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Fire-resistance Ratings - CAN/ULC-S101 Certified for Canada

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Guide Information for Fire-resistance Ratings Certified for Canada

This category covers fire-test methods and acceptance criteria in CAN/ULC-S101, "Standard Methods of Fire Endurance Tests of Building Construction and Materials." The ratings are expressed in hours and are applicable to floors, roofs, beams, columns and walls.

The specifications for the materials and construction of the fire-resistive assemblies are details that directly relate to the established ratings. The hourly ratings apply only to the entire assembly. Individual components are designated for use in a specific system to achieve specified ratings. The individual components are not assigned ratings and are not intended to be interchanged between systems.

Unless specifically detailed in a design or in the product certification information, the impact of galvanization applied to structural steel members has not been investigated under fire-test conditions. Galvanization may impact the adhesion of spray-applied fire-resistive materials or mastic and intumescent coatings.

When a test assembly complies with the acceptance criteria, a detailed description of the assembly, its performance in the fire test and other pertinent details, such as specifications of materials, Classification coverage and alternate assembly details are included in a report for the test sponsor. Sponsors may provide copies of the complete test report upon request. The report also contains a summary of important features of the rated assembly.

A complete description of each rated fire-resistive assembly can be found in Fire-resistance Ratings - ANSI/UL 263 (BXUV).

CAN/ULC-S101 requires loads applied to test samples to be calculated using the Limit States Design Method specified in the "National Building Code of Canada." The standard also requires fire-resistive assemblies with ratings obtained from samples tested with applied loads less than the maximum calculated value to be identified as "Load Restricted."

Assemblies tested with less than the maximum allowable load that would result from loading calculated using the Limit States Design Method are identified as "Load Restricted." The Percent Load Reduction and corresponding Load Restricted Factor for typical assemblies noted in Table I are based upon loading calculated in accordance with the Working Stress Design Method as compared to loading calculated in accordance with the Limit States Design Method. The calculations were performed for assemblies representing spans and member sizes of typical fire-test assemblies. The loads were calculated assuming a span of 4 m for floors and roofs and 3 m for walls.

The "National Building Code of Canada" requires that buildings and their structural components be designed to have sufficient strength and stability so that the factored resistance (ΦR) is greater than or equal to the effects of factored loads. The values for Φ and R are specified in the applicable Limit State Design Methods for concrete, masonry, steel and timber.

Some fire-resistive designs are specified with a Load Restricted Factor. When using fire-resistive designs with a Load Restricted Factor, the factored resistance of the structural members or components should be reduced by multiplying the factored resistance by the Load Restricted Factor specified in the individual fire-resistive designs.

The Load Restricted Factor should be applied to the factored resistance of all structural members or components, including, but not limited to, factored moment resistance (M_r), factored shear resistance (V_r), factored tensile resistance (T_r) and factored compressive resistance (C_r).

Table I

Type of Assembly	Percent Load Reduction (LSD-WSD) / LSD	Load Restricted Factor
W8x28 - AISC (W200x42 - CISC) noncomposite steel beam	12	0.88
W8x28 - AISC (W200x42 - CISC) composite steel beam	29	0.71
Floor/Roof supported by open-web steel joists	4	0.96
Floor supported by cold-formed steel channels	0	none
Floor supported by 2 x 10 in. (38 x 235 mm) wood joists	35	0.65

Wall supported by 2 x 4 in. (38 x 89 mm) wood studs	18	0.82
Wall supported by cold-formed steel studs	0	none
Steel columns	0	none
The ratings for floors supported by cold-formed steel channels and walls supported by cold-formed steel studs do not have a Load Restriction Factor because the associated loads in Canada and the U.S. are based on the same standard: CSA S136 (2001), "North American Specification for the Design of Cold-Formed Steel Structural Members," and "North American Specification and Commentary for the Design of Cold-Formed Steel Structural Members" (2007).		
The ratings for steel columns do not have a Load Restricted Factor because these ratings are based on temperature limitations. No loading is applied to steel columns during the fire test.		

The engineer of record should be consulted whenever fire-resistive assemblies with Load Restricted Factors are selected. The indicated load reductions are based upon factored load effects that are governed by the reduced factored resistance of the structural elements. The selection of structural elements is, at times, based upon service limits, such as deflection and vibration. These factors and others, such as the change in material strength properties as a function of temperature, should be considered when selecting fire-resistive assemblies with Load Restricted ratings.

Unless stated in a design, it is recommended the Load Restricted Factors in Table I be used. Designs detailed in Fire-resistance Ratings - ANSI/UL 263 (BXUV) that are also intended for use in Canada include the statement "Load Restricted for Canadian Applications - See Guide BXUV7."

Assemblies developed from tests where the load applied on the sample was based upon calculations in accordance with the Limit States Design Method are identified in Fire-resistance Ratings - ANSI/UL 263 (BXUV).

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