A GUIDE TO SELECTING THE RIGHT FAN

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BATHROOM EXTRACTOR FAN: SELECTION GUIDE FAN REGULATIONS

WHAT THE LAW STATES

New Zealand Building Code G4 Ventilation (summarised):

"Buildings shall have a means of collecting or otherwise removing: cooking fumes and odours; steam from laundering, utensil washing, bathing and showering; odours from sanitary and waste storage spaces; poisonous or flammable fumes and gases".

- Natural Ventilation for the above is acceptable as long as opening windows in each room have an area of 5% or more of the floor area of the room.
- For internal rooms without natural ventilation, mechanical ventilation (extraction fans) must be installed to extract the air at given rates. Residential requirements are listed below.
- Where fans are used to remove moisture and other contaminants from kitchens, bathrooms and laundries in housing, the exhaust air must be ducted to the outside at the flow rates mentioned below.
- Extraction of wet rooms (e.g. bathroom, toilet, laundry) must be kept separate from kitchen extraction.

MOISTURE AND CONDENSATION

Factors that affect condensation and moisture include:

- Bathroom size and materials used on the floor, walls, and ceiling
- Size and type of shower and showerhead
- Cold surfaces such glass, mirrors, tiles, wet-wall linings, cold uninsulated ceiling linings, etc.
- Cold air sources (i.e. an open window)
- Water pressure

INDUSTRY RECOMMENDATIONS

- The mentioned flow rates below are minimum allowable. In general these would not be enough to overcome excessive moisture and condensation problems encountered in modern homes.
- The ventilation industry has a "Recommended Air-Changes per Hour" approach solution. i.e. An air flow rate sufficient to remove/replace the total volume of air in a given room a specified number of times each hour.
- Obviously fans will not necessarily be left running for an hour - a fact which is taken into consideration in the formula.

Bathrooms

*25 l/s

Laundries

*20l/s

Toilets

*25 l/s

*** minimum flow rates are of a fan installed with ducting and grilles, measured at the inlet grille with an anemometer.**

TIPS FOR REDUCING CONDENSATION AND AIDING EXTRACTION

The following tips will ensure that the system is able to run as efficiently as possible:

- **Keep windows closed (specifically in winter)**: cold outside air mixing with warm inside air will cause an increase in condensation.
- **Ensuring sufficient makeup air:** in order for the fan to function efficiently, fresh air is needed to replace the extracted air. A 20mm gap under the door, or a door grille, will provide sufficient makeup air during a shower.
- **Heating:** using a bathroom heater to warm the room before a shower will assist in reducing condensation.
- **Post shower:** after a shower, keep the fan running for at least 5 minutes, and also keep the bathroom door open to aid extraction.

EXTRACTION SELECTION

CHOOSING A FAN

• AIR CHANGES PER HOUR (ACH)

The number of times the total room volume of air is changed each hour. Refer to the table below for the recommended Air Changes Per Hour based on the room type.

Application Description	Air Changes Per Hour
Bathrooms	11 - 15
Toilets	6 - 10
Laundries - (with ducted drier)	6 - 10
Laundries - (without ducted drier)	10 - 30

Always use the higher number (15 for bathrooms, 10 for toilets) when calculating the fan requirements.

Note:
Fan performance is tested under free-air confitions, unless otherwise stated. Free-air testing does not include ducting, grilles or a bathroom environment.

• WORKING OUT THE RIGHT FAN FOR THE JOB

- Calculate the room volume in metres (L x W x H).
  e.g. bathroom of 2m x 3m x 2.4m = 14.4 m³
- Multiply the room volume by the recommended air changes per hour for that room. Always use the higher limit
  e.g. bathroom of 14.4 m³ x 15 ACH = 216 m³/hr.
- The result is the minimum fan performance required in cubic metres per hour.
  e.g. a fan capable of at least 216 m³/hr for above bathroom

Select a fan with a higher performance than this figure.

If you know the Litres/Second (l/s):

l/s x 3.6 = m³/hr. (e.g. 25 l/s x 3.6 = 90m³/hr).

If you know the Cubic Metres/Hour (m³/hr):

m³/hr ÷ 3.6 = l/s. (e.g. 200m³/hr ÷ 3.6 = 55.55 l/s).

• FAN PERFORMANCE

The following factors may affect the extraction performance of a fan, resulting in a pressure drop of the system:

- **Type of grilles:** the more open the grille, the less the air restriction
- **Type of ducting:** rigid ducting allows air to pass through more efficiently
- **Length of ducting**: the longer the ducting, the more the pressure drop (approx. 1Pa/m)
- **Installation of ducting:** compressing the ducting to pass through joists and timber can restrict airflow. Wrinkled ducting causes turbulence and reduces airflow.
- **Number of duct bends:** sharp bends greatly restrict air flow

Note:
Stated extraction rates are “free air” values and do not account for grille type or duct run restrictions.

EXTRACTION SELECTION

WET AREA ZONE GUIDE

When considering where in the room to place an extractor fan, you must consider the wet areas.

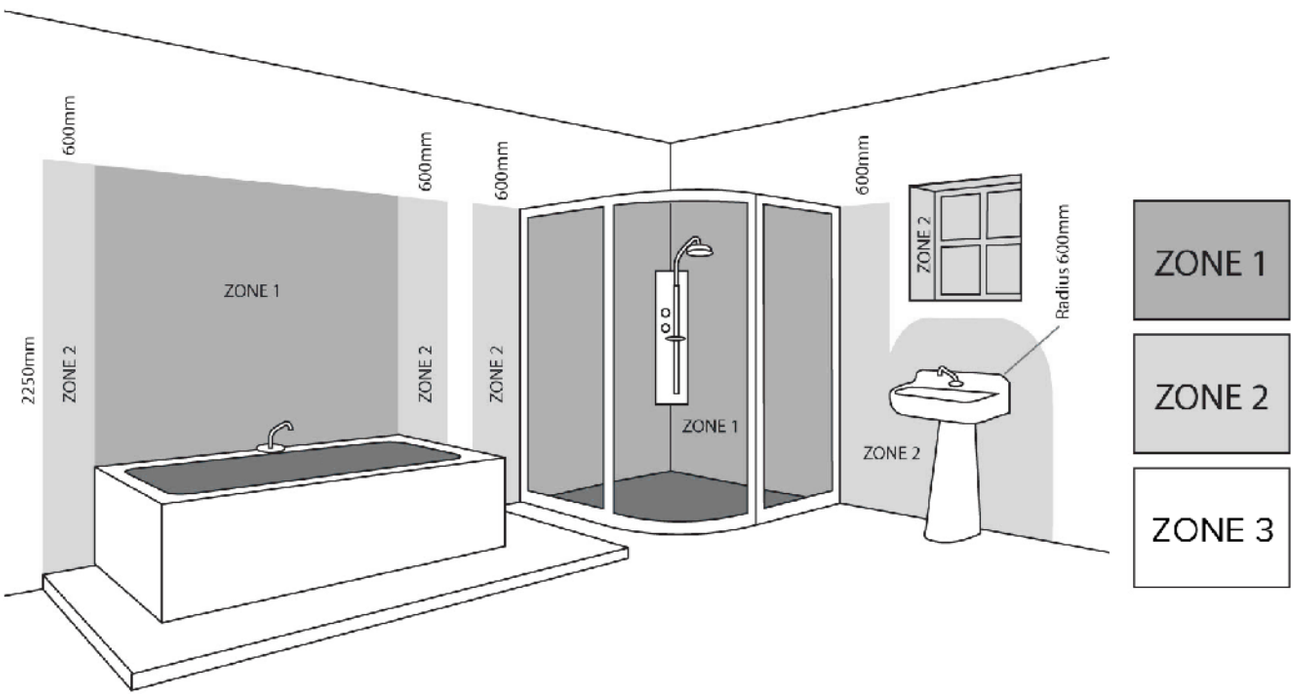
Zone 1: This is the zone directly within the shower or bath up to 2.25 metres above the floor and 150mm around the bath/shower cubicle. An SELV fan or an inline fan kit will be required in this zone.

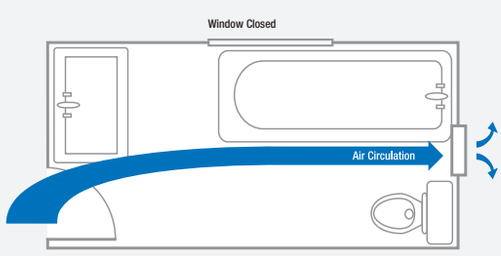
For example if a fan is mounted directly over the bath or shower it must be a low voltage fan (SELV).

Zone 2: This zone is 0.6 metres horizontally outside of zone 1 and up to 2.25 metres above the floor.

Zone 3: The outer layer is zone 3, which is 2.4 metres horizontally outside of zone 2 and 2.25 metres above the floor.

Zone 1:	Requires an SELV Fan or an Inline fan kit.
Zone 2:	Any fan model can be used.
Zone 3:	Any fan model can be used.





Best Circulation

Installing the extractor fan in a location across from the door would allow fresh makeup air to pass across the bathroom, further aiding extraction of the moist air.

Select the model that exhausts the closest to your requirements.

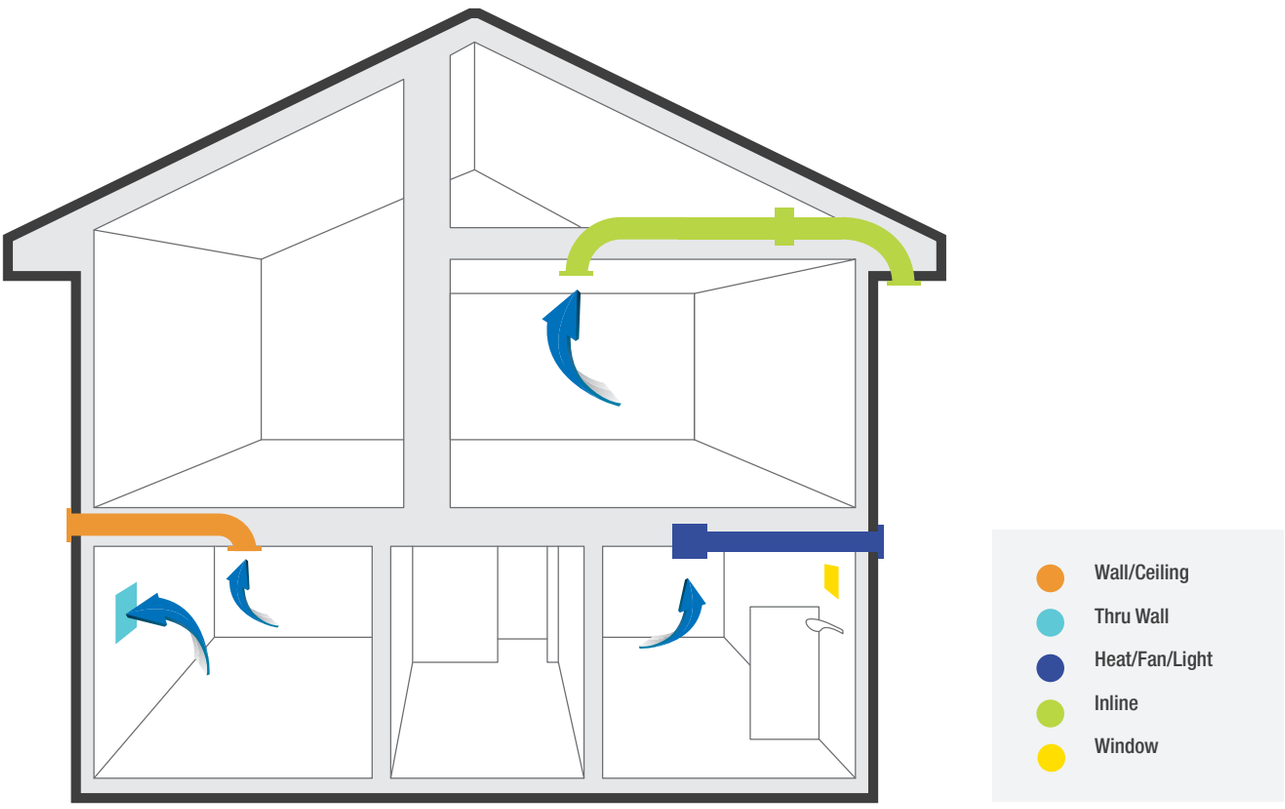
If the performance required falls between two fans, it is recommended you select the one handling the most air, as grille type and duct run length will reduce the stated 'free air' performance.

EXTRACTION SELECTION

FAN TYPES

Location of your extraction fan will depend on the physical constraints of your room. The wet area zone guide (shown on the previous page) will help you decide the most suitable physical installation to meet your requirements. Within the various mounting options there are other features available, such as:

- **TIMER** (maintain fan operation for a set time after the room is vacated).
- **PULLCORD** (switch at fan, instead of wall switch control).
- **AUTO-SHUTTER** (electrically operated shutters inside the fan - closed when the fan is not running to stop draughts).



Ceiling Mounted Fan

Designed for low-pitch roofs or between floors, where there is no ceiling access. Also available with heat lamps & lighting.

Thru Wall Fan Kit

Used where the bathroom is on an external wall, or there is no ceiling space for an inline fan.

Window Mounted Fan

Used in situations where an existing window fan is being replaced, or where there is no available external wall space and no ceiling space access.

Inline Mounted Fan Kit

Most common bathroom installation, the fan is mounted in the ceiling space with the grille directly above the source of the steam.

Generally this type of installation is quieter as the fan is not directly in the room.

Thru Roof Kit

Used where there is limited access to the roof space, or where there is no soffit available. Thru Roof Kits can be used with any extraction fan, or use a Thru Roof Fan Kit with the fan mounted within the cowl.

Simx Limited | www.simx.co.nz | sales@simx.co.nz