

**Transport Canada
Holdover Time (HOT) Guidelines
Winter 2005-2006**

Original Issue, July 2005

OBSOLETE

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>

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SUMMARY OF CHANGES FROM PREVIOUS YEAR

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

General

Ground Icing Operations and Holdover Time (HOT) Guideline information is provided in two documents. The two documents complement each other and should be used together for a more thorough understanding of the subject matter. The first document (TP 14052E) includes reference material related to Ground Icing Operations. The most recent version of TP 14052E is Edition 2, published April 2005. The second document consists of the HOT Guidelines, provided in this dedicated Transport Canada website.

Type I Fluid

No changes were made to the HOT values from last year. However, some format changes have been made to the Type I table to reflect changes made to the Type II/IV tables (see below).

Type II / IV Fluid

No new Type II fluids were introduced.

One new Type IV fluid, Octagon MaxFlo, has been certified and will be introduced in the 2005-06 winter season. A fluid-specific table has been created for this fluid. The addition of this fluid caused reductions to the holdover times in two snow cells of the generic Type IV guidelines.

Type IV fluid Clariant Safewing MP IV 1957 was removed from the generic table analysis, as it has not been commercially available for four years. Its removal resulted in increases in three cells in the generic HOT table: two changes in one freezing fog cell and three changes in two snow cells. All were in the “-3°C and above” temperature range. The fluid-specific table has been deleted.

Changes were made to the format of all Type II and Type IV tables. There were several changes including:

- i) The “above 0°C” temperature band was removed and incorporated within the newly modified “-3°C and above” temperature range;
- ii) Viscosity information was removed from each fluid-specific table and placed in a separate viscosity table (Table 9), which also includes the viscosity value measured using the Aerospace Information Report 9968 method;
- iii) Words previously abbreviated, including outside air temperature (OAT) and volume (vol), were replaced with their full spellings;
- iv) The title of the frost column was changed from “Frost” to “Active Frost”;
- v) The title of the snow column was changed from “Snow” to “Snow or Snow Grains”;
- vi) The Cautions section was changed so each sentence forms a new bullet; and
- vii) One note was modified in the generic tables and added to the fluid-specific tables to explain how the holdover time values are derived.

Type III Fluid

As a result of testing with dilutions of Clariant Safewing MP III 2031 ECO, rows for 75/25 and 50/50 dilutions have been added to the Type III generic holdover time guidelines. Format changes have been made to the Type III table to reflect changes made to the Type II/IV tables.

HOLDOVER TIME (HOT) GUIDELINES FOR WINTER 2005-2006

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Table 9	Lowest On-Wing Viscosity Values for Anti-Icing Neat Fluids

TABLE 1

SAE TYPE I³ FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006

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

Outside Air Temperature ⁵		Approximate Holdover Times Under Various Weather Conditions (minutes)								
Degrees Celsius	Degrees Fahrenheit	Active Frost	Freezing Fog	Snow or Snow Grains ¹			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
				Very Light	Light	Moderate				
-3 and above	27 and above	45	11 – 17	18	11 – 18	6 – 11	9 – 13	4 – 6	2 – 5	CAUTION: No holdover time guidelines exist
below -3 to -6	below 27 to 21	45	8 – 13	14	8 – 14	5 – 8	5 – 9	4 – 6		
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				

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 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 Type I Fluid / Water Mixture is selected so that the freezing point of the mixture is at least 10°C (18°F) below outside air temperature.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Ensure that the lowest operational use temperature (LOUT) is respected.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 2-Generic

SAE TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹

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

Outside Air Temperature		Type II Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	8:00	0:35 – 1:30	0:20 – 0:45	0:30 – 0:55	0:15 – 0:30	0:05 – 0:40	CAUTION: No holdover time guidelines exist
		75/25	5:00	0:25 – 1:00	0:15 – 0:30	0:20 – 0:45	0:10 – 0:25	0:05 – 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 ⁵	0:15 – 0:20 ⁵	0:15 – 0:30 ⁵				
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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

NOTES

- 1 Based on the lowest holdover times of the Type II fluids listed in Table 5-2.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Ensure that the lowest operational use temperature (LOUT) is respected.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 2-C-2025

CLARIANT TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
SAFEWING MP II 2025 ECO

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

Outside Air Temperature		Type II Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	8:00	1:30 – 2:05	0:40 – 1:10	0:40 – 1:00	0:25 – 0:35	0:10 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	5:00	0:55 – 1:45	0:25 – 0:45	0:25 – 0:45	0:20 – 0:25	0:05 – 0:50	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 2-K-ABC-2000

KILFROST TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
ABC-2000

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

Outside Air Temperature		Type II Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	8:00	1:30 – 3:05	0:30 – 1:00	0:55 – 1:35	0:40 – 0:50	0:15 – 1:10	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:40 – 3:30	0:30 – 1:05	0:45 – 1:15	0:40 – 0:50	0:15 – 1:40	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 2-K-ABC-II+

**KILFROST TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
ABC-II PLUS**

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

Outside Air Temperature		Type II Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	8:00	1:10 – 2:25	0:25 – 0:55	0:35 – 1:10	0:30 – 0:40	0:05 – 1:00	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:10 – 2:25	0:25 – 0:50	0:30 – 1:00	0:20 – 0:40	0:05 – 0:50	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 2-O-EM-II

OCTAGON TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
E MAX II

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

Outside Air Temperature		Type II Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	8:00	2:05 – 3:45	0:40 – 1:20	0:45 – 1:35	0:30 – 0:40	0:15 – 1:30	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:25 – 2:50	0:25 – 0:55	0:40 – 1:10	0:20 – 0:30	0:10 – 1:05	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 2-S-E26

SPCA TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
Ecowing 26

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

Outside Air Temperature		Type II Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	8:00	1:25 – 2:35	0:40 – 1:00	0:50 – 1:35	0:40 – 0:50	0:20 – 1:25	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:05 – 1:55	0:25 – 0:45	0:45 – 1:05	0:25 – 0:35	0:10 – 1:00	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type II fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 3

SAE TYPE III FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006

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

Outside Air Temperature ³		Approximate Holdover Times Under Various Weather Conditions (minutes)									
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Active Frost	Freezing Fog	Snow or Snow Grains			Freezing Drizzle ¹	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
					Very Light	Light	Moderate				
-3 and above	27 and above	100/0	120	20 – 40	35	20 – 35	10 – 20	10 – 20	8 – 10	6 – 20	CAUTION: No holdover time guidelines exist
		75/25	60	15 – 30	25	15 – 25	8 – 15	8 – 15	6 – 10	2 – 10	
		50/50	30	10 – 20	15	8 – 15	4 – 8	5 – 9	4 – 6		
below -3 to -10	below 27 to 14	100/00	120	20 – 40	30	15 – 30	9 – 15	10 – 20	8 – 10		
		75/25	60	15 – 30	25	10 – 25	7 – 10	9 – 12	6 – 9		
below -10	below 14	100/0	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 Ensure that the lowest operational use temperature (LOUT) is respected. 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/anti-icing do not provide in-flight icing protection.

TABLE 4-Generic

SAE TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	1:15 – 2:30	0:35 – 1:15	0:40 – 1:10	0:25 – 0:40	0:10 – 0:50	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:05 – 1:45	0:20 – 0:55	0:35 – 0:50	0:15 – 0:30	0:05 – 0:35	
		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	0:15 – 0:35	0:15 – 0:30 ³	0:10 – 0:20 ³		
below -14 to -25	below 7 to -13	100/0	12:00 ⁵	0:15 – 0:40 ⁵	0:15 – 0:30 ⁵				
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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 Based on the lowest holdover times of the Type IV fluids listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 Ensure that the lowest operational use temperature (LOUT) is respected.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-C-2001

CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
SAFEWING MP IV 2001

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	1:20 – 3:20	1:00 – 1:55	0:55 – 1:55	0:40 – 1:00	0:15 – 2:00	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:20 – 2:00	0:35 – 1:00	0:35 – 1:10	0:25 – 0:35	0:10 – 1:25	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-C-2012

CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
SAFEWING MP IV 2012 PROTECT

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	1:15 – 2:30	0:40 – 1:15	0:40 – 1:10	0:25 – 0:45	0:10 – 1:05	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:10 – 2:05	0:25 – 0:55	0:35 – 0:50	0:15 – 0:30	0:05 – 0:40	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-C-2030

CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
SAFEWING MP IV 2030 ECO

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	1:55 – 3:20	0:50 – 1:30	0:55 – 2:00	0:40 – 0:50	0:15 – 1:40	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:15 – 2:05	0:35 – 1:05	0:40 – 1:05	0:25 – 0:35	0:10 – 1:00	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-D-ULTRA+

DOW CHEMICAL TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
UCAR™ ADF/AAF ULTRA+

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	1:35 – 3:35	0:35 – 1:15	0:45 – 1:35	0:25 – 0:40	0:10 – 1:20	CAUTION: No holdover time guidelines exist
		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 ⁵	0:40 – 2:10 ⁵	0:20 – 0:45 ⁵				
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 outside air temperature and the aerodynamic acceptance criteria are met. ⁵ Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 These holdover times only apply to outside air temperatures to -24°C (-11°F).

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-K-ABC-S

KILFROST TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
ABC-S

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	2:35 – 4:00	1:00 – 1:40	1:20 – 1:50	1:00 – 1:25	0:20 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:05 – 1:45	0:30 – 0:55	0:45 – 1:10	0:35 – 0:50	0:10 – 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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-O-MF

OCTAGON TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
MAX-FLIGHT

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	2:40 – 4:00	0:50 – 1:35	0:55 – 2:00	0:35 – 1:00	0:15 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	5:00	2:05 – 3:15	0:45 – 1:45	1:15 – 2:00	0:35 – 1:10	0:10 – 0:40	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-O-MF-04

OCTAGON TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
MAX-FLIGHT 04

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)							
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²	
-3 and above	27 and above	100/0	12:00	2:40 – 4:00	1:25 – 2:00	2:00 – 2:00	1:10 – 1:30	0:20 – 2:00	CAUTION: No holdover time guidelines exist	
		75/25	5:00	2:05 – 3:15	1:05 – 2:00	1:50 – 2:00	1:00 – 1:20	0:20 – 2:00		
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.							

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-O-MFLO

OCTAGON TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
MAXFLO

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	2:20 – 3:35	0:40 – 1:30	1:20 – 2:00	0:30 – 1:00	0:10 – 2:00	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:25 – 2:00	0:20 – 0:55	0:40 – 1:05	0:20 – 0:35	0:05 – 1:15	
		50/50	3:00	0:20 – 0:40	0:05 – 0:15	0:10 – 0:20	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	12:00	1:10 – 2:20	0:25 – 1:00	0:35 – 1:45 ³	0:30 – 0:50 ³		
		75/25	5:00	0:40 – 1:25	0:15 – 0:40	0:35 – 1:15 ³	0:15 – 0:30 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:30 – 1:00	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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 4-S-AD-480

SPCA TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2005-2006¹
AD-480

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

Outside Air Temperature		Type IV Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours:minutes)						
Degrees Celsius	Degrees Fahrenheit		Active Frost	Freezing Fog	Snow or Snow Grains	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing	Other ²
-3 and above	27 and above	100/0	12:00	2:00 – 3:30	0:40 – 1:20	0:50 – 1:30	0:35 – 0:55	0:15 – 1:35	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:30 – 2:45	0:30 – 1:05	0:50 – 1:15	0:30 – 0:45	0:10 – 1:15	
		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 outside air temperature and the aerodynamic acceptance criteria are met. Consider use of Type I when Type IV fluid cannot be used.						

NOTES

- 1 These holdover times are derived from tests of this fluid having a viscosity as listed in Table 9.
- 2 Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, and hail.
- 3 These holdover times only apply to outside air temperatures to -10°C (14°F) under freezing drizzle and light freezing rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.

CAUTIONS

- The only acceptable decision criteria time is the shortest time within the applicable holdover time table cell.
- 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.
- Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground deicing/anti-icing do not provide in-flight icing protection.

TABLE 5

CURRENTLY QUALIFIED FLUIDS (2005-2006)

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	Arcton Ltd.	Arctica DG	06-03-30
1-2	<i>Aviation Xi'an High-tech</i>	<i>KHF-1</i>	<i>05-02-24</i>
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 TF Pre-Mix	*
1-6	Clariant GmbH	Clariant Safewing MP I 1938 ECO	06-08-30
1-7	Clariant GmbH	Clariant Safewing EG I 1996	06-08-24
1-8	Dow Chemical Company	Dow UCAR™ Aircraft Deicing Fluid Concentrate	06-10-26
1-9	Dow Chemical Company	Dow UCAR™ ADF XL-54	07-03-10
1-10	Dow Chemical Company	Dow UCAR™ PG Aircraft Deicing Fluid	06-01-30
1-11	Dow Chemical Company	Dow UCAR™ PG ADF Dilute 55/45	06-05-17
1-12	Inland Technologies Inc.	Inland Duragly-P ready to use	05-09-11
1-13	Inland Technologies Inc.	Inland Duragly-E ready to use	05-10-20
1-14	Kilfrost Limited	Kilfrost DF PLUS	05-09-11
1-15	Kilfrost Limited	Kilfrost DF PLUS (80)	06-07-05
1-16	Kilfrost Limited	Kilfrost DF PLUS (88)	05-09-03
1-17	Lyondell Chemical Co.	Lyondell ARCOPlus	06-03-29
1-18	Lyondell Chemical Co.	Lyondell ARCTIC Plus	06-03-15
1-19	Newave Aerochemical Co. Ltd.	FCY-1A	05-06-04*
1-20	Octagon Process Inc.	Octagon Octaflo EF	05-07-25*
1-21	Octagon Process Inc.	Octagon Octaflo EG	05-07-24*
1-22	SPCA	SPCA DE-950	06-06-08
1-23	Viterbo S.A.	Jarkleer SAE Type I	07-01-20

[†] 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.

Fluids listed in italics have expired and will be removed from this listing four years after expiry.

* Currently in re-qualification process.

TABLE 5 (cont.)

CURRENTLY QUALIFIED FLUIDS (2005-2006)

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	07-06-02
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	07-05-24

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	05-12-08

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+	06-12-20
4-5	Dow Chemical Company	UCAR AAF AD-480 ⁽¹⁾	05-07-01*
4-6	Ely Chemical Company	Octagon Max-Flight	06-07-06
4-7	Kilfrost Limited	Kilfrost ABC-S	05-08-06
4-8	Octagon Process Inc.	Octagon Max-Flight	06-07-06
4-9	Octagon Process Inc.	Octagon Max-Flight 04	06-05-05
4-10	Octagon Process Inc.	Octagon MaxFlo	07-03-24
4-11	SPCA	SPCA AD-480	05-07-01*

⁽¹⁾ This product is identical to SPCA AD-480; the SPCA AD-480 holdover time table applies.

[†] 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.

* Currently in re-qualification process.

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.

NOTES

- 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.
- 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.
- 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 outside air temperatures; 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.

NOTES

- 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.

CAUTIONS

- **Wing skin temperatures may differ and in some cases may be lower than outside air temperatures; 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.

TABLE 9

LOWEST ON-WING VISCOSITY VALUES FOR ANTI-ICING NEAT FLUIDS

	FLUID NAME	LOWEST ON-WING VISCOSITY ^a (mPa.s)	
		MANUFACTURER METHOD	AIR 9968 REVISION A METHOD
TYPE II	Clariant Safewing MP II 2025 ECO	5,500 ^b	5,750 ^g
	Kilfrost ABC-II Plus	3,600 ^c	3,600 ^g
	Kilfrost ABC-2000	2,350 ^c	2,350 ^g
	Octagon E Max II	13,520 ^d	13,520 ^g
	SPCA Ecowing 26	4,900 ^e	4,600 ^g
TYPE IV	Clariant Safewing MP IV 2001	18,000 ^b	18,000 ^c
	Clariant Safewing MP IV 2012 Protect	7,800 ^b	7,250 ^g
	Clariant Safewing MP IV 2030 ECO	10,500 ^b	10,500 ^c
	Dow UCAR ADF/AAF ULTRA+	36,000 ^f	28,000 ^c
	Octagon Max-Flight	5,540 ^d	5,540 ^g
	Octagon Max-Flight 04	5,540 ^d	5,540 ^g
	Octagon MaxFlo	8,670 ^g	8,670 ^g
	Kilfrost ABC-S	17,000 ^c	17,000 ^c
	SPCA AD-480	15,200 ^e	12,800 ^c

^a The Aerospace Information Report (AIR) 9968 Revision A (December 2004) viscosity method should only be used for field verification and auditing purposes; when in doubt as to which method is appropriate, use the manufacturer method.

^b Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.

^c Brookfield Spindle LV2-disc with guard leg, 150 mL of neat fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.

^d Brookfield Spindle LV1 with guard leg, 500 mL of neat fluid, at 20°C, 0.3 rpm, for 33 minutes 20 seconds.

^e Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of neat fluid, at 20°C, 0.3 rpm, for 30 minutes 0 seconds.

^f Brookfield Spindle SC4-31/13R, small sample adapter, 10 mL of neat fluid, at 0°C, 0.3 rpm, for 10 minutes 0 seconds.

^g Brookfield Spindle LV1 with guard leg, 500 mL of neat fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.

SIGNIFICANCE OF THIS TABLE

The viscosity of the fluids in this table are those that the fluid manufacturers provided for holdover time testing. For the holdover time guidelines to be valid, the viscosity of the neat fluid on the wing shall not be lower than that listed in this table. The user should periodically ensure that the viscosity value of a fluid sample taken from the wing is not lower than that listed.

Note: The fluid manufacturer should be consulted for lowest on-wing viscosity associated with dilutions.