

actual rate of heating of the W24x55 floor beam in a composite floor would be expected to fall between the times shown in the figures.

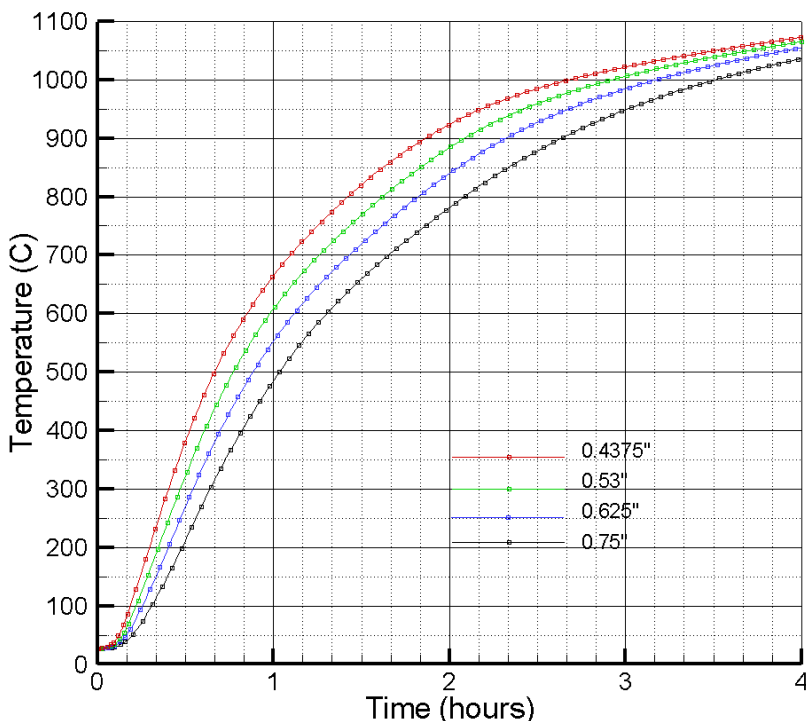
When the steel beam reached 600 °C under the ASTM E 119 temperature curve, the additional protection provided by increasing the SFRM thickness to 0.625 in. (5/8 in.) or 0.75 in. (3/4 in.) was approximately 8 min to 15 min, as shown in Figure 11–50. The ASTM E 119 tests for floors and roofs allow the temperature criteria to apply for one half of the classification of the assembly or 1 h, whichever is greater. For instance, for a 2 h fire rating for a floor assembly, the floor beams cannot exceed the temperature criteria of 1300 °F (704 °C) at any one location or 1100 °F (593 °C) for the average temperature at a cross section for 1 h.

When the steel beam reached 600 °C under the uniform 1100 °C gas temperature, the additional protection provided by increasing the SFRM thickness to 0.625 in. (5/8 in.) or 0.75 in. (3/4 in.) was approximately 10 min to 20 min, as shown in Figure 11–51.

Comparing Figure 11-51* to Figure 4-7, it can be seen that the temperature rise in the lower flange and web is similar. Figure 4-7 shows the temperature of a W24x55 floor beam with 0.5 in. of SFRM in a composite floor assembly for a constant 1100 °C gas temperature below the concrete slab. Figure 11-51* shows the temperature of a W24x55 beam (no concrete slab) with 0.53 in. of SFRM for a constant 1100 °C gas temperature. The beam without a slab analysis was conducted to evaluate the effect of SFRM thickness on steel temperature for a floor beam. The lower flange and web in Figure 4-7 and the beam in Figure 11-51* both reached 600 °C in 25 to 30 min.

Thus, an increase in the SFRM thickness on the floor beams would have delayed heating of the floor beams by 10 min to 20 min, but would not* have altered the outcome.

Figure 11–50.
Heating of a typical floor
beam (W24 x 55) subject
to an ASTM E 119
temperature profile for
different SFRM
thicknesses.



* Corrected text January 2009. Changes were made to this page only. Similar statements are correct in the original text for Chapter 11 Summary and in the findings and recommendations in NIST NCSTAR 1A.