



Acetal Products Comparison: Acetal vs. Delrin

Acetal is the common name for a family of thermoplastics with the chemical name "PolyOxyMethylene", or POM. Acetal is available in two general types of resins: Copolymer acetal (POM-C), and homopolymer acetal (POM-H); commonly called Delrin®. Each type of acetal has its own set of advantages and disadvantages.

Acetal Copolymer

The copolymer grade offers excellent performance at a slightly lower cost than Delrin®. Acetal copolymer offers consistent properties throughout the shape (being free of centerline porosity). Low stress levels and high strength assure flatness and dimensional stability up to a maximum continuous service temperature of 180°F (80°C). Copolymer acetal grades are FDA, USDA, NSF, and 3-A Dairy compliant. In addition, acetal copolymers are available in a wide variety of colors, including: natural, black, blue, red, yellow, green, brown, and grey. Other advantages over homopolymer acetal are:

- Better dimensional stability due to its lower level of crystallinity.
- Better resistance to hot water and strong caustics, or high pH (basic) solutions.
- Lower coefficient of friction and better impact and wear properties, especially in wet or moist environments.

Acetal Homopolymer

Delrin® acetal homopolymer offers slightly higher mechanical properties than acetal copolymer, but may contain a low density center (also known as "center line porosity") especially in large cross-sections. Delrin® also gives slightly less chemical resistance than copolymer acetal. As an example, Delrin® is ideal for small diameter, thin-walled bushings that benefit from the additional strength and rigidity of homopolymer acetal. Delrin® is available in colors of natural and black. Other advantages over copolymer acetal are:

- Greater stiffness, with higher flexural modulus at room and elevated temperature applications.
- Slightly higher tensile and impact strength at room temperatures and lower.
- Slightly harder, thus giving the homopolymer acetals a lower coefficient of friction.

What it means

In most applications, Delrin® and acetal copolymer can be interchanged because many material properties are within approximately 10% of each other. Notably, the most significant difference between Delrin® and copolymer acetal relates to what is commonly known as centerline porosity – an inherent characteristic of Delrin®. It is most prominent in thick slab and large diameter rod stock. Visually, it is clearly evident around the center portion of a rod, which extends down the entire length. In sheet, porosity appears as a line along the center of each cut edge. In some cases, the slab may appear to be laminated or glued together. Excessive centerline porosity is undesirable for the following reasons:

- Aesthetic - inconsistent color appearance in finished parts.
- Compromises structural integrity.
- Presents potential routes for leakage of gas and liquids.
- Provides areas where the bacteria can grow in food processing applications.

The cause of the porosity is shrinkage. During the extrusion process, the outside of the shape cools before the interior. As the interior material cools, there is a corresponding reduction of volume. Since the volume change of the shape is restricted due to the solidified skin, voids form to compensate for the loss of interior volume.