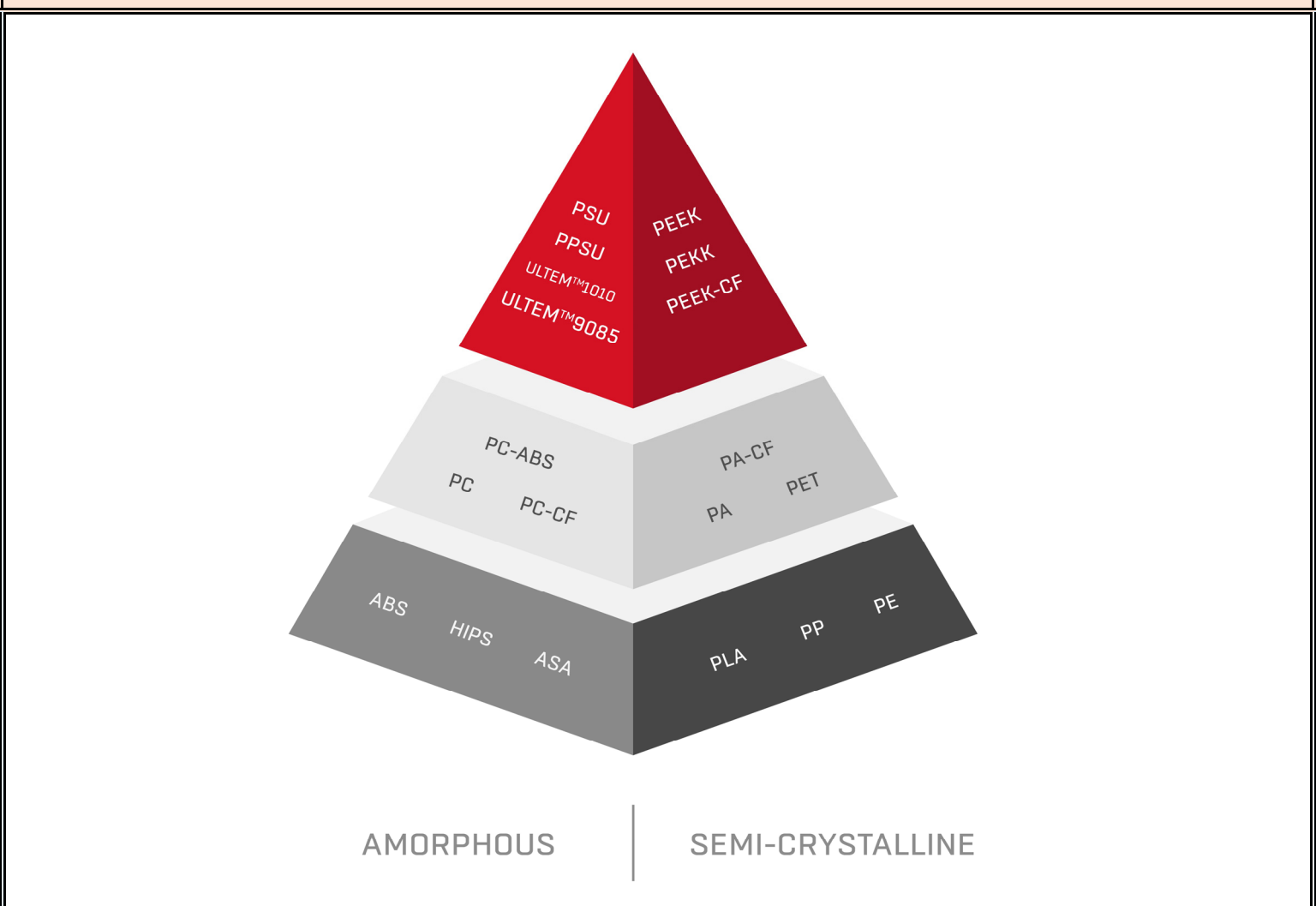


MATERIAL PROPERTIES	PRINT ENVELOPE UP TO: 454 × 454 × 640 mm	(17.9 x 17.9 x 25.2 in)
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Advantages of amorphous thermoplastics
 They're easy to thermoform, for starters. Because these materials are isotropic in flow, they possess better dimensional stability than semi-crystalline plastics and are less likely to warp. Amorphous thermoplastics also offer superior impact strength and are best used for structural applications.

The materials bond well using adhesives. They also tend to offer excellent resistance to hot water and steam, good chemical resistance, and good stiffness and strength. PSU and PEI are especially good examples of amorphous thermoplastics offering these qualities.

Disadvantages of amorphous thermoplastics
 The presence of hydrocarbons means they're more sensitive to stress cracking. They also don't perform well as bearings or wear components and have poor fatigue resistance. Amorphous thermoplastics tend to have lower chemical resistance and higher friction than semi-crystalline materials.



Advantages of semi-crystalline thermoplastics
 Semi-crystalline polymers form tough plastics due to their strong intermolecular forces. They perform extremely well in applications involving wear, bearings, and structural loads. They also provide excellent chemical resistance, where amorphous materials do not.

You can expect very good stiffness and strength, good toughness, and a very low coefficient of friction.

Disadvantages of semi-crystalline thermoplastics
 Semi-crystalline polymers' sharp melting point makes them difficult to thermoform. These materials are anisotropic in flow, so they shrink more in the direction transverse to flow than they do along the direction of flow. This results in dimensional instability, compared to amorphous polymers. Also, the impact resistance of semi-crystalline materials is average at best compared to that of amorphous plastics.

They're hydrophobic, chemically inert and possess low-surface energy, making them challenging to work with, despite these characteristics rating high for performance.

Material	Subclass	Description and Properties	Notes:
ABS	Readyprint™ ABS	AON3D Readyprint™ ABS (acrylonitrile butadiene styrene) is an amorphous thermoplastic polymer commonly used for in additive manufacturing. ABS is commonly used for its impact-resistant, low density, and affordability. ABS excels in form, fit, and function prototyping such as jigs and fixtures due to its strength, low cost, and ease of printability. ABS is best for medium-large parts without too many fine details. AON3D ABS has the following properties: → Impact resistance → Higher heat resistance than PLA (around 90°C) → A filament that can be used in all 3D printers on the market → Large formats from 5kg to 10kg and different colors available on request → Food contact certified under EU 10/2011 and FDA 21 CFR (white only) → Complies with the RoHS and REACH standards	

Material	Subclass	Description and Properties	Notes:
ABS-CF	Readyprint Carbon Fiber ABS	AON3D Readyprint™ carbon fiber ABS is a composite filament of ABS and chopped carbon fibers. Compared to standard ABS, carbon fiber ABS's main advantages are minimum shrinkage, good dimensional stability while printing, higher tensile strength, and tensile modulus. Carbon fiber ABS is a versatile material, suited to printing with a full range of nozzle sizes to meet a wide variety of mechanical properties, surface finish, and productivity requirements.	
ABS-ESD	Readyprint ESD ABS	AON3D Readyprint™ ESD ABS is an acrylonitrile butadiene styrene composite with carbon black to provide electrostatic discharge (ESD) on 3D printed parts. ESD ABS provides similar mechanical properties to baseline ABS with good impact resistance, low density, and printability. This composite polymer is typically used for parts that interface with electronic components such as housing for circuit boards or jigs and fixtures for electronics.	
ASA	Readyprint™ ASA	<p>Readyprint™ Acrylonitrile Styrene Acrylate (ASA) is an amorphous thermoplastic polymer commonly used for rapid prototyping and weather-resistant parts due to its strength, low cost, and ease of printability. ASA offers properties close to ABS with improved resistance to UV, moisture and other climatic conditions providing higher durability over time. AON3D ASA has the following properties:</p> <ul style="list-style-type: none"> → High weather resistance → High UV resistance → Complies with the RoHS and REACH standards 	
CFPA	Jabil PA 4535 CF (CFPA)	<p>PA 4535 CF is among the strongest PA6 co-polymer carbon fiber filaments available on the market, delivering increased strength and stiffness.</p> <p>Typical applications for PA 4535 CF are aluminum replacement parts, housings that require tight printing dimensional tolerances, clips, brackets, retainers, covers, in addition to jigs, fixtures, and tooling.</p> <p>PA 4535 CF has the highest carbon fiber loading available in the industry, providing 40% improvement in tensile strength, impact strength, Z strength and elongation at break, with the added benefit of being ESD safe.</p> <p>Additionally, the combination of carbon fiber in the already extremely low-warp nylon results in extraordinarily flat prints</p>	
Nylon-PA	DuPont™ Zytel® 3D1000FL NC010	Zytel® combines outstanding heat resistance with chemical- and hydrolysis-resistance. Zytel® nylon materials are used by customers across the automotive, electrical, electronics, furniture, sporting goods, and oil and gas industries, as well as many others.	
Nylon-PA	Jabil PA 4500	<p>A Neat Nylon with Improved Mechanical Properties and Printability.</p> <p>This neat Nylon copolymer possesses good lay flat/low warp properties making it easier to print. Along with better printability, PA 4500 delivers high strength in both XY and XZ directions, good toughness, 100% improved elongation at break, and better overall strength compared to other commercial Nylons.</p>	
Nylon-PA	DSM Novamid® ID 1030-CF10 PA6/66 AKA: Covestro Addigy F1030 CF10 (CFPA)	DSM Novamid® ID1030 CF10 is a semi-crystalline carbon fiber-filled polyamide filament used for durable structural parts with high dimensional stability that are stronger, stiffer, and tougher. With a carbon fiber loading of just 10%, Novamid® ID1030 CF10 prints parts with properties close to what is usually achievable only by injection molding. Due to its excellent mechanical properties and smooth surface quality, it is well-suited for demanding automotive structural applications that require robust performance at elevated temperatures.	

Material	Subclass	Description and Properties	Notes:
Nylon-CF	3DXTECH Obsidian PA6+CF	Obsidian™ PA6+CF is a drop-in replacement for Markforged Onyx™ and is compatible for use in all Markforged printers. Obsidian™ delivers excellent performance and appearance. Excellent strength and stiffness Resistant to aliphatic hydrocarbons (oil/gas/lubricants) Superior dimensional stability (low warp/shrink/CTE) Compatible with Markforged FX20, X7, X5, X3, Mark Two, Onyx Pro, and Onyx One printers	
PAEK	PAEK VICTREX AM™ 200 PAEK	A PAEK Family Material Formulated for Higher Isotropy and Printability. LMPAEK (low-melt polyaryletherketone) offers very high wear resistance, high temperature resistance, fatigue resistance, and corrosion resistance to fluid/chemical. VICTREX AM™ 200 Filament is optimized for 3D printing, providing easier printability and improved strength in the z-direction compared to PEEK and PEKK.	
PAPK	Jabil PA 0600	Delrin-Like Properties from a Safe and Easy to Print Alloy. This polyamide/polyketone alloy is tribologically similar to POM (Delrin) and PVDF with self-lubricating properties, good wear and abrasion resistance, and a low coefficient of friction. Combined with high strength and stiffness, this material is great for applications where high dimensional stability and lubricity are needed, such as gears and bearings. Unlike POM and PVDF, PA 0600 is low-warp, easier to print, and does not release any odors or toxic fumes when processed.	
PC	Readyprint PC	Readyprint™ Polycarbonate (PC) is an amorphous thermoplastic, commonly used as an engineering polymer for functional prototypes, jigs, fixtures, and end-use parts. Polycarbonate is a transparent plastic that offers high heat resistance (up to 140°C), high-impact resistance, affordability, and can be sterilized. PC complies with REACH and RoHS standards, and has EU 10/2011 and FDA 21 CFR food contact certifications. PC is often used in aerospace and defense, consumer electronics, and automotive.	
PC	SABIC LEXAN™ EXL Polycarbonate (PC)	LEXAN EXL AMHI240F filament is a high impact polycarbonate product available in black and white colors. It provides high impact strength and improved ductility over standard polycarbonate at room temperature and extreme low temperatures.	
PEEK	KetaSpire MS NT1 AM PEEK	Ketaspire® MS NT1 AM Filament provides long-term performance up to 240 °C, including exceptional chemical resistance, outstanding wear and abrasion resistance. These properties make it particularly suited for metal replacement in critical applications in severe end-use environments, such as Oil & Gas, Aerospace and Automotive.	
PAEK	Victrex AM 450 (PAEK) (Undergoing Validation)	VICTREX AM™ 450 FIL by Victrex is a semi-crystalline, high performance polyaryletherketone (PAEK) grade. Offers high wear-, temperature-, fatigue resistance and corrosion resistance to fluid/chemical. It is designed for filament fusion additive manufacturing and other melt extrusion 3D printing processes. Exhibits low outgassing and is suitable for sterilization. VICTREX AM™ 450 FIL is recommended for higher temperature applications and chemically aggressive environments.	

Material	Subclass	Description and Properties	Notes:
PEEK-A	Readyprint™ PEEK-A	<p>Readyprint™ Amorphous Polyetherketoneketone (PEKK-A) is a pseudo-amorphous thermoplastic copolymer, commonly used when resistance to extreme environments is required. Produced from Arkema Kepstan®, PEKK-A is easy to print due to its very slow crystallization rate and overall low degree of crystallinity. PEKK-A filament offers good mechanical and insulation properties with high chemical resistance, temperature resistance, flame retardancy, and complies with RoHS & REACH standards.</p> <p>PEKK-A is often considered as an alternative to aluminum, ideal for the aerospace and automotive industries where high strength-to-weight ratios are important. The amorphous nature of PEKK-A allows for increased interlayer adhesion and internal stress management compared to other semi-crystalline materials. Crystallization-induced shrinkage is drastically reduced, decreasing the likelihood of warping and shrinkage.</p>	
PEEK-CF	KetaSpire CF10 LS1 AM	<p>Carbon Fiber Filled PEEK for Ultra Strength and Better Printability.</p> <p>With 10% carbon fiber loading, Solvay's CF PEEK is one of the strongest polymers currently available. In addition, the material provides long term-performance up to 240 °C with good dimensional stability and exceptional chemical resistance. These properties make it well-suited for metal replacement in demanding end-use applications.</p>	
PEEK-CF	PEKK CARBON KIMYA	<p>A PEKK thermoplastic polymer reinforced with carbon fiber. This combination gives it a high level of rigidity and heat-resistance. It can be used as a material in components exposed to acids and hydrocarbons, such as fuel and lubricants, and also to produce components located in engine housings. The Kimya PEKK Carbon 3D filament has the following properties:</p> <ul style="list-style-type: none"> - Temperature resistance - Reinforced with carbon fiber - Complies with the REACH regulation and the RoHS directive 	
PEEK-GF	3DXTECH FIBREX PEEK+GF20	<p>FibreX™ PEEK+GF20 glass fiber reinforced PEEK [Polyether Ether Ketone] delivers the highest thermo-mechanical properties in our portfolio. This material boasts an industry-leading heat distortion temperature [HDT] of 310°C and is complimented by PEEK's exceptional mechanical and chemical resistance properties</p>	
PEI	Readyprint™ PEI 9085	<p>AON3D Readyprint™ PEI 9085 is an amorphous polyetherimide (PEI) blend, commonly used in prototyping, tooling, and production parts. Produced from SABIC ULTEM™ 9085 resin, PEI-9085 filament offers long-term heat resistance and stability of physical and mechanical properties at elevated temperatures for extended periods. Due to its heat resistance, high impact strength, high strength-to-weight ratio properties, and high resistance to abrasion is widely used in aerospace, automotive, and military applications. PEI 9085 has the following certifications & properties:</p> <ul style="list-style-type: none"> → Flame retardant and non-toxic - UL94 V0 → Railway fire and smoke standard EN45545 → Aerospace FAR 25.853 Standard → Complies with the RoHS and REACH standard 	

Material	Subclass	Description and Properties	Notes:
PEKK-A	PEKK-A Kimya (KEPSTAN®)	PEKK-A is the amorphous form of PEKK, providing ease of printing. This is a material that boasts good mechanical properties and is resistant to high temperatures (<150°C). Produced using KEPSTAN® Arkema, the Kimya PEKK-A 3D filament has been designed for technical applications. It can come into contact with hydrocarbons and fluids, enabling it to be used in multiple business sectors: aerospace, automotive, railways, etc. It has the following properties: <ul style="list-style-type: none"> - Temperature resistance - Flame retardant – eligible to UL94 V0 - Complies with the REACH regulation and the RoHS directive 	
PEKK-A	Readyprint PEKK-A	The AON3D Amourphous PEKK belongs to the polyaryletherketone family. Polyetherketoneketone (PEKK) is a thermoplastic polymer. Amourphous PEKK is the amorphous form of PEKK, providing ease of printing. This is a material that boasts good mechanical properties and is resistant to high temperatures (<150°C). Produced using KEPSTAN® Arkema, the AON3D Amourphous PEKK has been designed for technical applications. It can come into contact with hydrocarbons and fluids, enabling it to be used in multiple business sectors: aerospace, automotive, railways, etc. AON3D Amourphous PEKK has the following properties: → Temperature resistance → Flame retardant – eligible to UL94 V0 → Complies with the RoHS and REACH standard	
PETG-CF	Readyprint Carbon Fiber PETG	AON3D Readyprint™ carbon fiber polyethylene terephthalate glycol (PETG) is a composite filament of PETG and chopped carbon fibers. The addition of carbon fiber in PETG offers a significant increase in strength and stiffness along with great printability and dimensional stability, making it an optimum choice for functional prototypes, manufacturing jigs, or end-use parts. PETG complies with RoHS and REACH standards.	
PETG	Readyprint PETG	Readyprint™ Polyethylene terephthalate glycol (PETG) is an amorphous thermoplastic polymer commonly used for rapid prototyping due to its low cost and printability. PETG offers flexible but mechanically resistant parts. PETG is food contact certified under EU 10/2011 and complies with RoHS and REACH standards.	
PI	Tectonic TenneT PI	3D Printable Polyimide with Ultra Strength, High Isotropy, and High Heat Resistance. One of the most exciting polymers in additive manufacturing this year, Tectonic 3D's thermoplastic polyimide possesses a similar tensile modulus to ULTEM™ 9085 while exhibiting superior strength and elongation at break properties. This indicates that TenneT TPI theoretically has far better interlayer weld strength and part isotropy than ULTEM™. In tests supported by the Royal Netherlands Navy's Expertise Centre Additive Manufacturing (ECAM), a small aerospace tie-down bracket withstood 432 kg of load before failure and fractured through multiple layers of the print.	
PPSU	Readyprint™ PPSU	Polyphenylsulfone (PPSU) is an amorphous thermoplastic polymer commonly used where high impact, heat, and chemical resistance are required. Solvay Radel® PPSU filament offers improved ductility, impact resistance, high-temperature capabilities, and chemical resistance compared to PSU and PEI. Due to its high operating temperatures around 200°C and flame retardant properties, Radel® PPSU is widely used in multiple sectors, bringing performance to healthcare, energy storage, and aerospace applications. Printing Difficulty: Challenging/Expert	

Material	Subclass	Description and Properties	Notes:
PPSU	SOLVAY RADEL® PPSU	<p>Polyphenylsulfone (PPSU) is an amorphous thermoplastic polymer commonly used where high impact, heat, and chemical resistance are required. Solvay Radel® PPSU filament offers improved ductility, impact resistance, high-temperature capabilities, and chemical resistance compared to PSU and PEI.</p> <p>Due to its high operating temperatures around 200°C and flame retardant properties, Radel® PPSU is widely used in multiple sectors, bringing performance to healthcare, energy storage, and aerospace applications.</p>	
TPI	Zymergen Z2 TPI	<p>PI Z2 Filament is printable polyimide. This material has critical advantages for printing parts that require high tensile strength and higher yield. This material can also lead to higher reliability processes for manufacturing parts. Additionally, parts also do not need to be annealed after printing to perform well. Polyimide is a very high-strength polymer that is inherently flame retardant, has excellent insulating properties and excellent thermal stability. The PI filament meets the EN 45545, R22 and R23 in HL3 and thus is suitable for railway vehicles applications.</p>	
TPU	Readyprint 92A TPU	<p>AON3D Readyprint™ TPU-92A belongs to the thermoplastic polyurethane (TPU) family of flexible polymers. With a shore hardness of 92A, it can be used to print flexible parts with good thermal, impact, and abrasion resistance. TPU-92A is used in several industries including food, electronics, automotive, and consumer goods. TPU-92A is also food contact certified (EU 10/2011 & FDA 21 CFR for all colors other than black) and complies with RoHS & REACH standards.</p>	
ULTEM	Sabic ULTEM™ AM9085F	<p>ULTEM™AM9085F filament by SABIC belongs to the category of high performance technopolymers, or superpolymers, as it has resistance to hydrolysis and acid solutions, advanced thermal performances (supporting repeated cycles in autoclaves) and strong mechanical characteristics. ULTEM™AM9085F also has good electrical properties, which remain stable over a wide range of temperatures and frequencies (including microwaves). This, along with its good UV-light resistance and weatherability, is why it is one of few polymers that can be used on the outside of a spacecraft.</p>	