ELECTRO CHEMICAL
ENGINEERING & MANUFACTURING CO.

EC Duro-Bond
Polypropylene Sheet Lining

Description

Duro-Bond Polypropylene is a laminated sheet of polypropylene and natural rubber that forms an excellent chemically resistant membrane that is readily bonded to steel, concrete, or FRP substrates. Polypropylene is a thermoplastic resin that is melt flow processible. Duro-Bond Polypropylene sheet lining is available in thicknesses of 90 mils (2.3 mm) and 125 mils (3.0 mm).

Uses

Duro-Bond Polypropylene is particularly resistant to attack by mineral acids including the oxidizing acids, such as nitric and sulfuric.

Duro-Bond Polypropylene can be bonded to various substrates. It-is used for lining plating tanks, acid etch tanks, pickling tanks, process vessels, neutralization tanks, drip pans, ventilation hoods and ducts.

Advantages

The polypropylene layer, which is exposed to the solution being processed, provides the wide range of chemical resistance typical of polypropylene material. The natural rubber layer provides a flexible bond to the substrate which allows for the differences in thermal expansion.

Since curing or vulcanizing is not required, **Duro-Bond Polypropylene** can be shop or field installed. **Duro-Bond Polypropylene** has good non-stick properties and is highly recommended as a lining material for chutes and hoppers.

Service Temperature

The maximum continuous service temperature for which **Duro-Bond Polypropylene** can be used is 212^{o}F (100^{o}C). Corrosion resistant brick sheathing joined with one of the Electro Chemical corrosion resistant cements is used in conjunction with **Duro-Bond Polypropylene** when excessive temperatures are present. A 4" thick brick sheathing will provide a temperature drop of approximately 50 ^{o}F and an 8" brick lining will provide a drop of approximately 100 ^{o}F. When carbon brick are used the temperature drop will be somewhat less.

Chemical Resistance

The information listed may be considered as a basis for recommendation, but not as a guarantee, unless sold and installed by **Electro Chemical Engineering & Manufacturing Co.** For resistance of **Duro-Bond Polypropylene** to chemicals not listed, contact our Engineering Department at:

inquiry@electrochemical.net or **1-800-235-1885**.

The following table lists a number of chemicals at various concentrations and indicates the maximum operating temperatures at which **Duro-Bond Polypropylene** may be recommended in contact with these chemicals.

Key to Ratings:

S = Satisfactory
F = Fair
P = Poor
U = Unsatisfactory
- = No Information

Chemical	Conc.(%)	Temperature 72 °F	140 °F	212 °F
Acetic Acid (glacial)	97	S	F	P
Acetic Acid	80	S	F	P
Acetic Acid	40	S	F	P
Acetic Acid	10	S	S	F
Acetone	100	S	S	-
Aluminum Chloride	Sat'd	S	S	S
Aluminum Fluoride	Sat'd	S	S	S
Aluminum Sulfate	Sat'd	S	S	S
Ammonia gas (dry)	100	S	S	S
Ammonium Carbonate	Sat'd	S	S	S
Ammonium Chloride	Sat'd	S	S	S
Ammonium Fluoride	Sat'd	S	S	S
Ammonium Hydroxide	10	S	S	S
Ammonium Nitrate	Sat'd	S	S	S
Ammonium Sulfate	Sat'd	S	S	S
Amyl Alcohol	100	S	S	F
Aniline	100	S	S	S
Antimony Chloride	Sat'd	S	S	F
Aqua Regia		F	F	U
Barium Carbonate	Sat'd	S	S	S
Barium Chloride	Sat'd	S	S	S
Barium Hydroxide	Sat'd	S	S	S
Barium Sulfate	Sat'd	S	S	S
Benzene	100	F	U	U
Benzyl Alcohol	100	S	S	P
Boric Acid	Sat'd	S	S	S
Brine	Sat'd	S	S	S
Bromine (liquid)	100	P	-	-
Bromine Water	Sat'd	P	-	-
Butyl Acetate	100	F	U	U
Calcium Carbonate	Sat'd	S	S	S
Calcium Chlorate	Sat'd	S	S	S
Calcium Chloride	Sat'd	S	S	S
Calcium Hydroxide	Sat'd	S	S	S
Calcium Hypochlorite	Sat'd	S	F	F
Calcium Nitrate	Sat'd	S	S	S
Calcium Sulfate	Sat'd	S	S	S
Carbon Disulfide	100	F	U	-
Carbon Tetrachloride	100	U	U	U
Carbonic Acid	100	S	S	S
Chlorine (liquid)	100	P	P	-
Chlorosulfonic Acid	100	U	U	U
Chromic Acid	80	S	F[1]	P
Chromic Acid	50	S	F[1]	P
Chromic Acid	10	S	S	F[1]
Citric Acid	100	S	S	S
Copper Chloride	Sat'd	S	S	S
Copper Cyanide	Sat'd	S	S	S
Copper Nitrate	Sat'd	S	S	S
Copper Fluoride	Sat'd	S	S	-
Copper Sulfate	25	S	S	S
Cuprous Chloride	Sat'd	S	S	S

Chemical	Conc.(%)	Temperature 72 °F	140 °F	212 °F
Cyclohexanol	100	S	F	-
Cyclohexanone	100	F	P	-
Diethanolamine	100	S	S	-
Dioxane	100	F	F	-
Ethyl Acetate	100	F	P	U
Ethyl Alcohol	96	S	S	F
Ethylene Glycol	100	S	S	-
Ethanolamine	100	S	S	-
Ethyl Ether	100	F	-	-
Ethyl Chloride	100	P	P	-
Ethylene Oxide	100	F	-	-
Ferric Chloride	Sat'd	S	S	S
Ferric Nitrate	Sat'd	S	S	-
Ferric Sulfate	Sat'd	S	S	S
Ferrous Chloride	Sat'd	S	S	-
Ferrous Sulfate	Sat'd	S	S	S
Fluosilicic Acid		S	S	-
Formaldehyde	40	S	S	-
Formic Acid	100	S	-	-
Formic Acid	10	S	S	-
Furfural	100	P	P	-
Gasoline	100	F	P	-
Glucose	Sat'd	S	S	-
Glycerine	100	S	S	S
Hydrobromic Acid	50	S	S	-
Hydrochloric Acid	30	S	S	U
Hydrochloric Acid	10	S	S	F
Hydrochloric Acid	2	S	S	S
Hydrofluoric Acid	70	U	U	U
Hydrofluoric Acid	40	S	F	U
Hydrofluoric Acid	20	S	S	F
Hydrofluoric Acid	5	S	S	F
Hydrogen Peroxide	30	S	F	U
Hydrogen Peroxide	3	S	F	F
Hydrogen Peroxide	1	S	S	S
Hydrogen Sulfide	100	S	S	-
Isopropyl Alcohol	100	S	S	-
Lactic Acid	20	S	S	-
Lubricating Oil	100	S	F	-
Magnesium Carbonate	Sat'd	S	S	S
Magnesium Chloride	Sat'd	S	S	S
Magnesium Hydroxide	Sat'd	S	S	S
Magnesium Nitrate	Sat'd	S	S	S
Magnesium Sulfate	Sat'd	S	S	S
Mercuric Chloride	40	S	S	-
Mercuric Cyanide	Sat'd	S	S	-
Mercury	100	S	S	S
Mercurous Nitrate	Sat'd	S	S	-
Methyl Ethyl Ketone	100	S	P	-
Methyl Alcohol (Methanol)	100	S	S	-
Methylene Chloride	100	P	P	P
Mineral Oil	100	S	S	F
Monochloroacetic Acid	100	S	S	F

Chemical	Conc.(%)	72 °F	140 °F	212 °F
Naphtha	100	S	-	-
Naphthalene	100	S	S	S
Nickel Chloride	Sat'd	S	S	S
Nickel Nitrate	Sat'd	S	S	S
Nickel Sulfate	Sat'd	S	S	S
Nitric Acid[2]	Fuming	P	P	U
Nitric Acid[2]	70	S	P	U
Nitric Acid[2]	50	S	F	P
Nitric Acid[2]	15	S	F	P
Nitric Acid[2]	10	S	S	F
Nitro Benzene	100	S	S	-
Oils (essential)	100	S	S	-
Oxalic Acid (aqueous)	50	S	F	-
Phenol	100	S	S	F
Phosphoric Acid	95	S	S	S
Phosphoric Acid	85	S	S	S
Phosphoric Acid	50	S	S	S
Phosphoric Acid	25	S	S	S
Plating Solutions: (Concentrations as normally used in the plating industry)		S	S	-
Potassium Salts: (Same as Sodium Salts listed below)				
Propyl Alcohol	100	S	S	-
Propionic Acid	100	F	P	U
Pyridine	100	S	-	-
Silver Nitrate	Sat'd	S	S	-
Sodium Acetate	Sat'd	S	S	S
Sodium Bicarbonate	Sat'd	S	S	S
Sodium Bisulfate	Sat'd	S	S	S
Sodium Carbonate	Sat'd	S	S	S
Sodium Chlorate	Sat'd	S	S	-
Sodium Chloride	Sat'd	S	S	S
Sodium Chlorite	20	S	S	F
Sodium Cyanide	Sat'd	S	S	S
Sodium Dichromate[2]	Sat'd	S	S	S
Sodium Ferricyanide	Sat'd	S	S	S
Sodium Hydroxide	50	S	S	S
Sodium Hypochlorite 15% Avg. Cl_2	20	S	S	F
Sodium Nitrate	Sat'd	S	S	S
Sulphurous Acid	Sat'd	S	S	-
Sulfuric Acid[2]	98	F	U	U
Sulfuric Acid[2]	60	S	S	P
Sulfuric Acid[2]	50	S	S	P
Sulfuric Acid[2]	10	S	S	S
Sulfuric Acid[2]	2	S	S	S
Tannic Acid	10	S	S	-
Tetrahydrofuran	100	P	P	P
Trichloroacetic	10	S	S	-
Triethanolamine	100	S	S	-
Trichloroethylene	100	P	P	P
Urea	Sat'd	S	S	S
Xylene	100	P	P	P
Zinc Chloride	Sat'd	S	S	S
Zinc Sulfate	Sat'd	S	S	-

[1] Slight discoloration after 10 days

[2] In combinations of Sulfuric, Nitric and Sodium Dichromate a corrosion stress crack effect is noticed at 130° F

Physical Properties

The normal physical properties of polypropylene sheeting are shown in the following table:

Chemical characterization	Thermoplastic polymer
Color	Off White
Odor	None
Melting point	165°C
Upper Service Temperature	100 °C
Density (23°C)	0.91g/cm^3
Tensile Strength (N/mm^2)	33
Elongation at Break	350-600%
Solubility in water	Insoluble
Explosion limits	None
Hardness Durometer	D 95-100
Water absorption	< 0.03
Flammability	HB/V-2
Thermal Expansion Coefficient 23 -150°C (mm/mm/°C)	15 x 10^{-5}

Application

The method of application is as follows:

1. The surface to be lined is properly cleaned and grit blasted to a white metal finish to provide a suitable surface for bonding. (See Electro Chemical Technical Bulletin #1, "Specification for Welded Steel Tanks, Stacks, Ducts or Other Fabricated Equipment for Protective Linings and/or Coatings".)

2. The Duro-Bond Polypropylene laminate is cut into panels to cover the entire area to be lined with a minimum amount of joints to be welded.

3. The panels are then cemented into position and the seams welded with with polypropylene rod and polypropylene cap strip using a thermoplastic welding gun.

Tensile strength bonds between the lining and lined surface in the range of 350 psi and peel values of up to 65 lbs. per lineal inch are obtained, per ASTM D903 @ 180^{o} angle.

Method of Testing

All lined surfaces are visually inspected for surface defects. Any special dimensional tolerances required after lining are also checked.

All lined areas are then spark tested for pinhole leaks using a dielectric spark tester adjusted to 10,000 volts. The tester is moved constantly and quickly over the lining surface to prevent a burn through.

Repair Procedure

Duro-Bond Polypropylene sheet lining can be shop or field repaired. The repairs to defective or damaged areas in the sheet lining are accomplished by cutting out the faulty area, grinding or grit blasting the substrate surface, preparing a piece of sheet of the same dimension, cementing it into position and subsequently welding the joints as described under Application. The repaired area is then inspected and spark tested to insure lining integrity.

Additional Information

For additional technical or safety information, contact us at 1-800-235-1885, www.electrochemical.net, or inquiry@electrochemical.net.

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