

Acrylonitrile butadiene styrene, abbreviated as ABS, is a common plastic that is found all around us, famously used for making Lego bricks. Its properties, such as high strength and good temperature resistance, makes it a good choice for many applications.

ABS also offers the possibility of a good surface finish. ABS reacts to acetone, which tends to smooth and polish the surface. It's also a lot easier to sand ABS.

ABS can be a little tricky to print with. One issue you may face while printing ABS is that it's hard to get it to stick to the bed. The printed part tends to "warp" from the sides and the fumes generated can be unpleasant. But we'll get to all of that soon enough!

## Pros

- Very sturdy and hard
- Suitable for machine and car parts
- Higher melting point
- Longer lifespan

## Cons

- Made out of oil, so more damaging to the environment
- Deforms when not being print on a heated surface
- Hot plastic fumes when printing, therefor you need ventilation
- More difficult to print
- Not suitable for using with food

## Uses

- Sports equipment
- Objects that might be dropped toys
- Electronic applications

## 1. Identification of the material

Trade name	tm filament ABS
Chemical name	Acrylonitrilbutadienestyreen
Use	3D printing
Origin	tm filament

## 2. Material properties

Melt temperature	343	°C	ASTM D3418
Glass transition temperature	105	°C	ASTM D3419
Heat deflection temperature 0.46 MPa	98	°C	ISO 75
Vicat Softening Temperature	94	°C	ASTM D1525
Flame Rating (1.5 mm, ALL)	HB		UL 94
Met Flow Rate (220 C/10.0 kg)	23	g	ASTM D1238
Density	1.04	g/cm <sup>3</sup>	ASTM D790
Water absorption, 24 u	0.1	%	ASTM D570
Shrink rate	0.5 - 0.7	%	ASTM D955

### 3. Mechanical properties

Tensile Strength (yield, 3.20 mm/50 mm/min)	51	MPa	ASTM D638
Tensile Modulus (3.20 mm/1.0 mm/min)	2220	MPa	ASTM D638
Tensile elongation, (break, 3.20 mm/50 mm/min)	30	%	ASTM D638
Flexural Modulus (3.20 mm/15 mm/min)	2750	MPa	ASTM D790
Flexural Strength (3.20 mm/15 mm/min)	78.5	MPa	ASTM D790
Rockwell hardness (R-scale)	110		ASTM D785

### 4. Thermal properties

Deflection Temperature Under Load 0.45 MPa, Unannealed, 6.40 mm	90	°C	ASTM D648
Deflection Temperature Under Load 1.8 MPa, Unannealed, 6.40 mm	86	°C	ASTM D648
Vicat Softening Temperature	94	°C	ASTM D1525
RTI Elec			UL 746
1.50 mm	95.0	°C	
3.00 mm	100	°C	
RTI Imp			UL 746
1.50 mm	95.0	°C	
3.00 mm	100	°C	
RTI Imp			UL 746
1.50 mm	95.0	°C	
3.00 mm	100	°C	

## 5 Electrical

Volume Resistivity	1.0E+15	ohm-cm	ASTM D257
Dielectric Strength	27	kV/mm	ASTM D149
Arc Resistance	PLC 6		ASTM D495
Comparative Tracking index (CTI)	PLC 0		UL 746
High voltage arc tracking rate (HVTR)	PLC 2		UL 746
High Amp Arc Ignition (HAI)			UL 746
1.50 mm	PLC 0		
3.00 mm	PLC 1		
Hot wire Ignition (HWI)			UL 746
1.50 mm	PLC 3		
3.00 mm	PLC 3		

## 6 Printer settings

Printer	Desktop FFF printer
Nozzle	0.4 mm A2 hardened
Layer height	0.2 mm
Infill	100% ±45
Extrusion Temperature	400 - 420 °C
Bed temperature	130 - 145 °C
Bed preparation	PEI sheet
Print speed	20-40 mm/sec

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