# ECM Duro-Bond ETFE Lining

## Description

**Duro-Bond ETFE** is a laminated sheet lining consisting of a layer of Ethylenetetrafluoroethylene (ETFE) resin laminated to a fabric backing that is readily bonded to steel, concrete, or FRP substrates. ETFE is a partially fluorinated thermoplastic resin that is melt flow processible. Duro-Bond ETFE sheet lining is available in thicknesses of 60 mils (1.5 mm) and 90 mils (2.3 mm).

## Uses

**Duro-Bond ETFE** is used as a vessel lining material to provide chemical resistance to acids, bases, oxidizing agents, organic solvents and other corrosive media. **Duro-Bond ETFE** can be applied to tanks, scrubbing towers, reactors, valves, columns, agitators and other process equipment for handling corrosive materials.

When a combination of chemical, temperature, abrasion and permeation resistance is required **Duro-Bond ETFE** may be the optimum solution to the corrosion problem.

## Advantages

**Duro-Bond ETFE** fluoropolymer sheet lining exhibits outstanding chemical resistance, being virtually unaffected by many of the corrosive chemicals commonly encountered in the chemical process industry.

**Duro-Bond ETFE** is resistant to strong mineral and oxidizing acids, alkalis, metal etchants, liquid oxygen and essentially all organic solvents. Typical of the fluoropolymers, **ETFE** is attacked by metallic sodium and potassium. Rate of attack is a function of exposure time and temperature.

**Duro-Bond ETFE** sheet lining provides substrate protection by virtue of its excellent permeation resistance. The **ETFE** fluoropolymer has low permeability to water vapor and various other gases. The **ETFE** fluoropolymer also exhibits low permeability to liquid chemicals.

**Duro-Bond ETFE** does not contain any fillers or plastizers to leach out and contaminate the service thereby making it an excellent choice for handling high purity chemicals.

## Service Temperature

ETFE fluorocarbon resins withstand continuous service temperatures as high as 150 $^{o}$ C (300$^{o}$ F). When adhesively bonded to a substrate, the maximum recommended service temperature for **Duro-Bond FEP** sheet lining is 110 $^{o}$ C (230$^{o}$ F) on a continuous basis, 120 $^{o}$ C (250 $^{o}$ F) on an intermittent basis.

## 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 MANUFACTURING** For resistance of **Duro-Bond ETFE** to chemicals not listed, contact us at 330-313-6372, knightmaterials.com, or info@knightmaterials.com.

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Acetaldehyde | 200 | 95 |
| Acetamide | 230 | 110 |
| Acetic Acid (Glacial) | 230 | 110 |
| Acetic Acid, Dilute (50% $H_20$) | 230 | 110 |
| Acetic Anhydride | 230 | 110 |
| Acetone | 150 | 65 |
| Acetone (50% $H_20$) | 150 | 65 |
| Acetonitrile | 150 | 65 |
| Acetophenone | 230 | 110 |
| Acetylchloride | 150 | 65 |
| Acetylene | 230 | 110 |
| Acetylene Tebrabromide | 230 | 110 |
| Acetylene Tetrachloride | 230 | 110 |
| Acrylonitrile | 150 | 65 |
| Adipic Acid | 230 | 110 |
| Air | 230 | 110 |
| Alcohol, Allyl | 212 | 100 |
| Allyl Chloride | 212 | 100 |
| Aluminum Ammonium Sulfate | 230 | 110 |
| Aluminum Chloride | 230 | 110 |
| Aluminum Fluoride | 230 | 110 |
| Aluminum Hydroxide | 230 | 110 |
| Aluminum Nitrate | 230 | 110 |
| Aluminum Oxychloride | 230 | 110 |
| Aluminum Potassium Sulfate | 230 | 110 |
| Amino Acids ($H_20$) | 212 | 100 |
| Ammonia (Anhydrous) | 230 | 110 |
| Ammonia (Aqueous 30%) | 230 | 110 |
| Ammonium Bifluoride | 230 | 110 |
| Ammonium Bromide (50%) | 230 | 110 |
| Ammonium Carbonate | 230 | 110 |
| Ammonium Chloride | 230 | 110 |
| Ammonium Dichromate | 230 | 110 |
| Ammonium Fluoride | 230 | 110 |
| Ammonium Hydroxide | 230 | 110 |
| Ammonium Nitrate (Conc.) | 230 | 110 |
| Ammonium Perchlorate | 230 | 110 |
| Ammonium Persulfate | 230 | 110 |
| Ammonium Phosphate | 230 | 110 |
| Ammonium Sulfate | 230 | 110 |
| Ammonium Sulfide | 230 | 110 |
| Ammonium Thiocyanate | 230 | 110 |
| Amyl Acetate | 230 | 110 |
| Amyl Alcohol | 230 | 110 |
| Amyl Chloride | 230 | 110 |
| Aniline | 230 | 110 |
| Aniline Hydrochloride (10%) | 150 | 65 |
| Anthraquinone | 230 | 110 |
| Anthraquinone-Sulfonic Acid | 230 | 110 |
| Antimony Trichloride | 212 | 100 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Aqua Regia | 212 | 100 |
| Arsenic Acid | 230 | 110 |
| Barium Carbonate | 230 | 110 |
| Barium Chloride | 230 | 110 |
| Barium Hydroxide | 230 | 110 |
| Barium Sulfate | 230 | 110 |
| Barium Sulfide | 230 | 110 |
| Battery Acid | 230 | 110 |
| Benzaldehyde | 212 | 100 |
| Benzene | 212 | 100 |
| Benzene Sulfonic Acid | 212 | 100 |
| Benzoic Acid | 230 | 110 |
| Benzoyl Chloride | 150 | 65 |
| Benzyl Alcohol | 230 | 110 |
| Benzyl Chloride | 230 | 110 |
| Bismuth Carbonate | 230 | 110 |
| Black Liquor | 230 | 110 |
| Bleach (12.5% $Cl_2$) | 212 | 100 |
| Borax | 230 | 110 |
| Boric Acid | 230 | 110 |
| Brine | 230 | 110 |
| Bromic Acid | 230 | 110 |
| Bromine (Dry) | 150 | 65 |
| Bromine Water (10%) | 230 | 110 |
| mono-Bromobenzene | 212 | 100 |
| Bromoform | 212 | 100 |
| m-Bromotoluene | 212 | 100 |
| Butadiene | 230 | 110 |
| Butane | 230 | 110 |
| Butanediol | 230 | 110 |
| Butyl Acetate | 230 | 110 |
| Butyl Acrylate | 230 | 110 |
| n-Butyl Alcohol | 230 | 110 |
| sec-Butyl Alcohol | 230 | 110 |
| tert-Butyl Alcohol | 230 | 110 |
| n-Butylamine | 120 | 50 |
| sec-Butylamine | 120 | 50 |
| tert-Butylamine | 120 | 50 |
| di-n-Butyl Amine | 230 | 110 |
| tri-n-Butyl Amine | 230 | 110 |
| Butylene | 230 | 110 |
| Butyl Bromide | 230 | 110 |
| Butyl Chloride | 230 | 110 |
| Butyl Phenol | 230 | 110 |
| Butyl Phthalate | 150 | 65 |
| Butyraldehyde | 212 | 100 |
| Butyric Acid | 230 | 110 |
| n-Butyl Mercaptan | 230 | 110 |
| Calcium Bisulfate | 230 | 110 |
| Calcium Bisulfide | 230 | 110 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Calcium Carbonate | 230 | 110 |
| Calcium Chlorate | 230 | 110 |
| Calcium Chloride | 230 | 110 |
| Calcium Hydroxide | 230 | 110 |
| Calcium Hypochlorite | 230 | 110 |
| Calcium Nitrate | 230 | 110 |
| Calcium Oxide | 230 | 110 |
| Calcium Sulfide | 230 | 110 |
| Calcium Sulfate | 230 | 110 |
| Caprylic Acid | 212 | 100 |
| Carbon Tetrachloride | 230 | 110 |
| Carbon Dioxide (Wet) | 230 | 110 |
| Carbon Dioxide (Dry) | 230 | 110 |
| Carbon Disulfide | 150 | 65 |
| Carbonic Acid | 230 | 110 |
| Carbon Monoxide | 230 | 110 |
| Castor Oil | 230 | 110 |
| Caustic Potash (10 and 50%) | 212 | 100 |
| Caustic Soda (10 and 50%) | 212 | 100 |
| Cellosolve® | 230 | 110 |
| Chloral Hydrate | 212 | 100 |
| Chlorinated Brine | 230 | 110 |
| Chlorinated Phenol | 212 | 100 |
| Chlorine (Dry) | 212 | 100 |
| Chlorine (Wet) | 230 | 110 |
| Chlorine Dioxide | 230 | 110 |
| Chloroacetic Acid (50% $H_20$) | 230 | 110 |
| Chlorobenzene | 212 | 100 |
| Chlorobenzyl Chloride | 150 | 65 |
| Chloroform | 212 | 100 |
| Chlorohydrin (Liquid) | 150 | 65 |
| Chlorosulphonic Acid | 75 | 25 |
| Chromic Chloride | 212 | 100 |
| Chromic Acid (50%) | 150 | 65 |
| Chromyl Chloride | 212 | 100 |
| Clorox Bleach (5-1/2% $Cl_2$) | 212 | 100 |
| Coal Gas | 212 | 100 |
| Copper Chloride | 230 | 110 |
| Copper Cyanide | 230 | 110 |
| Copper Fluoride | 230 | 110 |
| Copper Sulfate | 230 | 110 |
| Copper Nitrate | 230 | 110 |
| Cresol | 230 | 110 |
| Cresylic Acid | 230 | 110 |
| Crotonaldehyde | 212 | 100 |
| Crude Oil | 230 | 110 |
| Cyclohexane | 230 | 110 |
| Cyclohexanol | 230 | 110 |
| Cyclohexanone | 230 | 110 |
| DDT | 212 | 100 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Decalin | 230 | 110 |
| Decane | 230 | 110 |
| Dextrin | 230 | 110 |
| Diacetone Alcohol | 212 | 100 |
| 1, 2, Dibromo Propane | 200 | 95 |
| Dibutyl Phthalate | 150 | 65 |
| Dichloroacetic Acid | 150 | 65 |
| O-Dichlorobenzene | 150 | 65 |
| Dichloroethylene | 150 | 65 |
| Dichloropropionic Acid | 150 | 65 |
| Diesel Fuels | 230 | 110 |
| Diethylamine | 230 | 110 |
| Diethyl Benzene | 230 | 110 |
| Diethyl Cellosolve | 230 | 110 |
| Diethyl Ether | 212 | 100 |
| Diethylene Triamine | 212 | 100 |
| Diglycolic Acid | 212 | 100 |
| Diisobutyl Ketone | 212 | 100 |
| Diisobutylene | 230 | 110 |
| Dimethylamine | 120 | 50 |
| Dimethylaniline | 230 | 110 |
| Dimethyl Phthalate | 212 | 100 |
| Dimethyl Sulfoxide | 212 | 100 |
| Dimethyl Formamide | 230 | 110 |
| Dimethyl Sulfate | 150 | 65 |
| Dioctyl Phthalate | 150 | 65 |
| p-Dioxane | 150 | 65 |
| Diphenyl Oxide | 175 | 80 |
| Divinyl Benzene | 175 | 80 |
| Epichlorhydrin | 150 | 65 |
| Ether | 212 | 100 |
| Ethyl Acetate | 150 | 65 |
| Ethyl Alcohol | 230 | 110 |
| Ethylamine | 100 | 40 |
| Esters | 150 | 65 |
| Ethylacetoacetate | 150 | 65 |
| Ethyl Acrylate | 212 | 100 |
| Ethyl Chloride | 230 | 110 |
| Ethyl Chloroacetate | 212 | 100 |
| Ethyl Cyanoacetate | 212 | 100 |
| Ethylene Bromide | 230 | 110 |
| Ethylene Chloride | 230 | 110 |
| Ethylene Chlorohydrin | 150 | 65 |
| Ethylene Diamine | 120 | 50 |
| Ethylene Glycol | 230 | 110 |
| Ethylene Oxide | 230 | 110 |
| Fatty Acids | 230 | 110 |
| Ferric Chloride (50% in $H_20$) | 230 | 110 |
| Ferric Hydroxide | 230 | 110 |
| Ferric Nitrate | 230 | 110 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Ferric Sulfate | 230 | 110 |
| Ferrous Chloride | 230 | 110 |
| Ferrous Hydroxide | 230 | 110 |
| Ferrous Nitrate | 230 | 110 |
| Ferrous Sulfate | 230 | 110 |
| Fluoroboric Acid | 230 | 110 |
| Fluorine (Gaseous) | 100 | 40 |
| Fluosilicic Acid | 230 | 110 |
| Formaldehyde (37% in $H_20$) | 230 | 110 |
| Formic Acid | 230 | 110 |
| FREON® 11 | 230 | 110 |
| FREON® 12 | 230 | 110 |
| FREON® 22 | 230 | 110 |
| Fuel Oil | 230 | 110 |
| Furane | 150 | 65 |
| Fumaric Acid | 200 | 95 |
| Furfural | 212 | 100 |
| Gallic Acid | 212 | 100 |
| Gas-Manufactured | 230 | 110 |
| Gas-Natural | 230 | 110 |
| Gasoline-Leaded | 230 | 110 |
| Gasoline-Unleaded | 230 | 110 |
| Gasoline-Sour | 230 | 110 |
| Glycerol | 230 | 110 |
| Glycolic Acid | 230 | 110 |
| Glycol | 230 | 110 |
| Heptane | 230 | 110 |
| Hexane | 230 | 110 |
| Hydrazine | 100 | 40 |
| Hydrazine Dihydrochloride | 125 | 50 |
| Hydriodic Acid | 230 | 110 |
| Hydrobromic Acid (50%) | 230 | 110 |
| Hydrochloric Acid (20%) | 230 | 110 |
| Hydrochloric Acid (Conc.) | 230 | 110 |
| Hydrochloric Acid (Gas) | 230 | 110 |
| Hydrocyanic Acid | 230 | 110 |
| Hydrofluoric Acid (35%) | 230 | 110 |
| Hydrofluoric Acid (70%) | 230 | 110 |
| Hydrofluoric Acid (100%) | 230 | 110 |
| Hydrofluorosilicic Acid | 230 | 110 |
| Hydrogen | 230 | 110 |
| Hydrogen Cyanide | 230 | 110 |
| Hydrogen Peroxide (30%) | 230 | 110 |
| Hydrogen Peroxide (90%) | 150 | 65 |
| Hydrogen Phosphide | 150 | 65 |
| Hydrogen Sulfide (Dry) | 230 | 110 |
| Hydrogen Sulfide (Wet) | 230 | 110 |
| Hypochlorous Acid | 230 | 110 |
| Hydroquinone | 230 | 110 |
| Inert Gases | 230 | 110 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Iodine (Dry) | 230 | 110 |
| Iodine (Wet) | 230 | 110 |
| Iodoform | 230 | 110 |
| Isobutyl Alcohol | 230 | 110 |
| Isopropylamine | 120 | 50 |
| Jet Fuel-JP4 | 230 | 110 |
| Jet Fuel-JP5 | 230 | 110 |
| Lactic Acid | 230 | 110 |
| Lard Oil | 230 | 110 |
| Lauric Acid | 230 | 110 |
| Lauryl Chloride | 230 | 110 |
| Lauryl Sulfate | 230 | 110 |
| Lead Acetate | 230 | 110 |
| LinoleicAcid | 230 | 110 |
| Linseed Oil | 230 | 110 |
| Lithium Bromide (Saturated) | 230 | 110 |
| Lithium Hydroxide | 230 | 110 |
| Lubricating Oil | 230 | 110 |
| Magnesium Carbonate | 230 | 110 |
| Magnesium Chloride | 230 | 110 |
| Magnesium Hydroxide | 230 | 110 |
| Magnesium Nitrate | 230 | 110 |
| Magnesium Sulfate | 230 | 110 |
| Maleic Acid | 230 | 110 |
| Maleic Anhydride | 200 | 95 |
| Malic Acid | 230 | 110 |
| Mercuric Chloride | 230 | 110 |
| Mercuric Cyanide | 230 | 110 |
| Mercuric Nitrate | 230 | 110 |
| Mercury | 230 | 110 |
| Methacrylic Acid | 200 | 95 |
| Methane | 230 | 110 |
| Methane Sulfonic Acid (50%) | 230 | 110 |
| Methyl Alcohol | 230 | 110 |
| n-Methyl Aniline | 230 | 110 |
| Methyl Benzoate | 230 | 110 |
| Methyl Bromide | 230 | 110 |
| Methyl Cellosolve® | 300 | 150 |
| Methyl Chloride | 230 | 110 |
| Methyl Chloroform | 150 | 65 |
| Methyl Chloromethyl Ether | 175 | 80 |
| Methyl Cyanoacetate | 175 | 80 |
| Methyl Ethyl Ketone | 230 | 110 |
| Methyl Sulfuric Acid | 212 | 100 |
| Methylene Bromide | 212 | 100 |
| Methylene Chloride | 212 | 100 |
| Methylene Iodide | 212 | 100 |
| Methyl Isobutyl Ketone | 230 | 110 |
| Methyl Methacrylate | 175 | 80 |
| Methyl Salicylate | 200 | 95 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Methyl Trichlorosilane | 200 | 95 |
| Mineral Oil | 300 | 150 |
| Monochlorobenzene | 230 | 110 |
| Monoethanolamine | 150 | 65 |
| Morpholine | 150 | 65 |
| Naphtha | 230 | 110 |
| Naphthalene | 230 | 110 |
| Nickel Chloride | 230 | 110 |
| Nickel Nitrate | 230 | 110 |
| Nickel Sulfate | 230 | 110 |
| Nicotine | 212 | 100 |
| Nicotonic Acid | 230 | 110 |
| Nitric Acid (Conc. 70%) | 75 | 25 |
| Nitric Acid (50%) | 150 | 65 |
| Nitric Acid-Sulfuric Acid (50/50) | 212 | 100 |
| Nitrobenzene | 230 | 110 |
| Nitrogen Gas | 230 | 110 |
| Nitrogen Dioxide | 212 | 100 |
| Nitromethane | 212 | 100 |
| Nitrous Acid | 212 | 100 |
| Octane | 230 | 110 |
| Octene | 230 | 110 |
| Oleic Acid | 230 | 110 |
| Oleum | 120 | 50 |
| Oxalic Acid | 230 | 110 |
| Oxygen | 230 | 110 |
| Ozone (<l% in Air) | 212 | 100 |
| Palmitic Acid | 230 | 110 |
| Perchlorethylene | 230 | 110 |
| Perchloric Acid (72%) | 150 | 65 |
| Perch loric Acid (10%) | 230 | 110 |
| Petrolatum | 230 | 110 |
| Petroleum | 230 | 110 |
| Petroleum Ether | 212 | 100 |
| Phenol (100%) | 212 | 100 |
| Phenol (10%) | 230 | 110 |
| PhenolsulfonicAcid | 212 | 100 |
| Phenylhydrazine | 212 | 100 |
| Pheny[hydrazine Hydrochloride | 212 | 100 |
| o-Phenylphenol | 212 | 100 |
| Phosgene | 212 | 100 |
| Phosphoric Acid (30%) | 230 | 110 |
| Phosphoric Acid (85%) | 230 | 110 |
| Phosphorus Pentoxide | 230 | 110 |
| Phosphorus Oxychloride | 212 | 100 |
| Phosphorus Pentachloride | 212 | 100 |
| Phosphorus Trichloride | 230 | 110 |
| Phthalic Acid | 212 | 100 |
| Phthalic Anhydride | 212 | 100 |
| Picric Acid | 125 | 50 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Polyvinyl Acetate | 230 | 110 |
| Polyvinyl Alcohol | 230 | 110 |
| Potassium Aluminum Chloride | 230 | 110 |
| Potassium Aluminum Sulfate (50%) | 230 | 110 |
| Potassium Bicarbonate | 230 | 110 |
| Potassium Borate | 230 | 110 |
| Potassium Bromate | 230 | 110 |
| Potassium Bromide | 230 | 110 |
| Potassium Carbonate | 230 | 110 |
| Potassium Chlorate | 230 | 110 |
| Potassium Chloride | 230 | 110 |
| Potassium Chromate | 230 | 110 |
| Potassium Cyanide | 230 | 110 |
| Potassium Dichromate | 230 | 110 |
| Potassium Ferrocyanide | 230 | 110 |
| Potassium Fluoride | 230 | 110 |
| Potassium Hydroxide (50%) | 212 | 100 |
| Potassium Hypochlorite | 230 | 110 |
| Potassium Nitrate | 230 | 110 |
| Potassium Perborate | 230 | 110 |
| Potassium Perchlorate | 212 | 100 |
| Potassium Permanganate | 230 | 110 |
| Potassium Persulfate | 150 | 65 |
| Potassium Sulfate | 230 | 110 |
| Potassium Sulfide | 230 | 110 |
| Propionic Acid | 212 | 100 |
| Propane | 230 | 110 |
| Propyl Alcohol | 212 | 100 |
| Propylene Dibromide | 212 | 100 |
| Propylene Dichloride | 212 | 100 |
| Propylene Glycol Methyl Ether | 212 | 100 |
| Propylene Oxide | 150 | 65 |
| Pyridine | 150 | 65 |
| Pyrogallol | 150 | 65 |
| Salicylaldehyde | 212 | 100 |
| Salicylic Acid | 230 | 110 |
| Salt Brine | 230 | 110 |
| Sea Water | 230 | 110 |
| Silicon Tetrachloride | 230 | 110 |
| Silver Chloride | 230 | 110 |
| Silver Cyanide | 230 | 110 |
| Silver Nitrate | 230 | 110 |
| Sodium Acetate | 230 | 110 |
| Sodium Benzene-Sulfonate | 230 | 110 |
| Sodium Benzoate | 230 | 110 |
| Sodium Bicarbonate | 230 | 110 |
| Sodium Bisulfate | 230 | 110 |
| Sodium Bisulfite | 230 | 110 |
| Sodium Borate | 212 | 100 |
| Sodium Bromide | 230 | 110 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Sodium Carbonate | 230 | 110 |
| Sodium Chlorate | 230 | 110 |
| Sodium Chloride | 230 | 110 |
| Sodium Chromate | 230 | 110 |
| Sodium Cyanide | 230 | 110 |
| Sodium Dichromate (Alkaline) | 212 | 100 |
| Sodium Ferricyanide | 230 | 110 |
| Sodium Ferrocyanide | 230 | 110 |
| Sodium Fluoride | 230 | 110 |
| Sodium Glutamate | 230 | 110 |
| Sodium Hydroxide (50%) | 230 | 110 |
| Sodium Hydroxide (10%) | 230 | 110 |
| Sodium Hypochlorite | 230 | 110 |
| Sodium Hyposulfite | 230 | 110 |
| Sodium Iodide | 230 | 110 |
| Sodium Lignosulfonate | 230 | 110 |
| Sodium Metasilicate | 230 | 110 |
| Sodium Nitrate | 230 | 110 |
| Sodium Nitrite | 230 | 110 |
| Sodium Perborate | 212 | 100 |
| Sodium Perchlorate | 150 | 65 |
| Sodium Peroxide | 230 | 110 |
| Sodium Persulfate | 175 | 80 |
| Sodium Phosphate | 230 | 110 |
| Sodium Silicate | 230 | 110 |
| Sodium Silicofluoride | 230 | 110 |
| Sodium Sulfate | 230 | 110 |
| Sodium Sulfide | 230 | 110 |
| Sodium Sulfite | 230 | 110 |
| Sodium Thiosulfate | 230 | 110 |
| Sorbic Acid | 230 | 110 |
| Sour Crude Oil | 230 | 110 |
| Stannic Chloride | 230 | 110 |
| Stannous Chloride | 230 | 110 |
| Stannous Fluoride | 230 | 110 |
| Stearic Acid | 230 | 110 |
| Stoddard's Solvent | 230 | 110 |
| Styrene Monomer | 212 | 100 |
| Succinic Acid | 230 | 110 |
| Sulfamic Acid | 212 | 100 |
| Sulfur (Molten) | 230 | 110 |
| Sulfur Dioxide | 230 | 110 |
| Sulfur Trioxide (Liquid) | 75 | 25 |
| Sulfuric Acid (60%) | 230 | 110 |
| Sulfuric Acid (Conc.) | 230 | 110 |
| Sulfuric Acid (Fuming-Oleum) | 120 | 50 |

| Chemical | Maximum Use Temperature °F | °C |
|---|---|---|
| Sulfurous Acid | 230 | 110 |
| Tall oil | 230 | 110 |
| Tannic Acid | 230 | 110 |
| Tartaric Acid | 230 | 110 |
| 2,3,4,6-Tetrachlorophenol | 212 | 100 |
| Tetraethyl Lead | 230 | 110 |
| Tetrahydrofuran | 212 | 100 |
| Tetramethyl Ammonium Hydroxide (50%) | 212 | 100 |
| Tin Tetrachloride | 230 | 110 |
| Toluene | 230 | 110 |
| Tributyl Phosphate | 150 | 65 |
| Trichloracetic Acid | 212 | 100 |
| Trichloroethylene | 230 | 110 |
| Trichloromethane | 212 | 100 |
| 2,4,5-Trichlorophenol | 212 | 100 |
| Trichloroethylene | 230 | 110 |
| Triethylamine | 230 | 110 |
| Trisodium Phosphate | 230 | 110 |
| Thionyl Chloride | 212 | 100 |
| Titanium Dioxide | 230 | 110 |
| Titanium Tetrachloride | 212 | 100 |
| Turpentine | 230 | 110 |
| UDMH-Hydrazine (50/50) | 120 | 50 |
| Urea (50% $H_20$) | 230 | 110 |
| Varsol | 230 | 110 |
| Vinyl Acetate | 230 | 110 |
| Vinyl Chloride (Monomer) | 150 | 65 |
| Water | 230 | 110 |
| Xylene | 230 | 110 |
| Water Sewage | 230 | 110 |
| Wax | 230 | 110 |
| Zinc Acetate | 230 | 110 |
| Zinc Chloride | 230 | 110 |
| Zinc Hydrosulfite (10%) | 230 | 110 |
| Zinc Nitrate | 230 | 110 |
| Zinc Sulfide | 230 | 110 |
| Zinc Sulfate | 230 | 110 |
| **PLATING SOLUTIONS** | | |
| Brass | 230 | 110 |
| Cadmium | 230 | 110 |
| Chrome | 230 | 110 |
| Copper | 230 | 110 |
| Gold | 230 | 110 |

# Physical Properties

The normal physical properties of the ETFE sheeting are shown in the following table.

| | |
|---|---|
| Chemical characterization | Thermoplastic fluorocarbon polymer |
| Color | Clear to translucent, depending on thickness |
| Odor | None |
| Melting point | 270$^{o}$C |
| Upper Service Temperature | 155$^{o}$C |
| Density (23$^{o}$C) | 1.7 g/cm3 |
| Tensile Strength (N/mm$^{2}$) | 44 |
| Elongation at Break | 200% |
| Solubility in water | Insoluble |
| Explosion limits | None |
| Hardness Durometer | D 75 |
| Water absorption | < 0.03 |
| Oxygen Index (%) | > 30 |
| Flammability | V-0 |
| Thermal Expansion Coefficient 23 -150$^{o}$C (mm/mm/$^{o}$C) | 8-12 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 Manufacturing Technical Bulletin #1, "Specification for Welded Steel Tanks, Stacks, Ducts or Other Fabricated Equipment for Protective Linings and/or Coatings".)

2. The Duro-Bond ETFE 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 Duro-Bond ETFE rod and ETFE cap strip using a thermoplastic welding gun with nitrogen gas as the inert atmosphere.

4. Suitable ventilation and respiration equipment must be used while working with this material.

## 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 Procedures

**Duro-Bond ETFE** 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.

## Safety Issues

ETFE resins are nonvolatile and safe at normal room temperatures. Good safety practice requires the use of adequate ventilation and respirators when processing ETFE. Heating ETFE may produce fumes and gases that are irritating or toxic. Care must be taken to avoid contamination of smoking tobacco or cigarettes.

Refer to the ETFE Material Safety Data Sheet for detailed recommended procedures for the safe handling and use of ETFE.

## Additional Information

For additional technical or safety information, contact us at 330-313-6372, knightmaterials.com, or info@knightmaterials.com.

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