Application Note
Aviation Industry

SCHMIDT HAENSCH

Measurement of Aviation De-Icing Fluids

Reliable Concentration Control of Ethylene Glycol and Propylene Glycol

Safe Aircraft De-Icing Through Reliable Fluid Control
Aircraft operating in winter conditions require effective protection against ice and snow. Ground de-icing fluids are commonly based on ethylene glycol (EG) or propylene glycol (PG) mixed with water. They are sprayed onto the fuselage, wings and control surfaces to remove frozen contamination and support safe aircraft operation.

The effectiveness of a de-icing fluid strongly depends on its glycol concentration. Additional water introduced by precipitation, melted snow and ice, or unintended dilution changes the composition of the fluid and consequently its freezing behavior. Reliable concentration monitoring is therefore an important element of de-icing fluid quality control.

At the same time, airports have an increasing interest in collecting and recovering used de-icing fluids. Instead of treating glycol-containing runoff solely as wastewater, suitable recovery processes can separate, concentrate and prepare the glycol solution for further use. The process diagram on page 1 of the source application note illustrates such a cycle, from aircraft spraying and apron drainage through filtration and regeneration to the final storage tank.

De-Icing Fluid Application
During ground de-icing, a glycol/water mixture is distributed over the aircraft using fixed spraying equipment or mobile de-icing vehicles. Correct fluid composition is essential because excessive dilution increases the freezing point and reduces the available protection against freezing conditions. Quality control can therefore include the measurement of refractive index. Because the refractive index of a glycol/water mixture changes with glycol concentration, refractometry provides a fast means of determining whether the fluid remains within the required concentration range. The measurement can consequently be used as an indirect indicator of the expected freezing behavior of the mixture.

Refractive Index as Process Analytical Tool (PAT)
Refractive index measurement provides a practical method for monitoring glycol concentration directly in the process. Instead of relying exclusively on manual sampling, an inline sensor can continuously detect changes in fluid composition. This is particularly useful in aviation de-icing because water may enter the fluid at several stages. During spraying and collection, precipitation and melted ice can dilute the glycol solution. During recovery, the concentration changes again as water and solids are separated from the collected fluid. Continuous measurement makes these changes immediately visible and provides process information for quality control and recovery operations.

For glycol-based fluids, inline refractometry can support:

- Continuous monitoring of glycol concentration
- Rapid detection of dilution by water
- Consistent de-icing fluid quality
- Reduced manual sampling requirements
- Process control during fluid collection and recovery
- Verification of glycol concentration before storage or reuse
- More efficient use of valuable de-icing chemicals

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Solution from SCHMIDT + HAENSCH

Using the **SCHMIDT + HAENSCH Full-Range Inline Process Refractometer iPR FR²** provide a reliable method for monitoring the concentration of sizing agents during textile ultrafiltration and recovery processes. Installed directly in the ultrafiltration circulation loop or process piping, the refractometer delivers continuous real-time concentration measurements throughout the entire recovery process. This enables immediate detection of concentration changes and ensures optimal recovery efficiency as well as consistent sizing agent quality for reuse. The iPR FR² can be installed on the pressure side of the circulation pump, directly in the UF system, or alternatively in a bypass line for flexible process integration without interrupting production operations.



iPR FR²

Product type	Product
Process Refractometer	iCS² PG or EG Inline Concentration Sensor with ethylene glycol or propylene glycol scale
Accessories	VARINLINE® housings (severals ends and diameters)
Accessories	VariVent Tank weld-in flange

Advantages

- Accurate, reliable, and fast inline concentration measurement
- Continuous real-time monitoring during ultrafiltration and recovery processes
- Optimized recovery efficiency of sizing agents such as starch, CMC, and PVA
- Reduced water consumption and wastewater discharge
- Lower operating and chemical costs through reuse of sizing materials
- Reduced risk of production interruptions and process deviations
- Consistent sizing agent quality for textile production reuse
- Enhanced sustainability and resource efficiency in textile processing

Typical industries

- Aviation and airport operations
- Aircraft ground de-icing services
- Airport de-icing fluid management
- De-icing fluid recovery and recycling
- Glycol-based fluid production and blending

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