

# Chemical Resistance of Durethan® Polyamide Resins

Durethan polyamide resins are semicrystalline materials having excellent chemical resistance. In general, Durethan polyamide is resistant to hydrocarbons, such as fuels, oils and greases, as well as esters, ketones, and organic and inorganic bases up to medium concentrations. Durethan polyamide is also largely resistant to many halogenated hydrocarbons, such as carbon tetrachloride and freon. Chloroform and methylene chloride, however, cause severe swelling. Short-chain alcohols, such as ethanol and methanol, produce effects similar to that of water, while the longer-chain alcohols have virtually no effect.

Durethan polyamide resins possess limited resistance to acids in general and are soluble in strong mineral acids, such as sulfuric and formic. Materials such as phenols and cresols also attack these resins.

The degree of crystallinity of polyamide resins can greatly influence their chemical resistance. In general, as the degree of crystallinity increases, chemical resistance also increases. Therefore, molding operations can affect the chemical resistance of polyamides.

To illustrate the excellent chemical resistance of Durethan polyamide resins, a study was conducted internally on Durethan B 31 F polyamide 6. Samples (50 x 6 x 4 mm) were immersed in various media at room temperature, unless otherwise specified, for a period of 12 months. The results are summarized in tables on pages 2 and 3.

The resistance ratings in the table were based on the following criteria:

- Change in weight and volume
- Change in notched izod strength
- Change in ball indentation hardness
- Results from practical experience

The general results obtained from this grade should also apply to other grades of Durethan polyamide.

As is the case with any compatibility test, results are dependent on such variables as concentration, time, temperature, part design, and residual stresses and should serve only as a guideline. It is imperative that production parts be evaluated under actual application conditions.

## Health and Safety Information

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. For materials mentioned which are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be followed. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, *e.g.*, *material safety data sheets and product labels*. Consult your LANXESS Corporation representative or contact the Product Safety and Regulatory Affairs Department at LANXESS.

Unless otherwise noted, all data were determined at 73°F (23°C).

Media	Rating
Acetic Acid, 5%	0
Acetic Acid, 30%	-
Acetone	+
Ammonia, 10%	+
Ammonia, Conc.	+
Ammonium Nitrate, Saturated Solution	+
Ammonium Sulfate, Saturated Solution	+
Amyl Acetate	+
Aniline	0
Basic Chrome Sulfate, Conc.	+
Baysilone® Fluid M 1000	+
Beer (Lager) at 32°F	+
Benzene	+
Benzyl Alcohol, 100%	-
Benzyl Benzoate, 100%	0
Blood (Ox Blood) at 35°F	+
Borax*, Saturated Solution	+
Brake Fluid, AT	+
Brandy, Commercial	+
Butane Gas	+
Butanol, 100%	+
Butyric Acid, Conc.	0
Calcium Chloride, Saturated Solution in Water	+
Calcium Hydroxide (Suspension), 30%	+
Calcium Soap Fat, Pure	+
Camphor Oil, 100%	+
Carbon Dioxide	+
Carbon Disulfide	+
Carbon Tetrachloride	+
Caustic Soda Solution, 10%	+
Caustic Soda Solution, Conc.	+
Chlorine Gas, Dry	-
Chlorobenzene	+
Chloroform	0
Citric Acid, 10%	+
Coal Gas	+
Copper Sulfate, Saturated Solution	+
Cyclohexanol	+
Cyclohexanone	+

Media	Rating
Dibutyl Phthalate	+
Diesel Oil	+
Dinonyl Phthalate	+
Diocetyl Phthalate	+
Ether	+
Ethyl Acetate	+
Ethyl Alcohol	+
Ethylene Chloride	+
Ethylene Glycol	+
Ferric Chloride, Saturated Solution (Neutral)	+
Fish Liver Oil	+
Formaldehyde, 10% in Water	+
Formic Acid, 30%	-
Formic Acid, Conc.	-
Freon** 11/12 Refrigerant (1/1), Under Pressure at 73°F	+
Fuel Oil, Heavy	+
Fuel Oil, Light	+
Fuel Oil, Medium	+
Gasohol	0
Gasoline	+
Glycerol	+
Glycol	+
Grapefruit Juice, Unsweetened at 35°F	+
Hydrochloric Acid, 1%	-
Hydrochloric Acid, 10%	-
Hydrochloric Acid, Conc.	-
Hydrofluoric Acid, 40%	-
Hydrogen Chloride Gas	-
Hydrogen Peroxide, 10%	-
Hydrogen Peroxide, 30%	-
Hydrogen Sulfide	+
Iodine, Tincture, Commercial	-
Isopropyl Alcohol	+
Jet Fuel, JP4	+
Lactic Acid, 10% in Water	+
Laundry Soap Solution, 1% in Water at 158°F	+

\* Borax is a registered trademark of U.S. Borax Inc.

\*\* Freon is a registered trademark of E.I. duPont de Nemours and Co.

Ratings
+ Resistant
0 Limited Resistance
- Not Resistant

Media	Rating
Margarine	+
Menthol, 90% in Denatured Alcohol	+
Mesamoll PVC Plasticizer	+
Metasystox* Insecticide, 0.5% in Water	+
Metasystox* Insecticide, Conc.	+
Methyl Alcohol, Pure	0
Methyl Amine, 30% in Water	+
Methylene Chloride	0
Milk, Whole	+
Mineral Water, Commercial	+
Naphthene Basic Oil (Lubricant)	+
Nekal** BX Wetting Agent, 2% in Water	+
Nitric Acid, 1%	-
Nitric Acid, 50%	-
Oleic Acid, Commercial	+
Oxalic Acid, 10% in Water	0
Oxygen (3 Bar)	-
Ozone (at 2 x 10 <sup>-6</sup> Parts Ozone to 1 Part Air)	-
Paraffin Basic Oil (Lubricant)	+
Perchloric Acid, 10% in Water	-
Petroleum Ether	+
Petroleum Spirit (for Dry Cleaning), bp 212°–284°F	+
Phenyl Ethyl Alcohol, 100%	0
Phosphoric Acid, 10%	0
Phosphoric Acid, 30%	-
Potassium Carbonate (Potash), Saturated Solution	+
Potassium Cyanide, Saturated Solution	+
Potassium Dichromate, Saturated Solution	0
Potassium Hexacyanoferrate (III), Saturated Solution	+
Potassium Metabisulfite, 40 g/l in Water	+
Potassium Perchlorate, 2% in Water	0
Potassium Permanganate, 10% in Water	-
Propane Gas	+
Propyl Alcohol	+
Rapeseed (canola) oil	+
Raspberry Juice (Sweetened), Commercial	+

\* Metasystox is a registered trademark of Chemagro Corporation.

\*\* Nekal is a registered trademark of J.G. Farbenindustrie Aktiengesellschaft.

Media	Rating
Sea Water	+
Silicofluoric Acid, 30%	-
Silver Nitrate, 10%	+
Sodium Bicarbonate (Soda), Saturated Solution	+
Sodium Chloride (Table Salt), Saturated Solution	+
Sodium Hypochlorite	-
Sodium Soap Fat	+
Sodium Sulfide, Saturated Solution	+
Sodium Thiosulfate (Fixing Bath), 200 g/l	+
Soil Bacterial Culture (Anaerobic)	+
Soil Mildew	+
Spinning Bath Acid	-
Stannous Chloride, Saturated Solution	-
Sugar Beet Syrup	+
Sugar Solution, Saturated	+
Sulfur Dioxide, Dry, Saturated Atmosphere	+
Sulfuric Acid, 10%	-
Sulfuric Acid, 30%	-
Sulfurous Acid, 10%	0
Tallow, Beef, Commercial	+
Tartaric Acid, 10% in Water	+
Tetraethyl Lead, 5% in Aliphatic Hydrocarbons, bp 212°–284°F	+
Thionyl Chloride, 100%	-
Toluene	+
Trichloroethyl Phosphate	-
Trichloroethylene	+
Tricresyl Phosphate (Low Ortho Content)	+
Triethanolamine	0
Urea, Saturated Solution	+
Urine	+
Vinyl Chloride, Under Pressure at Room Temperature	+
Water (Distilled) at 68°F	+
Water (Distilled) at 158°F	+
Water (Distilled) at 194°F	+
Wine, Commercial	+
Wood Turpentine, bp 302°–338°F	+

#### Ratings

+ Resistant

0 Limited Resistance

- Not Resistant

Note: The information contained in this publication is current as of May 2005. Please contact LANXESS Corporation to determine whether this publication has been revised.

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