



PERFORMANCE MATERIALS

A new approach to assess flammability characteristics of polymeric materials



Follow-up Services (FUS) testing is required for a number of products certified by UL, such as plastics, colorants, coatings, etc. To assist customers who have experienced a flammability testing FUS non-conformance and would like to better understand the flammability properties of their materials, UL has developed the Microscale Combustion Calorimetry (MCC) testing program.

The program uses a thermal and combustion analysis technique for Follow-Up Service (FUS) testing of UL 94 rated products. MCC does not replace the requirement for UL 94 flame ratings in end-product standards, but rather it serves as an alternative analytical test to verify material combustion consistency in FUS.

It is important to note that MCC will be conducted in conjunction with the typical analytical tests used to validate formulation consistency in surveillance of certified plastics, FTIR, TGA and DSC.

What is MCC Testing?

MCC is a thermal analysis technique for characterizing flammability properties of combustible materials such as plastics. UL follows ASTM D7309, Method B to perform this test.

This test is conducted in a laboratory environment in which milligram-scale specimen are heated at a controlled rate in an oxidizing atmosphere to achieve total material decomposition. The gases evolved during heating are continuously swept to a high temperature, oxygen-rich furnace in which they are totally oxidized. Heat release rates associated with the combustion are then calculated by means of oxygen consumption. The temperatures over which combustion heat is released are also measured.

The major differences which customers will notice when choosing this method are the quantitative nature of MCC results and that the flame bars are no longer required for FUS testing, since only a small amount of material in any form, including pellets, is needed to conduct the test.

For additional information about MCC testing please contact your sales representative or cec.us@us.ul.com

Application scenarios of MCC

While this new program helps customers identify the combustion fingerprint of a material when FUS non-conformances occur, it can also be used in Research and Development situations where a client is looking to differentiate formulations for FUS borderline non-conformance resolution or as a tool to assist during their product development stage. Another application of MCC is that it can also be used as Quality Control tool.

Below you will find some typical scenarios in which we are utilizing MCC to help plastics clients better understand the flammability characteristics of their materials:

- **New Recognition:** Establish MCC and ID testing of pellets for FUS. (Note that UL 94 ratings must be assigned based on testing of molded bars, not based on MCC.)
- **Current Recognition:** Use of MCC instead of UL 94 flame testing for FUS on non-HB rated materials.
- **Non-Conforming Flame Test Results:** Differences noted in FUS flame test results can be more extensively investigated by MCC to resolve deviations.
- **Research and Development:** MCC's quantitative nature can help customers better understand the combustion behavior of their formulations.
- **Quality Control:** For customers that would like to develop a quality control process for assessing combustion behavior.
- It is important to note that when using MCC for either; Research and Development or Quality Control applications we would work with clients to create a very specific and customized offering that meets their specific requirements or needs.

Benefits of using MCC

Some of the benefits of using MCC testing for UL's Follow-up-Services (FUS) program are:

- Provides a quantitative comparison of combustion characteristics of polymeric materials.
- Provides quantitative information to correlate flammability behavior of new formulations during product development.
- Eliminates the need for specimen conditioning inherent in the UL 94 test method, resulting in faster cycle-time to obtain results.
- Eliminates the need for molding, since MCC and ID tests can be done on pellets.
- Eliminates waste associated with molding bars, i.e., no more compounding of extra material to obtain only a limited amount of bars; no need to discard molded unburned bars and unburned portions of bars; no more purging of compounding and molding equipment.
- Significant reduction of combustion byproducts from UL 94 flammability testing.

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