



Global EcoTechnologies, inc.

ENDURA-FLEX® 1988 ELASTOMERIC POLYURETHANE

EF-1988 AND EF-1988FR (FIRE RETARDANT)*

PRODUCT DATA

PRODUCT DESCRIPTION

EF-1988 IS A SPECIALLY FORMULATED 100% SOLIDS, AROMATIC, MDI (RECOGNIZED FOR ITS SUPERIOR HYDROLYTIC STABILITY) ELASTOMERIC POLYURETHANE COATING/LINING SYSTEM FOR WATER AND WASTE WATER APPLICATIONS. FLUID APPLIED VIA AIRLESS PROPORTIONING EQUIPMENT, EF-1988 PROVIDES A SEAMLESS MONOLITHIC PINHOLE-FREE LINING FOR PROTECTION OF ALL TYPES OF CONCRETE AND STEEL. EF-1988 IS SELF PRIMING ON CONCRETE OR STEEL SURFACES THAT ARE CLEAN, DRY, AND PROPERLY ETCHED. ADHESION TO CONCRETE EXCEEDS THE COHESIVE STRENGTH OF CONCRETE AND SHOWS EXCELLENT ADHESION TO ABRASIVE BLASTED STEEL BY INDUSTRY STANDARDS. LICENSED APPLICATORS APPLY EF-1988 UTILIZING PATENTED TECHNOLOGY (U.S. PATENT #4,590,218) IN EXPANDED FORM. EF-1988 IS ALSO APPLIED AS A SOLID FILM OR MEMBRANE AND/OR COMBINATIONS OF BOTH. THERE WILL BE SOME COLOR CHANGE IN SUNLIGHT

TYPICAL USE AREAS

EF-1988 IS DESIGNED FOR USE IN GASEOUS OR LIQUID PHASE EXPOSURES, FOUND IN WATER AND WASTEWATER VESSELS OF ALL TYPES, BOTH STEEL AND CONCRETE. EF-1988 IS SUITABLE FOR THE PROTECTION OF CONCRETE OR STEEL STORAGE TANKS, CLARIFIERS, DIGESTERS, SEDIMENTATION BASINS, CHLORINE CONTACT OR AERATION BASINS, SEWER MANHOLES, PIPE, OR PENSTOCK. EF-1988FR* IS DESIGNED FOR USE IN OXYGEN RICH ENVIRONMENTS. ENDURA-FLEX® MATERIALS MAY INCORPORATE THE PATENTED EXPANSION PROCESS BY APPROVED AND LICENSED APPLICATORS FOR APPLICATIONS TO DETERIORATED CONCRETE SUBSTRATES. THIS PROCESS ALLOWS FOR SPRAY APPLIED THICK FILMS OVER ROUGH CONCRETE WITHOUT THE ASSOCIATED MATERIALS COST TO PRODUCE SUCH FILMS SO AS TO MAKE POSSIBLE A CONTINUOUS PINHOLE-FREE LINING WITH A ONE- PRODUCT APPLICATION. EF-1988 CONFORMS TO AWWA C222-08. EF-1988 IS USDA AND FDA APPROVED.



ENDURA-FLEX® 1988
Drinking Water System Components
In Accordance With
Standard ANSI/NSF 61
When Properly mixed (2:1)
ENDURA-FLEX® 1988 (B:A)

POTABLE WATER: SUITABLE IN ACCORDANCE WITH ANSI/NSF STANDARD 61

***NOTE: EF-1988FR IS NOT APPROVED FOR POTABLE WATER SERVICE PER ANSI/NSF STANDARD 61**

NOTE: GET®, ENDURA-FLEX®, ENDURA-TUF®, ECOSYSTEM®, ARE TRADEMARKS OF GLOBAL ECOTECHNOLOGIES, INC.

All recommendations, statements, and technical data contained herein are based on tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. User shall rely on his own information and tests to determine suitability of the product for the intended use and user assumes all risk and liability resulting from his use of the product. Seller's and manufacturer's sole responsibility shall be to replace that portion of the product of this manufacturer which proves to be defective. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss, or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements other than those contained in a written agreement signed by an officer of the manufacturer shall not be binding upon the manufacturer or seller. Manufacturer reserves the right to modify all data without prior notification or liability.

TECHNICAL DATA

COMPONENTS: A: ACTIVATOR, B: BASE
VOLUME OF SOLIDS: 100%

SHELF LIFE: ONE YEAR @ 75°F. IN SEALED, UNOPENED CONTAINERS

V.O.C. CONTENT: N/A WITH **MIX RATIO:** 2:1 BY VOLUME
THINNER: NONE REQUIRED, (CLEAN-UP: M.E.K.)
PACKAGING: 3 DRUM KIT, (1 PART A TO 2 PARTS B)
(160 GALLONS IN EACH KIT)

COVERAGE: 1604 FT²/MIL/GALLON
POT LIFE: < 3 MINS. @ 100°F.
SAG RESISTANCE: EXCELLENT
FLASHPOINT: > 300°F.

COLOR: SIDE A – BROWNISH, SIDE B - VARIOUS COLORS AVAILABLE, OFF-WHITE IS STANDARD
EF-1988FR (FIRE RETARDANT) - GRAY

DRY TIME: @ 70° F. **TO TOUCH:** 20 MINUTES
LT. FOOT: 1 HOUR, **HVY. FOOT:** 24 HOURS
CURED TO SERVICE: 24 HOURS
MAX. RECOAT: 24 HOURS - AFTER 24 HOURS SURFACE MUST BE ABRADED BEFORE RECOATING.
FULL CURE: 120 HOURS

FILM THICKNESS: UNLIMITED.
FILM SHRINKAGE: -0- (WET TO DRY)
EDGE-HANG: EXCELLENT

PRIMER: EF-1988 IS SELF-PRIMING. IF REQUIRED, OTHER EF PRIMERS ARE AVAILABLE TO ASSIST CONTRACTOR APPLICATIONS. EF-12P AND EF-1200P ARE HIGH PERFORMANCE TWO-PART EPOXY PRIMER SEALERS. EF-1200F IS A CHEMICALLY INERT LIGHTWEIGHT FILLER MATERIAL THAT MAY BE ADDED TO EF-1200P FOR RESURFACING OR FILLING VOIDS. (CONSULT EF-1988 GUIDE SPECIFICATION)

MINIMUM SUBSTRATE TEMPERATURE ABOVE DEW POINT ON APPLICATION: 5°F.
SERVICE TEMPERATURE RESISTANCE: IMMERSION 120°F. DRY 180°F.

HUMIDITY TOLERANCE ON APPLICATION: < 85%
MATERIAL TEMPERATURE REQUIREMENT FOR APPLICATION: ACTIVATOR: 95 TO 105°F. - BASE: 95 TO 120°F.

ALLOWABLE AMBIENT AIR TEMPERATURE FOR APPLICATION: MAXIMUM: 120°F. - MINIMUM: -25°F.



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PHYSICAL PROPERTY DATA

PHYSICAL PROPERTY	TEST METHOD	RESULT
Durometer Hardness @ 75°F.	ASTM D2240 30 minutes 60 minutes 4 hours 24 hours 48 hours	85-90 Shore A 95A Shore A 50D Shore D 65D Shore D 70D Shore D
Tensile Strength: PSI	ASTM D638	2800-3000 psi
Percent Elongation: @ 60 mils	ASTM D638	65% 41%
Abrasion Resistance: 1000 cycles; 1000 gms; CS-17	ASTM D4060	53 mg
Impact Resistance: @ 65 mils	ASTM G14 – 2-inch dia. Pipe	210-inch lbs. (23.73 j)
Weight per gallon: A-Activator B-Base	ASTM D1475	10.33 lbs./gal 8.71 lbs./gal.
Viscosity, CPS @ 80°F. A-Activator B-Base	ASTM D2196 Brookfield	210 1150
Cathodic Disbondment: 92 Day Exposure @ 60 mils Expanded	ASTM G8	.38 Average Disbonded Equivalent Circle Diameter (inches)
Atlas Cell: 150° F. Deionized Water @ 250 mils Expanded	NACE STANDARD TM-01-74 Test procedure A	12 Months, No Effect
Elcometer Adhesion: Steel, no primer; SSPC SP-10	ASTM D4541 (Scored to Steel)	>1500 PSI
Tear Resistance:	ASTM D624	461 lbf/in.
Accelerated Weathering (QUV):	ASTM G 23	Slight chalk/color change
Accelerated Weatherometer:	ASTM D2565 (89) Modified	330 Days, Moderate chalk/color change
Heat Aged 180°F. - 30 days:	ASTM D573	D65/36% Elongation
Water Absorption	ASTM D570	< .5%
Water Vapor Permeability:	ASTM D1653-91A	@ 75-80 mils .048 grams/ 23 hrs/ft ² (144 in ²)
Dielectric Strength: 80 mils @ 500 volts/mils	ASTM D149	8140 volts total (To breakdown): 103 volts/mils
Thermal Shock: @ 60 mils	-50° F. to 200° F. Eight Cycles	Pass - No Effect
Heat of Combustion: *EF-1988FR	ASTM D2382, Modified	Higher Heat of Combustion of 19.0 MJ/kg. (4,540 cal/g.)
Compatibility with Liquid Oxygen: *EF-1988FR @ 75 mils	ASTM D2512	Pass - No Reaction
Minimum Oxygen Concentration to Support Candle-like Combustion: *EF-1988FR	ASTM D2863	66% by Volume Sample Size: 0.25in X 4.0 X 30 mil
Cavitation: @ 60 mils	Nozzle-3/4 in., 200 gpm, 175 psi 25 Hours - two samples	Pass
High Humidity: @ 60 mils	ASTM B117 (90) Modified 124 Days	Pass - No Effect
Immersion: @ 60 mils	ASTM D870 (87) Modified 630 Days	Pass - No Effect Finished/filtered/raw/softened waters
Salt Fog: @ 60 mils	ASTM B117 (90) 112 Days	Pass - No Effect



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CHEMICAL CONTAINMENT DATA

The following chemical resistance data is offered as a guide as to performance to be expected from a 70-75 mil film of EF-1988 immersed in each substance listed at 75-78°F. As is true for all materials, EF-1988 has chemical and temperature limitations. Testing must be completed for substance applications other than those listed herein. Consult your representative.

CHEMICAL

KEY CODE

ACIDS

SULFURIC ACID, 60%
SULFURIC ACID, 30%
HYDROCHLORIC ACID, 37%
PHOSPHORIC ACID, 85%
ACETIC ACID, 60%
GLACIAL ACETIC
FERROUS CHLORIDE
FERRIC CHLORIDE
CHLORINE

S **KEY CODES:**
S **A = EXCELLENT**
S **B = GOOD**
S **C = FAIR**
D **D = NOT RECOMMENDED**
D **S = SATISFACTORY FOR SPLASH, SPILLAGE, AND**
S **SECONDARY CONTAINMENT (96 HOURS)**

ALKALIES

AMMONIUM HYDROXIDE, 30%
AMMONIUM HYDROXIDE, (CONC.)
SODIUM HYDROXIDE, (>50 Y.)

S
S
S

ALIPHATIC HYDROCARBONS

DIESEL
KEROSENE
UNLEADED GASOLINE
HYDRAULIC OIL
MOTOR OIL
CRUDE/SOUR CRUDE

A
S
S
A
A
A

AROMATICS, KEYTONES & CHLORINATED SOLVENTS

ALCOHOL, GRAIN 76.5%
HEXANE
XYLENE
MIBK
MEK
MAK
N-BUTANOL
IPA
TOLUENE

S
D
D
S
D
D
D
D
D

MISCELLANEOUS

SEWAGE
H₂S GAS
RAW WATER
SALT WATER
DE-IONIZED WATER
O₃
OXYGEN RICH ENVIRONMENTS (EF-1988FR* ONLY)

A
A
A
A
A
A
A

All recommendations, statements, and technical data contained herein are based on tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. User shall rely on his own information and tests to determine suitability of the product for the intended use and user assumes all risk and liability resulting from his use of the product. Seller's and manufacturer's sole responsibility shall be to replace that portion of the product of this manufacturer which proves to be defective. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss, or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements other than those contained in a written agreement signed by an officer of the manufacturer shall not be binding upon the manufacturer or seller. Manufacturer reserves the right to modify all data without prior notification or liability.



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MATERIAL CONDITIONING AND EQUIPMENT REQUIREMENTS

The following describes material "conditioning," mixing, and minimum equipment requirements and capabilities which have offered repeatable results to meet manufacturer's published physical properties for over five years. Differences in substrate temperature and film thickness during application have been shown to effect the rate at which applied film thicknesses reach the stated physical properties independent of the information listed below. Equipment lists are available for application equipment systems capable of meeting these requirements according to job production needs. Consult your Representative for specific equipment recommendations.

- * Each liquid component material shall be conditioned for use by heating to 80^o F. to 90^o F. Band heaters may not be used.
- * The equipment system used shall be capable of heating and maintaining, to the spray gun, individual components to in a range of 95° to 110° F. to reduce (band heaters are not permissible for heating the materials) viscosities to spray consistency, 105°F max on A side, pumping individual components simultaneously in precise metered quantities and mixing those materials during application in the required volume mix ratio to affect the degree of cure and physical properties stated by the most recent published product data sheet.
- * The conditioned materials shall be supplied to the proportioning equipment at a flowable, pumpable viscosity, and in such volume delivery to assure full supply for each pump stroke.

- * No solvent thinning of the materials is permitted. A solvent flush system will be necessary to clean mixed material from the spray gun at times when spraying stops for periods exceeding the material pot life.
- * The base "B" component material shall be mixed using a power mixer prior to use and mixed at least once daily.
- * ENDURA-FLEX® 1988 is a two-component (2:1 mix by volume) chemically reactive product and shall be applied using a heated "plural component" proportioning equipment system designed for high pressure airless spray (minimum 2500 psi) for a minimum distance from the proportioner to meet job conditions.

EQUIPMENT RECOMMENDATIONS: Plural

Component metering and mixing equipment. Refer to above Endura-Flex® 1988 "Material Conditioning and Equipment Requirements." Consult your Representative for specific recommendations.

SAFETY REQUIREMENTS: Please refer to the Material Safety Data Sheets for safety information and requirements. Always wear the appropriate respiratory protection. Avoid skin contact with materials being applied. Always wear the appropriate head protection, gloves, long sleeve coveralls, and foot protection.

SURFACE PREPARATION AND APPLICATION

PROCEDURE: Consult your Representative for specific recommendations to each individual project.

Global EcoTechnologies, inc.
"creative solutions for environmental concerns"
P.O. Box 2205 Antioch, CA 94531
Telephone (925) 473-9250 ** Fax (925) 432-0853
Email: getmail@getcoatings.com ** Web page: www.getcoatings.com