

# Fire Performance of Duct Liners: A Product Comparison Study

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## Background

### Importance of ASTM E84 Fire Testing

The formal name of ASTM E84 is the Standard Test Method for Surface Burning Characteristics of Building Materials. The purpose of this test is to observe the flame spread along a sample to determine the relative burning behavior of the material. There are several ASTM E84 references in the International Mechanical Code (IMC) that set limits to the Flame Spread Index (FSI) and Smoke Developed Index (SDI) in specific applications. Most relevant for this study, the IMC sets stringent FSI and SDI limits for duct insulation products located in plenum spaces to ensure occupant safety from dangerous fire spread and smoke in the event of fire.

### Preliminary Testing of Elastomeric Products

Initial testing performed by NAIMA at independent testing laboratories showed consistent failure of elastomeric products to meet claimed FSI and SDI performance from multiple manufacturers. NAIMA engaged with multiple elastomeric product manufacturers to provide substantiation of their claimed performance (i.e. independent ASTM E84 test reports) – no manufacturer provided a report.

## Round Robin Testing Plan

As a result of these initial tests, NAIMA developed a plan to systematically conduct third-party testing of both elastomeric and fiberglass duct liner products at multiple Intertek Laboratories.

The engagement of a third-party test laboratory as a part of this test program ensures that the ASTM E84 and E2231 procedures are followed without individual manufacturers guiding product selection or configuration of the test apparatus.

The results of the test program are listed below and show a systemic issue with the performance of elastomeric products. The results of this study are not intended to make claims on individual elastomeric products, but to display the issue at large. However, company claims should be investigated further based on the performance seen in this test program.

# ASTM E84 Results By Product Class

Elastomeric Duct Liner Products														
Company	Average		Intertek Elmendorf						Intertek York					
			Test 1		Test 2		Test 3		Test 1		Test 2		Test 3	
	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI
Company X	18	73	15	95	15	85	15	110	20	55	20	45	20	45
Company Y	32	267	25	300	35	250	40	300	30	250	30	250	30	250
Company Z	57	325	30	250	25	250	30	300	120	350	75	400	60	400

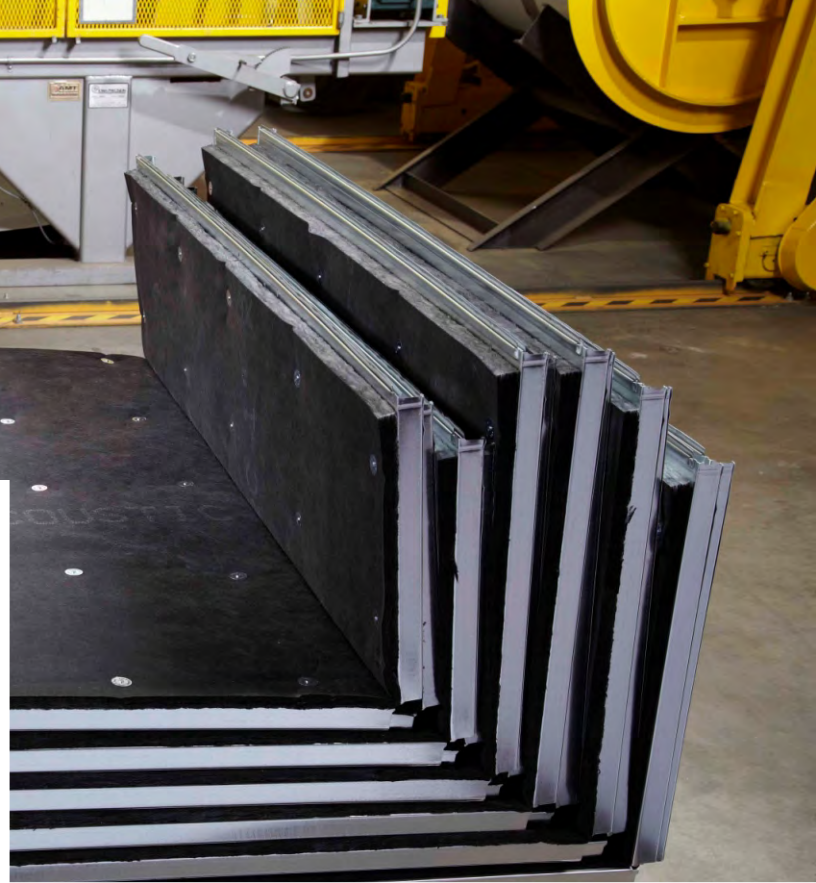
≤ 25 FSI or 50 SDI
  > 25 FSI or 50 SDI

Fiberglass Duct Liner Products														
Company	Average		Intertek Elmendorf						Intertek York					
			Test 1		Test 2		Test 3		Test 1		Test 2		Test 3	
	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI	FSI	SDI
Company 1	18	8	15	10	15	10	15	10	20	10	20	5	20	5
Company 2	18	0	15	0	15	0	15	0	20	0	20	0	20	0
Company 3	15	3	5	0	10	5	15	5	20	5	20	0	20	5
Company 4	18	3	15	0	15	5	15	0	20	0	20	5	20	5

≤ 25 FSI or 50 SDI
  > 25 FSI or 50 SDI

## Actions Designers and Specifiers Can Take Today

1. **Request third-party ASTM E84 testing report for the specific products.** The testing program found that, as a product category, elastomeric products with published flame spread index (FSI) and smoke developed index (SDI) values of 25 and 50 far exceeded claimed performance. While some products may meet 25 FSI and 50 SDI, the values included on product data sheets for elastomeric products were not in line with actual product performance. During engagement with manufacturers to discuss participation in the program, elastomeric manufacturers did not provide ASTM E84 test reports to corroborate their published data sheet claims for fire performance.



2. **Revisit your standards specifications if they include elastomeric duct liner products.** If you have standard specifications for elastomeric duct liner products, it may be worthwhile to call out specific products that you have obtained ASTM E84 reports for or remove elastomeric from the standard specification until more information is provided.

## Additional Test Program Details

- **Performed at Multiple Third-Party Test Labs.** This testing was designed so that a product from each manufacturer was tested three (3) times across two different test laboratories in compliance with manufacturer and ASTM E2231-19 guidance for mounting.
- **Standard Product Thickness Tested.** This partnership was designed to test duct liner products 1-inch thick. Products with higher thicknesses are readily available for all product types.
- **Multiple Manufacturers for Each Product.** Testing included products from four (4) fiberglass manufacturers and three (3) elastomeric manufacturers.
- **Product Acquisition.** Products were shipped directly from distributors and were acquired by the testing laboratory. At no point were products handled or individually selected by manufacturers.

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NAIMA is the association for North American manufacturers of fiberglass, rock wool, and slag wool insulation products. Its role is to promote energy efficiency and environmental preservation through the use of fiberglass, rock wool, and slag wool insulation, and to encourage the safe production and use of these materials. Through the Insulation Institute™, we leverage the collective insulation expertise of our organization and our members to empower homeowners and professionals to make informed insulation choices. Our mission is to enable a more comfortable, energy-efficient and sustainable future through insulation — and we are constantly working with building professionals, homeowners, government agencies, and public interest, energy and environmental groups to realize that vision.

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PUB. NO. AH149 5/23

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