Guest Editorial: Special Issue on Polyurethane Foam Combustion

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Flexible and rigid polyurethane foams can be formulated with a wide variety of mechanical, thermal, chemical and physical properties. Since they are lightweight and can be engineered for specific purposes, they are finding increasing application in the world around us—the construction, insulation, furniture and transportation industries. Yet, hydrocarbon based foams are very flammable, so fire safety and fire performance are key factors for many applications, as well as for their long term use in most sectors. As such, multi-faceted research is underway in many countries with focus on foam fire behaviour, application and scaling of fire test results and product safety of polyurethane foams and related products.

The purpose of this special section of *Fire Technology* is to communicate to the broad fire protection community a selection of interesting research findings and possible future advances related to the fire science and engineering of polyurethane foams. Three papers, describing both experimental and numerical investigations, are included in the section. As well as presenting new research findings, the papers address the implications of the results to product design and regulation, as well as fire test standard development. Authors representing research organizations and universities in Canada, the United Kingdom and the United States have contributed to this special section.

The three papers compiled here deal with flexible polyurethane foam, which is used extensively in upholstered furniture, mattresses and other consumer products. Pitts [1] describes the detailed burning behavior of polyurethane foam using data from cone calorimeter tests, and discusses key issues associated with using the cone calorimeter to measure heat release rates of the foam. Hadden et al. [2] then examine the effects of the size of cone calorimeter specimens on measurements of critical heat flux for smoldering and flaming ignition, as well as temperatures and flame spread rates during smoldering of the foam. Finally, Ezinwa et al. [3] discuss the ability of two fire safety engineering models to predict full-scale fire behavior of foam slabs using information from cone calorimeter tests of the foam specimens. While these three papers cover only a small cross-section of issues related to fire safety testing of polyurethane foams, it is hoped that they generate discussion and interest leading to continued development of fire safe products and the associated performance test standards.

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References

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