



# Enclosure Integrity Test Procedure

## Background:

Many high value zones are protected by fire suppression gases such as Halon and the more recent Clean Agents such as FM-200, Sapphire, Ecaro 25, Inergen, Argonite etc. Upon detection of a fire, these agents are released into the protected zone.

The fire suppression gas must be retained in the zone for a significant period of time, the hold time, to assure extinguishment of the fire, prevent re-ignition of the fire and to allow time for the arrival of the fire and security personnel.

The design and construction must provide for proper sealing (integrity) of the zone in order to retain the gas.

The first fire suppression gas used in occupied spaces was Halon. In order to assure that the Halon concentration would be retained in the zone a discharge test was performed and using a concentration meter the “hold” time was determined. If the zone was not properly sealed, the Halon concentration would escape and the required hold time would not be obtained.

Due to environmental reasons beginning in 1990 Halon was replaced by the current “Clean Agents”. Though a discharge test could be conducted with the clean agents, it has become cost prohibitive. The Enclosure Integrity Test Procedure was developed to measure the actual leakage areas and to predict the “hold” time.

## Standards:

NFPA 2001/2004 Standard on Clean Agent Fire Extinguishing Systems, Section 6.7.2.3 Review Enclosure Integrity (acceptance testing).

NFPA 2001/2012 Standard on Clean Agent Fire Extinguishing Systems, Section 7.7.2.3 Review Enclosure Integrity (acceptance testing).

NFPA 2001/2004 Standard on Clean Agent Fire Extinguishing Systems, Annex C Enclosure Integrity Procedure.

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## Principle:

Enclosure Integrity Test Procedure is based on the “door fan” test procedure which was developed to determine the leakage area in buildings for energy conservation. Using a similar procedure and calculations the leakage area and therefore the “hold” time for the suppression gas concentration can be predicted.



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## Equipment:

A calibrated (CFM), variable speed fan; door frame and cover to hold the fan; digital micro-manometer pressure gauges; computer with appropriate software plus various test accessories such the TEC-2003-DK FST Digital Enclosure Integrity Test Kit by Fire Safety Technology or equivalent.

## Test Procedure:

Upon arrival the technician will survey and measure the protected zone to accurately establish the as built dimensions and the height of the protected equipment. He will also determine a suitable doorway for locating the test equipment and will survey the area surrounding the protected zone to assure a free return air path back to the fan.

The zone data, gas type and concentration will be entered into the test program.

After the equipment is set up in the selected doorway, the zone must be placed in discharge status: dampers on incoming duct work closed. In an actual fire emergency it is recommended that self contained air handlers be shut down as well as all UPS units and all electrically operated equipment. For the Enclosure Integrity Test this equipment may remain operating. During the actual test, all doors must remain closed. Personnel may remain in the zone.

Per the test procedure the zone will be pressurized and de-pressurized to the column pressure created by the suppression / air gas mixture usually in the range of 10 to 20 pa ( .0015 to .0030 psi )and the required air flow recorded. The average leakage area and “hold” time will be calculated.

If the “hold” time is less than is required the technician may assist in locating possible leakage areas. These indicated areas may or may not be all the leakage areas. This service is provided as a courtesy with no responsibility to determine all leakage areas. For further guidance on typical leakage areas please refer to our publication “Sealing of Rooms for Containment of Fire Suppression Agents.”

Following the test a full written test report will be distributed within one week.

For more information on the test procedure and requirements please refer to NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems, Annex C: Enclosure Integrity Procedure.

## Annual Inspection, Testing:

NFPA 2001/2004 Standard on Clean Agent Fire Extinguishing Systems, Section 6.4 Enclosure Inspection (annual inspection and retesting of zone).

NFPA 2001/2012 Standard on Clean Agent Fire Extinguishing Systems, Section 7.4 Enclosure Integrity annual inspection and retesting of zone).

***Fire Safety Technology***

P.O. Box 1063  
Severna Park, MD 21146 U.S.A.  
Phone 800-685-8303, 410-647-8303  
FAX 410-647-7066  
e-mail: [mail@firesafetytech.com](mailto:mail@firesafetytech.com)  
[www.firesafetytech.com](http://www.firesafetytech.com)