
The objective of this study was to conduct flat plate and aerodynamic testing to substantiate and further develop the current ice pellet allowance times. A series of full-scale tests using the NRC open circuit wind tunnel were conducted to examine high speed and low speed flow-off properties of anti-icing fluids contaminated with simulated mixed conditions including ice pellets.

Type IV High Speed Allowance Times: The results indicated that many of the cells of the Type IV high speed allowance time table were validated, however, some additional data is proposed for the -10 to -25°C range for light and moderate ice pellets. A reduction to the light ice pellets mixed with moderate snow allowance time was issued for OAT above -5°C. The testing conducted also allowed the expansion of the table to include a new 25 minute allowance time light ice pellets mixed with moderate rain for above -0°C conditions, as well as a new 15 minute allowance time for light ice pellets mixed with light snow for -5°C to -10°C conditions.

Type IV Low Speed Allowance Times: Testing supported the preliminary development of allowance times for low speed operations with Type IV fluid, however due to the limited data collected, further testing is recommended before a separate low speed allowance time table is published in the HOT guidelines. In addition, Type IV fluids are generally not certified (or do not qualify) for low speed take off; therefore modifications to the aerodynamic acceptance tests are required to better reflect the current generation of low speed aircraft and respective take off profiles.

Type III Low Speed Allowance Times: The results indicated a good potential for the use of Type III fluid during ice pellet conditions. A comprehensive preliminary allowance time table was developed for Type III fluid applied at ambient temperature, however the publication of the guidelines has been postponed until further data is collected. Further testing is recommended to substantiate the current results, as well as to expand the data set to include heated Type III fluid applications, and high speed takeoff profiles.

Type II Allowance Times: The limited results indicate a good potential use for Type II fluids in mixed conditions with ice pellets, however further work is required to compile the necessary data to issue a separate Type II allowance time table. There has not been a strong industry need to have allowance times developed for use with Type II fluids therefore future work with Type II fluids should remain a lower priority.

A newly updated version of the Type IV allowance time table has been developed and adopted for the 2009-10 version of the HOT guidelines; this work was presented at the SAE G-12 meeting in May 2009. Future work is recommended to further expand the current Type IV high speed table to include additional conditions. Testing to develop Type IV low speed, Type III, and Type II allowance time tables will be prioritized based on industry support and recommendations. It is recommended that testing during the winter of 2009-10 be conducted with a super-critical airfoil as this type of airfoil is more common in current aircraft operations.

Several research reports for testing of de/anti-icing technologies were produced for previous winters on behalf of Transport Canada. These are available from the Transportation Development Centre (TDC). Several reports were produced as part of this winter's research program. Their subject matter is outlined in the preface. The work described in this report was, in part, co-sponsored by the Federal Aviation Administration (FAA).