PERFORMANCE PRODUCTS

CFFA CHEMICAL FABRICS & FILM ASSOCIATION, INC.

Making Vinyl Coated Fabrics a Mainstay for Marine Applications

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BASF We create chemistry

CGT the perfect finish.

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Today's Speakers

- **Eric Petersen**
  - Director of Marketing,
    Spradling International, Inc.

- **Steve Rye**
  - Senior Technical Services Manager,
    Global Coated Fabrics, OMNOVA Solutions
  - Chair of CFFA's Performance Products Division

Who is the Chemical Fabrics and Film Association?

CFFA CHEMICAL FABRICS & FILM ASSOCIATION, INC.

- The Chemical Fabrics and Film Association (CFFA) is an international trade association representing manufacturers of polymer-based fabric and film products, used in building and construction, automotive, fashion and many other industries.
- The members of the Performance Products Division (PPD) manufacture chemical fabrics and film used in numerous applications such as marine upholstery, contract upholstery, pool liners, and transportation interiors.

Learning Objectives

Following the presentation, attendees will be able to:

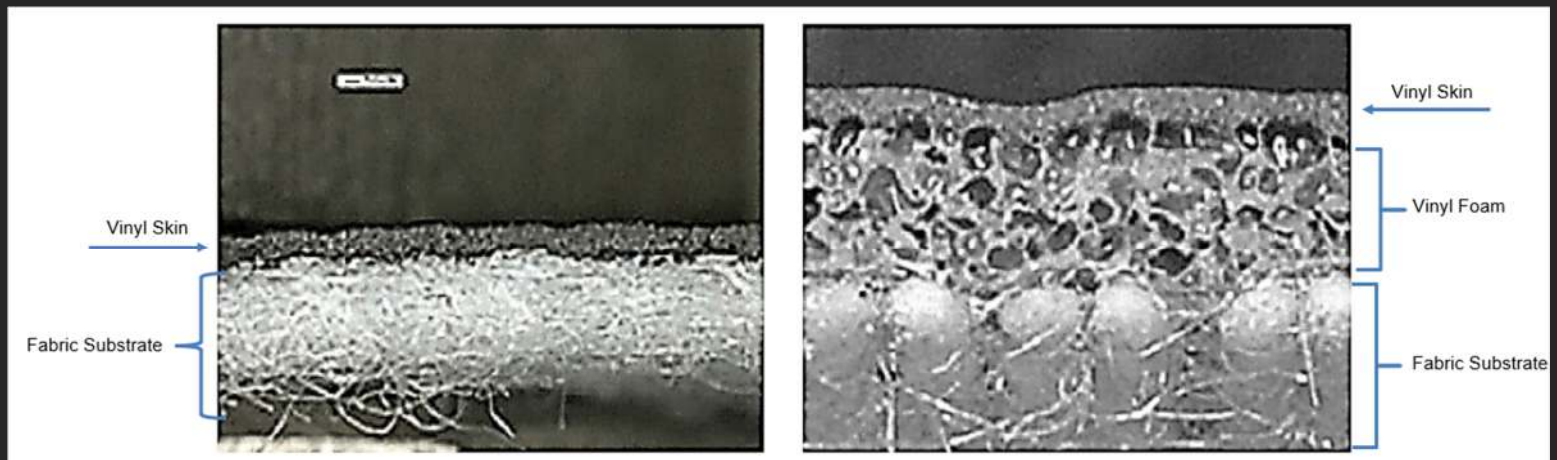
- Recognize how the chemical and structural composition of vinyl coated fabrics delivers durable and reliable fabrics for marine applications.
- Evaluate vinyl coated fabric product properties that are suitable for marine applications.
- Determine how vinyl coated fabrics are engineered to help reduce the occurrence of pink stain and mildew growth.

What are Coated Fabrics?

- Coated fabrics are a family of nonporous composite materials that can be manufactured to perform in a wide range of applications from marine upholstery to vinyl roofing to automotive products.

- The composite structure of a coated fabric is a multi-ply construction potentially composed of a top finish, solid film layer, foam, and adhesive, bonded to a flexible substrate. For upholstery, a top finish and film layer are the minimum components required to be bonded to the fabric substrate.

- The polymer-based layers can be made of PVC (vinyl), polyurethane, silicone, and thermoplastic elastomers.



Magnified cross section of nonexpanded PVC coated fabric

Magnified cross section of expanded PVC coated fabric

Where Are Coated Fabrics Used?

Coated fabrics are chosen based on their performance features, styling appeal, and other considerations for use in markets such as:

- corporate offices
- food service facilities
- healthcare
- hospitality and entertainment
- retail
- recreational vehicles
- buses, trains, and planes, and
- stadiums and arenas.

Which Applications Use Coated Fabrics?

Coated fabrics can be found on many items, such as:

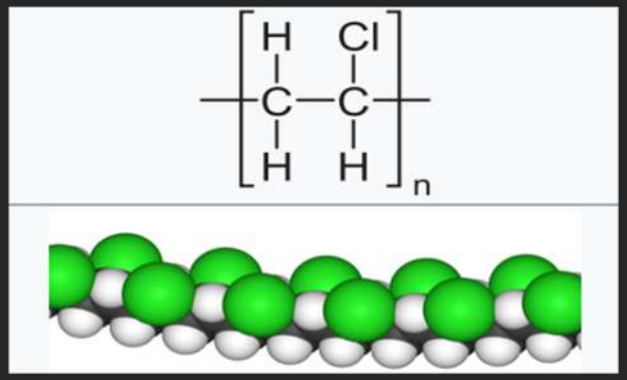
- marine seating
- contract seating
- dining seating
- medical furnishings
- guest room furnishings
- lobby furnishings
- spas and health club furnishings
- theater seating
- retail seating
- interior surfaces, and
- transit vehicle seating.

Additives in Coated Fabrics

- Vinyl can be modified by a wide variety of additives to give it properties that are required by the specific end use.

- The key additives in a compound for vinyl coated fabrics are:

  - plasticizers to provide flexibility
  - flame retardants to meet specific standards
  - antimicrobials where indicated for mold, mildew, and bacterial resistance
  - pigments for color
  - heat and light stabilizers to withstand processing temperatures and degradation from UV light
  - opacifiers and extenders to reduce transparency and cost
  - foaming agents to make expanded vinyl, and
  - other functional additives to provide desired properties.



Polyvinyl chloride

Additives for Marine Applications

- Could contain a half dozen additives to give the film the desired flexibility, color and processing stability.
- Inhibit mold and bacteria from growing on coated fabrics surface or backing.
- Increase sustainability of products by preventing product deterioration, extending their useful life.

Additives: Antimicrobials

- Also known as Biocides.

- Antimicrobials can be added to chemical fabric coatings to inhibit the proliferation of bacteria and prevent the growth of odor-causing mold and mildew.

- Antimicrobial disinfectants can be used without damaging antimicrobials.
  - Most common are quaternary ammonium chemicals, or quats; chlorine bleach; and hydrogen peroxide.

Marine Seat Construction

- Products and components of vinyl marine seating are selected for their special characteristics and performance qualities.
- Each item is an intricate part in the production of a durable, long-lasting, and resilient seat that will recover from the elements faster than other materials.
- We will take a closer look at each of the components of a marine seat in the following slides.

UV Stable Thread

- Polyester thread recommended for marine use (vs. nylon thread).
- Stands up to weather conditions.
- Stops wicking action that may cause leaks.
- Resistant to microorganisms (mold and mildew).
- In addition to UV stable thread, other options include:
  - Antimicrobial Protected Polyester Thread
  - PTFE (polytetrafluoroethylene) Thread

Marine Quality Vinyl

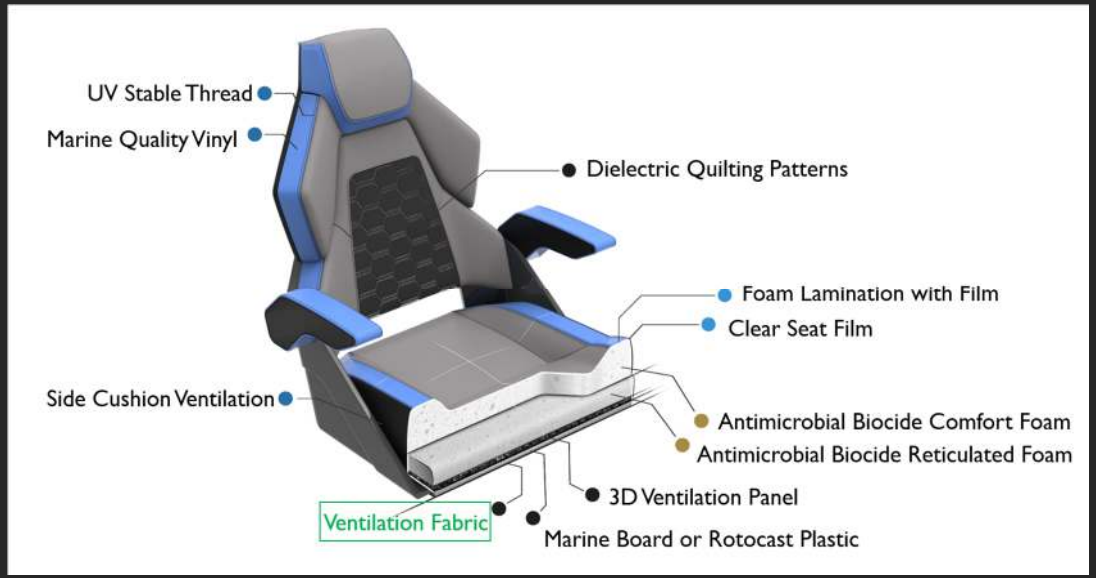
- UV Stability: Resistance to fading.
- Antifungal Protection: Biocide inhibitors for protection from fungal growth.
- Two most common constructions depending on application and design.
    1. Expanded on knit
    2. Solid polymer on non-woven

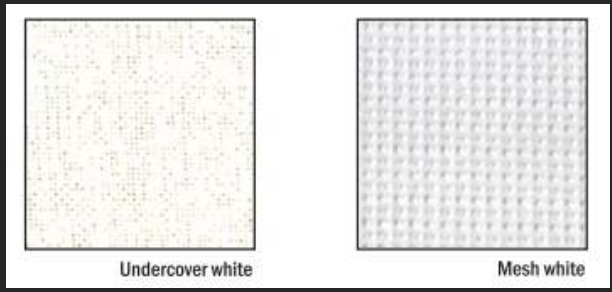
Side Cushion Ventilation

- Designed to enhance the seat design while providing an additional avenue for water drainage.
- Available in several styles and colors.
- Dimensionally stable, flexible in all climates, and fade and mildew resistant.

Ventilation Fabric

- Ventilation fabric, undercover or mesh, will maximize airflow that will result in quicker drying time for the whole seat.
- Designed to cover the bottom of the seat, providing a finished look.



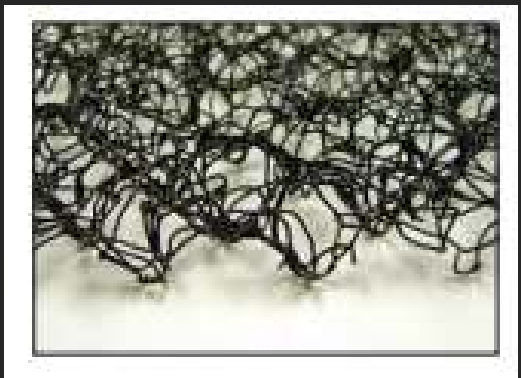


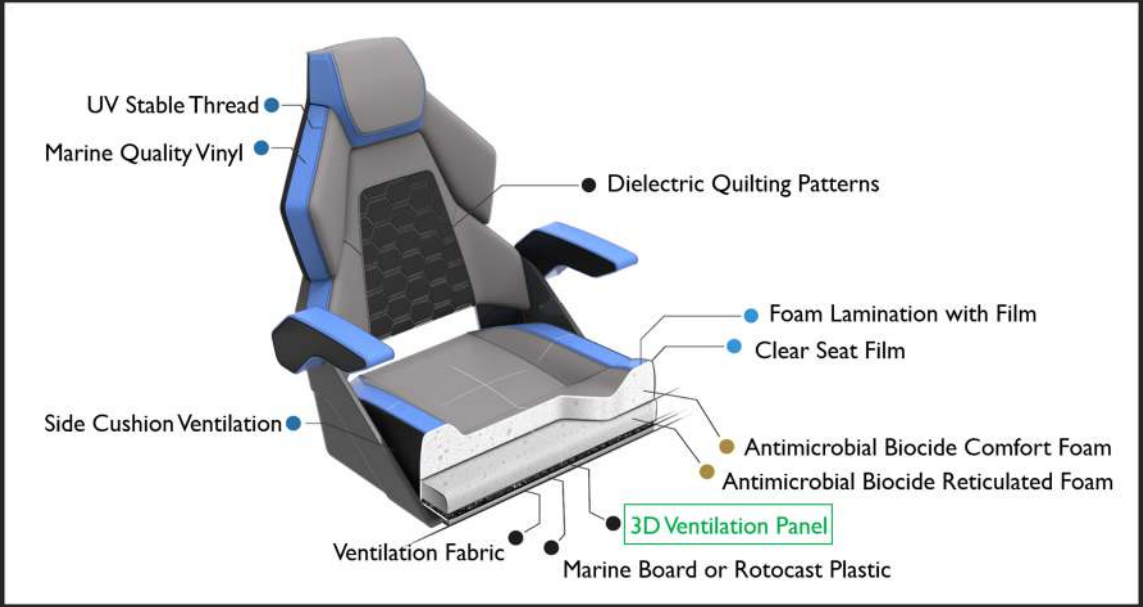
Marine Board / Rotocast Plastic

- Marine Board
  - Designed to withstand harsh outdoor marine environments.
  - UV stabilized to resist damage from direct sunlight.
  - Does not splinter, rot, swell, or absorb water.
- Rotocast
  - Molding process used in creating custom hollow plastic parts.
  - Can be designed to be resistant to UV, rot, mold, and mildew.
  - Can produce small to large parts for any style seating.

3-D Ventilation Panel

- Flexible three-dimensional mat used between the bottom foam and the seat base.
- Improves airflow and drainage of water through the bottom of the seat.



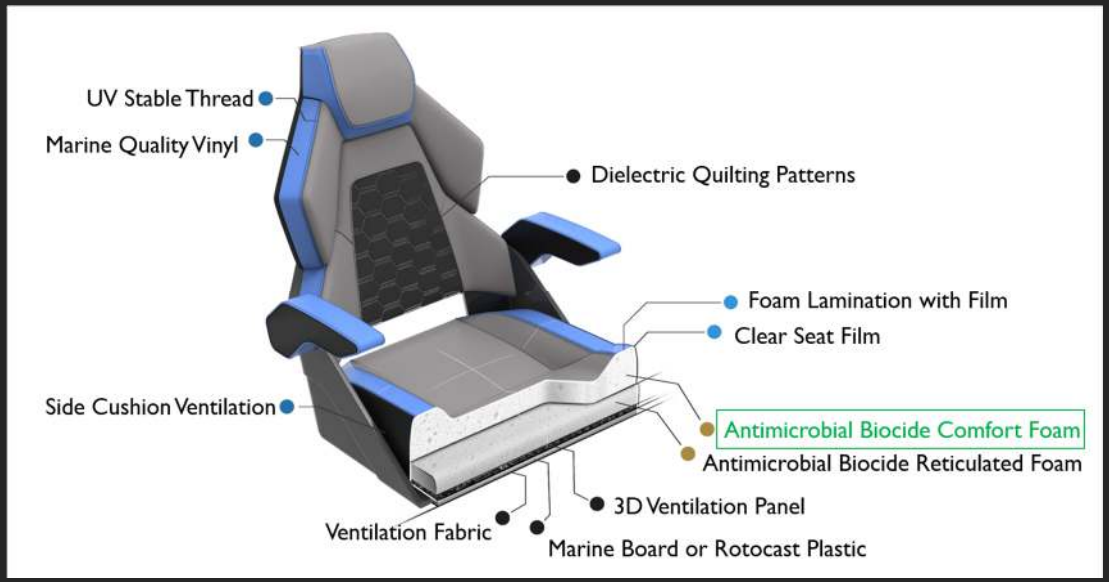


Antimicrobial Biocide Reticulated Foam

- Highly durable, mildew resistant, amine free, flexible polyurethane foam.
- Provides drainability and durability.
- Available in a wide variety of density and firmness qualities.
- Has the ability to pass water directly through the foam.

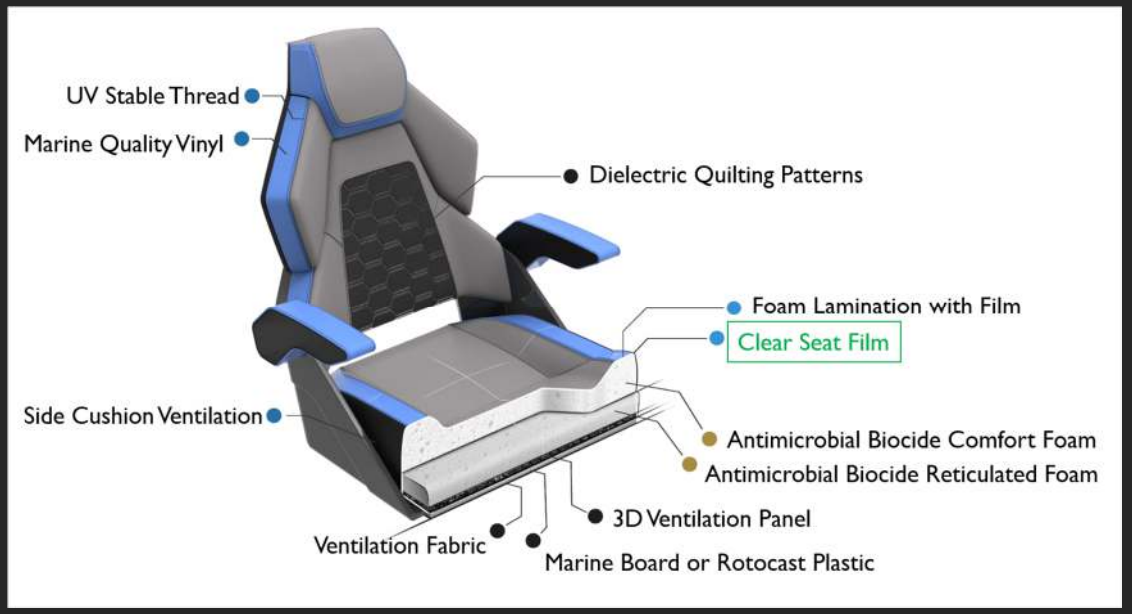
Antimicrobial Biocide Comfort Foam

- Amine-free polyurethane foam containing biocide additives to protect against mold and mildew.
- Molded to fit the seat design.
- A softer foam placed on top of support foam, usually a reticulated foam.



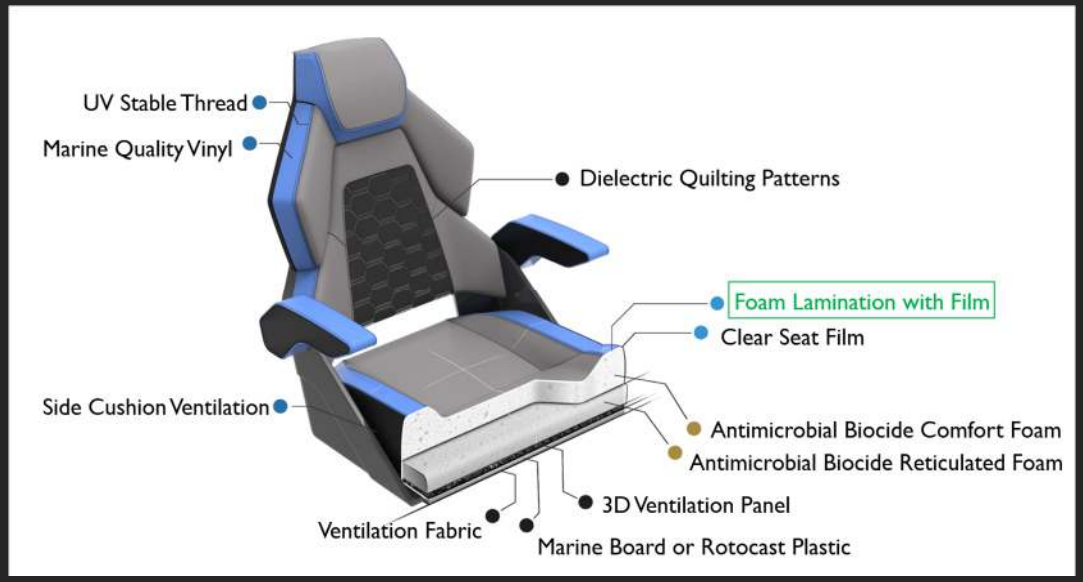
Clear Seat Film / Silk Film

- Thin clear EMA (Ethylene Methyl Acrylate) film.
- Commonly used to cover foam cushions to allow the vinyl skins to slide over the foam.
- Avoids the backing on marine quality vinyl from catching on the foam surface.



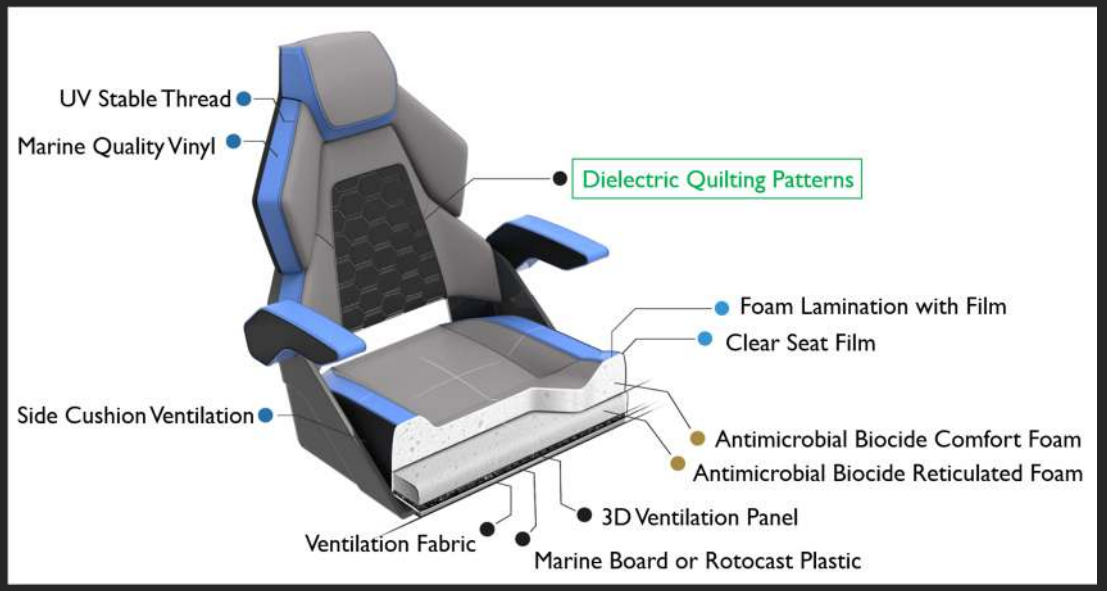
Foam Lamination with Film

- Standard polyester or eco-friendly.
- Contains additives that retard microbial growth and degradation.
- Treated to prevent the staining of vinyl fabric and pink staining.
- Several lamination backings are available.



Dielectric Channel Quilting

- Radio frequency welding or heat sealing, or “pleated vinyl”.
- Creates tiny depressions that simulate sewing needle holes to give vinyl a quilted look without stitching it.
- Does not penetrate the topskin of the vinyl, retaining the original level of protection.
- Available in several styles, widths and depths.



Setting the Standard in Marine Applications

- CFFA members have developed standards and laboratory test methods that set the bar for producing coated fabrics to ensure they withstand the normal conditions of commercial use.

- Members of CFFA responsible for these tests and standards subscribe to a philosophy of total quality management and continuous improvement for their products, processes, and services.

Performance Standards

- CFFA standards reference test methods developed by ASTM International, the American Association of Textile Chemists and Colorists (AATCC), and SAE International specifications. In the absence of relevant methods in the scientific community, the CFFA develops its own.

- Test methods are revised and updated as product requirements change, and newer polymer-based materials find increasing acceptance.

Performance Standards

Due to the wide variety of coated fabrics and films and the diverse end uses for each, individual performance standards have been developed. Two recommended minimum performance standards for marine applications published by the CFFA are listed below:

- Recommended Minimum Performance Standards for Vinyl Coated and Other Chemical Coated Upholstery Fabrics – Marine: CFFA-MARINE/VINYL-201E
- Recommended Minimum Performance Standards for Polyurethane Upholstery – Marine: CFFA-MARINE/PU-101C.

Recommended Minimum Performance Standards for Vinyl-Coated and Other Chemical Coated Upholstery Fabrics – Marine - CFFA-MARINE/VINYL-201E

CFFA-MARINE/VINYL-201D: Key Elements

- This standard sets forth recommended performance standards for vinyl and other chemical coated upholstery fabrics produced on non-woven or knit substrates suitable for marine applications.
- This standard covers but is not limited to chemical topcoats widely used for upholstery such as urethane and acrylic.
- This standard is not applicable to vinyl or chemical coated fabrics used in indoor applications.

CFFA-MARINE/VINYL-201E: Properties

- Depending upon specific tailoring and performance requirements, these properties should be used to select the construction of coated fabric most suited for each end use.

- Properties are measured using CFFA Standard Test Methods.

PROPERTY	TEST METHOD	KNITS	NON-WOVENS
Abrasion	CFFA 1a #10 Duck	25,000 Cycles No Appreciable Wear	25,000 Cycles No Appreciable Wear
Accelerated Light Aging	CFFA 2[1]	No Appreciable Color Change	No Appreciable Color Change
Adhesion	CFFA 3	3.0 Lbs.	3.0 Lbs.
Blocking	CFFA 4	No Blocking, Slight Adhesion	No Blocking, Slight Adhesion
Cold Crack	CFFA 6a[2]	No Cracking	No Cracking
Crocking: Dry & Wet	CFFA 7	Good Slight Transfer	Good Slight Transfer
Flex	CFFA 10	25,000 Cycles No Appreciable Crazing	25,000 Cycles No Appreciable Crazing
Mildew Resistance	CFFA 120	No Growth	No Growth
Pink Stain	CFFA 121	No Stain	No Stain
Scrubbability	CFFA 130	200	300
Seam Strength	CFFA 14	30 x 25 lbs.	35 x 35 lbs.
Tear: Tongue Trap	CFFA 16b CFFA 16c	4 x 4 lbs. NA	NA 15 x 15 lbs.
Tensile	CFFA 17	50 X 50 lbs.	50 X 50 lbs.
Volatility	CFFA 18[3]	8%	8%

Recommended Minimum Performance Standards for Polyurethane Upholstery – Marine - CFFA/MARINE/PU-101C

CFFA/MARINE/PU-101C: Key Elements & Properties

- Polyurethane upholstery materials are manufactured from natural and/or synthetic fibers, coated with a urethane film or coagulant on one side to provide a durable, protective surface.

- Depending on the application, polyurethane upholstery will be colored, decorated, and/or textured to provide an aesthetically pleasing appearance and feel, while maintaining minimum performance standards under appropriate consumer usage.

- This specification is not applicable to polyurethane materials used in indoor applications.

PROPERTY	TEST METHOD	KNITS & WOVENS	NON-WOVENS
Abrasion	CFFA 1a #10 Duck	25,000 Cycles No Appreciable Wear	25,000 Cycles No Appreciable Wear
Accelerated Light Aging	CFFA 2[1]	No Appreciable Color Change	No Appreciable Color Change
Adhesion	CFFA 3	3.0 lbs.	3.0 lbs.
Cold Crack	CFFA 6a[2]	No Cracking	No Cracking
Crocking: Dry & Wet	CFFA 7	Good Slight Transfer	Good Slight Transfer
Flex	CFFA 10	25,000 Cycles No Appreciable Crazing	25,000 Cycles No Appreciable Crazing
Hydrolytic Stability	CFFA 110 CFFA 3 CFFA 1a CFFA 10	**Adhesion** 75% Retention **Abrasion** 25,000 Cycles **Flex** 15,000 Cycles	**Adhesion** 75% Retention **Abrasion** 25,000 Cycles **Flex** 15,000 Cycles
Mildew Resistance	CFFA 120	No Growth	No Growth
Resistance to Disinfectants	CFFA 100	Visual Inspection Manual flex	Visual Inspection Manual Flex
Seam Strength	CFFA 14	30 X 25 lbs.	35 X 35 lbs.
Tear: Tongue (Single Rip) Trap	CFFA 16b CFFA 16c	4 X 4 lbs. NA	NA 15 X 15 lbs.
Tensile Strength	CFFA 18	50 X 50 lbs.	50 X 50 lbs.

Coated Fabric Test Methods

- There are several test methods listed on the CFFA website that are used by the industry and its customers to determine the physical properties of chemical coated fabrics and films in all applications, to facilitate quality control and to ensure customer satisfaction.

- Test methods are categorized according to the key performance elements of coated fabrics:
  - Inherent strength
  - Durability in service to withstand normal commercial use

Test Methods for Marine Applications

The following test methods are used to determine if coated fabrics are resistant to microorganisms:

- Mildew Resistance – CFFA-120 (based on ASTM G21)

  To determine degree of fungal growth on coated side only of chemical coated fabric.

- Pink Stain – CFFA-121 (based on ASTM E-1428)

  To evaluate the antimicrobial performance in or on a polymeric film against staining by a pink stain organism (Streptomyce species).

Summary

- Coated fabrics have a long history of usage and development, and there is now a virtually limitless range of combinations of high-performance products available.
- Each product has its own performance characteristics related to its inherent strength as well as its performance in real-world installations.
- Some fabrics are specifically intended for outdoor and marine use and engineered to help reduce the occurrence of pink stain and mildew growth.
- Becoming familiar with industry terminology, product materials, and the basics of how these fabrics are manufactured can assist greatly in improving product understanding.
- Selecting fabrics that meet CFFA standards ensure you are making an informed decision every time.

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