

Tough Clear

A clear, production-grade material engineered to offer long-term, environmental UV, humidity stability, chemical compatible, and has thermoplastic-like mechanical properties.

Production-grade material that is durable and avoids fading or discolouration for up to 8 years indoors

Tough Clear delivers long-term stability and a versatile combination of mechanical properties for functional prototyping or end-use parts. It offers high light transmission that can be made fully transparent with post-processing.

3D printing clear components is a cost-effective manufacturing process for product development. Get visibility into the workings of complex assemblies, observe gas or fluid flows and reduce product design cycles.

Tough Clear introduces long-term stability which minimizes reprints due to resistance to discoloration or yellowing up to 8 years indoors.



Applications

- ▶ End-use manufacturing of high volume, small plastic parts
- ▶ Load-bearing handles, cranks, knobs, and levers
- ▶ Structural brackets, snap-fits, and fasteners
- ▶ Lighting covers, cases, and reflectors
- ▶ Lenses and light guides
- ▶ Fast-moving consumer goods and consumer packaging



Benefits

- ▶ Production-grade material
- ▶ High heat resistance for testing and use in high heat environments
- ▶ No secondary thermal post-cure required
- ▶ Excellent visualisation for parts requiring evaluation of internal features and fluid flow performance

Features

- ▶ Excellent clarity that can be further improved with post-processing steps like clear coating
- ▶ Long-term environmental stability of mechanical properties and performance
- ▶ Ability to go from prototype to production parts using clear or transparent aesthetics
- ▶ Prototypes have longer lives and can be reused for longer periods of time
- ▶ Supports functional testing in outdoor settings
- ▶ Automotive fluid and chemical compatibility



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LIQUID MATERIAL			
MEASUREMENT	METHOD	METRIC	U.S.
Viscosity (@25°C)	Brookfield viscometer	41 cps	97 lb/ft-hr
Colour		Clear	
Liquid Density (@25°C)	Kruss K11 Force Tensiometer	1.21 g/cm ³	0.044 lb/in ³
SOLID MATERIAL			
MEASUREMENT	ASTM METHOD	METRIC	U.S.
PHYSICAL			
Solid Density (g/cm ³ lb/in ³)	ASTM D792	1.21	0.044
24 hour water absorption	ASTM D570	0.56%	0.56%
MECHANICAL			
Tensile Strength Ultimate	ASTM D638 Type IV	50 MPa	7300 psi
Tensile Strength at Yield	ASTM D638 Type IV	50 MPa	7200 psi
Tensile Modulus	ASTM D638 Type IV	2200 MPa	320 ksi
Elongation at Break	ASTM D638 Type IV	13.1%	13.1%
Elongation at Yield	ASTM D638 Type IV	4.1%	4.1%
Flexural Strength	ASTM D790	67 MPa	9700 psi
Flexural Modulus	ASTM D790	2000 MPa	290 ksi
Notched Izod Impact	ASTM D256	18 J/m	0.3 ft-lbs/in
Unnotched Izod Impact	ASTM D4812	400 J/m	7 ft-lbs/in
Shore Hardness	ASTM D2240		
THERMAL			
T _g (DMA E'')	ASTM E1640 (E' Peak)	48°C	119°F
HDT @ 0.45 MPa (66 PSI)	ASTM D648	48°C	119°F
HDT @ 1.82 MPa (264 PSI)	ASTM D648	42°C	108°F
CTE -40-15°C	ASTM E831		
CTE 55-125°C	ASTM E831		
UL Flammability	UL94		HB
ELECTRICAL			
Dielectric Strength (kV/mm) @ 3mm thickness	ASTM D149		
Dielectric Constant @ MkHz	ASTM D150		
Dissipation Factor @ MkHz	ASTM D150		
Volume Resistivity (ohm-cm)	ASTM D257		

*Tensile testing done at 50mm/min after timeout at 5mm/min per ASTM D638 standards

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