GLOSSARY

- **Filament**

A single thread-like fiber of extruded polymer solution. Typically microns in diameter.

- **Aramide**

Good strength (450-550 ksi), higher modulus (11.5-27.0 msi), costly fiber, very low density (one-half of glass fiber), excellent impact and damage tolerance properties, poor compression and shear strength.

- **Carbon/Graphite**

Wide strength range (270-1050 ksi), highest modulus (33-120 msi), highest fiber cost, intermediate density (two-thirds of glass fiber), poor impact or damage tolerance, best tensile strength and stiffness properties.

- **Fiber Glass**

Glass which has been extruded into extremely fine filaments. These filaments vary in diameter, and are measured in microns. Glass filaments are treated with special binders and processed similar to textile fibers. These fibers come in many forms such as roving, woven roving, mat and continuous strands.

- **E-Glass**

Good strength (400-500 ksi), low modulus (10.5 msi), lowest cost fiber, available in any forms, widely used in commercial and industrial products, most-used in filament winding.

- **S-Glass**

Improved strength (625-665 ksi), higher modulus (12.6 ksi), higher cost fiber, used in aerospace and high performance, pressure vessel applications.

- **Continuous Filament Strand**

A fiber bundle composed of many glass filaments. Also when referring to gun roving; a collection of string like glass fiber or yarn, which is fed through a chopper gun in the spray up process.

- **Continuous Strand Roving** A bundle of glass filaments fed throughchopper gun in the spray-up process.

- **Roving**

A collection of bundles of continuous filaments in untwisted strands. Used in the spray-up (chopping) process.

- **Chopped Strand Mat**

A fibreglass reinforcement consisting of short strands of fiber arranged in a random pattern and held together with a binder. Mat is generally used in rolls consisting of 3/4 oz/ft^2 to 2-oz/ft^2 materials.

- **Matrix**

The liquid component of a thermo-set and thermoplastic yarn or fibre of a thermoplastic composite.

- **Epoxy**

Wide range of resin use for thermo-set available, best strength properties, usually heat-cure required, good chemical resistance, higher viscosity systems, higher material cost and applications across broad market segment range for thermo-set composite.

- **General Purpose Polyester**

Classified as ortho ophthalmic polyesters, lowest cost system, widely used in fibre reinforced plastic industry, moderate strength and corrosion resistance, room temperature cure.

- **Improved Polyester**

Classified as isophthalic polyesters, slightly higher cost, good strength and corrosion resistance, widely used in corrosion applications, room temperature cure.

- **Polyester Resin**

The product of an acid-glycol reaction commonly blended with a monomer to crate a polymer resin. In its thermosetting form it is the most common resin used in the FRP industry.

- **Polyvinyl Alcohol (PVA)**

A parting film applied to mould for part releasing.

- **Vinyl Ester**

Chemical combination of epoxy and polyester technology, excellent corrosion resistance, higher cost, excellent strength and toughness properties, widely used as corrosion liner in Fiber Reinforced Plastic(FRP) products.

- **Thermoplastics**

A group of plastic materials that become elastic or melt when heated, and return to their rigid state at room temperature. Examples are PVC, ABS, polystyrene, polycarbonates, nylon, etc.

- **Thermosets**

Materials that undergo a chemical cross-linking reaction going from liquid to solid or semi-solid. This reaction is irreversible. Typical tehrmosets are polyesters, acrylics, epoxies, and phenolics.

- **Prepreg**

Reinforcing material impregnated with resin prior to the moulding process and cured by the application of heat.

- **Laminate**

To place into a mold a series of layers of polymer and reinforcement. The process of applying FRP materials to a mold. To lay up.

- **Compression Mould**

A closed mould, usually of steel, used to form a composite under heat and pressure.

- **Pressure Bag**

A membrane that conforms to the inside of a laminate laid up on a mold. The membrane or bag in then inflated under pressure, which consolidates and densities the laminate.

- **Pultrusion**

A continuous filament-reinforced plastic (FRP) manufacturing process used to produce highly reinforced plastic structural shapes. Unlike filament winding, which place the primary reinforcing in the circumferential (hoop) direction, pultrusion provides the primary reinforcement in the longitudinal direction. The typical pultruded product will exhibit higher mechanical properties in the longitudinal direction (0°) rather than the transverse (crosswise) direction.

- **Technical Textile**

The Technical textile is the most intelligent use of the textile material. Technical textiles are used by industries of non – textile character in high tech and high performance applications starting from automotive engineering to building and personal protection. The vast application includes advertising,

agriculture, automobile, aviation, civil engineering, chemical, electrical industries, leather, medical, environmental protection etc.

- **Conductive Thermoplastic Compound**

A blend of plastic resins and electrically conductive fibers, powers, or additives that overcome the base resin's natural insulating properties.

- **Conductivity**

The ability of a material to carry an electrical current. A good conductor is a poor insulator and vice versa.

- **Conductive material**

An ESD protective material having a surface resistivity of 10^5 ohms/square maximum. (10^5=100,000)

- **Insulator**

A material which will not conduct electricity. Insulators can often tribocharge to very high levels since a charge will remain stationary, or static, on its surface for long periods of time unless neutralized in some way, such as ionization.

- **Insulative material**

A material having a surface resistivity greater than 10^{12} ohms/square.

- **Dissipative material**

An ESD protective material having a surface resistivity greater than 10^6 but not greater than 10^{12} ohms/square. (10^6 = 1,000,000 and 10^{12} = 1,000,000,000,000).

- **Static dissipative materials**

An ESD protective material having a surface resistivity greater than 10^5 but not greater than 10^9 ohms/square. 10^5 = 100,000 and 10^9 = 1,000,000,000.

- **Antistatic Material**

An obsolete term that described materials with a surface resistivity from 10^9 to 10^{14} Ohms per Square. This material only reduces the amount of charge generated by tribocharging, but provides only limited protection from an ESD event. The preferred replacement materials are static dissipative.

- **Dielectric Strength**

The dielectric strength of an insulating material is defined as the maximum voltage required to produce a dielectric breakdown. Dielectric Strength is

expressed in volts per unit of thickness such as V/mil. The higher the Dielectric Strength, the better the quality of insulator.

- **Dielectric Constant (Permittivity)**

Dielectric Constant of an insulating material is defined as the ratio of the charge stored in an insulating material placed between two metallic plates to the charge that can be stored when the insulating material is replaced by air (or vacuum). Defined another way, the Dielectric Constant is the ratio of the capacitance induced by two metallic plated with an insulator placed between them and the capacitance of the same plates with a vacuum between them. Simply stated, the Dielectric Constant indicates the ability of an insulator to store electrical energy.

- **Dissipation Factor**

In all electrical applications, it is desirable to keep the electrical losses to a minimum. Electrical losses indicate the inefficiency of an insulator. The Dissipation Factor is a measure of such electrical inefficiency of the insulating material. The Dissipation Factor indicates the amount of energy dissipated by the insulating material when the voltage is applied to the circuit. The Dissipation Factor is defined as the ratio of the conductance of a capacitor in which the material is the dielectric to its susceptance or the ratio of its parallel reactance to its parallel resistance. Most plastics have a relatively lower Dissipation Factor at room temperature.

- **Resistance**

The opposition to the flow of electricity. It is expressed in ohms.

- **Ohm**

The basic unit of measurement for electrical resistance. Symbolized as Ω.

- **Resistivity**

The inability of a material to carry an electrical current.

- **Surface Resistivity**

A mathematical representation of a material's ability to resist the passage of electricity across its surface. It is expressed in ohms / square.

- ***Volume Resistivity***

A mathematical representation of a material's ability to resist the passage of electricity internally through the bulk. It is expressed in ohm - centimeter.

- **Antistatic property**

A material 's ability to resist triboelectric charge generation. The term "antistat" no longer refers to a material's resistivity range.

- **Electrostatic Charge**

An electrical potential or voltage on a surface of a material. Such charges can reach several thousand volts and can seriously damage electronic components that often are sensitive to discharges of less than 100 volts.

- **Electrostatic Discharge**

The transfer of electrostatic charge between two bodies at different electrostatic potentials.

- **ESD protected area**

Is an area where parts, assemblies, and equipment are handled in line with the ESD sensitivity of the device. A protected area is constructed, equipped and maintained with the necessary ESD protective materials and equipment to insure that voltages are below the sensitivity level of the most ESD sensitive device handled in your facility.

- **ESD packaging material**

A material capable of one or more of the following:--Limiting the generation of static electricity--Rapidly dissipating electrostatic charges over its surface or volume--Providing shielding from ESD spark discharge or electrostatic fields. ESD packaging materials are classified in accordance with their surface resistivity as conductive, static dissipative and the less effective antistatic.

- **ESD protective materials**

Are designed to provide a means to protect, or shield, a device from this field. If the material is conductive enough it can form a "quotFaraday cage" which can eliminate more than 99% of the effect of the local electrostatic field on the contents of the shielding enclosure. The shielding effect is the reason that conductive bags and tote boxes are in common use today.

- **ESD upset**

A loss of test data or incorrect test signals caused by ESD or the electromagnetic pulse associated with an ESD spark. The device under test (DUT) may not be actually damaged, but may only appear to be operating incorrectly.

- **Attenuation**

Reduction of a signal's strength by an EMI / RFI shield or housing. Usually expressed in decibels (dB), the degree of attenuation provided by a shield is determined by the absorption and reflection characteristics of the material being used, the thickness of the shield, and the manufacturing tolerances of the shield or housing.

- **Decibel (dB)**

A unit of measurement that shows the relative difference in power between two signals. A decibel measurement is equal to 10 times the common logarithm of the ratio between the signal strengths.

- **Electromagnetic Shield**

A screen or other housing placed around a device or circuit to reduce the effects from both electric and magnetic fields.

- **Electromagnetic Interference**

Electrical energy created by electromagnetic fields that is radiated or picked up by electronic equipment circuits and that interferes with the normal operation of the electrical or electronic equipment.

- **Radio Frequency Interference**

A form of EMI, generally electrical energy in the radio frequency range that is capable of interfering with the proper operation of electrical or electronic equipment. Sources of RFI include computers, broadcast equipment, lighting, and the spark from an electrostatic discharge.