



Celazole[®] PBI T-Series

SUPERIOR
POLYMER DURABILITY
FOR YOUR HIGH
PERFORMANCE NEEDS

pbi[®] PERFORMANCE
PRODUCTS, INC.

FOR HIGH-PERFORMANCE THERMOPLASTIC NEEDS

Celazole® T-Series products are PBI compounds designed for injection molding and extrusion. Combining the superior mechanical properties and thermal resistance of PBI with the melt process ability of polyaryletherketones (PEEK or PEKK), these products offer cost-effective high performance. These products are available in pellet form.

Celazole® PBI (polybenzimidazole) is a unique and highly stable heterocyclic polymer. PBI polymers are characterized by high thermal stability; exhibit high strength, broad chemical resistance and unique compatibility with certain other polymers including the polyaryletherketone family.

WEAR RESISTANCE

4x

increase in light fixture production compared with polyamideimide

HIGH STRENGTH

TF-60C has

14,500 psi

(100 MPa)

Flexural strength

at

500°F

(260°C)

COST EFFECTIVE

T-Series products are

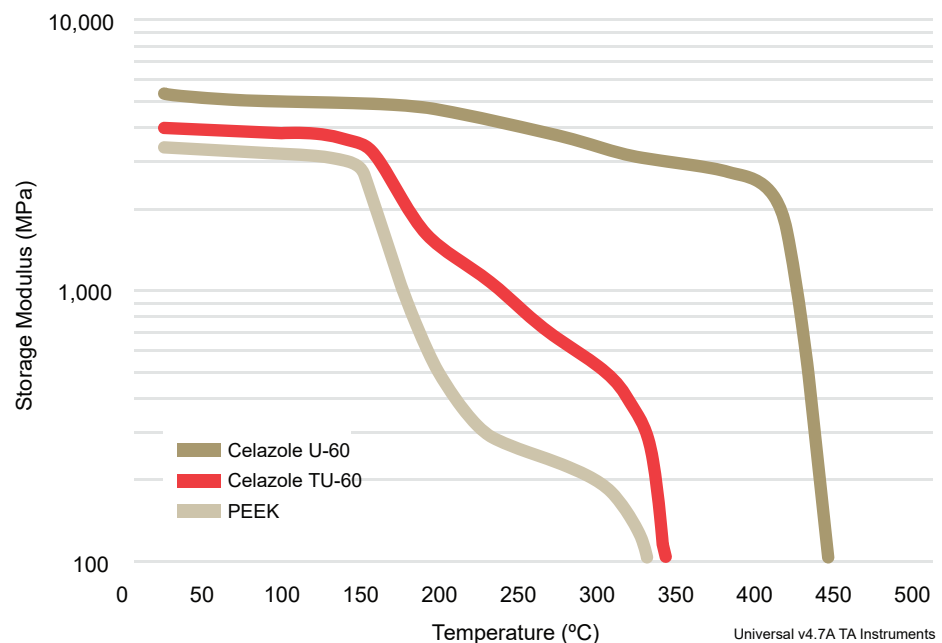
100%

melt processable

The advantage of T-Series over ordinary PEEK is the unexpected property set that results from the combination with PBI and other fillers (when present) that yield higher heat deflection temperatures (HDT), higher moduli, higher strength, improved wear resistance and lower creep. In the T-Series compound, HDT's can be raised to 330°C, just below the crystalline melting point of PEEK. The effect can be observed in the accompanying dynamic mechanical analysis (DMA) chart for TU-60 below.

A desirable balance of performance and tractability is obtained with the T-Series products that place the group's thermo-mechanical performance above PEEK, but below PBI. T-Series is designed for injection molding of parts that perform, but are cost effectively produced.

Celazole TU-60 DMA Storage Modulus compared with PEEK and PBI



OPTIMAL FOR PARTS AT ELEVATED TEMPERATURES

PROPERTIES:

- Excellent mechanical properties that are maintained well above the 143°C Tg of the PEEK component
- Particularly low strain over time as compared to polyimide and filled PEEK's, even at 300°C
- Allows users to enjoy improved levels of equipment performance, weight savings and/or thinner, smaller profiles
- Suited for mechanical service applications with high load at elevated temperatures
- Excellent thermal stability – enabling metal replacement
- Self-lubricating TL-60 displays low wear rates under conditions of high pressure (P) and velocity (V), a high limiting PV and cool operating temperatures in a lubricant free environment

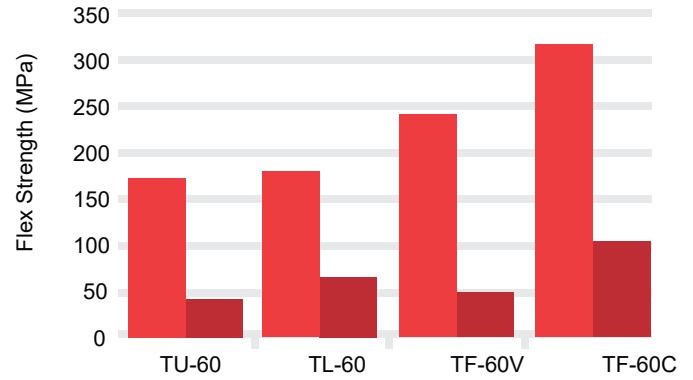
EXCEPTIONAL WEAR PERFORMANCE

Celazole TL-60 is an injection moldable polymer containing a dry-lube package with superior wear resistance.

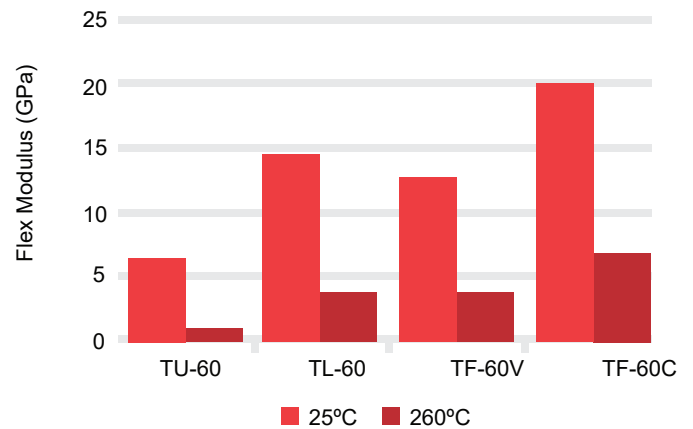
In a PV range of 100,000 – 200,000 psi-ft/min (3.5 – 7 MPa-m/sec), it's Wear Factor K is just 20×10^{-10} in³-min/ft-lb-hr (4.0×10^{-7} mm³/N-m) and its Dynamic Coef. of Friction is just 0.055.

This material is designed for high loads at any speed and outperforms wear-grade PAI, PI, and PEEK under similar conditions. Without additional lubrication, it runs 40-50F cooler than the competition.

Celazole T-Series – Strength vs. Temperature

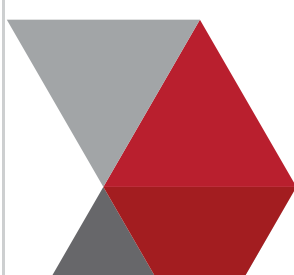
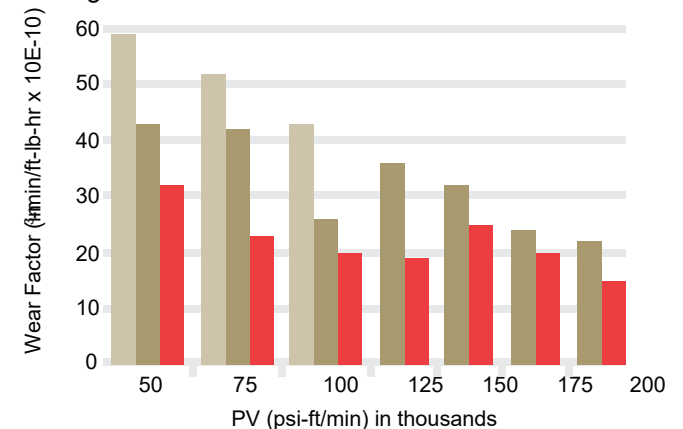


Celazole T-Series – Modulus vs. Temperature



PAI wear grade PI wear grade Celazole TL-60

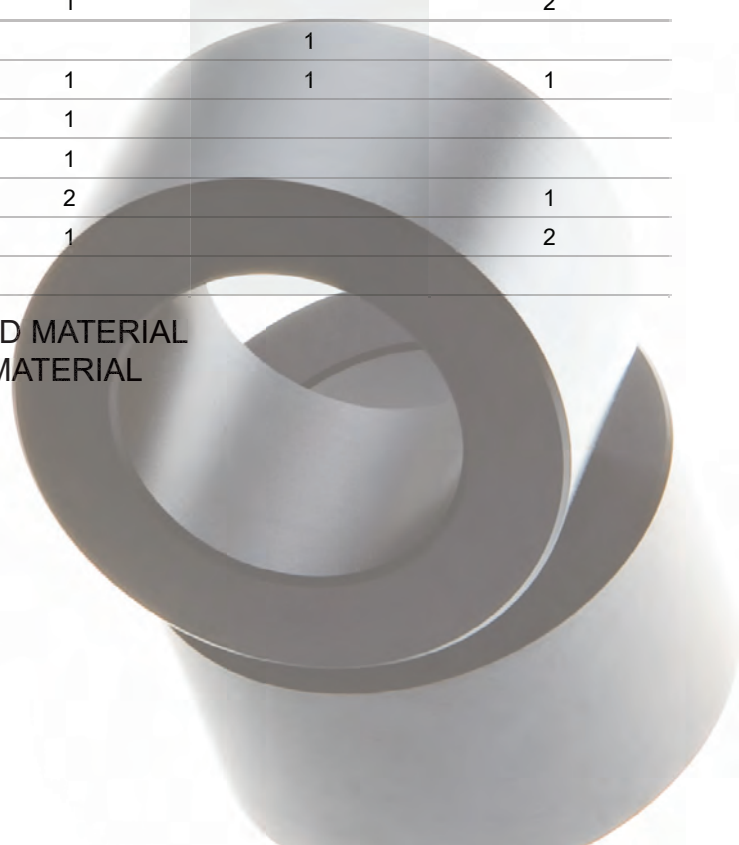
Average Wear Factor: 50-800 ft/min



INJECTION MOLDING THERMOPLASTIC POLYMERS

	TU-60 Unfilled High temperature performance, chemical resistant, V-0 flame rating	TL-60 Self-lubricating Superior wear resistance, low friction and cool running... even under load	TF-60V Glass fiber reinforced Thermal and electrical insulation, low creep, high strength	TF-60C Carbon fiber reinforced Highest strength, very low fatigue; a mechanical workhorse in the heat
Bearing cages		1		2
Bushings		1		
Compressor vanes		2		1
Conveyor systems		1		2
Dynamic load bearing components		1		
Dynamic seals	1		1	1
Electrical connectors	2		1	
End effector pads	2			1
Gears				1
Glass handling	1		1	1
Metal spinning rollers	1			
Office equipment	1	1	1	1
Oil field equipment	1		1	2
Oven conveyors		1	2	2
Piston rings		1		
Plane bearings		1		
Planetary gears			2	1
Plasma torch tips, insulators, swirl baffles	2		1	
Pump bearings		1		
Semiconductor wafer transportation	2			1
Sliding surfaces		1		
Soldering equipment				1
Synchronizer rings		1		2
Temperature sensor housings			1	
Textile equipment	1	1	1	1
Thrust washers		1		
Tilt pad bearings		1		
Turbines		2		1
Turbo charger bushings		1		2
Valve seats, stem seals, packings	1			

1 RECOMMENDED MATERIAL
2 ALTERNATIVE MATERIAL



Celazole T-Series Injection Molding Recommendations

Set-up

Equipment Requirement

Machine Temperature Capability	450°C (845°F)
Cylinder & Screw	Abrasion Resistant; HRC hardness 56-60
Injection Pressure	200-250 MPa (26–36 kpsi)
Injection Speed	High speed; up to 400 cm ³ /sec
Temperature Control	Cartridge heater for molds

Recommendation

Temperature Profile (°C)	TU-60	TF-60C	TF-60V	TL-60
Cylinder Nozzle	430	450	450	450
Cylinder Front	430	450	450	450
Cylinder Middle	420	420	420	420
Cylinder End	380	380	380	380
Mold	200	210	210	210

Injection Speed

Typical	200 cm ³ /sec or less
Thin parts (.4-.5mm)	400 cm ³ /sec

Mold Requirements

Mold Surface	Cr Steel; HRC hardness 50-60
Sprue	Taper 2-5 degrees; mirrored face

Pellet Storage/Drying

Storage	Keep dry; use soon after opening
Dry before use	4-6 hrs @ 180°C or 6-16 hrs @ 140°C plus 1-2 hrs @ 180°C



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