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of Engineers®**

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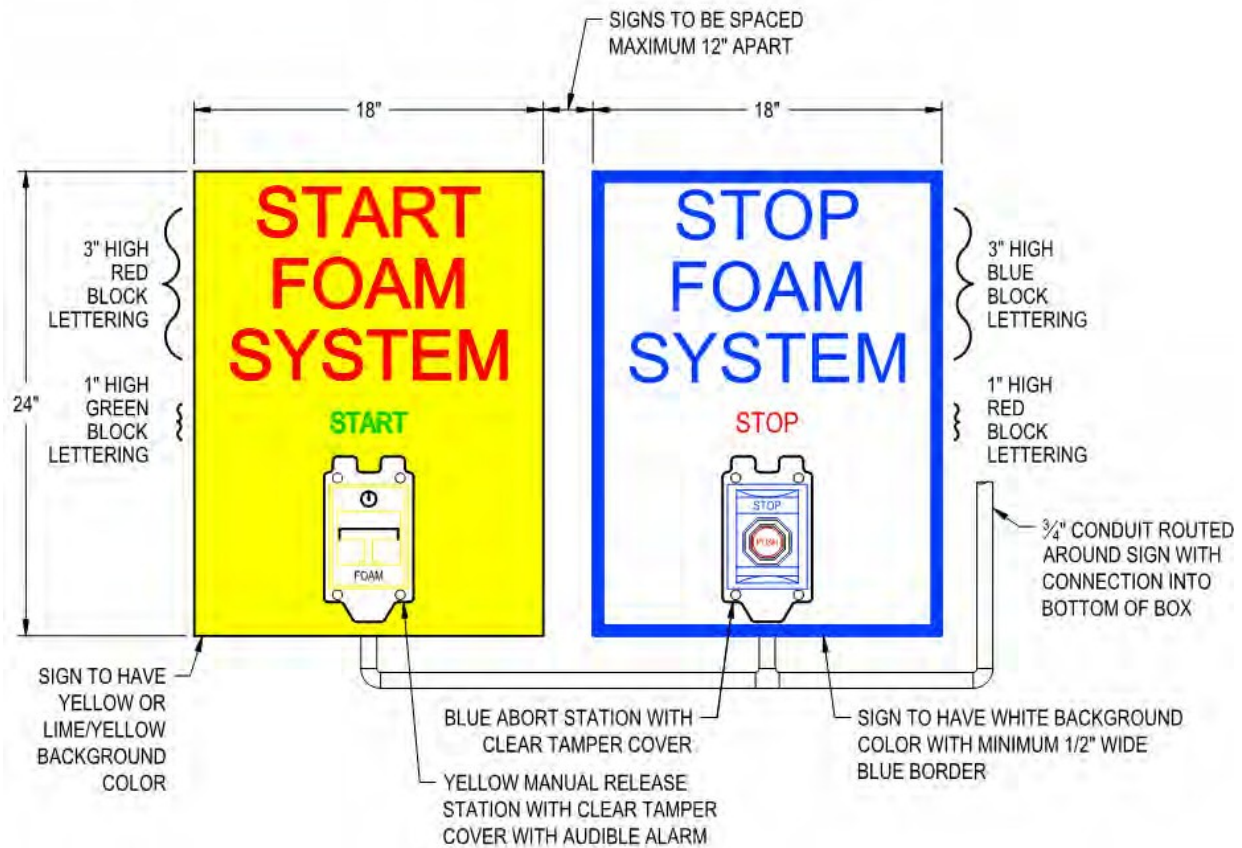
Expires: 01 Sep 17

**Subject:** Changes to Reduce False Activations of High Expansion Foam Systems in Army Hangars

**Applicability:** Directive and Policy

1. References: UFC 3-600-01, Change 3, 1 March 2013
2. UFC 3-600-01, and referenced standard NFPA 409, requires activation of high expansion foam fire suppression systems in Army aircraft hangars by manual foam release stations, or upon actuation of the fire sprinkler system. To reduce false foam activations due to the fire sprinkler system actuating on non-fire events, and improve protection of the aircraft from the effects of fire, this bulletin requires optical flame detectors in the hangar bay. The high expansion foam system will activate when two optical flame detectors alarm, or when one optical flame detector alarms with fire sprinkler system actuation, or by the manual foam release station. Actuation of the fire sprinkler system shall not activate the high expansion foam system, unless an optical flame detector alarms. See additional requirements in the paragraph titled, "Optical Flame Detectors".
3. Many existing systems include foam concentrate bladder tanks. To improve maintenance and reliability, and reduce false foam activations, this bulletin requires the use of atmospheric foam concentrate tanks with a foam pumping system. Foam concentrate bladder tanks are no longer permitted for use in Army hangars and those currently in use must be replaced with the concentrate tanks and foam pumping system. See additional requirements in the paragraph titled, "Foam Concentrate Storage and Proportioning System".
4. In order to reduce false foam activations from short circuits, ensure that components for all fire alarm circuits in the hangar bay and foam equipment rooms are as follows: watertight back boxes, enclosures, and conduit/connections; and NEMA 4 junction boxes. This also includes detection, releasing, signaling line, initiating device, and notification appliance circuits.
5. Install manual foam start and stop stations in the hangar bay. The manual foam start and stop stations shall be designed per the figure below. Manual foam start and stop stations shall be unobstructed, readily accessible, and located in the natural egress path from the hangar near each required exit. The distance between station locations will not exceed 200 linear feet. Provide foam stop stations of the "dead-man" type. The stop stations must be used in conjunction with valves and equipment that will stop the discharge of foam/water from the suppression system.

When the foam stop station button is depressed under full flow, the time to fully close the flow control valve will not exceed 15 seconds. The time for the flow control valve to fully open upon release of the foam stop station button will not exceed 5 seconds. Due to the increased pressure loss for the flow control valve, and resulting larger fire pumps and power requirements, these time limits do not apply to projects under construction at the time this ECB was released. Flow control valves with a longer closing time require less pressure loss, and may be used for projects under construction.



## 6. Optical Flame Detectors.

Provide a sufficient number of optical flame detectors, such that a fire at any position on the hangar bay floor will be within the range and cone-of vision of at least three detectors.

Optical flame detectors shall contain three infrared (IR) sensors, for detecting a fuel fire on the hangar floor, and shall not alarm on non-fire sources, including but not limited to, arc welding, lightning, sunlight, radiant heaters, aircraft engine exhaust, hot surfaces, strobes, beacons, etc.

Provide triple infrared (IR) optical flame detectors that are listed by a Nationally Recognized Testing Laboratory for the expected fuel hazards in the hangar bay. Provide detectors that are immune to radar and radio frequency emissions. Provide shielding for the optical flame detectors and their circuits from radio frequency interference. Provide shielded circuiting from the optical detectors to the fire alarm control panel (FACP) or foam system control panel (FSCP) and ground shielding at one end. Provide latching signals from the optical flame detector to the FACP or FSCP.

Mount detectors in accordance with their listing at approximately 8 feet above the finished floor of the hangar bay. Locate and position the optical flame detectors so the field of view is not obstructed by the facility construction, type of aircraft, aircraft configuration and positioning, and fixed and

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mobile equipment within the aircraft servicing area. Locate optical flame detector at a sufficient distance per the manufacturer recommendations from sources that may cause false alarms (e.g. welding, solar glare, radiant heaters, aircraft engine exhaust, strobes, hot surfaces and other relevant sources.) Do not mount optical detectors in inaccessible locations.

Angle detectors and provide blinds so the cone-of-vision does not extend more than 5 feet outside the hangar bay, or is not directed at hot sources such as radiant heaters. Permanently mark on each detector the horizontal and vertical axis determined during testing. Provide optical flame detectors with 5 feet of flexible conduit to allow for minor adjustments during testing or changes in the mission of the hangar bay.

With the exception of a manual foam release station, the cross-zoning of two automatic initiating devices in the hangar bay is required to release the high expansion foam. This is permitted to be the cross-zoning of a sprinkler water flow switch and an optical flame detector, or two optical flame detectors.

Activation of the first automatic initiating device shall annunciate at the local panel, and send a general alarm to the fire alarm control panel and the fire department. Activation of the second automatic initiating device shall, in addition to the above, release the high expansion foam.

Perform pan fire acceptance tests, using the expected aircraft fuel, at multiple locations on the hangar floor, including at least one at each designated aircraft parking spot, to demonstrate coverage by at least three optical flame detectors. Use a 2 foot x 2 foot (or smaller) test pan. Upon each 2 ft. x 2 ft. pool fire reaching full development, three detectors within the cone of vision are required to activate within 20 seconds.

Perform false alarm rejection test, by arc welding for five minutes at multiple locations on the hangar floor, including at least one at each designated aircraft parking spot.

Perform false alarm rejection test, by activating any hangar bay strobe lights and rotating beacons.

Perform false alarm rejection test, by opening hangar doors on a bright day.

Suppression systems shall be disconnected during all the above testing.

## 7. Foam Concentrate Storage and Proportioning System

A foam concentrate pumping system, with an atmospheric foam concentrate storage tank, is required.

Use foam concentrate pumps with electric motor drivers, supplied by a reliable power source. A reserve foam concentrate pump of equal capacity is required, and shall operate upon failure of the primary pump, with piping arranged to supply the foam concentrate demand. Provide a pressure maintenance foam concentrate pump, to maintain pressure in the foam concentrate piping, when the foam concentrate line to the proportioner exceeds 50 feet.

Use in-line balanced-pressure (ILBP) proportioners. ILBP proportioners must be factory assembled and tested by the manufacturer, and the entire ILBP proportioner assembly must be listed by a

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Nationally Recognized Testing Laboratory. Disassembly, reassembly, and or modification by the installing contractor will be prohibited.

Provide an atmospheric foam concentrate storage tank. Provide a closed cell double wall polyethylene storage tank compatible with the required concentrate. Provide either a translucent shell or clear vertical window to indicate fill level with permanent capacity markings at 50 gallon intervals. Mount concentrate tank on a 2 inch concrete housekeeping pad. The double wall tank does not required spill or secondary containment. A second foam concentrate tank or reserve concentrate supply is not required.

Pressurized foam concentrate bladder tanks are not permitted.

Proportioning by foam inductor(s) is not permitted.

8. For questions, the point of contacts are Mr. Randall Miller, P.E., Fire Protection Community of Practice leader, CECW-CE, 256-895-1811, or Mr. John W. Wilkus, P.E., Fire Protection Engineer, Kansas City District, 816-389-3227.

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