CNC MACHINING

Delrin (Acetal)

Low Friction Engineering Plastic

Delrin (acetal) delivers excellent dimensional stability, low friction, and high fatigue resistance. CNC machining produces smooth, precise components ideal for motion hardware and wear surfaces.



MACHINING ENVELOPE	LEAD TIME	TOLERANCE	PROCESS
1000 × 600 × 500 mm	5-7 business days	±0.050 mm typical	CNC Machining

MECHANICAL PROPERTIES

Delrin delivers dependable strength, stiffness and toughness, and its balanced mechanical profile handles demanding load conditions without turning brittle in critical parts. It suits precision gears and motion components, soft jaws and protective fixtures, and wear-resistant bushings that need long-term durability under repetitive stress.

The flexural fatigue endurance limit is the stress acetal carries for a million load cycles, the basis for sizing gear teeth, snap features and springs. Compressive strength at small and large strain, with deformation under a sustained load, helps size bushings and wear pads. Rows marked moulded resin are Delrin's injection-moulded test-bar values, which Delrin publishes for comparing grades. Unnotched bars do not break while notched values are far lower, so generous radii at corners and tooth roots keep the full toughness of the material in machined parts.

PROPERTY	VALUE	TEST STANDARD
Tensile Strength at Yield	**76 MPa**	ASTM D638
Tensile Modulus (moulded resin)	**2800 MPa**	ASTM D638
Elongation at Break	**25 %**	ASTM D638
Flexural Strength	**97 MPa**	ASTM D790
Flexural Modulus	**2900 MPa**	ASTM D790
Compressive Strength at 1% Strain	**18 MPa**	ASTM D695
Compressive Strength at 10% Strain	**107 MPa**	ASTM D695
Compressive Modulus	**2240 MPa**	ASTM D695
Shear Strength	**68 MPa**	ASTM D732
Deformation under Load (moulded resin, 13.8 MPa, 50 °C)	**0.5 %**	ASTM D621
Poisson's Ratio (moulded resin)	**0.35**	—
Flexural Fatigue Endurance Limit (moulded resin, 10^6 cycles, 23 °C, 50% RH)	**32 MPa**	ASTM D671
Izod Impact Strength, Notched (23 °C)	**107 J/m**	ASTM D256

Izod Impact Strength, Unnotched (moulded resin, 23 °C)	**No break**	ASTM D256
Rockwell Hardness M	**94**	ASTM D785
Rockwell Hardness R	**120**	ASTM D785
Shore Hardness D	**84**	ASTM D2240

THERMAL PROPERTIES

Delrin reports extremely high fatigue resistance from −40 to 82 °C, so gears and snap features in automation and consumer products keep working across that range. Heat deflection shows the short-term limit under load and should not be used to judge maximum use temperature; size parts from the long-term service rating and use the intermittent rating for short excursions.

Acetal expands several times more than steel or aluminium, and expansion rises with temperature, so check clearances and press fits against metal mating parts at operating temperature.

PROPERTY	VALUE	TEST STANDARD
Melting Point	**175 °C**	ASTM D2117
HDT @ 0.45 MPa	**169 °C**	ASTM D648
HDT @ 1.8 MPa	**125 °C**	ASTM D648
Service Temperature, Long Term	**85 °C**	UL 746B
Service Temperature, Intermittent	**149 °C**	—
Coefficient of Linear Thermal Expansion	**122 ×10^{-6}/K**	ASTM D696
Thermal Conductivity (moulded resin)	**0.4 W/m·K**	—
Specific Heat (−18 to 100 °C)	**1.47 kJ/kg·K**	—

PHYSICAL PROPERTIES

Consistent density and surface quality keep critical features in tolerance and downstream finishing predictable. Delrin absorbs little water even at saturation, so machined parts hold their dimensions in humid or wet service and assemblies fit without secondary rework.

Friction and wear factor come from unlubricated thrust-washer tests against steel. Use them to compare acetal with other bearing materials for bushings, slides and gears; lubrication, speed and load change the results.

PROPERTY	VALUE	TEST STANDARD
Density	**1.41 g/cm^3**	ASTM D792
Water Absorption (24 h, 23 °C)	**0.25 %**	ASTM D570
Water Absorption (moulded resin, equilibrium, 23 °C, 50% RH)	**0.22 %**	ASTM D570
Water Absorption (saturation, 23 °C)	**0.90 %**	ASTM D570
Dynamic Coefficient of Friction (vs. steel, 40 psi, 50 ft/min)	**0.20**	ASTM D3702
Wear Factor (40 psi, 50 ft/min)	**55 ×10^{-10} in^3·min/ft·lb·hr**	ASTM D3702

ELECTRICAL PROPERTIES

Delrin is an electrical insulator with high resistivity and good dielectric strength, and natural acetal does not carbon track under an arc. It suits insulating parts, connector bodies and electrical housings in integrated electrical systems.

Delrin reports that moisture has minimal effect on its electrical properties, and its low dissipation factor means low dielectric losses at power and radio frequencies, which helps in signal-sensitive use.

PROPERTY	VALUE	TEST STANDARD
Volume Resistivity	**> 10^{15} Ω·cm**	ASTM D257
Dielectric Strength (short time)	**19.7 kV/mm**	ASTM D149
Dielectric Constant (23 °C, 60 Hz)	**3.7**	ASTM D150
Dissipation Factor (23 °C, 60 Hz)	**0.005**	ASTM D150
Arc Resistance (moulded resin, 3.1 mm, no tracking)	**220 s**	ASTM D495

CHEMICAL PROPERTIES

Delrin resists alcohols, aldehydes, esters, ethers, fuels, lubricants, hydraulic fluids and many weak acids and bases, and keeps over 90% of its tensile strength after exposure to almost all solvents. The table shows the change in unstressed bars after long immersion, with the temperature and duration listed with each chemical and a range where Delrin tested several commercial products. Bars held bent in toluene, acetone, motor oil or brake fluid for a week showed no stress cracking.

Acetal is not suitable for strong acids, strong bases or oxidizing agents, and Delrin does not recommend it outside pH 4 to 9. Chlorine attacks it at 3 to 5 ppm and above, so keep it out of continuously chlorinated water. Confirm chemical ratings with application-specific testing before production release.

CHEMICAL	STRENGTH CHANGE	WEIGHT CHANGE
Acetone (23 °C, 365 days)	**−5%**	**+4.9%**
Ethanol (23 °C, 365 days)	**−5%**	**+2.2%**
Methanol (60 °C, 275 days)	**−10%**	**−2.3%**
Ethyl acetate (23 °C, 365 days)	**−7%**	**+2.7%**
Toluene (23 °C, 365 days)	**−7%**	**+2.6%**
Hexane (60 °C, 275 days)	**−4%**	**+0.7%**
Kerosene (60 °C, 275 days)	**0%**	**0%**
Gasolines, 7 grades (23 °C, 820 days)	**−4 to −9%**	**+0.7 to 1.6%**
Motor oil 10W-30 (70 °C, 365 days)	**+3%**	**−0.2%**
Brake fluids, 2 products (70 °C, 310 days)	**−6 to −23%**	**+0.9 to 1.6%**
Sodium chloride 10% (70 °C, 365 days)	**−15%**	**−0.6%**
Calcium chloride 5% (23 °C, 365 days)	**0%**	**−0.2%**
Acetic acid 5% (23 °C, 365 days)	**0%**	**+0.8%**
Hydrogen peroxide 50% (23 °C, 365 days)	**−2%**	**−0.1%**
Hydrochloric acid 10% (23 °C, 90 days)	**Unsatisfactory**	**Unsatisfactory**
Sulfuric acid 30% (23 °C, 182 days)	**Unsatisfactory**	**Unsatisfactory**

Sodium hydroxide 10% (23 °C, 365 days)	**Unsatisfactory**	**Unsatisfactory**
Bleach, 5% hypochlorite (23 °C, 30 days)	**Unsatisfactory**	**Unsatisfactory**

COMPLIANCE

Each status comes from the stock supplier's datasheet for natural Delrin 150 rod and plate, so food-equipment and drinking-water reviews can start from supplier listings. The listings cover natural stock; ask us for the supplier documentation for black or coloured stock.

Delrin rates every acetal composition UL 94 HB, so it is not flame retardant. Delrin sells dedicated medical grades for parts with body contact; Delrin 150, an extrusion grade, is not one of them.

STANDARD	STATUS
FDA 21 CFR 177.2480 (Food contact) Listed for natural Delrin 150 shapes; compliance refers to the resin the shapes are extruded from. Black and coloured stock need their own supplier documentation	Stock supplier listing
NSF/ANSI 51 and 61 Food equipment (51) and drinking-water system components (61), listed for natural Delrin 150 shapes. Delrin advises against continuous exposure to chlorine at 3 to 5 ppm and above	Stock supplier listing
ASTM D6100 S-POM0111 / ASTM D6778 POM0111 Extruded acetal homopolymer rod and plate specification that natural Delrin 150 shapes are supplied to	Stock specification
UL 94 flammability Delrin rates every composition HB; acetal is not flame retardant	HB

MANUFACTURING

Colours & finishes	**Natural white or black stock; deburring, polishing and threading**