UL's certification program for plastics for additive manufacturing

(The Blue Card™ Program)

FREQUENTLY ASKED QUESTIONS

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YOUR QUESTIONS ANSWERED:

- What is UL's Blue Card™?
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- Should I get a separate Blue Card for each printer/material combination?
- Is my Blue Card invalidated when I change the printer model? If I already have a Blue Card and change the printer, do I need a new Blue Card?
- How can I obtain a Blue Card for one of our internally developed materials? I would like to certify my materials for AM, but I don't want to publicize this information/all the details just yet. Does UL have any other options?
- Several test properties, e.g., hot wire ignition (HWI), high-current (or high-amp) arc ignition (HAI) and comparative tracking index (CTI) are missing from the Blue Card for a material our machine processes. Were they not tested?
- How many parts do we need to submit for a 3D printed part validation? How long does validation take?

Q: What is UL's Blue Card™?

A: The Blue Card™, formally known as UL's certification program for plastics for additive manufacturing, certifies plastic materials that are appropriate for 3D printing (3DP). More specifically, the Blue Card provides data to facilitate the preselection of 3D printed materials and components intended for use in various end-product applications from automotive to appliances and many others. It helps deliver confidence and trust across the supply chain — to both users and suppliers of 3D printed articles in terms of their quality, safety, consistency and performance.

Q: Why are certified materials important in additive manufacturing (AM)?

A: As the usage of 3D printing expands beyond rapid prototyping and into serial production applications, materials-related issues are being reported as the biggest barrier to even faster mainstream growth. The current set of materials available for additive manufacturing users to choose from is a small fraction of the materials available for traditional processes like injection molding. The challenges reported with current materials include cost, a lack of confidence in the reliability and consistency of the parts produced from them, and a lack of certified materials available in the marketplace. [(1)] These issues are magnified in more highly regulated industries such as aerospace and healthcare, to name a few. Industry wide AM standards and specifications for precursor materials need to be established and published. In their absence, the AM industry has relied upon existing standards and specifications that were developed decades ago based on conventional manufacturing methods, which often are unsuitable for additive manufacturing. [(2)]

(1) Jabil, 'Current State of Additive Material and 3D Printing', January 2019

(2) Deloitte Insights, 3D Opportunity for standards. Additive manufacturing measures up', 2017

UL's plastics experts conducted a systematic **research study** to fill in the knowledge gap. To obtain the information needed, the team investigated the influence of various 3D printing and build parameters on safety-critical performance properties, especially those defined in UL 94, the Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances testing, and UL 746A, the Standard for Polymeric Materials – Short Term Property Evaluations. Results were also compared to properties measured on injection molded specimens. The learnings from this research led to the creation of UL's certification program for Plastics for Additive Manufacturing (Blue Card). Certified materials help product/part designers make intelligent material selection decisions, while reducing their development time and ensuring compliance.

Q: What is the value of third-party certification versus self-declared ratings?

A: A certified material is a material that has gone through third-party testing and evaluation to validate its performance in accordance with a specific printer and settings. Third party certification makes it easier for original equipment manufacturers (OEMs) to adopt materials for mainstream AM production as it reduces the testing burden required on their components and products. Blue Card certification delivers confidence to users that the material performance remains consistent as the material is regularly inspected through UL Follow-Up Services program to ensure its continued compliance and certification. Self-declared ratings cannot be used to make certification decisions on end products. Products utilizing self-declared material ratings will face longer, more expensive certification pathways (due to increased testing requirements) versus products/components made from certified Blue Card materials.

Q: Why do I need a material certification for additive manufacturing (Blue Card™)? What will AM material certification do for me? How can a Blue Card™ help my business?

A:
- For plastic material manufacturers, Blue Card certified data reduces the amount of testing that end-users would need to do to get their products certified. Blue Card certification differentiates your materials from those with self-declared ratings, and increases their marketability to users who print parts for applications where certification is required. Once recognized, your products will be searchable to thousands of suppliers looking for a material that can meet their safety and performance requirements.

- As a (closed source) 3DP printer manufacturer, you need to convince your customers that your machines and materials can reliably print parts that meet application requirements (and comply with industry standards). Your customers are often in regulated industries and need confidence that they can make quality parts consistently from your system. The Blue Card gives your customers confidence that they can print parts that will meet end-product requirements using your machines and materials. It will help your customers receive their end-product certification quicker and more economically.

- As a part designer, part manufacturer or end product OEM, you need to know which materials and printers will help you make consistent quality parts. The Blue Card provides data integrity you need to make informed decisions. The Blue Card can help save you time and money in product development costs and certification. UL Follow-Up Services program monitors your material suppliers to ensure they are maintaining certification and ongoing compliance. UL's Recognized Fabricators program also provides you confidence that service bureaus are producing your parts in accordance with UL requirements and your internal specifications.

- As a service bureau, the Blue Card serves as a kind of cheat sheet to help you quickly identify material and machine combinations that enable production of parts that are UL Standard compliant. This will help you reduce internal testing and design of experiments (DOEs). When combined with UL's Recognized Fabricators program, the Blue Card provides a high level of confidence and quality assurance to OEMs looking for a trusted source of UL parts.

Q: Who applies for the Blue Card?

A: Anyone in the AM supply chain can apply for the Blue Card. For example, a 3D printer manufacturer or material manufacturer can apply for the Blue Card. Whoever applies for the Blue Card is called the applicant and receives the right to apply the UL Recognition Mark to the product.

It is possible to have two Blue Cards, or a joint Blue Card — one with the applicant (material manufacturer) and the second with the printer manufacturer. This enables both the material manufacturer and printer manufacturer to market the material individually. Since it's the same investigation, we can divide the project in half and each applicant can split the costs.

Q: What is the process for getting a Blue Card Recognition?

A: Because there are many variables surrounding recognition of additive manufacturing materials, the process to obtain a Blue Card starts with a certification requirement investigation project. We work directly with you to determine pertinent variables such as printer models, printing and build parameters, and any post-processing information to accurately determine what is required. After these requirements are finalized, we provide a detailed quotation for the full investigation along with sample requirements and an outline of the testing to be performed. Once your project is underway, we provide secure online access to your project status through the myUL™ Client Portal while you work with dedicated engineering resources to help ensure timely material certification.

Q: How do my customers find my materials once I have achieved UL certification/ recognition? Once I have materials recognized how do my customers find it?

A: Once your material is UL Certified, it will appear in UL's online Product iQ™ certification database, making it immediately visible to thousands of designers, engineers and suppliers searching for a material intended for 3D printing. Only materials that have been certified by UL appear in Product iQ, so you know that the material has been evaluated by an independent third-party.

Q: I am already using UL recognized/Yellow Card certified material for my AM printing application. Do these ratings apply?

A: Unfortunately, due to the printing process, ratings from the Yellow Card do not carry over to the AM materials and have to be evaluated separately, with the specific printer and parameters. This is due to the possibility of different equipment resulting in different performance. UL's plastics experts completed a 14-month long study on this. The detailed research report can be downloaded here.

Q: Should I get a separate Blue Card for each printer/material combination?

A: Each unique material grade should have a separate Blue Card. A given Blue Card can include multiple printers if the print parameters and performance properties are the same for these different printers. If print parameters and/or the printed properties differ for different model printers, multiple Blue Cards can be issued or multiple printer/processing designations can be used to highlight differences.

For example, if a material obtains a V-0 rating with one model printer and a V-2 with a different model printer, we would establish two Blue Cards in order to differentiate the performance.

Q: Is my Blue Card invalidated when I change the printer model? If I already have a Blue Card and change the printer, do I need a new Blue Card?

A: Not necessarily. We will work with you to evaluate printer equivalency. If there are differences, we will work with you to develop a reduced test program to help ensure consistent performance of the material across both platforms. A revised or new Blue Card will be issued to capture the usability of materials across both platforms.

Q: How can I obtain a Blue Card for one of our internally developed materials? I would like to certify my materials for AM, but I don't want to publicize this information/all the details just yet. Does UL have any other options?

A: UL does have a confidential solution. It is possible to have a **proprietary** Blue Card. Proprietary cards can still be accessed via the Product iQ database, so it will still be visible to the thousands of individuals searching this database for recognized materials, but the only publicly viewable information is your company name. No product names or ratings are viewable. The process to obtain a proprietary Blue Card is the same as a published Blue Card.

Q: Several test properties, e.g., hot wire ignition (HWI), high-current (or high-amp) arc ignition (HAI) and comparative tracking index (CTI) are missing from the Blue Card for a material our machine processes. Were they not tested?

A: The applicant decides what testing properties they would like listed on the Blue Card. Typically, flammability is always performed and, depending on the application of the material, other testing may be requested. Only UL-evaluated material performance properties are listed on the material's Blue Card. If properties are not listed, either UL has not evaluated the property or the applicant decided not to publish that information.

Q: How many parts do we need to submit for a 3D printed part validation? How long does validation take?

A: The number of parts and time required for validation ultimately depends upon the product category. Validation of a 3D printed part will be the same as a conventionally manufactured part provided both are made from UL recognized materials. The evaluation of 3D printed parts made using Blue Card recognized materials will be faster than for parts made using unrecognized materials due to reduced testing.

For more information visit www.UL.com/BlueCard.

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