

UL Equation for Adjustment of Thickness of SFRM for Restrained and Unrestrained Beams

The UL Fire Resistance Directory allows for the adjustment of thickness of SFRM for Restrained and Unrestrained beams when alternate sized steel beams are substituted for the given beam size in the A700, A800, A900, D700, D800, D900, G700, J700, J800, J900, N700, N800, P700, P800, P900, S700 and S800 series designs, provided the beams are of the same shape and the thickness of SFRM is adjusted in accordance with the following equation:

$$T_1 = ((W_2/D_2 + 0.6) \times T_2) / (W_1/D_1 + 0.6)$$

Where:

T = Thickness (in.) of spray-applied material (SFRM)

W = Weight of beam (lb/ft)

D = Perimeter of protection, at the interface of the protection material and the steel through which heat is transferred to steel (in.)

Subscript 1 = Refers to alternate beam size and required material thickness

Subscript 2 = Refers to given beam size and material thickness shown on the individual design

W/D values are not less than 0.37

T₁ values are not less than 3/8 in. and

The Unrestrained and Restrained Beam Rating is not less than 1 h.

The use of this procedure is applicable to the adjustment of spray-applied fire-resistive material thickness on Restrained and Unrestrained beams. It is not applicable to the adjustment of mastic and intumescent coatings on Restrained and Unrestrained beams.

When used to adjust the material thickness for a Restrained beam the use of this procedure is limited to steel sections classified as compact in accordance with the "Specification for the Design of Structural Steel Buildings" by the American Institute of Steel Construction, Load and Resistance Factor Design, Third Edition.

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The NFCA Technical Committee reviewed the *Specification for the Design of Structural Steel Buildings, Load and Resistance Factor Design, Third Edition*, and determined that Steel beam sections classified as ***noncompact***, and therefore restricted from such adjustment for Restrained beams, include but may not be limited to the following:

For 50 ksi steel: W6x15, W8x10, W10x12, W12x65, W14x90, W14x99, W40x174

For 36 ksi steel: W6x15

For the restrained condition where one of these sizes is present:

If the alternate beam has a W/D ratio greater than or equal to the given beam in the UL Design, the thickness given in the UL Design is applicable.

If the alternate beam has a W/D ratio less than the given beam in the UL Design, apply the adjustment equation using the thickness required for the Unrestrained beam given in the UL Design.

This information is intended to provide guidance on use of the thickness adjustment equation and NFCA accepts no responsibility for its application or misuse.