

**Transport Canada
Holdover Time (HOT) Guidelines
Winter 2004-2005**

**Original Issue, July 2004
Revision 1.0, December 2004** |

CHANGE CONTROL RECORDS

This page indicates the changes made to individual pages within the document and those changed pages have the appropriate date in the footer. Sidebars are shown to assist in identifying the changes from the previous version.

It is the responsibility of the end user to periodically check the following website for any Holdover Time Guideline updates: <http://www.tc.gc.ca/CivilAviation/commerce/HoldoverTime/menu.htm>.

<i>REVISION</i>	<i>DATE</i>	<i>DESCRIPTION OF CHANGES</i>	<i>AFFECTED PAGES</i>	<i>AUTHOR</i>
1.0	Dec. 2004	Minor editorial change.	2	TC / APS
		Note (6) regarding LOU ^T has been added on the Type I table.	5	TC / APS
		Note (3) has been reworded for clarification.	6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22	TC / APS
		Table 2-S-E26 has been changed: - The upper holdover time value for neat fluid under Rain on Cold Soaked Wing has changed from 1:20 to 1:25.	11	TC / APS
		Table 5 has been updated to reflect newly qualified fluids, and a change to the Type III fluid LOU ^T .	23, 24	TC / APS

SUMMARY OF CHANGES FROM PREVIOUS YEAR

The principal changes from the previous year are briefly indicated herein.

General

Previously Holdover Time (HOT) Guidelines were attached to the Commercial & Business Aviation Advisory Circular (CBAAC) entitled *Aircraft Ground Icing Update*. The CBAAC contained both reference information relating to Ground Icing Operations and the HOT Guidelines. Last year (2003), a decision was made to do away with the CBAAC, and move the contents of the CBAAC into two separate documents. The two documents complement each other and, for a more thorough understanding of the subject matter, should be used together. The first document (TP 14052E) includes reference material related to Ground Icing Operations. The second document consists of the HOT Guidelines. It was determined that the dissemination of current HOT Guideline information would be accomplished in a more timely and effective manner by the use of a dedicated website. Therefore, for the second consecutive year, the Holdover Time Table Guidelines can be found at this website, and TP 14052E will contain only reference information relating to Ground Icing Operations.

Type I Fluid

No changes were made to the HOT values from last year.

Type II / IV Fluid

One new Type IV fluid, Octagon Max-Flight 04, has been certified and will be introduced for the 2004-05 winter season. A fluid-specific table has been created for this fluid. No new Type II fluids were introduced.

Only very limited data has ever been collected in temperatures below -14°C in snow. In the winter of 2003-04, testing was conducted with artificial snowmakers at these temperatures with certified Type II and Type IV fluids that have fluid-specific tables. As a result, the generic Type II and Type IV value (15 to 30 minutes) has been applied to all fluid-specific tables, with the exception of Dow UCAR ADF/AAF Ultra+. This change has led to a reduction in the -14° to -25°C snow cell for the following fluids: SPCA Ecowing 26, Clariant Safewing MP IV 1957, Clariant Safewing MP IV 2001, Kilfrost ABC-S, Octagon Max-Flight and SPCA AD-480.

In addition, one Type IV fluid-specific table was removed because the fluid is no longer available commercially. The removal of Clariant Safewing Four did not have an impact on the generic Type IV holdover guideline values.

Type III Fluid

A new Type III generic table was produced this year. Several years ago, a need was identified for a de/anti-icing fluid that had longer holdover times than Type I fluid but a lower viscosity than Type II or IV fluid for aircraft with slower rotation speeds. Clariant produced a fluid to meet these requirements and, after undergoing extensive testing by TC and the FAA, this fluid, Clariant Safewing MP III 2031 ECO, has been certified as a Type III fluid. Values in the new generic Type III holdover time guidelines were generally based on the holdover times of this fluid.

The application procedure for Type III fluid is the same as the application procedure for Type II and Type IV fluids. Type III has been added to the Type II/Type IV application procedures table (Table 7).

HOLDOVER TIME (HOT) GUIDELINES FOR WINTER 2004-2005

Table 1	SAE Type I Fluid Holdover Guidelines
Table 2-Generic	SAE Type II Fluid Holdover Guidelines
Table 2-C-2025	Clariant Type II Fluid Holdover Guidelines Safewing MP II 2025 ECO
Table 2-K-ABC-2000	Kilfrost Type II Fluid Holdover Guidelines ABC-2000
Table 2-K-ABC-II+	Kilfrost Type II Fluid Holdover Guidelines ABC-II PLUS
Table 2-O-EM-II	Octagon Type II Fluid Holdover Guidelines E Max II
Table 2-S-E26	SPCA Type II Fluid Holdover Guidelines Ecowing 26
Table 3	SAE Type III Fluid Holdover Guidelines
Table 4-Generic	SAE Type IV Fluid Holdover Guidelines
Table 4-C-1957	Clariant Type IV Fluid Holdover Guidelines Safewing MP IV 1957
Table 4-C-2001	Clariant Type IV Fluid Holdover Guidelines Safewing MP IV 2001
Table 4-C-2012	Clariant Type IV Fluid Holdover Guidelines Safewing MP IV 2012 Protect
Table 4-C-2030	Clariant Type IV Fluid Holdover Guidelines Safewing MP IV 2030 ECO
Table 4-D-ULTRA+	Dow Chemical Type IV Fluid Holdover Guidelines UCAR™ ADF/AAF ULTRA+
Table 4-K-ABC-S	Kilfrost Type IV Fluid Holdover Guidelines ABC-S
Table 4-O-MF	Octagon Type IV Fluid Holdover Guidelines Max-Flight
Table 4-O-MF-04	Octagon Type IV Fluid Holdover Guidelines Max-Flight 04
Table 4-S-AD-480	SPCA Type IV Fluid Holdover Guidelines AD-480
Table 5	Currently Qualified Fluids
Table 6	SAE Type I Deicing Fluid Application Procedures
Table 7	SAE Type II, Type III and Type IV Anti-Icing Fluid Application Procedures
Table 8	Visibility in Snow vs. Snowfall Intensity Chart

TABLE 1

SAE TYPE I⁵ FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT ⁶		Approximate Holdover Times Under Various Weather Conditions (minutes)								
°C	°F	Frost ²	Freezing Fog	Very Light Snow ¹	Light Snow ¹	Moderate Snow ¹	Freezing Drizzle ³	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁴
-3 and above	27 and above	45	11 – 17	18	11 – 18	6 – 11	9 – 13	4 – 6	2 – 5	
below -3 to -6	below 27 to 21	45	8 – 13	14	8 – 14	5 – 8	5 – 9	4 – 6	CAUTION: No holdover time guidelines exist	
below -6 to -10	below 21 to 14	45	6 – 10	11	6 – 11	4 – 6	4 – 7	2 – 5		
below -10	below 14	45	5 – 9	7	4 – 7	2 – 4				

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature FP = Freezing Point

NOTES

- 1 To use these times, the fluid must be heated to a minimum temperature providing 60°C (140°F) at the nozzle and an average rate of at least 1 litre/m² (2 gal./100 sq. ft.) must be applied to deiced surfaces, OTHERWISE TIMES WILL BE SHORTER.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 4 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 5 Type I Fluid / Water Mixture is selected so that the FP of the mixture is at least 10°C (18°F) below OAT.
- 6 Ensure that the lowest operational use temperature (LOUT) is respected.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 2-Generic

SAE TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type II Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	12:00	0:35 – 1:30	0:20 – 0:55	0:30 – 0:55	0:15 – 0:30	0:05 – 0:40	CAUTION: No holdover time guidelines exist
		75/25	6:00	0:25 – 1:00	0:15 – 0:40	0:20 – 0:45	0:10 – 0:25	0:05 – 0:25	
		50/50	4:00	0:15 – 0:30	0:05 – 0:15	0:05 – 0:15	0:05 – 0:10		
0 to -3	32 to 27	100/0	8:00	0:35 – 1:30	0:20 – 0:45	0:30 – 0:55	0:15 – 0:30		
		75/25	5:00	0:25 – 1:00	0:15 – 0:30	0:20 – 0:45	0:10 – 0:25		
		50/50	3:00	0:15 – 0:30	0:05 – 0:15	0:05 – 0:15	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	8:00	0:20 – 1:05	0:15 – 0:35	0:15 – 0:45 ³	0:10 – 0:25 ³		
		75/25	5:00	0:20 – 0:55	0:15 – 0:25	0:15 – 0:30 ³	0:10 – 0:20 ³		
below -14 to -25	below 7 to -13	100/0	8:00 ⁷	0:15 – 0:20 ⁷	0:15 – 0:30 ⁷				
below -25	below -13	100/0	Type II fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Based on tests of neat fluids with the lowest viscosity deliverable on the aircraft, yet meeting Type II WSET and HHET.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.
- 7 Ensure that the lowest operational use temperature (LOUT) is respected.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 2-C-2025

**CLARIANT TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
SAFEWING MP II 2025 ECO (5,500 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type II Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	12:00	1:30 – 2:05	0:45 – 1:20	0:40 – 1:00	0:25 – 0:35	0:10 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	6:00	0:55 – 1:45	0:25 – 0:45	0:25 – 0:45	0:20 – 0:25	0:05 – 0:50	
		50/50	4:00	0:20 – 0:35	0:10 – 0:20	0:10 – 0:15	0:05 – 0:10		
0 to -3	32 to 27	100/0	8:00	1:30 – 2:05	0:40 – 1:10	0:40 – 1:00	0:25 – 0:35		
		75/25	5:00	0:55 – 1:45	0:25 – 0:45	0:25 – 0:45	0:20 – 0:25		
		50/50	3:00	0:20 – 0:35	0:05 – 0:15	0:10 – 0:15	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	8:00	0:45 – 1:50	0:35 – 1:00	0:35 – 1:05 ³	0:20 – 0:35 ³		
		75/25	5:00	0:40 – 1:20	0:25 – 0:45	0:30 – 0:40 ³	0:15 – 0:25 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:25 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type II fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 2-K-ABC-2000

KILFROST TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
ABC-2000 (2,350 mPa.s viscosity)¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type II Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	12:00	1:30 – 3:05	0:40 – 1:15	0:55 – 1:35	0:40 – 0:50	0:15 – 1:10	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:40 – 3:30	0:40 – 1:15	0:45 – 1:15	0:40 – 0:50	0:15 – 1:40	
		50/50	4:00	1:00 – 2:10	0:15 – 0:30	0:15 – 0:25	0:05 – 0:15		
0 to -3	32 to 27	100/0	8:00	1:30 – 3:05	0:30 – 1:00	0:55 – 1:35	0:40 – 0:50		
		75/25	5:00	1:40 – 3:30	0:30 – 1:05	0:45 – 1:15	0:40 – 0:50		
		50/50	3:00	1:00 – 2:10	0:15 – 0:30	0:15 – 0:25	0:05 – 0:15		
below -3 to -14	below 27 to 7	100/0	8:00	0:35 – 1:25	0:25 – 0:45	0:25 – 0:50 ³	0:10 – 0:30 ³		
		75/25	5:00	0:35 – 1:15	0:25 – 0:50	0:25 – 0:55 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:20 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type II fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle LV2 with guard leg, 150 mL of neat fluid, at 20°C, 0.3 rpm, 10 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 2-K-ABC-II+

**KILFROST TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
ABC-II PLUS (3,600 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type II Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	12:00	1:10 – 2:25	0:35 – 1:20	0:35 – 1:10	0:30 – 0:40	0:05 – 1:00	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:10 – 2:25	0:35 – 1:10	0:30 – 1:00	0:20 – 0:40	0:05 – 0:50	
		50/50	4:00	0:15 – 0:45	0:20 – 0:40	0:05 – 0:25	0:05 – 0:15		
0 to -3	32 to 27	100/0	8:00	1:10 – 2:25	0:25 – 0:55	0:35 – 1:10	0:30 – 0:40		
		75/25	5:00	1:10 – 2:25	0:25 – 0:50	0:30 – 1:00	0:20 – 0:40		
		50/50	3:00	0:15 – 0:45	0:15 – 0:35	0:05 – 0:25	0:05 – 0:15		
below -3 to -14	below 27 to 7	100/0	8:00	0:30 – 1:05	0:15 – 0:35	0:15 – 0:45 ³	0:10 – 0:30 ³		
		75/25	5:00	0:20 – 0:55	0:15 – 0:35	0:15 – 0:30 ³	0:10 – 0:20 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:15 – 0:20	0:15 – 0:30				
below -25	below -13	100/0	Type II fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit

OAT = Outside Air Temperature

Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle LV2 with guard leg, 150 mL of neat fluid, at 20°C, 0.3 rpm, 10 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 2-O-EM-II

OCTAGON TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
E MAX II (13,520 mPa.s viscosity)¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type II Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	12:00	2:05 – 3:45	0:45 – 1:30	0:45 – 1:35	0:30 – 0:40	0:15 – 1:30	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:25 – 2:50	0:30 – 1:00	0:40 – 1:10	0:20 – 0:30	0:10 – 1:05	
		50/50	4:00	0:30 – 0:55	0:15 – 0:30	0:15 – 0:30	0:10 – 0:15		
0 to -3	32 to 27	100/0	8:00	2:05 – 3:45	0:40 – 1:20	0:45 – 1:35	0:30 – 0:40		
		75/25	5:00	1:25 – 2:50	0:25 – 0:55	0:40 – 1:10	0:20 – 0:30		
		50/50	3:00	0:30 – 0:55	0:10 – 0:25	0:15 – 0:30	0:10 – 0:15		
below -3 to -14	below 27 to 7	100/0	8:00	0:50 – 1:45	0:35 – 1:10	0:35 – 1:00 ³	0:20 – 0:30 ³		
		75/25	5:00	0:30 – 1:20	0:25 – 0:50	0:35 – 1:05 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:20 – 0:35	0:15 – 0:30				
below -25	below -13	100/0	Type II fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle LV1 with guard leg, 500 mL of neat fluid, at 20°C, 0.3 rpm, 33 minutes 20 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 2-S-E26

SPCA TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
Ecowing 26 (4,900 mPa.s viscosity)¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type II Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	12:00	1:25 – 2:35	0:40 – 1:05	0:50 – 1:35	0:40 – 0:50	0:20 – 1:25	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:05 – 1:55	0:30 – 0:50	0:45 – 1:05	0:25 – 0:35	0:10 – 1:00	
		50/50	4:00	0:30 – 0:45	0:10 – 0:20	0:15 – 0:25	0:05 – 0:10		
0 to -3	32 to 27	100/0	8:00	1:25 – 2:35	0:40 – 1:00	0:50 – 1:35	0:40 – 0:50		
		75/25	5:00	1:05 – 1:55	0:25 – 0:45	0:45 – 1:05	0:25 – 0:35		
		50/50	3:00	0:30 – 0:45	0:10 – 0:20	0:15 – 0:25	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	8:00	0:45 – 2:15	0:35 – 0:55	0:30 – 1:10 ³	0:15 – 0:35 ³		
		75/25	5:00	0:35 – 1:15	0:25 – 0:40	0:20 – 0:50 ³	0:15 – 0:25 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:25 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type II fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 30 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 3

SAE TYPE III FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005

Outside Air Temperature ⁴		Approximate Holdover Times Under Various Weather Conditions (minutes)								
Degrees Celsius	Degrees Fahrenheit	Active Frost	Freezing Fog	Very Light Snow ³	Light Snow ³	Moderate Snow ³	Freezing Drizzle ¹	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	120	20 – 40	35	20 – 35	10 – 20	10 – 20	8 – 10	6 – 20	
below -3 to -10	below 27 to 14	120	20 – 40	30	15 – 30	9 – 15	10 – 20	8 – 10	CAUTION: No holdover time guidelines exist	
below -10	below 14	120	20 – 40	30	15 – 30	8 – 15				

NOTES

- 1 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 Snow includes snow grains.
- 4 Ensure that the lowest operational use temperature (LOUT) is respected, otherwise consider use of Type I when Type III fluid cannot be used.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- High wind velocity or jet blast may reduce holdover time.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-Generic

SAE TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	1:05 – 2:15	0:35 – 1:05	0:40 – 1:10	0:25 – 0:40	0:10 – 0:50	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:05 – 1:45	0:30 – 1:05	0:35 – 0:50	0:15 – 0:30	0:05 – 0:35	
		50/50	4:00	0:15 – 0:35	0:05 – 0:20	0:10 – 0:20	0:05 – 0:10		
0 to -3	32 to 27	100/0	12:00	1:05 – 2:15	0:30 – 0:55	0:40 – 1:10	0:25 – 0:40		
		75/25	5:00	1:05 – 1:45	0:25 – 0:50	0:35 – 0:50	0:15 – 0:30		
		50/50	3:00	0:15 – 0:35	0:05 – 0:15	0:10 – 0:20	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	12:00	0:20 – 1:20	0:20 – 0:40	0:20 – 0:45 ³	0:10 – 0:25 ³		
		75/25	5:00	0:25 – 0:50	0:20 – 0:35	0:15 – 0:30 ³	0:10 – 0:20 ³		
below -14 to -25	below 7 to -13	100/0	12:00 ⁷	0:15 – 0:40 ⁷	0:15 – 0:30 ⁷				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Based on tests of neat fluids with the lowest viscosity deliverable on the aircraft, yet meeting Type IV WSET and HHET.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.
- 7 Ensure that the lowest operational use temperature (LOUT) is respected.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-C-1957

**CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
SAFEWING MP IV 1957 (16,200 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	1:05 – 2:15	0:35 – 1:05	0:40 – 1:10	0:30 – 0:45	0:15 – 1:10	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:10 – 2:10	0:35 – 1:05	0:35 – 1:05	0:25 – 0:40	0:10 – 1:00	
		50/50	4:00	0:25 – 0:50	0:15 – 0:30	0:15 – 0:25	0:05 – 0:15		
0 to -3	32 to 27	100/0	12:00	1:05 – 2:15	0:30 – 0:55	0:40 – 1:10	0:30 – 0:45		
		75/25	5:00	1:10 – 2:10	0:30 – 0:50	0:35 – 1:05	0:25 – 0:40		
		50/50	3:00	0:25 – 0:50	0:10 – 0:20	0:15 – 0:25	0:05 – 0:15		
below -3 to -14	below 27 to 7	100/0	12:00	0:45 – 1:30	0:30 – 0:50	0:35 – 0:55 ³	0:20 – 0:35 ³		
		75/25	5:00	0:25 – 1:10	0:20 – 0:40	0:25 – 0:55 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:25 – 0:40	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-C-2001

**CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
SAFEWING MP IV 2001 (18,000 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	1:20 – 3:20	1:55 – 2:00	0:55 – 1:55	0:40 – 1:00	0:15 – 2:00	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:20 – 2:00	0:50 – 1:25	0:35 – 1:10	0:25 – 0:35	0:10 – 1:25	
		50/50	4:00	0:15 – 0:40	0:10 – 0:20	0:10 – 0:20	0:05 – 0:15		
0 to -3	32 to 27	100/0	12:00	1:20 – 3:20	1:00 – 1:55	0:55 – 1:55	0:40 – 1:00		
		75/25	5:00	1:20 – 2:00	0:35 – 1:00	0:35 – 1:10	0:25 – 0:35		
		50/50	3:00	0:15 – 0:40	0:10 – 0:20	0:10 – 0:20	0:05 – 0:15		
below -3 to -14	below 27 to 7	100/0	12:00	0:45 – 1:35	0:30 – 0:50	0:55 – 1:35 ³	0:30 – 0:45 ³		
		75/25	5:00	0:30 – 1:00	0:20 – 0:35	0:40 – 1:10 ³	0:20 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:20 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-C-2012

**CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
SAFEWING MP IV 2012 PROTECT (7,800 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	1:15 – 2:30	1:05 – 2:00	0:40 – 1:10	0:25 – 0:45	0:10 – 1:05	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:10 – 2:05	0:35 – 1:10	0:35 – 0:50	0:15 – 0:30	0:05 – 0:40	
		50/50	4:00	0:25 – 0:45	0:15 – 0:25	0:15 – 0:20	0:05 – 0:10		
0 to -3	32 to 27	100/0	12:00	1:15 – 2:30	0:40 – 1:15	0:40 – 1:10	0:25 – 0:45		
		75/25	5:00	1:10 – 2:05	0:25 – 0:55	0:35 – 0:50	0:15 – 0:30		
		50/50	3:00	0:25 – 0:45	0:15 – 0:25	0:15 – 0:20	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	12:00	0:45 – 1:35	0:20 – 0:40	0:25 – 0:45 ³	0:15 – 0:25 ³		
		75/25	5:00	0:25 – 1:05	0:20 – 0:40	0:15 – 0:30 ³	0:10 – 0:20 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:20 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-C-2030

**CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
SAFEWING MP IV 2030 ECO (10,500 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	1:55 – 3:20	0:50 – 1:35	0:55 – 2:00	0:40 – 0:50	0:15 – 1:40	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:15 – 2:05	0:35 – 1:05	0:40 – 1:05	0:25 – 0:35	0:10 – 1:00	
		50/50	4:00	0:30 – 0:45	0:15 – 0:25	0:15 – 0:25	0:05 – 0:10		
0 to -3	32 to 27	100/0	12:00	1:55 – 3:20	0:50 – 1:30	0:55 – 2:00	0:40 – 0:50		
		75/25	5:00	1:15 – 2:05	0:35 – 1:05	0:40 – 1:05	0:25 – 0:35		
		50/50	3:00	0:30 – 0:45	0:15 – 0:25	0:15 – 0:25	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	12:00	0:50 – 2:00	0:45 – 1:25	0:30 – 1:10 ³	0:20 – 0:35 ³		
		75/25	5:00	0:40 – 1:30	0:35 – 1:05	0:35 – 1:20 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:25 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-D-ULTRA+

DOW CHEMICAL TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
UCAR™ ADF/AAF ULTRA+ (36,000 mPa.s viscosity)¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	1:35 – 3:35	0:40 – 1:25	0:45 – 1:35	0:25 – 0:40	0:10 – 1:20	CAUTION: No holdover time guidelines exist
		75/25							
		50/50							
0 to -3	32 to 27	100/0	12:00	1:35 – 3:35	0:35 – 1:15	0:45 – 1:35	0:25 – 0:40		
		75/25							
		50/50							
below -3 to -14	below 27 to 7	100/0	12:00	1:25 – 3:00	0:25 – 0:55	0:45 – 1:25 ³	0:30 – 0:45 ³		
		75/25							
below -14 to -25	below 7 to -13	100/0	12:00 ⁷	0:40 – 2:10 ⁷	0:20 – 0:45 ⁷				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. ⁷ Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-31/13R, small sample adapter, 10 mL of neat fluid, at 0°C, 0.3 rpm, for 10 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.
- 7 The lowest operational use temperature (LOUT) for this fluid is -24°C (-11°F).

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-K-ABC-S

KILFROST TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
ABC-S (17,000 mPa.s viscosity)¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	2:35 – 4:00	1:10 – 2:00	1:20 – 1:50	1:00 – 1:25	0:20 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:05 – 1:45	0:30 – 1:05	0:45 – 1:10	0:35 – 0:50	0:10 – 0:50	
		50/50	4:00	0:20 – 0:35	0:05 – 0:20	0:15 – 0:20	0:05 – 0:10		
0 to -3	32 to 27	100/0	12:00	2:35 – 4:00	1:00 – 1:40	1:20 – 1:50	1:00 – 1:25		
		75/25	5:00	1:05 – 1:45	0:30 – 0:55	0:45 – 1:10	0:35 – 0:50		
		50/50	3:00	0:20 – 0:35	0:05 – 0:15	0:15 – 0:20	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	12:00	0:45 – 2:05	0:45 – 1:20	0:20 – 1:00 ³	0:10 – 0:30 ³		
		75/25	5:00	0:25 – 1:00	0:25 – 0:50	0:20 – 1:10 ³	0:10 – 0:35 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:20 – 0:40	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle LV2 with guard leg, 150 mL of neat fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-O-MF

**OCTAGON TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
MAX-FLIGHT (5,540 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	2:40 – 4:00	1:15 – 2:00	0:55 – 2:00	0:35 – 1:00	0:15 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	6:00	2:05 – 3:15	1:20 – 2:00	1:15 – 2:00	0:35 – 1:10	0:10 – 0:40	
		50/50	4:00	0:55 – 1:45	0:40 – 1:20	0:35 – 1:00	0:15 – 0:30		
0 to -3	32 to 27	100/0	12:00	2:40 – 4:00	0:50 – 1:35	0:55 – 2:00	0:35 – 1:00		
		75/25	5:00	2:05 – 3:15	0:45 – 1:45	1:15 – 2:00	0:35 – 1:10		
		50/50	3:00	0:55 – 1:45	0:25 – 1:15	0:35 – 1:00	0:15 – 0:30		
below -3 to -14	below 27 to 7	100/0	12:00	0:50 – 2:30	0:25 – 0:50	0:25 – 1:10 ³	0:20 – 0:40 ³		
		75/25	5:00	0:30 – 1:05	0:20 – 0:50	0:20 – 1:00 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:20 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle LV1 with guard leg, 500 mL of neat fluid, at 20°C, 0.3 rpm, 33 minutes 20 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-O-MF-04

OCTAGON TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
MAX-FLIGHT 04 (5,540 mPa.s viscosity)¹

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	2:40 – 4:00	2:00 – 2:00	2:00 – 2:00	1:10 – 1:30	0:20 – 2:00	CAUTION: No holdover time guidelines exist
		75/25	6:00	2:05 – 3:15	1:35 – 2:00	1:50 – 2:00	1:00 – 1:20	0:20 – 2:00	
		50/50	4:00	0:55 – 1:45	0:40 – 2:00	0:35 – 1:10	0:25 – 0:35		
0 to -3	32 to 27	100/0	12:00	2:40 – 4:00	1:25 – 2:00	2:00 – 2:00	1:10 – 1:30		
		75/25	5:00	2:05 – 3:15	1:05 – 2:00	1:50 – 2:00	1:00 – 1:20		
		50/50	3:00	0:55 – 1:45	0:25 – 1:15	0:35 – 1:10	0:25 – 0:35		
below -3 to -14	below 27 to 7	100/0	12:00	0:50 – 2:30	0:35 – 1:10	0:25 – 1:30 ³	0:20 – 0:40 ³		
		75/25	5:00	0:30 – 1:05	0:40 – 1:20	0:20 – 1:00 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:20 – 0:45	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle LV1 with guard leg, 500 mL of neat fluid, at 20°C, 0.3 rpm, 33 minutes 20 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 4-S-AD-480

**SPCA TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2004-2005
AD-480 (15,200 mPa.s viscosity)¹**

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER

OAT		Type IV Fluid Concentration Neat Fluid/Water (Vol% / Vol%)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
°C	°F		Frost ²	Freezing Fog	Snow ⁶	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ⁵
above 0	above 32	100/0	18:00	2:00 – 3:30	0:55 – 1:50	0:50 – 1:30	0:35 – 0:55	0:15 – 1:35	CAUTION: No holdover time guidelines exist
		75/25	6:00	1:30 – 2:45	0:40 – 1:20	0:50 – 1:15	0:30 – 0:45	0:10 – 1:15	
		50/50	4:00	0:30 – 0:45	0:15 – 0:30	0:15 – 0:25	0:05 – 0:15		
0 to -3	32 to 27	100/0	12:00	2:00 – 3:30	0:40 – 1:20	0:50 – 1:30	0:35 – 0:55		
		75/25	5:00	1:30 – 2:45	0:30 – 1:05	0:50 – 1:15	0:30 – 0:45		
		50/50	3:00	0:30 – 0:45	0:10 – 0:20	0:15 – 0:25	0:05 – 0:15		
below -3 to -14	below 27 to 7	100/0	12:00	0:20 – 1:20	0:30 – 0:55	0:25 – 1:20 ³	0:15 – 0:30 ³		
		75/25	5:00	0:25 – 0:50	0:20 – 0:45	0:25 – 1:05 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:15 – 0:40	0:15 – 0:30				
below -25	below -13	100/0	Type IV fluid may be used below -25°C (-13°F) provided the freezing point of the fluid is at least 7°C (13°F) below the OAT and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

°C = Degrees Celsius °F = Degrees Fahrenheit OAT = Outside Air Temperature Vol = Volume

NOTES

- 1 Lowest on-wing viscosity - Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 30 minutes 0 seconds.
- 2 During conditions that apply to aircraft protection for ACTIVE FROST.
- 3 Below -10°C (14°F) under freezing drizzle and light freezing rain no holdover time guidelines exist.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 6 Snow includes snow grains.

CAUTIONS

- The time of protection will be shortened in heavy weather conditions, heavy precipitation rates, or high moisture content. High wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when aircraft skin temperature is lower than OAT.
- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- Fluids used during ground deicing do not provide ice protection during flight.

TABLE 5
CURRENTLY QUALIFIED FLUIDS (2004-2005)

NOTE:

Concentrate fluids have also been qualified at 50/50 (glycol/water) dilution.

Table 5-1: Qualified Type I Anti-icing Fluids[†]			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
1-1	Arkton Ltd	Arctica DG	06-03-30
1-2	Aviation Xi' an High-tech	KHF-1	05-02-24
1-3	Beijing Wangye Aviation Chemical Product Co. Ltd.	KLA-1	05-09-26
1-4	Clariant GmbH	Clariant Safewing MP I 1938 TF	06-08-25
1-5	Clariant GmbH	Clariant Safewing MP I 1938 ECO	06-08-30
1-6	Clariant GmbH	Clariant Safewing EG I 1996	06-08-24
1-7	Dow Chemical Company	Dow UCAR™ Aircraft Deicing Fluid Concentrate	06-02-16
1-8	Dow Chemical Company	Dow UCAR™ ADF XL-54	05-08-29
1-9	Dow Chemical Company	Dow UCAR™ PG Aircraft Deicing Fluid	06-01-30
1-10	Dow Chemical Company	Dow UCAR™ PG ADF Dilute 55/45	06-05-17
1-11	Inland Technologies Inc.	Inland Duragly-P ready to use	05-09-11
1-12	Inland Technologies Inc.	Inland Duragly-E ready to use	05-10-20
1-13	Kilfrost Limited	Kilfrost DF PLUS	05-09-11
1-14	Kilfrost Limited	Kilfrost DF PLUS (80)	06-07-05
1-15	Kilfrost Limited	Kilfrost DF PLUS (88)	05-09-03
1-16	Lyondell Chemical Co.	Lyondell ARCOPlus	06-03-29
1-17	Lyondell Chemical Co.	Lyondell ARCTIC Plus™	06-03-15
1-18	Newave Aerochemical Co. Ltd.	FCY-1A	05-06-04
1-19	Octagon Process Inc.	Octagon Octaflo EF	05-07-25
1-20	Octagon Process Inc.	Octagon Octaflo EG	05-07-24
1-21	SPCA	SPCA DE-950	06-06-08

[†] Qualified solely with respect to anti-icing performance and aerodynamic acceptance by the Anti-icing Materials International Laboratory, Université du Québec à Chicoutimi. Web site: <http://www.uqac.quebec.ca/amil/>
For other specification requirements for Type I fluids, see SAE AMS 1424 (latest version). Fluids that successfully qualify after the issuance of this list will appear in a later update.

TABLE 5 (cont.)

CURRENTLY QUALIFIED FLUIDS (2004-2005)

Table 5-2: Qualified Type II Anti-icing Fluids [†]			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
2-1	Clariant GmbH	Clariant Safewing MP II 1951	05-07-11
2-2	Clariant GmbH	Clariant Safewing MP II 2025 ECO	06-08-24
2-3	Kilfrost Limited	Kilfrost ABC-II PLUS	05-10-29
2-4	Kilfrost Limited	Kilfrost ABC-3	06-08-22
2-5	Kilfrost Limited	Kilfrost ABC-2000	06-07-05
2-6	Octagon Process Inc.	Octagon E Max II	06-07-22
2-7	SPCA	SPCA Ecowing 26	05-06-03

Table 5-3: Qualified Type III Anti-icing Fluids [†]			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
3-1	Clariant GmbH	Clariant Safewing MP III 2031 ECO ⁽¹⁾	05-12-08

⁽¹⁾ **CAUTION:** The lowest operational use temperature (LOUT) is -16.5°C (2°F) for aircraft with rotation speeds less than 100 knots or -29°C (-20°F) for aircraft with higher rotation speeds.

Table 5-4: Qualified Type IV Anti-icing Fluids [†]			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
4-1	Clariant GmbH	Clariant Safewing MP IV 2001	06-06-02
4-2	Clariant GmbH	Clariant Safewing MP IV 2012 Protect	05-03-31
4-3	Clariant GmbH	Clariant Safewing MP IV 2030 ECO	06-07-27
4-4	Dow Chemical Company	Dow UCAR™ ADF/AAF ULTRA+	06-04-21
4-5	Ely Chemical Company	Octagon Max-Flight	06-07-06
4-6	Kilfrost Limited	Kilfrost ABC-S	05-08-06
4-7	Octagon Process Inc.	Octagon Max-Flight	06-07-06
4-8	Octagon Process Inc.	Octagon Max-Flight 04	06-05-05
4-9	SPCA	SPCA AD-480	05-07-01

[†] Qualified solely with respect to anti-icing performance and aerodynamic acceptance by the Anti-icing Materials International Laboratory, Université du Québec à Chicoutimi. Web site: <http://www.uqac.quebec.ca/amil/>
 For other specification requirements for Type II, III or IV fluids, see SAE AMS 1428 (latest version). Fluids that successfully qualify after the issuance of this list will appear in a later update.

TABLE 6

SAE TYPE I DEICING FLUID APPLICATION PROCEDURES

Guidelines for the application of SAE Type I fluid mixtures at minimum concentrations for the prevailing outside air temperature (OAT)

Outside Air Temperature OAT	One-Step Procedure Deicing/Anti-icing	Two-Step Procedure	
		First Step: Deicing	Second Step: Anti-icing ¹
-3°C (27°F) and above	Heated mix of fluid and water with a freezing point of at least 10°C (18°F) below OAT	Heated water or a heated mix of fluid and water	Heated mix of fluid and water with a freezing point of at least 10°C (18°F) below OAT
Below -3°C (27°F)		Freezing point of heated fluid mixture shall not be more than 3°C (5°F) above OAT	

1 To be applied before first step fluid freezes, typically within 3 minutes.

NOTE

Temperature of water or fluid/water mixtures shall be at least 60°C (140°F) at the nozzle. Upper temperature limit shall not exceed fluid and aircraft manufacturers' recommendations.

NOTE

To use Type I holdover time guidelines in snow conditions, at least 1 litre/m² (~ 2 gal./100 sq. ft.) must be applied to the deiced surfaces.

NOTE

This table is applicable for the use of Type I Holdover Time Guidelines. If holdover times are not required, a temperature of 60°C (140°F) at the nozzle is desirable.

CAUTION

- Wing skin temperatures may differ and in some cases may be lower than OAT; a stronger mix (more glycol) may be needed under these conditions.

TABLE 7

SAE TYPE II, Type III and TYPE IV ANTI-ICING FLUID APPLICATION PROCEDURES

Guidelines for the application of SAE Type II, III and IV fluid mixtures (minimum concentrations in % by volume) as a function of outside air temperature (OAT)

Outside Air Temperature (OAT)	One-Step Procedure Deicing/Anti-icing	Two-Step Procedure	
		First Step: Deicing	Second Step: Anti-icing ¹
-3°C (27°F) and above	50/50 Heated ² Type II/III/IV	Heated water or a heated mix of Type I, II, III or IV with water	50/50 Type II/III/IV
-14°C (7°F) and above	75/25 Heated ² Type II/III/IV	Heated suitable mix of Type I, Type II/III/IV and water with FP not more than 3°C (5°F) above actual OAT	75/25 Type II/III/IV
-25°C (-13°F) and above	100/0 Heated ² Type II/III/IV	Heated suitable mix of Type I, Type II/III/IV and water with FP not more than 3°C (5°F) above actual OAT	100/0 Type II/III/IV
Below -25°C (-13°F)	Type II/III/IV fluid may be used below -25°C (-13°F) provided that the freezing point of the fluid is at least 7°C (13°F) below OAT and that aerodynamic acceptance criteria are met. Consider the use of Type I when Type II/III/IV fluid cannot be used (see Table 6).		

- 1 To be applied before first step fluid freezes, typically within 3 minutes.
- 2 Clean aircraft may be anti-iced with unheated fluid.

NOTE

For heated fluids, a fluid temperature not less than 60°C (140°F) at the nozzle is desirable. Upper temperature limit shall not exceed fluid and aircraft manufacturers' recommendations.

CAUTION

- Wing skin temperatures may differ and in some cases may be lower than OAT; a stronger mix (more glycol) may be needed under these conditions.
- Whenever frost or ice occurs on the lower surface of the wing in the area of the fuel tank, indicating a cold soaked wing, the 50/50 dilutions of Type II, III or IV should not be used for the anti-icing step because fluid freezing may occur.
- An insufficient amount of anti-icing fluid may cause a substantial loss of holdover time. This is particularly true when using a Type I fluid mixture for the first step in a two-step procedure.

TABLE 8
VISIBILITY IN SNOW VS. SNOWFALL INTENSITY CHART¹

Lighting	Temperature Range		Visibility in Snow (Statute Miles)			
	°C	°F	Heavy	Moderate	Light	Very Light
Darkness	-1 and above	30 and above	≤1	>1 to 2½	>2½ to 4	>4
	Below -1	Below 30	≤¾	>¾ to 1½	>1½ to 3	>3
Daylight	-1 and above	30 and above	≤½	>½ to 1½	>1½ to 3	>3
	Below -1	Below 30	≤¾	>¾ to 7/8	>7/8 to 2	>2

1 Based on: *Relationship between Visibility and Snowfall Intensity* (TP 14151E), Transportation Development Centre, Transport Canada, November 2003; and *Theoretical Considerations in the Estimation of Snowfall Rate Using Visibility* (TP 12893E), Transportation Development Centre, Transport Canada, November 1998.

HOW TO READ THE TABLE

Assume that the daytime visibility in snowfall is 1 statute mile and the temperature is -7°C. Based on these conditions, the snowfall intensity is light. This snowfall intensity is used to determine which holdover time guideline value is appropriate for the fluid in use.