Terminal Area Icing Weather Information for NextGen (TAIWIN)

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Introduction

• FAA released new aircraft icing regulations on November 4, 2014.

• Portion of Part 25 aircraft, addressing supercooled large drop (SLD), mixed phase, and ice crystal icing conditions.

• TAIWIN addresses only SLD
Appendix O (1/3)

- SLD environments are freezing drizzle (FZDZ) or freezing rain (FZRA) environments
  - FZDZ Environments - Conditions with spectra maximum drop diameters from 100 μm to 500 μm
  - FZRA Environments - Conditions with spectra maximum drop diameters greater than 500 μm
Appendix O (2/3)

  – Note. Appendix O was known as Appendix X when report was published.
  – Provides explanation of data and analysis used in the development of Appendix O.
Appendix O (3/3)

• Appendix O or DOT/FAA/AR-09/10
  – “freezing drizzle and freezing rain environments”
  – FZDZ, FZRA, and smaller drops aloft

• Proposed Aircraft Flight Manual (AFM) limitations on operations in SLD
  – Ground is included

• TAIWIN focuses on ground conditions and conditions aloft in the terminal area.
§ 25.1420 Aircraft Affected

• No aircraft have applied for certification under rule as yet

• **Subject to new rule:** New type design airplanes with a maximum takeoff weight less than 60,000 pounds or with reversible flight controls
  – Includes some new design regional jets and smaller turboprops

• **Not subject to new rule:**
  – “Grandfathered” aircraft - Aircraft designs which are currently certified or have begun the icing certification process for Appendix C will not be subject to the new rule.
Part 23 Aircraft and SLD

- General Aviation (GA) aircraft mainly fall under Part 23
- Part 23 airplanes are under 12,500 pounds
- No proposed rule 23.1420 Supercooled Large Drop Conditions has been published in the Federal Register
- Part 23 SLD rule is under review in the Small Airplane Directorate
Review:
§25.1420 and Appendix O

- (a) (1): Certified to Appendix C but must detect and exit Appendix O, or
- (a) (2): Certified to operate in a selected portion of Appendix O, or
- (a) (3): Certified to operate in all Appendix O.

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<th>Appendix O</th>
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Takeoff and Landing Limitations

• Based on the certification, a statement will be placed in the Limitations Section of the Airplane Flight Manual.

• Proposed statements in accompanying advisory circular

• (a)(1) “Intentional flight, including takeoff and landing, into freezing drizzle or freezing rain conditions is prohibited.

• (a)(2) “Intentional flight, including takeoff and landing, into freezing rain conditions is prohibited.
Information Available to Pilots

• How do pilots decide?

• The information currently available to pilots is currently not deemed robust enough to make sound decisions such as diverting to an alternate airport.

• Central purpose of TAIWIN: Improve the information on icing, particularly SLD icing, available in terminal area.
TAIWIN Goals

• To provide:
  – Real-time representative rate measurement of all ground-level precipitation types and accurate identification of precipitation type
  – Highly resolved, timely diagnoses and forecasts for terminal area freezing precipitation that provide local-area information
  – Highly resolved, timely icing conditions aloft in the terminal area that quantify cloud properties in four-dimensions (4-D) to support aircraft trajectories
TAIWIN Approach

• Near-term requirements to implement terminal area icing information with current capabilities

• Follow-on plan for more mature TAIWIN capability needs with the improvement and/or development of technologies and icing weather information
  • Current improvements and enhancements
  • New methods
  • Delivery
TAIWIN Stages

• **Stage I:** current state of observational weather information for icing conditions, both at the ground and aloft.

• **Stage II:** capable of identifying and distinguishing between Appendix C and Appendix O icing conditions.

• **Stage III:** capable of distinguishing between the icing conditions defined in Appendix C and the subsets of Appendix O (FZDZ versus FZRA aloft).

• **Stage IV:** provide a capability at a spatial and temporal resolution that allows arrival and departure routings within the terminal area to be tailored with respect to the icing conditions.
# TAIWIN Stages

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Conclusion

• TAIWIN ConOps
• NCAR and other organizations
• Optimistic!
Thank You!

Questions?