Reference

Trade Names, Chemical Resistance and More

Product Compliance

Plastic materials are commonly used in processing equipment and products requiring various types of regulatory agency compliance. Our suppliers routinely work with these agencies to assure the widest variety of our products are recognized as being compliant - giving designers the broadest selection of canidate materials.

A brief overview of the six most common agencies is provided below. Additionaly, we have specific product listings with Underwriters Laboratories (UL), American Bureau of Shipping (ABS), ASTM and many global manufacturers.

Alro Plastics and our Suppliers can work with customers to develop unique product and quality specifications requiring testing, inspection and certifications. Such requests should be directed to Alro Plastics at (800) 877-2576.

FDA

FDA (Food & Drug Association) takes responsibility for determining whether and how manufactured materials may be used in contact with food products. Definitions for proper use are found in a series of regulations published annually under Government Regulations CFR 21. The FDA provides certain specifications regarding composition, additives, and properties. A material which meets these standards can then be stated as FDA COMPLIANT. End-users should note that it is their responsibility to use the product in a manner compatible with FDA guidelines.

USDA

USDA (U.S. Department of Agriculture) has jurisdiction over equipment used in federally inspected meat and poultry processing plants, and over packaging materials used for such products. Materials used in this equipment are approved on an individual basis. Determining suitabiliy for use of components and the materials from which they are made is the responsibility of the equipment manufacturer. On request, Alro will supply a "letter of guarantee" for a specific product listed as USDA compliant. This letter certifies that the material meets applicable FDA criteria. Supporting documentation as may be required by the Food Safety Inspection Service of USDA, is also available.

Canada AG

Agriculture Canada (Food Protection and Inspection Branch of the Candadian Government) is the Canadian government agency equivalent to the USDA. As with the USDA, plastic materials are approved per material for a group of related applications, such as Acetron® GP acetal (material) for meat and poultry processing (application).

3A-Dairy

3A-Dairy is a voluntary organization that provides standards of construction for milk, cheese, butter and ice cream processing equipment.

The organization covers the requirements of plastic materials for multiple use as product contact surfaces in equipment for production, processing, and handling of milk and milk products. The criteria for approval of plastic materials are specified in 3A standard 20-18, and include: cleanability, bacterial treatment, repeat use conditions, and FDA compliance. Materials are tested for compliance by the material supplier. Supporting documentation must be available as required by a food inspector.

Product Compliance

NSF

NSF (National Sanitation Foundation) sets standards for all direct and indirect drinking water additives. Manufacturers who provide equipment displaying the NSF symbol have applied to the NSF for device approval to a specific standard. The approval is issued for the finished product (device) in a specific use (application). To obtain device approval, all components within the device must comply with the Standard. Establishing compliance of the equipment's components can be accomplished in one of two ways:

1. The component has been tested to the Standard by the component supplier and is certified as such.
2. The equipment manufacturer must supply documentation that the component meets the Standard. If any testing is required, it must be completed by the equipment manufacturer.

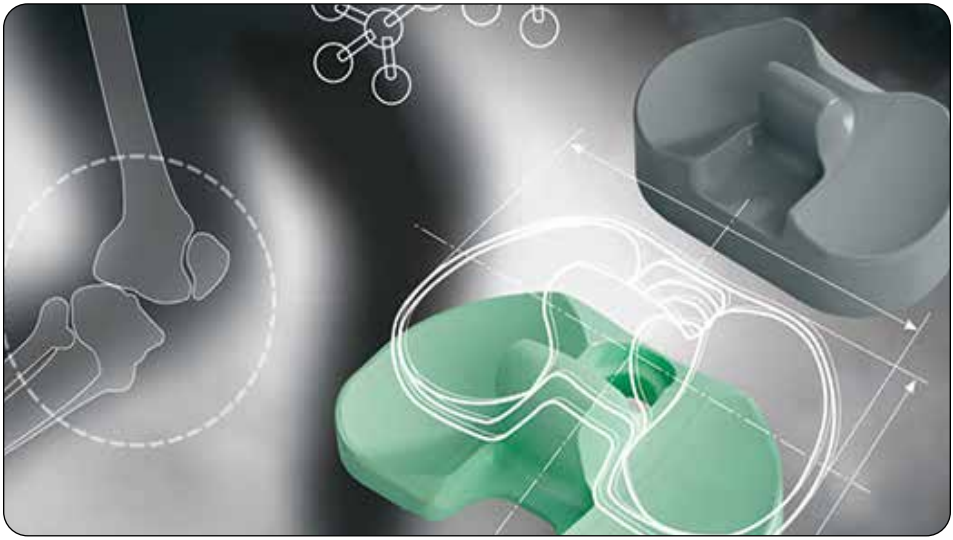
The NSF maintains numerous standards. Two standards which we frequently encounter and to which some of our products have been tested are:

51 Plastics in Food Equipment

61 Drinking Water System Components - Health Effects

USP Class VI

USP (U.S. Pharmacopoeia) Class VI judges the suitability of plastic material intended for use as containers or accessories for parenteral preperations. Suitability under USP Class VI is typically a base requirement for medical device manufacturers.



Product Compliance

MATERIAL NAME	PRODUCT FAMILY	COLOR	FDA	USDA
Acetron® GP	Acetal	Natural	YES	YES
Delrin®	Acetal	Natural	YES	YES
Delrin® AF Blend	Acetal	Brown	NO	NO
Ertalyte® PET-P	Polyester	Natural	YES	YES
Ertalyte® PET-P	Polyester	Black	YES	YES
Ertalyte® TX	Polyester	Gray	YES	YES
Fluorosint® 207	PTFE	Natural	YES	YES
Fluorosint® 500	PTFE	Natural	NO	NO
Ketron® PEEK	PEEK	Natural	YES	YES
MC® 901	Nylon 6	Blue	NO	NO
MC® 907	Nylon 6	Natural	YES	YES
Nylatron® GS	Nylon 6/6	Black-Grey	NO	NO
Nylatron® GSM	Nylon 6	Black-Grey	NO	NO
Nylatron® GSM Blue	Nylon 6	Dark Blue	NO	NO
Nylatron® NSM	Nylon 6	Grey	NO	NO
Nylon 101®	Nylon 6/6	Natural	YES	YES
Polycarbonate	PC	Natural	NO	NO
Polysulfone	PS	Natural	YES	YES
Radel® R	PPSU	Natural	NO	NO
Techtron®	PPS	Natural	NO	NO
Ultem® 1000	PEI	Natural	YES	YES
TIVAR® 1000	UHMW-PE	Natural	YES	YES
TIVAR® Oil Filled	UHMW-PE	Brown	YES	YES
TIVAR® Oil Filled	UHMW-PE	Gray	YES	YES
TIVAR® Clean Stat	UHMW-PE	Black	YES	YES
Proteus® Homopolyer	Polypropylene	Natural	YES	NO
Proteus® Homopolyer	Polypropylene	White	YES	NO
Proteus® Copolyer	Polypropylene	Natural	YES	NO
Proteus® White Flame Retardant 18G	Polypropylene	White	NO	NO
LDPE (Low Density)	Polyethylene	Natural	YES	NO
HDPE (High Density)	Polyethylene	Natural	YES	NO
HDPE (High Density)	Polyethylene	Black	NO	NO
Sanalite® Cutting Board (HDPE)	Polyethylene	Natural	YES	YES
Polytetrafluoroethylene (PTFE)	PTFE	White	YES	YES

Celazole® PBI, Torlon® PAI and all fiber-reinforced (i.e. glass, carbon) materials available from Mitsubishi Chemical Group are neither FDA, USDA, nor 3-A Dairy compliant. No Mitsubishi Chemical Group materials are suitable for implantable devices.

Product Compliance

NSF	3A-DAIRY	CANADA AG	USP CLASS VI	TYPICAL APPLICATIONS (STRUCTURAL & WEAR)
STD 51 & 61	YES	YES	NO	BOTH
STD 61	NO	YES	NO	BOTH
NO	NO	NO	NO	BEARING & WEAR
NO	YES	YES	NO	BOTH
NO	NO	NO	NO	BOTH
NO	YES	NO	NO	BOTH
NO	NO	NO	NO	BEARING & WEAR
NO	NO	NO	NO	BOTH
NO	YES	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	YES	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BEARING & WEAR
NO	NO	NO	NO	BEARING & WEAR
NO	NO	NO	NO	BEARING & WEAR
STD 61	YES	NO	NO	BOTH
NO	NO	NO	NO	STRUCTURAL
STD 61	YES	NO	YES	STRUCTURAL
NO	NO	NO	YES	STRUCTURAL
NO	NO	NO	NO	STRUCTURAL
STD 51	NO	NO	YES	STRUCTURAL
YES	YES	YES	---	WEAR
NO	NO	NO	NO	WEAR
NO	NO	NO	NO	WEAR
NO	NO	NO	NO	WEAR
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BOTH
NO	NO	NO	NO	BOTH
YES	NO	NO	NO	WEAR
YES	YES	NO	NO	WEAR

Celazole® PBI, Torlon® PAI and all fiber-reinforced (i.e. glass, carbon) materials available from Mitsubishi Chemical Group are neither FDA, USDA, nor 3-A Dairy compliant. No Mitsubishi Chemical Group materials are suitable for implantable devices.

Key Suppliers / Manufacturers

CAST NYLONS LIMITED

Ensinger

KING King Plastic Corporation
Our Innovation. Your Imagination.®

MITSUBISHI CHEMICAL GROUP

PLASKOLITE, INC.

POLYMER INDUSTRIES
GEARED TOWARDS EXCELLENCE

RÖCHLING
Engineered Plastics

SIMONA

STRONGWELL

Westlake plastics
LIFE IN POLYMERS

ZL ENGINEERING PLASTICS

member iapd
international association of plastics distribution

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Acetate Solvents Pure	1	1	NR	2	NR	NR	1	2	NR	NR	NR	NR	NR
Acetaldehyde	2	3	NR	2	3	*	*	*	NR	NR	NR	NR	NR
Acetamide	*	*	*	1	2	*	*	*	NR	NR	*	*	*
Acetic Solvents Crude	*	*	*	2	NR	NR	*	*	NR	NR	NR	NR	NR
Acetic Solvents Pure	1	1	NR	2	NR	NR	*	*	NR	NR	NR	NR	NR
Acetic Acid 10%	1	2	NR	1	1	1	1	1	1	1	1	2	NR
Acetic Acid 20%	1	2	NR	1	1	1	1	1	1	1	1	NR	NR
Acetic Acid 50%	1	2	NR	1	1	1	1	2	3	NR	NR	NR	NR
Acetic Acid 80%	1	2	NR	1	1	1	2	2	NR	NR	NR	NR	NR
Acetic Acid Glacial	1	2	NR	1	1	2	1	1	NR	NR	NR	NR	NR
Acetic Anhydride	1	1	NR	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acetone	1	1	NR	1	1	2	NR	NR	NR	NR	NR	NR	NR
Acetophenone	3	3	*	2	2	NR	*	*	NR	NR	*	*	*
Acetyl Chloride	*	*	*	*	*	*	*	*	NR	NR	NR	NR	NR
Acetylene	*	*	*	1	*	*	*	*	1	1	1	1	*
Acrylonitrile	*	*	*	1	2	*	*	*	*	*	*	*	*
Adipic Acid	*	*	*	1	2	2	*	*	1	1	1	1	*
Alcohol Allyl	1	NR	NR	2	2	*	2	2	NR	NR	NR	NR	NR
Alcohol Amyl	1	NR	NR	1	2	*	1	2	NR	NR	2	NR	NR
Alcohol Butyl	1	1	1	1	1	2	1	1	NR	NR	2	NR	NR
Alcohol Ethyl	1	1	1	1	1	2	2	NR	1	1	1	1	1
Alcohol Methyl	*	*	*	1	1	1	1	1	1	1	1	1	1
Alcohol Propyl	*	*	*	1	*	*	2	NR	1	NR	1	*	*
Allyl Chloride	1	3	*	2	*	*	2	NR	NR	NR	NR	NR	NR
Alum	1	1	*	1	1	1	1	1	1	1	1	1	1
Alum Ammonium	*	*	*	1	1	1	1	1	NR	NR	NR	NR	NR
Alum Chrome	*	*	*	1	1	1	1	1	1	1	1	1	1
Alum Potassium	*	*	*	1	1	1	1	1	1	1	1	1	1
Aluminum Chloride	1	1	Boiling	1	1	1	1	1	1	1	1	1	1
Aluminum Fluoride	1	1	*	1	1	1	1	1	1	1	1	1	
Aluminum Hydroxide	1	1	*	1	1	1	1	*	1	1	1	1	1
Aluminum Nitrate	*	*	*	1	1	1	1	*	1	1	1	1	1
Aluminum Sulfate	1	1	Boiling	1	1	*	1	2	1	1	1	1	1
Ammonia Anhydrous	1	1	*	1	1	1	*	*	2	NR	*	*	*
Ammonia Aqueous	1	1	*	1	1	1	*	*	1	1	1	1	*
Ammonium Bifluoride	*	*	*	1	1	1	1	1	1	1	1	1	*
Ammonium Carbonate	1	*	*	1	1	1	1	1	1	1	1	1	*
Ammonium Chloride	1	1	Boiling	1	1	2	1	1	1	1	1	1	*
Ammonium Fluoride 10%	*	*	*	1	1	1	1	1	1	1	1	1	*
Ammonium Fluoride 25%	*	*	*	1	1	1	1	1	NR	NR	NR	NR	NR
Ammonium Hydroxide	1	1	*	1	1	1	1	1	1	1	1	1	*
Ammonium Metaphosphate	*	*	*	1	1	1	1	1	1	1	1	1	*
Ammonium Nitrate	1	1	1	1	1	1	1	1	1	1	1	1	*
Ammonium Persulfate	1	1	*	1	1	1	1	1	1	1	1	1	*
Ammonium Phosphate	1	*	*	1	1	1	1	1	1	1	1	1	*
Ammonium Sulfate	1	1	Boiling	1	1	1	1	1	1	1	1	1	*
Ammonium Sulfide	*	*	*	1	1	1	*	*	1	1	1	1	*
Amyl Acetate	1	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Amyl Chloride	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Aniline	1	2	3	1	3	3	NR	NR	NR	NR	NR	NR	NR
Aniline Hydrochloride	*	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Antimony Trichloride	1	*	*	1	1	1	1	1	1	NR	NR	NR	NR
Aqua Regia	2	3	NR	2	NR	NR	NR	NR	3	NR	NR	NR	NR
Arsenic Acid	1	*	*	1	1	1	1	1	1	1	1	1	*
Barium Carbonate	*	*	*	1	1	1	1	1	1	1	1	1	*
Barium Chloride	1	*	*	1	1	1	1	1	1	1	1	1	*
Barium Hydroxide	1	1	*	1	1	2	1	1	1	1	1	1	*
Barium Sulfate	1	*	*	2	NR	NR	1	1	1	2	1	1	1
Barium Sulfide	1	1	*	1	1	1	1	1	1	2	1	1	1
Beer	1	1	1	1	1	1	1	1	1	1	1	1	1
Beet Sugar Liquors	*	*	*	1	2	*	1	1	1	1	1	1	1
Benzaldehyde	1	*	*	1	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzene	3	NR	*	3	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzene Sulfonic Acid	1	1	*	2	NR	NR	NR	NR	1	1	1	1	*
Benzoic Acid	1	1	*	1	NR	NR	1	*	1	2	1	1	*
Benzyl Alcohol	1	1	1	1	3	NR	*	*	NR	NR	NR	NR	NR
Benzyl Chloride	*	*	*	1	1	2	*	*	2	NR	*	*	*
Bismuth Carbonate	*	*	*	1	1	1	1	1	1	1	1	1	1
Borax	1	1	*	1	1	2	1	1	1	1	1	1	*
Boric Acid	1	1	*	1	1	1	1	1	1	1	1	1	*
Bromine Liquid	*	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bromine Water	3	*	1	NR	NR	NR	NR	NR	1	1	NR	NR	NR
Butadiene	3	NR	NR	NR	NR	NR	2	*	NR	NR	1	1	*
Butane	1	*	*	1	NR	NR	2	*	2	NR	1	NR	NR
Butyl Acetate	1	*	*	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl Alcohol	1	1	1	1	1	1	2	2	NR	NR	1	NR	NR
Butylene	1	*	*	2	NR	NR	2	*	3	NR	2	NR	NR
Butyl Phenol	*	*	*	2	*	*	2	*	NR	NR	2	NR	NR
Butyne Diol	*	*	*	1	1	*	2	*	1	NR	1	NR	NR
Butyric Acid	1	2	*	1	1	1	2	*	NR	NR	1	NR	NR
Butyl Amine	*	*	*	2	*	*	*	*	NR	NR	*	*	*
Butyl Ether	*	*	*	NR	NR	NR	*	*	1	1	*	*	*
Butyl Chloride	*	*	*	NR	NR	NR	*	*	*	*	*	*	*
Butyl Phthalate	1	*	*	2	2	*	*	*	2	NR	*	*	*
Calcium Bisulfide	*	*	*	1	1	1	1	1	1	1	1	1	1
Calcium Bisulfite	1	*	*	1	1	1	1	1	1	1	1	1	1
Calcium Carbonate	*	*	*	1	1	1	1	1	1	1	1	1	1
Calcium Chlorate	*	*	*	1	1	1	1	1	1	1	1	1	*
Calcium Chloride	1	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Hyrdroxide	1	1	Boiling	1	1	2	1	1	1	1	1	1	1
Calcium Hypochlorite	1	1	Boiling	1	2	2	1	1	1	1	1	1	*
Calcium Nitrate	*	*	*	1	1	1	1	1	1	1	1	1	*
Calcium Sulfate	1	1	*	1	1	1	1	1	1	1	1	1	1
Carbolic Acid	1	*	*	1	1	2	1	1	1	1	1	1	*
Carbolic Dioxide	1	1	*	1	1	1	1	1	1	1	1	1	1
Carbolic Disulfide	NR	*	*	NR	NR	NR	2	2	NR	NR	NR	NR	NR

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Carbon Monoxide	*	*	*	1	1	1	1	1	1	1	1	1	1
Carbon Tetrachloride	3	*	*	2	3	NR	NR	NR	NR	NR	NR	NR	NR
Castor Oil	*	*	*	1	3	NR	1	1	1	1	1	1	NR
Caustic Potash	1	1	*	1	1	1	1	1	1	1	1	1	1
Caustic Soda	1	1	1	1	2	2	1	*	1	1	1	1	*
Cellosolves	*	*	*	2	3	NR	2	*	1	2	1	2	*
Chloral Hydrate	*	*	*	1	*	*	2	*	1	1	1	1	*
Chloric Acid	*	*	*	NR	NR	NR	*	*	1	3	1	2	*
Chlorinated Water	1	1	*	2	3	*	*	*	1	3	*	*	*
Chlorine Dry	2	*	*	3	*	1*	NR	NR	NR	NR	NR	NR	NR
Chlorine Wet	2	2	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chloroacetic Acid	NR	*	*	1	1	*	2	*	2	3	1	2	NR
Chlorobenzene	2	NR	*	3	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chloroform	2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chlorosulfonic Acid	NR	*	*	3	NR	NR	NR	NR	3	NR	2	NR	NR
Chrome Alum	*	*	*	1	1	NR	1	1	1	1	1	1	NR
Chromic Acid 10%	1	1	Boiling	1	1	2	1	NR	NR	NR	NR	NR	NR
Chromic Acid 30%	1	1	Boiling	1	NR	NR	1	NR	NR	NR	NR	NR	NR
Chromic Acid 40%	1	1	Boiling	1	NR	NR	*	*	NR	NR	NR	NR	NR
Chromic Acid 50%	1	1	Boiling	1	NR	NR	1	NR	NR	NR	NR	NR	NR
Citric Acid	1	1	3	1	1	1	1	1	1	2	1	1	1
Coconut Oil	*	*	*	1	1	*	1	1	1	1	1	1	1
Copper Carbonate	*	*	*	1	1	1	*	*	1	1	1	1	1
Copper Chloride	1	*	*	1	1	1	1	1	1	1	1	1	1
Copper Cyanide	1	*	*	1	1	1	1	1	1	1	*	*	*
Copper Fluoride	*	*	*	1	1	1	1	1	1	1	1	1	1
Copper Nitrate	1	*	*	1	1	1	1	1	1	2	1	1	1
Copper Sulfate	1	1	*	1	1	1	1	1	1	2	1	1	1
Cottonseed Oil	1	2	*	1	1	1	1	1	1	1	1	1	1
Cresol	*	*	*	NR	NR	NR	NR	NR	NR	NR	2	NR	NR
Cresylic Acid	1	*	*	NR	NR	NR	NR	NR	NR	NR	2	NR	NR
Croton Aldehyde	1	1	*	1	NR	NR	2	*	NR	NR	NR	NR	*
Crude Oil	1	2	*	1	2	*	NR	NR	1	1	1	1	*
Cyclohexane	1	1	*	3	NR	NR	*	*	2	NR	1	*	*
Cyclohexanol	1	1	1	2	*	*	*	*	NR	NR	NR	NR	NR
Cyclohexanone	1	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Detergent	1	1	1	1	1	1	1	1	1	1	1	1	*
Dextrin	*	*	*	1	1	*	1	1	1	1	1	1	*
Dextrose	1	*	*	1	1	*	1	1	1	1	1	1	*
Diacetone Alcohol	*	*	*	1	2	*	*	*	NR	NR	NR	NR	NR
Diazo Salts	1	1	*	1	1	*	1	1	1	1	1	1	*
Dibutyl Phthalate	1	1	*	1	2	NR	*	*	NR	NR	NR	NR	NR
Dichlorobenzene	*	*	*	3	NR	NR	*	*	3	NR	*	*	*
Dichlorordifluoro Methane	*	*	*	1	2	*	*	*	1	NR	*	*	*
Dichloroethylene	NR	*	*	1	NR	NR	*	*	NR	NR	NR	NR	NR
Dichlorothane	3	*	Boiling	1	*	*	*	*	NR	NR	*	*	*
Diesel Fuel	1	1	NR	1	2	NR	*	*	1	2	1	2	NR
Diethylamine	*	*	*	1	2	2	2	*	NR	NR	NR	NR	NR

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NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Diethylene Glycol	*	*	*	1	1	1	*	*	3	NR	*	*	*
Diethyl Cellosolve	*	*	*	*	*	*	*	*	*	*	*	*	*
Diethyl Ether	1	*	*	NR	NR	NR	*	*	NR	NR	NR	NR	NR
Diglycolic Acid	*	*	*	1	NR	NR	*	*	1	1	1	1	*
Dimethylamine	*	*	*	1	1	*	2	*	NR	NR	NR	NR	NR
Dimethyl Formamide	1	*	*	1	1	*	*	*	NR	NR	NR	NR	NR
Dimethyl Sulfoxide	*	*	*	1	2	*	*	*	NR	NR	*	*	*
Dioctyl Phthalate	*	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dioxane 1,4	*	*	*	1	NR	NR	NR	NR	NR	NR	NR	NR	NR
Diphenyl	*	*	*	NR	*	*	*	*	*	*	*	*	*
Diphenyl Ether	*	*	*	NR	*	*	*	*	NR	*	*	*	*
Diphenyl Oxide	*	*	*	*	*	*	*	*	NR	*	2	*	*
Dipropylene Glycol	*	*	*	1	2	*	*	*	2	3	*	*	*
Distilled Water	1	1	1	1	1	1	1	1	1	1	1	1	1
Dizynilbenzene	*	*	*	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Epichlorohydrin	*	*	*	1	1	*	*	*	NR	NR	NR	NR	NR
Ethane	1	*	*	3	*	*	*	*	NR	*	NR	NR	NR
Ethanolamine	*	*	*	1	1	2	*	*	3	*	*	*	*
Ethers	2	*	*	NR	*	*	*	*	NR	*	*	*	*
Ethyl Acetate	1	1	NR@140	1	1	2	2	*	NR	*	NR	NR	NR
Ethyl Acetoacetate	*	*	*	NR	*	*	*	*	NR	NR	NR	NR	NR
Ethyl Acrylate	*	*	*	NR	*	*	2	NR	NR	NR	NR	NR	NR
Ethyl Alcohol	*	*	*	1	1	2	2	NR	1	1	1	2	*
Ethyl Benzene	1	*	*	NR	*	*	*	*	NR	*	*	*	*
Ethyl Benzoate	*	*	*	2	3	*	*	*	NR	*	*	*	*
Ethyl Butyrate	*	*	*	2	NR	*	*	*	NR	*	*	*	*
Ethyl Chloride	*	*	*	NR	*	*	NR	*	NR	*	NR	NR	*
Ethyl Ether	NR	*	*	3	NR	*	NR	*	3	NR	NR	NR	NR
Ethyl Sulfate	*	*	*	*	*	*	*	*	*	*	*	*	*
Ethylene Bromide	*	*	*	NR	NR	NR	NR	NR	NR	*	NR	*	*
Ethylene Chloride	2	NR	*	3	NR	*	*	*	NR	*	NR	NR	*
Ethylene Chlorohydrine	*	*	*	NR	*	*	NR	NR	NR	*	NR	NR	*
Ethylene Diamine	1	*	*	1	*	*	NR	*	NR	*	NR	*	*
Ethylene Dibromide	*	*	*	2	*	*	*	*	NR	*		*	*
Ethylene Dichloride	3	*	*	2	3	NR	NR	*	NR	NR	NR	NR	*
Ethylene Glycol	1	1	1	1	1	1	1	1	1	1	1	1	1
Ethylene Oxide	1	3	*	2	3	*	NR	NR	NR	*	NR	*	*
Fatty Acids	1	1	*	1	1	1	1	1	1	1	1	1	1
Ferric Chloride (concent)	1	1	Boiling	1	1	1	1	1	1	1	1	1	1
Ferric Nitrate	1	*	*	1	1	1	1	1	1	1	1	1	1
Ferric Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	1
Ferrous Chloride	1	*	*	1	1	1	1	1	1	1	1	1	1
Ferrous Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	1
Fish Solubles	1	1	1	1	1	1	1	1	1	1	1	1	1
Fluoboric Acid	1	1	*	1	1	1	1	*	1	1	1	1	*
Fluorine Gas (dry)	NR	NR	NR	NR	*	*	1	*	NR	NR	1	*	*
Fluorine Gas (wet)	3	*	*	NR	*	*	1	*	NR	*	NR	*	*
Flousilic Acid	1	*	*	1	1	1	1	*	1	3	1	1	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Formaldehyde	1	1	*	1	1	2	1	*	2	2	1	NR	NR
Formic Acid	1	1	*	1	NR	NR	1	2	3	NR	1	NR	NR
Freon Dry	*	*	*	NR	*	*	*	*	*	*	*	*	*
Freon Wet	*	*	*	1	2	2	*	*	*	*	*	*	*
Fructose	1	1	1	1	1	1	1	1	1	1	1	1	1
Fruit Juice	1	1	1	1	1	1	1	1	1	1	1	1	1
Furfural	1	*	*	NR	*	*	NR	*	NR	*	NR	NR	*
Gallic Acid	1	1	*	1	1	1	NR	*	1	1	1	1	*
Gas Manufactured	*	*	*	NR	NR	NR	NR	NR	1	*	1	1	*
Gas Natural	NR	*	2	*	*	NR	NR	1	2	1	1	*	
Gasoline (leaded)	*	*	*	3	NR	NR	1	1	2	2	1	NR	*
Gasoline (unleaded)	1	2	*	3	NR	NR	1	1	2	2	1	NR	*
Gelatin	1	*	*	1	1	1	1	1	1	1	1	1	1
Glucose	1	*	*	1	1	1	1	1	1	1	1	1	1
Glue	1	*	*	1	*	*	*	*	1	1	1	1	*
Glycerine	1	1	1	1	1	1	1	1	1	2	1	1	*
Glycol	1	1	1	1	1	1	1	1	1	1	1	1	*
Glycolic Acid	*	*	*	1	1	1	2	*	1	1	1	1	*
Green Liquor	*	*	*	1	*	*	*	*	1	1	1	1	*
Helium	*	*	*	1	*	*	*	*	*	*	*	*	*
Heptane	1	1	*	2	NR	*	NR	NR	3	NR	1	1	*
Hexamine	*	*	*	*	*	*	*	*	*	*	*	*	*
Hexane	1	*	*	2	NR	NR	NR	NR	2	NR	1	*	*
Hexanol Tertiary	*	*	*	1	2	*	2	NR	2	2	1	1	NR
Hydrazine	*	*	*	3	*	*	NR	NR	NR	NR	*	*	*
Hydraulic Fluid (petroleum)	1	*	*	NR	*	*	NR	*	NR	*	*	*	*
Hydrobromic Acid (37%)	1	1	*	1	2	3	1	1	2	NR	*	*	*
Hydrochloric Acid (>20%)	1	1	Boiling	1	1	1	1	2	2	2	1	*	*
Hydrochloric Acid (50%)	1	1	Boiling	1	1	2	1	2	2	2	1	1	*
Hyrdrocyanic Acid	1	1	*	1	1	1	1	1	1	1	1	1	*
Hydrofluoric Acid (>40%)	1	2	*	1	1	2	1	1	2	3	NR	*	*
Hydrofluosilicic Acid	1	*	*	1	1	1	*	*	NR	NR	NR	NR	NR
Hydrofluorisilicic Acid	1	*	*	1	1	1	*	*	1	2	*	*	*
Hydrogen Chloride	1	1	*	1	1	*	1	1	1	*	*	*	*
Hydrogen Cyanide	1	1	*	1	1	1	1	1	1	1	1	1	1
Hydrogen Fluoride	1	1	*	1	*	*	*	*	2	*	NR	*	*
Hydrogen Gas	1	*	*	1	1	1	1	1	1	2	1	1	1
Hydrogen Peroxide	1	2	3	1	2	3	1	2	1	1	1	*	*
Hydrogen Sulfide (wet/dry)	1	*	*	1	1	1	1	1	1	1	1	1	*
Hydroquinone	1	1	*	1	1	1	1	1	1	1	1	1	*
Hydroxylamine Sulfate	*	*	*	1	1	*	*	*	1	1	1	1	1
Hypo Sodium Thiosulfate	*	*	*	1	1	1	*	*	1	1	1	1	1
Hypochlorous Acid	*	*	*	1	1	*	2	NR	1	1	1	1	*
Iodine	1	*	*	1	1	1	2	NR	NR	NR	1	NR	NR
Isobutyl Alcohol	*	*	*	1	2	2	*	*	2	3	*	*	*
Isooctane	1	*	*	1	NR	NR	*	*	1	*	*	*	*
Isopropyl Acetate	*	*	*	2	3	*	*	*	NR	NR	*	*	*
Isopropyl Alcohol	1	1	1	1	1	1	*	*	1	2	1	*	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Isopropyl Ether	1	*	*	2	NR	NR	*	*	3	*	NR	*	*
Jet Fuel (JP3,4,5)	*	*	*	1	NR	*	*	*	1	1	1	*	*
Kerosene	1	3	*	1	NR	*	NR	NR	1	1	1	1	*
Keytones	2	NR	*	2	NR	*	*	*	NR	*	NR	*	*
Lactic Acid	1	1	*	1	1	2	1	1	2	3	1	1	*
Lacquer Solvents	1	*	*	NR	*	*	*	*	NR	*	*	*	*
LPG (Propane)	*	*	*	1	2	*	*	*	NR	NR	*	*	*
Lard	1	1	*	2	NR	*	NR	NR	1	2	1	1	*
Lauric Acid	*	*	*	1	1	*	2	NR	1	1	1	1	*
Lauryl Chloride	*	*	*	1	1	*	NR	*	1	1	1	1	*
Lead Acetate	1	*	*	1	1	2	1	1	1	1	1	1	*
Lead Molten	NR	NR	NR	NR	*	*	NR	*	NR	*	NR	*	*
Lead Nitrate	1	1	*	1	1	*	*	*	2	2	*	*	*
Lead Sulfamate	*	*	*	1	1	*	*	*	1	*	*	*	*
Lime	*	*	*	1	1	1	*	*	1	2	*	*	*
Lime Sulfur	1	*	*	1	1	1	*	*	1	1	*	*	*
Lineoleic Acid	*	*	*	2	*	*	2	NR	1	1	1	1	*
Linseed Oil	1	1	NR	1	1	1	NR	NR	1	1	1	*	*
Lithium Chloride	1	*	*	1	*	*	*	*	1	*	*	*	*
Lithium Hydroxide	1	*	*	1	*	*	*	*	1	1	*	*	*
Lubricating Oil	1	*	*	1	NR	*	*	*	2	2	1	1	*
Lye	1	1	1	1	1	1	*	*	1	1	1	1	*
Machine Oil	*	*	*	1	1	NR	*	*	1	1	1	1	*
Magnesium Bisulfate	*	*	*	1	2	*	1	1	1	2	1	1	*
Magnesium Carbonate	*	*	*	1	1	1	1	1	1	1	1	1	*
Magnesium Chloride	1	1	*	1	1	1	1	1	1	1	1	1	*
Magnesium Hydroxide	1	1	*	1	1	1	1	1	1	1	1	1	*
Magnesium Nitrate	*	*	*	1	1	1	1	1	1	1	1	1	*
Magnesium Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	*
Maleic Acid	1	1	*	1	1	1	1	1	1	1	1	1	*
Malic Acid	*	*	*	1	NR	*	*	*	1	1	1	1	*
Manganese Chloride	1	*	*	1	*	*	*	*	1	*	1	*	*
Manganese Sulfate	*	*	*	2	*	*	*	*	2	2	*	*	*
Mercuric Chloride	1	*	*	1	1	1	1	1	1	1	1	*	*
Mercuric Cyanide	*	*	*	1	1	1	1	1	3	3	1	1	*
Mercurous Nitrate	*	*	*	1	1	1	1	1	3	3	1	1	*
Mercury	1	1	*	2	2	2	1	1	1	1	1	1	*
Methane	1	*	*	1	*	*	*	*	1	1	1	*	*
Methanol	*	*	*	1	1	1	1	1	1	3	1	1	1
Methyl Acetate	1	*	*	1	*	*	*	*	NR	*	*	*	*
Methyl Acetone	*	*	*	*	*	*	*	*	NR	*	*	*	*
Methyl Amine	*	*	*	1	*	*	*	*	NR	*	*	*	*
Methyl Bromide	*	*	*	2	NR	*	2	*	NR	*	NR	*	*
Methyl Cellosolve	*	*	*	2	*	*	*	*	NR	*	NR	*	*
Methyl Chloraform	2	NR	*	2	*	*	*	*	NR	*	NR	*	*
Methyl Chloride Wet	2	*	*	3	NR	*	NR	*	NR	*	NR	*	*
Methyl Chloride Dry	2	*	*	NR	*	*	*	*	NR	*	*	*	*
Methyl Ether Keytone	1	*	*	NR	*	*	NR	*	NR	*	NR	*	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Methyl Isobutyl Keytone	NR	*	*	NR	*	*	NR	*	NR	*	NR	NR	*
Methyl Salicylate	*	*	*	1	*	*	*	*	1	*	1	*	*
Methyl Sulfate	*	*	*	1	*	*	NR	*	1	NR	1	NR	*
Methyl Sulfuric Acid	*	*	*	1	1	1	1	1	1	1	1	1	*
Methylene Chloride	2	*	*	2	NR	*	NR	*	3	NR	NR	NR	*
Milk	1	1	1	1	1	2	1	1	1	1	1	1	*
Mineral Oil	1	3	NR	2	2	*	NR	NR	1	3	1	1	*
Mixed Acids	*	*	*	NR	*	*	*	*	3	NR	*	*	*
Molasses	1	*	*	1	1	1	1	1	1	1	*	*	*
Morpholine	*	*	*	2	2	*	*	*	*	*	*	*	*
Monochloroacetic Acid	NR	NR	NR	1	1	*	*	*	2	3	*	*	*
Monochlorobenzene	2	NR	*	NR	*	*	NR	*	NR	*	*	*	*
Monochlorodifluoromethane	*	*	*	1	*	*	*	*	NR	*	*	*	*
Monoethanolamine	*	*	*	1	2	2	*	*	NR	*	*	*	*
Motor Oil	1	*	*	3	3	*	*	*	1	1	1	1	1
Mustard	*	*	*	1	1	*	*	*	*	*	*	*	*
Naptha	1	1	NR	3	NR	*	1	1	NR	*	1	*	*
Napthalene	1	NR	*	2	2	*	1	1	NR	*	NR	*	*
Nickel Chloride	1	1	*	1	1	1	1	1	1	1	1	1	*
Nickel Nitrate	1	*	*	1	1	1	1	1	1	1	1	1	*
Nickel Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	*
Nitric Acid (100%)	NR	*	*	NR	*	*	NR	*	NR	*	NR	*	*
Nitric Acid (70%)	NR	*	*	NR	*	*	NR	*	NR	*	NR	*	*
Nitric Acid (50%)	1	*	*	2	NR	*	1	2	1	NR	1	*	*
Nitric Acid (30%)	1	1	*	1	1	*	1	1	1	NR	1	*	*
Nitric Acid (10%)	1	1	*	1	1	1	1	1	1	NR	1	*	*
Nitrobenzene	1	*	*	2	NR	*	NR	*	NR	*	NR	*	*
Nitrous Oxide	*	*	*	1	*	*	*	*	1	3	1	*	*
Ocenol	*	*	*	NR	*	*	2	NR	1	1	1	1	*
Oils and Fats	1	*	*	1	1	*	NR	NR	2	2	1	1	*
Oils, Vegetables	1	*	*	1	1	*	*	*	1	1	1	1	*
Oleic Acid	1	1	3	2	2	2	2	NR	1	1	1	1	*
Oxalic Acid	1	1	*	1	1	*	1	1	1	3	1	1	*
Oxygen	1	*	*	1	1	1	1	1	1	1	1	1	1
Ozone	2	3	*	3	*	*	*	*	3	NR	*	*	*
Palmitic Acid	*	*	*	2	2	*	1	1	2	NR	1	*	*
Paraffin	1	*	*	1	*	*	*	*	1	1	*	*	*
Pentane	*	*	*	*	*	*	*	*	3	*	*	*	*
Perchloroethylene	2	*	*	NR	*	*	*	*	NR	*	*	*	*
Perchloric Acid	1	1	*	NR	*	*	*	*	NR	*	NR	*	*
Petroleum	1	*	*	2	*	*	NR	NR	3	3	*	*	*
Petroleum Ether	1	NR	*	1	1	*	NR	*	*	*	*	*	*
Phenol	1	3	*	1	NR	*	*	*	NR	*	1	*	*
Phenol Sulfonic Acid	*	*	*	*	*	*	*	*	2	2	*	*	*
Phenylhydrazine	*	*	*	*	*	*	*	*	NR	*	NR	*	*
Phosphoric Acid (10%)	1	1	Boiling	1	1	1	1	1	1	1	1	1	*
Phosphoric Acid (25%)	1	1	Boiling	1	1	1	1	1	1	1	1	1	*
Phosphoric Acid (50-100%)	1	1	Boiling	1	1	1	1	2	1	1	1	1	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Phosphorus	1	1	*	2	*	*	*	*	2	3	*	*	*
Phosphorus Trichloride	1	1	*	NR	*	*	*	*	NR	NR	NR	*	*
Phosphorus Pentachloride	*	*	*	1	2	2	*	*	3	NR	*	*	*
Photographic Solutions	1	1	*	1	1	3	*	*	1	1	1	1	*
Phthalic Acid	1	1	*	2	2	2	*	*	1	1	*	*	*
Picric Acid	*	*	*	*	*	*	*	*	NR	NR	NR	NR	*
Plating Solutions Brass	*	*	*	1	1	1	1	1	1	1	1	1	1
Plating Solutions Cadmium	*	*	*	1	1	1	1	1	1	1	1	1	1
Plating Solutions Chrome	*	*	*	1	1	1	*	*	2	2	1	1	2
Plating Solutions Copper	*	*	*	1	1	1	1	1	1	*	1	1	1
Plating Solutions Gold	*	*	*	1	1	1	1	1	1	2	1	1	1
Plating Solutions Lead	*	*	*	1	1	1	1	1	1	1	1	1	1
Plating Solutions Nickel	*	*	*	1	1	1	1	1	1	1	1	1	1
Plating Solutions Silver	*	*	*	1	1	1	1	1	1	1	1	1	1
Plating Solutions Tin	*	*	*	1	1	1	1	1	1	1	1	1	2
Plating Solutions Zinc	*	*	*	1	1	1	1	1	1	1	1	1	1
Potassium Acetate (50%)	1	*	*	1	*	*	*	*	1	1	*	*	*
Potassium Aluminum Sulfate	1	1	*	1	1	1	1	1	2	2	1	1	*
Potassium Bicarbonate (60%)	1	*	*	1	1	1	*	*	1	1	1	1	*
Potassium Bichromate (5%)	1	*	*	1	1	1	1	1	1	1	1	1	1
Potassium Bromide (10%)	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Carbonate	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Chlorate	1	1	*	1	1	1	*	*	1	1	1	1	*
Potassium Chloride	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Chromate	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Cyanide	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Dichromate (5%)	1	*	*	1	1	1	1	1	1	1	1	1	1
Potassium Ferricyanide	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Ferrocyanide	1	*	*	1	1	1	*	*	1	1	1	1	*
Potassium Hydrate	1	*	*	*	*	*	*	*	1	2	*	*	*
Potassium Hydroxide	1	1	1	1	1	*	*	*	1	1	1	1	*
Potassium Hypochlorite	2	*	*	NR	*	*	*	*	3	3	1	1	NR
Potassium Iodide	2	*	*	1	1	1	*	*	1	*	1	*	*
Potassium Nitrate (10%)	1	*	*	1	1	1	*	*	1	1	1	1	*
Potassium Permanganate	1	1	*	1	2	3	1	1	1	1	1	1	*
Potassium Persulfate	1	*	*	1	1	*	1	1	1	1	1	1	*
Potassium Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	*
Potassium Sulfide	1	*	*	1	1	1	1	1	1	1	*	*	*
Potassium Sulfite	1	*	*	1	1	*	1	1	2	2	*	*	*
Propane	1	*	*	2	NR	*	*	*	1	2	1	*	*
Propyl Alcohol	1	1	1	1	1	1	2	NR	1	NR	1	NR	*
Porpylene Glycol	*	*	*	1	2	*	1	1	3	NR	*	*	*
Propylene Oxide	*	*	*	1	2	*	*	*	3	NR	*	*	*
Pyridine	1	*	*	1	1	*	*	*	NR	*	NR	*	*
Pyrogallic Acid	*	*	*	1	*	*	*	*	3	*	*	*	*
Pyroligneous Acid	1	2	NR@140	1	2	*	*	*	3	3	*	*	*
Resorcinol	*	*	*	1	1	1	*	*	1	1	*	*	*
Rosin	1	*	*	1	1	*	*	*	3	NR	*	*	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Salicylic Acid	*	*	*	1	2	*	1	1	NR	*	*	*	*
Salicylaldehyde	*	*	*	1	2	*	*	*	3	NR	*	*	*
Salt Brine	1	1	1	1	1	1	1	1	1	1	1	1	*
Sea Water	1	1	1	1	1	1	1	1	1	1	1	1	*
Sewage	*	*	*	1	1	1	*	*	1	1	*	*	*
Silicon Oil	1	*	*	1	1	*	*	*	1	NR	1	1	*
Silver Chloride	*	*	*	1	2	*	*	*	1	2	*	*	*
Silver Cyanide	1	1	*	1	1	1	*	*	1	1	1	1	*
Silver Nitrate	1	1	*	1	2	2	*	*	1	2	1	1	*
Soap Solutions	1	1	*	1	1	1	1	1	1	1	1	1	*
Sodium Acetate (60%)	1	1	*	1	1	1	*	*	2	3	1	1	*
Sodium Acid Sulfate	*	*	*	1	1	1	*	*	1	1	*	*	*
Sodium Benzoate (10%)	1	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Bicarbonate	1	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Bichromate	1	1	*	1	1	2	*	*	1	2	*	*	*
Sodium Bisulfate	1	*	*	1	1	1	1	1	1	1	1	1	1
Sodium Bisulfite	1	*	*	1	1	1	1	1	1	1	1	1	1
Sodium Borate	1	1	*	1	1	2	1	1	1	1	1	1	*
Sodium Bromide	*	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Carbonate	1	1	1	1	1	1	1	1	1	1	1	1	*
Sodium Chlorate	1	1	*	1	1	1	1	1	1	2	1	1	*
Sodium Chromate	*	*	*	1	1	*	*	*	*	*	*	*	*
Sodium Cyanide	1	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Dichromate	1	1	*	1	1	2	1	1	1	2	1	1	*
Sodium Ferricyanide	*	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Ferrocyanide	*	*	*	1	1	*	1	1	1	1	1	1	*
Sodium Fluoride	*	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Hydroxide	1	1	1	2	2	2	1	2	1	2	1	1	*
Sodium Hypochlorite	1	1	1	2	*	*	*	*	2	2	1	1	*
Sodium Hyposulfite	1	1	*	*	*	*	*	*	2	2	*	*	*
Sodium Metaphosphate	1	*	*	1	NR	*	*	*	2	2	1	1	*
Sodium Nitrate	1	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Nitrite	1	1	1	1	1	1	1	1	1	1	1	1	*
Sodium Perborate	1	*	*	1	1	1	*	*	1	1	1	1	*
Sodium Peroxide	1	1	*	2	2	*	*	*	2	*	*	*	*
Sodium Phosphates	1	1	1	1	1	1	*	*	1	2	1	1	*
Sodium Silicate	1	*	*	1	1	1	*	*	1	1	1	1	*
Sodium Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Sulfide	1	*	*	1	1	1	1	1	1	1	1	1	*
Sodium Sulfite (90%)	1	*	*	1	1	2	1	1	1	1	1	1	*
Sodium Thiosulfate	1	1	*	1	1	2	*	*	1	1	1	*	*
Sodium Tetraborate	1	1	1	1	1	2	*	*	1	1	*	*	*
Soy Bean Oil	*	*	*	1	*	*	*	*	1	*	*	*	*
Stannic Chloride	*	*	*	1	1	1	1	1	1	1	1	1	*
Stannous Chloride	*	*	*	1	1	1	1	1	1	2	1	1	*
Starch	*	*	*	1	1	*	*	*	1	1	*	*	*
Stearic Acid	1	*	*	1	2	3	1	1	1	3	*	*	*
Stoddard's Solution	1	3	*	1	NR	*	*	*	NR	*	NR	*	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Styrene	*	*	*	*	*	*	*	*	NR	*	*	*	*
Sugar Juice	*	*	*	1	*	*	*	*	2	*	*	*	*
Sulfate Liquor	1	*	*	1	*	*	*	*	1	2	1	1	*
Sulfinol	*	*	*	*	*	*	*	*	*	*	*	*	*
Sulfur	1	1	*	1	1	1	1	1	1	1	*	*	*
Sulfur (Molten)	NR	NR	NR	NR	*	*	NR	*	NR	*	NR	*	*
Sulfur Chloride	*	*	*	NR	*	*	*	*	3	NR	1	1	*
Sulfur Dioxide Gas (Wet)	1	1	*	1	3	NR	1	1	NR	*	NR	*	*
Sulfur Dioxide Gas (Dry)	1	1	*	1	3	*	1	1	1	1	1	*	*
Sulfur Trioxide	*	*	*	NR	*	*	1	1	1	1	1	1	*
Sulfuric Acid (10%)	1	1	*	1	1	1	1	1	1	1	1	1	1
Sulfuric Acid (30%)	1	1	*	1	1	1	1	2	1	1	1	1	*
Sulfuric Acid (60%)	1	1	*	1	1	1	1	2	1	1	1	1	2
Sulfuric Acid (80%)	1	*	*	1	1	1	2	2	1	1	1	1	2
Sulfuric Acid (100%)	1	NR	*	1	2	NR	NR	NR	NR	NR	NR	*	*
Sulfurous Acid (10%)	1	*	*	1	1	1	1	1	1	1	1	1	*
Tall Oil	*	*	*	1	1	1	*	*	1	1	1	1	1
Tannic Acid	1	1	*	1	1	1	*	*	1	1	1	1	1
Tanning Liquor	1	*	*	1	2	2	1	1	1	1	1	1	1
Taritar Oil	*	*	*	1	*	*	*	*	NR	*	*	*	*
Tartaric Acid (10%)	1	*	*	1	1	1	NR	*	1	2	1	1	*
Tetrachloroacetic Acid	*	*	*	*	*	*	*	*	NR	*	*	*	*
Terachloroethane	*	*	*	NR	*	*	*	*	NR	*	*	*	*
Tetrachloroethylene	2	*	*	NR	*	*	*	*	NR	*	*	*	*
Tetraethyl Lead	*	*	*	2	NR	*	*	*	2	NR	1	*	*
Tetrahydrofuran	2	*	*	3	NR	*	NR	*	NR	*	NR	*	*
Tetrahydronaphthalene	1	*	*	3	NR	*	*	*	*	*	*	*	*
Tetraphosphoric Acid	*	*	*	*	*	*	*	*	*	*	*	*	*
Thionyl Chloride	3	*	*	NR	*	*	NR	*	NR	*	NR	*	*
Tin Tetrachloride	1	*	*	1	1	1	*	*	2	2	*	*	*
Titanium Tetrachloride	*	*	*	NR	*	*	*	*	NR	*	NR	*	*
Toluene	1	3	NR	NR	*	*	NR	*	NR	*	NR	*	*
Tomato Juice	1	*	*	1	1	1	*	*	1	*	1	1	*
Tributyl Citrate	*	*	*	2	3	*	*	*	3	NR	*	*	*
Tributyl Phosphate	*	*	*	2	NR	*	*	*	NR	*	NR	*	*
Transformer Oil	1	1	*	1	NR	*	*	*	NR	*	1	1	*
Trichloroacetic Acid	*	*	*	2	2	NR	*	*	NR	*	1	*	*
Trichloroethane	3	NR	*	NR	*	*	*	*	NR	*	*	*	*
Trichloroethylene	NR	*	*	3	NR	*	NR	*	NR	*	NR	*	*
Trichlorotrifluoroethane	*	*	*	1	*	*	*	*	NR	*	*	*	*
Tricresyl Phosphate	1	*	*	1	2	NR	*	*	NR	*	*	*	*
Triethanolamine	1	*	*	NR	*	*	NR	*	NR	*	NR	*	*
Triethylamine	*	*	*	NR	*	*	*	*	1	3	1	*	*
Triethylene Glycol	*	*	*	1	*	*	*	*	2	3	*	*	*
Trisodium Phosphate	1	1	*	*	*	*	*	*	*	*	*	*	*
Tripopylene Glycol	*	*	*	1	*	*	*	*	2	*	*	*	*
Trisodium Phosphate	1	1	*	1	1	1	1	1	1	1	1	1	*
Tung Oil	*	*	*	1	*	*	*	*	2	2	*	*	*

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

Continued on the next page

Chemical Resistance

CHEMICAL	TIVAR UHMW			Proteus Polypropylene			Polyethylene		PVC		Corzan CPVC		
	70°	122°	170°	70°	140°	180°	70°	140°	70°	140°	70°	170°	210°
Turpentine	1	3	NR	2	NR	*	NR	*	2	3	1	*	*
Undecanol	*	*	*	2	NR	*	*	*	1	3	*	*	*
Urea	1	*	*	1	1	1	1	1	2	NR	1	1	*
Urine	1	1	*	1	1	1	1	1	1	1	1	1	*
Varnish	1	*	*	1	*	*	*	*	NR	*	*	*	*
Vinegar	1	1	*	1	1	1	1	1	1	1	1	1	*
Vinyl Acetate	*	*	*	2	NR	*	2	NR	NR	*	NR	*	*
Vinyl Chloride	1	NR	*	*	*	*	*	*	NR	*	*	*	*
Vinylidene Chloride	*	*	*	NR	*	*	*	*	NR	*	*	*	*
Water, Fresh	1	1	1	1	1	1	1	1	1	1	1	1	1
Water, Acid Mine	1	1	*	1	1	1	1	1	1	1	1	1	NR
Water, Distilled	1	1	*	1	1	1	1	1	1	1	1	1	*
Water, Deionized	*	*	*	1	1	1	1	1	1	1	1	1	*
Water, Demineralized	*	*	*	1	1	1	1	1	1	1	1	1	*
Water, Salt	1	1	*	1	1	1	1	1	1	1	1	1	*
Whiskey	1	*	*	1	1	1	1	*	1	1	1	1	*
White Liquor	NR	*	*	1	1	*	*	*	1	1	1	1	*
White Spirit	1	3	*	1	1	1	*	*	1	1	*	*	*
Wine	1	1	1 to 160	1	1	1	1	*	1	1	1	1	*
Xylene	3	NR	*	NR	*	*	NR	*	NR	*	NR	*	*
Zinc Chloride	1	1	*	1	1	1	1	1	1	1	1	1	*
Zinc Cyanide	*	*	*	1	1	1	*	*	1	1	*	*	*
Zinc Molten	NR	NR	NR	NR	*	*	NR	*	NR	*	NR	*	*
Zinc Nitrate	*	*	*	1	1	1	1	1	1	1	1	1	*
Zinc Stearate	*	*	*	1	*	*	*	*	1	2	*	*	*
Zinc Sulfate	1	*	*	1	1	1	1	1	1	1	1	1	1

1 <15% loss in property values. Little or no chemical attack.

2 15-30% loss in propery values. Minor chemical attack.

3 30-50% loss in propery values. Moderate chemical attack.

NR Not Recommended. >50% loss in propery values.

** No data available.*

The chemical resistance of plastics can be difficult to predict. It is dependent upon: temperature, time of exposure, chemical concentration, and stress on the material. Increases in any of these factors may result in reduced chemical inertness. This table is intended as a **guide only**, and not intended as an alternative to actual testing. Alro Plastics and our suppliers highly recommend actual testing which represents the only method of evaluating suitability for use in your specific application.

Chemical Resistance 2

CHEMICAL	Concentration Weight, %	Nylon 101, Nylatron® GS	MC 901, MC 907 Nylatron® GSM, GSM Blue, Nylatron® NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P, Ertalyte® TX	PC 1000, Polycarbonate	PSU 1000, Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron® PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Acetaldehyde Aq.	40	B	B	A	A	D	*	D	A	A	A	A	*
Acetamide Aq.	50	A	A	A	*	*	*	*	A	*	A	*	*
Acetic Acid Aq.	10	C	C	C	B	B	A	A	A	A	A	A	B
Acetone		A	A	A	B	D	D	C	A	A	A	A	A
Acrylonitrile		A	A	*	B	D	D	*	A	A	A	A	A
Alcohols, Aliphatic		B	B	A	A	A	A	A	A	A	A	A	*
Allyl Chloride		C	*	*	*	*	*	*	A	*	A	*	*
Ally Alcohol		*	B	*	A	B	*	*	A	A	A	A	*
Aluminum Chloride Aq.	10	A	A	*	A	A	*	*	A	A	A	A	*
Aluminum Sulfate Aq.	10	A	A	A	*	A	A	*	A	A	A	A	*
Ammonia Aq.	10	A	A	A	A	*	*	*	A	A	A	B	C
Ammonia Gas		C	B	D	A	D	B	*	A	*	A	C	C
Ammonium Carbonate Aq.	10	A	A	*	A	B	*	*	A	A	A	A	*
Ammonium Chloride Aq.	10	D	B	A	A	A	A	*	A	A	A	A	*
Ammonium Chloride Aq.	37	D	B	A	A	A	*	*	A	A	A	A	*
Amyl Acetate		B	D	A	*	D	D	B	A	A	A	A	*
Amyl Alcohol		*	A	*	*	B	A	*	A	A	A	A	*
Aniline		C	C	B	A	C	*	*	A	A	A	A	*
Antimony Trichloride Aq.	10	D	D	*	*	A	D	*	A	*	A	*	*
Barium Chloride Aq.	10	D	B	A	*	A	A	*	A	A	A	A	*
Barium Sulfate Aq.	10	*	A	A	*	*	*	*	A	*	A	A	*
Barium Sulfide Aq.	10	A	*	*	*	*	*	*	A	*	A	A	*
Benzaldehyde		A	C	A	A	D	*	D	A	B	A	A	*
Benzene		A	A	A	A	D	D	D	A	A	A	A	*
Benzenesulfonic Acid		D	*	C	*	D	*	*	A	A	D	D	*
Benzyl Alcohol		C	D	A	A	D	*	*	A	A	A	A	*
Benzzoic Acid Aq.	SAT	C	D	*	A	D	*	*	A	A	A	*	*
Beverages Aq. Alcohol		B	B	A	A	A	A	A	A	A	A	A	A
Beverages Aq.Carbonated		B	B	A	A	A	A	A	A	A	A	A	A
Bitumen		B	B	A	*	*	*	*	A	*	A	*	*
Bleaching Lye	10	C	B	C	*	*	*	*	A	*	A	A	*
Bleaching Lye	100	C	B	C	*	*	*	*	A	*	A	*	*
Boric Acid Aq.	10	D	D	*	A	A	*	*	A	A	A	*	*
Boron Trifluoride		D	D	*	*	*	*	*	*	*	*	*	*
Bromine Aq.	30	D	D	D	*	D	A	*	*	A	B	A	*
Bromine Liq.		D	D	D	*	D	*	*	*	A	D	*	*
Butanol		B	B	A	B	A	B	A	A	A	A	A	A
Butyl Acetate		A	B	A	A	D	D	B	A	A	A	A	*
Butyl Phthalate		D	*	*	*	*	*	*	A	B	A	A	*
Butylene Glycol		A	B	*	B	B	*	A	A	A	A	*	A
Butylamine		A	*	D	*	D	*	D	A	B	A	A	*
Butyric Acid Aq.	20	D	B	A	*	D	*	*	A	A	A	*	*
Butyric Acid	Conc	D	B	*	*	D	*	*	A	A	A	*	*
Butyrolactone		*	A	A	B	C	*	*	A	*	A	A	*
Calcium Chloride Aq.	10	D	A	A	A	A	A	*	A	A	A	A	*

A No attack, possibly slight absorption. Negligible effect on mechanical properties

B Slight attack by absorption, some swelling and a small reduction in mechanical properties likely.

C Moderate attack or appreciable absorption; material will have limited life.

D Material will decompose or dissolve in a short period of time.

* No Data Available

Aq. = Aqueous Solution Sat = Saturated Aqueous Solution Conc = Concentrated Aqueous Solution

Continued on the next page

Chemical Resistance 2

CHEMICAL	Concentration Weight, %	Nylon 101, Nylatron® GS	MC 901, MC 907 Nylatron® GSM, GSM Blue, Nylatron® NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P, Ertalyte® TX	PC 1000, Polycarbonate	PSU 1000, Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron® PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Calcium Chloride (in Alcohol)	20	D	D	A	*	*	*	*	A	A	A	*	*
Calcium Hypochlorite		D	D	D	A	A	B	*	A	A	A	A	*
Camphor		A	A	A	*	*	*	*	A	A	A	*	*
Carbon Disulphide		A	A	A	*	D	*	*	A	A	A	*	*
Carbon Tetrachloride		A	A	A	A	D	A	A	A	A	A	A	A
Carbonic Acid Aq.	10	A	*	A	A	*	*	*	A	A	A	*	*
Carnalite Aq.	10	*	A	*	*	*	*	*	A	*	A	*	*
Castor Oil		A	*	A	A	A	*	*	A	*	A	*	*
Catechol		*	C	*	*	*	*	*	*	*	A	*	*
Chloroacetic Acid Aq.	10	D	C	D	*	*	*	*	A	A	A	*	*
Chloral Hydrate		D	D	*	*	*	*	*	A	*	A	*	*
Chlorine Aq.	10	D	D	D	*	D	D	*	A	*	D	*	*
Chlorine Gas	100	*	D	D	*	B	*	*	A	*	A	*	A
Chlorobenzene		A	A	A	A	D	D	*	A	A	A	A	*
Chloroform		A	C	C	D	D	D	D	A	A	A	A	A
Chlorosulfonic Acid Aq	10	D	C	D	*	*	*	*	A	D	D	*	*
Chrome Alum Aq.	10	A	*	*	*	A	*	*	A	*	A	*	*
Chromic Acid Aq.	1	D	C	B	A	A	A	A	A	A	A	A	*
Citric Acid Aq.	10	B	B	A	A	A	A	A	A	A	A	*	A
Citric Acid Aq.	Sat	C	C	*	A	*	A	*	A	A	A	*	*
Coconut Oil		A	A	*	*	*	*	*	A	A	A	*	*
Creosote		A	*	*	*	D	*	*	A	*	A	*	*
Cresols		D	D	*	*	D	D	*	A	A	A	*	*
Cresylic Acid		D	*	*	*	*	*	*	A	*	A	*	*
Cupric Chloride Aq.	10	D	*	A	A	A	A	*	A	A	A	*	*
Cupric Sulfate Aq.	0.5	*	B	A	A	A	*	*	A	A	A	*	*
Cupric Sulfate Aq.	10	B	*	A	*	*	*	*	A	A	A	*	*
Cupric Sulfate Aq.	Sat	*	B	*	*	*	*	*	A	A	A	*	*
Cyclohexane		A	A	A	A	B	B	A	A	A	A	A	A
Cyclohexanol		B	B	A	A	C	A	A	A	A	A	A	A
Cyclohexanone		A	A	A	A	D	D	*	A	A	A	A	A
Decalin		A	A	A	*	A	A	A	A	A	A	*	A
Detergents, Organic		A	A	A	A	A	A	A	A	A	A	*	A
Dibutylphthalate		A	A	A	*	D	*	B	A	*	A	A	*
Dichlorordifluoro Methane		A	A	A	A	D	D	D	A	B	A	*	A
Dichloroethylene		A	A	D	B	D	D	D	A	*	A	A	A
Diethyleneglycol Aq.	90	A	B	A	A	A	B	*	A	*	A	A	*
Diesel Oil		A	A	A	A	A	A	A	A	A	A	A	A
Dimethyl Carbinol		A	B	A	*	*	*	*	A	*	A	*	*
Dimethyl Aniline		A	*	*	B	D	D	D	A	A	A	A	*
Dimethyl Formamide		A	A	A	A	D	D	D	A	A	A	*	*
Dioxane		A	A	A	A	D	D	*	A	A	A	A	*
Edible Oils		A	A	A	A	A	B	A	A	A	A	A	A
Ethanol, Denatured	96	B	B	A	A	A	A	A	A	A	A	A	A
Ether, Diethyl		A	A	A	A	A	A	A	A	A	A	A	A

A No attack, possibly slight absorption. Negligible effect on mechanical properties

B Slight attack by absorption, some swelling and a small reduction in mechanical properties likely.

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D Material will decompose or dissolve in a short period of time.

** No Data Available*

Aq. = Aqueous Solution Sat = Saturated Aqueous Solution Conc = Concentrated Aqueous Solution

Continued on the next page

Chemical Resistance 2

CHEMICAL	Concentration Weight, %	Nylon 101, Nylatron® GS	MC 901, MC 907 Nylatron® GSM, GSM Blue, Nylatron® NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P, Ertalyte® TX	PC 1000, Polycarbonate	PSU 1000, Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron® PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Ethyl Acetate		A	A	C	A	D	D	B	A	A	A	A	*
Ethyl Butyrate		A	*	*	*	D	D	B	A	*	A	A	*
Ethyl Chloride		*	A	A	*	*	*	*	A	A	A	A	*
Ethylene Chlorohydrine		D	*	*	*	D	*	*	A	*	A	*	*
Ethylene Chloride		B	B	A	C	C	C	C	A	A	A	A	A
Ethylene Diamine		B	A	A	*	C	B	C	A	D	A	D	*
Ethylene Dichloride		B	*	B	*	D	*	D	A	B	A	A	A
Ethylene Glycol Aq.	96	A	B	A	A	B	A	D	A	A	A	A	A
Ethylene Propionate		A	*	*	*	*	*	*	A	*	A	A	*
Ferric Chloride Aq.	5	B	B	A	A	A	A	*	A	A	A	A	*
Ferric Chloride Aq.	10	B	*	A	*	A	A	*	A	A	B	A	*
Ferric Chloride Aq.	Sat	C	C	*	*	*	*	*	A	A	B	A	*
Ferrous Chloride Aq.	10	B	C	A	*	*	*	*	A	A	A	A	*
Fluorine		D	D	D	*	*	*	*	C	*	D	*	*
Flousilicic Acid Aq.	10	D	C	*	*	A	*	*	B	A	*	*	*
Fluothane		A	A	*	*	*	*	*	A	*	A	*	*
Freon 12 (Arcton 12)		A	A	A	A	D	A	*	A	B	A	*	A
Formaldehyde Aq.	10	A	B	A	A	A	C	A	A	A	A	A	*
Formic Acid Aq.	3	D	D	D	B	A	*	A	A	A	B	C	D
Formic Acid Aq.	10	D	D	D	C	B	D	A	A	A	B	C	D
Fruit Juices	Conc	A	B	A	A	A	A	*	A	A	A	A	*
Furfural		A	B	A	*	*	D	*	A	A	A	B	*
Gasoline		A	A	A	A	D	B	B	A	A	A	A	A
Glycerine		A	B	A	A	A	B	*	A	A	A	A	*
Heptane		A	A	A	A	A	A	A	A	A	A	A	A
Hexane		A	A	A	A	A	B	A	A	A	A	A	A
Hydrobromic Acid Aq.	10	D	C	D	*	*	B	*	A	B	D	A	*
Hydrochloric Acid Aq.	0.4	B	B	C	A	A	A	A	A	A	A	A	B
Hydrochloric Acid Aq.	2	C	D	D	B	A	A	A	A	A	A	A	D
Hydrochloric Acid Aq.	10	D	D	D	C	A	A	A	A	B	A	A	D
Hydrofluoric Acid Aq.	4	D	C	D	B	A	A	*	C	B	D	*	*
Hydrogenated Vegetable Oils		A	A	A	A	*	*	*	A	A	A	A	*
Hydrogen Peroxide Aq.	0.5	D	*	A	A	A	A	A	A	A	A	*	A
Hydrogen Peroxide Aq.	1	D	C	B	A	A	A	A	A	A	A	*	A
Hydrogen Peroxide Aq.	3	D	C	B	A	A	A	A	A	A	A	*	A
Hydrogen Sulfide Aq.	Sat	C	C	C	C	A	*	*	A	A	A	*	*
Hydroquinone		B	B	*	*	*	*	*	A	*	A	*	*
Iodine (in Alcohol)		D	D	*	*	D	*	*	A	*	A	*	*
Iodine (in Pt. Iodine) Aq.	3	D	C	*	*	D	*	*	A	*	A	*	*
Iso Octane		A	A	A	A	A	B	B	A	A	A	A	A
Isopropyl Alcohol		B	B	A	A	A	B	A	A	A	A	A	A
Isopropyl Ether		A	A	A	A	A	C	A	A	A	A	A	A
Lactic Acid Aq.	10	A	A	A	A	A	A	*	A	A	A	A	*
Lactic Acid Aq.	90	C	D	*	*	*	*	*	A	A	A	A	*
Lead Acetate Aq.	10	B	B	A	*	*	*	*	A	A	A	A	*

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B Slight attack by absorption, some swelling and a small reduction in mechanical properties likely.

C Moderate attack or appreciable absorption; material will have limited life.

D Material will decompose or dissolve in a short period of time.

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Aq. = Aqueous Solution Sat = Saturated Aqueous Solution Conc = Concentrated Aqueous Solution

Chemical Resistance 2

CHEMICAL	Concentration Weight, %	Nylon 101, Nylatron® GS	MC 901, MC 907 Nylatron® GSM, GSM Blue, Nylatron® NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P, Ertalyte® TX	PC 1000, Polycarbonate	PSU 1000, Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron® PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Lead Stearate		A	A	*	*	*	*	*	A	*	A	*	*
Linseed Oil		A	A	A	*	A	A	*	A	A	A	*	*
Lithium Bromide Aq.	50	D	D	A	*	*	*	*	A	*	A	*	*
Lubricating Oils (Petro)		A	A	A	A	A	A	A	A	A	A	A	A
Magnesium Chloride Aq.	10	A	A	A	A	A	A	*	A	A	A	A	*
Magnesium Hydroxide Aq.	10	A	A	A	B	*	*	*	A	A	A	D	*
Magnesium Sulfate Aq.	10	A	A	A	*	*	*	*	A	A	A	A	*
Maleic Acid Aq.	Conc	*	C	*	*	*	*	*	A	*	A	*	*
Malonic Acid Aq.	Conc	*	C	*	*	*	B	*	A	*	A	*	*
Manganese Sulfate Aq.	10	A	A	A	A	*	*	*	A	*	A	*	*
Mercuric Chloride Aq.	6	C	D	B	*	A	*	*	A	*	A	*	*
Mercury		A	A	A	A	A	*	*	A	A	A	*	*
Methanol		A	B	A	A	B	B	A	A	A	A	*	A
Methyl Acetate		A	A	A	A	D	*	B	A	A	A	A	*
Methyl Ethyl Ketone		A	A	B	A	D	B	D	B	B	A	A	A
Methylpyrrolidone		A	A	*	*	*	D	*	A	A	A	*	*
Methylene Chloride		B	B	C	D	D	D	C	A	A	A	A	C
Methyl Phenyl Ether		A	*	*	A	*	*	*	A	A	A	A	*
Milk		A	A	A	A	A	A	A	A	A	A	A	A
Mineral Oils		A	A	A	*	A	A	A	A	A	A	A	A
Naphthalene		A	A	A	A	D	D	D	A	A	A	*	
Nickel Sulfate Aq.	10	A	A	*	*	A	*	*	A	A	A	*	
Nicotine		D	D	*	*	*	*	*	*	*	A	*	
Nitric Acid Aq.	0.1	C	C	D	B	A	A	A	A	A	A	A	B
Nitric Acid Aq.	10	D	D	D	C	A	C	A	A	B	A	A	C
Nitrobenzene		C	B	B	D	D	D	D	A	A	A	A	*
Nitromethane		A	B	*	B	A	D	*	A	A	A	A	*
Oleic Acid		A	A	A	A	A	A	*	A	A	A	*	*
Oxalic Acid Aq.	10	C	B	C	*	A	A	*	A	A	A	*	*
Ozone		C	C	C	A	D	A	*	A	*	A	*	*
Paraffin		A	A	A	A	A	A	A	A	A	A	A	A
Perchloroethylene		B	B	B	A	C	*	C	A	A	A	A	A
Perchloric Acid Aq.	10	D	C	C	A	*	*	*	A	*	A	*	
Petroleum Ether		A	A	A	*	A	*	*	A	A	A	A	
Phenol Aq.	6	D	D	D	A	D	*	*	A	*	B	*	A
Phenol Aq.	75	D	D	D	C	D	D	D	A	*	D	*	A
Phenol (Molten)		D	D	D	C	D	D	D	A	*	B	*	
Phosphoric Acid Aq.	0.3	*	B	C	A	A	A	A	A	A	A	A	B
Phosphoric Acid Aq.	3	D	C	C	A	A	A	A	A	A	A	A	C
Phosphoric Acid Aq.	10	D	D	D	B	A	A	A	A	A	A	A	C
Phthalic Acid Aq.	Sat	B	B	A	*	*	*	*	A	*	A	*	*
Phthalic Dioctyl		A	A	*	*	*	*	*	A	A	A	*	*
Potassium Acetate Aq.	50	A	A	A	*	*	*	*	A	*	A	A	*
Potassium Bicarbonate Aq	60	A	A	A	A	*	*	*	A	A	A	A	*
Potassium Bromide Aq.	10	A	A	A	A	A	*	*	A	A	A	A	*

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Chemical Resistance 2

CHEMICAL	Concentration Weight, %	Nylon 101, Nylatron® GS	MC 901, MC 907 Nylatron® GSM, GSM Blue, Nylatron® NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P, Ertalyte® TX	PC 1000, Polycarbonate	PSU 1000, Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron® PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Potassium Carbonate Aq	60	A	A	A	A	*	*	A	A	A	A	A	*
Potassium Chloride Aq	90	A	A	A	A	A	*	*	A	A	A	A	*
Potassium Dichromate Aq	5	C	B	A	A	A	*	*	A	A	A	A	*
Potassium Ferricyanide Aq	30	A	B	*	A	*	*	*	A	*	A	*	*
Potassium Ferrocyanide Aq	30	A	B	*	*	*	*	*	A	*	A	*	*
Potassium Hydroxide Aq	10	C	A	A	C	C	A	A	B	A	A	D	*
Potassium Hydroxide Aq	50	C	A	D	C	D	B	*	C	A	A	D	*
Potassium Nitrate Aq	10	A	A	B	A	A	A	*	A	A	A	*	*
Potassium Permanganate Aq	1	D	C	A	A	A	A	*	A	A	A	A	*
Potassium Sulfite Aq.	Conc	A	A	*	*	*	*	*	A	A	A	A	*
Potassium Sulfite Aq.	90	A	*	*	*	*	*	*	A	*	A	A	*
Propane Gas		A	A	A	A	A	*	*	A	A	A	*	A
Pyridine		A	A	B	*	D	D	*	A	*	A	D	*
Resorcinol		D	D	*	*	*	*	*	A	*	A	*	*
Salicylic Acid		A	A	D	A	*	*	*	A	*	A	*	*
Silicone Fluids		A	A	A	A	A	*	*	A	A	A	A	A
Silver Nitrate		A	A	A	A	A	*	*	A	A	A	A	*
Soap Solutions		A	A	A	A	A	A	A	A	A	A	A	A
Sodium (Molten)		*	*	C	*	*	*	*	B	*	D	*	*
Sodium Acetate Aq.	60	A	B	A	A	*	*	*	A	A	A	A	*
Sodium Benzoate Aq.	10	A	*	A	A	*	*	*	A	*	A	A	*
Sodium Bicarbonate Aq.	50	A	A	A	A	A	*	*	A	A	A	A	*
Sodium Bisulphite Aq.	10	A	A	D	A	A	*	*	A	A	A	A	*
Sodium Bromide Aq.	10	A	B	A	A	*	*	*	A	A	A	A	*
Sodium Carbonate Aq.	20	A	B	A	A	*	*	*	A	A	A	A	A
Sodium Carbonate Aq.	50	A	*	A	*	*	*	*	A	A	A	A	*
Sodium Chlorate Aq.	10	A	B	A	*	A	*	*	A	A	A	A	*
Sodium Chloride Aq.	10	A	B	A	A	A	A	*	A	A	A	A	*
Sodium Chloride Aq.	90	A	B	A	A	A	*	*	A	A	A	A	*
Sodium Cyanide Aq.	10	A	*	A	*	A	*	*	A	A	A	*	*
Sodium Hydroxide Aq.	10	C	D	D	C	C	A	A	B	A	A	D	B
Sodium Hydroxide Aq.	50	D	D	D	C	D	C	D	C	B	A	D	C
Sodium Hypochlorite 15%		D	C	D	A	A	A	*	A	A	A	A	B
Cl (Chlorine Bleach)													
Sodium Nitrate Aq.	50	A	A	A	A	C	*	*	A	A	A	*	*
Sodium Perborate Aq.	10	B	*	A	*	*	*	*	A	*	A	*	*
Sodium Phosphate Aq.	90	A	*	*	*	*	*	*	A	*	A	*	*
Sodium Silicate		A	A	*	A	A	B	*	A	A	A	*	*
Sodium Sulfate Aq.	90	A	A	*	A	A	*	*	A	A	A	A	*
Sodium Sulfide Aq.	90	A	*	*	B	*	*	*	A	A	A	A	*
Sodium Thiosulfate Aq.	10	A	A	A	A	A	A	*	A	A	A	*	*
Stannic Chloride Aq.	10	D	*	D	*	A	A	A	A	A	A	*	A
Stannic Sulfate Aq.	10	D	C	*	*	*	*	*	A	A	A	*	*
Stearic Acid		A	A	A	*	*	*	*	A	*	A	*	*
Styrene (Monomer)		A	A	A	C	D	*	*	A	A	A	*	*

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Sulfur		A	A	A	A	A	*	*	A	*	A	*	*
Sulfur Dioxide (Dry Gas)	100	C	A	D	B	A	*	*	A	A	A	A	*
Sulfuric Acid Aq.	2	C	C	D	A	A	A	A	A	A	A	A	B
Sulfuric Acid Aq.	5	D	D	D	A	A	A	A	A	A	A	A	B
Sulfuric Acid Conc.		D	D	D	C	D	D	D	A	B	D	*	*
Sulfurous Acid Aq.	10	A	*	D	*	A	A	A	A	A	A	*	B
Tallow		A	A	A	*	A	A	A	A	A	A	A	A
Tar		B	B	A	*	*	*	*	A	A	A	A	*
Tartaric Acid Aq.	10	B	A	A	*	A	*	*	A	A	A	*	*
Tetrachlorethylene		A	C	A	B	D	D	A	B	*	A	*	*
Tetrahydrofuran		A	A	B	A	D	*	*	A	A	A	A	A
Tetralin		A	A	A	A	*	*	*	A	*	A	*	*
Thionyl Chloride		D	C	B	*	*	*	*	A	*	A	*	*
Thiophene		A	*	*	*	D	*	*	A	*	A	*	*
Toluene		A	A	B	A	D	D	D	A	A	A	A	A
Transformer Oil		A	A	A	*	A	A	*	A	A	A	A	*
Trichlorethylene		B	B	D	B	D	D	D	A	A	A	A	*
Triethanolamine		A	A	A	B	D	C	D	A	A	A	D	*
Turpentine		A	A	A	*	B	C	*	A	A	A	A	*
Trisodium Phosphate Aq.	95	*	B	A	A	A	*	*	A	A	A	*	*
Urea		A	A	A	A	A	*	*	A	A	A	*	*
Vaseline		A	A	A	A	A	A	A	A	A	A	A	A
Vegetable Oils		A	A	A	A	A	A	A	A	A	A	A	A
Vinegar		C	C	B	A	A	*	A	A	A	A	A	A
Vinyl Chloride		A	A	*	*	*	*	*	A	A	A	*	*
Water		A	A	A	A	A	A	A	A	A	A	A	A
Wax (Molten)		A	A	A	A	A	A	A	A	A	A	A	A
White Spirit		A	A	A	*	*	*	*	A	A	A	*	*
Wines & Spirits		B	B	A	A	A	*	A	A	A	A	A	A
Xylene		A	A	A	A	D	D	C	A	A	A	A	A
Xylenol		D	D	A	*	D	D	B	A	*	A	A	A
Zinc Chloride Aq.	10	C	B	D	A	A	A	A	A	A	A	*	*
Zinc Oxide		A	A	C	*	*	*	*	A	A	A	*	*
Zinc Sulfate	10	A	*	C	*	A	*	*	A	A	A	*	*

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Plastic Weight Chart

Plastic Sheet and Flat stock (LBS./SQFT)

THICK	UHMW-PE	HDPE	ACETAL	ACRYLIC	POLYCARBONATE	POLYPROPYLENE	NYLON	ABS	PTFE / TFE	PVC	PHENOLIC
1/16"	0.32	0.32	0.49	0.39	0.40	0.30	0.39	0.35	0.75	0.47	0.48
1/8"	0.63	0.63	0.99	0.78	0.79	0.60	0.78	0.70	1.50	0.94	0.96
3/16"	0.94	0.94	1.48	1.16	1.19	0.89	1.16	1.05	2.24	1.40	1.43
1/4"	1.26	1.26	1.98	1.55	1.59	1.19	1.55	1.40	2.99	1.87	1.91
3/8"	1.89	1.89	2.97	2.33	2.38	1.78	2.33	2.10	4.49	2.81	2.86
1/2"	2.52	2.52	3.96	3.10	3.17	2.38	3.10	2.80	5.98	3.75	3.82
5/8"	3.15	3.15	4.95	3.88	3.96	2.97	3.88	3.49	7.47	4.68	4.77
3/4"	3.78	3.78	5.94	4.65	4.75	3.56	4.65	4.20	8.97	5.62	5.73
7/8"	4.41	4.41	6.93	5.42	5.55	4.16	5.42	4.92	10.46	6.56	6.68
1"	5.04	5.04	7.92	6.20	6.34	4.75	6.20	5.60	11.96	7.49	7.64
1-1/8"	5.67	5.67	8.91	6.97	7.13	5.35	6.97	6.32	13.45	8.43	8.59
1-1/4"	6.30	6.30	9.90	7.75	7.92	5.94	7.75	6.99	14.94	9.36	9.54
1-3/8"	6.93	6.93	10.89	8.52	8.72	6.54	8.52	7.73	16.44	10.30	10.50
1-1/2"	7.56	7.56	11.88	9.29	9.51	7.13	9.29	8.40	17.93	11.23	11.45
1-5/8"	8.19	8.19	12.87	10.07	10.30	7.73	10.07	9.13	19.42	12.17	12.41
1-3/4"	8.82	8.82	13.86	10.84	11.09	8.32	10.84	9.78	20.92	13.11	13.36
2"	10.08	10.08	15.84	12.39	12.68	9.51	12.39	11.18	23.91	14.98	15.27
2-1/4"	11.34	11.34	17.83	13.94	14.26	10.70	13.94	12.64	26.89	16.85	17.18
2-1/2"	12.60	12.60	19.80	15.48	15.84	11.88	15.48	13.98	29.88	18.72	19.08
2-3/4"	13.86	13.86	21.78	17.03	17.43	13.06	17.03	15.45	32.87	20.60	20.99
3"	15.12	15.12	23.76	18.58	19.01	14.26	18.58	16.85	35.86	22.47	22.90
3-1/4"	16.38	16.38	25.74	20.13	20.60	15.45	20.13	18.26	38.85	24.34	24.81
3-1/2"	17.64	17.64	27.72	21.68	22.18	16.64	21.68	19.66	41.84	26.21	26.72
4"	20.16	20.16	31.68	24.77	25.35	19.01	24.77	22.36	47.81	29.96	30.53
4-1/2"	22.68	22.68	35.64	27.87	28.52	21.39	27.87	25.28	53.79	33.70	34.35
5"	25.20	25.20	39.60	30.97	31.68	23.76	30.97	28.10	59.76	37.44	38.16
5-1/2"	27.72	27.72	43.56	34.06	34.85	26.14	34.06	30.89	65.74	41.19	41.98
6"	30.24	30.24	47.52	37.16	38.02	28.52	37.16	33.70	71.72	44.93	45.80
7"	46.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8"	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

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Some materials listed above may or may not be in stock and some may be custom runs. The chart is just for reference only and should be used to help calculate shipping rates and such.

Plastic Weight Chart

Plastic Rod and Round stock (LBS./FOOT)

DIA.	UHMW-PE	HDPE	ACETAL	ACRYLIC	POLYCARBONATE	POLYPROPYLENE	NYLON	ABS	PTFE / TFE	PVC	PHENOLIC
1/8"	0.006	0.005	0.008	0.006	0.006	0.005	0.006	0.006	0.012	0.007	0.007
3/16"	0.013	0.011	0.017	0.014	0.014	0.011	0.014	0.013	0.026	0.016	0.16
1/4"	0.023	0.020	0.030	0.025	0.025	0.019	0.025	0.022	0.047	0.029	0.029
3/8"	0.052	0.045	0.068	0.057	0.057	0.044	0.056	0.050	0.105	0.066	0.065
1/2"	0.093	0.080	0.120	0.101	0.101	0.078	0.099	0.090	0.186	0.118	0.116
5/8"	0.145	0.125	0.188	0.158	0.158	0.121	0.155	0.140	0.291	0.184	0.180
3/4"	0.208	0.180	0.270	0.228	0.228	0.174	0.223	0.201	0.419	0.264	0.260
7/8"	0.283	0.245	0.368	0.310	0.310	0.237	0.303	0.274	0.570	0.360	0.354
1"	0.370	0.320	0.480	0.405	0.405	0.310	0.396	0.358	0.744	0.470	0.462
1-1/8"	0.468	0.405	0.608	0.513	0.513	0.392	0.501	0.453	0.942	0.595	0.585
1-1/4"	0.578	0.500	0.750	0.633	0.633	0.484	0.619	0.559	1.163	0.734	0.722
1-3/8"	0.700	0.605	0.908	0.766	0.766	0.586	0.749	0.677	1.407	0.889	0.873
1-1/2"	0.833	0.720	1.080	0.911	0.911	0.698	0.891	0.806	1.674	1.058	1.040
1-5/8"	0.977	0.845	1.268	1.069	1.069	0.819	1.046	0.945	1.965	1.241	1.220
1-3/4"	1.133	0.980	1.470	1.240	1.240	0.949	1.213	1.096	2.279	1.439	1.415
2"	1.480	1.280	1.920	1.620	1.620	1.240	1.584	1.432	2.976	1.880	1.848
2-1/4"	1.873	1.620	2.430	2.050	2.050	1.569	2.005	1.812	3.767	2.379	2.339
2-1/2"	2.313	2.000	3.000	2.531	2.531	1.938	2.475	2.238	4.650	2.938	2.888
2-3/4"	2.798	2.420	3.630	3.063	3.063	2.344	2.995	2.707	5.627	3.554	3.494
3"	3.330	2.880	4.320	3.645	3.645	2.790	3.564	3.222	6.696	4.230	4.158
3-1/4"	3.908	3.380	5.070	4.278	4.278	3.274	4.183	3.781	7.859	4.964	4.880
3-1/2"	4.533	3.920	5.880	4.961	4.961	3.798	4.851	4.386	9.114	5.758	5.660
4"	5.920	5.120	7.680	6.480	6.480	4.960	6.336	5.728	11.904	7.520	7.392
4-1/2"	7.493	6.480	9.720	8.201	8.201	6.278	8.019	7.250	15.066	9.518	9.356
5"	9.250	8.000	12.000	10.125	10.125	7.750	9.900	8.950	18.600	11.750	11.550
5-1/2"	11.193	9.680	14.520	12.251	12.251	9.378	11.979	10.830	22.506	14.218	13.976
6"	13.320	11.520	17.280	14.580	14.580	11.160	14.256	12.888	26.784	16.920	16.632
6-1/2"	15.633	13.520	20.280	17.111	17.111	13.098	16.731	15.126	31.434	19.858	19.520
7"	18.130	15.680	23.520	19.845	19.845	15.190	19.404	17.542	36.456	23.030	22.638
7-1/2"	20.813	18.000	27.000	22.781	22.781	17.438	22.275	20.138	41.850	26.438	25.988
8"	23.680	20.480	30.720	25.920	25.920	19.840	25.344	22.912	47.616	30.080	29.568
8-1/2"	26.733	23.120	34.680	29.261	29.261	22.398	28.611	25.866	53.754	33.958	33.380
9"	29.970	25.920	38.880	32.805	32.805	25.110	32.076	28.998	60.264	38.070	37.422
9-1/2"	33.393	28.880	43.320	36.551	36.551	27.978	35.739	32.310	67.146	42.418	41.696
10"	37.000	32.000	48.000	40.500	40.500	31.000	39.600	35.800	74.400	47.000	46.200
12"	44.000	n/a	58.000	n/a	n/a	n/a	57.000	n/a	n/a	n/a	n/a

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Terminology

ABLATIVE
To wear away, burn away, or vaporize.

ABRASION RESISTANCE
Ability to withstand the effects of repeated wear, rubbing, scraping, etc...

ACETAL RESINS
The molecular structure of the polymer is that of a linear acetal consisting of unbranched polyoxymethylene chains.

ACIDS
One of a class of substances compounded of hydrogen and one or more other elements, capable of uniting with a base to form a salt, and in aqueous solution, turning blue litmus paper red.

ACRYLATE RESINS
A class of thermoplastic resins produced by polymerization of acrylic acid derivatives.

ADHESIVE
A substance capable of holding materials together by surface attachment.

AGING
The effect of time on plastic exposed indoors at ordinary conditions of temperature and relatively clean air.

ALKALIES
Compounds capable of neutralizing acids and usually characterized by an acrid taste. Can be mild like baking soda or highly caustic like lye.

ANNEALING
A process of holding a material at a temperature near, but below its melting point, the object to permit stress relaxation without distortion of shape.

ARC RESISTANCE
Time required for a given electrical current to render the surface of a material conductive because of carbonization by the arc flame.

BLISTER
Undesirable rounded elevation on the surface of a plastic whose boundaries may be either more or less sharply defined, somewhat resembling in shape a blister on the human skin. A blister may burst and become flattened.

BOND
To attach by means of an adhesive.

BURNED
Showing evidence of thermal decomposition through discoloration, distortion or destruction of the surface of the plastic.

BUTADIENE STYRENE-PLASTICS
A synthetic resin derived from the copolymerization of butadiene gas and styrene liquids.

CALENDERING
A process by which a heated rubber plastic product is squeezed between heavy rollers into a thin sheet or film. The film may be frictioned into the interstices of cloth, or it may be coated onto cloth or paper.

CAST RESIN
A resinous product prepared by pouring liquid resins intoa mold and heat-treating the mass to harden it.

CELLULOID
A thermoplastic material made by the intimate blending of cellulose nitrate with camphor. Alcohol is normally employed as a volatile solvent to assist plasticization, and is subsequently removed.

CELLULOSE
A natural high polymeric carbohydrate found in most plants; the main constituent of dried woods, jute, flax, hemp, ramie, etc... Cotton is almost pure cellulose.

CELLULOSE ACETATE
An acetic acid ester of cellulose. It is obtained by the action under rigidly controlled conditions, of acetic acid and acetic anhydride on purified cellulose usually obtained from cotton linters. All three available hydroxyl groups in each glucose unit of the cellulose can be acetylated but in the material normally used for plastics, it is usual to acetylate fully an then to lower the acetyl value (expressed as acetic acid) to 52-56% by partial hydrolysis. When compounded with suitable plasticizers it gives a tough thermoplastic material.

CEMENT
A dispersion of a "solution" of unvulcanized rubber or a plastic in a volatile solvent. This meaning is peculiar to the plastics and rubber industries and may or may not be an adhesive composition.

COEFFICIENT OF LINEAR THERMAL EXPANSION
The amount of growth which occurs in a material when it is heated from one ambient temperature to another ambient temperature and is normally expressed in terms of in/in/°F.

COEFFICIENT OF FRICTION
The relation between force of frictional and normal pressure. Many factors affect friction & the lower the coefficient of friction the lower the wear on the machine or the material.

COLD FLOW
Change in dimensions or shape of some materials when subjected to external weight or pressure or pressure at room temperature.

COMPOUND
A combination of ingredients before being processed or made into a finished product. Sometimes used as a synonym for material formulation.

COMPRESSIVE STRENGTH
The maximum load in pounds which a one inch square section of material will support without fracturing.

CONDENSATION
A chemical reaction in which two or more molecules combine, usually with the separation of water or some other simple substance.

COPOLYMER
The product of simultaneous polymerization of two or more polymerizeable chemicals, commonly known as monomers.

COMPRESSIBILITY (RECOVERY)
This is a useful short-time test done at room temperature. Both are expressed as % of initial thickness. Some compressibility is necessary to fill irregularities, minor flaws or nicks. Good recovery when the load is released shows torque retention in a gasketed material.

CRAZING
Fine cracks at or under the surface of a plastic.

CREEP
The dimensional change with time of a material under load, following the initial instantaneous elastic deformation. Creep at room temperature is sometimes called Cold Flow.

CREEP RELAXATION
Expressed as a % of initial stress loss, this is a measure of a material's ability to maintain an initial stress over a period of time. A greater loss of stress increases the loss of bolting torque and the chance of leakage.

CROSS LAMINATE
A laminate in which some of the layers of material are oriented approximately at right angles to the remaining layers with respect to the grain or strongest direction in tension.

Terminology

CROSS-LINKING
Applied to polymer molecules, the setting-up of chemical links between the molecular chains. When extensive, as in most thermosetting resins, cross-linking makes one infusible super-molecule of all the chains.

DEFORMATION UNDER LOAD
The percentage of deformation that will occur in a material under a given period of time.

DEGRADATION
A deleterious change in the chemical structure of a plastic.

DELAMINATION
The separation of the layers in a laminate caused by the failure of the adhesive.

DIELECTRIC STRENGTH
Expressed in volts per mil and represents the number of volts required to cause an electrical breakthrough.

DIFFUSION
The migration or wandering of the particles or molecules of a body of fluid matter away from the main body through a medium or into another medium.

DIMENSIONAL STABILITY
Ability of a plastic part to maintain its original proportions under conditions of use.

DUROMETER
Trade name of the Shore Instrument Company for an instrument that measures hardness. The rubber or plastics durometer determines the "hardness" of rubber or plastics by measuring the depth of penetration (without puncturing) of a blunt needle compressed on the surface for a short period of time.

ELASTIC LIMIT
The load at which a material will no longer return to its original form when the load is released.

ELASTOMER
A material which at room temperature stretches under low stress to at least twice its length and snaps back to the original length upon release of stress.

ELECTRICAL PROPERTIES
Primarily the resistance of a plastic to the passage of electricity.

ELONGATION
The ability of a material to increase in length expressed as a percentage.

ELONGATION MODULUS
This is the force required to stretch the material to twice its original length. It is noted as PSI.

EMULSION
The dispersion of one liquid in another - possible only when they are mutually insoluble.

ESTER
A compound formed by the elimination of waste during the reaction between an alcohol and an acid; many esters are liquids. They are frequently used as plasticizers in rubber and plastic compounds.

ETHYL CELLULOSE
A thermoplastic material prepared by the ethylation of cellulose by diethyl sulfate or ethyl halides and alkali.

EXTRUSION
The compacting of a plastic material and forcing of it through an orifice in more or less continuous fashion.

FABRICATE
To work a material into a finished form by machining, forming or other operation, or to make flexible film or sheeting into end-products by sewing, cutting, sealing or other operation.

FILLER
A material added to plastic composition to impact certain qualities in the finished article.

FLEXURAL STRENGTH
The ability of a material to deflect under load and return to its original condition expressed in pounds per square inch.

FLUOROCARBONS
The family of plastics including polytetrafluoroethylene (PTFE), polychlorotrifluoroethlylene (PCTFE), polyvinylidene and fluorinated ethylene propylene (FEP), q.v. They are characterized by properties including good thermal and chemical resistance and nonadhesiveness and possess a low dissipation factor and low dielectric constant. Depending upon which of the fluorocarbons is used, they are available as molding materials, extrusion materials, dispersions film or tape.

FORMULATION
A combination of ingredients before being processed or made into a finished product. Sometimes used as a synonym for material compound.

FUSE
To join two plastics parts by softening the material by heat or solvents.

GENERIC
Common names for types of plastic materials. They may be either chemical terms or coined names. They contrast with trade marks which are the property of one company.

HARDNESS
A measure of the degree of surface hardness as measured on the Rockwell scale.

HEAT DISTORTION
The temperature at which a material bends a given number of mils under a given load. Commonly used as a relative comparison of materials.

HEAT RESISTANCE
The ability to withstand the effects of exposure to high temperature. Care must be exercised in defining precisely what is meant when this term is used. Descriptions pertaining to heat resistance properties include: boilable, washable, cigarette-proof, sterilizable, etc...

HOOP STRESS
The stress imposed on a cylindrical wall by internal pressure loading which acts so as to split the wall normal to any radius-wall intercept.

IMPACT STRENGTH
(1) The ability of a material to withstand shock loading; (2) the work done in fracturing, under shock loading, a specified test specimen in a specified manner.

IMPERMEABILITY
Permitting no passage into or through a material.

INJECTION MOLDING
A molding procedure whereby a heat-softened plastic material is forced from a cylinder into a relatively cool cavity which gives the article the desired shape.

LIGHT STABILITY
Ability of a plastic to retain its original color and physical properties upon exposure to sun or artificial light.

LIGHT TRANSMISSION
The amount of light a plastic will pass.

LONGITUDINAL STRESS
The stress imposed on the long axis of any shape. It can be either a compressive or tensile stress.

LOW PRESSURE LAMINATES
In general, laminates molded and cured in the range of pressures from 400 p.s.i. down to and including pressures obtained by the mere contact of the plies.

LUBRICANT
A substance used to decrease the friction between tosolid faces and sometimes used to improve processing characteristics of plastic compositions.

Terminology

MELAMINE PLASTICS
Thermosetting plastics made from melamine and formaldehyde resins.

MELTING POINT
The temperature at which the liquid first forms in a small sample as its temperature is increased gradually.

MODULUS
A term that may be applied to either tensile, flexural, compressive, or torsional actions. It defines the number of pounds per square inch required to cause deformation, elongation, or flexure in a material.

MODULUS OF ELASTICITY
The ratio of stress to strain in a material that is elastically deformed.

MOISTURE RESISTANCE
Ability to resist absorption of water.

MONOMER
The simplest repeating structural unit of a polymer; for addition polymers this represents the original unpolymerized compound.

NON-FLAMMABLE
Will not support combustion.

NON-RIGID PLASTIC
A plastic which has a stiffness or apparent modulus of elasticity of not over 10,000 p.s.i. at 23°C when determined in accordance with the Standard Method of Test for Stiffness in Flexure of Plastics.

NON-TOXIC
Non-poisonous.

NOTCH SENSITIVITY
The extent which the sensitivity of a material to fracture is increased by the presence of a surface in homogeneity such as a notch, a sudden change in section, a crack or a scratch. Low notch sensitivity is usually associated with ductile materials, and high notch sensitivity with brittle materials.

NYLON
The generic name for all synthetic fiber-forming polyamides, they can be formed into monofilaments and yarns characterized by great toughness, strength and elasticity, high melting point and good resistance to water and chemicals. The material is widely used for bristles in industrial and domestic brushes and for many textile applications. It is also in injection molding gears, bearings, combs, etc...

OLEFINS
A group of unsaturated hydrocarbons of the general formula CnH_2n and named after the corresponding paraffins by the addition of "ene" or "ylene" to the stern. Example are ethylene and propylene.

ORANGE-PEEL
Uneven and/or textured surface somewhat resembling an orange peel.

ORGANIC CHEMICAL
Originally applied to chemicals derived from living organisms, as distinguished from "inorganic" chemicals found in minerals and inanimate substances; modern chemists define organic chemicals more exactly as those which contain the element carbon.

PHENOLIC RESIN
A synthetic resin produced by the condensation of an aromatic alcohol with an aldehyde, particularly of phenol with formaldehyde. Phenolic resins form the basis for thermosetting molding materials laminated sheet and stoving varnishes. They are also used as impregnating agents and as compounds of paints varnishes, lacquers and adhesives.

PLASTIC
(n.) One of many high-polymeric substances, including both natural and synthetic products, but excluding the rubbers. At some stage in its manufacture every plastic is capable of flowing, under heat and pressure if necessary, into the desired final shape (adj.) Made of plastic: capable of flow under pressure or tensile stress.

PLASTICITY
A property of plastics and resins which allows the materials to be deformed continuously and permanently without rupture upon the application of a force that exceeds the yield value of the material.

PLASTICIZER
A liquid or solid incorporated in natural and synthetic resins and in related substances to develop such properties as resiliency, elasticity and flexibility.

POLYBUTYLENE PLASTICS
Plastics based on polymers made with butene as essentially the sole monomer.

POLYCARBONATE RESINS
Polymers derived from the direct reaction between aromatic and aliphatic dihydroxy compounds with phosgene or by the ester exchange reaction with appropriate phosgene-derived precursors.

POLYESTER
A resin formed by the reaction between a dibasic acid and dihydroxy alcohol, both organic. Modification with multi-functional acids and/or bases and some unsaturated reactants permit cross-linking to thermosetting resins. Polyester modified with fatty acids are called Alkyds.

POLYETHYLENE
A thermoplastic material composed by polymers of ethylene. It is normally a translucent, tough, waxy solid which is unaffected by water and by a large range of chemicals.

POLYMER
A high-molecular-weight organic compound, natural or synthetic whose structure can be represented by a repeated small unit, the "mer" e.g. polyethylene, rubber, cellulose. Synthetic polymers and formed by addition or condensation polymerization of monomers. If two or more monomers are involved, a copolymer is obtained. Some polymers are elastomers, some plastics.

POLYMERIZATION
Chemical change resulting in the formation of a new compound whose molecular weight is usually a multiple of that of the original substance.

POLYOLEFIN
A polymer prepared by the polymerization of an olefin(s) as the sole monomer(s).

POLYPROPYLENE
A tough, lightweight, rigid plastic made by the polymerization of high-purity propylene gas in the presence of an organometallic catalyst at relatively low pressures and temperatures.

POLYSTYRENE
A water-while thermoplastic produced by the polymerization of styrene (vinylbenezene). The electrical insulating properties of polystyrene are outstandingly good and the material is relatively unaffected by moisture. In particular, the power loss factor is extremely low over the frequency range 10-10/c.p.s.

POLYURETHANE RESINS
A family of resins produced by reacting diisocyanate with organic compounds containing two or more active hydrogens to form polymers having free isocyanate groups. These groups under the influence of heat or certain catalysts will react with each other or with water, glycols, etc... to form a thermosetting material.

Terminology

POLYVINYL CHLORIDE (PVC)
A thermoplastic material composed of polymers of vinyl chloride a colorless solid with outstanding resistance to water, alcohols and concentrated acids and alkalies. It is obtainable in the form of granules, solutions, latices and pastes. Compounded with plasticizers, it yields a flexible material superior to rubber in aging properties. It is widely used for cable and wire coverings in chemicals plants and in the manufacturing of protective garments.

POROSITY
Presence of numerous visible voids.

POSTCURE
Those additional operations to which a cured thermosetting plastic or rubber composition is subjected to enhance the level of one or more properties.

PV LIMIT
The Pressure-Velocity limit test is run at different surface speeds under increasing load. A material with good bearing ability has a high value.

RAYON
The generic term for fibers, staple and continuous filament yarns composed of generated cellulose, but also frequently used to describe fibers obtained from cellulose acetate or cellulose triacetate. Rayon fibers are similar in chemical structure to natural cellulose fibers (e.g. cotton) except that the synthetic fiber contains shorter polymer units. Most rayon is made by the viscose process.

RECOVERY (COMPRESSIBILITY)
This is a useful short-time test done at room temperature. Both are expressed as % of initial thickness. Some compressability is necessary to fill irregularities, minor flaws or nicks. Good recovery when the load is released shows torque retention in a gasketed material.

REINFORCED PLASTICS
Plastics with high strength filler imbedded in the composition, resulting in some mechanical properties superior to those of the base resin.

RESILIENCE
Usually regarded as another name for elasticity. While both terms are fundamentally related, there is a distinction in meaning. Elasticity is a general term used to describe the property of recovering original shape after a deformation, Resilience refers to the energy of recovery; that is, a body may be elastic but not highly resilient.

RESIN
Any class of solid or semisolid organic products of natural or synthetic origin, generally of high molecular weight with no definite melting point. Most resins are polymers, q.v.

RIGID PLASTICS
For purposes of general classification, a plastic that has a modulus of elasticity either in flexure or in tension greater than 100,000 p.s.i. at 23°C and 50% relative humidity when tested in accordance with ASTM Methods D747 or D790 Test for Stiffness of Plastics.

ROCKWELL HARDNESS
A common method for testing a plastics material for resistance to indentation in which a diamond or steel ball, under pressure, is used to pierce the test specimen. The load is expressed in kilograms.

RUBBER
An elastomer capable of rapid elastic recovery after being stretched to at least twice its length at temperatures from 0° to 150°F at any humidity. Specifically, natural rubber is the standard of comparison for elastomers.

SEALABILITY
Expressed as milliliters of leakage per hour. This test is conducted at room temperature under a certain gasket load and contained fluid (internal) pressure. The smaller the amount, the better.

SELF-EXTINGUISHING
A somewhat loosely-used term describing the ability of a material to cease burning once the source of flame has been removed.

SEMIRIGID PLASTIC
For purposes of general classification, a plastic that has a modulus of elasticity either in flexure or in tension between 10,000 and 100,000 p.s.i. at 23°C and 50% relative humidity when tested in accordance with ASTM Method D747 or D790 Test for Stiffness of Plastics.

SHORE HARDNESS
A method of determining the hardness of a plastic material using a scelroscope. This device consists of a small conical hammer fitted with a diamond point and acting in a glass tube. The hammer is made to strike the material under test and the degree of rebound is noted on a graduated scale. Generally, the harder the material the greater will be the rebound.

SIMULATED WEATHERING
The exposure of plastics to cyclic laboratory conditions of high and low temperatures, high and low relative humidities in an attempt to produce changes in their properties similar to those observed on long-time continuous exposure outdoors. The laboratory exposure conditions are usually intensified beyond those encountered in actual outdoor exposure in an attempt to achieve an accelerated effect.

SIMULATED AGING
The exposure of plastics to cyclic laboratory conditions of high and low temperatures, high and low relative humidities in an attempt to produce changes in their properties similar to those observed on long-time continuous exposure to conditions of temperature and relative humidity commonly encountered indoors or to obtain an acceleration of the effects of ordinary indoor exposure. The laboratory exposure conditions
are usually intensified beyond those actually encountered in an attempt to achieve an accelerated effect.

SOLVENT
The medium within which a substance is dissolved, most commonly applied to liquids used to bring particular solids into solution, e.g. acetone is solvent for PVC.

SPECIFIC GRAVITY
The density (mass per unit volume) of any material divided by that of water at a standard temperature, usually 4°C. Since water's density is nearly 1.00g/cc, density in g/cc and specific gravity are numerically nearly equal.

SPECIFIC HEAT
Ratio of the thermal capacity of a substance to that of water at 15°C.

STRENGTH
The mechanical properties of a plastic, such as load or weight carrying ability to withstand sharp blows. Strength properties include tensile, flexural and tear strength, toughness, flexibility, etc...

STRESS-CRACK
External or internal cracks in a plastic caused by tensile stresses less than that of its short-time mechanical strength.

STRETCH FORMING
A plastic sheet forming technique in which the heated thermoplastic sheet is stretched over a mold and subsequently cooled.

TEAR STRENGTH
Resistance of a material to tearing (strength).

Terminology

TENSILE STRENGTH
The capacity of a material to resist a force tending to stretch it. Ordinarily the term is used to denote the force required to stretch a material to rupture and is known variously as "breaking load", "breaking stress", "breaking strain". In plastics testing it is the load in pounds per square inch or kilos per square centimeter of original cross-sectional area supported at the moment of rupture by a piece of test sample on being elongated.

THERMAL CONDUCTIVITY
This shows the thermal insulating ability of a material. The higher the value, the greater the ability to conduct heat. It is expressed as BTU - inches per hour - square foot - degree Fahrenheit.

THERMAL EXPANSION
The increase in length of a dimension under influence of a change in temperature.

THERMOFORMING
Any process of forming thermoplastic sheet which consists of heating the sheet and pulling it down onto a mold surface.

THERMOPLASTIC
(adj.) Capable of being softened by heat and hardened by cooling. (n.) A material that will repeatedly soften when heated and harden when cooled. Typical of the thermoplastics family are the styrene polymers and copolymers, acrylics, cellulosics, polyethylenes, vinyls, nylons and the various fluorocarbon materials.

THERMOSET
A material that will undergo or has undergone a chemical reaction by the action of heat catalysts, ultra-violet light, etc... leading to a relatively infusible state. Typical of the plastics in the thermo-setting family are the aminos (melamine and urea), most polyesters, alkyds epoxies and phenolics.

TOLERANCE
A specified allowance for deviations in weighing, measuring, etc... or for deviations from the standard dimensions or weight.

TRANSLUCENT
Descriptive of a material or substance capable of transmitting some light, but not clear enough to be seen through.

TRANSPARENT
Descriptive of a material or substance capable of a high degree of light transmission, e.g. glass. Some polypropylene films and acrylic moldings are outstanding in this respect.

TRIBOLOGY
The study of the friction, wear, and lubrication of interacting surfaces in relative motion. (ie: bearings)

ULTRAVIOLET
Zone of invisible radiations beyond the violet end of the spectrum of visible radiation. Since UV wavelengths are shorter than the visible, their photons have more energy, enough to initiate some chemical reactions and to degrade most plastics.

VACUUM FORMING
Method of sheet forming in which the plastic sheet is clamped in a stationary frame, heated and drawn down by a vacuum into a mold. In a loose sense, it is sometimes used to refer to all sheet forming techniques, including Drape Forming, q.v. involving the use of vacuum and stationary molds.

VINYL CHLORIDE PLASTICS
Plastics based on resins made by the polymerization of vinyl chloride or copolymerization of vinyl chloride with minor amounts (not over 50%) of other unsaturated compounds.

VINYL PLASTICS
Plastics based on resins made from vinyl monomers except those specifically covered by other classifications, such as acrylic and styrene plastics. Typical vinyl plastics are polyvinyl chloride, polyvinyl acetate, polyvinyl alcohol, polyvinyl butyral and copolymers of vinyl monomers with unsaturated compounds.

VIRGIN MATERIAL
A plastic material in the form of pellets, granules, powder,flock or liquid that has not been subject to use or processing other than that required for its initial manufacture.

VISCOSITY
Internal friction of a liquid because of its resistance to shear agitation or flow.

VOLUME RESISTIVITY
The ability of a material to impede the flow of electricity as expressed in ohms per centimeter.

WATER ABSORPTION
The percentages by weight of water absorbed by a sample immersed in water. Dependent upon area exposed.

WATER VAPOR TRANSMISSION
The penetration of a plastic by moisture in the air.

WEAR FACTOR
This test measures material loss when an unlubricated sample under load is rotated on a fixed steel washer. The smaller the value, the smaller the wear.

WEATHER RESISTANCE
Ability of a plastic to retain its original physical properties and appearance upon prolonged exposure to outdoor weather.

WELDING
Joining thermoplastic pieces by one of several heat-softening processes. In hot-gas welding, the material is heated by a jet of hot air or inert gas directed from a welding "torch" onto the area over conditions of time, temperature and pressure.

YIELD POINT
There are various types of yield points - compressive, tensile, flexural and torsional. The point at which a material under stress will no longer return to its original dimensions after removal of the stress.

YIELD STRESS
The force which must be applied to a plastic to initiate flow. techniques, including Drape Forming, q.v. involving the use of vacuum and stationary molds.