GG222-14
508.1 (New), Section 508 (New)

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Add new text as follows:

SECTION 508
INSULATION

508.1 Surface-burning characteristics. Foam plastic insulation shall comply with Section 2603.3 of the International *Building Code*.

> **Exception:** Rigid foam plastic insulation board shall not be subject to flame spread or smoke developed requirements where installed below a concrete slab on grade that provides continuous separation from the interior of the building, or installed as below-grade exterior foundation insulation, or installed in accordance with Section 1809.5 of the *International Building Code*. This foam plastic insulation shall be clearly labeled as such in addition to the requirements of Section 2603.2 of the International *Building Code*.

Reason: Where specific installations of foam plastic insulation pose no fire safety hazard in a building, there is no justification to require that insulation to meet flame spread and smoke developed criteria. The rigid foam plastic insulation in the applications delineated in this proposal present no fire risk. To the contrary, because specific chemicals as well as the general class of chemicals currently used to meet flame spread and smoke developed testing requirements in foam plastic insulation are known or suspected to pose human health and environmental risks, the current requirements increase a range of risks throughout the entire lifecycle of these materials while providing no fire safety benefit – which is the sole reason for requiring these fire performance criteria.

Flame spread and smoke developed requirements have led directly to the incorporation of halogenated flame retardant chemicals in all foam plastic insulation currently available in the U.S. Two key issues among the human and environmental health concerns related to these chemicals are the recognized negative health impacts to firefighters and emergency responders, and aquatic toxicity, which is a particular concern for these applications since the insulation is in contact with soil, and thus has a high likelihood of soil contamination. It is imperative to identify applications for which the use of these chemicals can be reduced or eliminated while maintaining fire safety.

This proposal neither requires changes in current practice nor precludes the use of flame-retarded foam insulation, but would allow manufacturers to meet the rapidly rising demand for foam plastic insulation without halogenated flame retardants. This is especially important for green building projects, which seek to meet stricter requirements for energy efficiency and human and ecological health, augmenting the traditional life-safety goals of the building codes. Growing awareness of the human and ecological health impacts of building materials is driving the rapid increase in market demand apparent in large and small architectural and engineering firms, their clients, home owners, and green building and product certification programs. This market demand for safer insulation is now blocked by current code provisions. This change would create the opportunity for more diversity in the market, encouraging the development and use of products that are safer for humans and the environment without any sacrifice in fire safety.

The labeling of rigid foam insulation to differentiate product lines is already widely done, as in the case of termite resistant and non-termite resistant foam. Any technical challenges to such labeling would be the responsibility of the manufacturers who choose to introduce foam insulation free of halogenated flame retardants.

This proposal represents a more complete risk assessment than current code as it incorporates a more accurate reflection of both actual fire risk and risks to public health, and fire fighter and emergency responders from the hundreds of tons of these persistent chemicals Introduced into the environment every year. Halogenated flame retardants are hazardous or potentially hazardous chemicals which are known to be persistent organic pollutants and global contaminants. Current replacements for the most widely used and recognized chemicals of greatest concern are of the same general class of chemicals and thus are likely to present similar risks (Babrauskas et al.,

2012) .

Substantiation:

Because the code already accepts that 1 inch (25 mm) or greater of concrete or masonry protects foam plastic from ignition in the same way as a thermal barrier which meets the criteria of NFPA 275- by preventing the energy of a fire from reaching the foam, the separation provided by a concrete slab-on-grade or foundation more than adequately protects the insulation. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003). As stated in the Commentary, concrete or masonry also has these characteristics.

There is no evidence or history of fires or fire risk associated with foam plastic insulation used below concrete slabs or for foundation insulation.

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003) . When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

"…persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms."

and

"Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment." (US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012)Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From the 2012 IBC code and commentary:

2603.4.1.1 Masonry or concrete construction. A thermal barrier is not required for foam plastic installed in a masonry or concrete wall, floor or roof system where the foam plastic insulation is covered on each face by a minimum of 1-inch (25 mm) thickness of masonry or concrete.

Commentary No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and interior of the building. The intent is to accept 1 inch (25 mm) of masonry or concrete as equal to (or better than) 1/2- inch (12.7 mm) gypsum wallboard. This condition can arise when foam plastics are installed either within a wall or on the exterior side of a masonry wall. Some common examples are when foam plastics are installed:

- In the cavity of a hollow masonry wall;
- As the core of a concrete-faced panel;
- On the exterior face of a masonry wall and covered with an exterior finish;
- Within the cores of hollow masonry units; or
- Encapsulated within a minimum of 1-inch (25 mm) concrete or masonry wall, floor or roof system, such as in insulated tilt-up or pour-in-place concrete panels.

Note that the exterior surface would be required to comply with Section 2603.5. From the 2012 IgCC:

101.5 Intent. This code is intended to safeguard the environment, public health, safety and general welfare through the establishment of requirements to reduce the negative impacts and increase the positive impacts of the built environment on the natural environment and building occupants. This code is not intended to abridge or supersede safety, health or environmental requirements under other applicable codes or ordinances.

And from the 2012 IBC code and commentary:

[A] 101.3 Intent. The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, *means of egress* facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

Commentary: The intent of the code is to set forth regulations that establish the minimum acceptable level to safeguard public health, safety and welfare and to provide protection for fire fighters and emergency responders in building emergencies. The intent becomes important in the application of such sections as Sections 102, 104.11 and 114 as well as any enforcement-oriented interpretive action or judgment. Like any code, the written text is subject to interpretation. Interpretations should not be affected by economics or the potential impact on any party. The only considerations should be protection of public health, safety and welfare and emergency responder safety.

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Links to the above research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.org/bibliography/.

Cost Impact: Will not increase the cost of construction.

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