

0511P KEYSTONE ACOUSTICS IN LINING

Branded worksection

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Worksection abstract

This branded worksection *Template* is applicable to the installation of **Keystone Acoustics** perforated acoustic lining systems permanently fixed to internal walls and framed ceilings. It deals with internal dry linings of timber boards, gypsum plasterboard and cellulose fibre reinforced cement.

Background

The text of this worksection is built around the specification of products for which working practices are long established and there is comprehensive manufacturer's literature. In addition to the key materials specified here, there is a wide range of plasterboard, fibreboard, hardboard and metal proprietary systems. The specification of these is best handled by reference to product names and manufacturers' recommendations.

Guidance text

All text within these boxes is provided as guidance for developing this worksection and should not form part of the final specification. This *Guidance* text may be hidden or deleted from the document using the NATSPEC Toolbar or the hidden text *Hide* and *Delete* functions of your word processing system. For additional information visit FAQs at www.natspec.com.au.

Optional style text

Text in this font (blue with a grey background) covers items specified less frequently. It is provided for incorporation into *Normal* style text where it is applicable to a project.

Related material located elsewhere in NATSPEC

If a listed worksection is not part of your subscription package and you wish to purchase it, contact NATSPEC.

Related material may be found in other worksections. See for example:

- 0182 *Fire-stopping*.
- 0342 *Light steel framing* for support and structural sheet bracing.
- 0382 *Light timber framing* for support and structural sheet bracing.
- 0431 *Cladding – combined* for external cladding.
- 0472 *Acoustic insulation* for acoustic rated installations.
- 0511p *KEYSTONE ACOUSTICS in lining*
- 0522 *Partitions – framed and lined* for internal fitout partitions.
- 0532 *Suspended ceilings – flush lined*.
- 0641 *Applied wall finishes* for additional wall finishes applied over basic internal lining.
- 0642 *Wallcoverings* for additional wall finishes applied over basic internal lining.

Material not provided by Keystone Acoustics

This branded worksection includes generic material which may not be provided by the product partner, including tongue and grooved boards, particleboard and wet processed fibreboard.

Documenting this and related work

You may document this and related work as follows:

- Locate and schedule the sheet lay-up of framed partitions on drawings, e.g. for decorative panels.
- Joints and trim details may be better described on drawings.

The *Normal* style text of this worksection may refer to items as being documented elsewhere in the contract documentation. Make sure they are documented.

Specifying ESD

The following may be specified by including additional text:

- Reduced/zero formaldehyde emissions: For plywood, blockboard, particleboard, and wet and dry processed fibreboard (including MDF). Alternatively, select panels manufactured using water based adhesives.
- Recycled material content: For plasterboard, fibre cement, particleboard and MDF. For example, plasterboard may consist of recycled core content and liner paper manufactured from recycled newspaper and cardboard.

- Recycling of plasterboard waste/offcuts into new plasterboard or as soil conditioner.
- Fibre cement for resistance to termites and fungal decay.
- Alternative panel materials such as strawboard made from waste straw with zero formaldehyde, paperboard made from recycled paper, and bamboo panels.

Refer to the NATSPEC TECHreport TR 01 on specifying ESD.

1 GENERAL

For more than 40 years, **Keystone Acoustics**, an Australian owned and operated company, has been redefining its processes and machinery to create patterned, perforated and slotted panelling solutions, engineered for optimum performance.

Showcased in many of Australia's iconic buildings, **Keystone Acoustics'** solutions combine the widest range of quality substrates with the latest in innovative finishes to deliver acoustic performance, durability and design versatility. Panels are engineered to suit diverse applications - from contemporary office fitouts to exemplary facades.

1.1 RESPONSIBILITIES

General

Requirement: Provide **Keystone Acoustics** acoustic internal lining systems, as documented.

Documented is defined in 0171 General requirements as meaning contained in the contract documents.

Performance

Requirement: Provide lining system with a surface that is:

- Resistant to impacts expected in use.
- Resistant to moisture encountered under expected environmental conditions.
- Free of irregularities.
- A suitable substrate for the nominated final finish.

1.2 COMPANY CONTACTS

Keystone Acoustics technical contacts

Website: www.keystoneacoustics.com.au/contacts.php

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*

0171 General requirements contains umbrella requirements for all building and services worksections.

List the worksections cross referenced by this worksection. *0171 General requirements* references the *018 Common requirements* subgroup of worksections. It is not necessary to repeat them here. However, you may also wish to direct the contractor to other worksections where there may be work that is closely associated with this work.

NATSPEC uses generic worksection titles, whether or not there are branded equivalents. If you use a branded worksection, change the cross reference here.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the definitions given in AS/NZS 4491 and the following apply:

See AS/NZS 4491 for definitions of plywood, exterior plywood and blockboard.

- Decorative overlaid wood panels: Particleboard or fibreboard with a bonded decorative finishing surface such as thermosetting resin (low pressure melamine), PVC film, paper foils or wood veneer.
- Dry process fibreboard (MDF): Panel material with a nominal thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a forming moisture content of less than 20%.
- Fibre cement sheet linings: Treated cellulose fibre in a matrix of cement and sand autoclaved sheet, sealed on one side.
- High pressure decorative laminates (HPDL):

- . Panels consisting of core layers impregnated with phenolic and/or aminoplastic resins and a surface layer(s) impregnated with aminoplastic resins (mainly melamine resins).
- . Sheets consisting of a decorative face and layers of fibrous sheet material (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure of at least 5 MPa.
- Particleboard: Panel material manufactured under pressure and heat from particles of wood (wood flakes, chips, shavings, sawdust and similar) and/or lignocellulosic material in particle form (flax shives, hemp hurds, bagasse fragments, rice hulls, wheat straw and similar) with the addition of an adhesive.

Wood particles include: Woodflakes, chips, shavings, sawdust.

Lignocellulosic materials include: Flax, shives, hemp, wheat, straw, rice hulls.

- Wet processed fibreboard: Panel material with a nominated thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from the felting of the fibres and the panels are manufactured with a forming moisture content greater than 20%.

Edit the **Definitions** subclause to suit the project or delete, if not required. List alphabetically.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Product details: www.keystoneacoustics.com.au/products.php

PDF product brochures: www.keystoneacoustics.com.au/downloads.php

1.6 TOLERANCES

Permitted deviations

Gypsum lining: To AS/NZS 2589 clause 4.2.2.

Other lining: 4 mm from a 1.8 m straightedge.

Substrates

Requirement: Plumb, level, in true alignment and to the lining manufacturer's recommendations.

Timber, steel framing and battened masonry: To AS/NZS 2589 clause 4.2.

1.7 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformance to PRODUCTS, FIRE PERFORMANCE, Fire hazard properties.

Operation and maintenance manuals

Maintenance manual: Submit on completion.

Samples

Prefinished panels: Minimum 300 x 600 (wide) mm panel for each finish with associated trim.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following:

- Decorative panels: Showing panel set-out, large scale panel fixing details, attachment devices and other components.

Warranties

Requirement: Submit the following:

- [complete/delete]

Describe the requirements of warranties in **PRODUCTS** or **EXECUTION**, as appropriate, and list the submissions required here.

Lining materials: Submit the manufacturer's published product warranties.

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate or framing before installation of linings.
- Finished surface of installation before applying:

- . Sealer.
- . Finish coatings or decorative papers.

Amend to suit the project adding critical stage inspections required.

Hold points, if required, should be inserted here.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to PRODUCTS, **GENERAL, Substitutions** in *0171 General requirements*.

The *0171 General requirements* clause sets out the submissions required if the contractor proposes alternative products. Refer also to NATSPEC TECHnote GEN 006 for more information on proprietary specification.

Storage and handling

Requirement: Dry and undamaged lining stacked in pallets horizontally on a smooth, level surface. Prevent distortion or moisture ingress.

Timber or fibreboard panels: Store off the ground in a well-ventilated area.

Handling: Do not drag sheets across each other or across other materials. Protect edges, corners and surface from damage.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Edit the list to suit the project or delete if not required.

Certification

Timber based products: Label panels under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the label on faces or edges which will be concealed in the works.

Nominate relevant certification schemes in *0185 Timber products, finishes and treatment*.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1.

Non-sprinklered buildings: Wall and ceiling linings must either have an *average specific extinction area* less than 250 m²/kg or a *smoke growth rate index* not more than 100 as determined by AS 5637.1.

Refer to NATSPEC TECHnote DES 020 for information on fire hazard properties.

2.3 PLASTERBOARD

Consult the manufacturer's literature for information on availability and system performance.

BCA C1.9(e) allows plasterboard to be used as a non-combustible material.

General

Standard: To AS/NZS 2588.

Location: [complete/delete]

Grade: [complete/delete]

AS/NZS 2588 defines four grades by performances requirements:

- Standard.
- Bracing.
- Water resistant.

- Fire resistant.

Thickness (mm): [complete/delete]

e.g. 10 mm, 13 mm, 16 mm or 25 mm.

Sheet width (mm): [complete/delete]

e.g. 600 mm, 900 mm, 1200 mm or 1350 mm.

Sheet length (mm): [complete/delete]

Edge finish: [complete/delete]

e.g. square, recessed or bevelled to suit the specified joint finish. See Figure 1 of AS/NZS 2588.

Key-Board perforated plasterboard

Material: [complete/delete]

Select:

- Gyprock™.
- Gyprock EC08™.

Perforation pattern: [complete/delete]

Visit the **Keystone Acoustics** website for details of perforation patterns and their reference numbers. Specify a pattern or drawing reference number, including whether the pattern is to cover the whole sheet or to be laid out in modules.

Usually 10 to 25% of the surface area needs to be open for maximum acoustic performance. Openings can be perforated, slotted or patterned. Overall grids of perforations can be specified by hole diameter and centres. The *Key-Board Open Areas* document from the *Downloads* page of the **Keystone Acoustics** website shows the percentage of open area for a range of hole sizes at different centres.

Finish: [complete/delete]

Select None or Undercoat.

Key-Board can be supplied raw or undercoated. On-site painting after installation is recommended. Boards can also be supplied pre-shaped. Contact **Keystone Acoustics** for available undercoating and shaping options.

Backing: [complete/delete]

Select Keystone K100. Keystone K100 is a non woven acoustic textile, coated with heat reactive adhesive. When factory applied to the rear of perforated panels, it enhances their appearance and acoustic performance, and acts as a structural deterrent to pests, insects, fibres and dust. Put None if not required.

Key-Enviro

These paperless gypsum fibreboard panels are comprised of 95% recycled material, making them ideal for sustainable projects.

Location: [complete/delete]

Suitable for interior walls and ceilings or exterior dry soffit applications.

Material: [complete/delete]

Select:

- USG Fiberock.
- Knauf Vidiwall.

Contact **Keystone Acoustics** for current lead times on these products.

Perforation pattern: [complete/delete]

Visit the **Keystone Acoustics** website for details of perforation patterns and their reference numbers. Specify a pattern or drawing reference number, including whether the pattern is to cover the whole sheet or to be laid out in modules.

Usually 10 to 25% of the surface area needs to be open for maximum acoustic performance. Openings can be perforated, slotted or patterned. Overall grids of perforations can be specified by hole diameter and centres. The *Key-Enviro Open Areas* document from the *Downloads* page of the **Keystone Acoustics** website shows the percentage of open area for a range of hole sizes at different centres.

Thickness (mm): [complete/delete]

Select:

- 13 mm or 16 mm for USG Fiberock.
- 12.5 mm or 15 mm for Knauf Vidiwall.

Sheet width (mm): 1200.

Contact **Keystone Acoustics** for details of other widths available on order.

Sheet length (mm): 3000.

Contact **Keystone Acoustics** for details of other lengths available on order.

Edge finish: Recessed.

Contact **Keystone Acoustics** for details of other profiles available on order.

2.4 FIBRE CEMENT

BCA C1.9(e) allows fibre cement sheeting to be used as a non-combustible material, and 13 mm sheet to be used as a fire-protective covering.

General

Standard: To AS/NZS 2908.2.

AS/NZS 2908.2 classifies sheets according to their application, Type A (intended for external use) or Type B (intended for internal use), and mechanical and minimum modulus of rupture (Category 1, 2, 3, 4 and 5).

AS/NZS 2908.2 is cited at BCA A1.1 for fire-protective covering.

The BCA also cites the superseded ISO 8336-1993 as an alternative.

Wall and ceiling linings: Type B category 2.

Minimum thickness: 4.5 mm.

Location: [complete/delete]

Type: [complete/delete]

Category: [complete/delete]

Cladding and soffit linings are manufactured as Type A Category 3, internal linings are Type B Category 2 and compressed sheets are Type A Category 5.

Thickness (mm): [complete/delete]

Key-Endura and Key-Kompress perforated fibre cement

Product: [complete/delete]

Select Key-Endura (fibre cement) or Key-Kompress (compressed fibre cement). **Keystone Acoustics** also supply ceiling tiles for this range in 6 mm and 9 mm thicknesses for 590 x 590 mm and 590 x 1190 mm sizes.

Perforation pattern: [complete/delete]

Visit the **Keystone Acoustics** website for details of perforation patterns and their reference numbers. Specify a pattern or drawing reference number, including whether the pattern is to cover the whole sheet or to be laid out in modules.

Usually 10 to 25% of the surface area needs to be open for maximum acoustic performance. Openings can be perforated, slotted or patterned. Overall grids of perforations can be specified by hole diameter and centres. The *Key-Endura and Key-Kompress Open Areas* document from the *Downloads* page of the **Keystone Acoustics** website shows the percentage of open area for a range of hole sizes at different centres.

Finish: [complete/delete]

Select:

- None for unfinished board.
- CSR Cemiseal Barestone™ cement-look prefinish. (Key-Kompress only).
- White or coloured undercoat. Specify colour.
- Polyurethane clear or coloured. Specify colour and gloss level. Contact a **Keystone Acoustics** architectural representative to discuss your requirements.

Backing: [complete/delete]

Select KA100 for enhanced acoustic performance and as a structural deterrent to pests and insects. Put None if not required.

2.5 TONGUE AND GROOVE BOARDS

A wide variety of profiles is available and local suppliers should advise on availability.

Hardwood

Standard: To AS 2796.1.

Grade to AS 2796.2: [complete/delete]

AS 2796.2 describes four grades, select (SEL), medium feature (MF), high feature (HF), and parquet clear.

Seasoned cypress pine

Standard: To AS 1810.

Grade: [complete/delete]

1 or 2.

Softwood

Standard: To AS 4785.1.

Grade to AS 4785.2: [complete/delete]

AS 4785.2 describes five grades, clear (CL), appearance (AP), select (SEL), standard (STD) and utility (UTL).

2.6 PLYWOOD AND BLOCKBOARD**General**

General interior use: To AS/NZS 2270.

Areas requiring moisture resistance: To AS/NZS 2271.

Visible surfaces with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Back/face veneer: Veneer quality C or D.

Preservative treatment (if applicable): [complete/delete]

Presealed plywood: Plywood pre-sealed both sides and edges with a machine applied sealer.

Plywood formaldehyde emission class to AS/NZS 2270 and AS/NZS 2271: [complete/delete]

Select E₁ (1.0 mg/L) or E₀ (0.5 mg/L). E₀ class may be available at additional cost and lead time. If required consult the manufacturer. A formaldehyde emission class E₁ or less can improve indoor air quality.**Key-Ply perforated hoop pine plywood**

Perforation pattern: [complete/delete]

Visit the **Keystone Acoustics** website for details of perforation patterns and their reference numbers. Specify a pattern or drawing reference number, including whether the pattern is to cover the whole sheet or to be laid out in modules.Usually 10 to 25% of the surface area needs to be open for maximum acoustic performance. Openings can be perforated, slotted or patterned. Overall grids of perforations can be specified by hole diameter and centres. The *Key-Ply Open Areas* document from the *Downloads* page of the **Keystone Acoustics** website shows the percentage of open area for a range of hole sizes at different centres.

Veneer: [complete/delete]

Select a veneer from Keystone Acoustic's standard range or specify a custom veneer. Contact **Keystone Acoustics** for details.

Finish: [complete/delete]

Select:

- Standard 2 pack polyurethane clear – matt, satin or full gloss.
- Standard 2 pack polyurethane stained – matt, satin or full gloss.
- Low VOC 2 pack polyurethane clear – matt, satin or full gloss.
- Low VOC 2 pack polyurethane stained – matt, satin or full gloss.

A UV resistant additive can be added to both. Data sheets available on **Keystone Acoustics'** website.

Backing: [complete/delete]

Select KA100 for enhanced acoustic performance and as a structural deterrent to pests and insects. Put None if not required.

General

Hardboard, medium board and softboard: To AS/NZS 1859.4.

See AS/NZS 1859.4 clause 4 for definitions of each type. The NCC cites AS/NZS 1859.4:2004.

2.7 PARTICLEBOARD**General**

Standard: To AS/NZS 1859.1.

Classification: [complete/delete]

Standard (STD), moisture resistant (MR) or high performance (HP) intended for use in continuously humid conditions or for load bearing application.

Particleboard formaldehyde emission class to AS/NZS 1859.1: [complete/delete]

Select E1 (1.0 mg/L) or E0 (0.5 mg/L). E0 class may be available at additional cost and lead time. If required consult the manufacturer. A formaldehyde emission class E₁ or less can improve indoor air quality.

2.8 WET PROCESSED FIBREBOARD

General

Hardboard, medium board and softboard: To AS/NZS 1859.4.

See AS/NZS 1859.4 clause 4 for definitions of each type. The NCC cites AS/NZS 1859.4:2004.

General purpose board

General purpose: Interior use generally.

Tempered (MR) board

Location: For areas with humid conditions or subject to occasional wetting.

Veneered general purpose board

Location: Timber veneer faced to one or both sides for decorative ceiling and wall lining.

Surface finish: [complete/delete]

Thickness (mm): [complete/delete]

Softboard

Location: Pinboards and insulation boards for roofing/ceiling, walls, partitions and doors.

Surface finish: [complete/delete]

Thickness (mm): [complete/delete]

Edge finish: [complete/delete]

2.9 DRY PROCESSED FIBREBOARD (INCLUDING MEDIUM DENSITY FIBREBOARD)

General

Standard: To AS/NZS 1859.2.

Includes general purpose (STD MDF), ultra-low density (STD Ultra LDF), low density (STD LDF), high density (STD HDF), moisture resistant (MR HDF) or (MR MDF) or high performance (HP MDF).

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

Dry-processed fibreboard formaldehyde emission class to AS/NZS 1859.2: [complete/delete]

Select E1 (1.0 mg/L) or E0 (0.5 mg/L). E0 class may be available at additional cost and lead time. If required consult the manufacturer. A formaldehyde emission class E₁ or less can improve indoor air quality.

Key-Lena perforated dry-processed fibreboard

Key-Lena is available in a wide variety of prefinishes and can be perforated to suit specific aesthetic and acoustic requirements.

Keystone Acoustics also supply ceiling tiles for this range in 9 mm, 12 mm and 16 mm thicknesses for 590 x 590 mm and 590 x 1190 mm sizes.

Classification: [complete/delete]

Select:

- General purpose (STD MDF).
- Moisture resistant (MR HDF).
- High performance (HP MDF) for use in continuously humid conditions or for load bearing application.
- Fire retardant (FR MDF) Key-Eclipse for areas that require a Group 1 or Group 2 fire classification.

Perforation pattern: [complete/delete]

Visit the **Keystone Acoustics** website for details of perforation patterns and their reference numbers. Specify a pattern or drawing reference number, including whether the pattern is to cover the whole sheet or to be laid out in modules.

Usually 10 – 25% of the surface area needs to be open for maximum acoustic performance. Openings can be perforated, slotted or patterned. Overall grids of perforations can be specified by hole diameter and centres. The *Key-Lena Open Areas* document from the *Downloads* page of the **Keystone Acoustics** website shows the percentage of open area for a range of hole sizes at different centres.

Veneer: [complete/delete]

Select:

- None for a raw finish.
- Laminate from Laminex and Formica ranges.
- Natural and reconstituted veneer from **Keystone Acoustics'** extensive standard range or specify a custom veneer.
- Key-Nirvana (a panel prefinished with textured or timber grain look vinyl veneer).

Visit the **Keystone Acoustics'** website for details of all finishes.

Finish: [complete/delete]

Select:

- Polyurethane clear – satin, pearl, metallic or full gloss.
- Polyurethane stained – matt, satin or full gloss.
- 2 pack polyurethane. Specify a colour and gloss level.

Only selected Key-Nirvana finishes can be clear finished. Contact **Keystone Acoustics** for details.

Backing: [complete/delete]

Select:

- K100 (a non woven acoustic textile, coated with heat reactive adhesive).
- K50 (a lightweight black textile).

When factory applied to the rear of perforated panels, K100 and K50 enhance the panels' appearance and acoustic performance, and act as a structural deterrent to pests, insects, fibres and dust. Put None if not required.

OTHER KEYSTONE ACOUSTICS PRODUCTS

Key-Designa panels

One-of-a-kind solutions, custom engineered and manufactured to your requirements. This can include modular shapes, combining a range of materials, shaping and grooving, decorative patterning and cut-out lettering.

Key-Fabrica panels

Acoustic panels made from MDF or plywood substrate and covered with your choice of fabric or from the **Keystone Acoustics** range. Fabric can also be applied to the rear of the panels so that it shows through perforations or cut-outs.

Panels can be fabricated in modular form or to meet specified acoustic requirements.

Key – RLine

Acoustic panels without visible perforations in a choice of seamless joins or modular sections. RLines' standard designs will give a soft aesthetic look plus acoustic performance. Choose one of the standard designs or a combination.

Key-Graphix

Combining classic artistic techniques and modern technology to give a truly unique look. Available in a variety of substrates.

Visit the **Keystone Acoustics** website for images of all of the above products or contact a **Keystone Acoustics** architectural representative to discuss your requirements.

2.10 DECORATIVE OVERLAID WOOD PANELS

General

Standard: To AS/NZS 1859.3.

AS/NZS 1859.3 covers wood panels overlaid with low pressure melamine, PVC film, paper foils and wood veneer.

2.11 HIGH PRESSURE DECORATIVE LAMINATE SHEET

General

Standard: To AS/NZS 2924.1.

2.12 COATED STEEL

General

Standard: To AS 1397.

- Coating class interior: Z275.
- Coating class exterior: Z450.

For locations of atmospheric corrosivity category C3 or C4 to AS 4312, nominate stainless steel.

2.13 ADHESIVES, SEALANTS AND FASTENERS

Adhesives

For wallboards: Gunnable synthetic rubber/resin based mastic contact adhesive formulated for bonding flooring and wallboards to a variety of substrates.

Sealants

Fire-resistance rated sealant: Non-hardening sealant, compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed.

Fasteners

Steel nails: Hot-dip galvanized.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Conditions

Commencement: Do not commence lining work until the building or installation area is enclosed and weathertight, and all wet trades have been completed.

Conditioning

General: Stabilise the room temperature for seven days prior to, and two days after, installation of linings, as follows:

- Areas with air conditioning installed: Run air conditioning at operational temperature.
- Air conditioned areas not operational: Maintain a room temperature range of 18°C to 30°C.
- Un-air conditioned areas: Install at 18°C to 30°C.

Lining storage: Store horizontally in the space they are to be installed for at least five days before installation and keep dry. Support evenly at centres no greater than those recommended by **Keystone Acoustics** for installation of the product.

Substrates or framing

General: Before fixing linings, check and adjust the alignment of substrates or framing, if necessary.

Battens

General: Fix at each crossing with structural framing members, to solid walls or ceiling support. Provide wall plugs in solid substrates.

Ceiling linings

General: Do not install until the timber roof structure is fully loaded for at least 14 days.

Accessories and trim

General: Provide accessories and trim as necessary to complete the installation.

Adhesives

General: Provide adhesive types appropriate for the purpose, and apply them so they transmit the loads imposed without causing discolouration of the finished surfaces.

Fire-resisting and acoustic installations

Sealing: Apply sealant to the manufacturer's recommendations and as follows:

- Around services pipes and penetrations.
- Electrical outlets and recessed lights: Line back and sides of fixture with plasterboard and seal around fixture junction with sealant.
- Around perimeter of lining panels: Provide continuous runs of sealant.

3.2 PLASTERBOARD LINING

Installation

Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589.

Level of finish and jointing: To AS/NZS 2589 clause 3.1.

This standard is generally adequate for most plasterboard installation for framed construction and direct stick applications not involving fire or acoustic requirements, it does not cover all applications. If referring to more comprehensive manufacturer's recommendations, then delete reference to this standard.

Schedule or show on drawings additional requirements for fire resistance or acoustics. Alternatively, describe the construction required for sheet finish, edge treatments, thickness, type and number of layers and ceiling treatment.

The manufacturers' literature may provide more comprehensive guidance than is provided here.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceed the recommended spacing.
- Where direct fixing of plasterboard is not possible, due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Multiple sheet layers

Application: Fire-resistance rated and acoustic rated walls.

Joints: Fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural control joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

3.3 FIBRE CEMENT LINING

Many of the installation details for flush joints in fibre cement are similar to those for plasterboard.

For eaves lining in domestic construction 4.5 mm sheet is adequate on timber framing but 6.0 mm thickness should be used on steel framing.

Installation

Joints and layout: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceed the recommended spacing.
- Where direct fixing of fibre cement is not possible, due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Fixing

Timber framed construction: Nail only or combine with adhesive.

Steel framed construction: Screw only or combine with adhesive.

Wall framing: Conform to the following:

- Do not fix to top and bottom plates or noggings.
- In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Masonry wall construction: Conform to the following:

- Direct fixing: Adhesive fix to the masonry except where lining forms a substrate for tiled finish.

- Furring channels: Fix using screw and/or adhesive.

Edit alternatives as appropriate.

Ceilings: Fix using screw and/or adhesive to ceiling furring members. Do not fix sheets directly to the bottom chords of trusses.

- Ceiling battens: Fix at 600 mm maximum centres.

Wet areas: Do not use adhesive fixing alone.

Multiple sheet layers

Application: Fire-resistance rated and acoustic rated walls.

Joints: Fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Joint width:

- Butt joints: 1 to 2 mm.
- Expressed joints: 10 mm maximum.

Joint backing for expressed joints: Black self-adhesive polyurethane tape.

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide control joints to coincide with structural control joints and as follows:

- Walls: ≤ 7.2 m centres.
- Ceilings: To divide into bays not larger than 10.8 x 7.2 m.
- Soffit linings: To divide into bays not larger than 4.2 x 4.2 m or 5.6 x 3.6 m.
- Control joint beads: Purpose-made metallic-coated.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

Wet areas: Provide additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Bed perforated paper tape in bedding compound. Do not apply a topping coat.

- Control joints: Not more than 4.2 m centres and space to suit joints required in tiling.
- Internal corners: Reinforce with metallic-coated steel angles. In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing.

3.4 TONGUE AND GROOVE TIMBER LINING

Installation

General: Where possible, provide single lengths of boards when installed horizontally. Provide single lengths only, when installed vertically.

Stained or clear finished boards: Select board to give a random pattern. At corners, return the same board to give a continuous grain pattern.

Fixing: Nail twice to each crossing, except for secret nailed profiles.

Secret nail fixing: Fix nail diagonally through the tongue only. Punch nails to maintain correct alignment of the next board.

Nailheads: Treat visible nailheads as follows:

- In stained or clear finishes: Drive flush.
- In opaque finishes: Punch below surface and fill flush with putty after the surface has been primed.

Corners and junctions: Allow for movement at all corners and junctions.

Joints

Requirement: Select board lengths to give minimum number of joints.

End grain joints: Install boards so that butt joints are in compression.

Internal corners: Scribe.

External corners: Mitre.

Corner joint treatment: Vary as required or detail on the drawings.

3.5 TIMBER PANEL LINING

General

Location: [complete/delete]

Panel material: [complete/delete]

Installation: Set out in even panels with joints coinciding with framing members. Fit and fix panels and trim plumb, level and in true alignment of face and grain.

Fixing:

- Plywood and hardboard: Wallboard adhesive or pin fixed to timber frame, screw fixed to steel frame. Punch pin heads just below surface.
- Laminated plastic: Wallboard adhesive.

Plywood

Expansion joints: Provide a 2 to 3 mm gap at edges of linings and as follows:

- 2 to 3 mm gap at each panel joint, or
- 6 to 9 mm every 3.6 m, or
- 8 to 12 mm every 4.8 m.

Areas with an expected high level of internal moisture: Provide a gap of 4 to 6 mm every 1.2 m.

3.6 TRIM AND ACCESSORIES

General

Requirement: Provide trim such as beads, mouldings and stops to make neat junctions between lining components, finishes and adjacent surfaces.

Provide further requirements in **SELECTION, SHEET LINING, Sheet lining schedule** or refer to detail drawings. Locate to your office documentation policy.

Proprietary items: Provide complete with installation accessories.

Timber and MDF trim: Fix using full length so that trim is secure and without movement. Where nail or screw fixings are used, make sure fastener finishes sufficiently below face of trim so that stopping piece finishes flush with the face.

Import the **Trim schedule** from *0551 Joinery* for timber trims, if required.

3.7 COMPLETION

General

Damaged or marked lining and components: Replace.

Exposed surfaces: Touch up shop applied finishes and restore damaged or marked areas.

Timber panels: If appearance is not uniform, replace panels.

Cleaning: Clean completed surfaces to remove irregularities and leave panels smooth and clean, to the manufacturer's recommendations. If required, sand with fine paper to remove irregularities and refinish panel surface.

- Debris and unused material: Remove from site.

Warranties

Requirement: At practical completion, submit warranties against defective materials and installation.

4 SELECTIONS

Schedules are a way of documenting a selection of proprietary or generic products or systems by their properties. Indicate their locations here and/or on the drawings. Refer to NATSPEC TECHnote GEN 024 for guidance on using and editing schedules.

4.1 KEYSTONE ACOUSTICS PERFORATED ACOUSTIC SHEET LININGS

Sheet lining schedule

Property	L1	L2	L3
Location			
Material			
Thickness (mm)			

Property	L1	L2	L3
Configuration			
Edge type			
Joint type			
Fixing			
Level of finish			
Fire hazard properties: Group number			
Battens: Size (mm)			
Battens: Spacing			
Lining trim: Re-entrant corners			
Lining trim: Salient angles			
Lining trim: Edge trim			

L1, L2, L3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

Edit codes in the **Schedule** to match those on drawings.

Location: e.g. bulkheads, fire-resisting ceiling, room type or identifier, or use Lining designation code on drawings or in a Finishes schedule or Wall type schedule.

Material: e.g. Plasterboard, fibre cement, T&G timber, plywood or blockwood. Fire-resistance rated materials (e.g. expanded vermiculite boards) can be most easily identified by proprietary item.

Configuration: e.g. Horizontal, Vertical, Double thickness.

Joint type: e.g. Butt, Exposed or Flush.

Level of finish: To AS/NZS 2589.

- Level 3: For concealed surfaces.
- Level 4: Default level for gypsum lining, unless specified otherwise.
- Level 5: For gloss or semi-gloss paint finish under critical lighting conditions.

Group number: BCA Spec C1.10 Table 3 lists permitted wall and ceiling material group numbers.

4.2 OTHER SHEET LININGS

Tongue and groove timber lining schedule

Property	L1	L2	L3
Location			
Timber species			
Grade			
Profile			
Thickness (mm)			
Width (mm) coverage			
Orientation of boards			
Fire hazard properties: Group number			

L1, L2, L3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

Edit codes in the **Schedule** to match those on drawings.

Location: e.g. bulkheads, fire-resisting ceiling, room type or identifier, or use Lining designation code on drawings or in a Finishes schedule or Wall type schedule.

Group number: BCA Spec C1.10 Table 3 lists permitted wall and ceiling material group numbers.

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1397	2011	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1810	1995	Timber - Seasoned cypress pine - Milled products
AS/NZS 1859		Reconstituted wood-based panels - Specifications
AS/NZS 1859.1	2017	Particleboard
AS/NZS 1859.2	2017	Dry-processed fibreboard
AS/NZS 1859.3	2017	Decorative overlaid wood panels
AS/NZS 1859.4	2018	Wet-processed fibreboard
AS/NZS 2270	2006	Plywood and blockboard for interior use
AS/NZS 2271	2004	Plywood and blockboard for exterior use
AS/NZS 2588	1998	Gypsum plasterboard
AS/NZS 2589	2017	Gypsum linings - Application and finishing
AS 2796		Timber - Hardwood - Sawn and milled products
AS 2796.1	1999	Product specification
AS 2796.2	2006	Grade description
AS/NZS 2908		Cellulose-cement products
AS/NZS 2908.2	2000	Flat sheets
AS/NZS 2924		High pressure decorative laminates - Sheets made from thermosetting resins
AS/NZS 2924.1	1998	Classification and specifications
AS/NZS 4491	1997	Timber - Glossary of terms in timber related Standards
AS 4785		Timber - Softwood - Sawn and milled products
AS 4785.1	2002	Product specification
AS 4785.2	2002	Grade description
AS 5637		Determination of fire hazard properties
AS 5637.1	2015	Wall and ceiling linings

The following documents are mentioned only in the *Guidance* text:

AS/NZS 1859.4	2004	Wet-processed fibreboard
AS 4312	2008	Atmospheric corrosivity zones in Australia
BCA A1.1	2016	General provisions - Interpretation - Definitions
BCA C1.9(e)	2016	Fire resistance - Fire resistance and stability - Non-combustible building elements
BCA Spec C1.10	2016	Fire resistance - Fire hazard properties
NATSPEC DES 020	2011	Fire behaviour of building materials and assemblies
NATSPEC GEN 006	2007	Product specifying and substitution
NATSPEC GEN 024	2015	Using NATSPEC selections schedules
NATSPEC TR 01	2018	Specifying ESD
ISO 8336	1993	Fibre-cement flat sheets