ABS 3D Printing Filament

Technical Data Sheet

Version: 2.0 **Issue Date:** 2025-06-18 **Status:** Released

1. Product Identification

Product Name	ABS 3D Printing Filament
Material Type	Acrylonitrile Butadiene Styrene (ABS)
Brand	SSSray

Product Introduction

ABS 3D Printing Filament is a high-performance engineering-grade thermoplastics material renowned for its exceptional impact resistance, superior heat resistance, and excellent mechanical properties. As one of the most widely used FFF (Fused Filament Fabrication) materials in professional manufacturing, ABS delivers outstanding durability and toughness that surpasses PLA-based alternatives, making it the preferred choice for functional parts requiring structural integrity under demanding conditions.

SSSray ABS filament is engineered with precision-controlled formulations to ensure consistent extrusion performance and minimal warping behavior. The material exhibits excellent layer adhesion when printed with appropriate temperature settings, producing parts with superior surface quality that responds exceptionally well to post-processing techniques including sanding, acetone smoothing, and painting. This filament is specifically optimized for professional applications where heat resistance and impact toughness are critical performance requirements.

With its balanced combination of mechanical strength, thermal stability, and processing versatility, ABS filament serves extensive applications across automotive, electronics, industrial prototyping, and consumer products sectors. The material demonstrates excellent dimensional stability and low thermal shrinkage coefficient, enabling production of precision components with tight tolerances. For optimal printing results, a heated enclosure is recommended to minimize warping and ensure consistent part quality throughout the printing process.

2. Core Features

Superior Impact Resistance

Exceptional toughness and impact strength ensure durable parts that withstand mechanical

Excellent Heat Resistance

High glass transition temperature and HDT enable parts to maintain structural integrity at elevated operating temperatures.

Outstanding Machinability

Easily machined, sanded, drilled, and finished; excellent compatibility with post-

stress and shock loading conditions.

processing techniques including acetone smoothing.

Superior Surface Quality

Produces smooth, high-quality surface finishes with excellent detail reproduction and paint-adhesion properties.

Excellent Dimensional Stability

Low thermal shrinkage coefficient ensures consistent dimensions and tight tolerances in precision applications.

Wide Application Range

Versatile material suitable for functional prototypes, end-use parts, and production applications across multiple industries.

Typical Application Scenarios

- ✓ Functional prototypes and end-use production parts
- ✓ Electronic device housings and enclosures
- ✓ Tool handles and ergonomic grips
- ✓ Custom brackets and mounting assemblies
- ✓ Architectural models with acetone-smoothed finishes
- ✓ Automotive interior components and trim panels
- ✓ Industrial jigs, fixtures, and manufacturing aids
- ✓ Protective equipment and helmet shells
- ✓ Consumer product casings and covers
- ✓ Educational engineering projects and training models

3. Printing Parameters

Parameter	Recommended Range	Optimal Value
Nozzle Temperature	220°C - 240°C	**230°C**
Hot Bed Temperature	90°C - 100°C	**95°C**
Print Speed	40 - 2 5 0 mm/s	
First Layer Speed	15 - 25 mm/s	
Layer Fan Speed	0 - 5 0% (Recommended: Off for first 3 layers, then 0-50%)	
Chamber Temperature	Heated enclosure recommended (50-60°C for optimal results)	
Nozzle Material	Standard brass nozzle compatible (hardened steel recommended for high-volume printing)	
Retraction Settings	Distance: 3-6mm | Speed: 25-50 mm/s	
Drying Conditions	80°C for 4-6 hours (if moisture absorbed)	

Note: *ABS printing requires careful temperature management and environmental control. A heated build chamber is strongly recommended to minimize warping, especially for large or tall prints. Always ensure proper enclosure ventilation due to emissions during printing.*

4. Physical Properties

4.1 Physical Properties

Property	Typical Value	Test Standard	Unit
Density	1.04	ISO 1183 / ASTM D792	g/cm³
Melt Flow Rate (MFR) (220° C / 10kg)	10-25	ISO 1133	g/10min
Filament Diameter	1.75 ± 0.03 / 2.85 ± 0.03	-	mm
Roundness Deviation	≤ 0.02	-	mm
Net Weight	1 (Other specifications available upon request)	-	kg

4.2 Mechanical Properties

Property	Typical Value	Test Standard	Unit
Tensile Strength (XY)	40 ± 2	ISO 527-2 / ASTM D638	MPa
Tensile Modulus (XY)	2,300	ISO 527-2 / ASTM D638	MPa
Elongation at Break	8 - 15	ISO 527-2 / ASTM D638	%
Flexural Strength (XY)	60-70	ISO 178 / ASTM D790	MPa
Flexural Modulus (XY)	2,000-2,200	ISO 178 / ASTM D790	MPa
Izod Impact Strength (Notched)	18 - 28	ISO 180 / ASTM D256	kJ/m²
Charpy Impact Strength(Notched)	20 - 28	ISO 179-1	kJ/m²
Shore D Hardness	80	ISO 868 / ASTM D2240	-

4.3 Thermal Properties

Property	Typical Value	Test Standard	Unit
Glass Transition Temperature (Tg)	105.3	ISO 11357-2 / ASTM D3418	°C
Heat Deflection Temperature (HDT @ 0.455 MPa)	98	ISO 75-2 / ASTM D648	°C
Heat Deflection Temperature (HDT @ 1.82 MPa)	88	ISO 75-2 / ASTM D648	°C

Vicat Softening Temperature	109	ISO 306 / ASTM D1525	°C
Recommended Print Temperature	-	-	°C

4.4 Other Properties

Property	Typical Value	Test Standard	Unit
Water Absorption (24h)	0.2 - 0.4	ISO 62	%
Continuous Use Temperature	80 - 100	-	°C

Note: *All mechanical and thermal property values are based on 3D printed specimens printed under standard conditions (0.2mm layer height, 100% infill, XY plane orientation) unless otherwise specified. Actual performance may vary based on printing parameters, equipment calibration, and part design.*

5. Storage & Handling

Storage Environment

- Store in a cool, dry environment with relative humidity below 50%
- Recommended storage temperature: 15°C - 25°C (59°F - 77°F)
- Avoid exposure to direct sunlight or UV radiation
- Keep packaging sealed until ready for use

Packaging Requirements

- Vacuum-sealed packaging with desiccant moisture absorber
- Spool wound with consistent tension to prevent tangling
- Material lot number and production date clearly marked

Desiccant Storage Recommendations

- Original packaging desiccants may be reused if still active
- For extended storage, use additional food-grade silica gel desiccant
- Store opened spools in airtight containers with fresh desiccant
- Filament dry boxes with integrated desiccant are recommended for active printers

Shelf Life

Under proper storage conditions, unopened ABS filament maintains optimal performance for 12-24 months from production date. Once opened, material should be used within 6 months for best results.

Moisture Absorption Indicators

Even with sealed packaging, exposure to humidity during shipping or storage may occur. Signs of moisture absorption include:

- Excessive stringing or oozing during printing
- Popping or hissing sounds during extrusion
- Poor surface quality with bubbles or imperfections
- Inconsistent extrusion and reduced layer adhesion
- Increased brittleness of printed parts
- Pristine bubble-free extrusion suddenly degrading

Remediation: If moisture symptoms are observed, dry the filament at 80°C for 4-6 hours in a convection oven or use a dedicated filament dryer. Allow to cool to room temperature before loading into printer. Do not exceed recommended drying temperature or duration as this may degrade material properties. ABS is more sensitive to moisture than PLA and requires more thorough drying when moisture contamination is suspected.

6. Safety & Certifications

Certification	Status	Description
RoHS (Restriction of Hazardous Substances)	Compliant	Meets EU Directive 2015/863/EU on hazardous substance restrictions
CE Marking	Certified	Conforms to applicable EU safety and environmental directives
SDS (Safety Data Sheet)	Available	Detailed safety information available upon request
Third-Party Quality Verification	Available on Request	Independent testing reports provided as required (fees may apply)

Note: *This product is not certified for food-contact or medical applications. ABS printing produces emissions that require adequate ventilation. Please contact our technical team for information on materials suitable for specific compliance requirements.*

7. Product Positioning

7.1 Comparison with Industry Standard Materials

Property	ABS	PLA	PETG
Density (g/cm³)	1.04	1.24	1.27
Tensile Strength (MPa)	40± 2	50 - 53	45 - 50
Heat Resistance (HDT °C)	98	55 - 60	70 - 76
Print Difficulty	Moderate	Easy	Moderate
Print Odor	Moderate	Minimal	Slight
Impact Resistance	Excellent	Low	Moderate
UV Resistance	Moderate	Poor	Good
Post-Processing	Excellent	Limited	Limited

7.2 Performance Rating

Performance Dimension	Rating	Description
Printability	★★★☆☆	Moderate - Requires heated enclosure and proper settings
Tensile Strength	★★★★☆	Very Good - Suitable for structural applications
Heat Resistance	★★★★★	Excellent - Superior thermal stability for demanding environments
Surface Quality	★★★★☆	Very Good - Excellent post-processing and finishing capability
Impact Resistance	★★★★★	Excellent - Outstanding toughness and durability

Target Applications: *ABS is optimized for professional users requiring superior heat resistance, impact toughness, and post-processing versatility. For applications needing easier printing, consider PLA alternatives.*

8. Troubleshooting Guide

Problem 1: Warping / Corner Lifting

Possible Causes: Insufficient bed adhesion, thermal gradients, lack of heated enclosure, excessive cooling.

Solutions: Increase bed temperature to 100°C. Use adhesion aids (ABS slurry, PEI sheet, or Kapton tape). Enable heated chamber at 50-60°C. Disable part cooling fan entirely for first 5 layers. Consider draft shields or brim structures.

Problem 2: Layer Delamination / Poor Layer Adhesion

Possible Causes: Temperature too low, excessive cooling, uneven temperature distribution.

Solutions: Increase nozzle temperature by 5-10°C (target 245-255°C). Reduce or disable layer fan. Enable heated enclosure. Verify consistent ambient temperature. Increase print speed to reduce heat exposure time.

Problem 3: Stringing / Oozing Between Prints

Possible Causes: Temperature too high, insufficient retraction, moisture in filament.

Solutions: Reduce nozzle temperature by 5°C. Increase retraction distance (4-6mm) and speed (40-50 mm/s). Dry filament at 80°C for 4-6 hours if moisture suspected. Optimize travel path to minimize stringing locations.

Problem 4: Uneven Extrusion / Under-Extrusion

Possible Causes: Clogged nozzle, filament diameter variations, incorrect extrusion multiplier, moisture.

Solutions: Perform cold pull to clear nozzle. Measure filament diameter and adjust extrusion multiplier. Increase print temperature slightly. Dry filament thoroughly at 80°C for 4-6 hours if moisture present.

Problem 5: Surface Cracking / Splintering

Possible Causes: Thermal shock from excessive cooling, drafts, material degradation from overheating.

Solutions: Reduce or eliminate layer fan. Ensure heated enclosure is enabled. Print away from air currents and drafts. Verify nozzle temperature is within 230-260°C range. Check for nozzle clogs causing temperature fluctuations.

Problem 6: Discoloration / Darkening of Print

Possible Causes: Temperature too high causing degradation, extended exposure time at high temperatures.

Solutions: Reduce nozzle temperature by 5-10°C. Increase print speed to reduce heat exposure time. Verify no obstructions causing material dwell time increase. Use fresh filament as degradation products may cause discoloration.

9. Disclaimer & Limitation of Liability

DISCLAIMER & LIMITATION OF LIABILITY

The typical values presented in this datasheet are intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. Actual values may vary significantly with printing conditions, equipment calibration, environmental factors, and part design.

End-use performance of printed parts depends not only on material properties, but also on part design, wall thickness, print orientation, environmental conditions, printing parameters, and post-processing methods. Users should conduct their own testing to verify suitability for specific applications.

Product specifications are subject to change without notice. SSSray reserves the right to modify formulations and specifications to improve product quality or performance.

Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of SSSray materials for the intended application. SSSray makes no warranty of any kind, unless announced separately, as to the fitness for any particular use or application. SSSray shall not be held liable for any damage, injury, or loss induced from the use of SSSray materials in any application.

This document does not constitute technical advice. For technical support or custom formulation inquiries, please contact our technical team.

10. Document Revision History

Version	Issue Date	Author	Description
v2.0	2025-06-18	SSSray Technical	Product iteration - Updated specifications and formatting
v1.0	2024-01-15	SSSray Technical	Initial release

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