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Fire tests – then and now...

by Steve Hahn

"Look for the label" is an expression sometimes used to encourage consumers to verify the characteristics or suitability of a product. While fire doors don't really qualify as consumer products, the expression still certainly applies. Before any manufacturer can produce a fire door, it must first endure rigorous testing in compliance with recognized standards to validate its performance in a fire condition. Successful completion of such testing, and meeting subsequent additional requirements, is evidenced by a label being attached to the door.

Fire doors are listed or classified by testing laboratories. I'm sure you'll recognize the common laboratory names of UL, FM and Warnock Hersey. These laboratories follow test protocols – either their own in the case of UL 10B, or one of another nationally recognized standard, such as ASTM E-2074 or NFPA 252 – in the testing of many types of fire doors.

Test protocols have changed over the years since UL first started testing fire doors in 1903. Interestingly, according to their website, "...a rolling steel fire door was the very first product tested under UL's Listing service." Test procedures also vary somewhat depending on the type of door being tested and its hourly fire rating, but following is a brief explanation of the test process normally experienced by a rolling steel fire door.

At some point prior to the fire test, the door is subjected to operational tests to verify normal operation, automatic closing, and closing speed. FM conducts additional durability testing – consisting of cycle testing and a series of repeated drop-tests – intended to simulate a door's durability over what might be considered its reasonably expected life.

The actual fire test process starts with a rigid test frame being filled with either masonry or rated non-masonry wall construction, depending on the type of approval being sought. The test door is installed on the wall, the frame is attached to the front of the test furnace, and the furnace is ignited.

Different laboratories have different types of gas furnaces, but the tests are conducted following a standardized time-temperature curve. After only 5 minutes of testing, the furnace temperature has already increased to 1000 degrees (F). It climbs to 1638 degrees in 3/4 hour, and progresses to 1792 degrees in 1-1/2 hours, 1925 degrees at 3 hours, and 2000 degrees after 4 hours. The fire test *Continued on page 51*



UL Fire test, 1948 (above) More recent fire test (below)



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lasts for the period of the fire rating being sought. During that time, the door is continually monitored to make sure it does not develop any throughopenings or deflect more than allowed.

At the conclusion of the fire test, the test frame – with its scorched test specimen - is detached from the front of the furnace and moved to an area set up to conduct the hose stream test. The still red-hot door is then subjected to a high-pressure cold water stream from a 2-1/2" fire hose moved in a repeated pattern over the entire surface of the door from 20 feet away. A typical 3 or 4-hour rated 12'x12' door must withstand 45 PSI water pressure for more than 7 minutes

without coming loose or developing any through-openings.

If a door successfully survives all of the above, only then can it be called a fire door. But the successful completion of testing is only the first step. Fire door manufacturers must then maintain continued compliance with laboratory procedures, as verified by periodic in-plant product inspections and audits.

Fire door labels are attached to doors that are the same size or smaller than the size of the door that was

actually fire tested. Doors that are larger than the size of the door tested - up to the maximum approved size of a manufacturers listing - are provided with either an oversize door label attached to the door, or an oversize certificate. Both indicate the fire rating of the door, usually determined by the location and construction of the wall onto which the door is installed.

So look for the label... it says a lot, and there's quite a story behind it as well.

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UL 10B Fire Test Standard, 1997



UL Fire Test Standard, 1942