Super Firetemp Board for Fire Protection of Pipe and Tanks

In most applications, high-temperature insulation is typically specified for energy savings, process control, and personnel safety. However, it can also be applied in chemical and petroleum industries as Structural Fire Protection (SFP). With SFP applications, the basic principle for installing insulation still applies – reduce heat-flow; however, the reason for doing so differs. In SFP applications, the objective is to reduce heat-flow from the outside-in to protect the integrity of the structural member in the case of a fire, whereas in typical applications, insulation reduces heat-flow to maintain process control. In the event of a fire, structural steel must be protected because when the temperature of the steel reaches 1000° F, its structural strength is reduced to 40% of its strength at ambient temperatures, threatening the integrity of the structure itself.The specs were analyzed by SEM-EDS to identify the composition of the specs.

To estimate the insulation thickness that should be used for an SFP application, designers should target a specific hourly rating (the amount of time an insulation can withstand external heat before the steel beneath reaches 1000°F), by applying fire test data based on the mass of the structural element and the thickness of the insulation. Third-party data and test protocol ensures the structure will meet the time requirements (hourly rating) of the application before the temperature of the system reaches 1000°F.

Systems used for SFP in a chemical or petroleum environment are evaluated in accordance with UL 1709[1], which subjects the system to a temperature of 2000°F within 5 minutes after the start of the test. The test is run until the insulated steel has reached an average temperature of 1000°F with no single thermocouple reading greater than 1200°F. In the case of UL design XR301[2], several tests were performed on Johns Manville's Super Firetemp M board using the UL 1709 test method. Different insulation thicknesses and structural steel weights were tested to develop parameters for estimating the thickness of insulation needed to meet a specific hourly rating.

DESIGN NO. XR301 (For complete listing details visit the UL website)

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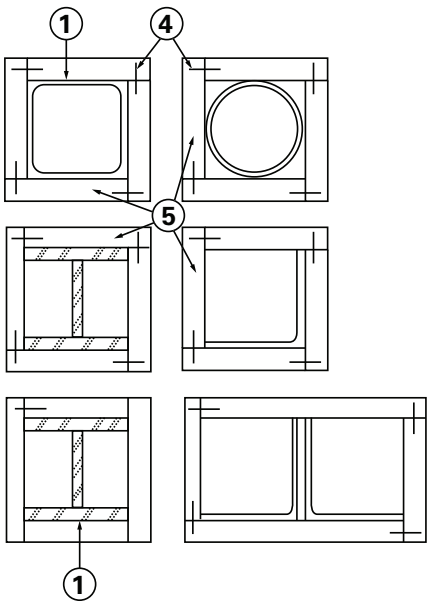
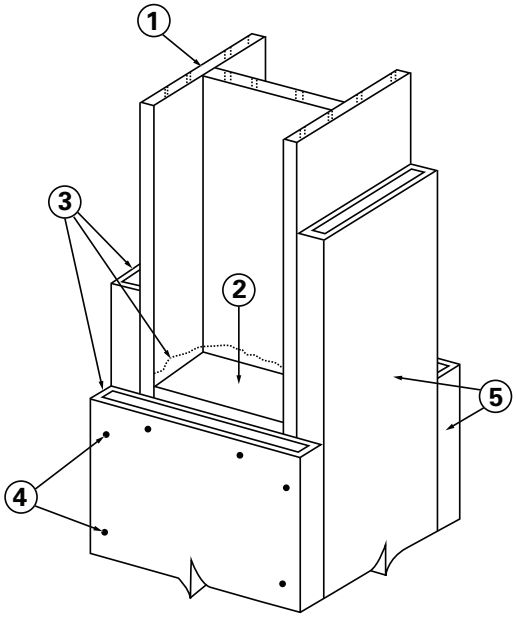
Ratings - 1, 1-1/2, 2, 2-1/2, 3 and 4 Hrs.

*Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.





1 UL 1709 Standard for Safety – Rapid Rise Fire Tests for Protection Materials for Structural Steel. Fire testing that requires a furnace temperature of 2000F within 5 minutes of the start of the test. The test was developed to simulate hydrocarbon "pool" fires.
2 UL XR301 is a fire resistance design based on UL 1709 testing of Johns Manville Super Firetemp M board.

1. Steel Column* - W-shaped, tubular, 2L back to back, L and Extra Strong Pipe steel columns. Min size for W-shape column is W6x16, min size for tubular columns is TS 4 x 4 x 0.188 in.; min sizes for 2L back to back columns are 2-1/2x2-1/2x3/8 in. (W/D = 0.787), 5x3-1/2x3/8 in. (W/D = 0.77); min size for L Columns is 5x3-1/2x3/8 in. (W/D = 0.612); and min size for Extra Strong Pipe column is nominal diameter 4 in. with wall thickness 0.337 in. (W/D = 0.832), as shown under Item 5.

2. Ribs - (For use with W-shaped columns only) - Min 1 in. thick mineral and fiber board (see Item 5) cut to fit snugly and flush between colu8mn flanges. Ribs to be used to back up butt joints when board thickness is less than 1 in. Ribs are optional for boards 1 in. thick or greater.

3. Adhesive* - Used to secure ribs (Item 2) in place and at butted joints on the sides of the column. May be used as spackle along joints and over recessed nail heads.

INDUSTRIAL INSULATION GROUP LLC - Type Calsilite CALBOND.

4. Fasteners - The boards (Item 5) are secured to the ribs and to one another by means of steel box (casing) nails spaced max 8 in. OC beginning 3 in. from top and bottom ends. As an option, Type S drywall screws may be used. The min length of fasteners should be twice the thickness of the board.

5. Mineral and Fiber Board* - The boards are cut in various widths to be compatible with the size of column being protected. For W-shaped columns, boards placed parallel with the flange are cut the width of the flange plus 1/4 in. Boards placed parallel with the web are cut the width of the web face plus twice the board thickness plus 1/4 in.

For tubular Extra Strong Pipe columns, boards are cut the width/diameter of the column plus the thickness of the board, plus 1/4 in.

The gap at the top of board protection shall be filled with a ceramic fiber material.

The thickness of mineral and fiber board (Item 5) required for rating periods of 1 h, 1-1/2 h, 2 h, 2-1/2 h, 3 h, and 4 h may be determined by the equation:

Where:

$$h = \frac{1.08\ R}{1.16\left(\frac{W}{D}\right) + 0.26}$$

h = Board thickness in the range 0.75-3 in.

R = Fire resistance rating in hours (1-4 h).

D = Heated perimeter of steel column in inches.

W = Weight of steel column in lbs per ft with (W/D) int he range 0.55 - 4.0.

As an alternate to the equation, the min thickness of mineral and fiber board required for various fire resistance ratings may be determined from the information in Table I.

Column Size	W/D	Min Thk in.					
		1 Hr	1-1/2 Hr	2 Hr	2-1/2 Hr	3 Hr	4 Hr
TS4x4x0.188	0.59	1-3/16	1-3/4	2-5/16	2-7/8	_	_
TS8x8x0.25	0.81	15/16	1-3/8	1-13/16	2-1/4	2-3/4	_
W6x16	0.77	15/16	1-3/8	1-7/8	2-3/8	2-13/16	_
W8x28	0.96	13/16	1-3/16	1-9/16	2	2-3/8	_
W10x49	1.23	3/4	15/16	1-5/16	1-5/8	1-15/16	2-9/16
W12x106	2.11	3/4	3/4	13/16	1	1-3/16	1-5/8
W14x233	3.65	3/4	3/4	3/4	3/4	3/4	15/16