Laboratory and Full-Scale Testing of Lightweight Aircraft Seat Cushion Materials

Tim Marker, FAA Technical Center, Atlantic City, NJ

Abstract. Laboratory and full-scale tests were conducted on a number of different types of aircraft seat cushion materials in order to determine the applicability of the current weight-loss criteria specified in Title 14 Code of Federal Regulations (CFR), Part 25.853(c), Part II of Appendix F. Cushion samples were initially tested in accordance with the current standard, and if they exceeded the 10% weight loss criteria, they were eligible for a full-scale test evaluation. During full-scale tests, a modified narrow-body fuselage test article was situated adjacent to a fuel pan to simulate a severe but survivable postimpact cabin fire. Four triple-seat frames used to mount the cushion samples were installed inside the test article. Honeycomb sidewall and ceiling panels, and aircraft-grade carpet were also installed in the vicinity of the seat frames to simulate a realistic aircraft cabin.

Laboratory-scale tests were completed on one set of standard fire-blocked cushions that met the current Title 14 CFR requirement, in addition to four lightweight materials. The standard fire-blocked cushions were then run under full-scale conditions to provide a baseline of the current level of safety, followed by full-scale tests of the four lightweight materials. Results indicated that several of the lightweight materials that failed the weight-loss criteria specified in 14 CFR Part II of Appendix F to 25.853(c) did not result in adverse safety levels inside the cabin when tested under the realistic full-scale conditions.