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HP 3D High Reusability PA 11

Materials Technical Fact Sheet

General Properties

Common information for all print modes

| Category | Measurement | Value | Method |
|--------------------|--------------------------------------|--------------------------|------------|
| General Properties | Powder melting point (DSC) | 202°C/396°F | ASTM D3418 |
| | Particle size | 54 µm | ASTM D3451 |
| | Bulk density of powder | 0.48 g/cm ³ | ASTM D1895 |
| | | 0.017 lb/in ³ | |
| Density of parts | 1.05 g/cm ³ | ASTM D792 | |
| | 0.038 lb/in ³ | | |
| Reusability | Refresh ratio for stable performance | 30% | |

Balanced print mode

Technical specifications¹

| Category | Measurement | Specimen | Value | Method | |
|--|---|--|------------------|-------------------------|-------------------------|
| Mechanical properties | Tensile strength, max load, ² XY | Type V | 52 MPa/7542 psi | ASTM D638 | |
| | | Type I | 52 MPa/7542 psi | ASTM D638 | |
| | Tensile strength, max load, ² Z | Type V | 52 MPa/7542 psi | ASTM D638 | |
| | | Type I | 52 MPa/7542 psi | ASTM D638 | |
| | Tensile modulus, ² XY | Type V | 1800 MPa/261 ksi | ASTM D638 | |
| | | Type I | 1800 MPa/261 ksi | ASTM D638 | |
| | Tensile modulus, ² Z | Type V | 1800 MPa/261 ksi | ASTM D638 | |
| | | Type I | 1800 MPa/261 ksi | ASTM D638 | |
| | Elongation at break, ² XY | Type V | 50% | ASTM D638 | |
| | | Type I | 30% | ASTM D638 | |
| | Elongation at break, ² Z | Type V | 50% | ASTM D638 | |
| | | Type I | 30% | ASTM D638 | |
| | Flexural modulus, ³ XY | | | 1650 MPa/240 ksi | ASTM D790 |
| | | Flexural modulus, ³ Z | | | 1700 MPa/246 ksi |
| | Flexural strength (@ 5%), ³ XY | | | | 70 MPa/10150 psi |
| | | Flexural strength (@ 5%), ³ Z | | | 70 MPa/10150 psi |
| | Charpy impact notched (@23°C/73.4°F), XY | | | | 5 kJ/m ² |
| | | Charpy impact notched (@23°C/73.4°F), Z | | | 5 kJ/m ² |
| | Izod impact notched (@3.2 mm/0.126 in, 23°C/73.4°F), XY | | | | 6.0 kJ/m ² |
| | | Izod impact notched (@3.2 mm/0.126 in, 23°C/73.4°F), Z | | | 5.0 kJ/m ² |
| Izod impact notched (@10 mm/0.394 in, 23°C/73.4°F), XY | | | | 4.5 kJ/m ² | ASTM D256 Test Method A |
| | Izod impact notched (@10 mm/0.394 in, 23°C/73.4°F), Z | | | 4.0 kJ/m ² | ASTM D256 Test Method A |
| Thermal properties | | Heat deflection temperature (@0.45 MPa, 66 psi), XY | | 185°C/365°F | ASTM D648 Test Method A |
| | Heat deflection temperature (@0.45 MPa, 66 psi), Z | | 185°C/365°F | ASTM D648 Test Method A | |
| | Heat deflection temperature (@1.82 MPa, 264 psi), XY | | 54°C/129°F | ASTM D648 Test Method A | |
| | Heat deflection temperature (@1.82 MPa, 264 psi), Z | | 54°C/129°F | ASTM D648 Test Method A | |

Mechanical print mode

Technical specifications¹

| Category | Measurement | Specimen | Value | Method |
|--|---|-----------------------|-------------------------|-------------------------|
| Mechanical properties | Tensile strength, max load, ² XY | Type V | 58 MPa/8412 psi | ASTM D638 |
| | | Type I | 55 MPa/7977 psi | ASTM D638 |
| | Tensile strength, max load, ² Z | Type V | 58 MPa/8412 psi | ASTM D638 |
| | | Type I | 55 MPa/7977 psi | ASTM D638 |
| | Tensile modulus, ² XY | Type V | 1900 MPa/275 ksi | ASTM D638 |
| | | Type I | 1900 MPa/275 ksi | ASTM D638 |
| | Tensile modulus, ² Z | Type V | 1900 MPa/275 ksi | ASTM D638 |
| | | Type I | 1900 MPa/275 ksi | ASTM D638 |
| | Elongation at break, ² XY | Type V | 55% | ASTM D638 |
| | | Type I | 30% | ASTM D638 |
| | Elongation at break, ² Z | Type V | 55% | ASTM D638 |
| | | Type I | 30% | ASTM D638 |
| | Flexural modulus, ³ XY | | 1650 MPa/239 ksi | ASTM D790 |
| | Flexural modulus, ³ Z | | 1650 MPa/239 ksi | ASTM D790 |
| | Flexural strength (@ 5%), ³ XY | | 65 MPa/9427 psi | ASTM D790 |
| | Flexural strength (@ 5%), ³ Z | | 65 MPa/9427 psi | ASTM D790 |
| | Charpy impact notched (@23°C/73.4°F), XY | | 6.5 kJ/m ² | ISO 179-1/1eA |
| | Charpy impact notched (@23°C/73.4°F), Z | | 6.0 kJ/m ² | ISO 179-1/1eA |
| | Izod impact notched (@3.2 mm/0.126 in, 23°C/73.4°F), XY | | 6.0 kJ/m ² | ASTM D256 Test Method A |
| | Izod impact notched (@3.2 mm/0.126 in, 23°C/73.4°F), Z | | 6.0 kJ/m ² | ASTM D256 Test Method A |
| Izod impact notched (@10 mm/0.394 in, 23°C/73.4°F), XY | | 5.0 kJ/m ² | ASTM D256 Test Method A | |
| Izod impact notched (@10 mm/0.394 in, 23°C/73.4°F), Z | | 5.0 kJ/m ² | ASTM D256 Test Method A | |
| Thermal properties | Heat deflection temperature (@0.45 MPa, 66 psi), XY | | 180°C/356°F | ASTM D648 Test Method A |
| | Heat deflection temperature (@0.45 MPa, 66 psi), Z | | 180°C/356°F | ASTM D648 Test Method A |
| | Heat deflection temperature (@1.82 MPa, 264 psi), XY | | 54°C/129°F | ASTM D648 Test Method A |
| | Heat Deflection Temperature (@1.82 MPa, 264 psi), Z | | 54°C/129°F | ASTM D648 Test Method A |

Dimensional print mode

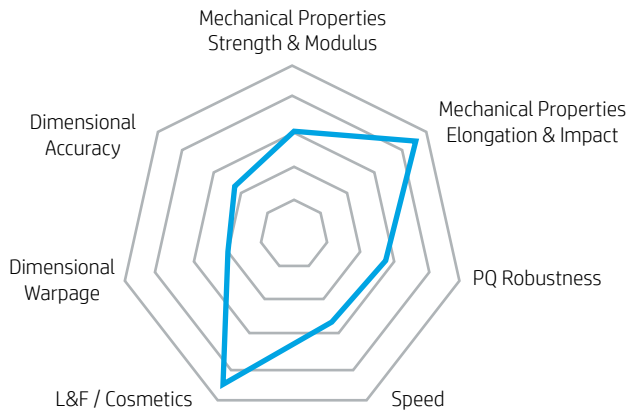
Technical specifications¹

| Category | Measurement | Specimen | Value | Method |
|--|---|-----------------------|-------------------------|-------------------------|
| Mechanical properties | Tensile strength, max load, ² XY | Type V | 50 MPa/7252 psi | ASTM D638 |
| | | Type I | 50 MPa/7252 psi | ASTM D638 |
| | Tensile strength, max load, ² Z | Type V | 50 MPa/7252 psi | ASTM D638 |
| | | Type I | 50 MPa/7252 psi | ASTM D638 |
| | Tensile modulus, ² XY | Type V | 1800 MPa/261 ksi | ASTM D638 |
| | | Type I | 1800 MPa/261 ksi | ASTM D638 |
| | Tensile modulus, ² Z | Type V | 1800 MPa/261 ksi | ASTM D638 |
| | | Type I | 1800 MPa/261 ksi | ASTM D638 |
| | Elongation at break, ² XY | Type V | 40% | ASTM D638 |
| | | Type I | 30% | ASTM D638 |
| | Elongation at break, ² Z | Type V | 25% | ASTM D638 |
| | | Type I | 15% | ASTM D638 |
| | Flexural modulus, ³ XY | | 1800 MPa/261 ksi | ASTM D790 |
| | Flexural modulus, ³ Z | | 1800 MPa/261 ksi | ASTM D790 |
| | Flexural strength (@ 5%), ³ XY | | 70 MPa/10152 psi | ASTM D790 |
| | Flexural strength (@ 5%), ³ Z | | 70 MPa/10152 psi | ASTM D790 |
| | Charpy impact notched (@23°C/73.4°F), XY | | 5 kJ/m ² | ISO 179-1/1eA |
| | Charpy impact notched (@23°C/73.4°F), Z | | 4 kJ/m ² | ISO 179-1/1eA |
| | Izod impact notched (@3.2 mm/0.126 in, 23°C/73.4°F), XY | | 6.0 kJ/m ² | ASTM D256 Test Method A |
| | Izod impact notched (@3.2 mm/0.126 in, 23°C/73.4°F), Z | | 4.5 kJ/m ² | ASTM D256 Test Method A |
| Izod impact notched (@10 mm/0.394 in, 23°C/73.4°F), XY | | 4.5 kJ/m ² | ASTM D256 Test Method A | |
| Izod impact notched (@10 mm/0.394 in, 23°C/73.4°F), Z | | 4.0 kJ/m ² | ASTM D256 Test Method A | |
| Thermal properties | Heat deflection temperature (@0.45 MPa, 66 psi), XY | | 180°C/356°F | ASTM D648 Test Method A |
| | Heat deflection temperature (@0.45 MPa, 66 psi), Z | | 180°C/356°F | ASTM D648 Test Method A |
| | Heat deflection temperature (@1.82 MPa, 264 psi), XY | | 54°C/129°F | ASTM D648 Test Method A |
| | Heat deflection temperature (@1.82 MPa, 264 psi), Z | | 54°C/129°F | ASTM D648 Test Method A |

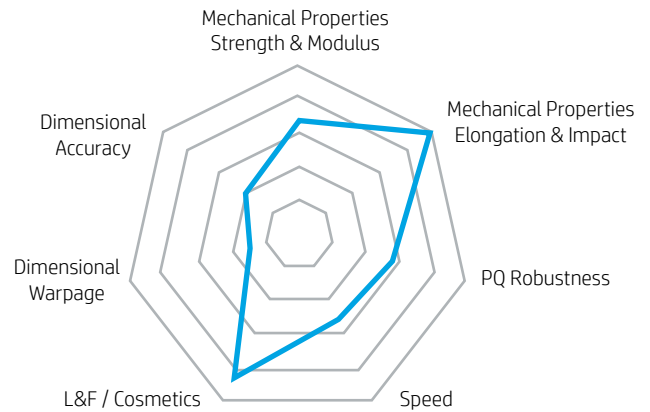
Print mode profiles

Profiles based on average XYZ values

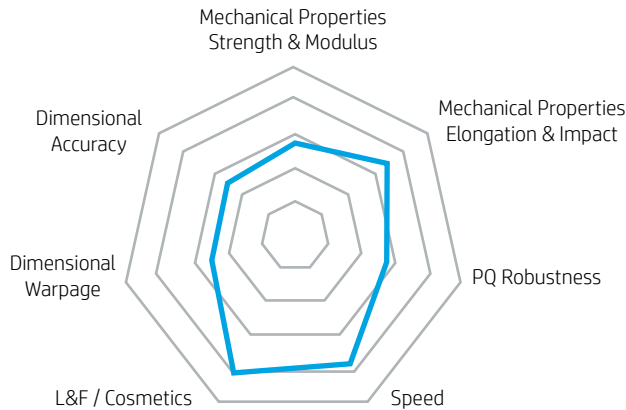
Balanced Print Mode



Mechanical Print Mode



Dimensional Print Mode



Print mode comparison table

Profiles based on average XYZ values

| | Speed | Mechanical properties | Look & feel | PQ Robustness | Dimensional accuracy | Dimensional warpage |
|-------------|-------|-----------------------|-------------|---------------|----------------------|---------------------|
| Balanced | = | = | = | = | = | = |
| Mechanical | ↓ | ↑ | = | = | ↓ | = |
| Dimensional | ↑ | ↓ | = | = | ↑ | ↑ |

For more information, please visit hp.com/go/3DMaterials

- The following technical information should be considered representative of averages or typical values and should not be used for specification purposes. These values are with FW BD7 and have been obtained from a sample of specimens printed in plots with 6% packing density. Separation between specimens in the plot was 10 mm. Modulus has been calculated using the slope of the regression line between 0.05% and 0.25% strain measured with an automatic extensometer during the entire test. Cross-section dimension measures are done using a micrometer with round ends. Conditioning according to ASTM D618 Procedure A: 48 hours after printing and unpacking of the parts at 23°C/73°F and 50% RH.
- Test results realized under the ASTM D638 with a test rate of 50 mm/min and 10 mm/min for type I and type V, respectively.
- Test results realized under ASTM D790 Procedure B at a test rate of 13.55 mm/min.

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