

PRODUCT MINI BOOKLET

**Vinyl Esters
Flame Retardants
Bio Resins
Tooling Systems
Bonding Pastes**



POLRES



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Polres Polyester

**we help turn your
ideas into reality**



About Us

Polres Polyester is a company with 100% domestic capital, founded in 2003. We produce polyester, vinyl ester, bio-based resins, gelcoats, pigment pastes, bonding pastes and fibro mastics. The company, which stands out with its R&D studies, focuses on quality and customer satisfaction. Our company's goal is to increase its international market share by increasing its exports with new products.



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VINYL ESTER RESINS

WHERE STRENGTH MEETS RESILIENCE

UNCOMPROMISING PERFORMANCE, UNWAVERING STRENGTH

What are Vinyl Ester Resins?

Vinyl ester resins are a type of thermosetting resin that combines the advantages of both polyester and epoxy resins. They offer better corrosion resistance and toughness compared to standard polyester resins. They have lower viscosity than epoxy resins, making them easier to work with.

Key Properties

- **Excellent Corrosion Resistance:** Resistant to a wide range of chemicals, acids, and alkalis.
- **High Strength and Toughness:** Good impact resistance and mechanical properties.
- **Good Fatigue Resistance:** Withstands repeated stress or flexing.
- **Low Water Absorption:** Less susceptible to moisture-related damage.
- **Versatile Processing:** Can be used in various manufacturing methods (e.g., hand lay-up, spray-up, pultrusion).

Types of Vinyl Ester Resins

- **Bisphenol A:** The most common type, offering a balance of good properties.
- **Novolac:** Higher crosslink density, enhanced chemical resistance, especially to solvents.
- **Brominated:** Flame retardant properties due to the inclusion of bromine in the resin structure.

PVE-04 BISPHENOL A EPOXY BASED VINYL ESTER RESIN

PVE-04 bisphenol A epoxy-based vinyl ester resin is a popular type of vinyl ester resin known for its excellent chemical resistance, high strength, and good processability. It is widely used in various industries where durability and performance under harsh conditions are required.

PVE-05 NOVOLAC EPOXY BASED VINYL ESTER RESIN

PVE-05 novolac epoxy based vinyl ester resin is a high performance resin known for its exceptional chemical resistance, high temperature stability and outstanding mechanical properties. PVE-05 can be used in various applications such as chemical processing, wastewater treatment, marine industry, manufacturing pipelines and other equipment for the oil and gas industry and infrastructure (protecting bridges, tunnels, and other structures from corrosion) sector.

PVE-06 VINYL ESTER AND DCPD BASED HYBRID RESIN

PVE-06 combines the best properties of vinyl ester and DCPD resins. PVE-06 offers a unique blend of chemical resistance, high temperature stability and excellent mechanical properties making it ideal for demanding applications. PVE-06 can be used in various applications such as chemical processing, wastewater treatment, marine industry, manufacturing pipelines and other equipment for the oil and gas industry and infrastructure (protecting bridges, tunnels, and other structures from corrosion) sector.



Liquid Resin	Conditions	PVE-04	PVE-05	PVE-06
Appearance	-	Clear	Clear	Clear
Density (g/cm ³)	20 °C	1.1	1.14	1.14
Acid Value (mgKOH/g)	-	17 ± 3	17 ± 3	20 ± 3
Solid Content (%)	150 °C for 1 hour	60 ± 2	60 ± 2	60 ± 2
Viscosity (cp)	25 °C / 3 sp / 100 rpm	400 ± 40	450 ± 50	450 ± 50
Gel Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	15 ± 2	12 ± 2	10 ± 2
Cure Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	30 ± 3	26 ± 4	24 ± 4
Cured Resin				
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	120 ± 10	120 ± 10	100 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3200 ± 200	3150 ± 100	3400 ± 100
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	3 ± 0.3	4 ± 0.5	3 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	70 ± 10	75 ± 10	70 ± 10
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3500 ± 200	3100 ± 100	3300 ± 100
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	2.6 ± 0.3	3.3 ± 0.3	3.0 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	105 ± 5	120 ± 5	110 ± 5

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PVE-07FR BISPHENOL A EPOXY BASED FLAME RETARDANT VINYL ESTER RESIN

PVE-07FR is a bisphenol A epoxy based flame retardant vinyl ester resin that wet glass and carbon fibers easily. This product is inherently flame retardant, meaning it does not contain liquid or solid additive-type flame retardant fillers. PVE-07FR is suitable for preparing high performance composite materials manufactured by filament winding, resin transfer moulding, vacuum infusion and pultrusion. Additionally, its thixotropic form can be usable in spray-up and hand lay-up applications. PVE-07FR can be used in various applications such as protecting structures from fire and corrosion in harsh marine environments, building components for fire-resistant buildings and structures, manufacturing fire-resistant components for vehicles and aircrafts and protecting electronic equipments from fire hazards.

PVE-08FR NOVOLAC EPOXY BASED FLAME RETARDANT VINYL ESTER RESIN

PVE-08FR is a novolac epoxy-based flame retardant vinyl ester resin that wet glass and carbon fibers easily. This product is inherently flame-retardant, meaning it does not contain liquid or solid additive-type flame retardant fillers. This product is appropriate for preparing high performance composite materials manufactured by filament winding, resin transfer moulding, vacuum infusion, and pultrusion processes. PVE-08FR can be used in various applications such as protecting structures from fire and corrosion in harsh marine environments, building components for fire-resistant buildings and structures, manufacturing fire-resistant components for varied vehicles.



Liquid Resin	Conditions	PVE-07FR	PVE-08FR
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.15	1.16
Acid Value (mgKOH/g)	-	16± 3	20 ± 3
Solid Content (%)	150 °C for 1 hour	60 ± 2	60 ± 2
Viscosity (cp)	25 °C / 3 sp / 100 rpm	550 ± 50	550 ± 50
Gel Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	15 ± 2	15 ± 2
Cure Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	30 ± 3	30 ± 3
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	120± 10	120± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3000 ± 200	3000 ± 100
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	4 ± 0.4	4.5 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	70 ± 10	80 ± 10
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3000 ± 200	3000 ± 100
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	3,4 ± 0.2	4,0 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	90 ± 5	90 ± 5

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PVE-204 BISPHENOL A VINYL ESTER RESIN BASED GELCOAT

PVE-204 is a bisphenol A vinyl ester resin based gelcoat and can be coloured as white and desired colours according to RAL codes. This product is usable for many applications conducted in various industries such as marine, offshore, automotive, rail vehicles, building and construction. PVE-204 spreads on the surface in regular. The formation of pores, Bénard cells and craters are obstructed via special additives compatible with base resin. PVE-204 exhibits excellent thixotropic index which provides anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique. The brushing version of this product can be arranged according to properties determined by customers.

PVE-205 NOVOLAC VINYL ESTER RESIN BASED GELCOAT

PVE-205 is a novolac vinyl ester resin-based gelcoat and can be coloured as white and desired colours according to RAL codes. This product takes a place in many industrial areas such as marine, offshore, automotive, rail vehicles, building and construction. Surface defects such as pores, Benard cells, and craters are nor observable after application. PVE-205 exhibits excellent thixotropic index which provides anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray up technique. The brushing version of this product can be arranged according to properties determined by customers.



Liquid Resin	Conditions	PVE-204	PVE-205
Appearance	-	Desired Colours	Desired Colours
Density (g/cm ³)	20 °C	1.2	1.2
Solid Content (%)	150 °C for 1 hour	60 ± 10	60 ± 10
Viscosity (cp)	25 °C / 4 sp / 5 rpm	11000 ± 1000	11000 ± 1000
Viscosity (cp)	25 °C / 4 sp / 50 rpm	1600 ± 100	1600 ± 100
Thixotropic Index	-	6.5	6.5
Gel Time at 25°C (min)	2 g Butanox M60	13 ± 2	13 ± 2
Cure Time at 25°C (min)	2 g Butanox M60	24 ± 4	24 ± 4
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	120± 10	120± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3300 ± 200	3150 ± 100
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	3 ± 0.3	4 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	75 ± 10	75 ± 10
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3500 ± 200	3100 ± 100
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	2.4 ± 0.3	3.3 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	105 ± 5	120 ± 5

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PVE-206 VINYL ESTER AND DCPD BASED HYBRID RESIN BASED GELCOAT

PVE-206 is a bisphenol A type vinyl ester and DCPD based hybrid resin-based gelcoat and can be coloured as white and desired colours according to RAL codes. This product takes a place in many industrial areas such as marine, offshore, automotive, rail vehicles, building and construction. Surface defects such as pores, Benard cells, and craters are not observable after application. PVE-206 exhibits excellent thixotropic index which provides anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique. The brushing version of this product can be arranged according to properties determined by customers.

PVE-207 INHERENTLY FLAME RETARDANT VINYL ESTER RESIN BASED GELCOAT

Inherently flame retardant vinyl ester resin-based gelcoats are specialized coatings designed to provide both aesthetic appeal and fire safety to various composite products. It is formulated using vinyl ester resins that possess inherent flame retardant properties, eliminating the need for additional flame-retardant additives. PVE-207 exhibits excellent thixotropic index which provides anti sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique. The brushing version of this product can be arranged according to properties determined by customers.

PVE-208 INHERENTLY FLAME RETARDANT NOVOLAC VINYL ESTER RESIN BASED GELCOAT

Inherently flame retardant novolac vinyl ester resin-based gelcoats are advanced coatings designed for applications demanding superior fire safety, chemical resistance and high temperature performance. PVE-208 exhibit excellent thixotropic index which provide anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique. The brushing version of this product can be arranged according to properties determined by customers.



Liquid Resin	Conditions	PVE-206	PVE-207	PVE-208
Appearance	-	Desired Colours	White or Gray	White or Gray
Density (g/cm ³)	20 °C	1.22	1.1 - 1.3	1.1 - 1.3
Solid Content (%)	150 °C for 1 hour	60 ± 10	60 ± 10	60 ± 10
Viscosity (cp)	25 °C / 4 sp / 5 rpm	11000 ± 1000	11000 ± 1000	11000 ± 1000
Viscosity (cp)	25 °C / 4 sp / 50 rpm	1600 ± 100	1600 ± 100	1600 ± 100
Thixotropic Index	-	6.0	6.5	6.5
Gel Time at 25°C (min)	2 g Butanox M60	10 ± 2	15 ± 2	12 ± 2
Cure Time at 25°C (min)	2 g Butanox M60	22 ± 3	30 ± 3	26 ± 4
Cured Resin				
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	100 ± 10	120 ± 10	120 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3400 ± 100	3100 ± 200	3200 ± 150
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	3 ± 0.5	4 ± 0.4	3.5 ± 1.0
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	65 ± 10	70 ± 10	75 ± 10
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3300 ± 100	3200 ± 200	3100 ± 100
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	3.0 ± 0.3	3.3 ± 0.2	3.5 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	100 ± 5	90 ± 5	100 ± 5

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FILAME RETARDANT RESINS & GELCOATS



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CLASS 1



BUILDING A SAFER FUTURE

PRE 1653FR-DTA FLAME RETARDANT THIXOTROPIC RESIN

PRE 1653FR-DTA is an orthophthalic based resin with flame retardant fillers to meet stringent fire safety requirements without relying on halogenated compounds. Most common application areas are interior components of trains, and automobiles, structural components in marine vessels, fire-resistant panels and doors, etc.

PRE-150FR-HDTA FLAME RETARDANT GELCOAT

Flame retardant gelcoats are crucial for the safety of rail vehicles. They provide a crucial layer of fire protection for composite components, reducing the risk of fire spread and protecting passengers and crew. This product is developed for preparing rail vehicle parts. PRE-150FR HDTA is consisting of ISO/NPG resin and fire-retardant fillers. No sedimentation and floating are present due to its special rheological additives. In addition, the formation of pores, Bénard cells and craters are obstructed via special additives compatible with base resin. This product exhibits suitable reactivity which facilitates the production of glass fibre reinforced composite materials.

PRE-1664FR-DTA FLAME RETARDANT THIXOTROPIC RESIN

PRE-1664FR-DTA is a DCPD based and additive type flame retardant filled thixotropic resin. It is being used with PRE-150FR-HDTA.



Liquid Resin	Conditions	PRE 1653FR-DTA	PRE-150FR-HDTA	PRE-1664FR-DTA
Appearance	-	Desired Colours	White	Pinkish
Density (g/cm ³)	20 °C	1.4	1.4	1.3
Solid Content (%)	150 °C for 1 hour	70 ± 5	75 ± 5	70 ± 5
Viscosity (cp)	25 °C / 4 sp / 5 rpm	1350 ± 150	11000 ± 1000	4000 ± 1000
Viscosity (cp)	25 °C / 4 sp / 50 rpm	-	1600 ± 100	700 ± 100
Thixotropic Index	-	3.5 ± 0.2	6.5 ± 0.5	5.5 ± 0.3
Gel Time at 25°C (min)	2 g Butanox M60	15 ± 1	10 ± 2	10 ± 2
Cure Time at 25°C (min)	2 g Butanox M60	22 ± 2	25 ± 3	25 ± 3
Reactivity (°C)	-	130 ± 20	60 ± 5	170 ± 10
Cured Resin				
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	80 ± 10	80 ± 10	90 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3600 ± 200	3600 ± 200	3700 ± 200
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	1.5 ± 0.5	1.5 ± 0.5	2 ± 0.3
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	50 ± 5	50 ± 5	55 ± 5
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3400 ± 100	3400 ± 100	3500 ± 150
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	1.0 ± 0.2	1.0 ± 0.2	1.5 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	105 ± 5	105 ± 5	90 ± 5

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PVE-07FR BISPHENOL A EPOXY BASED FLAME RETARDANT VINYL ESTER RESIN

PVE-07FR is a bisphenol A epoxy based flame retardant vinyl ester resin that wet glass and carbon fibers easily. This product is inherently flame retardant, meaning it does not contain liquid or solid additive-type flame retardant fillers. It is suitable for preparing high performance composite materials manufactured by filament winding, resin transfer moulding, vacuum infusion and pultrusion. Additionally, its thixotropic form can be usable in hand lay-up and spray-up applications. PVE-07FR can be used in various applications such as protecting structures from fire and corrosion in harsh marine environments, building components for fire-resistant buildings and structures, manufacturing fire-resistant components for vehicles and aircraft and protecting electronic equipments from fire hazards.

PVE-08FR NOVOLAC EPOXY BASED FLAME RETARDANT VINYL ESTER RESIN

PVE-08FR is a novolac epoxy based flame retardant vinyl ester resin that wet glass and carbon fibers easily. This product is inherently flame-retardant, meaning it does not contain liquid or solid additive-type flame retardant fillers. It is appropriate for preparing high performance composite materials manufactured by filament winding, resin transfer moulding, vacuum infusion, and pultrusion processes. PVE-08FR can be used in various applications such as protecting structures from fire and corrosion in harsh marine environments, building components for fire-resistant buildings and structures, manufacturing fire-resistant components for varied vehicles.



Liquid Resin	Conditions	PVE-07FR	PVE-08FR
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.15	1.16
Acid Value (mgKOH/g)	-	16 ± 3	20 ± 3
Solid Content (%)	150 °C for 1 hour	60 ± 2	60 ± 2
Viscosity (cp)	25 °C / 3 sp / 100 rpm	550 ± 50	550 ± 50
Gel Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	15 ± 2	15 ± 2
Cure Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	30 ± 3	30 ± 3
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	120 ± 10	120 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3000 ± 200	3000 ± 100
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	4 ± 0.4	4.5 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	70 ± 10	80 ± 10
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3000 ± 200	3000 ± 100
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	3,4 ± 0.2	4,0 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	90 ± 5	90 ± 5

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PVE-207 INHERENTLY FLAME RETARDANT VINYL ESTER RESIN BASED GELCOAT

Inherently flame retardant vinyl ester resin-based gelcoats are specialized coatings designed to provide both aesthetic appeal and fire safety to various composite products. It is formulated using vinyl ester resins that possess inherent flame-retardant properties, eliminating the need for additional flame-retardant additives. PVE-207 exhibits excellent thixotropic index which provide anti sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique. The brushing version of this product can be arranged according to properties determined by customers.

PVE-208 INHERENTLY FLAME RETARDANT NOVOLAC VINYL ESTER RESIN BASED GELCOAT

Inherently flame retardant novolac vinyl ester resin-based gelcoats are advanced coatings designed for applications demanding superior fire safety, chemical resistance, and high-temperature performance. PVE-208 exhibits excellent thixotropic index which provide anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray up technique. The brushing version of this product can be arranged according to properties determined by customers.

PVE-211 INHERENTLY FLAME RETARDANT BIO RESOURCED VINYL ESTER RESIN

PVE-211 is an advanced flame retardant bio-based vinyl ester resin, formulated from renewable raw materials and enhanced with phosphaphenanthrene derivatives for superior fire resistance, and mechanical durability. This resin is synthesized using bio-based carboxylic acids and epoxidized plant oils, providing an environmentally friendly alternative to conventional vinyl ester resins while maintaining exceptional chemical resistance and mechanical performance. This product is particularly well-suited for, automotive, marine, wind energy, and industrial sectors, where fire safety, heat resistance, and structural integrity are critical. Its high bio-content reduces dependence on fossil-based materials, while its enhanced flame retardancy ensures compliance with strict fire safety regulations. The resin exhibits excellent adhesion and compatibility with carbon fiber, making it ideal for lightweight, fire-resistant composite structures. This product is optimized for filament winding, resin transfer molding (RTM), vacuum infusion, pultrusion, compression molding, spray-up, hand lay-up, and mass production techniques such as sheet molding compound (SMC) and bulk molding compound (BMC). These capabilities make it an excellent material choice for fire-resistant automotive components, wind turbine blades, etc.



Liquid Resin	Conditions	PVE-207	PVE-208	PVE-211
Appearance	-	White or Gray	White or Gray	Clear
Density (g/cm ³)	20 °C	1.1 - 1.3	1.1 - 1.3	1.17
Solid Content (%)	150 °C for 1 hour	60 ± 10	60 ± 10	58 ± 2
Viscosity (cp)	25 °C / 4 sp / 5 rpm	11000 ± 1000	11000 ± 1000	700± 100
Viscosity (cp)	25 °C / 4 sp / 50 rpm	1600 ± 100	1600 ± 100	-
Thixotropic Index	-	6.5	6.5	
Acid Value (mgKOH/g)	-	-	-	20 ± 3
Gel Time at 25°C (min)	2 g Butanox M60	15 ± 2	12 ± 2	12 ± 2
Gel Time at 25°C (min)	2 g Butanox M60	30 ± 3	26 ± 4	26 ± 4
Cured Resin				
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	120 ± 10	120 ± 10	120 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3100 ± 200	3200 ± 150	3200 ± 150
Strain (°C)	16 Hours at R.T. 3 Hours at 90 °C	4 ± 0.4	3,5 ± 1,0	3,5 ± 1,0
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	70 ± 10	75 ± 10	75 ± 10
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3200 ± 200	3100 ± 100	3100 ± 100
Elongation at Break °C	16 Hours at R.T. 3 Hours at 90 °C	3,3 ± 0.2	3,5 ± 0.3	3,5 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	90 ± 5	100 ± 5	100 ± 5

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BIO-BASED POLYESTER RESIN SYSTEMS

Bio-Based Polyester Resins

Bio-based polyester resins are polymers made partially or entirely from renewable raw materials, offering a sustainable alternative to traditional fossil fuel-based polyester resins. They are widely used in various industries due to their balance of eco-friendliness, mechanical properties, and versatility.

✓ Key Characteristics

- **Renewable Feedstocks:** Derived from bio-based sources like plant oils, sugars, starches, or lignocellulosic materials.
- **Eco-Friendly:** Lower carbon footprint compared to conventional polyester resins.
- **Performance Similarity:** Comparable mechanical, chemical, and thermal properties to petroleum-based counterparts.

✓ Advantages

Bio-based polyester resins offer several advantages across environmental, economic, and performance dimensions, making them an increasingly popular choice in various industries.

- Sustainability
- Carbon Footprint Reduction
- Market Appeal
- Regulatory Compliance

• Renewable Feedstocks

Derived from bio-based sources like plant oils, sugars, starches, or lignocellulosic materials.

• Eco-Friendly

Lower carbon footprint compared to conventional polyester resins.

• Performance Similarity

Comparable mechanical, chemical, and thermal properties to petroleum-based counterparts.

• Versatility

Applicable in thermosetting resin formulations.

• Recyclability

Some formulations offer improved end-of-life options.

PRE-1000 BIO-RESOURCED POLYESTER RESIN

PRE-1000 is a bio-resourced polyester resin. The content of ^{14}C is 20 per cent in total carbon content ($^{14}\text{C}+^{12}\text{C}$). It is easy to use in manufacturing techniques such as filament winding, resin transfer molding, vacuum infusion, and pultrusion. In addition, its thixotropic form can be manufactured and used in production techniques such as spray-up and hand lay-up. It exhibits suitable reactivity facilitating the production of glass fiber reinforced composite materials. PRE-1000 accepts fillers to a high extent due to its aromatic structure and suitable viscosity.

PRE-1001 BIO-RESOURCED POLYESTER RESIN

PRE-1001 is a bio-resourced polyester resin. The content of ^{14}C is 30 per cent in total carbon content ($^{14}\text{C}+^{12}\text{C}$). It is easy to use in manufacturing techniques such as filament winding, resin transfer molding, vacuum infusion and pultrusion. In addition, its thixotropic form can be manufactured and used in production techniques such as spray-up and hand lay-up. It exhibits suitable reactivity facilitating the production of glass fiber reinforced composite materials. PRE-1001 accepts fillers to a high extent due to its aromatic structure and suitable viscosity.



Liquid Resin	Conditions	PRE-1000	PRE-1001
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.1	1.1
Solid Content (%)	150 °C for 1 hour	60 ± 2	60 ± 2
Viscosity (cp)	25 °C / 3 sp / 100 rpm	500 ± 100	450 ± 50
Gel Time at 25°C (min)	0.2 g Co Sol. + 2 g Butanox M60	10 ± 2	10 ± 2
Cure Time at 25°C (min)	0.2 g Co Sol. + 2 g Butanox M60	25 ± 3	25 ± 3
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	100 ± 10	115 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3500 ± 200	3550 ± 200
Strain (%)	16 Hours at R.T. 3 Hours at 90 °C	4.1 ± 0.5	4.1 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	70 ± 5	75 ± 5
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3400 ± 150	3450 ± 100
Elongation at Break (%)	16 Hours at R.T. 3 Hours at 90 °C	3.0 ± 0.6	3.1 ± 0.5
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	60 ± 5	65 ± 5

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PRE-1002 BIO-RESOURCED POLYESTER RESIN

PRE-1002 is a bio-resourced polyester resin. The content of ^{14}C is 50 per cent in total carbon content ($^{14}\text{C}+^{12}\text{C}$). This product is bio resourced dicarboxylic acid and glycol-based resin. It is easy to use in manufacturing techniques such as filament winding, resin transfer molding, vacuum infusion, sheet molding compound (SMC), bulk molding compound (BMC), and pultrusion. PRE-1002 exhibits suitable reactivity which facilitates the production of glass fiber reinforced composite materials. This product accepts fillers as high due to its aromatic structure and appropriate viscosity. PRE-1002 exhibits good HDT and high mechanical properties. In addition, fiber-reinforced composite materials produced using this product have superior mechanical properties.

PRE-1003 BIO-RESOURCED VINYL ESTER RESIN

PRE 1003 is an innovative bio-resourced vinyl ester resin designed for high-performance composite applications, offering exceptional mechanical strength, and chemical resistance. PRE 1003 incorporates bio-based carboxylic acids and epoxidized plant oils, providing a sustainable alternative to conventional petroleum-derived vinyl ester resins. This highly durable and chemically resistant resin is particularly well-suited for marine, automotive, wind energy, and industrial applications, where superior structural integrity, and environmental sustainability are critical. Pre-1003 exhibits excellent adhesion and compatibility with carbon fiber, ensuring lightweight, high-strength composites with outstanding fatigue resistance. Additionally, optimized styrene monomer or alternative reactive diluents are used to control viscosity, enhance processing characteristics, and improve polymerization efficiency, ensuring strong adhesion and durability in composite applications. Thanks to its versatile processability, PRE 1003 can be formulated compatible with filament winding, resin transfer molding (RTM), vacuum infusion, pultrusion, compression molding, spray-up, hand lay-up, and mass production techniques such as sheet molding compound (SMC) and bulk molding compound (BMC). These capabilities make it an excellent material choice for pipes, tanks, pressure vessels, wind turbine blades, automotive body panels, aerospace structural components, and advanced sporting goods. Additionally, PRE 1003 ensures efficient fiber wet-out, strong bonding with reinforcement materials, rapid curing, and long-term durability, making it a premium choice for sustainable high-performance composite manufacturing.



Liquid Resin	Conditions	PRE-1002	PRE-1003
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.1	1.12
Solid Content (%)	150 °C for 1 hour	60 ± 2	55 ± 2
Viscosity (cp)	25 °C / 3 sp / 100 rpm	1000 ± 100	600 ± 50
Gel Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	10 ± 2	12 ± 2
Cure Time at 25°C (min)	0,2 g Co Sol. + 2 g Butanox M60	23 ± 3	20 ± 3
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	100 ± 10	130 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3800 ± 200	3400 ± 200
Strain (%)	16 Hours at R.T. 3 Hours at 90 °C	4.0 ± 0.3	4.1 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	80 ± 5	65 ± 5
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3600 ± 200	3200 ± 100
Elongation at Break (%)	16 Hours at R.T. 3 Hours at 90 °C	3.3± 0.3	3.1 ± 0.5
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	115 ± 5	110 ± 5

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For polyester mould making

Mold and Tooling Systems

High impact strength and good resistance to chemicals

Mold and tooling resins and gelcoats are specialized coatings designed to provide a durable and protective surface for molds and tooling used in various manufacturing processes





Easy Application, Exceptional Results

Mold and Tooling Systems

Polres tooling gelcoats are indeed designed to work best in combination with Polres tooling resins and vinyl ester resins.

This is because these products are specifically formulated to complement each other, ensuring optimal performance and durability for your molds. Act now – secure your insurance today for a worry-free tomorrow.

Products specifically designed for mold production are essential for creating durable, accurate, and high-quality molds. These products often fall into several categories, each with a specific purpose:

Tooling Resins: These are the base materials for the mold itself. They need to be strong, durable, and have low shrinkage during curing to maintain the mold's dimensional accuracy. They are often formulated for specific applications, like high-temperature resistance or chemical resistance.

Tooling Gelcoats: These are applied to the mold surface to provide a smooth, high-gloss finish and protect the mold from wear and tear. They also contribute to the easy release of parts from the mold. They are specifically formulated to be compatible with the tooling resins.

➞ Why Choose Tooling Resins?

- **Dimensional Stability:** Minimal shrinkage during the curing process
- **Durability and Strength:** Molds need to withstand repeated use and the stresses of the molding process.
- **Heat Resistance:** Important for producing parts that require elevated curing temperatures
- **Chemical Resistance:** Tooling resins offer good chemical resistance to prevent degradation of the mold surface.
- **Ease of Use:** Ease of handling and application

➞ Why Choose Tooling Gelcoats?

- **Smooth, High-Gloss Surface:** High-quality finish on the parts produced
- **Wear Resistance:** Gelcoats protect the mold surface from wear and tear
- **Easy Release:** Sticking and ensuring clean and easy removal
- **Chemical Resistance:** Gelcoats offer excellent resistance to chemicals, protecting the mold from degradation
- **Improved Appearance:** Ease of handling and application

PRE-01 TA TOOLING-MOLD MAKING POLYESTER RESIN

PRE-01 TA is an orthophthalic acid based tooling resin that is usable for many applications. It readily wets out fiberglass reinforcement, which is essential for creating strong and durable molds. PRE-01 TA offers adequate strength and durability for many mold-making applications. PRE-01 TA exhibits excellent thixotropic index which provide anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique.

PRE-02 TA TOOLING-MOLD MAKING POLYESTER RESIN

PRE-02 TA is a tooling resin prepared by using isophthalic resin. This product is usable for many applications and offers superior mechanical properties, and better resistance to chemicals. PRE-02 TA provides a smooth surface finish on the mold, which contributes to the quality of the parts produced. It has lower shrinkage that helps maintain the dimensional accuracy of the mold.



Liquid Resin	Conditions	PRE-01 TA	PRE-02 TA
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.2	1.2
Solid Content (%)	150 °C for 1 hour	60 ± 5	65 ± 5
Viscosity (cp)	25 °C / 2 sp / 20 rpm	450 ± 50	900 ± 100
Thixotropic Index	Thixotropic	3 ± 0.5	3 ± 0.5
Gel Time at 25°C (min)	2 g Butanox M60	6 ± 2	30 ± 5
Cure Time at 25°C (min)	2 g Butanox M60	14 ± 4	40 ± 5
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	100 ± 20	120 ± 20
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3300 ± 200	3300 ± 200
Strain (%)	16 Hours at R.T. 3 Hours at 90 °C	3.5 ± 0.5	5.5 ± 0.5
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	55 ± 5	105 ± 5
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3150 ± 150	2900 ± 100
Elongation at Break (%)	16 Hours at R.T. 3 Hours at 90 °C	1.5 ± 0.3	3.6 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	80 ± 5	85 ± 5

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PVE-209 VINYL ESTER RESIN BASED TOOLING GELCOAT

PVE-209 is a fantastic choice for mold making when you need a high-performance, durable, and chemically resistant surface. It's an excellent investment for demanding applications (high-performance molds, chemically aggressive environments, high-temperature applications, superior surface finish) where mold longevity and part quality are critical.

PVE-210 NOVOLAC VINYL ESTER RESIN BASED TOOLING GELCOAT

PVE-210 is a really high-performance combination of mold making. The combination of Novolac vinyl ester resin and gelcoat results in a mold that can withstand the rigors of high-volume production, demanding molding processes, and harsh environments. PRE-210 is ideal for molds used in processes involving high temperatures. When the mold will be exposed to chemicals, solvents, or corrosive materials, PRE-210 provides the necessary resistance to prevent degradation and ensure a long service life. It provides a smooth, high gloss surface, ensuring that the molded parts have an excellent finish.



Liquid Resin	Conditions	PRE-209	PRE-210
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.2	1.2
Solid Content (%)	150 °C for 1 hour	60 ± 5	60 ± 5
Viscosity (cp)	25 °C / 4 sp / 5 rpm	1600 ± 200	1650 ± 200
Viscosity (cp)	25 °C / 4 sp / 50 rpm	10000 ± 1000	11000 ± 1000
Thixotropic Index	Thixotropic	5.5	3 ± 0.5
Gel Time at 25°C (min)	1 g Butanox M60	18 ± 2	18 ± 2
Cure Time at 25°C (min)	1 g Butanox M60	30 ± 4	30 ± 4
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	130 ± 10	120 ± 10
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3300 ± 200	3200 ± 200
Strain (%)	16 Hours at R.T. 3 Hours at 90 °C	3,2 ± 0.4	4,1 ± 0.4
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	65 ± 5	70 ± 5
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3200 ± 200	3000 ± 200
Elongation at Break (%)	16 Hours at R.T. 3 Hours at 90 °C	2.5 ± 0.5	2.6 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	90 ± 5	95 ± 5

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PRE-701 PERFORMANCE MOLD MAKING GELCOAT

PRE-701 is a premium option for creating high quality and durable molds used in composite manufacturing. For composite parts requiring high chemical resistance, dimensional stability or superior surface finish, PRE-701 isophthalic tooling gelcoat is the preferred choice.

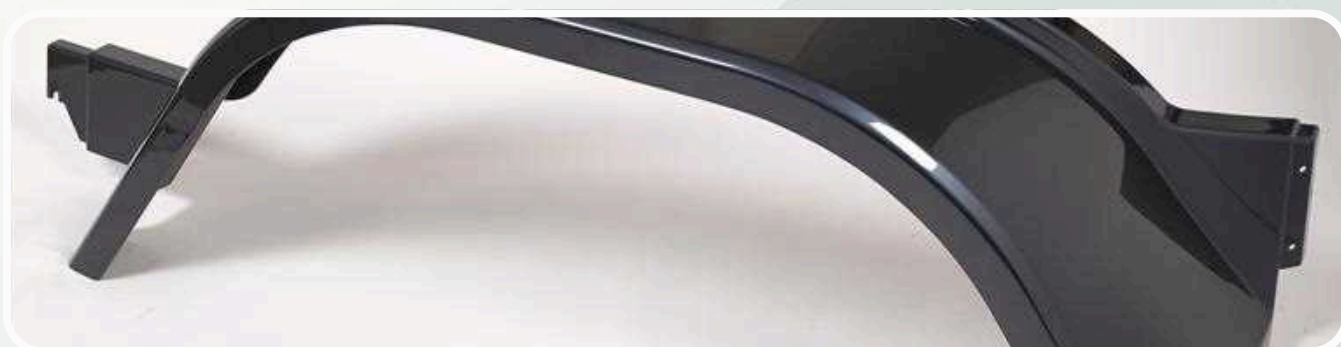
PRE-702 HIGH PERFORMANCE MOLD MAKING GELCOAT

PRE-702 represents a significant step up in performance and durability. The combination of isophthalic acid and neopentylglycol form an exceptionally hard and tough surface. This translates to molds with a very long lifespan, capable of withstanding extensive production runs. PRE-702 offers the highest level of chemical resistance among polyester gelcoats. It can handle aggressive chemicals and solvents used in some molding processes. NPC contributes to excellent resistance to UV degradation and weathering. Molds made with this gelcoat will maintain their appearance and properties even with prolonged exposure to sunlight and environmental factors.



Liquid Resin	Conditions	PRE-701	PRE-702
Appearance	-	Clear	Clear
Peak Exotherm (°C)	-	170-190	170-190
Solid Content (%)	150 °C for 1 hour	60 ± 5	60 ± 5
Viscosity (cp)	20 °C / 5 sp / 20 rpm	 3400-4000	1300-1900
Viscosity (cp)	25 °C / 5 sp / 20 rpm	 6000-7000	5000-7000
Thixotropic Index	Thixotropic	2.5-3.0	4-5
Gel Time at 25°C (min)	2 g Butanox M60	8-10	10-14
Cured Resin		Unit	
Flexural Strength (MPa)	24 Hours at R.T. 4 Hours at 80 °C	130 ± 10	115 ± 5
Elongation in flex (%)	24 Hours at R.T. 4 Hours at 80 °C	3-5	4-5
Elongation at break (%)	24 Hours at R.T. 4 Hours at 80 °C	2-3	2-3
Tensile strength (MPa)	24 Hours at R.T. 4 Hours at 80 °C	65 ± 5	55 ± 5
Impact Strength (kj/m²)	24 Hours at R.T. 4 Hours at 80 °C	5-10	5-10
Barcol Hardness (GYZ 934-1)	24 Hours at R.T. 4 Hours at 80 °C	35-40	40-45
Waterabsorption in 24 hrs. (%)	24 Hours at R.T. 4 Hours at 80 °C	0.3-0.8	0.1-0.3
HDT (°C)	24 Hours at R.T. 4 Hours at 80 °C	85± 5	85 ± 5

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PRE-703 HIGH PERFORMANCE TOPCOAT FOR MOLD REPAIR

PRE-703 is an allylic based, thixotropic, glossy topcoat. PRE-703 is a specialized coating designed for repairing and restoring molds, particularly those used in composite manufacturing. It applies to cleaned, sanded surfaces with a gun.

PRE-704 HIGH PERFORMANCE BISPHENOLIC GELCOAT

PRE-704 is a bisphenolic based gelcoat. It applies to varied surfaces with a gun. It gives a very glossy and hard surface after hardening. This product exhibits excellent thixotropic index which provides anti-sagging on vertical surfaces. The viscosity of the product is suitable for spray-up technique. The brushing version of this product can be arranged according to properties determined by customers.



Liquid Resin	Conditions	PRE-703	PRE-704
Appearance	-	Clear	Clear
Density (g/cm ³)	20 °C	1.3	1.3
Solid Content (%)	150 °C for 1 hour	60 ± 5	60 ± 5
Viscosity (cp)	20 °C / 5 sp / 20 rpm	1000 ± 100	2200 ± 200
Gel Time at 25°C (min)	1 g Butanox M60	12 ± 2	13 ± 2
Cure Time at 25°C (min)	1 g Butanox M60	20 ± 3	22 ± 3
Cured Resin			
Flexural Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	110 ± 10	115 ± 5
Flexural Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3300 ± 200	3500 ± 200
Strain (%)	16 Hours at R.T. 3 Hours at 90 °C	3.0 ± 0.5	2.9 ± 0.3
Tensile Strength (MPa)	16 Hours at R.T. 3 Hours at 90 °C	60 ± 5	60 ± 5
Tensile Modulus (MPa)	16 Hours at R.T. 3 Hours at 90 °C	3400 ± 150	3300 ± 150
Elongation at Break (%)	16 Hours at R.T. 3 Hours at 90 °C	2.4 ± 0.5	2.3 ± 0.3
HDT (°C)	16 Hours at R.T. 3 Hours at 90 °C	70 ± 5	120 ± 10

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Bonding Pastes and Fibro Mastics



- ✓ **Poltix Standart**
 - ✓ **Poltix Flexo**
 - ✓ **Poltix Fiber Reinforced For Marine Applications**
 - ✓ **Poltix High Performance**
 - ✓ **Poltix Fiber Reinforced Standart**
 - ✓ **Poltix Fiber Reinforced Performance**
-
- ✓ **Polyester Fibro Mastic**
 - ✓ **Performance Polyester Fibro Mastic**
 - ✓ **High Performance Polyester Fibro Mastic**

- **Fiberglass Repair:** Bonding fiberglass components, filling gaps, and reinforcing structures in boats, cars, and other applications.
- **General Construction:** Repairing cracks, filling holes, and adhering non-structural elements.
- **Automotive:** Repairing body panels, filling dents, and bonding accessories.
- **Transport:** Fitting inserts, filling corners and voids, fairing FRP mouldings

BONDING PASTES

	PBP-900	PBP-901	PBP-902
Description	Orthophthalic based, high thixotropy, high viscosity, pre-accelerated, unfilled, fiber-free	Isophthalic based high thixotropy, high viscosity, pre-accelerated, unfilled, fiber-free	Epoxy vinyl ester based, high thixotropy, high viscosity, pre-accelerated, unfilled, fiber-free
Features	<ul style="list-style-type: none"> Standard bonding paste 	<ul style="list-style-type: none"> Flexible bonding paste Low exothermic peak value with low volumetric shrink 	<ul style="list-style-type: none"> Special bonding paste with high mechanical properties
Specific Gravity (g/mL)	1.40-1.50	1.40-1.50	1.10-1.20
Viscosity (cp)	25000-35000	25000-35000	25000-35000
Gel Time (min)	10-12	25-30	35-45
Thixotropy	Thixotropic	Thixotropic	Thixotropic
Tensile Strength (MPa)	57-60	-	40-45
Lap Shear Strength (MPa)	4.5	5	7
Applications	Repairing and joining of rigid products	Marine, automotive, building and construction industries	High strength bondings

	PBP-903	PBP-904	PBP-905
Description	Orthophthalic based, pre-accelerated, contains filler and glass fiber scraps	Isophthalic based, pre-accelerated, contains filler and glass fiber scraps	Iso-Npg based, pre-accelerated, contains filler and glass fiber scraps
Features	<ul style="list-style-type: none"> Low volumetric shrink Improved mechanical properties Easy gap filling 	<ul style="list-style-type: none"> Low volumetric shrink Improved mechanical properties Easy gap filling Chemical Resistance 	<ul style="list-style-type: none"> Low volumetric shrink Improved mechanical properties Easy gap filling High Chemical Resistance
Specific Gravity (g/mL)	1.25-1.30	1.25-1.30	0.8-1.0
Viscosity (cp)	30000-40000	30000-40000	30000-40000
Gel Time (min)	25-35	25-35	25-35
Thixotropy	Thixotropic	Thixotropic	Thixotropic
Applications	For filling and repairing the surfaces of composite parts where chemical resistance not required	For filling and repairing the surfaces of composite parts where chemical resistance is required	For filling and repairing the surfaces of composite parts for marine

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FIBRO MASTICS

- **PFM01 Polyester Fibro Mastic** is a fiber mastic based on orthophthalic polyester resin and glass fiber. It is recommended for finishing and can be used on FIBROBOAT.
- **PFM02 Performance Polyester Fibro Mastic** is a fiber mastic based on isophthalic polyester resin and glass fiber. It is recommended for finishing and can be used on FIBROBOAT.
- **PFM03 Performance Polyester Fibro Mastic** is a pre-accelerated vinylester based high performance bonding paste. It is a non-sagging, filled compound with high strength, specifically designed for the assembly and bonding of GRP mouldings. Such applications include panels, inserts, internal frames, ribs, internal core materials and composite constructions. PFM03 provides high shear-strength bonded joints without the need for mechanical fixings.

Chemical Resistivity

The products mentioned in this booklet exhibit chemical resistivity to a lot of chemical environments. Because their crosslinked structures are very stable.

CHEMICAL ENVIRONMENT	CONCENTRATION (% W.)	MAXIMUM TEMPERATURE (°C)
ACETIC ACID	≤50	60
AMMONIUM HYDROXIDE, AQ, PH>101)	≤5	60
BUTANEDIOL 1,2	ALL	80
DIESEL	100	100
DIETHYLENE GLYCOL	ALL	80
DIPROPYLENE GLYCOL	ALL	80
FORMIC ACID	≤10	60
GLYCERIN	ALL	80
GREASE	100	100
HEPTANES	100	80
HEXANES	100	80
HYDROCHLORIC ACID	≤37	40
HYDROGEN PEROXIDE	≤30	60
ISOBUTANOL, AQ	≤20	80
ISOPROPANOL, AQ	≤20	80
N,N-DIETHYL ANILINE	100	NR
N,N-DIMETHYL ANILINE	100	NR
NEOPENTYL GLYCOL	ALL	80
NITRIC ACID	≤30	40
OXALIC ACID	≤10	60
PARAFFIN WAX	100	100
PERCHLORIC ACID	≤20	30
PHOSPHORIC ACID, AQ	≤80	80
POTASSIUM HYDROXIDE, AQ	≤20	60
POTASSIUM IODIDE, AQ	ALL	100
POTASSIUM NITRATE, AQ	ALL	100
PROPANOL, AQ	≤20	80
PROPYLENE GLYCOLE 1,2	ALL	80
SEAWATER (3≤PH≤8)	100	100
SILICON OIL	100	100
SODIUM ACETATE, AQ	ALL	80
SODIUM CHLORIDE, AQ	ALL	100
SODIUM HYDROXIDE, AQ	≤50	60
SOYA OIL	100	100
STEARIC ACID	100	100
SULPHURIC ACID	≤60	≤50
TOLUENE SULPHONIC ACID	≤50	60
TRIETHYLENE GLYCOL	ALL	80
TAP WATER	100	100

POLRES **POLYESTER**

Resin Manufacturer

CASTING TYPE

GRP

CONTINUOUS LAMINATING

PULTRUSION

SMC-BMC

RTM / INFUSION

CORROSION RESISTANT

FILAMENT WINDING

VINYL ESTER

BIO RESINS

DCPD RESINS

FLAME RETARDANT

MARBLE ADHESIVE

SPECIAL RESINS

GELCOATS AND TOPCOATS

TOOLING SYSTEMS

BONDING PASTES & FIBRO MASTICS

PIGMENT PASTES

AUXILIARY MATERIALS

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