



**Makrolon® marine
enclosure guide**
Redefining the view



The undeniable look of Makrolon®

Covestro, where innovation is natural

Make a stunning statement

With a selection of products providing a glass-like, wrinkle-free appearance, Makrolon marine products make navigating a breeze. Combining clarity with durability, Makrolon polycarbonate sheet provides clear, unobstructed views. These low distortion, high impact resistant products are available in 0.040" - 0.080", all of which can be sewn to provide a clean, crisp appearance to any enclosure. Makrolon is ideal for any climate as it remains stable and retains its shape during temperature fluctuations. The products withstand the harshest environment, providing unparalleled sightlines and a stunning look for years.

Explore the options

Makrolon® Marine 5

- Designed for the most demanding applications
- Provides highest weathering performance
- High optics, long-term clarity and low optical distortion
- Two-sided hard coat protection against abrasion, UV and chemical attack
- Sewable
- Available in 0.060" and 0.080"
- Flat and curved applications*



Makrolon® AR

- Provides high optics, long-term clarity and low optical distortion
- Two-sided hard coat protection against abrasion, UV and chemical attack
- Sewable
- Available in 0.060"
- Recommended for flat applications only



Makrolon® VR

- High optical clarity alternative to vinyl
- Two-sided enhanced weatherability, resistance to yellowing
- Improved sew-ability & cut-ability over heavier gauge polycarbonate options
- Can be rolled, ideal where space is limited
- Available in 0.040"
- Flat and curved applications*



Warranty

Makrolon Marine 5 – Five (5) year limited warranty: Breakage, Yellowing, Microcracking

Makrolon VR – Five (5) year limited warranty: Breakage



Product selector

**Makrolon®
Marine 5**

Best

**Makrolon®
AR**

Better

**Makrolon®
VR**

Good

Portfolio

Product	Gauge	Standard sheet size	Bend radius (min.)
Makrolon Marine 5	0.060"	50" x 110"	20"
Makrolon Marine 5	0.080"	60" x 110"	30"
Makrolon AR	0.060"	48" x 96"	No bend
Makrolon VR	0.040"	52" x 110"	4"



Product features	Material				
	Makrolon Marine 5	Makrolon AR	Makrolon VR	Vinyl	Acrylic
Optically clear	✓	✓	✓		✓
Low distortion	✓	✓	✓		✓
Abrasion resistance	✓	✓		available	available
Wrinkle-free	✓	✓	✓		✓
Sewable	✓	✓	✓	✓	
Rollable			✓	✓	
Low shrink rate	✓	✓	✓		✓
5 year warranty*	✓		✓		contact manufacturer

*Visit mfg. website for warranty details

Makrolon®

Fabrication

Shipping / Handling*

Abrasion resistant Makrolon® Marine 5 and Makrolon® AR sheets should be shipped to the fabricator on a flat shipping pallet and should not be rolled or bent.

Makrolon® VR can be shipped in either a shipping tube or by flat pallet.

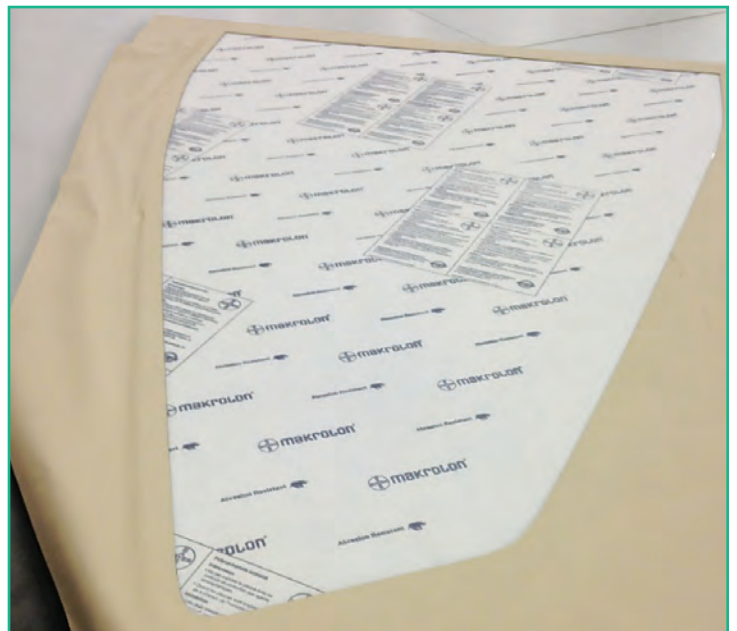
**The protective film masking should remain on the sheet during fabrication. Cut away only enough masking for seam work. Peel the masking back and then trim it off – do not score the sheet and peel the masking. This helps reduce the risk of scratching from the cutting and sewing process. Remove the remainder of masking after enclosure is installed on the boat.*

Cutting

Makrolon sheets can be cut with electric metal shears, tin snips or cutlery grade, carbon steel scissors (e.g. Kai scissor #7280 or Fiskars® 8" Titanium Nitrate Shop Snip for a tight radius). Wiss® Multi-Purpose Snip model A10BS, has an offset for table work.

Edge finishing: Remove burred edges caused by cutter using a deburring tool, a very fine metal file or lightly sand to deburr edges of the sheet along cut lines prior to sewing.

Corners: Remove sharp corners to keep polycarbonate from wearing through the canvas fabric over time.



Sewing

Commercially available, heavy duty sewing machines capable of sewing through polycarbonate are recommended. See machine supplier for brand and model.

General sewing recommendations:

Sewing machine speed: Use a slow feed rate. Top feed preferred – bottom feed will build up polycarbonate plugs/chips dislodged by the needle.

Stitch rate: Average (4) stitches per inch. A faster feed will add excess heat to the sewing needle.

Stitch: Square Feet or Step Stitch are commonly used. Distance from edge of sheet should be $>1/2"$.

Seams: The most popular seams used in canvas tops and covers are: the overlapping seam, the semi-flat felled seam, and the full flat felled seam. Seams can be waterproofed by using acrylic or Mylar® film basting tape. This double-sided adhesive tape bonds well with coarse canvas fabric. Use a soapstone pencil to mark stitching lines. Lines wash away when exposed to water.

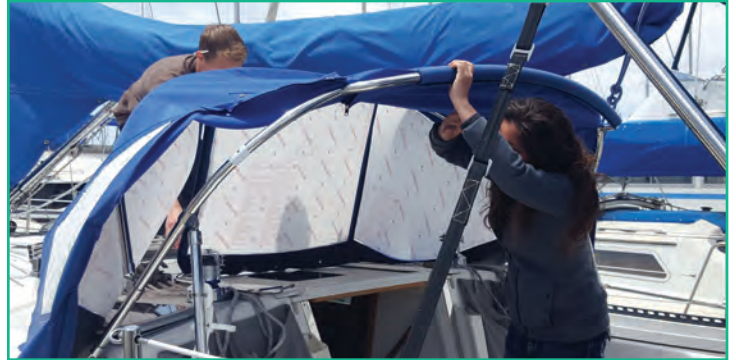
Motor: A servo motor instead of a DC stepper/clutch motor will allow for a more controlled sewing feed rate.

Needles: Groz Beckert needle points – Tripoint size 22,23 or Groz Beckert San 5.2 double grooved. Although diamond tip needles are capable of sewing through polycarbonate (size 20,21,22), they may abrade the weave of the fabric more than tripoints. A more roundly pointed needle will move between fabric fibers versus physically cutting the weave, which may eventually cause the fabric to fray.

Needle Cooling: Using a mini-cooler to blow cold air over the needle will keep it from overheating during long runs.

Thread: Standard choices include Solarfix® and Tenara® PTFE thread.* PTFE thread is commonly used due to the heat buildup in the needle from the sewing process.

*Fabricator is responsible for evaluating thread brand.



Troubleshooting

Thread breakage:

Check for rough metal surfaces within sewing area: needle, needle plate, feed dog, sewing hook or foot. Deburr metal surfaces where needed. Sand down burrs with emery string cord.

- Slow down stitching speed
- Replace worn needle
- Use mini-cooler to cool needle which keeps thread from melting and breaking at the needle due to heat buildup
- Thread can split at needle eye hole. Clean debris from eye hole
- Switch to larger needle

Excess heat buildup within sewing needle:

- Slow feed rate
- Use mini-cooler to cool needle

Thread ravel issues:

- Reduce bobbin tension on thread

Additional information on sewing products:

Sloan Machinery Company
www.sloanmachinery.com
Salem, NH 03079
Contact: Sam Sloan
603-893-8883

Consew (Consolidated Sewing Machine Corp.)
400 Veterans Blvd.
Carlstadt, NJ 07072
800-221-8494
212-741-7788
consew@att.net



Cleaning

Makrolon®, like other polycarbonate products, requires careful cleaning to prevent crazing, cracking or yellowing of product. Clean water should be used to wash off grime and loose grit from all panels before cleaning products are applied. Only a soft microfiber cloth, or microfiber sponge should be used to clean Makrolon windows. Avoid squeegees, deck / scrub brushes, scotch pads, paper / shop towels as they can be abrasive and can cause haze or swirls in the sheet. Avoid grit polishes as abrasives can lead to haze and swirls.

Points to remember:

Do not use abrasive cleaners

Do not use high alkaline cleaners (high pH or ammoniated)

Do not leave cleaners sitting on polycarbonate for periods of time; wash off immediately

Do not apply cleaners under direct sunlight or at elevated temperatures

Do not clean polycarbonate with any unapproved cleaners. When in doubt seek guidance.

Using scrapers, squeegees, razors or other sharp instruments may permanently scratch polycarbonate.

Always avoid dry rubbing cleaning polycarbonate, as sand and dust particles clinging to the exterior of the glazing may scratch its surface.

An anti-static canned-air ionizer can reduce electrostatic charge buildup on polycarbonate, consequently reducing dirt and dust buildup that would hinder cleaning.

Photos courtesy of:

Cover: *The Canvas Guy & Mark Mitchell (Boat Owner)*

Page 2 left side, top; left side bottom; right side, bottom: *David's Custom Trimmers*

Page 2 left side, middle: *Alameda Canvas & Coverings*

Page 2 right side, top: *The Canvas Guy & Mark Mitchell (Boat Owner)*

Page 3 left: *Alameda Canvas & Coverings*

Page 3 right: *Marine Tops Unlimited, Inc.*

Page 4 top three right: *Marine Tops Unlimited, Inc.*

Page 5: *Alameda Canvas & Coverings*

Cleaners:

Use only neutral-pH cleaners or those specified to be compatible with Makrolon products. Harsh detergents may damage product. Makrolon marine windows can be cleaned with over-the-counter dishwashing liquids such as Joy® or Palmolive® soaps. Rinse thoroughly with clean water to remove all traces of cleaning products. To prevent water spots, thoroughly dry the product with a dry microfiber cloth or chamois.

Do not apply RainX® or other brands of hydrophobic surface treatments to Makrolon polycarbonate as they may damage window's protective surface.

Waxes and sealants: can be helpful to reduce accumulation of dust / dirt / salt spray and make cleaning easier. Approved products include Meguiar's #10 Clear Plastic Polish & Cleaner, Meguiar's M18 Mirror Glaze® Clear Plastic Detailer, Star Brite® Rain View Wet Weather Visibility Treatment, Golden Eagle Company 303® Clear Vinyl Protective Cleaner, Sumner Laboratories 210® Plastic Cleaner & Polish.

Removal and stowing: Extra handling care should be taken any time when windows are installed or removed. Prior to removal, Makrolon windows should be cleaned and dried thoroughly. Always protect your windows with cloth covers immediately upon removal. Store windows in a location which is not exposed to the elements. If possible lay windows in a flat position. If storing horizontally isn't possible, store in a vertical position where they will not be bumped or damaged. Keep a cloth sheet between windows during storage. We recommend placing a soft non-abrasive fabric such as Evolution® to cover over all exposed window surfaces when not in use. Covering the surface reduces heat buildup and exposure to harmful UV radiation.

All materials should be tested prior to use for compatibility.

Please contact your Covestro representative or the Technical Service Group at 800.628.5084 with any questions, or if you require additional information.

Fiskars® is a registered trademark of Fiskars Corporation
Wiss® is a registered trademark of Apex Tool Group
Mylar® is a registered trademark of E.I. DuPont Corporation
Solarfix® is a registered trademark of The Miami Corporation
Tenara® is a registered trademark of W.L. Gore & Associates, Inc.
Joy® is a registered trademark of Proctor and Gamble
Palmolive® is a registered trademark of Colgate Palmolive
Rain-X® is a registered trademark of ITW Global Brands
Evolution® is a registered trademark of Sailrite
M18 Mirror Glaze® is a registered trademark of Meguiar's Inc.
303® is a registered trademark of Gold Eagle Company
210® is a registered trademark of Sumner Laboratories



The power of global. The service of local.

Covestro is one of the leading manufacturers of high-quality polycarbonate products, which are continually leaders in global markets. Behind the technologically sophisticated solutions you'll find the expertise of the global Covestro network. Customer focus, innovation and environmental protection are objectives of equal importance in our corporate policy.

For complete information on Makrolon® marine products, call **800.254.1707** or visit our website **sheets.covestro.com**



119 Salisbury Road
Sheffield, MA 01257
Toll Free: 800.254.1707
Fax: 800.457.3553
sfdinfo@covestro.com
sheets.covestro.com

BRO046 1017
©Copyright, Covestro, 2017
Makrolon® is a registered trademark of Covestro

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance, information and recommendations to determine to your own satisfaction whether our products, technical assistance and information are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by Covestro.

Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with any claim of any patent relative to any material or its use. No license is implied or in fact granted under the claims of any patent.

With respect to health, safety and environment precautions, the relevant Safety Data Sheets (SDS) and product labels must be observed prior to working with our products.