

rain or snow, it will not leak in a manner that will distract the crew or harm the structure.

(e) Vibration and noise characteristics of cockpit equipment may not interfere with safe operation of the airplane.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-4, 30 FR 6113, Apr. 30, 1965]

#### § 25.772 Pilot compartment doors.

For an airplane that has a lockable door installed between the pilot compartment and the passenger compartment:

(a) For airplanes with a maximum passenger seating configuration of more than 20 seats, the emergency exit configuration must be designed so that neither crewmembers nor passengers require use of the flightdeck door in order to reach the emergency exits provided for them; and

(b) Means must be provided to enable flight crewmembers to directly enter the passenger compartment from the pilot compartment if the cockpit door becomes jammed.

(c) There must be an emergency means to enable a flight attendant to enter the pilot compartment in the event that the flightcrew becomes incapacitated.

[Doc. No. 24344, 55 FR 29777, July 20, 1990, as amended by Amdt. 25-106, 67 FR 2127, Jan. 15, 2002]

#### § 25.773 Pilot compartment view.

(a) *Nonprecipitation conditions.* For nonprecipitation conditions, the following apply:

(1) Each pilot compartment must be arranged to give the pilots a sufficiently extensive, clear, and undistorted view, to enable them to safely perform any maneuvers within the operating limitations of the airplane, including taxiing, takeoff, approach, and landing.

(2) Each pilot compartment must be free of glare and reflection that could interfere with the normal duties of the minimum flight crew (established under § 25.1523). This must be shown in day and night flight tests under nonprecipitation conditions.

(b) *Precipitation conditions.* For precipitation conditions, the following apply:

(1) The airplane must have a means to maintain a clear portion of the windshield, during precipitation conditions, sufficient for both pilots to have a sufficiently extensive view along the flight path in normal flight attitudes of the airplane. This means must be designed to function, without continuous attention on the part of the crew, in—

(i) Heavy rain at speeds up to  $1.5 V_{SR1}$  with lift and drag devices retracted; and

(ii) The icing conditions specified in Appendix C of this part and the following icing conditions specified in Appendix O of this part, if certification for flight in icing conditions is sought:

(A) For airplanes certificated in accordance with § 25.1420(a)(1), the icing conditions that the airplane is certified to safely exit following detection.

(B) For airplanes certificated in accordance with § 25.1420(a)(2), the icing conditions that the airplane is certified to safely operate in and the icing conditions that the airplane is certified to safely exit following detection.

(C) For airplanes certificated in accordance with § 25.1420(a)(3) and for airplanes not subject to § 25.1420, all icing conditions.

(2) No single failure of the systems used to provide the view required by paragraph (b)(1) of this section must cause the loss of that view by both pilots in the specified precipitation conditions.

(3) The first pilot must have a window that—

(i) Is openable under the conditions prescribed in paragraph (b)(1) of this section when the cabin is not pressurized;

(ii) Provides the view specified in paragraph (b)(1) of this section; and

(iii) Provides sufficient protection from the elements against impairment of the pilot's vision.

(4) The openable window specified in paragraph (b)(3) of this section need not be provided if it is shown that an area of the transparent surface will remain clear sufficient for at least one pilot to land the airplane safely in the event of—

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(i) Any system failure or combination of failures which is not extremely improbable, in accordance with § 25.1309, under the precipitation conditions specified in paragraph (b)(1) of this section.

(ii) An encounter with severe hail, birds, or insects.

(c) *Internal windshield and window fogging.* The airplane must have a means to prevent fogging of the internal portions of the windshield and window panels over an area which would provide the visibility specified in paragraph (a) of this section under all internal and external ambient conditions, including precipitation conditions, in which the airplane is intended to be operated.

(d) Fixed markers or other guides must be installed at each pilot station to enable the pilots to position themselves in their seats for an optimum combination of outside visibility and instrument scan. If lighted markers or guides are used they must comply with the requirements specified in § 25.1381.

(e) *Vision systems with transparent displays.* A vision system with a transparent display surface located in the pilot's outside field of view, such as a head up-display, head mounted display, or other equivalent display, must meet the following requirements in non-precipitation and precipitation conditions:

(1) While the vision system display is in operation, it must compensate for interference with the pilot's outside field of view such that the combination of what is visible in the display and what remains visible through and around it, enables the pilot to perform the maneuvers and normal duties of paragraph (a) of this section.

(2) The pilot's view of the external scene may not be distorted by the transparent display surface or by the vision system imagery. When the vision system displays imagery or any symbology that is referenced to the imagery and outside scene topography, including attitude symbology, flight path vector, and flight path angle reference cue, that imagery and symbology must be aligned with, and scaled to, the external scene.

(3) The vision system must provide a means to allow the pilot using the display

to immediately deactivate and reactivate the vision system imagery, on demand, without removing the pilot's hands from the primary flight controls or thrust controls.

(4) When the vision system is not in operation it may not restrict the pilot from performing the maneuvers specified in paragraph (a)(1) of this section or the pilot compartment from meeting the provisions of paragraph (a)(2) of this section.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-23, 35 FR 5676, Apr. 8, 1970; Amdt. 25-46, 43 FR 50595, Oct. 30, 1978; Amdt. 25-72, 55 FR 29778, July 20, 1990; Amdt. 25-108, 67 FR 70827, Nov. 26, 2002; Amdt. 25-121, 72 FR 44669, Aug. 8, 2007; Amdt. 25-136, 77 FR 1618, Jan. 11, 2012; Amdt. 25-140, 79 FR 65525, Nov. 4, 2014; Docket FAA-2013-0485, Amdt. 25-144, 81 FR 90169, Dec. 13, 2016]

### § 25.775 Windshields and windows.

(a) Internal panes must be made of nonsplintering material.

(b) Windshield panes directly in front of the pilots in the normal conduct of their duties, and the supporting structures for these panes, must withstand, without penetration, the impact of a four-pound bird when the velocity of the airplane (relative to the bird along the airplane's flight path) is equal to the value of  $V_C$ , at sea level, selected under § 25.335(a).

(c) Unless it can be shown by analysis or tests that the probability of occurrence of a critical windshield fragmentation condition is of a low order, the airplane must have a means to minimize the danger to the pilots from flying windshield fragments due to bird impact. This must be shown for each transparent pane in the cockpit that—

(1) Appears in the front view of the airplane;

(2) Is inclined 15 degrees or more to the longitudinal axis of the airplane; and

(3) Has any part of the pane located where its fragmentation will constitute a hazard to the pilots.

(d) The design of windshields and windows in pressurized airplanes must be based on factors peculiar to high altitude operation, including the effects of continuous and cyclic pressurization loadings, the inherent characteristics of the material used, and the effects of