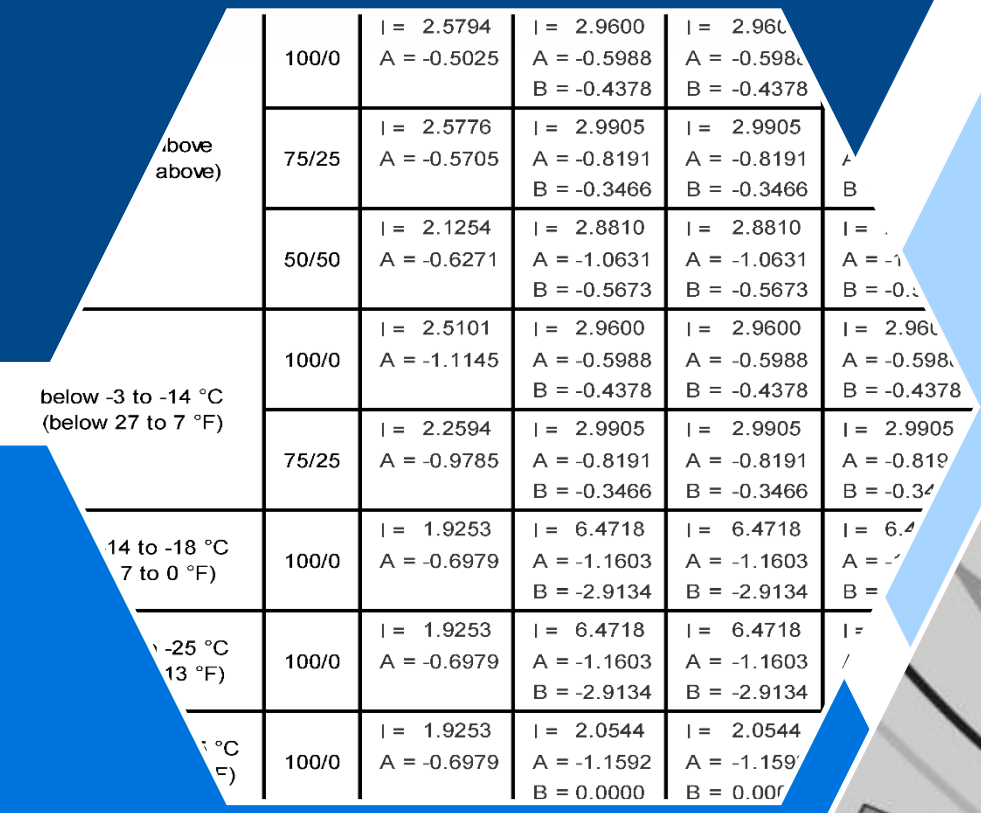

	100/0	I = 2.5794 A = -0.5025	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.960 A = -0.598 B = -0.4378	
bove above)	75/25	I = 2.5776 A = -0.5705	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	A B
	50/50	I = 2.1254 A = -0.6271	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = A = -1 B = -0.
	100/0	I = 2.5101 A = -1.1145	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.960 A = -0.598 B = -0.4378
below -3 to -14 °C (below 27 to 7 °F)	75/25	I = 2.2594 A = -0.9785	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.819 B = -0.34
14 to -18 °C 7 to 0 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4 A = - B =
-25 °C 13 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = /
°C F)	100/0	I = 1.9253 A = -0.6979	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.159 B = 0.000	

Aviation Inc.

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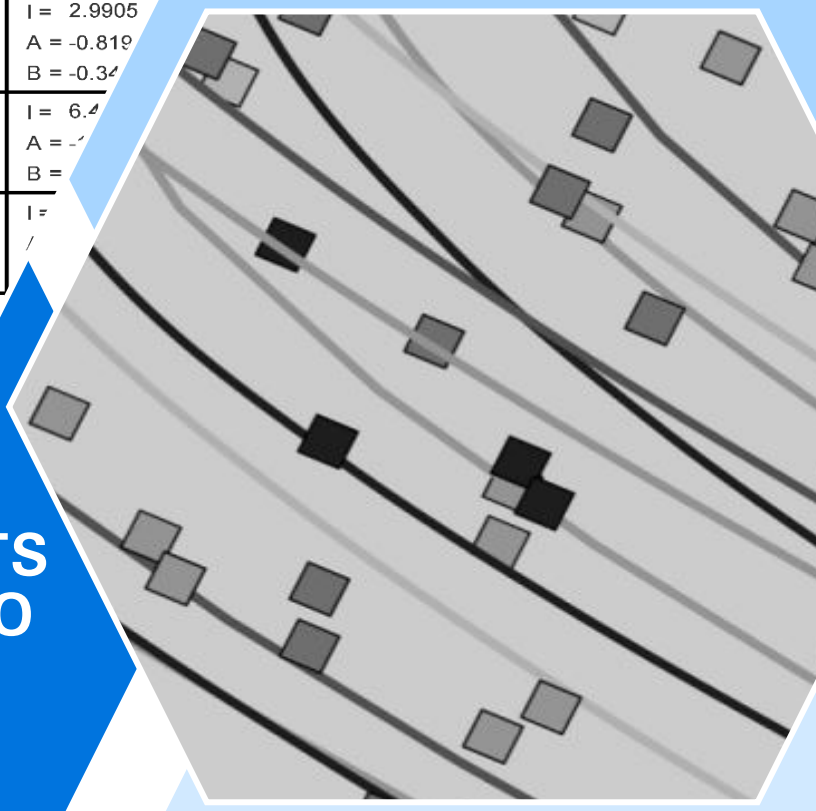

REGRESSION COEFFICIENTS AND EQUATIONS USED TO DEVELOP THE WINTER 2021-22 AIRCRAFT GROUND DEICING HOLDOVER TIME TABLES

Prepared for:

Transport Canada
Innovation Centre

In cooperation with:

Federal Aviation Administration
William J. Hughes Technical Center

Transport Canada
Civil Aviation

Federal Aviation Administration
Flight Standards – Air Carrier Operations

above above)	100/0	I = 2.5794 A = -0.5025	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.960 A = -0.598 B = -0.4378	
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	50/50	I = 2.1254 A = -0.6271	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = A = -1 B = -0.
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	75/25	I = 2.2594 A = -0.9785	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.819 B = -0.34
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TP 15495E
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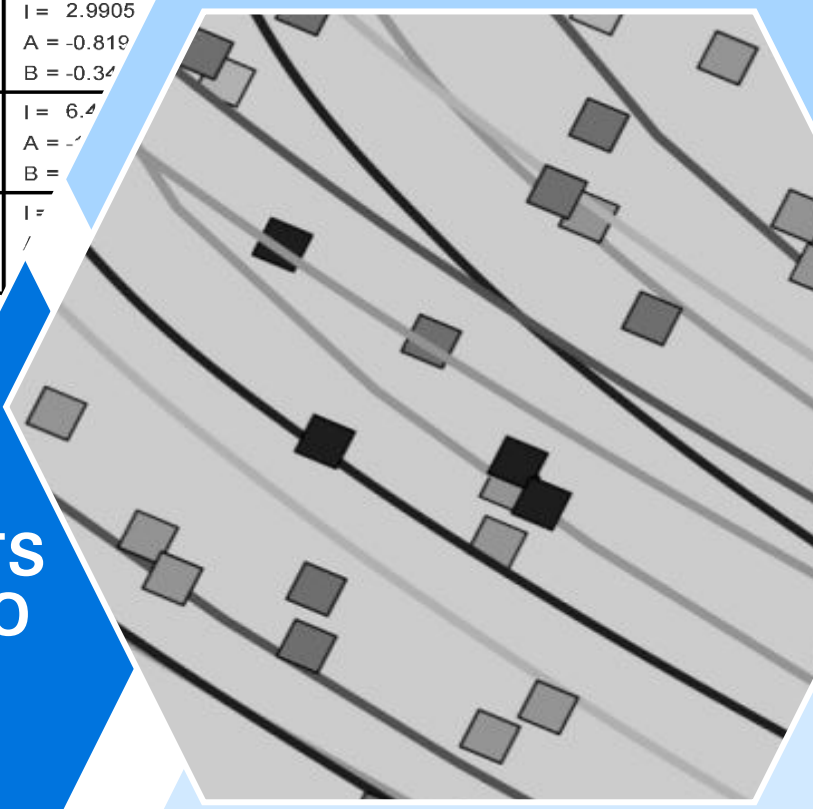

REGRESSION COEFFICIENTS AND EQUATIONS USED TO DEVELOP THE WINTER 2021-22 AIRCRAFT GROUND DEICING HOLDOVER TIME TABLES

Prepared by

Benjamin Bernier

The contents of this report reflect the views of APS Aviation Inc. and not necessarily the official view or opinions of the Transport Canada Innovation Centre or the co-sponsoring organizations.

Neither the Transport Canada Innovation Centre nor the co-sponsoring organizations endorse the products or manufacturers. Trade or manufacturers' names appear in this report only because they are essential to its objectives.

DOCUMENT ORIGIN AND APPROVAL RECORD

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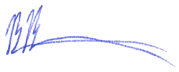

May 26, 2022

Benjamin Bernier, BSc — Date
Leader – Icing Research, Technical Services

Reviewed and Approved by:

May 26, 2022

John D'Avirro, Eng., PBDM — Date
Vice President – Aviation Services

Un sommaire français se trouve avant la table des matières.

This report was first provided to Transport Canada as Final Draft 1.0 in November 2021.
It has been published as Final Version 1.0 in May 2022.

PREFACE

Under contract to the Transport Canada Innovation Centre, APS Aviation Inc. has undertaken a research program to advance aircraft ground de/anti-icing technology. The primary objectives of the research program are the following:

- To develop holdover time data for all new de/anti-icing fluids;
- To conduct testing to determine holdover times for Type II, III, and IV fluids in snow at temperatures below -14°C;
- To conduct additional testing and analysis to evaluate and/or determine appropriate holdover times for Type I fluids in snow at temperatures below -14°C;
- To evaluate and develop the use of artificial snow machines for holdover time development;
- To conduct wind tunnel testing with a thin high performance wing model to support the development of guidance material for operating in ice pellet;
- To finalize the research for the development of degree-specific snow holdover time data;
- To study and support the interpretation of METAR reported weather for determining holdover time table guidance condition;
- To conduct general and exploratory de/anti-icing research;
- To finalize the publication and delivery of current and historical reports;
- To update the regression information report to reflect changes made to the holdover time guidelines; and
- To update the holdover time guidance materials for annual publication by Transport Canada and the Federal Aviation Administration.

Some project timelines were impacted due to the COVID-19 pandemic. The details of these impacts are described in the individual reports, if applicable. The research activities of the program conducted on behalf of Transport Canada during the winter of 2020-21 are documented in four reports. The titles of the reports are as follows:

- TP 15494E Aircraft Ground De/Anti-Icing Fluid Holdover Time Development Program for the 2020-21 Winter;
- TP 15495E Regression Coefficients and Equations Used to Develop the Winter 2021-22 Aircraft Ground Deicing Holdover Time Tables;
- TP 15496E Aircraft Ground Icing General Research Activities During the 2020-21 Winter; and
- TP 15497E Wind Tunnel Trials to Support Further Development of Ice Pellet Allowance Times: Winter 2020-21.

In addition, the following interim report is being prepared:

- *Artificial Snow Research Activities for the 2020-21 Winter*.

This report, TP 15495E, has the following objective:

- To document the regression information required for the winter 2021-22 aircraft ground deicing holdover time tables and to document how and from where the information was obtained.

This objective was met by analysing data from holdover time testing conducted over the winters of 1996-97 through 2020-21.

PROGRAM ACKNOWLEDGEMENTS

This multi-year research program has been funded by the Transport Canada Innovation Centre, with support from the Federal Aviation Administration William J. Hughes Technical Center, Transport Canada Civil Aviation, and Federal Aviation Administration Flight Standards – Air Carrier Operations. This program could not have been accomplished without the participation of many organizations. APS Aviation Inc. would therefore like to thank Transport Canada, the Federal Aviation Administration, National Research Council Canada, and supporting members of the SAE International G-12 Aircraft Ground Deicing Committees.

APS Aviation Inc. would also like to acknowledge the dedication of the research team, whose performance was crucial to the acquisition of hard data, completion of data analysis, and preparation of reports. This includes the following people: Brandon Auclair, David Beals, Steven Baker, Stephanie Bendickson, Benjamin Bernier, Chloë Bernier, Christopher D'Avirro, John D'Avirro, Peter Dawson, Jaycee Ewald, Noemie Gokhool, Benjamin Guthrie, Peter Kitchener, Diana Lalla, Shahdad Movaffagh, Dany Posteraro, Annaelle Reuveni, Marco Ruggi, Javad Safari, Alexa-Kiran Sareen-Diacoumacos, Niroshaan Sivarajah, James Smyth, Saba Tariq, Charles Wilson, Ian Wittmeyer, and David Youssef.

Special thanks are extended to Antoine Lacroix, Yvan Chabot, Warren Underwood, and Charles J. Enders, who on behalf of Transport Canada and the Federal Aviation Administration, have participated, contributed, and provided guidance in the preparation of these documents.

Transport Canada | Transports Canada

PUBLICATION DATA FORM

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TP 15495E	B14W	

4. Title and Subtitle	5. Publication Date
Regression Coefficients and Equations Used to Develop the Winter 2021-22 Aircraft Ground Deicing Holdover Time Tables	November 2021
	6. Performing Organization Document No.: 300293

7. Author(s)	8. Transport Canada File No.
Benjamin Bernier	2450-BP-14

9. Performing Organization Name and Address	10. PWGSC File No.
APS Aviation Inc. 6700 Cote-de-Liesse Rd., Suite 102 Montreal, Quebec, H4T 2B5	TOR-7-40103
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12. Sponsoring Agency Name and Address	13. Type of Publication and Period Covered
Transport Canada Innovation Centre 330 Sparks St., 18th Floor Ottawa, Ontario, K1A 0N5	Final
	14. Project Officer: Antoine Lacroix

15. Supplementary Notes (Funding programs, titles of related publications, etc.)

Several research reports for testing of de/anti-icing technologies were produced for previous winters on behalf of Transport Canada (TC). These are available from the TC Innovation Centre. Several reports were produced as part of this winter's research program. Their subject matter is outlined in the preface. This project was co-sponsored by the Federal Aviation Administration.

16. Abstract

Since the winter of 2009-10, Transport Canada (TC) has published the regression information underlying the data in the Holdover Time (HOT) Guidelines. Starting in the winter of 2013-14, the Federal Aviation Administration (FAA) also began publishing regression information. The information is published in several documents:

- TC and the FAA both publish online documents, which provide users with the regression information for the current winter's HOT Guidelines in a timely manner and in a user-friendly format; and
- TC publishes this TP report, which documents the source of the regression information and how it was obtained.

For the 2021-22 HOT Guidelines, regression data were generated for the two generic Type I holdover time tables, twelve Type II fluid-specific tables, two Type III fluid-specific tables, and twenty-seven Type IV fluid-specific tables. The data were predominantly obtained from holdover time testing conducted over the winters of 1996-97 to 2020-21. The regression data had been documented in a previous TC report and was extracted from that report.

It is recommended that both regression information publications be updated in one year to reflect any changes made to the HOT Guidelines for the winter of 2022-23.

17. Key Words	18. Distribution Statement
Anti-icing, deicing, deicing fluid, holdover times, precipitation, Type I, Type II, Type III, Type IV, aircraft, ground, test, winter, regression, holdover time determination system, liquid water equivalent	Available from the Transport Canada Innovation Centre

19. Security Classification (of this publication)	20. Security Classification (of this page)	21. Declassification (date)	22. No. of Pages	23. Price
Unclassified	Unclassified	—	xvi, 60 apps	—

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Benjamin Bernier	2450-BP-14

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12. Nom et adresse de l'organisme parrain	13. Genre de publication et période visée
Transports Canada Centre d'innovation 330, rue Sparks, 18ième étage Ottawa (Ontario) K1A 0N5	Final
	14. Agent de projet Antoine Lacroix

15. Remarques additionnelles (programmes de financement, titres de publications connexes, etc.)

Plusieurs rapports de recherche sur des essais de technologies de dégivrage et d'antigivrage ont été produits au cours des hivers précédents pour le compte de Transports Canada (TC). Ils sont disponibles auprès du Centre d'innovation de TC. De nombreux rapports ont été rédigés dans le cadre du programme de recherche de cet hiver. Leur objet apparaît à l'avant-propos. Ce projet était coparrainé par la Federal Aviation Administration.

16. Résumé

Depuis l'hiver 2009-2010, Transports Canada (TC) a publié l'information de régression sous-jacente aux données des lignes directrices sur les durées d'efficacité (HOT). À compter de l'hiver 2013-2014, la Federal Aviation Administration (FAA) a également entrepris de publier l'information de régression. Cette information est publiée dans plusieurs documents :

- TC et la FAA publient des documents en ligne qui fournissent aux utilisateurs l'information de régression applicable aux lignes directrices de l'hiver en cours sur les durées d'efficacité, en temps opportun et dans un format convivial ; et
- TC publie le présent rapport TP, qui documente la source de l'information de régression et la façon dont elle a été obtenue.

Pour les lignes directrices sur les durées d'efficacité de 2021-2022, des données de régression ont été produites pour les deux tableaux de durées d'efficacité des liquides génériques de Type I, les douze tableaux spécifiques à des liquides de Type II, les deux tableaux spécifiques à des liquides de Type III et les vingt-sept tableaux spécifiques à des liquides de Type IV. Les données ont été principalement obtenues à partir d'essais sur les durées d'efficacité tenus au cours des hivers 1996-1997 à 2020-2021. Les données de régression avaient été documentées dans un rapport précédent de TC, d'où elles ont été puisées.

Il est recommandé que les deux publications sur la régression soient actualisées dans un an pour refléter tout changement apporté aux lignes directrices sur les durées d'efficacité pour l'hiver 2022-2023.

17. Mots clés	18. Diffusion
Antigivrage, dégivrage, liquide de dégivrage, durées d'efficacité, précipitation, Type I, Type II, Type III, Type IV, aéronef, sol, essai, hiver, régression, système de détermination de durées d'efficacité, équivalence en eau liquide	Disponible auprès du Centre d'innovation de Transports Canada

19. Classification de sécurité (de cette publication)	20. Classification de sécurité (de cette page)	21. Déclassification (date)	22. Nombre de pages	23. Prix
Non classifiée	Non classifiée	—	xvi, 60 ann.	—

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EXECUTIVE SUMMARY

Systems that measure temperature, precipitation type and precipitation rate in real-time, and use that data to provide holdover time guidance information, are a relatively new development in the aircraft ground de/anti-icing industry. These systems, referred to as liquid water equivalent systems (LWES), and in specific forms as holdover time determination systems (HOTDS) or check time determination systems (CTDS), use the weather data they collect and holdover time regression information provided to them to calculate holdover times that are more specific than the ranges currently provided in the Holdover Time (HOT) Guidelines.

In order for these systems to be used by operators, regulators must make the regression information underlying the HOT Guidelines available to users. The information is published in several documents:

- Transport Canada (TC) and the Federal Aviation Administration (FAA) publish online documents, which provide users with the regression information for the current winter's HOT Guidelines in a timely manner and in a user-friendly format; and
- TC publishes this TP report, which documents the source of the regression information and how it was obtained.

For the 2021-22 HOT Guidelines, regression data were required for the two generic Type I holdover time tables, twelve Type II fluid-specific tables, two Type III fluid-specific tables, and twenty-seven Type IV fluid-specific tables.

The data were obtained predominantly from holdover time testing conducted over the winters of 1996-97 to 2020-21. Much of the data were already documented in a previous TC report and was therefore extracted from that report.

The 2021-22 regression information document was published by TC and the FAA on August 4, 2021. The information can be used by LWES, HOTDS, and CTDS to calculate holdover times during the winter of 2021-22.

It is recommended that all regression publications – the online documents and this report – be updated in one year to reflect any changes made to the HOT Guidelines for the winter of 2022-23.

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SOMMAIRE

Les systèmes qui mesurent la température, ainsi que le type et le taux de précipitation en temps réel, et qui utilisent ces données pour produire de l'information pour les lignes directrices sur les durées d'efficacité représentent un progrès relativement récent dans le domaine du dégivrage et de l'antigivrage d'aéronefs au sol. Ces systèmes, connus sous le vocable de systèmes d'équivalence en eau liquide (LWES) et, dans certaines formes particulières, sous les termes de systèmes de détermination de durées d'efficacité (HOTDS) ou de systèmes de détermination de temps de vérification (CTDS), utilisent les données météorologiques qu'ils recueillent, ainsi que l'information de régression des durées d'efficacité qui leur est fournie, pour calculer des durées d'efficacité plus précises que l'éventail actuellement fourni par les lignes directrices sur les durées d'efficacité (HOT).

Pour que les utilisateurs puissent se servir de ces systèmes, les organismes de réglementation doivent mettre à leur disposition l'information de régression sous-jacente aux lignes directrices sur les durées d'efficacité. Cette information est publiée dans plusieurs documents :

- Transports Canada (TC) et la Federal Aviation Administration (FAA) publient des documents en ligne qui fournissent aux utilisateurs l'information de régression applicable aux lignes directrices de l'hiver en cours sur les durées d'efficacité, en temps opportun et dans un format convivial ; et
- TC publie ce rapport TP, qui documente les sources de l'information de régression et la façon dont elle a été obtenue.

Pour les lignes directrices sur les durées d'efficacité de 2021-2022, des données de régression ont été produites pour les deux tableaux de durées d'efficacité des liquides génériques de Type I, les douze tableaux spécifiques à des liquides de Type II, les deux tableaux spécifiques à des liquides de Type III et les vingt-sept tableaux spécifiques à des liquides de Type IV.

Les données ont été principalement obtenues à partir d'essais sur les durées d'efficacité tenus au cours des hivers 1996-1997 à 2020-2021. Plusieurs des données étaient déjà documentées dans un rapport précédent de TC, d'où elles ont en conséquence été puisées.

L'information de régression pour 2021-2022 a été publiée en ligne par TC et la FAA le 4 août 2021. Elle peut servir aux LWES, HOTDS et CTDS pour calculer les durées d'efficacité pour l'hiver 2021-2022.

Il est recommandé que les deux publications sur la régression – le document en ligne et le présent rapport – soient actualisées dans un an, afin de refléter tout changement apporté aux lignes directrices sur les durées d'efficacité pour l'hiver 2022-2023.

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GLOSSARY

AC	Advisory Circular
APS	APS Aviation Inc.
ARP	Aerospace Recommended Practice
CARs	Canadian Aviation Regulations
CTDS	Check Time Determination Systems
FAA	Federal Aviation Administration
HOT	Holdover Time
HOTDS	Holdover Time Determination Systems
HUPR	Highest Usable Precipitation Rate
LOUT	Lowest Operational Use Temperature
LUPR	Lowest Usable Precipitation Rate
LWES	Liquid Water Equivalent Systems
NRC	National Research Council Canada
SAE	SAE International
TC	Transport Canada
WSET	Water Spray Endurance Test

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1. INTRODUCTION

Under winter precipitation conditions, aircraft are cleaned prior to takeoff. This is typically done with aircraft ground deicing fluids, which are freezing point depressant fluids developed specifically for aircraft use. If required, aircraft are then protected against further accumulation of precipitation by the application of aircraft ground anti-icing fluids, which are also freezing point depressant fluids. Most anti-icing fluids contain thickeners to extend protection time.

Prior to the 1990s, aircraft ground de/anti-icing had not been extensively researched. However, following several ground icing related incidents in the late 1980s, an aircraft ground icing research program was initiated by Transport Canada (TC). The objective of the program is to improve knowledge, improve safety, and enhance operational capabilities of aircraft operating in winter precipitation conditions.

Since its inception in the early 1990s, the aircraft ground icing research program has been managed by TC, with the co-operation of the United States Federal Aviation Administration (FAA), the National Research Council Canada (NRC), several major airlines, and de/anti-icing fluid manufacturers.

There is still an incomplete understanding of some of the hazards related to aircraft ground icing. As a result, the aircraft ground icing research program continues, with the objective of further reducing the risks posed by the operation of aircraft in winter precipitation conditions.

Under contract to the TC Innovation Centre, with support from the FAA William J. Hughes Technical Center, TC Civil Aviation, and FAA Flight Standards – Air Carrier Operations, APS Aviation Inc. (APS) carried out research in the winter of 2020-21 in support of the aircraft ground icing research program. Each major project completed as part of the 2020-21 research is documented in a separate individual report. This report documents the regression information project.

1.1 Background

Determining holdover times for de/anti-icing fluids and developing guidelines for their use has been a focus of the TC/FAA aircraft ground icing research program since its inception. The Holdover Time (HOT) Guidelines provide pilots with tables of the protection times for de/anti-icing fluids in winter conditions. The values in the HOT Guidelines are determined by conducting regression analysis of flat-plate test data collected with de/anti-icing fluids. The HOT Guidelines are revised and republished annually to account for the results of additional testing with new and existing fluids.

Aircraft de/anti-icing fluid holdover time is a function of fluid dilution, precipitation rate, precipitation type, and ambient temperature. Although the current methodology for determining holdover times enables values to be calculated at virtually any temperature and precipitation rate, it is neither practical nor feasible to include all of this information in the HOT Guidelines. Instead, holdover times are organized into tables that are divided into cells by precipitation type, temperature range, and fluid dilution. Within each of these cells, upper and lower values are given based on predetermined lower and upper precipitation rate limits and the lowest temperature in the temperature range.

Liquid water equivalent systems (LWES), also known in their specific forms as holdover time determination systems (HOTDS) or check time determination systems (CTDS), measure weather information (temperature, precipitation type, and precipitation rate) in real-time. They combine this data with holdover time regression information to calculate more specific holdover times than are currently provided in the HOT Guidelines. These holdover times can be relayed directly to the cockpit.

There are several advantages to be gained by using these systems in place of holdover time tables.

1. **Extended Holdover Times:** Whereas holdover time table values are calculated based on the lowest temperature in each temperature range and the highest precipitation rate in each precipitation category, HOTDS can calculate values at any temperature or precipitation rate and can provide users with longer holdover times in some conditions.
2. **Ease of Use:** LWES are more user friendly than holdover time tables, as they provide pilots with a single holdover time; pilots do not have to determine holdover times themselves by looking up specific weather conditions in the appropriate holdover time table, nor do they have to interpret a range of holdover times provided.
3. **Environmental and Cost Savings:** The information provided by LWES enables pilots to make better fluid selection decisions. This optimization is forecasted to increase the use of Type I fluid and decrease the use of Type IV fluid, potentially resulting in cost and environmental savings.

1.2 Role of Regulators

In order for LWES to be used, TC and the FAA must do the following:

1. Provide regulations that allow operators to use these systems; and
2. Publish the regression equations and related coefficients that are used in the development of the HOT Guidelines.

The following subsections describe these requirements in more detail.

1.2.1 Regulations for Liquid Water Equivalent Systems Use

TC has supported the development of LWES and has taken an active role in developing regulations for their use in Canada. The short-term methodology employed by TC to implement HOTDS in Canadian air operations included the development of the two documents outlined below.

1. A **performance standard** defining the minimum quality assurance requirements (quality management system; training and qualifications; installation, siting, operation, and maintenance) and minimum performance specifications (system accuracy; technical requirements for data inputs and holdover time determinations) for HOTDS.
2. An **air carrier exemption** from Canadian Aviation Regulations (CARs) 622.11 for the operational use of the holdover time information provided by the HOTDS.

TC developed a performance standard and an air carrier exemption for WestJet in the winter of 2006-07. Subsequent exemptions were issued as global exemptions applicable to any air operator using a HOTDS. The associated performance standard is provided as an appendix to the exemption document.

The FAA has taken a different approach, using an advisory circular (AC) to provide requirements for the use of LWES, HOTDS, and CTDS. AC 120-112, *Use of Liquid Water Equivalent System to Determine Holdover Times or Check Times for Anti-Icing Fluids*, was published July 2015 and is available on the FAA website (see http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_120-112.pdf).

1.2.2 Publication of Regression Equations and Related Coefficients

The regression equations and coefficients used to calculate the values in the holdover time tables are required for LWES to function. LWES manufacturers must obtain this information from regulators or an equally valid source.

TC first published regression information in the fall of 2008 in the TC report, TP 14873E, *Regression Coefficients and Equations Used to Develop the Winter 2008-09 Aircraft Ground Deicing Holdover Time Tables* (1). The report documented the process of creating the initial regression information database and contained regression information relevant to the 2008-09 HOT Guidelines.

Following the publication of TP 14873E (1), it was determined that two regression documents needed to be published annually. Two publications are necessary as manufacturers require slightly different information than regulators, and they require this information in a timely manner. Both publications must be updated annually because the HOT Guidelines are updated annually, and changes made to the HOT Guidelines must be reflected in the published regression information.

The two documents are summarized below and in Table 1.1.

1. **Document #1 – Online Publication:** The first document is for LWES manufacturers. It provides manufacturers with the current winter's regression information and guidance for its application and use in a user-friendly format. It is published online, which allows the information to be made available in a timely manner, typically in the summer preceding the winter operating season.

   TC has published its version of this document, entitled *Transport Canada Holdover Time (HOT) Guidelines Regression Information [Current Winter]*, annually since 2009.

   The FAA has published its version of this document, entitled *FAA Holdover Time Regression Information [Current Winter]*, annually since 2013.

2. **Document #2 – TP Report:** The second document is a reference document for regulators. Its purpose is to document the source(s) of the regression information provided in the online publications. It is published as a TC report with a TP number and may take several years to be published and made publicly available. The document is entitled *Regression Coefficients and Equations Used to Develop the Winter [Current Winter] Aircraft Ground Deicing Holdover Time Tables*.

1.2.3 History of Regression Information Publications

The history of regression information publications is provided in Table 1.2. Following the publication of the initial document for the winter of 2008-09, the two-document system was introduced for the winter of 2009-10 and has been followed since that time. It should be noted that the creation of new regression documents each year renders previous publications obsolete.

The documents that will be published for the winter of 2021-22 are shown in the last row of the table. These documents are currently the only valid publications.

Table 1.1: Regression Information Publications

Details	Document 1	Document 2
Publication Name(s)	• Transport Canada Holdover Time (HOT) Guidelines Regression Information [Current Winter] • FAA Holdover Time Regression Information [Current Winter]	• Regression Coefficients and Equations Used to Develop the [Current Winter] Aircraft Ground Deicing Holdover Time Tables
Publication Type	• Online publication	• Transport Canada TP report
Publication Location(s)	• Transport Canada HOT Guidelines website: http://www.tc.gc.ca/en/services/aviation/general-operating-flight-rules/de-icing-aircraft/hold-over-guidelines.html • FAA Aircraft Ground Deicing website: www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/deicing/	• Available from Transport Canada
Purpose	• To provide regression information and guidance on its application to users in a timely manner and in a user-friendly document	• To document the source(s) of the regression information provided in the online publication
Contents	• Regression equations and coefficients required for the current winter's HOT Guidelines • Guidance for application and use of regression information, including procedures for calculating generic holdover times • Lowest and highest usable precipitation rates (LUPRs and HUPRs) for snow	• Methodology to derive holdover times using regression analysis • Methodology used to determine HOT table values (fluid-specific and generic) • History of regression information collection • Source locations for current winter's information • Regression information required for the current winter's HOT Guidelines (incorporated by including the online publication as an appendix)

Table 1.2: History of Regression Information Publications

Winter	Document 1 (Online Publication)		Document 2 (TP Report)
	TC	FAA	
2008-09	• No online publication	• No online publication	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2008-09 Aircraft Ground Deicing Holdover Time Tables (TP 14873E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2009-10	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2009-2010 • **Publication:** Jan 2010 (online)	• No online publication	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2009-10 Aircraft Ground Deicing Holdover Time Tables (TP 14937E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2010-11	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2010-2011 • **Publication:** July 2010 (online)	• No online publication	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2010-11 Aircraft Ground Deicing Holdover Time Tables (TP 15054E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2011-12	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2011-2012 • **Publication:** July 2011 (online)	• No online publication	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2011-12 Aircraft Ground Deicing Holdover Time Tables (TP 15159E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2012-13	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2012-2013 • **Publication:** July 2012 (online)	• No online publication	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2012-13 Aircraft Ground Deicing Holdover Time Tables (TP 15198E) • **Publication:** Sept 2018 • **Validity:** Obsolete

Table 1.2: History of Regression Information Publications (cont'd)

Winter	Document 1 (Online Publication)		Document 2 (TP Report)
	TC	FAA	
2013-14	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2013-2014 • **Publication:** Aug 2013 (online)	• **Title:** Official FAA Holdover Time Regression Information Winter 2013-2014 • **Publication:** Aug 2013 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2013-14 Aircraft Ground Deicing Holdover Time Tables (TP 15229E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2014-15	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2014-2015 • **Publication:** Aug 2014 (online)	• **Title:** Official FAA Holdover Time Regression Information Winter 2014-2015 • **Publication:** Aug 2014 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2014-15 Aircraft Ground Deicing Holdover Time Tables (TP 15270E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2015-16	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2015-2016 • **Publication:** July 2015 (online)	• **Title:** FAA Holdover Time Regression Information Winter 2015-2016 • **Publication:** July 2015 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2015-16 Aircraft Ground Deicing Holdover Time Tables (TP 15322E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2016-17	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2016-2017 • **Publication:** Aug 2016 (online)	• **Title:** FAA Holdover Time Regression Information Winter 2016-2017 • **Publication:** Aug 2016 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2016-17 Aircraft Ground Deicing Holdover Time Tables (TP 15339E) • **Publication:** Sept 2018 • **Validity:** Obsolete
2017-18	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2017-2018 • **Publication:** Aug 2017 (online)	• **Title:** FAA Holdover Time Regression Information Winter 2017-2018 • **Publication:** Aug 2017 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2017-18 Aircraft Ground Deicing Holdover Time Tables (TP 15373E) • **Publication:** Sept 2018 • **Validity:** Obsolete

Table 1.2: History of Regression Information Publications (cont'd)

Winter	Document 1 (Online Publication)		Document 2 (TP Report)
	TC	FAA	
2018-19	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2018-2019 • **Publication:** Aug 2018 (online*)	• **Title:** FAA Holdover Time Guidelines Regression Information Winter 2018-2019 • **Publication:** Aug 2018 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2018-19 Aircraft Ground Deicing Holdover Time Tables (TP 15397E) • **Publication:** May 2019 • **Validity:** Obsolete
2019-20	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2019-2020 • **Publication:** Aug 2019 (online*)	• **Title:** FAA Holdover Time Guidelines Regression Information Winter 2019-2020 • **Publication:** Aug 2019 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2019-20 Aircraft Ground Deicing Holdover Time Tables (TP 15426E) • **Publication:** Oct 2019 • **Validity:** Obsolete
2020-21	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2020-2021 • **Publication:** Aug 2020 (online*)	• **Title:** FAA Holdover Time Guidelines Regression Information Winter 2020-2021 • **Publication:** Aug 2020 (online) • **Validity:** Obsolete	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2020-21 Aircraft Ground Deicing Holdover Time Tables (TP 15451E) • **Publication:** Nov 2020 • **Validity:** Obsolete
2021-22	• **Title:** Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2021-2022 • **Publication:** Aug 2021 (online*)	• **Title:** FAA Holdover Time Guidelines Regression Information Winter 2021-2022 • **Publication:** Aug 2021 (online) • **Validity:** Current	• **Title:** Regression Coefficients and Equations Used to Develop the Winter 2021-22 Aircraft Ground Deicing Holdover Time Tables (TP 15495E) • **Publication:** Not yet published • **Validity:** Current

*Information on how to request the document is provided online. The document itself was not published online.

1.3 Objectives

The primary objective of this report is to document how and from where the regression information for the 2021-22 winter aircraft ground deicing holdover time tables was obtained.

The report also has several secondary objectives:

- To document the methodology for deriving holdover times using regression analysis;
- To document the methodology used to determine holdover time table values (fluid-specific and generic); and
- To provide a history of regression information collection.

The detailed objectives of this project are provided in Appendix A as an excerpt from the related TC statement of work for Winter 2020-21.

1.4 Report Format

The following list provides short descriptions of subsequent sections of this report:

- Section 2 describes the methodology used to derive holdover times using regression analysis;
- Section 3 details the methodologies used to derive fluid-specific and generic holdover time table values;
- Section 4 presents the data collected for Winter 2020-21 and a history of data collected in previous winters;
- Section 5 describes the Winter 2021-22 regression information;
- Section 6 presents conclusions derived from the work; and
- Section 7 lists recommendations for future work.

1.5 Note on Frost and Allowance Time Conditions

The HOT Guidelines currently do not provide fluid-specific holdover times in frost conditions; generic holdover times that are not derived from regression analysis are provided for each of the four fluid types in a separate frost holdover time table.

The HOT Guidelines currently contain "allowance times" for ice pellets, small hail, and ice pellets mixed with several other types of precipitation, including freezing rain, freezing drizzle, rain, and snow. The allowance times are not fluid-specific and are not based on regression analysis.

As regression coefficients and equations are not used in the determination of frost holdover times or allowance times, regression information is not included for these conditions in the published regression information.

1.6 Note on TC/FAA Differences

Several minor differences exist between the TC and FAA holdover time table values. Accordingly, there are differences in the respective regression information. These differences are detailed in Subsection 3.5. It remains the user's responsibility to ensure the appropriate application of the data provided in this report.

2. METHODOLOGY FOR DERIVING HOLDOVER TIMES USING REGRESSION ANALYSIS

The methodology used to derive holdover times using regression analysis is presented in this section. This information is included to provide a better understanding of how holdover time values are derived.

There are two steps to deriving holdover times using regression analysis. The first step is to conduct endurance time testing to enable the collection of an appropriate data set. The second step is to analyse the data set using the regression analysis methodology.

2.1 Step 1: Endurance Time Testing

The first step in deriving holdover times using regression analysis is the collection of an appropriate endurance time data set. Endurance time tests measure the amount of protection time that de/anti-icing fluids offer against ice formation. These tests are carried out on flat plates in natural and simulated precipitation conditions.

Procedures for conducting endurance time tests have been refined over the years. They have culminated in the current standard approach, which has been followed since the 1990s. Since then, endurance time testing for the purpose of developing holdover times has been conducted by APS on behalf of TC and the FAA.

There are some differences in the way endurance time tests are carried out in freezing precipitation versus snow, largely due to the difference in control of test variables in simulated versus natural conditions.

2.1.1 Freezing Precipitation

Freezing fog, freezing rain, light freezing drizzle, and rain on a cold-soaked wing endurance time tests are conducted in simulated (laboratory) conditions. For each cell in the related holdover time table, four tests are conducted at the lowest temperature in the temperature range of the cell: two tests are conducted at the low precipitation rate, and two tests are conducted at the high precipitation rate.

The low and high precipitation rates are dependent on the precipitation type. The precipitation rate limits for freezing precipitation are as follows:[1]

[1] Significant research has gone into the selection of these values. See Subsection 2.9.1 of TC report, TP 14144E, *Aircraft Ground De/Anti-Icing Fluid Holdover Time Development Program for the 2002-03 Winter* (2).

- Freezing fog: 2 and 5 g/dm²/h;
- Freezing drizzle: 5 and 13 g/dm²/h;
- Light freezing rain: 13 and 25 g/dm²/h; and
- Rain on a cold-soaked wing: 5 and 75 g/dm²/h.

2.1.2 Snow

Snow endurance time tests are conducted in natural conditions where temperature and precipitation rate cannot be controlled. Therefore, the protocol for measuring endurance times in snow is slightly different – tests are conducted in natural snow in a range of temperatures and precipitation rates. Attempts are made to capture data in all snowfall intensities encompassed by the HOT Guidelines.

Three snowfall intensity categories are provided in the holdover time tables. The precipitation rate limits used for the snowfall intensity categories are as follows:[2]

- Very Light Snow: 3 and 4 g/dm²/h;
- Light Snow: 4 and 10 g/dm²/h; and
- Moderate Snow: 10 and 25 g/dm²/h.

Historically, a single snowfall intensity category was provided in the Type II and Type IV holdover time tables. The precipitation rate limits used were 10 and 25 g/dm²/h. Some Type II holdover time tables retain these limits for historical reasons.

2.2 Step 2: Regression Analysis

Once a complete data set has been collected for a fluid, it is subjected to regression analysis. This analysis provides the "raw" holdover time values for the fluid.

Due to the differences in the ways data are collected in snow and in freezing precipitation, the protocol for conducting regression analysis differs slightly for freezing precipitation versus snow. The freezing precipitation protocol is described in Subsection 2.2.1; the snow protocol is described in Subsection 2.2.2.

[2] These definitions are not directly correlated to meteorological observations.

2.2.1 Freezing Precipitation

The steps provided below are used to calculate freezing precipitation holdover times using regression analysis.

1. For each cell in a holdover time table, regression analysis is used to determine a best-fit power law curve from the data collected at the low and high precipitation rates associated with the cell (all tests are conducted at the same temperature; see Subsection 2.1.1). The equation used to treat the data is $\mathbf{t = 10^{I} R^{A}}$, where:
   - t = time (minutes);
   - R = rate of precipitation (g/dm²/h); and
   - I, A = coefficients determined from the regression.
2. Holdover times are calculated for the low and high precipitation rate limits for each precipitation type (see Subsection 2.1.1) using the resulting regression equation.
3. Steps 1 and 2 provide "raw" holdover times. Depending on how the times will be used, they may be subject to rounding and capping (see Section 3).

2.2.2 Snow

The steps provided below are used to calculate snow holdover times using regression analysis.

1. The natural snow data are subdivided into two groups by temperature, and each subsequent step is performed separately on each group. The two groups are as follows:
   a. Warm snow data, which consists of all data collected at temperatures greater than -16.5°C and is used to determine snow holdover times at temperatures greater than or equal to -14°C; and
   b. Very cold snow data, which consists of all natural snow data collected at temperatures less than or equal to -14°C and is used to determine snow holdover times at temperatures below -14°C. Very cold snow data collection is optional; fluids for which cold temperature data are not collected receive generic holdover times for natural snow at temperatures below -14°C (see Subsection 3.1 for additional details).
2. Each data group is subdivided by fluid dilution. The data set for each fluid dilution is subjected to a multi-variable regression analysis. The general form of the regression equation is $\mathbf{t = 10^{I} R^{A} (2\text{-}T)^{B}}$, where:

- t = time (minutes);
- R = rate of precipitation (g/dm²/h);
- T = temperature (°C); and
- I, A, B = coefficients determined from the regression.

3. A regression equation is generated for each fluid dilution in snow. Holdover times are calculated for the precipitation limits of each cell by using the appropriate regression equation and the most restrictive (lowest) temperature in the cell.
4. Steps 1 and 2 provide "raw" holdover times. Depending on how the times will be used, they may be subject to rounding and capping rules (see Section 3).

3. METHODOLOGIES FOR DETERMINING HOLDOVER TIME TABLE VALUES

The methodologies for determining fluid-specific and generic holdover time table values are presented in this section. This information is included to contextualize how the holdover time tables are compiled.

3.1 Methodology for Determining Fluid-Specific Holdover Time Table Values

Fluid-specific holdover times are calculated for most fluids submitted for holdover time testing. These times are used to develop the Type II, Type III, and Type IV fluid-specific holdover time tables (which in turn are used to develop the generic Type II and Type IV holdover time tables).

Fluid-specific holdover times are derived directly from regression analysis as described in Section 2.

In the case of Type II, Type III, and Type IV fluids, the regression-generated "raw" holdover times described in Section 2 are subject to rounding and capping to produce the values in the fluid-specific tables. The rounding and capping protocol is provided below.

1. Raw values are rounded to the nearest whole "5" digit. For example, values from 55.1 to 57.4 minutes are rounded down to 55 minutes, and values from 57.5 to 59.9 minutes are rounded up to 60 minutes.
2. In cases where the raw holdover times are below 10 minutes (Type II/IV fluids) or 20 minutes (Type III fluids), the numbers are rounded down to the nearest minute as a precautionary measure. For example, 9.7 minutes is rounded down to 9 minutes.
3. The rounded values are capped as follows:
    - Freezing fog – 4 hours;
    - Freezing drizzle, freezing rain, and rain on a cold-soaked wing – 2 hours;
    - Snow (TC) – 2 hours; and
    - Snow (FAA) – 3 hours.

3.1.1 Fluid-Specific Holdover Time Values for Snow at Temperatures Below -14°C

For Type II/IV fluids, obtaining fluid-specific holdover times for natural snow occurring at temperatures below -14°C requires collection of a "very cold snow" data set. This supplemental data collection is optional; fluids that are not tested in very cold snow conditions receive generic holdover time values for natural snow at temperatures below -14°C. These generic holdover times differ depending on whether the fluid in question is a Type II fluid, an ethylene glycol-based Type IV fluid, or a propylene glycol-based Type IV fluid.

Snow holdover times in the coldest temperature band [below -25°C to lowest operational use temperature (LOUT)] for Type II/III/IV fluids that have undergone the additional cold snow testing and that have an LOUT below -29°C are not determined by regression analysis. These values are instead derived from comparative artificial snow testing performed with the fluid in question at temperatures of -25°C and the fluid's LOUT.

3.2 Methodology for Determining Type II/IV Generic Holdover Time Table Values

The Type II and Type IV generic holdover time table values represent the most conservative (shortest) holdover times of all available Type II and Type IV fluids, respectively. The purpose of these tables is to provide operators with the minimum amount of holdover time available in a given weather condition when the operator does not know which fluid is being used. Since no single fluid underperforms all others across all weather conditions, it is necessary to complete an analysis to determine the shortest holdover times for each weather condition.

The list of fluids provided in the TC and FAA HOT Guidelines is used to determine which fluids are included in the Type II and Type IV generic analyses. These lists are updated on an annual basis as new fluids are added and obsolete fluids are removed (see Subsection 3.2.1).

It should be noted that SAE International (SAE) standards previously stipulated that Type IV fluids also qualified as Type II fluids. As a result, Type IV fluids were included in the Type II generic analysis. This stipulation changed in 2017; Type IV fluids are no longer qualified as Type II fluids and therefore are not included in the Type II generic analysis.

3.2.1 Note on Qualified Fluids

The protocol for the removal of obsolete Type II, III, and IV fluid data from the HOT Guidelines is provided in Subsection 5.11 of SAE Aerospace Recommended Practice (ARP) 5718B, *Qualifications Required for SAE Type II/III/IV Aircraft Deicing/Anti-Icing Fluid* (3). The protocol stipulates that fluids are removed from the HOT Guidelines four years after their fluid water spray endurance test (WSET)/aerodynamic qualification has expired.

This protocol is used to provide operators who have inventory of these fluids an opportunity to use them, rather than having to dispose of them immediately when the fluid qualification expires (assuming the fluids also pass any required quality control checks).

The result of this protocol is that the fluids included in the HOT Guidelines – which are the same fluids included in the Type II and Type IV generic holdover time analyses and in the regression information publications – may not all be currently qualified fluids.

3.3 Evolution of Type I Generic Holdover Time Table Values

Unlike the Type II and Type IV generic holdover time table values, there is no specific protocol in place for determining Type I generic holdover time table values. Moreover, unlike the Type II/IV generic values, the Type I generic values are relatively static and do not change as Type I fluids are added or removed from the list of qualified fluids.

The static nature of the Type I generic values is supported by a significant body of research and testing that has shown that all Type I fluids formulated with glycol perform similarly from an endurance time perspective. New glycol-based fluids are no longer required to undergo endurance time testing.

As a result of extensive research and testing, which showed that holdover times of Type I fluids are shorter on composite surfaces than on aluminum surfaces, holdover times for Type I fluids on composite surfaces were added to the HOT Guidelines starting in the winter of 2010-11. The existing Type I holdover times remained in place for aluminum surfaces.

A summary of how the current Type I holdover times were derived, as well as the data sets that were used in their determinations, is provided below.

- The **Type I aluminum snow** holdover times are derived from regression analysis of the 2001-02 Type I snow data set. Testing was conducted in the winter of 2001-02 using a new test protocol and a number of representative Type I fluids. The tests are documented in the TC report, TP 13994E, *Generation of Holdover Times Using the New Type I Fluid Test Protocol* (4).

- The **Type I aluminum freezing precipitation** holdover times are not derived from regression analysis. They were established in the early 1990s and substantiated by testing conducted up to and including the winter of 1995-96. The values in the "below -3 to -6°C" row were added in the winter of 2003-04 following testing with five representative Type I fluids in the winter of 2002-03. A detailed description of the evolution of the Type I aluminum freezing precipitation holdover times is provided in Appendix B of the TC report, TP 15052E, *Development of Type I Fluid Holdover Times for Use on Aircraft with Composite Surfaces* (Vol. 1) (5). Tests conducted for the "below -3 to -6°C" row are documented in Subsection 8.4.2 of the TC report, TP 14144E, *Aircraft Ground De/Anti-Icing Fluid Holdover Time Development Program for the 2002-03 Winter* (2).
- The **Type I composite snow** holdover times were derived from regression analysis of the Type I composite snow data set, which includes data collected in the winters of 2006-07, 2007-08, and 2009-10. A detailed description of this data, as well as the derivation of the Type I composite snow holdover times from this data, is provided in TP 15052E (Vol. 1) (5).
- The **Type I composite freezing precipitation** holdover times were derived from endurance time testing conducted in 2009-10. Although regression analysis formed part of the analysis that determined the holdover time values, the holdover times were not derived directly from the regression analysis. A detailed description of the data set, as well as the methodology used to derive the Type I composite freezing precipitation holdover times, is provided in TP 15052E (Vol. 1) (5).

3.4 Status of Type III Generic Holdover Time Table

Prior to the winter of 2015-16, no fluid-specific holdover time tables were published for Type III fluids. A generic holdover time table was published based loosely on the endurance time performance of the first next-generation Type III fluid. However, that changed in 2015-16 when regulators decided to publish fluid-specific holdover time tables for Type III fluids. These tables include data specific to fluid application temperature and aircraft rotation speed.

Currently, only one Type III fluid is listed in the HOT Guidelines. As a result, no Type III generic holdover time table is currently published.

3.5 Differences in the TC and FAA Holdover Time Table Values

There are differences in the TC and FAA holdover time table values. The reasons for the differences and the holdover time tables that are impacted are described below.

1. **Snow cells.** TC caps snow holdover times at 2 hours; the FAA caps snow holdover times at 3 hours. This results in different holdover times in some cases. The holdover time tables impacted include the following: select Type II fluid-specific, Type IV fluid-specific, and Type IV generic.
2. **Light freezing rain "-3°C and above" and "below -3 to -6°C" cells.** The TC Type I holdover time tables give holdover times for these cells based on testing conducted at -6°C; the FAA Type I holdover time tables give holdover times for these cells based on testing conducted at -10°C. The holdover time tables impacted include the following: Type I.

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4. DATA COLLECTION

The regression information underlying the HOT Guidelines was first collected and published in support of the Winter 2008-09 HOT Guidelines. Since then, the regression information has been updated annually to reflect the changes made to the HOT Guidelines. This section describes the evolution of the regression information (Subsection 4.1) and the data collected for the 2021-22 HOT Guidelines (Subsection 4.2).

Subsection 4.1 includes a year-by-year summary of the data collected, added, and removed. It also includes any changes made to the way the information is published.

Subsection 4.2 details the data required, collected, and removed for the Winter 2021-22 publication. It also includes the source locations of the data contained in the 2021-22 publication.

4.1 Evolution of Regression Information

In the past, the regression information underlying the HOT Guidelines was not published in a format that was appropriate for use with LWES. The data were published only as part of the annual report on holdover time testing conducted by APS, and only the regression information for the fluids tested in a given year was published in the annual report for that year. As a result, the regression information was not readily available; multiple publications, some not yet available to the public, had to be consulted to obtain the data. Further complications, such as the testing of some fluids over multiple winters, made it difficult for LWES manufacturers to obtain the correct data.

4.1.1 Initial Data Collection (2008-09 Holdover Time Guidelines)

The first regression information publication was developed over the winters of 2006-07 and 2007-08 in support of the Winter 2008-09 HOT Guidelines. As the regression information had not been published in the format required for LWES before this time and because the required data had to be collected and de-archived from a number of locations, several steps were required to produce the initial data set:

1. The fluids for which data were required were identified;
2. The relevant data set(s) for each fluid were identified;
3. The relevant data set(s) were de-archived;

4. The data set responsible for each holdover time value was determined for fluids with multiple data sets;
5. Regression coefficients were created for cell values not derived directly from regression analysis;
6. The data were amalgamated into a series of tables; and
7. A verification exercise was completed to ensure the selected data were correct.

A complete description of the work completed to create the initial database and the complete contents of the initial database are provided in TP 14873E (1).

4.1.2 Changes Required for 2009-10 Holdover Time Guidelines

The regression information was updated in 2009 to reflect changes made to the HOT Guidelines for use in the winter of 2009-10.

1. Data were collected and added to the regression database for three new fluids that were added to the HOT Guidelines in 2009-10:
   - Aviation Shaanxi Hi-Tech Cleanwing II (Type II);
   - ABAX ECOWING AD-49 (Type IV); and
   - Kilfrost ABC-4^{sustain} (Type IV).
2. Data were removed from the regression publication for two fluids that became obsolete and were removed from the HOT Guidelines in 2009-10:
   - Aviation Xi'an Hi-Tech KHF-II (Type II); and
   - Kilfrost ABC-II Plus (Type II).

This work is documented in the TC report, TP 14937E, *Regression Coefficients and Equations Used to Develop the Winter 2009-10 Aircraft Ground Deicing Holdover Time Tables* (6).

Work was completed in the fall of 2009 to develop the first online publication for the regression information. The 2009-10 online document, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2009-2010*, was published on the TC HOT Guidelines website in January 2010.

4.1.3 Changes Required for 2010-11 Holdover Time Guidelines

The regression information was updated in 2010 to reflect changes made to the HOT Guidelines for use in the winter of 2010-11.

1. Data were collected for the Type I fluid composite holdover times, which were added to the HOT Guidelines for the winter of 2010-11.
2. Data were collected for one new fluid that was added to the HOT Guidelines for the winter of 2010-11:
   - Cryotech Polar Guard® (Type IV).
3. Data were collected for one fluid that underwent additional holdover time testing in the winter of 2009-10 (resulting in changes to its fluid-specific holdover times):
   - Clariant Safewing MP II FLIGHT (Type II).
4. Data were removed for one fluid that became obsolete and was removed from the HOT Guidelines for the winter of 2010-11:
   - Octagon Max Flight (Type IV).

This work is documented in the TC report, TP 15054E, *Regression Coefficients and Equations Used to Develop the Winter 2010-11 Aircraft Ground Deicing Holdover Time Tables* (7). The 2010-11 online document, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2010-2011*, was published on the TC HOT Guidelines website in July 2010.

4.1.4 Changes Required for 2011-12 Holdover Time Guidelines

The regression information was updated in 2011 to reflect changes made to the HOT Guidelines for use in the winter of 2011-12.

1. Data were collected for one new fluid that was added to the HOT Guidelines for the winter of 2011-12:
   - Cryotech Polar Guard® Advance (Type IV).
2. Data were removed for two fluids that became obsolete and were removed from the HOT Guidelines for the winter of 2011-12:
   - Octagon MaxFlo (Type IV); and
   - Clariant Safewing 2012 (Type IV).

This work is documented in the TC report, TP 15159E, *Regression Coefficients and Equations Used to Develop the Winter 2011-12 Aircraft Ground Deicing Holdover*

Time Tables (8). The 2011-12 online document, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2011-2012*, was published on the TC HOT Guidelines website in July 2011.

4.1.5 Changes Required for 2012-13 Holdover Time Guidelines

The regression information was updated in 2012 to reflect changes made to the HOT Guidelines for use in the winter of 2012-13.

1. Data were collected for two new fluids that were added to the HOT Guidelines for the winter of 2012-13:
   - Clariant Safewing MP II FLIGHT PLUS (Type II); and
   - LNT Solutions P250 (Type II).
2. Data were removed for four fluids that became obsolete and were removed from the HOT Guidelines for the winter of 2012-13:
   - Clariant Safewing MP II 2025 ECO (Type II);
   - Octagon E Max II (Type II);
   - Clariant Safewing MP IV 2001 (Type IV); and
   - Dow Chemical UCAR ADF/AAF Ultra+ (Type IV).
3. A table of lowest usable precipitation rates (LUPRs) was added as a result of analysis that revealed natural snow test data for some fluids were insufficient to support the extrapolation of regression curves to very low rates of precipitation.

This work is documented in the TC report, TP 15198E, *Regression Coefficients and Equations Used to Develop the Winter 2012-13 Aircraft Ground Deicing Holdover Time Tables* (9). The 2012-13 online document, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2012-2013*, was published on the TC HOT Guidelines website in July 2012.

4.1.6 Changes Required for 2013-14 Holdover Time Guidelines

The regression information was updated in 2013 to reflect changes made to the HOT Guidelines for use in the winter of 2013-14.

1. Data were collected for two new fluids that were added to the HOT Guidelines for the winter of 2013-14:
   - Cryotech Polar Guard® II (Type II); and
   - Clariant Safewing MP IV LAUNCH PLUS (Type IV).

2. Data were collected for one fluid that underwent additional holdover time testing in the winter of 2012-13 (resulting in changes to its fluid-specific holdover times):
   - Clariant Safewing MP II FLIGHT PLUS (Type II).
3. Data were removed for three fluids that were removed from the HOT Guidelines for the winter of 2013-14 at the request of the manufacturers:
   - LNT Solutions P250 (Type II, never commercialized);
   - Kilfrost ABC-4^{sustain} (Type IV, never commercialized); and
   - Clariant Max Flight 04 75/25 and 50/50 (Type IV).
4. The "snow" column was renamed "moderate snow," and new columns for "very light snow" and "light snow" were added to the Type II/IV regression coefficients and verification tables. This was done to reflect equivalent changes made to the holdover time tables. Except for one fluid/dilution, the regression coefficients previously published under the "snow" column were used in the new "moderate," "light," and "very light" columns.
5. The additional Type II/IV data collected in support of the development of light and very light snow holdover times resulted in modified LUPRs for several Type II/IV fluids. The LUPR table was updated accordingly.
6. Ice crystals were added to all freezing fog columns in the HOT Guidelines for the winter of 2013-14. Ice crystals were correspondingly added to the freezing fog columns of the regression coefficients and verification tables. As the freezing fog regression information applies to ice crystals, no additional regression data were required.

This work is documented in the TC report, TP 15229E, *Regression Coefficients and Equations Used to Develop the Winter 2013-14 Aircraft Ground Deicing Holdover Time Tables* (10). The 2013-14 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2013-2014* and *Official FAA Holdover Time Regression Information Winter 2013-2014*, were published on the TC and FAA HOT Guidelines websites in August 2013.

4.1.7 Changes Required for 2014-15 Holdover Time Guidelines

The regression information was updated in 2014 to reflect changes made to the HOT Guidelines for use in the winter of 2014-15.

1. Data were collected for four new fluids that were added to the HOT Guidelines for the winter of 2014-15:
   - Clariant Max Flight SNEG (Type IV);

- LNT Solutions P250 (Type II);
- LNT Solutions E450 (Type IV); and
- Newave Aerochemical FCY 9311 (Type IV).

2. Data were removed for two fluids that became obsolete and were removed from the HOT Guidelines for the winter of 2014-15:
   - Kilfrost ABC 2000 (Type II); and
   - Lyondell Arctic Shield (Type IV).
3. A note was added to the Clariant Safewing MP III 2031 (Type III) regression coefficients table to indicate that the regression information was valid only if fluid was applied unheated. This reflected a similar note added to the corresponding holdover time table.

This work is documented in the TC report, TP 15270E, *Regression Coefficients and Equations Used to Develop the Winter 2014-15 Aircraft Ground Deicing Holdover Time Tables* (11). The 2014-15 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2014-2015* and *Official FAA Holdover Time Regression Information Winter 2014-2015*, were published on the TC and FAA HOT Guidelines websites in August 2014.

4.1.8 Changes Required for 2015-16 Holdover Time Guidelines

The regression information was updated in 2015 to reflect changes made to the HOT Guidelines for use in the winter of 2015-16.

1. Data were collected for three new Type II/IV fluids that were added to the HOT Guidelines for the winter of 2015-16:
   - Kilfrost ABC-Ice Clear II (Type II);
   - Newave Aerochemical FCY-2 Bio+ (Type II); and
   - Deicing Solutions ECO-SHIELD® (Type IV).
2. Fluid-specific holdover time tables were added to the HOT Guidelines for Type III fluids in the winter of 2015-16. These tables also include data specific to application temperature and aircraft rotation speed. Data were collected for the four new Type III fluid-specific holdover time tables:
   - AllClear AeroClear MAX, Applied Unheated, Low Speed;
   - AllClear AeroClear MAX, Applied Unheated, High Speed;
   - Clariant Safewing MP III 2031 ECO, Applied Heated, Low Speed; and
   - Clariant Safewing MP III 2031 ECO, Applied Heated, High Speed.

3. Data were collected for two fluids that underwent additional holdover time testing in the winter of 2014-15 (resulting in changes to the associated fluid-specific holdover times):
   - LNT Solutions P250 (Type II); and
   - LNT Solutions E450 (Type IV).
4. Data were removed for three fluids that became obsolete and were removed from the HOT Guidelines for the winter of 2015-16:
   - Clariant Safewing MP II 1951 (Type II);
   - ABAX AD-480 (Type IV); and
   - Kilfrost ABC-S (Type IV).

This work is documented in the TC report, TP 15322E, *Regression Coefficients and Equations Used to Develop the Winter 2015-16 Aircraft Ground Deicing Holdover Time Tables* (12). The 2015-16 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2015-2016* and *FAA Holdover Time Regression Information Winter 2015-2016*, were published on the TC and FAA HOT Guidelines websites in July 2015.

4.1.9 Changes Required for 2016-17 Holdover Time Guidelines

The regression information was updated in 2016 to reflect changes made to the HOT Guidelines for use in the winter of 2016-17.

1. Data were collected for four new Type II/IV fluids that were added to the HOT Guidelines for the winter of 2016-17:
   - Beijing Yadilite Aviation YD-102 Type II (Type II);
   - Clariant Max Flight AVIA (Type IV);
   - Clariant Safewing EG IV NORTH (Type IV); and
   - Shaanxi Cleanway Aviation Cleansurface IV (Type IV).
2. Data were collected for two fluids that underwent additional holdover time testing in the winter of 2015-16 (resulting in changes to the associated fluid-specific holdover times):
   - AllClear AeroClear MAX (Type III); and
   - Inland Technologies ECO-SHIELD (Type IV).
3. Data were removed for three fluids that became obsolete and were removed from the HOT Guidelines for the winter of 2016-17:
   - LNT Solutions P250 (Type II);

- Cryotech Polar Guard® (Type IV); and
- Dow Chemical UCAR™ FlightGuard AD-480 (Type IV).

4. Holdover times for Type II and Type IV fluids for snow at temperatures below -14°C are generic and not derived directly from regression analysis. These holdover times were updated for the winter of 2016-17 as a result of new research. Consequently, new regression coefficients were manually calculated to correspond to the new holdover times.
5. Following the initial publication of the Winter 2016-17 holdover time guidance materials, TC and the FAA subsequently reviewed the holdover times described in item 4 above. They consequently issued optional changes (increases) to Type IV ethylene glycol-based fluids below -14°C and Type II/IV propylene glycol-based fluids below -14 to -18°C. As a result, the related regression information also changed.

This work is documented in the TC report, TP 15339E, *Regression Coefficients and Equations Used to Develop the Winter 2016-17 Aircraft Ground Deicing Holdover Time Tables* (13). The 2016-17 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2016-2017* and *FAA Holdover Time Regression Information Winter 2016-2017*, were published on the TC and FAA HOT Guidelines websites in August 2016.

The updated holdover times and regression information for item 5 above were published by TC through AC 700-040, *Supplemental Holdover Timetables and Regression Information for SAE Type II and IV Fluids*, on October 18, 2016. The FAA published this information in addendums to the HOT Guidelines and Regression Information documents; the addendums were published on September 30, 2016.

4.1.10 Changes Required for 2017-18 Holdover Time Guidelines

The regression information was updated in 2017 to reflect changes made to the HOT Guidelines for use in the winter of 2017-18.

1. Data were collected and added to the regression database for three new fluids that were added to the HOT Guidelines in 2017-18:
   - ABAX ECOWING AD-2 (Type II);
   - CHEMCO ChemR EG IV (Type IV); and
   - Oksayd Defrost ECO 4 (Type IV).
2. Data were collected for one fluid that underwent additional holdover time testing in the winter of 2016-17 (resulting in changes to the associated fluid-specific holdover times):
   - AllClear AeroClear MAX (Type III).

3. Data were removed as the result of the removal of Kilfrost ABC-3 from the HOT Guidelines for the winter of 2017-18. As ABC-3 was the only remaining grandfathered fluid (fluid without fluid-specific data or a holdover time table), the grandfathered fluid data were removed from the regression database.
4. Fluid-specific holdover times for very cold snow were added to the HOT Guidelines for several fluids:
   - Clariant Safewing MP II FLIGHT;
   - Cryotech Polar Guard® II;
   - AllClear AeroClear MAX;
   - Clariant Safewing MP IV LAUNCH;
   - Clariant Safewing MP IV LAUNCH PLUS;
   - Cryotech Polar Guard® Advance;
   - Dow Endurance EG106; and
   - LNT Solutions E450.

   The regression data corresponding to the new very cold snow holdover times were added to the regression database.

   Note: The holdover times published for AllClear AeroClear MAX for snow below -25 to -35°C in 2017-18 were not derived directly from regression analysis. As a result, regression coefficients were created manually for this condition based on the published holdover time values.
5. The generic holdover times used for very cold snow for all other Type II and Type IV fluids were updated for the winter of 2017-18. New regression coefficients were manually calculated to correspond to the new holdover times.
6. As a result of supplemental research in heavy snow, the holdover times of some fluids were modified for Winter 2017-18. The affected fluids/dilutions were as follows:
   - ABAX ECOWING 26 (75/25, 50/50);
   - Cryotech Polar Guard® II (100/0, 75/25, 50/50);
   - ABAX ECOWING AD-49 (100/0, 75/25);
   - Clariant Max Flight SNEG (100/0);
   - Cryotech Polar Guard® Advance (100/0, 75/25, 50/50); and
   - Dow UCAR™ FlightGuard AD-49 (100/0, 75/25).

   The regression information for these fluids was updated accordingly.

7. Minor modifications were made to the methodology for determining LUPRs in snow. This resulted in several minor changes being made to LUPR values.
8. A table of highest usable precipitation rates (HUPRs) was added as a result of a multi-year analysis evaluating the robustness of snow data sets at high rates of precipitation. It determined that natural snow data for some fluids are insufficient to support extrapolation of the regression data to very high rates of precipitation.
9. Additional temperature bands were added to the Type II and IV regression tables to reflect equivalent changes made to the Type II and IV holdover time tables.

This work is documented in the TC report, TP 15373E, *Regression Coefficients and Equations Used to Develop the Winter 2017-18 Aircraft Ground Deicing Holdover Time Tables* (14). The 2017-18 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2017-2018* and *FAA Holdover Time Guidelines Regression Information Winter 2017-2018*, were published on the TC and FAA HOT Guidelines websites in August 2017.

4.1.11 Changes Required for 2018-19 Holdover Time Guidelines

The regression information was updated in 2018 to reflect changes made to the HOT Guidelines for use in the winter of 2018-19.

1. Data were collected and added to the regression database for three new fluids that were added to the HOT Guidelines in 2018-19:
   - Kilfrost Ice Clear II (Type II);
   - Oksayd Defrost PG 2 (Type II); and
   - Oksayd Defrost EG 4 (Type IV).
2. Data were removed for four fluids that became obsolete and were removed from the HOT Guidelines for the winter of 2018-19:
   - Kilfrost ABC-Ice Clear (Type II);
   - Clariant Safewing MP III 2031 ECO (Type III);
   - ABAX ECOWING AD-49 (75/25 and 50/50 dilutions only, Type IV); and
   - Dow FlightGuard AD-49 (75/25 and 50/50 dilutions only, Type IV).
3. As a result of supplemental research in heavy snow, the HUPR values for the 100/0 and 75/25 dilutions of Clariant Safewing MP II FLIGHT were increased to 50 g/dm²/h (up from 40 g/dm²/h).

4. An additional temperature (-8°C) was added to the Type II and IV verification value tables in the regression information publications to reflect equivalent changes made to the Type II and IV holdover time tables.

This work is documented in the TC report, TP 15397E, *Regression Coefficients and Equations Used to Develop the Winter 2018-19 Aircraft Ground Deicing Holdover Time Tables* (15). The 2018-19 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2018-2019* and *FAA Holdover Time Guidelines Regression Information Winter 2018-2019*, were published on the TC and FAA HOT Guidelines websites in August 2018.

4.1.12 Changes Required for the 2019-20 Holdover Time Guidelines

The regression information was updated in 2019 to reflect changes made to the HOT Guidelines for use in the winter of 2019-20.

1. Data were collected and added to the regression database for three new fluids that were added to the HOT Guidelines in 2019-20:
   - ROMCHIM ADD-PROTECT Type II (Type II);
   - AllClear ClearWing EG (Type IV); and
   - Cryotech Polar Guard® Xtend (Type IV).
2. The generic very cold snow holdover times for Type II and Type IV fluids were updated for the winter of 2019-20 as a result of new research. The updated generic holdover times differ depending on whether the fluid in question is a Type II fluid, an ethylene glycol-based Type IV fluid, or a propylene glycol-based Type IV fluid. New regression coefficients were manually calculated to correspond to the new holdover times.
3. The analytical protocol used to determine fluid-specific holdover times in snow below -29°C was finalized. This resulted in changes to the snow holdover times in the coldest temperature band for two Type IV fluids: Cryotech Polar Guard® Advance and LNT E450. As described in Subsection 3.1, these values were not derived directly from regression analysis. New regression coefficients were manually calculated to correspond to the new holdover times.

This work is documented in the TC report, TP 15426E, *Regression Coefficients and Equations Used to Develop the Winter 2019-20 Aircraft Ground Deicing Holdover Time Tables* (16). The 2019-20 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2019-2020* and *FAA Holdover Time Guidelines Regression Information Winter 2019-2020*, were published on the TC and FAA HOT Guidelines websites in August 2019.

4.1.13 Changes Required for the 2020-21 Holdover Time Guidelines

The regression information was updated in 2020 to reflect changes made to the HOT Guidelines for use in the winter of 2020-21.

1. Data were removed for one fluid that became obsolete and was removed from the HOT Guidelines for the winter of 2020-21.
   - ABAX Ecowing 26 (Type II).
2. Data were removed as the result of a change in LOUT for LNT E450 (Type IV) for the winter of 2020-21. The LOUT for this fluid is now -22.5°C; data for this fluid for temperatures colder than -22.5°C have been removed.

Due to the COVID-19 pandemic, no new fluids or data were added to the HOT Guidelines for use in the winter of 2020-21. Further details can be found in the TC report, TP 15451E, *Regression Coefficients and Equations Used to Develop the Winter 2020-21 Aircraft Ground Deicing Holdover Time Tables* (17).

The 2020-21 online documents, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2020-2021* and *FAA Holdover Time Guidelines Regression Information Winter 2020-2021*, were published on the TC and FAA HOT Guidelines websites in August 2020.

4.2 Data for the 2021-22 Holdover Time Guidelines

The data required for the 2021-22 HOT Guidelines is detailed in this subsection. The data are detailed by fluid type: Type I in Subsection 4.2.1, Type II in Subsection 4.2.2, Type III in Subsection 4.2.3, and Type IV in Subsection 4.2.4. Each subsection includes the following:

1. Data required: a description of the data required for the fluid type;
2. Data source(s): the original source location of the required data;
3. Data collection: the source of data collection for the 2021-22 publication; and
4. Data removal: a description of any data removed from the regression publication for Winter 2021-22.

Table 4.1, at the end of this section, summarizes the data included in the Winter 2021-22 regression publication.

4.2.1 Type I

4.2.1.1 Data Required

Regression information is required for the two generic Type I holdover time tables. As fluid-specific holdover time tables are not published for Type I fluids, no additional regression information is required.

4.2.1.2 Data Source(s)

The **Type I aluminum snow** holdover times are derived from regression analysis of the 2001-02 Type I snow data set (see Subsection 3.3). The data set is documented in TP 13994E (4).

The **Type I aluminum freezing precipitation** holdover times are not derived from regression analysis (see Subsection 3.3). The Type I aluminum freezing precipitation coefficients were calculated in 2008 using the values in the 2008-09 Type I holdover time table.

The **Type I composite snow** holdover times are derived from regression analysis of the Type I composite snow data set (which includes data from tests conducted in 2006-07, 2007-08, and 2009-10; see Subsection 3.3). The data set is documented in TP 15052E (Vol. 1) (5).

The **Type I composite freezing precipitation** holdover times are based on data collected in 2009-10. However, they are not derived directly from regression analysis (see Subsection 3.3). The data are documented in TP 15052E (Vol. 1) (5). As the holdover times are not derived directly from regression analysis, TP 15052E does not include regression information. Therefore, the Type I freezing precipitation coefficients were calculated in 2010 using the 2010-11 holdover time values. The calculations are detailed in Appendix C of TP 15054E (7).

4.2.1.3 Data Collection

The Type I regression information was collected previously (see Table 4.1) and was obtained from the previous regression publication, TP 15451E (17).

4.2.1.4 Data Removed

No Type I data were removed from the HOT Guidelines in 2021-22; therefore, no Type I data were removed from the regression publication.

4.2.2 Type II

4.2.2.1 Data Required

Regression information was required for the twelve Type II fluid-specific holdover time tables in the 2021-22 HOT Guidelines:

1. ABAX ECOWING AD-2;
2. Aviation Shaanxi Hi-Tech Cleanwing II;
3. Beijing Yadilite Aviation YD-102 Type II;
4. Clariant Safewing MP II FLIGHT;
5. Clariant Safewing MP II FLIGHT PLUS;
6. Cryotech Polar Guard® II;
7. JSC RCP NORDIX (Formerly Oksayd) Defrost PG 2;
8. Kilfrost ABC-K Plus;
9. Newave Aerochemical FCY-2;
10. Newave Aerochemical FCY-2 Bio+;
11. ROMCHIM ADD-PROTECT NG TYPE II; and
12. ROMCHIM ADD-PROTECT TYPE II.

Regression information was also required for the Type II generic holdover time table. As detailed in Subsection 3.2, the generic Type II holdover time table values are based on the shortest holdover times of all fluids on the TC and FAA lists of Type II fluids (see note on qualified fluids in Subsection 3.2.1).

As all Type II fluids had fluid-specific holdover time tables, and regression information was collected for those tables, no additional regression information was required to calculate the generic Type II holdover times.

4.2.2.2 Data Source(s)

Type II fluid-specific regression information was derived from holdover time testing conducted with the associated Type II fluids. The holdover time testing has been carried out over many years (see Table 4.1). These data were available from the reports on holdover time testing published annually.

4.2.2.3 Data Collection

Most of the data supporting the Type II regression information was collected previously (see Table 4.1) and was obtained from the previous regression publication, TP 15451E (17). However, new data were required for a new fluid, for a fluid with updated very cold snow holdover times, and for supporting a change to the snow holdover times for Cleanwing II.

- **New Fluid:** ROMCHIM ADD-PROTECT NG Type II was a new fluid that underwent endurance time testing in 2019-20. Due to the COVID-19 pandemic, the testing was completed late and the fluid was only added to the HOT Guidelines the following year. Regression information for this fluid was collected from the TC report, TP 15494E, *Aircraft Ground De/Anti-Icing Fluid Holdover Time Development Program for the 2020-21 Winter* (18).
- **Updated Fluid-Specific Very Cold Snow Holdover Times:** Cleanwing II underwent very cold snow endurance time testing in 2019-20 and 2020-21. This research is documented in TP 15494E (18); the related regression information was collected from that report.
- **Supplemental Testing with Cleanwing II:** Supplemental testing was conducted in 2020-21 with Cleanwing II to support a change to the fluid's snow holdover times. This resulted in the creation of light snow and very light snow columns within the Cleanwing II HOT table. This research is documented in TP 15494E (18); the related regression information was collected from that report.

4.2.2.4 Data Removed

One Type II fluid, Kilfrost Ice Clear II, was removed from the HOT Guidelines for 2021-22. The regression information for the fluid was correspondingly removed from the regression publication.

4.2.3 Type III

4.2.3.1 Data Required

Regression information was required for the two Type III fluid-specific holdover time tables in the 2021-22 HOT Guidelines:

1. AllClear AeroClear MAX, Applied Unheated, Low Speed; and
2. AllClear AeroClear MAX, Applied Unheated, High Speed.

It should be noted that the regression information for the low speed and high speed holdover time tables is the same. The only difference is the temperatures at which the information is valid.

4.2.3.2 Data Source(s)

Type III regression information was derived from holdover time testing conducted with the associated Type III fluids using test procedures applicable to heated or unheated fluid applications. The holdover time testing was carried out over several winters (see Table 4.1). The data were available in the reports on holdover time testing published for the years the fluid was tested.

4.2.3.3 Data Collection

Regression information for both Type III holdover time tables was collected previously (see Table 4.1) and was obtained from the previous regression publication, TP 15451E (17).

4.2.3.4 Data Removed

No Type III data were removed from the HOT Guidelines or the regression publication for 2021-22.

4.2.4 Type IV

4.2.4.1 Data Required

Regression information was required for the 27 Type IV fluid-specific holdover time tables in the 2021-22 HOT Guidelines:

1. ABAX ECOWING AD-49;
2. AllClear ClearWing ECO;
3. AllClear ClearWing EG;
4. ASGlobal 4Flite EG;
5. ASGlobal 4Flite PG;
6. AVIAFLUID AVIAFlight EG;

7. AVIAFLUID AVIAFlight PG;
8. CHEMCO ChemR EG IV;
9. ChemR Nordik IV;
10. Clariant Max Flight 04;
11. Clariant Max Flight AVIA;
12. Clariant Max Flight SNEG;
13. Clariant Safewing EG IV NORTH;
14. Clariant Safewing MP IV LAUNCH;
15. Clariant Safewing MP IV LAUNCH PLUS;
16. Cryotech Polar Guard® Advance;
17. Cryotech Polar Guard® Xtend;
18. Dow Chemical UCAR™ Endurance EG106;
19. Dow Chemical UCAR™ FlightGuard AD-49;
20. Inland Technologies ECO-SHIELD®;
21. JSC RCP NORDIX Defrost ECO 4;
22. JSC RCP NORDIX Defrost EG 4;
23. JSC RCP NORDIX Defrost NORTH 4;
24. Kilfrost ABC-S Plus;
25. Newave Aerochemical FCY 9311;
26. Newave Aerochemical FCY-EGIV; and
27. Shaanxi Cleanway Aviation Cleansurface IV.

Regression information was also required for the Type IV generic holdover time table. As detailed in Subsection 3.2, the generic Type IV holdover time table values were based on the shortest holdover times of all fluids on the TC and FAA lists of Type IV fluids (see note on qualified fluids in Subsection 3.2.1).

As all Type IV fluids had fluid-specific holdover time tables, and regression information was collected for those tables, no additional regression information was required to calculate the generic Type IV holdover times.

4.2.4.2 Data Source(s)

Type IV fluid-specific regression information was derived from holdover time testing conducted with the associated Type IV fluids. The holdover time testing has been

carried out over many years (see Table 4.1). The data were available in the reports on holdover time testing published annually.

4.2.4.3 Data Collection

Most of the data supporting the Type IV regression information was collected previously (see Table 4.1) and was obtained from the previous regression publication, TP 15451E (17). However, new data were required for new fluids, for fluids with updated very cold snow holdover times, and for supporting a change to the snow holdover times for Cleanwing II.

- **New Fluids:** AVIAFLUID AVIAFlight EG, AVIAFLUID AVIAFlight PG, AllClear ClearWing ECO, ASGlobal 4Flite EG, ASGlobal 4Flite PG, CHEMCO ChemR Nordik IV, JSC RCP Nordix Defrost NORTH 4, and Newave Aerochemical FCY EGIV were new fluids that underwent endurance time testing in 2019-20 and 2020-21. Regression information for these fluids was collected from TP 15494E (18).
- **Updated Fluid-Specific Very Cold Snow Holdover Times:** AVIAFLUID AVIAFlight EG, AVIAFLUID AVIAFlight PG, AllClear ClearWing ECO, AllClear ClearWing EG, CHEMCO ChemR EG IV, CHEMCO ChemR Nordik IV, Cryotech Polar Guard Xtend, Newave Aerochemical FCY 9311, and Newave Aerochemical FCY-EGIV were fluids that underwent very cold snow endurance time testing in 2019-20 and 2020-21. This research is documented in TP 15494E (18); the related regression information was collected from that report.
- **Supplemental Testing with Cleanwing II:** Supplemental testing was conducted in 2020-21 with Cleanwing II to support a change to the fluid's snow holdover times. This resulted in the creation of light snow and very light snow columns within the Cleanwing II HOT table. This research is documented in TP 15494E (18); the related regression information was collected from that report.

4.2.4.4 Data Removed

One Type IV fluid, LNT E450, was removed from the HOT Guidelines for 2021-22. The regression information for the fluid was correspondingly removed from the regression publication.

4.2.5 Lowest Usable Precipitation Rates for Snow

Analysis conducted in the winter of 2011-12 determined that natural snow data for some fluids were insufficient to support extrapolation of the regression curves to very low rates of precipitation. LUPRs for snow were subsequently determined for

each Type II, Type III, and Type IV fluid brand, fluid dilution, and air temperature. This work is documented in the TC report, TP 15202E, *Aircraft Ground Icing General Research Activities During the 2011-12 Winter* (19). As a result of this work, a table of LUPRs was added to the regression publication for Winter 2012-13.

Many LUPRs were modified as a result of additional snow data being collected in the winter of 2012-13 to develop light and very light snow holdover times for Type II/IV fluids. The table of LUPRs was updated accordingly in the 2013-14 regression publication. The analysis that resulted in the new LUPRs is documented in the TC report, TP 15228E, *Aircraft Ground De/Anti-Icing Fluid Holdover Time Development Program for the 2012-13 Winter* (20).

In the winter of 2016-17, refinements were made to the LUPR analysis methodology resulting in some minor changes to LUPR values for existing fluids. These changes are documented in the TC report, TP 15374E, *Aircraft Ground Icing General Research Activities During the 2016-17 Winter* (21).

Subsequently, LUPRs have been added for all new Type II, III, and IV fluids added to the HOT Guidelines each winter. The LUPR values were collected from the same report from which the regression information was collected.

4.2.6 Highest Usable Precipitation Rates for Snow

Analysis conducted in the winters of 2014-15 through 2016-17 determined that natural snow data for some fluids were not sufficient to support extrapolation of the regression curves to heavy rates of precipitation (above 25 g/dm²/h). HUPRs for snow were subsequently determined for each Type II, III, and Type IV fluid brand, fluid dilution, and air temperature. This work is documented in TP 15374E (21). As a result of this work, a table of HUPRs was added to the regression publication for Winter 2017-18.

Subsequently, HUPRs have been added for all new Type II, III, and IV fluids added to the HOT Guidelines each winter. The HUPR values were collected from the same report from which the regression information was collected.

4.2.7 Summary

Table 4.1 lists the regression data sets that are required for the 2021-22 HOT Guidelines and their respective sources. The first column specifies the fluid type and data set name, the second column specifies the source data for the regression information, and the third column indicates the year in which the data set was first included in the regression information documents.

It should be noted that multiple data sets exist for some fluids. In these cases, the data were examined to determine which data sets were used to develop the current fluid-specific values in the associated holdover time table. In some cases, the regression coefficients from multiple data sets have been included in the final information.

For brevity, the following abbreviations have been used within Table 4.1:

- NS: Natural snow;
- HS: Heavy snow;
- VCS: Very cold snow; and
- ZP: Freezing precipitation (including freezing drizzle, freezing fog, freezing rain, and rain on a cold-soaked wing).

Some regression coefficients are not derived directly from regression analysis of holdover time test data, specifically Type I freezing precipitation values, generic Type II/IV snow values below -14°C, and fluid-specific Type II/III/IV snow values below -25°C for fluids with LOUTs below -29°C. To obtain regression coefficients for these data sets, each cell value was assumed to be a test data point, and these data points were regressed to determine the regression coefficients for the resulting best-fit curves. For cases where the cell value was 0 minutes, a value of 0.01 minutes was used as the data point value.

4.2.8 Data Verification

In order to verify the accuracy of the data provided in the regression coefficients tables, the data provided in the tables were used to generate values for a fluid-specific holdover time table for each fluid. This information was cross-referenced with the values provided in the published generic and fluid-specific holdover time tables. The values were found to be the same, thus ensuring the accuracy of the regression coefficients.

Table 4.1: Regression Data Sets Required for 2021-22

Fluid Type: Data Set Name	Source of Regression Data	Year Added to Regression Publication
Type I: Generic (Aluminum Snow)	HOT Testing: 2001-02	2008-09
Type I: Generic (Composite Snow)	HOT Testing: 2006-07, 2007-08, 2009-10	2010-11
Type I: Generic (Aluminum Freezing Precipitation)	Created from 2008-09 HOT table values	2008-09
Type I: Generic (Composite Freezing Precipitation)	Created from 2010-11 HOT table values	2010-11
Type II: ABAX ECOWING AD-2	HOT Testing: 2016-17	2017-18
Type II: Aviation Shaanxi Cleanwing II	HOT Testing: 2008-09, 2015-16 (NS), 2019-20 (VCS), 2020-21 (VCS, NS)	2009-10
Type II: Beijing Yadilite Aviation YD-102 Type II	HOT Testing: 2015-16	2016-17
Type II: Clariant Safewing MP II FLIGHT	HOT Testing: 2005-06, 2009-10, 2016-17 (VCS)	2008-09
Type II: Clariant Safewing MP II FLIGHT PLUS	HOT Testing: 2011-12, 2012-13 (NS)	2012-13
Type II: Cryotech Polar Guard® II	HOT Testing: 2010-11, 2016-17 (VCS, HS)	2013-14
Type II: JSC RCP NORDIX (Formerly Oksayd) Defrost PG 2	HOT Testing: 2017-18	2018-19
Type II: Kilfrost ABC-K Plus	HOT Testing: 2007-08	2008-09
Type II: Newave Aerochemical FCY-2	HOT Testing: 2006-07	2008-09
Type II: Newave Aerochemical FCY-2 Bio +	HOT Testing: 2014-15	2015-16
Type II: ROMCHIM ADD-PROTECT TYPE II NG	HOT Testing: 2019-20, 2020-21	2021-22
Type II: ROMCHIM ADD-PROTECT TYPE II	HOT Testing: 2018-19	2019-20

Table 4.1: Regression Data Sets Required for 2021-22 (cont'd)

Fluid Type: Data Set Name	Source of Regression Data	Year Added to Regression Publication
Type III: AllClear AeroClear MAX, Applied Unheated, Low Speed	HOT Testing: 2016-17	2015-16
Type III: AllClear AeroClear MAX, Applied Unheated, High Speed	HOT Testing: 2016-17	2015-16
Type IV: ABAX ECOWING AD-49	HOT Testing: 2008-09, 2016-17 (HS)	2009-10
Type IV: AllClear ClearWing ECO	HOT Testing: 2019-20 (Standard HOT Testing, VCS), 2020-21 (VCS)	2021-22
Type IV: AllClear ClearWing EG	HOT Testing: 2018-19, 2019-20 (VCS), 2020-21 (VCS)	2019-20
Type IV: ASGlobal 4Flite EG	HOT Testing: 2020-21	2021-22
Type IV: ASGlobal 4Flite PG	HOT Testing: 2020-21	2021-22
Type IV: AVIAFLUID AVIAFlight EG	HOT Testing: 2019-20 (Standard HOT Testing, VCS), 2020-21 (VCS)	2021-22
Type IV: AVIAFLUID AVIAFlight PG	HOT Testing: 2019-20 (Standard HOT Testing, VCS), 2020-21 (VCS)	2021-22
Type IV: CHEMCO ChemR EG IV	HOT Testing: 2016-17, 2019-20 (VCS), 2020-21 (VCS)	2017-18
Type IV: CHEMCO ChemR Nordik IV	HOT Testing: 2019-20 (Standard HOT Testing, VCS), 2020-21 (VCS)	2021-22
Type IV: Clariant Max Flight 04	HOT Testing: 2000-01	2008-09
Type IV: Clariant Max Flight AVIA	HOT Testing: 2015-16	2016-17
Type IV: Clariant Max Flight SNEG	HOT Testing: 2013-14, 2016-17 (HS)	2014-15
Type IV: Clariant Safewing EG IV NORTH	HOT Testing: 2015-16	2016-17
Type IV: Clariant Safewing MP IV LAUNCH	HOT Testing: 2005-06 (ZP), 2006-07 (NS), 2016-17 (VCS)	2008-09

Table 4.1: Regression Data Sets Required for 2021-22 (cont'd)

Fluid Type: Data Set Name	Source of Regression Data	Year Added to Regression Publication
Type IV: Clariant Safewing MP IV LAUNCH PLUS	HOT Testing: 2012-13, 2016-17 (VCS)	2013-14
Type IV: Cryotech Polar Guard® Advance	HOT Testing: 2010-11, 2016-17 (VCS, HS)	2011-12
Type IV: Cryotech Polar Guard® Xtend	HOT Testing: 2018-19, 2019-20 (VCS), 2020-21 (VCS)	2019-20
Type IV: Dow UCAR™ FlightGuard AD-49	HOT Testing: 2008-09, 2016-17 (HS) (ABAX AD-49)	2010-11
Type IV: Dow UCAR™ Endurance EG106	HOT Testing: 2005-06, 2016-17 (VCS)	2008-09
Type IV: Inland Technologies ECO-SHIELD®	HOT Testing: 2015-16	2015-16
Type IV: JSC RCP NORDIX Defrost ECO 4	HOT Testing: 2016-17	2017-18
Type IV: JSC RCP NORDIX Defrost EG 4	HOT Testing: 2017-18	2018-19
Type IV: JSC RCP NORDIX Defrost NORTH 4	HOT Testing: 2020-21	2021-22
Type IV: Kilfrost ABC-S Plus	HOT Testing: 2006-07	2008-09
Type IV: Newave Aerochemical FCY 9311	HOT Testing: 2013-14, 2019-20 (VCS), 2020-21 (VCS)	2014-15
Type IV: Newave Aerochemical FCY-EGIV	HOT Testing: 2019-20 (Standard HOT Testing, VCS), 2020-21 (VCS)	2021-22
Type IV: Shaanxi Cleanway Aviation Cleansurface IV	HOT Testing: 2015-16	2016-17

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5. REGRESSION INFORMATION PUBLICATION: 2021-22

The regression information required to substantiate the 2021-22 HOT Guidelines is provided in the TC document, *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2021-2022*, and the FAA document, *FAA Holdover Time Guidelines Regression Information Winter 2021-2022*.

The contents of these documents are described in this section. The documents have a similar structure and nearly identical contents (see Subsection 3.5).

The documents were published in August 2021 (see Subsection 5.8). Copies of these documents are included in Appendix B (TC) and Appendix C (FAA).

5.1 Highlights and Changes

The highlights and changes section, included at the beginning of the documents, provides a detailed account of the changes made to the documents for 2021-22.

5.2 Guidance Material

The regression information publication contains guidance for using the information contained in the documents. This includes guidance on how to interpret and apply the information in the regression coefficients tables and how to calculate the Type II and Type IV generic holdover times. The documents also provide descriptions of the verification tables and their purpose, the LUPRs and HUPRs, and several limitations of the data (see Subsection 5.7).

5.3 Regression Coefficients Tables

There are 43 regression coefficients tables in the 2021-22 regression information publications. A list of the tables is provided in Table 5.1.

Table 5.1: Regression Coefficients Tables for Winter 2021-22

Fluid Type	Regression Coefficients Tables
Type I	• Generic Type I (Aluminum Wing Surfaces) • Generic Type I (Composite Wing Surfaces)
Type II	• ABAX ECOWING AD-2 • Aviation Shaanxi Hi-Tech Cleanwing II • Beijing Yadilite YD-102 Type II • Clariant Safewing MP II FLIGHT • Clariant Safewing MP II FLIGHT PLUS • Cryotech Polar Guard® II • JSC RCP NORDIX Defrost PG 2 • Kilfrost ABC-K Plus • Newave Aerochemical FCY-2 • Newave Aerochemical FCY-2 Bio + • ROMCHIM ADD-PROTECT NG Type II • ROMCHIM ADD-PROTECT Type II
Type III	• AllClear AeroClear MAX, Applied Unheated, Low Speed • AllClear AeroClear MAX, Applied Unheated, High Speed
Type IV	• ABAX ECOWING AD-49 • AllClear ClearWing ECO • AllClear ClearWing EG • ASGlobal 4Flite EG • ASGlobal 4Flite PG • AVIAFLUID AVIAFlight EG • AVIAFLUID AVIAFlight PG • CHEMCO ChemR EG IV • CHEMCO ChemR Nordik IV • Clariant Max Flight 04 • Clariant Max Flight AVIA • Clariant Max Flight SNEG • Clariant Safewing EG IV NORTH • Clariant Safewing MP IV LAUNCH • Clariant Safewing MP IV LAUNCH PLUS • Cryotech Polar Guard® Advance • Cryotech Polar Guard® Xtend • Dow Chemical UCAR™ Endurance EG106 • Dow Chemical UCAR™ FlightGuard AD-49 • Inland Technologies ECO-SHIELD® • JSC RCP NORDIX Defrost ECO 4

Table 5.1: Regression Coefficients Tables for Winter 2021-22 (cont'd)

Fluid Type	Regression Coefficients Tables
Type IV	• JSC RCP NORDIX Defrost EG 4 • JSC RCP NORDIX Defrost NORTH 4 • Kilfrost ABC-S Plus • Newave Aerochemical FCY 9311 • Newave Aerochemical FCY-EGIV • Shaanxi Cleanway Aviation Cleansurface IV

5.3.1 Table Format and Footnotes

With one exception, each regression coefficients table is presented in the format of its corresponding holdover time table. A footnote is associated with each column heading to indicate the form of the regression equation for he cells in that column. The regression coefficients required for the equation are provided in the corresponding cells below.

The exception is in the Type II/IV tables, which have a single temperature band that provides the regression coefficients for both the "below -3 to -8°C" and "below -8 to -14°C" temperature bands in the holdover time tables. This was done because the regression coefficients are the same for both temperature bands.

The coefficients provided in each table cell are valid only for the conditions (i.e., temperature, precipitation type, and fluid dilution) of that cell. In cells where no temperature coefficient (coefficient "B") is provided, temperature is not an input in the equation. The regression coefficients are derived using the lowest temperature in the temperature range of the cell and must then be used for all temperatures in the cell.

Additional footnotes are provided for several of the tables. Two sets of coefficients are provided in some table cells, as different data sets are responsible for the upper and lower values in the cell (see Subsection 4.2.7). A footnote on these cells indicates that each set of regression coefficients must be used to calculate a holdover time and that the shortest holdover time calculated is the value that must be used.

Footnotes are also used to highlight discrepancies that may be encountered if the regression coefficients are used to calculate the values provided in the HOT Guidelines.

As per the protocol described in Subsection 3.1, generic regression coefficients are included in the "below -14 to -18°C," "below -18 to -25°C," and "below -25 to LOUT" snow cells for many Type II and Type IV fluids.

5.4 Data Verification Tables

Verification tables are included in the regression information publications. The values in these tables were calculated using the regression coefficients provided in the publications. There is a verification table provided for each data set listed in Table 5.1.

Verification tables are also provided for the generic Type II and generic Type IV holdover time tables. The values in these tables were determined using the methodologies for calculating Type II and Type IV generic holdover times detailed in Subsection 3.2.

Each verification table provides holdover time values for select boundary conditions in the associated holdover time table. The verification tables can be used as aids for LWES manufacturers during the development process. These tables are not exhaustive, and manufacturers are cautioned that they must develop comprehensive verification and validation methods covering normal and exceptional conditions (e.g., values outside of the temperature range) to ensure the adequacy of their software algorithms.

5.5 Table of Lowest Usable Precipitation Rates in Snow

A table of the LUPRs in snow is provided for each Type II, Type III, and Type IV fluid, for each fluid dilution, and for each outside air temperature. These values were determined through examination of the robustness of the snow data sets at low rates of precipitation. The LUPR is the lowest precipitation rate for which sufficient natural snow data exists to support use of the regression coefficients. It is also the lowest snow precipitation rate that can be input into a LWES.

5.6 Table of Highest Usable Precipitation Rates in Snow

A table of the HUPRs in snow is provided for each Type II, III, and IV fluid, for each fluid dilution, and for each outside air temperature. These values were determined through examination of the robustness of the snow data sets at high rates of precipitation. The HUPR is the highest precipitation rate for which sufficient natural

snow data exist to support use of the regression coefficients. It is also the highest snow precipitation rate that can be input by a LWES.

5.7 Data Limitations

There are several limitations on the regression coefficients and equations that must be considered by users of the data. These limitations are described in the guidance section of the regression information publications and detailed below.

5.7.1 Limitation #1: Air Temperature Greater or Equal to 0°C

The regression equations that 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. Regulators have determined 0°C must be input into the LWES when temperature is above 0°C. This is specified in the online documents and in the related guidance documents.

5.7.2 Limitation #2: Non-Standard Fluid Dilutions

The data cannot be interpolated to determine holdover times for fluid dilutions other than the standard 100/0, 75/25, and 50/50 mixtures. This is due to the complex, non-linear, fluid-specific relationship between fluid dilution and holdover time.

5.7.3 Limitation #3: Precipitation Rates Outside Rate Limit Boundaries

Caution must be taken when using the regression equations to calculate holdover times with precipitation rates outside of the precipitation rate limits used in the development of holdover time tables (see Subsection 2.1).

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. Caution must be exercised in applying the regression coefficients at precipitation rates outside of the precipitation rate limits, especially at precipitation rates below the lower limit where the power-law curves give much longer holdover times.

This limitation is illustrated in the sample regression shown in Figure 5.1. This example illustrates that at precipitation rates below the lower rate limit at which tests are conducted (5 $g/dm^2/h$ in this example), derived holdover times can increase

substantially with a small decrease in precipitation rate. For example, at the lower rate limit of 5 g/dm^2/h, the endurance time is approximately 82 minutes; at a slightly lower rate of 3 g/dm^2/h, the endurance time increases to 122 minutes.

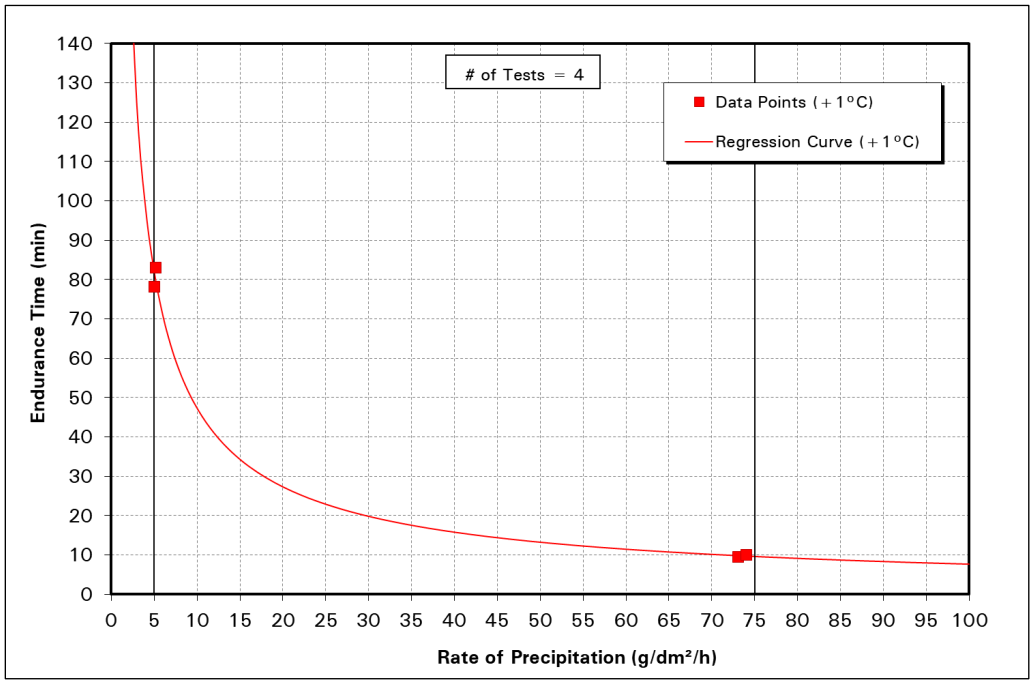

Figure 5.1: Sample Regression Curve – Cold-Soaked Wing

5.7.4 Limitation #4: Usable Precipitation Rates

The lowest and highest precipitation rates that can be input into the regression equations are determined by the more restrictive of the following:

- Lowest/highest rates provided in the applicable regulatory document (the FAA AC or the TC exemption document) for each precipitation type;
- Minimum demonstrated precipitation measuring equipment rates in accordance with the applicable regulatory document (the FAA AC or the TC exemption document); and
- For snow only, the LUPRs/HUPRs provided respectively in Table 5 and Table 6 of the online documents (see Subsections 5.5 and 5.6).

5.7.5 Limitation #5: Holdover/Allowance Times Without Regression Information

Regression is currently not used in the determination of frost holdover times or any allowance times (applicable to ice pellets, small hail, and ice pellets mixed with other types of precipitation). Therefore, LWES cannot use regression-based calculations to provide frost holdover times or any allowance times.

5.8 Document Publication

The regression information required for the 2021-22 HOT Guidelines was published online by TC and the FAA in August 2021.

TC published the document *Transport Canada Holdover Time (HOT) Guidelines Regression Information Winter 2021-2022* on August 4, 2021. Information on how to request the document is available here:

- https://www.tc.gc.ca/en/services/aviation/general-operating-flight-rules/de-icing-aircraft/hold-over-guidelines.html.

The FAA published the document *FAA Holdover Time Guidelines Regression Information Winter 2021-2022* on August 4, 2021. The document is available here:

- https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/deicing/.

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6. CONCLUSIONS

The regression information required for the 2021-22 HOT Guidelines was published online by TC and the FAA on August 4, 2021.

The data required, collected, and removed for the 2021-22 online publications were documented in this report. The data were collected from the previous regression reports. The data were primarily sourced from the results of holdover time testing conducted from the winters of 1996-97 to 2020-21.

The regression coefficients and equations can be used as inputs in LWES, HOTDS, and CTDS for the winter of 2021-22. However, 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 this report, in the online publications, and in the HOT Guidelines themselves that must be respected. It is also important to note that additional restrictions may be placed on the usage of the data by regulators (for example, by the TC exemption document or the FAA advisory circular).

Because the HOT Guidelines are updated on an annual basis and include changes such as the addition of newly qualified fluids, the removal of unavailable fluids, and modifications to the generic tables, the regression information must also be updated on an annual basis. This includes the regression information provided in the online publications and in this report.

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7. RECOMMENDATIONS

Due to the dynamic nature of the holdover time tables, it is recommended that the regression information publications – the online documents and this report – be updated and published on an annual basis.

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APPENDIX A

TRANSPORT CANADA
STATEMENT OF WORK EXCERPT –
AIRCRAFT & ANTI-ICING FLUID WINTER TESTING 2020-21

TRANSPORT CANADA
STATEMENT OF WORK EXCERPT –
AIRCRAFT & ANTI-ICING FLUID WINTER TESTING 2020-21

19. Update: Regression Coefficients Used to Compute Holdover Times

a) Update the TC and FAA regression coefficients tables and verification tables to reflect changes made to the HOT guidelines for the new winter operating season.

b) Prepare a final report to document the applicable regression coefficients underlying the new winter's published holdover guidelines.

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APPENDIX B

TRANSPORT CANADA HOLDOVER TIME (HOT) GUIDELINES REGRESSION INFORMATION – WINTER 2021-2022

Transport Canada
Holdover Time (HOT) Guidelines
Regression Information
Winter 2021-2022

Original Issue: August 4, 2021

This document should be used in conjunction with the Transport Canada Holdover Time Guidelines, available at: https://tc.canada.ca/en/aviation/general-operating-flight-rules/holdover-time-hot-guidelines-icing-anti-icing-aircraft.

Questions or comments on the content of the holdover time guidelines should be addressed to Transport Canada Civil Aviation Communication Centre Telephone 1-800-305-2059 Facsimile 613-957-4208 e-mail services@tc.gc.ca

To receive notification of HOT Guideline updates, subscribe to or update your e news subscription at the following Transport Canada Web site: http://wwwapps.tc.gc.ca/Comm/5/ListServ/menu.aspx. Subscribing to e-news will require an email address and selecting Holdover Time (HOT) Guidelines under Publications / Air Transportation / Aviation Safety - Safety Information.

CHANGE CONTROL RECORDS

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

It is the responsibility of the end user to periodically check the following website for updates on Regression Information: https://tc.canada.ca/en/aviation/general-operating-flight-rules/holdover-time-hot-guidelines-icing-anti-icing-aircraft.

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

TABLE OF CONTENTS

LIST OF TABLES

Highlights and Changes for Winter 2021-2022

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

Type I Fluid

- The Type I regression coefficients are unchanged.

Type II Fluid

- A regression coefficients table and verification table has been added for ROMCHIM ADD-PROTECT NG Type II, a new Type II fluid added to the holdover time (HOT) guidelines for winter 2021-2022.
- Supplemental testing in very cold snow resulted in changes to one Type II fluid snow holdover times at temperatures below -14°C for winter 2021-2022. The related regression information has been updated accordingly.
- Supplemental testing for Aviation Shaanxi Cleanwing II resulted in changes to the snow holdover times for winter 2021-22. The related regression information has been updated accordingly.
- The regression coefficients table and verification table for Kilfrost Ice Clear II have been removed.
- Several changes were made to the Type II generic holdover times for winter 2021-2022. The Type II generic verification table has been updated accordingly.

Type III Fluid

- The Type III regression coefficients are unchanged.

Type IV Fluid

- Regression coefficients tables and verification tables have been added for the eight new Type IV fluids, added to the holdover time (HOT) guidelines for winter 2021-2022: AVIAFLUID AVIAFlight EG, AVIAFLUID AVIAFlight PG, AllClear ClearWing ECO, ASGlobal 4Flite EG, ASGlobal 4Flite PG, CHEMCO ChemR Nordik IV, JSC RCP Nordix Defrost NORTH 4, and Newave Aerochemical FCY-EGIV.
- Supplemental testing in very cold snow resulted in changes to many Type IV fluids snow holdover times at temperatures below -14°C for winter 2021-2022. The related regression information has been updated accordingly.
- The regression coefficients table and verification table for LNT solutions E450 have been removed.
- Several changes were made to the Type IV generic holdover times for winter 2021-2022. The Type IV generic verification table has been updated accordingly.

Guidance

- The guidance section remains unchanged.

GUIDANCE FOR USING REGRESSION INFORMATION

In recent years, several companies have been developing systems that measure temperature, precipitation type and precipitation rate in real-time. These systems, referred to as holdover time determination systems (HOTDS), use the weather data they collect and the regression information underlying the holdover time guidelines to calculate more precise holdover times than can be obtained from the holdover time guidelines.

As a result of the development of HOTDS, Transport Canada is required to make 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 2021-2022 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, *Regression Coefficients and Equations Used to Develop the Winter 2021-22 Aircraft Ground Deicing Holdover Time Tables*. This document can be referenced for further information if required.

The use of these systems is only possible by operators meeting the conditions set out in the requirements in sections 7.1, 7.2, 9.1 and Appendix A of Standard 622.11 "*Ground Icing Operations*" (http://www.tc.gc.ca/eng/civilaviation/regserv/cars/part6-standards-standard622-513.htm).

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. (One exception is the Type II and Type IV regression coefficients tables, which have a single temperature band (below -3 to -14°C) which provides the regression coefficients for both the below -3 to -8°C and below -8 to -14°C temperature bands in the Type II and Type IV holdover time tables.) 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 all Type II, Type III, and Type IV fluids. 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).

To use the regression information provided in this document to obtain holdover times that are valid for operations in which flaps/slats are deployed prior to de/anti-icing: use the regression information applicable to the fluid and weather condition and multiply the result obtained by 76%.

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 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 HOTDS must be programmed to calculate the holdover time for each Type II fluid on the Transport Canada list of fluids tested for anti-icing performance and aerodynamic acceptance and return the shortest holdover time calculated. This is the generic Type II holdover time.

Type IV: To calculate Type IV generic holdover times, the HOTDS must be programmed to calculate the holdover time for each Type IV fluid on the Transport Canada 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: HOTDS manufacturers may find it useful to use these verification tables as an aid in verifying the implementation of their software algorithms. However, 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.

Lowest and Highest Usable Precipitation Rates in Snow (Table 5 and Table 6)

Snow test data for some fluids is not sufficient to support extrapolation of the regression curves to very low and/or very high rates of precipitation. The lowest usable precipitation rates (LUPRs) and highest usable precipitation rates (HUPRs) in snow have been identified and are included in Table 5 (LUPRs) and Table 6 (HUPRs) for Type II, III and IV fluids (Type I fluids are not affected). The LUPRs and HUPRs differ by fluid brand, fluid dilution and temperature.

NOTE: At this time LUPRs and HUPRs are provided for snow only; LUPRs and HUPRs are not provided for any other precipitation type. The lowest and highest precipitation rates that can be used in other precipitation types are specified in the applicable exemption document.

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. It is also important to note that additional restrictions may be put on their usage by the applicable Transport Canada exemption document.

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 an HOTDS in accordance with the exemption document.
- If regression equations include a temperature coefficient, 0°C must be input into the HOTDS 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 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 in accordance with the Transport Canada exemption document (in no case shall this 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 snow data exists to support use of the regression coefficients.

- The highest 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 lower of the following:

    1. The highest precipitation rate for snow stated in the applicable Transport Canada exemption document (50 g/dm²/h); and

    2. The highest usable precipitation rate (HUPR) for each fluid/dilution/temperature as defined in Table 6 of this document. The HUPR is the highest precipitation rate for which sufficient snow data exists to support use of the regression coefficients.

- All other lowest and highest precipitation rates to be used as inputs to the regression equations are precipitation type dependent and provided in the applicable Transport Canada exemption document.

- 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, small hail and ice pellets mixed with other types of precipitation, regression coefficient information is not provided for allowance times.

REGRESSION INFORMATION TABLES FOR WINTER 2021-2022

The regression information for winter 2021-2022 is presented in a series of tables on the following pages. The regression information tables are presented first and are followed by the tables of highest and lowest usable precipitation rates.

The regression information tables are sorted by fluid type (Type I, then Type II, then Type III, then Type IV). Within each fluid type group, the tables are arranged in alphabetical order. The tables are as follows:

- Tables 1-1 to 1-2: Type I Fluid Regression Information Tables
- Tables 2-1 to 2-13: Type II Fluid Regression Information Tables
- Tables 3-1 to 3-2: Type III Fluid Regression Information Tables
- Tables 4-1 to 4-28: Type IV Fluid Regression Information Tables

The tables of highest and lowest usable precipitation rates are presented following the regression information. The tables are as follows:

- Table 5: Lowest Usable Precipitation Rates
- Table 6: Highest Usable Precipitation Rates

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					
	Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	I = 1.3735 A = -0.4751	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.3829 A = -0.3848	I = 1.4688 A = -0.6200	I = 0.9355 A = -0.3384	
below -3 to -6 °C (below 27 to 21 °F)	I = 1.2734 A = -0.5299	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.3842 A = -0.6152	I = 1.4688 A = -0.6200		
below -6 to -10 °C (below 21 to 14 °F)	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 °C (below 14 °F)	I = 1.1473 A = -0.6415	I = 2.0072 A = -0.5752 B = -0.5585				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 Type I aluminum snow values are rounded down to the nearest one minute (e.g. 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, Freezing Mist, 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	4.0	6.0	2.0	5.0
-6	8.0	13.0	5.0	8.5	14.3	5.0	9.0	4.0	6.0		
-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					
	Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	I = 1.3931 A = -0.6279	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.4691 A = -0.5081	I = 1.4688 A = -0.6200	I = 1.1144 A = -0.5943	
below -3 to -6 °C (below 27 to 21 °F)	I = 0.9976 A = -0.3140	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.3842 A = -0.6152	I = 1.4688 A = -0.6200		
below -6 to -10 °C (below 21 to 14 °F)	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	CAUTION: No holdover time guidelines exist	
below -10 °C (below 14 °F)	I = 1.0289 A = -0.6107	I = 2.0072 A = -0.5752 B = -0.5585				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 Type I composite snow values below 10 mins are rounded down to the nearest one minute (e.g. 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, Freezing Mist, 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	4.0	6.0	1.0	5.0
-6	6.0	8.0	2.7	5.4	10.7	5.0	9.0	4.0	6.0		
-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 AD-2

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5300 A = -0.8946	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.6240 A = -0.8987	I = 2.5285 A = -0.7682	I = 2.4977 A = -0.8034	
	75/25	I = 1.9838 A = -0.1716	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.2055 A = -0.5820	I = 2.2411 A = -0.6851	I = 2.3107 A = -0.8650	
	50/50	I = 1.6478 A = -0.5976	I = 2.0999 A = -0.7867 B = -0.1524	I = 2.0999 A = -0.7867 B = -0.1524	I = 2.0999 A = -0.7867 B = -0.1524	I = 1.6770 A = -0.6366	I = 1.5734 A = -0.5302	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5699 A = -1.2862	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.6096 A = -1.0768	I = 2.3302 A = -0.7561		
	75/25	I = 2.4425 A = -1.2784	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.7079 A = -1.3713	I = 2.3728 A = -0.7324		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8390 A = -0.8725	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8390 A = -0.8725	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -27 °C (below -13 to -17 °F)	100/0	I = 1.8390 A = -0.8725	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	80.3	182.3	38.7	74.6	176.5	42.0	99.0	28.5	47.1	9.8	86.3
	75/25	73.1	85.5	26.0	52.5	132.2	36.1	62.9	19.2	30.1	4.9	50.8
	50/50	17.0	29.4	7.8	16.1	41.5	9.3	17.1	6.8	9.6		
-8	100/0	46.9	152.3	31.7	61.1	144.7	25.7	71.9	18.8	30.8		
	75/25	35.4	114.2	24.6	49.6	124.9	15.1	56.2	22.3	36.1		
-10 / -14 ***	100/0	46.9	152.3	27.7	53.4	126.4	25.7	71.9	18.8	30.8		
	75/25	35.4	114.2	23.7	47.8	120.2	15.1	56.2	22.3	36.1		
-18	100/0	16.9	37.7	2.0	7.0	30.0						
-25	100/0	16.9	37.7	1.0	3.0	15.0						
-27	100/0	16.9	37.7	0.0	1.0	7.0						

* 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.2573 A = -0.7407	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	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 = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	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 = 2.5060 A = -0.7213 B = -0.5237	I = 2.5060 A = -0.7213 B = -0.5237	I = 2.5060 A = -0.7213 B = -0.5237	I = 2.0341 A = -0.6288	I = 2.1847 A = -0.7830	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.3283 A = -0.9431	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.1441 A = -0.6033	I = 1.8282 A = -0.4021		
	75/25	I = 2.3328 A = -1.0611	I = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	I = 1.6685 A = -0.1061	I = 1.7474 A = -0.3274		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9950 A = -0.9540	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9950 A = -0.9540	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	28.6	52.6	117.3	36.3	62.7	23.6	35.7	10.3	53.4
	75/25	49.7	81.5	26.3	46.5	98.4	35.7	59.5	19.1	29.6	7.4	47.6
	50/50	35.1	62.3	13.5	26.2	62.5	21.6	39.3	12.3	20.5		
-8	100/0	46.7	110.8	23.0	42.3	94.4	29.7	52.8	18.5	24.0		
	75/25	39.0	103.1	25.9	45.8	97.0	35.5	39.3	19.5	24.1		
-10 / -14 ***	100/0	46.7	110.8	19.9	36.5	81.4	29.7	52.8	18.5	24.0		
	75/25	39.0	103.1	25.6	45.4	96.1	35.5	39.3	19.5	24.1		
-18	100/0	21.3	51.0	12.5	24.3	58.3						
-25	100/0	21.3	51.0	7.9	15.4	37.0						

* 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: BEIJING YADILITE AVIATION YD-102 TYPE II

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.2562 A = -0.5977	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.3920 A = -0.7249	I = 1.9465 A = -0.3059	I = 2.2622 A = -0.6682	
	75/25	I = 1.9892 A = -0.8353	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.2407 A = -0.9340	I = 2.3425 A = -0.9259	I = 1.7678 A = -0.5942	
	50/50	I = 1.5895 A = -0.5473	I = 2.1960 A = -0.8600 B = -0.3992	I = 2.1960 A = -0.8600 B = -0.3992	I = 2.1960 A = -0.8600 B = -0.3992	I = 1.6035 A = -0.6300	I = 1.5230 A = -0.4848	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.1988 A = -0.7861	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.0314 A = -0.4651	I = 1.4027 A = 0.0002		
	75/25	I = 1.8916 A = -0.6222	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 1.8407 A = -0.6501	I = 1.5490 A = -0.3996		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9202 A = -0.8505	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9202 A = -0.8505	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9202 A = -0.8505	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	68.9	119.2	25.3	49.9	121.6	38.4	76.8	33.0	40.3	10.2	62.4
	75/25	25.4	54.7	13.3	26.3	64.4	15.9	38.7	11.2	20.5	4.5	22.5
	50/50	16.1	26.6	5.2	11.4	32.1	8.0	14.6	7.0	9.6		
-8	100/0	44.6	91.7	18.8	37.0	90.2	32.6	50.9	25.3	25.3		
	75/25	28.6	50.6	10.4	20.7	50.6	13.1	24.3	9.8	12.7		
-10 / -14 ***	100/0	44.6	91.7	15.3	30.2	73.7	32.6	50.9	25.3	25.3		
	75/25	28.6	50.6	8.9	17.5	42.9	13.1	24.3	9.8	12.7		
-18	100/0	21.2	46.2	2.0	7.0	30.0						
-25	100/0	21.2	46.2	1.0	3.0	15.0						
-29	100/0	21.2	46.2	0.0	1.0	7.0						

* 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8996 A = -0.6356	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8996 A = -0.6356	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.8996 A = -0.6356	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6
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, Freezing Mist, 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	191.5	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		
-8	100/0	55.7	104.2	46.9	77.1	148.3	36.1	89.9	27.4	46.6		
	75/25	25.2	64.5	28.4	54.8	129.7	23.7	71.4	21.8	34.3		
-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	99.6	23.7	71.4	21.8	34.3		
-18	100/0	28.5	51.1	8.5	24.4	98.2						
-25	100/0	28.5	51.1	3.6	10.4	41.8						
-29	100/0	28.5	51.1	2.4	7.0	28.2						

* 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					
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8877 A = -0.8771	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8877 A = -0.8771	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.8877 A = -0.8771	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	249.4	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		
-8	100/0	42.0	138.1	39.1	88.1	198.8	34.3	87.2	33.0	53.9		
	75/25	32.1	104.3	57.7	101.5	213.4	26.9	69.0	32.1	42.9		
-10 / -14 ***	100/0	42.0	138.1	33.5	75.5	170.4	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		
-18	100/0	18.8	42.0	2.0	7.0	7.0						
-25	100/0	18.8	42.0	1.0	3.0	3.0						
-29	100/0	18.8	42.0	0.0	1.0	1.0						

* 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5794 A = -0.5025	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	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 = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	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 = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.2943 A = -0.9086	I = 2.3695 A = -0.9996	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5101 A = -1.1145	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.7077 A = -1.0390	I = 2.0801 A = -0.3886		
	75/25	I = 2.2594 A = -0.9785	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.4495 A = -0.9076	I = 2.0483 A = -0.3597		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -25 to -30.5 °C (below -13 to -23 °F)	100/0	I = 1.9253 A = -0.6979	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	65.6	113.6	233.5	97.1	123.5	73.5	88.3	14.7	127.9
	75/25	151.0	254.6	40.1	84.9	227.7	102.1	122.4	38.8	69.5	9.4	102.1
	50/50	48.6	86.4	10.0	26.4	94.9	19.2	45.6	9.4	18.0		
-8	100/0	53.8	149.5	48.4	83.8	172.4	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	31.5	66.8	179.1	27.4	65.3	35.1	44.4		
-10 / -14 ***	100/0	53.8	149.5	39.4	68.2	140.3	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	26.8	56.8	152.2	27.4	65.3	35.1	44.4		
-18	100/0	27.4	51.9	11.5	33.2	134.2						
-25	100/0	27.4	51.9	4.8	13.8	56.0						
-30.5	100/0	27.4	51.9	2.7	7.9	31.7						

* 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: JSC RCP NORDIX DEFROST PG 2

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.2918 A = -0.8145	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.2402 A = -0.6580	I = 2.3748 A = -0.7498	I = 2.4186 A = -0.7567	
	75/25	I = 2.2699 A = -0.6569	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.0887 A = -0.5872	I = 2.4497 A = -0.9006	I = 1.9718 A = -0.6216	
	50/50	I = 2.2311 A = -0.6560	I = 2.7673 A = -0.7928 B = -0.2600	I = 2.7673 A = -0.7928 B = -0.2600	I = 2.7673 A = -0.7928 B = -0.2600	I = 2.1018 A = -0.5878	I = 2.3509 A = -0.8146	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.0963 A = -0.5196	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 1.9595 A = -0.3909	I = 2.1235 A = -0.5815		
	75/25	I = 2.1158 A = -0.7229	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 1.9013 A = -0.4425	I = 1.8645 A = -0.4846		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0196 A = -0.6831	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0196 A = -0.6831	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -27 °C (below -13 to -17 °F)	100/0	I = 2.0196 A = -0.6831	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	52.8	111.3	29.1	56.8	136.9	32.2	60.3	21.2	34.6	10.0	77.6
	75/25	64.7	118.1	21.5	47.2	132.5	27.2	47.7	15.5	28.0	6.4	34.5
	50/50	59.2	108.0	30.0	62.1	161.2	28.0	49.1	16.3	27.8		
-8	100/0	54.1	87.1	22.7	44.3	106.8	33.4	48.6	20.4	29.9		
	75/25	40.8	79.1	14.3	31.5	88.5	25.6	39.1	15.4	21.1		
-10 / -14 ***	100/0	54.1	87.1	19.2	37.5	90.3	33.4	48.6	20.4	29.9		
	75/25	40.8	79.1	10.9	23.9	67.3	25.6	39.1	15.4	21.1		
-18	100/0	34.8	65.2	2.0	7.0	30.0						
-25	100/0	34.8	65.2	1.0	3.0	15.0						
-27	100/0	34.8	65.2	0.0	1.0	7.0						

* 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					
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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 °C (below 27 to 7 °F)	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		
	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 -18 °C (below 7 to 0 °F)	100/0	I = 1.9498 A = -0.6590	I = 2.2123 A = -1.3672 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9498 A = -0.6590	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9498 A = -0.6590	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	202.4	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	43.0	19.5	28.3	10.2	16.5		
-8	100/0	28.4	64.5	54.0	91.6	183.5	23.7	61.5	13.1	35.6		
	75/25	25.5	86.8	35.9	67.2	125.9	19.1	54.1	9.0	32.4		
-10 / -14 ***	100/0	28.4	64.5	50.5	85.7	171.7	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		
-18	100/0	30.8	56.4	2.0	7.0	7.0						
-25	100/0	30.8	56.4	1.0	3.0	3.0						
-29	100/0	30.8	56.4	0.0	1.0	1.0						

* 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					
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7388 A = -0.5485	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7388 A = -0.5485	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.7388 A = -0.5485	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	124.4	33.4	67.4	24.0	34.9	8.3	44.9
	75/25	48.8	90.8	22.0	39.6	85.7	22.9	44.1	12.8	25.9	5.0	25.7
	50/50	25.7	36.6	13.0	25.8	63.2	10.5	19.8	7.7	10.7		
-8	100/0	45.3	90.6	21.0	38.5	85.8	18.4	43.3	14.8	18.9		
	75/25	31.8	63.5	15.0	27.0	58.4	13.8	29.0	8.1	14.1		
-10 / -14 ***	100/0	45.3	90.6	16.3	30.0	66.8	18.4	43.3	14.8	18.9		
	75/25	31.8	63.5	11.6	20.8	45.0	13.8	29.0	8.1	14.1		
-18	100/0	22.7	37.5	2.0	7.0	7.0						
-25	100/0	22.7	37.5	1.0	3.0	3.0						
-28	100/0	22.7	37.5	0.0	1.0	1.0						

* 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: NEWAVE AEROCHEMICAL FCY-2 BIO+

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.3819 A = -0.6607	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 2.2626 A = -0.5057	I = 2.6041 A = -0.8687	I = 2.4390 A = -0.8058	
	75/25	I = 2.0853 A = -0.6218	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.2267 A = -0.7378	I = 1.9393 A = -0.5060	I = 1.9514 A = -0.5966	
	50/50	I = 1.6563 A = -0.6034	I = 1.9658 A = -0.5568 B = -0.3538	I = 1.9658 A = -0.5568 B = -0.3538	I = 1.9658 A = -0.5568 B = -0.3538	I = 1.6641 A = -0.5675	I = 1.7844 A = -0.6234	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.2250 A = -0.8616	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 2.2571 A = -0.6478	I = 2.4418 A = -0.8745		
	75/25	I = 2.0676 A = -0.8031	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 1.9065 A = -0.5604	I = 1.8028 A = -0.4737		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0929 A = -1.0828	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0929 A = -1.0828	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 2.0929 A = -1.0828	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	83.2	152.4	30.0	64.5	176.5	50.0	81.1	24.5	43.3	8.5	75.1
	75/25	44.7	79.1	18.4	38.2	100.1	25.4	51.4	17.1	23.7	6.8	34.2
	50/50	17.2	29.8	8.7	14.5	28.4	10.8	18.5	8.2	12.3		
-8	100/0	42.0	92.4	18.3	39.4	107.9	34.3	63.7	16.6	29.4		
	75/25	32.1	67.0	11.7	24.3	63.5	19.2	32.7	13.8	18.8		
-10 / -14 ***	100/0	42.0	92.4	13.1	28.2	77.3	34.3	63.7	16.6	29.4		
	75/25	32.1	67.0	8.6	17.8	46.7	19.2	32.7	13.8	18.8		
-18	100/0	21.7	58.5	2.0	7.0	30.0						
-25	100/0	21.7	58.5	1.0	3.0	15.0						
-28.5	100/0	21.7	58.5	0.0	1.0	7.0						

* 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: ROMCHIM ADD-PROTECT NG TYPE II

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.3974 A = -0.7794	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 2.3113 A = -0.5668	I = 2.2728 A = -0.5113	I = 2.4042 A = -0.8164	
	75/25	I = 2.2548 A = -0.6819	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.3252 A = -0.6462	I = 2.3988 A = -0.7047	I = 2.2378 A = -0.7242	
	50/50	I = 2.0350 A = -0.9539	I = 2.3515 A = -0.7025 B = -0.2827	I = 2.3515 A = -0.7025 B = -0.2827	I = 2.3515 A = -0.7025 B = -0.2827	I = 1.9619 A = -0.6157	I = 2.0649 A = -0.7375	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.1684 A = -0.6263	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 2.3829 A = -0.7538	I = 2.1520 A = -0.5404		
	75/25	I = 2.1020 A = -0.5437	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.4793 A = -0.9714	I = 2.3197 A = -0.7496		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.4934 A = -0.5224	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.4934 A = -0.5224	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.4934 A = -0.5224	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	71.2	145.5	33.1	71.2	195.4	47.9	82.2	36.1	50.5	7.5	68.2
	75/25	60.0	112.1	24.2	52.8	147.1	40.3	74.7	25.9	41.1	7.6	53.9
	50/50	23.3	56.0	14.9	28.3	65.9	18.9	34.0	10.8	17.5		
-8	100/0	53.8	95.5	23.6	50.9	139.6	34.9	71.8	24.9	35.5		
	75/25	52.7	86.8	17.6	38.3	106.8	25.0	63.1	18.7	30.5		
-10 / -14 ***	100/0	53.8	95.5	18.8	40.5	111.1	34.9	71.8	24.9	35.5		
	75/25	52.7	86.8	14.1	30.8	85.9	25.0	63.1	18.7	30.5		
-18	100/0	13.4	21.7	2.0	7.0	30.0						
-25	100/0	13.4	21.7	1.0	3.0	15.0						
-28	100/0	13.4	21.7	0.0	1.0	7.0						

* 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 2-12: ROMCHIM ADD-PROTECT TYPE II

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5740 A = -0.8251	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.6191 A = -0.9213	I = 2.4792 A = -0.7630	I = 2.1185 A = -0.6149	
	75/25	I = 2.0354 A = -0.6203	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.0120 A = -0.5901	I = 2.1011 A = -0.6689	I = 1.7686 A = -0.5325	
	50/50	I = 1.7404 A = -0.6221	I = 1.9864 A = -0.5840 B = -0.2529	I = 1.9864 A = -0.5840 B = -0.2529	I = 1.9864 A = -0.5840 B = -0.2529	I = 2.0897 A = -0.9018	I = 1.7429 A = -0.6010	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 1.8401 A = -0.5735	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.2574 A = -0.7754	I = 2.0901 A = -0.5723		
	75/25	I = 1.9219 A = -0.6509	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 1.8894 A = -0.5596	I = 1.8836 A = -0.5597		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.5810 A = -0.5714	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.5810 A = -0.5714	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.5810 A = -0.5714	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	99.4	211.7	29.7	58.7	143.7	39.2	94.4	25.9	42.6	9.2	48.8
	75/25	40.0	70.6	16.9	31.6	71.8	22.6	39.8	14.7	22.7	5.9	24.9
	50/50	20.2	35.7	9.8	16.8	34.0	12.2	28.8	8.0	11.8		
-8	100/0	27.5	46.5	21.0	41.4	101.4	24.8	51.9	19.5	28.4		
	75/25	29.3	53.2	12.1	22.6	51.2	18.5	31.5	12.6	18.2		
-10 / -14 ***	100/0	27.5	46.5	16.6	32.7	80.0	24.8	51.9	19.5	28.4		
	75/25	29.3	53.2	9.6	17.9	40.8	18.5	31.5	12.6	18.2		
-18	100/0	15.2	25.6	2.0	7.0	30.0						
-25	100/0	15.2	25.6	1.0	3.0	15.0						
-28	100/0	15.2	25.6	0.0	1.0	7.0						

* 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 2-13: 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, Freezing Mist, 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	52.8	108.2	25.3	49.9	32.2	60.3	21.2	34.6	7.5	44.9
	75/25	25.4	54.7	13.3	26.3	15.9	38.7	11.2	20.5	4.5	22.5
	50/50	16.1	26.6	5.2	11.4	8.0	14.6	6.8	9.6		
-8	100/0	27.5	46.5	18.3	37.0	18.4	43.3	13.1	18.9		
	75/25	25.2	50.6	10.4	20.7	13.1	24.3	8.1	12.7		
-10 / -14 **	100/0	27.5	46.5	13.1	28.2	18.4	43.3	13.1	18.9		
	75/25	25.2	50.6	8.6	17.5	13.1	24.3	8.1	12.7		
-18	100/0	13.4	21.7	2.0	7.0						
-25	100/0	13.4	21.7	1.0	3.0						

* 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: ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED ON LOW-SPEED AIRCRAFT

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions[1]					
		Freezing Fog, Freezing Mist, or Ice Crystals[2]	Snow, Snow Grains or Snow Pellets[3-4]	Freezing Drizzle[2]	Light Freezing Rain[2]	Rain on Cold Soaked Wing[2]	Other
-3 °C and above (27 °F and above)	100/0	I = 2.3532 A = -0.9867	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.2733 A = -0.8172	I = 2.4359 A = -0.9105	I = 2.1350 A = -0.7258	
	75/25	n/a	n/a	n/a	n/a	n/a	
	50/50	n/a	n/a	n/a	n/a		
below -3 to -10°C (below 27 to 14 °F)	100/0	I = 2.2318 A = -0.7815	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.1031 A = -0.6645	I = 2.2245 A = -0.7407		CAUTION: No holdover time guidelines exist
	75/25	n/a	n/a	n/a	n/a		
below -10 to -16 °C (below 14 to 3 °F)	100/0	I = 2.3342 A = -1.0165	I = 2.4111 A = -0.8236 B = 0.0000				

1 CAUTION: Fluid must be applied unheated on aircraft conforming to the SAE AS5900 low speed aerodynamic test criterion to use these regression coefficients
2 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
3 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
4 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	46.1	113.8	18.2	38.7	104.3	23.1	50.4	14.6	26.4	5.9	42.4
	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	100/0	48.5	99.2	18.2	38.7	104.3	23.1	43.5	15.5	25.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-25	100/0	42.0	106.7	18.2	38.7	104.3						

* 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 3-2: ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED ON HIGH-SPEED AIRCRAFT

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions[1]					
		Freezing Fog, Freezing Mist, or Ice Crystals[2]	Snow, Snow Grains or Snow Pellets[3,4]	Freezing Drizzle[2]	Light Freezing Rain[2]	Rain on Cold Soaked Wing[2]	Other
-3 °C and above (27 °F and above)	100/0	I = 2.3532 A = -0.9867	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.2733 A = -0.8172	I = 2.4359 A = -0.9105	I = 2.1350 A = -0.7258	CAUTION: No holdover time guidelines exist
	75/25	n/a	n/a	n/a	n/a	n/a	
	50/50	n/a	n/a	n/a	n/a		
below -3 to -10°C (below 27 to 14 °F)	100/0	I = 2.2318 A = -0.7815	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.1031 A = -0.6645	I = 2.2245 A = -0.7407		
	75/25	n/a	n/a	n/a	n/a		
below -10 to -25 °C (below 14 to -13 °F)	100/0	I = 2.3342 A = -1.0165	I = 2.4111 A = -0.8236 B = 0.0000				
below -25 to -35 °C (below -13 to -31 °F)	100/0	I = 2.1252 A = -1.0990	I = 2.1551 A = -0.8234 B = 0.0000				

1 CAUTION: Fluid must be applied unheated on aircraft conforming to the SAE AS5900 high speed aerodynamic test criterion to use these regression coefficients
2 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
3 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
4 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*												
		Freezing Fog, Freezing Mist, 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	3	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	46.1	113.8	18.2	38.7	82.3	104.3	104.3	23.1	50.4	14.6	26.4	5.9	42.4
	75/25	n/a	n/a	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	n/a	n/a		
-10	100/0	48.5	99.2	18.2	38.7	82.3	104.3	104.3	23.1	43.5	15.5	25.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-25	100/0	42.0	106.7	18.2	38.7	82.3	104.3	104.3						
-35	100/0	22.8	62.3	10.1	21.5	45.6	57.8	57.8						

* 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 ECOWING AD-49

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4713 A = -0.2370	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.3729 A = -0.3927	I = 2.4943 A = -0.5000	I = 2.6531 A = -0.8558	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5177 A = -1.7715	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.8172 A = -1.2681	I = 1.9828 A = -0.5016		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 1.7838 A = -0.5976	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	58.8	113.3	267.9	86.2	125.4	62.4	86.6	11.2	113.5
	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		
-8	100/0	19.0	96.5	46.6	89.6	211.9	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	19.0	96.5	39.7	76.5	180.8	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.2	40.2	2.0	9.0	45.0						
-25	100/0	23.2	40.2	1.0	3.0	20.0						
-26	100/0	23.2	40.2	0.0	2.0	10.0						

* 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: ALLCLEAR CLEARWING ECO

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6504 A = -0.8265	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 2.3553 A = -0.2823	I = 2.4131 A = -0.3736	I = 2.6188 A = -0.7057	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4735 A = -0.9792	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 2.6806 A = -0.8496	I = 2.7686 A = -0.7996		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9001 A = -0.7542	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9001 A = -0.7542	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 1.9001 A = -0.7542	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547				

CAUTION: No holdover time guidelines exist

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	118.2	252.1	52.4	106.8	271.8	109.9	143.9	77.8	99.3	19.8	133.5
	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		
-8	100/0	61.5	150.9	38.4	78.3	199.2	54.2	122.1	44.8	75.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	61.5	150.9	31.1	63.4	161.4	54.2	122.1	44.8	75.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.6	47.1	16.8	32.7	78.2						
-25	100/0	23.6	47.1	7.8	15.2	36.3						
-26	100/0	23.6	47.1	7.1	13.8	33.1						

* 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: ALLCLEAR CLEARWING EG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4808 A = -0.6236	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.2517 A = -0.3764	I = 3.1105 A = -1.1890	I = 2.4690 A = -0.7435	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6368 A = -0.9489	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.1945 A = -0.3445	I = 2.8711 A = -0.9900		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.3601 A = -0.9134	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.3601 A = -0.9134	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.3601 A = -0.9134	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	110.9	196.4	38.8	79.0	201.3	68.0	97.4	28.1	61.1	11.9	89.0
	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		
-8	100/0	94.1	224.5	34.6	70.5	179.5	64.7	89.9	30.7	58.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	94.1	224.5	32.0	65.2	166.2	64.7	89.9	30.7	58.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	52.7	121.7	22.3	46.6	122.7						
-25	100/0	52.7	121.7	13.1	27.4	72.0						
-29	100/0	52.7	121.7	10.3	21.4	56.4						

* 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: ASGLOBAL 4FLITE EG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5283 A = -0.7924	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.2777 A = -0.6136	I = 2.5046 A = -0.8767	I = 2.3356 A = -0.7595	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4381 A = -0.7329	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.2338 A = -0.5642	I = 2.4121 A = -0.7932		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0968 A = -0.5619	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0968 A = -0.5619	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -30 °C (below -13 to -22 °F)	100/0	I = 2.1030 A = -0.9200	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	94.3	194.9	31.1	62.3	155.4	39.3	70.6	19.0	33.7	8.2	63.8
	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		
-8	100/0	84.3	165.0	26.8	53.7	133.9	40.3	69.1	20.1	33.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	84.3	165.0	24.2	48.5	121.0	40.3	69.1	20.1	33.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	50.6	84.7	10.0	25.0	65.0						
-25	100/0	50.6	84.7	5.0	15.0	55.0						
-30	100/0	28.8	67.0	2.0	8.0	35.0						

* 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: ASGLOBAL 4FLITE PG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4855 A = -0.6410	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.1915 A = -0.3146	I = 2.5200 A = -0.6341	I = 2.2831 A = -0.5569	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.2316 A = -0.5964	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.0710 A = -0.3106	I = 2.4941 A = -0.6796		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8152 A = -0.5003	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8152 A = -0.5003	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to - 15°F)	100/0	I = 1.8152 A = -0.5003	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	109.0	196.1	54.3	95.1	198.7	69.4	93.7	43.0	65.1	17.3	78.3
	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		
-8	100/0	65.3	112.7	39.2	68.8	143.7	53.1	71.4	35.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	65.3	112.7	31.5	55.2	115.3	53.1	71.4	35.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	29.2	46.2	2.0	9.0	45.0						
-25	100/0	29.2	46.2	1.0	3.0	20.0						
-26	100/0	29.2	46.2	0.0	2.0	10.0						

* 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: AVIAFLUID AVIAFLIGHT EG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4936 A = -0.7662	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5110 A = -0.6263	I = 2.6126 A = -0.8113	I = 2.6633 A = -0.8384	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5170 A = -0.8812	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.2536 A = -0.4445	I = 2.4418 A = -0.6514		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.3805 A = -1.1620	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.3805 A = -1.1620	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851				
below -25 to -31 °C (below -13 to -24 °F)	100/0	I = 2.0469 A = -0.7482	I = 1.9668 A = -0.7022 B = 0.0000	I = 1.9668 A = -0.7022 B = 0.0000	I = 1.9668 A = -0.7022 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	90.8	183.2	39.1	67.6	138.6	65.1	118.4	30.1	51.2	12.3	119.5
	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		
-8	100/0	79.6	178.5	34.9	60.3	123.6	57.3	87.7	34.0	52.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	79.6	178.5	32.3	55.8	114.4	57.3	87.7	34.0	52.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	37.0	107.3	27.1	51.6	120.2						
-25	100/0	37.0	107.3	21.4	40.8	94.9						
-31	100/0	33.4	66.3	9.7	18.4	42.8						

* 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: AVIAFLUID AVIAFLIGHT PG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.7578 A = -0.8947	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 2.0792 A = 0.0000	I = 2.8829 A = -0.7432	I = 2.5971 A = -0.6957	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.3529 A = -0.7865	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 2.9286 A = -1.2431	I = 2.4317 A = -0.5672		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7548 A = -0.7332	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7548 A = -0.7332	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320				
below -25 to -25.5 °C (below -13 to -14 °F)	100/0	I = 1.7548 A = -0.7332	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	135.7	307.9	54.0	99.2	220.8	120.0	120.0	69.8	113.5	19.6	129.1
	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		
-8	100/0	63.6	130.7	35.4	65.1	144.8	35.0	114.7	43.5	63.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	63.6	130.7	26.6	48.9	108.8	35.0	114.7	43.5	63.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	17.5	34.2	14.3	26.5	59.6						
-25	100/0	17.5	34.2	6.9	12.8	28.7						
-25.5	100/0	17.5	34.2	6.6	12.2	27.5						

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

TABLE 4-8: CHEMCO CHEMR EG IV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5221 A = -0.6191	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.5776 A = -0.8305	I = 2.3603 A = -0.6816	I = 2.6437 A = -0.8858	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6566 A = -1.0376	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.3439 A = -0.5194	I = 2.3463 A = -0.5867		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.1693 A = -0.8359	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.1693 A = -0.8359	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000				
below -25 to -27 °C (below -13 to -17 °F)	100/0	I = 2.1693 A = -0.8359	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	122.8	216.6	33.2	76.9	231.7	44.9	99.3	25.6	39.9	9.6	105.8
	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		
-8	100/0	85.4	220.9	33.2	76.9	231.7	58.3	95.7	33.6	49.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	85.4	220.9	33.2	76.9	231.7	58.3	95.7	33.6	49.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	38.5	82.7	20.9	42.3	107.3						
-25	100/0	38.5	82.7	20.9	42.3	107.3						
-27	100/0	38.5	82.7	20.9	42.3	107.3						

* 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: CHEMCO CHEMR NORDIK IV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6325 A = -0.7158	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.6092 A = -0.6398	I = 2.4979 A = -0.5367	I = 2.5308 A = -0.6285	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6790 A = -0.9206	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.5682 A = -0.6212	I = 2.7893 A = -0.7992		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.2331 A = -0.9189	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.2331 A = -0.9189	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.2331 A = -0.9189	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	135.6	261.2	55.7	104.4	238.3	78.8	145.2	55.9	79.4	22.5	123.5
	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		
-8	100/0	108.5	252.3	55.7	104.4	238.3	75.2	136.1	47.0	79.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	108.5	252.3	55.7	104.4	238.3	75.2	136.1	47.0	79.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	39.0	90.5	47.7	93.5	226.9						
-25	100/0	39.0	90.5	33.6	66.0	160.2						
-29	100/0	39.0	90.5	28.7	56.2	136.4						

* 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: CLARIANT MAX FLIGHT 04

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1,4]	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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8804 A = -0.7843	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -23.5 °C (below 0 to -10 °F)	100/0	I = 1.8804 A = -0.7843	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6
4 Freezing drizzle and light freezing rain values were calculated at 12.7 g/dm²/h the year the holdover time table for this fluid was produced. Since they are now calculated at 13.0 g/dm²/h, 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, Freezing Mist, 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	399.5	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		
-8	100/0	50.5	151.0	50.2	98.9	241.3	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		
-10 / -14 ***	100/0	50.5	151.0	35.6	70.3	171.4	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		
-18	100/0	21.5	44.1	2.0	9.0	45.0						
-23.5	100/0	21.5	44.1	1.0	3.0	20.0						

* 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: CLARIANT MAX FLIGHT AVIA

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4864 A = -0.3214	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.5168 A = -0.5284	I = 2.2295 A = -0.3416	I = 2.8870 A = -1.0183	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6347 A = -0.8798	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.5583 A = -0.6474	I = 2.7838 A = -0.7360		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.1916 A = -0.8933	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.1916 A = -0.8933	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 2.1916 A = -0.8933	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	182.7	245.3	58.2	102.6	216.0	84.8	140.4	56.5	70.6	9.5	149.7
	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		
-8	100/0	104.7	234.3	48.0	84.6	178.1	68.7	127.6	56.9	92.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	104.7	234.3	42.1	74.2	156.2	68.7	127.6	56.9	92.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	36.9	83.7	10.0	25.0	65.0						
-25	100/0	36.9	83.7	5.0	15.0	55.0						
-28.5	100/0	36.9	83.7	2.0	8.0	35.0						

* 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: CLARIANT MAX FLIGHT SNEG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5734 A = -0.5916	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.1201 A = -0.0318	I = 3.1463 A = -1.0213	I = 2.3856 A = -0.6074	
	75/25	I = 2.3956 A = -0.0226	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.3595 A = -0.3733	I = 2.1906 A = -0.2633	I = 2.5045 A = -0.7062	
	50/50	I = 2.6114 A = -0.9560	I = 2.5982 A = -0.9523 B = 0.0000	I = 2.5982 A = -0.9523 B = 0.0000	I = 2.5982 A = -0.9523 B = 0.0000	I = 2.3438 A = -0.7175	I = 2.7427 A = -1.1421		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5197 A = -1.2481	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.7003 A = -1.0853	I = 2.6961 A = -0.9598		
	75/25	I = 2.2989 A = -1.2091	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.5864 A = -1.1239	I = 2.7996 A = -1.0818	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9524 A = -0.8898	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9524 A = -0.8898	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9524 A = -0.8898	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	144.5	248.5	55.4	100.5	219.6	121.5	125.3	52.3	102.0	17.6	91.4
	75/25	239.8	244.8	54.5	88.7	168.6	87.8	125.5	66.5	78.9	15.1	102.5
	50/50	87.7	210.7	18.5	44.2	139.3	35.0	69.5	14.0	29.5		
-8	100/0	44.4	139.3	43.9	79.6	174.0	31.0	87.4	22.6	42.4		
	75/25	28.4	86.1	43.9	71.6	136.0	21.6	63.2	19.4	39.3		
-10 / -14 ***	100/0	44.4	139.3	37.5	68.0	148.6	31.0	87.4	22.6	42.4		
	75/25	28.4	86.1	38.0	61.9	117.6	21.6	63.2	19.4	39.3		
-18	100/0	21.4	48.4	2.0	9.0	45.0						
-25	100/0	21.4	48.4	1.0	3.0	20.0						
-29	100/0	21.4	48.4	0.0	2.0	10.0						

* 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: CLARIANT SAFEWING EG IV NORTH

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5514 A = -0.5862	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.4593 A = -0.4518	I = 2.0514 A = -0.2650	I = 2.7876 A = -0.9859	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6521 A = -0.9130	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.4417 A = -0.5677	I = 2.7481 A = -0.7299		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.1343 A = -0.7329	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.1343 A = -0.7329	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -30 °C (below -13 to -22 °F)	100/0	I = 2.1343 A = -0.7329	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	138.6	237.1	52.3	97.5	221.2	90.4	139.2	48.0	57.0	8.7	125.5
	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		
-8	100/0	103.3	238.4	49.4	92.2	209.1	64.5	110.9	53.4	86.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	103.3	238.4	47.6	88.7	201.2	64.5	110.9	53.4	86.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	41.9	82.0	10.0	25.0	65.0						
-25	100/0	41.9	82.0	5.0	15.0	55.0						
-30	100/0	41.9	82.0	2.0	8.0	35.0						

* 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: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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 °C (below 27 to 7 °F)	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 -18 °C (below 7 to 0 °F)	100/0	I = 1.8894 A = -0.6349	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8894 A = -0.6349	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 1.8894 A = -0.6349	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	101.5	27.8	48.0	18.4	23.3		
-8	100/0	58.8	115.2	54.4	88.7	168.5	34.9	97.7	25.2	44.9		
	75/25	41.3	80.0	52.0	91.6	192.7	25.2	71.7	25.9	42.8		
-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		
-18	100/0	27.9	49.9	6.7	22.1	107.1						
-25	100/0	27.9	49.9	2.7	9.0	43.5						
-28.5	100/0	27.9	49.9	1.9	6.2	30.2						

* 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 4-15: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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 °C (below 27 to 7 °F)	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 -18 °C (below 7 to 0 °F)	100/0	I = 1.9339 A = -0.8158	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9339 A = -0.8158	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9339 A = -0.8158	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	121.6	22.7	58.8	13.5	18.7		
-8	100/0	54.6	133.0	44.0	99.4	290.4	26.7	93.0	26.6	38.5		
	75/25	41.9	120.0	36.6	87.5	274.6	22.1	62.6	21.7	31.6		
-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		
-18	100/0	23.1	48.8	7.4	23.7	109.1						
-25	100/0	23.1	48.8	3.0	9.6	44.1						
-29	100/0	23.1	48.8	2.0	6.3	29.0						

* 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 4-16: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5794 A = -0.5025	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	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 = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	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 = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.2943 A = -0.9086	I = 2.3695 A = -0.9996	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5101 A = -1.1145	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.7077 A = -1.0390	I = 2.0801 A = -0.3886		
	75/25	I = 2.2594 A = -0.9785	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.4495 A = -0.9076	I = 2.0483 A = -0.3597		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -25 to -30.5 °C (below -13 to -23 °F)	100/0	I = 1.9253 A = -0.6979	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	65.6	113.6	233.5	97.1	123.5	73.5	88.3	14.7	127.9
	75/25	151.0	254.6	40.1	84.9	227.7	102.1	122.4	38.8	69.5	9.4	102.1
	50/50	48.6	86.4	10.0	26.4	94.9	19.2	45.6	9.4	18.0		
-8	100/0	53.8	149.5	48.4	83.8	172.4	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	31.5	66.8	179.1	27.4	65.3	35.1	44.4		
-10 / -14 ***	100/0	53.8	149.5	39.4	68.2	140.3	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	26.8	56.8	152.2	27.4	65.3	35.1	44.4		
-18	100/0	27.4	51.9	11.5	33.2	134.2						
-25	100/0	27.4	51.9	4.8	13.8	56.0						
-30.5	100/0	27.4	51.9	2.7	7.9	31.7						

* 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 4-17: CRYOTECH POLAR GUARD® XTEND

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5325 A = -0.5036	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.0792 A = 0.0000	I = 3.0299 A = -0.8932	I = 2.4479 A = -0.6234	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.2661 A = -0.7204	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.7919 A = -1.1481	I = 1.9558 A = -0.1963		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7603 A = -0.5578	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7603 A = -0.5578	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.7603 A = -0.5578	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905				

CAUTION: No holdover time guidelines exist

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	151.5	240.4	65.1	118.7	261.6	120.0	120.0	60.4	108.4	19.0	102.8
	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		
-8	100/0	57.9	112.0	51.4	93.8	206.7	32.6	97.6	48.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	57.9	112.0	43.8	80.0	176.1	32.6	97.6	48.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.5	39.1	18.1	38.2	102.0						
-25	100/0	23.5	39.1	6.7	14.2	38.0						
-29	100/0	23.5	39.1	4.3	9.0	24.1						

* 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 4-18: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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 -18 °C (below 7 to 0 °F)	100/0	I = 2.0589 A = -0.7941	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0589 A = -0.7941	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.0589 A = -0.7941	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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		
-8	100/0	108.1	197.6	33.5	69.4	180.7	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		
-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		
-18	100/0	31.9	66.0	22.9	49.3	135.4						
-25	100/0	31.9	66.0	19.1	41.1	112.9						
-29	100/0	31.9	66.0	17.6	37.8	103.9						

* 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 4-19: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4713 A = -0.2370	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.3729 A = -0.3927	I = 2.4943 A = -0.5000	I = 2.6531 A = -0.8558	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5177 A = -1.7715	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.8172 A = -1.2681	I = 1.9828 A = -0.5016		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 1.7838 A = -0.5976	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	58.8	113.3	267.9	86.2	125.4	62.4	86.6	11.2	113.5
	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		
-8	100/0	19.0	96.5	46.6	89.6	211.9	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	19.0	96.5	39.7	76.5	180.8	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.2	40.2	2.0	9.0	45.0						
-25	100/0	23.2	40.2	1.0	3.0	20.0						
-26	100/0	23.2	40.2	0.0	2.0	10.0						

* 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 4-20: INLAND TECHNOLOGIES ECO-SHIELD®

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4628 A = -0.8425	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.5329 A = -0.8434	I = 1.8305 A = -0.1843	I = 2.4740 A = -0.7236	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4493 A = -0.8541	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.3150 A = -0.5411	I = 1.9809 A = -0.3441		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9894 A = -0.6913	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9894 A = -0.6913	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -25.5 °C (below -13 to -14 °F)	100/0	I = 1.9894 A = -0.6913	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	74.8	161.9	45.5	80.5	170.4	39.2	87.8	37.4	42.2	13.1	92.9
	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		
-8	100/0	71.2	155.7	39.6	70.0	148.2	51.6	86.5	31.6	39.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	71.2	155.7	36.0	63.7	134.8	51.6	86.5	31.6	39.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	32.1	60.4	2.0	9.0	45.0						
-25	100/0	32.1	60.4	1.0	3.0	20.0						
-25.5	100/0	32.1	60.4	0.0	2.0	10.0						

* 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 4-21: JSC RCP NORDIX DEFROST ECO 4

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4080 A = -0.6597	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.1497 A = -0.2970	I = 2.5972 A = -0.7187	I = 2.2932 A = -0.6241	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5248 A = -1.1145	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.2310 A = -0.4646	I = 2.2288 A = -0.4780		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8711 A = -0.5814	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8711 A = -0.5814	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -25.5 °C (below -13 to -14 °F)	100/0	I = 1.8711 A = -0.5814	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	88.5	162.0	37.3	74.9	187.5	65.9	87.5	39.1	62.6	13.3	71.9
	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		
-8	100/0	55.7	154.6	33.0	66.3	166.0	51.7	80.6	36.4	49.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	55.7	154.6	30.4	61.1	152.9	51.7	80.6	36.4	49.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	29.2	49.7	2.0	9.0	45.0						
-25	100/0	29.2	49.7	1.0	3.0	20.0						
-25.5	100/0	29.2	49.7	0.0	2.0	10.0						

* 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 4-22: JSC RCP NORDIX DEFROST EG 4

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5056 A = -0.4182	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.0792 A = 0.0000	I = 3.0138 A = -0.8899	I = 2.5585 A = -0.6856	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5610 A = -0.6008	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.6052 A = -0.7526	I = 2.5942 A = -0.4974		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.5376 A = -1.2454	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.5376 A = -1.2454	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 2.5376 A = -1.2454	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	163.4	239.7	85.7	146.0	293.9	120.0	120.0	58.9	105.3	18.7	120.0
	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		
-8	100/0	138.4	240.0	74.7	127.2	256.1	58.5	120.0	79.2	109.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	138.4	240.0	68.0	115.9	233.3	58.5	120.0	79.2	109.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	46.5	145.4	10.0	25.0	65.0						
-25	100/0	46.5	145.4	5.0	15.0	55.0						
-26	100/0	46.5	145.4	2.0	8.0	35.0						

* 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 4-23: JSC RCP NORDIX DEFROST NORTH 4

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6515 A = -0.7575	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.6377 A = -0.7492	I = 2.4403 A = -0.6778	I = 2.7110 A = -0.9348	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6157 A = -0.5906	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.6041 A = -0.7058	I = 2.5954 A = -0.7285		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.3727 A = -1.0450	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.3727 A = -1.0450	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 2.3727 A = -1.0450	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	132.4	265.1	38.8	82.8	224.0	63.6	130.0	31.1	48.4	9.1	114.2
	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		
-8	100/0	159.5	274.1	38.8	82.8	224.0	65.7	129.1	37.8	60.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	159.5	274.1	38.8	82.8	224.0	65.7	129.1	37.8	60.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	43.9	114.3	10.0	25.0	65.0						
-25	100/0	43.9	114.3	5.0	15.0	55.0						
-26	100/0	43.9	114.3	2.0	8.0	35.0						

* 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 4-24: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9370 A = -0.5185	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9370 A = -0.5185	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.9370 A = -0.5185	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	71.8	16.5	39.1	13.1	17.6		
-8	100/0	56.6	208.3	65.0	111.5	226.4	23.1	94.1	17.6	29.6		
	75/25	42.8	110.6	38.2	65.1	131.0	19.1	71.8	17.4	26.7		
-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		
-18	100/0	37.5	60.4	2.0	9.0	45.0						
-25	100/0	37.5	60.4	1.0	3.0	20.0						
-28	100/0	37.5	60.4	0.0	2.0	10.0						

* 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 4-25: NEWAVE AEROCHEMICAL FCY 9311

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6186 A = -0.7874	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.5218 A = -0.6026	I = 2.7035 A = -0.8019	I = 2.4128 A = -0.6988	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4840 A = -1.3099	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.4894 A = -0.8313	I = 2.3272 A = -0.7195		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9261 A = -0.6637	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9261 A = -0.6637	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481				
below -25 to -29.5 °C (below -13 to -21 °F)	100/0	I = 1.9261 A = -0.6637	I = 1.9749 A = -0.8155 B = 0.0000	I = 1.9749 A = -0.8155 B = 0.0000	I = 1.9749 A = -0.8155 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	117.0	240.8	35.8	71.0	174.7	70.9	126.1	38.2	64.6	12.7	84.0
	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		
-8	100/0	37.0	122.9	28.3	56.2	138.4	36.6	81.0	21.0	33.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	37.0	122.9	24.2	48.0	118.1	36.6	81.0	21.0	33.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	29.0	53.2	13.5	28.4	75.9						
-25	100/0	29.0	53.2	7.5	15.9	42.3						
-29.5	100/0	29.0	53.2	6.8	14.4	38.5						

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

TABLE 4-26: NEWAVE AEROCHEMICAL FCY-EGIV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.7246 A = -0.7713	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.5738 A = -0.6025	I = 2.6083 A = -0.7282	I = 2.6420 A = -0.7798	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6090 A = -0.9888	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.8537 A = -1.0325	I = 2.4852 A = -0.6098		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.4392 A = -1.2580	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.4392 A = -1.2580	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.4392 A = -1.2580	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	153.3	310.8	33.0	71.8	199.8	79.9	142.1	38.9	62.7	15.1	125.0
	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		
-8	100/0	82.8	204.8	27.1	59.1	164.4	50.5	135.5	42.9	64.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	82.8	204.8	23.8	51.8	144.1	50.5	135.5	42.9	64.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	36.3	114.9	17.1	40.6	126.3						
-25	100/0	36.3	114.9	12.6	29.8	92.8						
-29	100/0	36.3	114.9	10.9	25.9	80.6						

* 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 4-27: SHAANXI CLEANWAY AVIATION CLEANSURFACE IV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5037 A = -0.3903	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 2.2230 A = -0.1299	I = 1.9595 A = -0.0138	I = 2.7249 A = -0.8143	
	75/25	I = 2.5266 A = -0.4875	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 2.7184 A = -0.9235	I = 1.9155 A = -0.2570	I = 2.4087 A = -0.7760	
	50/50	I = 2.4207 A = -0.8825	I = 2.9686 A = -1.0764 B = -0.4446	I = 2.9686 A = -1.0764 B = -0.4446	I = 2.9686 A = -1.0764 B = -0.4446	I = 2.2650 A = -0.7956	I = 1.7827 A = -0.4609	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6480 A = -1.2687	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 2.7839 A = -1.1024	I = 2.4424 A = -0.8195		
	75/25	I = 2.3477 A = -0.9386	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 2.5842 A = -0.9804	I = 2.3692 A = -0.6948		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9241 A = -0.6900	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9241 A = -0.6900	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 1.9241 A = -0.6900	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	170.2	243.3	59.5	112.7	260.9	119.8	135.6	87.1	87.9	15.8	143.1
	75/25	153.4	239.8	43.1	94.8	266.9	48.9	118.3	36.0	42.6	9.0	73.5
	50/50	63.7	142.9	14.2	38.1	139.4	23.9	51.2	13.8	18.6		
-8	100/0	57.7	184.5	33.5	63.5	147.0	36.0	103.1	19.8	33.8		
	75/25	49.2	116.2	28.2	61.9	174.2	31.1	79.2	25.0	39.4		
-10 / -14 ***	100/0	57.7	184.5	22.7	43.0	99.6	36.0	103.1	19.8	33.8		
	75/25	49.2	116.2	21.1	46.4	130.5	31.1	79.2	25.0	39.4		
-18	100/0	27.7	52.0	2.0	9.0	45.0						
-25	100/0	27.7	52.0	1.0	3.0	20.0						
-28.5	100/0	27.7	52.0	0.0	2.0	10.0						

* 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 4-28: 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, Freezing Mist, 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	3	13	5	25	13	75	5
+1 / -3 *	100/0	74.8	161.9	31.1	62.3	138.6	39.2	70.6	19.0	33.7	8.2	63.8
	75/25	85.7	162.3	40.1	72.9	146.8	48.9	80.3	32.3	42.6	9.0	73.5
	50/50	30.7	52.7	10.0	26.4	71.8	16.5	39.1	9.4	17.6		
-8	100/0	19.0	96.5	26.8	53.7	123.6	23.1	69.1	17.6	26.5		
	75/25	28.4	80.0	28.2	61.9	131.0	19.1	62.6	17.4	26.7		
-10 / -14 **	100/0	19.0	96.5	22.7	43.0	99.6	23.1	69.1	17.6	26.5		
	75/25	28.4	80.0	21.1	46.4	117.6	19.1	62.6	17.4	26.7		
-18	100/0	17.5	34.2	2.0	9.0	45.0						
-25	100/0	17.5	34.2	1.0	3.0	20.0						

* 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 De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-2	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Aviation Shaanxi Hi-Tech Cleanwing II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Beijing Yadilite Aviation YD-102 Type II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing MP II FLIGHT	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing MP II FLIGHT PLUS	4 g/dm²/h	10 g/dm²/h	3 g/dm²/h	4 g/dm²/h
Cryotech Polar Guard® II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
JSC RCP NORDIX Defrost PG 2	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Kilfrost ABC-K Plus	3 g/dm²/h	10 g/dm²/h	4 g/dm²/h	3 g/dm²/h
Newave Aerochemical FCY-2	3 g/dm²/h	10 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Newave Aerochemical FCY-2 Bio+	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
ROMCHIM ADD-PROTECT NG Type II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
ROMCHIM ADD-PROTECT Type II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h

Type III De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-25°C AND ABOVE*	*BELOW -25°C*	*-10°C AND ABOVE*	*-3°C AND ABOVE*
AllClear AeroClear MAX	3 g/dm²/h	3 g/dm²/h	not applicable	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 the Transport Canada exemption document (in no case less than 2.0 g/dm²/h) or (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 the exemption document.

Table 5: Lowest Usable Precipitation Rates in Snow[1] (cont'd)

TYPE II, TYPE III AND TYPE IV FLUIDS[2]

Type IV De/Anti-Icing Fluids				
FLUID DILUTION	**100/0**		**75/25**	**50/50**
TEMPERATURE	***-14°C AND ABOVE***	***BELOW -14°C***	***-14°C AND ABOVE***	***-3°C AND ABOVE***
ABAX ECOWING AD-49	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AllClear ClearWing ECO	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AllClear ClearWing EG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite EG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite PG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight EG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight PG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
CHEMCO ChemR EG IV	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
CHEMCO ChemR Nordik IV	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Max Flight 04	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Max Flight AVIA	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Max Flight SNEG	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing EG IV NORTH	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Safewing MP IV LAUNCH	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing MP IV LAUNCH PLUS	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Cryotech Polar Guard® Advance	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Cryotech Polar Guard® Xtend	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Dow UCAR Endurance EG106	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Dow UCAR FlightGuard AD-49	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Inland Technologies ECO-SHIELD®	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost ECO 4	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost EG 4	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost NORTH 4	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Kilfrost ABC-S Plus	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Newave Aerochemical FCY 9311	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Newave Aerochemical FCY-EGIV	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Shaanxi Cleanway Cleansurface IV	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h

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 the Transport Canada exemption document (in no case less than 2.0 g/dm²/h) or (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 the exemption document.

TABLE 6: HIGHEST USABLE PRECIPITATION RATES IN SNOW[1]

TYPE II, TYPE III AND TYPE IV FLUIDS[2]

Type II De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-2	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Aviation Shaanxi Hi-Tech Cleanwing II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Beijing Yadilite Aviation YD-102 Type II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Clariant Safewing MP II FLIGHT	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	40 g/dm²/h
Clariant Safewing MP II FLIGHT PLUS	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	40 g/dm²/h
Cryotech Polar Guard® II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
JSC RCP NORDIX Defrost PG 2	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Kilfrost ABC-K Plus	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	25 g/dm²/h
Newave Aerochemical FCY-2	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Newave Aerochemical FCY-2 Bio+	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
ROMCHIM ADD-PROTECT NG Type II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
ROMCHIM ADD-PROTECT Type II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h

Type III De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-25°C AND ABOVE*	*BELOW -25°C*	*-10°C AND ABOVE*	*-3°C AND ABOVE*
AllClear AeroClear MAX	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable

1 The highest precipitation rate to be used as an input to the snow regression equations is constrained by the lower of: (1) the maximum allowable precipitation rate for snow specified in the Transport Canada exemption document (50 g/dm²/h) or (2) the highest usable precipitation rate (HUPR) 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 the exemption document.

TABLE 6: HIGHEST USABLE PRECIPITATION RATES IN SNOW[1] (cont'd)

TYPE II, TYPE III AND TYPE IV FLUIDS[2]

Type IV De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-49	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AllClear ClearWing ECO	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AllClear ClearWing EG	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite EG	45 g/dm²/h	25 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite PG	45 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight EG	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight PG	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
CHEMCO ChemR EG IV	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
CHEMCO ChemR Nordik IV	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Max Flight 04	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Max Flight AVIA	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Max Flight SNEG	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Clariant Safewing EG IV NORTH	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Safewing MP IV LAUNCH	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Clariant Safewing MP IV LAUNCH PLUS	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Cryotech Polar Guard® Advance	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Cryotech Polar Guard® Xtend	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Dow UCAR Endurance EG106	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Dow UCAR FlightGuard AD-49	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Inland Technologies ECO-SHIELD®	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost ECO 4	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost EG 4	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost NORTH 4	45 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Kilfrost ABC-S Plus	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Newave Aerochemical FCY 9311	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Newave Aerochemical FCY-EGIV	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Shaanxi Cleanway Cleansurface IV	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h

1 The highest precipitation rate to be used as an input to the snow regression equations is constrained by the lower of: (1) the maximum allowable precipitation rate for snow specified in the Transport Canada exemption document (50 g/dm²/h) or (2) the highest usable precipitation rate (HUPR) 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 the exemption document.

APPENDIX C

FAA HOLDOVER TIME GUIDELINES REGRESSION INFORMATION – WINTER 2021-2022

FAA
HOLDOVER TIME GUIDELINES
REGRESSION INFORMATION

WINTER 2021-2022
ORIGINAL ISSUE: AUGUST 4, 2021

The content of this document is the official FAA winter 2021-2022 holdover time guidelines 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 202-267-4557.

Questions on the technical content of the holdover time tables or regression information should be addressed to warren.underwood@faa.gov or 404-305-7267.

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

The Holdover Times Tables and related information can be found at the FAA's Aircraft Ground Deicing website. To receive notifications on updates to the Holdover Times Tables and related information, subscribe to the Aircraft Ground Deicing website by clicking on this link.

CHANGE CONTROL RECORDS

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

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

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LIST OF TABLES

HIGHLIGHTS AND CHANGES FOR WINTER 2021-2022

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

Type I Fluid

- The Type I regression coefficients are unchanged.

Type II Fluid

- A regression coefficients table and verification table has been added for ROMCHIM ADD-PROTECT NG Type II, a new Type II fluid added to the holdover time (HOT) guidelines for winter 2021-2022.
- Supplemental testing in very cold snow resulted in changes to one Type II fluid snow holdover times at temperatures below -14°C for winter 2021-2022. The related regression information has been updated accordingly.
- Supplemental testing for Aviation Shaanxi Cleanwing II resulted in changes to the snow holdover times for winter 2021-22. The related regression information has been updated accordingly.
- The regression coefficients table and verification table for Kilfrost Ice Clear II have been removed.
- Several changes were made to the Type II generic holdover times for winter 2021-2022. The Type II generic verification table has been updated accordingly.

Type III Fluid

- The Type III regression coefficients are unchanged.

Type IV Fluid

- Regression coefficients tables and verification tables have been added for the eight new Type IV fluids, added to the holdover time (HOT) guidelines for winter 2021-2022: AVIAFLUID AVIAFlight EG, AVIAFLUID AVIAFlight PG, AllClear ClearWing ECO, ASGlobal 4Flite EG, ASGlobal 4Flite PG, CHEMCO ChemR Nordik IV, JSC RCP Nordix Defrost NORTH 4, and Newave Aerochemical FCY-EGIV.
- Supplemental testing in very cold snow resulted in changes to many Type IV fluids snow holdover times at temperatures below -14°C for winter 2021-2022. The related regression information has been updated accordingly.
- The regression coefficients table and verification table for LNT solutions E450 have been removed.
- Several changes were made to the Type IV generic holdover times for winter 2021-2022. The Type IV generic verification table has been updated accordingly.

Guidance

- The guidance section remains unchanged.

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 2021-2022 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, *Regression Coefficients and Equations Used to Develop the Winter 2021-22 Aircraft Ground Deicing Holdover Time Tables*. This document can be referenced for further information if required.

Use of these systems is authorized through the FAA Advisory Circular (AC) 120-112 *Use of Liquid Water Equivalent System (LWES) to Determine Holdover Times or Check Times for Anti-icing Fluids* (latest version). Throughout this document, AC 120-112 is referred as the FAA LWES AC. For further information contact AFS-220 Ground Deicing Focal Charles J. Enders, phone 202-267-4557, email charles.j.enders@faa.gov.

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. (One exception is the Type II and Type IV regression coefficients tables, which have a single temperature band (below -3 to -14°C) which provides the regression coefficients for both the below -3 to -8°C and below -8 to -14°C temperature bands in the Type II and Type IV holdover time tables.) 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 all Type II, Type III, and Type IV fluids. 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).

To use the regression information provided in this document to obtain holdover times that are valid for operations in which flaps/slats are deployed prior to de/anti-icing: use the regression information applicable to the fluid and weather condition and multiply the result obtained by 76%.

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 calculate the holdover time for each Type II 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 II holdover time.

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.

Lowest and Highest Usable Precipitation Rates in Snow (Table 5 and Table 6)

Snow test data for some fluids is not sufficient to support extrapolation of the regression curves to very low and/or very high rates of precipitation. The lowest usable precipitation rates (LUPRs) and highest usable precipitation rates (HUPRs) in snow have been identified and are included in Table 5 (LUPRs) and Table 6 (HUPRs) for Type II, III and IV fluids (Type I fluids are not affected). The LUPRs and HUPRs differ by fluid brand, fluid dilution and temperature.

NOTE: At this time LUPRs and HUPRs are provided for snow only; LUPRs and HUPRs are not provided for any other precipitation type. The lowest and highest precipitation rates that can be used in other precipitation types are specified in the FAA LWES AC.

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 this document, the holdover time guidelines, and the FAA LWES AC 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 in accordance with the FAA LWES AC.
- 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 FAA LWES 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 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 in accordance with the FAA LWES AC (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 snow data exists to support use of the regression coefficients.

- The highest 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 lower of the following:

    1. The highest precipitation rate for snow stated in the FAA LWES AC (50 g/dm²/h); and

    2. The highest usable precipitation rate (HUPR) for each fluid/dilution/temperature as defined in Table 6 of this document. The HUPR is the highest precipitation rate for which sufficient snow data exists to support use of the regression coefficients.

- All other lowest and highest precipitation rates to be used as inputs to the regression equations are precipitation type dependent and provided in the FAA LWES AC.

- 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, small hail and ice pellets mixed with other types of precipitation, regression coefficient information is not provided for allowance times.

REGRESSION INFORMATION TABLES FOR WINTER 2021-2022

The regression information for winter 2021-2022 is presented in a series of tables on the following pages. The regression information tables are presented first and are followed by the tables of highest and lowest usable precipitation rates.

The regression information tables are sorted by fluid type (Type I, then Type II, then Type III, then Type IV). Within each fluid type group, the tables are arranged in alphabetical order. The tables are as follows:

- Tables 1-1 to 1-2: Type I Fluid Regression Information Tables
- Tables 2-1 to 2-13: Type II Fluid Regression Information Tables
- Tables 3-1 to 3-2: Type III Fluid Regression Information Tables
- Tables 4-1 to 4-28: Type IV Fluid Regression Information Tables

The tables of highest and lowest usable precipitation rates are presented following the regression information. The tables are as follows:

- Table 5: Lowest Usable Precipitation Rates
- Table 6: Highest Usable Precipitation Rates

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					
	Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	I = 1.3735 A = -0.4751	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.3829 A = -0.3848	I = 1.4688 A = -0.6200	I = 0.9355 A = -0.3384	
below -3 to -6 °C (below 27 to 21 °F)	I = 1.2734 A = -0.5299	I = 2.0072 A = -0.5752 B = -0.5585	I = 1.3842 A = -0.6152	I = 1.4688 A = -0.6200		
below -6 to -10 °C (below 21 to 14 °F)	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 °C (below 14 °F)	I = 1.1473 A = -0.6415	I = 2.0072 A = -0.5752 B = -0.5585				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 Type I aluminum snow values are rounded down to the nearest one minute (e.g. 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, Freezing Mist, 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					
	Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	I = 1.3931 A = -0.6279	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.4691 A = -0.5081	I = 1.4688 A = -0.6200	I = 1.1144 A = -0.5943	
below -3 to -6 °C (below 27 to 21 °F)	I = 0.9976 A = -0.3140	I = 1.6656 A = -0.7424 B = -0.2094	I = 1.3842 A = -0.6152	I = 1.4688 A = -0.6200		
below -6 to -10 °C (below 21 to 14 °F)	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	CAUTION: No holdover time guidelines exist	
below -10 °C (below 14 °F)	I = 1.0289 A = -0.6107	I = 2.0072 A = -0.5752 B = -0.5585				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 Type I composite snow values below 10 mins are rounded down to the nearest one minute (e.g. 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, Freezing Mist, 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 AD-2

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5300 A = -0.8946	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.6240 A = -0.8987	I = 2.5285 A = -0.7682	I = 2.4977 A = -0.8034	
	75/25	I = 1.9838 A = -0.1716	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.2055 A = -0.5820	I = 2.2411 A = -0.6851	I = 2.3107 A = -0.8650	
	50/50	I = 1.6478 A = -0.5976	I = 2.0999 A = -0.7867 B = -0.1524	I = 2.0999 A = -0.7867 B = -0.1524	I = 2.0999 A = -0.7867 B = -0.1524	I = 1.6770 A = -0.6366	I = 1.5734 A = -0.5302	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5699 A = -1.2862	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.7889 A = -0.7155 B = -0.2871	I = 2.6096 A = -1.0768	I = 2.3302 A = -0.7561		
	75/25	I = 2.4425 A = -1.2784	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.5435 A = -0.7664 B = -0.0812	I = 2.7079 A = -1.3713	I = 2.3728 A = -0.7324		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8390 A = -0.8725	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8390 A = -0.8725	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -27 °C (below -13 to -17 °F)	100/0	I = 1.8390 A = -0.8725	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	80.3	182.3	38.7	74.6	176.5	42.0	99.0	28.5	47.1	9.8	86.3
	75/25	73.1	85.5	26.0	52.5	132.2	36.1	62.9	19.2	30.1	4.9	50.8
	50/50	17.0	29.4	7.8	16.1	41.5	9.3	17.1	6.8	9.6		
-8	100/0	46.9	152.3	31.7	61.1	144.7	25.7	71.9	18.8	30.8		
	75/25	35.4	114.2	24.6	49.6	124.9	15.1	56.2	22.3	36.1		
-10 / -14 ***	100/0	46.9	152.3	27.7	53.4	126.4	25.7	71.9	18.8	30.8		
	75/25	35.4	114.2	23.7	47.8	120.2	15.1	56.2	22.3	36.1		
-18	100/0	16.9	37.7	2.0	7.0	30.0						
-25	100/0	16.9	37.7	1.0	3.0	15.0						
-27	100/0	16.9	37.7	0.0	1.0	7.0						

* 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.2573 A = -0.7407	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	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 = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	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 = 2.5060 A = -0.7213 B = -0.5237	I = 2.5060 A = -0.7213 B = -0.5237	I = 2.5060 A = -0.7213 B = -0.5237	I = 2.0341 A = -0.6288	I = 2.1847 A = -0.7830	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.3283 A = -0.9431	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.6057 A = -0.6656 B = -0.3133	I = 2.1441 A = -0.6033	I = 1.8282 A = -0.4021		
	75/25	I = 2.3328 A = -1.0611	I = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	I = 2.3044 A = -0.6229 B = -0.0204	I = 1.6685 A = -0.1061	I = 1.7474 A = -0.3274		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9950 A = -0.9540	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9950 A = -0.9540	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166	I = 4.0861 A = -0.7279 B = -1.5166				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	28.6	52.6	117.3	36.3	62.7	23.6	35.7	10.3	53.4
	75/25	49.7	81.5	26.3	46.5	98.4	35.7	59.5	19.1	29.6	7.4	47.6
	50/50	35.1	62.3	13.5	26.2	62.5	21.6	39.3	12.3	20.5		
-8	100/0	46.7	110.8	23.0	42.3	94.4	29.7	52.8	18.5	24.0		
	75/25	39.0	103.1	25.9	45.8	97.0	35.5	39.3	19.5	24.1		
-10 / -14 ***	100/0	46.7	110.8	19.9	36.5	81.4	29.7	52.8	18.5	24.0		
	75/25	39.0	103.1	25.6	45.4	96.1	35.5	39.3	19.5	24.1		
-18	100/0	21.3	51.0	12.5	24.3	58.3						
-25	100/0	21.3	51.0	7.9	15.4	37.0						

* 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: BEIJING YADILITE AVIATION YD-102 TYPE II

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.2562 A = -0.5977	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.3920 A = -0.7249	I = 1.9465 A = -0.3059	I = 2.2622 A = -0.6682	
	75/25	I = 1.9892 A = -0.8353	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.2407 A = -0.9340	I = 2.3425 A = -0.9259	I = 1.7678 A = -0.5942	
	50/50	I = 1.5895 A = -0.5473	I = 2.1960 A = -0.8600 B = -0.3992	I = 2.1960 A = -0.8600 B = -0.3992	I = 2.1960 A = -0.8600 B = -0.3992	I = 1.6035 A = -0.6300	I = 1.5230 A = -0.4848	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.1988 A = -0.7861	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.7385 A = -0.7402 B = -0.4299	I = 2.0314 A = -0.4651	I = 1.4027 A = 0.0002		
	75/25	I = 1.8916 A = -0.6222	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 2.4080 A = -0.7439 B = -0.3491	I = 1.8407 A = -0.6501	I = 1.5490 A = -0.3996		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9202 A = -0.8505	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9202 A = -0.8505	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9202 A = -0.8505	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	68.9	119.2	25.3	49.9	121.6	38.4	76.8	33.0	40.3	10.2	62.4
	75/25	25.4	54.7	13.3	26.3	64.4	15.9	38.7	11.2	20.5	4.5	22.5
	50/50	16.1	26.6	5.2	11.4	32.1	8.0	14.6	7.0	9.6		
-8	100/0	44.6	91.7	18.8	37.0	90.2	32.6	50.9	25.3	25.3		
	75/25	28.6	50.6	10.4	20.7	50.6	13.1	24.3	9.8	12.7		
-10 / -14 ***	100/0	44.6	91.7	15.3	30.2	73.7	32.6	50.9	25.3	25.3		
	75/25	28.6	50.6	8.9	17.5	42.9	13.1	24.3	9.8	12.7		
-18	100/0	21.2	46.2	2.0	7.0	30.0						
-25	100/0	21.2	46.2	1.0	3.0	15.0						
-29	100/0	21.2	46.2	0.0	1.0	7.0						

* 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8996 A = -0.6356	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8996 A = -0.6356	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.8996 A = -0.6356	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476	I = 6.2483 A = -1.1556 B = -2.8476				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6
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, Freezing Mist, 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	191.5	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		
-8	100/0	55.7	104.2	46.9	77.1	148.3	36.1	89.9	27.4	46.6		
	75/25	25.2	64.5	28.4	54.8	129.7	23.7	71.4	21.8	34.3		
-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	99.6	23.7	71.4	21.8	34.3		
-18	100/0	28.5	51.1	8.5	24.4	98.2						
-25	100/0	28.5	51.1	3.6	10.4	41.8						
-29	100/0	28.5	51.1	2.4	7.0	28.2						

* 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					
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8877 A = -0.8771	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8877 A = -0.8771	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.8877 A = -0.8771	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	249.4	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		
-8	100/0	42.0	138.1	39.1	88.1	198.8	34.3	87.2	33.0	53.9		
	75/25	32.1	104.3	57.7	101.5	213.4	26.9	69.0	32.1	42.9		
-10 / -14 ***	100/0	42.0	138.1	33.5	75.5	170.4	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		
-18	100/0	18.8	42.0	2.0	7.0	7.0						
-25	100/0	18.8	42.0	1.0	3.0	3.0						
-29	100/0	18.8	42.0	0.0	1.0	1.0						

* 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5794 A = -0.5025	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	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 = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	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 = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.2943 A = -0.9086	I = 2.3695 A = -0.9996	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5101 A = -1.1145	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.7077 A = -1.0390	I = 2.0801 A = -0.3886		
	75/25	I = 2.2594 A = -0.9785	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.4495 A = -0.9076	I = 2.0483 A = -0.3597		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -25 to -30.5 °C (below -13 to -23 °F)	100/0	I = 1.9253 A = -0.6979	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	65.6	113.6	233.5	97.1	123.5	73.5	88.3	14.7	127.9
	75/25	151.0	254.6	40.1	84.9	227.7	102.1	122.4	38.8	69.5	9.4	102.1
	50/50	48.6	86.4	10.0	26.4	94.9	19.2	45.6	9.4	18.0		
-8	100/0	53.8	149.5	48.4	83.8	172.4	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	31.5	66.8	179.1	27.4	65.3	35.1	44.4		
-10 / -14 ***	100/0	53.8	149.5	39.4	68.2	140.3	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	26.8	56.8	152.2	27.4	65.3	35.1	44.4		
-18	100/0	27.4	51.9	11.5	33.2	134.2						
-25	100/0	27.4	51.9	4.8	13.8	56.0						
-30.5	100/0	27.4	51.9	2.7	7.9	31.7						

* 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: JSC RCP NORDIX DEFROST PG 2

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.2918 A = -0.8145	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.2402 A = -0.6580	I = 2.3748 A = -0.7498	I = 2.4186 A = -0.7567	
	75/25	I = 2.2699 A = -0.6569	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.0887 A = -0.5872	I = 2.4497 A = -0.9006	I = 1.9718 A = -0.6216	
	50/50	I = 2.2311 A = -0.6560	I = 2.7673 A = -0.7928 B = -0.2600	I = 2.7673 A = -0.7928 B = -0.2600	I = 2.7673 A = -0.7928 B = -0.2600	I = 2.1018 A = -0.5878	I = 2.3509 A = -0.8146	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.0963 A = -0.5196	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 2.7346 A = -0.7309 B = -0.3571	I = 1.9595 A = -0.3909	I = 2.1235 A = -0.5815		
	75/25	I = 2.1158 A = -0.7229	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 2.9389 A = -0.8579 B = -0.5828	I = 1.9013 A = -0.4425	I = 1.8645 A = -0.4846		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0196 A = -0.6831	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0196 A = -0.6831	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -27 °C (below -13 to -17 °F)	100/0	I = 2.0196 A = -0.6831	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	52.8	111.3	29.1	56.8	136.9	32.2	60.3	21.2	34.6	10.0	77.6
	75/25	64.7	118.1	21.5	47.2	132.5	27.2	47.7	15.5	28.0	6.4	34.5
	50/50	59.2	108.0	30.0	62.1	161.2	28.0	49.1	16.3	27.8		
-8	100/0	54.1	87.1	22.7	44.3	106.8	33.4	48.6	20.4	29.9		
	75/25	40.8	79.1	14.3	31.5	88.5	25.6	39.1	15.4	21.1		
-10 / -14 ***	100/0	54.1	87.1	19.2	37.5	90.3	33.4	48.6	20.4	29.9		
	75/25	40.8	79.1	10.9	23.9	67.3	25.6	39.1	15.4	21.1		
-18	100/0	34.8	65.2	2.0	7.0	30.0						
-25	100/0	34.8	65.2	1.0	3.0	15.0						
-27	100/0	34.8	65.2	0.0	1.0	7.0						

* 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					
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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 °C (below 27 to 7 °F)	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		
	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 -18 °C (below 7 to 0 °F)	100/0	I = 1.9498 A = -0.6590	I = 2.2123 A = -1.3672 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9498 A = -0.6590	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9498 A = -0.6590	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	202.4	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	43.0	19.5	28.3	10.2	16.5		
-8	100/0	28.4	64.5	54.0	91.6	183.5	23.7	61.5	13.1	35.6		
	75/25	25.5	86.8	35.9	67.2	125.9	19.1	54.1	9.0	32.4		
-10 / -14 ***	100/0	28.4	64.5	50.5	85.7	171.7	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		
-18	100/0	30.8	56.4	2.0	7.0	7.0						
-25	100/0	30.8	56.4	1.0	3.0	3.0						
-29	100/0	30.8	56.4	0.0	1.0	1.0						

* 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					
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7388 A = -0.5485	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7388 A = -0.5485	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.7388 A = -0.5485	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2-T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	124.4	33.4	67.4	24.0	34.9	8.3	44.9
	75/25	48.8	90.8	22.0	39.6	85.7	22.9	44.1	12.8	25.9	5.0	25.7
	50/50	25.7	36.6	13.0	25.8	63.2	10.5	19.8	7.7	10.7		
-8	100/0	45.3	90.6	21.0	38.5	85.8	18.4	43.3	14.8	18.9		
	75/25	31.8	63.5	15.0	27.0	58.4	13.8	29.0	8.1	14.1		
-10 / -14 ***	100/0	45.3	90.6	16.3	30.0	66.8	18.4	43.3	14.8	18.9		
	75/25	31.8	63.5	11.6	20.8	45.0	13.8	29.0	8.1	14.1		
-18	100/0	22.7	37.5	2.0	7.0	7.0						
-25	100/0	22.7	37.5	1.0	3.0	3.0						
-28	100/0	22.7	37.5	0.0	1.0	1.0						

* 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: NEWAVE AEROCHEMICAL FCY-2 BIO+

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.3819 A = -0.6607	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 2.2626 A = -0.5057	I = 2.6041 A = -0.8687	I = 2.4390 A = -0.8058	
	75/25	I = 2.0853 A = -0.6218	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.2267 A = -0.7378	I = 1.9393 A = -0.5060	I = 1.9514 A = -0.5966	
	50/50	I = 1.6563 A = -0.6034	I = 1.9658 A = -0.5568 B = -0.3538	I = 1.9658 A = -0.5568 B = -0.3538	I = 1.9658 A = -0.5568 B = -0.3538	I = 1.6641 A = -0.5675	I = 1.7844 A = -0.6234	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.2250 A = -0.8616	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 3.1420 A = -0.8361 B = -0.7102	I = 2.2571 A = -0.6478	I = 2.4418 A = -0.8745		
	75/25	I = 2.0676 A = -0.8031	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 2.8399 A = -0.7994 B = -0.6556	I = 1.9065 A = -0.5604	I = 1.8028 A = -0.4737		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0929 A = -1.0828	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0929 A = -1.0828	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 2.0929 A = -1.0828	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	83.2	152.4	30.0	64.5	176.5	50.0	81.1	24.5	43.3	8.5	75.1
	75/25	44.7	79.1	18.4	38.2	100.1	25.4	51.4	17.1	23.7	6.8	34.2
	50/50	17.2	29.8	8.7	14.5	28.4	10.8	18.5	8.2	12.3		
-8	100/0	42.0	92.4	18.3	39.4	107.9	34.3	63.7	16.6	29.4		
	75/25	32.1	67.0	11.7	24.3	63.5	19.2	32.7	13.8	18.8		
-10 / -14 ***	100/0	42.0	92.4	13.1	28.2	77.3	34.3	63.7	16.6	29.4		
	75/25	32.1	67.0	8.6	17.8	46.7	19.2	32.7	13.8	18.8		
-18	100/0	21.7	58.5	2.0	7.0	30.0						
-25	100/0	21.7	58.5	1.0	3.0	15.0						
-28.5	100/0	21.7	58.5	0.0	1.0	7.0						

* 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: ROMCHIM ADD-PROTECT NG TYPE II

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.3974 A = -0.7794	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 2.3113 A = -0.5668	I = 2.2728 A = -0.5113	I = 2.4042 A = -0.8164	
	75/25	I = 2.2548 A = -0.6819	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.3252 A = -0.6462	I = 2.3988 A = -0.7047	I = 2.2378 A = -0.7242	
	50/50	I = 2.0350 A = -0.9539	I = 2.3515 A = -0.7025 B = -0.2827	I = 2.3515 A = -0.7025 B = -0.2827	I = 2.3515 A = -0.7025 B = -0.2827	I = 1.9619 A = -0.6157	I = 2.0649 A = -0.7375	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.1684 A = -0.6263	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 3.0299 A = -0.8381 B = -0.4851	I = 2.3829 A = -0.7538	I = 2.1520 A = -0.5404		
	75/25	I = 2.1020 A = -0.5437	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.8970 A = -0.8514 B = -0.4622	I = 2.4793 A = -0.9714	I = 2.3197 A = -0.7496		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.4934 A = -0.5224	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.4934 A = -0.5224	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.4934 A = -0.5224	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	71.2	145.5	33.1	71.2	195.4	47.9	82.2	36.1	50.5	7.5	68.2
	75/25	60.0	112.1	24.2	52.8	147.1	40.3	74.7	25.9	41.1	7.6	53.9
	50/50	23.3	56.0	14.9	28.3	65.9	18.9	34.0	10.8	17.5		
-8	100/0	53.8	95.5	23.6	50.9	139.6	34.9	71.8	24.9	35.5		
	75/25	52.7	86.8	17.6	38.3	106.8	25.0	63.1	18.7	30.5		
-10 / -14 ***	100/0	53.8	95.5	18.8	40.5	111.1	34.9	71.8	24.9	35.5		
	75/25	52.7	86.8	14.1	30.8	85.9	25.0	63.1	18.7	30.5		
-18	100/0	13.4	21.7	2.0	7.0	30.0						
-25	100/0	13.4	21.7	1.0	3.0	15.0						
-28	100/0	13.4	21.7	0.0	1.0	7.0						

* 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 2-12: ROMCHIM ADD-PROTECT TYPE II

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5740 A = -0.8251	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.6191 A = -0.9213	I = 2.4792 A = -0.7630	I = 2.1185 A = -0.6149	
	75/25	I = 2.0354 A = -0.6203	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.0120 A = -0.5901	I = 2.1011 A = -0.6689	I = 1.7686 A = -0.5325	
	50/50	I = 1.7404 A = -0.6221	I = 1.9864 A = -0.5840 B = -0.2529	I = 1.9864 A = -0.5840 B = -0.2529	I = 1.9864 A = -0.5840 B = -0.2529	I = 2.0897 A = -0.9018	I = 1.7429 A = -0.6010	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 1.8401 A = -0.5735	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.8637 A = -0.7431 B = -0.5033	I = 2.2574 A = -0.7754	I = 2.0901 A = -0.5723		
	75/25	I = 1.9219 A = -0.6509	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 2.5210 A = -0.6815 B = -0.4862	I = 1.8894 A = -0.5596	I = 1.8836 A = -0.5597		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.5810 A = -0.5714	I = 2.1496 A = -1.4094 B = 0.0000	I = 1.9908 A = -1.1457 B = 0.0000	I = 2.2123 A = -1.3672 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.5810 A = -0.5714	I = 2.0233 A = -1.7757 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.5810 A = -0.5714	I = 1.4031 A = -1.1696 B = 0.0000	I = 1.7565 A = -1.7565 B = 0.0000	I = 5.0259 A = -5.0259 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	99.4	211.7	29.7	58.7	143.7	39.2	94.4	25.9	42.6	9.2	48.8
	75/25	40.0	70.6	16.9	31.6	71.8	22.6	39.8	14.7	22.7	5.9	24.9
	50/50	20.2	35.7	9.8	16.8	34.0	12.2	28.8	8.0	11.8		
-8	100/0	27.5	46.5	21.0	41.4	101.4	24.8	51.9	19.5	28.4		
	75/25	29.3	53.2	12.1	22.6	51.2	18.5	31.5	12.6	18.2		
-10 / -14 ***	100/0	27.5	46.5	16.6	32.7	80.0	24.8	51.9	19.5	28.4		
	75/25	29.3	53.2	9.6	17.9	40.8	18.5	31.5	12.6	18.2		
-18	100/0	15.2	25.6	2.0	7.0	30.0						
-25	100/0	15.2	25.6	1.0	3.0	15.0						
-28	100/0	15.2	25.6	0.0	1.0	7.0						

* 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 2-13: 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, Freezing Mist, 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	52.8	108.2	25.3	49.9	32.2	60.3	21.2	34.6	7.5	44.9
	75/25	25.4	54.7	13.3	26.3	15.9	38.7	11.2	20.5	4.5	22.5
	50/50	16.1	26.6	5.2	11.4	8.0	14.6	6.8	9.6		
-8	100/0	27.5	46.5	18.3	37.0	18.4	43.3	13.1	18.9		
	75/25	25.2	50.6	10.4	20.7	13.1	24.3	8.1	12.7		
-10 / -14 **	100/0	27.5	46.5	13.1	28.2	18.4	43.3	13.1	18.9		
	75/25	25.2	50.6	8.6	17.5	13.1	24.3	8.1	12.7		
-18	100/0	13.4	21.7	2.0	7.0						
-25	100/0	13.4	21.7	1.0	3.0						

* 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

FAA HOT Guidelines Regression Information **Winter 2021-2022**

TABLE 3-1: ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED ON LOW SPEED AIRCRAFT

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions[1]					
		Freezing Fog, Freezing Mist, or Ice Crystals[2]	Snow, Snow Grains or Snow Pellets[3,4]	Freezing Drizzle[2]	Light Freezing Rain[2]	Rain on Cold Soaked Wing[2]	Other
-3 °C and above (27 °F and above)	100/0	I = 2.3532 A = -0.9867	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.2733 A = -0.8172	I = 2.4359 A = -0.9105	I = 2.1350 A = -0.7258	
	75/25	n/a	n/a	n/a	n/a	n/a	
	50/50	n/a	n/a	n/a	n/a		
below -3 to -10°C (below 27 to 14 °F)	100/0	I = 2.2318 A = -0.7815	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.1031 A = -0.6645	I = 2.2245 A = -0.7407	CAUTION: No holdover time guidelines exist	
	75/25	n/a	n/a	n/a	n/a		
below -10 to -16 °C (below 14 to 3 °F)	100/0	I = 2.3342 A = -1.0165	I = 2.4111 A = -0.8236 B = 0.0000				

1 CAUTION: Fluid must be applied unheated on aircraft conforming to the SAE AS5900 low speed aerodynamic test criterion to use these regression coefficients
2 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
3 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
4 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	46.1	113.8	18.2	38.7	104.3	23.1	50.4	14.6	26.4	5.9	42.4
	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	100/0	48.5	99.2	18.2	38.7	104.3	23.1	43.5	15.5	25.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-25	100/0	42.0	106.7	18.2	38.7	104.3						

* 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 3-2: ALLCLEAR AEROCLEAR MAX, APPLIED UNHEATED ON HIGH SPEED AIRCRAFT

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions[1]					
		Freezing Fog, Freezing Mist, or Ice Crystals[2]	Snow, Snow Grains or Snow Pellets[3,4]	Freezing Drizzle[2]	Light Freezing Rain[2]	Rain on Cold Soaked Wing[2]	Other
-3 °C and above (27 °F and above)	100/0	I = 2.3532 A = -0.9867	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.2733 A = -0.8172	I = 2.4359 A = -0.9105	I = 2.1350 A = -0.7258	
	75/25	n/a	n/a	n/a	n/a	n/a	
	50/50	n/a	n/a	n/a	n/a		
below -3 to -10°C (below 27 to 14 °F)	100/0	I = 2.2318 A = -0.7815	I = 2.4111 A = -0.8236 B = 0.0000	I = 2.1031 A = -0.6645	I = 2.2245 A = -0.7407		CAUTION: No holdover time guidelines exist
	75/25	n/a	n/a	n/a	n/a		
below -10 to -25 °C (below 14 to -13 °F)	100/0	I = 2.3342 A = -1.0165	I = 2.4111 A = -0.8236 B = 0.0000				
below -25 to -35 °C (below -13 to -31 °F)	100/0	I = 2.1252 A = -1.0990	I = 2.1551 A = -0.8234 B = 0.0000				

1 CAUTION: Fluid must be applied unheated on aircraft conforming to the SAE AS5900 high speed aerodynamic test criterion to use these regression coefficients
2 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
3 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
4 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*												
		Freezing Fog, Freezing Mist, 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	3	LUPR*	13	5	25	13	75	5
+1 / -3 **	100/0	46.1	113.8	18.2	38.7	82.3	104.3	104.3	23.1	50.4	14.6	26.4	5.9	42.4
	75/25	n/a	n/a	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	n/a	n/a		
-10	100/0	48.5	99.2	18.2	38.7	82.3	104.3	104.3	23.1	43.5	15.5	25.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-25	100/0	42.0	106.7	18.2	38.7	82.3	104.3	104.3						
-35	100/0	22.8	62.3	10.1	21.5	45.6	57.8	57.8						

* 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 ECOWING AD-49

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4713 A = -0.2370	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.3729 A = -0.3927	I = 2.4943 A = -0.5000	I = 2.6531 A = -0.8558	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5177 A = -1.7715	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.8172 A = -1.2681	I = 1.9828 A = -0.5016		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 1.7838 A = -0.5976	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	58.8	113.3	267.9	86.2	125.4	62.4	86.6	11.2	113.5
	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		
-8	100/0	19.0	96.5	46.6	89.6	211.9	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	19.0	96.5	39.7	76.5	180.8	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.2	40.2	2.0	9.0	45.0						
-25	100/0	23.2	40.2	1.0	3.0	20.0						
-26	100/0	23.2	40.2	0.0	2.0	10.0						

* 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: ALLCLEAR CLEARWING ECO

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6504 A = -0.8265	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 2.3553 A = -0.2823	I = 2.4131 A = -0.3736	I = 2.6188 A = -0.7057	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4735 A = -0.9792	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 3.1180 A = -0.7762 B = -0.4483	I = 2.6806 A = -0.8496	I = 2.7686 A = -0.7996		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9001 A = -0.7542	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9001 A = -0.7542	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 1.9001 A = -0.7542	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547	I = 5.5630 A = -0.7248 B = -2.5547				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	118.2	252.1	52.4	106.8	271.8	109.9	143.9	77.8	99.3	19.8	133.5
	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		
-8	100/0	61.5	150.9	38.4	78.3	199.2	54.2	122.1	44.8	75.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	61.5	150.9	31.1	63.4	161.4	54.2	122.1	44.8	75.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.6	47.1	16.8	32.7	78.2						
-25	100/0	23.6	47.1	7.8	15.2	36.3						
-26	100/0	23.6	47.1	7.1	13.8	33.1						

* 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: ALLCLEAR CLEARWING EG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4808 A = -0.6236	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.2517 A = -0.3764	I = 3.1105 A = -1.1890	I = 2.4690 A = -0.7435	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6368 A = -0.9489	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.7895 A = -0.7766 B = -0.1648	I = 2.1945 A = -0.3445	I = 2.8711 A = -0.9900		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.3601 A = -0.9134	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.3601 A = -0.9134	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.3601 A = -0.9134	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747	I = 4.7809 A = -0.8032 B = -1.7747				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	110.9	196.4	38.8	79.0	201.3	68.0	97.4	28.1	61.1	11.9	89.0
	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		
-8	100/0	94.1	224.5	34.6	70.5	179.5	64.7	89.9	30.7	58.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	94.1	224.5	32.0	65.2	166.2	64.7	89.9	30.7	58.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	52.7	121.7	22.3	46.6	122.7						
-25	100/0	52.7	121.7	13.1	27.4	72.0						
-29	100/0	52.7	121.7	10.3	21.4	56.4						

* 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: ASGLOBAL 4FLITE EG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5283 A = -0.7924	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.2777 A = -0.6136	I = 2.5046 A = -0.8767	I = 2.3356 A = -0.7595	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4381 A = -0.7329	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.7038 A = -0.7591 B = -0.2149	I = 2.2338 A = -0.5642	I = 2.4121 A = -0.7932		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0968 A = -0.5619	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0968 A = -0.5619	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -30 °C (below -13 to -22 °F)	100/0	I = 2.1030 A = -0.9200	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	94.3	194.9	31.1	62.3	155.4	39.3	70.6	19.0	33.7	8.2	63.8
	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		
-8	100/0	84.3	165.0	26.8	53.7	133.9	40.3	69.1	20.1	33.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	84.3	165.0	24.2	48.5	121.0	40.3	69.1	20.1	33.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	50.6	84.7	10.0	25.0	65.0						
-25	100/0	50.6	84.7	5.0	15.0	55.0						
-30	100/0	28.8	67.0	2.0	8.0	35.0						

* 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: ASGLOBAL 4FLITE PG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4855 A = -0.6410	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.1915 A = -0.3146	I = 2.5200 A = -0.6341	I = 2.2831 A = -0.5569	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.2316 A = -0.5964	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.9173 A = -0.6121 B = -0.4679	I = 2.0710 A = -0.3106	I = 2.4941 A = -0.6796		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8152 A = -0.5003	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8152 A = -0.5003	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to - 15°F)	100/0	I = 1.8152 A = -0.5003	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	109.0	196.1	54.3	95.1	198.7	69.4	93.7	43.0	65.1	17.3	78.3
	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		
-8	100/0	65.3	112.7	39.2	68.8	143.7	53.1	71.4	35.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	65.3	112.7	31.5	55.2	115.3	53.1	71.4	35.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	29.2	46.2	2.0	9.0	45.0						
-25	100/0	29.2	46.2	1.0	3.0	20.0						
-26	100/0	29.2	46.2	0.0	2.0	10.0						

* 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: AVIAFLUID AVIAFLIGHT EG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4936 A = -0.7662	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5110 A = -0.6263	I = 2.6126 A = -0.8113	I = 2.6633 A = -0.8384	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5170 A = -0.8812	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.5416 A = -0.5966 B = -0.1650	I = 2.2536 A = -0.4445	I = 2.4418 A = -0.6514		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.3805 A = -1.1620	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.3805 A = -1.1620	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851	I = 3.4362 A = -0.7022 B = -0.7851				
below -25 to -31 °C (below -13 to -24 °F)	100/0	I = 2.0469 A = -0.7482	I = 1.9668 A = -0.7022 B = 0.0000	I = 1.9668 A = -0.7022 B = 0.0000	I = 1.9668 A = -0.7022 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	90.8	183.2	39.1	67.6	138.6	65.1	118.4	30.1	51.2	12.3	119.5
	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		
-8	100/0	79.6	178.5	34.9	60.3	123.6	57.3	87.7	34.0	52.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	79.6	178.5	32.3	55.8	114.4	57.3	87.7	34.0	52.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	37.0	107.3	27.1	51.6	120.2						
-25	100/0	37.0	107.3	21.4	40.8	94.9						
-31	100/0	33.4	66.3	9.7	18.4	42.8						

* 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

FAA HOT Guidelines Regression Information — Winter 2021-2022

TABLE 4-7: AVIAFLUID AVIAFLIGHT PG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.7578 A = -0.8947	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 2.0792 A = 0.0000	I = 2.8829 A = -0.7432	I = 2.5971 A = -0.6957	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.3529 A = -0.7865	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 3.0863 A = -0.6642 B = -0.6086	I = 2.9286 A = -1.2431	I = 2.4317 A = -0.5672		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7548 A = -0.7332	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7548 A = -0.7332	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320				
below -25 to -25.5 °C (below -13 to -14 °F)	100/0	I = 1.7548 A = -0.7332	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320	I = 5.2600 A = -0.6724 B = -2.4320				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	135.7	307.9	54.0	99.2	220.8	120.0	120.0	69.8	113.5	19.6	129.1
	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		
-8	100/0	63.6	130.7	35.4	65.1	144.8	35.0	114.7	43.5	63.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	63.6	130.7	26.6	48.9	108.8	35.0	114.7	43.5	63.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	17.5	34.2	14.3	26.5	59.6						
-25	100/0	17.5	34.2	6.9	12.8	28.7						
-25.5	100/0	17.5	34.2	6.6	12.2	27.5						

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

TABLE 4-8: CHEMCO CHEMR EG IV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5221 A = -0.6191	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.5776 A = -0.8305	I = 2.3603 A = -0.6816	I = 2.6437 A = -0.8858	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6566 A = -1.0376	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.8018 A = -0.9158 B = 0.0000	I = 2.3439 A = -0.5194	I = 2.3463 A = -0.5867		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.1693 A = -0.8359	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.1693 A = -0.8359	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000				
below -25 to -27 °C (below -13 to -17 °F)	100/0	I = 2.1693 A = -0.8359	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000	I = 2.3992 A = -0.7726 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	122.8	216.6	33.2	76.9	231.7	44.9	99.3	25.6	39.9	9.6	105.8
	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		
-8	100/0	85.4	220.9	33.2	76.9	231.7	58.3	95.7	33.6	49.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	85.4	220.9	33.2	76.9	231.7	58.3	95.7	33.6	49.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	38.5	82.7	20.9	42.3	107.3						
-25	100/0	38.5	82.7	20.9	42.3	107.3						
-27	100/0	38.5	82.7	20.9	42.3	107.3						

* 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: CHEMCO CHEMR NORDIK IV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6325 A = -0.7158	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.6092 A = -0.6398	I = 2.4979 A = -0.5367	I = 2.5308 A = -0.6285	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6790 A = -0.9206	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.7042 A = -0.6856 B = 0.0000	I = 2.5682 A = -0.6212	I = 2.7893 A = -0.7992		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.2331 A = -0.9189	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.2331 A = -0.9189	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.2331 A = -0.9189	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607	I = 4.2171 A = -0.7360 B = -1.1607				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	135.6	261.2	55.7	104.4	238.3	78.8	145.2	55.9	79.4	22.5	123.5
	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		
-8	100/0	108.5	252.3	55.7	104.4	238.3	75.2	136.1	47.0	79.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	108.5	252.3	55.7	104.4	238.3	75.2	136.1	47.0	79.3		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	39.0	90.5	47.7	93.5	226.9						
-25	100/0	39.0	90.5	33.6	66.0	160.2						
-29	100/0	39.0	90.5	28.7	56.2	136.4						

* 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: CLARIANT MAX FLIGHT 04

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, or Ice Crystals[1]	Snow, Snow Grains or Snow Pellets[2,3]			Freezing Drizzle[1,4]	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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8804 A = -0.7843	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -23.5 °C (below 0 to -10 °F)	100/0	I = 1.8804 A = -0.7843	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6
4 Freezing drizzle and light freezing rain values were calculated at 12.7 g/dm²/h the year the holdover time table for this fluid was produced. Since they are now calculated at 13.0 g/dm²/h, 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, Freezing Mist, 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	399.5	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		
-8	100/0	50.5	151.0	50.2	98.9	241.3	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		
-10 / -14 ***	100/0	50.5	151.0	35.6	70.3	171.4	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		
-18	100/0	21.5	44.1	2.0	9.0	45.0						
-23.5	100/0	21.5	44.1	1.0	3.0	20.0						

* 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: CLARIANT MAX FLIGHT AVIA

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4864 A = -0.3214	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.5168 A = -0.5284	I = 2.2295 A = -0.3416	I = 2.8870 A = -1.0183	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6347 A = -0.8798	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.8243 A = -0.6182 B = -0.2788	I = 2.5583 A = -0.6474	I = 2.7838 A = -0.7360		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.1916 A = -0.8933	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.1916 A = -0.8933	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 2.1916 A = -0.8933	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

CAUTION: No holdover time guidelines exist

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	182.7	245.3	58.2	102.6	216.0	84.8	140.4	56.5	70.6	9.5	149.7
	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		
-8	100/0	104.7	234.3	48.0	84.6	178.1	68.7	127.6	56.9	92.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	104.7	234.3	42.1	74.2	156.2	68.7	127.6	56.9	92.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	36.9	83.7	10.0	25.0	65.0						
-25	100/0	36.9	83.7	5.0	15.0	55.0						
-28.5	100/0	36.9	83.7	2.0	8.0	35.0						

* 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: CLARIANT MAX FLIGHT SNEG

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5734 A = -0.5916	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.1201 A = -0.0318	I = 3.1463 A = -1.0213	I = 2.3856 A = -0.6074	
	75/25	I = 2.3956 A = -0.0226	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.3595 A = -0.3733	I = 2.1906 A = -0.2633	I = 2.5045 A = -0.7062	
	50/50	I = 2.6114 A = -0.9560	I = 2.5982 A = -0.9523 B = 0.0000	I = 2.5982 A = -0.9523 B = 0.0000	I = 2.5982 A = -0.9523 B = 0.0000	I = 2.3438 A = -0.7175	I = 2.7427 A = -1.1421		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5197 A = -1.2481	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.8863 A = -0.6493 B = -0.3359	I = 2.7003 A = -1.0853	I = 2.6961 A = -0.9598		
	75/25	I = 2.2989 A = -1.2091	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.6974 A = -0.5329 B = -0.3096	I = 2.5864 A = -1.1239	I = 2.7996 A = -1.0818	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9524 A = -0.8898	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9524 A = -0.8898	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9524 A = -0.8898	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	144.5	248.5	55.4	100.5	219.6	121.5	125.3	52.3	102.0	17.6	91.4
	75/25	239.8	244.8	54.5	88.7	168.6	87.8	125.5	66.5	78.9	15.1	102.5
	50/50	87.7	210.7	18.5	44.2	139.3	35.0	69.5	14.0	29.5		
-8	100/0	44.4	139.3	43.9	79.6	174.0	31.0	87.4	22.6	42.4		
	75/25	28.4	86.1	43.9	71.6	136.0	21.6	63.2	19.4	39.3		
-10 / -14 ***	100/0	44.4	139.3	37.5	68.0	148.6	31.0	87.4	22.6	42.4		
	75/25	28.4	86.1	38.0	61.9	117.6	21.6	63.2	19.4	39.3		
-18	100/0	21.4	48.4	2.0	9.0	45.0						
-25	100/0	21.4	48.4	1.0	3.0	20.0						
-29	100/0	21.4	48.4	0.0	2.0	10.0						

* 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: CLARIANT SAFEWING EG IV NORTH

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5514 A = -0.5862	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.4593 A = -0.4518	I = 2.0514 A = -0.2650	I = 2.7876 A = -0.9859	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6521 A = -0.9130	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.7261 A = -0.6800 B = -0.0814	I = 2.4417 A = -0.5677	I = 2.7481 A = -0.7299		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.1343 A = -0.7329	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.1343 A = -0.7329	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -30 °C (below -13 to -22 °F)	100/0	I = 2.1343 A = -0.7329	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	138.6	237.1	52.3	97.5	221.2	90.4	139.2	48.0	57.0	8.7	125.5
	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		
-8	100/0	103.3	238.4	49.4	92.2	209.1	64.5	110.9	53.4	86.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	103.3	238.4	47.6	88.7	201.2	64.5	110.9	53.4	86.1		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	41.9	82.0	10.0	25.0	65.0						
-25	100/0	41.9	82.0	5.0	15.0	55.0						
-30	100/0	41.9	82.0	2.0	8.0	35.0						

* 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: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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 °C (below 27 to 7 °F)	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 -18 °C (below 7 to 0 °F)	100/0	I = 1.8894 A = -0.6349	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8894 A = -0.6349	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 1.8894 A = -0.6349	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993	I = 6.5565 A = -1.3090 B = -2.9993				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	101.5	27.8	48.0	18.4	23.3		
-8	100/0	58.8	115.2	54.4	88.7	168.5	34.9	97.7	25.2	44.9		
	75/25	41.3	80.0	52.0	91.6	192.7	25.2	71.7	25.9	42.8		
-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		
-18	100/0	27.9	49.9	6.7	22.1	107.1						
-25	100/0	27.9	49.9	2.7	9.0	43.5						
-28.5	100/0	27.9	49.9	1.9	6.2	30.2						

* 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 4-15: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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 °C (below 27 to 7 °F)	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 -18 °C (below 7 to 0 °F)	100/0	I = 1.9339 A = -0.8158	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9339 A = -0.8158	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.9339 A = -0.8158	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196	I = 6.5722 A = -1.2696 B = -3.0196				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	121.6	22.7	58.8	13.5	18.7		
-8	100/0	54.6	133.0	44.0	99.4	290.4	26.7	93.0	26.6	38.5		
	75/25	41.9	120.0	36.6	87.5	274.6	22.1	62.6	21.7	31.6		
-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		
-18	100/0	23.1	48.8	7.4	23.7	109.1						
-25	100/0	23.1	48.8	3.0	9.6	44.1						
-29	100/0	23.1	48.8	2.0	6.3	29.0						

* 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 4-16: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5794 A = -0.5025	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	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 = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	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 = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.8810 A = -1.0631 B = -0.5673	I = 2.2943 A = -0.9086	I = 2.3695 A = -0.9996	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5101 A = -1.1145	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.9600 A = -0.5988 B = -0.4378	I = 2.7077 A = -1.0390	I = 2.0801 A = -0.3886		
	75/25	I = 2.2594 A = -0.9785	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.9905 A = -0.8191 B = -0.3466	I = 2.4495 A = -0.9076	I = 2.0483 A = -0.3597		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9253 A = -0.6979	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134	I = 6.4718 A = -1.1603 B = -2.9134				
below -25 to -30.5 °C (below -13 to -23 °F)	100/0	I = 1.9253 A = -0.6979	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000	I = 2.0544 A = -1.1592 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*									
		Freezing Fog, Freezing Mist, 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	65.6	113.6	233.5	97.1	123.5	73.5	88.3	14.7	127.9
	75/25	151.0	254.6	40.1	84.9	227.7	102.1	122.4	38.8	69.5	9.4	102.1
	50/50	48.6	86.4	10.0	26.4	94.9	19.2	45.6	9.4	18.0		
-8	100/0	53.8	149.5	48.4	83.8	172.4	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	31.5	66.8	179.1	27.4	65.3	35.1	44.4		
-10 / -14 ***	100/0	53.8	149.5	39.4	68.2	140.3	35.5	95.8	34.4	44.4		
	75/25	37.6	92.2	26.8	56.8	152.2	27.4	65.3	35.1	44.4		
-18	100/0	27.4	51.9	11.5	33.2	134.2						
-25	100/0	27.4	51.9	4.8	13.8	56.0						
-30.5	100/0	27.4	51.9	2.7	7.9	31.7						

* 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 4-17: CRYOTECH POLAR GUARD® XTEND

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5325 A = -0.5036	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.0792 A = 0.0000	I = 3.0299 A = -0.8932	I = 2.4479 A = -0.6234	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.2661 A = -0.7204	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.9681 A = -0.6559 B = -0.3399	I = 2.7919 A = -1.1481	I = 1.9558 A = -0.1963		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7603 A = -0.5578	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7603 A = -0.5578	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 1.7603 A = -0.5578	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905	I = 6.6792 A = -0.8166 B = -3.2905				

CAUTION: No holdover time guidelines exist

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	151.5	240.4	65.1	118.7	261.6	120.0	120.0	60.4	108.4	19.0	102.8
	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		
-8	100/0	57.9	112.0	51.4	93.8	206.7	32.6	97.6	48.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	57.9	112.0	43.8	80.0	176.1	32.6	97.6	48.0	54.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.5	39.1	18.1	38.2	102.0						
-25	100/0	23.5	39.1	6.7	14.2	38.0						
-29	100/0	23.5	39.1	4.3	9.0	24.1						

* 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 4-18: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.0589 A = -0.7941	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.0589 A = -0.7941	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.0589 A = -0.7941	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048	I = 3.3185 A = -0.8385 B = -0.6048				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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		
-8	100/0	108.1	197.6	33.5	69.4	180.7	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		
-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		
-18	100/0	31.9	66.0	22.9	49.3	135.4						
-25	100/0	31.9	66.0	19.1	41.1	112.9						
-29	100/0	31.9	66.0	17.6	37.8	103.9						

* 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 4-19: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4713 A = -0.2370	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.3729 A = -0.3927	I = 2.4943 A = -0.5000	I = 2.6531 A = -0.8558	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5177 A = -1.7715	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 3.0052 A = -0.7148 B = -0.3380	I = 2.8172 A = -1.2681	I = 1.9828 A = -0.5016		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.7838 A = -0.5976	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 1.7838 A = -0.5976	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	58.8	113.3	267.9	86.2	125.4	62.4	86.6	11.2	113.5
	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		
-8	100/0	19.0	96.5	46.6	89.6	211.9	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	19.0	96.5	39.7	76.5	180.8	25.4	85.3	19.1	26.5		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	23.2	40.2	2.0	9.0	45.0						
-25	100/0	23.2	40.2	1.0	3.0	20.0						
-26	100/0	23.2	40.2	0.0	2.0	10.0						

* 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 4-20: INLAND TECHNOLOGIES ECO-SHIELD®

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4628 A = -0.8425	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.5329 A = -0.8434	I = 1.8305 A = -0.1843	I = 2.4740 A = -0.7236	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4493 A = -0.8541	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.6693 A = -0.6224 B = -0.2015	I = 2.3150 A = -0.5411	I = 1.9809 A = -0.3441		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9894 A = -0.6913	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9894 A = -0.6913	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -25.5 °C (below -13 to -14 °F)	100/0	I = 1.9894 A = -0.6913	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

CAUTION: No holdover time guidelines exist

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	74.8	161.9	45.5	80.5	170.4	39.2	87.8	37.4	42.2	13.1	92.9
	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		
-8	100/0	71.2	155.7	39.6	70.0	148.2	51.6	86.5	31.6	39.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	71.2	155.7	36.0	63.7	134.8	51.6	86.5	31.6	39.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	32.1	60.4	2.0	9.0	45.0						
-25	100/0	32.1	60.4	1.0	3.0	20.0						
-25.5	100/0	32.1	60.4	0.0	2.0	10.0						

* 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 4-21: JSC RCP NORDIX DEFROST ECO 4

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.4080 A = -0.6597	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.1497 A = -0.2970	I = 2.5972 A = -0.7187	I = 2.2932 A = -0.6241	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5248 A = -1.1145	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.7595 A = -0.7621 B = -0.1757	I = 2.2310 A = -0.4646	I = 2.2288 A = -0.4780		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.8711 A = -0.5814	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.8711 A = -0.5814	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -25.5 °C (below -13 to -14 °F)	100/0	I = 1.8711 A = -0.5814	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	88.5	162.0	37.3	74.9	187.5	65.9	87.5	39.1	62.6	13.3	71.9
	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		
-8	100/0	55.7	154.6	33.0	66.3	166.0	51.7	80.6	36.4	49.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	55.7	154.6	30.4	61.1	152.9	51.7	80.6	36.4	49.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	29.2	49.7	2.0	9.0	45.0						
-25	100/0	29.2	49.7	1.0	3.0	20.0						
-25.5	100/0	29.2	49.7	0.0	2.0	10.0						

* 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 4-22: JSC RCP NORDIX DEFROST EG 4

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5056 A = -0.4182	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.0792 A = 0.0000	I = 3.0138 A = -0.8899	I = 2.5585 A = -0.6856	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.5610 A = -0.6008	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.8844 A = -0.5813 B = -0.1986	I = 2.6052 A = -0.7526	I = 2.5942 A = -0.4974		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.5376 A = -1.2454	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.5376 A = -1.2454	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 2.5376 A = -1.2454	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	163.4	239.7	85.7	146.0	293.9	120.0	120.0	58.9	105.3	18.7	120.0
	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		
-8	100/0	138.4	240.0	74.7	127.2	256.1	58.5	120.0	79.2	109.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	138.4	240.0	68.0	115.9	233.3	58.5	120.0	79.2	109.7		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	46.5	145.4	10.0	25.0	65.0						
-25	100/0	46.5	145.4	5.0	15.0	55.0						
-26	100/0	46.5	145.4	2.0	8.0	35.0						

* 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 4-23: JSC RCP NORDIX DEFROST NORTH 4

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6515 A = -0.7575	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.6377 A = -0.7492	I = 2.4403 A = -0.6778	I = 2.7110 A = -0.9348	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6157 A = -0.5906	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.7447 A = -0.8267 B = 0.0000	I = 2.6041 A = -0.7058	I = 2.5954 A = -0.7285		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.3727 A = -1.0450	I = 2.2480 A = -0.9120 B = 0.0000	I = 2.1544 A = -0.7565 B = 0.0000	I = 2.3979 A = -1.0000 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.3727 A = -1.0450	I = 2.2685 A = -1.1070 B = 0.0000	I = 2.2465 A = -1.0704 B = 0.0000	I = 2.3751 A = -1.1990 B = 0.0000				
below -25 to -26 °C (below -13 to -15 °F)	100/0	I = 2.3727 A = -1.0450	I = 2.1021 A = -1.1696 B = 0.0000	I = 2.1466 A = -1.2435 B = 0.0000	I = 2.4160 A = -1.5129 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	132.4	265.1	38.8	82.8	224.0	63.6	130.0	31.1	48.4	9.1	114.2
	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		
-8	100/0	159.5	274.1	38.8	82.8	224.0	65.7	129.1	37.8	60.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	159.5	274.1	38.8	82.8	224.0	65.7	129.1	37.8	60.8		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	43.9	114.3	10.0	25.0	65.0						
-25	100/0	43.9	114.3	5.0	15.0	55.0						
-26	100/0	43.9	114.3	2.0	8.0	35.0						

* 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 4-24: 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							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F 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		
below -3 to -14 °C (below 27 to 7 °F)	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	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9370 A = -0.5185	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9370 A = -0.5185	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28 °C (below -13 to -18 °F)	100/0	I = 1.9370 A = -0.5185	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	71.8	16.5	39.1	13.1	17.6		
-8	100/0	56.6	208.3	65.0	111.5	226.4	23.1	94.1	17.6	29.6		
	75/25	42.8	110.6	38.2	65.1	131.0	19.1	71.8	17.4	26.7		
-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		
-18	100/0	37.5	60.4	2.0	9.0	45.0						
-25	100/0	37.5	60.4	1.0	3.0	20.0						
-28	100/0	37.5	60.4	0.0	2.0	10.0						

* 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 4-25: NEWAVE AEROCHEMICAL FCY 9311

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.6186 A = -0.7874	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.5218 A = -0.6026	I = 2.7035 A = -0.8019	I = 2.4128 A = -0.6988	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.4840 A = -1.3099	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.8340 A = -0.7480 B = -0.3361	I = 2.4894 A = -0.8313	I = 2.3272 A = -0.7195		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		CAUTION: No holdover time guidelines exist
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9261 A = -0.6637	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9261 A = -0.6637	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481	I = 4.8041 A = -0.8155 B = -1.9481				
below -25 to -29.5 °C (below -13 to -21 °F)	100/0	I = 1.9261 A = -0.6637	I = 1.9749 A = -0.8155 B = 0.0000	I = 1.9749 A = -0.8155 B = 0.0000	I = 1.9749 A = -0.8155 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	117.0	240.8	35.8	71.0	174.7	70.9	126.1	38.2	64.6	12.7	84.0
	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		
-8	100/0	37.0	122.9	28.3	56.2	138.4	36.6	81.0	21.0	33.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	37.0	122.9	24.2	48.0	118.1	36.6	81.0	21.0	33.6		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	29.0	53.2	13.5	28.4	75.9						
-25	100/0	29.0	53.2	7.5	15.9	42.3						
-29.5	100/0	29.0	53.2	6.8	14.4	38.5						

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

TABLE 4-26: NEWAVE AEROCHEMICAL FCY-EGIV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.7246 A = -0.7713	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.5738 A = -0.6025	I = 2.6083 A = -0.7282	I = 2.6420 A = -0.7798	
	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		
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6090 A = -0.9888	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.9022 A = -0.8496 B = -0.2809	I = 2.8537 A = -1.0325	I = 2.4852 A = -0.6098		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 2.4392 A = -1.2580	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268			CAUTION: No holdover time guidelines exist	
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 2.4392 A = -1.2580	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268				
below -25 to -29 °C (below -13 to -20 °F)	100/0	I = 2.4392 A = -1.2580	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268	I = 3.8875 A = -0.9433 B = -1.0268				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	153.3	310.8	33.0	71.8	199.8	79.9	142.1	38.9	62.7	15.1	125.0
	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		
-8	100/0	82.8	204.8	27.1	59.1	164.4	50.5	135.5	42.9	64.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-10 / -14 ***	100/0	82.8	204.8	23.8	51.8	144.1	50.5	135.5	42.9	64.0		
	75/25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
-18	100/0	36.3	114.9	17.1	40.6	126.3						
-25	100/0	36.3	114.9	12.6	29.8	92.8						
-29	100/0	36.3	114.9	10.9	25.9	80.6						

* 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 4-27: SHAANXI CLEANWAY AVIATION CLEANSURFACE IV

REGRESSION COEFFICIENTS TABLE AND VERIFICATION TABLE

Outside Air Temperature	Fluid Dilution	Regression Coefficients for Calculating Holdover Times Under Various Weather Conditions							
		Freezing Fog, Freezing Mist, 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 °C and above (27 °F and above)	100/0	I = 2.5037 A = -0.3903	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 2.2230 A = -0.1299	I = 1.9595 A = -0.0138	I = 2.7249 A = -0.8143	
	75/25	I = 2.5266 A = -0.4875	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 2.7184 A = -0.9235	I = 1.9155 A = -0.2570	I = 2.4087 A = -0.7760	
	50/50	I = 2.4207 A = -0.8825	I = 2.9686 A = -1.0764 B = -0.4446	I = 2.9686 A = -1.0764 B = -0.4446	I = 2.9686 A = -1.0764 B = -0.4446	I = 2.2650 A = -0.7956	I = 1.7827 A = -0.4609	CAUTION: No holdover time guidelines exist	
below -3 to -14 °C (below 27 to 7 °F)	100/0	I = 2.6480 A = -1.2687	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 3.3279 A = -0.6974 B = -0.8278	I = 2.7839 A = -1.1024	I = 2.4424 A = -0.8195		
	75/25	I = 2.3477 A = -0.9386	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 3.2662 A = -0.8594 B = -0.6150	I = 2.5842 A = -0.9804	I = 2.3692 A = -0.6948		
below -14 to -18 °C (below 7 to 0 °F)	100/0	I = 1.9241 A = -0.6900	I = 2.3257 A = -1.4094 B = 0.0000	I = 2.2682 A = -1.3140 B = 0.0000	I = 2.5957 A = -1.6415 B = 0.0000				
below -18 to -25 °C (below 0 to -13 °F)	100/0	I = 1.9241 A = -0.6900	I = 2.4506 A = -2.4094 B = 0.0000	I = 1.7911 A = -1.3140 B = 0.0000	I = 1.6761 A = -1.1990 B = 0.0000				
below -25 to -28.5 °C (below -13 to -19 °F)	100/0	I = 1.9241 A = -0.6900	I = 1.5915 A = -1.2398 B = 0.0000	I = 1.6682 A = -1.3672 B = 0.0000	I = 6.0834 A = -5.7824 B = 0.0000				

1 Regression Equation: $t = 10^{I} R^{A}$, where t = holdover time (minutes) and R = precipitation rate (g/dm²/h)
2 Regression Equation: $t = 10^{I} R^{A} (2\text{-}T)^{B}$, where t = holdover time (minutes), R = precipitation rate (g/dm²/h) and T = temperature (°C)
3 CAUTION: Use of these coefficients is limited by the lowest usable precipitation rates provided in Table 5 and the highest usable precipitation rates provided in Table 6

Outside Air Temp. (°C)	Fluid Dilution	HOTDS Verification Times Under Various Weather Conditions (minutes) *As Calculated from Regression Coefficients*										
		Freezing Fog, Freezing Mist, 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	170.2	243.3	59.5	112.7	260.9	119.8	135.6	87.1	87.9	15.8	143.1
	75/25	153.4	239.8	43.1	94.8	266.9	48.9	118.3	36.0	42.6	9.0	73.5
	50/50	63.7	142.9	14.2	38.1	139.4	23.9	51.2	13.8	18.6		
-8	100/0	57.7	184.5	33.5	63.5	147.0	36.0	103.1	19.8	33.8		
	75/25	49.2	116.2	28.2	61.9	174.2	31.1	79.2	25.0	39.4		
-10 / -14 ***	100/0	57.7	184.5	22.7	43.0	99.6	36.0	103.1	19.8	33.8		
	75/25	49.2	116.2	21.1	46.4	130.5	31.1	79.2	25.0	39.4		
-18	100/0	27.7	52.0	2.0	9.0	45.0						
-25	100/0	27.7	52.0	1.0	3.0	20.0						
-28.5	100/0	27.7	52.0	0.0	2.0	10.0						

* 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 4-28: 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, Freezing Mist, 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	3	13	5	25	13	75	5
+1 / -3 *	100/0	74.8	161.9	31.1	62.3	138.6	39.2	70.6	19.0	33.7	8.2	63.8
	75/25	85.7	162.3	40.1	72.9	146.8	48.9	80.3	32.3	42.6	9.0	73.5
	50/50	30.7	52.7	10.0	26.4	71.8	16.5	39.1	9.4	17.6		
-8	100/0	19.0	96.5	26.8	53.7	123.6	23.1	69.1	17.6	26.5		
	75/25	28.4	80.0	28.2	61.9	131.0	19.1	62.6	17.4	26.7		
-10 / -14 **	100/0	19.0	96.5	22.7	43.0	99.6	23.1	69.1	17.6	26.5		
	75/25	28.4	80.0	21.1	46.4	117.6	19.1	62.6	17.4	26.7		
-18	100/0	17.5	34.2	2.0	9.0	45.0						
-25	100/0	17.5	34.2	1.0	3.0	20.0						

* 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 De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-2	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Aviation Shaanxi Hi-Tech Cleanwing II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Beijing Yadilite Aviation YD-102 Type II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing MP II FLIGHT	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing MP II FLIGHT PLUS	4 g/dm²/h	10 g/dm²/h	3 g/dm²/h	4 g/dm²/h
Cryotech Polar Guard® II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
JSC RCP NORDIX Defrost PG 2	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Kilfrost ABC-K Plus	3 g/dm²/h	10 g/dm²/h	4 g/dm²/h	3 g/dm²/h
Newave Aerochemical FCY-2	3 g/dm²/h	10 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Newave Aerochemical FCY-2 Bio+	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
ROMCHIM ADD-PROTECT NG Type II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
ROMCHIM ADD-PROTECT Type II	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h

Type III De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-25°C AND ABOVE*	*BELOW -25°C*	*-10°C AND ABOVE*	*-3°C AND ABOVE*
AllClear AeroClear MAX	3 g/dm²/h	3 g/dm²/h	not applicable	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 the FAA LWES AC (in no case less than 2.0 g/dm²/h) or (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 the FAA LWES AC.

TABLE 5: LOWEST USABLE PRECIPITATION RATES IN SNOW[1] (cont'd)

TYPE II, TYPE III AND TYPE IV FLUIDS[2]

Type IV De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-49	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AllClear ClearWing ECO	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AllClear ClearWing EG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite EG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite PG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight EG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight PG	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
CHEMCO ChemR EG IV	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
CHEMCO ChemR Nordik IV	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Max Flight 04	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Max Flight AVIA	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Max Flight SNEG	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing EG IV NORTH	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Clariant Safewing MP IV LAUNCH	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Clariant Safewing MP IV LAUNCH PLUS	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Cryotech Polar Guard® Advance	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Cryotech Polar Guard® Xtend	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Dow UCAR Endurance EG106	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Dow UCAR FlightGuard AD-49	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Inland Technologies ECO-SHIELD®	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost ECO 4	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost EG 4	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost NORTH 4	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Kilfrost ABC-S Plus	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h
Newave Aerochemical FCY 9311	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Newave Aerochemical FCY-EGIV	3 g/dm²/h	3 g/dm²/h	not applicable	not applicable
Shaanxi Cleanway Cleansurface IV	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h	3 g/dm²/h

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 the FAA LWES AC (in no case less than 2.0 g/dm²/h) or (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 the FAA LWES AC.

TABLE 6: HIGHEST USABLE PRECIPITATION RATES IN SNOW[1]

TYPE II, TYPE III AND TYPE IV FLUIDS[2]

Type II De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-2	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Aviation Shaanxi Hi-Tech Cleanwing II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Beijing Yadilite Aviation YD-102 Type II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Clariant Safewing MP II FLIGHT	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	40 g/dm²/h
Clariant Safewing MP II FLIGHT PLUS	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	40 g/dm²/h
Cryotech Polar Guard® II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
JSC RCP NORDIX Defrost PG 2	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Kilfrost ABC-K Plus	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	25 g/dm²/h
Newave Aerochemical FCY-2	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Newave Aerochemical FCY-2 Bio+	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
ROMCHIM ADD-PROTECT NG Type II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
ROMCHIM ADD-PROTECT Type II	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h

Type III De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-25°C AND ABOVE*	*BELOW -25°C*	*-10°C AND ABOVE*	*-3°C AND ABOVE*
AllClear AeroClear MAX	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable

1 The highest precipitation rate to be used as an input to the snow regression equations is constrained by the lower of: (1) the maximum allowable precipitation rate for snow specified in the FAA LWES AC (50 g/dm²/h) or (2) the highest usable precipitation rate (HUPR) 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 the FAA LWES AC.

TABLE 6: HIGHEST USABLE PRECIPITATION RATES IN SNOW[1] (cont'd)

TYPE II, TYPE III AND TYPE IV FLUIDS[2]

Type IV De/Anti-Icing Fluids				
FLUID DILUTION	100/0		75/25	50/50
TEMPERATURE	*-14°C AND ABOVE*	*BELOW -14°C*	*-14°C AND ABOVE*	*-3°C AND ABOVE*
ABAX ECOWING AD-49	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AllClear ClearWing ECO	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AllClear ClearWing EG	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite EG	45 g/dm²/h	25 g/dm²/h	not applicable	not applicable
ASGlobal 4Flite PG	45 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight EG	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
AVIAFLUID AVIAFlight PG	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
CHEMCO ChemR EG IV	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
CHEMCO ChemR Nordik IV	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Max Flight 04	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Max Flight AVIA	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Max Flight SNEG	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Clariant Safewing EG IV NORTH	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Clariant Safewing MP IV LAUNCH	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Clariant Safewing MP IV LAUNCH PLUS	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Cryotech Polar Guard® Advance	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Cryotech Polar Guard® Xtend	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Dow UCAR Endurance EG106	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Dow UCAR FlightGuard AD-49	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Inland Technologies ECO-SHIELD®	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost ECO 4	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost EG 4	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
JSC RCP NORDIX Defrost NORTH 4	45 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Kilfrost ABC-S Plus	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h
Newave Aerochemical FCY 9311	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Newave Aerochemical FCY-EGIV	50 g/dm²/h	25 g/dm²/h	not applicable	not applicable
Shaanxi Cleanway Cleansurface IV	50 g/dm²/h	25 g/dm²/h	50 g/dm²/h	50 g/dm²/h

1 The highest precipitation rate to be used as an input to the snow regression equations is constrained by the lower of: (1) the maximum allowable precipitation rate for snow specified in the FAA LWES AC (50 g/dm²/h) or (2) the highest usable precipitation rate (HUPR) 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 the FAA LWES AC.