

# Products for High Performance Applications

**WESTLAKE  
PLASTICS COMPANY**

## Material Descriptions

### ARDEL<sup>®</sup> (polyarylate)



Stock shapes extruded from Ardel resin are specifically formulated to endure the damaging effects of UV light. When exposed to UV light, this unique material undergoes a molecular rearrangement resulting in the formation of a protective layer that essentially serves as a UV stabilizer. This inherent UV stability combined with superior retention of optical and mechanical properties make polyarylate an ideal choice for any application where weathering effects could pose a problem.

### THERMALUX<sup>®</sup> (polysulfone)



Made from UDEL<sup>®</sup> polysulfone resin, these stock shapes remain stable, resisting creep and deformation under continuous load and elevated temperatures. They have high tensile strength and, as temperatures increase, flexural modulus remains high. Thermalux products will withstand exposure to soap, detergent solutions and some hydrocarbon oils, even at elevated temperatures under moderate stress levels.

### PES (polyethersulfone)



High resistance to heat and combustibility, low smoke emission, and transparency are the combination of properties possessed by stock shapes extruded from PES. These, coupled with light weight, good impact resistance, dimensional stability, and chemical resistance, make stock shapes extruded from PES resin useful in the electrical/electronics, aerospace/aircraft, automotive, and mass transit industries. PES stock shapes are also applicable for heat and fire safety, food service, and hospital and health care items.

### TEMPALUX<sup>®</sup> (polyetherimide)



An amorphous thermoplastic polyetherimide, stock shapes from ULTEM<sup>®</sup> resin possess a combination of useful characteristics, including high strength at elevated temperatures, high modulus, and broad chemical resistance. Tempalux stock shapes are inherently flame resistant with low smoke emission. Tempalux stock shapes display property retention and resistance to environmental stress cracking when exposed to a wide variety of chemicals. The standard color of Tempalux stock shapes is light amber. Glass filled grades appear tan or greenish in color.

### RADEL<sup>®</sup> R (polyphenylsulfone)



Stock shapes extruded from Radel R resins offer a superior combination of high performance properties that include excellent thermal stability, outstanding toughness, and good environmental stress cracking resistance. These properties make Radel R stock shapes attractive for a variety of demanding applications. The standard color of Radel R is off white, but a transparent grade is available.

# Westlake Products for High Performance Applications—Properties

Property	Units	ASTM Test	Ardel	Thermalux	PES	Tempalux	Tempalux 20% GF	Tempalux 30% GF	Radel R
			polyarylate	polysulfone	polyethersulfone	polyetherimide	polyetherimide 20% glass filled	polyetherimide 30% glass filled	polyphenylsulfone
<b>MECHANICAL</b>									
Tensile Strength @yield	psi	D638	10,000	10,200	12,000	15,200	—	—	10,100
Tensile Strength @break	psi	D638	—	—	—	—	20,100	24,500	—
Tensile Modulus	psi	D638	300,000	360,000	385,000	430,000	1,000,000	1,300,000	340,000
Tensile Elongation @yield	%	D638	9.1	5.0-6.0	5.5	7.0	—	—	7.2
Tensile Elongation @break	%	D638	60.0	50.0-100.0	50.0-100.0	60.0	3.0	3.0	60.0-120.0
Flexural Strength @yield	psi	D790	11,000	15,400	16,100	22,000	30,000 <sup>(1)</sup>	33,000 <sup>(1)</sup>	13,200
Flexural Modulus	psi	D790	310,000	390,000	420,000	480,000	900,000	1,300,000	350,000
Compressive Strength @yield	psi	D695	12,180	13,900	14,500	21,900	28,700	30,700	14,350
Compressive Modulus	psi	D695	—	—	388,000	480,000	809,000	938,000	251,000
Izod Impact Strength									
Un-Notched	ft•lbs/in	D256	—	No Break	No Break	25.0	9.0	8.0	No Break
Notched @73°F	ft•lbs/in	D256	3.8	1.3	1.6	1.0	1.6	2.0	13.0
Hardness (R, M, L or D)	—	D7852 D2240	R125	R120 M69	R127	M109	M114	M114	—
<b>THERMAL</b>									
Heat Deflection Temperature									
@66 psi	°F	D648	356	358	417	410	410	414	417
@264 psi	°F	D648	345	345	399	392	408	410	405
Coefficient of Thermal Expansion	in/in/°F	D696	6.1x10 <sup>-5</sup>	3.1x10 <sup>-5</sup>	2.7x10 <sup>-5</sup>	3.1x10 <sup>-5</sup>	1.4x10 <sup>-5</sup>	1.1x10 <sup>-5</sup>	3.1x10 <sup>-5</sup>
Flammability Rating-UL94	—	—	@.125* V-0	@.176* V-0	@.031* V-0	@.075* 5VA	@.016* V-0	@.016* V-0	@.031* V-0
Thermal Conductivity	(BTU•in)/(hr•ft <sup>2</sup> •°F)	C177	1.48	1.80	1.13	1.53	1.70	1.80	2.42
Limiting Oxygen Index	%	D2863	36.0	30.0	39.3	47.0	50.0	50.0	38.0
<b>ELECTRICAL</b>									
Dielectric Strength	V/mil	D149	400	425	380	831	670	770	360
Dielectric Constant @1kHz	—	D150	3.32	3.06	3.50	3.15	3.50	3.70	3.45
Dissipation Factor @1kHz	—	D150	0.0040	0.0010	0.0022	0.0013	0.0015	0.0015	0.0009
Volume Resistivity	ohm•cm	D257	2x10 <sup>14</sup>	5.0x10 <sup>16</sup>	1.7x10 <sup>15</sup>	1.0x10 <sup>17</sup>	7x10 <sup>16</sup>	3x10 <sup>16</sup>	>10 <sup>17</sup>
<b>OPTICAL</b>									
Haze	%	D1746	2.3	5.0	8.0	—	—	—	15.0
Transparency	%	D1746	87	75	76	—	—	—	50
<b>OTHER</b>									
Specific Gravity	—	D792	1.21	1.24	1.37	1.27	1.42	1.51	1.29
Water Absorption @24 hours	%	D570	0.26	0.30	1.85	0.25	0.19	0.16	0.37

<sup>(1)</sup> @break

## The Company

Westlake Plastics Company is the world leader in extrusion and compression molding technologies of high performance thermoplastics. Our advanced technologies allow us to convert the full range of thermoplastic resins into stock shapes and film.

New product development is the hallmark of Westlake Plastics. Our six business groups (Chemical Resistance, Engineering, Film, High Performance, Medical and Static Control) work in close conjunction with resin suppliers and end users to develop new products that meet the critical needs of customer applications as well as industry specific standards.

Our field and in-house technical experts provide you with excellent resources for product application and recommendations. Our industry focused expertise includes:

- **Analytical Instrumentation**
- **Automotive**
- **Aviation and Aerospace**
- **Chemical Processing**
- **Computer**
- **Electrical/Electronics**
- **Food Handling**
- **Medical**
- **Nuclear Energy**
- **Pharmaceutical**
- **Semiconductor**
- **Telecommunications**

In addition to our knowledge on specific industries, Westlake also offers over 40 years of manufacturing experience. With both compression molding and extrusion technologies, we are able to offer small runs of customized products with short turn around times as well as generous samples.

If it's product or application knowledge you seek, Westlake is ready to respond to your challenges.

## Other Westlake Products

Many of our standard products are also available in different grades including: FDA compliant, fire retardant and glass fiber reinforced.

### Made from:

#### Engineered and Other Thermoplastic Resins

Acetal Copolymer (ULTRAFORM<sup>®</sup>, CELCON<sup>®</sup>)  
Acrylonitrile-Butadiene-Styrene (CYCOLAC<sup>®</sup>)  
Modified Polyphenylene Oxide (NORYL<sup>®</sup>)  
Polycarbonate (LEXAN<sup>®</sup>, MAKROLON<sup>®</sup>)  
Low-Density Polyethylene  
High-Density Polyethylene  
Ultra-High Molecular Weight Polyethylene  
Polymethylpentene  
Polypropylene  
Crystal Polystyrene (STYRON<sup>®</sup>)  
High Impact Polystyrene (STYRON<sup>®</sup>)

#### Fluoropolymer Resins

Ethylene-Chlorotrifluoroethylene (HALAR<sup>®</sup>)  
Ethylene-Tetrafluoroethylene (TEFZEL<sup>®</sup>)  
Polyvinylidene Fluoride (KYNAR<sup>®</sup>)  
TFE/PVDF/HFP Terpolymer

#### High Performance Resins

Polyetheretherketone (VICTREX<sup>®</sup>)  
Polyethersulfone (RADEL<sup>®</sup>A, ULTRASON<sup>®</sup> E)  
Polyetherimide (Uitem<sup>®</sup>)  
Polysulfone (UDEL<sup>®</sup>)  
Polyphenylsulfone (RADEL<sup>®</sup> R)

### Westlake Product

Pomalux<sup>®</sup>  
Absylux<sup>®</sup>  
Norylux<sup>™</sup>  
Zelux<sup>®</sup>  
Ethylux<sup>®</sup>  
Ultra Ethylux<sup>®</sup>  
Lennite<sup>®</sup>  
TPX<sup>®</sup>  
Propylux<sup>®</sup>  
Styrclear<sup>®</sup>  
HIPS  
  
ECTFE  
ETFE  
PVDF  
Clariflex<sup>™</sup>  
  
PEEK  
PES  
Tempalux<sup>®</sup>  
Thermalux<sup>®</sup>  
PPSU

**WESTLAKE**  
**PLASTICS COMPANY**

### World Headquarters

P.O. Box 127 • West Lenni Road  
Lenni, PA 19052  
(610) 459-1000 • (800) 999-1700  
Fax: (610) 459-1084

### West Coast Office

377 E. Chapman Ave. • Suite 120  
Placentia, CA 92870  
(714) 961-1267 • (800) 440-0597  
Fax: (714) 961-0978

### Trade Names:

ABSYLUX<sup>®</sup> – Westlake Plastics Co.  
CELCON<sup>®</sup> – Ticona  
CYCOLAC<sup>®</sup> – GE Plastics  
CLARIFLEX<sup>™</sup> – Westlake Plastics Co.  
ETHYLUX<sup>®</sup> – Westlake Plastics Co.  
HALAR<sup>®</sup> – Ausimont USA, Inc.  
KYNAR<sup>®</sup> – Elf Atochem North America, Inc.  
LENNITE<sup>®</sup> – Westlake Plastics Co.  
LEXAN<sup>®</sup> – GE Plastics  
MAKROLON<sup>®</sup> – Mobay

NORYL<sup>®</sup> – GE Plastics  
NORYLUX<sup>™</sup> – Westlake Plastics Co.  
POMALUX<sup>®</sup> – Westlake Plastics Co.  
PROPYLUX<sup>®</sup> – Westlake Plastics Co.  
RADEL<sup>®</sup> – Amoco Performance Products, Inc.  
STANYL<sup>®</sup> – DSM Engineering Plastics  
STYRACLEAR<sup>®</sup> – Westlake Plastics Co.  
STYRON<sup>®</sup> – Dow U.S.A.  
TEFZEL<sup>®</sup> – Du Pont Co.  
TEMPALUX<sup>®</sup> – Westlake Plastics Co.

THERMALUX<sup>®</sup> – Westlake Plastics Co.  
TPX<sup>®</sup> – Mitsui Plastics, Inc.  
UDEL<sup>®</sup> – Amoco Performance Products, Inc.  
ULTEM<sup>®</sup> – GE Plastics  
ULTRAFORM<sup>®</sup> – BASF Corp.  
ULTRA ETHYLUX<sup>®</sup> – Westlake Plastics Co.  
ULTRASON<sup>®</sup> – BASF Corp.  
VICTREX<sup>®</sup> – Victrex, Inc.  
WESTLAKE<sup>®</sup> – Westlake Plastics Co.  
ZELUX<sup>®</sup> – Westlake Plastics Co.

This information is offered solely for your consideration, examination and verification, and is to be construed neither as a warranty nor guarantee that the same results as those stated herein will be obtained by the use to which others may put the material. Each user of the material should make his own tests to determine the characteristics and suitability of the material for his own particular use and the use which will be made of the completed product. This publication is not to be taken as a license to operate under, or a recommendation to infringe any patents. The observance of all legal regulations and patents is the responsibility of the user. The buyer's exclusive remedy against the seller shall be for the repair or replacement of defective stock. No other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available to the buyer. EXCLUSION OF WARRANTIES: THERE ARE NO WARRANTIES AS TO THE MATERIAL DESCRIBED HEREIN, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY VALUES STATED IN SELLER'S LITERATURE ARE TYPICAL PROPERTIES ONLY.