

FLAMMABILITY OF INTERIOR MATERIALS TEST



HP Inc.

HP 3D High Reusability¹ (HR) PA 12, HP 3D High Reusability² (HR) PA 11, HP 3D High Reusability³ (HR) PA 12 GB, and BASF Ultrasint TPU01⁴ have passed the FMVSS 302:2017 Flammability of Interior Materials test.

Test description

Officially known as 49 CFR 571.302, the **Federal Motor Vehicle Safety Standard (FMVSS) 302 for Flammability of Interior Materials–Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses** is one of the most common automotive materials tests. Founded as a Federal Standard in 1972, it is identical to the Canadian Motor Vehicle Safety Standard (CMVSS) 302 and will occasionally be referred to on a specification or printed part simply as MVSS 302.

FMVSS 302 is a general safety measure that is in place to reduce the likelihood of injury or death that may result from a vehicle fire, especially one originating in the interior of the vehicle from sources such as matches or cigarettes. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses. The test involves burning two or more samples of a plaque measuring 356mm x 102mm x 13mm of maximum thickness or a section of material and measuring the burn rate in millimeters per minute (mm/min). Ignition occurs at one end of the sample by exposing it to a Bunsen burner flame for 15 seconds. The burn rate dictates conforming or non-conforming material, and a maximum allowed burn rate to meet the FMVSS 302 standard is 102mm/min, although these criteria may be overridden by an OEM specification or part print detail.

The Society of Automotive Engineers (SAE) J369 and the International Standards Organization (ISO) 3795 are technically equivalent testing methods to FMVSS 302. However, they both require burning five specimens per material.

Sample preparation

On each test sample, two reference lines are drawn: the first reference line is 38 mm from one end of the test sample, and a second reference line is 254 mm from the first.

The test samples are **conditioned under** the following conditions: Temperature and humidity: $21^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $50\% \pm 5\%$. Time: 24 hours, and the test conditions are also $21^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

1. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 12 provide up to 80% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.
2. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 11 provide up to 70% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracies.
3. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 12 Glass Beads provide up to 70% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.
4. Available for the HP Jet Fusion 5200 Series 3D Printing Solution.

Test description

The test sample is placed in the sample holder so that the exposed side faces down toward the flame. The sample holder is pushed into the combustion chamber so that the end of the sample is exposed to the flame, and after 15 seconds the gas flow is cut off.

The burning time begins when the foot of the flame passes the first reference line and ends when the flame arrives at the second reference line or when the flame extinguishes before arriving at the second reference line.

Results

The burning rate of all five samples is 0mm/min, which means that the flame extinguishes when the gas flow is cut off.

Because the SAE J369 and the ISO 3795 are technically equivalent testing methods, passing the FMVSS 302:2017 is equivalent to passing the SAE J369 and the ISO 3795.

HP believes that the testing referred to above is representative of parts produced with HP 3D HR PA 12, HP 3D HR PA 11, HP 3D HR PA 12 GB, and BASF Ultrasint TPU01 when used with the HP Jet Fusion 3D 5200 Series 3D Printing Solution. Based on these results, HP expects that similar articles made from these materials under similar conditions will meet the compliance requirements of the FMVSS 302:2017 Flammability of Interior Materials test.

It is the responsibility of each customer to determine that its use of HP 3D HR PA 12, HP 3D HR PA 11, HP 3D HR PA 12 GB, and BASF Ultrasint TPU01 materials are safe and technically suitable to the customer's intended applications, and consistent with the relevant regulatory requirements applicable to the customer's final product. Customers should conduct their own testing to ensure that this is the case.

For additional information about HP 3D HR PA 12, HP 3D HR PA 11, HP 3D HR PA 12 GB, and BASF Ultrasint TPU01, please contact our HP 3D Printing materials team at 3dmaterials@hp.com.

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