

ECCOSTOCK® FPH

High Temperature Foam-in-Place Liquid

Material Characteristics

- Two part closed cell foam-in-place resin system
- Rigid, high temperature polyurethane (isocyanate)
- Rapid room temperature cure
- Once cured, ECCOSTOCK® FPH will withstand continuous exposure up to 275°F (135°C) and up to 325°F (163°C) for short periods remaining rigid
- Typical thermal conductivities of ECCOSTOCK® FPH are seen around 0.14 (BTU)(in)/(ft²)(hr)(°F), 0.03 Watts/(meter)(°C)
- Cured ECCOSTOCK® FPH does not support fungal growth per MIL-STD-810E

Applications

- Encapsulation of electronic modules, antennas, rockets, satellites and missiles
- Encapsulation of coiled waveguide delay line to provide rigidity
- Vibration and sound deadener when applied to interior surfaces of an instrument cabin
- Encapsulation of crystal ovens for temperature stability
- Staking material for high Q coils

Kit Availability

	Size I	Size II	Size III
FPH Resin	1.3 Lbs.	5.2 Lbs.	45.4 Lbs.
Catalyst (12-2H)	0.9 Lbs.	3.4 Lbs.	29.5 Lbs.
Catalyst (12-4H)	1.0 Lbs.	3.9 Lbs.	34.1 Lbs.
Catalyst (12-6H)	1.0 Lbs.	3.9 Lbs.	34.1 Lbs.
Catalyst (12-10H)	1.1 Lbs.	4.4 Lbs.	38.6 Lbs.

Related E&C Products

- ECCOSTOCK® SH: Sheet stock made from ECCOSTOCK® FPH, available in various sizes and densities

Shipping

- ECCOSTOCK® FPH ships as a hazardous material. Class 6.1 Poison, UN2078, PG II
- 1 Year shelf life

FPH/Catalyst Ratio By Weight

Catalyst	12-2H	12-4H	12-6H	12-10H
Parts Catalyst Per 100 Parts FPH Resin	65	75	75	85
Unconfined Bulk Density, lbs/ft ³ (g/cc)	2 (.03)	4 (.06)	6 (.10)	10 (.16)
Desired Bulk Density, lbs/ft ³ (g/cc)	2-3 (.03 - .05)	4-5 (.06 - .08)	6-10 (.10 - .16)	10-14 (.16 - .22)

Various densities can be produced by using different catalysts and foaming the material unconfined or in confined molds. The table above indicates which recommended catalyst can be used to achieve desired densities

Typical Properties

Bulk Density, lbs/ft ³ (g/cc)	2 (0.03)	8 (0.13)	14 (0.22)
Dielectric Constant (1 MHz)	1.04	1.12	1.25
Dissipation Factor (1 MHz)	0.001	0.002	0.005
Dielectric Strength, volts/mil (Kv/mm)	40 (1.58)	40 (1.58)	40 (1.58)
Compressive Strength, psi (kg/cm ²)	30 (2.1)	250 (17.6)	600 (42.3)
Flexural Strength at 5% strain, psi (Kg/cm ²)	25 (1.8)	225 (15.8)	800 (56.0)
Flexural Modulus, psi (kg/cm ²)	500 (35.2)	7,000 (493)	20,000 (1408)
Tensile Strength, psi (kg/cm ²)	40 (2.8)	200 (14.1)	450 (31.7)
Shear Strength, psi (kg/cm ²)	35 (2.5)	140 (9.9)	300 (21.1)
Coefficient of Thermal Expansion per °C	25 x 10 ⁻⁶	40 x 10 ⁻⁶	50 x 10 ⁻⁶
Water Absorption, % of gain in 24 hours	3	1.5	1

EMERSON & CUMING MICROWAVE PRODUCTS, INC., 28 York Avenue, Randolph, MA 02368 / Telephone (781) 961-9600. Use of Information and Material: Values shown are based on testing of laboratory test specimens and represent data that falls within normal range of the material. These values are not intended for use in establishing maximum, minimum or ranges of values for specification purposes. Any determination of the suitability of the material for any purpose contemplated by the user and the manner of such use is the responsibility of the user. The user should determine that the material meets the needs of the user's product and use. We hope that the information given here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the user's consideration, investigation and verification but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale INCLUDING THOSE LIMITING WARRANTIES AND REMEDIES, which apply to all goods supplied by us. We assume no responsibility for the use of these statements, recommendations or suggestions nor do we intend them as a recommendation for any use, which would infringe any patent or copyright. Emerson & Cuming Microwave Products Inc.

Molds

- Molds are preferably made of aluminum or steel because of high heat capacity. It is preferable to use a closed mold that will confine the foam. Small holes or cracks at the top of the mold will allow air to escape as the foam rises. When the foam completely fills the mold, it will exert a positive pressure on the mold.
- By proper mold design and by pouring a weighed amount in the mold, it is possible to adjust bulk density. For example, 8 lb/ft³ (0.13 g/cc) foam can be produced by adding the appropriate quantity of ECCOSTOCK[®] FPH and Catalyst to a closed mold.
- ECCOSTOCK[®] FPH has excellent adhesion to a wide variety of materials. In the event that release from the mold is desired, silicone mold releases are recommended. For very small molds small amounts of petroleum jelly can also be used.

Instructions For Use

- **CAUTION:** ECCOSTOCK[®] FPH contains toluene diisocyanate, an obnoxious and hazardous material. Handling should be carried out in a well-ventilated area. The use of rubber gloves and face shield is recommended. Toluene diisocyanate is an irritant to the skin and mucous membranes, especially eyes and upper respiratory tract. See MSDS.
- For best results, it is preferable that ECCOSTOCK[®] FPH liquids be at or below room temperature.
- Weigh out, into separate containers, the required amount of ECCOSTOCK[®] FPH and catalyst as determined by the FPH/Catalyst Ratio By Weight table for the desired density.
- Add the catalyst to the liquid ECCOSTOCK[®] FPH and mix in rapidly. Mechanical mixing is preferred. Mixing time will be shorter when the raw materials are warm. Indications of complete mixing are color changes from a deep to pale pink and temperature increasing as the exothermic reaction of foam formation begins. Prolonged mixing will start the foaming and curing in the mixing container.
- Free pour the mixed material into the cavity or mold without scraping.
- Foaming will begin shortly after the batch is poured and, depending upon the batch size, will usually be complete within a few minutes. For production uses, the foam can usually be removed from the mold prior to complete cure.
- Cure of the higher density foams is generally complete within a few hours at room temperature. For foams up to about 6 lb/ft³ (0.1 g/cc) density, an elevated temperature post cure is necessary to complete the reaction. Friability and an easily powdered surface are indications of incomplete cure. Post curing conditions depend on size and configuration. For most purposes a post cure of 4 hours at 200°F (93°C) is adequate.

Notes

- Under certain conditions, ECCOSTOCK[®] FPH will undergo some loss of solubility of ingredients. This does not apply to the catalyst. Before use, check each container for clarity. If the material is cloudy, it should be gently heated to 175°F (79°C) in a well-ventilated oven and cooled to room temperature or below before use. Containers should be tightly sealed after use to prevent moisture pick up. The foaming process is an exothermic reaction.
- Consistency of the final density of foam is dependent on temperature, humidity, and mixing technique. The shelf life of this product is 1 year when stored in unopened containers at temperatures no higher than 77°F (25°C).
- ECCOSTOCK[®] FPH at densities less than 3 lb/ft³ (0.05 g/cc) may warp at temperatures above 200°F (93°C). Higher density materials will withstand higher temperatures.

Cleanup

- Methylene Chloride is recommended for the cleanup of mixing equipment.
- DYNASOLVE 100 is the only recommended solvent powerful enough to dissolve away cured urethane foams such as ECCOSTOCK[®] FPH. Information on this product can be found at www.dynaloy.com

Safety Considerations

- Like most isocyanate base compounds, ECCOSTOCK[®] FPH may cause certain individuals to develop allergic skin and respiratory reactions after exposure. These reactions, which may be severe in some individuals, manifest themselves in a number of ways including asthma-like symptoms, breathing difficulties and skin rashes.
- It is highly recommended to use fume hoods with adequate ventilation and personal protective equipment (PPE) when working with this material
- Please consult the MSDS for FPH and the associated catalyst before using this product.