



ECOMARINE™ is a two-component rigid polyurethane designed for the manufacture of products for marine applications. It is primarily used in the boating industry but can also be used for structural, insulation, and acoustic attenuation.

THIRD PARTY CERTIFICATIONS:

Meets requirements of 33CFR §183.114 US Coast Guard Test of Flotation Materials (MILSPEC-P-21929B).

UL Designation:

ECOFOAM (A) (0.024-0.046 g/cm³)

ECOFOAM (B) (0.024-0.046 g/cm³)

UL File Number: E129225

Control Number: QMFZ2

CONTAINERS:

Non-Pressurized – IBCs/totes, drums, pails and kits.

Pressurized – Vessels.

Bulk – Railcars, tankers and isotainers.

DISPENSING EQUIPMENT:

SLUG, FLUSH, hand mix, high-pressure pump metering, low-pressure metering, air, electric and hydraulic proportioners.

MIX RATIO:

TYPE	ISO	POLYOL
Component by Weight	100	91 ±2
Specific Gravity	1.23	1.11
Viscosity, cps @ 25°C/77°F	200 ± 20	650 ± 50

TYPICAL PROCESSING & EQUIPMENT CONDITIONS:

Final conditions need be verified and approved by customer.

TYPE	RESULT
Ambient Temp.	≥ 21°C (70°F)
Chemical Temp.	29 – 35°C (85 – 95°F)
Substrate Temp.	29 – 43°C (85 – 110°F)
Mold/Fixture Temp.	29 – 43°C (85 – 110°F)
Primary Heater Temp.	29 – 35°C (85 – 95°F)
Hose Temp.	29 – 35°C (85 – 95°F)

SUBSTRATE CONDITIONS:

Substrates should be clean, free of oil, grease, residue, moisture, solvent, other contaminants and debris. Substrate temperatures should not create a “heat sink” when applied/dispensed to substrate to avoid undesired final product properties. Typical substrate temperatures range from 27 – 43°C (80 – 110°F). Final conditions need to be verified and approved by customer.

TYPICAL FINISHED FOAM FIRE PROPERTIES:

All polyurethane products are organic material and are combustible under certain fire conditions. ECOMARINE® contains low-level fire retardant additives designed only to cause foam to extinguish once the flame source is removed from the foam’s surface. Foam will burn while in contact with a flame or under very high temperatures and combustion conditions that occur in fires.

TYPE	RESULT
UL 94 HF-1 (PASS or FAIL)	PASS
FMVSS 302 (PASS or FAIL)	PASS

TYPICAL LABORATORY HAND MIX RESULTS:

Components measured by weight and hand mixed at 25°C (77°F) on a high speed pneumatic mixer capable of 15,000rpm @ 60psi. Results should serve as a guideline only.

TEST	RESULT
Cream Time	20 ± 5 seconds
String-Gel Time	85 ± 10 seconds
Tack-Free Time	150 ± 90 seconds
Free Rise Density kg/m ³ lb./ft ³	33.6 ± 1.6 2.1 ± 0.1
Core Density kg/m ³ lb./ft ³	43 ± 3.0 2.7 ± 0.2
Dimensional Stability, % Vol. Change after 7 days, 54°C (130°F), >90% RH after 7 days, -62°C (-80°F)	< 2.0% < 0.02%
Compressive Strength, kPa (psi) Parallel to Rise ⊥ Perpendicular to Rise	250 kPa (36 psi) 200 kPa (29 psi)
Water Absorption	0.24 kg/m ² (0.05 lb./ft ²)
Closed Cell Content	> 90%



LIMITATIONS AND HAZARDS:

Final foam product must be protected from weathering, physical deterioration. Final product should not be continuously exposed to temperatures $\geq 107^{\circ}\text{C}$ (225°F). Applications of excessive thickness should not occur as the exothermic reaction may lead to spontaneous combustion, excessive pressure, or thermal expansion from the significant heat developed in the foaming reaction. Use only in well-ventilated areas or with appropriate respiratory equipment. Consult SDS for specific details.

SAFETY:

When working with any chemicals it is necessary to wear eye protection and gloves. It is necessary to understand hazards involved in handling all components, establish and follow safe work procedures, and comply with all OSHA, DOT, and EPA Regulations. Refer to SDS for specific details. All persons who work with components must know and follow proper safe handling procedures.

SHELF LIFE:

Six (6) months from date of manufacture when stored in original, unopened, containers at temperatures between $65-80^{\circ}\text{F}$. Consult with FSI before disposal or return if components exceed shelf life.

HANDLING:

As with all chemicals, care should be exercised when handling. Avoid contact with eyes, skin, and clothing. Eye protection and gloves are considered a minimum requirement and should be worn at all times while working with components. Refer to SDS for specific details regarding handling requirements.

STORAGE:

Do not store in direct sunlight. Containers should be stored under cover and protected from contact with rain or snow. Water should not be able to accumulate where it can be drawn into the containers. Ideal storage temperatures are 50°F (10°C) to 75°F (24°C). Keep containers sealed until use. Refer to SDS for further information or contact FSI for assistance.

STEWARDSHIP:

FSI and its subsidiaries are committed to stewardship and have a concern for the health and safety of all individuals who come in contact with its products, as well as the environment. This philosophy is a foundation on which we assess information to appropriately protect individuals and preserve our environment. Success of stewardship rests with each and every individual involved in the cradle to grave life cycle of our products.

CUSTOMER RECOMMENDATIONS:

FSI strongly encourages customers to review their manufacturing, health, safety, and environmental processes and applications while evaluating its products. This document contains information, data and products that are considered **PROPRIETARY**. Reproduction, storage, transmission, or redistribution in any form, by any means, electronic or otherwise, is strictly prohibited, without the prior, express, written permission of FSI.

NOTE: The information provided herein is offered for the user's consideration and examination. The information, data and products presented herein are typical properties only and are not to be construed as specifications. Users should confirm results by their own tests. Individual results may vary according to specific manufacturing and processing parameters. The information, data and products presented herein are believed to be reliable, are based upon the information reasonably available to FSI at the time of publication and are presented in good faith. While the information is based on data believed to be reliable, FSI makes no warranties, expressed or implied as to the accuracy or reliability of the information, data and products herein and assumes no liability arising out of its use. This information and data may be subject to revision as new knowledge and experience become available. This publication is not to be taken as a license to operate under, or recommendation to infringe any patent.

NOTICE TO USERS: FSI products can be used to prepare a variety of polyurethane and other products. FSI strongly encourages users to review both their manufacturing processes and their applications of FSI products to ensure that FSI products are not used in ways for which they are not intended or tested. FSI personnel are available to answer your questions and to provide reasonable technical support.

FSI does not endorse or claim suitability of its products for specific applications. While the information and data provided herein falls within anticipated normal range of product(s) properties, this information and data should not be used to establish specification limits or used alone as the basis of design. It is the user's responsibility to satisfy itself that the product is suitable for the user's intended use. Because FSI neither controls nor can anticipate the many different end-uses and end-use and processing conditions under which this information, data and/or the products described herein may be used, FSI does not guarantee the usefulness of the information or the suitability of its products in any given application. FSI is not obligated to supply or otherwise commercialize such products for any use or application whatsoever. It is the responsibility of the user to determine that the FSI product is safe, lawful, and technically suitable for the intended use. The user must decide what measures are necessary to safely use the product, either alone or in combination with other products, also taking into consideration the conditions of its facilities, processes, operations, and its environmental, health and safety compliance obligations under any applicable laws.

DISCLAIMER: Nothing herein shall be construed as guarantee of any warranty, express or implied, regarding performance, results to be obtained from the use, comprehensiveness, merchantability, or that said information, data and products can be used without infringing patents. FSI MAKES NO WARRANTIES, EXPRESS OR IMPLIED, CONCERNING THE SUITABILITY OF ANY FSI PRODUCT. FSI EXPRESSLY DISCLAIMS ANY WARRANTY FOR A PARTICULAR PURPOSE OR FREEDOM FROM PATENT INFRINGEMENT.

LIMITATION: Failure to strictly adhere to recommended procedure(s) shall relieve FSI of all liability with respect to the FSI product or use thereof. User assumes all risks whatsoever as to the use and qualification of the FSI product in the finished product. User's exclusive remedy as to any breach of warranty or negligence claim shall be limited to the purchase price of the FSI product. The foregoing exclusive remedy will survive and apply even if this exclusive remedy is found to have failed of its essential purpose.