Microscale Criteria for Flammability of Aircraft Cabin Material Constituents

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Small changes in the composition of certified aircraft cabin constructions are often necessitated by the unavailability, performance characteristics, or environmental regulation of the original constituents- requiring costly recertification of all constructions and assemblies containing these constituents (e.g., adhesives, films, fibers, resins, thermoplastics, coatings, pigments, potting compounds, etc.). In response to this issue, the FAA in cooperation with the aviation industry, developed a microscale method and parameter to measure and compare the intrinsic flammability of constituent materials at the 10 milligram scale. This microscale test method and combustion parameter were codified as ASTM D7309-21b Standard Test Method for Determining Flammability Characteristics of Plastics and Other Combustible Solid Materials Using Microscale Combustion Calorimetry/*MCC*. The *MCC* combustion parameter called the fire growth capacity/*FGC*, includes ignitability and heat release, and was derived from a continuum-level unsteady burning model*. In this paper we present an empirical microscale/*FGC* criterion for flammability of substitute components of aircraft cabin materials that will provide similar 14 CFR 25 fire performance in bench scale tests. In particular, we demonstrated that the relative change in *FGC* of a substitute component should be similar to the expected variation of fire test results of cabin materials at the 95% confidence level.

*R.E. Lyon, N. Safronava, S. Crowley and R.N. Walters, A Molecular-Level Fire Growth Parameter, *Polymer Degradation and Stability*, **186**, 109478 (2021).