

Determination of Thickness of SFRM for Beams/Joists in Restrained Assemblies

According to the International Building Code (IBC), 2006, "Fire resistance rated assemblies tested in accordance with ASTM E119/UL 263 shall be considered unrestrained unless evidence satisfactory to the authority having jurisdiction is furnished by a registered design professional showing that the construction qualifies for a restrained classification."

When the design professional has determined that the structure to be fireproofed is in a restrained condition, knowledge of the Building Code and the UL Fire Resistance Directory are vital in selecting the proper SFRM thickness. This information is provided to guide in the appropriate use of the UL Designs and SFRM thickness determination.

Section 714.1 of the 2006 International Building Code (IBC) states the following:

"The fire-resistance rating of structural members and assemblies shall comply with the requirements for the type of construction and shall not be less than the rating required for the fire resistance-rated assemblies supported."

In an example of a building classified as Type IB Construction, Table 601 of the IBC requires floor construction to be rated for 2 hours including supporting beams and joists. It also requires roof construction to be rated for 1 hour including supporting beams and joists.

In the case of a restrained 2 hour rated floor assembly, this clearly states that the fire resistance rating of the beams and joists in this assembly must also meet the 2-hour fire resistance rating requirement.

Section IV Beams; paragraph (2) in the front of the UL Fire Resistance Directory, states:

*"ANSI/UL 263 provides for beams to be included in two types of test assemblies. One type of test assembly contains a full representation of the floor or roof construction being supported by the beam. Classifications resulting from this type of testing may include; (1) Restrained Assembly Ratings, (2) Unrestrained Assembly Ratings, and (3) Unrestrained Beam Ratings. **Restrained Beam Ratings are not determined from this type of test assembly.** Results from these tests are identified as Design Series Nos.A000, D000, G000, J000, and P000. **The other type of test assembly contains a partial representation of the floor or roof construction. Classifications resulting from this type of tested assembly may include: (1) Restrained Beam Ratings and***

National Fireproofing Contractors Association, its members and agents, disclaim any responsibility or liability for the completeness or accuracy of the information in this document.

Copyright © 2008

By

National Fireproofing Contractors Association

All Rights Reserved

Page 1 of 2

1/7/2008

(2) **Unrestrained Beam Ratings.** Ratings for floor or roof assemblies are not determined from this type of test assembly. Results from these tests are identified as Design Series Nos. N000 and S000.”

UL clearly states that Design Series (D) does not give a rating to a restrained beam and that restrained beam ratings and their required fireproofing thickness are only addressed in the UL Design Series (N) or (S).

The only way to achieve the restrained beam rating is to substitute the appropriate N-Series beam or joist into the D-Series for floors and the appropriate S-Series beam or joist into the P-Series for roofs.

It was requested of the International Code Council, publisher of the IBC, to confirm that use of the minimum listed beam in a restrained floor assembly (e.g. D925, a 2 hour restrained floor assembly with a minimum 1 hour unrestrained beam) meets the IBC requirement for 2 hour structural members supporting floors.

In a word, their answer was “No”. Their letter went on to state, “The fire-resistance rating of structural members and assemblies shall comply with the requirements for the type of construction and shall not be less than the rating required for the fire resistance rated assemblies supported.”

Example:

A floor assembly consists of 3-1/2 in. lightweight concrete on all fluted steel floor deck, supported by W8x28 beams. The applicable building code requires a 2 hour restrained assembly rating and that the beams supporting the assembly have the same hourly rating as the assembly. For a 2-hr Restrained Assembly Rating, many UL D900 series floor designs list a corresponding minimum beam thickness for a 1 hour Unrestrained Beam, which for this example does not satisfy the 2 hour rating required for the beam. To satisfy the 2 hour beam rating required by the code, one could use a 2 hour Unrestrained Beam thickness if listed in that D900 series design. Alternatively, one could substitute a 2 hour Restrained Beam from an N000 series design that lists the same product. In most cases, the latter is preferable since the N000 series designs often offer a lesser thickness of SFRM, as indicated in the following table:

	UL D900 Series Floor Design		UL N700 Series Beam Only Design	
		2 hr Unrestrained Beam Thickness		2 hr Restrained Beam Thickness
Product A	D902	11/16”	N759	9/16”
Product B	D925	1”	N782	11/16”
Product C	D949	13/16”	N791	9/16”

These rules are independent of design listing and apply to all fire resistive materials.