Transport Canada / Transports Canada

PUBLICATION DATA FORM

1. Transport Canada Publication No.	2. Project No.	3. Recipient's Catalogue No.
TP 14145E		

4. Title and Subtitle	5. Publication Date
Laboratory Test Parameters for Frost Endurance Time Tests	
	6. Performing Organization Document No.: CM1747.001

7. Author(s)	8. Transport Canada File No.
Peter Dawson	

9. Performing Organization Name and Address	10. PWGSC File No.
APS Aviation Inc. 1100 René-Lévesque Blvd. West, Suite 1340 Montreal, Quebec H3B 4N4 Canada	11. PWGSC or Transport Canada Contract No.

12. Sponsoring Agency Name and Address	13. Type of Publication and Period Covered
Transportation Development Centre (TDC) 800 René Lévesque Blvd. West, Suite 600 Montreal, Quebec H3B 1X9 Canada	Draft
	14. Project Officer: Barry Myers

15. Supplementary Notes (Funding programs, titles of related publications, etc.)

Several research reports for testing of de/anti–icing technologies were produced on behalf of Transport Canada for previous winters. These are available from the Transportation Development Centre (TDC). Thirteen reports (including this one) were produced as part of this winter's research program. Their subject matter is outlined in the preface. Partial funding was provided courtesy of the FAA.

16. Abstract

Removal of frost contamination on aircraft critical surfaces places a large demand on deicing resources: In mild winter climates such as London and Paris, frost accounts for up to 90 percent of all deicing operations; in colder winter climates it accounts for up to 25 percent of deicing operations.

Endurance tests in frost have never been conducted on SAE Type I, II or IV fluids. In 2000, an SAE Aerospace Standard (AS) 5485 Endurance Time Test Procedure was proposed to enable conduct of these tests. During the winter of 2000-01, tests to substantiate values for fluid endurance in active frost conditions concluded that the proposed test conditions did not produce the specified frost rates. A research program was established to document rates of frost accretion representative of those on aircraft surfaces and to determine the corresponding environmental conditions for the purpose of better defining laboratory test conditions.

The research program extended over two winter seasons, 2001-02 and 2002-03. Frost rates and wing-to-air temperature differentials were documented over a range of conditions and temperatures. A field trial was conducted on an operational aircraft in natural frost conditions to assess the validity of the results. Historical weather data was analyzed to ascertain the range of values for relative humidity during typical frost conditions in nature. Endurance tests on Type I fluids in natural frost were conducted. Trials were conducted to examine the ability to reproduce desired frost rates in a laboratory.

Based on the findings of the two–year test program, it is recommended that different test conditions be included in AS 5485 for endurance time testing of Type I fluids and for testing of Type II/IV fluids in frost. It is also recommended that frost holdover times for current fluids be substantiated through a series of trials in natural frost conditions.

17. Key Words	18. Distribution Statement
Endurance Time, Holdover Time, Frost, High Humidity, Deicing Fluids, Tests	Limited number of copies available from the Transportation Development Centre

19. Security Classification (of this publication)	20. Security Classification (of this page)	21. Declassification (date)	22. No. of Pages	23. Price
Unclassified	Unclassified	—	xxx, 182 app	—