Properties of smokes emitted during smoke-chamber tests

J. Moraine , J. Yon, M. Talbaut, A. Coppalle
UMR 6614 CORIA, Université et INSA de Rouen,
Avenue de l'université, B.P. 8, 76801 Saint-Etienne du Rouvray, France

The European project Aircraft Fire (FP7) aims to study fire degradation of aircraft materials, and their capacity to withstand significant radiative fluxes. The CORIA laboratory is studying the production of smokes due to the pyrolysis of materials, in order to look at their optical properties and to know how they affect the visibility. For this, a smoke chamber was used and different tests were performed according to ASTM E 662 or ISO 5659-2 standards. The first case, it is used a vertical sample exposed to a radiative flux equal to 25 KW/m2, while in the second case, the sample is horizontal and the radiative flux can be up to 50kw/m2. The optical density is measured during 10mn. At the same time, the mass concentrations and aerosol sizes in the smoke chamber were measured using a microbalance (R & P - TEOM Série 1105) and a mobility particle sizer (DMS500, CAMBUSTION).
At low radiative flux (25kW/m2), no flames were observed, while for the majority of the materials, flames were sustained at 50kW/m2. In both cases, the particles are submicronic, with a modal diameter at about 100 nm. It will be shown that the smoke properties (optical density, mass concentration and sizes) are different with and without flames. Values of the specific extinction coefficient (in m2/g) can be calculated from the experimental values of the mass concentration and the optical density. They will presented and discussed, as they are usefull parameters for the calculation of the visibility in smoky compartments

This study is funded by the project AircraftFire in the FP7 of the European community. In addition, we thank the Laboratory of Police of Paris (LCPP) for the loan of the smoke chamber.

Author:
Alexis Coppalle
UMR 6614 CORIA
Institut national des sciences appliquées de Rouen (INSA Rouen)
685 avenue de l'université BP 08
76801 SAINT-ETIENNE-DU-ROUVRAY CEDEX

coppalle@coria.fr