

<b>0746P AIROCLE NATURAL VENTILATION IN AIR GRILLES</b>
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**Branded worksection**

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**Worksection abstract**

This worksection *Template* is applicable to AIROCLE fixed and adjustable air grilles, used in air conditioning and ventilation systems and AIROCLE ventilators. The term air grille is used generically and includes diffusers, registers and weatherproof (exterior) louvres. The reference standard is AS 4254.2. See also AIRAH DA03. AIROCLE products applicable to this worksection include heat/smoke/fire ventilators, pressure ventilators, slope ventilators, ridge ventilators, rotary turbo ventilators, high capacity ventilators, round stationary ventilators, fixed and operable louvres.

**Guidance text**

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

**Optional text**

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

**Related material located elsewhere in NATSPEC**

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

- *0421 Roofing – combined* for roof ventilators.
- *0423 Roofing – profiled sheet metal* for roof ventilators.

**Material not provided by AIROCLE**

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

- Louvre ceiling diffusers.
- Circular diffusers.
- Curved blade diffusers.
- Perforated plate diffusers.
- Luminaire diffusers.
- Slot diffusers.
- Side wall diffusers.
- Jet diffusers.
- Thermally powered diffusers.
- Mesh grilles.
- Egg crate grilles.
- Volume control dampers.

**Documenting this and related work**

You may document this and related work as follows:

- Refer to AIRAH DA02 for noise levels due to air grilles, which is a responsibility of the designer.
- Show the location, type and size of air grilles on the drawings. Make sure the terminology used on the drawings agrees with the terminology in this worksection.
- This worksection covers a variety of air grille types. In order to avoid ambiguity, either delete types not required for the project or make sure that symbols and legends on the drawings indicate clearly the required type.
- For 1, 2 and 3 way diffusers indicate the blow directions or face that is to be blanked off.
- You may wish to use undercut doors in lieu of door grilles where small air quantities are involved.
- Consider installation details for diffusers in tiled ceilings. It may be more cost effective to use larger (e.g. half tile) diffusers with inactive sections blanked off than to use smaller diffusers which require trimming and cutting of the tiles.
- On air intakes and outlets, see AS/NZS 3666.1 clauses 2.2 and 2.3.

- Coordinate external louvres with the *0451 Windows and glazed doors* worksection, particularly clause **VENTILATING LOUVRE ASSEMBLIES, Fixed metal louvres**.
- This worksection contains text, including *Optional* text, which may be adapted for use in design and construct projects. See NATSPEC TECHreport TR 03 for information on specifying Design and Construct for mechanical services.

### Specifying ESD

The following may be specified by retaining default text:

- Durable components, particularly for corrosion resistance.
- Provisions to reduce noise caused by air grilles.

Refer to the NATSPEC TECHreport TR 01 on specifying ESD.

## 1 GENERAL

For over 90 years, AIROCLE has provided the building industry with effective and environmentally friendly solutions for natural building ventilation and smoke hazard management. AIROCLE has substantial expertise, experience and an absolute dedication to satisfying ventilation and smoke hazard management needs and expectations to deliver a comprehensive range of natural air, smoke, heat and pressure ventilation, and smoke hazard management. The result is some of the most reliable, effective and energy efficient solutions available for commercial, industrial and community projects.

### 1.1 RESPONSIBILITIES

#### General

Requirement: Provide AIROCLE air grilles, as documented.

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

This worksection does not include air grille schedules as it assumes the type, location and sizes will be shown on the drawings. A schedule, if required, should be included in **SELECTIONS**. If the contractor is to size air grilles, provide relevant design parameters such as face velocity, neck velocity and noise selection limits.

#### DESIGN

The *Optional* text in this clause may be used when the contractor is to design and select the air distribution equipment. Use the *0701 Mechanical systems* worksection to describe design parameters for mechanical systems, as a whole, including the basis for calculating the air quantities and definition of areas to be served by the documented types of air distribution equipment.

#### General

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.

Requirement: Design air grilles and other air distribution equipment, as documented.

#### Air grilles and air distribution equipment design, application and calculations

Standards: Conform to the recommendations of one or more of the following:

- AIRAH Design Application Manuals.
- ASHRAE Handbooks.
- CIBSE Guides.

Methods of calculation: Manual or software that employs the data and methods in the applicable standard.

#### Air distribution equipment types

Requirement: Provide air distribution equipment types selected from the following:

- Supply air: [complete/delete]
- Return air: [complete/delete]
- Outside air: [complete/delete]
- Toilet exhaust: [complete/delete]
- Door grilles: [complete/delete]

This may be used to specify permissible air distribution equipment types, e.g.:

- Supply air: Louvre face ceiling diffusers with blanking plates to provide 1, 2 3 or 4 way blow to suit the required air distribution.
- Return air grilles: Half chevron.
- Toilet exhaust: Egg crate.

**Supply air**

Requirement: Provide supply air grilles, diffusers, registers or unducted room air conditioners as follows:

- Evenly distribute supply air within the space, free from draughts, and to achieve the documented permissible temperature variation.
- With at least one air grille, diffuser, register or unducted room air conditioner in each room or space served.

Noise levels: Achieve documented noise levels within the space.

These are very broad requirements. Consider being more specific, for example specifying one supply diffuser per 12 m<sup>2</sup> of floor area. Other parameters that could be included are maximum neck and face velocities, throw parameters, maximum pressure drop and the like.

**Return air**

Requirement: Provide return air grilles as follows:

- Return air to the air conditioning plant in an energy efficient manner.

Noise levels: Achieve documented noise levels within the space.

Consider the return air path. e.g. through the ceiling void (if sealed) or through the corridors via door grilles.

Consider including related performance parameters such as maximum face velocity and pressure drop.

**Door grilles**

Requirement: Provide door grilles to:

- Return air to the plant if the return air path is through the door opening.
- Provide make-up air to exhaust ventilated spaces.
- In other locations, as required, to prevent excessive space air pressures and achieve energy efficient plant operation.

Door grilles provide limited sound isolation. For acoustically sensitive spaces, consider alternatives such as ceiling return or acoustic transfer ducts.

Consider including related performance parameters such as maximum face velocity and pressure drop.

**Exhaust air grilles**

Requirement: Provide exhaust grilles to meet the statutory ventilation requirements.

**Outside air grilles and louvres**

Requirement: Provide air grilles and louvres on the face of the building as follows:

- Supply fresh air to air conditioning and ventilation plant.
- Provide relief of exhaust and return air.
- Prevent the entry of rain and vermin.

Consider including related performance parameters such as maximum face velocity and pressure drop.

**1.2 COMPANY CONTACTS****AIROCLE technical contacts**

Website: [www.airocle.com.au](http://www.airocle.com.au).

**1.3 CROSS REFERENCES****General**

Requirement: Conform to the following:

- *0171 General requirements.*

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

- *0701 Mechanical systems.*

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

- *0744 Ductwork insulation.*

List the worksections cross referenced by this worksection. The *0171 General requirements* worksection 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.

**General**

Requirement: Conform to the following worksection(s):

- 0171 *General requirements*.

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

- 0701 *Mechanical systems*.

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

- 0744 *Ductwork insulation*.

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

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

**1.4 STANDARDS****General**

Requirement: To AS 4254.1 and AS 4254.2.

Indoor air contaminant control: To AS 1668.2 Supplement 1.

**1.5 MANUFACTURER'S DOCUMENTS****Technical manuals**

Catalogue: Visit [www.airocle.com.au](http://www.airocle.com.au) to request the *AIROCLE Product catalogue*.

**1.6 INTERPRETATION****Abbreviations**

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

- VAV: Variable air volume.

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:

- Air grille: An air grille of metal or other material fitted to the inlet or outlet end of an air duct or within walls, floors, ceilings or doors. It includes all types of diffusers, registers and other grilles.
- Diffuser: A supply air grille mounted in a ceiling or on the underside of a duct through which air is supplied and distributed within a room or interior space of a building.
- Register: A supply air grille mounted in a wall or on the side of a duct.

The above definitions are derived from SAA HB 50.

- Cushion head Box: A plenum box fitted above a diffuser.
- Louvres:
- Louvres - horizontal: Louvres that span between frames stiles, mullions or vertical supports.
- Louvres - continuous: Louvres that run continuously past, and are supported by, concealed framing or brackets.
- Louvres - vertical: Louvres that span between frame heads and sills, or horizontal supports.
- Plenum box: A lower velocity (larger volume) duct element behind an air grille intended to allow equalisation of air flow over the air grille.

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

**1.7 SUBMISSIONS****Operation and maintenance manuals**

Requirement: Submit the manufacturer's published instructions for operation, care and maintenance.

**Products and materials**

Requirement: Submit documentation from the manufacturer verifying conformance with the following:

- Smoke control systems: To AS 1668.3.
- Smoke/release vents: To AS 2427.

- Smoke/heat venting systems: To AS 2665.

All AIROCLE products conform to AS 2665.

### Samples

General: Submit a sample of each type of air grille. Include plenum box or cushion head box and blanking plates as documented.

### Tests

The 0171 General requirements worksection covers tests in **Definitions** and calls for an inspection and testing plan under **SUBMISSIONS, Tests**.

Type tests: Submit reports verifying conformance to AS/NZS 4740, excluding Appendix E, for the following:

- Acoustic performance: To ISO 5135 or ANSI/ASHRAE 70.
- Rain resistance.
- Discharge co-efficient.
- Wind loading.

AIROCLE states that their 5 Series ventilators have not been tested for flow rate performance to AS/NZS 4740 Appendix E, as no suitable or agreed method has been established.

All AIROCLE products are tested for discharge coefficient performance rating by the CSIRO, a NATA accredited testing laboratory.

Type tests are carried out before the contract. However, submission of evidence of a successful type test may be called up here for requirements specified in **SELECTIONS** or **PRODUCTS** when there are no **SELECTIONS**.

Testing method: Submit documentation from the manufacturer verifying the testing methods conforms to the following:

- Resistance to leakage during rain: To AS 2428.1.
- Operation under wind loading: To AS 2428.2.
- Operation characteristic: To AS 2428.3.
- Flame contact effect: To AS 2428.4.
- Discharge coefficient: To AS 2428.5.
- Operation under snow loading: To AS 2428.6.

### Warranties

General: Submit warranties as documented.

## 2 PRODUCTS

In selecting air grilles consider the following:

- Symbol used on the drawings.
- Outlet type, e.g. louvre ceiling slot diffuser, luminaire air diffuser.
- Dimensions.
- Designation (type of throw) e.g. 3 way, 2 way, horizontal, vertical.
- Material. If aluminium, specify alloy designation.
- Maximum pressure drop.
- Mounting frame type.
- Ambient sound level, e.g. NR30.

### 2.1 GENERAL

#### Product substitution

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

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

#### Marking

Identification: Marked to show the following:

- Manufacturer's identification.

- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.
- Material composition and characteristics such as volatility, flash point, light fastness, colour and pattern.

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

## 2.2 MANUFACTURE

### General

Proprietary air grilles: Conform to the following:

- Free from distortion, bends, surface defects, irregular joints, exposed fastenings and operation vibration.
- With flange corners neatly mitred, butted and buffed, with no joint gaps.

Material: Steel or aluminium.

This allows the contractor to select the material. Edit if only one is acceptable.

Finish:

- Exposed surfaces: Powder coated to the nominated colour.

Include the colour, if appropriate. Colours should be coordinated with architectural requirements.

Alternatively anodising may be possible but is normally only available on special order and may not be available at all from some manufacturers. If specifying, include coating thickness class and colour.

Clear (including tinted) and metallic powder coat may be available to give a similar effect.

- Visible internal elements: Matt black enamel.

Matt black is also specified for dampers and the inside of plenum boxes.

Fixings: Provide secure, concealed fixings that allow removal without damage to surrounds or air grilles.

### Variable volume systems

General: Provide air grilles tested for variable volume applications.

Designers should select air grilles to provide adequate air distribution without causing drafts at high volume or dumping at low volume. This may require limiting VAV terminal turn-down to, say, 40%. For large or critical projects, consider air flow tests on prototype installations. Diffusers that take advantage of the Coanda effect (e.g. slot type) are more suitable for VAV systems for this reason.

## 2.3 VOLUME CONTROL DAMPERS

Alternatively, show the damper types and locations on the drawings.

AIROCLE roof ventilators do not include volume control dampers. See *Guidance* for **TURBO VENTILATORS, Dampers**.

### Dampers controlling a single air grille attached to flexible duct

Location: Provide a damper as follows:

- If the duct spigot is located above a tiled or otherwise accessible ceiling: Provide a butterfly damper in the rigid duct spigot.
- If the duct spigot is not located above a tiled or otherwise accessible ceiling: Provide an opposed blade damper behind the face of the air grille.

Locating dampers at the spigot is less likely to lead to noise problems than locating them at the diffuser. Dampers at spigots may not be accessible in set plaster ceilings or if there is a mixture of set plaster and tiled ceilings. Consider showing the damper locations on the drawings.

### Butterfly dampers

Type: Single-blade round dampers with external locking quadrant indicating butterfly damper position.

Location: Conform to **Dampers controlling a single air grille attached to flexible duct**.

### Stream splitter dampers

Type: Duct mounted ganged, multi-blade, stream splitter type.

Location:

- At rigid duct take-offs to outlets.
- Conform to **Dampers controlling a single air grille attached to flexible duct.**
- Behind duct mounted registers.

#### **Opposed blade dampers**

Type: Multi-blade type with blades linked for ganged operation. If located at the air grille, provide adjustment accessible through the grille face. If visible through the air grille, paint the damper matt black.

Location:

- At the end of duct spigot take-offs.
- Conform to **Dampers controlling a single air grille attached to flexible duct.**
- Behind supply air grilles attached to flexible duct if the spigot at the rigid duct is not accessible through the ceiling.
- Behind return and exhaust air grilles connected to ducts.

## **2.4 AIR GRILLE TYPES**

This clause covers a range of air grille types many of which will be alternatives. To avoid ambiguity, delete air grille types that are not to be used in the project.

### **Air grilles in suspended ceilings**

Physical compatibility: To AS 2946.

AS 2946 covers the physical compatibility of ceiling diffusers, luminaires, etc. with suspended ceiling systems.

#### **Louvre ceiling diffusers**

General: Provide either:

- Multi-bladed, removable core 4-way blow configuration, fitted with a blanking plate for 1-, 2-, or 3-way blow, as appropriate; or
- Multi-bladed, removable core 1-, 2-, 3- or 4-way blow configuration.

These are alternatives. Show the required type on the drawings. If one style only is preferred (e.g. 4-way blanked), delete the other. Indicate on the drawings where 1-, 2-, 3- or 4-way blow is required.

Reducer necks: If the outlet neck is smaller than the outlet necessary to suit the louvre face size, provide a reducer neck.

Frame: Provide a frame style to suit the type of ceiling and ceiling grid mounting requirements.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **VOLUME CONTROL DAMPERS.**

#### **Circular diffusers**

General: As for **Louvre ceiling diffusers** but with adjustable threaded multi-core allowing variation of discharge pattern from horizontal to vertical by rotation of the centre core.

Material: Spun circular aluminium.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **VOLUME CONTROL DAMPERS.**

#### **Curved blade diffusers**

General: As for **Louvre ceiling diffusers** but with individually adjustable curved blades of extruded aluminium rotating in the support frame. Support blades firmly without rattle or flutter.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **VOLUME CONTROL DAMPERS.**

#### **Perforated plate diffusers**

General: Supply diffusers conforming to **Louvre ceiling diffusers** but with a hinged perforated face plate with minimum free area of 50%. Fold plate edges so that perimeter gaps do not exceed 0.5 mm.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air pattern control: Provide hidden air pattern control louvres adjustable to produce 1, 2, 3 or 4 way pattern.

Air volume control: Conform to **VOLUME CONTROL DAMPERS.**

**Perforated face air grilles**

General: Return or exhaust air grilles conforming to **Perforated plate diffusers** but omitting air pattern control.

**Luminaire air diffusers**

Type: Single sided or double sided, to conform to design of light fitting.

Physical compatibility: To AS 2946.

Performance:

- Maximum flow per slot: 50 L/s.
- Maximum pressure drop at maximum flow: 30 Pa, including damper.
- Maximum throw when delivering the maximum air flow: 5 m at 0.1 m/s terminal velocity.

These are typical performance values. Adjust to suit the project and slot design.

Construction: Metallic-coated steel sheet  $\geq 0.55$  mm thickness, folded and welded to produce an airtight assembly. Provide a circular or oval spigot for flexible duct connection.

Air flow deflection: Provide an adjusting device which can be operated through the slot in the luminaire to provide horizontal pattern designed to maximise Coanda effect.

Plenum: For air supply from each side of the luminaire, provide 2 plenum boxes joined with a connecting duct and fitted with a flexible duct connection to a plenum box.

Support of plenum boxes: Provide shouldered pins on the plenum box to fit into keyhole slots in the luminaire.

This text is *Optional* text for adjustable diffusers. Coanda effect causes air to stick to the ceiling making it desirable in VAV systems as it reduces air dumping.

Air volume control: Conform to **VOLUME CONTROL DAMPERS**.

**Slot diffusers**

Type: Linear slot type ceiling diffusers with one or multiple slots, nominally 20 mm wide and integral air pattern control.

Show the number of slots and blank sections on the drawings.

Construction: Extruded aluminium with parallel, inverted Tee members supported and spaced to form continuous discharge slots.

Plenum: Supply air to the active lengths of each diffuser via plenum ducts on the back of the diffuser with circular or oval spigots for flexible duct connections. Design the plenum ducts for even distribution of air flow along the active length of the diffuser.

Frame: Flanged with outside edge returned and coordinated with the ceiling system.

Finished appearance: Continuous and unbroken irrespective of the purpose of the slot. Blank off all slots not used for supply or return air. For long lengths, provide mechanical aligning devices to produce a rigid assembly that minimises the visibility of joints.

Air pattern control: Provide an adjusting device which can be operated from the face of the diffuser through the slot to allow 180° deflection of air pattern from vertical to horizontal in either direction.

Air volume control: Conform to **VOLUME CONTROL DAMPERS**.

**Side wall registers**

General: Double deflection type with horizontal front louvre blades and vertical rear blades at 19 mm nominal centres, capable of field adjustment of air throw over the range  $\pm 45^\circ$ .

Construction: Extruded aluminium with mitred corners and aerofoil section blades which rotate in non-metallic bearings in the support frame. Hold blades firmly so they do not rattle or flutter.

Core: Provide a removable core (support frame and blades).

In some cases (e.g. when mounted on a duct), the whole register can be removed easily and a removable core is not necessary.

Blades > 600 mm long: Support at mid-point on a notched support bar.

Dampers: Provide a stream splitter or opposed blade type damper behind each register, to provide even air flow across the register face.

**Jet diffusers**

General: Provide 3 concentric sections made of spun aluminium, bolted together.

Air pattern control: Adjustable in two planes for direction and to give either jet or diffuser pattern.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **VOLUME CONTROL DAMPERS**.

Mounting: Suitable for either ceiling, wall or direct duct mounted application.

### Thermally powered VAV diffusers

This is written around thermally powered diffusers that use expanding wax capsules or similar to drive the dampers. Other systems of self-powered diffusers (e.g. electronically controlled) are available.

Type: Proprietary VAV diffuser with integral actuator and dampers to adjust air volume in response to temperature sensed at the diffuser. Provide uniform air distribution pattern to maximise Coanda effect over the operating range from full open to the minimum air flow.

Construction: Provide an appearance panel mounted within a pressed diffuser frame.

Material: Powder coated metallic-coated steel sheet.

Frame: Provide a frame style to suit the type of ceiling, and ceiling grid mounting requirements.

Alternatively, provide nominal 600 x 600 mm diffuser mounting plate to match the type of ceiling, and ceiling grid mounting requirements.

Operation: Provide integral hinged dampers to vary the outlet supply air volume under the control of an inbuilt room temperature sensing element.

Control: Provide one of the following:

- Self-powered type with expanding wax or similar temperature sensitive elements.
- Line powered with integral 24 volt transformer.

Heating operation: If the system operates in both heating and cooling modes, provide a factory preset supply duct temperature sensor that reverses the control action between heating and cooling. Operate in cooling mode when the air supply is below 20°C and in heating mode when supply air is above 27°C.

Room temperature set point: Adjustable from below the face of the diffuser over the range 21°C to 26°C.

Infra-red remote control is also available for the line powered type.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **VOLUME CONTROL DAMPERS**.

### Return or exhaust air grilles – indoor

Construction: Extruded aluminium with fixed horizontal blades set into a fixed support frame with mitred corners. Fit blades tightly into the frame to prevent rattling or movement. Brace and stiffen to produce a rigid assembly.

Pressure drop: Maximum 10 Pa at the documented air flow.

This is a typical value which can be varied to suit the selected louvre and project. Show the air grille size on the drawings. While the specifying of free open area has been common practice, it is not as effective as specifying a maximum pressure drop.

Blades:

- Half chevron type: Blades at nominal 45° angle on a nominal 25 mm pitch.

Half chevron type are generally used as wall mounted return or air transfer air grilles, visible from one side only.

- Inverted Vee chevron type: Blades at nominal 25 mm pitch. Provide a telescopic frame with clip-on pattern surround frames on both sides.

Inverted V chevron type are generally used as wall or door mounted return or air transfer grilles, visible from both sides.

- Light proof grilles: Inverted Vee chevron type but with double inverted Vee chevron blades, blade pitch and edge detail designed to stop light penetration.

Air volume control: If the air grille is connected to a duct, provide an opposed blade damper behind the grille core, key operated without removing the core.

### Mesh air grilles

Light duty type: Fabricate from 1.5 mm thick galvanized steel or bronze wire at 12 mm centres fixed into a folded metallic-coated steel or aluminium frame.

Heavy duty type: Fabricate from 3 mm thick galvanized steel or bronze wire at 20 mm centres, welded into a 3 mm thick galvanized steel frame.

Dampers may be required. If so, specify or rely on dampers in the duct.

Bronze mesh: If bronze mesh is provided on external grilles, provide a bronze frame.

### Egg crate return or exhaust air grilles

Type: Nominal 12 x 12 mm square, 12 mm deep egg crate type aluminium core fixed in an extruded aluminium frame with mitred corners. Fit core tightly into the frame to prevent rattling or movement.

Core: Provide a removable core.

In some cases this *Optional* text requirement is not necessary (e.g. when mounted on a duct or for very small grilles). Delete if not required.

Free area:  $\geq 90\%$  of nominal face area.

Air volume control: If the air grille is connected to a duct, provide an opposed blade damper behind the grille core, key operated without removing the core.

## 2.5 WEATHERPROOF LOUVRE GRILLES

Coordinate with 0451 Windows and glazed doors particularly clause **METAL LOUVRE GRILLES**.

Detail the type of louvre, e.g. nominal 50 mm or 100 mm blade size, spacing of blades, drainable, etc.

### Louvre grilles

Requirement: Provide AIROCLE louvres, as documented.

### Fixed louvres

Requirement: Provide AIROCLE Alician, Arabella, Barton, Chelsea, Corvette, Mercury, Newport, Orlando or Regent fixed louvres, as documented.

The Barton range is also available as adjustable louvres.

Construction: Provide louvre blades, mounted in a metal surround frame or subframe.

### Fixed acoustic louvres

Requirement: Provide AIROCLE Stratford fixed acoustic louvres, as documented.

Construction: Provide fixed louvre blades incorporating acoustic material, mounted in a metal surround frame or subframe.

Louvre depth: As documented.

AIROCLE Stratford louvres are available in 100, 200, 300, 400 and 600 mm deep configurations to suit project requirements. Consult AIROCLE for performance details.

If specifying AIROCLE acoustic louvres, delete respective text from the Attenuators and acoustic louvres worksection.

### Adjustable louvres

Requirement: Provide AIROCLE Barton, Bravo, Brighton or Deakin adjustable louvres, as documented.

The Barton ranges is also available as fixed louvres.

Construction: Provide louvre blades, clipped into blade holders pivoted to stiles or coupling mullions, linked together in banks, each bank operated by an operating handle incorporating a latching device or by a locking bar.

Framed adjustable louvres: Provide louvre blades, beaded into steel blade surround frames (sash), pivoted to pressed steel main frames, linked together in banks, where each bank is controlled by a proprietary sash operator.

### Construction

Requirement: Provide louvre blades, mounted in a metal surround frame or subframe, and able to withstand the permissible-stress-design wind pressure for that location, without failure or permanent distortion of members, and without blade flutter.

Provide wind action details to AS/NZS 1170.2 in the **Structural design actions schedule** in the 0171 General requirements worksection.

Configuration: Horizontal or vertical louvre blades, as documented.

Horizontal blades are usually more resistant to the entry of rain.

Louvre blades: Set at nominal 45° angle, incorporating at least one hooked edge to prevent ingress of water under all operating conditions. Brace and stiffen to prevent rattling or movement.

Check weather resistance with the manufacturer. Intake louvres in high wind areas may require special attention.

Frame: Flanged or channel to suit the installation profile.

Blade and frame materials: As documented.

Materials may be documented in the **Weatherproof louvre grilles schedule**. AIROCLE can supply louvres in a variety of materials including Zinalume®, Colorbond®, Galvabond®, aluminium, stainless steel, copper, zinc and polycarbonate.

Pressure drop:  $\leq 15$  Pa at the documented air flow.

This is a typical value which can be varied to suit the selected louvre and project. Show the louvre size on the drawings.

Pressure drop performance data can be provided by AIROCLE upon request.

Screens: Provide one of the following:

- Screens behind louvres to prevent the entry of vermin, birds, rodents and wind-blown leaves and papers.
- Integral perforations in the louvres to achieve the same effect.

AIROCLE Regent Series louvres incorporate perforations that serve as screens. AS/NZS 3666.1 clause 2.2.1 requires the prevention of entry of vermin, birds, rodents, and wind-blown matter such as leaves and paper.

Screen material: As documented.

Materials may be documented in the **Weatherproof louvre grilles schedule**. AIROCLE can supply screens in a variety of materials including galvanized, galvanized and powder coated, stainless steel, plastic, perforated metal and expanded metal.

Mesh: If documented, provide behind the louvres.

Mesh and materials for insects and bushfire screens may be documented in the **Weatherproof louvre grilles schedule**. AIROCLE can supply mesh in a variety of materials including aluminium, fibreglass, stainless steel and perforated metal.

### Expansion joints

Requirement: Provide for expansion and contraction in continuous sections (e.g. continuous louvres, interlocking mullions), at spacing not exceeding those recommended by the manufacturer, or 6 m, whichever is the lesser.

## 2.6 VENTILATORS

### General

Requirement: Provide AIROCLE ventilators, as documented.

Design for wind actions: Install to withstand the permissible-stress-design wind pressure.

Provide wind action details to AS/NZS 1170.2 in the **Structural design actions schedule** in the *0171 General requirements* worksection.

Isolation: Provide neoprene isolation between dissimilar metals.

## 2.7 RIDGE AND SLOPE VENTILATORS

### General

Requirement: Provide AIROCLE Model 2 SERIES or 1 SERIES continuous ridge ventilators, as documented.

Formally the Commander and Admiral Series, respectively. Provide details in the **Ventilator schedule**.

Model number: As documented.

Show AIROCLE model number on the drawings or in the **Ventilator schedule**. AIROCLE ridge and slope ventilators are available in a range of throat widths and damper operations, see **WEATHERPROOF LOUVRE AND VENTILATOR ACCESSORIES**.

### Construction

Material and finish: As documented.

Provide details in the **Ventilator schedule**.

Wind jump diaphragms: Provide to AIROCLE's recommendations.

## 2.8 HIGH CAPACITY CONTINUOUS RIDGE VENTILATORS

### General

Requirement: Provide AIROCLE Model 3 SERIES high capacity, continuous ridge ventilators, as documented.

Formally the Vanguard Series. Provide details in the **Ventilator schedule**.

Model number: As documented.

Show AIROCLE's model number on the drawings or in the **Ventilator schedule**. AIROCLE high capacity continuous ridge ventilators are available in a range of throat widths and damper operations, see **WEATHERPROOF LOUVRE AND VENTILATOR ACCESSORIES**.

### Construction

Material and finish: As documented.

Provide details in the **Ventilator schedule**.

Wind jump diaphragms: Provide to AIROCLE's recommendations.

## 2.9 HEAT EXHAUST VENTILATORS

### General

Requirement: Provide AIROCLE Model 4 SERIES heat exhaust ventilators, as documented.

Formally the Hotspur Series. Provide details in the **Ventilator schedule**.

Model number: As documented.

Show AIROCLE's model number on the drawings or in the **Ventilator schedule**. AIROCLE heat exhaust ventilators are available in a range of throat widths and damper operations, see **WEATHERPROOF LOUVRE AND VENTILATOR ACCESSORIES**.

### Construction

Material and finish: As documented.

Provide details in the **Ventilator schedule**.

## 2.10 TURBO VENTILATORS

### General

Requirement: Provide AIROCLE Model 5 SERIES wind driven turbo ventilators, as documented.

Formally the Gyro Series.

Fire tested ventilators: Provide AIROCLE Gyro LTV fire tested turbo ventilators, as documented and conforming to AS/NZS 1668.1 clause 8.8.1.

Model number: As documented.

Show AIROCLE's model number on the drawings. AIROCLE turbo are available in a range of throat sizes.

### Construction

Material and finish: As documented.

### Booster fan

Fan: If documented, provide an AIROCLE supplied plate type axial flow fan in the base of the turbo ventilator to prevent friction and enhance flow in the head of the ventilator.

Allow for fire rated fans where booster fans are to be included in the smoke control system.

Diameter: To AIROCLE recommendations.

Power supply:

- Less than 1 kW: Single phase.
- Over 1 kW: Three phase.

### Dampers

Requirement: [complete/delete]

AIROCLE roof ventilators do not include volume control dampers. Throat dampers for summer-winter operation can be provided. Where dampers are to be included in the fire/smoke control system, allow for dampers with spring return actuators.

## 2.11 ROUND STATIONARY VENTILATORS

See *Guidance* for **TURBO VENTILATORS, Booster fan** and **TURBO VENTILATORS, Dampers**.

### General

Requirement: Provide AIROCLE Model 6 SERIES round stationary ventilators, as documented.

Model number: As documented.

Formally the Zephyr Series.

Show AIROCLE's model number on the drawings. AIROCLE 6 Series ventilators are available in a range of throat sizes and damper operations, see **WEATHERPROOF LOUVRE AND VENTILATOR ACCESSORIES**.

**Construction**

Material and finish: As documented.

**2.12 ACOUSTIC VENTILATORS****General**

Requirement: Provide AIROCLE Phonic acoustic treatment, as documented.

Provide details in the **Ventilator schedule**.

Model number: As documented.

Show AIROCLE's model number on the drawings or in the **Ventilator schedule**. AIROCLE ventilators are available in a range of throat widths.

**Construction**

Material and finish: As documented.

Provide details in the **Ventilator schedule**.

**2.13 AUTOMATIC FIRE VENTILATORS****General**

Requirement: Provide AIROCLE Model 7 or 8 SERIES automatic fire ventilators, as documented.

Formally the Pyravent and Pymont Series, respectively. Provide details in the **Ventilator schedule**.

Model number: As documented.

Show AIROCLE's model number on the drawings or in the **Ventilator schedule**. AIROCLE fire ventilators are available in a range of throat widths and damper operations, see **WEATHERPROOF LOUVRE AND VENTILATOR ACCESSORIES**.

**Construction**

Material and finish: As documented.

Provide details in the **Ventilator schedule**.

**2.14 PRESSURE RELIEF VENTILATORS****General**

Requirement: Provide AIROCLE Model Y SERIES wall or roof pressure relief ventilators, as documented.

Formally the Armada Series. Provide details in the **Ventilator schedule**.

Operation: Normally closed under gravity but designed to open and relieve excess pressure when required, and close at a controlled speed to prevent back pressure.

AIROCLE can also supply Armada 360 blast relief vents to suit more extreme situation. Consult AIROCLE.

Model number: As documented.

Show AIROCLE's model number on the drawings. AIROCLE Pressure Relief ventilators are available in a range of standard sizes.

**Construction**

Material and finish: As documented.

Provide details in the **Ventilator schedule**.

**2.15 WEATHERPROOF LOUVRE AND VENTILATOR ACCESSORIES****Sensors**

Moisture sensors: Provide AIROCLE supplied moisture sensors.

Moisture sensors detect atomised moisture and can be used to open or close dampers weathertight to suit ambient conditions. Generally included in vents with manual override.

Wind sensors: Provide AIROCLE supplied wind sensors.

Wind sensors can be used to open or close dampers weathertight to suit ambient conditions, e.g. in bushfire prone areas.

Rain sensors: Provide AIROCLE supplied rain sensors.

Electronic rain sensor to detect moisture for closing louvres.

**Operable dampers**

Requirement: Provide operable dampers, as documented.

Type: Manual, electrically powered or pneumatically powered, as documented.

Electric operation: Provide AIROCLE supplied electric operators. Provide controls, as documented.

Pneumatic Operation: Provide AIROCLE supplied pneumatic operators. Provide controls, as documented.

### 3 EXECUTION

#### 3.1 INSTALLATION OF AIR GRILLES

##### Protection

Wrapping: Leave protective wrappings in place until final mounting.

##### Mounting

General: Provide a matching escutcheon to close gaps between the air grille and its surrounds. Provide air grilles with flanges to cover penetrations and irregularities in surrounds.

Finishing methods other than flanges may be available to suit architectural considerations.

Tiled ceilings: Locate air grilles to minimise cut tiles. Otherwise, locate the air grille symmetrically in the tile.

The choice of location is an aesthetic and cost issue. For example, using nominal 600 x 600 mm diffusers in 600 x 1200 mm ceiling tiles (i.e. half a tile) and blanking off the neck to produce the required size may be cheaper overall than using smaller diffusers and cutting and trimming the tiles to suit. The oversized diffusers may be judged aesthetically preferable in some situations and not in others.

Appearance: Install square.

##### Fixing

Accessibility: Provide fixings which allow removal of the air grille without damage to surrounds or air grille.

Gaskets: Provide foam type gaskets under air grille flanges or flanged supports.

##### Plenum and cushion head boxes

Alternatively, this subclause may be deleted, in which case AS 4254.2 Figure 3.4 will apply. Note that the detail in this Figure does not agree with AS 4254.1 clause 2.5.3(c) in that it does not show the required 100 mm straight length of flexible duct at the diffuser nor the minimum flexible duct bend radius.

General: Provide side entry plenum or cushion head boxes to air grilles connected to flexible ductwork.

Design: To achieve even air flow across the face of the air grille.

Material: Prime quality lockforming galvanized steel, to AS 1397 Grade G2 or G3 with Z275 coating.

Insulation: Conform to the *0744 Ductwork insulation* worksection.

Painting: Paint the interior of plenum box matt black, if visible through the air grille.

Flexible duct connections: To AS 4254.1. Provide round or oval spigots on plenum boxes.

Support of plenum boxes: For louvre ceiling and slot diffusers, support the plenum from one of the following:

- From above and independently of the ceiling.
- From the ceiling main Tees, provided the load is less than the ceiling system manufacturer's recommended maximum.

Coordinate with the ceiling system. Alternatively, in suitable ceilings, the plenum may be supported by spanning between ceiling channels.

#### 3.2 WEATHERPROOF LOUVRE ASSEMBLIES

Coordinate with the *0451 Windows and glazed doors* worksection.

##### Installation

Requirement: Conform to the installation requirements for metal window installations in the *Windows and glazed doors* worksection.

Fixing: Screw fix stiles and mullions to the building structure.

Seals: Provide weather strips to heads and sills.

### Framed adjustable louvres

Installation: Screw fix the main frame to the building structure with monel, stainless steel screws or masonry anchors, using the type recommended by AIROCLE.

### 3.3 WARRANTIES

Refer to the **WARRANTIES** in the 0171 General requirements worksection.

Requirement: Provide the manufacturer's warranty as follows:

- Form: Against failure of finishes, materials and operation under normal environment and use conditions.
- In conformance with the manufacturer's data.

## 4 SELECTIONS

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

### 4.1 WEATHERPROOF LOUVRE GRILLES

If the louvres are connected to the air conditioning or ventilation system, obtain the value required for the maximum pressure drop at 2.0 m/s face velocity from the consultant and include as a performance requirement.

#### Weatherproof louvre grilles schedule

Property	A	B	C
AIROCLE Series			
Type			
Operation			
Blade pitch			
Louvre depth			
Frame material			
Blade material			
Finish			
Screen material			
Mesh material			
Accessories			

A, B, C: These designate each instance or type or location of the item scheduled. Repeat the schedule for each type. Edit to align with the project's codes or tags.

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

AIROCLE Series: e.g. Alician, Arabella, Barton, Bravo, Brighton, Chelsea, Corvette, Deakin, Mercury, Newport, Orlando, Regent, Stratford.

Type: e.g. horizontal, vertical, continuous horizontal.

Operation: e.g. fixed, operable.

Blade pitch: To suit AIROCLE's louvre Series selected.

Louvre depth: To suit AIROCLE's louvre Series selected.

Frame material: e.g. Zinalume®, Colorbond®, Galvabond®, aluminium, stainless steel, copper, zinc and polycarbonate.

Blade material: e.g. Zinalume®, Colorbond®, Galvabond®, aluminium, stainless steel, copper, zinc and polycarbonate.

Finish: e.g. powder coat, anodised, paint, clear finish, no applied finish. Coordinate paint finishes using paint type designation from the 0671 *Painting* worksection.

Bird screens: e.g. integral (AIROCLE Regent Series), galvanized, galvanized and powder coated, stainless steel, plastic, perforated metal and expanded metal. AS/NZS 3666.1. clause 2.2.1 requires the provision of screens for air intake louvres to prevent ingress of contaminants, vermin, birds, rodents and windblown material.

Mesh material: For insect or bushfire screens, e.g. aluminium, fibreglass, stainless steel and perforated metal or Not required. BCA 3.7.4 and AS 3959 calls for aluminium, corrosion resistant steel or bronze mesh with a maximum aperture size of 1.8 mm to areas of medium bush fire attack category and excludes aluminium mesh in areas of high category. Fibreglass mesh is excluded in all bush fire prone areas.

## Accessories:

- Sensors: e.g. moisture, wind or rain.
- Operable dampers: Manually, electrically or pneumatically operated.

**4.2 VENTILATORS**

If the louvres are connected to the air conditioning or ventilation system, obtain the value required for the maximum pressure drop at 2.0 m/s face velocity from the consultant and include as a performance requirement.

**Ventilator schedule**

Property	A	B	C
AIROCLE Series			
Type			
Material			
Finish			
Screen material			
Mesh material			
Damper operation			
Ridgelite			
Cyclone region			
Accessories			
Operation			

A, B, C: These designate each instance or type or location of the item scheduled. Repeat the schedule for each type. Edit to align with the project's codes or tags.

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

AIROCLE 1 to 8, Y and Z Series: e.g. Commander, Admiral, Vanguard, Hotspur, Gyro, Zephyr, Phonic, Pyravent, Pymont, Armada.

Material: To suit AIROCLE's ventilator Series, e.g. Zinalume®, Colorbond®, Galvabond®, aluminium, stainless steel, copper, zinc and polycarbonate.

Finish: To suit AIROCLE's ventilator Series, e.g. powder coat, anodised, paint, clear finish, no applied finish. Coordinate paint finishes using paint type designation from the *0671 Painting* worksection.

Bird screens: e.g. galvanized, galvanized and powder coated, stainless steel, plastic, perforated metal and expanded metal. AS/NZS 3666.1 clause 2.2.1 requires the provision of screens for air intake louvres to prevent ingress of contaminants, vermin, birds, rodents and windblown material.

Mesh material: For insect or bushfire screens, e.g. aluminium, fibreglass, stainless steel and perforated metal or Not required. BCA 3.7.4 and AS 3959 calls for aluminium, corrosion resistant steel or bronze mesh with a maximum aperture size of 1.8 mm to areas of medium bush fire attack category and excludes aluminium mesh in areas of high category. Fibreglass mesh is excluded in all bush fire prone areas.

Dampers: To suit AIROCLE's ventilator Series.

Ridgelite: e.g. Required or Not required.

Cyclone region: Region, A, B, C or D as defined in AS/NZS 1170.2.

Accessories: e.g. moisture, wind or rain sensor.

Operation: e.g. fixed, electric, pneumatic.

**REFERENCED DOCUMENTS**

The following documents are incorporated into this worksection by reference:

AS 1397	2011	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1668		The use of ventilation and air conditioning in buildings
AS/NZS 1668.1	2015	Fire and smoke control in multi-compartment buildings
AS 1668.2	2012	Mechanical ventilation in buildings
AS 1668.3	2001	Smoke control systems for large single compartments or smoke reservoirs
AS 2427	2004	Smoke/heat release vents
AS 2428		Methods of testing smoke/heat release vents
AS 2428.1	2004	Determination of resistance to leakage during rain
AS 2428.2	2004	Determination of ability to operate under wind loading
AS 2428.3	2004	Determination of operating characteristics

AS 2428.4	2004	Method 4: Determination of the effect of flame contact
AS 2428.5	2004	Determination of discharge coefficient and effective aerodynamic area
AS 2428.6	2004	Determination of ability to operate under snow loading
AS 2665	2001	Smoke/heat venting systems- Design, installation and commissioning
AS 2946	1991	Suspended ceilings, recessed luminaries and air diffusers - Interface requirements for physical compatibility
AS 4254		Ductwork for air-handling systems in buildings
AS 4254.1	2012	Flexible duct
AS 4254.2	2012	Rigid duct
AS/NZS 4740	2000	Natural ventilators – Classification and performance
ANSI/ASHRAE 70	2011	Method of testing the performance of air outlets and inlets
ISO 5135	1997	Acoustics - Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation room
<b>The following documents are mentioned only in the <i>Guidance</i> text:</b>		
AS 1170		Structural design actions
AS/NZS 1170.2	2011	Wind actions
AS/NZS 3666		Air-handling and water systems of buildings - Microbial control
AS/NZS 3666.1	2011	Design, installation and commissioning
AS 3959	2009	Construction of buildings in bushfire prone areas
SAA HB 50	2004	Glossary of building terms
AIRAH DA02	1995	Noise control
AIRAH DA03	1987	Duct design
BCA 3.7.4	2016	Acceptable construction – Fire safety – Bushfire areas
NATSPEC GEN 006	2007	Product specifying and substitution
NATSPEC TR 01	2015	Specifying ESD
NATSPEC TR 03	2015	Specifying Design and Construct for Mechanical services