

Technical Data Sheet

Eastman Tritan™ Copolyester EX401

Applications

- Baby bottles/sippy cups
- Childcare items
- Infant/toddler
- Small appliances non-food contact

Key Attributes

- Chemical resistance
- Clarity
- Global food contact regulatory clearances
- Heat resistance
- Hydrolytic stability
- Impact resistance
- Processing ease
- Sterilization capable via steaming or boiling water

Product Description

Tritan EX401, specifically developed for the Infant Care market, is an amorphous copolyester with excellent appearance and clarity. Tritan EX401 contains a mold release derived from vegetable based sources. Its most outstanding features are clarity, excellent toughness, hydrolytic stability, and heat and chemical resistance. Tritan EX401 meets infant care sterilization requirements via boiling water or microwave steam sterilization. This new-generation copolyester can also be molded into various applications without incorporating high levels of residual stress. Combined with Tritan's outstanding chemical resistance and hydrolytic stability, these features give molded products enhanced durability in the dishwasher environment, which can expose products to high heat, humidity, and aggressive cleaning agents.

Tritan EX401 can be converted into parts using injection molding, injection stretch blow molding (ISBM), and extrusion blow molding techniques.

Tritan EX401 may be used in repeated use food contact articles under United States Food and Drug Administration (FDA) regulations. Contact Eastman representative for details on global food contact regulatory clearances.

Tritan EX401 is included in Eastman Chemical Company's Customer Notification Procedure which details our policy for customer notification when significant changes are made in Tritan EX401 sold into the infant care market. This procedure provides the infant care industry an added layer of confidence in the consistent quality and performance of Tritan.

Typical Properties

| Property ^a | Test Method ^b | Typical Value, Units ^c |
|---|--------------------------|---|
| General Properties | | |
| Specific Gravity | D 792 | 1.17 |
| Injection Mold Shrinkage | D 955 | 0.005-0.007 mm/mm (0.005-0.007 in./in.) |
| ISBM Blow Mold Shrinkage ^e | EMN | 0.012-0.016 mm/mm |
| ISBM Bottle Properties | | |
| Fill Volume Shrinkage - Boiling, 1 hr ^d | EMN | <1 % |
| Fill Volume Shrinkage - Boiling, 2 hr ^d | EMN | <1.5 % |
| Fill Volume Shrinkage - Dishwasher ^d | EMN | <1 % |
| Microwave Steam Sterilization (Total Energy=Wattage*Minutes) ^d | EMN | Up to 11,200 W-min |
| Microwave Boiling, Oven Power ^d | EMN | Up to 2200 W |
| Thermal Shock, Water Immersion, 98 C to 35 C ^d | EMN | No effect |
| Mechanical Properties (ISO Method) | | |
| Tensile Strength @ Yield | ISO 527 | 45 MPa |
| Tensile Strength @ Break | ISO 527 | 49 MPa |
| Elongation @ Yield | ISO 527 | 7 % |
| Elongation @ Break | ISO 527 | 130 % |
| Tensile Modulus | ISO 527 | 1624 MPa |
| Flexural Modulus | ISO 178 | 1531 MPa |
| Izod Impact Strength, Notched | | |
| @ 23°C | ISO 180 | 66 kJ/m ² |
| @ -40°C | ISO 180 | 14 kJ/m ² |
| Mechanical Properties (DIN Method) | | |
| Tensile Stress @ Yield | D 638 | 44 MPa (6400 psi) |
| Tensile Stress @ Break | D 638 | 53 MPa (7700 psi) |
| Elongation @ Yield | D 638 | 7 % |
| Elongation @ Break | D 638 | 140 % |
| Tensile Modulus | D 638 | 1585 MPa (2.28 x 10 ⁵ psi) |
| Flexural Modulus | D 790 | 1585 MPa (2.28 x 10 ⁵ psi) |
| Flexural Yield Strength | D 790 | 66 MPa (9600 psi) |
| Rockwell Hardness, R Scale | D 785 | 115 |
| Izod Impact Strength, Notched | | |
| @ 23°C (73°F) | D 256 | 650 J/m (12.2 ft·lbf/in.) |
| @ -40°C (-40°F) | D 256 | 126 J/m (2.4 ft·lbf/in.) |
| Impact Strength, Unnotched | | |
| @ 23°C (73°F) | D 4812 | NB |
| @ -40°C (-40°F) | D 4812 | NB |
| Impact Resistance (Puncture), Energy @ Max. Load | | |
| @ 23°C (73°F) | D 3763 | 59 J (43 ft·lbf) |
| @ -40°C (-40°F) | D 3763 | 63 J (46 ft·lbf) |
| Optical Properties | | |
| Total Transmittance | D 1003 | 92 % |
| Haze | D 1003 | <1 % |

Properties After Boiling

| | | |
|--|-------|--------------------------|
| Haze | | |
| After 8 hr boiling | EMN | <1 % |
| Izod Impact Strength, Notched, 23 C | | |
| After 8 hr boiling | EMN | 650 J/m |
| After re-equilibration | | 643 J/m |
| Tensile Stress @ Yield | | |
| After 8 hr boiling | EMN | 44 MPa |
| After re-equilibration | | 45 MPa |
| Elongation @ Yield | | |
| After 8 hr boiling | EMN | 7 % |
| After re-equilibration | | 6.5 % |
| Thermal Properties | | |
| Deflection Temperature | | |
| @ 0.455 MPa (66 psi) | D 648 | 109 °C (228 °F) |
| @ 1.82 MPa (264 psi) | D 648 | 92 °C (198 °F) |
| Typical Drying Conditions | | |
| Drying Temperature | | 88 °C (190 °F) |
| Drying Time | | 4-6 hrs |
| Dewpoint | | < -35 °C (< -30 °F) |
| Typical Processing Conditions - Extrusion Blow Molding (EBM) | | |
| Processing Melt Temperature | | 240-250 °C (465-480 °F) |
| Mold Temperature | | 25-45 °C (80-110 °F) |
| Typical Processing Conditions - Injection Molding | | |
| Processing Melt Temperature | | 260-282 °C (500-540 °F) |
| Mold Temperature | | 38-66 °C (100-150 °F) |
| Typical Processing Conditions - Injection Stretch Blow Molding (ISBM) | | |
| Processing Melt Temperature | | 270-285 °C (520-545 °F) |
| Injection Mold Temperature | | 60-70 °C (140-160 °F) |
| Preform Temperature at Blow | | 185-195 °C (365-385 °F) |
| Primary Blow Pressure | | 0.03-0.08 MPa (4-12 psi) |
| Secondary Blow Pressure | | 0.2-0.3 MPa (25-40 psi) |
| Blow Mold Temperature | | 80-90 °C (175-195 °F) |
| Residual Stress Under Polarized Light, Fringe Count | EMN | <= 3 |

^aUnless noted otherwise, all tests are run at 23°C (73°F) and 50% relative humidity.

^bUnless noted otherwise, the test method is ASTM.

^cUnits are in SI or US customary units.

^dProperties are typical of bottles made with proper processing to minimize residual stress.

^eApplies to the stretch blow molded portion only (not the injection molded preform).

Technical Disclaimer

Eastman makes no representation and disclaims any warranty that the material in any particular shipment will conform exactly to the values given. Values as well as the performance of the final molded article may be affected by various factors such as the part design, mold design or tooling, drying, processing conditions as well as coloring or pigmentation of the product. No warranty of merchantability or fitness for use is made, and nothing herein waives any of the Seller's conditions of sale. You must make your own determination of the suitability of this product in your specific application due to the many factors (e.g. design, processing and conditions of use) that affect the performance of the final molded article. Suitability of use should be evaluated with appropriate testing and analysis. The processing melt temperature and mold temperature refer to the actual resin melt temperature and actual mold surface temperature respectively. Consider overall resin residence time, part shot size utilization and part geometry to set appropriate processing melt temperature and mold temperature in order to minimize IV loss and maximize molded part performance.

Comments

Properties reported here are based on limited testing. Eastman makes no representation that the material in any particular shipment will conform exactly to the values given.

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