



A lot of emphasis has recently been placed on having Factory Mutual (FM) approval for FRP composite duct. We have also seen specifications worded where the duct must meet the requirements for FM approval, even though such approval may not have been obtained.

There has been much misunderstanding as to just what such FM approval really means, in the real-world, in the way of increased safety and in-plant ducting performance.

To begin with, the standard duct tests that have been conducted by FM, and for which some fabricators have obtained FM approval, all assume that the fire will start inside of the duct. In reality probably 85% to 90% of all fire involving FRP composite duct and pipe have been from an external flame source. In this case the outside structural wall of the duct is the controlling "fire" criterion.

The acceptance level for Factory Mutual on their duct test is that the internal flame must not reach the 23 ft. point from the flame source, within 15 minutes of the start of the test. In addition, the temperature at the 23 ft. point must not reach 1000°F. This basis for "pass or not pass" is skewed in favor of a metallic duct, or a very thin wall plastic duct, with almost no corrosion liner.

What the FM test is actually measuring is the ability of the duct to radiate and conduct heat through the wall of the duct to the outside - lowering the temperature inside of the duct, and thus decreasing the flame advance. The Factory Mutual test and requirements make no judgement on the ability of the duct to handle the corrosive environment. The very nature of FM the test itself is severely weighted against duct made with thicker corrosion barriers.

As discussed in the patent of one manufacturer that has FM approval - during the Factory Mutual tests he deliberately kept the duct corrosion liner thickness to less than 50 mils. By doing so, there would not be any significant amount of contribution to the fire on the inside of the duct.

It is also interesting that during this same manufacturer's FM test, the outside of the duct caught on fire and burned vigorously for at least four feet, or greater, from the fire source. In the real-world this external burning of the duct exterior would be a very strong detriment to the use of that particular duct system. But yet external burning is not, and was not, penalized in the Factory Mutual test procedure. (The external fire helps the duct pass the arbitrary 23 ft. benchmark, because the convection current, set up by the external fire, carries the heat away from the duct wall - lowering the temperatures inside of the duct).

A properly made fume duct, with its heavier walls and corrosion liner, would not be able to pass the Factory Mutual test. But yet that properly made duct, as we have been able to demonstrate by Factory Mutual and Southwestern Labs testing, would never catch on fire or smoke on the interior or exterior.

Even those manufacturers that do have FM approval tend to "wink" at the FM requirements when it comes to shipping actual ducting for a real-world project. Factory Mutual is very specific in that you must ship the same identical product which was tested and approved. But yet most duct manufacturers know that for aggressive service environments, and especially for chemicals like hydrofluoric acid and sulfuric acid, that a minimum 100 mil corrosion liner is mandatory. Yet, these manufacturers have



## ***Industrial Fiberglass Specialties, Inc.***

521 Kiser Street  
Dayton, OH 45404-1641  
Tel: 937-222-9000  
Fax: 937-222-9020

Technical Bulletin

### ***Factory Mutual Approval for FRP Duct versus "Real World"***

02-28-1996

Page #2 of 2

Factory Mutual approval only for a 30 to 50 mil corrosion liner, and a very thin structural wall. From field inspections, this has never kept these suppliers from furnishing laminate constructions for which Factory Mutual approval has not been obtained - yet still putting the FM label on the product.

When an engineering firm or end user specifies Factory Mutual approval for duct, often based upon misinformation or a misunderstanding about the true real-world requirements for FRP composite duct, we are at a competitive disadvantage. Without question, based upon Factory Mutual and Southwestern Testing Labs test results on our ducting system, we have a far superior fume duct system, with built-in "real-world" corrosion resistance. However, when certain jobs come along, and other companies promote their FM label - which has little meaning in the real-world - we might as well move on to other projects.