

Applications

- Flexible medical device packaging
- Pharmaceutical packaging
- Rigid medical packaging

Product Description

Key Attributes

- Easy primary & secondary operations
- Excellent clarity
- Excellent toughness
- Gamma, ebeam, ETO sterilization stable

Meets ISO 10993 and/or USP Class VI biocompatibility requirement: Food Contact Status compliant. IC3D Standard PETG is a clear, amorphous material that can be molded and extruded with ease. Its excellent performance properties include clarity, toughness, good melt strength, no dusting, no stress whitening, good heat sealability, easy cutting and thermoforming. IC3D Standard PETG may be colored using color concentrates, dry colors, or liquid colorants. It can be safely sterilized with proper ethylene oxide, radiation, or electron beam methods without property loss or color shift. It is well suited for a variety of applications including, medical packaging, cosmetics and personal care packaging, food and beverage packaging, and display & signs.

In medical applications, IC3D Standard PETG provides:

- Superior, long-term clarity provides easy identification of instruments
- Excellent puncture resistance and impact toughness ensure package integrity
- Excellent ability to be subjected to several methods of sterilization, providing flexibility and security to the device manufacturer
- Excellent optical and physical property stability post sterilization
- Good melt strength offers wide processing latitude and ease in thermoforming

The production and trimming of rigid medical trays made from sheet of IC3D results in little or no dust or particulates. After the thermoformed trays are made, they are put in polybags. The polybags of trays are then placed in protective boxes for storage or shipment. If the polybags in the protective boxes are intact and no outside contamination is evident, the medical device manufacturer should not need to clean the tray prior to packaging a device and sealing the package. If contamination is found on the medical trays and cleaning is required, use a lint-free towel. Blowing the tray out with filtered, deionized, non-lubricated air is also acceptable, assuming this does not stir up dust from the surrounding area. Using alcohol, which could cause crazing, or water, which would not evaporate, is not recommended.

This product has been Cradle to Cradle Certified[™] Bronze, with Material Health Certificate, Platinum. The Cradle to Cradle Certified mark is a registered certification mark used under license through the Cradle to Cradle Products Innovation Institute, a nonprofit organization that administers the publicly available Cradle to Cradle Certified[™] Product Standard which provides designers and manufacturers with criteria and requirements for continually improving product materials and manufacturing processes. This standard guides designers and manufacturers through a continual improvement process that looks at a product through five quality categories—material health, material reutilization, renewable energy and carbon management, water stewardship, and social fairness. A product receives an achievement level in each category—Basic, Bronze, Silver, Gold, or Platinum—with the lowest achievement level representing the product's overall mark. The Material Health Certificate provides manufacturers with a trusted way to communicate their efforts to identify and replace chemicals of concern in their products.

Technical Data Sheet

Product Name: IC3D Standard PETG Revision Date: 01/16/2020



Typical Properties

	Typical Properties				
Property ^a	Test Method ^b	Typical Value, Units ^e			
Electrical Properties					
Dielectric Constant					
1kHz 1MHz	D 150	2.6 2.4			
Dissipation Factor	D 150	2,4			
1kHz	D 150	0.005			
1MHz	D 150	0.02			
Arc Resistance	D 495	158 sec			
Volume Resistivity	D 257	10 ¹⁵ ohm.cm			
Surface Resistivity	D 257	10 ¹⁶ ohms/square			
Dielectric Strength, Short Time, 500 V/sec rate-of-rise	D 149	16 kV/mm (410 V/mil)			
Film Properties					
Thickness of Film Tested	D 374	250 Microns (10 mils)			
Density	D 1505	1.27 g/cm ³			
Haze	D 1003	0.8 %			
Gloss @ 45°	D 2457	108			
Transparency	D 1746	85 %			
Regular Transmittance	D 1003 Modified	89 %			
Total Transmittance	D 1003 Modified	91 %			
Water Vapor Transmission Rate ^e	F 1249	7 g/m ² -24h (0.5 g/100in. ² -24h)			
Gas Permeability, CO2	D 1434	49 cm ³ -mm/m ² -24h-atm (125 cm ³ -mil/100in. ² -24h-atm)			
Gas Permeability, O2	D 3985	10 cm ³ -mm/m ² -24h-atm (25 cm ³ -mil/100in. ² -24h-atm)			
Elmendorf Tear Resistance M.D. T.D.	D 1922 D 1922	13.7 N (1400 gf) 16.7 N (1700 gf)			
PPT Tear Resistance M.D. T.D.	D 2582 D 2582	93 N (21 lbf) 93 N (21 lbf)			
Tear Propagation Resistance, Split Tear Method M.D. @ 254 mm/min (10 in./min) T.D. @ 254 mm/min (10 in./min)	D 1938 D 1938	36 N/mm (205 lbf/in.) 36 N/mm (205 lbf/in.)			
Tear Resistance, Trouser @ 200 mm/min M.D. T.D.	ISO 6383-1 ISO 6383-1	36 N/mm (205 lbf/in.) 36 N/mm (205 lbf/in.)			
Tensile Strength @ Yield M.D. T.D.	D 882 D 882	52 MPa (7500 psi) 52 MPa (7500 psi)			
Tensile Strength @ Break M.D. T.D.	D 882 D 882	59 MPa (8600 psi) 55 MPa (8000 psi)			
Elongation @ Yield M.D. T.D.	D 882 D 882	4 96 4 96			

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Elongation @ Break		
M.D. T.D.	D 882 D 882	400 % 400 %
Tensile Modulus M.D. T.D.	D 882 D 882	1900 MPa (2.8 x 10 ⁵ psi) 1900 MPa (2.8 x 10 ⁵ psi)
Dart Impact [*] @ -18°C (0°F) @ 23°C (73°F)	D 1709A Modified D 1709A Modified	500 g 400 g
Mechanical Properties (Injection Molded), ASTM Me	thod	
Specific Gravity	D 792	1.27
Water Absorption, 24 h Immersion	D 570	0.13 %
Tensile Stress @ Break	D 638	28 MPa (4100 psi)
Tensile Stress @ Yield	D 638	50 MPa (7300 psi)
Elongation @ Break	D 638	130 %
Tensile Modulus	D 638	2100 MPa (3.0 x 10 ⁵ psi)
Flexural Modulus	D 790	2100 MPa (3.0 x 10 ⁵ psi)
Flexural Yield Strength	D 790	70 MPa (10200 psi)
Rockwell Hardness, R-Scale	D 785	106
Izod Impact Strength, Notched @ 23°C (73°F) @ -40°C (-40°F)	D 256 D 256	101 J/m (1.9 ft-lbf/in.) 37 J/m (0.7 ft-lbf/in.)
Impact Strength, Unnotched @ -20°C (-4°F) @ 23°C (73°F) @ -30°C (-22°F) @ -40°C (-40°F)	D 4812 D 4812 D 4812 D 4812 D 4812	NB NB NB
Impact Resistance (Puncture), Energy @ Max. Load 2.5-mm (0.100-in.) Thick Plaques, @ 23°C (73°F)	D 3763	28 J (21 ft-lbf)
2.5-mm (0.100-in.) Thick Plaques, @ -40°C (-40°F)	D 3763	41 J (30 ft-lbf)
3.2-mm (0.125-in.) Thick	D 3763	33 J (24 ft-lbf)
Plaques, @ 23°C (73°F) 3.2-mm (0.125-in.) Thick Plaques, @ -40°C (-40°F)	D 3763	50 J (37 ft-lbf)
Mechanical Properties (Injection Molded), ISO Meth	od	
Density	ISO 1183, Method D	1.27 g/cm ³
Water Absorption, 24 h Immersion	ISO 62	0.13 %
Tensile Stress @ Break	ISO 527	28 MPa
Tensile Stress @ Yield	ISO 527	50 MPa
Elongation @ Break	ISO 527	100 %
Tensile Modulus	ISO 527	2100 MPa
Flexural Modulus	ISO 178	2000 MPa
Flexural Yield Strength	ISO 178	68 MPa
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Izod Impact Strength, Notched, Type 1 Specimen, Type A Notch @ 23°C @-40°C	ISO 180 ISO 180	6.2 kJ/m² 4.2 kJ/m²
Impact Strength, Unnotched, Type 1 Specimen ^f @ -20°C @ 23°C @ -30°C @ -40°C	ISO 180 ISO 180 ISO 180 ISO 180	NB kJ/m² NB kJ/m² NB kJ/m² NB kJ/m²
Impact Resistance (Puncture), Energy @ Max. Load ^h 2.5 -mm Thick Plaques @ 23°C 2.5 -mm Thick Plaques @ -40°C 3.2 -mm Thick Plaques @ 23°C 3.2 -mm Thick Plaques @ -40°C	ISO 6603-2 ISO 6603-2 ISO 6603-2 ISO 6603-2	40 J 35 J 44 J 36 J
Thermal Properties		
Deflection Temperature @ 0.455 MPa (66 psi) @ 1.82 MPa (264 psi)	D 648 D 648	70°C (158°F) 64°C (147°F)
Vicat Softening Temperature	D 1525	85°C (185°F)
Thermal Conductivity	C 177	0.21 W/m-K (1.5 Btu-in./h-ft ² -°F)
Glass Transition Temperature (T9)	DSC	80°C (176°F)
Specific Heat @ 100°C (212°F) @ 150°C (302°F) @ 200°C (392°F) @ 250°C (482°F) @ 60°C (140°F)	DSC DSC DSC DSC DSC DSC	1.76 kJ/kg-K (0.42 Btu/lb-°F) 1.88 kJ/kg-K (0.45 Btu/lb-°F) 1.97 kJ/kg-K (0.47 Btu/lb-°F) 2.05 kJ/kg=K (0.49 Btu/lb-°F) 1.30 kJ/kg-K (0.31 Btu/lb-°F)
Coefficient of Linear Thermal Expansion ^d	D 696	5.1 x 10 ⁻⁵ /°C (mm/mm-°C) (2.8 x 10 ⁻⁵ /°F (in./in°F)
Typical Processing Conditions		
Mold Temperature		16-38°C (60-100°F)
Processing Melt Temperature		249-271°C (480-520°F)
Drying Time		4-6 hrs
Drying Temperature		65°C (150°F)
Notes		
*Unless noted otherwise, all tests are run at 23°C (73°F) and 50	% relative humidity.	
^b Unless noted otherwise, the test method is ASTM.		
°Units are in SI or US customary units.		
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^d-30°C to 40°C (-22°F to 104°F)

eTest conducted at 38°C (100°F) and 100% relative humidity.

^fNonbreak as defined by ISO 180 with 4-mm specimens.

5Nonbreak as defined by ASTM D 4812 with 3.2-mm specimens.

^hTesting based on ISO 6603-2 using a striker diameter of 20 mm, a support and clamp diameter of 40 mm, and a velocity of 4.1 m/s

¹12.7 mm (0.5 in.) dia. head, 127 mm (5 in.) dia. clamp, 660 mm (26 in.) drop

Disclaimer: The technical data contained on this data sheet is furnished without charge or obligation and accepted at the recipient's sole risk. This data should not be used to establish specifications limits or used alone as the basis of design. The data provided is not intended to substitute any testing that may be required to determine fitness for any specific use.