

# Guide to Lighting and Decoration of Plasterboard



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# introduction

This Guide is intended for use by Building and Interior Designers, Builders, Contractors and Property Owners. It highlights some of the key factors affecting the appearance of flat plasterboard surfaces, and provides guidance on eliminating or reducing the undesirable effects due to unfavourable lighting conditions or inappropriate decoration.

Developed and published by Boral Plasterboard, this Guide has been endorsed by the following industry organisations:



This Guide contains the following information:

- an overview of various types of light sources – both natural and artificial – used to illuminate building interiors
- explanations of the possible problems that may arise when flat plasterboard surfaces are illuminated by various light sources
- suggestions of what to do – and what to avoid – in order to mitigate the problems if they arise
- the effect of illumination on decorative finishes such as gloss or sheen paints.

For additional information on finishing and decoration of plasterboard refer the following publications:

- AS 2589 'Gypsum linings – Application and finishing'
- AS 2311 'Guide to the painting of buildings'
- 'Illumination & Decoration of Flat Surfaces', CSIRO - 2009.

# general



There is little doubt that most customers have an expectation of a perfectly flat, blemish-free plasterboard surface finish. In practice, however, such finish is impossible to achieve and all that can be realistically expected is the perception of flatness.

Experience shows that satisfaction with plasterboard surfaces improves considerably when the following requirements have been met:

- Accurate installation of wall/ceiling framing and roof trusses
- Use of Ceiling battens
- Plasterboard installation to Australian Standard AS 2589 'Gypsum linings – Installation and finishing'
- Good painting practice to Australian Standard AS 2311 'The painting of buildings'
- A planned approach to lighting design and installation.

It should be emphasized that even if plasterboard installation has been carried out strictly in accordance with AS 2589, surface finish expectations may not be met unless the other requirements listed above have also been satisfied.

A major cause of dissatisfaction with plasterboard surfaces is, in fact, unfavourable lighting from internal or external sources.

the most common examples of unfavourable lighting:



Large Uncurtained Windows



An unshaded batten holder light globe



Ceiling fluorescent lights



Outdoor highly reflective surfaces



Incorrectly positioned spotlights



Energy saving downlights protruding from ceiling



Indiscriminate use of gloss paints

large uncurtained windows allow external light reflections (especially from water) to emphasise surface irregularities on adjacent walls and ceilings.



# design influences

There are many factors in modern building design that influence the overall appearance of walls and ceilings.

Many of today's homes have large open living areas with unbroken ceilings across adjoining rooms and, importantly, large windows and skylights. While providing the desired modern and spacious look, these features often create lighting conditions detrimental to the appearance of wall and ceiling surfaces.

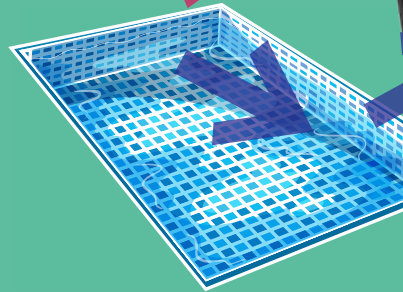
It is important that surface finish expectations are based on what can be realistically achieved given the design features of the project, particularly when some design features are likely to magnify any minor surface irregularities.

When considering the effects of building orientation and window size and positioning on appearance of wall and ceiling surfaces, one should be aware of the effects of external light at different times of the day.



## early morning sunlight

Casts deep elongated shadows and emphasises both decorative detail and variations in surface texture on walls and ceilings.



## building reflections

Light reflected from neighbouring buildings...from glazing and wall surfaces...





## direct sunlight

Strong overhead light. Intense shadows directly beneath objects. Washes out decorative detail and minimises variations in surface texture. Emphasised by bulkheads, skylights and atriums.

## late afternoon sunlight

Similar to early morning conditions but, obviously, the sunlight and shadow directions are reversed. Effects may be more intense than early morning and of longer duration on walls and ceilings.

## reflected sunlight

Waterfront properties and those with outdoor swimming pools may have harsh sunlight reflected back onto into building. The effect can be worse than direct light in that it strikes the surface from many angles.



compare a modern-day glass wall  
and yesterday's smaller windows

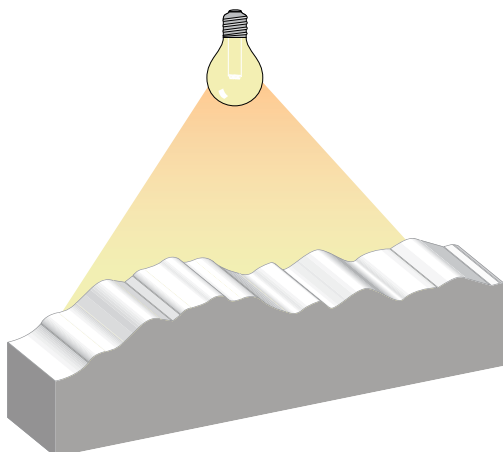


# glancing light

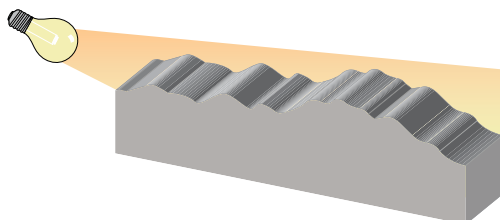
When architects, builders and home owners are considering what standard of finish is desired for plasterboard walls and ceilings, it is important to understand how the overall appearance is likely to be affected by glancing light.

Glancing light is the light that shines directly across the surface of a wall or ceiling.

Glancing light magnifies surface irregularities and can spoil the look of the highest quality surface finish.



Frontal light reduces or eliminates shadows to give a perception of perfectly flat surface



Glancing light throws deep shadows emphasising surface irregularities



As plasterboard linings are constructed on site using materials of two different surface textures and porosity (paper faced plasterboard and jointing compound), they cannot be expected to have a perfect, blemish-free surface. Because glancing light creates shadows from even minute undulations, it will highlight surface irregularities that would not normally be visible under a more diffuse light.

A wall or ceiling surface may be subjected to many different lighting conditions. Lighting direction and intensity changes constantly throughout the day and at night, depending on the position of windows and lighting, and the sun's reflections from adjacent buildings, water surfaces etc.

Plasterboard joint under diffused frontal light

The same plasterboard joint under glancing light





Critical instances of glancing light can occur when single unshaded light source is fixed directly to the ceiling or wall, but also in rooms with windows up to ceiling height or windows adjacent to walls (above).

A particularly severe glancing light problem occurs when a surface-mounted fluorescent batten light fitting is placed parallel with the plastering joints.

Resultant high intensity white light falling at a shallow angle will magnify any surface irregularities (below).

Glancing light reflected upwards from pool water onto interior walls and ceilings

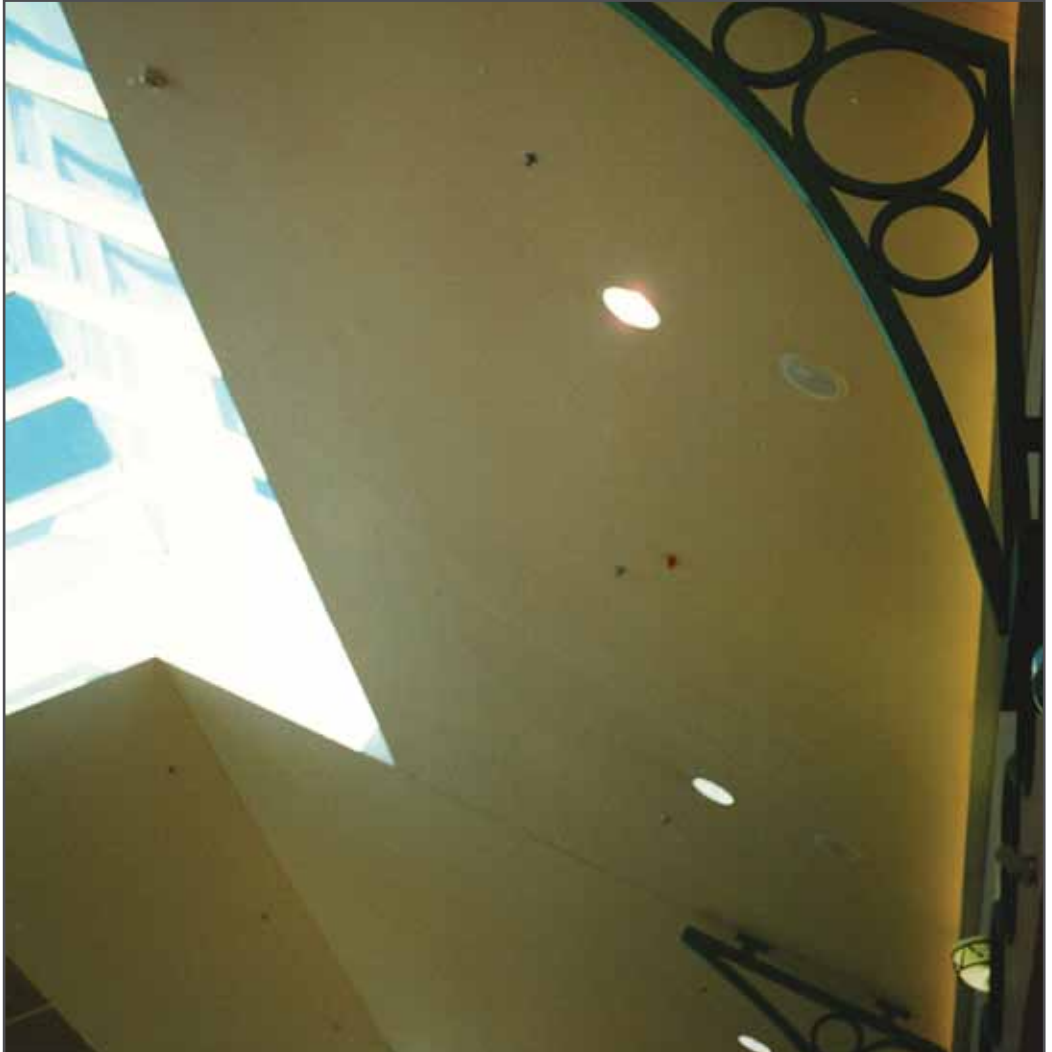


plasterboard ceiling under  
glancing light conditions





the same ceiling under different lighting conditions when viewed from another angle



wall surface under glancing light  
conditions caused by direct sunlight





the same wall surface  
under indirect light





A number of measures can be considered in order to eliminate glancing light effect on interior surfaces:

- Diffuse and soften the light entering the room through windows by using mesh curtains or other diffusers.
- Utilise a number of lower-wattage light bulbs, rather than one or two bright ones, to illuminate the room, thus reducing the shadowing effect.
- Utilise suspended or recessed ceiling lights.
- Select shades that direct light downwards or directly at the feature to be highlighted.

Incorrectly positioning a spotlight to highlight an object can also create glancing light effect emphasising surface irregularities on walls and ceilings.

Feature or spot lights should light only the featured object (below).



# lighting

Lighting is one of the most important elements in building design and can add that special finishing touch.

One must be aware of the effects of glancing light when considering lighting types and positioning.

Modern lighting solutions can help to balance illumination and shadow and to achieve a better outcome in a new home or commercial project.

Although the selection of light fittings is usually governed by taste and budget, it is wise to consider lighting effect on internal surfaces even before construction is commenced.

Large living areas, which are a feature of modern open plan designs, are the most severely affected by glancing light. Consideration should be given to illuminating such areas with general diffused light using downlights or spotlights, in combination with local accent lighting such as floor lamps, table lamps etc.

Recessed ceiling lights close to a wall highlight texture variations on wall surfaces



## cautionary notes

- Fluorescent or unshaded ceiling lights installed in kitchen areas that form part of a large open living area will, in some cases, create unfavourable effects on the other ceilings by highlighting variations in the finished surface.
- In two storey dwellings, some downlights may not fit within the floor cavity. This needs to be taken into account at design stage.

# favourable lighting

# unfavourable lighting



An opaque shade directs the light downwards to illuminate the room not the ceiling.



A recessed fluorescent light avoids ceiling shadows and does not highlight surface variations.



Recessed downlights and spotlights avoid glancing light by providing an even downward illumination.



In some circumstances, fluorescent lights installed directly over butt joints may help to conceal the joints.



An area of ceiling in daylight. No surface variations are visible when ceiling light is off.



A batten holder without lampshade casts harsh light on the ceiling and highlights surface variations.



Unguarded fluorescent lights close to the ceiling highlight surface variations and cast unsightly shadows.



Ceiling mounted circular fluorescent lights provide very strong glancing light and accentuate surface variations.



Fluorescent light tubes should be run parallel to the short edges of plasterboard sheets.



The same area at night when lit by ceiling mounted round fluorescent light.

# gloss/sheen paint finishes

Gloss and even semi-gloss paints will accentuate surface variations regardless of the direction of lighting or the viewing angle. Flat paints, on the other hand, reflect light in a diffused form and thus mask surface variations.

As plasterboard's paper surface has a different surface texture from hand applied jointing materials, this difference in texture can be accentuated by gloss paints.

Where gloss or impervious sheen paint finishes are desirable or mandatory for functional reasons (eg in kitchens, bathrooms and commercial food preparation areas), some loss of appearance can be expected, even when the work has been carried out to the highest level of workmanship.



Surface finished with matt paint (above)



Surface finished with gloss paint (below)

For the reasons outlined, a full gloss paint finish is not recommended on plasterboard walls or ceilings.

Where gloss or semi-gloss paints are to be used, the highest level of plasterboard finish as stipulated by AS 2589 'Gypsum linings – Application and Finishing' is recommended (Level 5 finish; see Levels of Finish page 24).

A gloss paint finish subjected to external glancing light

Careful consideration must also be given to:

- The placement of windows.
- The type of lighting.
- The standard of paint finish.
- The positioning of plasterboard joints (both butt and recess).
- Building aspect – Northerly? Westerly?



# painting preparation and application

## preparation

The quality of a painted finish can be improved if adequate steps have been taken in preparation of plasterboard surfaces prior to painting:

All surfaces should be clean and dust free prior to painting

Any major defects visible after the first (sealer undercoat) coat of paint should be referred to the plasterboard contractor before proceeding with the second and final coats. Minor blemishes are normally attended to by the painter.

## application (level 4 finish)

For the best results, Boral Plasterboard recommends roller paint application and the use of a suitable sealer undercoat over the entire plasterboard surface in order to equalise porosity and texture of the jointing material and plasterboard paper face.

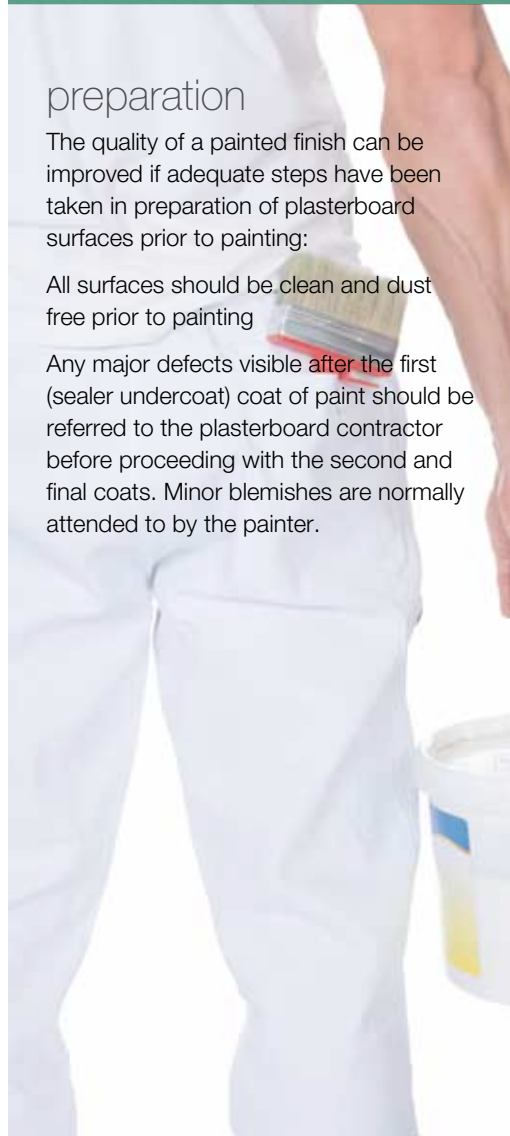
Sealer undercoat should be lightly sanded before applying the second paint coat.

As spray painting does not impart a textured surface and does not equalise the porosity of what is essentially two different materials, it tends to emphasise the paper nap and accentuate joint locations.

**If the spray painting method is to be used, it is recommended that all paint coats are backrolled and allowed to dry thoroughly prior to application of subsequent coats.**

Backrolling must be carried out over wet paint to create a textured background for subsequent paint coats.

Choice of colours is also important, as some darker colours tend to highlight surface variations. Light colours give better results, and white is recommended for the ceilings (refer to AS 2311 'Guide to the Painting of Buildings').



# levels of finish

## definition

The term 'level of finish' applies to plasterboard linings prior to decoration.

AS 2589 'Gypsum linings – Application and finishing' defines three levels of finish: Levels 3, 4 and 5. Level 4 is the default level of finish for plasterboard surfaces, unless specified otherwise.

It is essential that the level of finish is determined at the design stage since each level of finish has specific requirements for substrate tolerances and plasterboard installation, jointing and finishing. The desired level of finish may not be achieved unless all of these requirements are met through various stages of construction.

For a full description of levels of finish refer AS 2589. A summary of various levels of finish is provided below:

## level 3

This level of finish is used in areas that do not require decoration or where finish is not important (for example, above ceilings or inside service shafts and the like).

All joints and interior angles must have tape embedded in the joint compound and one separate coat of joint compound applied over all joints and fastener heads.

## level 4

This is the default and generally accepted level of plasterboard finish.

All joints and interior angles must have tape embedded in the jointing compound and a minimum of two separate coats of joint compound applied over all joints, angles fastener heads and accessories.

If Level 4 surface is to be exposed to critical lighting (see Glancing Light above), it should be covered with textured finishes or wall coverings. Smooth textured finishes and flat/matt or low sheen paints can be used when Level 4 finish is illuminated by non-critical lighting. Flat paints in this situation tend to conceal joints.

Weight, texture and sheen level of wall coverings/finishes should be carefully evaluated and joints should be adequately concealed if wall-covering material is lightweight, glossy or lightly patterned.

### Notes:

- In critical lighting conditions, surface variations may still be apparent in a Level 4 surface finish.
- Gloss, semi-gloss or deep tone paints are not recommended for Level 4 finish, as they accentuate surface variations.





## level 5

Level 5 finish should be used where gloss or semi-gloss paints are specified or where flat or low sheen paints will be exposed to critical lighting conditions. Level 5 finish is characterized by a parity of surface texture and porosity.

All joints and interior angles must have tape embedded in the jointing compound and a minimum of two separate coats of jointing compound applied over all joints, angles, fastener heads and accessories.

The work is finished with proprietary surface preparations or skim coating to remove differential surface textures and porosity. A suitable paint or plaster material is sprayed, rolled or trowelled over the defined area. The surface texture must be random and monolithic, concealing joints and fixing points.

### Notes:

- If Level 5 finish is desired for a decorated plasterboard surface, this must be specified at the design stage.
- Level 5 finish does not mean the surface is without texture variation.
- Level 5 finish is difficult to achieve and always requires the cooperation of the framer, plasterer and painter in establishing suitable work practices that deliver the agreed painted finish for the given project.
- Some minor surface variations may still be visible in Level 5 finish. However, these will be minimized.
- The surface of the defined area may require sanding to be suitable for decoration.

# joint inspection and tolerances

As outlined in the Guide to Standards and Tolerances 2007<sup>1</sup>, a visual inspection of wall and ceiling surfaces should be carried out from a distance of 1.5m or greater, under non-glancing lighting conditions.

**Plasterboard surfaces should not be inspected under glancing light conditions.**

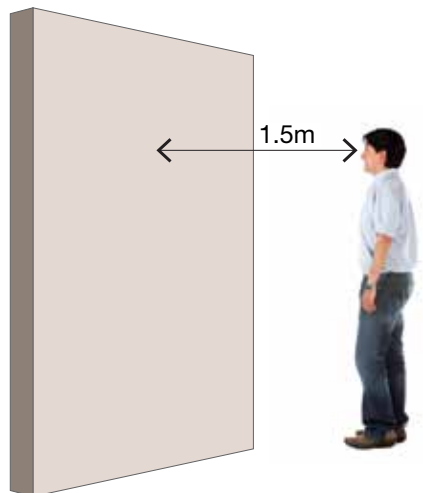
Allowable tolerances for plasterboard joint build-up are outlined in AS 2589 'Gypsum Linings - Application and Finishing'.

Refer AS 2589 and the relevant industry publications for guidance on conducting plasterboard joint inspections.

1 'Guide to Standards and Tolerances 2007', Victorian Building Commission in collaboration with Office of Fair Trading NSW, the Tasmanian Government and the ACT Government.



Digital gauge used to determine plasterboard joint compliance with AS 2589 'Gypsum linings – Application and finishing'



# points to remember

Plasterboard surfaces are never perfectly flat. Even with the most careful professional finish, every surface will contain variations.

Surface variations invisible under normal lighting conditions will almost certainly be emphasised by a combination of glancing light and sheen or gloss paint finishes.

Glancing light can be caused by natural lighting conditions or by certain types of artificial lighting. Unfavourable factors include:

- Large uncurtained windows.
- Unshaded light bulbs.
- Ceiling-mounted fluorescent lights.
- Incorrectly-positioned spotlights.
- Gloss or sheen paint finishes.
- Outdoor reflective surfaces (eg pools, canals, adjoining steel roofing and painted walls)
- Plasterboard joints parallel to a glancing light source.

## Sustainability

Boral Plasterboard aims to minimise the environmental impact of its operations and to make a positive difference to the environment and communities in which it operates. Plasterboard is manufactured from abundant natural gypsum resources and 100% recycled paper liner.

Plasterboard waste can be recycled back into new plasterboard or used as a soil conditioner. Please contact Boral Plasterboard regarding waste collection services available in your region.

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## Health and Safety

For information regarding the safe use of Boral Plasterboard products and accessories please refer to instructions on the product packaging or contact your local Boral Plasterboard Sales Office or TecASSIST® for a current copy of the Material Safety Data Sheet.

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## Technical Enquiries **1800 811 222**

TecASSIST® provides technical advice to builders, architects, contractors, engineers, regulators and home owners throughout Australia.

Our friendly team can offer both practical and design input at all levels of the plasterboard industry. Get your next project off on the right track by contacting TecASSIST® weekdays 8.30am - 4.30pm AEST on 1800 811 222 or [www.boral.com.au/tecassist](http://www.boral.com.au/tecassist).

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