

UNDERWRITERS LABORATORIES INC. CERTIFICATION REQUIREMENT DECISION

This Certification Requirement Decision is prepared by UL LLC. It is normative for the applicable UL Product Certification Program(s); however, it is currently not part of the UL Standard(s) referenced below.

Product Category (CCN): GAQF, GKEC2, GKEE2, GKEH2, GKEK2, GKEP2, GKET2, GKEV2, GKEY2, GKEZ2, GKEC8, GKEE8, GKEH8, GKEK8, GKEP8, GKET8, GKEV8, GKEY8, GKEZ8, GOYW, VKYP, VKYP7

Standard Number: UL/ULC 2127

Standard Title: Standard for Inert Gas Clean Agent Extinguishing System Units

Edition Date: May 9, 2017

Edition Number: 3

Section / Paragraph Reference: 52

Subject: Aging Tests - Plastic Materials

DECISION:

52 Aging Tests - Plastic Materials

52.1 Air-oven aging test

52.1.1 There shall be no cracking of a plastic part subjected to the flow of clean agent, or bracket, after air-oven aging for 180 days at 100°C (212°F). Aged samples of the valve, valve part, bracket, or container shall perform as intended when tested as specified in 26.4 (valves and parts); Hydrostatic Pressure Test, Section 26 (containers); 34.1 (brackets); High Pressure Discharge Test, Section 29 (nozzles); or the Burst Strength Test - Gauges, Section 45 (pressurized gauge components). See 52.1.4 - 52.2.4.

52.1.2 Following air-oven aging for 90 days at 100°C (212°F), there shall be no cracking of a plastic siphon tube, and aged samples of the siphon tube shall perform as intended. Ring samples cut from the aged tube shall not exhibit a degradation in excess of 40 percent of the original tensile or ring crushing strength values.

~~52.1.3 When a plastic material is not capable of withstanding the temperature specified in 52.1.1 and 52.1.2 without excessive softening, distortion, or deterioration, an air-oven aging test at a lower temperature for a longer period of time meets the intent of this requirement. The equivalent time and temperature for 180 days at 100°C (212°F) is to be 430 days at 87.0°C (188.6°F). The equivalent time and temperature for 90 days at 100°C (212°F) is to be 210 days at 87.0°C (188.6°F).~~

52.1.3 When a plastic material is unable to withstand the temperature specified in 52.1.1 and 52.1.2 without excessive softening, distortion, or deterioration, an air-oven aging test at a lower temperature for a longer period of time is permitted to be used. When a plastic material is able to withstand a higher temperature than specified in 52.1.1 and 52.1.2 without excessive softening, distortion, or deterioration, an air-oven aging test at a higher temperature for a shorter period of time is permitted to be used.

For 52.1.1,

$$t = 146040 \cdot e^{-0.067 \cdot T}$$

For 52.1.2,

$$t = 60930 \cdot e^{-0.0652 \cdot T}$$

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

where:

t = Aging duration in days: $t \geq 25$ days

T = Aging temperature in °C: $T \geq 87^\circ\text{C}$

52.1.4 When plastic parts are attached to other parts or assemblies, the securement of the parts shall not be impaired after air-oven aging.

52.1.5 To determine the degradation of a plastic material used in a siphon tube, ring samples 12.7 mm (1/2 inch) wide are to be cut from the tube and subjected to air-oven aging. See 52.1.6. The ring samples then are to be subjected to a crush test between parallel flat plates using a machine that applies a compression load at a uniform rate of 5 mm (0.2 inch) per min and records the load applied as a function of the deflection. The test also is to be conducted on unaged parts of identical size for comparative purposes. When the nature of the material is such that meaningful test results are unobtainable, other tests, such as a tension test, are to be conducted.

52.1.6 The plastic valve parts and plastic siphon tube samples to be aged are to be supported in a full-draft, circulating-air oven that has been preheated at full draft to $100 \pm 1.0^\circ\text{C}$ ($212 \pm 1.8^\circ\text{F}$). Samples are not to touch one another or the sides of the oven. The samples of the plastic valve parts and siphon tube are to be aged for 180 and 90 days, respectively, at full draft and then cooled in air at $23.0 \pm 2.0^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) for at least 24 h before conducting any test or dimensional measurement. As used in this test, the term "full draft" refers to the oven used with inlet and outlet vents open and the air vent damper control at a setting that provides 250 to 350 air changes per h.

52.2 Light and water test

52.2.1 There shall be no cracking of materials used for a plastic valve, exposed valve part, or bracket after exposure to light and water for 720 h. Samples of the valve or valve part or bracket so exposed shall perform as intended when tested as specified in Hydrostatic Pressure Test, Section 26 (containers); 26.4 (valves and parts); High Pressure Discharge Test, Section 29 (nozzles); Mounting Device Test, Section 34 (brackets); or the Burst Strength Test - Gauges, Section 45 (gauges). When a gauge or indicator is involved in this test, it shall remain watertight throughout the test.

52.2.2 The ultraviolet light is to be obtained from two stationary enclosed carbon-arc lamps. The arc of each lamp is to be formed between two vertical carbon electrodes, 12.7 mm (1/2 in) in diameter, located at the center of a revolvable vertical metal cylinder, 787 mm (31 in) in diameter and 450 mm (17-3/4 in) in height. Each arc is to be enclosed with a No. 9200-PX clear Pyrex glass globe. The samples are to be mounted vertically on the inside of the revolvable cylinder, facing the lamps, and the cylinder continuously revolved around the stationary lamps at one revolution per minute. A system of nozzles is to be provided so that each sample, in turn, is sprayed with water as the cylinder revolves. During each operating cycle (total of 20 minutes) each sample is to be exposed to the light and water spray for 3 minutes and to the light only for 17 minutes. The air temperature within the revolving cylinder of the apparatus during operation is to be $63 \pm 5^\circ\text{C}$ ($145 \pm 9^\circ\text{F}$).

52.2.3 An alternate ultraviolet light exposure is obtainable in accordance with ASTM D2565, Standard Practice for Operating Xenon Arc-Type (Water-Cooled) Light-Exposure Apparatus With and Without Water for Exposure of Plastics. The source of radiation is to be a 6500 Watt, water-cooled xenon-arc lamp with borosilicate inner and outer optical filters. The wattage to the lamp is automatically controlled to provide spectral irradiance of 0.35 W/m^2 at 340 nm. The samples are mounted vertically on the inside of a 97 cm (38 in) diameter cylinder, facing the arc, and the cylinder is rotated about the arc at one revolution