



Federal Aviation Administration

Memorandum

Date: February 26, 2015

To: Manager, Transport Standards Staff, International Branch, ANM-116

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Nazih Khaouly, ANM-111

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Position Lights on a Model ERJ 170 airplane, FAA Project # AT10314IB-T

ELOS Memo #: AT10314IB-T-S-63

Regulatory Ref: §§ 25.1389(b)(3) and 25.1395

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Model ERJ 170 airplane.

Background

The position lights using light emitting diodes (LED) of the winglet equipped Embraer Model ERJ-170 airplane exceed the allowable overlapping intensities specified by Title 14, Code of Federal Regulation (14 CFR) 25.1389(b)(3) and 25.1395. Embraer has consequently requested an ELOS to the referenced requirements.

Applicable regulation(s)

§§ 25.1389(b)(3), 25.1391, and 25.1395

Regulation(s) requiring an ELOS finding

§§ 25.1389(b)(3) and 25.1395

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)

For the “A” overlapping areas, the red light overlap into the green area and the white light overlap into the red and green areas do not exceed the limit of § 25.1395.

For the “B” overlapping areas, the white light overlap into the green area does not exceed the limit of § 25.1395.

The intensity of the main beam light is always higher than the overlap beam light intensity. The signal intensity margin is much higher than the basic intensity requirement and ensures that the main beam color will always be easily perceived. For the other areas where the red light overlaps into the green area, the green light overlaps into the red area and the red light overlaps the white area “A”, the position light installation complies with the requirement for angles less than +/- 30 degrees.

Any signal margin less than these high values are outside the +/- 30 vertical angle limit where regulations allow negative margins. Even that, the only places where the signal ratio reverses is at very high vertical angles greater than 35 degrees where reversals are allowed and where the target airplane would not likely be visible to the other flight crew due to visibility obstruction by cockpit structure.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The position light installation of the winglet equipped Model ERJ 170 airplane does not meet the maximum overlap intensity levels of § 25.1395 but the LED lights provide an intensity level in the main beams that are much greater than the minimums required by § 25.1391. This high intensity of light provided in the required coverage areas more than compensates for the small intensity exceedances in the overlap areas. As such, this slightly exceeding the allowable overlap intensity does not adversely affect signal clarity of the position light system. While the position light installation does not literally comply with § 25.1395 limits, the intensities supply a greater level of safety than that required by the regulation, and hence provide a basis for a finding of equivalent safety.

The LED position light installation of the winglet equipped Model ERJ 170 airplane provide the necessary conspicuity to allow anyone encountering the airplane to easily discern its position and direction of travel and to take the appropriate action to avoid a collision. The brightness of the LED lights more than compensates for the intensity and overlap shortcomings, and actually provide for an overall level of conspicuity much higher than the minimums required by § 25.1389(b).

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper S-63, titled Position Lights. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique

ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):

- § 25.1389(b) Position light distribution and intensities, Forward and rear position lights.
- § 25.1395 Maximum intensities in overlapping beams of forward and rear position lights.
(documented in TAD ELOS Memorandum AT10314IB-T-S-63)

Dale Dunford, Acting ANM-111

Transport Airplane Directorate,
Aircraft Certification Service

February 26, 2015

Date

ELOS Originated by: Airplane & Flight Crew Interface Branch	Project Engineer: Nazih Khaouly	Routing Symbol: ANM-111
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