Process Specification for Flame Retardant Treatment of Fabrics and Webbings

Engineering Directorate

Structural Engineering Division

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REVISIONS		
VERSION	**CHANGES**	**DATE**
--	Original version	5/1/2003
A	Added new Scotchgard product formulation. Scotchgard 4101W or Scotchgard 4101 may be used.	7/25/2005
B	Added Structural Engineering Division emblem to cover page; updated signature page; removed Scotchgard P/N 4101W from applicable sections. Any Scotchgard Fabric and Upholstery Protector part number(s) compliant with Scotchgard 4101 can be used as a replacement.	10/12/2011
C	Administrative changes. Updated reference section 4.0 to include SOP-007.2 and JPG 8500.4 document references.	5/13/2020
D	Scotchgard 4101 has been discontinued and is replaced by Scotchgard 4106-PF	8/1/2021
E	Added additional part number for ammonium dihydrogen phosphate. Part number is dependent upon quantity ordered.	5/28/2026

1.0 SCOPE

This process specification establishes requirements for the application of flame retardant coatings to fabrics and webbings.

2.0 APPLICABILITY

This process specification applies to flame retardant treatments for fabrics and webbings used in both flight and non-flight hardware. This process specification covers the use of ammonium dihydrogen phosphate solution and Scotchgard 4106-PF. Any Scotchgard Fabric and Upholstery Protector part number(s) compliant with Scotchgard 4106-PF can be used as a replacement.

3.0 USAGE

This process specification shall be called out on the engineering drawing by using a drawing note that identifies the surface(s) to be coated. One example of a standard callout is:

APPLY FLAME RETARDANT TREATMENT TO ALL SURFACES OF FABRIC PER NASA/JSC PRC-4005

The materials used for the flame-retardant coating are not required to be listed in the drawing's parts list.

3.1 WORK INSTRUCTIONS

Work instructions shall be generated for implementing this process specification. The work instructions shall contain sufficient detail to ensure that the manufacturing process produces consistent, repeatable products that comply with this specification.

4.0 REFERENCES

NASA-STD-6001	Flammability, Off-gassing, and Compatibility Requirements and Test Procedures
SOP-007.2	Preparation and Revision of Process Specification
JPG 8500.4	Engineering Drawing System Manual

5.0 MATERIAL REQUIREMENTS

The ammonium dihydrogen phosphate and Scotchgard Fabric and Upholstery Protector shall be used within the shelf life that is listed for each product. The ammonium dihydrogen phosphate is GFS Chemicals P/N 13231, P/N 13232, or P/N 13233. The previously used 3M Scotchgard Fabric and Upholstery Protector P/N 4101 and the similar Scotchgard P/N 4106 have been discontinued and replaced by Scotchgard P/N 4106-PF Fabric and Upholstery Protector. Scotchgard 4106-PF replaces the perfluorinated urethane fabric protector by a mixture of silicones and a proprietary resin for environmental reasons. This fabric protector may increase the flammability of fabrics so the fabric treated with ammonium dihydrogen phosphate and Scotchgard 4106-PF may be slightly more flammable than when treated with only ammonium dihydrogen phosphate. Other brands of fabric protector may be acceptable. A materials and processes engineer shall be consulted to verify acceptability.

6.0 PROCESS REQUIREMENTS

6.1 PRE-TREATMENT PREPARATION

The surfaces of the fabric or webbing to be chemically treated shall be clean and dry prior to beginning the flame treatment process.

6.2 FLAME RETARDANT TREATMENT PROCESS SUMMARY

The fabric or webbing to be treated is immersed in an ammonium dihydrogen phosphate solution (6-7 oz. by weight with 1-gallon deionized water) for 30 minutes. Do not rinse. Allow material to dry for a minimum of 24 hours. Apply 2 coats of the Scotchgard Fabric and Upholstery Protector to each side of the fabric or webbing.

7.0 PROCESS QUALIFICATION

The flame-retardant treatment process described in section 6.2 has been qualified for flammability resistance for Nomex fabrics in environments up to 30% oxygen at 10.2 psia. Any other application or new formulation must be qualified such that it will pass the NASA-STD-6001 Test 1 flammability test.

8.0 PROCESS VERIFICATION

When visually examined in its finished form, the appearance of the flame retardant coating shall be uniform and free of contamination, crystalline residue, streaking or other surface irregularities.

9.0 TRAINING AND CERTIFICATION OF PERSONNEL

All flame-retardant treatment operations shall be performed by personnel who have received on-the-job training for this process. No formal qualification or certification of employees is required.

10.0 DEFINITIONS

Flame-retardant The condition of a fabric or webbing that has been treated to