

FAA HOLDOVER TIME GUIDELINES



WINTER 2015-2016 ORIGINAL ISSUE

The information contained in this document serves as the official FAA guidance, Holdover Times and Allowance Times for use during the 2015-2016 winter season. This document is designed to be used in conjunction with the FAA N 8900 series notice “Revised FAA-Approved Deicing Program Updates, Winter 2015-2016.”

Questions concerning FAA aircraft ground de/anti-icing requirements or Flight Standards policies should be addressed to charles.j.enders@faa.gov or 202-267-4557.

Questions on the technical content of the holdover time tables should be addressed to warren.underwood@faa.gov or 404-305-6652.

Questions regarding editorial content or web access issues should be addressed to sung.shin@faa.gov or 202-267-8086.

CHANGE CONTROL RECORDS

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

It is the responsibility of the end user to periodically check the following website for updates:
https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/deicing/.

<i>REVISION</i>	<i>DATE</i>	<i>DESCRIPTION OF CHANGES</i>	<i>AFFECTED PAGES</i>	<i>AUTHOR</i>

SUMMARY OF CHANGES FOR WINTER 2015-2016

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

ACTIVE FROST

- The active frost holdover time (HOT) guidelines are unchanged.

TYPE I FLUIDS

- The Type I HOT guidelines are unchanged.

TYPE II FLUIDS

- Fluid-specific HOT guidelines have been created for two new Type II fluids: Kilfrost ABC-Ice Clear II and Newave Aerochemical FCY-2 Bio+.
- Several of the LNT Solutions P250 snow holdover times have been increased as a result of supplemental testing.
- Clariant Safewing MP II 1951 has been removed from the Type II guidelines as per the protocol for removing obsolete fluids.
- Six changes (increases and decreases of up to five minutes) have been made to the Type II generic holdover times as a result of the new and removed Type II fluids.

TYPE III FLUIDS

- Fluid-specific, application temperature-specific, and aircraft rotation speed profile-specific HOT guidelines have been added for Type III fluids. This includes guidelines for the existing Type III fluid Clariant Safewing MP III 2031 ECO (applied heated) and for the new Type III fluid AllClear AeroClear MAX (applied unheated).
- Due to the different application temperature requirements of the two Type III fluids it is not possible to determine generic Type III holdover times. As a result, the Type III generic HOT guideline has been removed. Users must know which fluid brand is being used and use the appropriate Type III fluid-specific HOT guidelines when using Type III fluid.

TYPE IV FLUIDS

- Fluid-specific HOT guidelines have been created for the new Type IV fluid Deicing Solutions ECO-SHIELD®.
- Most of the LNT Solutions E450 snow holdover times have been increased as a result of supplemental testing.
- ABAX AD-480 and Kilfrost ABC-S have been removed from the Type IV guidelines as per the protocol for removing obsolete fluids.
- Significant changes, primarily increases, have been made to the Type IV generic holdover times as a result of the new and removed Type IV fluids.

ICE PELLET AND SMALL HAIL ALLOWANCE TIMES

- A new note has been added to the allowance time tables to indicate that if an intensity is reported with small hail, the equivalent ice pellet condition can be used, i.e. if light small hail is reported, the light ice pellet allowance times can be used. If an intensity is not reported, the moderate ice pellet allowance times must be used.

- Two new cautions have been added to the allowance time tables. These cautions provide important information within the allowance time tables, which was previously provided only in the allowance time operational guidance section. This is to highlight its importance to users.

FAA / TRANSPORT CANADA HARMONIZATION INITIATIVE

- In late 2014, FAA and Transport Canada initiated an effort to harmonize their holdover time guidelines documents. Several changes have been made as a result of this initiative, including:
 - Minor changes to wording of many holdover time table notes and cautions
 - Rewording of holdover time table titles
 - Reordering of some document content
 - Merging of the information previously provided in the list of fluids tested, table of lowest operational use temperatures (LOUTs) and table of lowest on-wing viscosities (LOWVs) into a single table (Table 8). Fluid expiry date and fluid base information has also been added to this table.
 - Separating the content previously provided in the Summary of Changes section into two sections: the Summary of Changes section provides details of revisions made to the document for the current winter and the Key Guidance section provides important guidance which remains in the document from year to year.
- Harmonization efforts and discussions will continue over winter 2015-2016 and further changes are expected in future versions of this document.

EARLY FLUID FAILURE ON EXTENDED SLATS AND FLAPS

- Research has determined that fluid degradation is accelerated by the steeper angles of the flaps/slats in the takeoff configuration. The degree of potential degradation is significantly affected by the specific aircraft design. For the winter of 2014-2015, holdover time and allowance time tables were published which include 90% adjusted holdover / allowance times. These adjusted tables will continue to be used for winter 2015-2016.
- The 90% adjusted tables provide holdover / allowance times that must be used when flaps and slats are deployed prior to de/anti-icing. Standard holdover / allowance times can be used if flaps and slats are deployed as close to departure as safety allows. Additional guidance is provided in the FAA N 8900 series notice “Revised FAA-Approved Deicing Program Updates, Winter 2015-2016.”

INTERPRETATION OF METAR CODE GS

- The World Meteorological Organization (WMO) states METAR code GS is used for two meteorological conditions: “snow pellets” and “small hail.” However, investigation has determined that not all countries follow these guidelines, notably Canada. The use of the reported GS code can potentially lead to difficulties in determining which condition (snow pellets or small hail) is occurring and therefore in establishing the appropriate holdover time/allowance time. The related section in the FAA N 8900 series notice “Revised FAA-Approved Deicing Program Updates, Winter 2015-2016” has been updated to provide proper guidance for determining which holdover times/allowance times should be used with METAR code GS.

KEY GUIDANCE FOR WINTER 2015-2016

TYPE I FLUID HOLDOVER TIMES. The Type I fluid holdover times for composite surfaces, Table 1C, and applicable sections of Table 0, must be applied to aircraft with all critical surfaces that are predominantly or entirely constructed of composite materials. However, the Type I fluid holdover times for composite surfaces do not need to be applied to aircraft that are currently in service, have a demonstrated safe operating history using Type I fluid aluminum structure holdover times, and have critical surfaces only partially constructed of composite material. The aluminum values also apply to other metals used in aircraft construction such as titanium. If there is any doubt, consult with the aircraft manufacturer to determine whether aluminum or composite holdover times are appropriate for the specific aircraft.

TYPE II AND TYPE IV GENERIC FLUID HOLDOVER TIMES. The values in the Type II and Type IV generic holdover time guidelines (Table 2-GENERIC, Table 4-GENERIC) are the shortest (worst case) holdover times of all Type II (Table 2-GENERIC) or all Type IV (Table 4-GENERIC) fluids included on the FAA List of Fluids. These values are specific to precipitation condition, temperature range, fluid concentration, and precipitation rate. An analysis of all available Type II and Type IV fluids is done annually to determine these values. The generic holdover times must be used if the specific Type II or Type IV fluid being used cannot positively be determined.

Note: The lowest on-wing viscosity (LOWV) of the fluid being used must always be respected, even when the generic Type II or Type IV holdover times are used.

HOLDOVER TIMES FOR NON-STANDARD DILUTIONS OF TYPE II, III, AND IV FLUIDS. When a Type II, III, or IV fluid is diluted to other than the published 100/0, 75/25 or 50/50 dilutions, the more conservative holdover time and LOUT associated with either the dilution above or below the selected dilution are applicable. For example:

- 1) The holdover time and LOUT of a 80/20 dilution would be the more conservative holdover time and LOUT of either the 100/0 or 75/25 dilutions;
- 2) The holdover time and LOUT of a 60/40 dilution would be the more conservative holdover time and LOUT of either the 75/25 or 50/50 dilutions.

SNOWFALL VISIBILITY TABLE. Table 5, Snowfall Intensities as a Function of Prevailing Visibility, is unchanged for 2015-2016. For simplification purposes, portions of the table may be included in an air carrier's winter operations plan in non-table format. An example would be: "Since very light snow is being added to some of the Type II and Type IV tables, and since the METAR and the associated ATIS do not report very light snow, a METAR reported visibility of 2.5 miles or higher can be used as an indication that the snowfall intensity is very light." An air carrier certainly would also have the option of providing a more detailed description utilizing lower METAR reported visibilities for specific day/night and temperature conditions.

SURFACE VISIBILITY. Some METARS contain tower visibility as well as surface visibility. Whenever surface visibility is available from an official source, such as a METAR, in either the main body of the METAR or in the Remarks ("RMK") section, the preferred action is to use the surface visibility value.

USE OF RUNWAY VISUAL RANGE (RVR). The use of RVR is not permitted for determining visibility used with the holdover tables.

USE OF ELECTRONIC HAND HELD DEVICES TO DETERMINE HOLDOVER TIMES (eHOT). Electronic devices to determine HOTS may be used as part of an air operator's Title 14 of the Code of Federal Regulations (14 CFR) part 121, § 121.629 winter operations plan submitted to the FAA for approval. If for any reason the device or application fails or if the user has any concern regarding the

accuracy of the data being displayed, printed tables sourced from the FAA HOTS must be used as a fall back information source. Questions regarding the use of these devices should be submitted to charles.j.enders@faa.gov, 202-267-4557.

LOWEST OPERATIONAL USE TEMPERATURE (LOUT) TABLE. Lowest Operational Use Temperature (LOUT) information for Type I, II, III and IV fluids is provided in Table 8 and is updated for each version of this document. This information is derived by the FAA based on data provided by the fluid manufacturers. Contact the fluid manufacturer if further clarification with respect to the information in these tables is required.

The Lowest Operational Use Temperature, or LOUT, is the lowest temperature at which a de/anti-icing fluid will adequately flow off aircraft critical surfaces and maintain the required anti-icing freezing point buffer which is 7 °C (13 °F) below outside air temperature (OAT) for SAE Type II, Type III, and Type IV fluids and 10 °C (18 °F) below (OAT) for SAE Type I fluids.

For example, if a Type IV fluid has been aerodynamically tested and demonstrated adequate flow-off capability down to -30 °C (-22 °F), and the freezing point of this fluid is -35 °C (-31 °F), the LOUT would be -28 °C (-18.4 °F) to account for the required 7 °C (13 °F) freezing point buffer. In this case, the freezing point buffer requirement is the LOUT limiting factor.

Similarly if a Type I fluid has been found to adequately flow off down to -29 °C (-20.2 °F), and the freezing point is -40 °C (-40 °F), the LOUT would be -29 °C (-20.2 °F) to account for the lowest temperature at which the fluid adequately flows off the aircraft. Here, in this example, the fluid aerodynamic flow-off capability limits the LOUT.

There are two aerodynamic fluid flow-off test protocols: the high speed test for aircraft with rotation speeds generally greater than 100 or 110 knots and the low speed test is for aircraft with rotation speeds generally less than 100 knots. Type II, and Type IV fluids typically do not pass the low speed test. Therefore in order for these fluids to be used on a low rotation speed aircraft, the aircraft manufacturer must conduct testing to determine if these fluids can be safely applied on these aircraft and to identify operational procedures that must be implemented to insure the safe operation when these fluids have been applied.

The LOUTs for Type I fluids provided in Table 8-1 also include the manufacturer specified fluid/water concentration used to establish the LOUT for each fluid. This concentration should not be exceeded.

As previously stated, in the cases of Types II, III, and IV fluids, there can be multiple LOUTs to account for the undiluted fluid (100/0) and the 50/50 and 75/25 dilutions. In addition to being provided in Table 8, the LOUTs are also listed in their brand-specific holdover tables

FLIGHT CREW AWARENESS OF CONDITIONS AFFECTING THE AIRCRAFT ANTI-ICING TREATMENT FOLLOWING DEICING AND ANTI-ICING OPERATIONS. The operator's deicing plan must provide a process that informs the captain of the time of the deicing/anti-icing treatment and conditions that have affected the aircraft anti-icing treatment since that time. If the flight crew is not present at the time of the deicing/anti-icing application, the crew will review this information before calculating the holdover time.

STANDARDIZED INTERNATIONAL AIRCRAFT GROUND DEICING PROGRAM (SIAGDP). For those air carriers participating in the SIAGDP one change was agreed upon after the 2010-2011 winter revisions were made to the SIAGDP. This change was included in the 2011-2012 revision. This change addresses a concern that the air carriers have expressed over the completion of the annual audits within the anniversary month. In addition to the scheduling difficulties that this has generated, it has also necessitated that many of the audits be conducted in late summer and early fall prior to the service providers being in a full operational mode. In many cases this has limited the auditor's effectiveness and has not been conducive to the high quality audit that is fundamental to the success

of the SIAGDP. Therefore it was agreed upon by the member air carriers participating in the SIAGDP and the FAA policy office that the grace month concept that is currently applied to the training/qualification annual requirements under the SIAGDP will be also applied to the annual audit requirements. This allows a three month period in which the audit can be conducted and credited as though it was conducted in the month it was originally due. For example if the audit in 2009 was completed in September the next audit would be due in September 2010. The 2010 audit could be completed in either August, September or October 2010 and credited as completed in its original due month of September 2010. The next audit would be due in September 2011 regardless of which of the three months the audit was completed in 2010. The same grace month rational will apply for the 2011 audit as well. If the recurring audit is not completed in the three month applicable period then the service provider would be considered as a new service provider under the SIAGDP and an initial detailed qualification audit would need to be completed prior to any SIAGDP participating air carrier utilizing their services under the SIAGDP. Policy development is continuing in 2015-2016.

OPERATIONS IN HEAVY SNOW

Tactile and Visual Checks of Aircraft. No holdover times (HOT) exist for heavy snow conditions in the current HOT tables. Review of existing data from past testing has indicated takeoffs may be safely conducted with proper tactile and/or visual checks, as appropriate for the aircraft, and a determination that the fluid has not failed. A tactile and/or visual check in heavy snow conditions must be accomplished in a manner that provides an assessment that can be accurately accomplished. It is imperative that the tactile and/or visual check procedures to determine if the anti-icing fluid has failed in heavy snow conditions be at least as comprehensive as the authorized procedures for the operator's pretakeoff contamination check (when HOTs have been exceeded) for those precipitation conditions for which HOTs exist. Anti-icing fluids dissolve the snow and absorb the resulting moisture into the fluid. When the fluid begins to fail it starts to change in appearance (e.g., less glossy and more opaque) and the snow starts to accumulate on and in the fluid. At this stage, the fluid has failed and takeoff is not authorized. If the operator's procedure to accomplish this check is different from the operator's approved pretakeoff contamination check procedures for other precipitation conditions, this check procedure must be verified and approved by the operator's Principal Operations Inspector (POI).

Takeoff in Heavy Snow Conditions. Operators with a deicing program approved in accordance with 14 CFR part 121, § 121.629, will be allowed to takeoff in heavy snow conditions subject to the following restrictions:

- 1) The aircraft must be anti-iced with undiluted Type IV fluid.
- 2) The aircraft critical surfaces must be free of contaminants, or the aircraft must be properly deiced before the application of the anti-icing fluid.
- 3) When appropriate, the operator must accomplish an approved tactile and/or visual check of the aircraft critical surfaces within 5 minutes of takeoff.
- 4) If this check is accomplished visually from within the aircraft, the view must be such that it is not obscured by de/anti-icing fluid, dirt, or fogging. If the critical surfaces cannot be seen due to snowfall, distance from the viewing position, or inadequate lighting, or for any other reason, the check must be a visual or tactile check conducted from outside the aircraft.
- 5) If a definitive fluid failure determination cannot be made using the checks prescribed, takeoff is not authorized. The aircraft must be completely deiced, and if precipitation is still present, anti-iced again before a subsequent takeoff.

Note: Current aircraft certification standards only require testing of flight instrument sensing devices and engine anti-icing systems in moderate snow levels. Ground operations in heavy snow conditions may exceed the capabilities or limitations of these systems and devices to adequately provide anti-icing.

HOLDOVER TIME (HOT) GUIDELINES FOR WINTER 2015-2016

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90% Adjusted Type III HOT Guidelines - CLARIANT SAFEWING MP III 2031 ECO,
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90% Adjusted Type IV HOT Guidelines - CRYOTECH POLAR GUARD® Table 4F-90%

90% Adjusted Type IV HOT Guidelines - CRYOTECH POLAR GUARD® ADVANCE Table 4G-90%

90% Adjusted Type IV HOT Guidelines - DEICING SOLUTIONS ECO-SHIELD® Table 4H-90%

90% Adjusted Type IV HOT Guidelines - DOW CHEMICAL UCAR™ ENDURANCE EG106 .. Table 4I-90%

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90% Adjusted Type IV HOT Guidelines - DOW CHEMICAL UCAR™ FLIGHTGUARD
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90% Adjusted Type IV HOT Guidelines - KILFROST ABC-S PLUS Table 4L-90%

90% Adjusted Type IV HOT Guidelines - LNT SOLUTIONS E450 Table 4M-90%

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90% Adjusted Allowance Times

90% Adjusted Ice Pellet and Small Hail Allowance Times - SAE Type III Fluids Table 6-90%

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TABLE 0. HOLDOVER TIME GUIDELINES FOR SAE TYPE I, TYPE II, TYPE III, AND TYPE IV FLUIDS IN ACTIVE FROST

Outside Air Temperature ^{1,2}		Approximate Holdover Times (hours:minutes)	Outside Air Temperature ²		Concentration Neat Fluid/Water (Volume %/ Volume %)	Approximate Holdover Times (hours:minutes)		
Degrees Celsius	Degrees Fahrenheit	Active Frost Type I	Degrees Celsius	Degrees Fahrenheit		Active Frost		
			Type II	Type III ³		Type IV		
-1 and above	30 and above	0:45 (0:35) ⁴	-1 and above	30 and above	100/0	8:00	2:00	12:00
			75/25	5:00	1:00	5:00		
			50/50	3:00	0:30	3:00		
below -1 to -3	below 30 to 27		100/0	8:00	2:00	12:00		
			75/25	5:00	1:00	5:00		
			50/50	1:30	0:30	3:00		
below -3 to -10	below 27 to 14		100/0	8:00	2:00	10:00		
			75/25	5:00	1:00	5:00		
below -10 to -14	below 14 to 7	100/0	6:00	2:00	6:00			
		75/25	1:00	1:00	1:00			
below -14 to -21	below 7 to -6	100/0	6:00	2:00	6:00			
below -21 to LOU	below -6 to LOU	100/0	2:00	2:00	4:00			
		Below -25	Below -13	No holdover time guidelines exist				

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

- 1 Type I Fluid / Water Mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
- 2 Ensure that the lowest operational use temperature (LOU) is respected.
- 3 To use the Type III fluid frost holdover times, the fluid brand being used must be known. AllClear AeroClear MAX must be applied unheated. Clariant Safewing MP III 2031 ECO must be applied heated.
- 4 Value in parentheses is for aircraft with critical surfaces that are predominantly or entirely constructed of composite materials.

CAUTIONS:

- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 1A. HOLDOVER TIME GUIDELINES FOR SAE TYPE I FLUID ON CRITICAL AIRCRAFT SURFACES COMPOSED PREDOMINANTLY OF ALUMINUM

Outside Air Temperature ^{1,2}		Wing Surface	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	Aluminum	0:11-0:17	0:18-0:22	0:11-0:18	0:06-0:11	0:09-0:13	0:02-0:05	0:02-0:05	CAUTION: No holdover time guidelines exist
below -3 to -6	below 27 to 21	Aluminum	0:08-0:13	0:14-0:17	0:08-0:14	0:05-0:08	0:05-0:09	0:02-0:05		
below -6 to -10	below 21 to 14	Aluminum	0:06-0:10	0:11-0:13	0:06-0:11	0:04-0:06	0:04-0:07	0:02-0:05		
Below -10	below 14	Aluminum	0:05-0:09	0:07-0:08	0:04-0:07	0:02-0:04				

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

- 1 Type I fluid / water mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 1C. HOLDOVER TIME GUIDELINES FOR SAE TYPE I FLUID ON CRITICAL AIRCRAFT SURFACES COMPOSED PREDOMINANTLY OF COMPOSITES

Outside Air Temperature ^{1,2}		Wing Surface	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	Composite	0:09-0:16	0:12-0:15	0:06-0:12	0:03-0:06	0:08-0:13	0:02-0:05	0:01-0:05	CAUTION: No holdover time guidelines exist
below -3 to -6	below 27 to 21	Composite	0:06-0:08	0:11-0:13	0:05-0:11	0:02-0:05	0:05-0:09	0:02-0:05		
below -6 to -10	below 21 to 14	Composite	0:04-0:08	0:09-0:12	0:05-0:09	0:02-0:05	0:04-0:07	0:02-0:05		
Below -10	below 14	Composite	0:04-0:07	0:07-0:08	0:04-0:07	0:02-0:04				

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

- 1 Type I fluid / water mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2-GENERIC. TYPE II HOLDOVER TIME GUIDELINES FOR SAE TYPE II FLUIDS

Outside Air Temperature ¹		Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	0:35-1:30	0:20-0:45	0:30-1:00	0:15-0:30	0:07-0:40	CAUTION: No holdover time guidelines exist
		75/25	0:25-1:00	0:15-0:30	0:20-0:45	0:10-0:25	0:05-0:25	
		50/50	0:15-0:30	0:05-0:15	0:10-0:20	0:05-0:10		
below -3 to -14	below 27 to 7	100/0	0:20-1:05	0:15-0:30	0:20-0:45 ⁷	0:10-0:20 ⁷		
		75/25	0:25-0:50	0:08-0:20	0:15-0:30 ⁷	0:08-0:15 ⁷		
Below -14 to LOU	Below 7 to LOU	100/0	0:15-0:35 ⁸	0:15-0:30 ⁸				

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

- 1 Ensure that the lowest operational use temperature (LOU) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).
- 8 If the LOU is unknown, no holdover time guidelines exist below -25° C (-13 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2A. TYPE II HOLDOVER TIME GUIDELINES FOR ABAX ECOWING 26

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:25-2:35	1:35-1:50	1:00-1:35	0:40-1:00	0:50-1:35	0:40-0:50	0:20-1:25	CAUTION: No holdover time guidelines exist
		75/25	1:05-1:55	1:15-1:25	0:45-1:15	0:25-0:45	0:45-1:05	0:25-0:35	0:10-1:00	
		50/50	0:30-0:45	0:40-0:50	0:20-0:40	0:10-0:20	0:15-0:25	0:08-0:10		
below -3 to -14	below 27 to 7	100/0	0:45-2:15	1:25-1:40	0:55-1:25	0:35-0:55	0:30-1:10 ⁷	0:15-0:35 ⁷		
		75/25	0:35-1:15	0:55-1:05	0:40-0:55	0:25-0:40	0:20-0:50 ⁷	0:15-0:25 ⁷		
below -14 to -25	below 7 to -13	100/0	0:25-0:45	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2B. TYPE II HOLDOVER TIME GUIDELINES FOR AVIATION SHAANXI HI-TECH CLEANWING II

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	0:55-1:50	0:30-0:55	0:35-1:05	0:25-0:35	0:10-0:55	CAUTION: No holdover time guidelines exist
		75/25	0:50-1:20	0:25-0:45	0:35-1:00	0:20-0:30	0:07-0:50	
		50/50	0:35-1:00	0:15-0:30	0:20-0:40	0:10-0:20		
below -3 to -14	below 27 to 7	100/0	0:45-1:50	0:30-0:55	0:30-0:55 ⁷	0:20-0:25 ⁷		
		75/25	0:40-1:45	0:25-0:45	0:35-0:40 ⁷	0:20-0:25 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:20-0:50	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2C. TYPE II HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP II FLIGHT

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:30-4:00	2:35-3:00	1:35-2:35	1:00-1:35	1:20-2:00	0:45-1:25	0:10-1:30	CAUTION: No holdover time guidelines exist
		75/25	1:50-2:45	2:35-3:00	1:20-2:35	0:40-1:20	1:10-1:30	0:30-0:55	0:06-0:50	
		50/50	0:55-1:45	0:45-0:55	0:25-0:45	0:10-0:25	0:20-0:30	0:10-0:15		
below -3 to -14	below 27 to 7	100/0	0:55-1:45	1:50-2:10	1:05-1:50	0:40-1:05	0:35-1:30 ⁷	0:25-0:45 ⁷		
		75/25	0:25-1:05	1:20-1:40	0:40-1:20	0:20-0:40	0:25-1:10 ⁷	0:20-0:35 ⁷		
Below -14 to -29	Below 7 to -20.2	100/0	0:30-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2D. TYPE II HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP II FLIGHT PLUS

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	2:40-4:00	0:50-1:50	1:25-2:00	0:45-1:00	0:15-2:00	CAUTION: No holdover time guidelines exist
		75/25	2:35-4:00	1:00-1:45	1:35-2:00	0:50-1:15	0:15-1:15	
		50/50	1:05-2:20	0:15-0:25	0:30-1:05	0:15-0:20		
below -3 to -14	below 27 to 7	100/0	0:40-2:20	0:35-1:15	0:35-1:25 ⁷	0:35-0:55 ⁷		
		75/25	0:30-1:45	0:55-1:40	0:25-1:10 ⁷	0:30-0:45 ⁷		
Below -14 to -29	Below 7 to -20.2	100/0	0:20-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2E. TYPE II HOLDOVER TIME GUIDELINES FOR CRYOTECH POLAR GUARD® II

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
		Very Light ³		Light ³	Moderate					
-3 and above	27 and above	100/0	2:50-4:00	2:35-2:50	1:50-2:35	1:20-1:50	1:35-2:00	1:15-1:30	0:15-2:00	CAUTION: No holdover time guidelines exist
		75/25	2:30-4:00	2:25-2:55	1:20-2:25	0:45-1:20	1:40-2:00	0:40-1:10	0:09-1:40	
		50/50	0:50-1:25	1:20-1:45	0:35-1:20	0:15-0:35	0:20-0:45	0:09-0:20		
below -3 to -14	below 27 to 7	100/0	0:55-2:30	1:45-1:55	1:15-1:45	0:55-1:15	0:35-1:35 ⁷	0:35-0:45 ⁷		
		75/25	0:40-1:30	1:45-2:05	1:00-1:45	0:35-1:00	0:25-1:05 ⁷	0:35-0:45 ⁷		
Below -14 to -30.5	Below 7 to -22.9	100/0	0:25-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2F. TYPE II HOLDOVER TIME GUIDELINES FOR KILFROST ABC-ICE CLEAR II

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:00-1:45	1:45-2:10	0:50-1:45	0:25-0:50	0:40-1:05	0:25-0:35	0:07-0:45	CAUTION: No holdover time guidelines exist
		75/25	0:50-1:10	1:20-1:45	0:40-1:20	0:20-0:40	0:30-0:45	0:20-0:30	0:05-0:35	
		50/50	0:15-0:30	0:20-0:25	0:15-0:20	0:08-0:15	0:10-0:20	0:07-0:10		
below -3 to -14	below 27 to 7	100/0	0:40-1:35	1:15-1:35	0:35-1:15	0:20-0:35	0:25-1:00 ⁷	0:15-0:30 ⁷		
		75/25	0:40-1:20	0:55-1:10	0:25-0:55	0:15-0:25	0:25-0:45 ⁷	0:15-0:20 ⁷		
Below -14 to -29.5	Below 7 to -21.1	100/0	0:20-0:40	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2G. TYPE II HOLDOVER TIME GUIDELINES FOR KILFROST ABC-K PLUS

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	2:15-3:45	1:00-1:40	1:50-2:00	1:00-1:25	0:20-2:00	CAUTION: No holdover time guidelines exist
		75/25	1:40-2:30	0:35-1:10	1:25-2:00	0:50-1:10	0:15-2:00	
		50/50	0:35-1:05	0:07-0:15	0:20-0:30	0:10-0:15		
below -3 to -14	below 27 to 7	100/0	0:30-1:05	0:50-1:25	0:25-1:00 ⁷	0:15-0:35 ⁷		
		75/25	0:25-1:25	0:35-1:05	0:20-0:55 ⁷	0:09-0:30 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:30-0:55	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2H. TYPE II HOLDOVER TIME GUIDELINES FOR LNT SOLUTIONS P250

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:10-4:00	3:00-3:00	1:45-3:00	0:55-1:45	1:35-2:00	0:50-1:25	0:15-2:00	CAUTION: No holdover time guidelines exist
		75/25	1:50-2:35	2:50-3:00	1:25-2:50	0:45-1:25	1:20-1:35	0:40-1:00	0:10-1:50	
		50/50	0:35-0:50	1:05-1:25	0:30-1:05	0:15-0:30	0:20-0:35	0:15-0:20		
below -3 to -14	below 27 to 7	100/0	0:45-2:20	3:00-3:00	1:40-3:00	0:50-1:40	0:25-1:20 ⁷	0:25-0:35 ⁷		
		75/25	0:35-1:45	2:50-3:00	1:25-2:50	0:45-1:25	0:20-1:15 ⁷	0:20-0:30 ⁷		
Below -14 to LOUT	Below 7 to LOUT	100/0	0:20-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2I. TYPE II HOLDOVER TIME GUIDELINES FOR NEWAVE AEROCHEMICAL FCY-2

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	1:15-2:25	0:30-0:55	0:35-1:05	0:25-0:35	0:08-0:45	CAUTION: No holdover time guidelines exist
		75/25	0:50-1:30	0:20-0:40	0:25-0:45	0:15-0:25	0:05-0:25	
		50/50	0:25-0:35	0:15-0:25	0:10-0:20	0:07-0:10		
below -3 to -14	below 27 to 7	100/0	0:45-1:30	0:15-0:30	0:20-0:45 ⁷	0:15-0:20 ⁷		
		75/25	0:30-1:05	0:10-0:20	0:15-0:30 ⁷	0:08-0:15 ⁷		
below -14 to -28	below 7 to -18.4	100/0	0:25-0:35	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 2J. TYPE II HOLDOVER TIME GUIDELINES FOR NEWAVE AEROCHEMICAL FCY-2 BIO+

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:25-2:30	2:20-2:55	1:05-2:20	0:30-1:05	0:50-1:20	0:25-0:45	0:08-1:15	CAUTION: No holdover time guidelines exist
		75/25	0:45-1:20	1:20-1:40	0:40-1:20	0:20-0:40	0:25-0:50	0:15-0:25	0:06-0:35	
		50/50	0:15-0:30	0:25-0:30	0:15-0:25	0:08-0:15	0:10-0:20	0:08-0:10		
below -3 to -14	below 27 to 7	100/0	0:40-1:30	1:00-1:15	0:30-1:00	0:15-0:30	0:35-1:05 ⁷	0:15-0:30 ⁷		
		75/25	0:30-1:05	0:35-0:45	0:20-0:35	0:08-0:20	0:20-0:35 ⁷	0:15-0:20 ⁷		
below -14 to -28.5	below 7 to -19.3	100/0	0:20-1:00	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 3A-LS. LOW SPEED TYPE III HOLDOVER TIME GUIDELINES FOR ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED¹
FOR AIRCRAFT CONFORMING TO THE SAE AS5900 LOW SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	1:00-2:15	0:35-0:40	0:20-0:35	0:10-0:20	0:40-1:20	0:25-0:30	0:09-1:00	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
		50/50	N/A	N/A	N/A	N/A	N/A	N/A		
below -3 to -10	below 27 to 14	100/0	1:00-1:45	0:30-0:35	0:15-0:30	0:09-0:15	0:40-1:10	0:30-0:40		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -10 to -16	below 14 to 3.2	100/0	0:30-1:05	0:30-0:35	0:15-0:30	0:08-0:15				

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

- 1 Fluid must be applied unheated to use these holdover times. No holdover times exist for this fluid when applied heated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 3A-HS. HIGH SPEED TYPE III HOLDOVER TIME GUIDELINES FOR ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED¹
FOR AIRCRAFT CONFORMING TO THE SAE AS5900 HIGH SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	1:00-2:15	0:35-0:40	0:20-0:35	0:10-0:20	0:40-1:20	0:25-0:30	0:09-1:00	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
		50/50	N/A	N/A	N/A	N/A	N/A	N/A		
below -3 to -10	below 27 to 14	100/0	1:00-1:45	0:30-0:35	0:15-0:30	0:09-0:15	0:40-1:10	0:30-0:40		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -10 to -25	below 14 to -13	100/0	0:30-1:05	0:30-0:35	0:15-0:30	0:08-0:15				
below -25 to -35	below -13 to -31	100/0	0:18-0:55							

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

- 1 Fluid must be applied unheated to use these holdover times. No holdover times exist for this fluid when applied heated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 3B-LS. LOW SPEED TYPE III HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP III 2031 ECO, APPLIED HEATED¹
FOR AIRCRAFT CONFORMING TO THE SAE AS5900 LOW SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	0:25-0:50	0:40-0:55	0:20-0:40	0:10-0:20	0:17-0:30	0:10-0:14	0:05-0:30	CAUTION: No holdover time guidelines exist
		75/25	0:19-0:40	0:35-0:45	0:16-0:35	0:07-0:16	0:13-0:20	0:08-0:09	0:03-0:18	
		50/50	0:13-0:18	0:25-0:30	0:13-0:25	0:07-0:13	0:13-0:14	0:07-0:07		
below -3 to -10	below 27 to 14	100/0	0:35-1:15	0:40-0:50	0:20-0:40	0:10-0:20	0:14-0:30	0:09-0:13		
		75/25	0:19-0:45 ⁸	0:25-0:35 ⁸	0:12-0:25 ⁸	0:05-0:12 ⁸	0:09-0:16 ⁸	0:06-0:08 ⁸		
below -10 to -16.5	below 14 to 2.3	100/0	0:25-0:45	0:40-0:45	0:19-0:40	0:09-0:19				

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

- 1 Fluid must be applied heated to use these holdover times. No holdover times exist for this fluid applied unheated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 6 provides allowance times for ice pellets and small hail).
- 8 No holdover time guidelines exist for 75/25 fluid below -9 °C (15.8 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 3B-HS. HIGH SPEED TYPE III HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP III 2031 ECO, APPLIED HEATED¹
FOR AIRCRAFT CONFORMING TO THE SAE AS5900 HIGH SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	0:25-0:50	0:40-0:55	0:20-0:40	0:10-0:20	0:17-0:30	0:10-0:14	0:05-0:30	CAUTION: No holdover time guidelines exist
		75/25	0:19-0:40	0:35-0:45	0:16-0:35	0:07-0:16	0:13-0:20	0:08-0:09	0:03-0:18	
		50/50	0:13-0:18	0:25-0:30	0:13-0:25	0:07-0:13	0:13-0:14	0:07-0:07		
below -3 to -10	below 27 to 14	100/0	0:35-1:15	0:40-0:50	0:20-0:40	0:10-0:20	0:14-0:30	0:09-0:13		
		75/25	0:19-0:45	0:25-0:35	0:12-0:25	0:05-0:12	0:09-0:16	0:06-0:08		
below -10 to -25	below 14 to -13	100/0	0:25-0:45	0:40-0:45	0:19-0:40	0:09-0:19				
below -25 to -29	below -13 to -20.2	100/0	0:25-0:45	0:40-0:45	0:19-0:40	0:09-0:19				

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

- 1 Fluid must be applied heated to use these holdover times. No holdover times exist for this fluid applied unheated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 6 provides allowance times for ice pellets and small hail).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4-GENERIC. TYPE IV HOLDOVER TIME GUIDELINES FOR SAE TYPE IV FLUIDS

Outside Air Temperature ¹		Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	1:30-2:25	0:35-1:10	0:50-1:30	0:35-0:50	0:10-1:25	CAUTION: No holdover time guidelines exist
		75/25	1:25-2:40	0:30-1:05	0:50-1:15	0:30-0:45	0:09-1:15	
		50/50	0:25-0:40	0:09-0:15	0:15-0:25	0:09-0:15		
below -3 to -14	below 27 to 7	100/0	0:20-1:20	0:25-0:50	0:25-1:10 ⁷	0:15-0:25 ⁷		
		75/25	0:25-0:50 ⁸	0:20-0:40 ⁸	0:15-1:05 ^{7,8}	0:15-0:25 ^{7,8}		
below -14 to LOU	below 7 to LOU	100/0	0:15-0:40 ⁹	0:15-0:30 ⁹				

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

- 1 Ensure that the lowest operational use temperature (LOU) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).
- 8 If the LOU is unknown, no holdover time guidelines exist below -5.5 °C (22.1 °F).
- 9 If the LOU is unknown, no holdover time guidelines exist below -23.5 °C (-10.3 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4A. TYPE IV HOLDOVER TIME GUIDELINES FOR ABAX ECOWING AD-49

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:20-4:00	2:50-3:00	1:50-2:50	1:10-1:50	1:25-2:00	1:00-1:25	0:10-1:55	CAUTION: No holdover time guidelines exist
		75/25	2:25-4:00	2:05-2:15	1:40-2:05	1:20-1:40	1:55-2:00	0:50-1:30	0:10-1:40	
		50/50	0:25-0:50	0:40-0:45	0:25-0:40	0:15-0:25	0:15-0:30	0:10-0:15		
below -3 to -14	below 27 to 7	100/0	0:20-1:35	2:50-3:00	1:50-2:50	1:10-1:50	0:25-1:25 ⁷	0:20-0:25 ⁷		
		75/25	0:30-1:10	2:05-2:15	1:40-2:05	1:20-1:40	0:15-1:05 ⁷	0:15-0:25 ⁷		
below -14 to -26	below 7 to -14.8	100/0	0:25-0:40	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4B. TYPE IV HOLDOVER TIME GUIDELINES FOR CLARIANT MAX FLIGHT 04

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:40-4:00	3:00-3:00	2:45-3:00	1:25-2:45	2:00-2:00	1:10-1:30	0:20-2:00	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	0:50-2:30	2:20-2:50	1:10-2:20	0:35-1:10	0:25-1:30 ⁷	0:20-0:40 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -23.5	below 7 to -10.3	100/0	0:20-0:45	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4C. TYPE IV HOLDOVER TIME GUIDELINES FOR CLARIANT MAX FLIGHT SNEG

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:25-4:00	2:45-3:00	1:40-2:45	1:05-1:40	2:00-2:00	0:50-1:40	0:20-1:30	CAUTION: No holdover time guidelines exist
		75/25	4:00-4:00	2:25-2:50	1:30-2:25	0:55-1:30	1:30-2:00	1:05-1:20	0:15-1:45	
		50/50	1:30-3:30	1:45-2:20	0:45-1:45	0:20-0:45	0:35-1:10	0:15-0:30		
below -3 to -14	below 27 to 7	100/0	0:45-2:20	2:00-2:20	1:15-2:00	0:45-1:15	0:30-1:25 ⁷	0:25-0:40 ⁷		
		75/25	0:30-1:25	1:40-2:00	1:00-1:40	0:40-1:00	0:20-1:05 ⁷	0:20-0:40 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:20-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4D. TYPE IV HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP IV LAUNCH

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	4:00-4:00	2:50-3:00	1:45-2:50	1:05-1:45	1:30-2:00	1:00-1:40	0:15-1:40	CAUTION: No holdover time guidelines exist
		75/25	3:40-4:00	3:00-3:00	1:45-3:00	1:00-1:45	1:40-2:00	0:45-1:15	0:10-1:45	
		50/50	1:25-2:45	1:25-1:40	0:45-1:25	0:25-0:45	0:30-0:50	0:20-0:25		
below -3 to -14	below 27 to 7	100/0	1:00-1:55	2:10-2:30	1:20-2:10	0:50-1:20	0:35-1:40 ⁷	0:25-0:45 ⁷		
		75/25	0:40-1:20	2:25-2:55	1:25-2:25	0:45-1:25	0:25-1:10 ⁷	0:25-0:45 ⁷		
below -14 to -28.5	below 7 to -19.3	100/0	0:30-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4E. TYPE IV HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP IV LAUNCH PLUS

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:55-4:00	3:00-3:00	2:05-3:00	0:55-2:05	2:00-2:00	1:00-2:00	0:20-2:00	CAUTION: No holdover time guidelines exist
		75/25	3:55-4:00	3:00-3:00	1:55-3:00	0:50-1:55	2:00-2:00	1:20-1:25	0:20-1:50	
		50/50	1:15-1:50	1:35-2:00	0:45-1:35	0:20-0:45	0:25-1:00	0:15-0:20		
below -3 to -14	below 27 to 7	100/0	0:55-2:15	3:00-3:00	1:25-3:00	0:40-1:25	0:25-1:35 ⁷	0:25-0:40 ⁷		
		75/25	0:40-2:00	2:55-3:00	1:15-2:55	0:30-1:15	0:20-1:05 ⁷	0:20-0:30 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:25-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4F. TYPE IV HOLDOVER TIME GUIDELINES FOR CRYOTECH POLAR GUARD®

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	2:15-3:30	0:50-1:30	1:15-2:00	0:50-1:15	0:15-1:25	CAUTION: No holdover time guidelines exist
		75/25	1:40-2:40	0:35-1:10	1:05-1:25	0:35-1:00	0:10-1:15	
		50/50	0:25-0:40	0:10-0:15	0:15-0:25	0:10-0:15		
below -3 to -14	below 27 to 7	100/0	0:45-1:45	0:30-0:55	0:25-1:10 ⁷	0:15-0:35 ⁷		
		75/25 ⁸	0:35-1:30 ⁸	0:20-0:40 ⁸	0:25-1:05 ⁸	0:20-0:30 ⁸		
Below -14 to -23.5	Below 7 to -10.3	100/0	0:20-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).
- 8 Temperature is limited to -5.5 °C (22 °F) when using 75/25 dilution of this fluid.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4G. TYPE IV HOLDOVER TIME GUIDELINES FOR CRYOTECH POLAR GUARD® ADVANCE

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:50-4:00	2:35-2:50	1:50-2:35	1:20-1:50	1:35-2:00	1:15-1:30	0:15-2:00	CAUTION: No holdover time guidelines exist
		75/25	2:30-4:00	2:25-2:55	1:20-2:25	0:45-1:20	1:40-2:00	0:40-1:10	0:09-1:40	
		50/50	0:50-1:25	1:20-1:45	0:35-1:20	0:15-0:35	0:20-0:45	0:09-0:20		
below -3 to -14	below 27 to 7	100/0	0:55-2:30	1:45-1:55	1:15-1:45	0:55-1:15	0:35-1:35 ⁷	0:35-0:45 ⁷		
		75/25	0:40-1:30	1:45-2:05	1:00-1:45	0:35-1:00	0:25-1:05 ⁷	0:35-0:45 ⁷		
Below -14 to -30.5	Below 7 to -22.9	100/0	0:25-0:50	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4H. TYPE IV HOLDOVER TIME GUIDELINES FOR DEICING SOLUTIONS ECO-SHIELD®

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:30-2:25	2:25-2:55	1:20-2:25	0:45-1:20	0:55-1:35	0:40-0:50	0:15-1:55	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	1:10-2:30	1:45-2:05	0:55-1:45	0:30-0:55	0:45-2:00 ⁷	0:25-0:40 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -24.5	below 7 to -12.1	100/0	0:30-0:55	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4I. TYPE IV HOLDOVER TIME GUIDELINES FOR DOW CHEMICAL UCAR™ ENDURANCE EG106

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:05-3:10	2:45-3:00	1:20-2:45	0:40-1:20	1:10-2:00	0:50-1:15	0:20-2:00	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
		50/50	N/A	N/A	N/A	N/A	N/A	N/A		
below -3 to -14	below 27 to 7	100/0	1:50-3:20	2:10-2:45	1:05-2:10	0:30-1:05	0:55-1:50 ⁷	0:45-1:10 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -27	below 7 to -16.6	100/0	0:30-1:05	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4J. TYPE IV HOLDOVER TIME GUIDELINES FOR DOW CHEMICAL UCAR™ FLIGHTGUARD AD-480

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	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	1:30-2:45	0:30-1:05	0:50-1:15	0:30-0:45	0:10-1:15	
		50/50	0:30-0:45	0:09-0:20	0:15-0:25	0:09-0:15		
below -3 to -14	below 27 to 7	100/0	0:20-1:20	0:30-0:55	0:25-1:20 ⁷	0:15-0:30 ⁷		
		75/25	0:25-0:50	0:20-0:45	0:25-1:05 ⁷	0:15-0:30 ⁷		
below -14 to -26	below 7 to -14.8	100/0	0:15-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4K. TYPE IV HOLDOVER TIME GUIDELINES FOR DOW CHEMICAL UCAR™ FLIGHTGUARD AD-49

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:20-4:00	2:50-3:00	1:50-2:50	1:10-1:50	1:25-2:00	1:00-1:25	0:10-1:55	CAUTION: No holdover time guidelines exist
		75/25	2:25-4:00	2:05-2:15	1:40-2:05	1:20-1:40	1:55-2:00	0:50-1:30	0:10-1:40	
		50/50	0:25-0:50	0:40-0:45	0:25-0:40	0:15-0:25	0:15-0:30	0:10-0:15		
below -3 to -14	below 27 to 7	100/0	0:20-1:35	2:50-3:00	1:50-2:50	1:10-1:50	0:25-1:25 ⁷	0:20-0:25 ⁷		
		75/25	0:30-1:10	2:05-2:15	1:40-2:05	1:20-1:40	0:15-1:05 ⁷	0:15-0:25 ⁷		
below -14 to -26	below 7 to -14.8	100/0	0:25-0:40	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4L. TYPE IV HOLDOVER TIME GUIDELINES FOR KILFROST ABC-S PLUS

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:10-4:00	3:00-3:00	2:05-3:00	1:15-2:05	1:50-2:00	1:05-2:00	0:25-2:00	CAUTION: No holdover time guidelines exist
		75/25	1:25-2:40	2:05-2:25	1:15-2:05	0:45-1:15	1:00-1:20	0:30-0:50	0:10-1:20	
		50/50	0:30-0:55	1:00-1:10	0:30-1:00	0:15-0:30	0:15-0:40	0:15-0:20		
below -3 to -14	below 27 to 7	100/0	0:55-3:30	2:55-3:00	1:45-2:55	1:00-1:45	0:25-1:35 ⁷	0:20-0:30 ⁷		
		75/25	0:45-1:50	1:45-2:00	1:00-1:45	0:35-1:00	0:20-1:10 ⁷	0:15-0:25 ⁷		
below -14 to -28	below 7 to -18.4	100/0	0:40-1:00	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4M. TYPE IV HOLDOVER TIME GUIDELINES FOR LNT SOLUTIONS E450

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:50-2:55	2:25-2:45	1:35-2:25	1:00-1:35	1:35-2:00	0:55-1:20	0:25-2:00	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	1:30-3:55	1:50-2:05	1:10-1:50	0:45-1:10	1:45-2:00 ⁷	1:05-1:40 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to LOUT	below 7 to LOUT	100/0	0:35-1:05	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 4N. TYPE IV HOLDOVER TIME GUIDELINES FOR NEWAVE AEROCHEMICAL FCY 9311

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:55-4:00	2:20-2:55	1:10-2:20	0:35-1:10	1:10-2:00	0:40-1:05	0:15-1:25	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	0:35-2:05	1:35-2:00	0:50-1:35	0:25-0:50	0:35-1:20 ⁷	0:20-0:35 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -29.5	below 7 to -21.1	100/0	0:30-0:55	0:40-0:50	0:30-0:40	0:15-0:30				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7 provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

TABLE 5. SNOWFALL INTENSITIES AS A FUNCTION OF PREVAILING VISIBILITY

Time of Day	Temp.		Visibility in Statute Miles (Meters)									Snowfall Intensity
	Degrees Celsius	Degrees Fahrenheit	≥ 2 1/2 (≥ 4000)	2 (3200)	1 3/4 (2800)	1 1/2 (2400)	1 1/4 (2000)	1 (1600)	3/4 (1200)	1/2 (800)	≤ 1/4 (≤ 400)	
Day	colder/equal -1	colder/equal 30	Very Light	Very Light	Very Light	Light	Light	Light	Moderate	Moderate	Heavy	
	warmer than -1	warmer than 30	Very Light	Light	Light	Light	Light	Moderate	Moderate	Heavy	Heavy	
Night	colder/equal -1	colder/equal 30	Very Light	Light	Light	Moderate	Moderate	Moderate	Moderate	Heavy	Heavy	
	warmer than -1	warmer than 30	Very Light	Light	Moderate	Moderate	Moderate	Moderate	Heavy	Heavy	Heavy	

NOTE 1: This table is for estimating snowfall intensity. It is based upon the technical report, "The Estimation of Snowfall Rate Using Visibility," Rasmussen, et al., Journal of Applied Meteorology, October 1999 and additional in situ data.

NOTE 2: This table is to be used with Type I, II, III, and IV fluid guidelines.

NOTE 3: If visibility from a source other than the METAR is used, round to the nearest visibility in the table, rounding down if it is right in between two values. For example, .6 and .625 (5/8) would both be rounded to .5 (1/2).

HEAVY = Caution—No Holdover Time Guidelines Exist

During snow conditions alone, the use of Table 5 in determining snowfall intensities does not require pilot company coordination or company reporting procedures since this table is more conservative than the visibility table used by official weather observers in determining snowfall intensities.

Because the FAA Snowfall Intensities Table, like the FMH-1 Table, uses visibility to determine snowfall intensities, if the visibility is being reduced by snow along with other forms of obscuration such as fog, haze, smoke, etc., the FAA Snowfall Intensities Table does not need to be used to estimate the snow fall intensity for HOT determination during the presence of these obscurations. Use of the FAA Snow Intensity Table under these conditions may needlessly overestimate the actual snowfall intensity and therefore the snowfall intensity being reported by the weather observer or automated service observing system (ASOS), from the FMH-1 Table may be used.

ICE PELLET AND SMALL HAIL ALLOWANCE TIMES 2015-2016

1. Background

During the winter of 2006-2007, operations in ice pellets were approved for “light ice pellets” with an allowance time of 25 minutes. That time was based on limited research conducted late in the winter of 2005-2006 at the request of various industry groups. Additional and more comprehensive ice pellet research was conducted jointly by the research teams of the FAA and Transport Canada during the 2007-2008 winter season.

This research consisted of extensive climatic chamber and wind tunnel testing with ice pellets (light and moderate) and light ice pellets mixed with other forms of precipitation. Additionally, Type IV anti-icing fluid with ice pellets embedded was evaluated for its aging qualities over periods of time beyond the allowance times, when the active precipitation time was limited to the allowance times. Results of this research provide the basis for extended allowance times for operations in light ice pellets, as well as allowance times for operations in moderate ice pellets and light ice pellets mixed with other forms of precipitation. Additional ice pellet research was conducted during the winter season of 2008-2009 which further expanded the ice pellet allowance times under specified conditions. Guidance was also provided for Type IV anti-icing fluid with embedded ice pellets “aged” beyond its allowance time when the precipitation stops at or prior to the expiration of the allowance time.

During the winter of 2009-2010, wind tunnel research conducted with a newer generation type airfoil showed that Propylene Glycol (PG) and Ethylene Glycol (EG) fluids behave differently under certain temperature and ice pellet conditions. Specifically, higher aircraft rotation speeds are required to effectively remove PG fluid contaminated with light or moderate ice pellets at temperatures less than -10 °C. Therefore, there are no allowance times associated with the use of PG fluids on aircraft with rotation speeds of less than 115 knots in conditions of light or moderate ice pellets at temperatures below -10 °C.

Furthermore, research with this newer generation type airfoil has shown that the allowance times are shorter when using PG fluids under certain conditions for all aircraft regardless of the rotation speed. This research resulted in the allowance time when using PG fluids at temperatures of -5 °C and above being limited to 15 minutes in moderate ice pellets. Currently all Type IV fluids are PG based with the exception of Dow EG106 and LNT Solutions E450 which are EG based.

Research has indicated that Type IV PG fluids are removed less effectively when contaminated with moderate ice pellets at temperatures below -16 °C; operations in these conditions are not recommended. Therefore, there are no allowance times associated with the use of PG fluids in conditions of moderate ice pellets at temperatures below -16 °C, irrespective of aircraft rotation speed.

In 2014-2015, allowance times were published for undiluted (100/0) Type III fluid applied unheated in select conditions. Further testing is required to expand Type III allowance times in other conditions, such as temperatures below -10 °C. No testing has been conducted with AllClear AeroClear MAX; therefore, no allowance times currently exist for this fluid. Allowance times for small hail were also added in 2014-2015, as it was determined small hail is meteorologically equivalent to moderate ice pellets.

2. Operations in Light and Moderate Ice Pellets and Light Ice Pellets mixed with other forms of precipitation.

A. Tests have shown that ice pellets generally remain in the frozen state imbedded in Type III and Type IV anti-icing fluid, and are not absorbed by the fluid in the same manner as other forms of precipitation. Using current guidelines for determining anti-icing fluid failure, the presence of a

contaminant not absorbed by the fluid (remaining imbedded) would be an indication that the fluid has failed. These imbedded ice pellets are generally not readily detectable by the human eye during pre-takeoff contamination check procedures. Therefore, a visual pre-takeoff contamination check in ice pellet conditions may not be of value and is not required.

B. The research data have also shown that after proper deicing and anti-icing, the accumulation of light ice pellets, moderate ice pellets, and ice pellets mixed with other forms of precipitation in Type III or Type IV fluid will not prevent the fluid from flowing off the aerodynamic surfaces during takeoff except as noted above. This flow-off due to the shearing forces occurs with rotation speeds consistent with Type III or Type IV anti-icing fluid recommended applications, and up to the applicable allowance time listed in Table 6 and Table 7 below. These allowance times are from the start of the Type III/IV anti-icing fluid application. Additionally, if the ice pellet condition stops, and the allowance time has not been exceeded, the operator is permitted to consider the Type III or Type IV anti-icing fluid effective without any further action up to 90 minutes after the start of the application time of the Type III or Type IV anti icing fluid. To use this guidance in the following conditions, the outside air temperature (OAT) must remain constant or increase during the 90 minute period:

- light ice pellets mixed with light or moderate freezing drizzle;
- light ice pellets mixed with light freezing rain;
- light ice pellets mixed with light rain; and
- light ice pellets mixed with moderate rain.

Examples:

- 1) Type IV anti-icing fluid is applied with a start of application time of 10:00, OAT is 0 °C, light ice pellets fall until 10:20 and stop and do not restart. The allowance time stops at 10:50; however, provided that no precipitation restarts after the allowance time of 10:50 the aircraft may takeoff without any further action up to 11:30.
- 2) Type IV anti-icing fluid is applied with a start of application time of 10:00, OAT is 0 °C, light ice pellets mixed with freezing drizzle falls until 10:10 and stops and restarts at 10:15 and stops at 10:20. The allowance time stops at 10:25, however provided that the OAT remains constant or increases and that no precipitation restarts after the allowance time of 10:25, the aircraft may takeoff without any further action up to 11:30.
- 3) Type IV anti-icing fluid is applied with a start of application time of 10:00, OAT is 0 °C, light ice pellets mixed with light freezing rain falls until 10:10, stops and restarts at 10:15, and stops at 10:20. The allowance time stops at 10:25; however, provided that the OAT remains constant or increases and no precipitation restarts after the end of the allowance time at 10:25, the aircraft may take off without any further action until 11:30.
- 4) On the other hand, if Type IV anti-icing fluid is applied with a start of application time of 10:00, OAT is 0 °C, light ice pellets mixed with freezing drizzle falls until 10:10 and stops and restarts at 10:30 with the allowance time stopping at 10:25 the aircraft may not takeoff, no matter how short the time or type of precipitation after 10:25, without being deiced and anti-iced if precipitation is present.

C. Operators with a deicing program approved in accordance with Title 14 of the Code of Federal Regulations 14 CFR part 121, § 121.629, will be allowed, in the specified ice pellet and small hail conditions listed in Tables 6 and 7, up to the specific allowance time, to commence the takeoff with the following restrictions:

- 1) The aircraft critical surfaces must be free of contaminants before applying Type III or Type IV anti-icing fluid. If not, the aircraft must be properly deiced and checked to be free of contaminants before the application of Type III or Type IV anti-icing fluid.

- 2) The allowance time is valid only if the aircraft is anti-iced with undiluted Type III or Type IV fluid.
- 3) The Type III allowance times are only applicable for unheated anti-icing fluid applications.
- 4) Due to the shearing qualities of Type III and Type IV fluids with imbedded ice pellets, this allowance is limited to aircraft with a rotation speed of 100 knots or greater or 115 knots as indicated in the Ice Pellet Allowance Table below.
- 5) If the takeoff is not accomplished within the applicable allowance time in Table 6 or Table 7, the aircraft must be completely deiced, and if precipitation is still present, anti-iced again prior to a subsequent takeoff. If the precipitation stops at or before the time limits of the applicable allowance time and does not restart, the aircraft may takeoff up to 90 minutes after the start of the application of the Type III or Type IV anti-icing fluid, subject to the restrictions in 2.B. on the previous page.
- 6) A pre-takeoff contamination check is not required. The allowance time cannot be extended by an internal or external check of the aircraft critical surfaces.
- 7) If ice pellet precipitation becomes heavier than moderate or if the light ice pellets mixed with other forms of allowable precipitation exceeds the listed intensities or temperature range, the allowance time cannot be used.
- 8) If the temperature decreases below the temperature on which the allowance time was based,
 - a) and the new lower temperature has an associated allowance time for the precipitation condition and the present time is within the new allowance time, then that new time must be used as the allowance time limit.
 - b) and the allowance time has expired (within the 90 minute post anti-icing window if the precipitation has stopped within the allowance time), the aircraft may not takeoff and must be completely deiced and, if applicable, anti-iced before a subsequent takeoff.

TABLE 6. ICE PELLET AND SMALL HAIL ALLOWANCE TIMES FOR SAE TYPE III FLUIDS

This table is for use with SAE Type III undiluted (100/0) fluids applied unheated only¹

Precipitation Type	Outside Air Temperature		
	-5°C and above	Below -5 to -10°C	Below -10°C ²
Light Ice Pellets	10 minutes	10 minutes	Caution: No allowance times currently exist
Moderate Ice Pellets or Small Hail ³	5 minutes	5 minutes	
Light Ice Pellets Mixed with Light or Moderate Freezing Drizzle	7 minutes	5 minutes	
Light Ice Pellets Mixed with Light Freezing Rain	7 minutes	5 minutes	
Light Ice Pellets Mixed with Light Rain	7 minutes ⁴		
Light Ice Pellets Mixed with Moderate Rain			
Light Ice Pellets Mixed with Light Snow	10 minutes	10 minutes	
Light Ice Pellets Mixed with Moderate Snow	10 minutes	10 minutes	

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

NOTES

- 1 No allowance times exist for AllClear AeroClear MAX.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 If no intensity is reported with small hail, moderate ice pellets allowance times apply. However, if an intensity is reported with small hail, the ice pellet condition with the equivalent intensity can be used, e.g. light small hail = light ice pellets, moderate small hail = moderate ice pellets.
- 4 No allowance times exist in this condition for temperatures below 0 °C; consider use of light ice pellets mixed with light freezing rain.

CAUTIONS:

- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.
- Allowance time cannot be extended by an inspection of the aircraft critical surfaces.
- Take off is allowed up to 90 minutes after start of fluid application if the precipitation stops at or before the allowance time expires and does not restart. The OAT must not decrease during the 90 minutes to use this guidance in conditions of light ice pellets mixed with either: light or moderate freezing drizzle, light freezing rain, or light rain.

TABLE 7. ICE PELLET AND SMALL HAIL ALLOWANCE TIMES FOR SAE TYPE IV FLUIDS

This table is for use with SAE Type IV undiluted (100/0) fluids only. All Type IV fluids are propylene glycol based with the exception of Dow EG106 and LNT E450 which are ethylene glycol based.

Precipitation Type	Outside Air Temperature		
	-5°C and above	Below -5 to -10°C	Below -10°C ¹
Light Ice Pellets	50 minutes	30 minutes	30 minutes ²
Moderate Ice Pellets or Small Hail ³	25 minutes ⁴	10 minutes	10 minutes ^{2,5}
Light Ice Pellets Mixed with Light or Moderate Freezing Drizzle	25 minutes	10 minutes	Caution: No allowance times currently exist
Light Ice Pellets Mixed with Light Freezing Rain	25 minutes	10 minutes	
Light Ice Pellets Mixed with Light Rain	25 minutes ⁶		
Light Ice Pellets Mixed with Moderate Rain	25 minutes ⁷		
Light Ice Pellets Mixed with Light Snow	25 minutes	15 minutes	
Light Ice Pellets Mixed with Moderate Snow	10 minutes	7 minutes	

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

NOTES

- 1 Ensure that the lowest operational use temperature (LOUT) is respected.
- 2 No allowance times exist for propylene glycol (PG) fluids when used on aircraft with rotation speeds less than 115 knots. (For these aircraft, if the fluid type is not known, assume zero allowance time.)
- 3 If no intensity is reported with small hail, moderate ice pellets allowance times apply. However, if an intensity is reported with small hail, the ice pellet condition with the equivalent intensity can be used, e.g. light small hail = light ice pellets, moderate small hail = moderate ice pellets.
- 4 Allowance time is 15 minutes for propylene glycol (PG) fluids or when the fluid type is unknown.
- 5 No allowance times exist for propylene glycol (PG) fluids in this condition for temperatures below -16 °C.
- 6 No allowance times exist in this condition for temperatures below 0 °C; consider use of light ice pellets mixed with light freezing rain.
- 7 No allowance times exist in this condition for temperatures below 0 °C.

CAUTIONS:

- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.
- Allowance time cannot be extended by an inspection of the aircraft critical surfaces.
- Take off is allowed up to 90 minutes after start of fluid application if the precipitation stops at or before the allowance time expires and does not restart. The OAT must not decrease during the 90 minutes to use this guidance in conditions of light ice pellets mixed with either: light or moderate freezing drizzle, light freezing rain, light rain, or moderate rain.

TABLE 8-1.
LIST OF TYPE I FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	LOWEST OPERATIONAL USE TEMPERATURE ³				
				DILUTION ^{4,5} (FLUID/WATER)	LOW SPEED AERODYNAMIC TEST ⁶		HIGH SPEED AERODYNAMIC TEST ⁶	
					°C	°F	°C	°F
ABAX Industries	DE-950	PG	18-05-01	71/29	-26	-14.8	-31	-23.8
<i>ABAX Industries</i>	<i>DE-950 Colorless</i>	<i>PG</i>	<i>12-06-26⁹</i>	<i>60/40</i>	<i>Not tested¹⁰</i>	<i>Not tested¹⁰</i>	<i>-24</i>	<i>-11.2</i>
ADDCON EUROPE GmbH	IceFree I.80	PG	17-05-20	70/30	-26	-14.8	-32	-25.6
AllClear Systems LLC	Lift-Off P-88	PG	18-06-11	70/30	-24.5	-12.1	-29.5	-21.1
AllClear Systems LLC	Lift-Off E-188	EG	18-07-15	70/30	-40	-40	-41.5	-42.7
Arcton Ltd. ¹¹	Arctica DG ready-to-use	DEG	17-07-15	as supplied	-26	-14.8	-26	-14.8
<i>Arcton Ltd.¹¹</i>	<i>Arctica DG 91 Concentrate</i>	<i>DEG</i>	<i>15-07-25⁹</i>	<i>75/25</i>	<i>-25</i>	<i>-13</i>	<i>-25</i>	<i>-13</i>
AVIAFLUID International Ltd.	AVIAFLO EG	EG	16-11-28	70/30	-40.5	-40.9	-44	-47.2
Aviation Shaanxi Hi-Tech Physical Chemical Co. Ltd.	Cleanwing I	PG	15-12-19	75/25	Not tested ¹⁰	Not tested ¹⁰	-39.5	-39.1
Aviation Xi'an High-Tech Physical Chemical Co. Ltd.	KHF-1	PG	19-05-22	75/25	Not available ¹²	Not available ¹²	-38.5	-37.3
<i>Baltic Ground Services¹¹</i>	<i>DEFROSOL ADF</i>	<i>NG</i>	<i>15-03-18⁹</i>	<i>65/35</i>	<i>-25</i>	<i>-13</i>	<i>-30</i>	<i>-22</i>
<i>Beijing Phoenix Air Traffic Product Development and Trading Co.¹¹</i>	<i>CBSX-I</i>	<i>PG</i>	<i>12-04-21⁹</i>	<i>Not available¹²</i>	<i>Not available¹²</i>	<i>Not available¹²</i>	<i>Not available¹²</i>	<i>Not available¹²</i>
Beijing Wangye Aviation Chemical Product Co Ltd. ¹¹	KLA-1	EG	15-08-25	60/40	Not available ¹²	Not available ¹²	-30.5	-22.9
Beijing Yadilite Aviation Advanced Materials Corporation	YD-101 Type I	PG	17-05-27	60/40	Not tested ¹⁰	Not tested ¹⁰	-30	-22
CHEMCO Inc.	CHEMR EG I	EG	16-03-25	70/30	-37	-34.6	-43	-45.4
CHEMCO Inc.	CHEMR REG I	EG	16-07-08	75/25	-36	-32.8	-40.5	-40.9
<i>Clariant Produkte (Deutschland) GmbH</i>	<i>EcoFlo Concentrate</i>	<i>NG</i>	<i>13-07-06⁹</i>	<i>65/35</i>	<i>Not tested¹⁰</i>	<i>Not tested¹⁰</i>	<i>-30.5</i>	<i>-22.9</i>
<i>Clariant Produkte (Deutschland) GmbH</i>	<i>EcoFlo 2 Concentrate</i>	<i>NG</i>	<i>13-07-25⁹</i>	<i>65/35</i>	<i>Not tested¹⁰</i>	<i>Not tested¹⁰</i>	<i>-29</i>	<i>-20.2</i>
Clariant Produkte (Deutschland) GmbH	Octaflo EF Concentrate	PG	18-03-20	65/35	-25	-13	-33	-27.4
<i>Clariant Produkte (Deutschland) GmbH</i>	<i>Octaflo EF-80</i>	<i>PG</i>	<i>13-12-21⁹</i>	<i>70/30</i>	<i>-25</i>	<i>-13</i>	<i>-33</i>	<i>-27.4</i>
Clariant Produkte (Deutschland) GmbH	Octaflo EG Concentrate	EG	17-07-23	70/30	-40.5	-40.9	-44	-47.2
Clariant Produkte (Deutschland) GmbH	Octaflo LYOD	EG	16-02-11	70/30	-40	-40	-45.5	-49.9
<i>Clariant Produkte (Deutschland) GmbH</i>	<i>Safewing EG I 1996</i>	<i>EG</i>	<i>12-06-10⁹</i>	<i>75/25</i>	<i>-35.5</i>	<i>-31.9</i>	<i>-43</i>	<i>-45.4</i>
Clariant Produkte (Deutschland) GmbH	Safewing EG I 1996 (88)	EG	15-10-19	70/30	-39.5	-39.1	-41.5	-42.7

TABLE 8-1 (CONT'D).
LIST OF TYPE I FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	LOWEST OPERATIONAL USE TEMPERATURE ³				
				DILUTION ^{4,5} (FLUID/WATER)	LOW SPEED AERODYNAMIC TEST ⁶		HIGH SPEED AERODYNAMIC TEST ⁶	
					°C	°F	°C	°F
Clariant Produkte (Deutschland) GmbH	Safewing MP I 1938 ECO	PG	16-06-26	65/35	-25.5	-13.9	-32	-25.6
Clariant Produkte (Deutschland) GmbH	Safewing MP I 1938 ECO (80)	PG	16-07-09	71/29	-25	-13	-32.5	-26.5
Clariant Produkte (Deutschland) GmbH	Safewing MP I 1938 ECO (80) Premix 55% i.g. ready-to-use	PG	17-03-13	as supplied	Not tested ¹⁰	Not tested ¹⁰	-19	-2.2
Clariant Produkte (Deutschland) GmbH	Safewing MP I ECO PLUS (80)	PG	19-03-13	71/29	-25	-13	-33	-27.4
Cryotech Deicing Technology	Polar Plus [®]	PG	16-01-16	63/37	-27	-16.6	-32	-25.6
Cryotech Deicing Technology	Polar Plus [®] LT	PG	16-03-13	63/37	-27	-16.6	-33	-27.4
Cryotech Deicing Technology	Polar Plus [®] LT (80)	PG	16-09-15	70/30	-27	-16.6	-33	-27.4
Cryotech Deicing Technology	Polar Plus [®] (80)	PG	17-09-12	70/30	-24.5	-12.1	-32.5	-26.5
Deicing Solutions LLC	Safetemp [®] ES Plus (Multiple Location)	PG	18-08-29	65/35	-25.5	-13.9	-31	-23.8
Dow Chemical Company	UCAR [™] ADF Concentrate	EG	19-05-11	75/25	-36	-32.8	-45	-49
Dow Chemical Company	UCAR [™] ADF XL54	EG	17-01-18	as supplied	-33	-27.4	-33	-27.4
Dow Chemical Company	UCAR [™] PG ADF Concentrate	PG	19-05-11	65/35	-25	-13	-32	-25.6
<i>Dow Chemical Company</i>	<i>UCAR[™] PG ADF Dilute 55/45</i>	<i>PG</i>	<i>12-02-05⁹</i>	<i>as supplied</i>	<i>-24</i>	<i>-11.2</i>	<i>-25</i>	<i>-13</i>
Heilongjiang Hangjie Aero-chemical Technology Co. Ltd.	HJF-1	EG	17-10-02	65/35	Not tested ¹⁰	Not tested ¹⁰	-42	-43.6
Heilongjiang Hangjie Aero-chemical Technology Co. Ltd.	HJF-1A	EG	16-09-02	75/25	Not tested ¹⁰	Not tested ¹⁰	-40.5	-40.9
HOC Industries	SafeTemp [®] ES Plus	PG	16-08-07	65/35	-25.5	-13.9	-29	-20.2
Inland Technologies CANADA Inc.	DuraGly-E Type I ADF Concentrate	EG	19-01-13	60/40	-33	-27.4	-33	-27.4
Inland Technologies CANADA Inc.	DuraGly-P Type I ADF Concentrate	PG	15-02-04 ¹³	60/40	-25	-13	-25	-13
Kilfrost Limited	Kilfrost DF Plus	PG	15-08-30	69/31	-25.5	-13.9	-32	-25.6
Kilfrost Limited	Kilfrost DF Plus (80)	PG	16-07-13	69/31	-26	-14.8	-31.5	-24.7
Kilfrost Limited	Kilfrost DF Plus (88)	PG	15-08-30	63/37	-25.5	-13.9	-32	-25.6
Kilfrost Limited	Kilfrost DF ^{Sustain}	PDO	15-08-08	68/32	-34	-29.2	-41	-41.8
LNT Solutions	LNT E188	EG	17-10-01	70/30	-30.5	-22.9	-41	-41.8
LNT Solutions	LNT P180	PG	17-10-04	69/31	-26	-14.8	-32	-25.6
LNT Solutions	LNT P188	PG	18-11-28	70/30	-24.5	-12.1	-31.5	-24.7

TABLE 8-1 (CONT'D).
LIST OF TYPE I FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	LOWEST OPERATIONAL USE TEMPERATURE ³				
				DILUTION ^{4,5} (FLUID/WATER)	LOW SPEED AERODYNAMIC TEST ⁶		HIGH SPEED AERODYNAMIC TEST ⁶	
					°C	°F	°C	°F
Newave Aerochemical Co. Ltd.	FCY-1A	EG	19-02-20	75/25	-40	-40	-40	-40
Newave Aerochemical Co. Ltd.	FCY-1Bio+	EG	16-07-08	75/25	Not tested ¹⁰	Not tested ¹⁰	-40.5	-40.9
Oksayd Co. Ltd.	DEFROST ECO 1	NG	16-07-09	70/30	Not tested ¹⁰	Not tested ¹⁰	-36	-32.8
Shaanxi Cleanway Aviation Chemical Co., Ltd	Cleansurface I	EG	17-09-12	75/25	-32.5 ¹⁴	-26.5 ¹⁴	-40.5	-40.9
Shaanxi Cleanway Aviation Chemical Co., Ltd	Cleansurface I-BIO	EG	18-07-11	75/25	Not tested ¹⁰	Not tested ¹⁰	-37	-34.6
Velvana a.s.	AIRVEL OK 1	PG	17-01-28	70/30	-26	-14.8	-30	-22

TABLE 8-2.
LIST OF TYPE II FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	DILUTION (FLUID/WATER)	LOWEST OPERATIONAL USE TEMPERATURE ³		LOWEST ON-WING VISCOSITY ^{7,8} (mPa.s)	
					HIGH SPEED AERODYNAMIC TEST ⁶		MANUFACTURER METHOD	AS 9968 METHOD
					°C	°F		
ABAX Industries	Ecowing 26	PG	17-04-28	100/0	-25	-13	4 900 (h)	4 600 (a)
				75/25	-14	7	2 200 (a)	2 200 (a)
				50/50	-3	27	50 (a)	50 (a)
Aviation Shaanxi Hi-Tech Physical Chemical Co. Ltd.	Cleanwing II	PG	17-05-20	100/0	-29	-20.2	4 650 (f)	4 500 (a)
				75/25	-14	7	9 450 (f)	10 000 (a)
				50/50	-3	27	10 150 (f)	10 200 (a)
Clariant Produkte (Deutschland) GmbH	Safewing MP II FLIGHT	PG	16-05-14	100/0	-29	-20.2	3 340 (a)	3 340 (a)
				75/25	-14	7	12 900 (c)	12 900 (c)
				50/50	-3	27	11 500 (a)	11 500 (a)
Clariant Produkte (Deutschland) GmbH	Safewing MP II FLIGHT PLUS	PG	16-02-28	100/0	-29	-20.2	3 650 (o)	3 100 (a)
				75/25	-14	7	12 400 (o)	10 450 (a)
				50/50	-3	27	7 800 (o)	7 050 (a)
Cryotech Deicing Technology	Polar Guard® II	PG	17-03-11	100/0	-30.5	-22.9	4 400 (g)	4 050 (a)
				75/25	-14	7	11 600 (g)	9 750 (a)
				50/50	-3	27	80 (a)	80 (a)
Kilfrost Limited	ABC-3	PG	16-10-08	100/0	-27	-16.6	2 500 (f)	2 500 (a)
				75/25	-14	7	2 000 (f)	2 000 (a)
				50/50	-3	27	400 (f)	400 (a)
Kilfrost Limited	ABC-Ice Clear II	PG	17-05-13	100/0	-29.5	-21.1	7 720 (a)	7 720 (a)
				75/25	-14	7	5 660 (a)	5 660 (a)
				50/50	-3	27	580 (a)	558 (n)
Kilfrost Limited	ABC-K Plus	PG	16-11-24	100/0	-29	-20.2	2 850 (f)	2 640 (a)
				75/25	-14	7	12 650 (f)	12 650 (c)
				50/50	-3	27	4 200 (f)	5 260 (a)
LNT Solutions	LNT P250	PG	Y-M-D ¹³	100/0	Not available ¹²	Not available ¹²	2 400 (e)	2 150 (a)
				75/25	Not available ¹²	Not available ¹²	16 200 (e)	15 200 (a)
				50/50	Not available ¹²	Not available ¹²	8 150 (e)	8 100 (a)
Newave Aerochemical Co. Ltd.	FCY-2	PG	17-02-20	100/0	-28	-18.4	7 000 (f)	8 920 (a)
				75/25	-14	7	18 550 (f)	18 550 (f)
				50/50	-3	27	6 750 (f)	7 030 (a)

TABLE 8-2 (CONT'D).
LIST OF TYPE II FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	DILUTION (FLUID/WATER)	LOWEST OPERATIONAL USE TEMPERATURE ³		LOWEST ON-WING VISCOSITY ^{7,8} (mPa.s)	
					HIGH SPEED AERODYNAMIC TEST ⁶		MANUFACTURER METHOD	AS 9968 METHOD
					°C	°F		
Newave Aerochemical Co. Ltd.	FCY-2 Bio+	PG	17-05-06	100/0	-28.5	-19.3	7 210 (a)	7 210 (a)
				75/25	-14	7	21 400 (c)	21 400 (c)
				50/50	-3	27	1 900 (a)	1 900 (a)

TABLE 8-3.
LIST OF TYPE III FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	DILUTION (FLUID/WATER)	LOWEST OPERATIONAL USE TEMPERATURE ³				LOWEST ON-WING VISCOSITY ^{7,8} (mPa.s)	
					LOW SPEED AERODYNAMIC TEST ⁶		HIGH SPEED AERODYNAMIC TEST ⁶		MANUFACTURER METHOD	AS 9968 METHOD
					°C	°F	°C	°F		
AllClear Systems LLC	AeroClear MAX	EG	16-12-22 ¹⁵	100/0	-16	3.2	-35	-31	7 300 (m)	Not Available ¹⁶
				75/25	Dilution Not Applicable		Dilution Not Applicable		Dilution Not Applicable	
				50/50	Dilution Not Applicable		Dilution Not Applicable		Dilution Not Applicable	
Clariant Produkte (Deutschland) GmbH	Safewing MP III 2031 ECO	PG	15-08-15	100/0	-16.5	2.3	-29	-20.2	120 (n)	120 (n)
				75/25	-9	15.8	-10	14	86 (n)	86 (n)
				50/50	-3	27	-3	27	16 (n)	16 (n)

TABLE 8-4.
LIST OF TYPE IV FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	DILUTION (FLUID/WATER)	LOWEST OPERATIONAL USE TEMPERATURE ³		LOWEST ON-WING VISCOSITY ^{7,8} (mPa.s)	
					HIGH SPEED AERODYNAMIC TEST ⁶		MANUFACTURER METHOD	AS 9968 METHOD
					°C	°F		
ABAX Industries	Ecowing AD-49	PG	16-06-02	100/0	-26	-14.8	12 150 (i)	11 000 (a)
				75/25	-14	7	30 700 (i)	32 350 (c)
				50/50	-3	27	19 450 (i)	21 150 (c)
Clariant Produkte (Deutschland) GmbH	Max Flight 04	PG	16-07-23	100/0	-23.5	-10.3	5 540 (b)	5 540 (a)
				75/25	Dilution Not Applicable		Dilution Not Applicable	
				50/50	Dilution Not Applicable		Dilution Not Applicable	
Clariant Produkte (Deutschland) GmbH	Max Flight SNEG	PG	16-02-20	100/0	-29	-20.2	8 700 (p)	8 050 (a)
				75/25	-14	7	20 200 (q)	21 800 (c)
				50/50	-3	27	13 600(q)	15 000 (c)
Clariant Produkte (Deutschland) GmbH	Safewing MP IV LAUNCH	PG	16-06-02	100/0	-28.5	-19.3	7 550 (a)	7 550 (a)
				75/25	-14	7	18 000 (a)	18 000 (a)
				50/50	-3	27	17 800 (a)	17 800 (a)
Clariant Produkte (Deutschland) GmbH	Safewing MP IV LAUNCH PLUS	PG	17-03-24	100/0	-29	-20.2	8 700 (p)	8 450 (a)
				75/25	-14	7	18 800 (q)	17 200 (c)
				50/50	-3	27	9 700 (p)	12 150 (a)
Cryotech Deicing Technology	Polar Guard®	PG	12-08-30 ⁹	100/0	-23.5	-10.3	32 100 (k)	36 300 (c)
				75/25	-5.5	22.1	24 200 (k)	27 800 (c)
				50/50	-3	27	6 200 (k)	7 500 (a)
Cryotech Deicing Technology	Polar Guard® Advance	PG	17-03-11	100/0	-30.5	-22.9	4 400 (g)	4 050 (a)
				75/25	-14	7	11 600 (g)	9 750 (a)
				50/50	-3	27	80 (a)	80 (a)
Deicing Solutions LLC	ECO-SHIELD®	PG	17-01-26	100/0	-24.5	-12.1	1 900 (a)	1 900 (a)
				75/25	Dilution Not Applicable		Dilution Not Applicable	
				50/50	Dilution Not Applicable		Dilution Not Applicable	
Dow Chemical Company	UCAR™ Endurance EG106 De/Anti-Icing Fluid	EG	17-05-20	100/0	-27	-16.6	24 850 (j)	2 230 (a)
				75/25	Dilution Not Applicable		Dilution Not Applicable	
				50/50	Dilution Not Applicable		Dilution Not Applicable	
Dow Chemical Company	UCAR™ FlightGuard AD-480	PG	12-06-15 ⁹	100/0	-26	-14.8	15 200 (h)	12 800 (d)
				75/25	-14	7	16 000 (h)	12 400 (d)
				50/50	-3	27	4 000 (h)	3 800 (a)

TABLE 8-4 (CONT'D).
LIST OF TYPE IV FLUIDS TESTED FOR ANTI-ICING PERFORMANCE AND AERODYNAMIC ACCEPTANCE
 (see cautions and notes on page 57)

COMPANY NAME	FLUID NAME	TYPE OF GLYCOL ¹	EXPIRY ² (Y-M-D)	DILUTION (FLUID/WATER)	LOWEST OPERATIONAL USE TEMPERATURE ³		LOWEST ON-WING VISCOSITY ^{7,8} (mPa.s)	
					HIGH SPEED AERODYNAMIC TEST ⁶		MANUFACTURER METHOD	AS 9968 METHOD
					°C	°F		
Dow Chemical Company	UCAR™ FlightGuard AD-49	PG	17-05-20	100/0	-26	-14.8	12 150 (i)	11 000 (a)
				75/25	-14	7	30 700 (i)	32 350 (c)
				50/50	-3	27	19 450 (i)	21 150 (c)
Kilfrost Limited	ABC-S Plus	PG	17-06-16	100/0	-28	-18.4	17 900 (f)	17 900 (c)
				75/25	-14	7	18 300 (f)	18 300 (c)
				50/50	-3	27	7 500 (f)	7 500 (a)
LNT Solutions	LNT E450	EG	Y-M-D ¹³	100/0	Not available ¹²	Not available ¹²	45 300 (l)	Not Available ¹⁶
				75/25	Dilution Not Applicable		Dilution Not Applicable	
				50/50	Dilution Not Applicable		Dilution Not Applicable	
Newave Aerochemical Co. Ltd.	FCY 9311	PG	15-12-20	100/0	-29.5	-21.1	14 100 (c)	14 100 (c)
				75/25	Dilution Not Applicable		Dilution Not Applicable	
				50/50	Dilution Not Applicable		Dilution Not Applicable	

CAUTIONS AND NOTES FOR TABLES 8-1, 8-2, 8-3, 8-4

CAUTIONS

- This table lists fluids that have been tested with respect to anti-icing performance and aerodynamic acceptance (Type I: SAE AMS1424 §3.5.2 and §3.5.3; Type II, III, IV: SAE AMS1428 §3.2.4 and §3.2.5) only. These tests were conducted by Anti-icing Materials International Laboratory: www.uqac.ca/amil. The end user is responsible for contacting the fluid manufacturer to confirm all other SAE AMS1424/1428 technical requirement tests, such as fluid stability, toxicity, materials compatibility, etc. have been conducted.
- LOU data provided in these tables is based strictly on the manufacturer's data; the end user is responsible for verifying the validity of this data.
- Type I fluids supplied in concentrated form must not be used in that form and must be diluted.

NOTES

- 1 PG = propylene glycol; PDO = propylene glycol (propane-1, 3-diol); EG = ethylene glycol; DEG = diethylene glycol; NG = non-glycol.
- 2 Expiry date is the earlier expiry date of the Aerodynamic Test(s) or Water Spray Endurance Test. Fluids that are tested after the issuance of this list will appear in a later update.
- 3 The values in this table were determined using test results from pre-production fluid samples when available. In some cases, the fluid manufacturer requested the publication of a more conservative value than the pre-production test value. The lowest operational use temperature (LOUT) for a given fluid is the higher of:
 - a) The lowest temperature at which the fluid meets the aerodynamic acceptance test for a given aircraft type;
 - b) The actual freezing point of the fluid plus its freezing point buffer (Type I = 10°C/18°F; Type II/III/IV = 7°C/13°F); or
 - c) For diluted Type II/III/IV fluids, the coldest temperature for which holdover times are published.
- 4 The LOU for Type I fluids that are intended to be diluted is derived from a dilution that provides the lowest operational use temperature. For other Type I dilutions, determine the freezing point of the fluid and add a 10°C freezing point buffer, as a dilution will usually yield a higher and more restrictive operational use temperature. Consult the fluid manufacturer or fluid documentation for further clarification and guidance on establishing the appropriate operational use temperature of a diluted fluid.
- 5 Type I concentrate fluids have also been tested at 50/50 (glycol/water) dilution.
- 6 If uncertain whether the aircraft to be treated conforms to the low speed or the high speed aerodynamic test, consult the aircraft manufacturer. The aerodynamic test is defined in SAE AS5900 (latest version).
- 7 The viscosity values in this table are those of the fluids provided by the manufacturers for holdover time testing. For the holdover times to be valid, the viscosity of the fluid on the wing shall not be lower than that in this table. The user should periodically ensure that the viscosity of a fluid sample taken from the wing surface is not lower than that listed.
- 8 The SAE AS9968 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. Viscosity measurement methods are indicated as letters (in parentheses) beside each viscosity value. Details of each measurement method are shown in the table below. The exact measurement method (spindle, container, fluid volume, temperature, speed, duration) must be used to compare the viscosity of a sample to a viscosity given in this table.

Method	Brookfield Spindle	Container	Fluid Volume	Temp.	Speed	Duration
a	LV1 (with guard leg)	600 mL low form (Griffin) beaker	575 mL*	20°C	0.3 rpm	10.0 minutes
b	LV1 (with guard leg)	600 mL low form (Griffin) beaker	575 mL*	20°C	0.3 rpm	33.3 minutes
c	LV2-disc (with guard leg)	600 mL low form (Griffin) beaker	425 mL*	20°C	0.3 rpm	10.0 minutes
d	LV2-disc (with guard leg)	250 mL tall form (Berzelius) beaker	200 mL*	20°C	0.3 rpm	10.0 minutes
e	LV2-disc (with guard leg)	200 mL tall form (Berzelius) beaker	155 mL*	20°C	0.3 rpm	10.0 minutes
f	LV2-disc (with guard leg)	150 mL tall form (Berzelius) beaker	135 mL*	20°C	0.3 rpm	10.0 minutes
g	SC4-34/13R	small sample adapter	10 mL	20°C	0.3 rpm	10.0 minutes
h	SC4-34/13R	small sample adapter	10 mL	20°C	0.3 rpm	30.0 minutes
i	SC4-31/13R	small sample adapter	10 mL	20°C	0.3 rpm	10.0 minutes
j	SC4-31/13R	small sample adapter	10 mL	0°C	0.3 rpm	10.0 minutes
k	SC4-31/13R	small sample adapter	9 mL	20°C	0.3 rpm	10.0 minutes
l	SC4-31/13R	small sample adapter	9 mL	0°C	0.3 rpm	10.0 minutes
m	SC4-31/13R	small sample adapter	9 mL	0°C	0.3 rpm	30.0 minutes
n	LV0	UL adapter	16 mL	20°C	0.3 rpm	10.0 minutes
o	LV1	big sample adapter	50 mL	20°C	0.3 rpm	10.0 minutes
p	LV1	big sample adapter	55 mL	20°C	0.3 rpm	10.0 minutes
q	LV2-disc	big sample adapter	60 mL	20°C	0.3 rpm	10.0 minutes

*If necessary, adjust fluid volume to ensure fluid is level with notch on the spindle shaft

- 9 Fluids listed in italics have expired and will be removed from this listing four years after expiry.
- 10 Manufacturer has indicated fluid was not tested.
- 11 Manufacturer has not provided fluid information as required in SAE ARP5718A; fluid may be removed from this listing in subsequent revisions.
- 12 Manufacturer had not provided LOU information at the time of publication.
- 13 Currently in the test/re-retest process.
- 14 Fluid was not retested for low speed aerodynamics. This data will be removed four years after the expiry of the last low speed test.
- 15 Fluid did not meet the minimum Water Spray Endurance Test requirement for a Type III fluid in AMS1428G; Transport Canada and the FAA have proposed a change to the SAE G-12 for this requirement.
- 16 Measurements using the SAE AS9968 method do not provide stable, reliable results. Use the manufacturer method to evaluate viscosity.

TABLE 9. GUIDELINES FOR THE APPLICATION OF SAE TYPE I FLUID MIXTURE MINIMUM CONCENTRATIONS AS A FUNCTION OF OUTSIDE AIR TEMPERATURE

Outside Air Temperature (OAT)	One-step Procedure Deicing/Anti-icing ¹	Two-step Procedure	
		First step: Deicing	Second step: Anti-icing ^{1,2}
-3 °C (27 °F) and above	Mix of fluid and water heated to 60 °C (140 °F) minimum at the nozzle, with a freezing point of at least 10 °C (18 °F) below OAT	Heated water or a mix of fluid and water heated to 60 °C (140 °F) minimum at the nozzle	Mix of fluid and water heated to 60 °C (140 °F) minimum at the nozzle, 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	
<p>1) Fluids must only be used at temperatures at or above their lowest operational use temperature (LOUT).</p> <p>2) To be applied before first-step fluid freezes, typically within 3 minutes. (This time may be higher than 3 minutes in some conditions, but potentially lower in heavy precipitation, colder temperatures, or for critical surfaces constructed of composite materials. If necessary, the second step shall be applied area by area.)</p>			
<p>NOTES:</p> <ul style="list-style-type: none"> • Upper temperature limit shall not exceed fluid and aircraft manufacturers' recommendations. • To use Type I holdover time guidelines in all conditions including active frost, at least 1 liter per square meter (~2 gal. per 100 square feet) fluid shall be applied to the deiced surfaces. • This table is applicable for the use of Type I holdover time guidelines in all conditions, including active frost. If holdover times are not required, a temperature of 60 °C (140 °F) at the nozzle is desirable. • The lowest operational use temperature (LOUT) for a given Type I fluid is the higher of: <ul style="list-style-type: none"> a) The lowest temperature at which the fluid meets the aerodynamic acceptance test for a given aircraft type, or b) The actual freezing point of the fluid plus a freezing point buffer of 10 °C (18 °F). 			
<p>CAUTION:</p> <ul style="list-style-type: none"> • Wing skin temperatures may differ and, in some cases, be lower than OAT. A stronger mix (more glycol) may be needed under these conditions. 			

TABLE 10. GUIDELINES FOR THE APPLICATION OF SAE TYPE II, TYPE III, AND TYPE IV FLUID MIXTURES MINIMUM CONCENTRATIONS AS A FUNCTION OF OUTSIDE AIR TEMPERATURE (CONCENTRATIONS IN % VOLUME)

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 Types II, III or IV	Heated water or a heated mix of Type I, II, III or IV, and water	50/50 Type II, III, or IV
Below -3 °C (27 °F) to -14 °C (7 °F)	75/25 Heated ³ Types II, III or IV	Heated suitable mix of Type I, II, III or IV, and water with a freezing point not more than 3 °C (5 °F) above actual OAT	75/25 Type II, III, or IV
below -14 °C (7 °F) to -25 °C (-13 °F)	100/0 Heated ³ Types II, III or IV	Heated suitable mix of Type I, II, III or IV, and water with a freezing point not more than 3 °C (5 °F) above actual OAT	100/0 Type II, III, or IV
Below -25 °C (-13 °F)	<p>SAE Type II/IV fluid may be used below -25 °C (-13 °F) provided that the OAT is at or above the LOU.T.</p> <p>SAE Type III fluid may be used below -10 °C (14 °F) provided that the OAT is at or above the LOU.T.</p> <p>Consider the use of SAE Type I fluid (Table 9) when Type II, III, or IV fluid cannot be used.</p>		
<p>1) Fluids must only be used at temperatures at or above their lowest operational use temperature (LOU.T).</p> <p>2) To be applied before first step fluid freezes, typically within 3 minutes. (This time may be higher than 3 minutes in some conditions, but potentially lower in heavy precipitation, in colder temperatures, or for critical surfaces constructed of composite materials. If necessary, the second step shall be applied area by area.)</p> <p>3) Clean aircraft may be anti-iced with unheated Type II, III, or IV fluid, unless the related holdover time table requires a heated application to obtain holdover times.</p>			
<p>NOTES:</p> <ul style="list-style-type: none"> For heated fluids, a fluid temperature not less than 60 °C (140 °F) at the nozzle is desirable. For fluids which require a heated application to obtain holdover times (this is stated in the applicable holdover time table), the temperature at the nozzle shall be at least 60 °C and at least 1 liter/m² (2 gal./100 sq. ft.) shall be applied. Upper temperature limit shall not exceed fluid and aircraft manufacturer's recommendations. The lowest operational use temperature (LOU.T) for a given Type II, III, or IV fluid is the higher of: <ul style="list-style-type: none"> a) The lowest temperature at which the fluid meets the aerodynamic acceptance test for a given aircraft type, or b) The actual freezing point of the fluid plus a freezing point buffer of 7 °C (13 °F). 			
<p>CAUTIONS:</p> <ul style="list-style-type: none"> Wing skin temperatures may differ and in some cases may be lower than OAT. A stronger mix (more glycol) may be needed under these conditions. As fluid freezing may occur, 50/50 Types II, III, or IV fluid shall not be used for the anti-icing step of a cold-soaked wing as indicated by frost or ice on the lower surface of the wing in the area of the fuel tank. An insufficient amount of anti-icing fluid, especially in the second step of a two-step procedure, may cause a substantial loss of holdover time, particularly when using a Type I fluid mixture for the first step (deicing) of a two-step procedure. Repeated deicing/anti-icing with heated thickened fluids without the frequent use of Type I fluid/water mixtures for deicing can lead to the buildup of residue which can re-hydrate and freeze on control surfaces, hinges, and associated actuators during flight and restrict movement of these devices, leading to an unsafe condition. If repeated deicing/anti-icing with heated thickened fluids occurs, periodic inspections and removal of residue in accordance with the aircraft manufacturer's instructions and procedures should be followed. 			

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING

TABLE 0-90%. 90 PERCENT ADJUSTED HOLDOVER TIME GUIDELINES FOR SAE TYPE I, TYPE II, TYPE III, AND TYPE IV FLUIDS IN ACTIVE FROST

Outside Air Temperature ^{1,2}		Approximate Holdover Times (hours:minutes)
Degrees Celsius	Degrees Fahrenheit	
Active Frost		
		Type I
-1 and above	30 and above	0:41 (0:32) ⁴
below -1 to -3	below 30 to 27	
below -3 to -10	below 27 to 14	
below -10 to -14	below 14 to 7	
below -14 to -21	below 7 to -6	
below -21 to LOUT	below -6 to LOUT	

Outside Air Temperature ²		Concentration Neat Fluid/Water (Volume %/ Volume %)	Approximate Holdover Times (hours:minutes)		
Degrees Celsius	Degrees Fahrenheit		Active Frost		
			Type II	Type III ³	Type IV
-1 and above	30 and above	100/0	7:12	1:48	10:48
		75/25	4:30	0:54	4:30
		50/50	2:42	0:27	2:42
below -1 to -3	below 30 to 27	100/0	7:12	1:48	10:48
		75/25	4:30	0:54	4:30
		50/50	1:21	0:27	2:42
below -3 to -10	below 27 to 14	100/0	7:12	1:48	9:00
		75/25	4:30	0:54	4:30
below -10 to -14	below 14 to 7	100/0	5:24	1:48	5:24
		75/25	0:54	0:54	0:54
below -14 to -21	below 7 to -6	100/0	5:24	1:48	5:24
below -21 to -25	below -6 to -13	100/0	1:48	1:48	3:36
Below -25	Below -13	No holdover time guidelines exist			

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

- 1 Type I Fluid / Water Mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 To use the Type III fluid frost holdover times, the fluid brand being used must be known. AllClear AeroClear MAX must be applied unheated. Clariant Safewing MP III 2031 ECO must be applied heated.
- 4 Value in parentheses is for aircraft with critical surfaces that are predominantly or entirely constructed of composite materials.

CAUTIONS:

- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 1A-90%. 90 PERCENT ADJUSTED HOLDOVER TIME GUIDELINES FOR SAE TYPE I FLUID ON CRITICAL AIRCRAFT SURFACES COMPOSED PREDOMINANTLY OF ALUMINUM

Outside Air Temperature ^{1,2}		Wing Surface	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	Aluminum	0:10-0:15	0:16-0:20	0:10-0:16	0:05-0:10	0:08-0:12	0:02-0:05	0:02-0:05	CAUTION: No holdover time guidelines exist
below -3 to -6	below 27 to 21	Aluminum	0:07-0:12	0:13-0:15	0:07-0:13	0:05-0:07	0:05-0:08	0:02-0:05		
below -6 to -10	below 21 to 14	Aluminum	0:05-0:09	0:10-0:12	0:05-0:10	0:04-0:05	0:04-0:06	0:02-0:05		
Below -10	below 14	Aluminum	0:05-0:08	0:06-0:07	0:04-0:06	0:02-0:04				

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

- 1 Type I fluid / water mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 1C-90%. 90 PERCENT ADJUSTED HOLDOVER TIME GUIDELINES FOR SAE TYPE I FLUID ON CRITICAL AIRCRAFT SURFACES COMPOSED PREDOMINANTLY OF COMPOSITES

Outside Air Temperature ^{1,2}		Wing Surface	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	Composite	0:08-0:14	0:11-0:14	0:05-0:11	0:03-0:05	0:07-0:12	0:02-0:05	0:01-0:05	CAUTION: No holdover time guidelines exist
below -3 to -6	below 27 to 21	Composite	0:05-0:07	0:10-0:12	0:05-0:10	0:02-0:05	0:05-0:08	0:02-0:05		
below -6 to -10	below 21 to 14	Composite	0:04-0:07	0:08-0:11	0:05-0:08	0:02-0:05	0:04-0:06	0:02-0:05		
Below -10	below 14	Composite	0:04-0:06	0:06-0:07	0:04-0:06	0:02-0:04				

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

- 1 Type I fluid / water mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2-GENERIC-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
SAE TYPE II FLUID

Outside Air Temperature ¹		Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	0:32-1:21	0:18-0:41	0:27-0:54	0:14-0:27	0:06-0:36	CAUTION: No holdover time guidelines exist
		75/25	0:23-0:54	0:14-0:27	0:18-0:41	0:09-0:23	0:05-0:23	
		50/50	0:14-0:27	0:05-0:14	0:09-0:18	0:05-0:09		
below -3 to -14	below 27 to 7	100/0	0:18-0:59	0:14-0:27	0:18-0:41 ⁷	0:09-0:18 ⁷		
		75/25	0:23-0:45	0:07-0:18	0:14-0:27 ⁷	0:07-0:14 ⁷		
Below -14 to LOU	Below 7 to LOU	100/0	0:14-0:32 ⁸	0:14-0:27 ⁸				

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

- 1 Ensure that the lowest operational use temperature (LOU) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).
- 8 If the LOU is unknown, no holdover time guidelines exist below -25° C (-13 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2A-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
ABAX ECOWING 26

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:17-2:20	1:26-1:39	0:54-1:26	0:36-0:54	0:45-1:26	0:36-0:45	0:18-1:17	CAUTION: No holdover time guidelines exist
		75/25	0:59-1:44	1:08-1:17	0:41-1:08	0:23-0:41	0:41-0:59	0:23-0:32	0:09-0:54	
		50/50	0:27-0:41	0:36-0:45	0:18-0:36	0:09-0:18	0:14-0:23	0:07-0:09		
below -3 to -14	below 27 to 7	100/0	0:41-2:02	1:17-1:30	0:50-1:17	0:32-0:50	0:27-1:03 ⁷	0:14-0:32 ⁷		
		75/25	0:32-1:08	0:50-0:59	0:36-0:50	0:23-0:36	0:18-0:45 ⁷	0:14-0:23 ⁷		
below -14 to -25	below 7 to -13	100/0	0:23-0:41	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2B-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
AVIATION SHAANXI HI-TECH CLEANWING II

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	0:50-1:39	0:27-0:50	0:32-0:59	0:23-0:32	0:09-0:50	CAUTION: No holdover time guidelines exist
		75/25	0:45-1:12	0:23-0:41	0:32-0:54	0:18-0:27	0:06-0:45	
		50/50	0:32-0:54	0:14-0:27	0:18-0:36	0:09-0:18		
below -3 to -14	below 27 to 7	100/0	0:41-1:39	0:27-0:50	0:27-0:50 ⁷	0:18-0:23 ⁷		
		75/25	0:36-1:35	0:23-0:41	0:32-0:36 ⁷	0:18-0:23 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:18-0:45	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2C-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
CLARIANT SAFEWING MP II FLIGHT

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:09-3:36	2:20-2:47	1:26-2:20	0:54-1:26	1:12-1:48	0:41-1:17	0:09-1:21	CAUTION: No holdover time guidelines exist
		75/25	1:39-2:29	2:20-2:51	1:12-2:20	0:36-1:12	1:03-1:21	0:27-0:50	0:05-0:45	
		50/50	0:50-1:35	0:41-0:50	0:23-0:41	0:09-0:23	0:18-0:27	0:09-0:14		
below -3 to -14	below 27 to 7	100/0	0:50-1:35	1:39-1:57	0:59-1:39	0:36-0:59	0:32-1:21 ⁷	0:23-0:41 ⁷		
		75/25	0:23-0:59	1:12-1:30	0:36-1:12	0:18-0:36	0:23-1:03 ⁷	0:18-0:32 ⁷		
Below -14 to -29	Below 7 to -20.2	100/0	0:27-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2D-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
CLARIANT SAFEWING MP II FLIGHT PLUS

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	2:24-3:36	0:45-1:39	1:17-1:48	0:41-0:54	0:14-1:48	CAUTION: No holdover time guidelines exist
		75/25	2:20-3:36	0:54-1:35	1:26-1:48	0:45-1:08	0:14-1:08	
		50/50	0:59-2:06	0:14-0:23	0:27-0:59	0:14-0:18		
below -3 to -14	below 27 to 7	100/0	0:36-2:06	0:32-1:08	0:32-1:17 ⁷	0:32-0:50 ⁷		
		75/25	0:27-1:35	0:50-1:30	0:23-1:03 ⁷	0:27-0:41 ⁷		
Below -14 to -29	Below 7 to -20.2	100/0	0:18-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2E-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
CRYOTECH POLAR GUARD® II

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:33-3:36	2:20-2:33	1:39-2:20	1:12-1:39	1:26-1:48	1:08-1:21	0:14-1:48	CAUTION: No holdover time guidelines exist
		75/25	2:15-3:36	2:11-2:38	1:12-2:11	0:41-1:12	1:30-1:48	0:36-1:03	0:08-1:30	
		50/50	0:45-1:17	1:12-1:35	0:32-1:12	0:14-0:32	0:18-0:41	0:08-0:18		
below -3 to -14	below 27 to 7	100/0	0:50-2:15	1:35-1:44	1:08-1:35	0:50-1:08	0:32-1:26 ⁷	0:32-0:41 ⁷		
		75/25	0:36-1:21	1:35-1:53	0:54-1:35	0:32-0:54	0:23-0:59 ⁷	0:32-0:41 ⁷		
Below -14 to -30.5	Below 7 to -22.9	100/0	0:23-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2F-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
KILFROST ABC-ICE CLEAR II

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	0:54-1:35	1:35-1:57	0:45-1:35	0:23-0:45	0:36-0:59	0:23-0:32	0:06-0:41	CAUTION: No holdover time guidelines exist
		75/25	0:45-1:03	1:12-1:35	0:36-1:12	0:18-0:36	0:27-0:41	0:18-0:27	0:05-0:32	
		50/50	0:14-0:27	0:18-0:23	0:14-0:18	0:07-0:14	0:09-0:18	0:06-0:09		
below -3 to -14	below 27 to 7	100/0	0:36-1:26	1:08-1:26	0:32-1:08	0:18-0:32	0:23-0:54 ⁷	0:14-0:27 ⁷		
		75/25	0:36-1:12	0:50-1:03	0:23-0:50	0:14-0:23	0:23-0:41 ⁷	0:14-0:18 ⁷		
Below -14 to -29.5	Below 7 to -21.1	100/0	0:18-0:36	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2G-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
KILFROST ABC-K PLUS

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	2:02-3:23	0:54-1:30	1:39-1:48	0:54-1:17	0:18-1:48	CAUTION: No holdover time guidelines exist
		75/25	1:30-2:15	0:32-1:03	1:17-1:48	0:45-1:03	0:14-1:48	
		50/50	0:32-0:59	0:06-0:14	0:18-0:27	0:09-0:14		
below -3 to -14	below 27 to 7	100/0	0:27-0:59	0:45-1:17	0:23-0:54 ⁷	0:14-0:32 ⁷		
		75/25	0:23-1:17	0:32-0:59	0:18-0:50 ⁷	0:08-0:27 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:27-0:50	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2H-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
LNT SOLUTIONS P250

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:57-3:36	3:00-3:00	1:35-3:00	0:50-1:35	1:26-1:48	0:45-1:17	0:14-1:48	CAUTION: No holdover time guidelines exist
		75/25	1:39-2:20	2:33-3:00	1:17-2:33	0:41-1:17	1:12-1:26	0:36-0:54	0:09-1:39	
		50/50	0:32-0:45	0:59-1:17	0:27-0:59	0:14-0:27	0:18-0:32	0:14-0:18		
below -3 to -14	below 27 to 7	100/0	0:41-2:06	2:51-3:00	1:30-2:51	0:45-1:30	0:23-1:12 ⁷	0:23-0:32 ⁷		
		75/25	0:32-1:35	2:33-3:00	1:17-2:33	0:41-1:17	0:18-1:08 ⁷	0:18-0:27 ⁷		
Below -14 to LOUT	Below 7 to LOUT	100/0	0:18-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2I-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
NEWAVE AEROCHEMICAL FCY-2

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	1:08-2:11	0:27-0:50	0:32-0:59	0:23-0:32	0:07-0:41	CAUTION: No holdover time guidelines exist
		75/25	0:45-1:21	0:18-0:36	0:23-0:41	0:14-0:23	0:05-0:23	
		50/50	0:23-0:32	0:14-0:23	0:09-0:18	0:06-0:09		
below -3 to -14	below 27 to 7	100/0	0:41-1:21	0:14-0:27	0:18-0:41 ⁷	0:14-0:18 ⁷		
		75/25	0:27-0:59	0:09-0:18	0:14-0:27 ⁷	0:07-0:14 ⁷		
below -14 to -28	below 7 to -18.4	100/0	0:23-0:32	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 2J-90%. 90 PERCENT ADJUSTED TYPE II HOLDOVER TIME GUIDELINES FOR
NEWAVE AEROCHEMICAL FCY-2 BIO+

Outside Air Temperature ¹		Manufacturer Specific Type II Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:17-2:15	2:06-2:38	0:59-2:06	0:27-0:59	0:45-1:12	0:23-0:41	0:07-1:08	CAUTION: No holdover time guidelines exist
		75/25	0:41-1:12	1:12-1:30	0:36-1:12	0:18-0:36	0:23-0:45	0:14-0:23	0:05-0:32	
		50/50	0:14-0:27	0:23-0:27	0:14-0:23	0:07-0:14	0:09-0:18	0:07-0:09		
below -3 to -14	below 27 to 7	100/0	0:36-1:21	0:54-1:08	0:27-0:54	0:14-0:27	0:32-0:59 ⁷	0:14-0:27 ⁷		
		75/25	0:27-0:59	0:32-0:41	0:18-0:32	0:07-0:18	0:18-0:32 ⁷	0:14-0:18 ⁷		
below -14 to -28.5	below 7 to -19.3	100/0	0:18-0:54	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type II fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING

TABLE 3A-LS-90%. 90 PERCENT ADJUSTED LOW SPEED TYPE III HOLDOVER TIME GUIDELINES FOR ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED¹

FOR AIRCRAFT CONFORMING TO THE SAE AS5900 LOW SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	0:54-2:02	0:32-0:36	0:18-0:32	0:09-0:18	0:36-1:12	0:23-0:27	0:08-0:54	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
		50/50	N/A	N/A	N/A	N/A	N/A	N/A		
below -3 to -10	below 27 to 14	100/0	0:54-1:35	0:27-0:32	0:14-0:27	0:08-0:14	0:36-1:03	0:27-0:36		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -10 to -16	below 14 to 3.2	100/0	0:27-0:59	0:27-0:32	0:14-0:27	0:07-0:14				

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

- 1 Fluid must be applied unheated to use these holdover times. No holdover times exist for this fluid applied heated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING

TABLE 3A-HS-90%. 90 PERCENT ADJUSTED HIGH SPEED TYPE III HOLDOVER TIME GUIDELINES FOR ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED¹

FOR AIRCRAFT CONFORMING TO THE SAE AS5900 HIGH SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)									
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷	
				Very Light ⁴	Light ⁴	Moderate					
-3 and above	27 and above	100/0	0:54-2:02	0:32-0:36	0:18-0:32	0:09-0:18	0:36-1:12	0:23-0:27	0:08-0:54	CAUTION: No holdover time guidelines exist	
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
below -3 to -10	below 27 to 14	100/0	0:54-1:35	0:27-0:32	0:14-0:27	0:08-0:14	0:36-1:03	0:27-0:36	CAUTION: No holdover time guidelines exist		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A			
below -10 to -25	below 14 to -13	100/0	0:27-0:59	0:27-0:32	0:14-0:27	0:07-0:14					CAUTION: No holdover time guidelines exist
below -25 to -35	below -13 to -31	100/0	0:16-0:50							CAUTION: No holdover time guidelines exist	

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

- 1 Fluid must be applied unheated to use these holdover times. No holdover times exist for this fluid applied heated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING

TABLE 3B-LS-90%. 90 PERCENT ADJUSTED LOW SPEED TYPE III HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP III 2031 ECO, APPLIED HEATED¹

FOR AIRCRAFT CONFORMING TO THE SAE AS5900 LOW SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	0:23-0:45	0:36-0:50	0:18-0:36	0:09-0:18	0:15-0:27	0:09-0:13	0:05-0:27	CAUTION: No holdover time guidelines exist
		75/25	0:17-0:36	0:32-0:41	0:14-0:32	0:06-0:14	0:12-0:18	0:07-0:08	0:03-0:16	
		50/50	0:12-0:16	0:23-0:27	0:12-0:23	0:06-0:12	0:12-0:13	0:06-0:06		
below -3 to -10	below 27 to 14	100/0	0:32-1:08	0:36-0:45	0:18-0:36	0:09-0:18	0:13-0:27	0:08-0:12		
		75/25	0:17-0:41 ⁸	0:23-0:32 ⁸	0:11-0:23 ⁸	0:05-0:11 ⁸	0:08-0:14 ⁸	0:05-0:07 ⁸		
below -10 to -16.5	below 14 to 2.3	100/0	0:23-0:41	0:36-0:41	0:17-0:36	0:08-0:17				

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

- 1 Fluid must be applied heated to use these holdover times. No holdover times exist for this fluid applied unheated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 6-90% provides allowance times for ice pellets and small hail).
- 8 No holdover time guidelines exist for 75/25 fluid below -9 °C (15.8 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING

TABLE 3B-HS-90%. 90 PERCENT ADJUSTED HIGH SPEED TYPE III HOLDOVER TIME GUIDELINES FOR CLARIANT SAFEWING MP III 2031 ECO, APPLIED HEATED¹

FOR AIRCRAFT CONFORMING TO THE SAE AS5900 HIGH SPEED AERODYNAMIC TEST CRITERION

Outside Air Temperature ²		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %)	Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ³			Freezing Drizzle ⁵	Light Freezing Rain	Rain on Cold Soaked Wing ⁶	Other ⁷
				Very Light ⁴	Light ⁴	Moderate				
-3 and above	27 and above	100/0	0:23-0:45	0:36-0:50	0:18-0:36	0:09-0:18	0:15-0:27	0:09-0:13	0:05-0:27	
		75/25	0:17-0:36	0:32-0:41	0:14-0:32	0:06-0:14	0:12-0:18	0:07-0:08	0:03-0:16	
		50/50	0:12-0:16	0:23-0:27	0:12-0:23	0:06-0:12	0:12-0:13	0:06-0:06	CAUTION: No holdover time guidelines exist	
below -3 to -10	below 27 to 14	100/0	0:32-1:08	0:36-0:45	0:18-0:36	0:09-0:18	0:13-0:27	0:08-0:12		
		75/25	0:17-0:41	0:23-0:32	0:11-0:23	0:05-0:11	0:08-0:14	0:05-0:07		
below -10 to -25	below 14 to -13	100/0	0:23-0:41	0:36-0:41	0:17-0:36	0:08-0:17				
below -25 to -29	below -13 to 20.2	100/0	0:23-0:41	0:36-0:41	0:17-0:36	0:08-0:17				

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

- 1 Fluid must be applied heated to use these holdover times. No holdover times exist for this fluid applied unheated.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type III fluid cannot be used.
- 3 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 4 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 5 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 6 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 7 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 6-90% provides allowance times for ice pellets and small hail).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast will reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4-GENERIC-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
SAE TYPE IV FLUIDS

Outside Air Temperature ¹		Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	1:21-2:11	0:32-1:03	0:45-1:21	0:32-0:45	0:09-1:17	CAUTION: No holdover time guidelines exist
		75/25	1:17-2:24	0:27-0:59	0:45-1:08	0:27-0:41	0:08-1:08	
		50/50	0:23-0:36	0:08-0:14	0:14-0:23	0:08-0:14		
below -3 to -14	below 27 to 7	100/0	0:18-1:12	0:23-0:45	0:23-1:03 ⁷	0:14-0:23 ⁷		
		75/25	0:23-0:45 ⁸	0:18-0:36 ⁸	0:14-0:59 ^{7,8}	0:14-0:23 ^{7,8}		
below -14 to LOU	below 7 to LOU	100/0	0:14-0:36 ⁹	0:14-0:27 ⁹				

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

- 1 Ensure that the lowest operational use temperature (LOU) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).
- 8 If the LOU is unknown, no holdover time guidelines exist below -5.5 °C (22 °F).
- 9 If the LOU is unknown, no holdover time guidelines exist below -23.5 °C (-10.3 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4A-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
ABAX ECOWING AD-49

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:00-3:36	2:33-2:51	1:39-2:33	1:03-1:39	1:17-1:48	0:54-1:17	0:09-1:44	CAUTION: No holdover time guidelines exist
		75/25	2:11-3:36	1:53-2:02	1:30-1:53	1:12-1:30	1:44-1:48	0:45-1:21	0:09-1:30	
		50/50	0:23-0:45	0:36-0:41	0:23-0:36	0:14-0:23	0:14-0:27	0:09-0:14		
below -3 to -14	below 27 to 7	100/0	0:18-1:26	2:33-2:51	1:39-2:33	1:03-1:39	0:23-1:17 ⁷	0:18-0:23 ⁷		
		75/25	0:27-1:03	1:53-2:02	1:30-1:53	1:12-1:30	0:14-0:59 ⁷	0:14-0:23 ⁷		
below -14 to -26	below 7 to -14.8	100/0	0:23-0:36	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4B-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
CLARIANT MAX FLIGHT 04

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:24-3:36	3:00-3:00	2:29-3:00	1:17-2:29	1:48-1:48	1:03-1:21	0:18-1:48	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	0:45-2:15	2:06-2:33	1:03-2:06	0:32-1:03	0:23-1:21 ⁷	0:18-0:36 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -23.5	below 7 to -10.3	100/0	0:18-0:41	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4C-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
CLARIANT MAX FLIGHT SNEG

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:11-3:36	2:29-2:51	1:30-2:29	0:59-1:30	1:48-1:48	0:45-1:30	0:18-1:21	CAUTION: No holdover time guidelines exist
		75/25	3:36-3:36	2:11-2:33	1:21-2:11	0:50-1:21	1:21-1:48	0:59-1:12	0:14-1:35	
		50/50	1:21-3:09	1:35-2:06	0:41-1:35	0:18-0:41	0:32-1:03	0:14-0:27		
below -3 to -14	below 27 to 7	100/0	0:41-2:06	1:48-2:06	1:08-1:48	0:41-1:08	0:27-1:17 ⁷	0:23-0:36 ⁷		
		75/25	0:27-1:17	1:30-1:48	0:54-1:30	0:36-0:54	0:18-0:59 ⁷	0:18-0:36 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:18-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4D-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
CLARIANT SAFEWING MP IV LAUNCH

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:36-3:36	2:33-3:00	1:35-2:33	0:59-1:35	1:21-1:48	0:54-1:30	0:14-1:30	CAUTION: No holdover time guidelines exist
		75/25	3:18-3:36	2:47-3:00	1:35-2:47	0:54-1:35	1:30-1:48	0:41-1:08	0:09-1:35	
		50/50	1:17-2:29	1:17-1:30	0:41-1:17	0:23-0:41	0:27-0:45	0:18-0:23		
below -3 to -14	below 27 to 7	100/0	0:54-1:44	1:57-2:15	1:12-1:57	0:45-1:12	0:32-1:30 ⁷	0:23-0:41 ⁷		
		75/25	0:36-1:12	2:11-2:38	1:17-2:11	0:41-1:17	0:23-1:03 ⁷	0:23-0:41 ⁷		
below -14 to -28.5	below 7 to -19.3	100/0	0:27-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4E-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
CLARIANT SAFEWING MP IV LAUNCH PLUS

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:32-3:36	3:00-3:00	1:53-3:00	0:50-1:53	1:48-1:48	0:54-1:48	0:18-1:48	CAUTION: No holdover time guidelines exist
		75/25	3:32-3:36	3:00-3:00	1:44-3:00	0:45-1:44	1:48-1:48	1:12-1:17	0:18-1:39	
		50/50	1:08-1:39	1:26-1:48	0:41-1:26	0:18-0:41	0:23-0:54	0:14-0:18		
below -3 to -14	below 27 to 7	100/0	0:50-2:02	2:56-3:00	1:17-2:56	0:36-1:17	0:23-1:26 ⁷	0:23-0:36 ⁷		
		75/25	0:36-1:48	2:38-3:00	1:08-2:38	0:27-1:08	0:18-0:59 ⁷	0:18-0:27 ⁷		
below -14 to -29	below 7 to -20.2	100/0	0:23-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4F-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
CRYOTECH POLAR GUARD®

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	2:02-3:09	0:45-1:21	1:08-1:48	0:45-1:08	0:14-1:17	CAUTION: No holdover time guidelines exist
		75/25	1:30-2:24	0:32-1:03	0:59-1:17	0:32-0:54	0:09-1:08	
		50/50	0:23-0:36	0:09-0:14	0:14-0:23	0:09-0:14		
below -3 to -14	below 27 to 7	100/0	0:41-1:35	0:27-0:50	0:23-1:03 ⁷	0:14-0:32 ⁷		
		75/25 ⁸	0:32-1:21 ⁸	0:18-0:36 ⁸	0:23-0:59 ⁸	0:18-0:27 ⁸		
Below -14 to -23.5	Below 7 to -10.3	100/0	0:18-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).
- 8 Temperature is limited to -5.5 °C (22 °F) when using 75/25 dilution of this fluid.

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4G-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
CRYOTECH POLAR GUARD® ADVANCE

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	2:33-3:36	2:20-2:33	1:39-2:20	1:12-1:39	1:26-1:48	1:08-1:21	0:14-1:48	CAUTION: No holdover time guidelines exist
		75/25	2:15-3:36	2:11-2:38	1:12-2:11	0:41-1:12	1:30-1:48	0:36-1:03	0:08-1:30	
		50/50	0:45-1:17	1:12-1:35	0:32-1:12	0:14-0:32	0:18-0:41	0:08-0:18		
below -3 to -14	below 27 to 7	100/0	0:50-2:15	1:35-1:44	1:08-1:35	0:50-1:08	0:32-1:26 ⁷	0:32-0:41 ⁷		
		75/25	0:36-1:21	1:35-1:53	0:54-1:35	0:32-0:54	0:23-0:59 ⁷	0:32-0:41 ⁷		
Below -14 to -30.5	Below 7 to -22.9	100/0	0:23-0:45	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4H-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
DEICING SOLUTIONS ECO-SHIELD®

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:21-2:11	2:11-2:38	1:12-2:11	0:41-1:12	0:45-1:26	0:36-0:45	0:14-1:44	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	1:03-2:15	1:35-1:53	0:50-1:35	0:27-0:50	0:41-1:48 ⁷	0:23-0:36 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -24.5	below 7 to -12.1	100/0	0:27-0:50	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4I-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
DOW CHEMICAL UCAR™ ENDURANCE EG106

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:53-2:51	2:29-3:00	1:12-2:29	0:36-1:12	1:03-1:48	0:45-1:08	0:18-1:48	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
		50/50	N/A	N/A	N/A	N/A	N/A	N/A		
below -3 to -14	below 27 to 7	100/0	1:39-3:00	1:57-2:29	0:59-1:57	0:27-0:59	0:50-1:39 ⁷	0:41-1:03 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -27	below 7 to -16.6	100/0	0:27-0:59	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4J-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
DOW CHEMICAL UCAR™ FLIGHTGUARD AD-480

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ^{2,3}	Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
-3 and above	27 and above	100/0	1:48-3:09	0:36-1:12	0:45-1:21	0:32-0:50	0:14-1:26	CAUTION: No holdover time guidelines exist
		75/25	1:21-2:29	0:27-0:59	0:45-1:08	0:27-0:41	0:09-1:08	
		50/50	0:27-0:41	0:08-0:18	0:14-0:23	0:08-0:14		
below -3 to -14	below 27 to 7	100/0	0:18-1:12	0:27-0:50	0:23-1:12 ⁷	0:14-0:27 ⁷		
		75/25	0:23-0:45	0:18-0:41	0:23-0:59 ⁷	0:14-0:27 ⁷		
below -14 to -26	below 7 to -14.8	100/0	0:14-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4K-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
DOW CHEMICAL UCAR™ FLIGHTGUARD AD-49

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	3:00-3:36	2:33-2:51	1:39-2:33	1:03-1:39	1:17-1:48	0:54-1:17	0:09-1:44	CAUTION: No holdover time guidelines exist
		75/25	2:11-3:36	1:53-2:02	1:30-1:53	1:12-1:30	1:44-1:48	0:45-1:21	0:09-1:30	
		50/50	0:23-0:45	0:36-0:41	0:23-0:36	0:14-0:23	0:14-0:27	0:09-0:14		
below -3 to -14	below 27 to 7	100/0	0:18-1:26	2:33-2:51	1:39-2:33	1:03-1:39	0:23-1:17 ⁷	0:18-0:23 ⁷		
		75/25	0:27-1:03	1:53-2:02	1:30-1:53	1:12-1:30	0:14-0:59 ⁷	0:14-0:23 ⁷		
below -14 to -26	below 7 to -14.8	100/0	0:23-0:36	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4L-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
KILFROST ABC-S PLUS

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:57-3:36	3:00-3:00	1:53-3:00	1:08-1:53	1:39-1:48	0:59-1:48	0:23-1:48	CAUTION: No holdover time guidelines exist
		75/25	1:17-2:24	1:53-2:11	1:08-1:53	0:41-1:08	0:54-1:12	0:27-0:45	0:09-1:12	
		50/50	0:27-0:50	0:54-1:03	0:27-0:54	0:14-0:27	0:14-0:36	0:14-0:18		
below -3 to -14	below 27 to 7	100/0	0:50-3:09	2:38-3:00	1:35-2:38	0:54-1:35	0:23-1:26 ⁷	0:18-0:27 ⁷		
		75/25	0:41-1:39	1:35-1:48	0:54-1:35	0:32-0:54	0:18-1:03 ⁷	0:14-0:23 ⁷		
below -14 to -28	below 7 to -18.4	100/0	0:36-0:54	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4M-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
LNT SOLUTIONS E450

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:39-2:38	2:11-2:29	1:26-2:11	0:54-1:26	1:26-1:48	0:50-1:12	0:23-1:48	CAUTION: No holdover time guidelines exist
		75/25	N/A				N/A	N/A	N/A	
		50/50	N/A				N/A	N/A		
below -3 to -14	below 27 to 7	100/0	1:21-3:32	1:39-1:53	1:03-1:39	0:41-1:03	1:35-1:48 ⁷	0:59-1:30 ⁷		
		75/25	N/A				N/A	N/A		
below -14 to LOUT	below 7 to LOUT	100/0	0:32-0:59	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING
TABLE 4N-90%. 90 PERCENT ADJUSTED TYPE IV HOLDOVER TIME GUIDELINES FOR
NEWAVE AEROCHEMICAL FCY 9311

Outside Air Temperature ¹		Manufacturer Specific Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %)	Approximate Holdover Times Under Various Weather Conditions (hours: minutes)							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals	Snow, Snow Grains or Snow Pellets ²			Freezing Drizzle ⁴	Light Freezing Rain	Rain on Cold Soaked Wing ⁵	Other ⁶
				Very Light ³	Light ³	Moderate				
-3 and above	27 and above	100/0	1:44-3:36	2:06-2:38	1:03-2:06	0:32-1:03	1:03-1:48	0:36-0:59	0:14-1:17	CAUTION: No holdover time guidelines exist
		75/25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		50/50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
below -3 to -14	below 27 to 7	100/0	0:32-1:53	1:26-1:48	0:45-1:26	0:23-0:45	0:32-1:12 ⁷	0:18-0:32 ⁷		
		75/25	N/A	N/A	N/A	N/A	N/A	N/A		
below -14 to -29.5	below 7 to -21.1	100/0	0:27-0:50	0:36-0:45	0:27-0:36	0:14-0:27				

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

- 1 Ensure that the lowest operational use temperature (LOUT) is respected. Consider use of Type I fluid when Type IV fluid cannot be used.
- 2 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 5) is required.
- 3 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain.
- 4 Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
- 5 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
- 6 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail (Table 7-90% provides allowance times for ice pellets and small hail).
- 7 No holdover time guidelines exist for this condition below -10 °C (14 °F).

CAUTIONS:

- The time of protection will be shortened in heavy weather conditions. Heavy precipitation rates or high moisture content, high wind velocity, or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may be reduced when aircraft skin temperature is lower than outside air temperature.
- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.

**THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED
PRIOR TO DE/ANTI-ICING**

**TABLE 6-90%. 90 PERCENT ADJUSTED ICE PELLET AND SMALL HAIL
ALLOWANCE TIMES FOR SAE TYPE III FLUIDS**

This table is for use with SAE Type III undiluted (100/0) fluids applied unheated only¹

Precipitation Type	Outside Air Temperature		
	-5°C and above	Below -5 to -10°C	Below -10°C ²
Light Ice Pellets	9 minutes	9 minutes	Caution: No allowance times currently exist
Moderate Ice Pellets or Small Hail ³	5 minutes	5 minutes	
Light Ice Pellets Mixed with Light or Moderate Freezing Drizzle	6 minutes	5 minutes	
Light Ice Pellets Mixed with Light Freezing Rain	6 minutes	5 minutes	
Light Ice Pellets Mixed with Light Rain	6 minutes ⁴		
Light Ice Pellets Mixed with Moderate Rain			
Light Ice Pellets Mixed with Light Snow	9 minutes	9 minutes	
Light Ice Pellets Mixed with Moderate Snow	9 minutes	9 minutes	

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

NOTES

- 1 No allowance times exist for AllClear AeroClear MAX.
- 2 Ensure that the lowest operational use temperature (LOUT) is respected.
- 3 If no intensity is reported with small hail, moderate ice pellets allowance times apply. However, if an intensity is reported with small hail, the ice pellet condition with the equivalent intensity can be used, e.g. light small hail = light ice pellets, moderate small hail = moderate ice pellets.
- 4 No allowance times exist in this condition for temperatures below 0 °C; consider use of light ice pellets mixed with light freezing rain.

CAUTIONS:

- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.
- Allowance time cannot be extended by an inspection of the aircraft critical surfaces.
- Take off is allowed up to 90 minutes after start of fluid application if the precipitation stops at or before the allowance time expires and does not restart. The OAT must not decrease during the 90 minutes to use this guidance in conditions of light ice pellets mixed with either: light or moderate freezing drizzle, light freezing rain, or light rain.

THIS TABLE IS FOR USE WHEN FLAPS/SLATS ARE DEPLOYED PRIOR TO DE/ANTI-ICING

TABLE 7-90%. 90 PERCENT ADJUSTED ICE PELLET AND SMALL HAIL ALLOWANCE TIMES FOR SAE TYPE IV FLUIDS

This table is for use with SAE Type IV undiluted (100/0) fluids only. All Type IV fluids are propylene glycol based with the exception of Dow EG106 and LNT E450 which are ethylene glycol based.

Precipitation Type	Outside Air Temperature		
	-5°C and above	Below -5 to -10°C	Below -10°C ¹
Light Ice Pellets	45 minutes	27 minutes	27 minutes ²
Moderate Ice Pellets or Small Hail ³	23 minutes ⁴	9 minutes	9 minutes ^{2,5}
Light Ice Pellets Mixed with Light or Moderate Freezing Drizzle	23 minutes	9 minutes	Caution: No allowance times currently exist
Light Ice Pellets Mixed with Light Freezing Rain	23 minutes	9 minutes	
Light Ice Pellets Mixed with Light Rain	23 minutes ⁶		
Light Ice Pellets Mixed with Moderate Rain	23 minutes ⁷		
Light Ice Pellets Mixed with Light Snow	23 minutes	14 minutes	
Light Ice Pellets Mixed with Moderate Snow	9 minutes	6 minutes	

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

NOTES

- 1 Ensure that the lowest operational use temperature (LOUT) is respected.
- 2 No allowance times exist for propylene glycol (PG) fluids when used on aircraft with rotation speeds less than 115 knots. (For these aircraft, if the fluid type is not known, assume zero allowance time.)
- 3 If no intensity is reported with small hail, moderate ice pellets allowance times apply. However, if an intensity is reported with small hail, the ice pellet condition with the equivalent intensity can be used, e.g. light small hail = light ice pellets, moderate small hail = moderate ice pellets.
- 4 Allowance time is 14 minutes for propylene glycol (PG) fluids or when the fluid type is unknown.
- 5 No allowance times exist for propylene glycol (PG) fluids in this condition for temperatures below -16 °C.
- 6 No allowance times exist in this condition for temperatures below 0 °C; consider use of light ice pellets mixed with light freezing rain.
- 7 No allowance times exist in this condition for temperatures below 0 °C.

CAUTIONS:

- Fluids used during ground de/anti-icing do not provide in-flight icing protection.
- This table is for departure planning only and should be used in conjunction with pretakeoff check procedures.
- Allowance time cannot be extended by an inspection of the aircraft critical surfaces.
- Take off is allowed up to 90 minutes after start of fluid application if the precipitation stops at or before the allowance time expires and does not restart. The OAT must not decrease during the 90 minutes to use this guidance in conditions of light ice pellets mixed with either: light or moderate freezing drizzle, light freezing rain, light rain, or moderate rain.