

## **Society of Flight Test Engineers**

**“Improving Flight Safety using cost efficient test techniques”**

**TITLE: Use of HISS to certificate helicopter operations in icing conditions**

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## ABSTRACT

This paper presents the flight procedures adopted during artificial icing testing activity and the advantages given by the use of the HISS (Helicopter Icing Spray System) in the certification process of any ice protection system.

Natural icing tests have been fully documented in the certification reports, while artificial tests, being considered development activity, were mainly carried out in a provisional configuration and only partially included in the certification documentation.

The flight activity has been carried out with AW139 AC7, in 2007 and 2008 winter seasons, in Duluth, MN, for Limited Icing and Full Icing certification respectively.

The scope of this paper is to gather and keep track of the knowledge regarding:

- ice characteristics and related meteorology
- helicopter behavior in icing conditions
- icing test procedures
- test crew workload sharing
- safety considerations related to icing test
- Anti-ice/de-ice systems
- Satisfying the requirements to support an icing certification

Besides, the considerable amount of experience gathered during the two campaigns, allows optimizing the HISS test planning, balancing the different task of the artificial icing tests. The definition of the test point matrix to be flown must be planned with flexibility, to allow on going modification based on the obtained results, and should be guided by the following rules:

- Safety of flight in icing condition
- Opportunity to discover defects or limits of the system
- Need to verify and validate the prototype instrumentation and calibrate the sensors of the final (production) configuration
- Cover the largest possible envelope of icing conditions
- Cover of the test points required by the rules but rarely achievable in nature

The HISS campaigns carried out successfully contributed to the development and certification process of both FIPS and LIPS.