# ATTACHMENT 3

## Firestone Geomembrane Chemical Resistance Chart

*Firestone Geomembrane exposure to these chemicals causes no swelling, softening or surface deterioration of the membrane.*

Acetamide
Acryimide (to 60°C)
Acetaldehyde (to 38°C)
Acetophenone (to 60°C)
Acetylene gas (to 93°C)
Alum (to 60°C)
Aluminum acetate
Aluminum chloride
Aluminum nitrate
Aluminum sulfate (to 60°C)
Ammonia
Ammonia gas (cold)
Ammonia gas (hot) (to 60°C)
Ammonia hydroxide (to 10%)
Ammonia hydroxide (concentrated)
Ammonium carbonate
Ammonium chloride
Ammonium nitrate
Ammonium phosphate
Ammonium sulfate
Amyl alcohol
Arsenic acid (to 60°C)
Adipic acid (to 60°C)

Barium chloride (to 80°C)
Barium hydroxide
Barium sulfide
Benzaldehyde (to 93°C)
Benzyl alcohol
Boric acid (to 60°C)
Borium sulfate (to 21°C)

Calcium acetate
Calcium chloride (to 80°C)
Calcium hydrochlodte (to 20%, to 21°C)
Calcium hydroxide (to 80°C)
Calcium nitrate (to 80°C)
Calcium silicate (to 21°C)
Calcium sulfide (to 80°C)
Caustic soda (to 50%, to 80°C)
Chloroacetone (to 21°C)
Citric acid (to 93°C)
Copper II chloride (to 80°C)
Copper cyanide (to 60°C)
Copper nitrate (to 80°C)
Copper sulfate (to 21°C)
Copper sulfide (to 21°C)

Diiron sulfide
Diisopropyl ketone (to 21°C)
Dimethyl holmiamide
Dibutyl cellosolve adipote (to 93°C)
Dextrose (to 80°C)
Disodium phosphate (to 21°C)
Dioctyl amine (to 49°C)

Ethyl chloride (to 60°C)
Ethyl silicate (to 21°C)
Ethylene glycol (to 100°C)
Ethlendiamine (to 49°C)
Ethyl alcohol (to 93°C)
Ethyl sulfate (to 93°C)

Flurobodc acid (to 60°C)
Formaldehyde (to 40%, to 21°C)
Freon 142B (to 21°C)
Floromethane (to 21°C)

Gelatin
Glucose
Glue (to 80°C)

Hydrochloric acid (to 20%, to 21°C)
Hydrogen peroxide (to 0.5%, to 21°C)
Hydrobromic acid (to 20%, to 93°C)
Hydrogen (to 60°C)
Hydrogen sulfide (to 60°C)
Hydroxybutane (to 21°C)

Iron sulfate (to 21°C)
Iron II chloride (to 80°C)
Iron II nitrate (to 80°C)
Isobutyl alcohol (to 71°C)
Isopropyl acetate (to 71°C)
Isopropyl alcohol (to 71°C)

Lead sulfate (to 80°C)
Lactic acid (to 100%, to 60°C)
Lead acetate (to 93°C)
Lead nitrate (to 80°C)
Lead sulfamate (to 60°C)
Lead chloride (to 80°C)
Lime, soda (to 21°C)

Magnesium chloride (to 100%, to 80°C)
Magnesium hydroxide (to 80°C)
Magnesium sulfate (to 80°C)
Mercury (to 60°C)
Mercury II chloride (to 60°C)
Methyl alcohol (to 80°C)
Mirabilite (to 21°C)
Magnesium acetate (to 20%, to 49°C)

Nickel acetate (to 21°C)
Nickel chloride (to 80°C)
Nickel sulfate (to 21°C)
Nitric acid (to 25%, to 21°C)
Nitrogen, gas (to 21°C)

Octyl alcohol (to 71°C)
Oxalic acid (to 100%, to 121°C)
Oxygen, cold (to 21°C)
zone, [O3 ] (to 21°C)
Orthoboric acid (to 21°C)

Phosphoric acid (to 85%, to 93°C)
Potassium bichromate (to 60°C)
Potassium bisulfite (to 80°C)
Potassium carbonate (to 80°C)
Potassium hydroxide (to 100%, to 93°C)
Potassium nitrate (to 100%, to 80°C)
Potassium phosphate (to 21°C)
Potassium sulfate (to 60°C)
Propyl alcohol (to 80°C)
Propylene glycol (to 21°C)

Salicylic acid (to 93°C)
Salt solution (to 100%, to 80°C)
Silicone greases (to 60°C)
Silicone oil (to 60°C)
Silver nitrate (to 80°C)
Soap solution (to 100°C)
Sodium bicarbonate (to 100%, to 100°C)
Sodium bisulfate (to 80°C)
Sodium bisulfite (to 100°C)
Sodium borate (to 60°C)
Sodium carbonate (to 100%, to 80°C)
Sodium chloride (to 100%, to 80°C)
Sodium hydroxide (to 100%, to 21°C)
Sodium nitrate (to 80°C)
Sodium perborate (to 100%, to 60°C)
Sodium phosphate (to 100%, to 80°C)
Sodium silicate (to 100%, to 80°C)
Sodium sulfite (to 100%, to 60°C)
Sodium sulfate (to 100%, to 60°C)
Sodium thiosulfate (to 60°C)
Sulfuric acid (to 25%, to 60°C)
Sulfurous acid (to 20%, to 100°C)
Sucrose solution (to 121°C)

Tannic acid (to 100%, to 60°C)
Triethanol amine (to 71°C)

Vinegar (to 60°C)

Zeolite
Zinc acetate (to 60°C)
Zinc chloride (to 100%, to 80°C)

*Firestone Geomembrane exposed to these chemicals can cause some discoloration, swelling and up to a 30% loss of tensile strength. Limited duration exposure is recommended.*

Acetic acid (to 10%, to 21°C)
Acetic anhydride
Acetone
Anhydrofluoric acid
Aniline (to 93°C)
Aniline dye
Animal fats (10%, to 60°C)

Butyl acetate (to 60°C)
Butyl alcohol (to 121°C)

Carbinol (to 21°C)
Carbonic acid (to 85°C)
Carbonic acid gas (to 85°C)
Caster oil (to 60°C)
Chromic acid (to 25%, to 21°C)
Cottonseed oil (to 80°C)
Cyclohexanone (to 21°C)

Dibutylphtalate (to 121°C)
Dibenziether (to 21°C)
Diethlylene glycol (to 60°C)
Dioctylphthalate (at 60°C)
Dioxane (to 71°C)

Epichlorohydrin (to 21°C)
Ethanolamine (to 21°C)
Ethyl acetate (to 70°C)
Ethyl acrylate (to 21°C)
Ethyl cellulose (to 21°C)

Freon 12 (to 21°C)
Furfural (to 71°C)

Glycerin (to 93°C)

Hydrochloric acid (to 25%, to 80°C)
Hydrofluoric acid
Hydrogen peroxide (to 100%, to 21°C)
Hypochlorous acid (at 50% to 60°C)

Linseed oil (at 21°C)

Methyl acetate (to 71°C)
Methyl ethyl ketone (to 93°C)
Mono ethanol amine (to 60°C)
Methyl cellosolve (to 93°C)

Nitric acid (to 35%, to 21°C)
Nitrobenzene (to 60°C)
Nitro ethane (to 21°C)
Nitromethane (to 49°C)

Olive oil (to 21°C)

Palmitic acid diluted (to 50%, to 21°C)
Picric acid (to 21°C)
Propyl acetate (to 21°C)
Pyridine (to 71°C)

Stearic acid concentrated (to 60°C)
Sodium hypochlorite (to 5%, to 21°C)
Sulfuric acid (to 25%, to 60°C)
Sulfuric acid gas (to 50%, to 100°C)
Sulfurous acid (to 20%, to 100°C)
Sulfurous acid gas (to 21°C)

Triethanol amine (to 71°C)

Urea (to 93°C)

Vegetable oil (to 93°C)

*Firestone Geomembrane exposure to these chemicals is expected to cause deterioration of the membrane. EXPOSURE TO THESE CHEMICALS IS NOT RECOMMENDED.*

Acrylonitrile
Aciyonitrile
Amyl acetate
Amyl naphthalene
Animal fats (concentrated)
Aqua regia
ASTM oil no. 1
ASTM oil no. 2
ASTM oil no. 3
ASTM fuel oil A
ASTM fuel oil B
ASTM fuel oil C
Acetyl chloride

Benzene
Benzyl chloride
Benzine
Butane
Butyl acrylate
Butyl acetate (above 60°C)
Butyl stearate (21°C or higher)

Biphenyl

Carbolic acid
Carbon disulfide
Carbon tetrachloride
Chlorine gas (wet)
Chloro benzene
Chloro naphthalene
Chloro sulfonic acid
Chloroform
Chlorotolehe
Chromic acid (to 25%, above 21°C)
Cresol(s)
Creosote oil
Cyclohexanol
Corn oil
Cyclohexane
Cyclohexanone

Dibutylether
Diclorobenzene
Diethylether
Dipentene
Diisopropyl ether
Dibutylamine
Dextron

Ethyl benzene
Ethylene oxide
Ethylenedichloride
Ethyl bromide
Ethyl butyrate

Freon 11
Freon 21
Freon 113
Fuel oil
Furan
Furfural (at 100°C)

Gasoline
Glacial acetic acid

Hexane
Hexyl alcohol
Hexylene
Hydrochloric acid (above 20%, above 21°C)
Hydrofluoric acid (at 25% or above at 100°C, 100% conc. at 60°C)
Hypochlorous acid (at 75% or above at 21°C or higher)
η-Heptane
Hydrogen peroxide (to 100%, above 21°C)

Itexylene
Isooctane
Isopropyl ether
Isoamyl chloride
Isoamyl ether
Isoamyl phthalate
Isobutylnamide

Jet Fuel
J.P. fuel oil

Lacquer
Lard oil
Linolenic acid
Liquid petronium gas

Malic acid
Mercaptan
Methyl isobutyl ketone
Methyl methacrylate
Methylene dichloride
Mineral oil

Monochlorbenzene
Mineral Naphtha

Naptha
Napthalene
Natural gas
Nitric acid (above 30%, at 21°C or higher
Nitric acid (above 60%)

Oxygen (above 21°C)
Oleic acid
Octane

Pyridine
Perchloroethylene
Petrol (gasoline)
Petroleum, hydraulic fluid
Pinene
Pine oil
Piperidine
Propane
Propylene
Palm oil (at 21°C)
Phenol (at 21°C)
Pyrole

Solene
Styrene
Sulfuric acid (concentrated)
Sulfur monochloride
Sulfur dichloride
Sulfur trioxide

Terpene
Tetraln
Trachloroethane
Toluene
Trichloroethylene
Turpentine oil
Tall oil
Tartaric acid
Tetrahydrofuron [THF] (at 21°C)
Trichloromethane
Tung oil (at 77°C)

Xylene

Varnish
Vinyl benzene

Wood tar

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