

MATERIALS BUYER'S GUIDE

True Production-Grade Materials for PSLA

How to Evaluate Additive Manufacturing
Materials for Production



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PROJECTION-BASED SLA SYSTEM

PSLA (Projector-based SLA) is 3D Systems' innovative 3D-printing architecture that combines the speed and throughput of projection (DLP-like) curing with the precision, surface quality, and reliability of traditional laser-based stereolithography, offering faster, accurate, and material-flexible additive manufacturing.

The PSLA is designed to work with the Figure 4® family of engineering-grade resins, offering a broad palette of production-ready materials. These resins are designed for high-quality, injection-mold-like performance, covering a wide range of functional, thermal, mechanical, and aesthetic requirements.



What's Different About Figure 4 Production-Grade Materials

A major stigma around Additive Manufacturing (AM) materials has been the belief that they are brittle and only have reliable mechanical properties for short periods of time. These perceptions have posed a hurdle to adoption, and are something the 3D printing industry has struggled with for years.

Now that advancements in part quality, speed, and cost are moving AM technology beyond prototyping and into production, it is necessary for AM materials to level-up as well. To do this, the right material properties, performance, and testing standards are necessary. 3D Systems recognizes this, and we have adapted our approach to material property and performance testing as well as our datasheets for Figure 4 production materials.

We are proud to provide our users with comprehensive information in a consistent format to enable you to effectively evaluate our production additive materials for your specific application(s). To ensure data integrity, all of our Figure 4 production materials data is tested and conditioned per ASTM and ISO requirements.



Consistent and Comprehensive Testing

Within the Production Materials section of this document, you will find material performance highlights of our Figure 4 production-grade materials. If viewing this document digitally, you will also be able to navigate to the complete material datasheets of any material you are interested in exploring further.

Each Figure 4 production material datasheet provides clear and separate reports on the following measures, as relevant:

- Mechanical, thermal, and electrical properties (including flammability, dielectric properties, and 24-hour water absorption);
- Isotropic properties;
- Long-term indoor and outdoor environmental stability;
- Chemical and automotive fluid compatibility;
- Biocompatibility.



A Word from Our Materials Development Team

"It's up to the design engineer to decide how well a given material will work for a given application, that's why our datasheets include all the data we tested, and not just the most impressive results. We want our users to be able to quickly and confidently identify the right choice for their project.

When I look at these datasheets, some of the places I look right away are the elongation of yield and the tensile modulus in the long-term environmental stability section. If my elongation is flat, I have not gone brittle. If my tensile modulus is flat, I have not gotten stiff. Heat Deflection Temperature (HDT) is also an important data point to pay attention to and indicates how well a part will withstand heat exposure for things as routine as transportation conditions to more intense aspects of production such as sterilization in an autoclave.

We also tested each of our production-grade materials in a range of common build orientations to provide early visibility into the relationship of part orientation to part performance. Our goal in how we tested and documented these materials was to equip design engineers with as much upfront data as possible to help them get the most out of these capabilities. These datasheets are packed with information, because we want to help our users make informed decisions."

Martin Johnson

Vice President, Product, Technical Fellow, 3D Systems

Mechanical Properties

The full suite of mechanical properties included in our Figure 4 production materials datasheets are given per industry standards such as ASTM and ISO test standards. Additional properties provided include flammability, dielectric properties, and 24-hour water absorption. This allows for better understanding of the material capability to aid in design decisions for each material. All parts are conditioned per ASTM recommended standards for a minimum of 40 hours at 23 °C, 50% RH.

Solid material properties reported reflect printing along the vertical axis (ZY-orientation). Figure 4 material properties are relatively uniform across print orientations, as detailed within each specific section on isotropic properties. Because of this, parts for most materials do not need to be oriented in a particular direction to exhibit these properties.

LONG-TERM ENVIRONMENTAL STABILITY

Material stability has been a big hurdle for AM. To combat conventional expectations, 3D Systems has conducted extensive testing on its Figure 4 production materials to demonstrate stability as far out as eight years from production. Our testing shows we can now produce parts that last.

Indoor stability was tested per the ASTM D4329 standard method; outdoor stability was tested per the ASTM G154 standard method.

CHEMICAL AND AUTOMOTIVE FLUID COMPATIBILITY

Exposure to hydrocarbons and cleaning chemicals is a routine part of many applications. Our Figure 4 production-grade materials were therefore tested for sealed and surface contact compatibility per ASTM D543 test conditions and per USCAR2 test conditions. In addition to the tensile strength (MPa) results included within this document, the full datasheets include data tables for tensile modulus, elongation at break, and notched impact strength.

MATERIALS FROM PROTOTYPING TO PRODUCTION

3D Systems' Figure 4 platform spans the prototyping to production workflow, and our materials portfolio is likewise divided by application. As a comprehensive guide to all of our Figure 4 materials, this document includes all classes of Figure 4 materials, including:

- Production materials for direct production parts (pages 8-16);
- Indirect production materials for multi-stage production processes (pages 23-25);
- Prototyping materials for general purpose prototypes and functional testing (pages 26-29).



Production



Figure 4[®] F3 Orange

High resolution, distinguishable parts with excellent surface finish

PROPERTIES:



Rigid, high-strength prototyping resin with ~59 MPa tensile strength and ~90 MPa flexural strength for functional test parts.



High stiffness ($\approx 2.7\text{--}2.8$ GPa modulus) ideal for jigs, fixtures, assemblies, and structural prototypes.



Moderate thermal stability with HDT up to ~ 82 °C, supporting warm-environment testing and RTV mold master use.



Low water absorption (0.31%) ensures stable dimensions and predictable fit/assembly performance.

GOOD FOR:

- Form, fit and function prototypes
- General purpose prototyping
- Master patterns for RTV/silicone molding
- Fine detail parts, jigs & fixtures, assemblies.

Rigid mechanical properties with good heat resistance give robust parts for a wide range of applications across form, fit and functional testing.








[Get the full datasheet for Figure 4 F3 Orange here](#)



Figure 4[®] PRO-BLK 10

Long-term indoor & outdoor environmental stability

PROPERTIES:

-  Exhibits thermoplastic behavior in necking at tensile break point
-  Fast print speed up to 62 mm/hr at 50 micron layer thickness
-  >70 °C heat deflection temperature
-  12% elongation at break
-  Durability and strength
-  UL 94 HB flammability
-  Biocompatible capable per ISO 10993-5 and 10993-10

No secondary thermal cure required; simple, solvent cleaning.

[Get the full datasheet for Figure 4 PRO-BLK 10 here](#)

GOOD FOR:

- Alternative to injection molding or cast urethane processes
- Motor housings, connectors, snap-fits
- Other general-use production parts



Figure 4[®] Rigid White

Long-term environmental stability and long-lasting clean opaque white color

PROPERTIES:

- Exhibits thermoplastic behavior in necking at tensile break point
- Fast print speed up to 47 mm/hr at 50 micron layer thickness
- 65 °C heat deflection temperature
- 20% elongation at break
- Durability and strength
- UL 94 HB flammability
- Biocompatible capable per ISO 10993-5 and 10993-10

GOOD FOR:

- Handles and fixtures for medical applications that require biocompatibility
- Electronics enclosures and small components or parts for devices
- Motor housings, covers, guards, snap-fit parts, jigs, fixtures and other functional prototypes and low volume production plastic parts

No secondary thermal cure required; simple, solvent cleaning.






[Get the full datasheet for Figure 4 Rigid White here](#)



Figure 4[®] Rigid Composite White

High stiffness, rigid parts

PROPERTIES:

-  Longterm indoor and outdoor stability (retaining > 90 % of its tensile modulus)
-  Smooth surface finish and low-cost post-processing
-  Excellent thermal resistance for environments with elevated operating temperatures
-  Highest flexural modulus in its class (over 10,000 MPa)
-  Excellent resistance to automotive fluids and chemicals

GOOD FOR:

- Wind tunnel testing
- Automotive parts
- Motorsports parts
- Small format, short-run tools, jigs, and fixtures
- Parts exposed to automotive fluids and chemicals

No secondary thermal cure required; simple, solvent cleaning.









[Get the full datasheet for Figure 4 Rigid Composite White here](#)



Figure 4[®] Rigid Gray

High contrast gray plastic for long-term use parts with balanced thermal and mechanical properties

PROPERTIES:

-  Long-term indoor and outdoor environmental stability of mechanical properties and color; tested out to 8 and 1.5 years (respectively) per ASTM methods
-  Tensile testing shows thermoplastic behavior with necking at break
-  72°C heat deflection temperature at 0.455MPa
-  30% elongation at break
-  2200MPa flexural modulus
-  UL 94 HB flammability
-  Biocompatible capable per ISO 10993-5 and ISO10993-5
-  Fast print speed up to 48 mm/hr at 50-micron layer thickness

GOOD FOR:

- Static rigid production components like housings and covers
- Small parts requiring detail and accuracy for consumer products and general use
- Parts requiring painting, plating, and laser-etching
- Functional prototyping and low volume production parts where visualization of features is critical











No secondary thermal cure required; simple, solvent cleaning.

[Get the full datasheet for Figure 4 Rigid Gray here](#)

Figure 4[®] Tough 60C White

White plastic for long-term use parts with a good combination of impact strength, elongation, and tensile strength properties

PROPERTIES:

-  Long-term indoor and outdoor environmental stability of mechanical properties and color; tested out to 8 and 1.5 years (respectively) per ASTM methods
-  Biocompatible-capable per ISO10993-5 and ISO10993-10
-  65 °C heat deflection temperature at 0.455MPa
-  23% elongation at break
7.1% elongation at yield
-  34 J/m notched impact strength
-  1500 MPa tensile modulus
-  UL 94 HB flammability
-  Sterilization through autoclave

GOOD FOR:

- Clinical trials and medical devices such as tools, handles, and small plastic parts
- Load-bearing parts such as handles, cranks, knobs, and levers
- Structural parts like brackets, snap-fits, and custom fasteners
- Small parts requiring detail and accuracy in consumer products, wearable devices, and general use
- Functional prototyping and biocompatible end-user parts







No secondary thermal cure required; simple, solvent cleaning.

[Get the full datasheet for Figure 4 Tough 60C White here](#)

Figure 4[®] HI TEMP 300-AMB

Rigid plastic for ultra-high heat environments

PROPERTIES:

-  >300 °C heat deflection temperature at 0.455 and 1.82 MPa
-  High tensile modulus (4000MPa)
-  10J/m notched impact strength
-  Rigid and translucent

No secondary thermal cure required; excellent visualization for internal features and fluid flow performance.

[Get the full datasheet for Figure 4 HI TEMP 300-AMB here](#)

GOOD FOR:

- HVAC, consumer appliances, motor enclosures, and other test or end-use components requiring high heat resistance
- Low pressure molding/tooling
- Overmolding

Additional materials with high thermal resistance:

Figure 4 MED-AMB 10

Figure 4 MED-WHT 10

Figure 4 Rigid 150C FR Black







Figure 4 Tough 75C FR Black



Figure 4[®] Tough FR V0 Black

Proven Performance in Extreme Conditions

PROPERTIES:

-  Passes UL94 V0 test standards @ 2 mm and 3 mm thickness
-  Passes FAR Part 25.853 (a) @ 3 mm thickness
-  Exceptionally high elongation at break @ ~35–44%, depending on orientation
-  Strong chemical/fluid resistance
-  ~1 GPa flexural modulus
-  Long-term indoor and outdoor environmental stability of mechanical properties; tested out to 8 and 1 years (respectively) per ASTM methods

GOOD FOR:

- Aircraft electrical connectors, knobs, grommets, and spacers
- End-use manufacturing of high-volume, small plastic parts
- Printed circuit board covers
- Electrical and under-hood housings
- Tough covers, hangers, and brackets
- Flame retardant parts for trains and buses



No secondary thermal cure required; simple, solvent cleaning.

[Get the full datasheet for Figure 4 Tough FR V0 Black here](#)






Indirect Production



Figure 4[®] EGGSHELL-AMB 10

Process-optimized for silicone casting

PROPERTIES:

-  High tensile modulus (2800 MPa)
-  90 °C heat deflection temperature at 0.455 MPa
-  5% elongation at break

Specifically engineered to withstand liquid silicone injection at high temperature and pressure, with intentional brittleness to easily break away from silicone once the mold has been filled and cooled. Its amber color allows for visualization of the injected silicone.

[Get the full datasheet for Figure 4 EGGSHELL-AMB 10 here](#)

GOOD FOR:

- Casting silicone parts in multiple durometers
- Customized end-use and low volume production parts in silicone



What's Next?

Interested in finding the right PSLA solution for your application?

Figure 4 EGGSHELL-AMB 10

Figure 4 FLEX-BLK 20

Figure 4 HI TEMP 300-AMB

Figure 4 PRO-BLK 10

Figure 4 Rigid Composite White

Figure 4 Rigid Gray

Figure 4 Rigid White

Figure 4 Tough 60C White

Figure 4 Tough FR V0 Black

Talk to an expert about which materials
and printers would work for you

[Click here to get in touch](#)

Appendix

Material and Printer Compatibility

Material	Certified Printers
Figure 4 EGGSHELL-AMB 10	S P 135 PSLA
Figure 4 FLEX-BLK 20	S P PSLA
Figure 4 HI TEMP 300-AMB	S P 135 PSLA
Figure 4 PRO-BLK 10	S P 135 PSLA
Figure 4 Rigid Composite White	P PSLA
Figure 4 Rigid Gray	S P PSLA
Figure 4 Rigid White	S P 135 PSLA
Figure 4 Tough 60C White	S P PSLA
Figure 4 Tough FR V0 Black	S P 135 PSLA

Materials by Application

Medical/HI TEMP	Direct Production	Indirect Production
HI TEMP 300 AMB	Rigid Gray	EGGSHELL-AMB 10
	Rigid White	
	Rigid White Composite	
	Tough 60C White	
	Tough FR V0 Black	
	FLEX-BLK 20	
	PRO-BLK 10	

S = Figure 4® Standalone
P = Figure 4® Production
135 = Figure 4® 135
PSLA = PSLA 270