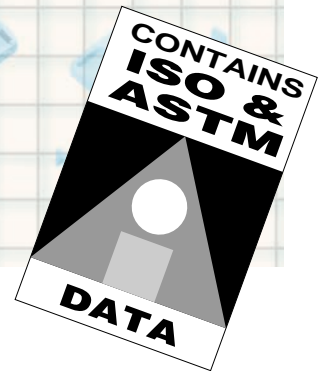
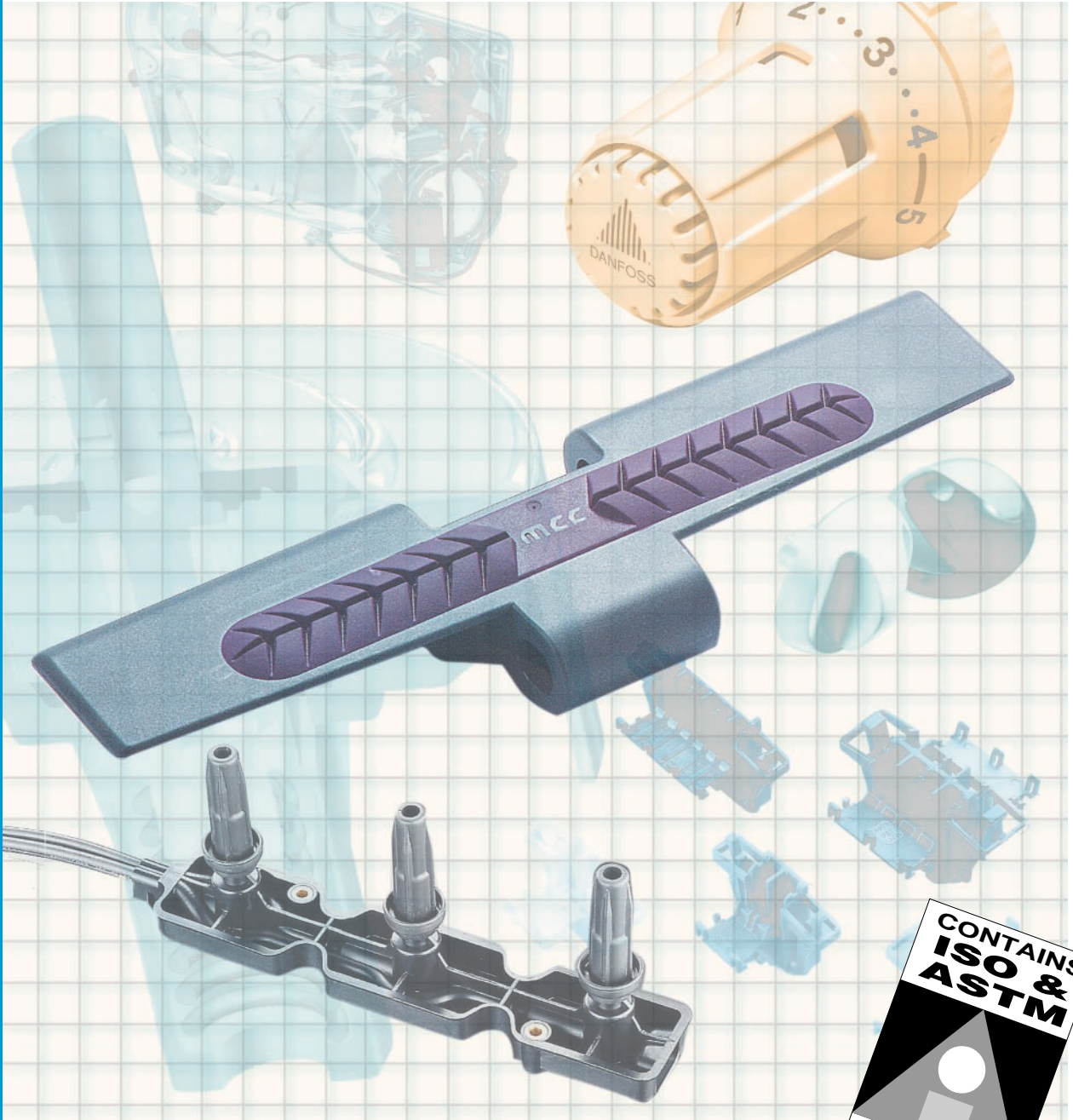


# Ticona

## Celanex<sup>®</sup> thermoplastic polyester Short Term Properties Brochure

*Thermoplastic polyester*

CX-4



Celanex<sup>®</sup> Thermoplastic polyester

## Introduction

Celanex thermoplastic polyester resins are engineering materials based on polybutylene terephthalate (PBT). They are used in a wide spectrum of applications where a strong, smooth, thermally stable, chemically resistant and electrically insulating product is required. Dimensional stability is significantly better than nylon, especially in humid environments. They have excellent processing characteristics and will fill complex and thin-walled molds in relatively short cycle times. Several grades are processable (per Underwriters Laboratories approval) with up to 50% regrind content, which can significantly reduce manufacturing costs.

Unfilled grades offer a wide range of melt viscosities for excellent processing latitude. Molded parts have smooth surfaces, high strength and very good chemical resistance. Several grades have superior hydrolytic stability for applications requiring performance in hot, humid environments, such as fiber optic buffer tubes, brake cable linings and automotive connectors.

Glass reinforced grades have excellent strength and high modulus while maintaining easy processing characteristics. Several grades are rated V-0 in the UL 94 flammability test in part thicknesses as low as 1/32 in. (0.80 mm). Molded parts made from many of these grades are free of surface exudation.

Glass/mineral grades are also available which produce parts with high impact strength, low warp and excellent dimensional stability.

## Celanex<sup>®</sup> Thermoplastic Polyester – Grade Characteristics

<b>Unreinforced</b>	1300 A	Very high melt flow	<b>High Impact</b>	4300	30% Glass-fiber, good impact strength	
	1400 A	High melt flow		4302	30% Glass-fiber, good impact strength, good surface smoothness	
	1600 A	Extrusion grade		4305	33% Glass-fiber, good impact strength	
	1700 A	Ultrahigh molecular weight		4306	30% Glass-fiber, good impact strength, low warp	
	2000	High melt flow		<b>Improved Surface Finish</b>	5200	15% Glass-fiber, good surface smoothness
	2000 K	Key cap grade			5300	30% Glass-fiber, good surface smoothness
	2001	Hydrolytically stable grade			<b>Low Warp General Purpose</b>	J600
	2002	Medium melt flow		6400		40% Glass/mineral, warp resistant, good surface smoothness
	2003	Higher flow than 2002		6407		30% Glass/mineral, low warp, good surface smoothness, improved impact
	2003HR	Hydrolysis resistant, higher flow than 2002		<b>Low Warp Flame Retardant</b>	6500	30% Glass/mineral, good surface smoothness
	2004	Good balance of flow and toughness			7700	35% Glass/mineral, flame retardant and low warp
	2008	Lowest molecular weight			7305	35% Glass/mineral, flame retardant, low warp, improved impact
	2012	Flame retardant			7316	35% Glass/mineral, flame retardant, non-exuding, higher CTI than 7716
	2016	Flame retardant, non-exuding			7716	35% Glass/mineral, flame retardant, non-exuding, low warp
	4016	Impact modified, flame retardant, non-exuding				
<b>Glass Reinforced</b>	3200	15% Glass-fiber, general purpose, high flow				
	3200HR	Hydrolysis resistant, 15% glass-fiber				
	3201	15% Glass-fiber, higher toughness than 3200				
	3300, 3300D	30% Glass-fiber, general purpose				
	3300LM	Laser markable, 30% glass-fiber				
	3300HR	Hydrolysis resistant, 30% glass-fiber				
	3400	40% Glass-fiber, general purpose				
<b>Glass Reinforced Flame Retardant</b>	3116	7.5% Glass-fiber, flame retardant, non-exuding				
	3210	20% Glass-fiber, flame retardant				
	3216	15% Glass-fiber, flame retardant, non-exuding				
	3310	30% Glass-fiber, flame retardant				
	3316	30% Glass-fiber, flame retardant, non-exuding				



### NOTICE! ISO DATA INCLUDED

Ticona has expanded its plastics testing and reporting of data to include ISO (International Organization for Standardization) protocols. This change will mean more reproducible and consistent test data for Ticona plastic products. This brochure contains both ISO and ASTM data.

## Celanex® Thermoplastic Polyester – Typical Areas of Application

Application Areas	Benefits
<b>Appliances</b> <ul style="list-style-type: none"><li>■ Bases</li><li>■ Computer key caps</li><li>■ Business machine housings</li></ul>	<ul style="list-style-type: none"><li>■ High thermal stability, UL 94 V-0 rating</li><li>■ Excellent dimensional stability, printable, colorable</li><li>■ High strength</li></ul>
<b>Automotive</b> <ul style="list-style-type: none"><li>■ Connectors</li><li>■ Door handles</li><li>■ Fan blades</li><li>■ Motor housings</li><li>■ Switches</li><li>■ Shrouds</li></ul>	<ul style="list-style-type: none"><li>■ Good dimensional stability, electrically insulative</li><li>■ Paintable grades available</li><li>■ High strength, high abrasion resistance</li><li>■ Excellent dimensional stability</li><li>■ Good impact, environmental and thermal resistance</li></ul>
<b>Electrical/Electronic</b> <ul style="list-style-type: none"><li>■ Brush holders</li><li>■ Circuit breakers</li><li>■ Coil bobbins</li><li>■ Cable liners</li><li>■ Interconnects</li><li>■ Fiber optic buffer tubes</li><li>■ Header connectors</li><li>■ Motor end caps</li><li>■ Sockets</li><li>■ Stator insulation</li><li>■ Switches</li><li>■ Terminal boards</li><li>■ Transformers</li></ul>	<ul style="list-style-type: none"><li>■ Excellent processability</li><li>■ Superior electrical insulating properties</li><li>■ Flame retardant UL 94 V-0 rating</li><li>■ Excellent thermal properties</li><li>■ Easily fills thin-wall parts</li><li>■ Provides smooth part surface finish</li><li>■ Good hydrolytic stability</li><li>■ Excellent dimensional stability</li><li>■ Low warp</li></ul>
<b>Industrial</b> <ul style="list-style-type: none"><li>■ Filter media</li><li>■ Packaging</li><li>■ Pumps</li><li>■ Impellers</li></ul>	<ul style="list-style-type: none"><li>■ Excellent chemical and hydrolytic stability</li><li>■ Good extrusion characteristics</li><li>■ Precision molding, high abrasion resistance</li><li>■ Excellent chemical and environmental resistance</li></ul>

## Celanex® Thermoplastic Polyester – Typical Properties

PROPERTY	Test Method	Units	Unreinforced Polymers					
			1300A	1400A	1600A	1700A	2000 2000K	2001
<b>ISO TEST METHOD</b>								
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	ISO 527	MPa	(60)	(60)	(60)	(60)	(60)	(60)
Tensile Modulus	ISO 527	MPa	2,500	2,700	2,550	2,500	2,700	2,600
Flex Modulus	ISO 178	MPa	2,200	2,200	2,200	2,200	2,600	2,500
Flex Strength	ISO 178	MPa	80	80	80	80	85	80
Izod Impact Strength, Notched	ISO 180/1A	kJ/m <sup>2</sup>	2.9	3.7	5.5	5.5	3.2	5.5
Rockwell Hardness	ISO 2039-2	M scale	72	72	72	72	75	72
<b>Thermal</b>								
DTUL at 0.45 MPa	ISO 75	°C	156	142	150	150	155	150
DTUL at 1.8 MPa	ISO 75	°C	62	58	50	50	55	50
<b>Electrical</b>								
Volume Resistivity, 1 mm	IEC 93	ohm-cm	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>
Dielectric Strength, 3 mm	IEC 243-1	kV/mm	15	15	23	23	23	15
Permittivity, 1 MHz, 3 mm	IEC 250	—	3.2	3.2	3.5	3.6	3.5	3.2
Dissipation Factor, 1 MHz, 3 mm	IEC 250	—	0.02	0.02	0.02	0.02	0.02	0.02
<b>ASTM TEST METHOD</b>								
	Test Method	Units	1300A	1400A	1600A	1700A	2000 2000K	2001
<b>Physical</b>								
Specific Gravity	D792	—	1.31	1.31	1.31	1.31	1.31	1.31
Water Absorption	D570	%	0.08	0.08	0.08	0.08	0.09	0.05
Mold Shrinkage, 1/8" bar, Flow Direction*	Internal test	mils/in	18-20	18-20	18-20	18-20	18-20	18-20
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	D638	psi	(8,000)	(8,000)	(8,000)	(8,000)	(8,300)	(8,000)
Elongation at Break	D638	%	25	50	>200	>200	5	>200
Flex Strength	D790	psi	12,000	12,000	12,000	12,000	12,400	12,000
Flex Modulus	D790	psi	330,000	330,000	330,000	330,000	360,000	330,000
Izod Impact Strength, Notched	D256	ft. lb/in	0.5	0.6	1.0	1.0	0.7	1.0
<b>Thermal</b>								
HDT @ 66 psi	D648	°F	310	310	310	310	324	310
HDT @ 264 psi	D648	°F	130	130	130	130	123	130
<b>Flammability</b>								
UL Rating @ 1/32" thickness (as tested by Ticona)	UL94	—	(HB)	HB	HB	HB	HB	(HB)
UL94 5VA min. thickness	UL94	inches						
<b>Electrical</b>								
Volume Resistivity	D257	ohm-cm	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>
Dielectric Strength, 1/8", 50% RH, 73°F	D149	V/mil	400	400	400	400	420	420
Dielectric Constant, 100Hz (1MHz)	D150	—	3.2	3.2	3.2	3.2	3.2	3.2
Dissipation Factor, 100Hz (1MHz)	D150	—	0.001	0.001	0.001	0.001	0.002	0.002
Comparative Tracking Index	D3638	volts					600+	

\* Mold shrinkage determined on laboratory samples. To be used only as a guide for comparative purposes.

\*\* Value @ 1 kHz

## Celanex® Thermoplastic Polyester – Typical Properties

PROPERTY	Test Method	Units	Unreinforced Polymers				Unrein. Flame Ret.	
			2002	2003, 2003HR	2004	2008	2012	2016
<b>ISO TEST METHOD</b>								
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	ISO 527	MPa	(60)	(60)	53	(60)	(60)	(60)
Tensile Modulus	ISO 527	MPa	2,600	2,700	2,400	—	—	3,000
Flex Modulus	ISO 178	MPa	2,500	2,550	2,280	2,200	2,700	3,100
Flex Strength	ISO 178	MPa	85	80	69	80	95	95
Izod Impact Strength, Notched	ISO 180/1A	kJ/m <sup>2</sup>	5	4	4.8	3.1	5	4.8
Rockwell Hardness	ISO 2039-2	M scale	78	72	—	72	80	78
<b>Thermal</b>								
DTUL at 0.45 MPa	ISO 75	°C	150	150	166	155	152	165
DTUL at 1.8 MPa	ISO 75	°C	55	55	54	57	57	65
<b>Electrical</b>								
Volume Resistivity, 1 mm	IEC 93	ohm-cm	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>
Dielectric Strength, 3 mm	IEC 243-1	kV/mm	23	15	—	15	15	25
Permittivity, 1 MHz, 3 mm	IEC 250	—	3.5	3.2	3.5	3.2	3.3	3.5
Dissipation Factor, 1 MHz, 3 mm	IEC 250	—	0.02	0.02	0.02	0.02	0.02	0.02
<b>ASTM TEST METHOD</b>								
	Test Method	Units	2002	2003, 2003HR	2004	2008	2012	2016
<b>Physical</b>								
Specific Gravity	D792	—	1.31	1.30	1.31	1.43	1.44	1.45
Water Absorption	D570	%	0.09	0.09	0.08	0.08	0.09	0.07
Mold Shrinkage, 1/8" bar, Flow Direction*	Internal test	mils/in	18-20	18-20	18-20	18-20	18-20	25-30
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	D638	psi	(8,100)	(8,100)	7,700	(8,000)	(8,000)	(8,600)
Elongation at Break	D638	%	>200	60	180	5	24	20
Flex Strength	D790	psi	12,500	12,000	12,000	12,000	14,000	15,400
Flex Modulus	D790	psi	370,000	350,000	360,000	330,000	400,000	477,000
Izod Impact Strength, Notched	D256	ft. lb/in	0.9	0.7	0.9	0.5	0.5	0.6
<b>Thermal</b>								
HDT @ 66 psi	D648	°F	320	315	324	310	354	328
HDT @ 264 psi	D648	°F	131	126	133	130	135	158
<b>Flammability</b>								
UL Rating @ 1/32" thickness (as tested by Ticona)	UL94	—	HB	HB	(HB)	(HB)	V-0	V-0
UL94 5VA min. thickness	UL94	inches						
<b>Electrical</b>								
Volume Resistivity	D257	ohm-cm	>10 <sup>16</sup>	>10 <sup>16</sup>	>1.2 x 10 <sup>17</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	>2 x 10 <sup>16</sup>
Dielectric Strength, 1/8", 50% RH, 73°F	D149	V/mil	420	420	390	400	450	>700
Dielectric Constant, 100Hz (1MHz)	D150	—	3.2	3.2	3.2	3.2	3.2	3.0
Dissipation Factor, 100Hz (1MHz)	D150	—	0.002	0.002	0.001	0.001	0.002	0.01
Comparative Tracking Index	D3638	volts	600+	—	—	—	250	325

\* Mold shrinkage determined on laboratory samples. To be used only as a guide for comparative purposes.

\*\* Value @ 1 kHz

## Celanex® Thermoplastic Polyester – Typical Properties

PROPERTY	Test Method	Units	Glass Reinforced					
			4016	3200, 3200HR	3201	3300,3300D, 3300HR, 3300LM	3400	3116
<b>ISO TEST METHOD</b>								
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	ISO 527	MPa	55	100	100	130	140	75
Tensile Modulus	ISO 527	MPa	2,800	5,800	6,000	9,200	12,100	4,700
Flex Modulus	ISO 178	MPa	2,630	5,200	5,600	9,700	11,00	4,400
Flex Strength	ISO 178	MPa	76	135	160	190	215	120
Izod Impact Strength, Notched	ISO 180/1A	kJ/m <sup>2</sup>	7.7	5	7	7.5	10	5.6
Rockwell Hardness	ISO 2039-2	M scale	60	90	—	90	93	90
<b>Thermal</b>								
DTUL at 0.45 MPa	ISO 75	°C	159	215	218	225	226	210
DTUL at 1.8 MPa	ISO 75	°C	62	195	195	205	212	150
<b>Electrical</b>								
Volume Resistivity, 1 mm	IEC 93	ohm-cm	>10 <sup>15</sup>	>10 <sup>15</sup>	—	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>
Dielectric Strength, 3 mm	IEC 243-1	kV/mm	50	29	—	31	19	27
Permittivity, 1 MHz, 3 mm	IEC 250	—	3.1	3.8	—	4.1	—	3.4
Dissipation Factor, 1 MHz, 3 mm	IEC 250	—	0.02	0.02	—	0.02	—	0.02
<b>ASTM TEST METHOD</b>								
	Test Method	Units	4016	3200, 3200HR	3201	3300,3300D, 3300HR, 3300LM	3400	3116
<b>Physical</b>								
Specific Gravity	D792	—	1.41	1.41		1.53	1.61	1.50
Water Absorption	D570	%	0.08	0.07	0.07	0.07	0.05	0.05
Mold Shrinkage, 1/8" bar, Flow Direction*	Internal test	mils/in	24-28	5-7	5-7	5-7	3-5	10-14
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	D638	psi	5,150	13,500	13,500	19,500	21,300	11,000
Elongation at Break	D638	%	40	3	2.5	2	2	4.5
Flex Strength	D790	psi	12,400	21,000	21,000	28,000	30,000	17,500
Flex Modulus	D790	psi	375,000	700,000	740,000	1,200,000	1,500,000	650,000
Izod Impact Strength, Notched	D256	ft. lb/in	1.7	1.0	1.0	1.7	1.9	0.9
<b>Thermal</b>								
HDT @ 66 psi	D648	°F	313	415	415	442	433	405
HDT @ 264 psi	D648	°F	145	378	378	403	408	315
<b>Flammability</b>								
UL Rating @ 1/32" thickness (as tested by Ticona)	UL94	—	V-0	HB	(HB)	(HB)	HB	V-0
UL94 5VA min. thickness	UL94	inches						0.12
<b>Electrical</b>								
Volume Resistivity	D257	ohm-cm	10 <sup>15</sup>	>10 <sup>16</sup>	>10 <sup>15</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	2 x 10 <sup>16</sup>
Dielectric Strength, 1/8", 50% RH, 73°F	D149	V/mil	>700	460	460	560	480	540
Dielectric Constant, 100Hz (1MHz)	D150	—	(3.4)	3.5	—	3.7	3.9	3.0**(3.2)
Dissipation Factor, 100Hz (1MHz)	D150	—	(0.01)	0.001	—	0.002	0.002	(0.01)
Comparative Tracking Index	D3638	volts	250	250	—	500	500	250

\* Mold shrinkage determined on laboratory samples. To be used only as a guide for comparative purposes.

\*\* Value @ 1 kHz

## Celanex® Thermoplastic Polyester – Typical Properties

PROPERTY	Test Method	Units	Glass Reinforced, Flame Retardant				High Impact	
			3210	3216	3310	3316	4300	4302
<b>ISO TEST METHOD</b>								
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	ISO 527	MPa	115	100	140	135	130	120
Tensile Modulus	ISO 527	MPa	7,500	6,700	10,800	10,700	9,300	—
Flex Modulus	ISO 178	MPa	8,000	6,000	10,600	10,300	9,000	8,700
Flex Strength	ISO 178	MPa	170	155	225	200	205	190
Izod Impact Strength, Notched	ISO 180/1A	kJ/m <sup>2</sup>	5	5.5	8.4	7.7	11.5	—
Rockwell Hardness	ISO 2039-2	M scale	90	87	90	89	91	—
<b>Thermal</b>								
DTUL at 0.45 MPa	ISO 75	°C	223	217	222	220	220	—
DTUL at 1.8 MPa	ISO 75	°C	203	200	205	208	200	173
<b>Electrical</b>								
Volume Resistivity, 1 mm	IEC 93	ohm-cm	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	—
Dielectric Strength, 3 mm	IEC 243-1	kV/mm	17	30	16	34	—	—
Permittivity, 1 MHz, 3 mm	IEC 250	—	3.3	3.5	3.3	3.6	—	—
Dissipation Factor, 1 MHz, 3 mm	IEC 250	—	0.01	0.02	0.01	0.01	—	—
<b>ASTM TEST METHOD</b>								
	Test Method	Units	3210	3216	3310	3316	4300	4302
<b>Physical</b>								
Specific Gravity	D792	—	1.62	1.54	1.66	1.66	1.53	1.49
Water Absorption	D570	%	0.07	0.05	0.07	0.07	<0.1	<0.1
Mold Shrinkage, 1/8" bar, Flow Direction*	Internal test	mils/in	4-6	4-6	3-5	3-5	3-5	2-4
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	D638	psi	16,500	14,500	19,500	19,500	18,000	16,000
Elongation at Break	D638	%	3	4	2	2.5	3	3
Flex Strength	D790	psi	25,000	22,000	28,000	29,500	27,000	25,000
Flex Modulus	D790	psi	1,200,000	900,000	1,500,000	1,400,000	1,200,000	1,000,000
Izod Impact Strength, Notched	D256	ft. lb/in	1.0	1.0	1.3	1.4	1.9	2.2
<b>Thermal</b>								
HDT @ 66 psi	D648	°F	435	415	442	430	433	420
HDT @ 264 psi	D648	°F	396	365	406	403	399	344
<b>Flammability</b>								
UL Rating @ 1/32" thickness (as tested by Ticona)	UL94	—	V-0	V-0	V-0	V-0	HB	(HB)
UL94 5VA min. thickness	UL94	inches	0.12	0.12	0.06	0.06		
<b>Electrical</b>								
Volume Resistivity	D257	ohm-cm	>10 <sup>16</sup>	2 x 10 <sup>16</sup>	>10 <sup>16</sup>	2 x 10 <sup>16</sup>	>10 <sup>16</sup>	—
Dielectric Strength, 1/8", 50% RH, 73°F	D149	V/mil	480	600	490	500	550	536
Dielectric Constant, 100Hz (1MHz)	D150	—	3.8	2.9**(3.2)	3.9	3.7	3.8	—
Dissipation Factor, 100Hz (1MHz)	D150	—	0.002	(0.01)	0.006	(0.02)	0.002	—
Comparative Tracking Index	D3638	volts	330	250	280	250	500	—

\* Mold shrinkage determined on laboratory samples. To be used only as a guide for comparative purposes.

\*\* Value @ 1 kHz

## Celanex® Thermoplastic Polyester – Typical Properties

PROPERTY	Test Method	Units	High Impact		Improved Surface Finish		Low Warp, General Purpose	
			4305	4306	5200	5300	J600	6400
<b>ISO TEST METHOD</b>								
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	ISO 527	MPa	110	120	120	135	95	110
Tensile Modulus	ISO 527	MPa	9,500	9,200	6,000	10,000	11,000	12,000
Flex Modulus	ISO 178	MPa	9,000	8,500	8,000	9,000	11,000	11,000
Flex Strength	ISO 178	MPa	170	180	185	200	155	170
Izod Impact Strength, Notched	ISO 180/1A	kJ/m <sup>2</sup>	11.8	12	7.1	8.3	5.1	4.1
Rockwell Hardness	ISO 2039-2	M scale	62	74	91	93	73	86
<b>Thermal</b>								
DTUL at 0.45 MPa	ISO 75	°C	224	210	215	220	220	220
DTUL at 1.8 MPa	ISO 75	°C	206	164	180	200	190	200
<b>Electrical</b>								
Volume Resistivity, 1 mm	IEC 93	ohm-cm	>10 <sup>15</sup>	—	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>
Dielectric Strength, 3 mm	IEC 243-1	kV/mm	—	—	28	30	35	36
Permittivity, 1 MHz, 3 mm	IEC 250	—	—	—	4	4.2	4.4	4.3
Dissipation Factor, 1 MHz, 3 mm	IEC 250	—	—	—	—	—	0.02	0.02
<b>ASTM TEST METHOD</b>								
	Test Method	Units	4305	4306	5200	5300	J600	6400
<b>Physical</b>								
Specific Gravity	D792	—	1.50	1.50	1.41	1.54	1.62	1.65
Water Absorption	D570	%	<0.1	<0.1	0.05	0.05	<0.1	0.04
Mold Shrinkage, 1/8" bar, Flow Direction*	Internal test	mils/in	1-3	4-6	4-6	3-5	4-6	4-6
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	D638	psi	16,000	17,500	13,000	19,000	14,000	14,800
Elongation at Break	D638	%	4	3	2	2	2	2
Flex Strength	D790	psi	25,000	26,000	22,000	29,000	23,500	23,000
Flex Modulus	D790	psi	1,200,000	1,200,000	880,000	1,300,000	1,500,000	1,600,000
Izod Impact Strength, Notched	D256	ft. lb/in	2.5	2.0	1.0	1.5	1.3	0.7
<b>Thermal</b>								
HDT @ 66 psi	D648	°F	435	410	420	430	430	426
HDT @ 264 psi	D648	°F	401	338	355	403	380	388
<b>Flammability</b>								
UL Rating @ 1/32" thickness (as tested by Ticona)	UL94	—	(HB)	(HB)	HB	HB	HB	HB
UL94 5VA min. thickness	UL94	inches						
<b>Electrical</b>								
Volume Resistivity	D257	ohm-cm	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	10 <sup>16</sup>
Dielectric Strength, 1/8", 50% RH, 73°F	D149	V/mil	550	490	490	530	550	550
Dielectric Constant, 100Hz (1MHz)	D150	—	3.6	3.5	3.7	3.8	3.9	3.9
Dissipation Factor, 100Hz (1MHz)	D150	—	0.002	0.002	0.002	0.002	0.02	0.02
Comparative Tracking Index	D3638	volts	—	—	—	320	—	310

\* Mold shrinkage determined on laboratory samples. To be used only as a guide for comparative purposes.

\*\* Value @ 1 kHz



## Celanex® Thermoplastic Polyester – Typical Properties

PROPERTY	Test Method	Units	Low Warp, General Purpose		Low Warp, Flame Retardant			
			6407	6500	7700	7305	7316	7716
<b>ISO TEST METHOD</b>								
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	ISO 527	MPa	85	125	90	85	80	83
Tensile Modulus	ISO 527	MPa	8,000	9,700	12,900	—	9,200	10,800
Flex Modulus	ISO 178	MPa	8,000	9,500	12,000	8,500	9,450	11,650
Flex Strength	ISO 178	MPa	140	180	150	125	130	140
Izod Impact Strength, Notched	ISO 180/1A	kJ/m <sup>2</sup>	6.2	5.3	4.3	6.2	6	4.9
Rockwell Hardness	ISO 2039-2	M scale	—	91	76	50	—	—
<b>Thermal</b>								
DTUL at 0.45 MPa	ISO 75	°C	209	223	223	221	212	222
DTUL at 1.8 MPa	ISO 75	°C	172	202	204	197	184	194
<b>Electrical</b>								
Volume Resistivity, 1 mm	IEC 93	ohm-cm	—	—	>10 <sup>15</sup>	—	—	—
Dielectric Strength, 3 mm	IEC 243-1	kV/mm	—	—	18	—	—	—
Permittivity, 1 MHz, 3 mm	IEC 250	—	—	—	3.7	—	—	—
Dissipation Factor, 1 MHz, 3 mm	IEC 250	—	—	—	0.01	—	—	—
<b>ASTM TEST METHOD</b>								
	<b>Test Method</b>	<b>Units</b>	<b>6407</b>	<b>6500</b>	<b>7700</b>	<b>7305</b>	<b>7316</b>	<b>7716</b>
<b>Physical</b>								
Specific Gravity	D792	—	1.52	1.55	1.74	1.74	1.74	1.69
Water Absorption	D570	%	0.10	<0.1	0.04	0.11	<0.1	<0.1
Mold Shrinkage, 1/8" bar, Flow Direction*	Internal test	mils/in	3-4	2-4	5-7	3-5	—	2.5 - 4.5
<b>Mechanical</b>								
Tensile Strength at Break (Yield)	D638	psi	12,500	18,000	11,900	12,700	11,000	11,200
Elongation at Break	D638	%	3	3	3	2.3	1.9	—
Flex Strength	D790	psi	20,000	28,000	19,300	20,500	17,500	19,000
Flex Modulus	D790	psi	1,000,000	1,350,000	1,600,000	1,500,000	1,400,000	1,150,000
Izod Impact Strength, Notched	D256	ft. lb/in	1.1	1.4	0.7	1.4	1.1	1.1
<b>Thermal</b>								
HDT @ 66 psi	D648	°F	414	428	419	410	417	417
HDT @ 264 psi	D648	°F	347	400	390	390	383	376
<b>Flammability</b>								
UL Rating @ 1/32" thickness (as tested by Ticona)	UL94	—	(HB)	(HB)	V-0	V-0	V-0	V-0
UL94 5VA min. thickness	UL94	inches			0.087			
<b>Electrical</b>								
Volume Resistivity	D257	ohm-cm	—	>10 <sup>16</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	1 x 10 <sup>14</sup>	1 x 10 <sup>15</sup>
Dielectric Strength, 1/8", 50% RH, 73°F	D149	V/mil	—	600	602	440	470	670
Dielectric Constant, 100Hz (1MHz)	D150	—	—	4.2	(3.7)	4.1	(3.8)	4.0
Dissipation Factor, 100Hz (1MHz)	D150	—	—	0.02	0.009	0.01	(0.02)	0.03
Comparative Tracking Index	D3638	volts	—	128	400	—	300	250

\* Mold shrinkage determined on laboratory samples. To be used only as a guide for comparative purposes.

\*\* Value @ 1 kHz

# Ticona

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Celanex® Thermoplastic Polyesters are not intended for use in medical or dental implants.

## Products offered by Ticona

**Celcon® and Hostaform®** *acetal copolymer (POM)*

**GUR®** *ultra-high molecular weight polyethylene (UHMW-PE)*

**Celanex®** *thermoplastic polyester*

**Impet®** *thermoplastic polyester*

**Vandar®** *thermoplastic polyester alloy*

**Riteflex®** *thermoplastic polyester elastomer*

**Vectra®** *liquid crystal polymer (LCP)*

**Vectran™** *liquid crystal polymer (LCP)*

**Celstran®** *long fiber reinforced thermoplastic (LFRT)*

**Fortron®** *polyphenylene sulfide (PPS)*

**Celanese®** *nylon 6/6 (PA 6/6)*

**Topas®** *cyclic olefin copolymer (COC)*

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