Sheet Steel Facts 48

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Sheet Steel Building Products Fire Facts

Introduction

Questions occasionally arise about how sheet steel building products meet the requirements of the National and Provincial building codes related to fire protection. The objective of this Fact Sheet is to highlight certain building code requirements and show how sheet steel building products comply.

Non-combustibility

The definition in the NATIONAL BUILDING CODE OF CANADA (NBCC) 2015 for *noncombustible* is a material that meets the acceptance criteria of CAN/ULC-S114, "Test for Determination of Non-Combustibility in Building Materials". Additional requirements in Sentence 3.1.5.1.(2) state that notwithstanding the definition of noncombustible, a material is permitted to be used in noncombustible construction provided that, when tested in accordance with ULC-S135 at a heat flux of 50 kW/m^2, meet the following requirements:

a) its average total heat release is not more than 3 MJ/m^2;
b) its average total smoke extinction area is not more than 1.0 m^2; and,
c) the test duration is extended beyond the time stipulated in the referenced standard until it is clear there is no further release of heat or smoke.

Tests in accordance with ULC-S135 were conducted for the CSSBI on sheet steel samples with the following specifications:

a) Z275 galvanized metallic coating with a pre-finished paint coating; and
b) AZM150 aluminum-zinc alloy metallic coating with a pre-finished paint coating.

The two material had slightly different results, but the largest average total heat release was 0.62 MJ/m^2 and the largest average total smoke extinction area was 0.94 m^2. These tests confirmed that pre-finished, metallic-coated sheet steel used in Canada is non-combustible.[1]

Flame Spread Rating (FSR) and Smoke Developed Classification (SDC)

Other fire-related performance characteristics of a building material that are regulated by the building codes are the flame spread rating (FSR) and smoke developed classification (SDC).

The FSR and SDC requirements of NBCC, Division B, Subsection 3.1.13. on Interior Finish apply to **interior finishes only**. Prepainted cladding is an exterior component of a building and, therefore, beyond the scope of this Subsection.

If a sheet steel product is used as an interior finish then FSR and SDC limits would apply depending on the building occupancy. The FSR/ SDC for steel are listed in NBCC 2015, Table D-3.1.1.-A as follows:

- 0/0 for unfinished steel; and,
- 25/50 for painted steel (alkyd or latex paint not more than 1.3 mm thick).

[1] Test reports no. 18-002-775(A) and 18-002-775(B), Exova, Mississauga, ON, 26 February 2019.

Fire Resistance Ratings

The definition in the NATIONAL BUILDING CODE OF CANADA (NBCC) 2015 for *fire-resistance rating* (FRR) means the time in minutes or hours that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria. There are certain situations where a building assembly would require a minimum fire resistance rating (e.g. between occupancies or dwelling units). There are a wide range of assemblies made with sheet steel components that have been tested and assigned a FRR. Listings of these assemblies are available in the following:

- NBCC 2015, Volume 2, Division B, Fire and Sound Resistance Tables;
- Underwriters Laboratories of Canada on-line directories; and,
- "A Guide to Fire & Acoustic Data for Cold-Formed Steel Floor, Wall & Roof Assemblies", available at www.steelframingalliance.org

Fire Load or Fuel Load

The fire load, or fuel load, is used by the fire protection engineer in "design fires" to engineer the amount of fire protection needed (e.g., that in some cases leads to unprotected steel work). Fire protection engineers can pursue alternative solutions for fire safety that are not limited to those assemblies that have an assigned FRR.

Metal Roof Deck Assemblies

NBCC Article 3.1.14.2 requires that a metal roof deck assembly meet the conditions of acceptance of CAN/ULC S126, "Test for Fire Spread Under Roof-Deck Assemblies" if there is combustible material above the deck that could propagate a fire underneath. There are a number of roof deck assemblies that have been tested by ULC and are included in their on-line listings. ULC publication "TGKXC GuideInfo Roof Deck Constructions" provides background information on the listings. According to NBCC Clause 3.1.14.2.(2)(a) the S126 test is not required if a layer of 12.7 mm thick gypsum board is installed beneath the roof deck.

Roof Coverings

NBCC Subsection 3.1.15. on roof coverings requires that roof covering classification (Class A, B or C) be determined in conformance with CAN/ULC-S107, "Fire Tests of Roof Coverings." An exemption to this requirement is given for a steel building system provided the roof covering consists of brick, masonry, concrete, metal sheets or metal shingles, as per NBCC Clause 3.1.15.2.(2)(d).

FM Classification of Assemblies

Factory Mutual Global (FM Global) is a property insurance company that has its own set of standards and certifications for building construction. These requirements are not part of the building code and only applicable if the building owner is applying for FM Global property insurance.

For More Information

For more information on sheet steel building products, or to obtain other CSSBI publications, contact the CSSBI at the address shown below or visit the web site at www.cssbi.ca.