

0762P KINGSPAN INSULATED PANELS IN COOL ROOMS

Branded worksection

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Worksection abstract

This worksection *Template* is applicable to refrigerated walk-in cool rooms using sandwich panels by KINGSPAN INSULATED PANELS. It is applicable to cool rooms including those operating below freezing. It is intended for small to medium walk-in cool rooms up to 36 m² floor area and includes the construction of the room and its associated refrigeration system and controls.

How to use this worksection

Customise this worksection *Template* for each project. See [A guide to NATSPEC worksections \(www.natspec.com.au\)](http://www.natspec.com.au) for information on *Template* structure, word styles and completing a worksection.

Various, sometimes ambiguous, terms used in the industry for the rooms covered by this worksection include cool room, cold room, chiller, freezer, freezer room. For example, a room operating at close to, but just above, 0°C is not a 'freezer', but requires features such as electric defrost not needed in rooms operating at higher temperatures. To avoid ambiguity, only the term cool room is used in this worksection and requirements are specified in terms of room operating temperature.

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, including:

- 0310 Concrete - combined.
- 0315 Concrete finishes.
- 0612 Cementitious toppings.
- 0631 Ceramic tiling.
- 0651 Resilient finishes.
- 0657 Resin based seamless flooring.

Related branded worksections include:

- 0428p KINGSPAN INSULATED PANELS roofing systems.
- 0437p KINGSPAN INSULATED PANELS cladding systems.

Material not provided by KINGSPAN INSULATED PANELS

This branded worksection *Template* includes generic material which may not be provided by the Product Partner including:

- Refrigeration plant.
- Shelving.

Documenting this and related work

You may document this and related work as follows:

- Coordinate cool room details with the base building. For example, cool rooms with floors at the same level as the adjacent floor require substantial set downs in the slab, typically 200 mm for a cool room operating above 0°C and 250 mm for a cool room operating below 0°C. Depth will depend on insulation thickness, screed thickness and floor finish. Alternatively, if the insulation cannot be located above the slab, insulation below the slab (and possibly heaters) will be required to prevent condensation and conserve energy.
- Likewise, some internal finishes, such as floor tiles, may need to be coordinated with building finishes.
- Show the location of refrigeration equipment on the drawings, paying attention to adequate provision of cooling air intakes and discharge.
- The luminaire type can be nominated while the location of luminaires may be shown on the drawings or left to the contractor to determine based on default text.
- Local regulations may apply, notably in relation to Work Health and Safety, health (food storage), laboratory safety and practices.
- Consider access to the space above cool rooms and equipment. Sandwich panels, although rigid, may not be adequate for the applied loads.
- If shelving is to be attached to cool room walls, consider the method of fixing to minimise cold bridging and formation of condensation on the outside of the cool room.

- Make sure there is adequate airflow into and away from condensing units, particularly if mounted indoors or if drop-in units are documented.
- Since cool rooms vary in temperature more than the surrounding spaces, make adequate provision to accommodate thermal movement, particularly near doors with anti-condensation heater cables.
- This worksection includes the option of Class 2L (lower flammability) refrigerants to AS/NZS ISO 817 (2016). If used, make sure the relevant provisions of AS/NZS 5149.1 (2016), AS/NZS 5149.2 (2016), AS/NZS 5149.3 (2016) and AS/NZS 5149.4 (2016) are incorporated. Issues to consider include plant location, plant room size, plant room ventilation and refrigerant alarms.
- Refer to AIRAH DA12 (2020), which, in addition to recommendations on energy conservation, contains useful design information relevant to Australia.
- Consider ventilation requirements. This worksection assumes cool rooms are intermittently occupied. If they are continuously occupied at times, conform to AS 1668.2 (2024).
- This worksection includes reference to BCA (2025) Section J. NCC (2025) notes that for Class 2 buildings, BCA (2025) Section J is replaced by the equivalent section in NCC (2022). If your project is required to be to another edition of the NCC, review all NCC citations in this worksection and edit accordingly.

This worksection *Template* contains text that may be adapted for use in Design and Construct projects. See NATSPEC TECHreport TR 03 on specifying Design and Construct for mechanical services.

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

For example:

- The location of viewing panels in cool room doors.

Specifying ESD

KINGSPAN INSULATED PANELS have the following sustainable product attributes:

- Green tag certification.
- EPD reports.
- Excellent thermal performance.
- Low air leakage values.
- Minimal thermal bridging.
- Panels are easily dismantled for reusing or recycling.
- No interstitial condensation.

The following may be specified by retaining default text:

- Measures to minimise condensation to improve equipment life and limit microbial growth risk.
- Prohibition of CFCs and HCFCs as blowing agents.
- Durable components, particularly for corrosion resistance.
- Provisions for reducing vibration.
- Features recommended by AIRAH DA12 (2020) to increase energy efficiency. Refer to AIRAH DA12 (2020) for additional energy saving options.

Refer to NATSPEC TECHreport TR 01 on specifying ESD.

1 GENERAL

Kingspan Insulated Panels is the world's largest and leading manufacturer of high-performance insulated panel building envelopes. Its wide range of products manufactured in their Australia facilities include insulated wall and roof panels, high performance standing seam systems and façade solutions. Kingspan Insulated Panels is widely recognised in the industry for the high quality and performance of its products as well as its commitment to excellent customer services and technical support.

1.1 RESPONSIBILITIES

General

Requirement: Provide refrigerated cool rooms using sandwich panels by KINGSPAN INSULATED PANELS, as documented.

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

DESIGN

Cool rooms are provided by specialist subcontractors on essentially a design and construct basis to meet specified performance parameters.

The *Optional* style text in this clause may be used by changing it to *Normal* style text if the contractor is to design and select the cool rooms and associated refrigeration equipment. Use *0701 Mechanical systems* to describe design parameters for mechanical systems, as a whole, including the basis for calculating the cool room capacities.

The SELECTIONS schedules provide a means for the specifier to define basic cool room parameters from which the contractor will complete the design including sizing and selecting the plant, and detailing the construction.

Selection parameters included in the SELECTIONS schedules should not be repeated here. The schedules' *Guidance* text includes suggestions for modification to suit design and construct projects.

General

Requirement: Design refrigerated cool rooms to **DESIGN** in *0701 Mechanical systems* and as documented.

Design documentation

This is a partial list of items only. Edit to suit the project. Drawings relating to whole systems should be included in *0701 Mechanical systems*.

General: To **DESIGN DOCUMENTS** in *0171 General requirements*.

Calculations: Provide calculations of the refrigeration system and assumptions made using the design processes detailed in AIRAH DA12 (2020).

Drawings: In addition to the drawings documented in **SUBMISSIONS, Shop drawings**, provide the following:

- Location of refrigeration equipment.
- Access to space above cool rooms and equipment.
- Details of shelving.
- Details of external and internal finishes and protection.
- Arrangement for adequate airflow into and away from condensing units.
- [complete/delete]

1.2 COMPANY CONTACTS**KINGSPAN INSULATED PANELS technical contacts**

Website: www.kingspan.com/au/en/contact-us/

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.

- *0701 Mechanical systems*.

0701 Mechanical systems deals with matters common to more than one Mechanical worksection.

- *0771 Automatic controls*.
- *0781 Mechanical electrical*.
- *0791 Mechanical commissioning*.
- *0792 Mechanical maintenance*.

1.4 STANDARDS**General**

Refrigeration systems: To AS/NZS 5149.1 (2016), AS/NZS 5149.2 (2016), AS/NZS 5149.3 (2016) and AS/NZS 5149.4 (2016).

AS/NZS 5149.1 (2016), AS/NZS 5149.2 (2016), AS/NZS 5149.3 (2016) and AS/NZS 5149.4 (2016) deal with safety and environmental aspects of refrigeration systems. They are based on the corresponding ISO 5149 series standards but with Australian amendments including a performance option in Appendix ZZ of each part of the standard.

See NATSPEC TECHnote PRO 007 on refrigerant.

Cool rooms for food storage: To AS 4674 (2004).

This standard covers matters including finishes, fixtures, fittings and lighting for the design and construction of food premises. AS 4674 (2004) uses the terms chiller and freezer without defining them.

Electrical safety: To AS/NZS 60335.1 (2022) and AS/NZS 60335.2.89 (2020).

Refrigerant handling: To AIRAH Refrigerant handling Code of Practice Part 1 (2025) or AIRAH Refrigerant handling Code of Practice Part 2 (2025), as applicable.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Technical manuals for the KS1100/1200CS Coldstore Panel:

www.kingspan.com/au/en/products/insulated-panels/cold-store-panels/ks1100-1200cs-coldstore-panel

Kingspan insulated panel support: www.kingspan.com/au/en/contact-us/

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- ABS: Acrylonitrile butadiene styrene.
- BMS: Building management system.

Similar terms are DDC (direct digital control) and BAC (building automation and control system). Adjust to suit the project terminology.

- CS: KS1100/1200CS Coldstore Panel.
- KIP: KINGSPAN INSULATED PANELS.
- PIR: Polyisocyanurate.

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

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Cool room: A refrigerated space that is designed to maintain a temperature below 5°C and is used primarily for the storage of product.

Product is used generically to refer to the contents stored and so encompasses perishable materials such as food and temperature sensitive materials such as some pharmaceuticals.

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

1.7 SUBMISSIONS

Certification

Cool room and cool room location structural and trafficable ceilings: Submit certification of the ceiling from a structural engineer.

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**.

Fire-resistance level: Submit evidence of conformity to **FIRE PERFORMANCE, Fire-resistance of building elements**.

Products and materials

Thermal insulation properties: Submit evidence of conformity to AS/NZS 4859.1 (2018).

Evidence of delivery: Submit delivery docket as evidence of delivery of the following:

- [complete/delete]

If evidence of delivery to site is required for particular products, consider including this *Optional* style text by changing to *Normal* style.

Type tests: Submit test results for the following:

- Cyclone performance: To **KINGSPAN INSULATED PANELS KS1100/1200CS COLDSTORE WALL AND CEILING PANELS, Tests.**
- Refrigeration equipment: To **REFRIGERATION PLANT GENERALLY, Tests.**

TESTING - GENERALLY in 0171 *General requirements* requires that all testing be done by an Accredited Testing Laboratory except for site tests or test methods that do not have an Accredited Testing Laboratory. Accredited Testing Laboratory is defined in 0171 *General requirements*. It includes organisations outside Australia that meet defined criteria.

Type tests are carried out off site. However, submission of evidence of a successful type test may be called up here for requirements specified in PRODUCTS.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples.**

Shop drawings

Requirement: In addition to the requirements of 0701 *Mechanical systems*, submit drawings showing the following:

- Plan and cross-sections of cool room.
- Room construction details including vapour barriers and measures to prevent cold bridging. Provide drawings of each type of the following:
 - . Wall to wall joint.
 - . Wall to ceiling joint.
 - . Wall to floor joint.
 - . Partition wall to external wall joint.
 - . Panel to panel joint.
 - . Door jamb.
 - . Floor cross-section.
 - . Ceiling suspension detail.
- Escape provisions.
- Coordination with building elements.
- Provisions for differential thermal movement.
- Condensate drainage.
- Refrigeration system and piping.
- Door and other heaters.
- Lighting including emergency lighting and lighting control location.
- If the cool room is recessed into the floor slab, details of set downs.

Subcontractors

Recommended installers: Submit the name and contact details of the proposed KINGSPAN INSULATED PANELS recommended installer.

KINGSPAN INSULATED PANELS recommend that the appointed subcontractor attend the appropriate product installation training course.

Tests

Detail the tests required in EXECUTION and list the submissions required here.

Requirement: Submit test results for the following:

- Testing to **EVACUATION OF REFRIGERANT GAS SYSTEMS.**

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.8 INSPECTION

Notice

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

- Floor slab: Ready for installation of subbase.
- Heated subbase: Complete and before commencing floor laying.
- Vapour barrier: Installed with locating angle in position ready for wall panel installation.
- Membrane: Installed ready for placing wearing surface.

Edit to suit the project, adding critical stage inspections required.

Hold points, if required, should be inserted here.

If a slab set-down is not used, the above can be deleted.

For critical installations, it may be desirable to make the above witness points into hold points.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

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

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.

Samples

Requirement: Provide a sample of each of the following:

- Wall to wall to ceiling corner joint.
- Panel to panel joint.

List other samples to suit the project, e.g. wall to floor joint, door jamb.

Cutaway sections: For each sample, provide cutaway sections to permit inspection of application details including insulation materials, adhesives, sealants and fasteners.

Storage and handling

Requirement: Store and handle materials to the KINGSPAN INSULATED PANELS recommendations and as follows:

- Provide a safe and trade free area for the storage of KINGSPAN INSULATED PANELS materials.
- Remove KINGSPAN INSULATED PANELS protective film within the time stipulated on the face of each insulated panel.
- Protect materials including edges and surfaces from damage.
- Keep dry and unexposed to weather including protection from direct sunlight.
- Do not drag metal sheets or panels across each other or over other materials.
- Insulated panels: Store unpacked panels by size in racks on a slight slope to prevent ponding on panel surfaces. Protect from scratching, warping or bending.

Operating conditions

General: Provide equipment that operates within an ambient temperature range of 0°C to 45°C, without excessive head pressure or unstable operation.

Edit upper and lower temperature to suit the actual conditions of the project area, if necessary.

Adhesives and sealants

Requirement: Conform to **ADHESIVES AND SEALANTS** in 0701 *Mechanical systems*.

0701 *Mechanical systems* defines sealant as including liquids and mastics.

Corrosion protection

Ferrous metals:

- Inside the cool room or outside but subject to condensation: Stainless steel or hot dip galvanized steel.

- Outside the cool room and not subject to condensation: Stainless steel, hot dip galvanized steel or metallic-coated steel.

Fasteners: Stainless steel or non-ferrous only.

Fasteners

Primary fasteners: Provide high threaded self-drilling, self-tapping screws with bonded washers, as follows:

- Types, sizes and drilling capacity: As recommended by fastener manufacturer to suit type and thickness of supports, and thickness of panels.
- Screw material: PIR panels: Carbon steel.
- Washer material: Non-ferrous.
- Washer size: 16 mm diameter.
- Heads: Plastic moulded or lacquered.

Secondary fasteners: Provide fasteners for internal flashing installation at 300 mm centres, as follows:

- Screw/washer material: As primary fasteners.
- Heads: Low profile, painted to match colour of the flashing.

Mushroom bolts: Provide mushroom bolts with threaded rod, lock nut and plastic cover.

Rivets: Expanding solid end type ≥ 4.8 mm diameter.

Screws: Self-tapping, self-drilling.

Number, type and location of fasteners: To suit project to KIP Technical Services recommendations.

Refrigerants

Requirement: Provide refrigerants as follows:

- Listed as Safety Group A1 or A2L in AS/NZS ISO 817 (2016).

Safety Group A1 refrigerants have low toxicity and no flame propagation. Safety Group A2L refrigerants have low toxicity and lower flammability. Refrigerants not listed in AS/NZS ISO 817 (2016) are not covered by AS/NZS 5149.1 (2016), AS/NZS 5149.2 (2016), AS/NZS 5149.3 (2016) or AS/NZS 5149.4 (2016) so should be avoided.

- Ozone Depletion Potential: 0.
- Global Warming Potential: ≤ 700 .

A Global Warming Potential of 700 represents moderate requirement. Refrigerants with higher or lower values are available. Lower values tend to be associated with higher flammability.

Safety Group, Ozone Depletion Potential and Global Warming Potential for refrigerants are listed in AS/NZS 5149.1 (2016) Annex B. See NATSPEC TECHnote PRO 007 on refrigerant options.

Insulation blowing agents

Restricted agents: Conform to PRODUCTS AND MATERIALS, **GENERAL**, **Prohibited materials** in 0171 *General requirements*.

Factory Mutual (FM) panel system approval

KINGSPAN INSULATED PANELS controlled environment panel systems: Approved to FM 4880 (2017) and FM 4881 (2016).

The certification branch of FM Global (FM Approvals) offers worldwide certification and testing services of industrial and commercial loss prevention products. Recognised and respected across the globe, FM Approvals certification assures customers that a product or service has been objectively tested and confirms to the highest national and international standards.

2.2 FIRE PERFORMANCE

Fire hazard properties

See NATSPEC TECHnote DES 003 for more information on the fire hazard properties of insulation materials and NATSPEC TECHnote DES 020 on fire behaviour of building materials and assemblies.

Group number: To AS 5637.1 (2015).

Non-sprinklered buildings: Wall and ceiling linings must either have an average specific extinction area (i.e. smoke density generation) less than 250 m²/kg or a smoke growth rate index not more than 100 as determined to AS 5637.1 (2015).

Materials: Tested to AS/NZS 1530.3 (1999). Fire hazard properties as follows:

- Refrigeration pipe insulation:
 - . Spread-of-Flame Index: 0.

- . Smoke-Developed Index: ≤ 3 .
- Other materials:
 - . Spread-of-Flame Index: ≤ 9 .
 - . Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index is more than 5.

KINGSPAN INSULATED PANELS wall and ceiling panels:

- Ignitability Index: 0.
- Heat evolved Index: 0.
- Spread-of-Flame Index: 0.
- Smoke-Developed Index: 2.

Materials with reflective facing: Tested to AS/NZS 1530.3 (1999) and the recommendations of clause A6.

The requirements above are consistent with the NCC.

AS/NZS 1530.3 (1999) is a mandatory standard in the NCC. Smoke-Developed Index and Spread-of-Flame Index are determined under AS/NZS 1530.3 (1999). See also BCA (2025) C2D11.

For more stringent fire performance, consider requiring that both insulation material and facing individually meet the fire hazard indices, not just as a composite material.

AS/NZS 1530.3 (1999) clause A6 recommends that reflective surfaces of test specimens (which would otherwise generally pass this test) be blackened and diagonally scored in order to simulate soot deposition onto reflective surfaces in a real fire situation. Note also that AS/NZS 1530.3 (1999) clause 4.12.2(c) requires three test specimens of laminated reflective surface materials to incorporate a vertical joint. For flexible ducting, see AS/NZS 1530.3 (1999) clause 4.9.2(a).

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

Refer to NATSPEC TECHnote DES 020 for information on fire-resistance levels.

2.3 PRE-COMPLETION TESTS

Standards

General: Provide refrigeration equipment that has been subjected to physical tests as follows:

- Pressure tests: To AS/NZS 5149.2 (2016).

2.4 KINGSPAN INSULATED PANELS KS1100/1200CS COLDSTORE WALL AND CEILING PANELS

This clause covers wall, partition and ceiling construction of a cold store, chill or ambient food production or storage area.

Panels

Requirement: Provide KINGSPAN INSULATED PANELS KS1100/1200CS Coldstore Panel insulated wall and ceiling panels.

Construction: Prefinished metal skins continuously laminated over a polyisocyanurate (PIR) core.

Panel to panel joints: KINGSPAN INSULATED PANELS proprietary jointing system except for cut panels. Make sure the visible facing joint engages with a gap of less than 3 mm so the foam faces form a butt joint and maintain an effective seal.

Insulation: Polyisocyanurate (PIR) in continuous form without voids and free of line faults through or across the sheet.

Declared thermal conductivity: 0.022 W/(m.K) at 23°C. To AS/NZS 4859.1 (2018).

Internal and external skins

Material: 0.5 mm zinc-coated steel sheet to AS 1397 (2021), with Z275 Zincform G300S coating, factory precoated on the exposed surface.

Factory precoating: Coolroom White, 25 µm thick.

Other colours and coatings are available. Contact KINGSPAN for details.

Colour: Coolroom White.

Panel profile: Flat or ribbed as documented.

Dimensions

KINGSPAN KS1100/1200CS Coldstore Panels are available in 50, 75, 100, 125, 150 and 200 mm thicknesses.

Panel thickness: To suit the temperature difference across the panel and performance requirements.

Contractor to select panel thickness. Alternatively show thicknesses on the drawings or in SELECTIONS to KINGSPAN recommendations and delete the above sentence.

Panel width:

- Standard module cover width: 1100 mm.
- Non-standard module cover width: 1200 mm.

Ceiling panels

Thickness: To achieve the documented insulation performance except if the ceiling is trafficable or serves a structural function and greater thickness or different construction is required.

Structural and trafficable ceilings: If the ceiling is trafficable or serves a structural function, provide professional engineer's certification that the thickness and construction is adequate for the imposed loads and meets statutory requirements.

Professional engineer is defined in 0171 General requirements as having the same meaning as the term in the NCC.

Tests

0171 General requirements defines different tests in INTERPRETATION, Definitions.

Cyclone performance of KS1100 CS wall panels: Tested to 19.5 kPa (Test Load) or 13.5 kPa (Design Load) wind loading to AS 4040.3 (2018).

The KS1100/1200CS Coldstore Panel wall panel has been tested to 19.5 kPa (Test Load) or 13.5 kPa (Design Load) wind loading in conformance with the AS 4040.3 (2018) test standard. Contact KIP Technical Services for further information.

2.5 DOOR AND FLOOR PANEL CONSTRUCTION

Panels

General: Prefabricated twin stressed-skin sandwich panels consisting of a sheet of insulation with metal skins bonded to both faces. Bond at high temperature and pressure using thermosetting adhesive. Stress both skins equally in the finished panels to provide stable performance under varying temperature and humidity conditions.

Insulation: Single layer rigid cellular insulation in continuous form without voids and free of line faults through or across the sheet.

See also BCA (2025) Spec 7 for related material on fire hazard properties of floors, walls and ceilings. If considering expanded polystyrene (EPS), check the fire properties and confirm its acceptability to the principal and insurers.

Internal and external skins

Material: 0.55 mm zinc-coated steel sheet with Z275 coating to AS 1397 (2021), factory precoated with a food-safe plastic on the exposed surface.

Factory precoating: Silicon polyester to a dry film thickness of 25 µm.

Colour: White.

Dimensions

Panel thickness: As documented or to achieve the documented insulation R-Value.

This may be documented in the Cool room schedule.

Panel width: Standard module width: 1200 mm.

2.6 DOORS

Door assembly

Type: Sliding or hinged panels as documented that close against a door frame. Provide all necessary door hardware, gaskets and accessories to form a complete installation.

Escape provisions: Provide access doors openable from both the inside and outside. If the door is electrically or pneumatically operated, provide a means for opening the door manually.

Back-up escape provisions: Provide at least one of the following:

- A telephone in every room.
- Unlocked insulated safety exit door that can only be opened from the inside.
- A door to **EMERGENCY ACCESS DOORS**.
- A panel removable from the door or adjacent wall from the inside of the room making an opening large enough for a person to pass through.

Thermal performance: Provide doors and door sets that, when closed, have thermal insulation properties equal to those of the wall in which they are located.

Seal: Provide face sealing doors.

Sill-less doors: If the door has no sill, provide a mechanism to elevate the door clear of the floor surface during opening and closing.

Door panel

Construction: Provide doors of panel type construction, free of studding with skins bonded to both sides of an insulation core.

Insulation: Conform to **DOOR AND FLOOR PANEL CONSTRUCTION** for the system selected.

Edging: Form door edging from a heavy gauge aluminium extrusion with double web seal to both skins. Mitre corner and firmly secure to panel with stainless steel countersunk head screws.

Viewing panel

Type: Triple glazed, vacuum insulated with thermally broken aluminium frame.

External panes: Toughened safety glass to AS/NZS 2208 (2023).

Size and location: As documented.

Include in the **Cool room schedule** or on the drawings.

Finish: Powder coated frame to match the door finish.

Anti-condensation heater cables

Heater cables: Incorporate a thermal break and dual heater cables (1 operational and 1 spare) to prevent condensation on outside face of door and cold bridging of the door. Locate heater cables at door seals.

Type: 230 V self-temperature regulating heating cable terminating in coiled tails. Provide earth leakage protection.

Installation: Install heating cables, accessible for replacement, in the door frame and threshold.

Heater cable section below doors: Locate heater cables as follows:

- Cool room door threshold flush with external floor: Locate heater cable in a channel formed in the external floor between two 25 x 25 x 3 mm aluminium angles recessed into the floor. Provide polyurethane packing below the heater cable and removable silicone seal above it.
- Cool room door threshold higher than the external floor: Locate heater cable in a removable angle or Z section on the external face of the cool room, below the door threshold. Fix section with countersunk stainless steel screws.

Door frame

Construction: Form frame stiles and head from 3 mm aluminium or 10 mm PVC-U extrusions incorporating rebates if required for door seating. Mitre corners and fix frame firmly to the inner and outer wall skins. Maintain the vapour seal of the wall panel. Make suitable provision for fixing the specified hardware.

Threshold

Construction: Aluminium chequer plate 200 mm wide x 2.5 mm thick. Fix to the floor across the full width of the door opening.

Gaskets

Construction: Provide naturally resilient, non-hygroscopic neoprene or silicone rubber gaskets with minimum 2 sealing prongs. Fix to the door using a method that allows easy removal and replacement.

Door protection

Requirement: If door protection is documented, provide 2.5 mm thick aluminium chequer plate, the width of the door, to both sides of the door and to a height of 1200 mm. Fix with countersunk stainless steel screws.

If required, include door protection in the **Cool room schedule** or show on the drawings.

Door energy conservation

Open doors can significantly affect cool room energy use. AIRAH DA12 (2020) claims that plastic strip curtains, automatic door closers or alarm systems and implementing proper door management through staff training can deliver savings of up to 15% of refrigeration energy.

The following may be included individually or in combination by documenting them in the **Cool room schedule**.

Plastic strip curtain: Provide heavy duty, clear plastic curtains with overlapping strips, as documented. Install the full width of the door. Minimise gaps at the top bottom and sides.

Automatic door closer: Provide an automatic closer as documented to close the door tight against its seals when not being held open.

Door open alarm: Provide an audible alarm as documented to signal when the door has been open for a pre-set time period.

2.7 EMERGENCY ACCESS DOORS

General

Requirement: Conform to **DOORS** with the following exception:

- Locks: Openable from inside the cool room only.

2.8 DOOR HARDWARE

Catches

Construction: Provide externally lockable door catches with overriding internal safety release mechanism and internal handles for closing of door.

Hinges

Hinged doors: Hang hinged doors on edge-mounted, rising butt type, self-closing hinges capable of holding the door fully open.

Material

Hinges, catches, handles and similar items: Heavy duty brass or gunmetal, chromium-plated to AS 1192 (2004), service condition number 2, satin finish.

Sliding track

Sliding doors: Hang sliding doors on an overhead sliding track mechanism of capacity suitable to the door, comprising an extruded aluminium track section, top carriages with ball bearing nylon wheels, bottom roller guides and a door height adjustment mechanism. Provide heavy duty rubber stops at both ends of the door travel.

Installation

Fixing: Securely bolt hardware to the door and frame. Minimise cold bridging and formation of condensation on the outside of the cool room.

Alarm bell

Bell: Provide a manually operated bell on the door with the operating mechanism on the inside and the bell on the outside. Recess the operating mechanism so that it is flush with the inside face of the door.

2.9 REFRIGERATION PLANT GENERALLY

Construction

Requirement: Provide one or more complete packaged systems per room consisting of condensing and evaporator units, designed and rated by the manufacturer to operate together.

Consider the need for duty-standby or dual systems rather than a single system per room.

Refrigeration system types

Type: Provide one of the following refrigeration system types:

This is for conventional systems. For higher energy efficiency, consider inverter or digital compressors. Heat exchangers to recover heat for water heating are also available.

Include refrigeration system type in the **Cool room schedule** or on the drawings.

- Split system: Two piece package system with separate evaporator and air cooled condensing unit.

Preferably show the location of the condensing unit on the drawing.

- Single drop-in unit: Drop-in or slide-in unit, self-contained one piece factory sealed unit, fully wired and complete with all controls.

Selection: Select system components to match the documented capacities and to operate without excessive saturated suction temperature.

Components

Requirement: Provide the following for each system:

- Air-cooled condensing unit.
- One or more evaporators with fans.

- Automatic controls.
- Capacity control on systems over 30 kW.
- Manual reset high pressure and auto reset low pressure cutouts.
- High and low side test points.
- Associated refrigerant and drain piping.
- Refrigeration plant power circuits.
- Vibration isolating mountings.
- Pressure relief to AS/NZS 5149.2 (2016).
- Phase failure protection on motors ≥ 5.5 kW.
- Permanent, weatherproof, wiring diagram fixed on or next to the control panel.

Split systems: Provide in addition:

- Liquid line solenoid valve.
- Liquid-suction heat exchanger.
- Thermostatic or electronic expansion valve.

Electronic is usually more energy efficient.

- Compressor service valves.
- Integral positive temperature coefficient type crankcase heaters if required for safe compressor operation. Energise when the compressor is off.
- Schrader type connections for evacuation and refrigerant charging.
- Evaporator isolating valves.
- Test valves.
- Liquid receiver with service valves. Size to hold the full refrigerant charge.
- Suction line vibration eliminator.
- Replaceable filter-dryer.
- Low oil pressure cutout.
- Liquid line sight glass and moisture indicator.
- Cool room temperature $\leq 0^{\circ}\text{C}$: Provide also:
 - . Crankcase pressure regulator.
 - . Liquid line accumulator with liquid heat exchanger.
 - . Insulated oil separator.

Consider oil return and separator, particularly with long pipe runs.

Defrosting

Room operating temperature $\leq 2^{\circ}\text{C}$: Electric defrost.

Room operating temperature $> 2^{\circ}\text{C}$: Natural defrost.

Tests

0171 General requirements defines different tests in **INTERPRETATION, Definitions**.

Type tests: Factory type test packaged refrigerating plant for capacity and operating performance to the following:

- Condensing units: To EN 13215 (2016).
- Evaporators: To EN 328 (2014).

2.10 EVAPORATORS

Description

General: Provide low-silhouette evaporators that include an extended surface aluminium finned copper cooling coil with externally-mounted externally equalised expansion valve, refrigerant distributors, one or more fans and motors, air outlet baffles, insulated stainless steel or aluminium condensate drain pan and accessories. Locate the expansion valve bulb or sensor to the valve manufacturer's recommendations.

Type: Low profile induced draft or forced draft.

Casing: Stainless steel or heavy gauge aluminium.

Coils

Fins: ≤ 240 fins/m.

Room air to coil temperature difference: ≤ 5 K.

Face velocity: ≤ 2.5 m/s.

Fans

Type: Axial flow, aluminium blade, propeller with an IP54 motor, class E insulation and built-in auto-resetting overload protection.

Noise level in room with all fans operating: ≤ 65 dB(A).

Installation: Provide a corrosion-resistant fan guard and aerodynamic contoured tube housing. Provide easy access to each fan and motor for inspection and maintenance.

Air delivery: Direct to the room with a throw of not less than three quarters of the room length.

Consider EC fan motors as they are more energy efficient. (High voltage permanent magnet DC with built in AC to DC conversion.)

Motors ≥ 0.37 kW: 3-phase only.

Heaters

Room operating temperature $\leq 2^{\circ}\text{C}$: Provide coil defrost heaters and drain pan heaters consisting of totally enclosed sheathed heater elements, in banks designed for separate and easy removal in the case of failure. Provide dual heater circuits.

Heater size: $\leq 15\%$ of evaporator cooling capacity.

2.11 CONDENSING UNITS**Description**

Type: Provide packaged condensing units comprising liquid receiver, compressor, hot gas line, condenser and accessories. Mount the components on a common grid corrosion protected steel base.

Room operating temperature $\leq 0^{\circ}\text{C}$: In addition, provide the following:

- Open surge tank suction accumulator.
- Back pressure regulator.
- Oil separator.

Consider EC fan motors as they are more energy efficient. (High voltage permanent magnet DC with built in AC to DC conversion.)

Compressor types

Type: Provide compressors as follows:

- Belt drive open compressor.
- Direct drive open compressor.
- Semi-hermetic compressor.
- Hermetic compressor.

Include compressor type in the **Cool room schedule** or show on the drawings.

Open compressors

Requirement: Provide the following:

- Mounting: Vibration isolating mountings.
- Service valves: Packed and capped, backseating refrigerant suction valve.
- Charging connections: Schrader type connections for evacuation and refrigerant charging.

Crankcase heaters: Provide integral positive temperature coefficient type crankcase heaters if required for safe compressor operation.

Hermetic and semi-hermetic compressors

Enclosure: Welded or accessible hermetic steel enclosure with at least 3 mounting feet. Provide the following:

- Mounting: Vibration isolating mountings.
- Service valves: Packed and capped, backseating refrigerant suction valve.
- Charging connections: Schrader type connections for evacuation and refrigerant charging.

Crankcase heaters: Provide integral positive temperature coefficient type crankcase heaters if required for safe compressor operation.

Scroll compressors: Provide reverse rotation protection.

Gauges

Requirement: Provide suction and discharge pressure gauges to nominated condensing units.

If required, include in the **Cool room schedule** or show on the drawings.

Air-cooled condensers

Condenser coils:

- Tubes: Copper to AS 1569 (1998), AS 1571 (2020) or AS 1572 (2023), designation C12200.
- Fins: Aluminium alloy plate fins ≥ 0.12 mm thick to AS 2848.1 (1998), designation 3003 or 8011.
- Fin pitch: ≤ 550 fins/m.
- Subcooling: > 5 K.

For some environments, such as those close to the ocean, additional coil treatment may be needed. If so, see **ADDITIONAL COIL CORROSION PROTECTION** in 0733 Air coils.

Fans: Propeller or axial flow as follows:

- Propeller fan: Direct drive with single thickness fixed pitch aluminium or ultraviolet light protected polypropylene blades.
- Aerofoil axial flow fan: Direct drive with adjustable pitch aerofoil section blades of ultraviolet light protected glass reinforced plastic or polypropylene, or aluminium.

Fan motors:

- > 0.37 kW: 3-phase.
- Speed: < 25 r/s.
- Bearings: Sealed for life ball bearings.
- Minimum degree of protection: IP55.

Head pressure control: Provide head pressure control by fan cycling.

Water cooled condensers

Type: Mechanically cleanable shell and tube condensers with steel end plates and shells, and copper or copper alloy extended surface tubes.

Performance rating: Rate to AHRI 450 (2007).

Design pressures:

- Water side: ≤ 1000 kPa.
- Refrigerant side: To AS/NZS 5149.2 (2016).

Drain and vent: Provide valved water side drain and vent connections to each condenser.

Compressor cooling: If the compressor is not refrigerant cooled, provide a compressor cooling fan.

Sacrificial anodes: Provide sacrificial anodes conforming to AS 2129 (2000) and AS 2239 (2003) in the condenser water boxes to protect all ferrous metals.

Head pressure control: Provide a water flow control valve to maintain head pressure.

Condensing unit enclosure

Requirement: Provide an enclosed powder coated casing enclosure rated at IP54 to nominated condensing units. Arrange to be easily removable for service.

If required, include in the **Cool room schedule** or show on the drawings.

2.12 REFRIGERATION PIPE INSULATION

Material

Material R-Value: To BCA (2025) J6D9.

Type: Chemically blown closed cell nitrile rubber or polyethylene in tubular form.

Physical properties:

- Maximum thermal conductivity: 0.04 W/(m.K) at 0°C .
- Moisture absorption: Non-hygroscopic.
- Water vapour resistance factor μ : ≥ 5000 to EN ISO 12629 (2022).

Water vapour resistance factor μ is the ratio of the water vapour diffusion resistance of the material to that of still air. As a ratio, it is unitless. If the water vapour permeability of still air is taken as 0.2 g/MN.s, a μ of 5000 is equivalent to 5000 times 0.2 or 1000 g/MN.s, which is 0.0001 μ g/N.s.

2.13 SHELVING

General

Shelving: Provide proprietary adjustable modular shelving as follows:

- Posts: 25 x 25 x 1.2 mm cold-rolled angle section with 25 mm diameter foot with 32 mm height adjustment. Provide slotted holes at regular centres in the posts for shelf height adjustment.
- Shelf frames: 32 x 2.5 mm cold-rolled angle section at front and rear.
- Moulded shelves: ABS polymer.
- Wire grid shelves: Welded frame with 4 mm wires at 25 mm centres supported on 8 mm centre and edge bars.
- Dunnage shelves: Welded frame with 25 x 25 x 1.6 mm square hollow section tubes at 65 mm centres.

Consider this construction also for shelves that are subject to high loadings and/or greater wear and tear.

Material: ABS, hot dip galvanized steel or stainless steel as documented.

Include material in the **Shelving schedule** or show on the drawings.

3 EXECUTION

3.1 INSTALLATION

Substrates or framing

Preparation: Before fixing panels, check the alignment of substrates or framing and adjust if required.

Execution details

Construction details: Conform to KIP Technical Services recommended construction details.

Site assembly instructions are available from KIP Technical Services. KINGSPAN recommend the contractor attends the appropriate product installation training course before installation which is provided by KINGSPAN Field Service Department.

KIP Technical Services recommendations: Conform to KINGSPAN INSULATED PANELS recommendations and use KINGSPAN INSULATED PANELS approved installers for installation. Conform to the following:

- Fasteners, seals and fillers: Install as documented.
- Site cut panels:
 - . Provide accurate, true lines with no distortion.
 - . Cut with a suitable metal cutting circular type saw and treat exposed edges with a suitable edge protection lacquer.

Refer to KINGSPAN technical bulletin, Method statement for the on-site cutting of insulated panels.

- Openings: Cut to the minimum size necessary.
- Penetrations: Cut to the minimum size necessary.
- Edge reinforcement: Provide trimming plates.
- General: Install neatly and accurately, and to suit sizes and edge details of fittings.
- Services: Position services accurately, support adequately. Align and level in relation to the ceiling and suspension system and correctly seal maintaining the vapour barrier and continuity of insulation. Do not diminish performance of ceiling system.
- Penetrations up to 300 mm: Supported by ceiling panel.
- Penetrations for ducting, access hatches, etc: Support independently and provide flanges to support ceiling system.
- Swarf: Remove swarf and any foreign matter immediately from the external surface of panels.
- Protection: Protect surfaces and finishes, including the retention of protective coatings during installation.

Joints

General: Provide aluminium extrusions or steel flashings of the same material as the panel skin internally and externally:

- At panel junctions except where KINGSPAN INSULATED PANELS proprietary panel to panel joint is used.
- Make sure the visible facing joint engages with a gap of less than 3 mm so the foam faces form a butt joint and maintain an effective seal.
- Between panels and building structures.

Sealant: Apply a continuous bead of sealant along extrusions to form an airtight seal.

Floor joint: Provide a steel angle or F extrusion base mould with mitred corners at the base of walls. Fix at 400 mm centres to professional engineer's recommendations.

See 0171 General requirements for the definition of professional engineer.

Panel butt jointing

General: Join using KINGSPAN INSULATED PANELS proprietary panel to panel slip joint with sealant applied to inside and outside to KIP Technical Services recommendations.

Cut panels

Position: Locate cut panels at the corners of the room.

Joint types

Vertical corner joints: Create a rebate for one panel to receive the other, providing continuous insulation contact to KINGSPAN INSULATED PANELS standard details.

Wall to ceiling joints: Form a rebate in the wall panel to receive the ceiling panel. If panels join at the corner without a rebate, cut back the internal skin of the panel that is receiving the other panel for the width of the panel thickness to provide continuous insulation contact.

This is to prevent cold bridging at this point.

Floor insulation to wall joint: Remove the inside skin of the cool room floor wall panels for the height of the floor insulation to form insulation continuity without gaps.

This is to prevent cold bridging at this point.

Joint covers

External wall and ceiling joint cover: Provide 50 x 50 mm extruded aluminium angle or 0.55 mm steel angle of the same material and finish as the panel skin.

Internal wall and ceiling joint cover: Coved aluminium extrusion or 0.55 mm steel angle of the same material and finish as the panel skin.

Delete steel angle if only coved extrusion required.

Internal floor joint cover: Coved aluminium extrusion.

Joint cover fixing: Fix the joint covers to panels with sealed blind rivets.

Panel penetrations

Construction: Provide flanged PVC-U sleeves for service penetrations through wall and ceiling panels. Fill the void between the service and the sleeve with sealant. Vapour seal to the panel. Provide a plastic flange to the sleeve on the outside of the panel and vapour seal to the panel.

External flashing

Construction: Provide an extruded aluminium cove moulding, minimum 25 mm radius, as a flashing moulding between the external wall skin and the external floor.

This is typical. Edit to suit external floor finish.

Internal wall protection

Requirement: Provide wall protection to internal walls of the cool room.

If required, include in the **Cool room schedule** or show on the drawings.

Cool rooms with no shelving:

- Concrete wearing surface floor: Provide a 50 x 50 x 3 mm hot dip galvanized rectangular hollow section bump rail 100 mm from the wall. Support rail 100 mm above the finished floor on 44 x 6 mm hot dip galvanized brackets at maximum 1500 mm centres.

- Aluminium chequer plate or seamless vinyl wearing surface: Provide 5 heavy duty 100 x 25 mm extruded aluminium bump rail sections fixed horizontally to the full width of each wall. Locate at 250 mm centres vertically with the lowest bump rail 100 mm above the finished floor.

Cool rooms with shelving: Provide heavy duty 100 x 25 mm extruded aluminium bump rail sections fixed horizontally to the full width of the wall. Provide one per shelf at a height to suit the shelving.

High ambient humidity environments

Requirement: If KS1100/1200CS Coldstore Panels are installed in situations where ambient humidity could cause condensation, provide the following:

High ambient humidity situations include the wet tropics and within buildings with high internal humidity such as swimming pools. Document in the **Cool room schedule**.

- Intermediate supports in high humidity applications: Seal along purlins using two unbroken runs of sealant tape or neoprene foam tape: 4.8 x 60 mm.
- Coating for high humidity internal environments other than swimming pools: AQUAsafe55 and AQUAsafe25.

Selection subject to project specifics.

- Coating for swimming pools environments: AQUAsafe55 and AQUAsafe25.

3.2 SEALING

Sealants

Type: Use a mastic sealant for internal mating surfaces and a liquid sealant as a secondary vapour barrier on external joints.

Vapour sealing

Construction: Form a continuous external vapour barrier around the cool room by vapour sealing the external wall and ceiling joints and penetrations, and by sealing the locating section to the base of the wall panels and to the vapour barrier membrane.

Water sealing

Construction: Form a waterproof joint between walls and floor wearing surfaces by sealing the internal cove and external flashing mouldings to the respective wall and floor surfaces. Seal internal butt and corner joints to 1 m above the floor to facilitate cleaning.

3.3 PRESSURE RELIEF

Relief port

Requirement: Provide each room with an operating temperature below 0°C with two relief ports in one wall.

Construction: Square aluminium body in a PVC-U sleeve with internal vertical hinged PVC-U vanes.

Size: To the recommendations of AIRAH DA12 (2020).

Heater: Provide an electric heater in each relief port to prevent malfunction resulting from freezing.

3.4 CEILING SUPPORT

Execution details

Requirement: Conform to KIP Technical Services recommendations.

Ceiling joints over internal walls

Overlap: If ceiling panels butt join over internal wall panels, locate the ceiling joint minimum 25 mm from the face of the wall panels.

3.5 HEATED FLOOR SUBBASE

Heated subbase

Requirement: Provide a heated subbase incorporating a heating mat over the floor slab under cool rooms as follows:

- Under all rooms constructed on suspended floors.
- Under all rooms with an operating temperature below 0°C.

Heating mat

Construction: Provide a heating mat with twin overlapping circuits, each of 100% of the required heating capacity.

Cables: 230 V self-temperature regulating heating cable, factory assembled into mats each with not more than 500 mm between adjacent coils and terminating in cold tails.

Output of heating mat: As documented.

Heating mat output may be documented in the **Cool room schedule**.

Mat installation

Location: Lay the mats on insulated spacers at centres recommended by the manufacturer to cover the whole floor area to within 200 mm of the walls.

Termination: Terminate the tails in a junction box located on the inside wall of the room.

Alternatively, show location on the drawings.

Screed: Embed the heating mats in a 1:3 cement: sand screed to provide minimum 25 mm cover. Provide a smooth level surface finish, free of loose material and projections, suitable for receiving the vapour barrier membrane.

Testing

Continuity: Test the heating mat cables for electrical continuity:

- Before laying the screed.
- Continuously during the laying process and for the following 24 hours.

Method: Use a continuity warning device temporarily connected to the circuits during this period.

Tanking

Requirement: Provide bituminous sheeting over the subbase or subfloor and sides of a rebated floor. Lap all joints 150 mm. Install to the manufacturer's recommendations.

If required, include in the **Cool room schedule** or show on the drawings.

3.6 FLOOR VAPOUR BARRIER MEMBRANE

General

Material: Polyethylene film branded continuously:

- AS 2870 (2011) CONCRETE UNDERLAY 0.2 mm HIGH IMPACT RESISTANCE.

Installation

General: Install as follows:

- Lay over the base, lap joints at least 200 mm and seal the laps and penetrations with non-hardening mastic sealant spread in a continuous strip 75 mm wide.
- Tape over joints with polyethylene pressure-sensitive adhesive tape, applied without wrinkles. Face the laps away from the direction of concrete pour.
- Patch or seal punctures or tears before pouring concrete. Cut back excess polyethylene film not required as a vapour barrier after concrete has gained strength and forms have been removed.

Base preparation: Remove projections above the plane surface and loose material.

Locating section: Fix over the vapour barrier membrane, extruded aluminium angles mitred at the corners to form a locating frame for positioning the walls of the cool room. Fix the locating frame by securing to the subfloor using masonry anchors. Vapour seal the fastener penetration with sealant before inserting the fastener.

Vapour seal: Apply continuous mastic sealant between the locating section and vapour barrier membrane and between the locating section and the wall panels.

3.7 FLOOR INSULATION

Insulation

Insulation thickness: Same as documented for walls and ceilings.

This may be documented in the **Cool room schedule**.

Concrete wearing surface

Floors with a concrete wearing surface: Lay rigid cellular polyurethane sheet insulation to AS 1366.1 (1992) over the whole of the internal floor area tightly fitted without gaps immediately above the vapour barrier membrane. Lay the insulation boards in two equal thickness layers using ship-lapped joints.

Aluminium chequer plate or seamless vinyl wearing surface

Floors with an aluminium chequer plate or seamless vinyl wearing surface: Provide floor insulation in the form of prefabricated panels to **DOOR AND FLOOR PANEL CONSTRUCTION**, bonded to the wearing surface. Lay panels immediately above the vapour barrier membrane and tightly fitted without gaps.

Aluminium is not generally suitable for rooms below freezing.

3.8 RECESSED COOL ROOM FLOORS**General**

Grout: If the installation of wall panels within the set-down for a recessed cool room floor results in a space between the vertical face of the set-down and the wall panels, grout the space between the two to finish level with the floor.

3.9 WATERPROOF MEMBRANE**General**

Membrane and sealing: Conform to **FLOOR VAPOUR BARRIER MEMBRANE**.

Installation: Lay the membrane over the floor insulation with 150 mm overlaps at the joints. Turn the edges up against the wall inner skin, to the lesser of a height of 50 mm or the top of the cove moulding.

3.10 FLOOR WEARING SURFACE**General**

Requirement: Provide a wearing surface:

- To accept the floor in-service loads without damage to the floor insulation.
- With a hard wearing surface finish.

Include the wearing surface type in the **Cool room schedule** or show on the drawings.

Grading: Grade the surface to doorway.

Cool rooms for food storage: To AS 4674 (2004) Section 3.

AS 4674 (2004) Table 3.1 includes acceptable floor finishes. AS 4674 (2004) Section 3 includes acceptable coving and prohibits feather edge skirting.

Concrete wearing surface

Construction: Provide a concrete slab reinforced with SL72 mesh conforming to AS/NZS 4671 (2019). Locate the mesh to provide a top cover of 25 mm, using reinforcement chairs.

AS 4674 (2004) Section 3 requires steel trowelled concrete surfaces treated with a surface hardener in cool rooms for food storage. Edit the **Concrete wearing surface** subclause to suit the project.

Coving: Provide a 75 mm radius cove in the concrete at the junction between the wearing surface and the wall inner skin. Finish the cove under an aluminium coving angle. Seal gaps to **SEALING**.

Concrete strength: 40 MPa.

Entrained air: If the room operating temperature is not more than 0°C, conform to AS 3600 (2018) clause 4.7.

For 10 mm aggregate and concrete subject to freezing, AS 3600 (2018) clause 4.7 limits the percentage of entrained air to between 4% and 8%.

Maximum aggregate size: 10 mm.

Slab thickness: ≥ 75 mm.

This thickness should allow for falls (not less than 1:100 in AS 4674 (2004)).

Finish: Provide a finish to the concrete conforming to the following:

- As laid concrete: Finish the concrete surface in a slip-resistant finish by trowelling silicon carbide or aluminium oxide grains into the surface.
- Epoxy coating: Apply a 3 mm thick slip-resistant epoxy coating to the floated concrete surface.
- Steel tiles: Bed and grout steel tiles to the concrete surface.
- Ceramic tiles: Selected slip-resistant, fully vitrified ceramic tiles. Bed and grout to the concrete surface.

Aluminium chequer plate wearing surface

Construction: Bond 20 mm thick marine plywood to AS/NZS 2272 (2006), formaldehyde emission class E₁ or lower, over the whole surface area to the floor insulation metal skin. Bond 2.5 mm thick aluminium chequer plate to the whole surface area of the plywood with a flexible and durable adhesive recommended by the manufacturer for this application. Extend aluminium plate into the door threshold.

A formaldehyde emission class E₁ or less can improve indoor air quality.

Joints: Locate aluminium plate joints to overlap the joints in the marine plywood by minimum 50 mm. Fix aluminium plate joints to the marine ply with countersunk head stainless steel screws and seal with sealant.

Coving: Provide an extruded aluminium cove moulding, minimum 25 mm radius, at the junction between the wearing surface and the wall inner skin. Seal gaps to **SEALING**.

Consider aluminium chequer plate for cool rooms if the floors will be subject to a significant abuse, such as kegs being rolled and dropped often. Stainless steel is another option but is far less common because of its significantly greater expense. Aluminium chequer plate is an alternative to metal tiles that were previously used for such applications.

Seamless vinyl wearing surface

Requirement: Provide a seamless vinyl wearing surface over concrete or marine plywood, as documented.

Construction: Install to seamless vinyl manufacturer's recommendations for cool room application.

Coving: Provide a 25 mm radius cove moulding. Run vinyl cove to minimum 75 mm on wall above the floor.

Document floor finish in the **Cool room schedule** or on the drawings.

3.11 REFRIGERANT PLANT**General**

Access for maintenance: To **ACCESS FOR MAINTENANCE** in 0171 *General requirements*.

Vibration suppression: To **VIBRATION SUPPRESSION** in 0171 *General requirements*.

Evaporators

Location: To the recommendations of AIRAH DA12 (2020).

Mounting: Mount the evaporator below the ceiling, with 450 mm between the cool room wall and the rear of the evaporator and at least 2100 mm clearance under.

Support: Suspend the unit from cold-rolled metallic-coated steel bearers mounted above the cool room. Extend the bearers to the cool room walls and size to suit the load and span.

Hardware: Nylon or stainless steel to suit the load.

Condensing units

Location: To the recommendations of AIRAH DA12 (2020).

Vibration isolation: Mount each condensing unit on 4 vibration isolators.

Support: Support condensing units on either a concrete plinth or hot dip galvanized steel frame securely fixed to the wall, floor or slab above using anchor bolts.

Arrangement: Provide clearance around units for condenser airflow and maintenance access. Make sure discharge air does not short-circuit to condenser intake.

Alternatively adjust outdoor coil air entering temperature to compensate for elevated air temperature due to recirculation.

Plinths: If located on grassed or similar permeable surfaces, provide concrete plinths under outdoor equipment.

For plinths, see 0171 *General requirements*. Preferably show plinths on the drawings. Consider security of outdoor equipment.

Refrigerant leak detection

Requirement: Provide refrigerant leak detection to AS/NZS 5149.3 (2016).

Sensors: To **GAS SENSORS, Refrigerant sensor** in 0771 *Automatic controls*.

3.12 REFRIGERATION PIPING

General

Requirement: Conform to equipment manufacturer's recommendations for the refrigerant used. Provide refrigeration piping designed and installed so that the complete system meets the documented performance and operating conditions.

Design

Suction lines: Size for pressure drop less than 1.0 K saturated suction temperature.

Correct sizing of suction lines is essential to the efficient operation of the system. Normally units are selected with a capacity above that documented. If the suction line is undersized, the loss in capacity may be hidden behind the excess plant capacity. For the owner however excess suction line pressure drop means wasted energy. In more extreme situations, it can result in the unit failing to meet required latent cooling capacity as the excess suction line pressure drop appears as an elevated evaporator suction temperature and hence coil dew point.

Oil return: Size for oil return to compressor. If velocity for oil return would result in the suction line pressure drop exceeding pressure drop limit, provide double suction risers. Prevent oil draining back during the off cycle.

Liquid lines: Size for pressure drop of less than 1.0 K saturated liquid temperature when handling the manufacturer's unit capacity under the operating temperatures stated in the schedules.

Layout

General: Install piping in straight lines and uniform grades without sags. Grade horizontal hot gas lines and suction lines at minimum 1 in 200 in the direction of gas flow.

Location: Where possible, run suction and liquid lines inside common insulation.

This reduces condensation and the resulting heat transfer increases refrigeration efficiency.

Connections to vibrating equipment. Provide flexibility to resist vibration by way of coiled pipe connections or braided hose.

Pipe support

Requirement: To **SERVICES INSTALLATION, Pipe support systems** in 0171 General requirements.

Stand-off brackets: If pipes are exposed within the cool room or in food preparation areas, support on brackets on panels fixed to structural support to provide the clearances from adjacent surfaces to AS 4674 (2004) clause 3.2.9.

Pipes

Piping: Provide one of the following:

- No capacity limitation: Copper tubes as follows:
 - . ≤ DN 15: To AS 1571 (2020), 0 temper.
 - . > DN 15: To AS 1571 (2020), 1/2H temper. Use annealed (0 temper) copper only for pulled bends.
 - . ≤ DN 50 pipe wall thickness: To Type B.
 - . > DN 50 pipe wall thickness: ≥ 1.6 mm.

0 temper = fully softened condition (annealed). 1/2H = intermediate temper (half hard).

- Split systems ≤ 7.5 kW_r: Split system manufacturer's standard pre-charged piping kit.

Bends

Pulled bends: Form bends without flattening or wrinkling with an inside radius of minimum 3 pipe diameters using the correct tool size for the pipe diameter.

Pipe fittings

Copper alloy fittings: To AS 3688 (2016), dezincification resistant, welded, brazed or compression type only.

Preformed fittings: Preformed refrigerant capillary line tees, bushes, couplings and elbows. Wherever possible, make reductions at elbows, tees, line devices or equipment connections with reducing fittings, otherwise provide reducing bushes or reducing couplings.

Compression fittings: Flareless twin ferrule, torque free, mechanical grip fittings that can be gauged using a precision ground and hardened metal gap inspection gauge. Provide frost proof flare nuts.

Screwed joints: Use only if equipment items are not available with flare, flanged or brazed capillary connections.

Brazed joints

General: Provide preformed capillary fittings or form capillary unions by expanding one pipe end. Prevent flux and brazing alloy from entering pipes. Use dry nitrogen to purge air from pipes before brazing. During brazing, maintain a flow of dry nitrogen through pipes to prevent oxidation.

Avoid flared screwed or flanged joints wherever possible. In addition to using nitrogen, if possible, clean internal accessible joints before proceeding with further assembly work to provide the maximum possible internal cleanliness.

Brazing alloy: To AS/NZS ISO 17672 (2025) Table 7 alloy CuP 284.

Brazing alloy for jointing dissimilar metals: To AS/NZS ISO 17672 (2025) Table 6 alloy Ag 134.

Penetrations

General: Provide cover plates and sleeves to **BUILDING PENETRATIONS** in *0171 General requirements*, and insulate the space between the pipe and sleeves.

Valves

General: Provide valves to AS/NZS 5149.2 (2016). Make provision for charging and withdrawal of refrigerant. If a gauge is not permanently connected (for example commissioning connections), seal the outlet of the isolating valve with a flared seal cap nut.

Valve types

Expansion valves: To maintain correct superheat over the operating range.

Packed and capped line globe valves: Back seating valves with renewable nylon or PTFE seats, packed spindle and removable gland cap. Incorporate mounting feet integral with valve body with adequate fixing holes.

Service valves: Backseating type with gasketed cap.

Solenoid line valves: Solenoid coil and valve parts replaceable without disturbing valve body or refrigerant piping.

Piping protection

Extent: Protect refrigeration piping exposed to view, weather or potential damage with piping covers fabricated from 0.6 mm thick prefinished metallic-coated steel.

e.g. Colorbond.

Section: Folded hat sections to suit piping.

Weatherproofing: Weatherproof external joints and fasteners with non-setting mastic sealant.

3.13 CONDENSATE DRAINS

See AS/NZS 3666.1 (2011) clauses 2.8 and 2.9 for drainage requirements and recommendations. See NATSPEC TECHnote DES 022 for more information on requirements for microbial control in buildings.

General

Condensate drains: Provide trapped drain lines with uniform and continuous fall to connect condensate trays to the nearest building drain point.

Preferably show the location of building drain points on the drawings. There may be local statutory restrictions on where condensate can be discharged.

Material:

- Room operating temperature > 0°C: PVC-U.
- Room operating temperature ≤ 0°C:
 - . Inside room: Copper.
 - . Outside room: PVC-U.
- All cool rooms in kitchens: Chromium-plated copper.

Size: The greater of the unit drain connection size and DN 20.

Pipe support spacing: To AS/NZS 3500.1 (2025) Table 5.7.4.

AS/NZS 3500.1 (2025) Table 5.7.4 includes copper, PVC-U and other materials.

Sealing: Seal drain pipes if they penetrate casing.

Termination: Terminate drains to allow visual inspection of condensate flow.

Traps: To withstand more than 2 times fan static pressure. Construct from either:

- Transparent, kink resistant hose.

- PVC-U trap with removable caps and a visible air break.

Falls and drains: Check that the condensate tray falls conform to AS/NZS 3666.1 (2011). Make sure trays and sumps are graded to the outlet to prevent moisture retention. Test drains by pouring a measured quantity of water into upstream end.

Trace heating

Room operating temperature $\leq 2^{\circ}\text{C}$: Provide trace heating to condensate drain piping to prevent their contents from freezing.

It may be necessary to insulate drains in high humidity environments, such as tropical locations. If the condensate drain discharges into a waste line that has intermittent flows from other sources, the waste may also require insulation.

Control: Integrate heater operation with defrost termination and fan delay thermostat.

Insulation

General: If drains run in ceilings above occupied areas or other locations where condensation could cause damage or nuisance, provide insulation to **REFRIGERATION PIPE INSULATION**.

Insulation R-Value: $\geq 0.6 \text{ m}^2\cdot\text{K}/\text{W}$.

Edit R-Value to suit project conditions.

Consider including this *Optional* style text by changing to *Normal* style text.

3.14 REFRIGERATION PIPE INSULATION

Installation

General: Insulate any refrigerant piping that may sweat. Apply insulation un-slit if possible. If the insulation is slit, refix slit faces with adhesive applied to full area.

Joining: Use only an adhesive or jointing system supplied by the insulation manufacturer.

Timing: Leak test piping to **EVACUATION OF REFRIGERANT GAS SYSTEMS** before insulating joints, fittings and valves.

Finish: If exposed to sunlight or to view in occupied areas, provide 2 coats of tintable, water-based, rubberised, ultraviolet-resistant, flexible paint finish.

Penetrations through fire-resistant elements: If insulated pipe penetrates a fire-resistant element, provide a section of non-combustible, non-hygroscopic insulation for the thickness of the element and 150 mm each side.

3.15 EVACUATION OF REFRIGERANT GAS SYSTEMS

General

System evacuation: Dehydrate the refrigerant gas system before charging with the refrigerant gas.

Evacuation: Conform to the recommendations of

AIRAH Refrigerant handling Code of Practice Part 1 (2025) or

AIRAH Refrigerant handling Code of Practice Part 2 (2025), as applicable. If using the deep vacuum method to AIRAH Refrigerant handling Code of Practice Part 2 (2025), pull a vacuum to the lowest pressure achievable with the available equipment.

The objective of the specified requirement is to make the most of the evacuation process. The achievable vacuum will depend on factors such as the pump used, system size and amount of water in the system. Below 610 Pa (absolute) water freezes so additional heat will be required to remove it.

3.16 ELECTRICAL GENERALLY

General

Requirement: Conform to *0781 Mechanical electrical*.

Alternatively, consider *0782 Mechanical electrical - minor* for a stand-alone cool room contract.

Conduits: Box type sealed internally.

Stand-off brackets: If conduits are exposed within the cool room or in food preparation areas, support on brackets to provide the clearances from adjacent surfaces to AS 4674 (2004) clause 3.2.9.

Control panel cabinets

Construction: Provide control panels documented as follows:

- Location: Outside the cool room.
- Metallic-coated steel: Construction to *0781 Mechanical electrical*.

- Proprietary: Proprietary IP65 polycarbonate enclosure with removable front cover retained by quarter turn fasteners with front cover fasteners and wall fixing holes located outside the sealed space. In all other respects, conform to *0781 Mechanical electrical*.

Include panel type in the **Cool room schedule** or show on the drawings.

3.17 LIGHTING

Service lighting

Cool rooms for food storage: To AS 4674 (2004) clause 2.6.

AS 4674 (2004) clause 2.6 references AS/NZS 1680.1 (2006) and AS/NZS 1680.2.4 (2017).

Service lighting illumination level: Greater than 100 lux.

Luminaires

Cool rooms for food storage: To AS 4674 (2004) clause 2.6.2.

Type: Provide LED luminaires specifically designed for use at both ambient temperature and the cool room minimum operating temperature.

Diffuser: High impact acrylic or UV-stabilised polycarbonate.

Degree of protection: Minimum IP65 to AS 60529 (2025). Seal all wiring entries.

AS 60529 (2004) will also remain current for 24 months (until 23 May 2027) after the date of publication of AS 60529 (2025).

Switching requirements

Service lights: Provide a labelled LIGHTING ON/OFF control switch on the inside of the cool room adjacent to the door, to control the service light(s). Arrange so that the light(s) cannot be switched off from outside the room. Ensure no other interposing switch/contactors is inserted into the internal cool room lighting control switch wire.

Control switch degree of protection: IP66 to AS 60529 (2025). Seal all wiring entries.

Pilot light: Provide a pilot light on the outside of the cool room with labelling to indicate when the service lights are ON.

3.18 EMERGENCY LIGHTING

General

Location: Provide an emergency light within each cool room adjacent to the exit door, positioned to illuminate the emergency door release mechanism, alarm and emergency instructions.

Luminaires

The contractor is responsible for locating the single point luminaires for conformance to AS/NZS 2293.3 (2018).

Type: A non-maintained, surface mounted weatherproof luminaire, fitted with LED lamp, with non-corrosive body and one piece polycarbonate diffuser cover, separated by a neoprene gasket and suitable for an operating temperature range of -40°C to 40°C provided with remote control gear and battery pack.

Degree of protection: Minimum IP65 to AS 60529 (2025). Seal all wiring entries.

Switching: Power the emergency light from the remote emergency lighting battery supply, to operate automatically in the event of mains power supply failure to the cool room lighting circuit.

Visual indicator lights: Provide a status indicator, readily visible when the luminaire is in its operating location, which indicates that the battery is being charged.

Local test switches: Provide a momentary action test switch, accessible by removing the diffuser cover within each luminaire to temporarily disconnect the mains supply and connect the battery to the LED lamp(s).

Common test switches: Provide a common emergency lighting test unit at the local distribution board to disconnect the main supply to the luminaires to test discharge performance to AS/NZS 2293.1 (2018). Configure to automatically revert to normal operating mode on completion of the discharge performance test.

Batteries

Location: Locate batteries outside the cool room.

Type: Lithium nanophosphate or lithium iron phosphate batteries capable of operating each LED lamp at its rated output continuously at least 2 hours during final commissioning, pre-practical completion tests and 1.5 hours during subsequent tests.

Battery life: At least 10 years when operating under normal conditions at an ambient temperature of 25°C and subjected to charging and discharging at 6 monthly intervals.

See AS/NZS 2293.2 (2019) for system checks.

Marking: Indelibly mark each battery with its date of manufacture.

See also AS/NZS 2293.1 (2018) clause 6.4.8.

Installation

Mounting: Securely mount the charger and battery in a separate enclosure with hinged door, of the same construction as the control board, attached to and mounted near the control board. Provide a label on the door PERSONNEL SAFETY ALARMS AND OTHER EQUIPMENT. This enclosure is to also house the evaporator fans shutdown control equipment.

Connection: Polarise the connections from the charger to the battery, and between the battery and load, or clearly mark to prevent reverse connection.

Label

Battery installation/replacement date: Attach a stamped metal tag to the battery indicating the installation date and advised replacement date to the battery manufacturer's recommendations.

Power supply

General: Provide an unswitched active supply to remote control gear/batteries for each emergency luminaire.

3.19 PERSONNEL SAFETY ALARM

Make sure that personnel safety conforms to local Work Health and Safety requirements.

Alarm

Requirement: Provide each cool room with a personnel safety alarm consisting of an emergency pushbutton switch within cool room and an external audible alarm with indicator light as follows:

- Emergency switch: Mechanical illuminated latching mushroom type located in cool room adjacent to the exit door and suitable for use at the cool room operating temperature. Minimum IP65 to AS 60529 (2025). Seal all wiring entries.
- Audible alarm: Bell or siren type located above (outside) the cool room door. Alarm to be silenced by reversing the emergency switch.
- Indicator light: Flashing red, ≥ 50 mm diameter, located outside and above the cool room door.
- Label the light: PERSON TRAPPED IN COOL ROOM.

3.20 BATTERY SUPPLY - PERSONNEL SAFETY ALARMS

General

Requirement: Provide a mains powered battery charger and battery to serve the personnel safety alarms, independent of all other emergency power supplies within the building.

Batteries

Type: Provide maintenance free, sealed, lithium iron phosphate type batteries 12 volt or 24 volt.

Battery capacity: 7 Ah or sufficient to run all emergency lights and alarm monitoring systems for 2 hours, whichever is the greater.

Edit details to suit the project requirements.

Battery charger

Type: Provide a battery charger suitable for continuous float charge use in conformance with the battery manufacturer's recommendations.

Charging current: Suitable for battery capacity selected. Incorporate individual connections for battery and load output with a re-settable current overload protection device, with visual device incorporated in the charger.

Inverter system: Provide step-up DC to AC inverter system where personnel safety alarm system operates using 230 Volts AC.

Edit details to suit the project requirements.

Installation

Mounting: Securely mount the charger and battery in a separate enclosure with hinged door, of the same construction as the control board, attached to and mounted near the control board. Provide a

label on the door PERSONNEL SAFETY ALARMS AND OTHER EQUIPMENT. This enclosure is to also house the evaporator fans shutdown control equipment.

Connection: Polarise the connections from the charger to the battery, and between the battery and load, or clearly mark to prevent reverse connection.

Label

Battery installation/replacement date: Attach a stamped metal tag to the battery indicating the installation date and advised replacement date to the battery manufacturer's recommendations.

3.21 CONTROLS GENERALLY

General

Controls: To 0771 *Automatic controls*.

Control module

General: Provide a microprocessor-based electronic control module, to monitor and control each cool room and its refrigeration system. Locate each control module outside the cool room it serves. Provide the following functions:

- Control the cool room temperature.
- Adjustable set point and control differential.
- Measure, log (hourly) and display the cool room temperature.
- Display highest and lowest room temperature logs for period.
- Sensor calibration.
- High room temperature alarm.
- Automatic duty/standby change over for cool rooms with duty/standby systems.
- Alarm outputs.
- Phase failure relay.
- Automatic defrost cycle control.
- Defrost cycle sequencing to prevent simultaneous defrost if the cool room has multiple refrigeration systems.
- Separate fuses for each evaporator.
- Manual defrost initiate and termination.
- Display time to next defrost and time from last defrost.
- Anti-short cycle adjustable timer limits compressor starts per hour.
- Self-test function.
- Memory retention in the event of power failure.

Consider location of the control module. Possible arrangements are flush-mounted on the fascia of the fixed panel above the door of the control board or surface-mounted adjacent to the cool room door.

Evaporator fans shutdown control

Requirement: Provide a labelled FANS OFF TIMER with a momentary on control switch located on the inside of each cool room adjacent to the door, to shut down the evaporator fans and refrigerant solenoid valves using an adjustable "Delay Off" timer unit.

Control switch degree of protection: IP66 to AS 60529 (2025). Seal all wiring entries.

Adjustable "Delay Off" timer unit: Provide an adjustable "Delay-Off" timer control unit, triggered by a change of state from off-to-on (switch later returning to the off state), resulting in a preset 30 minute-on period. Mount equipment in the enclosure labelled PERSONNEL SAFETY ALARMS AND OTHER EQUIPMENT located near the control board.

Pilot light: Provide a pilot light on the outside of the cool room with labelling to indicate the evaporator fans OVER-RIDE CONTROL OPERATIONAL.

Temperature control

Control accuracy: Maintain the required room temperature within ± 0.5 K of set point.

Evaporator fans: To run continuously during normal (non-defrost) operation.

Defrost cycle

Room operating temperature $> 0^{\circ}\text{C}$: Provide a defrost cycle controlled by the electronic control module, with time initiation and evaporator temperature termination. Run evaporative fans continuously during defrost.

Room operating temperature $\leq 0^{\circ}\text{C}$: Provide a defrost cycle controlled by the electronic control module, time initiated and evaporator temperature terminated. De-energise the evaporator fan during the defrost cycle and delay it from restarting on termination of the defrost cycle until the evaporator reaches operating temperature.

Room door interlock

Requirement: Provide a switch to activate a contactor when the door is opened so that:

- Service lighting within the cool room is switched on, and will remain on until the door is closed. Wire this door interlock switch to be in parallel with the internal cool room lighting control switch. Ensure no other interposing switch/contacter is inserted into the internal cool room lighting control switch wire.
- Evaporator fans and refrigerant solenoid valves are switched off by the evaporator fans shutdown control "Delay Off" timer control unit. Wire this door interlock switch to also trigger the preset 30 minute-on period and pilot light operation.
- Mount equipment in the enclosure labelled PERSONNEL SAFETY ALARMS AND OTHER EQUIPMENT located near the control board.

Installation protection

Requirement: Provide the following:

- Motor thermal overload.
- Manually reset low and high pressure cutouts.
- Separate fuses for multiple evaporator fans.

BMS interface

BMS points: Provide the alarm and monitoring points to interface with the BMS.

Include BMS points in the **Cool room BMS points schedule** or show on the drawings. Coordinate the BMS interface with 0773 *Building management systems*. Refer to that worksection for interface issues such as interoperability, e.g. via ANSI/ASHRAE 135 (2024) (BACnet) compliance.

DIGITAL SYSTEM CONTROLLER INTERFACE in 0771 *Automatic controls* may be used as a basis for specifying the interface in this worksection.

Connection: Provide voltage-free contacts wired to a dedicated terminal strip in the respective cool room switchboard.

Coordinate with 0773 *Building management systems*.

Independent operation: Arrange the interface so that failure or fault in the BMS does not render the cool room installation inoperative in any way.

3.22 CONTROLS FOR COOL ROOMS WITH DROP-IN AND SLIDE-IN SINGLE PACKAGED REFRIGERATION UNITS

General

Control: If a drop-in or slide-in packaged refrigeration unit is documented for the cool room, provide the unit fully factory wired and complete with all refrigeration controls, other controls and safety features.

Include refrigeration system type in the **Cool room schedule** or show on the drawings.

Thermometer: Provide a 100 mm dial thermometer to each cool room.

Defrost: Incorporate electric defrost heaters in refrigeration units. Defrost to be time initiated, pressure or temperature terminated, with fail-safe override and evaporator fan delay.

3.23 PAINTING AND LABELLING

General

Requirement: Conform to 0171 *General requirements*.

Standards

Refrigeration systems: To AS/NZS 5149.2 (2016).

Safety signs: To AS 1319 (1994).

Emergency instructions

Notice: Provide a notice located within the cool room adjacent to the door indicating the locations of the personnel safety alarm switch and door release mechanism with instructions on how to activate the alarm and operate the door release mechanism.

Construction: Photo luminescent type with lettering at least 15 mm high. Screw fix to the cool room wall panel. Provide a photo luminescent exit sign above the cool room door.

Photo luminescent sign output: $\geq 2 \text{ mcd/m}^2$, 60 minutes after light source is removed.

Labels

General: Provide labels for the following:

- Controls.
- Switches.
- Switchboard components.
- Indicator lights.
- Alarms.
- Each cool room door.

Consider coordination of door labelling with other door labels in the project.

- Control boards.
- Condensing units.

3.24 COMMISSIONING

For information on the commissioning process refer to NATSPEC TECHnote GEN 010 and NATSPEC TECHnote GEN 020.

Compliance with this clause targets the Commissioning and Tuning requirement within the Minimum Expectation level of the Verification and Handover credit in Green Star Buildings (2025).

General

Requirement: Conform to *0791 Mechanical commissioning*. Commission to the KINGSPAN recommendations.

Standard: To the recommendations of AIRAH DA12 (2020).

3.25 COMPLETION**Cleaning**

Panels and floors: Clean to manufacturer's recommendations.

Panel finishes may require special cleaning products.

Warranties

Requirement: On completion and when inspected by KINGSPAN INSULATED PANELS, provide KINGSPAN INSULATED PANELS warranty with corresponding inspection and maintenance document.

Period: Provide KINGSPAN INSULATED PANELS warranties as follows:

- Thermal performance: Up to 25 years.
- Structural performance: Up to 25 years.
- Coating performance: Up to 10 years.

List the requirements of the action to be warranted. A coating performance warranty of up to 10 years is dependent on application and environment.

Workmanship: Include warranties on the installation of the wall and/or ceiling system.

3.26 MAINTENANCE**General**

Requirement: Provide maintenance as documented. Conform to *0792 Mechanical maintenance*.

4 SELECTIONS

Schedules are a tool to specify properties required for products or systems. If the principal permits documentation of the product or system by proprietary name, some of the properties may be unnecessary and can be deleted. Document the product

or system's location or application here and/or on the drawings with a matching project code. Refer to NATSPEC TECHnote GEN 024 for guidance on using and editing schedules.

4.1 COOL ROOMS

Cool room schedule

	Cool room 1	Cool room 2	Cool room 3
Room function			
KINGSPAN INSULATED PANELS wall and ceiling panel type			
Internal humidity			
Ambient humidity			
Panel width (mm)			
Panel length (m)			
External sheet: Thickness (mm)			
External sheet: Profile			
External sheet: Finish			
External sheet: Colour			
Internal sheet: Thickness (mm)			
Internal sheet: Profile			
Internal sheet: Finish			
Internal sheet: Colour			
Core thickness (mm):			
Wall, ceiling, door and floor insulation material R-Value (m ² .K/W) at 23°C			
Fire-resistance level (FRL)			
Room internal dimensions: Length (mm)			
Room internal dimensions: Width (mm)			
Room internal dimensions: Height (mm)			
Room operating temperature (°C)			
Air-cooled condenser: Air entering temperature (°C)			
Water cooled condenser: Water entering temperature (°C)			
Water cooled condenser: Water leaving temperature (°C)			
Refrigeration plant capacity at above conditions (kW _r)			
Refrigeration plant operating hours per day			
Wall panel facing profile: Inside			
Wall panel facing profile: Outside			
Ceiling panel facing profile: Inside			
Ceiling panel facing profile: Outside			
Panel protection: Internal wall protection			
Panel protection: Door protection			
Floor: Floor wearing surface type			
Floor: Concrete wearing surface finish			
Floor: Tanking			
Floor heating mat output (W/m ²)			

	Cool room 1	Cool room 2	Cool room 3
Main door: Door type			
Main door: Door clear opening (width x height) (mm)			
Main door: Viewing panel size (width x height) (mm)			
Emergency access doors: Number required			
Emergency access doors: Door action			
Emergency access doors: Door clear opening (width x height) (mm)			
Door plastic strip curtain			
Automatic door closer			
Door open alarm			
Refrigeration plant: Type			
Refrigeration plant: Acceptable refrigerants			
Refrigeration plant: Compressor type			
Refrigeration plant: Compressor drive			
Refrigeration plant: Suction and discharge pressure gauges			
Refrigeration plant: Condensing unit enclosure			
Refrigeration plant: Condenser fan motor			
Refrigeration plant: Evaporator fan motor			
Control panels: Enclosure material			
Service lighting: Number of luminaires			
Control options: Phase failure relay			
Control options: Condensing unit fault indication			
Remote alarms: Refrigeration plant fault			
Remote alarms: Room over temperature			

The codes in the header row of the schedule designate each application or location of the item scheduled. Edit the codes to match those in other contract documents.

Some items in this schedule may be omitted if the respective clauses are deleted, for example, internal wall protection if the **Internal wall protection** subclause is deleted. Alternatively, some or all of the details in this schedule may be shown on the drawings and deleted from the schedule. Similarly, if schedule items are detailed on the drawings they should be deleted from the schedule.

Room function: e.g. Restaurant service, pharmaceutical storage, mortuary.

KINGSPAN INSULATED PANELS wall and ceiling panel type: Select from KS1100CS or KS1200CS.

Internal humidity: e.g. Select Low-humidity or high humidity. Delete if not required.

Ambient humidity: e.g. High humidity, low humidity.

Panel width (mm):

- KS1100/1200CS: Select from 1100 or 1200.

Panel length (m):

- KS1100/1200CS: Select from standard 2 m to 13.7 m or non-standard up to 16.1 m maximum, depending on panel thickness.

External sheet: Thickness: KS1100/1200CS: Select from standard 0.45 mm, 0.6 mm (ribbed) or non-standard 0.55 mm.

External sheet: Profile:

- KS1100/1200CS panels: Select from flat or ribbed.

External sheet: Finish:

- KS1100/1200CS panels: Standard range: Select from Coolroom white, AQUAsafe55, AQUAsafe25 (for high humidity environments and swimming pools).

External sheet: Colour:

- KS1100/1200CS panels: Coolroom white, off-white (high humidity) or as per standard external colour range.

Internal sheet: Thickness (mm): KS1100/1200CS panels: Standard 0.45 mm (flat), 0.6 mm (ribbed) or non-standard 0.55 mm.

Internal sheet: Profile:

- KS1100/1200CS panels: Select from flat or ribbed.

Internal sheet: Finish:

- KS1100/1200CS panels: Select from Coolroom white, AQUAsafe55 or AQUAsafe25 (for high humidity environments and swimming pools) or Standard range.

Internal sheet: Colour:

- KS1100/1200CS panels: Coolroom white, off white (high humidity) or as per standard external colour range.

Core thickness (mm): KS1100/1200CS panels: Select from 50, 75, 100, 125, 150 or 200.

R-Value ($\text{m}^2\cdot\text{K}/\text{W}$):

- KS1100/1200CS panels: Select from 2.23, 3.43, 4.60, 5.76, 6.92 or 9.25. AS/NZS 4859.1 (2018) requires that R-Value is declared at 23°C for insulation products sold in Australia.
- Door and floor panel R-Value to match wall panel R-Value.

Fire-resistance level (FRL): e.g. -/30/30. Consult KINGSPAN for fire-resistance level testing and further information:

Air-cooled condenser: Air entering temperature (°C): To suit site and plant configuration. If airflow is restricted, consider specifying a value higher than design ambient to compensate. Delete if there are no air-cooled units.

Water cooled condenser: Water entering/leaving temperature (°C): Delete if there are no water cooled units.

Refrigeration plant capacity at above conditions (kW_r): See AIRAH DA12 (2020) for guidance on calculating this.

Refrigeration plant operating hours per day: e.g. 18. This is used to calculate plant capacity allowing for defrost. Omit if the refrigeration plant is fully specified.

Wall panel facing profile:

- Inside: Select from flat or ribbed.
- Outside: Select from flat or ribbed.

Ceiling panel facing profile:

- Inside: Select from flat or ribbed.
- Outside: Select from flat or ribbed.

Panel protection:

- Internal wall protection: e.g. Required, not required.
- Door protection: e.g. Required, not required.

Floor:

- Floor wearing surface type: e.g. Concrete, aluminium chequer plate, seamless vinyl.
- Concrete wearing surface finish: e.g. As laid, epoxy coated, steel tiles, ceramic tiles.
- Tanking: e.g. Required, not required.

Floor heating mat output (W/m^2): If heating mat is required insert heat output based on the temperatures in the room and conditions under the floor. If no heating mat is required, either delete the row or insert Not required.

Main door:

- Door type: e.g. Hinged, sliding.
- Viewing panel size (width x height) (mm): Insert dimensions or note not required.

Door plastic strip curtain: e.g. Required, not required.

Automatic door closer: e.g. Required, not required.

Door open alarm: e.g. Required, not required.

Refrigeration plant:

- Type: e.g. Split system, single drop-in unit, single slide-in unit.

- Acceptable refrigerants: This may be omitted if the refrigerants permitted under the respective legislation are acceptable. See NATSPEC TECHnote PRO 007 on refrigerant options.
- Compressor type: e.g. Belt driven open drive, direct driven open drive, hermetic, semi-hermetic.
- Compressor drive: e.g. a.c., inverter, digital.
- Suction and discharge pressure gauges: e.g. Required, not required.
- Condensing unit enclosure: e.g. Required, not required. Omit for drop-in and slide-in types.
- Condenser fan motor: e.g. a.c., EC.
- Evaporator fan motor: e.g. a.c., EC.

Control panels: Enclosure material: e.g. Metallic-coated steel, polycarbonate.

Control options:

- Phase failure relay: e.g. Required, not required.
- Condensing unit fault indication: e.g. Required, not required.

Remote alarms:

- Refrigeration plant fault: e.g. Required, not required.
- Room over temperature: e.g. Required, not required.

Adapting schedules for design by contractor

If the contractor is to calculate the required performance and to select the equipment, the SELECTIONS schedules can be used to set generic selection parameters. Note that the documents should include sufficient information for items to be determined by the contractor, for example from documented performance parameters and drawing information. For these items, insert suitable text, e.g. To the documented requirements.

The **Cool room schedule** can then form the basis of the contractor's submissions with the text replaced by design values.

4.2 BMS INTERFACE

Cool room BMS points schedule

Equipment item and point description	Point type	Scheduled	Trend log	Alarm	Include in graphic

Legend

AI: Analog input (hardware point).
 AO: Analog output (hardware point).
 DI: Digital input (hardware point).
 DO: Digital output (hardware point).

Use this schedule to define interface requirements to the building management system so their values can be transmitted to the BMS.

Other possible inclusions are software points, e.g. AV (analog value), BV (binary value).

Points schedules are often restricted to hardware points. However, software points may be included so their values can be transmitted to the BMS. Exercise caution if including software points. Failure to include points may give rise to variations.

Key to schedule

Equipment item and point description: e.g. Cool room temperature.

Point type: See **Legend**.

Scheduled: Insert time schedule if scheduled.

Trend log: If logging is required, e.g. Required, not required.

Alarm: If alarm is required, e.g. Required, not required.

Include in graphic: If the point is to be included in a BMS graphic, e.g. Yes, no.

Adapting the Cool room BMS points schedule for design by contractor

Insert the information described in the above guidance.

4.3 COOL ROOM ACCESSORIES

Shelving schedule

	Cool room 1	Cool room 2	Cool room 3
Number of shelving modules			
Size of modules (width x depth x height) (mm)			
Number of shelves per module			
Post and frame material			
Shelf material			
Number of dunnage shelves			
Size of dunnage shelves (width x depth x height) (mm)			
Dunnage shelf material			

The codes in the header row of the schedule designate each application or location of the item scheduled. Edit the codes to match those in other contract documents.

Some or all of the details in this schedule may be shown on the drawings and deleted from the schedule.

Post and frame material: e.g. Metallic-coated steel, stainless steel.

Shelf material: e.g. ABS, metallic-coated steel, stainless steel.

Dunnage shelf material: e.g. Metallic-coated steel, stainless steel.

Adapting the Shelving schedule for design by contractor

Insert the information described in the above guidance.

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS/NZS ISO 817	2016	Refrigerants - Designation and safety classification
AS 1192	2004	Electroplated coatings - Nickel and chromium
AS 1319	1994	Safety signs for the occupational environment
AS 1366		Rigid cellular plastics sheets for thermal insulation
AS 1366.1	1992	Rigid cellular polyurethane (RC/PUR)
AS 1397	2021	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1530		Methods for fire tests on building materials, components and structures
AS/NZS 1530.3	1999	Simultaneous determination of ignitability, flame propagation, heat release and smoke release
AS 1530.4	2014	Fire-resistance tests for elements of construction
AS 1569	1998	Copper and copper alloys - Seamless tubes for heat exchangers
AS 1571	2020	Copper - Seamless tubes for air-conditioning and refrigeration
AS 1572	2023	Copper and copper alloys - Seamless tubes for engineering purposes
AS 2129	2000	Flanges for pipes, valves and fittings
AS/NZS 2208	2023	Safety glazing materials in buildings
AS 2239	2003	Galvanic (sacrificial) anodes for cathodic protection
AS/NZS 2272	2006	Plywood - Marine
AS/NZS 2293		Emergency lighting and exit signs for buildings
AS/NZS 2293.1	2018	System design, installation and operation
AS 2848		Aluminium and aluminium alloys - Compositions and designations
AS 2848.1	1998	Wrought products
AS 2870	2011	Residential slabs and footings
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2025	Water services
AS 3600	2018	Concrete structures
AS/NZS 3666		Air-handling and water systems of buildings - Microbial control
AS/NZS 3666.1	2011	Design, installation and commissioning
AS 3688	2016	Water supply and gas systems - Metallic fittings and end connectors
AS 4040		Methods of testing sheet roof and wall cladding
AS 4040.3	2018	Resistance to wind pressures for cyclone regions
AS/NZS 4671	2019	Steel for the reinforcement of concrete
AS 4674	2004	Design, construction and fit-out of food premises
AS/NZS 4859		Thermal insulation materials for buildings
AS/NZS 4859.1	2018	General criteria and technical provisions
AS/NZS 5149		Refrigerating systems and heat pumps - Safety and environmental requirements
AS/NZS 5149.1	2016	Definitions, classification and selection criteria (ISO 5149-1:2014, MOD)
AS/NZS 5149.2	2016	Design, construction, testing, marking and documentation (ISO 5149-2:2014, MOD)
AS/NZS 5149.3	2016	Installation site (ISO 5149-3:2014, MOD)

AS/NZS 5149.4	2016	Operations, maintenance, repair and recovery (ISO 5149-4:2014, MOD)
AS 5637		Determination of fire hazard properties
AS 5637.1	2015	Wall and ceiling linings
AS/NZS ISO 17672	2025	Brazing - Filler metals
AS/NZS 60335		Household and similar electrical appliances - Safety
AS/NZS 60335.1	2022	General requirements (IEC 60335-1 Ed 6, MOD)
AS/NZS 60335.2.89	2020	Particular requirements for commercial refrigerating appliances and ice-makers with an incorporated or remote refrigerant unit or motor-compressor
AS 60529	2025	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989 (ED. 2.2) MOD)
BCA J6D9	2025	Energy efficiency - Air-conditioning and ventilation - Pipework insulation
AIRAH DA12	2020	Energy efficiency in cold rooms
AIRAH RHCop		Australia and New Zealand Refrigerant Handling Code of Practice
AIRAH RHCop P1	2025	Self-contained low charge systems
AIRAH RHCop P2	2025	Systems other than self-contained low charge systems
AHRI 450	2007	Performance rating of water-cooled refrigerant condensers, remote type
FM 4880	2017	Approval standard for Evaluating the Fire Performance of Building Panel Assemblies and Interior Finish Materials
FM 4881	2016	Approval standard for Class 1 exterior wall systems
EN 328	2014	Heat exchangers - Forced convection unit air coolers for refrigeration - Test procedures for establishing the performance
EN ISO 12629	2022	Thermal insulating products for building equipment and industrial installations - Determination of water vapour transmission properties of preformed pipe insulation
EN 13215	2016	Condensing units for refrigeration - Rating conditions, tolerances and presentation of manufacturer's performance data
The following documents are mentioned only in the <i>Guidance</i> text:		
AS 1668		The use of ventilation and air conditioning in buildings
AS 1668.2	2024	Mechanical ventilation in buildings
AS/NZS 1680		Interior and workplace lighting
AS/NZS 1680.1	2006	General principles and recommendations
AS/NZS 1680.2.4	2017	Industrial tasks and processes
AS/NZS 2293		Emergency lighting and exit signs for buildings
AS/NZS 2293.2	2019	Routine service and maintenance
AS/NZS 2293.3	2018	Emergency luminaires and exit signs
AS 60529	2004	Degrees of protection provided by enclosures (IP Code)
BCA C2D11	2025	Fire resistance - Fire resistance and stability - Fire hazard properties
BCA Section J	2025	Energy efficiency
BCA Spec 7	2025	Fire resistance - Fire hazard properties
NCC	2022	National Construction Code
NCC	2025	National Construction Code
GBCA Buildings	2025	Green Star Buildings
NATSPEC DES 003		Fire hazard properties of insulation and pliable membranes
NATSPEC DES 020		Fire behaviour of building materials and assemblies
NATSPEC DES 022		Microbial control
NATSPEC GEN 006		Product specifying and substitution
NATSPEC GEN 010		Mechanical commissioning strategies
NATSPEC GEN 020		Building commissioning
NATSPEC GEN 024		Using NATSPEC selections schedules
NATSPEC PRO 007		Refrigerant options
NATSPEC TR 01		Specifying ESD
NATSPEC TR 03		Specifying design and construct for mechanical services
ANSI/ASHRAE 135	2024	BACnet: A data communication protocol for building automation and control networks
ISO 5149		Refrigeration systems and heat pumps - Safety and environmental requirements