

Consultant's Corner: Engine Room Ventilation



consultants corner

Engine room ventilation key to proper gen set operation

It's been estimated that up to 10 percent of the fuel consumed by the average internal combustion engine is dissipated to the surrounding area as heat. This heat must be removed to maintain proper and safe gen set operation. This is usually accomplished by induced draft or ventilation fans.

The most efficient method of removing this heat is with a system that pulls air past switchgear, then over the engine, from back to front. If air curtains are used, the airflow should gather this radiant heat just above the gen set, which offers greater efficiency and less exposure to high air velocities in other areas of the gen set room. Airflow should be upward around each engine or in the case of engines with mounted radiators, across the back of the engine to the front. The ventilation system should sufficiently move air to control temperature in all areas of the engine room.

Ventilation fan sizing

The following equations provide the proper airflow (cfm or m³/s velocity for a given gen set installation, assuming 100 F (38C) ambient temperature:

Airflow (cfm or m³/s should increase 10 percent for every 2,500 feet (760m) above sea level.

$$V \text{ (cfm)} = \frac{H}{0.07 \times 0.24 \times \text{delta } T} + \text{Engine combustion air}$$

$$V \text{ (m}^3\text{/min)} = \frac{H}{1.099 \times 0.017 \times \text{delta } T} + \text{Engine combustion air}$$

Where:

V = ventilating air

H = heat radiation

delta T = Permissible temperature rise in engine room (degrees F or C)

Density of air at 100°F = 0.07 lb/cu ft (1.099 kg/m³)

Specific heat of air = 0.24 Btu/°F (0.017 kW/°C).

Sound control

Minimizing engine noise while maintaining adequate cooling presents some design challenges. Insulated air ducts and close attention to air inlet and outlet locations can greatly minimize noise problems. Unfortunately, air louvers are not adequate to contain engine noise.

Engineers at Toromont Engine Power Systems have worked on several installations where ventilation noise was a key design consideration. We can share the experience gained with you during your design phase.

Cold weather considerations

In colder climates, the desired temperature rise needed to maintain optimum engine operating temperature could be as much as 80 F (27C) instead of the usual 10 to 20 F (5.5 to 11C). In these cases, it is better to specify a number of smaller fans than one large fan to supply ventilation air. This also allows you to adjust ventilation if the gen set operates at a lower output. Movable louvers positioned to redirect engine heat back into the room until the jacket water temperatures reach 190 F (88 C) may be used. Then, these louvers close so ventilation air is exhausted.

Call us

Achieving correct ventilation levels is best accomplished during the design phase. We can help you at this juncture to best plan for ventilation needs.