

Transport Canada Holdover Time (HOT) Guidelines Winter 2007-2008

Original Issue, July 2007

This document should be used in conjunction with *Guidelines for Aircraft Ground-Icing Operations* (TP 14052, second edition, April 2005)

The two documents complement each other and should be used together for a thorough understanding of the subject matter.

CHANGE CONTROL RECORDS

This page indicates any changes made to individual pages within the document. Changed pages have the appropriate revision date in the footer. Sidebars are shown to assist in identifying where the changes have been made on these pages.

It is the responsibility of the end user to periodically check the following website for updates on Holdover Time Guidelines:

<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>

OBSOLETE

SUMMARY OF CHANGES FROM PREVIOUS YEAR

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

Type I Fluid

The Type I holdover guideline values are unchanged.

Type II Fluid

Fluid-specific tables have been created for two new Type II fluids, Aviation Xi'An High-Tech KHF-II and Newave Aerochemical FCY-2. The addition of these fluids caused reductions to the holdover times in four cells in the below -3 to -14°C row of the Type II generic holdover guidelines.

The Kilfrost ABC-TF2 fluid-specific table has been removed, as the fluid was never qualified.

Type III Fluid

The Type III holdover guideline values are unchanged.

Type IV Fluid

A fluid-specific table has been created for one new Type IV fluid, Lyondell ARCTIC Shield®. The Clariant Safewing MP IV 2030 ECO fluid-specific table has been removed, as the fluid was not commercialized. In addition, several other changes have been made to the Type IV guidelines:

- Holdover times in the Clariant Safewing MP IV Launch snow cells have increased as a result of natural snow testing conducted with this fluid.
- Significant changes have been made to the Kilfrost ABC-S PLUS fluid-specific table as a result of testing with a higher viscosity sample. The lowest on-wing viscosity value for this fluid has increased to 17,900 mPa.s.
- A change has been made to the Clariant Safewing MP IV 2012 Protect fluid-specific table to correct a clerical error. The holdover time for neat fluid in freezing fog at below -3 to -14°C is now 0:45 – 1:45.

The Type IV generic holdover guideline values are unchanged.

Lowest On-Wing Viscosity Values

The lowest on-wing viscosity values of Clariant Safewing MP II 1951, Clariant Safewing MP III 2031 ECO and Kilfrost ABC-3 have been added to Table 9. This table now also includes lowest on-wing viscosity values for the dilutions of the anti-icing fluids.

OPERATIONS DURING ICE PELLET CONDITIONS

Transport Canada is conducting research to provide additional guidance for aircraft operations during ice pellet conditions. Because further research is necessary, no changes to the operational and HOT guidelines with respect to ice pellet conditions have been made at this time.

CHANGES TO *Guidelines of Aircraft Ground-Icing Operations* (TP 14052, second ed., April 2005)

The following changes will be incorporated into TP 14052 at its next revision. They are recorded here in advance due to the longer life cycle time associated with the updating and publication of TP 14052 and are for immediate use.

Replace Sub-Paragraph 10.13.3, “Hot Water”, with the following:

Hot water may be used to remove large amounts of contamination (such as ice) from an aircraft provided that the Outside Air Temperature is -3°C and above as per the application procedures for SAE Type I and SAE Type II, III and IV fluids described in tables 6 & 7 of the Transport Canada HOT Guidelines document.

Delete Sub-Paragraph 10.13.3.1 Item g) only.**Replace Sub-Paragraph 11.1.5, “Elapsed time is less than the lowest time in the HOT cell”, with the following:**

Transport Canada has previously considered that, under an approved ground icing program, if the lowest time in a cell has NOT been exceeded for conditions covered by the Guidelines, there is no requirement to inspect the aircraft’s critical surfaces prior to commencing a takeoff.

This position was based on evidence gained during fluids testing. The HOT values are conservative for the lowest number in the cell, if:

- a) The conditions present are NOT in excess of those conditions represented by the table (e.g. for snow it would be a moderate snow condition); and
- b) The impact of other factors (e.g. jet blast) has been considered and deemed not to affect the HOT.

If there is doubt surrounding the conditions associated with using the lowest time as decision making criteria, an inspection prior to takeoff would be prudent. This inspection should be conducted in accordance with the procedures described in the Air Operator’s Approved Ground Icing Program.

HOLDOVER TIME (HOT) GUIDELINES FOR WINTER 2007-2008

Table 1	SAE Type I Fluid Holdover Guidelines
Table 2-Generic	SAE Type II Fluid Holdover Guidelines
Table 2-A-KHF-II	Aviation Xi'an High-Tech Type II Fluid Holdover Guidelines KHF-II
Table 2-C-2025	Clariant Type II Fluid Holdover Guidelines Safewing MP II 2025 ECO
Table 2-C-Flight	Clariant Type II Fluid Holdover Guidelines Safewing MP II Flight
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-N-FCY-2	Newave Aerochemical Type II Fluid Holdover Guidelines FCY-2
Table 2-O-EM-II	Octagon Type II Fluid Holdover Guidelines E Max II
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Table 3	SAE Type III Fluid Holdover Guidelines
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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-Launch	Clariant Type IV Fluid Holdover Guidelines Safewing MP IV Launch
Table 4-D-ULTRA+	Dow Chemical Type IV Fluid Holdover Guidelines UCAR™ ADF/AAF ULTRA+
Table 4-D-E106	Dow Chemical Type IV Fluid Holdover Guidelines UCAR™ Endurance EG106
Table 4-K-ABC-S	Kilfrost Type IV Fluid Holdover Guidelines ABC-S
Table 4-K-ABC-S PLUS	Kilfrost Type IV Fluid Holdover Guidelines ABC-S PLUS
Table 4-L-ARCTIC Shield	Lyondell Type IV Fluid Holdover Guidelines ARCTIC Shield®
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-O-MFLO	Octagon Type IV Fluid Holdover Guidelines MaxFlo
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 9	Lowest On-Wing Viscosity Values for Anti-Icing Fluids

TABLE 1

SAE TYPE I³ FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008

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	
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				

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 2007-2008¹

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 – 0:30	0:15 – 0:45 ³	0:10 – 0:20 ³		
		75/25	5:00	0:20 – 0:55	0:10 – 0:20	0:15 – 0:30 ³	0:05 – 0:15 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-A-KHF-II

AVIATION XI'AN HIGH-TECH TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
KHF-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	1:15 – 2:15	0:45 – 1:20	0:50 – 1:30	0:30 – 0:45	0:10 – 1:15	CAUTION: No holdover time guidelines exist
		75/25	5:00	0:45 – 1:00	0:25 – 0:40	0:25 – 0:45	0:15 – 0:25	0:05 – 0:45	
		50/50	3:00	0:20 – 0:30	0:15 – 0:25	0:10 – 0:15	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	8:00	1:10 – 2:40	0:35 – 1:00	0:20 – 1:35 ³	0:25 – 0:40 ³		
		75/25	5:00	0:45 – 1:20	0:15 – 0:30	0:20 – 0:45 ³	0:15 – 0:20 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:35 – 0:50	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-C-2025

CLARIANT TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
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-C-Flight

CLARIANT TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
SAFEWING MP II FLIGHT

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	3:30 – 4:00	1:00 – 1:35	1:20 – 2:00	0:45 – 1:25	0:10 – 1:30	CAUTION: No holdover time guidelines exist
		75/25	5:00	2:30 – 4:00	0:40 – 1:20	1:15 – 2:00	0:30 – 0:55	0:05 – 1:20	
		50/50	3:00	0:55 – 1:45	0:10 – 0:25	0:20 – 0:30	0:10 – 0:15		
below -3 to -14	below 27 to 7	100/0	8:00	0:55 – 1:45	0:40 – 1:05	0:35 – 1:30 ³	0:25 – 0:45 ³		
		75/25	5:00	0:40 – 1:10	0:20 – 0:40	0:25 – 1:10 ³	0:30 – 0:40 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:30 – 0:50	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 2007-2008¹
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 2007-2008¹
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-N-FCY-2

NEWAVE AEROCHEMICAL TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
FCY-2

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	1:15 – 2:25	0:30 – 0:55	0:35 – 1:05	0:25 – 0:35	0:05 – 0:45	CAUTION: No holdover time guidelines exist
		75/25	5:00	0:50 – 1:30	0:20 – 0:40	0:25 – 0:45	0:15 – 0:25	0:05 – 0:25	
		50/50	3:00	0:25 – 0:35	0:15 – 0:25	0:10 – 0:20	0:05 – 0:10		
below -3 to -14	below 27 to 7	100/0	8:00	0:45 – 1:30	0:15 – 0:30	0:20 – 0:45 ³	0:15 – 0:20 ³		
		75/25	5:00	0:30 – 1:05	0:10 – 0:20	0:15 – 0:30 ³	0:05 – 0:15 ³		
below -14 to -25	below 7 to -13	100/0	8:00	0:25 – 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-O-EM-II

OCTAGON TYPE II FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
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 2007-2008¹
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 2007-2008

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 2007-2008¹

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 2007-2008¹
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 2007-2008¹
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 – 1:45	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-Launch

CLARIANT TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
SAFEWING MP IV LAUNCH

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	4:00 – 4:00	1:05 – 1:45	1:30 – 2:00	1:00 – 1:40	0:15 – 1:40	CAUTION: No holdover time guidelines exist
		75/25	5:00	3:40 – 4:00	1:00 – 1:45	1:40 – 2:00	0:45 – 1:15	0:10 – 1:45	
		50/50	3:00	1:25 – 2:45	0:25 – 0:45	0:30 – 0:50	0:20 – 0:25		
below -3 to -14	below 27 to 7	100/0	12:00	1:00 – 1:55	0:50 – 1:20	0:35 – 1:40 ³	0:25 – 0:45 ³		
		75/25	5:00	0:40 – 1:20	0:45 – 1:25	0:25 – 1:10 ³	0:25 – 0:45 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:30 – 0:50	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 2007-2008¹
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-D-E106

DOW CHEMICAL TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
UCAR™ ENDURANCE EG106

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	2:05 – 3:10	0:40 – 1:20	1:10 – 2:00	0:50 – 1:15	0:20 – 2:00	CAUTION: No holdover time guidelines exist
		75/25							
		50/50							
below -3 to -14	below 27 to 7	100/0	12:00	1:50 – 3:20	0:30 – 1:05	0:55 – 1:50 ³	0:45 – 1:10 ³		
		75/25							
below -14 to -25	below 7 to -13	100/0	12:00	0:30 – 1:05	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-K-ABC-S

KILFROST TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
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-K-ABC-S PLUS

**KILFROST TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
ABC-S PLUS**

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	2:10 – 4:00	1:15 – 2:00	1:50 – 2:00	1:05 – 2:00	0:25 – 2:00	
		75/25	5:00	1:25 – 2:40	0:45 – 1:15	1:00 – 1:20	0:30 – 0:50	0:10 – 1:20	
		50/50	3:00	0:30 – 0:55	0:15 – 0:30	0:15 – 0:40	0:15 – 0:20	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	12:00	0:55 – 3:30	1:00 – 1:45	0:25 – 1:35 ³	0:20 – 0:30 ³		
		75/25	5:00	0:45 – 1:50	0:35 – 1:00	0:20 – 1:10 ³	0:15 – 0:25 ³		
below -14 to -25	below 7 to -13	100/0	12:00	0:40 – 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-L-ARCTIC Shield

LYONDELL TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
ARCTIC SHIELD[®]

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 – 3:10	0:50 – 1:25	0:55 – 1:40	0:45 – 1:05	0:15 – 1:25	CAUTION: No holdover time guidelines exist
		75/25	5:00	1:20 – 2:15	0:40 – 1:05	0:55 – 1:25	0:30 – 0:45	0:05 – 1:20	
		50/50	3:00	0:35 – 0:45	0:20 – 0:35	0:20 – 0:30	0:10 – 0:15		
below -3 to -14	below 27 to 7	100/0	12:00	1:00 – 2:25	0:45 – 1:15	0:25 – 1:30 ³	0:25 – 0:30 ³		
		75/25	5:00	0:50 – 1:45	0:35 – 0:55	0:30 – 1:15 ³	0:25 – 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-O-MF

OCTAGON TYPE IV FLUID HOLDOVER GUIDELINES FOR WINTER 2007-2008¹
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 2007-2008¹
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 2007-2008¹
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 2007-2008¹
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 (2007-2008)

Table 5-1: Qualified Type I Anti-icing Fluids^{(1) (2)}			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
1-1	Arcton Ltd.	Arctica DG	08-04-10
1-2	Aviation Xi'an High-Tech	Aviation Xi'an KHF-1	07-09-22
1-3	Battelle	D ³ : Degradable by Design Deicer™ ADF 1006A	08-01-13
1-4	Beijing Wangye Aviation Chemical Product Co. Ltd.	KLA-1	07-09-07
1-5	Clariant GmbH	Clariant Safewing MP I 1938 TF	08-08-21
1-6	Clariant GmbH	Clariant Safewing MP I 1938 TF Pre-Mix	07-09-14
1-7	Clariant GmbH	Clariant Safewing MP I 1938 ECO (80) Pre-Mix	09-03-01
1-8	Clariant GmbH	Clariant Safewing MP I 1938 ECO	08-08-17
1-9	Clariant GmbH	Clariant Safewing EG I 1996	08-08-16
1-10	Chemical Specialists and Development Inc.	Prist Wing De-Icer	08-05-17
1-11	Dow Chemical Company	Dow UCAR™ Aircraft Deicing Fluid Concentrate	08-08-21
1-12	Dow Chemical Company	Dow UCAR™ ADF XL-54	09-02-01
1-13	Dow Chemical Company	Dow UCAR™ PG Aircraft Deicing Fluid	08-02-02
1-14	Dow Chemical Company	Dow UCAR™ PG ADF Dilute 55/45	08-02-02
1-15	HOC Industries	SafeTemp I ES	07-10-27
1-16	HOC Industries	SafeTemp ES Plus	07-09-15
1-17	<i>Inland Technologies Inc.</i>	<i>Inland Duragly-P ready to use</i>	<i>05-09-11⁽³⁾</i>
1-18	<i>Inland Technologies Inc.</i>	<i>Inland Duragly-E ready to use</i>	<i>05-10-20⁽³⁾</i>
1-19	Kilfrost Limited	Kilfrost DF PLUS	07-08-26
1-20	Kilfrost Limited	Kilfrost DF PLUS (80)	08-07-12
1-21	Kilfrost Limited	Kilfrost DF PLUS (88)	07-08-26
1-22	Kilfrost Limited	Kilfrost DF ^{sustain}	09-01-26
1-23	Lyondell Chemical Co.	Lyondell ARCOPlus	08-02-14
1-24	Lyondell Chemical Co.	Lyondell ARCTIC Plus™	08-04-10
1-25	Newave Aerochemical Co. Ltd.	Newave FCY-1A	07-06-15 ⁽⁴⁾
1-26	Octagon Process Inc.	Octagon EcoFlo	09-08-03 ⁽⁴⁾
1-27	Octagon Process Inc.	Octagon Octaflo EF	07-05-12 ⁽⁴⁾
1-28	Octagon Process Inc.	Octagon Octaflo EG	07-05-12 ⁽⁴⁾
1-29	SPCA	SPCA DE-950	08-05-30
1-30	Viterbo S.A.	Jarkleer SAE Type I	07-01-20 ⁽³⁾

⁽¹⁾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.ugac.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.

⁽²⁾Concentrate fluids have also been qualified at 50/50 (glycol/water) dilution.

⁽³⁾Fluids listed in italics have expired and will be removed from this listing four years after expiry.

⁽⁴⁾Currently in qualification/re-qualification process.

TABLE 5 (cont.)

CURRENTLY QUALIFIED FLUIDS (2007-2008)

Table 5-2: Qualified ⁽¹⁾ Type II Anti-icing Fluids			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
2-1	Aviation Xi'an High-Tech	Aviation Xi'an KHF-II	08-06-15
2-2	Clariant GmbH	Clariant Safewing MP II 1951	09-05-08
2-3	Clariant GmbH	Clariant Safewing MP II 2025 ECO	08-06-26
2-4	Clariant GmbH	Clariant Safewing MP II Flight	08-04-27
2-5	<i>Kilfrost Limited</i>	<i>Kilfrost ABC-II PLUS</i>	<i>05-10-29⁽²⁾</i>
2-6	Kilfrost Limited	Kilfrost ABC-3	08-07-07
2-7	Kilfrost Limited	Kilfrost ABC-2000	08-07-12
2-8	Newave Aerochemical Technology	Newave FCY-2	09-01-11
2-9	Octagon Process Inc.	Octagon E Max II	08-10-31
2-10	SPCA	SPCA Ecowing 26	08-10-31

Table 5-3: Qualified ⁽¹⁾ Type III Anti-icing Fluids			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
3-1	Clariant GmbH	Clariant Safewing MP III 2031 ECO	09-05-02
	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 ⁽¹⁾ Type IV Anti-icing Fluids			
#	COMPANY NAME	FLUID NAME	EXPIRY (Y-M-D)
4-1	Clariant GmbH	Clariant Safewing MP IV 2001	08-06-26
4-2	<i>Clariant GmbH</i>	<i>Clariant Safewing MP IV 2012 Protect</i>	<i>07-07-12⁽²⁾</i>
4-3	Clariant GmbH	Clariant Safewing MP IV Launch	08-05-16
4-4	Dow Chemical Company	Dow UCAR ADF/AAF ULTRA+	08-08-21
4-5	Dow Chemical Company	UCAR AAF FlightGuard AD-480 ⁽³⁾	08-05-31
4-6	Dow Chemical Company	UCAR TM Endurance EG106	08-01-25
4-7	<i>Ely Chemical Company</i>	<i>Octagon Max-Flight</i>	<i>06-07-06⁽²⁾</i>
4-8	Kilfrost Limited	Kilfrost ABC-S	07-08-02
4-9	Kilfrost Limited	ABC-S PLUS	09-03-07
4-10	Lyondell Chemical Co.	Lyondell ARCTIC Shield [®]	08-04-26
4-11	<i>Octagon Process Inc.</i>	<i>Octagon Max-Flight</i>	<i>06-07-06⁽²⁾</i>
4-12	Octagon Process Inc.	Octagon Max-Flight 04	08-05-30
4-13	Octagon Process Inc.	Octagon MaxFlo	07-03-24 ⁽⁴⁾
4-14	SPCA	SPCA AD-480	07-07-05 ⁽⁴⁾

⁽¹⁾ 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.ugac.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.

⁽²⁾ Fluids listed in italics have expired and will be removed from this listing four years after expiry.

⁽³⁾ This product is identical to SPCA AD-480; the SPCA AD-480 holdover time table applies.

⁽⁴⁾ 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) ¹	One-Step Procedure Deicing/Anti-icing	Two-Step Procedure	
		First Step: Deicing	Second Step: Anti-icing ²
-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 Fluids must not be used at temperatures below their lowest operational use temperature (LOUT).

2 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) ¹	One-Step Procedure Deicing/Anti-icing	Two-Step Procedure	
		First Step: Deicing	Second Step: Anti-icing ²
-3°C (27°F) and above	50/50 Heated ³ 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 ³ 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 ³ 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 (LOUT) are met. Consider the use of Type I when Type II/III/IV fluid cannot be used (see Table 6).		

1 Fluids must not be used at temperatures below their lowest operational use temperature (LOUT).

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

3 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 FLUIDS
(See Table 9 endnotes)

Table 9-1: Type II Anti-Icing Fluids			
FLUID NAME	FLUID DILUTION	LOWEST ON-WING VISCOSITY ^a (mPa.s)	
		MANUFACTURER METHOD	AIR 9968 REVISION A METHOD
Aviation Xi'An Hi-Tech KHF-II	100/0	8 750 ^c	7 690 ^g
	75/25	6 400 ^c	6 890 ^g
	50/50	2 950 ^c	3 150 ^g
Clariant Safewing MP II 2025 ECO	100/0	5 500 ^b	5 750 ^g
	75/25	10 000 ^b	10 000 ^g
	50/50	3 000 ^b	3 250 ^g
Clariant Safewing MP II Flight	100/0	3 340 ^g	3 340 ^g
	75/25	17 500 ^g	17 500 ^g
	50/50	11 500 ^g	11 500 ^g
Clariant Safewing MP II 1951	100/0	2 500 ^b	2 750 ^g
	75/25	2 900 ^b	3 000 ^g
	50/50	50 ^b	50 ^g
Kilfrost ABC-3	100/0	2 500 ^c	2 500 ^j
	75/25	2 000 ^c	2 000 ^j
	50/50	400 ^c	400 ^j
Kilfrost ABC-2000	100/0	2 350 ^c	2 350 ^g
	75/25	3 000 ^c	3 000 ^j
	50/50	1 000 ^c	1 000 ^j
Kilfrost ABC-II Plus	100/0	3 600 ^c	3 600 ^g
	75/25	4 000 ^c	4 000 ^j
	50/50	1 000 ^c	1 000 ^j
Newave Aerochemical FCY-2	100/0	7 000 ^c	8 920 ^g
	75/25	18 550 ^c	18 550 ^c
	50/50	6 750 ^c	7 030 ^g
Octagon E Max II	100/0	13 520 ^d	13 520 ^g
	75/25	11 400 ^g	11 400 ^g
	50/50	2 820 ^g	2 820 ^g
SPCA Ecowing 26	100/0	4 900 ^e	4 600 ^g
	75/25	2 200 ^g	2 200 ^g
	50/50	50 ^g	50 ^g

Table 9-2: Type III Anti-Icing Fluids			
FLUID NAME	FLUID DILUTION	LOWEST ON-WING VISCOSITY ^a (mPa.s)	
		MANUFACTURER METHOD	AIR 9968 REVISION A METHOD
Clariant Safewing MP III 2031 ECO	100/0	30 ^h	Not Applicable
	75/25	55 ^h	Not Applicable
	50/50	10 ^h	Not Applicable

TABLE 9 (cont.)
 LOWEST ON-WING VISCOSITY VALUES FOR ANTI-ICING FLUIDS
 (See Table 9 endnotes)

Table 9-3: Type IV Anti-Icing Fluids			
FLUID NAME	FLUID DILUTION	LOWEST ON-WING VISCOSITY ^a (mPa.s)	
		MANUFACTURER METHOD	AIR 9968 REVISION A METHOD
Clariant Safewing MP IV 2001	100/0	18 000 ^b	18 000 ^c
	75/25	8 000 ^b	11 500 ^g
	50/50	1 200 ^b	1 750 ^g
Clariant Safewing MP IV 2012 Protect	100/0	7 800 ^b	7 250 ^g
	75/25	17 800 ^b	17 700 ^c
	50/50	4 500 ^b	4 250 ^g
Clariant Safewing MP IV Launch	100/0	7 550 ^g	7 550 ^g
	75/25	18 000 ^g	18 000 ^g
	50/50	17 800 ^g	17 800 ^g
Dow UCAR AAF FlightGuard AD-480	100/0	15 200 ^e	12 800 ^c
	75/25	16 000 ^e	12 400 ^c
	50/50	4 000 ^e	3 800 ^g
Dow UCAR ADF/AAF ULTRA+	100/0	36 000 ^f	28 000 ^c
	75/25	Dilution Not Applicable	Dilution Not Applicable
	50/50	Dilution Not Applicable	Dilution Not Applicable
Dow UCAR Endurance EG106	100/0	24 850 ^f	2 230 ^g
	75/25	Dilution Not Applicable	Dilution Not Applicable
	50/50	Dilution Not Applicable	Dilution Not Applicable
Kilfrost ABC-S	100/0	17 000 ^c	17 000 ^c
	75/25	12 000 ^c	12 000 ^c
	50/50	2 000 ^c	2 000 ^c
Kilfrost ABC-S PLUS	100/0	17 900 ^c	17 900 ^c
	75/25	18 300 ^c	18 300 ^c
	50/50	7 500 ^c	7 500 ^c
Lyondell Arctic Shield®	100/0	23 150 ⁱ	28 000 ^c
	75/25	21 700 ⁱ	22 100 ^c
	50/50	6 400 ⁱ	7 640 ^g
Octagon Max-Flight	100/0	5 540 ^d	5 540 ^g
	75/25	15 000 ^g	15 000 ^g
	50/50	5 200 ^g	5 200 ^g
Octagon Max-Flight 04	100/0	5 540 ^d	5 540 ^g
	75/25	15 000 ^g	15 000 ^g
	50/50	5 200 ^g	5 200 ^g
Octagon MaxFlo	100/0	8 670 ^g	8 670 ^g
	75/25	8 200 ^g	8 200 ^g
	50/50	2 200 ^g	2 200 ^g
SPCA AD-480	100/0	15 200 ^e	12 800 ^c
	75/25	16 000 ^e	12 400 ^c
	50/50	4 000 ^e	3 800 ^g

TABLE 9 (cont.)

LOWEST ON-WING VISCOSITY VALUES FOR ANTI-ICING FLUIDS

NOTES

- 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 fluid, at 20°C, 0.3 rpm, for 15 minutes 0 seconds.
- c Brookfield Spindle LV2-disc with guard leg, 150 mL of fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.
- d Brookfield Spindle LV1 with guard leg, 500 mL of fluid, at 20°C, 0.3 rpm, for 33 minutes 20 seconds.
- e Brookfield Spindle SC4-34/13R, small sample adapter, 10 mL of fluid, at 20°C, 0.3 rpm, for 30 minutes 0 seconds.
- f Brookfield Spindle SC4-31/13R, small sample adapter, 10 mL of fluid, at 0°C, 0.3 rpm, for 10 minutes 0 seconds.
- g Brookfield Spindle LV1 with guard leg, 500 mL of fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.
- h Brookfield Spindle LV0, UL-Adapter, 16 mL of fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.
- i Brookfield Spindle SC4-31/13R, small sample adapter, 9 mL of fluid, at 20°C, 0.3 rpm, for 33 minutes 0 seconds.
- j Brookfield Spindle LV1 with guard leg, 150 mL of fluid, at 20°C, 0.3 rpm, for 10 minutes 0 seconds.

SIGNIFICANCE OF THIS TABLE

The viscosity values of the fluids in this table are those of the fluids provided by the manufacturers for holdover time testing. For the holdover time guidelines to be valid, the viscosity of the 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.