Composites

Epotec® Epoxy Systems

epotec®

Transcending the conventional barriers of business to send out a message that “We Care”

The Aditya Birla Group

A US $29.2 billion corporation, the Aditya Birla Group is in the League of Fortune 500. It is anchored by an extraordinary force of 130,000 employees, belonging to 30 different nationalities. In India, the Group has been adjudged “The Best Employer in India and among the top 20 in Asia” by the Hewitt-Economic Times and Wall Street Journal Study 2007. Over 60 per cent of its revenues flow from its overseas operations.

The Group operates in 25 countries - India, UK, Germany, Hungary, Brazil, Italy, France, Luxembourg, Switzerland, Australia, USA, Canada, Egypt, China, Thailand, Laos, Indonesia, Philippines, Dubai, Singapore, Myanmar, Bangladesh, Vietnam, Malaysia and Korea.

A Global Perspective

A metals powerhouse, among the world’s most cost-efficient aluminium and copper producers. Hindalco-Novelis is the largest aluminium rolling company. It is one of the 3 biggest producers of primary aluminium in Asia, with the largest single location copper smelter.

No. 1 in viscose staple fibre.

The 4th largest producer of insulators.

The 4th largest producer of carbon black.

The 11th largest cement producer globally, the 7th largest in Asia and the 2nd largest in India.

Among the world’s top 15 BPO companies and among India’s top 4.

Among the best energy efficient fertilizer plants.

In India

A premier branded garments player.

The 2nd largest player in viscose filament yarn.

The 2nd largest in the Chlor-alkali sector.

Among the top 5 mobile telephony companies.

A leading player in Life Insurance and Asset Management.

Among the top 3 super-market chains in the Retail business.

Beyond Business

The Aditya Birla Group is working in 3,700 villages, reaching out to 7 million people annually through the Aditya Birla Centre for Community Initiatives and Rural Development, spearheaded by Mrs. Rajashree Birla. The Group’s functions span 42 schools and 18 hospitals, furthering its focus on health care, education, sustainable livelihood, infrastructure and social causes.

For more information visit www.adityabirla.com

Our Company acts as a solution provider, formulating specialized Epoxy systems for your specific performance needs.

Aditya Birla Chemicals, Epoxy Division

Thai Epoxy and Allied Products Company Limited (Thai Epoxy), has recently been transformed to the Epoxy Division of Aditya Birla Chemicals (Thailand) Limited. It is part of the Aditya Birla Group of Companies. Being the pioneer manufacturer of epoxy resins in the ASEAN region, the Company constitutes its success on its Specialized Epoxy Systems and its complete in-house Research and Application Development Center. Sustainability has also been achieved through its group-wide unique World Class Manufacturing (WCM) strategy for enterprise excellence.

Located within the prestigious *Map Tha Phut Industrial Estate* at Rayong Province in Thailand, the Company started commercial production in 1992 with technology from Tohto Kasei Company Limited, Japan's largest producer of epoxy resins. The Company is currently accredited and certified with ISO 9001:2000 and ISO 14001 in recognition of its quality and environment management systems.

The Company offers a wide range of epoxies and modifiers that vary in chemical structure, molecular weight, viscosity and functionality. All products are marketed under the trade name of Epotec®, including liquid, solid, solutions, blends and other multifunctional epoxy resins. Epoxy Resin, a performance polymer, is a versatile resin which finds application in adhesives, civil engineering, composites, casting and encapsulation of electrical components, and coatings including protective, marine, floor, powder, can and coil.

The Company stretches its business arms in all six continents of the globe.

This booklet illustrates the range of Epotec® Epoxy Systems suitable for Composite Applications. These systems find use in the following products:

Composite Applications

- Airplanes
- High-Speed Trains
- Satellites
- Surf Boards
- Helmets
- Fishing Rods
- Golf Shafts and Clubs
- Formula One Cars
- Racing Boats
- Jet Skis
- Carbon Bicycles
- Printed Circuit Boards
- Windmill Blades
- Pipes and Tubes
- Bridges

Composites

Polymer Matrix Composites (PMC) offer a host of unique properties such as:

- Higher strength to weight ratio compared to metals.
- Considerable design flexibility due to wide range of matrix and reinforcement material availability to choose from.
- Wide range of manufacturing techniques to apply for different designs.
- Low capital investment.
- Ease of design and fabrication from very simple to highly complex components.

The flexibility of Epoxy Systems has made them the material of choice for designers. PMCs are primarily used in structure of airplanes and satellites, recreational components such as surf boards, fishing rods and golf shafts, refrigerated containers that transport perishable goods, Formula One cars and racing boats, printed circuit boards (PCB), toys, offshore drilling rigs, windmills.

Although a vast range of binding matrices are available, epoxies remain the workhorse for high performance composites. We work closely with our customers to develop products that are tailored to their specific requirements. This approach has enabled us to create a wide range of products such as single component prepreg system, thixotropic adhesive with improved peel strength for thicker glue lines and low viscosity matrix resin for infusion process suitable for manufacture of large components.

Epotec® Epoxy Systems for composite applications are suited to address many design challenges in the pursuit of superior performance, weight savings, durability, adhering environmental standards and in ensuring cost effectiveness. They are designed to meet process requirements, such as Resin Transfer Molding (RTM), Resin Infusion (RI), Hand Lay Up, Prepregs, Filament Winding and Pultrusion.

Prepreg Systems

Prepreg molding is the technique used in manufacture of fiber-reinforced components with precision, dimensional stability and consistency. In this process, reinforcement is preimpregnated in the system and processed to attain B-stage. In this form, it can be stored for a few days to a few months before it is vacuum bagged, and pressure-molded to the final desired shape.

Epotec® Epoxy Systems for Prepreg are designed for in-house prepreg manufacturing even in small lots. The solvent-free system does not require complicated solvent recovery system which reduces cost of equipment.

Features

- Excellent processibility with glass, carbon and Kevlar® fibers.
- Suitable for wet impregnation without solvent.
- Suitable to achieve variable tack.
- Short to long storage life.
- Contact to high pressure can be used for molding.
- Suitable to fabricate small to large components in any size and shape.
- Excellent combination of mechanical, electrical and thermal properties.
- Good performance in a wide range of temperatures.
- Extremely low shrinkage and water absorption.

Applications

Epotec® Epoxy Systems are suitable for manufacture of laminated components in various shapes and sizes for electrical insulation, defense, automobile, aeronautics, railways, sporting goods, marine and wind energy industries.

TABLE 1.0 **Prepreg Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	SHELF LIFE[3]	Tg[4]	FEATURES
YD 143	100	3,000 - 10,000[5]	160 - 180	120 - 150	Single component system with long storage life and excellent thermal resistance.
YD 563 / TH 7270	100 : 25	1,000 - 3,000	30 - 60	110 - 130	Solvent based system for excellent wetting of reinforcement with long shelf life.
YD 565 / TH 7252	100 : 20	3,000 - 4,000	30 - 40	110 - 130	Solvent-free system for high gloss, defect free components of high mechanical strength. System is capable to provide thickening property within 8 hours after impregnation of reinforcement.

[1] Part by weight (pbw), [2] Brookfield Viscosity @ 25°C (cP), [3] Shelf life in days @ 20°C, [4] Glass Transition Temperature (°C),
[5] Brookfield Viscosity @ 80°C (cP)

Filament Winding and Pultrusion Systems

Filament Winding is a process used in the manufacturing of cylindrical, elliptical or spherical fiber reinforced components. In this process, reinforcing fibers that are saturated with resin and curing agent mix are wrapped around a mandrel that forms the shape of the component. The component is cured and removed from the mandrel.

Pultrusion is the process used in the manufacture of continuous profile. The reinforcement material is drawn through a resin bath and pulled through the heated die where material cures and adopts the shape of the die.

Epotec® Epoxy Systems for Filament Winding and Pultrusion are designed to meet process requirements such as low viscosity, long pot life and accelerated curing at elevated temperatures.

Applications

Epotec® Epoxy Systems are suitable for electrical insulation, pressure pipes, water and effluent pipes, CNG cylinders, underground cable covers, storage and transportation tanks, tubes for defense, aeronautics, and aerospace industries.

Features

- Good wetting properties.
- Suitable pot life and curing conditions.
- Excellent mechanical and electrical properties.
- High dimensional stability.
- Resistant to most chemicals.
- Low water absorption and minimum shrinkage.
- Negligible permeability at high pressure.
- Good compatibility with pigments and internal releasers.

TABLE 2.0 **Filament Winding and Pultrusion Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	POT LIFE[3]	Tg[4]	FEATURES
YDL 535 / TH 7354	100 : 35	500 - 1,000	8 - 10	145 - 155	Low viscosity, long pot life system suitable to cure at ambient temperature, post curing above 120°C is required.
YDL 549 / TH 7664	100 : 90	400 - 800	8	115 - 125	Elevated temperature curing system for designed for fast productivity. Excellent performance in cyclic loading conditions.
YDL 582 / TH 7255	100 : 35	500 - 750	25 - 35[5]	80 - 90	Low viscosity, fast, ambient cure system for small components.
YDL 582 / TH 7256	100 : 35	500 - 650	80 - 100[5]	80 - 90	Ambient temperature cure, low viscosity system for small components with medium reactivity.
YDL 582 / TH 7257	100 : 35	200 - 500	4.5 - 5.5	80 - 90	Ambient temperature cure, slow reactive system with very low viscosity for fairly large components.
YDL 660 / TH 7455	100 : 25	1,500 - 3,500	> 16	170 - 200	Very slow reactive, ambient cure system for high glass transition temperature (Tg). Post curing required above 160°C.
YDL 670 / TH 7353	100 : 22	1,000 - 2,000	1 - 3	130 - 180	High temperature resistance, medium viscosity system for ambient curing, post curing above 120°C is required to achieve full strength.
YDL 670 / TH 7354	100 : 35	500 - 1,000	8 - 10	130 - 180	Long pot life, high temperature resistant system. Post curing above 120°C is required.
YDL 680 / TH 7652 / TA 7851	101 : 80 : 1 - 2	500 - 1,000	> 10	130 - 160	Low viscosity, long pot life, elevated temperature cure system for high thermal resistance.
YDL 680 / TH 7661 / TA 7851	102 : 85 : 1 - 2	1,000 - 2,500	> 10	160 - 180	Low viscosity, long pot life, elevated temperature cure system for large components.
YDL 680 / TH 7661 / TA 7852	100 : 25	3,000 - 6,000[6]	> 16	220 - 240	Very slow reactive, ambient cure system for excellent thermal resistance. Post curing above 200°C is required to achieve full strength.

[1] Part by weight (pbw), [2] Brookfield Viscosity @ 25°C (cP), [3] Pot life in hours, @ 25°C 100 grams mix, [4] Glass Transition Temperature (°C),
[5] Pot life in minutes @ 25°C 100 grams mix, [6] Brookfield Viscosity @ 50°C (cP)

Resin Transfer Molding, Resin Infusion and Hand Lay Up Systems

Resin Transfer Molding (RTM) is a closed mold technique where fiber reinforcement is placed in the mold and the resin is injected under pressure. This technique offers significant advantage over open mold processes in terms of higher productivity and reproducibility, reduced labor cost, two-side finish, better dimensional tolerance, and reduced volatile emission.

Resin Infusion or Vacuum Assisted Resin Transfer Molding technique retains all the advantages of RTM, while involving less tooling cost, and is used in manufacture of larger integrated structures for marine and automobile industries and windmills.

Epotec® Epoxy Systems for Resin Transfer Molding, Resin Infusion and Hand Lay Up are designed to have low initial viscosity and reactivity from a few minutes to several hours at ambient temperature. The choice is made depending on process conditions, geometry of the component and end use requirements.

Applications

Epotec® Epoxy Systems are suitable for manufacture of high performance fiber composite elements. These systems can be used for laminations in combination with different reinforcements and honeycombs to make a high-strength light-weight structural components for sporting goods, applications in marine, aeronautics and automobile industries, electrical insulation, windmills, tools and fixtures.

Features

- Excellent wetting property with reinforcements.
- Variable pot life and curing conditions.
- Extremely low shrinkage.
- Resistant to most chemicals.
- Excellent combination of properties.
- Suitable for small to large components.
- Good performance at extremely low to high temperature.
- Compatible with pigments and internal releasers.

TABLE 3.0 **Resin Transfer Molding (RTM), Resin Infusion (RI), and Hand Lay Up Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	POT LIFE[3]	Tg[4]	FEATURES
YD 535 / TH 7253	100 : 35	800 - 1,400	8 - 14	80 - 90	Low viscosity resin with six different curing agents of variable reactivity ranging from 10 minutes to more than 10 hours pot life at 25°C. Suitable for very small to large components with excellent wetting and mechanical properties.
YD 535 / TH 7254	100 : 35	800 - 1,400	14 - 20	80 - 90	
YD 535 / TH 7255	100 : 35	800 - 1,400	25 - 35	80 - 90	
YD 535 / TH 7256	100 : 35	600 - 1,000	80 - 100	75 - 85	
YD 535 / TH 7257	100 : 35	300 - 500	280 - 330	75 - 85	
YD 535 / TH 7258	100 : 35	300 - 500	> 10[5]	75 - 85	
YD 580C / TH 7253C	100 : 33	800 -1400	8 - 14	80 - 90	Low viscosity resin with six different curing agents of variable reactivity ranging from 10 minutes to more than 10 hours pot life at 25°C. Designed for high mechanical strength and stiffness.
YD 580C / TH 7254C	100 : 33	800 -1400	14 - 20	80 - 90	
YD 580C / TH 7255C	100 : 33	800 -1400	25 - 35	80 - 90	
YD 580C / TH 7256C	100 : 33	600 - 1000	80 - 100	75 - 85	
YD 580C / TH 7257C	100 : 33	300 - 500	280 - 330	75 - 85	
YD 580C / TH 7258C	100 : 33	300 - 500	> 10[5]	75 - 85	
YD 535LV / TH 7253	100 : 35	600 - 800	8 - 14	80 - 90	One basic, very low viscosity resin with six different curing agents of variable reactivity. Suitable for resin infusion technique. Excellent mechanical properties with lowest resin content can be achieved in FRP components.
YD 535LV / TH 7254	100 : 35	600 - 750	14 - 20	80 - 90	
YD 535LV / TH 7255	100 : 35	600 - 750	25 - 35	80 - 90	
YD 535LV / TH 7256	100 : 35	200 - 300	80 - 100	80 - 90	
YD 535LV / TH 7257	100 : 35	200 - 300	280 - 330	80 - 90	
YD 535LV / TH 7258	100 : 35	200 - 300	> 10[5]	80 - 90	
YD 535SP / TH 8257SP	100 : 34	200 - 300	> 10[5]	80 - 90	Low viscosity resin suitable for resin infusion technique. Charactrized by fast strength build-up and possess excellent combination of mechanical properties.
YDL 579 / TH 8270	100 : 38	500 - 700	80 - 120	110 - 130	Fast strength build-up with high thermal stability, excellent dynamic mechanical properties.
YDL 535 / TH 7295	100 : 30	800 - 1,500	120 - 140	120 - 140	Low viscosity, slow reactive system for high thermal resistance and mechanical property retention at elevated temperature.
YDL 546 / TH 7278	100 : 25	1,000 - 2,000	50 - 60	70 - 80	Low viscosity, medium reactive ambient cure system for small components where high wetting and fast strength build-up is required.
YDL 560 / TH 7285	100 : 35	500 - 1,000	180 - 210	55 - 65	Low viscosity, slow reactive system for FRP components with high elongation and low modulus.
YDL 660 / TH 7255	100 : 35	1,000 - 1,400	30 - 50	90 - 110	Medium viscosity system for small components with good thermal resistance.

NOTE: The above Systems with Epotec® Epoxy Resins YD 535, YD 535LV and Epotec® Curing Agents TH 7253, TH 7254, TH 7255, TH 7256, TH 7257, TH 7258 and Epotec® Epoxy Resin YD 580C with Epotec® Curing Agents TH 7253C, TH 7254C, TH 7255C, TH 7256C, TH 7257C, TH 7258C are approved by Germanischer Lloyd, Germany.

[1] Part by weight (pwb), [2] Brookfield Viscosity @ 25°C (cP), [3] Pot life in minutes @ 25°C 100 grams mix, [4] Glass Transition Temperature (°C), [5] Pot life in hours @ 25°C 100 grams mix

TABLE 3.1 **Resin Transfer Molding (RTM), Resin Infusion (RI), and Hand Lay Up Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	POT LIFE[3]	Tg[4]	FEATURES
YDL 660 / TH 7257	100 : 35	500 - 1,000	5 - 6[5]	90 - 110	Low viscosity, slow reactive system for FRP components with high elongation and low modulus.
YDL 670 / TH 7652 / TA 7851	100 : 80 : 1 - 2	500 - 1,000	> 10[5]	130 - 160	Elevated temperature cure, low viscocity standard sysrem for good mechanical and thermal properties.
YDL 670 / TH 7661 / TA 7851	100 : 80 : 1 - 2	1,000 - 2,500	> 10[5]	160 - 180	Elevated temperature cure, low viscocity specialty system for excellent thermal and mechanical resistance at elevated temperature.
YDL 680 / TH 7354	100 : 35	2,000 - 4,000	8 - 10[5]	130 - 180	Medium viscosity, slow reactive, ambient cure system for excellent thermal resistance. Post curing above 140°C is required.

[1] Part by weight (pwb), [2] Brookfield Viscosity @ 25°C (cP), [3] Pot life in minutes @ 25°C 100 grams mix, [4] Glass Transition Temperature (°C),
[5] Pot life in hours @ 25°C 100 grams mix

Expandable Epoxy, Adhesive and Flexible Epoxy Systems

Liquid epoxy resin and curing agent when mixed together, create in-situ foams of desired density and cure in rigid and dimensionally stable mass.

Expandable Epotec® Epoxy Systems are suitable for production of light weight, rigid and dimensionally stable components starting from prototypes to bulk production.

Epotec® Epoxy Systems for Adhesives are designed to join various similar and dissimilar substrates providing excellent adhesion over wide range of service conditions.

Flexible Epotec® Epoxy Systems are used in a wide range of applications starting from decorative souvenirs, labels to mold and patterns for molding RCC components, and PU components.

Applications

Epotec® Epoxy Systems are suitable for combining light weight structures with high mechanical properties for sporting goods, insulation, molds and tools.

Features

- Excellent adhesion with most of the surfaces.
- Suitable to process at ambient temperature.
- Low water absorption.
- Excellent combination of properties in adverse environmental conditions.
- Good thermal resistance.

TABLE 4.0 **Expandable Epoxy Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	POT LIFE[3]	Tg[4]	FEATURES
YD 1100 / TH 7152	100 : 27	2,500 - 3,500	15 - 20	65 - 75	Closed cell in-situ non CFC foam system with density 0.20 - 0.25 g/cc.
YD 1101 / TH 7298	100 : 40	3,000 - 6,000	15 - 25	85 - 95	Closed cell in-situ, high strength, non CFC foam system with density 0.37 - 0.42 g/cc.
YD 1106 D250 / TH 7161	100 : 40	1,500 - 3,000	20 - 25	85 - 95	Closed cell in-situ, high strength, non CFC foam systems with density 0.25 - 0.50 g/cc. Can be blended in any proportions to get the desired density.
YD 1106 D350 / TH 7161	100 : 40	1,500 - 3,000	20 - 25	85 - 95	
YD 1106 D450 / TH 7161	100 : 40	1,500 - 3,000	20 - 25	90 - 100	

[1] Part by weight (pbw), [2] Brookfield Viscosity @ 25°C (cP), [3] Pot life in minutes @ 25°C 100 grams mix, [4] Glass Transition Temperature (°C)

TABLE 4.1 **Adhesive Epoxy Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	POT LIFE[3]	Tg[4]	FEATURES
YD 1100 / TH 7152	100 : 27	2,500 - 3,500	15 - 20	65 - 75	Low density epoxy foam adhesive for light weight components.
YD 1101 / TH 7298	100 : 40	3,000 - 6,000	15 - 25	85 - 95	Expandable epoxy with excellent adhesion strength to most of the substrates.
YD 1106 D250 / TH 7161	100 : 40	1,500 - 3,000	20 - 25	85 - 95	Expandable epoxy with excellent adhesion. Can be blended in any proportions to get the desired expansion.
YD 1106 D350 / TH 7161	100 : 40	1,500 - 3,000	20 - 25	85 - 95	
YD 1106 D450 / TH 7161	100 : 40	1,500 - 3,000	20 - 25	90 - 100	
YD 1535G / TH 7254G	100 : 45	-	10 - 15	80 - 90	Fast reactive, thixotropic, paste adhesive for excellent bonding.
YD 1535G / TH 7255G	100 : 45	-	30 - 40	80 - 90	Medium reactive, thixotropic, paste adhesive for high strength.
YD 1535G / TH 7256G	100 : 45	-	70 - 100	80 - 90	Slow reactive, thixotropic, paste adhesive for high strength.
YD 1535G / TH 7257G	100 : 45	-	220 - 300	80 - 90	Extra slow, thixotropic, paste adhesive for high strength.
YD 7253 / TH 7271	100 : 50	-	20 - 30	100 - 120	Fast reactive, thixotropic, paste adhesive for high chemical resistant joints.

[1] Part by weight (pbw), [2] Brookfield Viscosity @ 25°C (cP), [3] Pot life in minutes @ 25°C 100 grams mix, [4] Glass Transition Temperature (°C)

TABLE 4.2 **Flexible Epoxy Systems**

EPOTEC® SYSTEM	MIXING RATIO[1]	MIX VISCOSITY[2]	POT LIFE[3]	FEATURES
YD 135 / TH 7202	100 : 10	1,500 - 2,000	15 - 20	Fast curing system with flexibility at lower thickness.
YD 135 / TH 8279	100 : 33	1,500 - 2,000	15 - 25	Low color, blush-free system with good flexibility.
YD 135 / TH 7273	100 : 33	3,000 - 4,000	10 - 15	Slow curing system with excellent flexibility at higher thickness.

[1] Part by weight (pbw), [2] Brookfield Viscosity @ 25°C (cP), [3] Pot life in minutes @ 25°C 100 grams mix

Glossary

A-stage
First stage in the polymerization of thermosetting resin in which material is still fusible.

Ablative
A material that absorbs heat at the exposed surface through decomposition process called pyrolysis.

Anisotropic
Exhibiting different properties when tested along axes in different directions.

B-stage
Intermediate stage in the polymerization of thermosetting resin in which material softens with heat. For example, resin of uncured prepreg of premix.

C-stage
Final step in the curing of thermosetting resin resulting in irreversible hardening and insolubility.

Coefficient of Thermal Expansion
The fractional change in length (or sometimes in volume, when specified) of a material for a unit change in temperature.

Cure
Irreversible alteration of the molecular structure and physical properties of a thermosetting resin by chemical reaction simulated by heat or catalysts, with or without pressure.

Dielectric Strength
Voltage required to penetrate an electrical insulating material.

Elastic Limit
Maximum stress sustained without permanent deformation.

Exotherm
Heat released during a chemical reaction. Control of exotherm and heat build up is crucial during making of a Composite.

Fatigue Strength
Maximum cyclical stress withstood for a given number of cycles before a material fails.

Fracture Toughness
Measure of damage tolerance of a material containing initial flaws or cracks.

Glass Transition
Change in an amorphous polymer between a viscous condition and a hard, relatively brittle condition.

Glass Transition Temperature (Tg)
The temperature at which the amorphous polymer changes from a glass-like brittle state to rubbery state.

Isotropic Laminate
A laminate with equal strength properties in all directions.

Mandrel
A form, fixture or male mold used as the base for production of a part in processes such as lay up or filament winding.

Offset Yield Strength
The stress at which the strain exceeds by a specific amount an extension of the initial proportional portion of the stress-strain curve.

Peel Ply
A layer of material that, when applied to a layup surface, can be removed from the cured laminate prior to bonding operations, leaving a clean, resin-rich surface suitable for bonding.

Post Cure
Additional elevated-temperature cure, usually without pressure, to improve final properties and / or complete the cure.

Pot Life (Working Life)
The length of time a quantity of catalyzed resin system in a container remains liquid prior to gelation.

Preform
Preshaped fibrous reinforcement supplied without matrix.

Prepreg
Fibrous reinforcement preimpregnated with resin and capable of storage for later use. For thermosetting matrices the resin is usually partially cured or brought to B-stage.

Sandwich Structure
A Composite component with a lightweight core material sandwiched between two relatively thin, dense, high strength, functional or decorative skins.

Shelf Life
Length of time a material can be stored and continues to be suitable for its intended use.

Shrinkage
The tendency of a resin system to contract in volume when transitioning from the liquid to the cured state.

Sizing (Size)
A chemical solution used to coat fiber filaments, facilitating operations such as weaving or braiding. Sizing is usually removed and replaced with finish before matrix application.

Stiffness
Measure of resistance of material to deformation.

Tack
Stickiness of an uncured prepreg.

Notes

Disclaimer

This brochure is designed to provide you with information to the Epotec® range of Products referred to, and should be read in conjunction with the latest Technical Data Sheets (TDS) and Material Safety Data Sheets (MSDS), and may not be construed as legally binding. Nothing contained herein constitutes an offer for the sale of any product. The Company makes no warranties, either expressed or implied, with respect to its product or the results of its use, or with respect to any information provided by the Company.

Because of changes in conditions and circumstances the Company reserves the right, subject to all applicable laws, at any time, at its discretion, and without notice, to discontinue or change the specifications and the prices of their products, and to either permanently or temporarily withdraw any such products from the market without incurring any liability to any prospective purchaser or purchaser. It is the sole responsibility of the user to test our products for suitability in the intended use. Always consult an authorized Epotec® representative for the latest information with respect to specifications, prices, and availability.

Material Safety, Handling and Storage Conditions

Due to variety of materials used in epoxy systems, please consult Epotec® Technical Data Sheets (TDS) and Material Safety Data Sheets (MSDS). TDS and MSDS are available for all Epotec® products upon request. Alternatively, visit www.epotec.info for detailed material safety, handling, and storage conditions.

01 Composites
Epotec® Epoxy Systems

ADITYA BIRLA GROUP

Epoxy Division
Aditya Birla Chemicals (Thailand) Limited

epotec®

Composites
Epotec® Epoxy Systems

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