GUIDELINES FOR REPAIRING GIB® PLASTERBOARD LININGS IN WIND OR EARTHQUAKE DAMAGED PROPERTIES

Supplement to: GIB® Site Guide, January 2010; GIB® Fire Rated Systems, January 2006; and GIB EzyBrace® Systems 2011

SCOPE OF USE

This information bulletin provides general guidelines for carrying out remedial work to plasterboard wall and ceiling surfaces following damage sustained after a severe wind or earthquake event.

Significant sheet fracture

The information is aimed at;

- Homeowners
- Trades people
- Architectural designers & engineers
- Building Consent Authorities
- Insurance assessors or loss adjusters

NOTE

These guidelines are by necessity of a general nature. Detailed investigation needs to be carried out on a case by case basis to establish the extent of damage to the structure and linings, before commencing repairs.

Prior to carrying out remedial work to plasterboard walls and ceilings, buildings must be checked for structural adequacy, safe entry and working conditions, as well as being straight, plumb and level.

INTRODUCTION

Severe wind or earthquake loading can subject buildings to intense forces and movements placing significant strain on wall and ceiling planes. Resulting damage to wall and ceiling surfaces can often include;

- cracked joints and fastener popping
- sheets being forced from walls
- sheets breaking independently of joints

REMEDIAL WORK

It is important to note that even if remedial work is carried out to a high level of workmanship, the quality of the finished surface may not be exactly as it was prior to the event. Building owners need to take this into consideration when having repair work carried out to their properties.

Ensure a safe working environment before carrying out any remedial work and ensure that there is no danger from items such as;

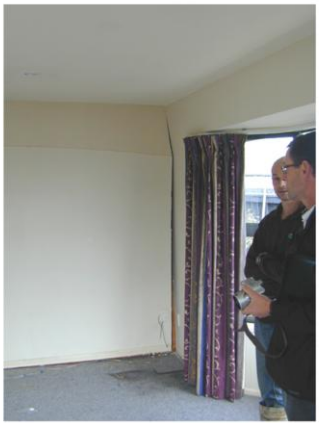
- contents or cabinetry that has been loosened
- ceiling sheets that might collapse
- damaged electrical services and outlets

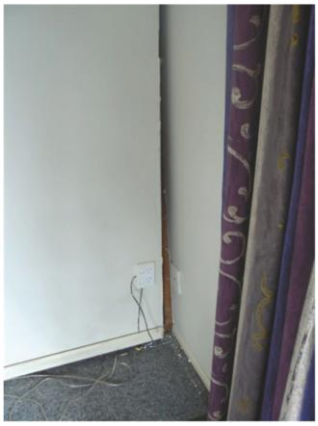
WALL BRACING

Earthquake and wind damage may cause houses to lose their stiffness and strength resulting in structures being 'loose'. Repairs to gypsum plasterboard linings need to restore structural integrity to prevent future small events repeating the cracking and damage.

Any damaged sections of wall forming part of a bracing element must be replaced with an equivalent sheet material fastened as a bracing element. A key part of remedial work will be to check the original bracing schedule for the building.

Although not essential, it is highly recommended that any other severely damaged plaster board wall sheets are replaced and installed as if they were bracing elements with fastenings as described in GIB® bracing publications. This will provide additional stiffening of the building structure.





Lining detached from the framing requiring replacement of the bracing element.

The checklist that follows has more specific bracing elements & general wall and ceiling repair guidance. Visit www.gib.co.nz/canterburyearthquake and refer to the BUILD article: "*Repairing Earthquake Damaged Wall Linings*" for more detailed information on this and specific reference to the Canterbury earthquakes.

FIRE RATED SYSTEMS

Consult the original building plans to establish the location of fire rated walls which form part of the building's fire safety system. GIB® Fire Rated systems are common in commercial or multi-unit residential construction and their performance is dependent on strict compliance with the installation instructions contained in GIB® Fire Rated Systems publications. Damage sustained to passive fire resistant walls could seriously compromise the effectiveness of the building's fire safety system. Fire rated walls need to be carefully inspected and if damage is noted, they need to be reinstated in full compliance with GIB® Fire Rated Systems specifications.

COSMETIC REPAIRS

For repair guidance on cosmetic damage, e.g. minor cracking refer to the following checklist and Appendix 1 *"Cosmetic Repair Guidelines"*.

CHECKLIST FOR REPAIRING GIB® PLASTERBOARD LININGS IN WIND OR EARTHQUAKE DAMAGED PROPERTIES

This checklist will assist trade professionals to reinstate interiors of earthquake or wind damaged residential buildings. Once specific damaged has been identified the following tables give specific recommendations on how to repair.

Failure to adequately reinstate bracing resistance, stiffness and strength is likely to result in cracking or damage of cosmetic repairs following future relatively minor events.

Standard gypsum plasterboard and sometimes special purpose gypsum plasterboard internal linings provide most of the bracing resistance in many light steel and timber framed New Zealand homes. Prior to commencing repairs a bracing assessment of the property must be carried out to determine the location and type of designated bracing elements and the adequacy of bracing resistance. This either involves an assessment of existing bracing plans and calculations or completing a new evaluation *(see www.gib.co.nz/ezybrace for bracing design advice and tools*). Cosmetic repairs alone may otherwise be vulnerable to damage with any minor future event.

WALLS

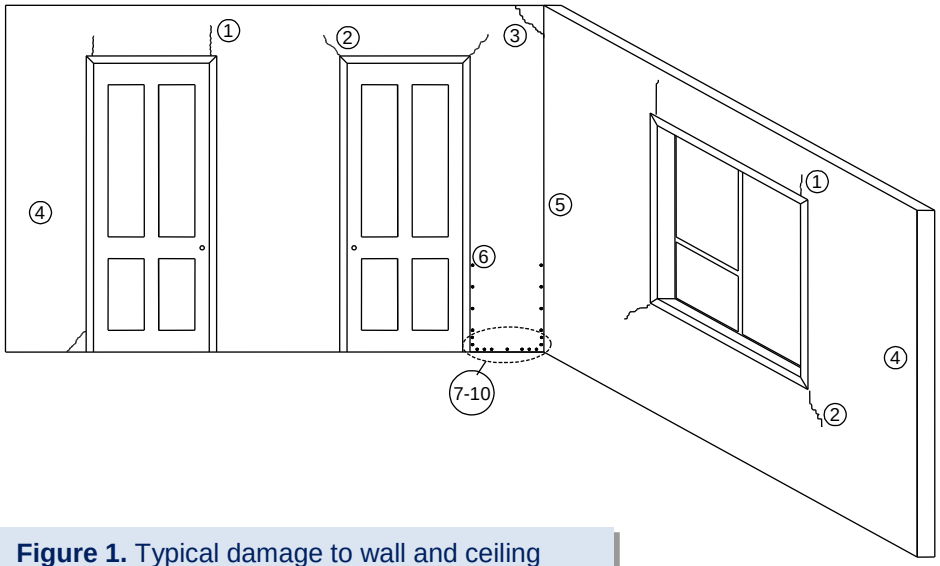
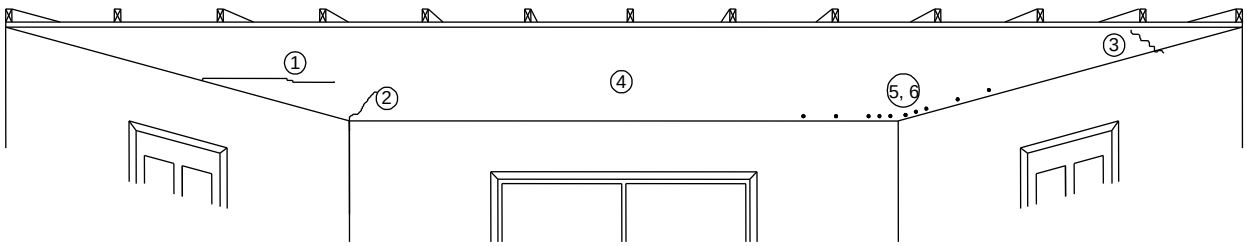


Figure 1. Typical damage to wall and ceiling linings (The numbers shown on Fig. 1 refer to the repair guidelines in the following tables)

Note: The dotted lines indicate where cracking may occur and the dots indicate where fastener stress may occur.

CEILINGS



WALLS

Damage			*Repair*		*Notes*
#	Type	Likely Cause	Bracing Element	General Lining	
1	Vertical cracks above or below windows or above doors in joints between plasterboard sheets.	Relative movement of sheets due to wall racking.	For minor cracks in existing jointing, carefully scrape out existing joint compound. Re-stop using GIB® paper tape embedded in GIB Plus 4®, GIB Promix® All Purpose or GIB® Trade Finish® Multi for first and second coats followed by a finishing coat of the same compounds. See Appendix 1 for more details.		This is inherently a weak joint and cosmetic cracking may re-occur if subjected to further movement.
2	Diagonal cracks from the corners of window or door openings.	Sheet fracture around opening due to 'racking' or horizontal structural movement	Replace sheet, re-fasten and finish joints as a bracing element. Alternatively overlay with new linings, fixed in a bracing pattern using min. 40 mm fasteners.	See Appendix 1 for repair of minor cracks. Sheet replacement may be necessary for extensive cracking.	Feather jointing to disguise build up.
3	Diagonal cracks in wall corners	Stress at stud to plate connections due to 'racking' movement			
4	"Drummy" or loose linings (hollow sound when tapped)	Buckling of centre sheet and loss of fixing / adhesion	Re-fix centre of sheets using gypsum drywall screws generally at 200 mm centres to intermediate framing. Temporary propping may be required to hold sheets back until all fasteners are installed.		
5	Creasing or cracks in wallpaper and/or fastener tearing at wall intersections	Relative movement of sheets due to racking	Ensure the structure is plumb.		If the wall paper is damaged, re-papering will often be required.
6	Perimeter fastener stress	Sheet to fastener bending due to racking	Check sheet perimeter fasteners. Insert fasteners in between existing ones and repair as for 'general lining'. Replace sheets if fasteners have pulled through or plaster bulges around fastener heads. Alternatively overlay with new linings, fixed in a bracing pattern using min. 40mm fasteners.	Insert fasteners between existing ones. Repair as outlined for loose fasteners in Appendix 1	
7	Fastener stress at bottom plate	Wall racking and sheet lift relative to bottom plate		Insert fasteners between existing ones. Significant damage to general linings may indicate insufficient bracing resistance. Check bracing design.	Add bracing and perimeter fasteners to general linings where possible.
8, 9	Framing connections such as stud lift, plate lift,	Wall racking induced lift and stressed framing connections	Remove linings. Reinstate framing connections. Re-line and add framing fixings and bracing resistance where possible. Alternatively, fix framing connections, patch and overlay with new linings, fixed in a bracing pattern using min. 40mm fasteners.	(Partially) remove linings to reinstate framing connections and repair. Check bracing design.	Frame lift and framing connection failure is an indication of inadequate bracing provision generally or in specific building locations.
10	Panel hold-down connections				

CEILINGS

Damage			*Repair*		*Notes*
#	Type	Likely Cause	Ceiling diaphragm	General Lining	
1	Sheet joint cracking	Relative movement of sheets due to racking.	For minor cracks in existing jointing, carefully scrape out existing joint compound. Re-stop using GIB® paper tape embedded in GIB TradeSet® 20 or 45 for first and second coats followed by a finishing coat of GIB Plus 4®, GIB® Trade Finish® Lite or GIB Promix® Lite. For further detail see Appendix 1. For major cracking or if in doubt, replace sheet, re-fasten and finish as a bracing element. Alternatively overlay with new linings, fixed in a bracing pattern using minimum length 40 mm fasteners.		Cut sheet joints are inherently weak and cosmetic cracking may re-occur following future serviceability events.
2	Diagonal cracks from corners	Sheet fracture due to racking movement	Replace sheet and re-fasten and finish joints as a bracing element. Alternatively and depending on the extent of damage, overlay the ceiling with new linings.	To repair cracking, see Appendix 1 later in this document. Sheet replacement may be necessary for extensive cracking.	Feather jointing to disguise build up.
3	Diagonal cracks across corners				
4	“Drummy” or loose linings (hollow sound when tapped)	Buckling of centre sheet and loss of fixing / adhesion	Re-fix centre of sheets using gypsum drywall screws generally at 200 mm centres to intermediate framing. Temporary propping may be required to hold sheets back until all fasteners are installed.		
5	Cracks and fastener stress at wall intersections	Relative movement of sheets due to racking	Ensure the structure is plumb.		
6	Perimeter fastener stress	Sheet to fastener bending due to racking	Check sheet perimeter fasteners. Insert fasteners in between existing ones and repair as for ‘general lining’. Replace sheets if stress has resulted in fastener pull through or plaster bulging around fastener heads. Alternatively and depending on the extent of damage, overlay the ceiling with new linings.	Insert fasteners between existing ones. Repair as outlined for loose fasteners in Appendix 1	

For further information or advice contact the GIB® Technical Helpline 0800 100 442 or visit gib.co.nz/canterburyearthquake

APPENDIX 1: COSMETIC REPAIR[1] GUIDELINES

1. Minor cracks in joints in plasterboard walls or ceilings[2].

Scrape out minor cracks with a carbide blade to recreate a recess approximately 60mm wide and approximately 1 mm deep. Do not cut through the plasterboard paper. Clean out and remove any loose plaster, paper or paint, then lightly sand the surface before embedding GIB® paper tape in an air drying multipurpose compound such as GIB Plus 4®, GIB ProMix® All Purpose or GIB Trade Finish® Multi using a trowel or spatula knife. When dry, lightly sand the surface and apply a finishing coat of the same compound. Let thoroughly dry, lightly sand and paint as per the paint manufacturer's requirements. Where internal corner joints are cracked or internal corner trims are broken, clean out and remove any loose plaster, paper or paint and then lightly sand the surface before embedding GIB® paper tape or GIB® Goldline® trim and treating as above.

2. Sheet fracture or breakages[3].

Sheet breakage differs from a joint crack in that the plasterboard sheet itself has actually fractured. Often this will have occurred where a sheet has been cut at the corner of a door or window opening or at a change of direction in a ceiling. Sheet fractures can sometimes occur between framing members and are obvious when the sheet is pushed. Smaller breakages less than 300 mm long in non-structural applications can be ground out with an angle grinder and jointed using GIB® paper tape embedded in a setting compound such as GIB Tradset® 20 or 45 and then finished with a light coat of GIB Plus 4®, GIB Trade Finish® or GIB Promix® Lite.

3. Loose fasteners.

Refix or tighten any existing loose fasteners ensuring that the original fastener is slightly below the surface of the board. Place an additional fastener approximately 50mm from the original ensuring that it is just below the board surface. Lightly sand painted surfaces prior to filling fastener heads with a 100mm broad knife using GIB Plus 4®, GIB ProMix® All Purpose or GIB® Trade Finish® Multi. Apply a third finishing coat with a 150mm broad knife. Let dry then sand & paint. The remedial process is described in some detail on pages 80 & 95 of the GIB® Site Guide (Jan 2010).

4. Holes.

If holes have been punched in a wall, it may be more efficient to cut out the damaged area and follow the procedure for repairing holes as described in some detail on page 90 of the GIB® Site Guide (Jan 2010). Sheets with significant damage over a large proportion of its surface should be removed and replaced.

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[1] If repairs are performed in cool weather, it is imperative that the room being repaired is heated to above 10 ^{o}C as there is a risk of delayed shrinkage occurring if the compound is not dry before painting ("hollow joints").

[2] Plasterboard sheet joints placed alongside and above or below door and windows are susceptible to cracking due to structural movement. Minor damage is relatively easy to remedy but is unlikely to resist cracking as a result of any major future movement.

[3] Any sheet fracture repair will not be as strong as the original sheet material and damage is likely to repeat following any future movement as a result of wind, earthquake, impact or even traffic vibrations. If in doubt, replace.