



## Product Guide



# ClearWing ECO

**SAE AMS 1428/1 Type IV  
Aircraft Anti-Icing Fluid**

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## Table of Contents

|  |    |
|--|----|
| Table of Contents .....                                | i  |
| 1. About AllClear Systems, LLC .....                   | 1  |
| 2. The Product .....                                   | 1  |
| 3. Delivery Options .....                              | 2  |
| 4. Product Development Testing and Qualification ..... | 2  |
| 5. Regulatory Testing and Approval .....               | 3  |
| 6. Operational Data Summary .....                      | 4  |
| 7. Lowest Operational Use Temperature .....            | 5  |
| 8. Product Viscosity and Required Tests .....          | 6  |
| 9. Production Range Viscosity .....                    | 6  |
| 10. Lowest On-Wing Viscosity .....                     | 6  |
| 11. Storage and Handling .....                         | 7  |
| 11.1 Product Safety .....                              | 7  |
| 11.2 Storage Vessels .....                             | 8  |
| 11.3 Piping and Hoses .....                            | 9  |
| 11.4 Pumping and Handling .....                        | 9  |
| 11.5 Maintaining Product Integrity .....               | 9  |
| 11.6 Storage Stability .....                           | 10 |
| 12. Product Delivery Acceptance .....                  | 11 |
| 13. Product Usage .....                                | 12 |

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## 1. About AllClear Systems, LLC

AllClear Systems, LLC (hereinafter AllClear) is a dynamic, customer-focused company providing aviation de/anti-icing products to the commercial and military sectors of the aviation industry, with a service-delivery ethos that is second to none.

Headquartered near Philadelphia, Pennsylvania, AllClear has extensive regional product manufacturing and logistics capability across North America.

## 2. The Product

AllClear's ClearWing ECO is a Propylene Glycol-based anti-icing fluid containing water, corrosion inhibitors, wetting agents, thickening agents and an emerald green dye. The fluid has been tested in accordance with SAE International (SAE) Aerospace Material Specification (AMS) 1428/1 and has been fully qualified.

**WARNING:** ClearWing ECO is supplied to customers as a neat (100%), ready-to-use product. The fluid **SHALL NOT BE DILUTED** before use.

The details contained within this Product Guide were based on information believed to be reliable at the time of publication and are intended to provide general guidance on this product and its usage. All references within this document to third-party information were correct at the time of this document's publication.

AllClear Systems does not guarantee, expressly or implied, any specific properties of the product or the suitability of the product for a particular application. The user of the product must determine the product's suitability for the intended application and purpose. The user assumes all risk and liability in connection with the use of the product.

This Product Guide provides details and guidance information for the handling and use of ClearWing ECO. The user of ClearWing ECO shall ensure that the fluid is always employed in conjunction with the procedures and processes included in the latest version of SAE Aerospace Standard (AS) 6285 and all applicable service provider and/or air carrier de/anti-icing programs. The

user of ClearWing ECO shall also ensure that only properly trained personnel are employed to receive, handle and apply ClearWing ECO to aircraft.

The user of ClearWing ECO shall include applicable information from this Product Guide within employee training programs, to ensure company personnel are knowledgeable of product properties, handling considerations, limitations and performance characteristics, at a minimum.

This Product Guide (Version 3.0) is dated December 2022 and will remain in effect until a subsequent revision of the Product Guide is developed and made available on the [www.allclearsys.com](http://www.allclearsys.com) website. The user of the ClearWing ECO shall always ensure that the most recent version of the Product Guide is employed and that all previously issued Product Guides are removed from circulation and destroyed.

The user of ClearWing ECO shall read this entire document and the associated Safety Data Sheet (SDS) before receiving, handling or using ClearWing ECO.

### 3. Delivery Options

ClearWing ECO fluid can be obtained from AllClear in the following delivery formats:

- Bulk (typical volume, but can vary by region):
  - Tanker truckload up to ~32,000 litres (~8,450 US gallons)
  - ISO tank ~22,700 litres (~6,000 US gallons)
  - Railcar ~70,000 litres (~18,500 US gallons)
- IBC/Totes – ~1,000 litres (~265 US gallons)
- Drums – ~208 litres (~55 US gallons)

### 4. Product Development Testing and Qualification

SAE AMS 1428/1 establishes the testing and performance requirements for all glycol-based Type IV anti-icing fluids used in aircraft ground de/anti-icing operations. AMS 1428/1 requires the conduct of extensive product testing,

which measures the compatibility of materials used in aircraft construction with the fluid and establishes the compliance requirements for the physical properties of the fluid. In addition, AMS 1428/1 requires that anti-icing and aerodynamic performance tests are performed and that minimum performance results are achieved. [SEP]

ClearWing ECO fluid has been fully tested by accredited independent laboratories and has been found to meet or exceed the requirements of SAE AMS 1428/1. A copy of the full Fluid Qualification Report for ClearWing ECO can be obtained directly from AllClear upon request.

ClearWing ECO is included on the Qualified Fluids List published by the Anti-Icing Materials International Laboratory (AMIL). The list can be found at the following location:

<https://amillaboratory.ca/aircraft-deanti-icing-fluids/qualified-fluids-lists/>

## 5. Regulatory Testing and Approval

Holdover Time is defined as the estimated time that an anti-icing fluid will prevent the formation of frost or ice and the accumulation of snow on the treated surfaces of an aircraft.

ClearWing ECO fluid was rigorously tested in accordance with SAE Aerospace Recommended Practice (ARP) 5485 to determine the endurance times of the fluid when subjected to various winter weather conditions. This test program was completed by an accredited independent laboratory and was supported by Transport Canada (TC) and the Federal Aviation administration (FAA), resulting in the development of a fluid Holdover Time Table for ClearWing ECO that was published by each regulator in their respective annual Holdover Time Updates. ClearWing ECO has also been included on the TC and FAA lists of approved fluids.

The TC and FAA Holdover Time Updates, which include the lists of approved fluids and the fluid-specific Holdover Time Table for ClearWing ECO, can be found at the following locations:

### **Transport Canada**

[www.tc.gc.ca/eng/civilaviation/standards/commerce-holdovertime-menu-1877.htm](http://www.tc.gc.ca/eng/civilaviation/standards/commerce-holdovertime-menu-1877.htm)

**Federal Aviation Administration**

[www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/deicing](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/deicing)

The user of ClearWing ECO shall always ensure that the most current version of the ClearWing ECO Holdover Time Table is employed in operations, as these tables may change from year to year based on potential changes to test protocols, regulatory requirements or other considerations.

**6. Operational Data Summary**

| <b>ClearWing ECO</b>               |  |
|------------------------------------|--|
| Composition                        | Propylene Glycol-based liquid  |
| Color                              | Emerald Green  |
| Dilution                           | <b><u>Must Not Be Diluted</u></b>  |
|                                    |  |
| Lowest Operational Use Temperature | <u>High Rotation Speed</u><br><u>Take-off Aircraft</u>   |
|                                    | <b>-26°C (-15°F)</b>   |
| Product Freezing Point             | -37°C (-34.6°F)  |
|                                    |  |
| Viscosity at 20°C (68°F)           |  |
| Production Range:                  | 42,300 to 51,900 mPa.s   |
| Lowest On-Wing Viscosity:          | 42,000 mPa.s   |
| Viscosity Measurement Method:      | LV2-disc (with guard leg), 600 mL low form (Griffin) beaker, 425 mL fluid, 20°C, 0.3 rpm, 10.0 minutes |
|                                    |  |
| Application                        | Apply <b>unheated</b> , using only low shear nozzles and suitable pumps.                               |



## 7. Lowest Operational Use Temperature

The Lowest Operational Use Temperature (LOUT) for a Type IV fluid is defined as the higher (warmer) temperature of:

- The freezing point of the fluid plus the required freezing point buffer of 7°C (12.6°F) for a Type IV fluid. In the case of ClearWing ECO, the freezing point plus the buffer is equal to -30°C (-37°C + 7°C) or -22°F (-34.6°F + 12.6°F); and <sup>[1]</sup><sub>[SEP]</sub>
- The lowest temperature at which the fluid meets the aerodynamic acceptance test (determined in accordance to SAE AS 5900) for a given type of aircraft rotation speed (high-speed or low-speed). In the case of ClearWing ECO, the aerodynamic acceptance is -26°C (-15°C).

As such, the LOUT of ClearWing ECO fluid for high-speed aircraft has been determined to be -26°C (-15°F).

The user of ClearWing ECO shall ensure that the LOUT is respected at all times and that ClearWing ECO is **never applied to aircraft surfaces below -26°C (-15°F).**



## 8. Product Viscosity and Required Tests

ClearWing ECO fluid is a thickened fluid with high viscosity designed to protect clean aircraft surfaces against the reformation of ice, frost and snow. The fluid is designed to remain on aircraft surfaces until the shear forces of the take-off roll are exerted upon the fluid. As such, the viscosity of the fluid plays a significant role in the overall performance of the fluid.

AllClear employs the following methodology for measuring and reporting the viscosities of ClearWing ECO fluid:

- Brookfield LVT Viscometer, DV-II or equivalent, equipped with spindle LV2-disc (with guard leg);
- 425 mL of fluid is placed in a 600 mL low form (Griffin) beaker;
- Test temperature = 20°C (68°F);
- The viscometer is started at a test speed of 0.3 rpm;
- The measurement (in millipascal-seconds or mPa.s) is recorded at precisely 10 minutes time.

The user of ClearWing ECO should perform periodic measurements of fluid viscosity to ensure the quality of ClearWing ECO used in operations, including pre-seasonal tests of fluid stored in tanks and vehicles, as per the requirements in SAE AS 6285.

## 9. Production Range Viscosity

The Production Range Viscosity for ClearWing ECO fluid has a lower limit of 42,300 mPa.s and an upper limit of 51,900 mPa.s. ClearWing ECO fluid received by the user shall always be within this defined range. More details on Product Delivery Acceptance will be provided in Section 12 of this Product Guide.

## 10. Lowest On-Wing Viscosity

The Lowest On-Wing Viscosity (LOWV) for ClearWing ECO is the lowest viscosity at which the fluid-specific holdover times for ClearWing ECO will apply. The LOWV for ClearWing ECO, which is identified in the TC and FAA

Holdover Time guidance material, is 42,000 mPa.s, using AllClear's recommended fluid viscosity measurement methodology (identified in Section 8 of this Product Guide).

SAE AS 6285 and global air carrier de/anti-icing programs require that testing is performed on an annual basis to ensure that de/anti-icing vehicles used in operations do not shear Type IV fluids below the LOWV. These tests are vital to ensure the performance of ClearWing ECO. The user of the fluid shall perform tests and collect samples according to procedures included in AS 6285 and/or the carrier programs. These samples shall then be tested for viscosity using AllClear's recommended viscosity measurement methodology. Alternatively, fluid samples may be collected and sent to AllClear for measurement.

Tests to determine compliance of fluid sprayed through de/anti-icing vehicle nozzles with the documented LOWV should be performed a minimum of one time annually prior to the onset of the season, but air carriers and other end users may also require additional testing at various points during the year or whenever equipment is repaired or new equipment is introduced. For more details on spray tests, consult the various air carrier programs or contact an AllClear representative for guidance.

## 11. Storage and Handling

It is very important that ClearWing ECO is stored and handled correctly to prevent degradation and the potential for performance reduction.

### 11.1 Product Safety

The user shall always consult the latest SDS, as appropriate to local jurisdiction, before handling the ClearWing ECO product. All necessary steps to ensure that this product is used safely and in an environmentally responsible manner consistent with all applicable regulations shall be observed.

Regulations and use conditions are subject to change by government, state, provincial and local authorities. It is the user's responsibility to determine that the available information is appropriate and complete in order to comply with the applicable laws and regulations in force at the time and place of use.

The user should provide all applicable safety information to its employees, contractors, customers, or any other users of the product, and request that they do the same.

Areas sprayed with glycol-based products may become slippery. Caution shall be maintained while operating equipment or walking on areas exposed to these products. Even areas only affected by overspray or dripping should be treated with the same caution. Before you enter vehicles, aircraft or buildings, wipe your feet and be aware that vehicles, and even foot traffic, can cause other areas to become slippery. If vacuum trucks are available, they can remove excess accumulations on the ground. If further ground cleanup is required using solid or absorbent materials, ensure that these are quickly removed and disposed of in accordance with the regulations in force at your location.

## 11.2 Storage Vessels

ClearWing ECO should only be stored in vessels made from either stainless steel, or light colored opaque high-density polyethylene (dark colors can generate higher internal tank temperatures due to sunlight exposure). Other materials may be considered on a case-by-case basis, subject to receipt of written approval from AllClear.

All storage vessels (bulk, tote and drum) and associated pumps, piping and hoses should be kept in a well-maintained and clean condition.

When supplied in totes and drums, it is preferable for these storage units to be stored inside a dry building with all fill and drain ports protected against damage. They should be kept away from direct heat sources.

Totes should be shielded from sources of ultraviolet (UV) light, which include fluorescent lights and sunlight. If this is not possible, storage units should be fully covered to prevent UV exposure. Failure to do so may result in the product dye color fading and possibly also cause a decrease in product viscosity.

ClearWing ECO is not corrosive and will not damage materials commonly used for storage tanks, pumps, fittings and transfer lines, as well as many gasket, seal and hose elastomers. Avoid using dissimilar metals in contact with each other as galvanic action can occur, which may degrade the fluid.

Some, but not all, symptoms of galvanic action occurring may be indicated by the presence of gels or light residues.

### 11.3 Piping and Hoses

All piping and hoses should be dedicated solely for use with this product, clearly labeled, color-coded and well maintained. A minimum pipe or hose diameter of 8 centimeters (3 inches) is recommended.

It is recommended that fixed piping used for this product is made from stainless steel. The piping surfaces should be smooth, and sharp bends must be avoided. Again, be aware of the use of dissimilar metals and the potential for galvanic action to degrade the fluid.

Flexible hoses approved for use with either petroleum-based products or chemical solvents should be used. Hose fittings should be capped when not in use and stored off the ground to keep them free from contaminants.

### 11.4 Pumping and Handling

It is preferable for either compressed air or gravity to be used to transfer ClearWing ECO. If this is not possible, then low-shear diaphragm or progressive cavity pumps must be used. Product circulation should be limited as extended use may cause degradation.

ClearWing ECO should not be filtered as an increase in shear potential may result in viscosity degradation.

### 11.5 Maintaining Product Integrity

All fluid storage vessels or deicing unit tanks should be clean, dry and stain free prior to initially filling with ClearWing ECO. **Do not** mix ClearWing ECO with any other product. **Do not dilute ClearWing ECO** before use. Tank access hatches and fill/dispense ports should be properly closed and sealed to prevent ingress of foreign matter.

Once ClearWing ECO has been loaded into a de/anti-icing vehicle or spray equipment, it must not be transferred back into a storage tank, tote, drum or similar vessel that contains fresh ClearWing ECO. This will prevent the possibility of contamination in the deicing application equipment from degrading the fresh product in the storage vessel.

ClearWing ECO must be stored unheated.

The dye in ClearWing ECO is designed to degrade upon exposure to UV light, causing the product color to gradually fade. This color loss is most noticeable in sight level tubes used on storage tanks or deicing trucks and these shouldn't be used as the sole means of determining the appearance of the fluid inside the tank. Exposure to UV light may also cause a decrease in product viscosity.

If the integrity of the product is in doubt, the user should contact AllClear for guidance.

### 11.6 Storage Stability

Provided that storage requirements are adhered to, under normal ambient conditions the shelf life of ClearWing ECO will exceed one year. It is recommended that, at a minimum, product samples are quality tested against AllClear specifications prior to use at the start of each deicing season. Each company or customer may also specify that a more frequent schedule is adopted.



## 12. Product Delivery Acceptance

Prior to accepting delivery of ClearWing ECO, the user shall confirm that:

- All delivery vessel port caps are secured with identifiable tamper proof seals that match the delivery documentation;
- All delivery documentation/labeling refers to ClearWing ECO;
- The product complies with the test parameters described on the delivery Certificate of Analysis (C of A), in accordance with the product acceptance procedures employed by the user or specified by the air carriers. The following table summarizes the C of A acceptance criteria.

| ClearWing ECO   |  |
|---|--|
| Base Composition  | Propylene Glycol   |
| Appearance  | Emerald Green colored liquid, free from any visible impurities. Air bubbles may be present.                                      |
| pH at 20°C  | 7.0 – 7.9  |
| BRIX at 20°C  | 34.2 – 37.2  |
| Refractive Index at 20°C  | 1.3887 – 1.3943  |
| Viscosity at 20 °C<br>Note: Delivery only.  | 42,300 to 51,900 mPa.s<br>LV2-disc (with guard leg), 600 mL low form (Griffin) beaker, 425 mL fluid, 20°C, 0.3 rpm, 10.0 minutes |
| <b>If any test results are out of range, <u>do not use</u>; contact AllClear immediately.</b> |  |

## 12.1 Refractometers

While laboratories use specialized equipment and procedures to determine fluid refractive index, or degrees Brix, this is not necessarily practical for testing during winter operations on the airport. In the field, temperature-compensated, correctly calibrated, portable refractometers are more convenient for operational usage. Do not use hydrometers on AllClear products.

The user should contact AllClear for guidance on obtaining a suitable refractometer model for use with AllClear products.

The user should always comply with the refractometer manufacturer's requirements for the maintenance and calibration schedule of the selected refractometer, as well as its proper care and use.

## 13. Product Usage

### 13.1 Introduction

Aircraft manufacturers provide recommendations for the de/anti-icing their aircraft models in maintenance and operating manuals. Additionally, aviation regulators, such as TC and the FAA, require air operators to have a regulator approved ground icing operations program. Industry standards, material specifications and recommended practices published by SAE are employed generally as the basis for these programs and should be adhered to by the user of ClearWing ECO.

Environmental considerations may need to be adopted depending on federal, state, provincial and local agency requirements at the airport location.

Consideration should be given to the suitability of the de/anti-icing location with respect to all applicable airport operational and environmental factors.

**CAUTION:** As with any aircraft deicing or anti-icing process, only personnel who have been properly trained in the use of ClearWing ECO fluid in accordance with the requirements of applicable approved Ground Icing Operations Program should be employed. Personnel should also be kept up to date on revised ClearWing ECO technical material as provided from time to time by AllClear.



## 13.2 Product Strength

**ClearWing ECO must only be used in an undiluted state.** This is defined as the fluid being in a “Neat” condition (undiluted as shipped by the fluid manufacturer). Dilution is not permitted as the fluid protection time performance has been determined based upon independent testing of the “Neat” fluid. Holdover times do not exist for dilutions of this product.

When reporting the fluid strength to aircraft flight crews as part of the communication of the anti-icing code, this could be stated as “Type IV, AllClear Systems, ClearWing ECO, 100%”. The user should always follow standard or customer-specific communication requirements at all times.

## 13.3 Precautions

- a) ClearWing ECO is only to be applied unheated and is recommended for application on aircraft exterior surfaces only.
- b) Prior to any individual piece of deicing equipment being filled with ClearWing ECO for the first time, and prior to it being used to anti-ice an aircraft, the user should ensure:
  - i. That the anti-icing fluid storage tank, associated pump(s), valves, pipes, hoses and nozzles have been thoroughly cleaned to remove all traces of prior products or foreign contaminants. Once filled, operate the fluid spray system until a steady stream of clean ClearWing ECO is viewed at the nozzle;
  - ii. That all local safety and environmental regulations in effect for test spraying a propylene glycol-based product shall be complied with; and
  - iii. That fluid samples from the spray nozzle are collected and returned to AllClear for verification of fluid viscosity with the ClearWing ECO specification.
- c) Following any subsequent major deicing equipment pumping and spraying system maintenance, and prior to the equipment being used to anti-ice an aircraft, ensure that in addition to a system cleanliness check, fluid samples are taken from the spray nozzle and returned to AllClear for verification of fluid viscosity with the ClearWing ECO specification.
- d) ClearWing ECO should not be used on:

- Helicopters (unless approved by the helicopter manufacturer);
  - Areas designated by the aircraft manufacturer as no-spray zones. The user of ClearWing ECO should refer to air carrier programs or SAE AS 6286 for more details on aircraft diagrams and no-spray zones. Common examples have historically been, but are not limited to, cockpit windows, aircraft brakes, engine/auxiliary power unit inlets and exhausts, passenger or cargo door gaps, systems inlets or vents, instrument sensors etc.;
  - Runways;
  - Pavement;
  - Roadways;
  - Sidewalks;
  - Vehicles; or
  - Ground Support Equipment.
- e) ClearWing ECO should not be used as antifreeze for:
- Vehicles;
  - Ground Support Equipment;
  - Sanitary Water Facilities; or
  - Aircraft or Portable Lavatories.
- f) ClearWing ECO should not be applied using forced air application systems. Some de/anti-icing vehicles have forced air application systems that are designed to reduce the amount of fluid required for deicing operations. These trucks may either inject the fluid into the airstream, or on top of it. Applying anti-icing fluids using forced air assistance can seriously degrade the viscosity of the product to the point that it may not conform to its original qualification parameters. Forced air application may also result in a thinner or uneven coating of fluid on the wing. Additionally, holdover times have not yet been established for ClearWing ECO applied with forced air assistance equipment.
- g) Some aircraft operators may allow the application of anti-icing fluid to uncontaminated aircraft surfaces if freezing precipitation is not present but is expected to start prior to the scheduled departure time. This

preventative practice can minimize the possibility of snow and ice bonding to aircraft surfaces or reduce the accumulation of frozen precipitation on aircraft surfaces making subsequent deicing easier, although it does increase the potential of building up dried product residues.

If this preventative practice is allowed by the air operator's approved program, care should be taken to ensure that any applicable holdover times are not exceeded. If the expected holdover time will be exceeded, the aircraft should be thoroughly deiced before flight using heated Type I and then anti-iced as appropriate for the conditions.

### 13.4 Application Guidance

The following guidance is provided for general information purposes only. The user is responsible for employing correct application procedures compliant with SAE standards, regulatory requirements, airframe manufacturer requirements and customer de/anti-icing program requirements.

ClearWing ECO Type IV anti-icing fluid has been designed for use as either:

1. The second step of a two-step de/anti-icing process following correct application of a fully qualified SAE AMS 1424/1 Type I deicing fluid heated to 60°C to 82°C (140°F to 180°F).
2. A standalone anti-icing fluid applied on a clean aircraft.

ClearWing ECO should be:

- Applied unheated, using only low shear nozzles and positive displacement or screw pumps;
- Applied only after a check to confirm that the applicable aircraft surfaces are clean in accordance with all applicable programs, regulations and procedures;
- Applied in sufficient quantity to ensure a stabilized thickness of fluid of 1 to 3 millimeters on aircraft surfaces. For more information on suggested spray quantities for various aircraft types, the user of ClearWing ECO should consult the air carrier programs or SAE AS 6286.

### General ClearWing ECO Application Tips:

Using a low-shear pumping system and nozzle, ClearWing ECO should be applied with a reduced flow rate and a fan spray setting to lay an even coating over the surface being treated. High fluid pressures and flow rates can be detrimental to this product reducing fluid viscosity and resulting in reduced fluid holdover performance.

Proper and uniform coverage should be ensured by applying a sufficient quantity to completely remove any remaining Type I fluid. Aircraft surfaces should be coated to a depth of 1 to 3 millimeters. Insufficient application will result in a thin layer and reduced holdover protection.

ClearWing ECO will quickly provide even and effective coverage.

After spraying an area, the user should take a moment to see how the fluid is flowing to provide the required coverage. ClearWing ECO's flow properties may differ from those of previous fluids employed by the user.

### Two-Step De/Anti-Icing Operations

This process is generally used when frozen deposits are required to be removed from the aircraft and active freezing precipitation is either occurring or is expected before take-off of the aircraft.

- First step: A fully qualified SAE AMS 1424/1 Type I deicing fluid shall be used to clean the aircraft surfaces in accordance with the procedural and inspection requirements of the approved program in effect for the aircraft. The Type I fluid should be heated to 60°C to 82°C (140°F to 180°F).
- Second step: After the Type I application has been satisfactorily completed and the required aircraft surfaces are clean, ClearWing ECO should be applied to the clean surfaces typically within 3 minutes of the Type I application and prior to the onset of any refreezing of the Type I fluid. Unheated, undiluted ClearWing ECO anti-icing fluid should be applied in sufficient quantity to the required aircraft surfaces to adequately displace any Type I used in the first step and also to form a layer of suitable thickness to provide adequate protection.

### One-Step Anti-Icing Operations

While not a common practice, this process is sometimes used as a preventative measure on clean aircraft surfaces prior to the start of active precipitation. Examples of using this practice might be, but are not limited to, when frost or freezing precipitation is expected to start or when fluid is applied to clean aircraft surfaces in a hangar.

**CAUTION:** Do not use ClearWing ECO on an aircraft that still has contamination present on its surfaces.

**CAUTION:** In one-step anti-icing operations, the holdover time of ClearWing ECO always starts upon first application of the anti-icing fluid, even if active precipitation has yet to start. The anti-icing fluid should be removed with heated Type I prior to the next take-off if either:

- The applicable holdover time has expired; or
- The required inspection of pre-treated aircraft surfaces identifies contamination prior to the departure of the aircraft.

**CAUTION:** In the event that ClearWing ECO is applied in the hangar to aircraft surfaces and the fluid holdover time is exceeded, the failed fluid needs to be removed from the aircraft using an acceptable process or heated Type I fluid (if available) and the one-step anti-icing process needs to be repeated, if required.

### Monitoring Fluid Effectiveness

ClearWing ECO is designed to absorb and melt precipitation to prevent recontamination occurring on aircraft surfaces for a period of time known as holdover time. As with any SAE deicing or anti-icing fluid, continued exposure to precipitation after application will dilute the fluid and will eventually cause the fluid to lose its effectiveness in preventing frozen contamination from reforming.

It is important that both flight and ground personnel are trained to recognize when this might be about to happen or has happened. A fluid will typically start to lose its gloss and dye when it is losing its effectiveness. At this point it may be close to providing inadequate protection, so it is important to also look for signs of snow or ice accumulation, surface freezing, build-up of ice

crystals in or on the fluid, or the presence of slush. A pre-takeoff check, or if necessary, a pre-takeoff contamination check, may be the only way to determine if an aircraft is free of contamination prior to take-off.

### 13.5 Anti-Icing Fluid Runoff and Mitigation

Anti-icing fluid runoff mitigation control measures may be required at your airport. ClearWing ECO is produced using high-quality propylene glycol, and therefore complying with any required mitigation measures may be simplified when it is used in conjunction with a propylene glycol-based Type I deicing fluid.

All applicable authorities should be consulted to assure compliance with federal, state, provincial and local laws as appropriate. It is the responsibility of the user to determine and ensure compliance with all applicable legal requirements.

Fluid runoff will contain additional materials that are not present in the products when they are supplied by AllClear. Such runoff should be tested to determine its material composition and the measures needed to dispose of it to comply with the applicable legal requirements.

