

Speaker:

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Title:

Do differences in bench- or small-scale experiments manifest in different fire growth behavior? A case study with PMMA.

Abstract:

In this work, the effects of sample geometry, sample color and sample deformation were studied at the mg- and g-scale (small- and bench-scale, respectively) in three experimental apparatus. A tube furnace was equipped with an online mass loss measurement to test it as a new bench scale experiment and results from these tests were compared to tests conducted in a thermogravimetric analyzer (TGA, small scale) and a cone calorimeter (bench scale). Polymethyl methacrylate (PMMA) was used as a representative test material, with multiple types of PMMA (e.g., cast vs extruded, different molecular weights, and multiple colors) tested in all three experimental apparatus. Preliminary results suggest that noted differences in sample type for nominally the 'same' material may result in differences in heat release rate (HRR) measured in the cone calorimeter. When compared to literature data from other bench scale tests on PMMA, the results also show large scattering, possibly due to differences in the PMMA used. Therefore, the aim of these tests is to identify the specific types of PMMA which have the greatest deviations in fire behavior in these small- and bench-scale tests and to conduct larger-scale fire growth experiments on these samples to see whether the differences (e.g., in HRR measured in cone calorimeter tests) also manifest themselves at a larger scale. In this presentation, first results of the comparison of different types of PMMA in bench scale experiments will be discussed.