



Fire Protection Products

BURNING ISSUES



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SMOKE SEALING PERIMETER JOINTS

In response to an industry wide demand for a perimeter joint (curtain wall gap or edge of slab detail) solution, 3M has invested resources to develop a tested solution. As of June 4, 1997, we have tested a 6.0" joint between four typical exterior wall substrates and a concrete slab to the movement criteria ASTM E 1399, "Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems" and air leakage criteria of UL 2079, "Tests for Fire Resistance of Building Joint Systems." The following are the application details of the perimeter joint solution and discussion.

Assembly: A maximum 6" wide perimeter joint between a minimum 4.5" concrete floor and an unrated exterior curtain wall constructed of steel, aluminum, concrete, or gypsum wallboard.

Smoke Seal Rating: <2 CFM/LIN FT per UL 2079

3M Fire Barrier Material: FireDam™ Spray

Movement: 16.7% Extension and Compression (500 cycles at 10 cycles/minute per ASTM E 1399)

Application Details: To smoke seal the joint, install a minimum 3" depth of 4lb. Density mineral wool compressed 25% into the opening, and then apply a minimum 1/8" wet coating of FireDam™ Spray onto the mineral wool overlapping onto the curtain wall and concrete a minimum 1/2" as detailed in the attached Omega Point Laboratories Test Report dated June 4, 1997.

Discussion: The substrates that make-up the perimeter joint have different fire ratings. The concrete floor has a 2 hour rating per ASTM E 119, and the steel panel has a 0 hour rating. The joint system connecting the two substrates takes the rating of the weaker substrate; therefore, the joint cannot carry a rating. However, from previous testing 3M FireDam™ Spray, when installed properly, will provide a smoke seal. When installed properly, they will receive a L rating of <2 CFM/FT² per UL 2079 testing.

August 6, 1997

Mr. Brandon Cordts
3M Company
3M Center Building 207-1W-02
St. Paul, MN 55144-1000

Re: Project No. 9006-101458
UL 2079 Air Leakage Tests of FireDam™ Spray

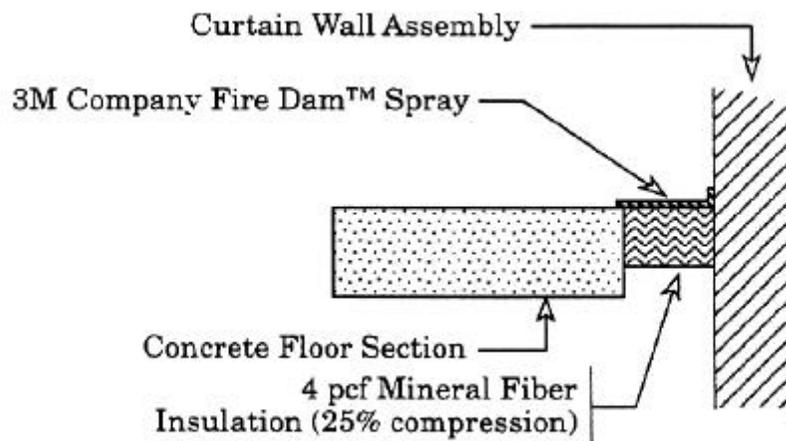
Dear Mr. Cordts:

This letter will serve as a synopsis of the results obtained in the series of air leakage rate tests which we performed on May 22 and 23, 1997. The test series was performed in accordance with UL 2079 (sections 19-22). Four sepa-

rate test articles were constructed to evaluate potential differences in adhesion of the tested material to various substrates. Each of the test assemblies mimicked a section of curtain wall and adjacent slab with the test sample comprising the perimeter joint smoke seal between these two entities. In each case the slab section consisted of normal weight concrete and the wall construction was of one of the following four materials: concrete, gypsum, aluminum, steel. The seal installed into each test article was identical and was installed into a 6" width joint opening. The seal (4 pcf mineral wool installed flush with the top of the slab section (8" width compressed into 6" opening), topped with a spray application of 3M Company FireDam™ Spray. The edges of substrate construction on either side of each joint were masked to maintain a consistent 1/2" overlap. The spray material was applied to an approximately wet thickness of 1/8" to allow for a minimum dry thickness of 1/16" (50% moisture loss expected) and was allowed to cure for a minimum of 48 hours. The joint detail tested is shown in the figure on the following page.

Prior to leakage rate testing, each test article was cycled in accordance with the ICBO ES AC 30 at a rate of at least ten (10) cycles per minutes for a total of 500 cycles. The joint was subjected to a 16.7% movement (5" minimum width to 7" maximum width) The joint was then stretched to the maximum width of 7" and prepared for air leakage rate testing.

The air leakage test was conducted, for each test article, at ambient conditions and at elevated temperature (400°F). The air leakage rate is determined by enclosing the underside of the seal and developing a constant pressure of 0.3" W.C. The top of the seal is then covered and sealed with an air impermeable membrane and the extraneous chamber leakage is determined by measuring the air supply velocity required to maintain the designated pressure. The membrane is then removed and the velocity is again measured to determine the total metered air flow. Once the air supply is corrected to STP and the velocity is converted to volumetric flow, the difference between the two leakage rates is calculated and converted into the quotient of air leakage and divided by the overall seal length and is expressed in standard cubic feet per minute per linear foot of seal (sCFM/lin. Ft). This procedure is duplicated with the pressure chamber temperature raised to 400°F±20°F.



SPRAY APPLIED JOINT DETAIL

Substrate Construction	Air Leakage Rate (sCFM/lin.ft)	
	Ambient	400°F
Concrete-Concrete	0.254	0.322
Concrete-Steel	0.704	0.704
Concrete-Gypsum	1.915	1.532
Concrete-Aluminum	0.509	0.509

If you have any questions, please feel free to call us at any time.

Written by Herbert W. Stansberry II
 Manager, Fire Resistance Testing Services