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PRODUCT INFORMATION AND ENGINEERING DATA SHEET

TECHNICAL BULLETIN 625-3

C-THERM FPG Pack-In-Place Syntactic Insulation

INTRODUCTION

Cuming Corporation's *C-THERM* product line of syntactic foam thermal insulation offers superior performance for deepsea oil and gas production. See Technical Bulletin 601 for an overview of the entire product line. This document is one of several bulletins describing insulation systems for field installation on subsea equipment. Other bulletins in the series include 625-1, "precast," and 625-2, "pour-in-place" materials.

SYNTACTIC FOAM

The basis of any *C-THERM* product is syntactic foam, an advanced composite material of glass or ceramic microspheres cast into a binder of semi-rigid epoxy plastic resin. The chemical and mechanical properties of *C-THERM* materials are adaptable to almost any operating condition.

FORMS AVAILABLE

C-THERM FPG pack-in-place syntactic foam is supplied in two-part kits. The kits are of a unique "modeling clay" consistency, allowing the mixed material to be shaped and applied by hand. Upon curing, *C-THERM* FPG is a tough, semi-rigid solid with excellent water and temperature resistance. Application is best performed under clean and dry conditions between 15° - 32° C (60° - 90° F). The following kits are standard.

SIZE 1: 3.7 liter (1 gallon) kit, supplied in two containers. Intended for test and evaluation.

SIZE 2: 18 liter (5 gallons) kit, supplied in two containers. A convenient size for small jobs.

SIZE 3: 200 liter (55 gallons) kit, supplied in two containers. Our standard project size. Requires powered mixing equipment.

OTHER SIZES: Custom-designed kits of almost any size and special-purpose pack-in-place materials can be designed for specific applications.

TOTAL COVERAGE: The *C-THERM* insulation system uses an "ensemble" of precast panels, pour-in-place kits, and pack-in-place syntactic foam to achieve total coverage of critical subsea equipment. Consult our engineers for advice.



Subsea equipment insulated with *C-THERM* FPG

OPERATING LIMITS

The standard grade of *C-THERM* FPG as described in this bulletin is FPG-100-2,300, rated for continuous service at 100° C in 2,300 m water (212° F in 7,500 fsw). See the chart on the next page for thermal and mechanical properties.

PREPARATION

The surfaces of the subsea equipment must be clean and dry and warmed to at least 15° C (60° F). *C-THERM* FPG will adhere well to any metal or painted surface. A release agent must be applied to any surface where adhesion is not desirable. Thickness is built up to provide the amount of insulation specified, with 50-100 mm (2" - 4") being common. Cuming Corporation technicians are skilled in the design, application, and quality control of *C-THERM* materials.

SAFETY AND HEALTH

These products present no unusual hazard under normal use; however, they are intended for use by trained professionals in accordance with all applicable regulations. Consult Material Safety Data Sheet 625-3 and file for reference.

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The information in this Technical Bulletin is not a warranty by which Cuming Corporation assumes any legal liability. The customer is solely responsible for ensuring its fitness for purpose as well as its safe and proper use and application.

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C-THERM FPG Epoxy Based Syntactic Foam Pack-In-Place Deepwater Thermal Insulation

Property	Units	Value	Test Method
Product Description	—	Formable epoxy syntactic foam	—
Application	—	Field joints, jumpers, lines and subsea equipment	—
Application Method	—	Pack in Place	—
Max. Service Depth	<i>m</i> <i>ft</i>	2,300 7,500	—
Max. Service Temperature	<i>°C</i> <i>°F</i>	100 212	—
Density	<i>kg/m³</i> <i>Lb/ft³</i>		ASTM D 792
Thermal Conductivity	<i>W/m-°K</i> <i>BTU-ft/hr-ft²-°F</i>		ASTM C 518
Specific Heat	<i>J/g-°C</i> <i>BTU/lb-°F</i>		ASTM C 351
Hardness	<i>Shore</i>		ASTM D 2240
Compressive Strength	<i>Mpa</i> <i>psi</i>		ASTM D 695
Compressive Modulus	<i>Mpa</i> <i>psi</i>	229,000	ASTM D 695
% Strain @ Max Stress	<i>%</i>	4.8	ASTM D 695
Tensile Strength	<i>Mpa</i> <i>psi</i>	7.0 1,000	ASTM D 1623
Tensile Modulus	<i>Mpa</i> <i>psi</i>	1,380 200,000	ASTM C 1623
Tensile Elongation	<i>%</i>	4.8	ASTM D 1623
Hydrostatic Compression Strength	<i>Mpa</i> <i>psi</i>	28 4,000	ASTM D 2736*
Water Absorption: 168 hr @ 200°F/3,000 psi	<i>%</i>	<10%	ASTM D 570*

WARNING!
This is an uncontrolled document that may not contain current data. Please request our most recent data sheets through any of our sales offices or e-mail us via www.cumingcorp.com (click on "contact us").

* Cuming Corporation proprietary hydrostatic testing procedures are similar to the ASTM standards shown. Supporting test data is available upon request.