GUIDE TO PLASTICS

Acetal (Delrin®, Celcon®) - Acetals display good impact resistance, dimensional stability and outstanding surface hardness due to their high degree of crystallinity. They have high dielectric strength and are resistant to many solvents. They also exhibit negligible water absorption. Typical applications include roller bearings, gears, reels, counters, control cams, valves, and pump parts.

CPVC - Chlorinating PVC results in a polymer that has all of PVC's good qualities, plus improved fire retardance, weatherability, a higher maximum working temp. and light-fastness.

Engage® - Ethylene alpha-olefin copolymer bridges the gap between plastics and rubber properties. Key performance benefits include toughness, flexibility, light weight, high clarity, and UV stability. It resists low temperature brittleness and can be engineered to offer specific levels of flexibility to meet a range of technical requirements.

Halar® (ECTFE) - Ethylene-Chlorotrifluorethylene copolymer exhibits better mechanical properties than many other fluoroplastics. But like other fluoroplastics, its flame retardance, chemical resistance and low dielectric constant remain constant over a wide temperature range. These qualities make it suitable for use in such products as electrical insulation, monofilament, tank linings, housings, and electrical components. It may be usefully employed at temperatures from the cryogenic range to about 330ºF.

Isoplast™ - Isoplast urethane resins are high tensile strength, chemically resistant resins originally developed for medical use. They are available in long glass fiber-filled grades. Isoplast combines the toughness and dimensional stability of amorphous resins with the chemical resistance of crystaline materials. The long fibre reinforced grades are strong enough to replace some metals in load bearing applications.

Kynar® (PVDF) - Polyvinylidene fluorides has a useful temperature range of -148ºF to 302ºF. It has good strength, creep resistance and weatherability. Like some other chlorinated engineering plastics, it will not support combustion in air.

Lexan® (PC) - Polycarbonate exhibits the highest impact strength over a range of temperatures from -60ºF to 270ºF. It is fine for all precision parts, or where transparency is desired. Its water-clear transmittance (89%) makes it excellent for visors or guards. It shows good creep resistance and has a temperature-independent dielectric constant, as well as good insulating properties.

Noryl® (PPE) - Modified polyphenylene ether is one of the more widely known engineering plastics and has gained UL and FDA approval for a broad spectrum of moldable and foamable grades. It has good impact strength at low temperatures and is resistant to many agents, including steam. It may be furnished in either unreinforced or reinforced grades and remains stable when processed. Yield strength of reinforced grades is comparable to aluminum. Typical end uses include computer and electric housings, automotive body parts, and piping.

Nylon 6/6- All grades possess toughness and resiliency and have high fatigue strength. Resistance to oils and hydrocarbon solvents is also good. Almost all formulations are also self-extinguishing and retain stable mechanical properties at temperatures from -75ºF to above 225ºF. They are widely used for latches, cams, gears, and many other moving parts due to their excellent abrasion and impact resistance. Nylon is also available in a variety of cast forms and mobdylidenum disulphide filled grades (Nylatron® GS).

Nylon 46 - Bridges the price-performance gap between traditional nylons and high performance materials. Suitable for both extrusion and injection molding, Nylon 46 offers a range of functionality including extensive UL classifications and specialized wear and bearing grades.

PCTFE - Polychlorotrifluoroethylene is highly transparent. It also exhibits good electrical properties, and is resistant to most common solvents at room temperature. PCTFE is less permeable to gasses and water vapor than any other transparent film.

PEEK™ - Polyetheretherketone is a material which has excellent chemical resistance and is rated for continuous service to 470ºF. It is tough and strong, with low creep, and has the best fire safety rating of all thermoplastics. It tolerates radiation to 1100 M rads without undergoing significant change. Applications include engine parts, aerospace components and other uses which require PEEK's unique qualities.

PES® - Crystal clear polyethersulfone has truly outstanding creep resistance, dimensional stability, and excellent mechanical properties. It can withstand continuous use in air and water at temperatures to above 350ºF. It has low flammability and minimal smoke emission during burning. Its weatherability and solvent resistance are also good. Since PES is sterilizable, it has a wide variety of medical applications. Other applications include electronic components of all types, and structural parts.

PFA® - Perfluoroalkoxy resins, which are marketed under the Teflon® trademark, have properties similar to FEP and PTFE. However, unlike FEP, PFA may be used to temperatures of approximately 500ºF. While PFA shares PTFE's chemical resistance and low coefficient of friction, it is also a moldable, and extrudable material. Some applications include packing and seals, cable sheathing, and fire-retardant insulation.

Polycarbonate - This material exhibits the highest impact strength over a range of temperatures from -60ºF to 270ºF. It is fine for all precision parts, or where transparency is desired. Its water-clear transmittance (89%) makes it excellent for visors or guards. It shows good creep resistance and has a temperature-independent dielectric constant, as well as good insulating properties.

Polyethylene (PE) - Because of its flexibility at low temperatures, excellent electrical resistance and low dielectric constant, Polyethylene is unique. PE's self-lubricating properties also make it ideal for applications such as rollers, skids and other end-uses which call for a non-stick, low-friction material. PE is available in a wide range of densities and formulations.

Polypropylene (PP) - has good impact resistance and structural rigidity. It is unaffected by any solvent at room temperatures. It has excellent insulating properties and is extremely lightweight. Its high fatigue strength makes it a topchoice under cyclic loading conditions.

Polystyrene (PS) - is naturally clear. It exhibits excellent chemical resistance and is more resistant to irradiation than is PE or PP. Electrical resistance is also good. This, plus the ease with PS can be painted or shielded, has led to extensive electrical and electronic applications. PS is also often used in appliances and housings. Special high gloss and high impact grades are also widely available.

Polysulfone (PSO) - is a naturally transparent, true engineering plastic whose electrical and mechanical properties are constant up to temperatures above 320ºF. It is also rated for continuous service in steam to 300ºF. It shows excellent resistance to alkalies, acids and salts, as well as to many hydrocarbons. PSO is suited for microwave use, and may also be plated or glass-filled. Amongst its varied uses are many medical, automotive, and electronic applications.

PVC - Polyvinylchloride exhibits little or no water absorption. Since it is chlorinated, PVC also possesses natural flame retardant qualities. PVCs are available in a wide variety of colors and varying compositions. They are typically employed in packaging, water and chemical piping assemblies, appliances, furniture and other components.

RADEL® A-200 - is a polyethersulfone resin offering high heat deflection temperatures, excellent toughness and dimensional stability, and superior resistance to steam, boiling water, and mineral acids. Other desirable properties include thermal stability, creep resistance, and inherent flame resistance. Grade A-200 is a medium viscosity grade that can be used for either extrusion or injection molding. It is transparent and injection-moldable to close tolerances.

RADEL® AG-330 - is a 30% glass fiber reinforced polyethersulfone compound. Adding glass fiber to Radel A-300 polyethersulfone substantially increases the regidity, tensile strength, creep resistance, dimensional stablity, and chemical resistance of the material, while maintaining most of its other basic characteristics. The combination of structural properties and cost effectiveness makes this resin an attractive alternative to metals in many engineering applications. Radel AG-330 is an opaque, grayish material in its natural form and may be readily colored.

RADEL® R-5000 - is a polyphenylsulfone resin offering exceptional hydrolytic stability, and toughness that is superior to other commercially-available, high-temperature engineering resins. It offers high deflection temperatures and outstanding resistance to environmental stress cracking. The polymer is inherently flame retardant, and also has excellent thermal stability and good electrical properties. Radel R-5000 resin is a transparent injection molding grade.

Ryton® PPS - This exceptionally strong, thermally stable, corrosion resistant engineering thermoplastic retains structural integrity under the most demanding conditions of temperature and physical abuse. In continuous-service applications, Ryton® PPS boasts UL temperature indices up to 240ºC with outstanding dimensional stablity, and it can withstand short-term exposures to temperatures greater than 500ºF. It is inherently flame retardant and exhibits low smoke emission and non-toxic gas generation. Ryton® PPS is resistant to a broad spectrum of solvents, organic acids and alkalies.

Teflon® (PTFE) - An extremely low coefficient of friction makes Polytetrafluoroethylene the ideal choice where surface wear might otherwise be a problem. PTFE also exhibits a useful service life from below-100ºF, to temperatures of over 500ºF. Its resistance to solvents is also excellent throughout a wide range of temperatures. Its low dielectric constant and electrical resistance also remain constant throughout this range.

Tefzel® (ETFE) - Ethylene-tetrafluoroethylene copolymer is a high impact material with properties similar to ECTFE. It is commonly used to manufacture pumps, valves, computer housings, and other electrical components.

Torlon® (PAI) - Polyamide-imide possesses a combination of great mechanical strength, the ability to withstand radiation, usability from approximately -300ºF to 500ºF, and resistance to most chemicals at room temperature. It is also flame retardant and gives off almost no smoke when burned. It is available in unreinforced and reinforced grades and is readily machinable. This combination of assets makes it a good metal substitute for aerospace and electronic applications.

ULTEM - Unreinforced ULTEM® (polyetherimide) keeps its hardness, and mechanical properties from -40ºF, up to temperatures of 356ºF. It is radiation-resistant, microwave transparent and is naturally flame-retardant. Reinforced grades have even higher mechanical strength. Because of its unequalled properties, ULTEM® is the ideal replacement for steel and other metals. It also has a wide range of electronic and medical applications.

UHMW® - While Ultra-High Molecular Weight Polyethylene retains the inherent qualities of low-density polyethylene, its increased toughness allows its use in a wide variety of rugged applications. It is commonly employed to provide rollers, cams, impellers and bumper guards. Because of its high lubricity, it is also used to coat conveyer-belts, ramps and hoppers. UHMW's imperviousness to attack by steam and chemicals, and its continued good performance at low temperatures, has also enabled it to gain FDA approval for a variety of applications within the food and drug industries.

Vespel® - is a high performance polyimide material which can operate continuously from cryogenic temperatures to 550°F (288°C), with excursions to 900°F (482°C). Vespel parts exhibit superior performance in a variety of applications requiring low wear and long life in severe environments.