

# Consultant's Corner: Exhaust Systems

consultants corner



## Best installation practices for exhaust systems

A gen set 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.

Several factors impact exhaust system performance. Building constraints, noise control, condensation, vibration, heat dissipation and building codes must be considered. Following are "best practice" criteria:

### Exhaust piping

Each gen set 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.

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 degree bends with radii of at least one and one half times the pipe diameter.

Exhaust piping should not exert more than 37kg (60 pounds) 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 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 foot) steel exhaust pipe at 30 C (100 F) will increase 33mm (1.3 inches) 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 gen set 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.

Consult with Toromont Engine Power Systems for proper exhaust specifications.

### Muffler/sound abatement

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

Several grades of mufflers are available. Because noise level varies by engine model, rating and the distance at which it is measured from the exhaust outlet, Toromont can provide the engine manufacturer data and the muffler performance data to assure adequate silencing for the application.

### Considerations for piping through the building

Pipe should be installed with at least 229mm (9 inch) clearance from combustible materials. High temperature insulation or pre-fabricated insulating sections can be used over pipes to prevent heat radiation. Pipes passing through wooden walls or roofs require single walled metal thimble guards 305mm (12 inches) larger than the exhaust pipe diameter. Double walled metal thimbles must be 153mm (6 inches) 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 degree 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.