

International Conference of Building Officials

RESEARCH COMMITTEE RECOMMENDATION

Report No. 1578
September, 1972

**VERMICULITE TYPE MK-3 AND MK-4 (MONO-KOTE)
FIREPROOFING
ZONOLITE DIVISION
W. R. GRACE AND COMPANY
2500 S. GARNSEY
SANTA ANA, CALIFORNIA 92680**

**VERMICULITE PRODUCTS
HOUSTON, TEXAS
TEXAS VERMICULITE
DALLAS, TEXAS
ROBINSON INSULATION
GREAT FALLS, MONTANA
VERMICULITE-INTERMOUNTAIN
SALT LAKE CITY, UTAH
ARI-ZONOLITE
PHOENIX, ARIZONA**

I. Introduction: At the request of the Zonolite Division, W. R. Grace and Co., Santa Ana, California, the Research Committee of the International Conference of Building Officials has made a re-examination of the data submitted in connection with the use of Vermiculite MK-3 and MK-4 (Mono-Kote) Fireproofing.

II. Description: General: Vermiculite MK-3 (Mono-Kote) Fireproofing is a mill-mixed cementitious material of grayish brown color and granular texture which is machine-applied to fire-protect steel beam and floor construction. The exact composition of the material is of a proprietary nature. Vermiculite MK-4 (Mono-Kote) Fireproofing is completely free of asbestos fibers. It is machine-applied to fire-protected steel beam and floor construction. The exact composition is also of a proprietary nature.

Application: The material is supplied in bags and is mixed with approximately six gallons of water per 25 pounds of material. It has setting characteristics and must be applied promptly after mixing. Clean equipment must be used.

It is mixed in a mixer for a minimum of three to four minutes and then machine-applied through a nozzle with air pressure and volume adjusted to provide a spray pattern. The material is applied in one coat, doubling back when the thickness is to exceed one inch

(1"). The wet density of the material as applied through the nozzle ranges from 52 to 65 pounds per cubic foot. The in-place density required is approximately 1.5 pounds per square foot per inch of thickness and may be verified by removing one square foot of the material and determining the density after oven drying to constant weight. Steel surfaces which are to be protected must be clean and dry and free from dust, oil, grease, galvanized particles or any other substances which would prevent good adhesion. Steel beams and columns may be painted or unpainted.

III. Evidence Submitted: The results of fire endurance tests are submitted.

Recommendation

IV. Recommendation: That the Vermiculite Type MK-3 and MK-4 Fireproofing as manufactured by member companies of the Vermiculite Institute is a satisfactory alternate method of fire protection of steel beam, column and floor construction to that specified in the Uniform Building Code provided:

1. The material is applied as set forth in Part II of this report.
2. The material is classified as a Class I interior finish.
3. Type MK-3 and MK-4 (Mono-Kote) Fireproofing is not allowed as a ceiling or wall finish or exposed beam treatment at a ceiling height of less than eight feet (8').
4. The thicknesses are not less than the values set forth in Table No. I.
5. Fire-resistive ratings assigned to structural steel columns are contingent upon protection of the MK-3 and MK-4 Fireproofing from the floor to a height of at least eight feet (8') by an approved surfacing material to avoid injury to the fireproofing on any face that may be subjected to direct contact.
6. Where trench headers or header ducts are used the method for establishing header duct location from the underside shall be approved by the Building Official.

This recommendation is subject to annual re-examination.

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TABLE NO. 1—MINIMUM THICKNESS (IN INCHES) OF
TYPE MK-3 AND MK-4 (MONO-KOTE) FIREPROOFING

TYPE OF CONSTRUCTION	4-HR.	3-HR.	2-HR.	1-HR.
Three-inch deep cellular steel floor or roof panels (fluted top and bottom plate) with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of the steel panels to fill all troughs to depth shown (measured from bottom of panels)		½		
Three-inch deep cellular steel floor or roof panels (fluted top and bottom plate) with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of the steel panels following the contour		¾ (Bs) ¾ (T)	¾	
Three-inch deep cellular steel floor or roof panels (fluted top plate and flat bottom plate) used in conjunction with all fluted (single plate) floor or roof deck with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of the panels following the contour ²		¾ (Bs) ¾ (T)	¾	
Three-inch deep all cellular steel floor or roof panels (fluted top plate and flat bottom plate) with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the steel panels ²		¾	¾	
Three-inch deep all fluted steel floor or roof panels (single plate) with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the steel panels following the contour		¾ (Bs) 1 (T)	¾	
One and one-half-inch deep fluted steel floor or roof panels with web indentations (single sheet) and 2½-inch reinforced concrete slab on top (designed to act as a composite section with the deck) and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of the steel panels to fill all troughs to depth shown (measured from bottom of panels)			¾	

TABLE NO. 1—(Continued)

TYPE OF CONSTRUCTION	4-HR.	3-HR.	2-HR.	1-HR.
Reinforced concrete joist construction with a 2½-inch thick concrete slab and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of slab only. Joist steel shall have 1-inch clear concrete cover			¾	
One and one-half-inch deep all fluted (single plate) or cellular steel floor or roof panels (fluted top plate and flat bottom plate) with web indentations (designed to act as a composite section with the concrete) with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of the steel panels following soffit contour		¾ (B) 1 (Ts)	¾	
One and one-half-inch deep all fluted (single plate) or cellular steel floor or roof panels (fluted top plate and flat bottom plate) with 2½ inches of concrete on top and Type MK (Mono-Kote) Fireproofing applied directly to the soffit of the steel panels following soffit contour		¾	¾	
Concrete masonry block and beam floor and roof system with Type MK (Mono-Kote) Fireproofing applied directly to the bottom flange of the steel beams		¾	¾	
Steel beam with Type MK (Mono-Kote) Fireproofing applied directly to web and flanges	2	1½	1	¾
Structural steel columns with Type MK (Mono-Kote) Fireproofing applied directly to the web and flanges	2½	1¾	1¾	¾
Structural steel columns having a section equal or greater than a 14WF 228 column with Type MK (Mono-Kote) Fireproofing applied directly to the web and flanges	1¾	¾		

¹(A) Unless otherwise indicated, the specified thicknesses of Type MK Fireproofing are average values $\pm \frac{1}{8}$ inch. The amount of thickness over $\frac{1}{8}$ inch shall not be included when determining the average.

(B) indicates the required thickness of Type MK Fireproofing on the bottom of fluted sections, or on the flat plate of sections having a flat lower plate. (T) is the required thickness across the top of the fluted sections. Subscript (s) following symbols B or T (Bs or Ts) indicates the same thickness as required for the bottom (B) or Top (T) is required for the sides of the fluted sections.

²Approved trench headers having a maximum width of 36 inches may be used provided they are protected with $\frac{1}{8}$ -inch additional thicknesses of Type MK with flutes of the fluted units filled. The increased thicknesses shall extend 3 inches beyond each side of the header.

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