0731P FANTECH FANS

Branded worksection

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Worksection abstract

This branded worksection *Template* is applicable to FANTECH centrifugal, axial flow, mixed flow and propeller fans, roof mounted fans and window/wall mounted fans of the type commonly used in air conditioning and ventilation systems. FANTECH products applicable to this worksection include wall, window and ceiling fans, axial and centrifugal duct mounted fans, roof mounted fans, DWDI and SWSI centrifugal fans and associated ancillary equipment.

Background

For general material dealing with the selection and application of fans refer to the ASHRAE Systems *HVAC Systems and Equipment* (in particular the Fans chapter) and AIRAH DA13.

***Guidance* text**

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

***Optional* style text**

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

Related material located elsewhere in NATSPEC

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

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

- *0711 Chillers – combined* includes fans in air cooled chillers.
- *0721 Packaged air conditioning* includes fans in one-piece and split packaged air conditioning plant.
- *0722 Room air conditioners*.
- *0723 Evaporative air coolers*.
- *0745p FANTECH attenuators and acoustic louvres*
- .
- *0747 Variable air volume terminals* includes fans in VAV terminals.
- *0931 Power generation – engine driven* includes fans that are part of generating sets.

Documenting this and related work

You may document this and related work as follows:

- Fire-resistance rating of fans should be shown on the drawings. Where a duct system must be fire-resistance rated, that FRL must also apply to fans unless they have been tested and certified to be fire-resisting. Few fans will meet this testing requirement and consequently fans must be provided with fire-resisting coatings or enclosures. See **FIRE PROTECTION OF DUCTWORK** in *0741 Ductwork*. Fire-resisting material should not impede or prevent inspection and maintenance of the fan.
- Noise and vibration isolation of fans. Features such as flexible connections should be shown on the drawings as should suspension points if used.

When detailing the fan installation, check for the following:

- Access space to remove whole fan, fan motor, impeller and fan shaft. Removal of these should not require demolition of walls or dismantling adjacent ducts, pipes or equipment. Similarly, fire-resisting materials must not impede access to the fans for inspection or removal.
- For roof mounted fans detail the mounting arrangement, flashing and coordinate with roofing details.
- Make sure heavy items located at high level such as fan motors can be safely removed.
- Access panels and sight holes are easy to locate and access.
- Show drains from fans likely to collect moisture.
- Provide electrical isolation for each fan (a local isolator adjacent to the fan, may also be required).
- Access conforms to Work Health and Safety requirements.

- Service personnel are protected from injury by moving parts. For example where the interior of an air handling unit is accessible and the fan speed may require measurement with a tachometer, is the fan inlet and drive adequately guarded?
- Lubrication points, if fitted, are easily located and accessible.
- The interior of the fan can be accessed for inspection and cleaning. For example, if a plastic bag became tangled on the impeller how easy would it be to locate and remove it?
- For BCA Class 2 to 9 buildings exhaust fans must be fitted with a self closing damper or similar. See BCA J3.5 for conditions.
- 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.

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

Specifying ESD

The following may be specified by retaining default text:

- Durable components, particularly for corrosion resistance.
- Provisions to reduce transmitted noise and vibration.

The following may be specified using included options:

- Higher efficiency fans; this includes provisions to reduce fan energy consumption for all fans.
- Low noise fans.

Refer to the NATSPEC TECHreport TR 01 on specifying ESD.

1 GENERAL

FANTECH has been at the forefront of fan and acoustics technology by developing and implementing new and innovative products of virtually every air movement and ventilation need, as well as noise attenuation. With ISO 9001:2008 accreditation, FANTECH maintains high standards of manufacturing and a continuous improvement culture. With modern manufacturing plants in Melbourne and Sydney and warehouses throughout Australia and New Zealand, FANTECH provides unmatched delivery performance and customer service.

1.1 RESPONSIBILITIES

General

Requirement: Provide FANTECH fans, as documented.

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

Bushfire prone areas

Bushfire Attack Level (BAL) to AS 3959: [complete/delete]

Nominate the BAL for the site if it is in a bushfire prone area. AS 3959 applies to any ventilators or appliances permitting potential paths of ember ingress. Refer to BCA 3.7.4 and BCA G5.2 for requirements. State variations apply. Check products selected for compliance, particularly spark arrestor mesh.

See GL Gamma, Ezifit Thru Roof, Alpha, and New Generation Series Bushfire Code Compliant fans.

1.2 DESIGN

Fan energy considerations

While other pieces of equipment such as chillers may have larger motors, fans are the principal users of energy in most air conditioning systems. For this reason engineers who seek to provide their clients with energy efficient buildings must give high priority to reducing fan energy consumption. The principal means for achieving this are:

- Optimising fan characteristics and selection.
- Efficient control to match fan performance to loads. An example of this is reducing air flow by means of variable speed drives rather than dampers.
- Reducing system pressure losses and efficiently converting velocity pressure to static pressure.
- Optimising fan operating hours. A fan will never use less energy than when it is off.

Designers wishing to exceed NCC energy efficiency could consider applying the concept of Specific Fan Power (SFP) which is rated fan motor power (watts) divided by supply air quantity (L/s) and is easily calculated from scheduled values. The UK Chartered Institute of Building Services Engineers CIBSE Guide F, *Energy Efficiency in Buildings* requires that ‘specific fan power should be 2 W/(L/s) or less to achieve good practice in offices; very energy efficient systems can sometimes be around 1 W/(L/s)’.

The data in **SELECTIONS** should reflect the NCC requirements. Note in particular that inefficient fans, and over sizing of fans and fan motors are likely to lead to contravening NCC but are manageable with good design practices. The following provide for increasing fan capacity by increasing fan speed, pitch, etc. Check that the resulting fan motor does not exceed the power limit in BCA Spec J5.2a Table 3a.

General

The *Optional* text in this clause may be used when the contractor is to design and select the fans. Use the *0701 Mechanical systems* worksection to describe design parameters for mechanical systems, as a whole, including the basis for calculating the required fan performance.

Requirement: Design fans, as documented.

Centrifugal fans

Requirement: Select fans so the air flow can be increased ≥ 10% above the rate documented as follows:

- Against the corresponding increased system resistance as installed.
- Without unstable operation.
- Without motor change.
- By speed change alone.

This provides some scope for adjustment during commissioning.

Axial flow fans

Requirement: Select fans so the air flow can be increased not less than 10% above the rate documented in **Fan schedules** as follows:

- Against the corresponding increased system resistance as installed.
- Without unstable operation.
- Without motor change.
- By pitch angle change alone.

This provides some scope for adjustment during commissioning.

Variable volume systems

Requirement: Provide fans for variable volume systems selected for:

- Maximum fan efficiency at 70% to 80% of design air flow rate.
- Operation from 30% to 110% of design air flow without going into a surge condition.

As VAV systems operate most of the time at less than 100% air flow, selection for maximum efficiency at 70% to 80% of design air flow rate yields high efficiency over more of their operating range. It also yields a slightly smaller fan than would be the case for constant volume systems where selection should be for maximum efficiency at the design point. Selecting a smaller fan means that it will turn down to a smaller percentage of maximum air flow before entering the fan surge region. Check fan curves. The greater the turn down the greater the risk of stall.

See ASHRAE Applications Chapter 47 (*Design and Application of Controls*) for discussion of selection of fans for VAV systems.

Other factors such as room air distribution may dictate minimum value higher than 30% but this value, like the 110% maximum, provides a safety margin.

Avoid specifying outlet velocities on VAV centrifugal fans as this may lead to oversizing of the fan and be incompatible with stable operation to low air flow.

Fans with variable speed drives

Requirement: Conform to the following:

- All fans: Provide fans selected to operate at no more than 50 Hz under all conditions.
- Fans with belt drives: Adjust fan speed during commissioning for motor to operate at no more than 50 Hz under all conditions.

This is to prevent fans being selected with motors run over rated speed.

Fans with multi-speed motors

Requirement: Conform to the following:

- Two speed fans: Provide fans selected to perform duties documented in the **Fan schedules**.

This is intended for situations where two speed, three phase fan motors are used to provide two duties. For example when lower noise levels are required at night. Include the two duties in the respective **Fan schedules**.

- Fans with 3 or more speeds and single phase fans with adjustable speed control: Provide fans selected to achieve the duty documented at a speed not more than 80% of highest speed.

This is intended to apply to small fans such as those in packaged units. It provides some scope for adjustment during commissioning and tends to reduce noise levels.

Fan types

Requirement: Select fan types from the following:

- [complete/delete]

This may be used to specify permissible fans included in this worksection types, e.g:

- Toilet exhaust: Select from **CENTRIFUGAL FANS – IN-LINE**, **ROOF MOUNTED FANS**.

Fan selection

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

General: Select fans for the performance calculated, in conformance with the *0701 Mechanical systems* worksection, for the spaces served under the documented conditions.

Fan 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.

Documentation

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

Drawings: Show the following on the drawings:

- Fire-resistance of fans and arrangements for maintenance access to fans through fire-resisting material.
- Noise of vibration isolation of fans.
- [complete/delete]

1.3 COMPANY CONTACTS

FANTECH technical contacts

Website: www.fantech.com.au.

1.4 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.

- *0784 Motors and starters.*

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.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.fantech.com.au

Catalogue: www.fantech.com.au/Content.aspx?ContentID=D3

Product selection: www.fantech.com.au/SelectFan.aspx

Copies of the catalogue and CD Selector software may be requested from Fantech or downloaded from the Fantech website.

1.6 SUBMISSIONS

Products and materials

Although not cited in this worksection, there are other fan testing standards such as the combined US Air Movement and Control Association (AMCA), ASHRAE, ANSI standards. If fans tested to such standards are selected or offered by contractors ensure that the test conditions match those used to determine scheduled performance. The type of duct connections at the fan is particularly important and appropriate corrections obtained from the standard or manufacturer's data should be applied.

Type tests of fans are performed at standard air conditions (1.2 kg/m³ density). Allow for performance correction figures for fans operating at different air temperatures or elevations. The *0171 General requirements* worksection defines air quantities as being at standard air density of 1.2 kg/m³. It is preferable to give all values in the specification and on the drawings at standard air conditions and to only correct site measured values for altitude and temperature.

It is also important to apply corrections for inlet and outlet duct conditions in accordance with the test standard used (ISO 5801 or AMCA 210).

The availability of laboratory facilities for testing fan performance and noise is limited in Australia. Manufacturers should be asked about the basis of the performance details offered. In the case of axial fans the tests should be on the blades, hub, motor and casing combination being offered and not blades alone. Similarly centrifugal fans should have been tested with the fan and scroll offered. Tests carried out to ISO 5801 at third party (e.g. NATA) accredited facilities are to be preferred. Overseas authorities are acceptable provided they meet the NCC requirements.

Type tests: Submit evidence of type tests as follows:

- Fan performance: To ISO 5801.

Fans are tested in FANTECH owned facilities. EN ISO 5801, ISO 5801 and AS ISO 5801 are equivalent standards. Previously, ISO 5801:2007 was endorsed as BS 848-1:2007.

- Fan sound power levels: To ISO 3744.

Manufacturers may have carried out tests overseas to these standards. Vary as required. As with fan performance, tests should be to the applicable standard on the fan combination offered and carried out in a third party accredited facility.

- Smoke spill fans: To AS 4429.

Conforming fans are available, both made in Australia and sourced overseas. Refer to BCA Spec E2.2b and AS/NZS 1668.1.

Before specifying check the availability of proposed fans tested to AS 4429. For example centrifugal fans have been manufactured and installed for many years in severe industrial applications similar to the test conditions in the standard (for example as boiler induced draft fans). However, there may not have been tested to AS 4429 in the size required due to the difficulties in furnace testing large fans or for other reasons. AS 4429 requires fan aerodynamic performance to be tested to ISO 5801. Insert required rating to AS 4429. Ratings 3 and 4 are listed in AS 4429 but are not called for in AS/NZS 1668.1. They are included within the standard to accommodate ratings that may be specified for some overseas markets. AS 4429 defines the following test time and temperature rating:

Rating to AS 4429	**Minimum operating period (minutes)**	**Temperature,°C (Tolerance of + 25, - 0)**
1	120	200 Sprinklered buildings.See AS/NZS 1668.1 clause 4.8.1)
2	30	300 (Non-sprinklered buildings. See AS/NZS 1668.1 clause 4.8.1)
3	90	400 (Not in AS/NZS 1668.1)
4	60	600 (Not in AS/NZS 1668.1)

Special rating Minimum operating period and temperature as specified by supplier.

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 **SELECTIONS** or **PRODUCTS**, if there are no **SELECTIONS**.

2 PRODUCTS

2.1 GENERAL

Labels

Identification: Show the following:

- Manufacturer's name.

- Model.
- Serial number.
- Size.
- Direction of rotation, marked on casing.

2.2 MATERIALS

Galvanized steel components

Hot-dip galvanized components: Conform to AS/NZS 4680.

Coating thickness and mass: To AS/NZS 4680 Table 1.

AS/NZS 4680 Table 1 gives minimum coating masses depending on the base metal thickness. These vary from 320 g/m^2 for base metal no more than 1.5 mm thick to 600 g/m^2 for base metal at least 6 mm thick. Consider increasing the coating mass in aggressive environments.

2.3 MOTORS

General

Requirement: Provide either FANTECH EC motors or motors to the *0784 Motors and starters* worksection, as documented.

EC motors offer superior controllability and higher efficiency at below full-speed settings.

EC motors: To *0784 Motors and starters*, except as follows:

- Type: EC-DC external rotor motor.
- Power supply: Single or three phase to *0784 Motors and starters*.

The *0784 Motors and starters* worksection requires three phase over 0.75 kW.

- Insulation: Class F with a 60°C winding temperature rise.
- Ingress protection:
  - . External rotor motors: IP44.
  - . Induction motors: IP54.
- Motor protection: Integral current overload, over-temperature, reverse polarity and locked rotor protection.

External electrical protection such as thermal overloads are not required for EC motors.

- Bearings: Sealed for life ball bearings.

Control: Control input: 0-10 volt to **EC motor control**, as documented.

Include the type of control in the relevant fan schedule of **SELECTIONS**.

EC motor control

Requirement: Provide FANTECH Ecovent Intelligent Controllers and controls as documented.

Describe the required control strategies in the functional descriptions in *0771 Automatic controls* or *0772 Automatic controls - minor.*

Fantech can also supply sensors such as NOx, CO and CO_2 to suit Ecovent controllers.

Type: Digital or analog as documented.

Soft start: Required.

Ingress protection: IP40.

BMS connection: RS485, BACnet IP, BACnet ms/tp and MODbus.

2.4 CENTRIFUGAL FANS – GENERAL PURPOSE

This clause covers fans with non-overloading backward inclined impellers. See **Centrifugal fans – sheet metal** below for forward curved fans.

Casings

Specify split type casings when the site requires it for access, installation or disassembly for service. Very large fans may be too high to transport. Check with manufacturer on size limitations.

Fans operating at elevated temperatures may require special construction methods or special materials.

Construction: Welded steel scroll and side plates, reinforced to prevent flexing and drumming.

Often welded on inside only. Welding from outside produces a neater finish and may be the only practical method for smaller fans.

Split casing: If the fan impeller is more than 1200 mm diameter, provide a horizontally split casing.

Inlet bells: Removable, shaped for aerodynamically efficient air entry and close approach to impeller.

Access panels: Provide inspection/access panels to casings of fans with impellers ≥ 650 mm diameter. Seal panels airtight with neoprene gaskets.

Outlets: Provide flanged or spigoted outlets to suit connected ductwork or equipment.

Specify matching flanges if required. In most cases fans will be installed with flexible connections immediately adjacent, in which case spigot connections may be adequate. Flanged outlets are more costly than spigots.

Guards: For fans not connected to ductwork provide removable inlet guards, discharge guards or both.

Drain point: Where moisture is likely to enter or condense inside a fan provide a 25 mm drain point welded into base of scroll and stopped with non-ferrous screwed plug.

If required include drain point in the **Centrifugal fan schedule**.

Minimum casings thickness table

Impeller diameter (mm)	Side plates (mm)	Scroll (mm)
≤ 450	2	1.6
> 450, ≤ 800	2.5	2
> 800, ≤ 1000	3	2.5
> 1000, ≤ 1500	3	3
> 1500	5	3

Bases

Separate bases bolted to fan casing are commonly used on large fans for industrial applications. Integral bases with or without outrigger sections are common for smaller fans for air conditioning applications.

Single width fans are acceptable with the motor mounted on the sloping side of the bearing pedestal.

General: Form from fully welded steel sections integral with or bolted to casings.

Mounting brackets: Provide at least 4 height saving mounting brackets.

May be non-standard – check with manufacturer.

Impellers

Backward inclined aerofoil and single thickness impellers generally produce their peak static pressure in the range of 50 to 70% of free volume. This is also the range of maximum efficiency and minimum sound level. The kW consumption reaches a maximum near the peak efficiency area and decreases towards the free delivery point on the fan performance curve, thus giving non-overloading characteristics.

The efficiency of aerofoil backward inclined fans is usually slightly higher than for fans with single thickness backward inclined blades but this may not always be the case.

Blade type: Backward inclined aerofoil or laminar single thickness type, flat or curved section, with non-overloading power characteristics, as documented in **SELECTIONS, FANS**.

Characteristics: Provide the following:

- Statically and dynamically balanced.
- Keyed to drive shafts by means of taper-lock fixing devices or taper keys.

Keying to drive shafts may be via through-bore hubs for larger fans.

- For overhung driven fans more than 1000 mm diameter, retained onto drive shafts by positive devices such as washers and set screws into tapped holes in shaft ends.
- Countersink in shaft for tachometer.

If appropriate include special coatings e.g. epoxy. Hot dip galvanized then epoxy painted is specified in **Kitchen exhaust fans.**

Bearings

For single width fans with impellers less than 1250 mm diameter and double width fans with impellers less than 950 mm diameter: Provide pillow-block mounted, self aligning ball bearings, sealed for life, with a minimum rating fatigue life of 40 000 hours.

For single width fans with impellers at least 1250 mm diameter and double width fans with impellers at least 950 mm diameter: Provide plummer-block mounted roller bearings with seals and grease relief, with a minimum rating fatigue life of 20 000 hours. Extend grease nipples for ready access.

Vary the default life if required e.g. if other bearing types are used, such as grease valve bearings. 50 000 hours and 80 000 hours (for larger fans) may be appropriate minimums in this case. Consult with manufacturers.

In any case these bearings are provided by the fan manufacturer, not the motor manufacturer, and should be documented. Bearing specification is a complex business, varying with clearance, accuracy, load (including direction), speed, materials of shafts and housings, ambient temperature, lubrication, workings hours, etc.

Motors

General: Provide electric motors that are compatible with fan requirements, providing efficient non-overloading fan units.

Power rating: The greater of the following:

- The fan limit load power at speed required for the air flow and resistance required in **DESIGN**.
- The power required by the fan when the air flow is increased by 5% above the design air flow rate required in **DESIGN**, against the corresponding increased system resistance.

Motor protection: Minimum IP54.

IP54 (formerly Totally Enclosed Fan Cooled or TEFC) is standard. IP54 provides complete protection against ingress of dust and water splashed against enclosure from any direction.

Belt drives

Drive sizing: Size for at least 125% of motor power and capable of transmitting the full starting torque without slip.

Belts: Wedge belts to AS 2784, consisting of matched sets of at least 2 belts. Mark belt size in a prominent location on the fan casing.

Belt tensioning: Provide adjustment of belt drive tension by either movement of motor on slide rails or by pivoting support. Do not use the weight of motors to provide belt tension. Restrain motors with locknuts on bolts, clamping motors in place.

Drive shafts

Characteristics: Provide the following:

- Designed so that the first critical resonant speed of the shaft is at least 130% of design maximum operating speed.
- Double width fans with shaft diameter more than 60 mm: Filleted stepped type to permit easy impeller removal.
- Keyed with taper-lock fixing devices for fixing of pulleys.
- Countersunk ends for tachometer application or, where the end of the shaft is not accessible, make provision for use of stroboscope or optical tachometer.
- Material: Mild steel or high tensile steel, as appropriate for the duty. Provide corrosion protection by solvent removable petroleum based protective coating formulated for machinery shafts and parts.

Drive guards

Requirement: Provide rigid, removable belt guards on all fans where drive is accessible while motor is running. Provide the following:

- Tachometer opening.
- Perforated sides on double width, double inlet fans.
- Weatherproof construction, ventilated and drained where exposed to weather.

Material: Open mesh or perforated metallic-coated sheet steel.

Drive guards should be perforated for double width fans to reduce disturbance to air flow. Guards should be sized to allow for full belt adjustment and tachometer hole located so the shaft can be accessed with the guard in place.

Finishes

Primer: Prime all surfaces with zinc phosphate primer to AS/NZS 3750.20 and apply manufacturer's standard paint system to external surfaces.

Consult manufacturer for critical locations such as corrosive fumes and locations near the ocean exposed to salt mist. Hot-dip galvanizing, metal flame spray or epoxy coatings may be available.

High temperature exhaust fans

Requirement: Provide heat slingers and guards on shafts between the in-board bearings and fan casings. Locate in-board bearings clear of fire-resisting insulation applied to fan casings.

Kitchen exhaust fans

Additional requirements: Provide the following:

- Access for cleaning: Provide a large gasketed access panel.
- Drain: Provide trapped drain from lowest point in casing. Provide unions at connection and arrange drain for easy cleaning. Pipe drain to waste.
- Finish: Internally zinc sprayed.
- Fire-resistance rating: If fan is installed in a fire-resisting duct system and not installed in a separate fire-resisting room or enclosure, provide fire-resistance rating to the same standard as duct. Make sure the fire-resisting provisions permit easy access for inspection, cleaning and maintenance.

Unless the kitchen exhaust fan has been tested for the required fire-resistance rating (which is unlikely) it will probably need to be located within a fire-resisting room. See AS/NZS 1668.1 clause 6.2.8. Enclosing a fan in fire-resisting coating instead of a room may prevent access required by other standards for inspection, cleaning and maintenance.

2.5 FANTECH CENTRIFUGAL FANS – SHEET METAL

This clause is primarily intended to cover smaller size fans of the type used in packaged air conditioning units. The *0721 Packaged air conditioning* worksection also specifies such fans as part of packaged air conditioning units and split systems. This clause can be deleted if the only sheet metal centrifugal fans are in such packaged equipment.

Selection

Proprietary item: Provide FANTECH FlexLine, Sigma or Fan and blower light weight range, as documented.

Features:

- Drive: Provide FlexLine fans with either speed controllable direct driven external rotor motors or direct or belt driven arrangements as documented. Provide standard TEFC motors.
- Construction: Galvanised steel housing with spun aluminium inlet cone, modern flanged connections and backward-curved centrifugal impellers.

Standard

General: To **CENTRIFUGAL FANS – GENERAL PURPOSE** and **MOTORS** except as follows:

- Casing construction: Metallic-coated steel sheet, riveted or spot welded with joints sealed.
  - . Scroll: 1.2 mm minimum thickness.
  - . Side plates: 2 mm minimum thickness.
- Bases:
  - . Formed from pressed metallic-coated steel sheets, bolted to casings.
  - . Provide at least 4 brackets for mounting.
- Impellers:
  - . Type: Backward or forward curved section, laminar or aerofoil, as documented.
  - . Construction: Extruded aluminium or metallic-coated steel blades secured between reinforced galvanized steel plates.

Backward or forward inclined are alternatives. Include required type in the **Fan schedule.**

- Bearings:
  - . Self-aligning sealed for life ball or roller type.
  - . Finish: Brush and prime spot welds with zinc-rich organic primer to AS/NZS 3750.9.
- Motors:
  - . Minimum degree of protection: IP51.

Standard

General: To **CENTRIFUGAL FANS – GENERAL PURPOSE** except as varied in **FANTECH CENTRIFUGAL FANS - SHEET METAL**, **Casing construction** and **Motors**.

Casing construction

General: Metallic-coated steel sheet, riveted or spot welded with joints sealed.

- Scroll: 1.2 mm minimum thickness.

- Side plates: 2 mm minimum thickness.

Bases: Formed from pressed metallic-coated steel sheets, bolted to casings. Provide at least 4 brackets for mounting.

Impellers:

- Type: Backward or forward curved section, laminar or aerofoil, as documented.

Backward or forward inclined are alternatives. Include required type in the **Fan schedule.**

- Construction: Extruded aluminium or metallic-coated steel blades secured between reinforced galvanized steel plates.

Bearings: Self-aligning sealed for life ball or roller type.

Finish: Brush and prime spot welds with zinc-rich organic primer to AS/NZS 3750.9.

Motors

Minimum degree of protection: IP51.

2.6 FANTECH CENTRIFUGAL AND MIXED FLOW FANS - IN-LINE

Selection

Proprietary item: Provide FANTECH Mixvent, ProVent, JetStream, VentMajor, PowerLine or Multiflow series fans as documented.

Features: Provide inline duct mounted fans with manual reset current overload protection to AS/NZS 60335.2.80.

General

Requirement: Provide fans with non-overloading power characteristics.

Casings

Access panels are normally not viable on this type of fan. Arrange fan installation so it can either be removed from the duct or inspected and serviced through an adjacent duct access panel.

Casing types: Rectangular or circular with spigot or flanges for duct mounting, with construction as follows:

- Steel: Metallic-coated steel sheet, spot welded. Brush and prime spot welds with zinc-rich organic primer to AS/NZS 3750.9.
- Glass reinforced plastic (GRP) or plastic: Moulded GRP or impact resistant plastic with integral support foot.

Impellers

Requirement: Backward inclined or forward curved style, as documented.

Backward inclined or curved are alternatives. Include required type in the **Fan schedule**.

Construction: Metallic-coated steel, extruded aluminium or polypropylene.

Balance: Balance impellers statically and dynamically.

Motors: Direct mounted to impellers with minimum thermal class 155 (F) insulation to IEC 60085.

Bearings: Sealed for life bearings with a minimum rating fatigue life of 40 000 hours at 40^{o}C ambient.

Electrical connection: Terminal box external to fan casing and wired to fan motor.

Access to impellers up to 350 mm diameter: Provide fan manufacturer's standard fast clamps both sides of the fan to permit removal of the impeller-motor assembly or fan as a whole.

If in-line centrifugal fans are used for kitchen exhaust include additional requirements here based on the kitchen exhaust fan requirements in **CENTRIFUGAL FANS – GENERAL PURPOSE**.

2.7 FANTECH AXIAL FLOW FANS

Selection

Proprietary item: Provide FANTECH Adjustable Pitch Axial Flow Fans.

Features: Provide fans with adjustable pitch impellers with means for easy removal of the impeller from the motor shaft such that adjustment can be achieved without damaging the impeller or needing to use excessive shock force, which could damage the bearings. Do not provide straight through bores. Deemed to comply:

- Tech lock as supplied by FANTECH.
- Taper lock as supplied by Fenner Industries.

Manufacture:

- Before despatch from the factory, test run each fan and record the current draw.
- Factory test fans for smooth, vibration free operation and despatch only if satisfactory. In the event of excessive vibration change or balance the impeller until smooth running is achieved.
- Set pitch angels on a precision pitch setting device, custom designed and built to suit the impeller range.
- If requested, provide test sheets signed by the assembler or quality assurance personnel, showing the recorded current draw.

General

Requirement: Non-overloading power characteristics.

Casing

Type: Tubular, flanged at each end, constructed from mild steel, fully welded, hot-dip galvanized after fabrication.

Standard finish is hot-dip galvanized or pre-galvanized steel sheet, which should be suitable for most situations. Consult the manufacturer for critical locations such as corrosive fumes and locations near the ocean exposed to salt mist. Additional finishes such as epoxy coatings may be available.

Access:

- < 1000 mm diameter: Sight hole in casing plugged with an airtight removable closure.
- ≥ 1000 mm diameter: Provide access panels, securely bolted to casings and sealed with neoprene gaskets, for maintenance.

Access panels are difficult to provide for small fans (e.g. 300 mm diameter). They are normally only practical on large fans (say over 1000 mm diameter). Alternatively show access requirements on the drawings. An access panel in the adjacent duct on the impeller side of the fan may be a suitable solution.

Mounting feet: Provide mounting feet, either bolt to the flanges or welded to fan housing.

Impellers

Requirement: Aerofoil section blades constructed from cast aluminium alloy or glass reinforced plastic.

Material: As documented in the **Axial flow fan schedule**.

Pitch angle: Manually adjustable.

Balancing: Balance impellers, statically and/or dynamically.

Both static and/or dynamic balancing may be required for aerofoil impellers depending on size and maximum fan speed.

Unducted inlets/outlets

Inlet cones: Provide aerodynamically shaped cones to inlets of fans.

Outlets: Provide manufacturer's standard 15º conical diffuser to convert velocity head to static pressure.

Guards: Provide galvanized steel or bronze mesh guards.

Motors

General: Direct mount to impellers with minimum thermal Class 155 (F) insulation to IEC 60085.

For smoke spill fans, Class 180 (or higher) insulation is required.

Bearings: Provide sealed for life bearings or grease packed bearings fitted with lubrication lines extending through the casing. Provide bearings with a minimum rating fatigue life of 17,500 hours, suitable for horizontal or vertical mounting as appropriate.

Motors with Class F or Class H insulation must use high temperature grease. See AS/NZS 1668.1 and AS 4429.

Motor protection: Minimum IP54.

IP54 (formerly Totally Enclosed Fan Cooled or TEFC) is standard. IP54 provides complete protection against ingress of dust and water splashed against enclosure from any direction.

Electrical connection

General: Provide terminal box external to fan casings and wire to fan motors.

Not for explosion-proof motors – refer to manufacturer.

Kitchen exhaust fans

Type: Axial flow with non-combustible casing and cowl (if fitted).

This conforms to AS/NZS 1668.1 clause 6.2.5. The original clause required the whole of kitchen exhaust fans be non-combustible (i.e. including the impeller blades) but amendment 1 reduced this requirement so that only the cowls and casings need to be non-combustible.

Access for cleaning: Large gasketed access panels.

Finish: Hot-dip galvanized then epoxy painted.

Fire-resistance level (FRL): If fan is installed in a fire-resisting duct system and not installed in a separate fire-resisting room or enclosure, provide FRL to the same standard as the duct. Make sure the fire-resisting provisions permit easy access for inspection, cleaning and maintenance.

Unless the kitchen exhaust fan has been tested for the required fire-resistance rating (which is unlikely) it will probably need to be located within a fire-resisting room. See AS/NZS 1668.1 clause 6.2.8. Enclosing a fan in fire-resisting coating instead of a room may prevent access required by other standards for inspection, cleaning and maintenance.

Materials generally: Except for minor items such as grommets, junction boxes, etc., construct from materials with a temperature of fusion > 1000°C.

2.8 FANTECH ROOF MOUNTED FANS

Make sure safe access is available to the fan and/or fan motor assembly. Document requirements on the installation detail drawing. Refer to AS 1657, referenced in the *0171 General requirements* worksection.

Selection

Proprietary item: Provide FANTECH fans as follows:

- Centrifugal: FANTECH Gamma, FANTECH GL Gamma, FANTECH Heritage and FANTECH GE, FANTECH FA series and FANTECH Ezifit Thru Roof as documented.
- Axial: FANTECH Minivent, FANTECH Alpha/Beta, FANTECH New Generation, FANTECH High capacity or FANTECH Smoke Spill series as documented.

Features: For kitchen exhaust applications provide FANTECH GL Gamma, FANTECH Heritage and FANTECH GE and New Generation vertical discharge.

Types

General: Centrifugal, mixed flow, aerofoil axial or propeller.

Axial flow and propeller: Conform to **AXIAL FLOW FANS**.

Centrifugal fans: To **CENTRIFUGAL FANS - GENERAL PURPOSE** except as varied in the following:

- Casing: Scroll at least 1.2 mm and side plates at least 2 mm thick zinc-coated steel, riveted or spot welded with joints sealed.
- Bases: Metallic-coated steel sheets bolted to casings with at least 4 mounting brackets.
- Impellers: Constructed with extruded aluminium or zinc-coated steel blades secured between reinforced galvanized steel plates.
- Bearings: Self-aligning sealed for life ball or roller type.
- Finish: Brush and prime spot welds with zinc-rich organic primer to AS/NZS 3750.9.
- Motor minimum degree of protection: IP44.

Mixed flow fans:

- Impeller: Mixed flow with rotating parts vibration isolated from the unit casings by suitable resilient mountings.
- Arrangement: Position the motor above the impeller to allow servicing from above the roof.

Housing

Requirement: House fans in compact bases fitted with weathering skirts and a hinged or removable weatherproof cowl with bird screen.

Material: UV stabilised ABS, polypropylene, polyethylene, glass-fibre reinforced polyester or steel, hot-dip galvanized (HDG) after manufacture, as documented.

Include materials in **Roof mounted fan schedule** or leave to contractor to select. Hot-dip galvanized mild steel is preferred treatment for axial fans.

Vertical discharge

Requirement: Weatherproof galvanized steel, plastic or aluminium backdraft dampers where the weather may enter when units are stopped.

Backdraft dampers may be in plastic to 700 mm diameter and aluminium for larger fans that run at low speed. Select and specify as required.

Backdraft damper closure: Counterweighted or electrically driven.

Vermin mesh: Where backdraft dampers are not fitted, provide vermin mesh guards to AS/NZS 3666.1 clause 2.2.1.

Motors

Bearings: Sealed for life or grease-packed, fitted with lubrication lines extending through roof cowls. Provide bearings with a minimum rating fatigue life of 40 000 hours. Provide access to grease relief ports.

Minimum degree of protection: IP55.

Drive: Belt or direct as appropriate.

Belt drive: Conform to **CENTRIFUGAL FANS - GENERAL PURPOSE**.

Electrical connection

General: Provide terminal boxes external to fan casings and wired to fan motors.

Kitchen exhaust fans

Housing, base and casing: Hot-dip galvanized steel or stainless steel only.

Materials generally: Except for minor items such as grommets, junction boxes, etc., construct from materials with a temperature of fusion > 1000°C.

2.9 FANTECH PLATE MOUNTED FANS

Selection

Proprietary item: Provide FANTECH continuously rated plate mounted fans such as the FANTECH HXM, Compact 2000 or SQ Series fans suitable for the volume and static pressure as documented.

General

Type: Plate mounted fans designed for diaphragm, wall or cowl mounting, as documented.

Impeller: Direct driven with metallic-coated curved steel or glass reinforced plastic blades and balanced statically and/or dynamically.

Bearings: Sealed for life suitable for horizontal or vertical mounting.

Cowls: Glass fibre or fabricated metal.

Unducted inlets and outlets: Provide metallic-coated steel or bronze mesh guards.

Finish to metal parts: Air drying enamel or powder coat.

2.10 FANTECH WINDOW/WALL FANS

Selection

Proprietary item: Provide FANTECH fans as follows:

- Wall and ceiling: EDM, Silent Design, Ring Plate and Vogue series.
- Wall and window: HCM, and Stylvent series.
- Wall: HXM, SQ, Compact 2000 and Delta series.
- Ceiling: ULT, HDC and HBF header boxes.
- Filtered supply units: Series 1.

Features: Provide continuous rated motors in all wall, window and ceiling fans.

General

Control: Connect to the local lighting circuit and provide an automatic run-on timer.

Consider the method of connection and controlling these small fans. For example, with simple toilet exhaust applications it may be adequate to connect to the lighting circuit. If so, this *Optional* text might be used.

Impeller: Plastic or metallic-coated steel propeller type, adjustable pitch axial or centrifugal.

Housing: Provide the following:

- Isolating mountings.
- Discharge cowls with birdmesh guards.
- Backdraft shutters constructed from lightweight nylon or aluminium blades, arranged to gravity close when fans are not operating.

Filtered supply units

Construction: Provide easily removable disposable filter.

Filter performance classification: G4 to AS 1324.1.

This represents an average efficiency to AS 1324.2 Test dust number 4 of ≥ 90%.

2.11 FUME CUPBOARD FANS

This clause is for fans for typical simple fume cupboards e.g. for schools. Edit to suit project requirements e.g. materials.

Standard

Requirement: To AS/NZS 2243.8.

Type

Requirement: Select from the following:

Edit to suit project. Fan type can be included in SELECTIONS, **FANS**, **Fume cupboard fan schedule**.

- SISW centrifugal fan to **CENTRIFUGAL FANS – GENERAL PURPOSE**.
- Axial flow fan to **AXIAL FLOW FANS** but with bifurcated casing.
- Centrifugal in-line fan to **CENTRIFUGAL FANS – IN-LINE** but with bifurcated casing.

Motor

Type: Variable speed.

Construction

Requirement: Designed and constructed to handle fume cupboard exhaust without deterioration caused by corrosion or solvent action.

Fan location: Locate outside the building. If at ground level, provide a lockable enclosure.

Materials: To the respective fan type clause except as follows:

- Casing: PVC-U.
- Impeller: PVC-U or polypropylene impeller.
- Other components in contact with exhaust air flow: No less resistance to corrosion and solvents than the fan casing.

2.12 FANTECH IMPULSE CAR PARK VENTILATION FANS

FANTECH Jetvent impulse fans are intended primarily as an Performance solution to NCC for car park ventilation. They can significantly reduce construction costs by reducing or eliminating ductwork, reducing excavation and space required compared to NCC Deemed-to-Satisfy systems. As an Performance solution, computational fluid dynamics (CFD) analysis may be required to verify design compliance. Consult FANTECH for advice on CFD analysis. See also FANTECH *JetVent Practical Guide for Selection and Application.*

Standards

Air flow: Tested to ISO 5801.

Noise: Tested to ISO 3745.

Thrust air performance: Tested to ISO 13350.

Selection

Proprietary item: Provide impulse fans as follows:

- Axial flow: FANTECH JV Series.
- Universal: FANTECH JIU Series.
- High temperature: FANTECH JISU Series.
- Digital EC: FANTECH JUI-CPCEC Series.

Construction

Impellers: Axial flow, mixed flow or centrifugal as documented.

Casing and internal sheet metal components: Metallic-coated steel with visible surfaces powder coated.

Motors: Induction or EC motors as documented with sealed for life ball bearings.

3 EXECUTION

3.1 INSTALLATION

Access

General: Arrange fans and accessories to allow service access for maintenance, removal or replacement of assemblies and component parts, without disturbance of other items of plant, fire-resistance level of materials and/or the building structure.

Duct connections

Flexible connections: Provide flexible connections to prevent transmission of vibration to ductwork. If under negative pressure, make sure that flexible connection does not reduce fan inlet area. If necessary, provide spacer pieces between fans and flexible connections.

To make sure that the fan inlet area is not reduced, where the flexible connection is under negative pressure arrange to install the flexible connection at least one fan diameter upstream from the fan inlet.

Drains

General: Where moisture is likely to enter or condense inside a fan provide a trapped drain in conformance with AS/NZS 3666.1.

See NATSPEC TECHnote DES 022 for more information on requirements for microbial control in buildings.

Vibration isolation

General: Provide each assembly with at least four anti-vibration mountings, selected to give an isolation efficiency not less than 95%.

See also **VIBRATION SUPPRESSION** in the *0171 General requirements* worksection.

Type: As recommended by the fan manufacturer to achieve the required isolation efficiency for the specific fan under the documented operating conditions. Provide levelling screws and locknuts on metal spring mounts.

Location: Locate the mountings so that the mounts deflect uniformly when the fan is operating and subject to all loads, including those imposed by the duct.

Duct connections: Arrange flexible duct connections so that the fan vibration isolation efficiency is not adversely affected.

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 FANS

The FANTECH Product Selection Program has a facility that allows direct output of fan schedules into an Excel spreadsheet, Word document and other software programs. Use the Print “To Excel” and “To Clipboard” buttons in the software to transfer schedules to the specification. If using schedules created by the FANTECH Product Selection Program the schedules below should be deleted and replaced by the imported schedules.

The schedules provide for insertion of *static pressure* and *total efficiency values*.

Total pressure versus static pressure

Total pressure is a better indication of the fan and duct system performance than static pressure. In the absence of manufacturer’s total pressure and efficiency data, they can be calculated from a combination of manufacturer’s static pressure data and air quantity and fan dimensions. The use of total pressure takes into account the velocity pressure at the fan and the effects of static pressure regain.

Note that the static pressure difference measured across the fan is normally greater than the published fan static pressure. This is because the published fan static pressure is the difference between the outlet static pressure and inlet total pressure. Attempting to reconcile site measurements of fan static pressure difference against manufacturer’s data will overestimate the fan’s performance.

See the Fans chapter in ASHRAE Applications and AIRAH DA13 for information of the use of static and total pressure values.

Calculating fan total pressure

Fan total pressure should take into account:

- Accurate calculation of system static pressure losses.
- Effect of static regain (if any) from the discharge.

- Realistic values for coil pressure drops.
- An appropriate value for filter pressure drop. Selecting the fan for a fully loaded filter, and then commissioning the system with it clean will result in the system under performing and wasting energy. Once selected, the system performance should be checked at its clean and dirty filter conditions.
- Conditions under which the system will be commissioned. See the Mechanical commissioning worksection.

Fan selections and scheduled values should take into account all relevant factors including:

- Inlet and outlet configuration and any corrections to test data recommended in the relevant standards (e.g. ISO 5801).
- Operating point of the fan on its fan curve. It is preferable that fans have a constant falling head versus quantity curve for stable operation. They should also be selected for duty point safely to the right of the peak in the pressure/quantity curve.
- Selection for maximum efficiency.
- Turn down of fan and system pressure loss at minimum flow for VAV systems.
- Avoidance of stall and pulsation.

Centrifugal fan schedule

Property	**CF1**	**CF2**	**CF3**
Function			
FANTECH series			
Make	FANTECH	FANTECH	FANTECH
Centrifugal fan type			
Maximum air quantity (L/s)			
Minimum air quantity (L/s)			
Static pressure at maximum L/s (Pa)			
Minimum total efficiency at maximum air quantity (%)			
Impeller style			
Impeller material			
Casing material			
Drain point required:			
Drive type			
Operating temperature (°C)			
Rating to AS 4429			
Minimum motor (kW)			
Maximum motor (kW)			
Motor enclosure			
High efficiency motor required			
Maximum sound power*:63 Hz			
Maximum sound power*:125 Hz			
Maximum sound power*: 250 Hz			
Maximum sound power*: 500 Hz			

Property	CF1	CF2	CF3
Maximum sound power*: 1000 Hz			
Maximum sound power*: 2000 Hz			
Maximum sound power*: 4000 Hz			
Maximum sound power*: 8000 Hz			
* Maximum sound power level (dB re 10^{-12} watts) measured in duct at fan discharge.			

CF1, CF2, CF3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

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

Function: e.g. constant volume, variable volume, smoke spill, return air, fume exhaust.

FANTECH series: Select from:

- Sheetmetal: SWGI, FlexLine, Sigma fans.
- In-line: Mixvent, Provent, JetStream, VentMajor, PowerLine or Multiflow series fans.

Centrifugal fan type: Double width double inlet (DWDI) or single width single inlet (SWSI).

Maximum air quantity (L/s): Insert calculated value. Schedule refers to maximum and minimum air flows (for fans with variable speed drives or inlet guide vanes). Delete Maximum for fans operating at constant volume.

Minimum air quantity (L/s): Insert calculated value for VAV systems. Delete row for fans operating at constant volume.

Static pressure at maximum L/s (Pa): Insert calculated static pressure. When static values are used for centrifugal fans with low outlet velocities the dynamic head ignored is small. At an outlet velocity of 8 m/s the velocity head Vp is only 39 Pa (Vp = 0.602 times velocity^2). For constant volume systems delete the word Maximum. If static pressure is used also provide fan size.

AS/NZS ISO 12759 provides information on determining fan efficiency at under a number of conditions including off-duty point.

Minimum total efficiency at maximum air quantity %: For constant volume systems specify minimum fan total efficiency at design air flow e.g. 75%. Note that selection of VAV fans for maximum efficiency at 70 to 80% maximum flow may result in a fan that is one size smaller than would be the case for constant volume systems.

Impeller style: e.g. aerofoil, backward inclined; single thickness backward inclined; or forward curved.

Impeller material: Insert material. Normally steel but special material may be required for certain applications e.g. PVC-U.

Casing material: Insert material. Normally steel but special material may be required for certain applications e.g. PVC-U.

Drain point required: e.g. Yes or no.

Operating temperature °C: Insert temperature.

Rating to AS 4429: For smoke spill fans - delete otherwise. Typically 1 (120 minutes at 200°C) for sprinklered buildings or 2 (30 minutes at 300°C) for unsprinklered but see AS/NZS 1668.1 and NCC. Make sure that fans and motors for smoke spill are selected for both their normal function and for their operation at elevated temperatures. See AS/NZS 1668.1 clause 4.8.2.

Drive type: e.g. belt, direct drive, variable speed, two speed.

Minimum motor (kW): Select to suit fan duty and documented efficiency.

Maximum motor (kW): Insert a value that meets BCA J5.

Motor enclosure: Specify special enclosure if other than worksection default of IP54 e.g. for hazardous locations. If IP54 is suitable this item may be omitted.

High efficiency motor required: See also *0784 Motors and starters* worksection. Note that 0.75 kW is a practical lower limit size. Some equipment such as fans with external rotor motors and packaged equipment may not be available with high efficiency motors.

Maximum sound power level (in duct at fan discharge) (dB re 10^{-12} watts): This table uses sound power, the most flexible measure. Data from some manufacturers may only be available as sound pressure (e.g. dB(A) at 3 m in free field). Modify schedule to suit selected fan and required performance. Do not specify maximum outlet velocity if also including sound data.

Adapting the fan schedules for design and construct projects

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 such as, *To the documented requirements*. The **Centrifugal fan schedule** can then form the basis of the contractor's submissions with the text replaced by design values:

- Air quantities [various].
- Static pressures [various].
- Minimum impeller diameter (mm).
- Minimum fan diameter (mm).
- Minimum motor (kW).
- Maximum motor (kW).
- Maximum sound power level in duct at fan discharge (dB re 10^{-12} watts) and following frequency rows.
- Maximum sound pressure level at 3 m free field from fan discharge (dB(A)).

In-line centrifugal fan schedule

Property	**IF1**	**IF2**	**IF3**
Function			
Make	FANTECH	FANTECH	FANTECH
FANTECH series			
Air quantity (L/s)			
Static pressure at above L/s (Pa)			
Minimum impeller diameter (mm)			
Maximum speed (rev/s)			
Maximum motor input power (kW)			
Impeller style			
Impeller material			
Casing material			
Operating temperature (°C)			
Minimum motor (kW)			
Motor enclosure			
High efficiency motor required			
EC motor required			
Maximum sound power*: 63 Hz			
Maximum sound power*: 125 Hz			
Maximum sound power*: 250 Hz			
Maximum sound power*: 500 Hz			
Maximum sound power*: 1000 Hz			
Maximum sound power*: 2000 Hz			
Maximum sound power*: 4000 Hz			
Maximum sound power*: 8000 Hz			
* Maximum sound power level (dB re 10^{-12} watts) measured in duct at fan discharge.			

IF1, IF2, IF3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

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

See *Guidance* for **Centrifugal fan schedule** for related schedule items.

FANTECH In-line series: Select from: Mixvent, Provent, JetStream, VentMajor, PowerLine or Multiflow series fans.

Minimum impeller diameter (mm) and Maximum motor input power (kW): As manufacturers often publish neither total nor static efficiencies use these to exclude inefficient fans. If efficiency is available include it and delete this item.

EC motor required: Insert Required, Not required. Delete row if there are no EC motors.

Axial flow fan schedule

Property	**AF1**	**AF2**	**AF3**
Function			
Make	FANTECH	FANTECH	FANTECH
FANTECH series			
Maximum air quantity (L/s)			
Minimum air quantity (L/s)			
Static pressure at maximum L/s (Pa)			
Minimum fan diameter (mm)			
Maximum speed (rev/s)			
Minimum fan total efficiency at maximum air quantity (%)			
Blade material			
Casing material			
Hub material			
Operating temperature (°C)			
Drive type			
Minimum motor (kW)			
Maximum motor (kW)			
Motor enclosure			
High efficiency motor required			
EC motor required			
Maximum sound power*: 63 Hz			
Maximum sound power*: 125 Hz			
Maximum sound power*: 250 Hz			
Maximum sound power*: 500 Hz			
Maximum sound power*: 1000 Hz			

Property	AF1	AF2	AF3
Maximum sound power*: 2000 Hz			
Maximum sound power*: 4000 Hz			
Maximum sound power*: 8000 Hz			
* Maximum sound power level (dB re 10^{-12} watts) measured in duct at fan discharge.			

AF1, AF2, AF3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

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

See *Guidance* for **Centrifugal fan schedule** for related schedule items.

FANTECH series: Select from: FANTECH Adjustable Pitch Axial Flow Fans series.

Static pressure at maximum L/s (Pa): For axial fans the velocity head is normally much higher hence the error is higher when using static values, particularly when the fan is followed by a transition piece. Even a simple one diameter long square to round transition (e.g. 600 mm diameter to 600 x 600 mm) can deliver worthwhile regain. Efficient recovery of velocity head from axial fans can substantially improve their performance compared with installations where it is lost into a plenum of poor duct configuration.

Blade material: Glass reinforced plastic (GRP) blades are cheaper and more common than aluminium. Typical blade material choices are as follows:

- Fans < 300 mm: Fixed pitch aerofoil section polypropylene impellers or fixed pitch metallic-coated pressed steel.
- Fans < 350 mm: Fixed pitch pressed metallic-coated steel impellers.
- Fans < 1800 mm: Glass-fibre reinforced aerofoil section polyester impellers. Glass-fibre is limited to less than 1800 mm diameter due to rotational stresses.
- All sizes: Aerofoil section die cast aluminium alloy.

EC motor required: Insert Required, Not required. Delete row if there are no EC motors.

Roof mounted fan schedule

Property	RF1	RF2	RF3
Function			
Brand	FANTECH	FANTECH	FANTECH
FANTECH series			
Impeller type			
Impeller material			
Casing material			
Drive type			
Shutters			
Vertical discharge (yes/no)			
Air quantity (L/s)			
Static pressure at L/s (Pa)			
Minimum fan diameter (mm)			
Maximum speed (rev/s)			
Maximum motor input power at L/s (kW)			
Minimum fan total efficiency at maximum			

Property	RF1	RF2	RF3
air quantity (%)			
Operating temperature (°C)			
Minimum motor (kW)			
Maximum motor (kW)			
Motor enclosure			
High efficiency motor required			
EC motor required			
Maximum sound power*: 63 Hz			
Maximum sound power*: 125 Hz			
Maximum sound power*: 250 Hz			
Maximum sound power*: 500 Hz			
Maximum sound power*: 1000 Hz			
Maximum sound power*: 2000 Hz			
Maximum sound power*: 4000 Hz			
Maximum sound power*: 8000 Hz			
* Maximum sound power level (dB re 10^{-12} watts) measured in duct at fan discharge.			

RF1, RF2, RF3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

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

See *Guidance* for **Centrifugal fan schedule** for related schedule items.

Impeller style: Include if a specific type is required e.g. axial flow.

FANTECH series: Select from:

Centrifugal: Gamma, GL Gamma, Heritage, GE, FA series and Ezifit Thru Roof.

Axial: Minivent, Alpha/Beta, New Generation, High capacity and Smoke Spill.

For kitchen exhaust applications: GL Gamma, Heritage, GE and New Generation vertical discharge.

EC motor required: Insert Required, Not required. Delete row if there are no EC motors.

Window/wall mounted fan schedule

Property	WF1	WF2	WF3
Make	FANTECH	FANTECH	FANTECH
FANTECH series			
Air quantity (L/s)			
Minimum impeller diameter (mm)			
Maximum speed (rev/s)			
Maximum motor input power (kW)			
Minimum motor (kW)			

Property	WF1	WF2	WF3
Motor enclosure			
Maximum sound pressure level at 3 m free field from fan discharge (dB(A))			

WF1, WF2, WF3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

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

See *Guidance* for **Centrifugal fan schedule** for related schedule items.

FANTECH series: Select from:

- Wall and ceiling: EDM, Silent Design, Ring Plate and Vogue series.
- Wall and window: HCM, and Stylvent series.
- Wall: HXM, SQ, Compact 2000 and Delta series.
- Ceiling: ULT, HDC and HBF series header boxes.
- Filtered supply units: Series 1, Series 3.
- For plate mounted fans select from: HXM, Compact 2000 or SQ Series fans.

Minimum impeller diameter (mm) and Maximum motor input power (kW): As manufacturers often publish neither total nor static efficiencies use these to exclude inefficient fans.

Maximum sound pressure level at 3 m free field from fan discharge (dB(A)): Sound power data is unlikely to be available for this type of fan.

Fume cupboard fan schedule

Property	FCF1	FCF2	FCF3
Fume cupboard			
Fan type			
Maximum air quantity (L/s)			
Minimum air quantity (L/s)			
Static pressure at maximum L/s (Pa)			
Minimum total efficiency at maximum air quantity (%)			
Impeller material			
Casing material			
Drain point required:			
Drive type			
Operating temperature (°C)			
Rating to AS 4429			
Minimum motor (kW)			
Maximum motor (kW)			
Motor enclosure			
High efficiency motor required			
Maximum sound power*:			

Property	FCF1	FCF2	FCF3
63 Hz			
Maximum sound power*: 125 Hz			
Maximum sound power*: 250 Hz			
Maximum sound power*: 500 Hz			
Maximum sound power*: 1000 Hz			
Maximum sound power*: 2000 Hz			
Maximum sound power*: 4000 Hz			
Maximum sound power*: 8000 Hz			
* Maximum sound power level (dB re 10^{-12} watts) measured in duct at fan discharge.			

Fan type: e.g. SISW centrifugal, Bifurcated axial flow, Bifurcated centrifugal.

For other guidance, see *Guidance* to the **Centrifugal fan schedule.**

Impulse car park ventilation fan schedule

Property	CPF1	CPF2	CPF3
Function			
Make	FANTECH	FANTECH	FANTECH
FANTECH series			
Maximum speed (rev/s)			
Thrust rating at maximum speed (N)			
Rating to AS 4429			
EC motor required			
Control type			
Maximum motor (kW)			
Free field noise rating (dB(A) at 3 m)			

CPF1, CPF2, CPF3: These designate each instance or type or location of the item scheduled. Edit to align with the project's codes or tags.

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

Fantech series: Select from: Fantech JV, JIU, JISU, JUI-CPCEC series.

Maximum speed (rev/s): Insert speed. May be less than the maximum possible in order to meet project requirements.

EC motor required: Insert Required, Not required. Delete row if there are no EC motors.

Control type: Insert 2-speed, Analog VSD or EcoVent.

REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1324		Air filters for use in general ventilation and airconditioning
AS 1324.1	2001	Application, performance and construction
AS/NZS 2243		Safety in laboratories
AS/NZS 2243.8	2014	Fume cupboards
AS 2784	2002	Endless wedge belt and V-belt drives
AS/NZS 3666		Air-handling and water systems of buildings - Microbial control
AS/NZS 3666.1	2011	Design, installation and commissioning
AS/NZS 3750		Paints for steel structures
AS/NZS 3750.9	2009	Organic zinc-rich primer

AS/NZS 3750.20	2008	Anticorrosive metal primer - Solvent borne - Lead and chromate free
AS 3959	2009	Construction of buildings in bushfire prone areas
AS 4429	1999	Methods of test and rating requirements for smoke-spill fans
AS/NZS 4680	2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 60335		Household and similar electrical appliances - Safety
AS/NZS 60335.2.80	2016	Particular requirements for fans
IEC 60085	2007	Electrical insulation - Thermal evaluation and designation
ISO 3745	2012	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic rooms and hemi-anechoic rooms
ISO 5801	2017	Fans - performance testing using standardized airways
ISO 13350	2015	Fans- Performance testing of jet fans
The following documents are mentioned only in the *Guidance* text:		
AS 1324		Air filters for use in general ventilation and airconditioning
AS 1324.2	2003	Methods of test
AS 1657	2018	Fixed platforms, walkways, stairways and ladders - Design, construction and installation
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 ISO 5801	2004	Industrial fans - performance testing using standardized airways
AS/NZS ISO 12759	2013	Fans - Efficiency classification for fans
AIRAH DA13	2013	Fans - selection and application
BCA 3.7.4	2016	Acceptable construction – Fire safety – Bushfire areas
BCA Spec E2.2b	2016	Services and equipment - Smoke exhaust systems
BCA G5.2	2016	Ancillary provisions - Construction in bushfire prone areas - Protection
BCA J3.5	2016	Energy efficiency - Building sealing - Exhaust fans
BCA J5	2016	Energy efficiency - Air-conditioning and ventilation systems
BCA Spec J5.2a Table 3a	2016	Energy efficiency - Fans - Maximum fan motor power - Supply and return air fans
NATSPEC DES 022	2010	Microbial control
NATSPEC GEN 024	2015	Using NATSPEC selections schedules
NATSPEC TR 01	2018	Specifying ESD
NATSPEC TR 03	2018	Specifying Design and Construct for Mechanical services
BS 848-1	2007	Performance testing using standardised airways
EN ISO 5801	2008	Fans. Performance testing using standardized airways
CIBSE Guide F	2012	Energy efficiency in buildings
AMCA 210	2016	Laboratory methods of testing fans for certified aerodynamic performance rating
ASHRAE Applications	2015	ASHRAE Handbook - HVAC applications
ASHRAE Systems	2016	ASHRAE Handbook - HVAC systems and equipment
ISO 9001	2000	Quality management systems - Requirements