AWCI
Association of WALL & CEILING INDUSTRIES Australia & New Zealand

Edition Two
October 2018

TRADE GUIDELINES AND INFORMATION

Walls and Ceilings

The information contained in this publication has been compiled by the Association of Wall and Ceiling Industries of Australia and New Zealand Technical Committee. The Technical Committee has a broad range of contractor, supplier, manufacturer and technical experience.

This document has been developed with both education and industry "best practice" in mind. The aim is to provide designers, builders, contractors and home owners with information on the wall and ceiling industry and factors that influence the quality of finish.

The intended use is as a guide only and does not substitute for either manufacturers specifications and/or relevant standards. For more detailed information, please contact the relevant product supplier and/or refer to the relevant standard.

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Our thanks are extended to the following companies for their support in providing technical advice:

BGC Plasterboard Fibre Cement · GIB · GYPROCK Everything else is just plasterboard · CSR · James Hardie · KNAUF · RONDO · USG BORAL INNOVATION INSPIRED BY YOU.

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Australia and New Zealand

This trade guideline has been prepared to be relevant to both Australia and New Zealand. Care has been taken to write the document for conditions in both countries, however, some issues are more specific to Australia. New Zealand tradespeople should check with their manufacturer or AWCI technical contact where a discrepancy is identified.

Residential v Commercial

Many of the comments in this document are relevant to all aspects of the wall and ceiling trade, however, the main focus of the document is toward residential tradespeople.

Future editions will include more commercial trade information.

Trade Terminology

Please consider the following when reading this trade guideline as trade terminology can change from state to state, country to country and even within the trade.

Phrase	Meaning
Framing, Partitions, Stud and Track	All relate to stud partition wall systems
Fixing, Sheeting, Lining, Throwing and Hanging board	Refers to the installation of plasterboard to walls and ceilings
Setting, Flushing, Finishing, Trowelling, Stopping	Refers to the application of plaster compounds to joints, joins and angles
Joints, Joins, Recess Angles, Butties	Is where boards meet or join together
Ornamental, Fancy, Decorative, Cast	Refer to pre-cast and fancy paper faced decorative cornice
Compound, Base, Topping, Mud, Mix, Gauge	Relate to the mixed plaster compounds used in the taping, filling and finishing of joins
Broadknife, Blades, Scrapers, Trowels	Some tools used in the application of compounds to give a smooth, paintable, plaster finish
Dwang, Nogging, Nog, Trimmers	Refers to the horizontal bracing used between wall studs and ceiling joist/trusses

General Overview

Plasterboard is a machine made board consisting of a core essentially of cast Gypsum plaster with both faces and the longitudinal edges incased in a paper liner. When installed in ceilings and walls, plasterboard may be subject to stresses from underlying structural movement, truss settlement & flexing, creep, reactive soils, wind loads, ceiling traffic, its use as a structural bracing element loading of down lights, insulation, air conditioning ducting, vents and the like.

No sheet lining material or substrate has a surface that is perfectly flat or totally free from minor imperfections.

Although it is impossible to get a perfectly flat or blemish free interior surface, it is possible to reduce the impact of manual finishing processes and lighting effects to achieve “the appearance” of blemish free flatness from the normal viewing position.Lighting design plays an obvious role in disguising minor (albeit acceptable) surface blemishes.

TABLE OF CONTENTS

1. DESIGN CONSIDERATIONS (p. 5-24)
a. Summary of Roles and Responsibilities, including Void Protection
b. Framing Material (Timber and Steel)
c. Levels of Finish (3, 4, 5)
d. Glancing Light
e. Loads On Ceilings
f. Garage Ceilings
g. External Ceilings (including wind loading)
h. Roof Space Ventilation
i. Post Plastering Installations

2. IS THE SITE PLASTERBOARD READY? (p.25-30)
a. Is the Site Plasterboard Ready?
b. Safe Unloading and Delivery of Plasterboard on Site
c. Safe Work Method Statement
d. Storage of Plasterboard on Site

3. INSTALLING INTERIOR LININGS (p. 31-46)
a. Background Framing
b. Alternate Fixing Methods for Walls and Ceilings
c. Expansion or Control Joints
d. Wet Areas (Walls & Ceilings)
e. Back blocking
f. Garage Ceilings
g. External Ceilings

4. FINISHING INTERIOR LININGS (p. 47-62)
a. Recommended Materials and Systems
b. Finishing of Joins (including tolerances)
c. Banjo Box & Setting Boxes CorrectApplication
d. Three Coat Jointing System
e. Sanding
f. Cornice
g. Completion of Plastering Stage - Pre Paint Checklist
h. Finishing & Decoration of Plasterboard
i. Levels of Finish
j. Painting of Plasterboard Surfaces

5. INSPECTION (p. 63-70)
a. Called Glancing Light
b. Warranties
c. For Renovations and Repairs

6. TROUBLESHOOTING (p. 71-87)
a. Frame / Substrate Movement
1 - Wavy Surfaces
2 - Fastener Popping
3 - Centre Cracking
4 - Joint Peaking / Ridging
5 - Stud Adhesive Bond Failures
b. Taping / Joint Defects
1 - Tape Dry Out
2 - Tape Lift / Edge Cracking
3 - Blisters or Air Bubbles in Tape
4 - Tram Lines / Tracks
5 - Compound Defects
6 - Excessive and / or Delayed Shrinkage
7 - Joint Darkening / Staining
8 - High Crowns
9 - Starved / Hollow Joints
c. Trim Defects
d. Surface Decoration Defects
1 - Finish Gloss Variation
2 - Checking / Cracking
3 - Shadowing
4 - Peeling / Flaking
5 - Fibre Raise Adjacent to Joint Areas
6 - Discolouration
e. Protection / Safe work

1. DESIGN CONSIDERATIONS

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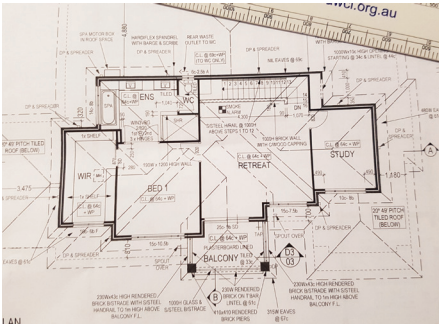
h. Roof Space Ventilation

A) SUMMARY OF ROLES AND RESPONSIBILITIES

Achieving a quality result in construction relies on every party involved knowing their responsibilities and doing their job to standard. Problems arise when one of the parties in the chain undertakes deficient work or were not aware of what they were meant to do. It is often too late by that stage for the next trades on the project to rectify or adjust the work to the satisfaction of the client and disputes result. Awareness of everyone's roles and responsibilities can help to achieve a positive result and avoid disputes.



Designer

- Convert client brief into building design,including taking the necessary measures to limit impact of movement on gypsum linings
- Determine Building Code requirements including, but not limited to, the appropriate design loads, fire protection requirements, structural, thermal, seismic and acoustic ratings
- Determine level of finish desired and consider factors that will influence the outcome e.g. natural and critical illumination, placement of lighting, windows, environment, energy efficiency requirements
- Determine location of control joints
- That ceiling loads maybe compromised in tiled roofs without sarking
- When finalising the specification and contract documentation, include documentation that provides enough detail to avoid different interpretation of what is required. Where applicable, include set out points, ceiling levels, wall elevations, reflected ceiling plans should indicate the layout of light fittings, air registers, sprinkler heads etc. Similarly wall elevations should show all penetrations, wall mounted fittings etc.

Builder

- Project management and supervision including having the site ready for each incoming trade
- Ensure that all trades coordinate to achieve the specified level of quality and finish

Carpenter

- To ensure all frame is plumb and true prior to plasterboard application
- To ensure framing noggins are flush with framing studs
- To ensure truss support brackets are flush with truss chords
- To ensure correct amount of trimmers are installed at the change of truss direction and perimeter of rooms
- The frame is checked by the builder and passed off prior to the plasterer commencing installation

Electrician/Plumber/HVAC Services

- To ensure all services are permanently positioned prior to the installation of plasterboard

Note: Plasterboard ceilings must not support electrical fittings, lights etc.

Mechanical Services

- To ensure all mechanical services are permanently positioned and at least 35 mm below surface level of the frame, excluding outlets, prior to the installation of plasterboard

Note: Plasterboard ceilings must not support mechanical services e.g. air conditioning units, extraction fans.

Plasterer/Fixer/Stopper

- To ensure plasterboard is fixed in accordance with both the manufacturers' specification and the contract requirements
- To ensure plaster finishing is carried out in accordance with relevant standards, the manufacturers' recommendations and the requirements of the contract
- To ensure all set (flush finished) joints, screw heads and angles are sanded down in preparation for painting
- To ensure a pre-paint inspection is carried out with the builder/ supervisor/owner before (or in some cases after) the first paint

coating is applied (mark up with pencil)
- To ensure all patching of the pre-paint inspection is sanded down and made good prior to subsequent coats of paint being applied

Painter

- To correctly apply the specified paint system in accordance with manufacturers' recommendations
- To ensure the correct number of type and paint coats and thickness (minimum 25 microns per coat) are applied in accordance with AS/NZS 2311.
- Specification and application in accordance with AS/NZS 2311 is one coat of sealer undercoat and two coats of top coat, DFT of 75 microns.
- Spray painting is not a recommended method of application of paint.
- However any sprayed surface to be backrolled with a medium pile wet roller immediately, especially the first coat
- To ensure pre-paint inspection patching is spot sealed prior to subsequent coats being applied
- To ensure minor imperfections are filled, sanded and spot sealed
- To ensure first coat is sanded to remove foreign particles and dusted down prior to finishing coats applied

Insulation

- To ensure all insulation is installed observing load limit specifications on plasterboard ceilings
- To ensure that wall insulation does not protrude beyond the face of the studs

Note: Trades installing insulation post plasterboard installation, must be careful not to cause stress on or dislodge previous work.

With an understanding of these responsibilities, the wall and ceiling contractor can set up check measures at each step to assist the planning process.

WALL AND CEILING CONTRACTOR: Project Check Points

CHECK POINT 1 - In the Office

- Check contract documentation for ceiling and wall specification/s
- Ensure required levels of finish are specified in accordance with AS/NZS2589
- Review manufacturer's published data against specification and contract requirements
- Where external ceilings are to be installed ensure that the wind loading and the appropriate coating system is specified. Fixing method to be fully mechanically fixed at 300 mm centres to metal or wood battens at maximum 450 mm centres including the perimeter with 30mm W screws to wood battens and 25 mm S screws to metal battens.
- Determine appropriate direction for wall and ceiling linings, considering building layout
- Itemise, cost and submit any discrepancies prior to commencing work on site
- Itemise, cost and submit any additional works required for code compliance
- Do not commence any variations to the original contract until agreed by all parties and signed off in writing, covering scope of works, time and cost

CHECK POINT 2 -Pre-Installation

- Review requirements for the specified level of finish with the builder/painter
- The site is ready for plasterboard delivery in accordance with the GBMA "A Guide to Safe Site Delivery of Plasterboard and Associated Products"
- Other trades have completed "pre-plasterboard" activities e.g. plumbing, electrical, insulation, frame inspection.
- The framing has been installed in accordance with appropriate framing codes and is within tolerances specified in AS/NZS 2589 and has been checked and signed off by the builder before handing over to the plasterer to commence work.
- All on site safety requirements are in place and a safe work method statement (if working over 2 metres high) has been completed along with provision of daily site risk assessments
- On double storey houses that the void protection is in place.

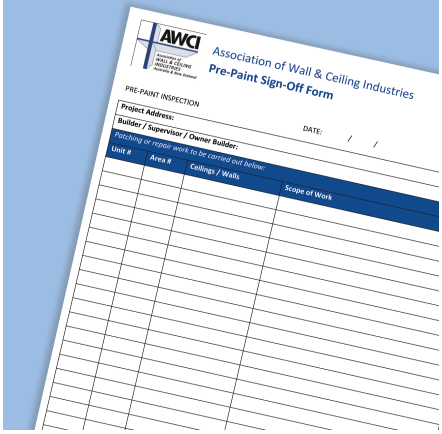
CHECK POINT 3 - Installation

- Ensure the building is effectively enclosed and weathertight prior to commencing interior linings
- Ensure the lining boards are stored in accordance with the manufacturer's recommendations and placed around the site such as not to overload any part of the structure, especially timber floors.
- Ensure the wall and ceiling linings are installed and finished in accordance with the standard AS/NZS 2589 requirements, and the manufacturer's published information

CHECK POINT 4 - Completion

- Do a preliminary inspection and review of works for compliance with contract specification, standards and manufacturer's recommendations
- Mark areas that need attention with a pencil, preferably a joint inspection with the site manager
- Undertake to rectify all areas marked up. Some contractors may wish to undertake this after the first coat is applied
- Once satisfied your work is complete, undertake a final inspection with the project manager
- Sign off the job with the project manager using appropriate forms such as the AWCI Pre-Paint Sign Off Form.
- Inform project manager that should the painter find any major works that needs the plasterers' attention, to call immediately, for rectification. This does not include standard / normal preparation that should be undertaken by the painter
- Application of the second coat of paint deems that the painter is satisfied with the finish executed by the plasterer.

Download a copy of the
Pre-Paint Sign-Off form
at www.awci.org.au
or visit your state AWCI office



Void Protection

- Under the Safety Code of Practice the builder is responsible for ensuring the site is safe
- This includes clear access and egress form the site, ensuring a clear path and that the site is ready for plastering including delivery
- On Double storey houses the stairwell or any other void MUST be protected to ensure all trades from carpenters, roofers, plasters etc. cannot fall through the void
- Void protection is not just for plasterers, here is what the National Australian Code of Practice States:-

The National Australian Code of Practice states:-

- Void Protection

Where workers are working from trestles, ladders and mobile scaffolds on solid construction and they are located in close proximity to floor openings such as stairwells and partially completed floors, edge protection will not prevent a fall into the opening. The openings must be covered with covers designed to withstand likely impact and static loads and fixed to prevent any dislodgement or accidental removal.

- Entry and Exit

Every solid construction must have safe and suitable means of entry and exit, such as:

- existing floor levels
- permently installed platforms, ramps, stairways and fixed ladders (further information is available in AS 1657: Fixed platforms, walkways, stairways and ladders - Design, construction and installation)
- temporary access ways and temporary stair systems
- secured single portable ladders set up at a slope of 4:1 and extending at least 1 metre above the stepping off point
- Stepladders and trestle ladders should not be used for access to, or egress from, solid construction

A typical Build Safe void scaffold

B) FRAMING MATERIAL
(Timber And Steel)

Framing materials can be timber, steel or block work. It is the responsibility of the carpenter for framework to be plasterboard ready, level and true within standard prior to the Wall & Ceiling contractor starting.

STANDARDS FOR FRAMING

Timber Framing
- AS 1684 – Residential Timber Framed Construction or
- AS 1720 Timber Structures Parts 1-2
- NZS 3604 Timber Framed Buildings (New Zealand only)

Metal framing
- AS 1397 Sheet steel and strip - hot dipped zinc coated or aluminium/ zinc coated
- AS 4600
- AS 3623 Domestic metal framing
- AS/NZS 2785 Suspended ceilings

Concrete, brick and masonry surfaces
- AS 3700 compliant surfaces can be sheeted with plasterboard adhered directly to the wall (do not use Glue)
- Or use a furring system applied in accordance with AS 1684, to which plasterboard may then be fixed using an appropriate system

NOTE:
- Best practice for installing plasterboard to external walls is to use furring channels
- Best practice fixing plasterboard to external brick walls is to use battens
- Linings in tiled and wet areas must be mechanically fastened to furring channels or timber battens

Substrate members are to:
- Be straight and suitable for the application of plasterboard
- Have a minimum flat fixing face of 35mm for nail fixing or 32mm for screw fixing if supporting a joint. All other substrate members are to be a minimum of 30mm

Deviation in the alignment of the bearing surfaces shall not exceed the tolerances, as stated within the plasterboard manufacturers installation requirements.

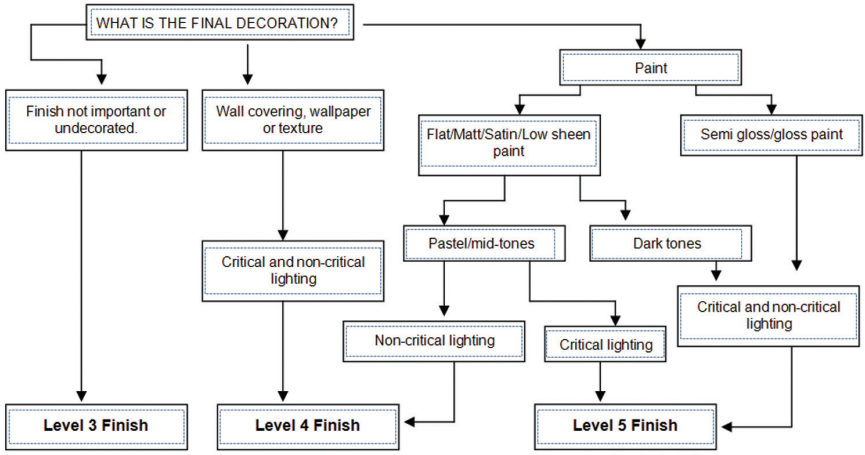
Trimmers are to be provided in the part of the ceiling frame system, where primary support members change direction within a room.

C) LEVELS OF FINISH

The adoption of the levels of finish clauses into the Australian Standard AS/NZS 2589 provides designers, builders, manufacturers, plasterboard installers and finishers with a best practice roadmap for achieving an acceptable quality of finish with a decorated plasterboard surface. Following the defined methods and practices is the best way to meet customer expectations.

Establishing the required level of finish to meet customer expectations in the design stage is absolutely critical to the outcome of the project and many disputes can be avoided if the customer expectations, their understanding of the desired level of finish as well as what is achievable form the basis of the discussion at design stage – not during or after completion.

The quality of finish can be influenced by many factors especially the quality of workmanship of each trade – not just the drywall contractor. For example, if the frame is constructed outside of tolerances defined for a level 5 finish, no matter what the quality of the wall and ceiling lining and decoration that follows – a Level 5 finish will not be achieved.



*Critical lighting: natural or artificial light projected across a surface at a low incidence angle.
Non-critical lighting: when the light striking the surface is diffuse or at right angels, or both.
+May not be suitable for subsequent decoration to high levels of quality in the future.
See Level 4 or Level 5 for upgrading requirements.

As a designer, builder or home owner involved in planning a new project, it is important to take into account the following:

- No sheeting lining material or substrate has a surface that is perfectly flat or totally free from minor imperfections
- A Level 4 finish is the default industry standard
- A requirement for a Level 5 finish has to be defined up front and written into the contract
- A Level 5 finish has allowable tolerances and will never be a dead flat finish or a car duco mirror finish
- Level 5 can only be achieved through a coordinated approach between the builder and all trades especially the carpenter, wall and ceiling contractor and painter

Level 5 Requirements

☑	A level 5 background
☑	All paint coats to be rolled
☑	A three coat paint system must be applied
☑	All ceilings must be battened
☑	Ceiling joints to run with the light source
☑	Wall joints to be fixed horizontally *
☑	Back-blocking to butt joins in ceilings of all rooms

* Some exceptions apply e.g. for narrow spaces.

Possible pitfalls

☑	Full height glass
☑	Windows abutting walls
☑	Glancing light
☑	Directional lighting
☑	Skylights
☑	Gloss, semi-gloss and dark tone paint
☑	Vertical joints

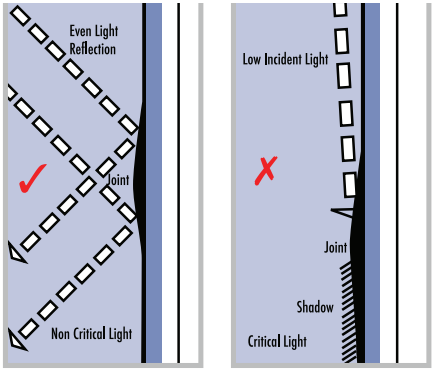
See section 4) i for more details on levels of finish and what can influence the result.

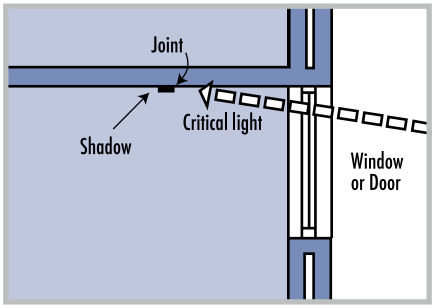
D) GLANCING LIGHT

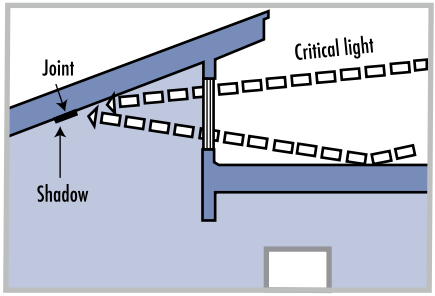
Consideration of the effect of glancing light is one of the most important factors in the design of a building. Although a flat finish is the common expectation this is not always possible with present building technology. No matter how flat a surface may appear, there are always undulations and deviations from flatness. What is possible is the appearance of flatness, though this is dependent on the level of finish and the lighting sources and design.

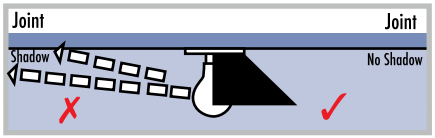
With an acute or critical angle of light (i.e. light that shines directly along the surface), illumination of one side of the most minute undulation can create a shadow on the other side. This highlights joints, patches and surface texture variations, which is why it is important to do the lighting design when determining the level of finish for the specified area.

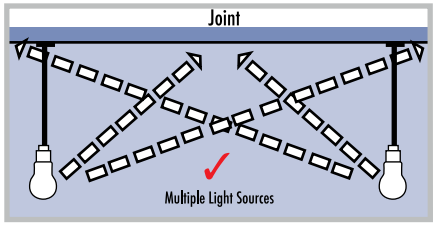
Not taking into account the effect of lighting when deciding where to locate windows, ceiling and wall lighting can lead to serious disputes on completion of a project as the satisfaction of the consumer is compromised by lighting that demands more than the surface and current practices can deliver.

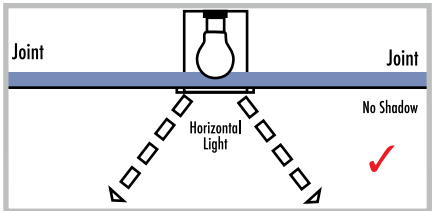












Good choices of window placement, and consideration of appropriate types of ceiling and wall lights and shades will support an even and consistent look to the surfaces.
Designers, builders and homeowners should take into account the following:

- Where possible ceiling and wall joints should run in the direction of the light source e.g. at right angles to windows or large openings. Avoid butt joints wherever possible. Finished joints are subject to a variety of lighting conditions. Light intensities are constantly changing throughout the day, depending on the position of the sun, sky conditions, window, door or the location of artificial light sources and reflections from surrounding buildings, ground etc, subjecting the ceilings to diffused light from all directions
- At night, the intensity varies again
- High output light sources are more severe in their effect because they create deeper shadows. The whiter the light, the stronger the contrast, the greater the perceived imperfection
- Energy efficient fluorescent globes are non-sympathetic to plasterboard ceilings and placement is critical to control glancing light
- Light shades are some of the most effective devices for enhancing the appearance of plasterboard

ceilings. By understanding the role that fittings play and the consequences of their position it is possible to minimise adverse shadowing on surfaces

- Down lights (although not the total solution) have proven excellent value for the presentation of large ceilings
- Wall mounted lights may well show up a ceiling in a kindly manner, because they are some distance below it. They will, however, tend to accentuate minor imperfections in the walls
- The ideal lighting technique is to use a series of fittings hung as low as possible below the ceiling. The angle of light striking the surface is as great as possible and the multiple light sources cancel out each other's shadows
- Soft low wattage diffused lighting provides reasonable results
- The positioning of feature lighting using small spots or floodlights should be well planned. The fittings should allow for a generous angle of incidence to the featured surface to minimise visibility of minor imperfections
- In general terms, recessed fittings and ceiling surfaces are compatible. However they should be kept well away from walls. This is assuming that they are deeply recessed and do not have a flush mounted diffuser, which transmits light to the ceiling surface
- Pools and water sources directly outside the building reflect natural light at angles that can show up and emphasise plasterboard joints
- Large gloss floor tiles can reflect light at angles that can show up and emphasise plasterboard joints
- Floor to Ceiling windows or windows that extend up to (or close) the corner of the room allow natural light to shine directly along the surface can show up and emphasise plasterboard joints. This effect will vary through the day as the angle of light varies
- Raked ceiling coupled with high level windows facing critical light or louvred windows. In this case, the problem is invariably complicated by reflections from adjacent roof surfaces
- REMEDIAL MEASURES:
  Where the physical circumstance producing glancing light effect already exists, the situation can be improved by appropriate soft furnishings, pelmets, curtaining, blinds or redecorating with light matt finishes. Also consider changes to type and location of artificial lighting

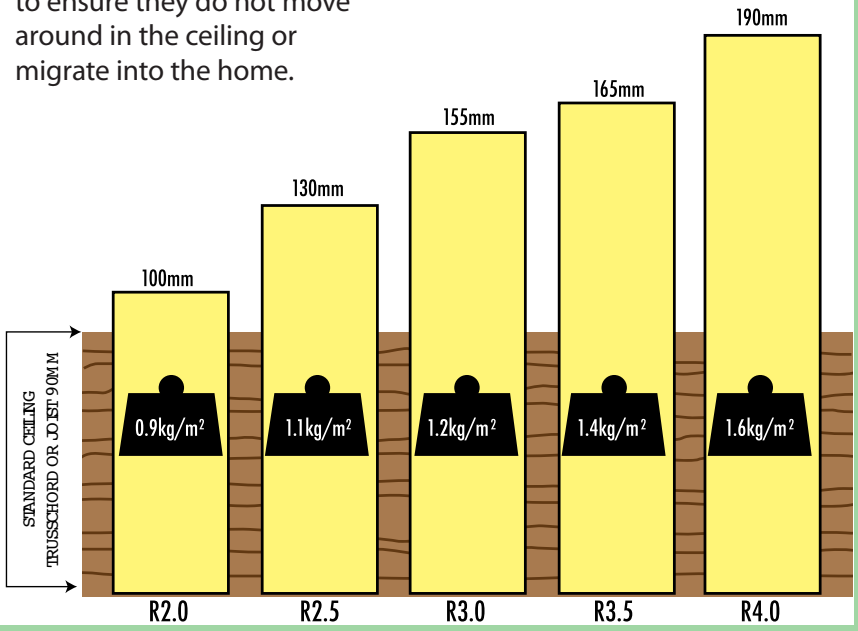
E) LOADS ON CEILINGS

There are a million things on your mind when building or extending a home. The last thing you need to worry about is whether the plasterboard ceilings are going to cope with the weight of the ceiling insulation.

Using the wrong product could lead to ceilings sagging or possibly collapsing due to excessive weight loading. Check with the manufacturer before laying insulation as it must be laid in reference to load constraints on plasterboard. Another factor to consider is that higher humidity areas and in southern winters, plasterboard can take in moisture and may be affected by dead loads such as insulation. Australia and New Zealand's leading plasterboard manufacturers have strict guidelines on the maximum deadload on ceilings.

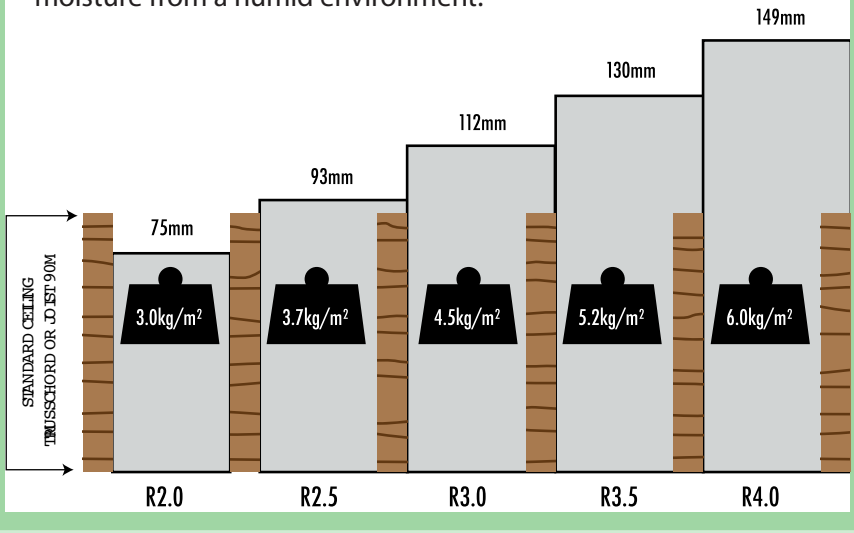
Glasswool Mats

These products are manufactured with bonded fibres which allow the mats to sit proud of the ceiling joist without obscuring them. This also contains the fibres within the mats to ensure they do not move around in the ceiling or migrate into the home.



Loose Fill Cellulose Fibre

Loose fill cellulose fibre can be manufactured in Australia at densities between 24kg/m^3 and 60kg/m^3 (refer AIRAH Handbook, pages 624 & 625). We have used a density of 40kg/m^3 in the analysis below to highlight the weight impact of this form of insulation on ceilings. Note also that this assumes a moisture content for cellulose of 16%, although this can vary in practice especially as cellulose fibre can draw moisture from a humid environment.



The above examples are types of insulation showing the variation of weight and R value based on choice of material. There are many types of insulation and all vary in weight to achieve a certain R value.

Not complying with these guidelines can void the manufacturers warranty. Be aware that other equipment and appliances located in the ceiling may cause an unacceptable loading on the plasterboard. These should be tied back to the frame - not just left on

the plasterboard. Note that AS 2785 states that these loads should only be tied back to the ceiling framing if the framing has been designed to account for the extra loading.
Be careful when walking in roof spaces or installing fixtures — don't put any point pressure on plasterboard, furring or battens.

F) GARAGE CEILINGS
(Australia Only)

Garage ceilings are subject to conditions that are more demanding than in any other part 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. Garage doors also cause a large amount of constant vibration when in use that can affect board fixing and adhesion. These factors call for a more durable installation to avoid 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 fixed cross-flow ventilation, or roof Sarking and cross flow ventilation to the ceiling to improve the performance of garage ceilings
- Fixing methods should be fully mechanical fixed or third fixing method as per manufacturers' recommendations

G) EXTERNAL CEILINGS
(Australia Only)
Plasterboard Ceilings Check List

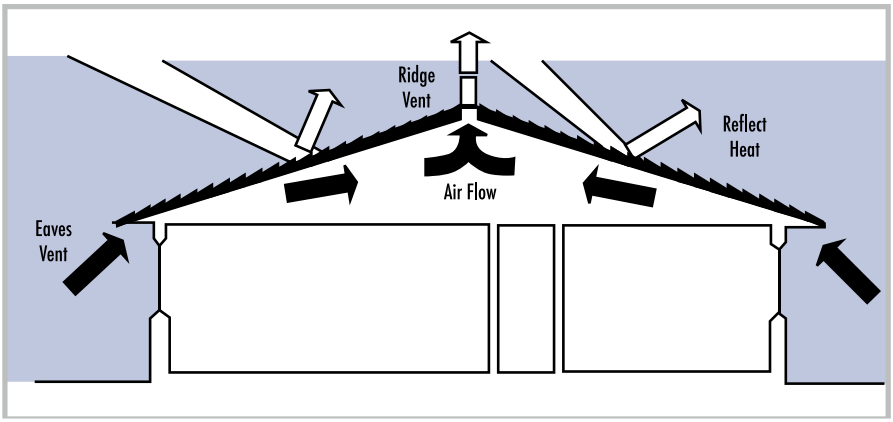
- Wind loadings, regional conditions and other influences
- 10mm or 13mm ceiling grade plasterboard recommended
- Framing members and cross trimmers to be 450mm max centres
- Appropriate framing to secure ends of sheets to take weight of cornices
- Metal ceiling battens and furring

channels installed in accordance with manufacturers specifications

- Fixing method: A full mechanical system must be used, fixed at 300 centres on metal or wood battens fixed at maximum 450 centres, Perimeter battens (wood or metal) must be fixed to all outer edges, end sheets screwed to these at 300mm centres
- Backblock all joints as per Backblocking specification
- Wet Area or Standard Compounds for finishing of joints will be determined by design of house
- Coastal regions be aware of what screws and beads to be used
- Control joints to be installed as per manufacturers specifications
- Should be painted with an exterior paint system in accordance with manufacturers recommendations
- Roof sarking should be installed where recommended by the roof manufacturers
- Cross flow ventilation to the ceiling can improve the performance of external ceilings

Fibre Cement Check List

- Wind loadings, regional conditions and other influences
- Framing members and cross trimmers to be 450mm max centre
- Appropriate framing to secure ends of sheets
- Metal ceiling battens and furring channels installed in accordance with manufacturers specifications
- Fixing method as per manufacturers specifications
- Coastal regions be aware of what screws and beads to be used
- Control joints to be installed as per manufacturers specifications



- Should be carried out in accordance with an exterior paint system as recommended by the paint manufacturer
- Roof sarking should be installed where recommended by the roof manufacturers
- Cross flow ventilation to the ceiling can improve the performance of external ceilings

H) ROOF SPACE VENTILATION
(Australia Only)

Modern construction has reduced the roof space, and modern techniques have generally resulted in buildings which do not breathe adequately. Special consideration needs to be given to spaces below tile roofs where aluminium foil sarking is used, and below metal deck roofs.
Gypsum Plasterboard will give many years of satisfactory performance under a wide range of climatic conditions and to enhance the long term performance of both lining material and paint finish, the roof space should be adequately ventilated.

Ventilation of the roof space improves living comfort by minimising heat build-up above ceilings and reducing the risk of condensation causing damage to lining and roofing. There are many ways for moisture to get into a roof and without ventilation to let it out can result in:

- immeasurable damage to both timber framing and plasterboard
- joint distortion (peaking etc)
- board sag, and
- nail popping

Significant benefits can be gained by ventilating the ceiling and wall areas by way of:

- Soffit Vents
- Gable or Roof Vents
- Wall Vents
- Mechanical Ventilation

Ventilation recommendations, requirements and advantages are also illustrated in BRANZ Bulletin 302 (Nov 92).

Extracts from this publication are included in most plasterboard manufacturer's specifications.

CONDENSATION

When air is cooled its ability to contain water vapour is reduced and moisture condenses on certain given surfaces. In most cases this condensed water evaporates again, but sometimes a wall, floor or ceiling may remain wet for days, or even months. This may lead to dimpling of nail heads, sagging of ceilings, rotting of framing timbers and encouragement of mould growth.

Ventilation is but one of the many inter-related factors the building designer must take into account if condensation is to be eliminated in the building structure.

Other factors include:

- orientation
- temperature and relative humidity differentials
- shading
- ventilation
- methods of heating and cooling
- building techniques
- Use of materials of low or high thermal capacity
- function of the building, and
- living habits of the occupants.

Keep:

- materials and structures above the "dew point" temperature
- air spaces well ventilated to allow re-evaporation
- moist air away from cold surfaces (e.g. by using a vapour barrier, i.e. a thin membrane of low water vapour permeability)

More information on condensation and its occurrence in houses may be found in Experimental Building Station publications: Notes on the Science of Building Nos. 61 and 78.

I) POST PLASTERING INSTALLATIONS

Benefits by way of ventilation whirlybirds, wider eaves, sisalation etc. are welcome inclusions. However, care must be taken when installing insulation and other objects in the ceiling space. Inexperienced installers will complete their job totally unaware of the damage caused to finished plaster ceilings. Of particular concern is when the insulation installer is closely followed by the installation of ducted air conditioning.

Installation and how fixtures are fixed to the space can cause substantial movement resulting in screw pops and other maintenance issues.

Generally it is considered that whatever appears in the plaster finish belongs only to the plasterers but installation of the above devices can have a dramatic impact after the plasterer has finalised his work. Therefore, ensure that all additional fixtures and fittings including such things as air-conditioning, hanging lights, pot plants and the like are supported by or fixed to the framing member (truss or joist). If this is not in the correct spot then additional noggins should be added for these items to be fixed to. Works should only be undertaken by licenced tradesmen.

2. IS THE SITE PLASTERBOARD READY?

2. IS THE SITE PLASTERBOARD READY? (p.25-30)

a. Is the Site Plasterboard Ready?
b. Safe Unloading and Delivery of Plasterboard on Site
c. Safe Work Method Statement
d. Storage of Plasterboard on Site

MOVE IT THE GBMA WAY

safe site delivery

An important and comprehensive guide to the Safe Delivery & Storage of Plasterboard on site

The AWCI strongly encourages every contractor and builder to retain a copy and follow the recommendations on all projects.

Available from
AWCI State offices
& plasterboard manufacturers

Download your free
electronic copy at www.awci.org.au

A) IS THE SITE PLASTERBOARD READY

The term "plasterboard ready site", is used to describe when a building site is ready for the safe delivery, unloading, storage and installation of plasterboard internal linings.

For a site to be deemed: "plasterboard ready", the following considerations are essential.

Preceding stages of Construction completed

- Building structure is weatherproof i.e. External walling, windows, gable ends, ridge capping and roofing in place
- Plumbing, electrical and insulation in place
- Frame passed by building officials, and checked to be within required tolerances and ready for sheeting

Avoid Condensation

- Plasterboard must not be installed until the building is weatherproof
- Complete all exterior doors, walls, windows and the roof before delivering and installing plasterboard
- Prevent rain from entering buildings, avoid water on floors and other sources of open water and allow wet concrete or masonry to dry

'Not Plasterboard Ready'

Scaffolding obstructing the building access

Poor housekeeping increases the risk of injury

No clear access

'Plasterboard Ready'

Good access to site

Excellent housekeeping

Clear internal access

- Wrap the plasterboard with plastic overnight
- Provide ventilation
- Install soon after delivery
- Install during dry weather for best results
- Reverse build may delay installation and shrink wrapping may be required

These precautions will reduce internal humidity that may be absorbed by timber or unpainted plasterboard and minimise defects related to shrinkage or moist plasterboard.

Pre delivery Site Requirements

Safe and clear access for delivery vehicle and unloading of plasterboard on site.

- No obstructions, open trenches or building waste hindering access
- Site and delivery walk-way clear of any obstructions, other trades people and equipment
- Ensure scaffolding does not hinder entrance to dwelling
- Entry point of dwelling allow sufficient space for the access of plasterboard and be as close as possible to the delivery vehicle
- Voids and penetrations covered with a platform including ladder access.
- If part of the platform has to be partially removed to pass sheets up, then a fall arrest system must be used by the carters.
- Likewise any sheets being passed through a window or unfenced balcony must also be aided by the carters using fall arrest systems

Pre-delivery Site Inspection

If it is not plasterboard ready or where there are known site conditions, issues or complexities – do a pre-delivery site inspection with the supplier and builder.

Site issues may include;

- Constraint of access to site
- Site safety management plans
- Additional labour for upper or lower level placement
- Working with and meeting mechanical or crane lift requirements
- Spread or support the weight of the load, especially on timber floors, or else propping as agreed with the builder.
- Void protection not in place

Ideally such a site inspection should be attended by the builder, plasterboard contractor and the plasterboard supplier.

B) SAFE UNLOADING AND DELIVERY OF PLASTERBOARD ON SITE

Make sure other trades stay clear of the delivery operation.
Delivery team must undertake a Site Risk Assessment.

Some possible Site Hazards:

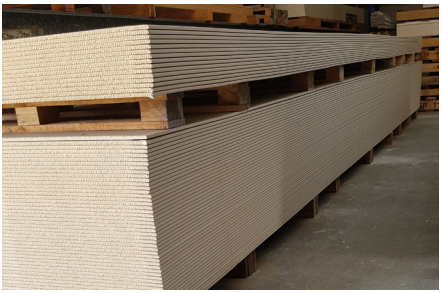
- Uneven delivery surface
- Muddy delivery surface
- Overhead power lines
- Machinery operating on site
- Other trades working on site
- Materials on site, e.g. bricks, sand,.
- Open trenches
- Scaffolding/restricted access
- Protruding/sharp objects
- Potential fall zones i.e. slip areas or working at heights
- Inclement weather e.g. wind, rain and poor visibility
- Void protection not in place
- Traffic Management

C) SAFE WORK METHOD STATEMENT

All work, including the handling, carrying and stacking of plasterboard on site, working at heights should be subject of a Safe Work Method Statement (SWMS).
The most dangerous thing we do in this industry is the delivery of materials from the back of a truck to the inside of the dwelling

D) STORAGE OF PLASTERBOARD ON SITE

- Delivery walkway and area where plasterboard is to be stored should be clean and free of any obstacles
- All materials must be kept dry, preferably by being stored inside the building
- If stored outside, sheets are to be stored off the ground, stacked as previously detailed and protected from the weather
- Exposure to high 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
- Care should be taken to avoid sagging or damage to edges, ends and surfaces

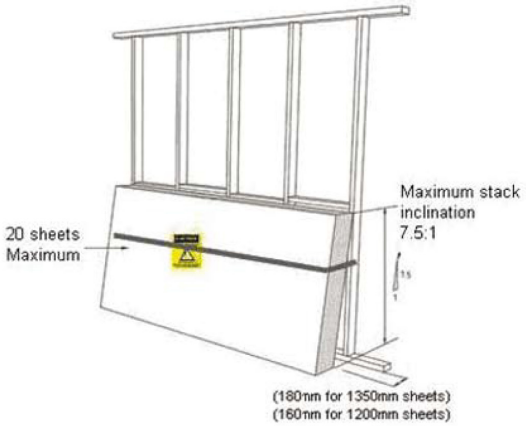


- Plasterboard should be stacked flat, properly supported on a level platform or on support members which are spaced at maximum 600mm centres. Load restrictions apply to the number of plasterboard sheets that can be stacked horizontally. The size of the stack is dependant upon the type and structural strength of floor material
- Flat stacked sheets must not exceed the floor or platform serviceability loading
- Should the option of stacking plasterboard flat not be viable, only then should sheets be stacked vertically on their edge
- Where plasterboard is edge stacked, it is essential that it be

leaned against a wall or frame at an angle not greater than 10 degrees or less than 5 degrees and adequately secured so as to prevent toppling and falling

- Edge stacking requires careful attention to the issue of safe restraint of edge stacks, both during storage periods and when the stack is being accessed
- Site signage should be affixed on or adjacent to any edge stacked plasterboard
- 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 stain sealer undercoat as recommended by the paint manufacturer

Note: If in doubt refer to:
Move it – the GMBA Way A Guide To The Safe Site Delivery of Plasterboard And Associated Products



3. INSTALLING INTERIOR LININGS

3. INSTALLING INTERIOR LININGS (p. 31-46)

a. Background Framing
b. Alternate Fixing Methods for Walls and Ceilings
c. Expansion or Control Joints
d. Wet Areas (Walls & Ceilings)
e. Back blocking
f. Garage Ceilings
g. External Ceilings

Did you know?

The Australian/New Zealand standard for plasterboard fixing and finishing AS/NZS2589: is a major improvement on any past literature and is a must-have for serious contractors.

Although some may never quite feel the need to get a copy, there are numerous improved practices which will help you achieve positive outcomes.

The following information is only a quick guide to some of the best practices related to installation referenced in the Australian/NZ Standards or individual manufacturer's specifications.

Tolerance Guidelines:

RECESS EDGE JOINTS

- Total width for recess joint must not be less than 250mm
- The joint build should be less than 2mm and not display a ridge or peak at the center

EXTERNAL ANGLES

- The build-up at the metal angle should not exceed 3mm over the width of the joint
- Corner beads should be lifted 6-10 mm off the floor

INTERNAL CORNERS

- Joint build should not be less than 2mm
- Width either side of corner should not be less than 75mm

PERIMETER FIXING

- Fasteners should be installed at 300mm centers at all external and internal angles and around window and door openings
- For ceiling and wall junctions that require square set finish, support framing should be provided to enable adequate fixing for entire perimeter of the ceiling to wall junction to minimize movement in the linings and screwed up at 150mm centres.

Ventilation

- Adequate ventilation and condensation control is required for long-term performance of plasterboard lining, in accordance with manufacturers specifications

Stud Adhesive

- Care should be taken with the selection of adhesive for use on treated timber. Daubs of adhesive should be approximately 25mm in diameter and 15mm high
- Walls for 1200mm boards - 4 daubs per stud. NZ Standards 3 daubs are acceptable
- Walls for 1350 mm boards - 5 daubs per stud
- Minimum 200 mm from fasteners on walls, evenly distributed between screws on ceilings

Back Blocking

- Ceiling butt joints must fall centrally between framing members and be back blocked to form a recess
- Provided there is no rigid connection between the ceiling and wall, e.g. rigid or square set, ceilings supported by a ceiling suspension system do not require back blocking of recess joints with Level 5 ceilings, all recess joints shall be back blocked regardless of ceiling support system

- Back blocks to be cut at least 200mm wide to fit between framing members with a gap at each end not greater than 30mm

Framing Deviations & Tolerances

LEVEL 4 FINISH

- 4mm over a 1.8 straight edge for 90% of area, remainder 5mm

LEVEL 5 FINISH

- 3mm over a 1.8 straight edge for 90% of area, remainder 4mm

CONTROL JOINTS

- Control joints shall be continuous through battens and mouldings, such as cornices, in order to maintain continuity

TAPES

- Use paper tapes
- Where self-adhesive fiberglass tapes are used, the joints must be back blocked
- Do not use fibreglass tapes in wet areas or fire rating

CEILINGS

- Trimmers are required for truss roof construction. NZ requires battens
- For garages and external ceilings, refer to manufacturer's specifications

SCREWS

- Screws used for fixing gypsum linings to softwood ceilings substrates should have a minimum length of 30mm (W Type) , 25mm (S Type) into steel frames or metal battens

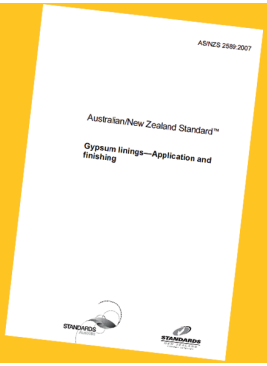
Masonry Application

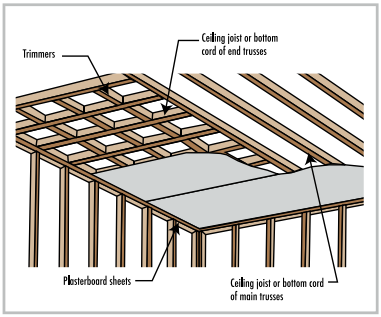
- Wherever the substrate is more than 25mm out of place, the masonry system shall not be used
- The masonry system should not be used on walls over 3 meters high unless otherwise specified by the plasterboard manufacturer
- Bonding agents may be required to allow adhesion to porous surfaces
- NEVER use stud adhesive to direct fix plasterboard to masonry or blockwork surfaces

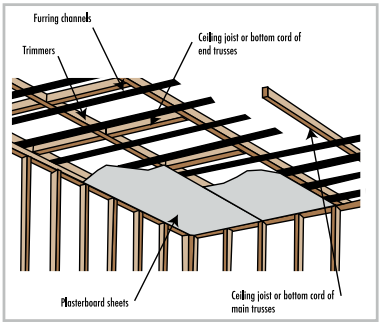
Inspections

- Artificial lighting can be used by the plasterer to assist with the final presentation, but not for the finish approval process. Australian Standards AS/NZS 2589

Download your copy of The Australian/New Zealand standards for plasterboard fixing and finishing AS/NZS2589:2007 at: http://infostore.saiglobal.com/store/ or read at your local library







A) BACKGROUND FRAMING

The background is the foundation for internal linings. If the ceiling is not battened, chances are the framing background for direct fix plasterboard will be insufficient and the perimeter fixing will be inadequate.

All too often, substrates for fixing plasterboard linings are constructed with the thought that if it's not complete - the plasterer will provide any required extras. Can you imagine the painter plastering a couple of joints, just because the plasterer didn't complete the job? I don't think so.

A plasterer is well within their rights to apply an additional charge for jobs that are not plaster ready. Rectification costs or loss of productivity should not fall on the plasterers shoulders.

Just as the painter will inspect the plasterer's work for obvious deficiencies and wait for the plasterer to rectify, so should the Builder inspect the frame and to ensure the framer has presented a frame that complies with the relevant standard and has been checked and passed by the builder before requesting the plasterer to commence work.

AS/NZS2589 requires ceiling trimmers or continuous furring or battening to be provided as part of the framing system where primary framing members change direction within a room.

Trimmers for change of direction

Plasterboard manufacturers also recommend that clipped furring channels should be used under trussed roofs which may be subject to significant structural movement e.g. skillion or raked ceilings.

Install plasterboard perpendicular to ceiling battens and/or main roof frame. If it isn't right before you start, it will show up right the way through to finishing and decoration. Before sheeting begins - do a cursory inspection and check that the framer

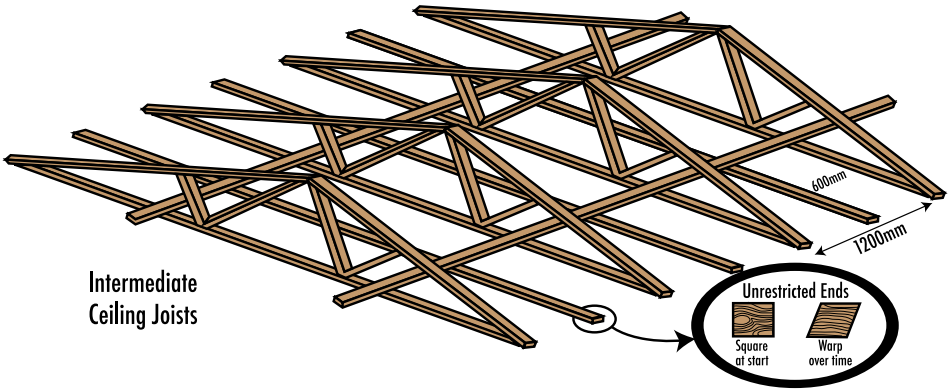
has fixed any items picked up by the builder, normally marked during the builders frame inspection, and therefore the frame should be within tolerances. Report any obvious inconsistencies to the builder before fixing, so they can address them.

Issues to be aware of installing over timber:

- Bent or twisted stud, noggins or battens
- Protruding noggins or dwangs
- Steel angle brace not set flush with frame
- Nails, screws, skew nails not driven home or countersunk
- Inconsistent machining of the timber frame particularly at the stud/lintel connection
- Poorly assembled timber framing
- Nail plates or hold down ties not set flush with the surface of the framing
- Insulation, pipes or wiring protruding past the face of the frame
- If it feels wet, do not install board

Issues to be aware of installing over steel:

- Bent or twisted stud, noggins or batten
- Poorly assembled steel framing
- Screws in steel frame not countersunk flush
- Insulation, pipes or wiring protruding past the face of the frame
- Ensure all metal studs are facing in the same direction



Please note: Unrestrained ends of intermediate ceiling joists may cause warping or twisting, screw popping and reduced adhesive bond.

Intermediate ceiling joists - for best results ceiling should be battened.

Issues to be aware of installing over blockwork:

Uneven blockwork surfaces

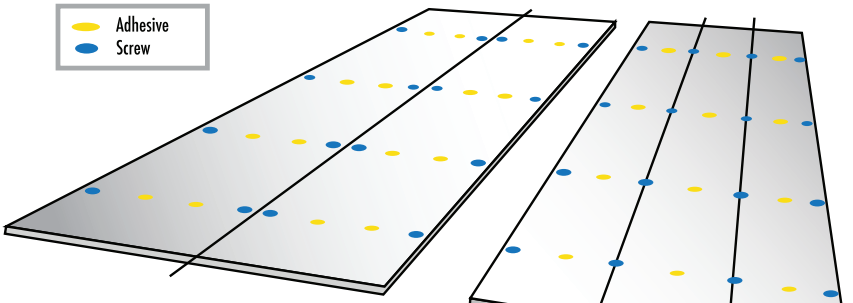
Intermediate Ceiling Joists

Intermediate Ceiling Joists are used for a variety of reasons, mostly under metal roofs. I.C.J.'s contribute more to overall maintenance in plasterboard ceilings than the majority of other building systems.

When considering the benefits of this system, metal battens may be an economical alternative. Battens will overcome some of the variations in the ceiling plane caused by the differing cambers and deflection rates of the intermediates.

Trusses are designed to support the roof, whereas the only function of the I.C.J.s is to support the ceiling.
The trusses are manufactured with a camber; intermediates are straight – often resulting in uneven cornice lines, popped nails/screws.

Problems can arise at ends where unrestrained I.C.J.s twist or lay over. With increasing maintenance costs, battens provide an economical solution.



Conventional Method
Temporary Blocks required in wet weather

Recommended Method
No Temporary Blocks required

THE 1/3RD FIXING METHOD WILL DRAMATICALLY IMPROVE THE LONG TERM APPEARANCE AND PERFORMANCE OF PLASTERBOARD CEILINGS

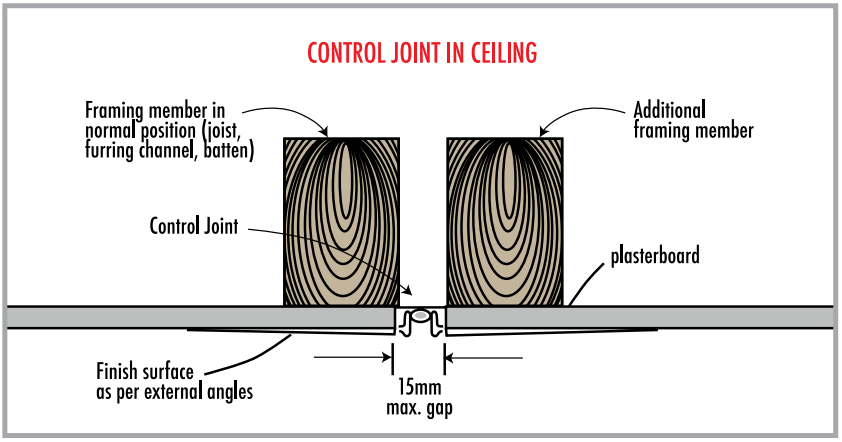
B) RECOMMENDED FIXING METHOD FOR CEILINGS

Most tradesmen would now be aware of the recommended fixing lines available on the face of the plasterboard. This fixing method (also known as the 1/3 fixing method) is an alternative in AS/NZS 2589:(to the old conventional method of centre fixing) and has been tested over many years to significantly reduce long-term maintenance and give improved overall performance in Houses and Garages. It is highly recommended by all manufacturers.
The heat build-up in the ceiling space is a major contributing factor to ceiling problems in both joint distortion and adhesive bond failure.

Most problems occur in homes with dark colour low pitch roofs with little or no ventilation. The third fixing method is recommended for internal ceilings, garages and for roofs with:

- No ventilation
- No sarking
- Areas of high humidity
- Above average rainfall
- Plasterboard fixed to pre-painted steel battens
- In cyclonic or extraordinary weather events.
- If you still use the old conventional method of fixing the two centre screws should be at least 50mm apart

For External ceilings and carports a fully mechanically screwed system fixed at 300mm centres on 450mm battens is mandatory. Review fixing spacing in all regions where high winds are prevalent, especially cyclone regions.



C) EXPANSION OR CONTROL JOINTS

Due to the many and varied innovations in lightweight building design, there is a need to recognise the importance for the correct placement of control joints, not only at the construction stage but at the design stage.

Standard specifications are supplied from the plasterboard manufacturer, but it should be noted that these recommendations relate mainly to any movement that may occur in the plasterboard itself and its supporting framework. Plasterboard is intended for use as a decorative product only and will not contribute to the structural qualities of a building. Basically, plasterboard is an inert material and, as such, does not crack without some form of movement to the background or general structure. The strategic placement of control joints designed to cope with building movement in ceilings should be where large areas such as loung rooms abut passageways as illustrated. Similarly walls in stairwells require control joints particularly between floor levels. Board manufacturers' technical literature is no substitute for designers considerations of structural requirements up front.

- Control joints should be spaced at maximum 12 metre centres in either direction.
- These are determined by both in number and position at design stage.

D) WET AREAS (WALLS AND CEILINGS)

Do:

- Use water resistant lining like water resistant grade plasterboard or fibre cement
- Use screws or nails to install wall lining. Use Class 2 or 3 fasteners for plasterboard, and Class 3 fasteners for fibre cement
- Fully mechanically fixed in the shower and bath recess, with minimum fasteners at 150mm in the corners and 200mm on the studs
- Check for overweight tiles, tiles to all walls and mirrors outside the shower area, as these will need to be fully mechanically fixed as well, with overweight tiles requiring closer fixing points. Check builders' specification and manufacturers' recommendations.
- Note that the application of waterproof membranes are now executed by specialist waterproof applicators who are engaged by, and sign off to, the builder directly,
- Base only in joints in shower and bath recesses (there can be issues with adhesion of wet area taping cement and waterproof membranes) and use paper tape only
- Leave 5-10mm gap between the bottom of the wall lining and the flooring, preformed basin and bath lip
- Install water resistant angle on internal corners of the wall frame, behind wall lining
- Ensure the builder has installed additional noggins at shower base and to support mechanical services and bath/toilet furniture e.g. shelves, grab rails.
- Note to check with manufacturers recommendations for fixing cornice in fully tiled bathrooms or where these are square set.

Do Not

- Use stud adhesive to install sheets in shower areas or any area where surface tiles or mirrors are to be applied
- Use fibreglass tape Install wall lining so that it is in contact with the flooring, preformed basin and bath lip
- Allow insulation to touch services in wall cavity

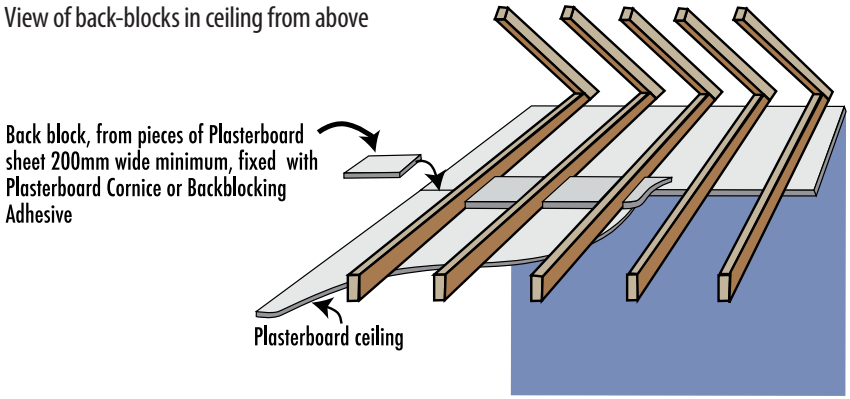
E) BACK BLOCKING

Back blocking is part of the plasterboard installation specification.

It is a mandatory fixing practice and forms part of the Australian Standard AS/NZS 2589.

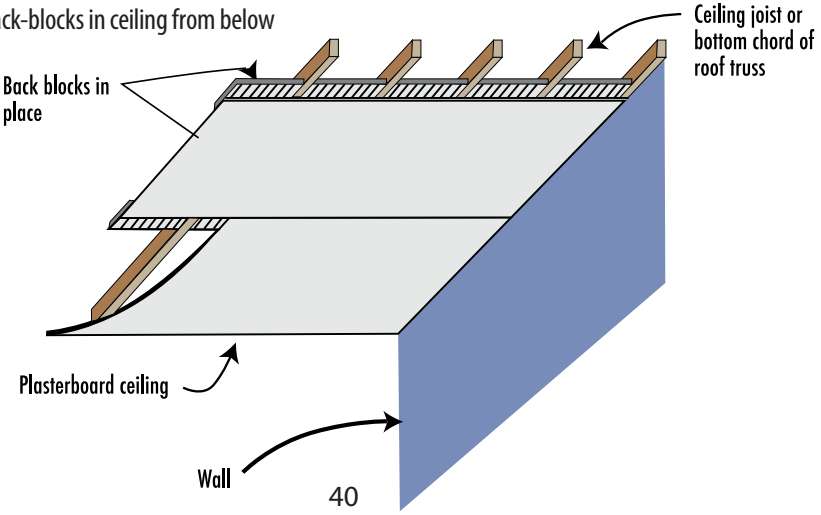
- Back-blocking substantially reduces call-backs, in particular reducing cracking and peaking joints
- Be aware, back-blocking is an additional cost at least in the short term, but in the long run, back-blocking will produce positive cost benefits
- Any additional cost in relation to back-blocking must be included in your quote

View of back-blocks in ceiling from above



If you are thinking of placing insufficient adhesive on the back of the block or using undersize plasterboard for the back block...
DON'T WASTE YOUR TIME - THEY DON'T WORK

View of back-blocks in ceiling from below



- Failure to provide back-blocking installed as per AS/NZS 2589 may void warranties and make the plasterer responsible for any associated costs relating to maintenance and/or rectification caused by jointing defects i.e. it will void your warranty

Recessed Joints in Ceiling

Any areas containing 3 or more recessed joints must be back-blocked. See Figure 1 and follow this back-blocking procedure:

- Cut pieces of plasterboard sheet sizes no less than 200mm wide in lengths that will fit loosely between framing members e.g. 30mm from each end
- Soak cornice adhesive and or back blocking cement in a clean container with sufficient water to make a stiff paste of smooth consistency
- Apply adhesive over the full face of the plasterboard pieces using a notched spreader to form beads of 6mm x 6mm at approximately 20mm centres and at right angles to the joint

- Fix plasterboard sheets cut at right angles to framing members, placing the back-blocks centrally along the full length of the sheets edge
- Fix the next sheets immediately after the blocks are in place

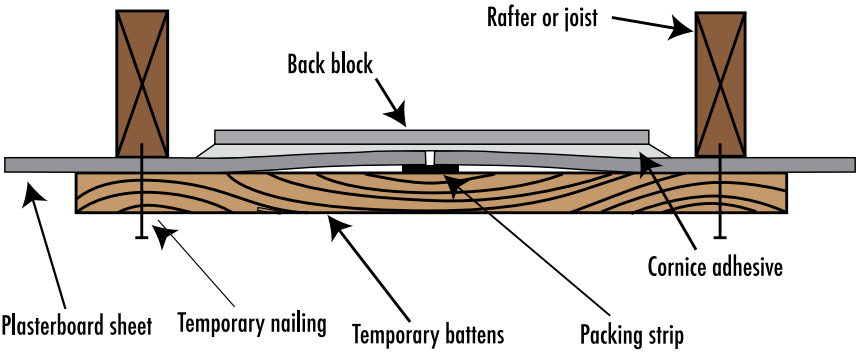
Back-blocks in ceilings may be cemented into position from within the roof after the boards have been fixed and before they are flush jointed (set).

Back-Blocking Ceilings Under Floors and Low-Pitched Roofs

This can be carried out from the floor below, one step at a time.

- Fix the first plasterboard sheet
- Cut the next sheet
- Apply back-blocking/cornice adhesive to back-blocks and place them between framing members along the full length of the sheet already fixed.
- Immediately after all blocks are in place, install the next sheet
- Proceed this way across the entire ceiling area

- Once complete, and the adhesive has thoroughly set, apply flush-jointing procedure



Butt joins - cross section through back-block

Back-Blocking Butt Joints

As described in AS/NZS 2589, Butt joints on ceilings shall fall centrally between framing members and be back-blocked.

The recommended procedure is as follows:

- Fix ceiling sheets with ends butted neatly together. The butt joint shall fall within 50mm of the mid-span point between framing members
- Use battens and packers to support and deflect the sheet ends upwards about 2mm as shown in the image above

Back-Blocking Dos and Don'ts

- Back-blocking MUST be installed at the fixing stage
- Joints cannot be set prior to back-blocking
- Do not use plaster in its advanced setting state or any air drying compound for back-blocking. Dry or partly dry compounds combined with ceiling temperatures may cause premature dry-out and reduced bond
- Ensure back-blocking is completely dry prior to the taping process
- If back-blocking can be separated from the back of the plasterboard joint, then quite clearly they are ineffective
- Do not use stud adhesive for back-blocking. Use only back blocking cement/cornice adhesive as recommended
- Woven or self-adhesive woven Fibreglass taped joints must be backblocked

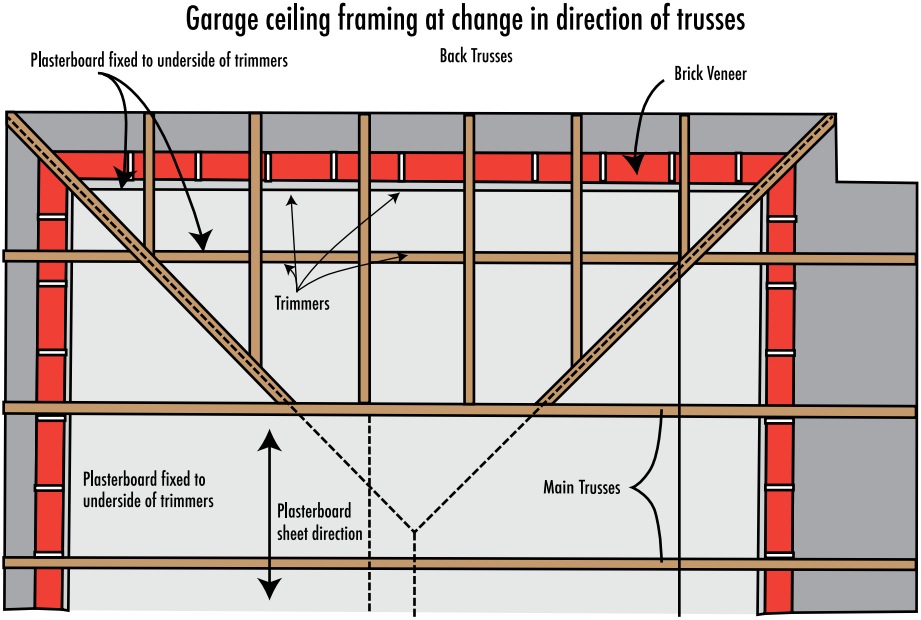
F) GARAGE CEILINGS
(Australia Only)

Garage ceilings are subject to conditions that are more demanding than in any other part 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. Garage doors also cause a large amount of constant vibration when in use that can affect board fixing and adhesion. These factors call for a more durable installation to avoid maintenance issues.

Installation Requirements for Garage Ceilings

- Fix the ceiling sheets using the Screw Only Method or the One Third Fixing Method
- Provide additional framing around perimeter by inserting trimmers between ceiling frames or installing steel angle
- Fix the perimeter of the sheets using screws at 300mm maximum spacing
- Avoid windy conditions during and immediately after installation to ensure adhesives sets intact
- Back-block all plasterboard joints
- Roll or brush on a high quality sealer undercoat designed for exterior use
- Use a premium exterior paint system

The Rules have changed for Garage Ceilings—Did you know?



Beware the spaced noggins...they don't work!

GARAGE CEILINGS ARE THE MOST LIKELY TO FAIL LONG TERM. CORNICE WILL NOT SUPPORT SHEET ENDS. CORNICE ADHESIVE WILL NOT ADHERE TO TIMBER. CORNICE BOTTOM MEMBER MUST BE FIRMLY FIXED, FLOATING BOTTOM MEMBER WILL BRING YOUR CEILING DOWN

G) EXTERNAL CEILINGS
(Australia Only)

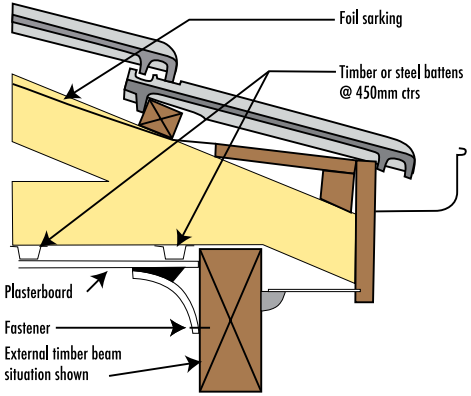
In view of the higher wind loadings and other influences on external ceilings, industry has upgraded its specifications for these areas as follows:

- External application corrosive resistant screws and protective coated angles should be used within coastal areas
- 13mm Standard core or 10mm ceiling grade plasterboard is recommended for use in external ceilings
- Framing members should be spaced at max. 450mm centres. In areas where ceiling joists or roof trusses are spaced at more than 450mm, trimming or suitable ceiling battens should be provided at max. 450mm centres. Metal ceiling battens and furring channels must be installed in accordance with manufacturer's specifications
- Run plasterboard sheets at right angles to framing members. Provide a min. 6mm gap between the edges of plasterboard sheet and adjacent walls, beams, columns and fascias
- Ceiling linings must be fully screw fixed at max. 300mm centres, 32mm 'W' type screws should be used for fixing into timber framing. 25mm 'S' or 'D' type screws, as appropriate, used for fixing into steel framing
- Back-block all joints in ceiling linings as per back-blocking specifications
- Control joints should be provided in external ceiling at max. 6m centres in both directions
- External ceilings should be painted with three coat exterior paint system applied in accordance with manufacturer's recommendations
- Roof sarking and cross flow ventilation to the ceiling cavity can improve long term performance of external ceilings by reducing the possibility of condensation on top of the ceiling lining

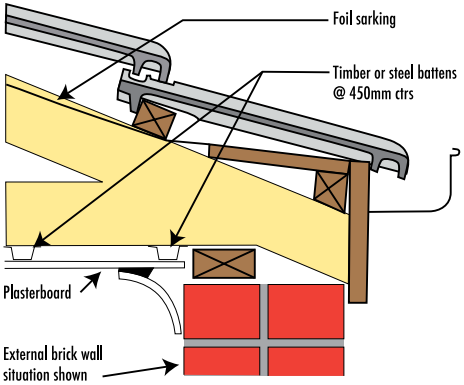
External Ceiling Specifications

External ceilings require strict adherence to specification - Non-compliance will reflect in the finish.

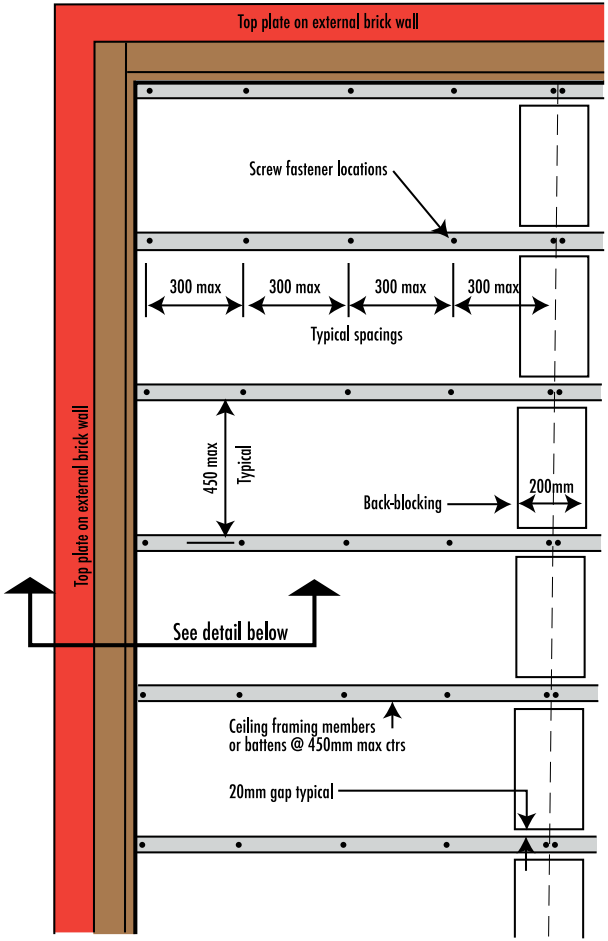
- Fixing spacing requirement should be checked for high wind areas, especially cyclonic regions
- For fibre cement external ceilings refer to manufacturer's specifications for correct fixing details.



Section through external ceiling



Section through external ceiling



External Ceiling Fixing Layout (1200mm wide plasterboard sheets)

4.FINISHING INTERIOR LININGS

4. FINISHING INTERIOR LININGS (p. 47-62)

a. Recommended Materials and Systems
b. Finishing of Joints (including tolerances)
c. Banjo Box & Setting Boxes Correct Application
d. Three Coat Jointing System
e. Sanding
f. Cornice
g. Completion of Plastering Stage - Pre Paint Checklist
h. Finishing & Decoration of Plasterboard
i. Levels of Finish
j. Painting of Plasterboard Surfaces

A) RECOMMENDED MATERIALS AND SYSTEMS

Manufacturers and Component suppliers offer warranty and guarantee statements in their technical bulletins covering their ranges of products and systems.

It should be clearly understood this will apply only if the system recommendations contained within the individual manufacturer's technical bulletins are followed.

In all cases these recommended systems have been subject to vigorous testing procedures in order to deliver and maintain an acceptable performance level, and to comply with Australia/New Zealand conditions, Australia/New Zealand Standards and the Building Codes of Australia and New Zealand.

The warranty offered may be compromised if products, components or installation practices fall outside of, or fail to comply with a manufacturer's recommended system.

When carrying out rectification works to painted areas, ensure paint surface is scuffed sufficiently to ensure adhesion of the new compounds

B) FINISHING OF JOINS

- Use complete jointing system nominated or approved by the manufacturer of the wall and ceiling lining products
- Do not tamper, mix, add other additives or add additional water to the jointing material/s
- Joints made using paper tape are stronger and more durable than those made with woven or self-adhesive woven fibreglass tape and it is recommended to use only paper tape on the setting of all joints
- Where woven or self-adhesive woven fibreglass tapes are used, the joints are to be back-blocked
- Woven or self-adhesive woven Fibreglass tape is not permitted for use in wet areas or fire rated systems and acoustic systems
- All wall and ceiling linings must be free of dirt, oil or other foreign debris which could cause a lack of bond

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

Setting Cements

- Setting cements are plaster-based, supplied in powder form and when combined with water harden by chemical reaction. When using cements always refer to the manufacturer's specifications
  NOTE: While it is better to dry thoroughly between coats, in cold and humid conditions, additional coats of setting cement can be applied to the joints when the cement is hard but before it is completely dry. NEVER apply wet on wet.

- Hot and dry conditions may dry out the cement before it sets resulting in reduced strength
- Accelerating and retarding additives must not be used as they can also reduce strength
- Setting cements must not be applied over air-drying compounds
- Application of wet over wet coats can encourage pin holing.
- Ensure the recess is filled with sufficient compound when taping in to avoid tape lift and hollow joints

Air-Drying Compounds

- Paper tape only to be used with Air-drying Compounds - Woven or self-adhesive woven fibreglass tape is not allowed with Air-drying compounds
- Air-drying compounds are generally pre-mixed and harden by drying out. They may be softer than setting cements, and are generally designed for easy sanding
- Additional time between coats of air-drying compounds must be allowed compared to setting type cements. Previous coats of air-drying compound or setting cement must be completely dry before applying the next coat and before sanding
- 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

C) BANJO BOX AND SETTING BOXES CORRECT APPLICATION

Banjo Box (Mud Machine)

Basecoat 45, 60 and 90 mixture ratio should be approximately 5kg of powder to 3L water (over thinning the mix will weaken bond). Check specification sheet for specific products. Centre the perforated paper tape along the joint and, using a broad knife, press the tape down into the cement. With the broad knife held at approximately 45 degrees to the board surface, draw along the joint with enough pressure to remove excess cement and remove any air bubbles sandwiched beneath the tape (avoid dry spots under tape).

Banjo Box 'chaser' should immediately follow to avoid dry-out.

It is most important to fill the recess before bedding the tape to achieve a good bond by leaving a minimum of 1.0mm compound under the joint and similarly above.

Immediately apply a skim coat of cement. This reduces the possibility of the tape edge curling or wrinkling which could lead to edge cracking (especially in hot, dry conditions).

Flat Boxes

200mm—250mm—300mm flat boxes.

Automatic boxes distribute the correct amount of joint compound over all flat surfaces. All flat boxes have an adjustable setting that automatically crown the joint.
When second coating with 200mm box avoid too much 'take off' if following through with a broad knife, this will ensure the joint is flat.
Sometimes hollow joints can be created when following through with a broad knife.
Note: All topping compounds will shrink back if second coat is hollow.

Ensure box setting camber is set correctly to compensate for any uneven frame undulations i.e. Uneven trusses— center row wall noggins. Regularly change box blades and skid plates to avoid uneven joint finish.

Mechanical Tapers

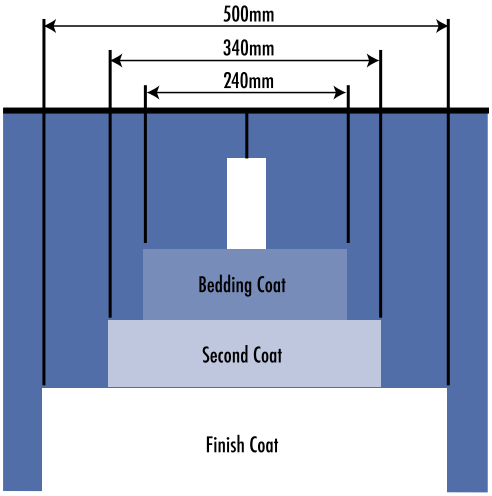
As the trend towards longer life base coats to cater for machine application increases, be advised that manufacturers recommendations for plaster base compounds under extreme weather conditions to avoid dry out is:

When taping by hand the recess is filled with compound with the tape being forced in. When using a taping machine a controlled amount of normally over wet compound is applied to the joint via the back of the tape. Surface compound is then removed with limited pressure. Less pressure means less bond.

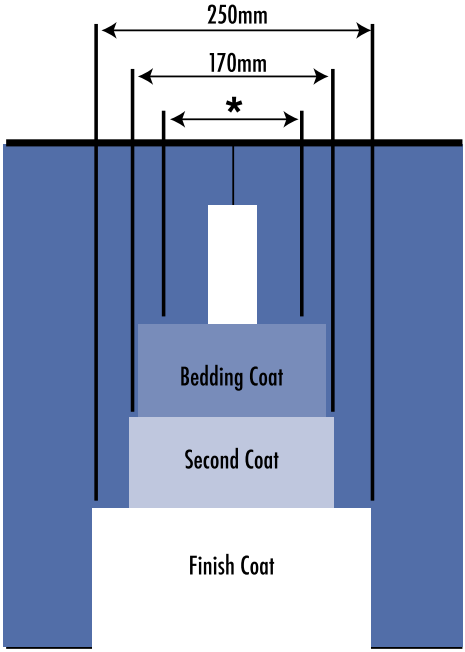
Be aware: It is important to understand that paper tape has two sides, both different as part of the manufacturing process. Although both sides are buffed to provide better adhesion the inside of the roll will always be the smoother side. The outside of the roll should always be applied to the wet plaster compound to ensure the best adhesion.

D) THREE COAT JOINTING SYSTEM

The Three Coat Jointing System consists of a Bedding Coat and paper tape, a Second Coat and a Finish Coat of compound.
All manufacturers state "first fill the recess"



Butt joint made over a framing member



Recessed joint and back-blocked butt joints
* Fill recess completely

Note: A 250mm box will not achieve a 250mm finished width joint. Level 4 and Level 5 Finishes must use the Three Coat Jointing System for all joints and external corners. Internal corners only require a Bedding Coat and a Finish Coat.

Finished Coat Widths

Finished coat widths must account for jointing shrinkage and also sanding which will reduce the applied coat width.
Allowable Tolerances under AS/NZS 2589

Recessed Edge and Butt Joints

Joint shape should be gradually curved and the highest point must not be greater than or exceed 2mm above the plane of the finished plasterboard surface.

External Angles

Jointing must not be less than 250mm either side of the external corner
Jointing build-up at the external angle should not exceed 3mm and be feathered away from the corner.

Internal Corners

Jointing should not be less than 75mm either side of the internal corner
Jointing-up build-up at the corner must not exceed 2mm over the width of the joint.

E) SANDING

Mechanical Sanding

Check with Manufacturers recommendations of finishing compounds as some may not be suitable for mechanical/electrical sanding.

- Wear an approved respirator for dust when sanding. Type 1 & 2 are often recommended by safety authorities
- Make sure joints are dry
- Sanding pad is suitable
- Speed of sander (could leave swirl marks)
- Amount of pressure put on sander
- System when sanding: outside edges then finish down centre of joint
- Check for edges and swirl marks once completed
- Maintenance of sander
- Avoid Oversanding and scuffing face of plasterboard.
- Change sandpaper regularly
- Topped fasteners to have maximum sanded height of 1mm
- Do not under fill or over sand as both these operations will expose the recesses and leave an unsatisfactory result

Hand Sanding

- Wear an approved respirator for dust
- Make sure joints are dry
- Correct sand paper grit
- Correct sanding float (not flex sanding blocks)
- Sand edges (do not scuff edges)

- Sand joints in circular motion
- Avoid heavy pressure
- If scuffing occurs, damp sponge edges
- Check for scratching and edges once completed

F) CORNICE
(Standards, Installation and Finish)

Cornice Projection
Cornice projection is not measured across the face, it is the distance down the wall and across the ceiling.

PAPER FACED CORNICE
- Cornice stacked flat
- Ensure substrates are secure, clean, level and any painted surfaces are well keyed
- Measuring of walls and cornice to be precise
- Cutting of cornice with correct saw
- Mark cornice projection down wall if required
- It is recommended that all butt joints should be mitred
- Mixing of cornice cement (refer manufacturer's recommendations) Use no additives, retarders etc.
- Amount of cornice cement mixed will depend on weather conditions
- Under severe drying conditions, mix only small quantities
- Butter 10mm wide beads of cement along full length of back edge of the cornice including back of mitres and joins for extra strength
- When installing onto face brick do not apply a cornice cement bead to the bottom edge. Instead use blobs part way up to prevent spilling out the bottom onto brick work
- Wet fibre cement lining at cornice line prior to installation to prevent dry out and bottom member cracking

- Where necessary hold cornice in position with temporary nails top and bottom
- Mechanical fixing to bottom member around cupboards or timber beams

- Clean any surplus cement off the top and bottom member of cornice
- Fill external and internal mitres
- Clean off residue with a damp sponge
- Allow to set before removing the temporary nails,and fill the holes or indents
- Apply a second coat or as many coats as required to the mitres and butt (mitred) joints to ensure finish is a paintable blemish free surface

CAST DECORATIVE PLASTER CORNICE

- Cornice stacked flat and patterns are all facing the correct way
- Ensure substrates are secure, clean, level and any painted surfaces are well keyed
- Measuring of walls and cornice to be precise

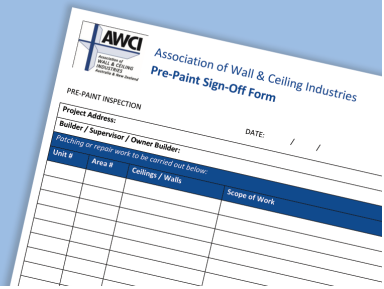
- Cutting of cornice with correct saw and mitre box (refer to cornice projection)
- Match patterns at mitre and joins, note all butt joints to be mitred.
- Mark cornice projection down wall if required
- Mixing of cornice cement (refer manufacturer's recommendations) Use no additives, retarders etc.
- Amount of cornice cement mixed will depend on weather conditions
- Under severe drying conditions, mix only small quantities

- Before applying cornice cement wet cornice back edges with brush or sponge
- Wet fibre cement lining at cornice line prior to installation to prevent dry out and bottom member cracking
- Butter 10mm wide beads of cement along full length of each back edge of the cornice including back of mitres and joins for extra strength, refer to manufacturers specifications for further details
- When installing onto face brick do not apply a cornice cement bead to the bottom edge. Instead use blobs part way up to prevent spilling out the bottom onto brick work
- Where necessary hold cornice in position with temporary nails
- Use extra permanent fixings on larger cornice for support of weight
- Clean any surplus cement off the top and bottom member of cornice
- Straight stop cornice and fill internal and external mitres
- Clean off residue with a damp water brush
- Allow to set before removing the temporary nails and fill the holes or indents
- Apply a second coat or as many coats as required to the mitres and butt joints to ensure finish is a paintable blemish free surface
- Check patterns in cornice e.g. Ribbons or bows are rebuilt to original condition - use no additives, retarders etc

G) COMPLETION OF PLASTERING STAGE - PRE PAINT CHECKLIST

Many contractors are caught out by not closing off their work on completion.
Without a clear understanding of when the plastering work is completed and ready for the next stage, plasterers will be open to claims from other trades for rectification or modifications to the original plans.
Install a standard process for all your works.
Completions may be at the last sand stroke or at a prepaint stage either before or after the first coat of paint. You may allow an additional cost for this.
Whatever it is, it must be detailed in your quotation and agreed prior to commencement, so there are no arguments.

Download a copy of the
Pre-Paint Sign-Off form
at www.awci.org.au
or visit your state AWCI office



Misunderstandings are the largest reason for poor payment practices. A pre-paint sign off form is one way to ensure that the builder, painter and plasterer have good lines of communication on any work required before painting commences and completes

H) FINISHING & DECORATION OF PLASTERBOARD

As discussed earlier in this document, the level of finish desired for a plasterboard finish must be determined at the design stage. If your project has gone through the design, installation, and finishing stages and gets to the decoration stage before deciding on the level of finish, then the client may not receive the result they desire.

There is no doubt most consumers' expectations of plasterboard finishes are for an absolute blemish-free finish.

Absolute blemish-free surfaces are extremely difficult, if not impossible, to achieve and in reality the consumer can expect a serviceable and even decorative finish.

When expectations of the finish go beyond what can be realistically achieved, then designers should have investigated options for introducing a Level 5 finish as part of the specifications at design stage. It would be assumed that top end homes would have already allowed for this

I) LEVELS OF FINISH

Level 3

- Level 3 shall be used in areas that do not require decoration such as above ceiling level or inside service shafts and the like
- All joints and interior angles shall have tape embedded in joint cement/compound and one separate coat of joint cement/ compound applied over all joints and fastener heads
- All joint cement/compound shall be finished smooth. Generally this is achieved by scraping off nibs and ridges and the like, with the edge of a trowel

Level 4

Most domestic and commercial applications are prepared to a level 4 finish.

- Unless otherwise specified a level 4 plasterboard finish shall be taken as the standard finish for plasterboard (as defined in AS/ NZS 2589 Gypsum linings, application and finishing
- Plasterboard should, where possible, be installed on walls horizontally

- Ceiling sheets should be installed parallel to primary light source and where appropriate, back-blocked
- Where possible full sheets should be used thus minimising the need for butt joints
- All joints and interior angles shall comprise a three coat system - tape embedded in jointing cement/ jointing compound and a minimum of two separate coats of jointing cement/jointing compound applied over all joints, angles, fastener heads and accessories. Each coat should be fully dried
- All jointing cement/jointing compound shall be finished evenly and be free of tool marks and ridges in preparation for decoration. Edges should be feathered in order to minimise scuffing of the paper face
- All internal and external corners, fixings and cornice installation should be finished to the same standard
- This will deliver a substrate in a suitable condition to accept paint or other decoration
- Flat or low sheen paints shall be used for this level - where gloss, semi-gloss and deep tone paints are used, surface imperfections will be more evident. They will also show up painting imperfectiona including roller marks

- In critical lighting conditions, surface imperfections may still be apparent in a Level 4 Surface finish

Level 5

- Level 5 finishes require a lot of coordination between the builder, carpenter, framer, plasterer and painter
- Level 5 shall be specified where critical lighting conditions occur on flat or low sheen paints

Refer to Section 3 for tolerances.

J) PAINTING OF PLASTERBOARD SURFACES

Plasterboard Surfaces are not just "Plasterboard Surfaces"...

- A plasterboard wall or ceiling presents the painter with a surface comprising two different materials of differing texture, porosity and surface tension
- To ensure a satisfactory finish, these differences in surface characteristics must be addressed.
- Unless otherwise specified a Level 4 plasterboard finish as defined in AS/NZS Standard 2589 Gypsum Linings Application and Finishing shall be taken as the standard finish for plasterboard presented for painting.
- One of the objectives of the paint system, as defined in Australian Standard AS 2311 – Guide to the Painting of Buildings is to deliver the appearance of a uniform surface texture and colour

Application

To achieve the best possible presentation of a plasterboard surface the following procedure is recommended:

- Broom down plasterboard surface to remove excess dust
- Apply 1 x coat of good quality plasterboard or wallboard sealer undercoat (preferably by roller or back rolled if sprayed) and allow adequate drying and curing time
- Inspection of the surface to be carried out and minor imperfections to be filled, sanded and spot primed as normal painting preparation
- Painting should not proceed over surface blemishes.
- Pay particular attention to any imperfections identified before the application of further coats, major issues should be immediately referred back to the plasterer via the builder. Continuation of painting over these blemishes will be the responsibility of the painter
- Lightly sand and dust down between coats
- Apply 2 x coats of desired quality paint finish to achieve manufacturers recommended paint film thickness and consistency in sheen level allowing adequate drying time between coats. A three coat system should give a DFT of at least 75 microns.
- Back rolling as per paint manufacturers recommendation will be required after each coat if applied by the spray method

Why Seal and Undercoat the Surface?

- An essential first step is to seal the face of the plasterboard and the plaster joints with a good quality sealer undercoat. This will ensure an even "suction rate" and provide a degree of
- opacity for subsequent

paint coats. In some cases, the sealer undercoat could be considered as the most important component of the paint system.

- The application of the sealer/ undercoat should be carried out in such a way as to ensure that the plasterboard paper face fibres remain flat.
- In some circumstances, an initial coat of a suitable sealer will be required on surfaces subject to yellowing, bleed or sheen staining. Where that sealer is not a sealer undercoat and does not exhibit the properties of an undercoat, the sealer coat needs to be followed by an appropriate undercoat prior to the top finishing coats
- Once the sealer undercoat has fully dried, two top coats of quality water-based paint must be applied
- (ensuring adequate drying between coats) as defined in AS 2311.
- The performance of the finished paint system and the appearance of walls and ceilings are highly dependent on the quality of the paint used, application method, colour and sheen level.

Gloss Banding / Sheen Staining

- These terms are used to describe the phenomena where the plasterboard joints exhibit variability in gloss level compared to the overall surface appearance.
- This is often due to the failure to use an appropriate sealer.
- Bleed through: due to no sealer undercoat and/or insufficient thickness of paint (DFT)

How Many Coats?

- Once the sealer/undercoat has fully dried 2 top coats of quality water based paint must be applied (ensuring adequate drying between coats) as defined in AS/NZS 2311.
- If using a spray coat system, each coat must be backrolled (with a wet roller) to give an orange peel texture.

The performance of the finished paint system and the appearance of walls and ceilings are highly dependent on the quality of the paint used, application method, colour and sheen level.

Proper Drying Between Coats

- The masking up and covering of window and door openings required for the spray application restricts the normal air flow inside the residence and can severely hamper the drying process
- It is important to remember although the paint surface may feel touch dry the jointing compound below the paint surface will in all probability be still holding moisture if the second coat is applied too quickly
- Sometimes recommended drying times for paint has to be extended when painting plasterboard particularly during periods of inclement weather when the atmosphere is:
  - high in humidity and retards the drying process, and
  - in cold times which delays air drying and can cause bleed through

Caution: When the system exceeds the limitations, excess moisture can affect the performance of some plaster compounds.

Brush, Roll or Spray?

Brush

Most suitable for small areas or cutting in, a brush provides a reasonably smooth finish but slow application. Brush application does not impart an appropriate texture.

Roller

The roller provides a medium to high build 'orange peel' texture finish. It is generally agreed that roller application of paint is the preferred method as a uniform finish and texture is imparted to the surface with each coat of paint.

Roller application also provides a constant even paint film build over the plasterboard and jointed areas.

Spray

The preferred finish of paintwork to plasterboard finish is by roller, however spray application is tolerated provided the correct process is followed.

A spray application provides the smoothest finish and is 20% quicker than rolling. However, it is difficult to touch up after the job is completed and does not deliver a uniform finish.

When a spray application is used an acceptable finish can only be achieved if the coats are 'back rolled' while the paint is still wet. This will provide a uniform texture over the entire surface and flatten any raised nap or paper

fibres, promote adhesion of each coat and give a uniform surface when patch repairing. Backrolling is required on Level 4 or better surfaces.

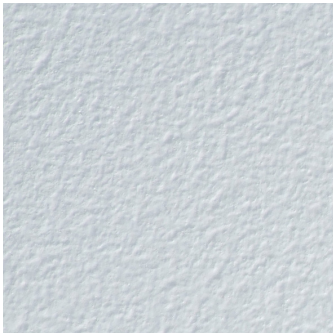
Other problems that may arise from spray application:

- Temperature conditions may prematurely dry the paint before back rolling can impart the required texture to the surface
- Over dilution of the paint will reduce paint opacity and texture
- Heavy application/overloading of a single coat will soften the top coat of jointing compound resulting in a general breakdown of the compound
- Shrink-back of topping compound around fastener heads may occur.

A uniform texture will assist with the elimination of sctraches and minor surface variations and reduce pre-paint patching.

These are acceptable textures:

Medium Texture



Heavy Texture

Why use Back Rolling with spray painting?

The most important but the least understood part of the painting process, is back rolling, when the spray method is used.

Back rolling will greatly assist with the optimum presentation of plasterboard.

Back rolling must be done over a wet painted surface using a paint loaded roller to create an oragne peel textured finish, keeping it wet by continual topping up from a paint tray.

Back-rolling is done to not only give texture but also to key into the substrate for future coats.

Be Aware:

- High temperature conditions may prematurely dry the paint before back rolling can impart the required texture to the surface
- Over dilution of the paint will reduce paint opacity/cover
- Heavy application/ overloading of a single coat will soften the top coat of jointing compound and shrink-back of topping compound around fastener heads may occur
- Very low temperatures may also effect the paints coverage. Bleed through can occur

Touch Up and Repairs

When patching or repairing gypsum plasterboard where compound is used for the repair, recoating will require full surface treatment including sealer undercoat followed by top coat

Summary

Whatever the system, the objective is to equalise the texture difference and suction rate of the paper face and stopped joint. This can only be achieved by good plasterboard installation practice, selection of quality paints and suitable application methods resulting in a minimum finished dry film thickness of 75 microns.

The final result can be influenced by other factors such as inappropriate lighting. These factors should be considered at the design stage.

Unless the plasterboard and paint systems have been installed and/or applied strictly in accordance with the manufacturers' specifications and those of the applicable Australian Standards, the plasterboard and paint manufacturers cannot warrant the performance and integrity of the plasterboard, the jointing and the paint systems.

A satisfactory finish for gypsum linings is dependent on a number of critical factors including the straightness of underlying substrate of which they are attached.

Visual satisfaction of the final job can be impacted by the quality of finished decoration

5. INSPECTION

5. INSPECTION (p. 63-70)

a. Called Glancing Light
b. Warranties
c. For Renovations and Repairs

There are many instant experts when it comes down to inspection and adjudication of plasterboard finishes. Most builder associations have guidelines for the inspection of plaster finishes and it is important to use these when undertaking final inspections or dispute resolution. The standard for inspection was developed with an understanding that plasterboard does not deliver a completely blemish free and flat surface and many factors including lighting can affect the visual performance. By inspecting within the industry standard, the builder, plasterer, painter and consumer can review a surface under reasonable lighting and observation conditions.

To undertake inspections outside the following conditions opens up debate on unrealistic expectations of plasterboard finishes.

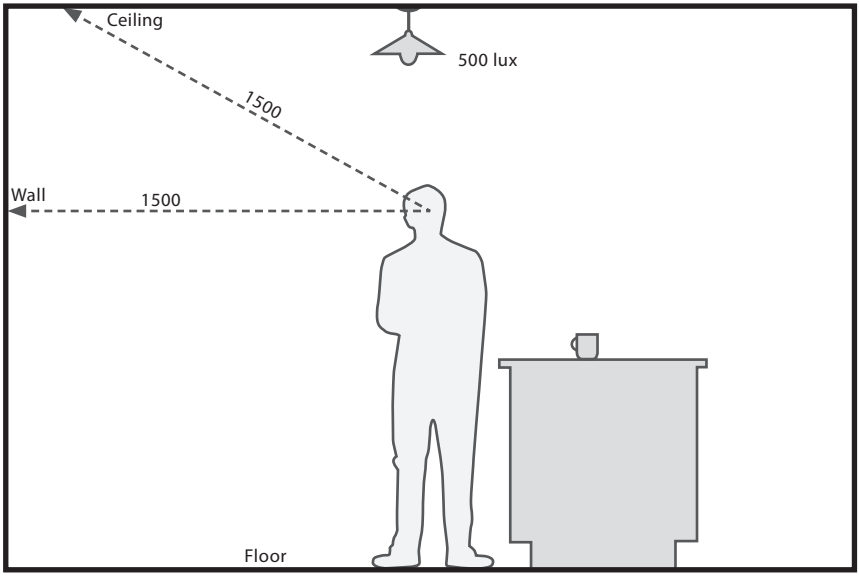
It is recommended that:

- Visual inspections on finished surfaces be carried out in normal lighting conditions
- No torches, no artificial light, no 1000w halogen spotlights
- Inspections are visual not by "feeling" for surface variations
- Artificial light to be used only to assist the plasterer in carrying out their work—not for approval purposes

HIGH INTENSITY LIGHTING IS UNSUITABLE FOR VISUAL INSPECTION OF INTERIOIR SURFACES

- Avoid glancing light by performing inspections between the hours of 10am and 2pm
- The inspection of a particular surface should be carried out at a distance of 1.5 to 2.0 metres and from a normal viewing position (see figure below from AS/NZS 2589).
- Where differences of appearance are not clearly discernable, then that finish is generally considered acceptable
- AS/NZS2589 now provides tolerances for plasterboard work allowing for inspections to be based on recognised parameters
- A sign off form should be used at handover to assist in agreement between the parties on the quality of finish to avoid concerns being levelled at the finish of the gypsum lining when it may relate to inadequate decoration
- AWCI ANZ has inspection tools available to check tolerances of finishes.

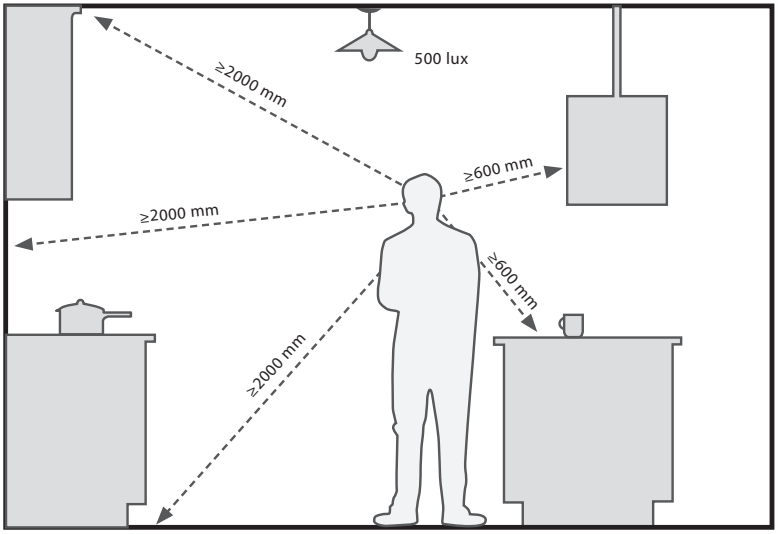
Inspection of plasterboard surfaces to AS/NZS 2589 AUSTRALIA



NOTES:

1. Generally, variations in the surface colour, texture and finish of walls, ceilings, floors and roofs and variations in glass and similar transparent materials should be viewed where possible from a normal viewing position.
2. A normal viewing position is looking at a distance of 1.5m or greater (600 mm for appliances and fixtures) with the surface being illuminated by 'non-critical light'. 'Non-critical light' means the light that strikes the surface is diffused and is not glancing or parallel to the surface.
3. Slight variations in the colour and finish of materials do not always constitute a defect.
4. Figure 4.7.1(A) is reproduced with modification from 'Guide to tolerances, materials and workmanship in new residential construction', published May 2015, Ministry of Business, Innovation and Employment.

Inspection of plasterboard surfaces to AS/NZS 2589 NEW ZEALAND



NOTES:

1. Normal viewing positions vary depending on the type of surface being inspected.
2. Figure 4.7.1(B) is reproduced without modification from 'Guide to tolerances, materials and workmanship in new residential construction', published May 2015, Ministry of Business, Innovation and Employment.

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Lighting

Effects of poor downlight design

Lighting on ceiling

The same room 20 minutes later

Called Glancing Lights

Much has now been said about determining the level of finish at a design stage. This is also important for the choice and location of windows and internal lighting to give a good result in the finished project and avoid highlighting minor surface imperfections through the phenomenon known as "Glancing Light."

Most home owners unfortunately are unfamiliar with the building process, are totally unaware of the pitfalls associated with the design process and know little about the effects of lighting. Despite our best efforts with education, literature and illustration, there are still many hurdles to overcome. Particularly when attempting to demonstrate to a less than happy owner (one who has just viewed for the first time the ceilings of his/her new home at night), the circumstances behind this unwanted phenomenon occurring in their residence.

As industry professionals, we are faced with a constant challenge to give a better understanding to designers and builders — so that they may indicate to the end-user the standard that can reasonably be expected from the choice of materials and design within their nominated budget.

When considering the type of finish required from plasterboard, it is important to understand how the overall appearance is to be affected by glancing light.

Today's contemporary designs pose many problems for plasterers, particularly when these designs include large ceiling areas and window openings. Anyone who has ever built opposite the water canal estates, swimming pools etc. will testify to the dramatic change in appearance that can be caused by light reflections.

Some tips for avoiding glancing light issues:

- Avoid lighting that shines directly along a surface
- Don't leave a bare bulb – install light shades (even low cost plastic shades give a better result)
- Avoid fluorescent tubes, unless they can be installed at right angles to any plastered joints, or recessed into the ceiling
- Caution is recommended when considering circular fluorescent lighting
- Adjust any spotlights so as to avoid glancing light on ceilings or walls
- Creative lighting can be used for effect on plasterboard walls or ceilings
- Downlights in most situations will be favourable
- Avoid downlights in passageways, toilets, wall niches or any areas close to walls that may highlight surface variations in the walls

(See section 1D for more information on glancing light)

This action will, in all probability make the difference between owner's acceptance or rejection of the

appearance of the ceilings or walls in their new residence, and may avoid the obvious requests for rework to be carried out.

Be aware rework may not provide the total solution as lighting may be the source of the problem. When complaints arise regarding visible joints irrespective of how good the plasterers' argument sounds, he will receive little credibility when faced with an unhappy owner who steadfastly declares that you could not see a join in his last house. In the past, opinions on what's good and what's bad were based purely on perception with the only guidelines being joint widths and number of coats. To support a more technically based review, plasterers should always refer back to AS/NZS 2589 which states a range of parameters and tolerances that can assist in determining the outcome of a dispute.

Warranties

We regularly hear comments, *"I have finished the job 2, 3, 5 or 6 years ago and the builder/owner has demanded I come back to fix some cracks in the walls or ceiling .... I do not have a warranty."*

You may not be aware, if you do not enter into an express written warranty that limits your liability, then you are at the mercy of Common Law, which says you will make right any defects within a reasonable period of time and that could mean from six months up to the life of the building so it is extremely important when you do a job that you let the end user/customer be aware of what they are entitled to.

Over the years most plastering contractors have avoided discussing warranties and hope the customer does not bring them up either.
A warranty (and more importantly – limitations on liability) should be set out in an express written contract. Terms of trade set out on your invoice are irrelevant and of no legal effect whatsoever.

Your warranty should spell out all of the conditions that you are prepared to return to the site to rectify defects. Part of your warranty should include the products that you use on site, which could read similar to the following: *"Materials used on this project are covered by the relevant Manufacturers' warranties. Please contact them for further details."*

For your own reference you may also wish to contact your material supplier/ manufacturer and ask them for a copy of their product guarantee, to have on hand.

Quite often, defects are not under your control and a warranty is a good place to identify those circumstances. For example, most internal linings are purely decorative and structural movement of the framing can lead to cracked internal linings that you may be asked to return to site to rectify.
You may state in your warranty (plasterboard is used in this example) the following:

"Plasterboard is a machine made board consisting of a core essentially of cast Gypsum plaster with both faces and the longitudinal edges incased in a paper liner. When installed in ceilings and walls, plasterboard may be subject to stresses from underlying structural movement, truss settlement & flexing, creep, reactive soils, wind loads, ceiling traffic, its use as a structural bracing element loading of down lights, insulation, air conditioning ducting, vents and the like.
No sheet lining material or substrate has a surface that is perfectly flat or totally free from minor imperfections.
Although it is impossible to get a perfectly flat or blemish free interior surface, it is possible to reduce the impact of manual finishing processes and lighting effects to achieve "the appearance" of blemish free flatness from the normal viewing position. Lighting design plays an obvious role in disguising minor (albeit acceptable) surface blemishes."

It's important that your warranty states the standards to which you performed the work for example:
"The workmanship on this project conforms to the requirements of Australian Standard AS/NZS 2589 with a default level 4 finish."

Last but not least, state the time period that your warranty operates for.

For New Work

When a new project is handed over and materials and installation comply with required standards, most states have a legislated 12 month defects period and any defects becoming evident within that period are rectified via the builder. At the conclusion of this 12 month defects period, plasterboard workmanship is considered acceptable and any further work required is regarded as maintenance and at the owners/ customers expense.
You may want to use similar to the following as part of your new work warranty, which can be handed over to the builder or other stake holder:
"The plastering workmanship on this new project has a defects liability period of 12 months (or whatever your state legislation states) from hand over and after this period has elapsed any work required will be at your expense."

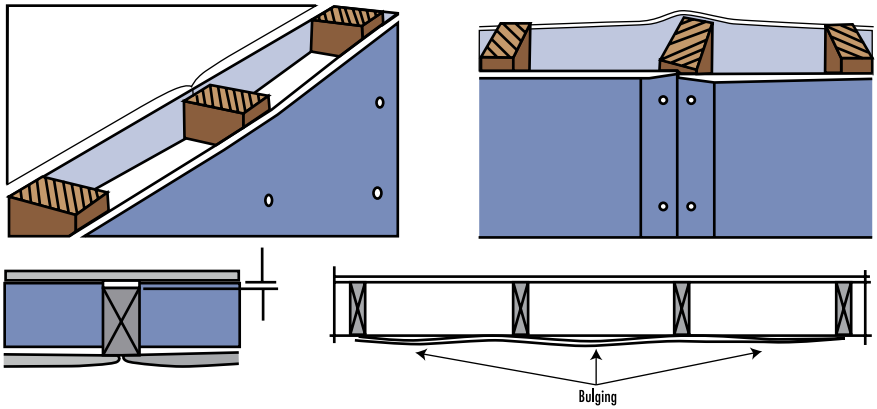
For Renovations and Repairs

When the job is a renovation or repair it does not have the coverage of a new home builder's defects liability period. In these circumstances it may be up to the plasterer's discretion to determine the warranty period, be it at job completion or a nominated time frame, for example 30 days from plasterwork completion. Please contact the AWCI, should further information be required.
This statement covers some of the common issues regarding warranties and does not purport to address all issues. Please discuss with your legal advisor prior to the preparation of your individual warranties:- these should be part of your quotation including your scope of works, specification, payment terms, commencement and completion dates, hourly rate for extra to order works and contract price including GST.

6. TROUBLE SHOOTING

6. TROUBLESHOOTING (p. 71-87)

a. Frame / Substrate Movement
b. Taping / Joint Defects
c. Trim Defects
d. Surface Decoration Defects
e. Protection / Safe work



A) FRAME/SUBSTRATE MOVEMENT

1) Wavy Surfaces

Description

- Plasterboards appear not to be flat but have a bowed, dished or undulating surface

Causes

- Studs or ceiling joists not on the same plane as other framing members
- A twisted framing member
- Shadows being cast across the joint
- Plasterboard forced into place
- Framing out of alignment with adjacent framing making it difficult to bring the sheet into firm contact with framing members
- Excessive moisture in the timber framing can also cause warpage, twisting or bowing as it dries
- Fixing the perimeter of the sheet prior to the centre
- Fixing of damp plasterboard
- Excessive loading from insulation or light fittings causing too much weight on plasterboard ceiling
- Insulation batts too thick for the wall cavity framing
- Incorrect placement of vapour barrier causing moisture build up within the plasterboard
- Exceeding board manufacturer's recommended fixing spacings
- Not allowing a 6-10mm gap between the floor and the plasterboard

- Incorrect fastening sequence for lining light gauge steel framing
- High temperatures in the ceiling space causing board expansion, particularly in skillion roofs with poor ventilation
- Incorrect storage- storing of plasterboard on edge on damp concrete floors
- Packing strips used to level wall framing

Prevention

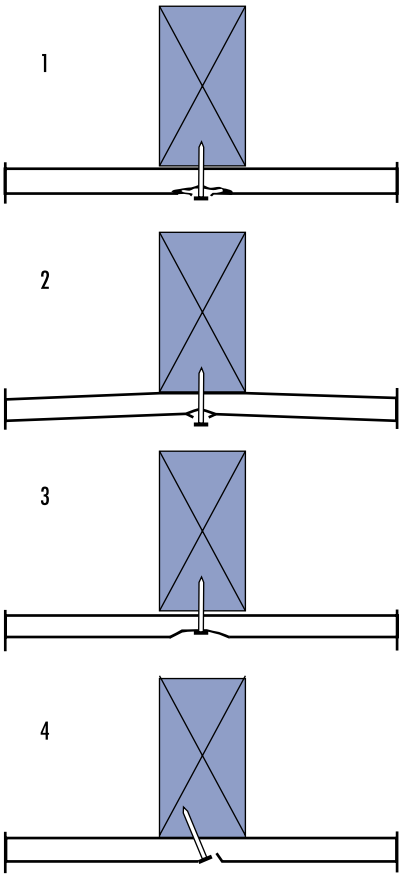
- Timber members must be brought into alignment
- Check stud, batten and joist alignment, correcting wherever necessary
- Always fix from the centre outwards
- Sheets must be touch fitted and not forced into place
- Maintain ceiling insulation load on ceilings as recommended by Plasterboard Manufacturers
- Do not sheet over insulation batts that bulge past the wall frame surface
- Sheet metal studs in the correct direction to reduce lipping

Remedy

- It is extremely difficult to rectify some of these problems without having to resort to full replacement of the linings after rectifying underlying factors
- Replace all warped or crooked studs

2) Fastener Popping

Nail/Screw Pops



Description

- Protrusions or bumps directly over the nail/screw head
- Rupture of the surface around nail/ screw head
- Looks like nail/screw head protruding above the surface of the board
- Blister in the board (convex or concave)

Possible Cause

1. Timber Shrinkage - Timber shrinks as it dries causing the fastener to protrude. Nail/screw pops may not become apparent for some considerable time after installation
2. Fixing through glue - If screws or nails are applied through adhesive a pop can occur as the glue dries and shrinks back pulling the plasterboard closer to the framing member. This would normally occur within the first 24 - 48 hours, depending on time it takes the glue to cure
3. Plasterboard not held in close contact with the framing members - If the plasterboard is not held firmly against the stud while fixing it increases the possibility of over-driving the nail, resulting in a blister like defect the size of the hammerhead
4. Overdriven or skewed nails/screws can puncture the face paper, which results in no holding power
5. Careless installation of services or products in the ceiling space (e.g. insulation or air conditioning units can cause substantial movement resulting in screw pops and other maintenance issues

Prevention

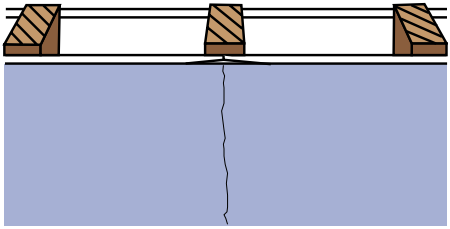
- Timber shrinkage - Use metal furring or battens for ceilings. Close in the building and protect the timber framing from the elements as soon as possible. Ensure that timber moisture content is 15% or less at the time of lining. (18% in NZ) Use of metal battens for large ceiling areas will eliminate shrinkage factors and screw popping.
- Fixing through glue - For walls; use nails/screws around the perimeter and adhesive in the centre of the sheet. No mechanical fastener should be within a nominal 200mm of an adhesive daub. Never nail/screw through glue
- Plasterboard not in close contact with the framing members - When fixing ceilings fix the centre of the plasterboard first. In all cases hold the plasterboard firm against the framing member whilst fixing
- Nail heads / screw heads puncturing face paper - Drive nails/screw in straight so they are neatly seated slightly below but not penetrating the surface liner board of the sheet
- Care must be taken when installing insulation in the ceiling space. Inexperienced installers will complete their job totally unaware of the damage caused to finished plasterboard ceilings. Of particular concern is when the insulation installer is closely followed by the installation of ducted air conditioning

Remedy

- Nail / screw pops that occur after a seasonal cycle could be caused by timber creep (shrinkage). Because further creep is likely to occur and pops reappear, do not repair until the end of a seasonal cycle

- A screw should be reapplied 50mm from the popped fastener. Drive in a new fastener whilst applying firm pressure to ensure firm contact with framing. The popped fastener should be screwed in beneath the surface of the plasterboard or removed completely. Remove loose compound and paper. Apply two coats of taping compound followed by a topping coat then redecorate

3) Centre Cracking



Description
- Cracks appear in the join down the centre of the joint tape

Cause
- Abnormal stress build-up resulting from structural deflection or racking
- Excessive stresses resulting from significant differences in hygrometric and/or thermal expansion and contraction of linings and structure
- Laying in edging or positive edge angle in the plasterboard sheets which occurs at the time of manufacture
- Use of woven or self-adhesive woven fibreglass tape, especially with steel frames.

Prevention
- Correct unsatisfactory environmental conditions. Provide sufficient relief and re-tape
- Provide proper isolation from structure to prevent stress build-up in joints
- Provide adequate control joints (especially when adjacent to structural relief joints)
- Structurally brace underlying framing
- Ensure moisture content of timber framing is 15% (18% in NZ) or less at the time of lining (although there are some timber materials that have exceptions—see AS/NZS Timber Standards)

Remedy
- Relieve stress by installing a control joint and re-tape (Isolate stresses). Feather compound over broad area to minimise build-up
- Remove woven or self-adhesive woven fibreglass tape and retape with paper tape

4) Joint Peaking / Ridging Description
- A condition where the centre of a joint exhibits a ‘peak’ or ‘ridge’ visible under critical lighting
- More prevalent when board has been installed in cold weather
- Often called ridging or beading
- Looks like a continuous ridge along the centre and length of the joint
- Commonly occurs in conjunction with ‘nail/screw popping’ on timber framed structures

Possible Cause

- Excessive gaps (i.e. over 3mm) left between sheets
- Timber movement due to excessive moisture content of timber at time of lining which subsequently dries out and shrinks. This is more prevalent with 10mm plasterboard than thicker plasterboards
- No gaps at the base of wall sheets. This can cause pressure on the base of the sheets thus transferring tension to the joints
- Inadequate ventilation with concrete floor slabs. Results in a build up of water vapour/humidity within the interior of a building
- Joints have not been backblocked

Prevention

- Use metal furring or battens on ceilings
- Ensure timber framing moisture content is 15% (18% in NZ) or less at time of lining in compliance with the AS/NZ Building Code
- Use compounds at the heaviest consistency as possible (lowest water content)
- Use a back blocking system as detailed in AS/NZS 2589 or as recommended by the manufacturers for the system specified
- Gaps between sheets should be pre-filled with a setting compound and allowed to completely dry before application of tape and subsequent coats of compound
- Always allow a 6-10mm gap at the base of wall sheets to allow for shrinkage of the wall plates and studs
- Use thicker plasterboards such as 13mm
- Ensure framing materials are maintained at a minimum temperature of 10°C during and following installation. Allow adequate ventilation
- In ceiling application install relief joint to areas of continuous unbroken spans of 12 metres in either direction

Remedy

- Ridges must only be repaired after a full heating cycle (6 months to a year). February is generally the best month for rectifications
- Apply a coat of setting compound over the joints using a 300 mm trowel to widen the joint. Scrape back and apply a light coat of a topping coat. Re-seal affected area. Examine the surface with harsh lighting to determine whether the ridge has been concealed. If all right, then decorate

5) Stud Adhesive Bond Failures

Never underestimate the importance of the role stud adhesive plays in both maintenance reduction and the long term appearance of your internal linings.

Rectification is expensive — following the manufacturers' recommendations

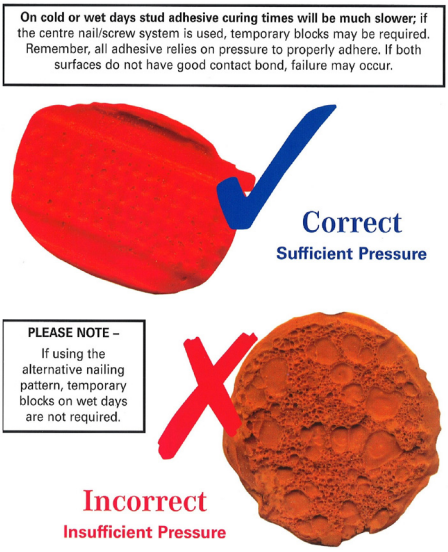
is your best insurance. Remember, stud adhesive is one of the cheapest accessories; however, any failures will quickly make it the most expensive.

Manufacturers of stud adhesive have issued many guidelines in the past to assist with the long-term presentation of their products and maintenance reduction.

Temporary blocks required on walls, every second stud.

Remember, no pressure - no bond.

The 1/3rd fixing method is also known to significantly reduce the incidence of bond failure.



B) TAPING / JOINT DEFECTS

1) Tape Dry Out

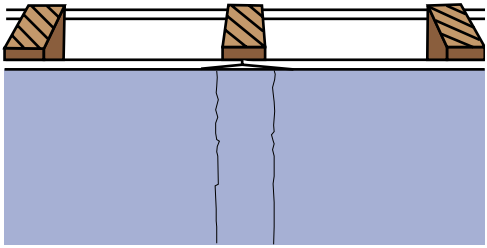
Summer Conditions (hot windy days) can cause dry-out, resulting in tape fall-out. All compound manufacturers require the recess to be filled before bedding the tape and it is recommended to a minimum depth of 1.0 mm under the tape for joint strength

- All powdered plaster compounds set as a result of a chemical action
- Hot and windy conditions can seriously affect setting times
- If your compound is drying out a lot quicker than its nominated set time then it may not have achieved a chemical bond. This can seriously reduce bond strength
- Check the ceiling sheets if they feel hot or if the conditions are windy use a compound with a faster set time
- Ceilings set in the hotter part of the day are most at risk
- Moisture will be lost through evaporation and absorption into both the background and also the tape. Compound must cover the tape (skim coat) and fill the recess as part of the taping process in order to retain moisture and prevent dry out
- Early exit of moisture from the system will accelerate the drying process and affect the chemical action of the setting process severely hampering the strength of the plastered joint

2) Tape Lift/Edge Cracking

Description

Cracks at edge of the jointing/ paper tape or trims



Possible Cause

- Dry out of taping compound because of high temperature and low humidity or excessive drafts
- Operator error of Mechanical Tapers
- Improper application - over-dilution of compound, use of wrong compound
- Cold, wet application conditions (also causes poor bond)
- Insufficient compound either above or below the tape
- Excessive compound under the tape
- Porous surfaces e.g. Fibre cement sheeting
- Adding retarders - the longer the set, the weaker the bond, (unless using a compound designed and manufactured for longer set times.)

Prevention

- When working in extreme conditions, if in doubt, quick use 45 minute setting joint compounds as opposed to a 60 minute or use air drying ready mix All Purpose compounds which dries slower than conventional setting compounds i.e. provides more open time
- Lightly wet the background or lightly wet down floors if room humidity is too low
- Place shielding devices over room openings to prevent drafts
- Do not apply joint treatment over hot surfaces
- During cold weather, control heat at min. 10°C and supply good ventilation
- Avoid practices listed under "Cause" above

Remedy

- When repairing cracks or tape lift, do not reset joints without removing the tape and retaping (do not attempt partial repair), it never works
- Before retaping remove all loose or powdery compound and wet the background or apply bondcrete

3) Blisters or air bubbles in Tape

Description

Bubbles appear in areas of the paper jointing tape. These may range in size from approximately 10mm through to 40mm.

Possible Cause

- Insufficient or overly thinned compound used under tape
- Tape not initially pressed into good contact with compound
- Too much compound forced from under tape by excessive tool pressure when embedding
- Not enough compound in the joint recess
- Compound gauge is too dry (applied too late in it working life)
- Adverse weather conditions — hot, windy, dry conditions

Prevention

- Provide sufficient compound under entire tape – 0.5mm minimum
- Apply only sufficient pressure to bed the tape
- Avoid excessive tool pressure in bedding the tape

Remedy

- Slit tape to open up blistered area
- Fill out with compound, press tape back in place with broad knife
- When dry, smooth out

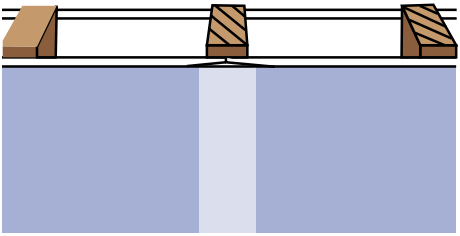
Or

- Remove tape and re–tape as recommended

4) Tram Lines/Tracks

Description

Shrinkage of the paper tape within the joint compound.



Possible Cause

- The first coat of compound is not sufficiently dry before the second coat is applied. Subsequently when the first coat of compounds dries, it shrinks and 'pulls' the tape back into the joint
- Compound is too thin or watery
- Inadequate drying between coats (such as in poor drying conditions)
- Slow drying due to application of excessive compound applied in one coat
- Premature paint application
- Oversanding gives the impression of high shoulders
- Adding retarders - the longer the set, the weaker the bond

Prevention

- Allow joint compound to fully dry between coats
- Don't over sand

Oversanding

Remedy

- Lightly sand affected areas
- Apply a skim coat to the joint with a setting joint compound, then a top coat and sand. Decorate

5) Compound Defects

When working with compounds be aware of some of the following problems:

- **Grit**
  Small pieces of raw material or contaminant that show up when the compound is troweled
- **Seeding/Lumps**
  Small lumps of hard compound that can form towards the end of a setting compounds working time. Can be due to contamination, over mixing, dirty tools, or particles of dry compound left in the mixing bowl
- **Inconsistent Set Time**
  Setting compounds having a different set time to those stated on the bag. There are a number of probable causes including contamination, particles of dry compound left in the mixing bowl, variable water temperature, over mixing and remixing and inappropriate storage
- **Variable Viscosity**
  Compound thickening throughout the working time of the compound

Remedy

- Lightly sand affected areas
- Apply a skim coat to the joint with a setting joint compound, then a top coat and sand. Decorate

6) Excessive and/or Delayed Shrinkage

Description

Compound shrinking back when it dries causing a depression at the joint or on a fastener. Looks like depressions at the joint.

Possible Cause

- Atmospheric conditions - slow drying and high humidity (under slow drying conditions, joints and plasterboard may hold moisture for weeks)
- Excessive compound depth
- Slow drying due to excessive filling in one coat
- Insufficient drying time between coats of compound
- Excessive water added in mixing compound
- Combinations of the above

Prevention

- Provide proper drying conditions for compound. The two setting coats must be thoroughly dry prior to top coating. The top coat must be thoroughly dry prior to application of sealer
- Use compound at heaviest workable consistency and allow to stand for 2-3 minutes before applying
- In slow drying conditions apply a number of thinner coats rather than a few thick coats
- Under slow drying conditions use shorter set time joint compounds
- Joint should be level or overfilled

Remedy

- Lightly sand affected areas and re-apply jointing and topping compounds and sand using 220 grit or finer sand paper
- Re-seal affected area and then fully decorate

7) Joint Darkening / Staining

Description

A dark area occurs in the area of the joint.

Possible Cause

- Occurs commonly as a result of set compound being darker than dried compound and also in association with mid or deep tone tinted paints rather than white/pastel shades
- Most severe when applied in humid weather or when joints have not fully dried
- Can also occur if the moisture or humidity levels in the ceiling cavity are excessive. Moisture may migrate to the dry side of a ceiling sheet carrying dust particle (stain) with it

Prevention

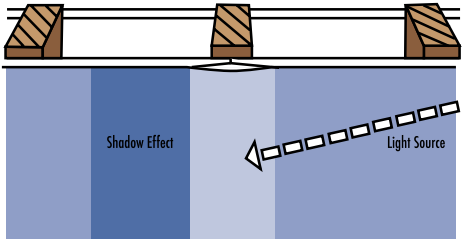
- Be sure joints are thoroughly dry before painting
- Apply appropriate sealers/ undercoats

- Ensure there is permanent cross flow ventilation within the ceiling cavity to prevent moisture or humidity build up

Remedy
- Redecorate after joints are thoroughly dry, use a sealer undercoat

8) High Crowns

Description
Joint area is higher than the surrounding plasterboard and may result in shadowing across the joints. Note that AS/NZS 2589 allows for a maximum 2mm crown



Possible Cause
- Misuse of or worn tools
- Inexperienced tradesperson, applicator or installer
- Excessive compound over joint
- Compound not feathered out beyond shoulders
- Improper bedding of tape
- Framing out of alignment or sheet edges not tight against framing
- Improper adjustment of mechanical tools
- Recess joint board edges too shallow or poorly shaped
- Using a box that is too narrow

Prevention
- Embed tape properly, using only enough compound to cover tape
- Fill tape depression or tape itself at butt joints
- Adequately feather compound

Remedy
- Sand joints to flush surface (take care to avoid scuffing paper or joint tape by over-sanding)

9) Starved / Hollow Joints

Description
Joint area is under filled in relation to the surrounding plasterboard.

Cause
- Delayed shrinkage caused chiefly by insufficient drying time between coats of compound
- Insufficient compound applied for second taping coat to fill joint recess/taper. Shrinkage usually progresses until drying is complete
- Over-thinning compound, particularly with boxes
- Over sanding

Remedy
- Reapply a full coat of compound over tape. Since this is the thickest application most shrinkage occurs in this coat, making it easier to fill

taper properly. Finish by standard procedure

Prevention

- Allow each coat of compound to dry thoroughly before applying succeeding coat, or use a low shrinkage setting compound
- Don't over sand

C) TRIM DEFECTS

Description

Cracks appearing at the edge of trims.

Possible Cause

- Taping compound dries too fast due to high temperatures/low humidity or excessive drafts
- Improper application, such as over-dilution of compound, use of wrong compound, excessive compound under tape, no second coat over tape
- Cold, wet application - poor bond

Prevention

- Do not install at temperatures below 10˚C. During cold weather, control heat at a minimum 10˚C and supply good ventilation
- In hot, dry conditions, place shielding devices over room openings to prevent drafts
- Do not apply joint treatment over hot surfaces. Lightly wet down floors if room humidity is too low. Avoid practices listed under "Causes" above
- When using plastic edge trims use correct spray on adhesives in conjunction with staples as per trim manufacturer
- When installing shadowline or flush setting to edges of doorways always ensure the framer has installed sufficient studs, especially where there is a small return, as cracking will inevitably occur when doors are slammed or the wind closes the door with force

Remedy

- Remove all poorly bonded trims and reapply compound and trims as recommended

D) SURFACE DECORATION DEFECTS

1) Finish Gloss Variation

Description

Variations in gloss level of paint between the field of the plasterboard and joint area.

Possible Causes

- Differences in suction of the board paper and joint compound. Problem accentuated by strong side lighting with slight angle of incidence to ceiling or wall surface
- Lack of a paint sealer coat
- Chemical incompatibility of joint compounds and paint system
- Excessive film build of paint top coats (such as from airless spray application) during damp, cold or poor drying conditions
- The addition of non compliant retarders or accelerators to the base materials at mixing stage

Prevention

- Use a sealer coat
- Before painting ensure that drying conditions are adequate and comply with paint manufacturers
- Under poor drying conditions, improve ventilation and heating and roller apply paint
- Don't use additives in compounds, follow manufacturer's specifications

Remedy

- Allow the paint to 'age' for 3-4 weeks then redecorate using thin film build coats. Ensure that the paint is roller applied

2) Checking/Cracking

Description

Small splits or star shape cracks on paint film surface

Possible Cause

- Joint or Topping Compound not fully dry before paint application
- Paint not fully dried before next application
- Paint applied far too thickly
- Incorrect paint used
- Incompatible paint used between coats

Remedy

- Remove paint or coating, allow joint compound to fully dry and reapply paint as per manufacturers instructions

3) Shadowing

Description

Shows as a build up of dust and/or mould spores on areas subject to condensation, typically once the wall has been decorated.

Possible Cause

- Temperature differentials in outside walls or top-floor ceilings cause airborne dust to collect on colder condensation spots of interior surface
- This results in photographing or shadowing over fasteners, furring or framing (thermal bridging effects)

- The higher the indoor-outdoor temperature variation, the more likely the issue is to occur
- Not unusual in un- insulated areas such as garages

Remedy
- Wash painted surfaces, remove spots with wallpaper cleaner, or redecorate surface

4) Peeling / Flaking / Severe Cracking

Description
Large flakes that adhere loosely to the surface

This problem is an extension of cracking and the causes and remedies are the same.

5) Fibre Raise Adjacent to Joint Areas

Description
A shadow adjacent to the stopped area.

Possible Cause
- Commonly encountered with spray applied sealer and top coats which have not been lightly sanded back between coats
- Also common where alkyd sealers are used and not sanded back before the application of top coats

Prevention
- Lightly sand between all coats

6) Discolouration

Description
Patches of ivory or light yellow discolouration

Cause
- Use of water based wallboard sealers on old 'yellowed' plasterboard which has been exposed to sunlight for longer than 3 weeks

Prevention
- Use a pigmented oil based wallboard sealer

Remedy
- Apply a pigmented oil based sealer compatible with and over discoloured top coats. Apply paint top coats as usual

E) PROTECTION / SAFE WORK

Protection of surfaces is often brought up where Garages have sustained some plaster dags during the process of the works.

The Builder expects the garage to be a pristine concrete floor.

The requirements of the Standard is that Garages are not an habitable area and therefore do not require pristine floor conditions.

However, to avoid confrontation it is advisable to mix gauges in a room which will be scraped clean and be careful where you throw your dags.

If the builder require this, then this should be protected, by the Builder, using non slippery floor covering, at his expense, prior to plaster commencing.

Maintenance (or warranty works) when the floor coverings and floorboards are laid, it is imperative that all floors should be protected, by the builder, prior to any work commencing. Remember, one scratch on a polished floor could cost thousands $$, so don't do it without protection.

Also note that any works in staircases or voids over 2 metres will need an appropriate scaffold to the OHSE requirements and not a conglomeration of ladders and trestles, which are unsafe.

They contravene the Code of Practice and you will be liable to prosecution and so will the builder.

These are NOT safe methods of work, these can lead to serious injury or death.

It's not worth the risk to save the BUILDER (NOT YOU) a couple of hundred bucks. Get a properly constructed SAFE work platform installed before carrying out any sort of maintenance or warranty work.

AWCI
Association of WALL & CEILING INDUSTRIES Australia & New Zealand

if you found this useful...

This trade guideline was put together by the AWCI (Association of Walls and Ceiling Industries) to push forward standardised techniques and practices for workers in our industry. We know working in this industry has its fair share of challenges and we are committed to bridging the gap between plasterers and other workers on-site for a better understanding on the work we do.

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– Steve Langridge, Langridge Ceilings

GET IN TOUCH WITH US

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