

A GUIDE TO UNDERSTANDING THE REQUIREMENTS OF NFPA 285 and ROCKWOOL INSULATION

Designing and creating a building that is aesthetically pleasing, energy efficient and safer is at the heart of any design professional. With meeting NFPA 285 becoming an important design consideration, ensuring that these design criteria can be accomplished while meeting building code, specifically NFPA 285, has become an increasing concern.

This technical bulletin aims to help clarify uncertainties surrounding NFPA 285 and how the choice of insulation may restrict design freedom.

TYPES OF CONSTRUCTION

Chapter 6 of the 2012 and 2015 International Building Code [IBC] governs the fire resistance requirements for the various building elements for the 5 types of construction which are described as follows:

Type I and II – the various building elements are made up of non-combustible materials

Type III – exterior walls are made of non-combustible materials and the interior building materials are of any material permitted by the IBC

Type IV [Heavy Timber, HT] – exterior walls are made of non-combustible materials and the interior elements are made of solid or laminated wood without concealed spaces

Types V – structural elements for both exterior and interior walls are of any materials permitted by the IBC, usually combustible construction

ROCKWOOL NON-COMBUSTIBLE STONE WOOL INSULATION

ROCKWOOL offers specific products for cavity wall, curtain wall and fire safing applications. These products have been tested by accredited third party laboratories to the following standards:

ASTM E136 – Standard Test Method for Behaviour of Materials in a Vertical Tube Furnace at 750°C

ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials

The results of the above third part testing confirm that ROCKWOOL stone wool insulation products do not ignite, burn, support combustion or release flammable vapours when subjected to fire or heat. Additionally, ROCKWOOL insulation products achieve a Flame Spread and Smoke Development rating of zero and zero, confirming the products to be non-combustible.

Specific ROCKWOOL stone wool insulation products are accepted under the 2012 and 2015 International Building Code, meeting the requirements of non-combustible materials.

NFPA 285

The IBC requires that wall assemblies that incorporate combustible plastics and combustible water resistive barriers be tested in accordance with NFPA 285 “Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.”

The 2012 IBC includes six provisions where NFPA 285 testing is specifically required:

1. Section 1403.5: For combustible water-resistive barriers in buildings over 40 feet in height of Type I, II, III, or IV construction.
2. Section 1407.10.4: For metal composite materials (MCM) used on buildings of Type I, II, III, and IV construction. Section 1407.11 of the IBC provides alternate conditions that do not require compliance with NFPA 285, such as using MCM not higher than 40 feet and having a fire separation distance of more than 5 feet. If the fire separation distance is 5 feet or less, then only 10% of the wall area can include MCM.
3. Section 1409.10.4: For high-pressure decorative exterior-grade compact laminates (HPL) exterior wall coverings used on buildings of Type I, II, III, and IV construction. Section 1409.11 of the IBC provides alternate conditions that do not require compliance with NFPA 285, such as using HPL not higher than 40 feet and having a fire separation distance of more than 5 feet. If the fire separation distance is 5 feet or less, then only 10% of the wall area can include HPL.
4. Section 1509.6.2: Combustible mechanical equipment screens used on buildings of Type I, II, III, and IV buildings.
5. Section 2603.5.5: Exterior walls of buildings of Type I, II, III, and IV construction of any height incorporating foam plastic insulation, except for one-story sprinklered buildings.
6. Section 2612.5: For fiberglass-reinforced polymer (FRP) exterior wall coverings. This section references Section 2603.5, which means NFPA 285 is required for Type I, II, III, and IV buildings that are more than two stories and higher. However, this section does offer two exceptions that would not require NFPA 285 testing.

The 2015 IBC includes some exceptions to NFPA 285 testing requirement:

- Exception 1: "Walls in which the water-resistive barrier is the only combustible component and the exterior wall has a wall covering of brick, concrete, stone, terra cotta, stucco, or steel with thicknesses in accordance with Table 1405.2."
- Exception 2: "Walls in which the water-resistive barrier is the only combustible component and the water-resistive barrier has a Peak Heat Release Rate of less than 150 kW/m², a Total Heat Release of less than 20 MJ/m² and an Effective Heat of Combustion of less than 18 MJ/kg as determined in accordance with ASTM E 1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m²."
- Exception 3: "Windows and doors and flashing for windows and doors shall not be considered to be part of a water resistive barrier for purposes of this section."
- Exception 4: "For one-story buildings, foam plastic having a flame spread index of 25 or less, and a smoke developed index of not more than 450, shall be permitted without thermal barriers in or on exterior walls in a thickness not more than 4 inches (102 mm) where the foam plastic is covered by a thickness of not less than 0.032-inch-thick (0.81 mm) aluminium or corrosion-resistant steel having a base metal thickness of 0.0160 inch (0.41 mm) and the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1

DESIGNING AROUND NFPA 285

Designing an attractive, durable, sustainable, energy efficient exterior envelope can have thousands of possible products and combinations. Ensuring these combinations are safe and meet building code requirements can be a limiting factor and restrict design freedom. With energy codes requiring higher performance from building envelopes, one of the best methods to improve thermal performance is using continuous exterior insulation, the type of insulation can have one of the biggest impacts on this design freedom.

The following options are then available to design professionals:

- Design a wall assembly and have it tested;

The project budget may not allow for the first option since project specific testing can be very expensive and there may not be enough time to complete testing.

- Design an exterior wall assembly that has no combustible materials

Steel, concrete, masonry, gypsum and mineral wool are the materials of choice when fire performance and designing with non-combustible materials is in mind, thus eliminating the need to test to NFPA 285.

- Select a tested wall assembly from those assemblies that are available

Given that NFPA 285 is an assembly test and not a component test, it has become cost prohibitive for manufacturers to test every possible assembly, however ROCKWOOL and various other manufacturers do have a catalogue of tested assemblies design professionals can pick from.

- Design a building using MCM and HPL that is more than 5 feet from the lot line and is less than 40 feet in height and includes no foam insulation or combustible water-resistive barrier

MCM panel manufacturers such as KingSpan and HPL panel manufacturers such as Trespa have tested assemblies that do not contain foam insulation in the core

- Design a sprinklered building with only one story above grade plane

This option may not be immediately available to the design professional due to a building's design program, available site area, or project budget.

Assemblies that have been tested to and pass NFPA 285 must be strictly followed to obtain the required performance. Modifications, or substitutions to tested assemblies may result in failures of the assembly due to increased fuel loads or change in design loads. These modifications, or substitutions may be permitted through an engineering judgement, however the final acceptance for this modified assembly will lie with the Authority Having Jurisdiction [AHJ].

When tested as part of a complete assembly, selective foam plastics have managed to pass the NFPA requirements, generally at a limited thickness. The use of halogenated fire retardants, spray on fire resistive coatings, thermal barriers, protective cement board, stucco finishes and measures such as a decreased air gap in the wall cavity and special treatment around openings [such as the use of mineral wool above the window] enable these combustible materials to meet the NFPA 285 requirements. Compliance with NFPA 285 does not mitigate the need for engineering fire hazard and fire risk assessments.

Many manufacturers list their products as NFPA 285 compliant and provide details on how their product can be used as part of the an NFPA 285 tested system, however, care should be taken to ensure that the manufacturers details match those of the NFPA 285 tested system.

CONCLUSION

Steel, concrete, masonry, gypsum and stone wool are the materials of choice when fire performance and the presence of combustible materials within the building envelope are of concern.

As insulation thicknesses increase, the potential use of foam plastic insulation increases the fuel load available in a fire event and limits the number of passing NFPA 285 tested systems. While it can seem like the options available for exterior envelope construction are limited, the use ROCKWOOL stone wool insulation is not restricted to a specific thickness, allowing for a wider variety of cladding, and WRB options to be used.

Using the knowledge and information outlined in this bulletin, designers can openly select a variety of materials to be used around ROCKWOOL insulation that will ensure their desire for an attractive, durable, sustainable, energy efficient and safe building is met. Our NFPA 285 tested solutions can be found on Intertek's Directory of Building products at https://whdirectory.intertek.com/pages/DLP_SearchDetail.aspx?id=43109.

For more information on ROCKWOOL's NFPA 285 tested assemblies or how to incorporate ROCKWOOL stone wool into your design, contact ROCKWOOL Technical Innovation at 1.800.823.9790 or contactus@rockwool.com.