ETL 91-01
2 JANUARY 1991

ENGINEERING TECHNICAL LETTER

# FIRE PROTECTION ENGINEERING CRITERIA

# TESTING HALON FIRE SUPPRESSION SYSTEMS

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INSTALLATION DEVELOPMENT DIVISION
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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, DC 20332-5000

2 JANUARY 1991

REPLY TO
ATTN OF: LEED

SUBJECT: Engineering Technical Letter (ETL) 91 - 01:
Fire Protection Engineering Criteria for Testing Halon Fire Suppression Systems

TO: See Distribution

1. PURPOSE. This letter provides criteria for the testing of total and partial flooding halon fire suppression systems.

2. APPLICATION.

a. This ETL is mandatory for all projects related to or containing halon fire suppression systems.

b. HQ USAF/LEED message, 131445Z SEP 90, Limitation of Chlorofluorocarbons and Halon, prohibited the award of new construction efforts which include Halon 1301 systems. However, Halon 1301 systems will continue to be received for a number of years as a result of projects awarded before 13 Sep 90. Additionally, maintenance or reconfiguration of existing systems will often require system testing to validate performance.

3. IMPLEMENTATION. This ETL is to be implemented in accordance with AFR 8-7, Air Force Engineering Technical Letters (ETLs). Waivers will be processed in accordance with the procedure established by AFR 88-15.

a. HQ USAF/LEED is responsible for the management and currency of this criteria and for the approval/disapproval of waivers IAW AFR 88-15, paragraph 15.63, Waivers and Deferrals.

b. MAJCOMs evaluate waiver request IAW AFR 88-15, paragraph 15.63, Waivers and Deferrals.

4. REFERENCED PUBLICATIONS.

a. AFR 8-7, Air Force Engineering Technical Letters, Jan 87.

b. AFR 88-15, Criteria and Standards for Air Force Construction (Draft 15 Dec 85).

c. MIL-HDBK 1008A, Fire Protection for Facilities Engineering, Design, and Construction, 31 March 1988.

d. National Fire Protection Association Standard 12A (NFPA 12A), Halon 1301 Fire Extinguishing Systems (latest edition).

5. CRITERIA: Halon fire suppression system testing must comply with the requirements of NFPA 12A, paragraph 1-7.4, Approval of Installations.

a. All tests must be witnessed by representatives of the facility/area occupant/user, base fire protection branch, base systems maintenance/controls branch, construction agent fire protection engineer, construction agent's quality assurance personnel, and the contractor's quality control personnel.

b. The contractor must document each individual item listed in NFPA 12A. The use of photographic or video documentation is encouraged.

c. The puff test may be conducted with carbon dioxide COÚ2¿, sulfurhexafluoride SFÚ6¿ or Halon 121. During the puff test each discharge nozzle/device must be observed by either a human observer or a video recording device.

d. Full discharge testing may be used in lieu of the puff test only. Full discharge testing may not substitute for any other tests listed in NFPA 12A paragraph 1-7.4. During the full discharge test each discharge nozzle/device must be observed by either a human observer or a video recording device. Full discharge testing will be accomplished as described in attachment 1, Alternative to NFPA 12A paragraph A-1-7.4, Full Discharge Testing.

FOR THE CHIEF OF STAFF

CHARLES L. PEARCE, Colonel, USAF
Chief, Installation Development Division
Directorate of Engineering and Services

2 Attachments
1. Test Guidance
2. Distribution

ATTACHMENT 1

ALTERNATIVE TO NFPA 12A PARAGRAPH A-1-7.4
FULL DISCHARGE TESTING

A-1-7.4 Where circumstances exist that require a discharge test, the following test agents, sulfurhexafluoride or Halon 121, should be used. These agents have been identified as having characteristics similar to Halon 1301.

**********
NOTE: Only sulfurhexafluoride or Halon 121 must be used for test in Air Force facilities or tenant facilities on an Air Force installations.
**********

A. Planning for the Acceptance Test.

1. A date and time should be set well in advance of the test to assure that proper preparations are made.

**********
NOTE: 90 days notice is required for Air Force projects
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2. To assure that the testing objectives are met, an evaluation team should be set up, including the following: the user, the installer, and the authority having jurisdiction.

**********
NOTE: All tests must be witnessed by representatives of the facility/areas occupant/user, base fire protection branch, base systems maintenance/controls branch, construction agent fire protection engineer, construction agent's quality assurance, and the contractor's quality control.
**********

B. Conducting the Discharge Test.

1. All members of the test evaluation team should meet and make sure all items on the pretest inspection have been resolved.

2. Before conducting an actual system test, read and perform all appropriate steps in the predischarge checklist.

3. The following equipment will be required for the test:

(a) An accurate concentration meter capable of providing both direct readout and printout. Multiple recorders may be required for large installations.

**********
NOTE: Three test points are required in each separate room/space.
**********

(b) A stopwatch.

(c) Portable exhaust fans, if needed, for post-test ventilation.

C. The following procedure should be used for the test:

1. Availability of Halon 1301 is limited by the Montreal Protocol on Substances that Deplete the Ozone Layer. Use of Halon 1301 as a test agent further reduces availability for fire extinguishing purposes, therefore, Halon 1301 must not be used as a test agent.

2. When using sulfurhexafluoride SFÚ6¿ the following guidance applies:

(a) Enclosure leakage rate of SFÚ6¿ dispersed in air is nearly identical to Halon 1301. The vapor densities alone and in mixtures with air is nearly identical to Halon 1301.

(b) Distribution in balanced system is very similar to Halon 1301. Hydraulically complex systems may not be suitable for testing with this agent.

(c) SFÚ6¿ is compatible with Halon 1301 systems hardware.

(d) The toxicity of SFÚ6¿ is no greater than Halon 1301.

(e) The test cylinder for SFÚ6¿ should be filled to 98 percent of the Halon 1301 weight to achieve the same volume percent concentration.

(f) Test cylinder for 360 psi applications filled with SFÚ6¿ will not meet DOT/CTC regulations for shipping. Filling must be performed at the job site.

**********
WARNING: SFÚ6¿ must not be stored in 360 psi system cylinders. SFÚ6¿ may only be placed in 360 psi system cylinders immediately prior to the test.
**********

(g) Thermal conductivity test meters should be calibrated with a sample of SFÚ6¿ in air. Meters used to measure Halon 1301 concentrations are suitable for this purpose. The recording response time of the meter when SFÚ6¿ is used will be slower than Halon 1301.

(h) SFÚ6¿ is not a fire extinguishing agent.

(i) SFÚ6¿ should not be used or stored in 360 psig cylinders where the ambient temperature exceeds 100 deg. F.

**********
WARNING: Testing with SFÚ6¿ in 360 psi system cylinders is not permitted when the ambient temperature exceeds 100 deg. F.
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(j) SFÚ6¿ ozone depletion potential is zero and is not regulated by the Montreal Protocol.

3. When using Halon 121 the following guidance applies:

(a) Enclosure leakage rate of Halon 121 dispersed in air is lower than Halon 1301. The vapor density of Halon 121 is less than Halon 1301.

(b) Distribution in a balanced system is very similar to Halon 1301. Hydraulicly complex systems may not be suitable for testing with this agent.

(c) Common materials of construction are satisfactory for use with Halon 121. However, the compatibility with Buna-N seals should be established for the duration of storage.

(d) Self contained breathing apparatus must be used if personnel enter the protected space while the agent is present. The threshold limit value for Halon 121 is 1,000 ppm by volume.

(e) The test cylinder for Halon 121 should be filled to 58 percent of the Halon 1301 weight.

(f) Thermal conductivity test meters should be calibrated with a sample of Halon 121 in air. Meters used to measure Halon 1301 concentrations are suitable for this purpose. The recording response time of the meter when Halon 121 is used will be slower than Halon 1301.

(g) Halon 121 ozone depletion potential is low (0.050) and is not regulated by the Montreal Protocol.

(h) The suitability of Halon 121 at minimum cylinder fill densities has not been determined.

(i) Halon 121 is not a recognized fire extinguishing agent.

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