

Diesel Generator Exhaust Insulation Selection

For years, the question on what is the best product to use for insulating diesel generator exhaust has been asked many times. Two products commonly used are calcium silicate pipe insulation and mineral wool pipe insulation. Johns Manville manufactures both products and can provide information on the system design.

When a diesel generating system is activated, it is designed to quickly provide power to pumps, blowers, elevators, and other equipment. This causes the temperature of the exhaust gases to rapidly change from ambient to 700°F or higher. Some manufacturers state the exhaust temperatures will approach 1000°F. The insulation system needs to be designed to allow for rapid temperature changes and be able to withstand many start ups without worrying about the loss of performance of the insulation.

Johns Manville recommends the insulation be installed in two layers to allow for expansion and contraction of the exhaust piping. The two layers should be offset from each other such that the outer layer covers the joints of the inner layer. On long horizontal runs, insulation expansion joints should be used to allow for movement of the system. On long vertical runs, use insulation support rings to support the weight of the insulation as well as expansion joints. Cover the insulation with a metal jacket such as aluminum or stainless steel.

Mineral wool pipe insulation, while rated to 1200°F, is held together with an organic binder system which begins to oxidize near 350°F (177°C), (See ASTM C447, Section 5.7.2). This degeneration of the binder, commonly referred to as “binder burn out,” decreases the integral strength of the insulation causing sag and slump. Any vibration of the exhaust further accelerates this condition. This obviously has a very adverse effect on insulation system design and can result in much higher surface temperatures and heat losses.

Johns Manville recommends Thermo-1200® Calcium Silicate pipe insulation for the best-long term performance of the system. Thermo-1200 is inorganic and will not decompose or degenerate after being exposed to the high temperatures of diesel engines. Thermo-1200 used in this application will retain the full thickness and thermal performance, as installed, over the life of the system, even through repetitive cycling of the equipment. There is no organic binder to “burn out,” and the effect of the vibration of the system on the insulation is minimal. Calcium silicate is noncombustible and will not off-gas during use.

In wood frame construction, thermal insulation is not rated for zero clearance to combustibles. The clearance to combustibles is dictated by national and local building codes. In the ICC 2006 Mechanical Code, Table 511.2 has some information about clearance for medium-heat and low-heat appliances. Consult the local building code for specific clearance to combustibles required. Sources of installation drawings and details you should consider:

1. Johns Manville Guide Specification Thermo-1200 calcium silicate pipe and block insulation
2. “National Commercial and Industrial Insulation Standards” available from the Midwest Insulation Contractors Assoc., 800-747-6422, or www.micainsulation.org
3. “INIH1000 Hot Insulation Installation Details” available from Process Industry Practices, www.pip.org

Figure 1: Typical assembly of tested pipping.

