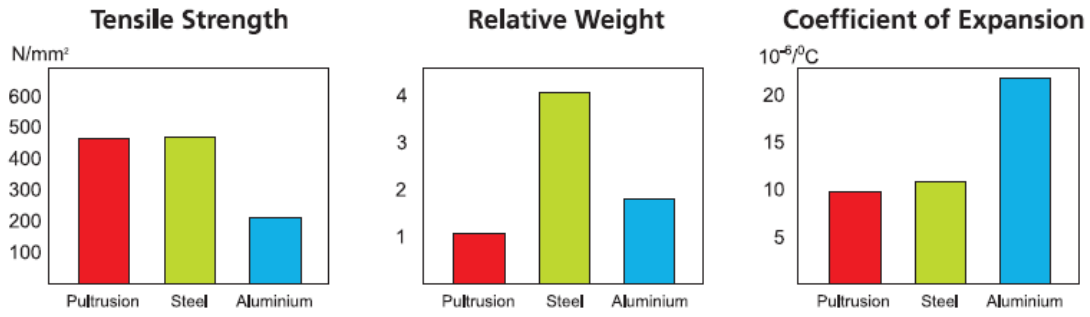
Properties of Pultruded sections

The information provided is a guide to the typical properties of pultruded fibreglass reinforced plastics. The pultruded profiles are made from a combination of continuous longitudinal rovings, continuous filament, mats and resin, thus properties will vary depending on reinforcement and resin choice.

COMPARISONS



PROPERTIES

Mechanical:		
Tensile Strength, Longitudinal:	400 – 450	N/mm^2
Flexural Stress, Longitudinal:	200 – 450	N/mm^2
Elastic Modulus, Flexural, Longitudinal:	15,000 – 30,000	N/mm^2
Compressive Strength:	150 – 300	N/mm^2
Impact Strength:	1 – 2	kJ/M
Elongation at Rupture:	2	%
Hardness (Barcol 934-1):	50 – 60	
Specific Gravity:	1.7 – 1.9	
Electrical:		
Dielectric Strength:	12	kV/mm
Volume Resistivity:	$10^{10} – 10^{12}$	Ω/cm^2
Thermal:		
Coefficient of Thermal Expansion:	8 - 10	$10^{-6}/^0K$
Thermal Conductivity:	0.2 – 0.3	$W/^0K.M$
Operating Temperature Range (resin dependent):	-70 to +120	^0C

Fire:

B.S. 476 - Class 1
ASTM E84 - Class A
IEC 60695 - 960 ^0C Max.

Smoke:

ASTM E662 - Ds at 1.5 min = 0.68
ASTM E84 - Class A

Up to temperature °C	Vinylester 49°	Vinylester 99°	Isophathalic Polyester 49°	Isophathalic Polyester 99°
Acetaldehyde	R	N	N	N
Acetaldehyde, aq. 40%	N	N	N	N
Acetic Acid, glacial	L	N	N	N
Acetic Acid, 20% (25)	R	R	R	N
Acetic Acid, 80%	R	R	N	N
Acetic Anhydride	L	N	N	N
Acetone, 10%	R	N	N	N
Adipic Acid	R	N		
Alcohol, allyl	N	N	N	N
Alcohol, benzyl	L	N	N	N
Alcohol, butyl (n-butanol)	R	N	N	N
Alcohol, butyl (2-butanol)	R	N	N	N
Alcohol, ethyl	L	N	R	N
Alcohol, hexyl	R	L	N	N
Alcohol, isopropyl (2-propanal)	R	N	N	N
Alcohol, methyl	L	N	L	N
Alcohol, propyl (1-propanaol)	R	N	N	N
Allyl chloride	N	N	N	N
Alum	R	R	R	R
Ammonia, gas	L	N	R	N
Ammonia, liquid	N	N	N	N
Ammonia, aq. 20%	R	N	N	N
Ammonia salts, except fluoride	R	R	R	R
Ammonium fluoride, 25%	R	N	N	N
Amlyl acetate	R	N	N	N
Amyl chloride	R	N	N	N
Aniline	N	N	N	N
Aniline hydrochloride	R	N	N	N
Antimony trichloride			R	N
Aqua regia			N	N
Arsenic Acid, 80%	L	N		N
Aryl-sulfonic acid	R	R	N	N
Barium salts	R	R	R	N
Beet sugar liquor	R	N		
Benzaldehyde, 10%			N	N
Benzaldehyde, 10 - 100%	N	N	N	N
Benzene (Benzoil)	L	N	N	N
Benzene sulfonic acid, 10%	R	R	R	N
Benzene sulfonic acid, 50%	R	N	N	N
Benzonic acid	R	R	R	N
Black liquor - paper	R	R	N	N
Bleach, 12.5% active chlorine	R	N	N	N
Bleach, 5.5% active chlorine	R	N	R	N
Borax	R	R	R	N
Boric Acid	R	N	R	N
Brine	R	N	R	R
Bromic acid, < 50%	R	N		N
Bromine, liquid	N	N	N	N
Bromine, gas 25%	N	N	N	N
Bromine, aq.	R	N		
Butane	R	R	R	R
Butanediol (eythriol)	R	R	R	R
Butanediol	R	R	N	N
Butyl Acetate	N	N		
Butyl phenol	N	N	N	N
Butyric acid, < 50%	R	R	N	N
Calsium hypochlorite	R	N	R	N
Calcium hypochlorite	R	N	R	N
Calcium hydroxide, 100%	R	R	R	N
Cane sugar liquors	R	L		
Carbon disulfide	N	N	N	N
Carbon dioxide	R	R	R	N
Carbon dioxide, aq.	R	R	R	R
Carbon monoxide	R	R	R	R
Carbon tetrachloride	R	N	N	N
Casein	R	R	R	R
Castor oil	R	N		
Caustic potash (KOH)	R	N	N	N
Caustic soda (NaOH)	R	N	N	N
Chlorine, gas, dry	R	R	R	N
Chlorine, gas, wet	R	R	N	N
Chlorine, liquid	N	N	N	N
Chlorine, water	R	R	N	N
Chloroceitic acid	R	N	N	N
Chlorobenzene	L	N	N	N
Chloroform	N	N	N	N
Chlorosulfonic acid, 10%	N	N	N	N
Chromic acid, 10%	R	N		
Chromic acid, 30%	N	N	N	N
Chromic acid, 40%	N	N	N	N
Chromic acid, 50%	N	N	N	N
Citric acid	R	R	R	N
Coconut oil	R	R	R	N
Copper salts, aq.	R	R	R	R
Cottonseed oil	R	R	R	R
Cresylic acid, 50%	N	N	N	N

Up to temperature °C	Vinylester 49°	Vinylester 99°	Isophathalic Polyester 49°	Isophathalic Polyester 99°
Cyclohexane	R	N	R	R
Cyclohexanol	R	N	R	N
Cyclohexanone			N	N
Diesel fuels	R	R	R	N
Diethyl amine	N	N	N	N
Dioctyl phthalate	R	R	N	N
Dioxane - 1, 4			N	N
Dimethylamine	N	N	N	N
Dimethyl formamide	N	N	N	N
Detergents, aq	R	R	R	R
Didutylphthalate	R	R	N	N
Didutylsebacate	R	N	R	R
Dichlorobenzene	R	N	N	N
Dichlorethylene	N	N	N	N
Ether (diethyl)	N	N	N	N
Ethyl halides	N	N	N	N
Ethylene halides	N	N	N	N
Ethylene glycol	R	R	R	R
Ethylene oxide	N	N	N	N
Fatty acids	R	R	R	R
Ferric salts	R	R	R	R
Fluorine, gas, dry	N	N	N	N
Fluorine, gas, wet	N	N	N	N
Fluoroboric acid, 25%	R	R	N	N
Fluorosilicic acid, 10%	R	N	N	N
Formaldehyde	R	N	R	N
Formic acid	L	N	N	N
Freon, F11, F12, 113, 114	N	N	N	N
Freon, F21, F22	N	N	N	N
Fruit Juices and pulps	N	N	R	N
Fuel oil	R	R	R	N
Furfural	N	N	N	N
Gas, natural, methane	R	N	R	N
Gasoline	R	L	R	N
Gelatin	R	L	R	N
Glycerine (glycerol)	R	R	R	N
Glycols	R	R	R	R
Glycolic acid	L	N	R	N
Green Liquor - paper	R	N	N	N
Heptane	R	R	R	N
Hexane	R	N	R	N
Hydrobromic acid, 25%	R	N	R	N
Hydrochloric acid	R	R	R	N
Hydrofluoric acid, 10%	R	N	L	N
Hydrofluoric acid, 60%	N	N	N	N
Hydrofluoric acid, 100%	N	N	N	N
Hydrocyanic acid	R	R	N	N
Hydrogen peroxide, 50%			N	N
Hydrogen peroxide, 90%			N	N
Hydrogen sulfide, dry	R	R	R	N
Hydrazine	N	N	N	N
Hypochlorous acid, 10%	R	L	N	N
Jet fuels, JP 4 and JP 5	R	N	N	N
Kerosense	R	N	R	N
Lactic acid, 25%	R	R	R	N
Lauric acid	R	R	R	N
Lauryl chloride	R	R	R	N
Laurlyl sulfate	R	R	R	N
Lead salth	R	R	R	R
Linoleic acid	R	R	R	N
Linseed oil	R	R	R	N
Lithium salth	R	R	R	N
Lubricating oils	R	N	R	N
Machine oil	R	N	R	N
Magnesium salts	R	R	R	R
Maleic acid	R	R	N	N
Manganese sulfate	R	R	R	N
Mercuric salts	R	R	R	N
Mercury	R	R	R	R
Methane	R	R	R	R
Methyl acetate	N	N	N	N
Methyl bromide (gas)	N	N	N	N
Methyl cellosolve			R	N
Methyl chloride	N	N	N	N
Methyl chloroform	N	N	N	N
Methyl cyclohexanone	N	N	N	N
Methyl methacrylate	N	N	N	N
Methylene bromide	N	N	N	N
Methylene chloride	N	N	N	N
Methylene iodide	N	N	N	N
Mineral oil	R	R	R	N
Molasses	R	N	R	N
Monochlorobenzene	L	N	N	N
Monoethanolamine	N	N	N	N
Motor oil	R	R	R	R
Naphtha	R	R	R	N
Napthalene	R	R	R	N
Nickel salts	R	R	R	R
Nitric acid, 0 to 20%	R	N	N	N

Up to temperature °C	Vinylester 49°	Vinylester 99°	Isophathalic Polyester 49°	Isophathalic Polyester 99°
Nitric acid 21 to 100%	N	N	N	N
Nitric acid, fuming	N	N	N	N
Nitrobenzene	L	N	N	N
Nitrous acid	R	N	R	N
Oleic acid	R	R	R	R
Oleum	N	N	N	N
Olive oil	R	R	R	R
Oxalic acid		R	R	R
Ozone, gas, 5%	R	N	N	N
Palmitic acid, 10%	R	R	R	R
Palmitic acid, 70%	R	R	R	R
Paraffin	R	R	R	R
Pentane	R	N	R	N
Perchloric acid, 10%	R	N	N	N
Perchloric acid, 70%	R	N	N	N
Perchloroethylene	R	N	N	N
Petroleum, sour	R	R	R	N
Petroleum, refined	R	R	R	N
Phenol, 88%	N	N	N	N
Phenylcarbinol	N	N	N	N
Phenylhydrazine	N	N	N	N
Phosphoric acid	R	R	R	L
Phosphorous, yellow	N	N	N	N
Phosphorous, red	N	N	N	N
Phosphorous, trichloride	N	N	N	N
Phthalic acid	R	R		
Potassium salts, aq.	R	R	R	R
Potassium permanganate 25%	R	R	R	N
Propane	R	R	R	R
Propylene dichloride	N	N	N	N
Propylene glycol	R	R	R	N
Propylene oxide	N	N		
Pyridine	N	N	N	N
Rayon coagulating bath	R	N	N	N
Sea water	R	R	R	R
Salicylic acid	R	N	R	N
Sewage, residential	R	L	R	N
Silicic acid	R	R	R	N
Silicone oil	R	R	R	R
Silver salts	R	R	R	R
Soaps	R	R	R	R
Sodium hydroxide			N	N
Sodium salts, aq. except	R	R	R	R
Sodium chlorite 10%	R	N		
Sodium chlorate	R	R		
Sodium dichromate, acid	R	R		
Stannic chloride	R	R	R	N
Stannous chloride	R	R	R	R
Stearic acid	R	R	R	R
Sulfite liquor	R	R	R	N
Sulfur	R	R	R	N
Sugars, aq.			R	R
Sulfur dioxide, dry	R	R	R	R
Sulfur dioxide, wet	R	R	R	R
Sulfur trioxide, gas, dry	R	R	N	N
Sulfur trioxide, wet	N	N	N	N
Sulfuric acid, < 26%	R	R	R	N
Sulfuric acid, 26% to 80%	R	N	N	N
Sulfuric acid, 81% to 100%	N	N	N	N
Sulfurous acid, 10%	R	N	N	N
Tall oil	R	R	R	N
Tannic acid	R	R	R	R
Tartaric acid	R	R	R	R
Tetrachloroethane	R	N	N	N
Tetrahydrofuran	N	N	N	N
Thionyl chloride	N	N	N	N
Thread cutting oil	R	N	R	N
Terpineol	R	R	R	R
Toluene	R	N	N	N
Tributyl phosphate	R	N	N	N
Tricresyl phosphate	R	N	N	N
Trichloracetic acid	R	R	N	N
Trichloroethylene	N	N	N	N
Triethanolamine	R	N	N	N
Triethylamine	R	N	N	N
Turpentine	R	R	N	N
Urea, 50%	R	N	R	N
Vaseline	R	R	R	R
Vegetable oils	R	R	R	R
Vinegar	R	R	R	N
Vinyl acetate	N	N	N	N
Water, distilled	R	R	R	N
Water, fresh	R	R	R	R
Water, mine	R	R	R	N
Water, salt	R	N	R	R
Water, tap	R	R	R	R
Whiskay	R	N	R	N
Wines	R	N	R	N
Xylene	R	N	N	N
Zinc salts	R	R	R	R

R=Resistant, N=Not resistant, L=Less resistant than R. but still suitable for some conditions