

Physical Results

Carnegie

Xorel Summary of Test Results



All Xorel® fabrics are woven with polyethylene yarn of different sizes and shapes. Most Xorel fabrics are inherently flame retardant and are designated IFR XOREL. All Xorel yarns are solution dyed and are totally free of chlorine, plasticizers, heavy metals, and chemical finishes.

Regardless of which yarn type is used, all Xorel fabrics are generically the same and have the same basic characteristics with the exception of flame retardancy. Therefore test results achieved on any particular Xorel fabric can be presumed to apply equally to all other Xorel fabrics.

FLAME RETARDANCY UNITED STATES

Tunnel Tests - Astm E 84

The ASTM E 84 Tunnel Test is the most widely accepted procedure to determine the surface burning behavior of building materials used for exposed surfaces, such as ceilings or walls.

The results developed for flame spread and smoke are stated relative to red oak, which is given an arbitrary rating of 100 and GRC board, given a rating of 0. Please note that the smoke index is not an indication of toxicity but a relative measure of the ability to see beyond the smoke produced by the burning surface.

The standard classification system is as follows:

Class	Flame Spread	Smoke Developed
1 or A	0-25	450 Maximum
2 or B	26-75	450 Maximum
3 or C	76-200	450 Maximum

However building and fire codes may vary from state to state and even from one municipality to another within a state. These codes generally assign a Class designation to different areas within a building, determined by proximity to a fire exit or by density of occupancy.

It is therefore the responsibility of the specifier to determine whether the material selected meets the code requirements of the location in which it is to be installed.

The ASTM E84 test is also published under the following designations:
ANSI 2.5, NFPA 255, UBC 42-1, UL 723

Vertical Tests

NFPA 701, NYC 294-40 S.R., CAL TITLE 19, FAA 25.853 (a & b)

Vertical tests are generally required for fabrics that hang freely such as window draperies or cubicle curtains. Most of them are considered more stringent than the Tunnel Test because the tested fabric is surrounded by air during the procedure.

Although they are rarely used hanging freely, IFR Xorel fabrics have been subjected to the tests to indicate their high degree of flame retardancy.

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Upholstery tests

California 117E and NFPA 260

This two tests are the most commonly required for upholstery fabrics.

Room Corner Tests NFPA 265

This test is the most demanding of all flame retardancy tests. Although not generally required under most building and fire codes, it probably offers the best indication of the fire safety of a textile wallcovering.

Please note that the Xorel fabric specifically chosen for this test was STRIE 6423, which is woven with non-flame retardant yarns. Xorel fabrics made from inherently flame-retardant yarns should perform at least as well.

FLAME RETARDANCY EUROPE AND CANADA

Flame retardancy tests in Europe have varied from country to country but the European Community is establishing a test which will apply uniformly to all EC Countries. Xorel fabrics have been tested and passed the individual requirements for Finland (EC test), France, Switzerland and Canada.

FLAME RETARDANCY INTERNATIONAL MARITIME ORGANIZATION (IMO)

The IMO is a specialized agency of the United Nations which is responsible for measures to improve the safety of international shipping.

Among these measures is MSC.61(67) International Code for Application of Fire Test Procedures (the FTP Code).

IFR Xorel fabrics were tested under this code and have qualified for shipboard use by passing the following:

- Upholstery Composite - A.652 (16)
- Surface Flammability - A.653 (16)
- Smoke and Toxicity - ISO 5659 Part-2

INDOOR AIR QUALITY

The release of formaldehyde and other volatile organic compounds (VOCs) from interior building materials can create significant health problems. This is a major issue for the Leadership in Energy and Environmental Design (LEED) program of the United States Green Building Council.

Xorel fabrics were first tested for indoor air quality in 1993 and certified as safe for use in San Francisco's Main Library. They have been more recently tested and approved following the procedure of ASTM D5116-97, Sections 01350 and 01351, for the State of California Capitol East End Complex.

Xorel fabrics have also been tested and approved by the California Health Services Department. Greenpeace also recognizes Xorel fabrics as a viable environmental alternative to PVC vinyl.

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TOXICITY IN FIRE

There are no nationally accepted standards in the United States for the evaluation of toxic gasses from a fire.

However IMO Resolution MSC.61(67) (Fire Test Procedures Code) includes a test for Smoke and Toxicity which sets safe limits for the emission of seven specific gasses.

	IMO Limit	Xorel Results
Carbon Monoxide (CO)	1450 ppm	326 ppm
Hydrogen Bromide (HBr)	600 ppm	30 ppm
Hydrogen Chloride (HCl)	600 ppm	20 ppm
Hydrogen Cyanide (HCN)	140 ppm	2 ppm
Hydrogen Fluoride (HF)	600 ppm	10 ppm
Nitrogen Oxide (NOx)	350 ppm	30 ppm
Sulfur Dioxide (SO2)	120 ppm	2 ppm

By passing this test as well as the IMO tests for Surface Flammability and Upholstery Composite (see the Flame Retardancy Section), IFR Xorel fabrics have qualified for shipboard use.

**New York City Department Of Buildings
Division Of Materials And Equipment Acceptance
MEA 474-89M**

Xorel fabrics have been found acceptable for use in accordance with the report of the Material and Equipment Acceptance (MEA) Division of the New York City Building Code.

DURABILITY AND STRENGTH

According to the standards established by A.C.T. (the Association of Contract Textile Companies) a fabric qualifies for heavy duty upholstery use if it passes 30,000 double rubs in the Wyzenbeek abrasion test ASTM D3597.

Xorel fabrics went to one million (1,000,000) double rubs in this test with "no significant yarn breakage" in either the warp or the weft. At this point, the test was discontinued.

Xorel fabrics exceeded all other A.C.T. requirements for

Tear Strength	ASTM D2261
Tensile Strength	ASTM D5034
Seam Slippage	ASTM D4034
	ASTM D434

and scored the highest rating, Class 5, in a test for resistance to pilling and fuzzing.

In a Scrubability test, Xorel went to 5,000 cycles, ten times the minimum required for heavy duty wallcoverings, with no noticeable change in appearance.

Xorel fabrics also comply with:

- Blocking Resistance test FTM 5872
- Adhesion to Coating test ASTM D 751 Sections 50-53
- Cold Crack Resistance test ASTM F 793 Paragraph 7.13

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COLORFASTNESS

Light - AATCC 16E

Under this test procedure colorfastness to light is measured by a fadeometer, a device that directs intense light at a fabric sample to measure its resistance to fading at different time levels ranging from 40 hours to 200 hours.

Results are stated on a scale of 1 to 5 as follows:

- Class 5, No Fading
- Class 4, Slight Fading
- Class 3, Noticeable Fading
- Class 2, Considerable Fading
- Class 1, Excessive Fading

Under ACT standards, fabrics to be used for upholstery, direct glue wallcoverings, panels and upholstered walls must attain a minimum rating of Class 4 after 40 hours. Drapery fabrics must attain a Class 4 rating after 60 hours.

Six representative Xorel colors were tested, four for 80 hours and two for 200 hours. All six achieved a rating of Class 5, No Fading.

Crocking - AATCC 8 Dry and wet procedure

This procedure measures the loss of color caused by rubbing the fabric while dry or while wet. Xorel achieved the highest rating, Class 5.

ACOUSTICS

ASTM C 423

These sound absorption tests determine how much the sound absorption property of a highly absorptive fiberglass batting is diminished (or increased) by covering it with a Xorel fabric. The result is expressed as a numerical change (+ or -) in the noise reduction coefficient (NRC) of the fiberglass.

- Xorel II - increase .05
- Xorel 6571 - increase .05
- Xorel 6423 - decrease .20
- Xorel 6547 - decrease .05
- Xorel 6603 - decrease .05
- Xorel 6557 - increase .05
- Xorel 6619 - increase .05
- Xorel 6623 - increase .05
- Xorel 6621 - increase .05

These results indicate that the tested fabrics are essentially neutral in key frequencies, i.e., they permit sound to pass through to the fiberglass batting without significantly affecting the absorption effectiveness of the batting.

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HOSPITAL USE

ASTM G -21-70 ASTM G - 22-76

AATCC 100 Bacterial Strike - Through

The suitability of Xorel fabrics for use in hospitals is indicated by these tests which show that Xorel fabrics will not support the growth of fungi, bacteria, or staphylococcus aureus, and when paper backed will not permit the passage of bacteria.

STAIN RESISTANCE

In tests conducted at intervals of one hour, one day and seven days, 27 common stains were completely removed by cleaning procedures specified by Carnegie. These procedures are outlined in a special ®Xorel informational brochure entitled "Suggested Maintenance Procedures".

DIMENSIONAL STABILITY

Xorel fabrics were tested for their reaction to conditions of high humidity. No change occurred during the test in the fabric's length (warp) or width (weft).