



19 February 2020

Luke Street
Project Manager
Norkote
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Email: luke@norkote.com

RE: Project: Killingsworth
Location: Portland, OR
Contractor: Norkote
Isolatek Engineering Judgment: 01CS20044, dated: February 13, 2020

Dear Luke:

We have received and reviewed the Engineering Judgment documentation, 01CS20044, prepared by Cole Swanson, Isolatek International Engineering Staff, dated 13 February 2020 regarding the use of CAFCO Spray Applied Fire Resistive Material (SFRM) on structural steel beams at the above referenced project, along with all pertinent data. It is desired that the appropriate thickness of CAFCO SFRM be determined so that the required hourly fire-resistance rating of the load bearing, hollow tube steel beams is maintained in accordance with ASTM E119/UL 263, "Standard Test Methods for Fire Tests of Building Construction and Materials," as well as the 2014 Oregon Structural Specialty Code.

A listed fire resistance system has not been tested for this specific application. As a result, an Engineering Analysis per Item #4, Section 703.3 of 2014 Oregon Structural Specialty Code, is required in the form of an Engineering Judgment to address the fire resistance rating of this condition. Section 703.3 states that, "The application of any of the methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 or UL 263. The required fire resistance of a building element, component or assembly shall be permitted to be established by any of the following methods or procedures: 1) Fire-resistance designs documented in approved sources; 2) Prescriptive designs of fire-resistance-rated building elements, components or assemblies as prescribed in Section 721; 3) Calculations in accordance with Section 722; 4) Engineering analysis based on a comparison of building element, component or assemblies designs having fire-resistance ratings as determined by test procedures set forth in ASTM E119 or UL 263; 5) Alternative protection methods as allowed by Section 104.11; 6) Fire-resistance designed certified by an approved agency."

It is standard industry practice to determine thickness based on calculated A/P and W/D ratios. These ratios are determined by dividing the weight, W, of the steel section in lbs./ft. (or the cross-sectional area, A, of the steel member) by the heated perimeter, D (or P), of protection at the interface of the



protection material through which heat is be transferred to the steel, in inches. A/P ratio equation for steel columns is provided in the Underwriters Laboratories, Inc. (UL) Directory. The member listed falls outside of the respective UL Designs to achieve the fire rating, as this condition requires evaluation of a miscellaneous shape (steel angle). It is also standard industry practice to utilize column designs (X- or Y-Series UL designs) as a basis for determining thickness as these are more conservative due to the four-sided exposure, as opposed to a three-sided exposure. In addition, column tests do not account for the heat sink properties of a concrete floor. Thickness would be determined based on the derived W/D ratio of the wide-flange steel member and the corresponding column design thickness.

Limiting temperatures for beam evaluations are for a limiting average steel temperature of 1100°F, or a limiting individual steel temperature of 1200°F at any single measured point. Based on alternative methods of testing in accordance with ASTM E119, item #26 Conditions of Acceptance, the column thicknesses will provide limiting average steel temperatures of 1000°F, or a limiting individual steel temperature of 1200°F at any single measured point. These temperatures are more stringent than those required for beam evaluations.

Pursuant to our review of the evaluation presented, we find the report provides substantial justification to support the conclusions drawn that the required fire-resistance rating in accordance with ASTM E119 would be obtained, provided that the CAFCO SFRM is installed in accordance with manufacturer's written application installation instructions and methods.

This review is limited to those specific assemblies depicted and only for use as part of the above referenced project and cannot be extended to other assemblies or projects. The rating of the fireproofing system is dependent on the performance of the surrounding structure under fire exposure. The contractor is responsible for the compliant installation of the referenced engineering judgment.

Reviewed by: John D. Campbell, P.E.



EXPIRES: Dec 31, 2021