

**Test Method of Specified Requirements of
Flame-Resistant Textiles**

FTTS-FA-015

FTTS-FA-015 Flame-Resistant Textiles

Flame-Resistant Textiles are most commonly made from synthetic fibers that have been individually treated with flame-resistant additives. However, they may also be made from synthetic fibers having inherent flame-resistant quality, natural fibers treated with flame-resistant additives, or fabrics coated with flame-resistant additives during finishing process. Flame-Resistant Textiles do not easily catch fire. Moreover they deter combustion and block flames. Flame-Resistant Textiles are commonly used in fabrics for infant wear, children's pajamas, general apparel, wall coverings, furniture decorations, curtains, tents, special work apparel and many other applications.

Taiwan technology for Flame Resistant Textiles achieves CPAI-84 requirement (tent fabric) and better than class 2 for CNS10285 2 (General apparel fabric). Phenomena measured are carbonized distance, after-flame time, and after-glow time. The top grade for this test is Class 1 for CNS10285 1 (based on fabric weight of 450g/m²).

1. Scope

This criterion defines the evaluation and testing of stain release textiles. It is applicable to measure the ability of textile to release stain after home laundering.

2. Terminology

- 2.1 After flame: Persistence of flaming of material under the specified test conditions, after the ignition source has been removed.
- 2.2 After flame time: The length of time for which a material continues to flame, under the specified test conditions, after the ignition source has been removed (also called duration of flame).
- 2.3 Afterglow: Persistence of glowing combustion of a material under specified test conditions, after cessation of flaming or, if no flaming occurs, after removal of the ignition source.
- 2.4 After glow time: The time for which of a material continues to afterglow, under specified test conditions after cessation of flaming or after removal of the ignition source, ignoring glowing debris.
- 2.5 Carbonized area: The area of carbonized section.
- 2.6 Carbonized distance: The largest length of carbonized section.

3. Performance specification

	Requirement
stained sample before pretreatment	Grade 3.5
stained sample after pretreatment (refer to Note 1)	Grade 3

Note 1 Washing condition should be according to AATCC 135(1)(III)(A)iii and washing cycles should be referred to section 4.1 for durability consideration.

4. Test method :

4.1 General clothing textiles : Determination of burning speed , the test angle is 45 degree ° Refer to CPSC 16 CFR Part 1610.

4.1.1 Durability: Wash 20 times according to AATCC 135(1)(III)(A)iii.

4.1.2 Preparation of test specimen: Five specimens, each measuring 50 mmX150 mm (2 inX6 in), are required for each test. The test direction and surface of specimen should be that in which the burn most rapidly in preliminary test ° If the specimens in the preliminary test do not ignite or are every slow burning, or have a fire retarding finish, and sample need to be subjected to the dry cleaning and washing procedures.

4.1.3 Testing procedure:

4.1.3.1 Each specimen having a raised-fiber surface, in its original condition or after dry cleaning and washing, is placed on the brushing device carriage and drawn under the brush once against the lay of the raised-fiber surface. Other specimens do not require brushing. All specimens are clamped individually in the specimen holders of the flammability tester. The specimen then are dried in an oven for 30 minutes at $105\pm 2^{\circ}\text{C}$, removed from the oven, and placed in a desiccators until cool, but for not less than 15 minutes.

4.1.3.2 Adjust the flame to a length of 5/8 inch.

4.1.3.3 Remove the mounted specimen from the desiccators and place it in a position on the rack into chamber of the apparatus. The stop cord (No.50 cotton sewing thread) is strung through of this section. Bring the starting lever over to the extreme right and release it. this starts the timing mechanism and applies the flame to the specimen for a period of 1 second. This should be done within 45 seconds of the time the specimen was removed form the desiccators. Timing is automatic, starting upon application of the flame and ending when the weight is released by the burning of the stop cord. If the time of flame of flame spread is less than 4 seconds of if the specimens do not burn, test 5 additional specimens.

4.1.4 The time of flame spread is then taken to be the average time except the specimen did not burn or the flam distinguish before reach the stop cord.

4.2 Children's sleepwear: A vertical flammability test. Refer to CPSC 16 CFR Part 1615/1616.

4.2.1 Durability : Wash 50 times according to AATCC 124 at 60°C °

4.2.2 Preparation of test specimen: Totally 10 specimens in original and after durability wash states.

specimen size : 89 mm X 254 mm

Original state : cut 2 (or 3) specimens in length and 3 (or 2) specimens in width direction from the beginning and the end of fabric respectively. After durability wash: cut 2 (or 3) specimens in length and 3 (or 2) specimens in width direction from the beginning and the end of fabric respectively.

4.2.3 Testing procedure:

4.2.3.1 Put the specimen into an oven for 30 minutes at $105 \pm 2^\circ\text{C}$, removed from the oven, and placed in a desiccators to cool for 30-60 minutes ◦

4.2.3.2 Adjust the flame (at least 97% pure methane) to a length of 38 mm ◦

4.2.3.3 Remove the specimens form the desiccators and suspended in the cabinet for testing. The burner flame impinged on the bottom edge of the specimen for 3.0 ± 0.2 seconds. When flame impingement, remove the specimen form the cabinet and holder. Insert a hook with the correct weight as shown in below table in the specimen on one side of the charred area. Tear the specimen by grasping the other lower corner of the fabric and gently raising the specimen and weight clear of the supporting surface. Measure the char length as the distance from the end of the tear to the edge of the specimen exposed to the flame. Five additional specimen should be tested form the same end of fabric if only one specimen char length equal to 25.4 cm.

Fabric weight	Dead weight
Less than 101 g/m ² (3 oz/yd ²)	54.4 g (0.12 lb)
101-207 g/m ² (3-6 oz/yd ²)	113.4 g (0.25 lb)
207-338 g/m ² (6-10 oz/yd ²)	226.8 g (0.50 lb)
Greater than 338 g/m ² (10 oz/yd ²)	340.2 g (0.75 lb)

4.2.3.4 Report the value of char length for each specimen, as well as the average char length for each set of five specimens.

4.3 Other textile fabric/ROC: test angle is 45 degree ◦ Refer to CNS 10285 L3196 A-1 or A-2 (depend on fabric weight) and Flame-Resistance testing standard of Ministry of the Interior ◦

4.3.1 Durability : Depend on the needs, wash 5 cycles of $60 \pm 2^\circ\text{C}$ for 15 minutes according to CNS 8038 method F2 ◦

4.3.2 Preparation of test specimen: Cut enough specimens from original and /or washed samples both in warp(length) and weft (width) directions. Size: 350 mm x 250 mm.

4.3.3 Testing procedure:

4.3.3.1 Put the specimen into an oven for 24 hours at $50 \pm 2^\circ\text{C}$, removed from the oven, and placed in a desiccators to cool for 2 hours ◦

4.3.3.2 Adjust the flame(mainly butane and butane) to a length of 45 mm for A-1, 65 mm for A-2 ◦

4.3.3.3 Three steps :

(1) Step 1: Flame application time 1 minute for A-1 or 2 minutes for A-2, measure.

After-flame time, After-flow time and char area, take 3 specimens both in warp (length) and weft (width) directions.

(2) Step 2 (with ignited): Flame application time 3 seconds for A-1 or 6 seconds for A-2 after ignited, measure After-flame time, Afterglow time and char area, take 2 specimens both in warp (length) and weft (width) directions.

(3) Step 3(with melting): Make the specimen in 5% more loss, repeat step1 and 2, measure After-flame time, Afterglow time, char area and char length.

4.3.4 Report the maximum value of after-flame time, afterglow time, char area and char length.

4.4 Other textile fabric/US: A vertical flammability test. Refer to CPAI-84 Section 6 ◦

4.4.1 Durability: The specimens shall be immersed in water for 72 hours then air-dried. The water shall be changed by a continuous flow or by emptying and refilling every 12 hours.

4.4.2 Preparation of test specimen: Cut 4 specimens from original and /or washed samples both in warp(length) and weft (width) directions. Size: 70 mm x 300 mm.

4.4.3 Testing procedure:

(1) Put specimen in standard atmospheric conditions.

(2) Adjust the flame (at least 97% pure methane) to a length of 38 mm.

(3) Removed the specimen from standard atmospheric conditions and mounted in sample holder, than suspended vertically in the cabinet. The burner flame applied for 12 seconds. After flaming and glowing have ceased, removed the tested specimen from cabinet, Insert a hook with the correct weight as shown in below table in the specimen on one side of the charred area. Tear the specimen by grasping the other lower corner of the fabric and gently raising the specimen and weight clear of the supporting surface. Measure the char length as the distance from the end of the tear to the edge of the specimen exposed to the flame.

Fabric weight	Dead weight
less than 100 g/m ²	50 g
100-200 g/m ²	100 g
200-340 g/m ²	200 g
greater than 340 g/m ²	350 g

* CPAI-84 Sec.6

4.4.4 Report the after-flame time and char length in individual and average results. Loss weight percentage should be reported as well for fabric weight less than 100 g/m².

4.5 Other textile fabric/ISO : A vertical flammability test. Refer to EN 1103 (Apparel only) and ISO 6941 °

Durability : Cleaning procedure should according to the given care label, if no cleansing procedure is prescribed, washing condition 6A (40°C x 6 minutes) of EN 26330 (ISO 6330-1984) should be used ° Wash 20 times for Apparel; 5 times for others.

4.5.1 Preparation of test specimen : Cut 3 specimens from original and /or washed samples both in warp(length) and weft (width) directions. Size : 560 mm x 170 mm ° Wash once for un-washed garment according the given care label. if no cleansing procedure is prescribed, washing condition 6A (40°C x 6 minutes) of EN 26330 (ISO 6330-1984) should be used

4.5.2 Testing procedure :

- (1) Condition the test specimen at least 24 hours in the standard atmosphere.
- (2) Adjust the flame (propane) to a length of 40 mm °
- (3) Flame application time is 10 seconds.

Ignite position :

apparel textile - ignite on the surface of specimen.

curtains and drapes - ignite on the surface of specimen. If cannot ignite then ignite on the bottom edge of specimen.

Campers : ignite the bottom edge of specimen.

4.5.3 Report the follows:

- (1) the time from the start of the application of the test flame until the severance of the 1st and 3rd marker thread;
- (2) record the time form the severance of the 1st to the 3rd marker thread to obtain the burning speed; record the after-flame time if the 3rd marker thread did not burnout.