



AEROSPACE STANDARD

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AS 580B

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PILOT VISIBILITY FROM THE FLIGHT DECK DESIGN OBJECTIVES FOR COMMERCIAL TRANSPORT AIRCRAFT

1. PURPOSE AND SCOPE

This Aerospace Standard (AS) assures that new transport type aircraft will provide adequate visibility from the flight deck.

Background - Prior to updating this AS, the committee re-evaluated flight deck visibility angles existing in transport aircraft produced up to 1975. In addition, studies and evaluations made by various airframe manufacturers were reviewed. As a result, this standard has been modified to provide more visibility in the critical areas that are most effective for collision avoidance. The "three second rule" for landing has been retained unmodified even though some late model aircraft do not completely meet the rule. The SAE Committee S-7, whose members represent a good cross section of operations personnel of the airline operators and manufacturers feel that it is still a desirable goal and no technical studies have been presented to show that a better standard would be more desirable.

2. PHILOSOPHY

The flight deck windshield must provide sufficient external vision to permit the pilot to safely perform any maneuvers within the operating limits of the aircraft and at the same time afford an unobstructed view of the flight instruments and other critical components and displays from the same eye position.

3. DESIGN EYE POSITION

3.1 The design eye position shall be in accordance with ARP 268. Means within the aircraft shall be provided to facilitate and guide the pilot to the design eye position. For the right seat pilot, all dimensions are opposite.

3.2 Visual field and angle measurements shall utilize ambinoocular vision (total vision of both eyes). (See Fig. 1).

3.2.1 The two eye points are placed 31.8 mm (1-1/4 in.) on each side of the design eye position.

3.2.2 The eye positions are rotated in the horizontal plane from a central (vertical) axis located 84 mm (3-5/16 in.) aft of the design eye position. (See Fig. 1)

3.2.3 The horizontal and vertical vision angles shall be measured from (1) a vertical plane running fore and aft through the design eye point and central axis and (2) a horizontal plane that passes through the design eye point and central axis. The horizontal and vertical reference plane shall be parallel to those corresponding to zero pitch and yaw angles.

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4. CLEAR AREAS OF VISION

With the design eye position located per paragraph 3, the vision through the transparent areas shall provide the following minimum viewing angles:

- 4.1 Forward and up 35 degrees from the horizon at 40 degrees left diminishing linearly to 15 degrees up at 20 degrees right.
- 4.2 Forward and down 17 degrees from the horizon between 30 degrees left and 10 degrees right diminishing linearly to 10 degrees down at 20 degrees right.
- 4.3 Forward and up 35 degrees from the horizon between 40 degrees left and 80 degrees left diminishing linearly up to 15 degrees up at 120 degrees left.
- 4.4 Increasing linearly from forward and down 17 degrees from the horizon at 30 degrees left to forward and down 27 degrees from the horizon at 70 degrees left.
- 4.5 Forward and down 27 degrees from the horizon between 70 degrees left and 95 degrees left diminishing linearly to 15 degrees down at 120 degrees left.

5. LANDING VISION

In addition to the requirements of paragraph 4, the view angle forward and down shall be sufficient to allow the pilot to see a length of approach and/or touch down zone lights which would be covered in three seconds at landing approach speed when the aircraft is:

- (a) On a 2-1/2 degree glide slope
- (b) At a decision height which places the lowest part of the aircraft at 30.5 m (100 ft.) above the touch-down zone extended horizontally.
- (c) Yawing to the left to compensate for ten knots crosswind
- (d) Loaded to the most critical weight and center of gravity
- (e) Making the approach with 365 mm (1200 ft.) RVR

6. IMPAIRMENTS

Impairments to vision within the vision area described in paragraph 4 when using ambinoocular vision shall meet the following requirements:

- 6.1 No obstructions to vision between 20 degrees right and 20 degrees left.
- 6.2 It must be possible for the pilot to eliminate any obstruction to vision using ambinoocular vision with head movement of 64 mm (1.25 in.) left and right.

7. OPTICAL PROPERTIES

The windshield shall exhibit equivalent optical properties, without electrically conductive heating films, to MIL-P-25374A for plastic windows and MIL-P-25871A for glass or glass-plastic windows.

8. PRECIPITATION

Precipitation clearing shall be provided for the windshield panels directly forward of each pilot, and shall be effective regardless of thrust setting at all speeds up to at least 1.6 Vs (clean) or 230 knots, whichever is less. The minimum area to be cleared shall be 15 degrees left to 15 degrees right of the design eye position, upwards to the horizon during the steepest approach path expected in operation and downwards to minimum established vision limits required by paragraphs 4 and 5.