

the various components of the airplane is adequate, taking into account the various airplane operational configurations; and

(b) To verify the ice protection analysis, to check for icing anomalies, and to demonstrate that the ice protection system and its components are effective, the airplane or its components must be flight tested in the various operational configurations, in measured natural atmospheric icing conditions and, as found necessary, by one or more of the following means:

(1) Laboratory dry air or simulated icing tests, or a combination of both, of the components or models of the components.

(2) Flight dry air tests of the ice protection system as a whole, or of its individual components.

(3) Flight tests of the airplane or its components in measured simulated icing conditions.

(c) Caution information, such as an amber caution light or equivalent, must be provided to alert the flightcrew when the anti-ice or de-ice system is not functioning normally.

(d) For turbine engine powered airplanes, the ice protection provisions of this section are considered to be applicable primarily to the airframe. For the powerplant installation, certain additional provisions of subpart E of this part may be found applicable. (e) One of the following methods of icing detection and activation of the airframe ice protection system must be provided:

(1) A primary ice detection system that automatically activates or alerts the flightcrew to activate the airframe ice protection system;

(2) A definition of visual cues for recognition of the first sign of ice accretion on a specified surface combined with an advisory ice detection system that alerts the flightcrew to activate the airframe ice protection system; or

(3) Identification of conditions conducive to airframe icing as defined by an appropriate static or total air temperature and visible moisture for use by the flightcrew to activate the airframe ice protection system.

(f) Unless the applicant shows that the airframe ice protection system need not be operated during specific phases of flight, the requirements of

paragraph (e) of this section are applicable to all phases of flight.

(g) After the initial activation of the airframe ice protection system—

(1) The ice protection system must be designed to operate continuously;

(2) The airplane must be equipped with a system that automatically cycles the ice protection system; or

(3) An ice detection system must be provided to alert the flightcrew each time the ice protection system must be cycled.

(h) Procedures for operation of the ice protection system, including activation and deactivation, must be established and documented in the Airplane Flight Manual.

[Amdt. 25-72, 55 FR 29785, July 20, 1990, as amended by Amdt. 25-121, 72 FR 44669, Aug. 8, 2007; Amdt. 25-129, 74 FR 38339, Aug. 3, 2009]

#### **§ 25.1420 Supercooled large drop icing conditions.**

(a) If certification for flight in icing conditions is sought, in addition to the requirements of § 25.1419, an airplane with a maximum takeoff weight less than 60,000 pounds or with reversible flight controls must be capable of operating in accordance with paragraphs (a)(1), (2), or (3), of this section.

(1) Operating safely after encountering the icing conditions defined in Appendix O of this part:

(i) The airplane must have a means to detect that it is operating in Appendix O icing conditions; and

(ii) Following detection of Appendix O icing conditions, the airplane must be capable of operating safely while exiting all icing conditions.

(2) Operating safely in a portion of the icing conditions defined in Appendix O of this part as selected by the applicant:

(i) The airplane must have a means to detect that it is operating in conditions that exceed the selected portion of Appendix O icing conditions; and

(ii) Following detection, the airplane must be capable of operating safely while exiting all icing conditions.

(3) Operating safely in the icing conditions defined in Appendix O of this part.

(b) To establish that the airplane can operate safely as required in paragraph (a) of this section, an applicant must