Selecting Fiberglass, Rock and Slag Wool Insulation for Fire Safety and Code Compliance

By North American Insulation Manufacturers Association

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The high cost of energy today makes insulation a primary consideration in building design and a critical component in reducing a building’s energy use and lifetime operating costs. Whether constructing a new building or renovating an existing structure, insulation’s primary function is to reduce heat loss and heat gain. In addition, insulating with fiberglass, rock and slag wool insulations to recommended thickness levels helps control condensation, bar unwanted noise and improve indoor comfort. These insulations are also an integral component in some fire-resistant constructions. However, choosing the right insulation for a particular application can be a challenge as each insulation type has different properties and application recommendations.

When designing, building or renovating structures, designers, specifiers and builders must ask several key questions about the insulation.

- What are the thermal requirements needed to meet codes or design specifications?
- How can the insulation selected best help the owner reduce operating expenses and energy costs?
- Does the insulation system meet OSHA’s workplace acoustical standards and should additional insulation be considered where acoustical comfort is critical to the building occupants?
- Is the insulation selected of the
type and density to provide at least the minimum required fire rating for the assembly?

Will the overall insulation system provide the fire properties required?

**Insulation Materials**

Fiberglass has been commercially manufactured and marketed for more than 50 years. Designers and engineers are most familiar with fiberglass as a thermal insulation in building thermal envelopes, but a variety of products has been developed for sound-control applications and as thermal insulation for air ducts, pipes, automobiles, mobile homes, aircraft, refrigerators, cooking appliances and a variety of other appliances and equipment.

While it is not designed principally for fire protection, fiberglass insulation does have some fire-resistant attributes: glass wool is inorganic and, therefore, inherently non-combustible. With the proper mix of binder levels and density, fiberglass can be used in certain applications of up to 1,000 degrees Fahrenheit. Of course, the product manufacturer’s specifications must be consulted in any proposed high-temperature applications.

Similarly, rock wool and slag wool insulation are used in products such as ceiling tiles, wall and roof insulation, pipe and process insulations, insulation for ships, mobile homes, cooking appliances and other products used for sound attenuation and fire protection.

Rock and slag wool are also inherently non-combustible. They maintain their performance in higher temperatures and are used in certain continuous applications and fire protection assemblies at up to 2,000 degrees. Again, consult specific manufacturer’s specifications in any proposed high-temperature applications.

**Insulation Types**

Today, there are four basic types of fiberglass, rock and slag wool insulations commonly used in commercial and industrial building applications:

**Flexible Blanket Insulations.** These are commonly used for insu-
lating walls, ducts, ceilings and roofs for thermal and acoustical control.

**Board Insulations.** Semi-rigid to rigid pre-formed insulation boards are commonly used in partitions for sound control, curtain wall applications, ceiling boards, boiler walls, hot and cold ducts, tanks and breechings. In addition, some of these board insulations are used in fire-rated insulation assemblies.

**Preformed Pipe Insulations.** These are used for insulating domestic hot and chilled water pipe lines and distributions systems, low- and high-pressure steam lines and power and process lines.

**Spray Fireproofing.** This is used for thermal, acoustical and fire-protective applications on structural steel members, concrete pan joists, steel roof and floor sections, walls and partitions.

Combined, these products meet the needs of a variety of thermal, acoustical and fire applications and are manufactured and engineered with building codes, occupant safety and fire protection in mind.

**Fire-Performance Testing**

In industrial, commercial and residential buildings, insulation and other building materials must meet fire-resistance levels established by local, state and federal building codes. These codes typically are based on tests developed by the American Society for Testing and Materials and include ASTM E-136, “Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees Centigrade,” to be classified non-combustible and

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To put the heat of an ordinary oven in a 550-degrees-Fahrenheit

A self-cleaning model

800 degrees during

A typical two-hour fire test

more than double the generated by a s


ASTM E-84 measures surface burning characteristics such as “flame spread” and “smoke developed.” To determine flame spread, the insulation is subjected to a controlled flame in a test apparatus called the Steiner Tunnel. Smoke developed is determined through the use of photometers that detect the
opacity of the smoke generated by
the insulation in the fire test.

Although acceptable parameters
for both flame spread and smoke
developed are established within in-
dividual building codes and thus
may vary between jurisdictions, the
standard usually is “25/50” (always,
however, consult the specific build-
ing code in the applicable jurisdic-
tion). This means an insulation must
not have a flame-spread rating of
greater than 25 or a smoke devel-
oped rating greater than 50.

Another important fire-test stan-
dard for commercial construction in
ASTM E-119, “Standard Method of
Fire Tests of Building Construction
and Materials,” which tests for fire
endurance levels and gives results in
rating of one-, two-, or three-hours.
Fire endurance is especially critical
in specific commercial applications
where building codes typically man-
date fire barriers to prevent the
spread of fire, maintain structural
integrity and allow time for people
to safely exit the building.

To put the heat of a fire into per-
spective, an ordinary oven in a home
features up to a 550-degrees-Fahrenheit baking temperature. A self-cleaning model will heat up to 800 degrees during the cleaning cycle. A typical two-hour fire test rating is 1,800 degrees—more than double the maximum temperature generated by a self-cleaning oven.

An excellent method of decreasing the risk to people and property during a fire is by using an insulation assembly built expressly for this purpose. In these assemblies, the insulation and its other components work together to keep the cold side from getting too hot, and maintaining the total integrity of the structure by not allowing flames to pass through or spread to other parts of the building. Rock and slag wool insulation is also subjected to ASTM E-814, “Standard Test Method for Fire Tests of Through Penetration Fire Stops.”

Fiberglass, rock wool and slag wool insulations for commercial construction are engineered to meet the fire-performance requirements of today’s rigorous building codes. In addition, they provide valuable energy savings, and thermal and acoustical benefits. These insulation products come in many shapes and sizes to meet every design application challenge found in residential, commercial and industrial construction. When properly selected and installed in accordance with manufacturers’ specifications, these insulation products enhance the building’s structural integrity and quality of our indoor environment.

**About the Author**
The North American Insulation Manufacturers Association, a trade association for fiberglass, rock wool and slag wool insulation manufacturers, offers general information on product performance characteristics, installation guidelines, energy-savings tips, building code compliance, standards and specifications, sound control recommendations, use of vapor retarders and condensation control, insulation and fire safety, thickness recommendations, energy and its procedures and much more.