OFFICIAL FAA HOLDOVER TIME REGRESSION INFORMATION

WINTER 2013-2014

The information contained in this document is the FAA official holdover time regression information for use in Winter 2013-2014. The content of this document is included by reference in the FAA Winter 2013-2014 Notice N 8900.TBD[1] that is published in FSIMS. The content of this document should be used as the official winter 2013-2014 holdover time regression information.

Questions concerning FAA aircraft ground de/anti-icing requirements or Flight Standards policies should be addressed to charles.j.enders@faa.gov or 202-493-1422.

Questions on the technical content of the holdover time tables should be addressed to warren.underwood@faa.gov or 404-305-7163.

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

[1] The Notice will be published shortly. Once published, "N 8900.TBD" will be changed to reflect the publication number.

CHANGE CONTROL RECORDS

This page indicates any changes made to individual pages within the document. Changed pages have the appropriate revision date in the footer.

It is the responsibility of the end user to periodically check for updates on Regression Information.

REVISION	*DATE*	*DESCRIPTION OF CHANGES*	*AFFECTED PAGES*	*AUTHOR*

SUMMARY OF CHANGES FROM PREVIOUS YEAR

As this is the first year this document is published, there are no changes from a previous year.

GUIDANCE FOR USING REGRESSION INFORMATION

In recent years, several companies have been developing systems that measure precipitation rate in real-time. These systems, referred to as liquid water equivalent systems (LWES), can be used by check-time determination systems (CTDS) and holdover time determination systems (HOTDS) to calculate more precise holdover times than can be obtained from the holdover time guidelines. They do this using the weather data they collect and the regression information underlying the holdover time guidelines.

As a result of the development of LWES, CTDS and HOTDS, the FAA is making the regression coefficients and equations underlying the holdover time tables available to users. The purpose of this document is to provide the holdover time guidelines regression information for the 2013-14 holdover time guidelines and to provide guidance on its usage.

The sources of the regression data, along with a history of the publication of regression information, are documented in the Transport Canada report, TP 15229E, *Regression Coefficients and Equations Used to Develop the Winter 2013-14 Aircraft Ground Deicing Holdover Time Tables*. This document can be referenced for further information if required.

At this time, use of these systems is authorized through an FAA Operational Demonstration which for the winter of 2013-14 will be limited to snow conditions.

Interpreting Regression Coefficients Tables

Regression information is provided in this document in a series of regression coefficients tables. Each regression coefficients table shows the regression coefficients and equations that are to be used to calculate holdover times at specific outside air temperatures, under specific precipitation types, with specific fluid dilutions (as applicable for Type II/III/IV fluids).

Each regression coefficients table is presented in the format of its corresponding holdover time table. A footnote is provided at the top of each column to indicate the form of the regression equation for the cells in that column. The regression coefficients required for the equation are given in the corresponding cells below.

The coefficients provided in each table cell are valid only for the conditions (temperature, precipitation type, fluid dilution) of that cell. In cells where no temperature coefficient (coefficient “B”) is provided, temperature is not an input into the equation.

Applicability of Regression Coefficients Tables

The Type I generic regression coefficients tables are applicable for all Type I fluids. Fluid-specific regression coefficients tables are available and applicable for Type III fluids and Type IV fluids and for the majority of Type II fluids. If a fluid-specific table is not available for use in calculating fluid-specific holdover times for a Type II or Type IV fluid (currently the case for only two fluids - Clariant Safewing MP II 1951 and Kilfrost ABC-3) or if the specific fluid being used is not known, the methodology for calculating Type II or Type IV generic holdover times must be followed (see next page).

Calculating Type II and Type IV Generic Holdover Times

Generic Type II and Type IV holdover times are used when a flight crew is unaware of the specific fluid that has been used to de/anti-ice their aircraft. The generic values represent the shortest possible holdover time of either all Type II or all Type IV fluids available. The following methodologies must be applied to CTDS/HOTDS programming to enable the systems to determine generic Type II and Type IV holdover times.

Type II: To calculate Type II generic holdover times, the CTDS/HOTDS must be programmed to return the shortest holdover time calculated from the regression information provided for each of the following:

a) Each Type II fluid on the FAA list of fluids tested for anti-icing performance and aerodynamic acceptance, excluding Kilfrost ABC-3;

b) The Type II grandfathered fluid data set, and

c) Each Type IV fluid on the FAA list of fluids tested for anti-icing performance and aerodynamic acceptance (as Type IV fluids also qualify as Type II fluids).

This methodology must also be followed if either Kilfrost ABC-3 or Clariant Safewing MP II 1951 is being used, as neither of these fluids is qualified for use with fluid-specific holdover times.

Type IV: To calculate Type IV generic holdover times, the CTDS/HOTDS must be programmed to calculate the holdover time for each Type IV fluid on the FAA list of fluids tested for anti-icing performance and aerodynamic acceptance and return the shortest holdover time calculated. This is the generic Type IV holdover time.

Verification Tables

Verification tables are provided for each of the regression coefficients tables and also for the generic Type II and generic Type IV holdover times. Each verification table provides verification values for select boundary conditions in the associated holdover time table. For Type II, III and IV fluids, the verification tables also include verification values for the lowest usable precipitation rate in snow.

NOTE: CTDS/HOTDS manufacturers may find it useful to use these verification tables as an aid in verifying the implementation of their software algorithms. However, CTDS/HOTDS manufacturers are cautioned that these tables are not all encompassing and that they must develop comprehensive verification and validation methods to ensure the adequacy of their software algorithms.

NOTE: The temperatures used in the verification tables do not respect limitations imposed by fluid lowest operational use temperatures.

Lowest Usable Precipitation Rates in Snow (Table 5)

Analysis conducted in the winter of 2011-12 determined that natural snow test data for some fluids is not sufficient to support extrapolation of the regression curves to very low rates of precipitation. The lowest usable precipitation rates (LUPRs) in snow have been identified and are included in Table 5 for Type II, III and IV fluids (Type I fluids are not affected). The lowest usable rates differ by fluid brand, fluid dilution and temperature. Supplemental testing conducted in the winter of 2012-13 resulted in reductions to the LUPRs of some Type II and IV fluids.

Limitations of Regression Information

Users are cautioned that care must be taken in the application of the regression information. There are a number of rules, exceptions and cautions detailed in both this document and in the holdover time guidelines that must be considered.

Several limitations on the usage of the regression information are listed below.

- The regression coefficients can only be used with liquid water equivalent information that is provided by a CTDS or HOTDS.

- Regression equations which include a temperature coefficient cannot be populated with temperature data greater than or equal to 2°C. This is a limitation of the form of the equation. The AC instructs that 0°C be input into the equation when temperature is above 0°C.

- Regression data is developed for specific fluid dilutions. The data cannot be interpolated to determine holdover times for use with dilutions other than the standard 100/0, 75/25 and 50/50 mixtures.

- The regression coefficients are based on best-fit power-law curves and the shape of these curves can result in extreme values outside the precipitation rate limits at which endurance time tests are conducted. Therefore, these values are not necessarily accurate. Caution must therefore be exercised when using the regression equations to calculate holdover times outside of the precipitation rate limits used in the development of holdover time tables, especially at precipitation rates below the lower precipitation rate limit, where the power-law curves give much longer holdover times.

- The lowest and highest precipitation rates to be used as an input to the regression equations are precipitation type dependent, but are currently limited to snow for the winter of 2013-14.

- The lowest precipitation rate to be used as an input to the snow regression equations (this does not apply to other precipitation types) is constrained by the higher of the following:

    1. Minimum demonstrated precipitation measuring equipment rates which shall not be less than 2.0 g/dm²/h and

    2. Lowest usable precipitation rate (LUPR) for each fluid/dilution/temperature as defined in Table 5 of this document. The LUPR is the lowest precipitation rate for which sufficient outdoor snow data exists to support use of the regression coefficients. Further data on the substantiation of the LUPR values is available in TP 15229E.

- The highest precipitation rate to be used as an input to the snow regression equations shall be 25 g/dm^2/h.

- As regression coefficients and equations are not currently used in the determination of frost holdover times, regression coefficient information is not provided for frost.

- As regression coefficients and equations are not used in the determination of the allowance times provided for ice pellets and ice pellets mixed with other types of precipitation, regression coefficient information is not provided for the ice pellet allowance times.

REGRESSION INFORMATION TABLES FOR WINTER 2013-2014

TABLE 1-1
GENERIC TYPE I (ALUMINUM WING SURFACES)
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	**Degrees Fahrenheit**	**Freezing Fog or Ice Crystals[1]**	**Snow, Snow Grains or Snow Pellets[2,3]**	**Freezing Drizzle[1]**	**Light Freezing Rain[1]**	**Rain on Cold Soaked Wing[1]**	**Other**
-3 and above	27 and above	I = 1.3735 A = -0.4751	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.3829 A = -0.3848	I = 2.2598 A = -1.4012	I = 0.9355 A = -0.3384	
below -3 to -6	below 27 to 21	I = 1.2734 A = -0.5299	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.3842 A = -0.6152	I = 2.2598 A = -1.4012		
below -6 to -10	below 21 to 14	I = 1.1678 A = -0.5575	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.2545 A = -0.5857	I = 2.2598 A = -1.4012		CAUTION: No holdover time guidelines exist
below -10	below 14	I = 1.1473 A = -0.6415	I = 2.0072 A = -0.5752 B = -0.5585				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] Type I aluminum snow values are rounded down to the nearest one minute (i.e. 6.5 mins = 6 mins, 18.6 mins = 18 mins) to determine holdover time table values

Outside Air Temp. (°C)	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
	Freezing Fog or Ice Crystals (g/dm²/h)		**Snow, Snow Grains or Snow Pellets** (g/dm²/h)			**Freezing Drizzle** (g/dm²/h)		**Light Freezing Rain** (g/dm²/h)		**Rain on Cold Soaked Wing** (g/dm²/h)	
	5	**2**	**25**	**10**	**4**	**13**	**5**	**25**	**13**	**75**	**5**
+1 / -3 *	11.0	17.0	6.5	11.0	18.6	9.0	13.0	2.0	5.0	2.0	5.0
-6	8.0	13.0	5.0	8.5	14.3	5.0	9.0	2.0	5.0		
-10	6.0	10.0	4.0	6.7	11.4	4.0	7.0	2.0	5.0		
-25	5.0	9.0	2.5	4.3	7.3						

* Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C

TABLE 1-2
GENERIC TYPE I (COMPOSITE WING SURFACES)
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	**Degrees Fahrenheit**	**Freezing Fog or Ice Crystals[1]**	**Snow, Snow Grains or Snow Pellets[2,3]**	**Freezing Drizzle[1]**	**Light Freezing Rain[1]**	**Rain on Cold Soaked Wing[1]**	**Other**
-3 and above	27 and above	I = 1.3931 A = -0.6279	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.4691 A = -0.5081	I = 2.2598 A = -1.4012	I = 1.1144 A = -0.5943	
below -3 to -6	below 27 to 21	I = 0.9976 A = -0.3140	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.3842 A = -0.6152	I = 2.2598 A = -1.4012	CAUTION: No holdover time guidelines exist	
below -6 to -10	below 21 to 14	I = 1.1308 A = -0.7565	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.2545 A = -0.5857	I = 2.2598 A = -1.4012		
below -10	below 14	I = 1.0289 A = -0.6107	I = 2.0072 A = -0.5752 B = -0.5585				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] Type I composite snow values below 10 mins are rounded down to the nearest one minute (i.e. 2.5 mins = 2 mins) to determine holdover time table values

Outside Air Temp. (°C)	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
	Freezing Fog or Ice Crystals (g/dm²/h)		**Snow, Snow Grains or Snow Pellets** (g/dm²/h)			**Freezing Drizzle** (g/dm²/h)		**Light Freezing Rain** (g/dm²/h)		**Rain on Cold Soaked Wing** (g/dm²/h)	
	5	**2**	**25**	**10**	**4**	**13**	**5**	**25**	**13**	**75**	**5**
+1 / -3 *	9.0	16.0	3.0	6.0	11.8	8.0	13.0	2.0	5.0	1.0	5.0
-6	6.0	8.0	2.7	5.4	10.7	5.0	9.0	2.0	5.0		
-10	4.0	8.0	2.5	5.0	9.8	4.0	7.0	2.0	5.0		
-25	4.0	7.0	2.5	4.3	7.3						

* Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C

TABLE 2-1
ABAX ECOWING 26
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1,4]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.3810 A = -0.6352	I = 2.3598 A = -0.5098 B = -0.0978	I = 2.3598 A = -0.5098 B = -0.0978	I = 2.3598 A = -0.5098 B = -0.0978	I = 2.4589 A = -0.6723	I = 2.0131 A = -0.2946	I = 2.3224 A = -0.5535	
		75/25	I = 2.2439 A = -0.6073	I = 2.3334 A = -0.5288 B = -0.2160	I = 2.3334 A = -0.5288 B = -0.2160	I = 2.3485 A = -0.6016 B = -0.1043	I = 2.1009 A = -0.4085	I = 2.0488 A = -0.4806	I = 2.2032 A = -0.6072	
		50/50	I = 1.7955 A = -0.5090	I = 2.0178 A = -0.6943 B = 0.0298	I = 2.0178 A = -0.6943 B = 0.0298	I = 2.0178 A = -0.6943 B = 0.0298	I = 1.7327 A = -0.5413	I = 1.6166 A = -0.5058	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5006 A = -1.2335	I = 2.3598 A = -0.5098 B = -0.0978	I = 2.3598 A = -0.5098 B = -0.0978	I = 2.3598 A = -0.5098 B = -0.0978	I = 2.4044 A = -0.8101	I = 2.7587 A = -1.1217		
		75/25	I = 2.1380 A = -0.8452	I = 2.3334 A = -0.5288 B = -0.2160	I = 2.3334 A = -0.5288 B = -0.2160	I = 2.3485 A = -0.6016 B = -0.1043	I = 2.2768 A = -0.8445	I = 2.3760 A = -0.8759		
below -14 to -25	below 7 to -13	100/0	I = 1.8682 A = -0.6972	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5
[4] Freezing drizzle and light freezing rain values were calculated at 12.7 g/dm²h the year the holdover time table for this fluid was produced. Since they are now calculated at 13.0 g/dm²h, values in the holdover time table may differ slightly from those calculated using these coefficients.

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	86.5	154.8	37.9	60.5	137.4	51.3	97.5	39.9	48.4	19.3	86.2
	75/25	66.0	115.1	27.2	47.2	105.5	44.2	65.4	23.8	32.6	11.6	60.1
	50/50	27.5	43.9	11.7	22.1	51.0	13.5	22.6	8.1	11.3		
-10 / -14 ***	100/0	43.5	134.7	33.8	54.0	122.6	31.8	68.9	15.5	32.3		
	75/25	35.3	76.5	24.1	41.8	82.1	21.7	48.6	14.2	25.1		
-25	100/0	24.0	45.5	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-2
AVIATION SHAANXI HI-TECH CLEANWING II
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.2573 A = -0.7407	I = 2.4007 A = -0.6714 B = 0.0000	I = 2.1979 A = -0.5728	I = 2.2567 A = -0.6317	I = 2.1512 A = -0.6064	
		75/25	I = 2.0742 A = -0.5411	I = 2.3510 A = -0.6986 B = 0.0000	I = 2.1475 A = -0.5338	I = 2.2158 A = -0.6683	I = 2.1568 A = -0.6861	
		50/50	I = 1.9836 A = -0.6276	I = 2.3242 A = -0.6725 B = -0.2889	I = 2.0341 A = -0.6288	I = 2.1847 A = -0.7830	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.3283 A = -0.9431	I = 2.4007 A = -0.6714 B = 0.0000	I = 2.1441 A = -0.6033	I = 1.8282 A = -0.4021		
		75/25	I = 2.3328 A = -1.0611	I = 2.3510 A = -0.6986 B = 0.0000	I = 1.6685 A = -0.1061	I = 1.7474 A = -0.3274		
below -14 to -29	below 7 to -20.2	100/0	I = 1.9950 A = -0.9540	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	54.9	108.2	29.0	53.6	99.2	36.3	62.7	23.6	35.7	10.3	53.4
	75/25	49.7	81.5	23.7	44.9	85.2	35.7	59.5	19.1	29.6	7.4	47.6
	50/50	35.1	62.3	15.2	28.2	35.8	21.6	39.3	12.3	20.5		
-10 / -14 ***	100/0	46.7	110.8	29.0	53.6	99.2	29.7	52.8	18.5	24.0		
	75/25	39.0	103.1	23.7	44.9	85.2	35.5	39.3	19.5	24.1		
-25	100/0	21.3	51.0	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-3
CLARIANT SAFEWING MP II 1951
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions[1]					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[2]	Light Freezing Rain[2]	Rain on Cold Soaked Wing[2]	Other
-3 and above	27 and above	100/0	I = 2.1983 A = -0.6306	I = 2.4921 A = -0.7197 B = -0.1457	I = 2.1302 A = -0.5579	I = 2.0690 A = -0.5228	I = 2.1024 A = -0.5666	
		75/25	I = 2.0535 A = -0.5710	I = 2.4196 A = -0.7591 B = -0.1914	I = 2.0792 A = -0.6250	I = 1.9155 A = -0.5042	I = 2.0174 A = -0.6000	
		50/50	I = 1.5607 A = -0.3896	I = 2.3542 A = -0.9691 B = -0.3207	I = 1.6283 A = -0.6320	I = 1.6164 A = -0.5744	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.1272 A = -0.6673	I = 2.4921 A = -0.7197 B = -0.1457	I = 2.1765 A = -0.6919	I = 2.3569 A = -0.8074		
		75/25	I = 1.9549 A = -0.6133	I = 2.4196 A = -0.7591 B = -0.1914	I = 1.9187 A = -0.5179	I = 1.9149 A = -0.5296		
below -14 to -28	below 7 to -18.4	100/0	I = 1.8859 A = -0.8776	I = 2.2336 A = -0.7565 B = 0.0000				

[1] The Clariant Safewing MP II 1951 regression information is only to be used in the calculation of Type II generic holdover times. The information cannot be used to deduce fluid-specific holdover times for Clariant Safewing MP II 1951.
[2] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[3] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[4] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	57.2	102.0	24.2	46.8	111.4	32.3	55.0	21.8	30.7	11.0	50.9
	75/25	45.1	76.1	16.8	33.6	114.1	24.2	43.9	16.2	22.6	7.8	39.6
	50/50	19.4	27.8	6.0	14.5	68.9	8.4	15.4	6.5	9.5		
-10 / -14 ***	100/0	45.8	84.4	20.4	39.5	94.0	25.5	49.3	16.9	28.7		
	75/25	33.6	58.9	13.4	26.9	91.3	22.0	36.0	14.9	21.1		
-25	100/0	18.7	41.9	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-4

CLARIANT SAFEWING MP II FLIGHT

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.4369 A = -0.1630	I = 2.7425 A = -0.5435 B = -0.3120	I = 2.7425 A = -0.5435 B = -0.3120	I = 2.7425 A = -0.5435 B = -0.3120	I = 2.6541 A = -0.6697	I = 2.9080 A = -0.8860	I = 2.4810 A = -0.7583	
		75/25	I = 2.3415 A = -0.4326	I = 3.0163 A = -0.7162 B = -0.5615	I = 3.0163 A = -0.7162 B = -0.5615	I = 3.0163 A = -0.7162 B = -0.5615	I = 2.1306 A = -0.2689	I = 2.5596 A = -0.7512	I = 2.5884 A = -0.9638 or[4] I = 2.2277 A = -0.7375	
		50/50	I = 2.2250 A = -0.6732	I = 2.2879 A = -0.7080 B = -0.2971	I = 2.2879 A = -0.7080 B = -0.2971	I = 2.2879 A = -0.7080 B = -0.2971	I = 1.7413 A = -0.3693	I = 1.9070 A = -0.6463	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.2233 A = -0.6827	I = 2.7425 A = -0.5435 B = -0.3120	I = 2.7425 A = -0.5435 B = -0.3120	I = 2.7425 A = -0.5435 B = -0.3120	I = 2.6220 A = -0.9557	I = 2.5701 A = -0.8095		
		75/25	I = 2.1182 A = -1.0244	I = 3.0163 A = -0.7162 B = -0.5615	I = 3.0163 A = -0.7162 B = -0.5615	I = 3.0163 A = -0.7162 B = -0.5615	I = 2.6085 A = -1.0800 or[4] I = 2.7141 A = -1.2023	I = 2.3076 A = -0.6932		
below -14 to -29	below 7 to -20.2	100/0	I = 1.8996 A = -0.6356	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5
[4] Calculate value using both sets of coefficients; take shortest holdover time calculated

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	210.4	244.2	58.2	95.7	184.1	80.9	153.5	46.7	83.4	11.5	89.3
	75/25	109.4	162.7	41.9	80.8	256.0	67.8	87.6	32.3	52.8	6.0	51.5
	50/50	56.8	105.3	12.3	23.6	55.3	21.4	30.4	10.1	15.4		
-10 / -14 ***	100/0	55.7	104.2	40.5	66.6	128.1	36.1	89.9	27.4	46.6		
	75/25	25.2	64.5	21.8	42.1	133.2	23.7	71.4	21.8	34.3		
-25	100/0	28.5	51.1	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-5
CLARIANT SAFEWING MP II FLIGHT PLUS
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.5234 A = -0.4612	I = 3.1605 A = -0.8880 B = -0.3275	I = 2.4469 A = -0.4650	I = 2.2484 A = -0.4093	I = 2.6707 A = -0.8193	
		75/25	I = 2.5521 A = -0.5255	I = 2.6834 A = -0.6171 B = -0.0598	I = 2.3720 A = -0.3524	I = 2.6120 A = -0.6593	I = 2.3026 A = -0.5932	
		50/50	I = 2.4106 A = -0.8778	I = 2.6120 A = -0.6769 B = -0.7145	I = 2.3447 A = -0.7750	I = 1.8799 A = -0.5318	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5312 A = -1.2991	I = 3.1605 A = -0.8880 B = -0.3275	I = 2.6242 A = -0.9778	I = 2.5660 A = -0.7490		
		75/25	I = 2.4057 A = -1.2869	I = 2.6834 A = -0.6171 B = -0.0598	I = 2.5280 A = -0.9864	I = 2.1271 A = -0.4438		
below -14 to LOUT	below 7 to LOUT	100/0	I = 1.8877 A = -0.8771	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	158.9	242.4	49.0	110.6	204.6	84.9	132.4	47.4	62.0	13.6	125.3
	75/25	153.0	247.7	60.1	105.8	222.4	95.4	133.6	49.0	75.4	15.5	77.3
	50/50	62.7	140.1	14.7	27.3	50.7	30.3	63.5	13.7	19.4		
-10 / -14 ***	100/0	42.0	138.1	33.5	75.5	139.8	34.3	87.2	33.0	53.9		
	75/25	32.1	104.3	56.1	98.7	207.5	26.9	69.0	32.1	42.9		
-25	100/0	18.8	42.0	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-6
CRYOTECH POLAR GUARD II
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.5794 A = -0.5025	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.2682 A = -0.2524	I = 2.2584 A = -0.2806	I = 2.6661 A = -0.7999	
		75/25	I = 2.5776 A = -0.5705	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.2204 A = -0.1898	I = 2.8328 A = -0.8896	I = 2.6248 A = -0.8807	
		50/50	I = 2.1254 A = -0.6271	I = 2.5102 A = -0.8406 B = -0.1391	I = 2.5102 A = -0.8406 B = -0.1391	I = 2.5102 A = -0.8406 B = -0.1391	I = 2.2943 A = -0.9086	I = 2.3695 A = -0.9996	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5101 A = -1.1145	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.7077 A = -1.0390	I = 2.0801 A = -0.3886		
		75/25	I = 2.2594 A = -0.9785	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.4495 A = -0.9076	I = 2.0483 A = -0.3597		
below -14 to -30.5	below 7 to -22.9	100/0	I = 1.9253 A = -0.6979	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	169.1	268.0	79.2	110.1	169.7	97.1	123.5	73.5	88.3	14.7	127.9
	75/25	151.0	254.6	44.9	80.3	223.2	102.1	122.4	38.8	69.5	9.4	102.1
	50/50	48.6	86.4	17.3	37.4	144.5	19.2	45.6	9.4	18.0		
-10 / -14 ***	100/0	53.8	149.5	54.3	75.5	116.3	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	32.6	58.4	162.2	27.4	65.3	35.1	44.4		
-25	100/0	27.4	51.9	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-7
KILFROST ABC-2000
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.5017 A = -0.7918	I = 2.6793 A = -0.7155 B = -0.2475	I = 2.3530 A = -0.5406	I = 2.1752 A = -0.4212	I = 2.2715 A = -0.6219	
		75/25	I = 2.5693 A = -0.8090	I = 2.6945 A = -0.7473 B = -0.2060	I = 2.2641 A = -0.5653	I = 2.0107 A = -0.2793	I = 2.5276 A = -0.7483	
		50/50	I = 2.3546 A = -0.8144	I = 2.3633 A = -0.8758 B = 0.0000	I = 1.7696 A = -0.5811	I = 1.8264 A = -0.6348	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.1872 A = -0.8952	I = 2.6793 A = -0.7155 B = -0.2475	I = 2.2482 A = -0.7642	I = 2.8779 A = -1.2797		
		75/25	I = 2.1388 A = -0.8953	I = 2.6945 A = -0.7473 B = -0.2060	I = 2.2588 A = -0.7609	I = 2.5694 A = -0.9881		
below -14 to -27.5	below 7 to -17.5	100/0	I = 1.9361 A = -0.8977	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	88.8	183.4	32.1	61.8	195.4	56.3	94.4	38.6	50.8	12.7	68.7
	75/25	100.9	211.7	32.1	63.6	211.6	43.1	74.0	41.7	50.1	13.3	101.1
	50/50	61.0	128.7	13.8	30.7	125.8	13.3	23.1	8.7	13.2		
-10 / -14 ***	100/0	36.4	82.7	24.0	46.3	146.5	24.9	51.8	12.3	28.3		
	75/25	32.6	74.0	25.2	50.0	166.5	25.8	53.3	15.4	29.4		
-25	100/0	20.4	46.3	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-8
KILFROST ABC-K PLUS
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.5148 A = -0.5532	I = 2.6804 A = -0.5771 B = -0.1414	I = 2.2527 A = -0.1978	I = 2.5473 A = -0.5588	I = 2.6523 A = -0.7393	
		75/25	I = 2.3020 A = -0.4342	I = 2.5273 A = -0.6849 B = -0.0149	I = 2.3200 A = -0.3522	I = 2.4709 A = -0.5601	I = 2.5956 A = -0.7470	
		50/50	I = 1.9950 A = -0.6463	I = 2.3972 A = -0.8261 B = -0.5288	I = 1.7256 A = -0.3910	I = 2.0364 A = -0.7354		
below -3 to -14	below 27 to 7	100/0	I = 2.0780 A = -0.8928	I = 2.6804 A = -0.5771 B = -0.1414	I = 2.4865 A = -0.9979	I = 3.2510 A = -1.5260	CAUTION: No holdover time guidelines exist	
		75/25	I = 2.3405 A = -1.3357	I = 2.5273 A = -0.6849 B = -0.0149	I = 2.4921 A = -1.0863	I = 3.6906 A = -1.9574		
below -14 to -29	below 7 to -20.2	100/0	I = 1.9498 A = -0.6590	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	134.3	223.0	59.5	101.0	171.4	107.7	130.1	58.4	84.1	18.5	136.6
	75/25	99.7	148.4	36.3	67.9	127.2	84.7	118.5	48.7	70.3	15.7	118.4
	50/50	34.9	63.2	7.5	15.9	60.1	19.5	28.3	10.2	16.5		
-10 / -14 ***	100/0	28.4	64.5	50.5	85.7	145.4	23.7	61.5	13.1	35.6		
	75/25	25.5	86.8	35.6	66.8	125.0	19.1	54.1	9.0	32.4		
-25	100/0	30.8	56.4	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-9
NEWAVE AEROCHEMICAL FCY-2
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.3831 A = -0.7394	I = 2.7862 A = -0.6652 B = -0.5351	I = 2.3424 A = -0.7349	I = 2.1756 A = -0.5685	I = 2.0886 A = -0.6241	
		75/25	I = 2.1617 A = -0.6765	I = 2.6255 A = -0.6413 B = -0.5531	I = 2.1241 A = -0.6856	I = 2.6154 A = -1.0787	I = 1.8312 A = -0.6039	
		50/50	I = 1.6808 A = -0.3883	I = 2.1561 A = -0.7445 B = 0.0000	I = 1.7656 A = -0.6698	I = 1.6020 A = -0.5128	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.1844 A = -0.7552	I = 2.7862 A = -0.6652 B = -0.5351	I = 2.2637 A = -0.8968	I = 1.6935 A = -0.3738		
		75/25	I = 2.0300 A = -0.7545	I = 2.6255 A = -0.6413 B = -0.5531	I = 2.0031 A = -0.7745	I = 2.0994 A = -0.8524		
below -14 to -28	below 7 to -18.4	100/0	I = 1.7388 A = -0.5485	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	73.5	144.7	30.4	55.8	162.9	33.4	67.4	24.0	34.9	8.3	44.9
	75/25	48.8	90.8	22.0	39.6	111.1	22.9	44.1	12.8	25.9	5.0	25.7
	50/50	25.7	36.6	13.0	25.8	85.5	10.5	19.8	7.7	10.7		
-10 / -14 ***	100/0	45.3	90.6	16.3	30.0	87.4	18.4	43.3	14.8	18.9		
	75/25	31.8	63.5	11.6	20.8	58.4	13.8	29.0	8.1	14.1		
-25	100/0	22.7	37.5	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-10
TYPE II "GRANDFATHERED" FLUID DATA
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions[1]					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[2]	Light Freezing Rain[2]	Rain on Cold Soaked Wing[2]	Other
-3 and above	27 and above	100/0	I = 2.2645 A = -1.0307	I = 2.5382 A = -0.8850	I = 2.2851 A = -0.7254	I = 2.6578 A = -1.0599	I = 1.9599 A = -0.5119	
		75/25	I = 2.0657 A = -0.9554	I = 2.2336 A = -0.7565	I = 2.2464 A = -0.8486	I = 2.9588 A = -1.4012	I = 1.8133 A = -0.5943	
		50/50	I = 2.0141 A = -1.1989	I = 2.3751 A = -1.1990	I = 1.8080 A = -0.7254	I = 2.1807 A = -1.0599		
below -3 to -14	below 27 to 7	100/0	I = 2.2645 A = -1.0307	I = 2.6725 A = -1.0704	I = 2.2851 A = -0.7254	I = 3.3485 A = -1.6800	CAUTION: No holdover time guidelines exist	
		75/25	I = 2.0657 A = -0.9554	I = 2.2336 A = -0.7565	I = 2.2464 A = -0.8486	I = 2.9588 A = -1.4012		
below -14 to -25	below 7 to -13	100/0	I = 2.4483 A = -1.6414	I = 2.2336 A = -0.7565				

[1] The Grandfather fluid regression information is only to be used in the calculation of Type II generic holdover times. The information cannot be used to deduce fluid-specific holdover times for any fluid.
[2] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	35.0	90.0	20.0	45.0	45.0	30.0	60.0	15.0	30.0	10.0	40.0
	75/25	25.0	60.0	15.0	30.0	30.0	20.0	45.0	10.0	25.0	5.0	25.0
	50/50	15.0	45.0	5.0	15.0	15.0	10.0	20.0	5.0	10.0		
-10 / -14 ***	100/0	35.0	90.0	15.0	40.0	40.0	30.0	60.0	10.0	30.0		
	75/25	25.0	60.0	15.0	30.0	30.0	20.0	45.0	10.0	25.0		
-25	100/0	20.0	90.0	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 2-11
TYPE II GENERIC
VERIFICATION TABLE

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)		Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	**2**	**25**	**10**	**13**	**5**	**25**	**13**	**75**	**5**
+1 / -3 *	100/0	35.0	90.0	20.0	45.0	30.0	55.0	15.0	30.0	8.3	40.0
	75/25	25.0	60.0	15.0	30.0	20.0	43.9	10.0	22.6	5.0	25.0
	50/50	15.0	27.8	5.0	14.5	8.4	15.4	5.0	9.5		
-10 / -14 **	100/0	19.0	64.5	15.0	30.0	18.4	43.3	10.0	18.9		
	75/25	24.5	51.9	11.6	20.8	13.8	29.0	8.1	14.1		
-25	100/0	17.4	37.5	15.0	30.0						

* Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C

** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 3-1

CLARIANT SAFEWING MP III 2031 ECO

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 1.8574 A = -0.6489	I = 2.1115 A = -0.6963 B = -0.1456	I = 1.9299 A = -0.7118	I = 1.7185 A = -0.5394	I = 1.7197 A = -0.4605	
		75/25	I = 1.7259 A = -0.6144	I = 1.9882 A = -0.6441 B = -0.1563	I = 1.7700 A = -0.6803	I = 1.8560 A = -0.7070	I = 1.5307 A = -0.5484	
		50/50	I = 1.5142 A = -0.6078	I = 1.7655 A = -0.6226 B = -0.2590	I = 1.3637 A = -0.5187	I = 1.4971 A = -0.5838	CAUTION: No holdover time guidelines exist	
below -3 to -10	below 27 to 14	100/0	I = 1.7495 A = -0.4928	I = 2.1115 A = -0.6963 B = -0.1456	I = 1.7755 A = -0.5900	I = 1.6118 A = -0.4205		
		75/25	I = 1.7409 A = -0.7580	I = 1.9882 A = -0.6441 B = -0.1563	I = 1.3372 A = -0.2919	I = 1.6085 A = -0.5431		
below -10	below 14	100/0	I = 1.8547 A = -0.6749	I = 2.1115 A = -0.6963 B = -0.1456				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*											
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)				Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	4	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	25.3	45.9	10.9	20.6	39.0	63.1	13.7	27.1	9.2	13.1	7.2	25.0
	75/25	19.8	34.7	9.5	17.2	31.0	48.4	10.3	19.7	7.4	11.7	3.2	14.0
	50/50	12.3	21.4	5.2	9.2	16.2	12.6	6.1	10.0	4.8	7.0		
-10	100/0	25.4	39.9	9.6	18.1	34.3	55.6	13.1	23.1	10.6	13.9		
	75/25	16.3	32.6	8.3	15.0	27.0	42.2	10.3	13.6	7.1	10.1		
-25	100/0	24.2	44.8	8.5	16.1	30.5	30.5						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C

TABLE 4-1
ABAX AD-480
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.5155 A = -0.6296	I = 2.8771 A = -0.7459 B = -0.3169	I = 2.4133 A = -0.6465	I = 2.3229 A = -0.5386	I = 2.5009 A = -0.7370	
		75/25	I = 2.4258 A = -0.6912	I = 2.8157 A = -0.8148 B = -0.2892	I = 2.2256 A = -0.4857	I = 2.2663 A = -0.5461	I = 2.3778 A = -0.7322	
		50/50	I = 1.7682 A = -0.3911	I = 2.4274 A = -0.8852 B = -0.2983	I = 1.8484 A = -0.6021	I = 1.7714 A = -0.5857	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.3324 A = -1.4027	I = 2.8771 A = -0.7459 B = -0.3169	I = 2.7690 A = -1.2527	I = 2.2782 A = -0.7465		
		75/25	I = 1.9626 A = -0.8214	I = 2.8157 A = -0.8148 B = -0.2892	I = 2.5153 A = -1.0108	I = 2.4335 A = -0.8683		
below -14 to -26	below 7 to -14.8	100/0	I = 1.8643 A = -0.8914	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	119.0	211.8	41.0	81.2	269.8	49.3	91.5	37.2	52.8	13.2	96.8
	75/25	87.6	165.1	29.8	62.9	233.5	48.4	76.9	31.8	45.5	10.1	73.5
	50/50	31.2	44.7	9.6	21.6	33.9	15.1	26.8	9.0	13.2		
-10 / -14 ***	100/0	22.5	81.3	28.4	56.2	186.6	23.6	78.2	17.2	28.0		
	75/25	24.5	51.9	21.3	44.9	166.8	24.5	64.4	16.6	29.3		
-25	100/0	17.4	39.4	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-2
ABAX ECOWING AD-49
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.4713 A = -0.2370	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.3729 A = -0.3927	I = 2.4943 A = -0.5000	I = 2.6531 A = -0.8558	
		75/25	I = 2.5800 A = -0.6022	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.1714 A = -0.1070	I = 2.9993 A = -0.9367	I = 2.5561 A = -0.8097	
		50/50	I = 1.9283 A = -0.7029	I = 2.0082 A = -0.5107 B = -0.1529	I = 2.0082 A = -0.5107 B = -0.1529	I = 2.0082 A = -0.5107 B = -0.1529	I = 2.0190 A = -0.7545	I = 1.5732 A = -0.3413	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5177 A = -1.7715	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.8172 A = -1.2681	I = 1.9828 A = -0.5016		
		75/25	I = 2.1600 A = -1.0180	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.7575 A = -1.3630	I = 2.3495 A = -0.8598		
below -14 to -26	below 7 to -14.8	100/0	I = 1.7838 A = -0.5976	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	202.1	251.2	70.4	108.7	192.5	86.2	125.4	62.4	86.6	11.2	113.5
	75/25	144.2	250.4	78.6	99.4	135.6	112.8	124.9	49.0	90.3	10.9	97.8
	50/50	27.4	52.1	15.4	24.6	45.5	15.1	31.0	12.5	15.6		
-10 / -14 ***	100/0	19.0	96.5	70.4	108.7	192.5	25.4	85.3	19.1	26.5		
	75/25	28.1	71.4	78.6	99.4	135.6	17.3	63.8	14.0	24.6		
-25	100/0	23.2	40.2	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-3

CLARIANT MAX FLIGHT 04 *(formerly Octagon Max Flight 04)*

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1,4]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.5102 A = -0.4343	I = 3.4634 A = -0.7407 B = -0.7275	I = 3.4634 A = -0.7407 B = -0.7275	I = 3.4634 A = -0.7407 B = -0.7275	I = 2.0949 A = -0.0224	I = 2.4117 A = -0.4124	I = 2.6420 A = -0.6956	
		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	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5385 A = -1.1945	I = 3.4634 A = -0.7407 B = -0.7275	I = 3.4634 A = -0.7407 B = -0.7275	I = 3.4634 A = -0.7407 B = -0.7275	I = 2.8956 A = -1.3456	I = 2.8529 A = -1.1429		
		75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -26.5	below 7 to -15.7	100/0	I = 1.8804 A = -0.7843	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)

[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)

[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

[4] Freezing drizzle and light freezing rain values were calculated at 12.7 g/dm²h the year the holdover time table for this fluid was produced. Since they are now calculated at 13.0 g/dm²h, values in the holdover time table may differ slightly from those calculated using these coefficients.

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	160.9	239.6	83.1	163.8	539.4	117.5	120.0	68.4	89.6	21.8	143.2
	75/25	n/a	n/a	n/a	n/a	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	n/a	n/a		
-10 / -14 ***	100/0	50.5	151.0	35.6	70.3	231.4	24.9	90.2	18.0	38.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-25	100/0	21.5	44.1	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow

** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C

*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-4
CLARIANT SAFEWING MP IV LAUNCH
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.3942 A = 0.0152	I = 2.7218 A = -0.5330 B = -0.2408	I = 2.7218 A = -0.5330 B = -0.2408	I = 2.7218 A = -0.5330 B = -0.2408	I = 2.7789 A = -0.7426	I = 2.9492 A = -0.8489	I = 2.5170 A = -0.7291	
		75/25	I = 2.4388 A = -0.1431	I = 2.7841 A = -0.6180 B = -0.2044	I = 2.7841 A = -0.6180 B = -0.2044	I = 2.7841 A = -0.6180 B = -0.2044	I = 2.7945 A = -0.7101	I = 2.7548 A = -0.7917	I = 2.6192 A = -0.8499	
		50/50	I = 2.4323 A = -0.7333	I = 2.3978 A = -0.6703 B = -0.1021	I = 2.3978 A = -0.6703 B = -0.1021	I = 2.3978 A = -0.6703 B = -0.1021	I = 2.0818 A = -0.5727	I = 1.7686 A = -0.3607	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.2823 A = -0.7333	I = 2.7218 A = -0.5330 B = -0.2408	I = 2.7218 A = -0.5330 B = -0.2408	I = 2.7218 A = -0.5330 B = -0.2408	I = 2.7424 A = -1.0767	I = 2.6379 A = -0.8846		
		75/25	I = 2.1203 A = -0.7220	I = 2.7841 A = -0.6180 B = -0.2044	I = 2.7841 A = -0.6180 B = -0.2044	I = 2.7841 A = -0.6180 B = -0.2044	I = 2.6204 A = -1.0940	I = 2.4901 A = -0.7708		
below -14 to -28.5	below 7 to -19.3	100/0	I = 1.8894 A = -0.6349	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	254.0	250.5	64.3	104.8	199.2	89.5	181.9	57.9	100.8	14.1	101.7
	75/25	218.2	248.7	59.9	105.5	222.0	100.8	198.7	44.5	74.6	10.6	106.0
	50/50	83.1	162.8	24.5	45.3	133.2	27.8	48.0	18.4	23.3		
-10 / -14 ***	100/0	58.8	115.2	48.6	79.2	150.5	34.9	97.7	25.2	44.9		
	75/25	41.3	80.0	47.2	83.2	175.0	25.2	71.7	25.9	42.8		
-25	100/0	27.9	49.9	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-5

CLARIANT SAFEWING MP IV LAUNCH PLUS

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.3920 A = -0.0283	I = 3.2161 A = -0.8902 B = -0.3284	I = 3.2161 A = -0.8902 B = -0.3284	I = 3.2161 A = -0.8902 B = -0.3284	I = 2.1074 A = -0.0294	I = 3.1822 A = -0.9927	I = 2.5435 A = -0.6674	
		75/25	I = 2.3948 A = -0.0330	I = 3.2776 A = -0.9501 B = -0.3856	I = 3.2776 A = -0.9501 B = -0.3856	I = 3.2776 A = -0.9501 B = -0.3856	I = 2.0839 A = -0.0124	I = 2.0297 A = -0.0872	I = 2.4962 A = -0.6485	
		50/50	I = 2.1682 A = -0.4153	I = 2.6868 A = -0.8488 B = -0.2819	I = 2.6868 A = -0.8488 B = -0.2819	I = 2.6868 A = -0.8488 B = -0.2819	I = 2.4651 A = -0.9953	I = 1.8233 A = -0.4948	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.4166 A = -0.9721	I = 3.2161 A = -0.8902 B = -0.3284	I = 3.2161 A = -0.8902 B = -0.3284	I = 3.2161 A = -0.8902 B = -0.3284	I = 2.8810 A = -1.3058	I = 2.2126 A = -0.5630		
		75/25	I = 2.4251 A = -1.1486	I = 3.2776 A = -0.9501 B = -0.3856	I = 3.2776 A = -0.9501 B = -0.3856	I = 3.2776 A = -0.9501 B = -0.3856	I = 2.5583 A = -1.0902	I = 2.1385 A = -0.5738		
below -14 to LOUT	below 7 to LOUT	100/0	I = 1.9339 A = -0.8158	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	235.6	241.8	55.2	124.8	364.6	118.8	122.1	62.3	119.2	19.6	119.4
	75/25	235.4	242.6	47.9	114.3	358.7	117.5	118.9	80.9	85.6	19.1	110.4
	50/50	75.5	110.5	20.1	43.7	171.5	22.7	58.8	13.5	18.7		
-10 / -14 ***	100/0	54.6	133.0	37.7	85.2	248.8	26.7	93.0	26.6	38.5		
	75/25	41.9	120.0	30.6	73.0	229.1	22.1	62.6	21.7	31.6		
-25	100/0	23.1	48.8	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-6
CRYOTECH POLAR GUARD
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.4745 A = -0.4951	I = 2.9490 A = -0.6572 B = -0.4714	I = 2.4635 A = -0.5345	I = 2.5395 A = -0.6046	I = 2.4044 A = -0.6799	
		75/25	I = 2.3528 A = -0.4927	I = 2.8812 A = -0.6909 B = -0.5035	I = 2.1051 A = -0.2583	I = 2.7647 A = -0.8848	I = 2.3810 A = -0.7348	
		50/50	I = 1.7729 A = -0.5202	I = 2.5348 A = -0.5623 B = -1.0578	I = 1.8582 A = -0.6374	I = 1.9646 A = -0.6911	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.3284 A = -0.9987	I = 2.9490 A = -0.6572 B = -0.4714	I = 2.5957 A = -1.0521	I = 2.8526 A = -1.1562		
		75/25	I = 2.2518 A = -1.0158	I = 2.8812 A = -0.6909 B = -0.5035	I = 2.5165 A = -0.9865	I = 2.1692 A = -0.6193		
below -14 to -23.5	below 7 to -10.3	100/0	I = 1.8174 A = -0.7192	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	134.4	211.6	50.2	91.7	144.6	73.8	123.0	49.5	73.5	13.5	85.0
	75/25	102.0	160.1	36.6	68.9	209.5	65.7	84.1	33.7	60.1	10.1	73.7
	50/50	25.7	41.3	10.2	17.1	42.3	14.1	25.9	10.0	15.7		
-10 / -14 ***	100/0	42.7	106.6	29.0	53.0	83.6	26.5	72.5	17.2	36.7		
	75/25	34.8	88.3	20.4	38.4	116.7	26.2	67.1	20.1	30.2		
-25	100/0	20.6	39.9	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-7
CRYOTECH POLAR GUARD ADVANCE
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.5794 A = -0.5025	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.2682 A = -0.2524	I = 2.2584 A = -0.2806	I = 2.6661 A = -0.7999	
		75/25	I = 2.5776 A = -0.5705	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.2204 A = -0.1898	I = 2.8328 A = -0.8896	I = 2.6248 A = -0.8807	
		50/50	I = 2.1254 A = -0.6271	I = 2.5102 A = -0.8406 B = -0.1391	I = 2.5102 A = -0.8406 B = -0.1391	I = 2.5102 A = -0.8406 B = -0.1391	I = 2.2943 A = -0.9086	I = 2.3695 A = -0.9996	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5101 A = -1.1145	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.6278 A = -0.3591 B = -0.3246	I = 2.7077 A = -1.0390	I = 2.0801 A = -0.3886		
		75/25	I = 2.2594 A = -0.9785	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.7318 A = -0.6352 B = -0.2744	I = 2.4495 A = -0.9076	I = 2.0483 A = -0.3597		
below -14 to -30.5	below 7 to -22.9	100/0	I = 1.9253 A = -0.6979	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	169.1	268.0	79.2	110.1	169.7	97.1	123.5	73.5	88.3	14.7	127.9
	75/25	151.0	254.6	44.9	80.3	223.2	102.1	122.4	38.8	69.5	9.4	102.1
	50/50	48.6	86.4	17.3	37.4	144.5	19.2	45.6	9.4	18.0		
-10 / -14 ***	100/0	53.8	149.5	54.3	75.5	116.3	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	32.6	58.4	162.2	27.4	65.3	35.1	44.4		
-25	100/0	27.4	51.9	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-8
DOW CHEMICAL UCAR™ ENDURANCE EG106
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.4198 A = -0.4664	I = 2.8358 A = -0.7951 B = -0.1996	I = 2.8358 A = -0.7951 B = -0.1996	I = 2.8358 A = -0.7951 B = -0.1996	I = 2.4460 A = -0.5295	I = 2.5011 A = -0.5672	I = 2.5903 A = -0.7102	
		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	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.4942 A = -0.6588	I = 2.8358 A = -0.7951 B = -0.1996	I = 2.8358 A = -0.7951 B = -0.1996	I = 2.8358 A = -0.7951 B = -0.1996	I = 2.5065 A = -0.6779	I = 2.6525 A = -0.7145		
		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	I = 2.0589 A = -0.7941	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	124.1	190.3	38.4	79.6	207.5	71.8	119.1	51.1	74.0	18.1	124.1
	75/25	n/a	n/a	n/a	n/a	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	n/a	n/a		
-10 / -14 ***	100/0	108.1	197.6	30.5	63.1	164.5	56.4	107.8	45.0	71.9		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-25	100/0	31.9	66.0	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-9
DOW CHEMICAL UCAR™ FLIGHTGUARD AD-480
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.5155 A = -0.6296	I = 2.8771 A = -0.7459 B = -0.3169	I = 2.4133 A = -0.6465	I = 2.3229 A = -0.5386	I = 2.5009 A = -0.7370	
		75/25	I = 2.4258 A = -0.6912	I = 2.8157 A = -0.8148 B = -0.2892	I = 2.2256 A = -0.4857	I = 2.2663 A = -0.5461	I = 2.3778 A = -0.7322	
		50/50	I = 1.7682 A = -0.3911	I = 2.4274 A = -0.8852 B = -0.2983	I = 1.8484 A = -0.6021	I = 1.7714 A = -0.5857		
below -3 to -14	below 27 to 7	100/0	I = 2.3324 A = -1.4027	I = 2.8771 A = -0.7459 B = -0.3169	I = 2.7690 A = -1.2527	I = 2.2782 A = -0.7465		CAUTION: No holdover time guidelines exist
		75/25	I = 1.9626 A = -0.8214	I = 2.8157 A = -0.8148 B = -0.2892	I = 2.5153 A = -1.0108	I = 2.4335 A = -0.8683		
below -14 to -26	below 7 to -14.8	100/0	I = 1.8643 A = -0.8914	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	119.0	211.8	41.0	81.2	269.8	49.3	91.5	37.2	52.8	13.2	96.8
	75/25	87.6	165.1	29.8	62.9	233.5	48.4	76.9	31.8	45.5	10.1	73.5
	50/50	31.2	44.7	9.6	21.6	33.9	15.1	26.8	9.0	13.2		
-10 / -14 ***	100/0	22.5	81.3	28.4	56.2	186.6	23.6	78.2	17.2	28.0		
	75/25	24.5	51.9	21.3	44.9	166.8	24.5	64.4	16.6	29.3		
-25	100/0	17.4	39.4	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-10
DOW CHEMICAL UCAR™ FLIGHTGUARD AD-49
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.4713 A = -0.2370	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.3729 A = -0.3927	I = 2.4943 A = -0.5000	I = 2.6531 A = -0.8558	
		75/25	I = 2.5800 A = -0.6022	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.1714 A = -0.1070	I = 2.9993 A = -0.9367	I = 2.5561 A = -0.8097	
		50/50	I = 1.9283 A = -0.7029	I = 2.0082 A = -0.5107 B = -0.1529	I = 2.0082 A = -0.5107 B = -0.1529	I = 2.0082 A = -0.5107 B = -0.1529	I = 2.0190 A = -0.7545	I = 1.5732 A = -0.3413	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.5177 A = -1.7715	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.5108 A = -0.4746 B = 0.0000	I = 2.8172 A = -1.2681	I = 1.9828 A = -0.5016		
		75/25	I = 2.1600 A = -1.0180	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.2550 A = -0.2574 B = 0.0000	I = 2.7575 A = -1.3630	I = 2.3495 A = -0.8598		
below -14 to -26	below 7 to -14.8	100/0	I = 1.7838 A = -0.5976	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	202.1	251.2	70.4	108.7	192.5	86.2	125.4	62.4	86.6	11.2	113.5
	75/25	144.2	250.4	78.6	99.4	135.6	112.8	124.9	49.0	90.3	10.9	97.8
	50/50	27.4	52.1	15.4	24.6	45.5	15.1	31.0	12.5	15.6		
-10 / -14 ***	100/0	19.0	96.5	70.4	108.7	192.5	25.4	85.3	19.1	26.5		
	75/25	28.1	71.4	78.6	99.4	135.6	17.3	63.8	14.0	24.6		
-25	100/0	23.2	40.2	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-11
KILFROST ABC-S
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.7032 A = -0.7245	I = 2.7666 A = -0.6013 B = -0.2217	I = 2.2743 A = -0.3333	I = 2.5227 A = -0.5326	I = 2.2207 A = -0.4813	
		75/25	I = 2.1889 A = -0.5545	I = 2.5569 A = -0.7273 B = -0.1092	I = 2.1721 A = -0.4710	I = 2.3286 A = -0.5836	I = 2.0484 A = -0.5136	
		50/50	I = 1.6863 A = -0.5068	I = 2.3232 A = -0.8869 B = -0.2936	I = 1.7499 A = -0.5783	I = 1.6395 A = -0.4931	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.4307 A = -1.1131	I = 2.7666 A = -0.6013 B = -0.2217	I = 2.1724 A = -0.5641 or[4] I = 3.0193 A = -1.5395	I = 3.1764 A = -1.5258		
		75/25	I = 2.0461 A = -0.9024	I = 2.5569 A = -0.7273 B = -0.1092	I = 2.4843 A = -0.9047 or[4] I = 3.0881 A = -1.6196	I = 3.5272 A = -1.7987		
below -14 to -28	below 7 to -18.4	100/0	I = 1.8469 A = -0.7299	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5
[4] Calculate value using both sets of coefficients; take shortest holdover time calculated

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	157.3	305.6	59.0	102.4	211.2	80.0	110.0	60.0	85.0	20.8	76.6
	75/25	63.3	105.2	29.1	56.7	110.3	44.4	69.6	32.6	47.7	12.2	48.9
	50/50	21.5	34.2	7.6	17.0	49.5	12.8	22.2	8.9	12.3		
-10 / -14 ***	100/0	44.9	124.6	45.6	79.1	163.2	20.2	60.0	11.1	30.0		
	75/25	26.0	59.5	25.6	49.9	97.2	19.2	71.1	10.3	33.4		
-25	100/0	21.7	42.4	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-12
KILFROST ABC-S PLUS
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
				< 4 g/dm²/h	4 to <10 g/dm²/h	≥ 10 g/dm²/h				
-3 and above	27 and above	100/0	I = 2.5882 A = -0.6773	I = 2.7997 A = -0.5886 B = -0.1639	I = 2.7997 A = -0.5886 B = -0.1639	I = 2.7997 A = -0.5886 B = -0.1639	I = 2.1349 A = -0.0810	I = 3.2080 A = -1.0102	I = 2.5437 A = -0.6337	
		75/25	I = 2.4204 A = -0.6975	I = 2.5586 A = -0.5815 B = -0.1638	I = 2.5586 A = -0.5815 B = -0.1638	I = 2.5586 A = -0.5815 B = -0.1638	I = 2.1108 A = -0.2951	I = 2.5019 A = -0.7097	I = 2.4230 A = -0.7288	
		50/50	I = 1.8988 A = -0.5888	I = 2.1742 A = -0.6668 B = 0.0000	I = 2.1742 A = -0.6668 B = 0.0000	I = 2.1742 A = -0.6668 B = 0.0000	I = 2.2203 A = -0.8993	I = 1.7490 A = -0.4516	CAUTION: No holdover time guidelines exist	
below -3 to -14	below 27 to 7	100/0	I = 2.7468 A = -1.4224	I = 2.7997 A = -0.5886 B = -0.1639	I = 2.7997 A = -0.5886 B = -0.1639	I = 2.7997 A = -0.5886 B = -0.1639	I = 2.9992 A = -1.4676	I = 2.3542 A = -0.7931		
		75/25	I = 2.3554 A = -1.0359	I = 2.5586 A = -0.5815 B = -0.1638	I = 2.5586 A = -0.5815 B = -0.1638	I = 2.5586 A = -0.5815 B = -0.1638	I = 2.8273 A = -1.3891	I = 2.1553 A = -0.6538		
below -14 to -28	below 7 to -18.4	100/0	I = 1.9370 A = -0.5185	I = 2.0691 A = -0.7757 B = 0.0000	I = 1.7911 A = -0.3140 B = 0.0000	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	130.3	242.3	72.8	124.9	253.7	110.8	119.8	62.5	121.0	22.7	126.1
	75/25	85.7	162.3	42.8	72.9	146.8	60.5	80.3	32.3	51.4	11.4	82.0
	50/50	30.7	52.7	17.5	32.2	94.1	16.5	39.1	13.1	17.6		
-10 / -14 ***	100/0	56.6	208.3	60.2	103.2	209.7	23.1	94.1	17.6	29.6		
	75/25	42.8	110.6	35.4	60.2	121.3	19.1	71.8	17.4	26.7		
-25	100/0	37.5	60.4	15.0	30.0	50.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-13
LYONDELL ARCTIC SHIELD™
REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature		Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions					
Degrees Celsius	Degrees Fahrenheit		Freezing Fog or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]	Freezing Drizzle[1]	Light Freezing Rain[1]	Rain on Cold Soaked Wing[1]	Other
-3 and above	27 and above	100/0	I = 2.4454 A = -0.5452	I = 2.6137 A = -0.5939 B = -0.1143	I = 2.4067 A = -0.5864	I = 2.5402 A = -0.6454	I = 2.3859 A = -0.6640	
		75/25	I = 2.3152 A = -0.5992	I = 2.4438 A = -0.5642 B = -0.1089	I = 2.2230 A = -0.4318	I = 2.4152 A = -0.6779	I = 2.4635 A = -0.7899	
		50/50	I = 1.7122 A = -0.2153	I = 2.1743 A = -0.6196 B = 0.0000	I = 1.8862 A = -0.5423	I = 1.9811 A = -0.6662		
below -3 to -14	below 27 to 7	100/0	I = 2.4503 A = -0.9456	I = 2.6137 A = -0.5939 B = -0.1143	I = 2.8685 A = -1.2952	I = 1.9544 A = -0.4082		CAUTION: No holdover time guidelines exist
		75/25	I = 2.2491 A = -0.7644	I = 2.4438 A = -0.5642 B = -0.1089	I = 2.5673 A = -0.9868	I = 2.0026 A = -0.4621		
below -14 to -24.5	below 7 to -12.1	100/0	I = 1.8254 A = -0.6370	I = 2.2336 A = -0.7565 B = 0.0000				

[1] Regression Equation: $t = 10^{I} R^{A}$, where R = precipitation rate (g/dm²h)
[2] Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where R = precipitation rate (g/dm²h) and T = temperature (in °C)
[3] CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)			Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	116.0	191.1	50.5	87.1	99.4	56.7	99.3	43.4	66.3	13.8	83.5
	75/25	78.8	136.4	37.9	63.6	72.1	55.2	83.4	29.3	45.7	9.6	81.5
	50/50	36.5	44.4	20.3	35.9	44.7	19.1	32.1	11.2	17.3		
-10 / -14 ***	100/0	61.6	146.4	44.2	76.2	87.0	26.7	91.9	24.2	31.6		
	75/25	51.9	104.5	33.4	56.0	63.6	29.4	75.4	22.7	30.8		
-25	100/0	24.0	43.0	15.0	30.0	30.0						

* Refer to Table 5 for the lowest usable precipitation rates in snow
** Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C
*** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 4-14
TYPE IV GENERIC
VERIFICATION TABLE

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog or Ice Crystals (g/dm²/h)		Snow, Snow Grains or Snow Pellets (g/dm²/h)		Freezing Drizzle (g/dm²/h)		Light Freezing Rain (g/dm²/h)		Rain on Cold Soaked Wing (g/dm²/h)	
		5	2	25	10	13	5	25	13	75	5
+1 / -3 *	100/0	116.0	190.3	38.4	79.6	49.3	91.5	37.2	52.8	11.2	76.6
	75/25	63.3	105.2	29.1	56.7	44.4	69.6	29.3	45.5	9.4	48.9
	50/50	21.5	34.2	7.6	17.0	12.8	22.2	8.9	12.3		
-10 / -14 **	100/0	19.0	81.3	28.4	53.0	20.2	60.0	11.1	26.5		
	75/25	24.5	51.9	20.4	38.4	17.3	62.6	10.3	24.6		
-25	100/0	17.4	39.4	15.0	30.0						

* Rain on cold soaked wing calculated at +1°C; all other conditions calculated at -3°C

** Freezing fog and snow calculated at -14°C; freezing drizzle and light freezing rain calculated at -10°C

TABLE 5
LOWEST USABLE PRECIPITATION RATES IN SNOW[1]
TYPE II, TYPE III AND TYPE IV FLUIDS[2]

TYPE II FLUIDS

Fluid Name	*Fluid Dilution*	*-14°C and Above*	*Below -14°C*
ABAX Ecowing 26	100/0	2 g/dm²/h	3 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	3 g/dm²/h	not applicable
Aviation Shaanxi Hi-Tech Cleanwing II	100/0	4 g/dm²/h	10 g/dm²/h
	75/25	4 g/dm²/h	not applicable
	50/50	7 g/dm²/h	not applicable
Clariant Safewing MP II 1951	100/0	3 g/dm²/h	10 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Clariant Safewing MP II FLIGHT	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	3 g/dm²/h	not applicable
Clariant Safewing MP II FLIGHT PLUS	100/0	5 g/dm²/h	10 g/dm²/h
	75/25	3 g/dm²/h	not applicable
	50/50	4 g/dm²/h	not applicable
Cryotech Polar Guard II	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Kilfrost ABC 2000	100/0	2 g/dm²/h	10 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Kilfrost ABC-K Plus	100/0	4 g/dm²/h	10 g/dm²/h
	75/25	4 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Newave Aerochemical FCY-2	100/0	2 g/dm²/h	10 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Type II Grandfathered Fluid Data	100/0	10 g/dm²/h	10 g/dm²/h
	75/25	10 g/dm²/h	not applicable
	50/50	10 g/dm²/h	not applicable

TYPE III FLUIDS

Fluid Name	*Fluid Dilution*	*-10°C and Above*	*Below -10°C*
Clariant Safewing MP III 2031 ECO	100/0	2 g/dm²/h	4 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	6 g/dm²/h	not applicable

TYPE IV FLUIDS

Fluid Name	*Fluid Dilution*	*-14°C and Above*	*Below -14°C*
ABAX AD-480	100/0	2 g/dm²/h	10 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	6 g/dm²/h	not applicable
ABAX Ecowing AD-49	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	3 g/dm²/h	not applicable
	50/50	3 g/dm²/h	not applicable
Clariant Max Flight 04	100/0	2 g/dm²/h	3 g/dm²/h
	75/25	not applicable	not applicable
	50/50	not applicable	not applicable
Clariant Safewing MP IV LAUNCH	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	3 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Clariant Safewing MP IV LAUNCH PLUS	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	3 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Cryotech Polar Guard	100/0	5 g/dm²/h	10 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Cryotech Polar Guard Advance	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Dow UCAR Endurance EG106	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	not applicable	not applicable
	50/50	not applicable	not applicable
Dow UCAR FlightGuard AD-480	100/0	2 g/dm²/h	10 g/dm²/h
	75/25	2 g/dm²/h	not applicable
	50/50	6 g/dm²/h	not applicable
Dow UCAR FlightGuard AD-49	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	3 g/dm²/h	not applicable
	50/50	3 g/dm²/h	not applicable
Kilfrost ABC-S	100/0	3 g/dm²/h	10 g/dm²/h
	75/25	4 g/dm²/h	not applicable
	50/50	3 g/dm²/h	not applicable
Kilfrost ABC-S Plus	100/0	3 g/dm²/h	3 g/dm²/h
	75/25	3 g/dm²/h	not applicable
	50/50	2 g/dm²/h	not applicable
Lyondell Arctic Shield	100/0	8 g/dm²/h	10 g/dm²/h
	75/25	8 g/dm²/h	not applicable
	50/50	7 g/dm²/h	not applicable

[1] The lowest precipitation rate to be used as an input to the snow regression equations is constrained by the higher of: (1) the minimum demonstrated precipitation measuring equipment rates in accordance with AC #TBD (in no case less than 2.0 g/dm²/h) and (2) the lowest usable precipitation rate (LUPR) for the fluid/dilution/temperature as defined in this table.

[2] Type I fluids are limited only by the general precipitation rate limitations set out in AC #TBD.