

## Best Installation Practices for Exhaust Systems

### Recommended Installation Practices

A genset exhaust system must collect gases from engine cylinders and discharge them as quickly and silently as possible. It must minimize back pressure, which can cause horsepower losses and temperature increases that can shorten the engine's life or reduce its performance.

Several factors impact exhaust system performance. Building constraints, noise control, condensation, vibration, emissions after treatment systems, heat dissipation, and building codes must be considered. The following are best practice criteria:

### Exhaust Piping

Each genset must be equipped with its own exhaust system. Ganging or sharing exhaust piping increases chances of fumes entering idle engines or equipment, subjecting them to corrosive gases or condensation.

If the genset is installed indoors, specify Schedule 40 piping. Its heavy duty construction dampens vibration and resists corrosion from condensate. To minimize back-pressure from bends in the exhaust system, make sweeping 90° bends with radii of at least one and one half times the pipe diameter.

Exhaust piping should not exert more than 37kg (60 lbs) of weight on the engine when the system is at operating temperature.

Flexible connections are needed to relieve exhaust system components of vibrational fatigue. They can also prevent vibration transmission (and resultant noise) throughout the building and can accommodate misalignment problems at installation.

Long pipe runs require flexible connections to provide for thermal growth. For example, a 6m (20') steel exhaust pipe at 30°C (100°F) will increase 33mm (1.3") when heated to 510°C (950°F). Similarly, pipe supports must also allow for thermal growth.

Consider insulating pipes. Up to a liter of water vapor can be produced from burning a liter of fuel in diesel engines. Insulation helps retain exhaust in gaseous state and lessens heat radiating into the genset room.

Install long horizontal exhaust pipe runs with a slight downward pitch away from the engine. A trap should be at the lowest point of the run so condensate can be drained.

### Muffler/Sound Abatement

Mufflers, when installed as close to the engine as possible, offer the best sound attenuation and minimize pipe vibration. Like piping, mufflers should be installed slanted away from the engine and equipped with a condensate drain.

Several grades of mufflers are available. Noise levels vary by engine model, rating and the distance at which it is measured from the exhaust outlet. Cashman can provide the engine manufacturer data and the muffler performance data to ensure adequate silencing for the application.

When used with an outdoor enclosure, keep in mind most of the noise generated is from the engine and radiator fan and not from the exhaust – specify silencers acoustically compatible with the enclosure rather than any specific noise reduction level.

### Considerations for Piping through the Building

Pipe should be installed with at least 304mm (12") clearance from combustible materials. High temperature insulation or prefabricated insulating sections should be used over pipes to prevent heat radiation. Pipes passing through wooden walls or roofs require single walled metal thimble guards 304mm (12") larger than the exhaust pipe diameter. Double

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walled metal thimbles must be 152mm (6") larger than pipe diameter. The thimble must conform to the National Fire Protection Association bulletin NFPA-110 and local building codes.

Both horizontal and vertical exhaust stacks should extend above or away from the building. Horizontal pipe outlets should be oriented away from prevailing winds and cut at 30° to 45° angles to reduce gas turbulence and resulting noise. Vertical stacks require rain caps which impose little back-pressure and can be forced open by exhaust. In all instances, stacks should be located away from building air intakes.