NORSODYNE®
POLYESTER RESINS

CrayValley produce a comprehensive range of unsaturated polyester resins suitable for chemical resistance applications.

The resins recommended for chemical resistance are, in increasing resistance:

- **Medium reactivity, general purpose, polyester resins**
- **Isophthalic polyester resin**
- **Terephthalic NPG polyester which has excellent hydrolytic stability, good chemical resistance and good adhesion to PVC**

Other Cray Valley resins may be suitable for certain chemical contact applications. For information on these, and chemical environments not listed below, contact Cray Valley Technical Service Department.

The table shows the maximum working temperatures to which the chemical resistance laminates should be exposed. The side of the laminate exposed to the chemical environment should always be a resin rich layer reinforced with synthetic tissue. The data has been determined from a number of sources including case histories, laboratory tests and practical experience. It is emphasised, however, that this information is only intended to serve as a guide to the resistance of fully post cured laminates. It should be pointed out that the reinforcement type, fabrication technique, laminate quality, design, exposure conditions, loadings both static and dynamic, all play their part in environmental resistance. For guidance on manufacture of chemical tanks, BS 4994 1987 should be consulted.

CURE DETAILS

Laminates must be post cured in order to develop their maximum chemical resistance and heat deflection temperature. Mouldings should be allowed to stand at room temperature for at least 24-hours then post cured for a minimum of 3 hours at 80°C. If the operating temperature of the article is to be above 80°C then the post cure temperature must be at the operating temperature.

The maximum operating temperatures and recommendations shown in this leaflet are based on laboratory testing and case histories. To the best of our knowledge, these are reliable but are made without any representation of guarantee or warranty of accuracy and are made with reservation of all patent rights. Our products are sold on the condition that the users themselves carry out their own tests to determine the applicability of the information and the suitability of Norsodyne® resins for their particular requirements.

CHEMICAL	%	GP/ENYDYNE	ISOPHTHALIC	TERE/ NPG
Acetic Acid	Glacial	NR	NR	NR
Acetic Acid	10	20	60	80
	25	NR	40	60
	50	NR	20	20
	78	NR	NR	NR
	98	NR	NR	NR
Acetone	10	NR	25	NR
	100	NR	NR	NR
Acriflavine	2	40	50	45
Acrylonitrile	100	NR	NR	NR
Alcohols:				
Amyl	100	20	40	40
Butyl	100	20	35	35
Ethyl	100	NR	30	30
Methyl	100	NR	30	30
Aluminium Chloride	SAT	40	55	80
Aluminium Nitrate	10	35	60	70
Aluminium Potassium Sulphate	SAT	40	60	80
Aluminium Sulphate	SAT	40	65	85
Ammonium Bromate	SAT	20	40	40
Ammonium Carbonate	5	20	40	40
	SAT	NR	NR	NR
Ammonium Chloride	50	40	60	60
	SAT	40	60	60
Ammonium Citrate	SAT	30	50	65
Ammonium Hydroxide	5	NR	NR	30
(Ammonia)	20	NR	NR	20
Ammonium Nitrate	SAT	30	60	70
Ammonium Sulphate	SAT	40	65	80
Amyl Acetate	100	NR	20	20
Aniline	100	NR	NR	NR
Antimony Trichloride	100	NR	20	30
Aviation Fuel:				
AVTAG/JP4	100	NR	20	20
AVTUR	100	20	25	25
Barium Chloride	SAT	40	60	80
Barium Hydroxide	10	NR	NR	20
Benzaldehyde	100	NR	NR	NR
Benzoic Acid	SAT	40	60	70
Boric Acid	SAT	40	60	80
Brine		40	60	80
Bromine	100	NR	NR	NR
Butyl Acetate	100	NR	NR	NR
Calcium Chloride	SAT	40	60	80
Calcium Hydroxide	20	NR	30	40
Calcium Oxide		NR	30	40
Calcium Nitrate	SAT	40	60	80
Calcium Sulphate	SAT	40	60	80
Carbon Disulphide	100	NR	NR	NR
Carbonic Acid	SAT	40	60	80
Carbon Tetrachloride	100	NR	20	20
Chloroacetic Acid	25	NR	20	40
	50	NR	NR	NR
	100	NR	NR	NR
Chlorine Water	SAT	NR	25	35
Chlorobenzene	100	NR	NR	NR
Chloroform	100	NR	NR	NR
Chromic Acid	10	25	40	50
	20	NR	20	30
	50	NR	20	20
Citric Acid	SAT	40	60	70
Copper Chloride	SAT	20	60	80
Copper Cyanide	SAT	20	60	70
Copper Sulphate	SAT	20	60	70
Cresol	100	NR	NR	NR
Cyclohexanol	100	30	40	40
Diesel Fuel	100	30	40	40
Diethylene Glycol	100	20	60	70
Diethyl Ketone	100	NR	NR	NR
Diethyl Formamide	100	NR	NR	NR
Dimethyl Formamide	100	NR	NR	NR
Dimethyl Phthalate	100	30	50	60
Dipropylene Glycol	100	20	60	70
Ethyl Acetate	100	NR	NR	NR
Ethyl Acrylate	100	NR	NR	NR
Ethylene Chlorohydrin	50	NR	60	60
	100	NR	60	60
Ethylene Glycol	100	30	60	70
Ferric Chloride	SAT	30	60	70
Ferric Nitrate	SAT	30	60	70
Ferric Sulphate	SAT	30	60	70
Ferrous Sulphate	SAT	30	60	70
Formaldehyde	10	20	60	70
Formic Acid	20	20	50	60
	50	NR	40	50
	100	NR	NR	NR
Furfural	5	NR	NR	NR
	25	NR	NR	NR
Glycerol	100	40	60	80
Heptane	100	20	30	30
Hexane	100	20	30	30
Hydrobromic Acid	20	30	60	70
	48	20	50	60
Hydrochloric Acid	10	30	60	70
	25	25	50	50
	35	NR	30	30
Hydrofluoric Acid	10	20	25	30
Hydrogen Chloride Gas	100	30	60	70
Hydrogen Peroxide	20 VOL	NR	30	45
	100 VOL	NR	NR	20
Hydrogen Sulphide Gas	100	35	50	50

CHEMICAL	%	GP/ENYDYNE	ISOPHTHALIC	TERE/ NPG
Iodine	2	NR	NR	NR
Iso-Octane	100	20	30	40
Isopropyl Alcohol	100	NR	20	30
Kerosene (Domestic)	100	25	40	40
Lactic Acid	50	30	60	70
Lanolin	100	40	55	70
Lead Acetate	SAT	35	60	60
Lead Nitrate	SAT	30	60	70
Linseed Oil	100	55	80	90
Lubricating Oil	100	30	60	60
Magnesium Carbonate	SAT	35	60	75
Magnesium Chloride	SAT	35	60	75
Magnesium Nitrate	SAT	35	60	75
Magnesium Sulphate	SAT	35	60	75
Maleic Acid	SAT	30	60	70
Methylene Chloride	100	NR	NR	NR
Methyl Ethyl Ketone	100	NR	NR	NR
Methyl Methacrylate	100	NR	NR	NR
Mineral Oil	100	40	50	50
Monochloro Benzene	100	NR	NR	NR
Naphtha	100	20	35	35
Naphthalene	100	20	50	50
Nickel Chloride	SAT	35	60	80
Nickel Nitrate	SAT	35	60	80
Nickel Sulphate	SAT	35	60	80
Nitric Acid	5	30	50	60
	10	20	40	50
	20	NR	NR	25
	40	NR	NR	NR
Nitroaniline	100	NR	NR	NR
Nitrobenzene	100	NR	NR	NR
Oleic Acid	100	35	60	70
Oleum		NR	NR	NR
Oxalic Acid	SAT	35	55	65
Paraffin Wax	100	50	65	80
Perchloric Acid	25	NR	NR	NR
Petrol Lead-Free	100	NR	NR	NR
Phenol Sol	SAT	NR	NR	NR
Phosphoric Acid	50	35	60	70
	85	35	60	70
Phthalic Acid	SAT	35	55	65
Potassium Carbonate	10	NR	20	30
	40	NR	NR	NR
Potassium Chloride	SAT	35	60	75
Potassium Chromate	SAT	25	60	60
Potassium Ferricyanide	SAT	35	60	75
Potassium Ferrocyanide	SAT	35	60	75
Potassium Hydroxide	30	NR	NR	NR
Potassium Permanganate	SAT	NR	20	30
Potassium Phosphate	SAT	35	60	75
Potassium Sulphate	SAT	35	60	75
Propylene Glycol	100	30	60	70
Pyridine	100	NR	NR	NR
Sea Water	-	35	60	80
Silicone Oils	100	50	65	80
Silver Nitrate	SAT	NR	30	50
Sodium Acetate	SAT	35	60	75
Sodium Bicarbonate	SAT	35	60	75
Sodium Carbonate	10	NR	25	30
	25	NR	20	25
Sodium Chloride	SAT	35	60	80
Sodium Ferricyanide	SAT	30	60	65
Sodium Hydroxide	<1	NR	NR	25
(Caustic Soda)	5	NR	NR	NR
Sodium Hypochlorite Aqueous Soln (14% Active Cl2)	-	NR	NR	NR
Sodium Nitrate	SAT	NR	60	65
Sodium Nitrite	SAT	NR	60	65
Sodium Perborate	SAT	NR	60	65
Sodium Perchlorate	SAT	NR	60	65
Sodium Phosphate	SAT	35	60	75
Sodium Sulphate	SAT	40	65	80
Sodium Sulphide	SAT	40	65	80
Sodium Sulphite	SAT	40	65	80
Sodium Thiosulphate	SAT	35	60	75
Stannous Chloride	SAT	35	60	75
Stearic Acid	-	35	60	75
Styrene	100	NR	NR	NR
Sulphuric Acid	25	35	60	75
	50	35	60	75
	75	NR	NR	20
	98	NR	NR	NR
Tannic Acid	SAT	35	60	75
Tartaric Acid	SAT	35	60	75
Tetrachloroethylene	100	NR	NR	NR
Tetrahydrofuran	100	NR	NR	NR
Thionyl Chloride	100	NR	NR	NR
Toluene	100	NR	20	20
Turpentine	100	NR	20	25
Urea	2	30	40	65
Urine	-	25	30	45
Vinyl Acetate	100	NR	NR	NR
Water:				
De-Ionized	100	30	55	75
Sea	100	35	60	80
White Spirit	100	25	35	30
Xylene	100	NR	NR	NR
Zinc Chloride	SAT	35	60	75
Zinc Nitrate	SAT	NR	60	75
Zinc Sulphate	SAT	35	60	75

	GP/ENYDYNE	ISOPHTHALIC	TERE/ NPG
RESIN TYPE	Ortho	ISO	TERE/NPG
MONOMER CONTENT	44%	43%	48%
VISCOSITY @25°C	2.5dPas	4.5dPas	3.6dPas
GEL TIME	16-20mins (1)	5-10mins (2)	15-20mins (2)
HEAT DEFLECTION	62°C	90°C	115°C
FLEXURAL STRENGTH	78 MPa	100 MPa	78 MPa
TENSILE STRENGTH	55 MPa	65 MPa	62 MPa
ELONGATION	2.6%	1.3%	2.5%
BARCOL HARDNESS TEMP	40-45	45-50	40-45

Notes:

1. *Mechanical properties measured on unreinforced resin casts following post curing.*
2. *Gel times shown were carried out using medium activity Methyl Ethyl Ketone Peroxide solution at the following addition levels and temperatures;*

   (1) 2% @ 20°C

   (2) 2% @ 25°C
3. *Check with Technical Services (01469 551035) for specific grades that are suitable for your application.*