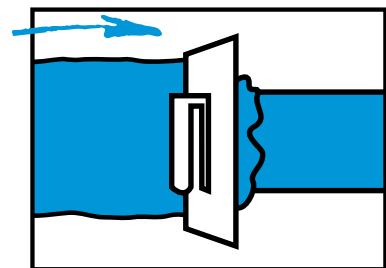
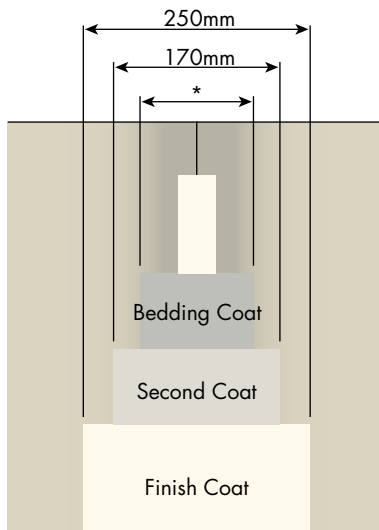
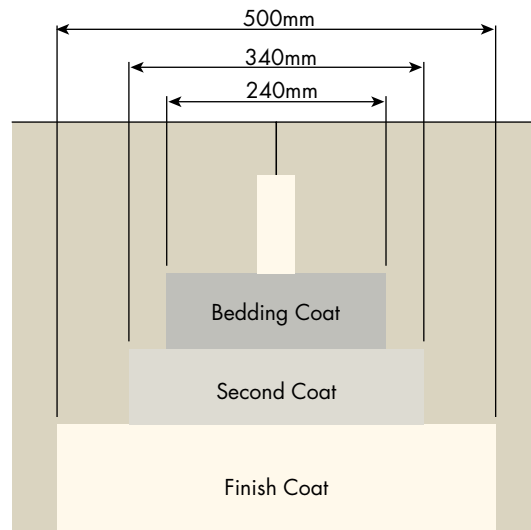


FIGURE 58 Second Coat



Recessed Joint and back-blocked Butt Joints
* Fill recess completely

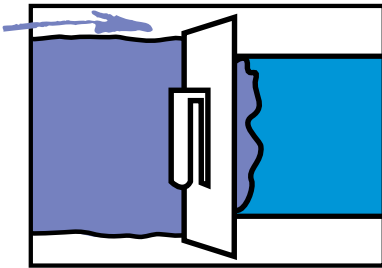


Butt Joint made over a framing member

FIGURE 59 Minimum Coat Widths After Sanding

FINISH COAT (THIRD COAT)**Method**

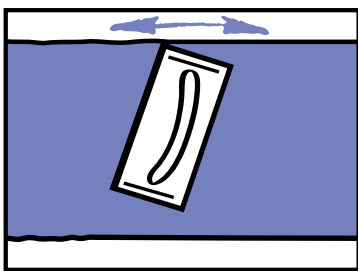
- Allow the second coat to set and dry and lightly scrape off any lumps and high spots of compound
- Use a 280mm trowel to apply a third coat of compound [Refer to Figure 60 and to Figure 59 for minimum coat widths]
- Feather the joint edges to a smooth even surface, removing any excess
- Allow the compound to fully dry before sanding

**FIGURE 60** Finish Coat**FASTENERS**

- Cover fastener heads with at least two coats of compound, applying each coat in a different direction

SANDING**Method**

- Lightly sand to a smooth even surface using a sanding float and 180 grit paper or 220 sanding mesh - use finer paper for MastaLite (e.g. 220 paper) [Refer to Figure 61]
- Do not expose or scuff the paper linerboard while sanding
- Use power sanders with care as they can easily over sand the joint



- A finished joint should have a slight crown

FIGURE 61 Sanding**Internal Corners****Method**

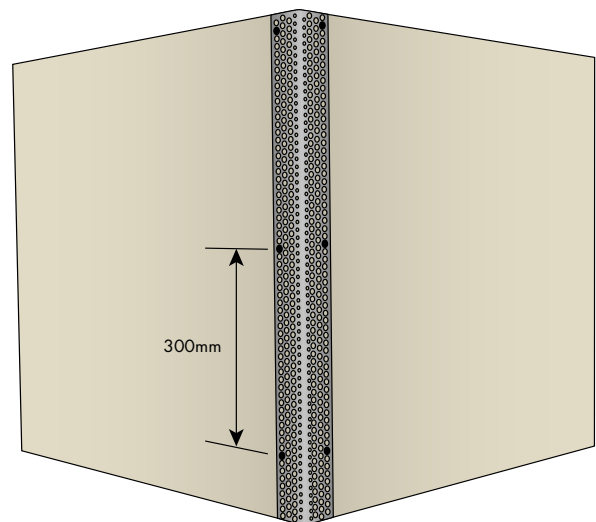
- Use a 75mm broadknife to apply compound to the corner
- Fold MastaMate Paper Tape in half and bed it into the compound using a corner taping tool
- Cover the tape with a thin coat of bedding compound and remove any excess and allow to set and dry
- Apply a finish coat with a 100mm broadknife to both sides of the angle
- Feather the edges and finish the joint with an internal angle finishing tool and allow to dry
- Lightly sand to a smooth finish before painting

External Corners**Method**

- Position a corner bead ensuring that it is plumb and straight [Refer to Figure 62]
- Fix the bead in place using fasteners or staples at 300mm centres on both sides

Treat external corner beads with the three coat jointing system as described previously. The minimum width of the three coats on both sides of the external corner is:

- Bedding coat 200mm
- Second coat 230mm
- Finish coat 250mm

**FIGURE 62** Knauf Corner Bead on External Corner



Cornice Installation

Cornice is used to complete the decoration of the building. Cornice is fixed to walls and ceilings using cornice cements, which are chemical setting compounds available in powder form.

Cornice cements are selected depending on the length and stability of the setting time, as well as their features for practical application, such as the ability to work back the cornice cement, polish mitres and the instant grab strength.

Cornice Cements

TABLE 9 Type and Use of Compounds – Cornice Cements

| Compounds | Type | Setting Time | Applications | | |
|--------------------------------|-------------------------|--------------|--------------|-----------|----------|
| | | | Minutes | Cornicing | Patching |
| Cornice Cements | | | | | |
| MastaCove45 | Chemical Setting Powder | 45 | ✓ | ✓ | |
| MastaCove75 | Chemical Setting Powder | 75 | ✓ | ✓ | |
| MastaSmooth | Chemical Setting Powder | 45 | ✓ | ✓ | |
| 3-in-1 Specialty Cement | | | | | |
| MastaFix20 | Chemical Setting Powder | 20 | ✓ | ✓ | ✓ |

Method

- Ensure that wall and ceiling surfaces are free of dust and dirt
- Measure and cut all cornices to the required lengths. Cut internal and external mitres using a mitre box
- Avoid joints in straight runs where possible - if necessary, mitred joints are recommended
- Measure and mark cornice projection on wall and ceiling to ensure accurate placement
- Mix only the quantity of cornice cement that can be used within the setting time
- Spread a 10mm continuous bead of cement along both back edges and the mitred end of the cornice [Figure 63]
- Press the cornice into place and if necessary hold with temporary nails in the wall and ceiling along the edges of the cornice [Figure 64]
- Clean off excess and remove nails when cement has partially set [Figure 65]
- Straight stop along cornice edge at wall and ceiling and finish mitres using a small cornice tool [Figure 66]
- Wipe down the cornice with a wet sponge [Figure 67].

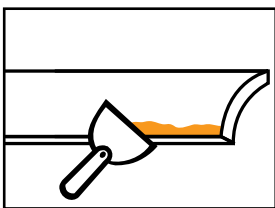


FIGURE 63
Butter Up

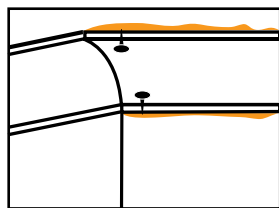


FIGURE 64
Position Cornice

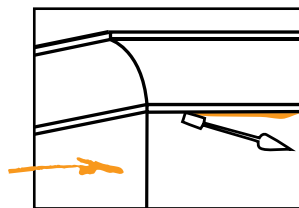


FIGURE 65
Clean Off Excess

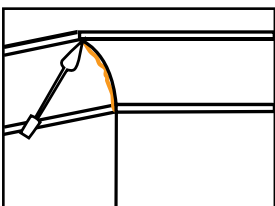


FIGURE 66
Mitres

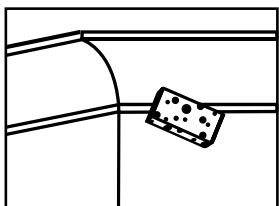


FIGURE 67
Wipe Down



| | |
|---|-----------|
| AUSTRALIAN STANDARD REQUIREMENTS | 70 |
|---|-----------|

| | |
|-------------------------------------|-----------|
| SEALER UNDERCOAT APPLICATION | 71 |
|-------------------------------------|-----------|

| | |
|--------------------------|-----------|
| PAINT APPLICATION | 71 |
|--------------------------|-----------|

| | |
|-------------------|-----------|
| INSPECTION | 71 |
|-------------------|-----------|

Painting Plasterboard

Australian Standard Requirements

Painting systems and methods are detailed in Australian Standard AS/NZS 2311, Guide to the painting of buildings.

If painting plasterboard, a **Three Coat Paint System** must be applied to achieve the best finish. This consists of a sealer undercoat followed by two top coats. Both the quality of the paint and how it is applied have a large effect on the finished appearance of the plasterboard.

Two coat paint systems are not nominated by AS/NZS 2311 as they often do not meet the customer's expectations by showing up joints through texture and sheen variations.

Sealer Undercoat Application

RECOMMENDATIONS

- Ensure surfaces are set and dry
- Lightly sand any minor surface defects and brush down surfaces to remove dust
- Apply a sealer undercoat suitable for plasterboard, preferably with a roller - plasterboard that has been exposed to sunlight and/or is discoloured will require a stain sealer undercoat
- Ensure that the sealer undercoat is applied such that the plasterboard paper fibres remain flat
- Check for any unsuitable surface imperfections and repair
- Lightly sand with fine to medium grade paper before applying top coats
- Avoid overworking sealer undercoat on plasterboard joints to avoid paint lifting

Paint Application

RECOMMENDATIONS

- Ensure surfaces are dry
- Lightly sand any minor surface defects and brush down surfaces to remove dust
- Cut in edges with a brush

- Apply paint to the broad areas with an appropriate 10-14 mm nap synthetic roller - the roller nap gives a slight texture that improves the overall evenness of finish
- Ensure each paint film is dry and manufacturer's recoat times are followed before applying the next coat

If plasterboard is to be spray painted, the paint must not be diluted more than the manufacturer recommends. While the sealer undercoat is still wet, the surface should be back rolled to leave a 'roller finish'. This helps to equalise the surface texture between the plasterboard and the set joints. For best results also back roll 2nd and 3rd coats. Any minor paint touch-ups can then be done with a roller rather than having to re-spray.

Inspection

The final inspection of a plasterboard wall or ceiling occurs after painting. AS/NZS 2589 AS/NZS 2311 recommend that visual inspection of finished surfaces of plasterboard be carried out in ordinary lighting, sighting from a distance of at least 1.5 metres from the surface. If differences of appearance are not clearly discernable the finish is usually considered acceptable.

For further information on painting plasterboard visit www.awci.org.au (industry publications).



To achieve a good quality painted finish, the following recommendations in addition to the three coat paint system should be followed:

- Apply paint according to the manufacturer's recommendations
- Avoid spraying or brushing which require advanced application techniques
- Choose white or light colours, flats for ceilings and matt or low sheen paints for walls
- Select a Level 5 Finish when using medium to high gloss or dark coloured paints, or in areas of glancing light in accordance with AS2589 as these paints highlight any minor imperfections in the plasterboard and make the joints more visible



For more information on glancing light, painting and other subjects affecting the appearance of plasterboard walls and ceilings, refer to:

- www.awci.org.au (Association of Wall and Ceiling Industries – Australia and New Zealand)
- www.apmf.asn.au (Australian Paint Manufacturers Association)



Glancing Light

Glancing light is natural or artificial light that is cast along a surface. Glancing Light refers to light being cast along the face of a surface showing any minute undulation. As a result of this light being cast, a shadow is produced on the other side of the undulation. This draws attention to surface texture variations, such as plasterboard joints and patches, which under more diffused light would not be visible.

The glancing light condition can occur even when the wall or ceiling has been built according to AS/NZS 2589. Glancing light effects are directly linked to the type and placement of light sources relative to ceilings and walls.

Glancing light can highlight the following surface conditions:

- Sheet joints
- Surface irregularities
- Patches
- Variations in paint application technique.

Attention can also be drawn to minor deviations inherent in the manufacture and installation of plasterboard.

Minimising Glancing Light

INTERIOR DESIGN

The following are recommendations to reduce the effect of glancing light:

- Avoid full length windows in direct sunlight
- Avoid locating windows close to perpendicular wall and ceiling surfaces during design phase
- Diffuse light entering a room by using curtains, blinds or other window treatments
- Introduce curtains or blinds where windows are close to wall and ceiling surfaces
- Use low gloss, light coloured paints applied with a brush or roller.

FRAMING

Framing members should be straight and aligned.

SHEET ORIENTATION

Plasterboard sheets should be fixed parallel to the light source. Also arrange the sheets to minimise the number of joints.

LIGHTING

Glancing light caused by artificial lighting can be addressed by changing the type and/or positioning of the light fittings. Natural lighting problems are normally caused by building geometry. An example is running windows right to the edge of the ceiling or wall line.

The following are recommendations for design of light fittings:

- Use recessed downlights and recessed fluorescent tubes
- Shade batten-fixed bulbs on the ceiling and table lamps
- Avoid designs that will create glancing light conditions where possible
- Position downlights so that they do not shine down the surface of a wall.



For a premium Level 4 Finish use **OPAL** [Refer to the latest **OPAL** brochure on the website].

LEVEL 5 FINISH

A Level 5 Finish is the highest level of finish possible and can assist in reducing the effect of glancing light. By covering the entire surface, the skim coat of a Level 5 Finish fills any slight impressions in the surface, and removes the difference in texture and paint absorption between plasterboard and the joints. The framer, plasterer and painter all need to cooperate and contribute to providing a Level 5 Finish. Even when applied correctly, a Level 5 Finish is no guarantee that all surface deviations will be invisible, only minimised [Refer to Section 3.1 for details on Level 5 Finish].



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