Tentative Interim Amendment

NFPA® 1851

Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

2020 Edition

Reference: Various Paragraphs in Chapters 11 and 12, various new Annex A material, and B.1.2.4
TIA 20-2
(SC 19-8-33 / TIA Log #1446)

Note: Text of the TIA was issued and approved for incorporation into the document prior to printing.

1. Revise 11.3.7.3 thru 11.3.7.5 to read as follows:

11.3.7.3 When tested for removal of selected products of combustion as specified in Section 12.4, the cleaning process shall provide for a ~~70~~ 50 percent or greater cleaning efficiency for ~~each of the specified~~ the average of all surrogate heavy metal contaminants.

11.3.7.4 When tested for removal of selected products of combustion as specified in Section ~~12.6~~ 12.4, the cleaning process shall provide for a 50 percent or greater average cleaning efficiency for ~~each of the specified class of~~ the average of all surrogate semivolatile organic compounds.

11.3.7.5 When tested for the neutralization and sanitization of biological contaminants as specified in Section 12.5, the sanitization process shall provide for at least $\log_{10}$ 3 reduction of ~~incident~~ challenge microorganisms.

2. Revise 12.4.3.3.1 to read as follows:

12.4.3.3.1 A minimum of six specimens shall be contaminated with selected semivolatile organic compounds as specified in 12.6.1 and 12.6.2.

3. Revise 12.4.3.4.1 to read as follows:

12.4.3.4.1 A minimum of six specimens shall be contaminated with selected heavy metals as specified in 12.7.1 and 12.7.2.

4. Revise 12.4.4.5.1 to read as follows:

12.4.4.5.1 The wash load shall be assembled as specified in ~~12.12.3~~ 12.9.3 and adjusted according to the cleaning facility's procedures for load size.

5. Revise 12.4.5.2 to read as follows:

12.4.5.2 Test specimens for heavy metal contamination removal shall be subject to the extraction and analysis procedures specified in ~~12.7.2~~ 12.7.3 and 12.7.4.

6. Revise section 12.4.6 to read as follows:

12.4.6 Report.

The following information shall be reported for each contaminant:

(1) Contaminant concentration in the contaminated specimen that stayed at the certification organization or its designated laboratory

(2) Contaminant concentration in the contaminated, traveling specimen, if applicable

(3) Contaminant concentration in the unwashed, traveling specimen, if applicable

(4) Contaminant concentration in each of the washed specimens

(5) Average contaminant concentration of the washed specimens
(6) Contaminant concentration in the washed, blank specimen
(7) Calculated cleaning efficiency by contaminant
(8) ~~For semivolatile organic compound contaminants only, t~~ The average calculated cleaning efficiency for all contaminants

7. Revise 12.4.7.2 to read as follows:

12.4.7.2 Overall compliance with the requirement for chemical decontamination involving heavy metals shall be based on the ~~individual~~ average calculated cleaning efficiency for ~~each~~ all chemical contaminants.

8. Revise 12.5.2.1 to read as follows:

12.5.2.1 The certification organization or its designated laboratory shall contaminate sets of selected outer shell material specimens with the two specific microorganisms.

9. Revise 12.6.2.2, add a new 12.6.2.3, renumber existing 12.6.2.3 as 12.6.2.4 and add a new 12.6.2.5 to read as follows:

12.6.2.2 Using a gastight syringe, a volume of 300 µL of the polycyclic aromatic hydrocarbons (PAH)/phthalate/phenols contamination mixture specified in 12.6.1 shall be dispensed uniformly onto each specimen by drawing the solution into the syringe and slowly depressing the plunger onto the specimen while gently rubbing the end of the syringe onto the specimen.

12.6.2.3 Contaminated specimens shall be permitted to dry under ambient laboratory conditions for no more than 30 minutes following the application of the PAH/phthalate/phenols mixture.

~~**12.6.2.3**~~ **12.6.2.4** The specimen shall be placed in a labeled jar or other container and kept in a refrigerator at 4°C (39°F) until ready for shipping.

12.6.2.5 Alternative techniques for contaminating the specimens shall be permitted if it can be demonstrated that the selected technique provides a specimen concentration of the specific contaminant(s) that are ±20 percent of the target concentration following the application of the technique.

10. Revise 12.6.3.1 and 12.6.3.1.1 to read as follows:

12.6.3.1 All labware, jars, or extraction vessels made of glass or ~~perfluoroalkoxy alkanes (PFAs)~~ other degradation-resistant and contamination-free materials shall be thoroughly cleaned, rinsed, and dried.

12.6.3.1.1 Where specified, other types of labware can be substituted ~~for PFA jars~~ if it can be demonstrated that the labware will not contribute to the cross contamination of the extraction liquids.

11. Add "" to 12.6.4.8 to read as follows:*

12.6.4.8* Alternative procedures for preparing the extract for analysis shall be permitted, provided that extraction recovery average efficiencies of 80 percent or better can be demonstrated.

12. Revise 12.6.5.3 and add a new 12.6.5.3.1 to read as follows:

12.6.5.3 The output from the gas chromatography and mass spectroscopy shall be used to integrate and calculate the concentration of each chemical per mass of specimen remaining with the percentage removal based on the calibration curves.

12.6.5.3.1 The concentration in each specimen shall be reported in µg/g specimen.

13. Revise 12.6.5.4 and add new paragraphs 12.6.5.4.1 and 12.6.5.4.2 to read as follows:

12.6.5.4 Cleaning efficiency shall be calculated for each contaminant with the following equation and as specified in 12.6.5.4.1 and 12.6.5.4.2:

$$\text{cleaning efficiency} = 1 - \left[\frac{(C_C - C_M) - (C_W - C_P)}{(C_C - C_M)} \right] \times 100 \qquad [12.6.5.4]$$

where:

C_C = contaminated specimen

C_M = material specimen (unwashed, not contaminated)

C_W = contaminated specimen (washed)

C_P = material specimen (washed, not contaminated)

12.6.5.4.1 The actual masses used in the calculation of cleaning efficiency shall be the specific measured concentration of contaminant.

12.6.5.4.2 If the measured mass is below the detection limit, a value of "0" shall be used.

14. Revise 12.6.5.6 to read as follows:

12.6.5.6* Alternative procedures for the analysis of specimens specified in 12.6.5.1 through 12.6.5.3 shall be permitted, provided that the procedures take the concentrations of the controls into account by providing sufficient sensitivity to allow for the measurement of a ~~0.5~~ 1.0 percent difference or lower in cleaning efficiency.

15. Revise section 12.7.1 and add a new paragraph 12.7.1.2 to read as follows:

12.7.1 Selection of Contaminants.

12.7.1.1 A certified solution shall be obtained that contains the following metals, each at a concentration of 100 ppm:

(1) Antimony
(2) Arsenic
(3) Cadmium
(4) Chromium
(5) Cobalt
(6) Lead

12.7.1.2 Alternative techniques for preparing a mixture of the target heavy metal contaminants shall be permitted if it can be demonstrated that the heavy metal concentrations are 100 ppm ±10 ppm.

16. Revise 12.7.2.4.1 thru 12.7.2.4.3 and add a new paragraph 12.7.2.4.4 to read as follows:

12.7.2.4.1 The operator shall ensure that the specimen is at the bottom of the plastic tube and sufficiently wetted by the metals standard solution.

12.7.2.4.2 The total volume of 500 µL of the metals standard solution shall be pipetted and allowed to dry before pipetting the remaining 500 µL.

12.7.2.4.3* The operator shall ensure that all applied metals standard solution remains on the specimen.

12.7.2.4.4 Contaminated specimens shall be dried in an oven at 50ºC ±5ºC for 5 minutes, –0/+2 minutes to complete their drying.

17. Revise 12.7.3.1.5 to read as follows:

12.7.3.1.5* Modifications to the specimen acid digestion procedures provided in 12.7.3.1.1 through 12.7.3.1.4 shall be permitted, provided that extraction recovery average efficiencies of 90 percent or better can be demonstrated.

18. Revise 12.7.3.2.9 to read as follows:

12.7.3.2.9* Modifications to the specimen filtration procedures provided in 12.7.3.2.3.1 through 12.7.3.2.8 shall be permitted, provided that extraction recovery average efficiencies of ~~90~~ 80 percent or better can be demonstrated.

19. Revise 12.7.4.1.3 to read as follows:

12.7.4.1.3* An alternative analytical technique shall be permitted if it demonstrates sensitivity to the respective metals to a minimum of 100 ppb, provides for a linear calibration for determining each metal concentration with a correlation coefficient of 0.90 or better, and permits the ability for discerning a difference of ~~0.5~~ 1.0 percent or lower in cleaning efficiency.

20. Revise 12.9.2.1 to read as follows:

12.9.2.1 Four different ballast fabric-based wash panels – Panel A, Panel B, Panel C, and Panel F – shall be prepared from the ballast materials specified in 12.4.4.3 according to the instructions provided in 12.9.2.2 through 12.9.2.5. All panel edges shall be unfinished. Panel D ~~E~~ shall be the surrogate coat and Panel E shall be the surrogate pants prepared according to 12.9.1.

21. Revise 12.9.3.8 to read as follows:

12.9.3.8* The sequencing of panels shall be as follows:

(1) The sequencing shall be repeated for attaining a load with the mass capacity specified by the cleaning facility.
(2) Panel D and Panel E shall be alternated in the sequencing.
(3) A total of three panels each shall be used for Panel D and Panel E.

22. Add new annex material as Annex A.12.6.4.8 to read as follows:

A.12.6.4.8 EPA Method 3540C, "Soxhlet Extraction," can be adapted for use with textile sample matrices for performing this type of extraction for semivolatile organic compound contaminants.

23. Add new annex material as Annex A.12.6.5.6 to read as follows:

A.12.6.5.6 EPA Method 8270E, "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)," can be adapted for use with textile sample matrices for performing this type of analysis for semivolatile organic compound contaminants.

24. Add new annex material as Annex A.12.7.2.4.3 to read as follows:

A.12.7.2.4.3 Given the hydrophobic nature of original finish on the specimens, extreme care must be exercised that no liquid runs off the specimen during the application of the metals standard solution.

25. Add new annex material as Annex A.12.7.3.1.5 to read as follows:

A.12.7.3.1.5 EPA Method 3050B, "Acid Digestion of Sediments, Sludges, and Soils," can be adapted for use with textile sample matrices for performing this type of extraction for heavy metal contaminants.

26. Add new annex material as A.12.7.3.2.9 to read as follows:

A.12.7.3.2.9 EPA Method 3050B, "Acid Digestion of Sediments, Sludges, and Soils," can be adapted for use with textile sample matrices for performing this type of extraction for heavy metal contaminants.

27. Add new annex material as A.12.7.4.1.3 to read as follows:

A.12.7.4.1.3 EPA Method 6010D, "Inductively Coupled Plasma," can be adapted for use with textile sample matrices for performing this type of analysis for heavy metal contaminants.

28. Revise Annex B.1.2.4 to read as follows:

B.1.2.4 EPA Publications.

Environmental Protection Agency, William Jefferson Clinton East Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

~~Method 3015A, "Microwave Assisted Acid Digestion of Aqueous Samples and Extracts,"~~ EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (The specific methods cited can be downloaded at https://www.epa.gov/hw-sw846):~~, September 1994.~~

Method 3015A, "Microwave Assisted Acid Digestion of Aqueous Samples and Extracts," February 2007.

Method 3050B, "Acid Digestion of Sediments, Sludges, and Soils," December 1996.

Method 3540C, "Soxhlet Extraction," ~~EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* December 1996~~.

Method 6010D, "Inductively Coupled Plasma~~-Atomic Emission Spectrometry~~," ~~EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* December 1996~~July 2018.

Method 8270~~D~~E, "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)," ~~Revision 3, December 1996~~2007.

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