



# Figure 4™ TOUGH-BLK 20

Production Rigid

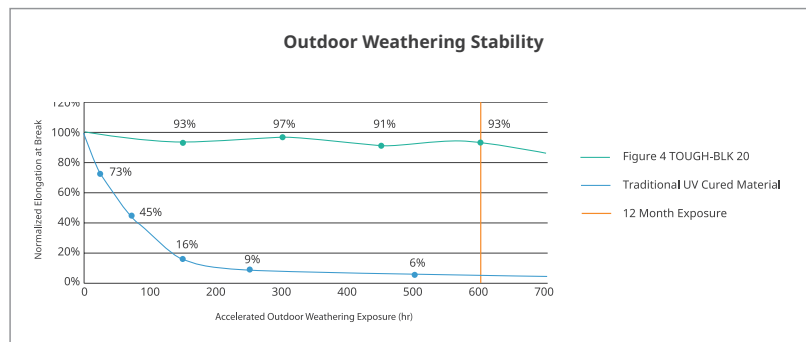
A strong material with long-term UV stability for the production of black ABS-like parts

Figure 4®

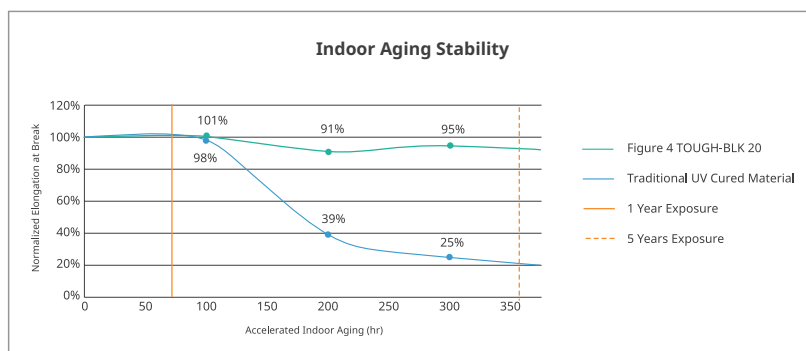
## EXCEPTIONAL SURFACE FINISH, DURABILITY AND UV STABILITY FOR HIGH PERFORMANCE PROTOTYPING AND PRODUCTION APPLICATIONS

Figure 4 TOUGH-BLK 20 is a strong ABS-like black plastic with industry-leading UV stability for high performance prototyping and production applications where lifecycle stability is critical and mechanical properties fit. It provides high precision, smooth surface finish and exceptional sidewall quality with minimal finishing.

### INDUSTRY-LEADING UV STABILITY



Performed in accordance with ASTM G154 to simulate actual outdoor exposure of plastics



Performed in accordance with ASTM D4329 to simulate ASTM D4459, Indoor exposure of plastics from solar radiation through a window

### APPLICATIONS

- Rapid design iteration
- Strong functional parts for:
  - Automotive styling parts
  - Consumer electronics components
  - Legacy replacement parts
  - Form, fit and function testing
  - Durable assemblies and snap fits
  - Bezels, knobs, brackets, covers, cases
- Master patterns for RTV/silicone molding
- Short-run manufacturing of rigid parts

### BENEFITS

- Reliable and robust functional prototypes
- Production-grade stability – mechanical properties, color, opacity, dimensions will not change over time with exposure to daylight
- High precision and exceptional part quality with smooth surfaces and sidewalls
- Beautiful ABS-like parts

### FEATURES

- Long-term indoor and outdoor UV stability (1+ years)
- Durable and strong
- Excellent humidity/moisture resistance
- Look and feel of molded black ABS



## Liquid Material

LIQUID PROPERTIES			
MEASUREMENT	CONDITION	METRIC	U.S.
Viscosity	@ 25 °C (77 °F)	2623 cps	6350 lb/ft-hr
Color		Black	
Liquid Density	@ 25 °C (77 °F)	1.04 g/cm <sup>3</sup>	0.038 lb/in <sup>3</sup>
Package Volume		1 kg bottle - Figure 4 Standalone 2.5 kg cartridge - Figure 4 Modular 10 kg container - Figure 4 Production	
Layer Thickness (Standard Mode)		0.05 mm	0.002 in
Vertical Build Speed (Standard Mode)		45 mm/hr	1.8 in/hr
Draft Mode		53 mm/hr	2.1 in/hr

## Post-Cured Material

MECHANICAL PROPERTIES			
MEASUREMENT	CONDITION	METRIC	U.S.
Solid Density (g/cm <sup>3</sup>   lb/in <sup>3</sup> )	ASTM D792	1.11	0.040
Tensile Strength, Ultimate (MPa   PSI)	ASTM D638	40	5860
Tensile Strength, at Yield (MPa   PSI)	ASTM D638	40	5860
Tensile Modulus (MPa   KSI)	ASTM D638	1780	260
Elongation at Break	ASTM D638	36%	
Elongation at Yield	ASTM D638	4.6%	
Flexural Strength (MPa   PSI)	ASTM D790	61	8775
Flexural Modulus (MPa   KSI)	ASTM D790	1650	240
Notched Izod Impact Strength (J/m   Ft-lbs/in)	ASTM D256	27	0.5
Unnotched Izod Impact Strength (J/m   Ft-lbs/in)	ASTM D4812	1008	18.9
Heat Deflection Temperature @ 0.45 MPa (66 PSI) @ 1.82 MPa (264 PSI)	ASTM D648	55 °C 45 °C	131 °F 113 °F
Coefficient of Thermal Expansion (CTE) (ppm/°C   ppm/°F) < Tg > Tg	ASTM E831	83 173	46 96
Glass Transition (Tg), DMA, E''	ASTM E1640	46 °C	115 °F
Hardness, Shore	ASTM D2240	79D	
Water Absorption (24 hour)	ASTM D570	0.31%	



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