

**Chemical Compatibility
between Historical and
New C6 Foam Concentrates**

Technical Bulletin: Chemical Compatibility between Historical and New C6 Foam Concentrates

As summarized in Tyco Fire Protection Products Technical Bulletin, "Transition of the Firefighting Foam Industry," foam manufacturers are converting concentrate formulations from C8 to C6 perfluorinated chemistry. Accordingly, CHEMGUARD historical AFFF, AR-AFFF, and Fluoroprotein foam concentrates (which may have contained some level of C8 fluorosurfactants/fluoropolymers) are being displaced with new, C6 formulated products. A consideration for CHEMGUARD foam concentrate end users during this transition is the chemical compatibility of historical products with the new, C6 displacement concentrates.

Combining any foam concentrate with a different formulated concentrate for long-term storage is not desirable. However, it is recognized situations may occasionally require that concentrates of the same product type, but different formulation, be mixed for extended duration. In anticipation of such circumstances, Tyco Fire Protection Products has conducted stability testing between selected historical and displacement C6 CHEMGUARD foam concentrates using the following analytical protocols:

- US Department of Defense Military Specification, MIL-F-24385F, "Fire Extinguishing Agent, Aqueous Film-Forming Foam (AFFF) Liquid Concentrate, for Fresh and Sea Water" foam compatibility test protocol on admixtures of 0/100, 25/75, 50/50, 75/25 and 100/0.
- EN1568-3/4:2008, utilizing Temperature Conditioning of Foam Concentrates at High Temperature (Annex E) on 50/50 admixtures mixed and 50/50 admixtures layered.

Based on the results of these analyses, Tyco Fire Protection Products does not anticipate issues of long-term compatibility/stability between a historical CHEMGUARD AFFF or AR-AFFF concentrate and the corresponding displacement C6 concentrate, with two exceptions: 1) CHEMGUARD CUG 3x3 AR-AFFF displaced by CHEMGUARD C334-LV 3x3 AR-AFFF, 2) CHEMGUARD C135 1x3 AR-AFFF displaced by CHEMGUARD C137 1x3 AR-AFFF. Given the substantial physiochemical property differences between these historic and displacement products, long-term mixing is not advisable.

The following limitations should be noted:

1. Mixing of different types of foam concentrates - such as 1% AFFF with 3% AFFF or 3% AFFF with 3x3 AR-AFFF - is never recommended.
2. Mixing of a C6 formulation with a historical C8 concentrate produces a concentrate that is not in accordance with the 2015 EPA PFOA Stewardship program (i.e., it is considered a C8 product).
3. Addition of fresh concentrate to an older concentrate effectively produces a mixture considered as old as the oldest foam concentrate component.
4. All foam concentrates must be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. Annual foam quality tests of a concentrate mixture may be less effective as the physiochemical properties of the formulations may be different. Concentrate mixture make-up (% of each component) should be documented when submitting sample for foam quality testing.
5. Third party approvals and certifications are concentrate specific and noted on the Technical Data Sheet of each concentrate; for details such as hardware devices, orifice sizes, flow ranges, pressure ranges, etc., the published listing for an individual concentrate must be consulted. There are differences in listing details between some historical and displacement products. Owners should evaluate whether hardware changes and/or performance testing are warranted. Acceptability of a foam concentrate mixture is subject to the discretion of the Authority Having Jurisdiction.

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