FESHM 6040.2: FIRE CONSTRUCTION REQUIREMENTS – INTERIOR FINISH MATERIALS

Revision History

Author	Description of Change	Revision Date
J. Niehoff	Added: • Plenum, • Floor Rating, • Vertical Flammability Categories	April 2018
J. Priest & J. Niehoff	• Applied FESHM template • Clarified guidance on Chapter content • Added UL 94 and Vertical Burn Test • Deleted Table of suggested Manufactures	December 2014
W. James	Initial Release of FESHM 6040.2	June 2009

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1.0 INTRODUCTION

The general requirements to be followed for interior finish materials are contained in National Fire Protection Association (NFPA) codes and standards. Tests of interior finishes are typically conducted by Underwriters Laboratory (UL) utilizing the American National Standards Institute (ANSI) standards.

In order to limit the potential for fast spreading fires and the development of large quantities of toxic combustion products, it is preferable to use interior finish materials Class A which have "flame spread" ratings of 25 or less and "smoke developed" ratings of 450 or less as determined by the American Society for Testing Materials (ASTM). Of particular concern are thermal and acoustic insulating materials manufactured with expanded foam, most of which greatly exceed these values. This chapter describes procedures for the selection and safe use of interior finish materials. This chapter applies to the Fermilab site in Batavia, Illinois and all Fermilab leased spaces.

2.0 DEFINITIONS

- **Building Manager** - Designated employee for each building on site that will serve as the contact point for all activities that will affect that building as a result of daily operations or services requested from both internal and external sources.
- **Fire Hazard Subcommittee (FHS)** – Subcommittee of the Fermilab ES&H Committee is delegated the Alternate Authority Having Jurisdiction (AHJ) in absence of the primary AHJ Site Fire Protection Engineer approved by Fermi Site Office (FSO).

3.0 RESPONSIBILITIES

3.1 Building Manager

- The Building Managers assigned to specific buildings ensure that new building interior materials meets the requirements set forth in this chapter.

3.2 ESH&Q- Fire Protection Engineer or FHS

- Assists FESS\Engineering Department or Project as requested during the design, installation, testing, and acceptance of interior finishes.

3.3 Facilities Engineering Service Section (FESS) Engineering Department or Project

- The Facilities Engineering Services Section engineering staff (FESS-Eng) or project staff will new specified construction materials meet this chapter.

4.0 PROGRAM

4.1 Building Materials Classification

4.1.1. Class A - 25/450 Flame Spread/Smoke Development Rating

- If practical, interior finish materials should have a flame spread rating of 25 or less and a smoke developed rating of 450 or less as determined by the ASTM E-84 (NFPA 255) test. (Note: Manufacturers often avoid presenting results in terms of these ratings when their products "fail" the ASTM E 84 test.)
- ESH&Q-FPE must review proposed installation involving foam insulation boards or spray foams when used outside manufacturer's installation specifications.

4.1.2. Class B or C - Greater than 25/450 Flame Spread/Smoke Development Rating

- Materials with a flame spread rating >25 and smoke developed rating >450 may be covered by a rigid noncombustible thermal barrier such as sheetrock to mitigate the consequences of the higher flame spread and smoke development properties. In order to be effective, the material should be in direct contact with the barrier.

Table 1: Summary of Wall/Ceiling Interior Finishes (ASTME E84)

Rating	Flame Spread	Smoke Developed
Class A	0-25	0-450
Class B	26-75	0-450
Class C	76-200	0-450
Plenum	25	50

Table 2: Flooring Interior Finishes including Trim & Base (ASTM E648)

Rating	Description
Class I	Critical radiant flux of not less than 0.45W/cm^2
Class II	Critical radiant flux of not less than 0.22 W/cm^2 but less than 0.45W/cm^2

4.2 Plastic Materials for Devices and Appliances

4.2.1. Vertical Flammability Classification

- The after-flame time for each individual specimen is less than 10 seconds. The total after-flame time for any condition set is less than 50 seconds. The cotton indicator is not ignited by flaming particles or drops.
- ESH&Q-FPE must review proposed installation involving V-1 classifications or higher.

Rating	Description
5VA Surface Burn	Burning stops within 60 seconds after five applications of five seconds each of a flame (larger than that used in Vertical Burn testing) to a test bar. Test specimens MAY NOT have a burn-through (no hole). **This is the highest (most flame retardant) UL94 rating.**
5VB Surface Burn	Burning stops within 60 seconds after five applications of five seconds each of a flame (larger than that used in Vertical Burn testing) to a test bar. Test specimens MAY HAVE a burn-through (a hole).
V-0 Vertical Burn	Burning stops within 10 seconds after two applications of ten seconds each of a flame to a test bar. NO flaming drips are allowed.
V-1 Vertical Burn	Burning stops within 60 seconds after two applications of ten seconds each of a flame to a test bar. NO flaming drips are allowed.
V-2 Vertical Burn	Burning stops within 60 seconds after two applications of ten seconds each of a flame to a test bar. Flaming drips ARE allowed.
H-B Horizontal Burn	Slow horizontal burning on a 3mm thick specimen with a burning rate is less than 3"/min or stops burning before the 5" mark. H-B rated materials are considered "self-extinguishing".

5.0 REFERENCE

- Fermilab Environmental Safety Health Manual (FESHM) 6010, Fire Protection Program
- ANSI/UL 723, Standard for Test for Surface Burning Characteristics at Building Materials, 2010
- ANSI/UL 94, Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, 2013
- ASME D 2850, Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials, 2006
- ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, 2010
- NFPA 101, Life Safety Code, 2015 Edition
- NFPA 253, Standard Method of Test for Critical Radiant Flux of Floor Covering System Using Radiant Heat Energy Source, 2011 Edition
- NFPA 261, Standard Method of Test for Determining Resistance of Mock-up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes, 2013 Edition
- NFPA 265, Standard Methods of Tests for Evaluating Room Fire Growth Contribution of Textile Covering on Full Height Panels and Walls, 2011 Edition
- NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, 2011 Edition
- NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, 2010 Edition