

UNDERSTANDING DIFFERENT TYPES OF PLASTIC MATERIALS: A RESIN COMPARISON GUIDE

Plastic Comparison Chart

Material Code Symbol	Resin	Clarity	Moisture Barrier	Oxygen Barrier	Max. Temp. Resistance	Min. Temp. Resistance	Rigidity	Resistance to Impact	Resistance to Heat	Resistance to Cold	Resistance to Sunlight	General Industry Uses
 PETE	Polyethylene Terephthalate	Clear	Fair to Good	Good	176°F	-58°F	Moderate to High	Good to Excellent	Poor to Fair	Good	Good	Cosmetics, Pharmaceuticals, Carbonated Beverages, Mouthwashes, Liquors
 HDPE	High Density Polyethylene	Translucent	Good to Excellent	Poor	230°F	-148°F	Moderate	Good to Excellent	Good	Excellent	Fair	Detergents, Bleaches, Syrups, Industrial Cleaning Products, Cosmetics, Industrial & Edible Oils
 V	Polyvinyl Chloride	Clear	Fair	Good	158°F	-13°F	Moderate to High	Fair to Good	Poor to Fair	Fair	Poor to Good	Cosmetics, Personal Care, Household Chemicals, Edible Oils, Vinegars
 LDPE	Low Density Polyethylene	Translucent	Good	Poor	176°F	-58°F	Low	Excellent	Fair	Excellent	Fair	Cosmetics, Pharmaceuticals, Personal Care
 PP	Polypropylene	Translucent	Good to Excellent	Poor	275°F	32°F	Moderate to High	Poor to Good	Good	Poor to Fair	Fair	Pharmaceuticals, Cosmetics, Syrups, Juices, Personal Care
 PS	Polystyrene	Clear	Poor to Fair	Fair	140°F	-40°F	Moderate to High	Fair to Good	Poor to Fair	Fair	Poor to Good	Pharmaceuticals, Jellies, Jams, Vitamins, Spices

Plastic bottles and jars are great packaging options for a wide range of products. Combining both convenience and flexibility with safety and sustainability, these economical containers are a smart choice for a range of products from food packaging for food and drink to household cleaners and weed killers. Additionally, they generally cost less to ship than glass, have lightweight portability, and most can be recycled.

But, how do you know which plastic containers are right for your product packaging? With so many types of plastic in the world, it can get quite overwhelming when trying to decide. In this FAQ, we are going to give a quick breakdown of the different types of plastic materials available, their resin identification, and the main benefits of each common plastic type

The Most Common Types of Plastic Materials

PP - Polypropylene

What is PP Plastic?


PP

Polypropylene (PP), known as polypropene, is the second-most used thermoplastic polymer in the world. More rigid than HDPE plastics, bottles made of PP tend to naturally be more yellowish or gray in color, but can be translucent or even clear depending on exactly how they are made. They have an excellent environmental stress crack resistance, and though properties are generally equal to those of HDPE plastics, PP plastics are also resistant to most chemicals. This makes them the popular choice for pharmaceuticals, cosmetics, syrups, juices, shampoos and more. A major advantage to PP containers is that they have a higher temperature resistance than HDPE containers, with a max temperature of 275° Fahrenheit, and a 32° Fahrenheit minimum temperature. Furthermore, the containers can be sterilized by autoclave, gas, or chemical disinfectant.

Help

PET - Polyethylene Terephthalate

What is PET Plastic?



Polyethylene Terephthalate, PET or PETE, is part of the polyester family, and is known as the most common thermoplastic polymer resin. PET plastic is often rigid and transparent (or even crystal clear) and has very good oil barrier properties, good alcohol and solvent barrier, and a fair water barrier. Containers using this type of plastic material have a 176° Fahrenheit max temperature (204° F for short periods) and a -58° Fahrenheit minimum temperature.

Additionally, PET containers are not recommended for autoclave or dry heat sterilization, but can be sterilized with gas, gamma irradiation, or chemical disinfectant sterilization processes. Furthermore, PET (or PETE) plastic containers are generally used for cosmetics, pharmaceuticals, carbonated beverages, mouthwashes, and liquors.

LDPE - Low-Density Polyethylene

What is LDPE Plastic?



Low-Density Polyethylene (LDPE) is the first grade of polyethylene and is a thermoplastic made from ethylene. LDPE is flexible and milky in color, has high impact strength, excellent environmental stress crack resistance, and is resistant to many chemicals. LDPE bottles have a 176° Fahrenheit max temperature (204° F for short periods) and a -58° Fahrenheit minimum temperature. This makes LDPE highly used in cosmetics, pharmaceuticals, and personal care products. Though LDPE containers are not recommended for autoclave or dry heat sterilization, they can still be sterilized with chemical disinfectant sterilization processes, gas, or gamma irradiation.

However, LDPE plastic has a low water and alcohol permeability, meaning it can be slowly attacked by strong oxidizing agents or solvents. This will eventually cause softening or swelling.

PS - Polystyrene

What is PS Plastic?



Polystyrene (PS) is a synthetic aromatic hydrocarbon polymer made out of styrene. Hard, rigid, and transparent, this plastic has good dimensional stability and is great for dry pharmaceuticals, jellies, vitamins, and spices. PS has a good chemical resistance to many aqueous solutions but is soluble in many aromatic or halogenated solvents. This results in the material becoming brittle at lower temperatures. Though the plastic is okay at temperatures of 158° Fahrenheit for short times, it is not generally recommended that they are kept in temperatures in excess of 140° Fahrenheit. They should also not be kept at temperatures below -40° Fahrenheit. Gas sterilization or gamma irradiation sterilization processes are the most recommended for containers made of PS plastic.

Other Common Types of Plastic Materials

HDPE - High-Density Polyethylene

What is HDPE Plastic?



High-Density Polyethylene (HDPE) is a thermoplastic polymer chain made from repeating ethylene monomer units, and is often more rigid than LDPE or MDPE plastics. They are known to have good impact strength, good environmental stress crack resistance, and better barrier properties than LDPE plastics. Milky in color (known in the container industry as "Natural"), HDPE plastics have a higher opacity than LDPE plastics.

Additionally, HDPE bottles have a 230° Fahrenheit max temperature (248° F for short periods) and a -148° Fahrenheit minimum temperature. Though HDPE containers are not recommended for autoclave or dry heat sterilization, they can be sterilized with gamma irradiation, gas, or chemical disinfectant sterilization processes. These types of plastic containers are most commonly used to package detergents, bleaches, syrups, industrial cleaning products, cosmetics, and oils (both industrial and edible).

PVC - Polyvinylchloride

What is PVC Plastic?



Polyvinylchloride (PVC) is the third-most produced synthetic plastic polymer in the world. Often hard and rigid, this plastic is transparent in color with a blue hue. In addition, PVC is not recommended for temperatures in excess of 158° Fahrenheit and has a low-temperature threshold of -13° Fahrenheit. However, they have a very good resistance to oils and a low permeability to gases. This results in PVC plastic being most commonly used for automotive chemicals, cosmetics, personal care products, household chemicals, edible oils, and vinegar. Furthermore, the recommended sterilization processes for products made from this material is using gas or chemical disinfectant.

MDPE-Medium Density Polyethylene

What is MDPE Plastic?



Medium Density Polyethylene – Great for squeeze applications, this type of plastic provides intermediate properties between low and high-density polyethylene. It is more rigid than LDPE but less rigid than HDPE. These bottles are usually milky in color.

Browse our complete selection of [plastic bottles & jars](#) and if you want to easily compare the different types of plastic materials mentioned in this post, check out and save a copy of our [Plastic Comparison Chart](#) below!

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