

## Excerpts from SFPE AFFF Chapter by Scheffey

The International Organization for Standardization (ISO) has issued a specification for low-expansion foams, EN 1568-3.<sup>26</sup> The specification includes definitions for protein, fluoroprotein, synthetic, alcohol resistant, AFFF, and FFFP concentrates. A positive spreading coefficient is required for film-forming foams when cyclohexane is used as the test fuel. There are toxicity, corrosion, sedimentation, viscosity, expansion, and drainage criteria. The fire test uses a 2.4-m (8-ft) diameter circular pan with heptane as the fuel. The UNI 86 foam nozzle is used for either a “forceful” or “gentle” application method at a flow rate of 11.4 L/min (3 gpm). The application rate is 2.4 L/min/m<sup>2</sup> (0.06 gpm/ft<sup>2</sup>). For the greatest performance level, a 3 minute extinguishment time is required. This extinguishment time results in an extinguishment application density of 7.6 l/m<sup>2</sup> (0.19 gal/ft<sup>2</sup>).

The proposed ISO/EN requirements for extinguishing and burnback are summarized in Table 4-4.8. There are three levels of extinguishment performance and four levels of burnback performance. For extinguishing performance, Class I is the highest class and Class III the lowest class. For burnback resistance, Level A is the highest level and Level D is the lowest level.

**Table 4-4.8 Maximum Extinction Times and Minimum Burnback Times from ISO/EN Specification**

| Extinguishing<br>Performance Class | Burnback<br>Resistance Level | Gentle Application Test                |                                      | Forceful Application Test              |                                      |
|------------------------------------|------------------------------|----------------------------------------|--------------------------------------|----------------------------------------|--------------------------------------|
|                                    |                              | Extinction Time (min)<br>Not More Than | Burnback Time (min)<br>Not Less Than | Extinction Time (min)<br>Not More Than | Burnback Time (min)<br>Not Less Than |
| I                                  | A                            | —                                      | —                                    | 3                                      | 10                                   |
|                                    | B                            | 5                                      | 15                                   | 3                                      | Not tested                           |
|                                    | C                            | 5                                      | 10                                   | 3                                      | Not tested                           |
|                                    | D                            | 5                                      | 5                                    | 3                                      | Not tested                           |
| II                                 | A                            | —                                      | —                                    | 4                                      | 10                                   |
|                                    | B                            | 5                                      | 15                                   | 4                                      | Not tested                           |
|                                    | C                            | 5                                      | 10                                   | 4                                      | Not tested                           |
|                                    | D                            | 5                                      | 5                                    | 4                                      | Not tested                           |
| III                                | B                            | 5                                      | 15                                   | Not tested                             | Not tested                           |
|                                    | C                            | 5                                      | 10                                   | Not tested                             | Not tested                           |
|                                    | D                            | 5                                      | 5                                    | Not tested                             | Not tested                           |

Typical performance classes and levels for different concentrates are provided. Typical anticipated performance for AFFF is noted as Level IC, and Level IB for alcohol-type AFFF. For a fluoroprotein foam, performance is expected to be Level IIA for both alcohol-type and hydrocarbon-only concentrates.

**Table 4-4.10 Examples of Extinguishment Application Densities of Various Test Standards**

| Test<br>Standard    | Fuel              | Application<br>Rate<br>(L/min/m <sup>2</sup><br>[gpm/ft <sup>2</sup> ]) | Nozzle<br>Movement<br>Permitted | Extinguishment<br>Application<br>Density<br>(L/m <sup>2</sup> [gal/ft <sup>2</sup> ]) |
|---------------------|-------------------|-------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------|
| Mil SPEC            | Motor<br>gasoline | 1.6 (0.04)                                                              | Yes                             | 1.34 (0.033)                                                                          |
| UL 162              | Heptane           | 1.6 (0.04)                                                              | Yes                             | 4.9 (0.12)                                                                            |
| ICAO Level B        | Kerosene          | 2.5 (0.06)                                                              | Yes (horizontal<br>plane)       | 2.5 (0.06)                                                                            |
| ICAO Level C        | Kerosene          | 1.6 (0.04)                                                              |                                 | 1.6 (0.04)                                                                            |
| ISO/EN—<br>Forceful | Heptane           | 2.5 (0.06)                                                              | No                              | 7.6 (0.19)                                                                            |

International Organization for Standardization, “Fire Extinguishing Media—Foam Concentrates—Part 3: Specification for Low-Expansion Foam Concentrates for Surface Application to Water-Immiscible Liquids,” *European Standard EN 1568-3*, ISO, Geneva, Switzerland (2001).