



Federal Aviation Administration

Memorandum

Date: February 27, 2014

To: Manager, International Branch, ANM-116

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Don Stimson, ANM-111

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Steep Approach – Use of 35 Feet Height Above Landing Surface for Landing Distance Determination For Steep Approach – on Model ATR42-300/ -320/ -500 airplanes, FAA Project # AT10109IB-T

ELOS Memo.#: AT10109IB-T-F-101

Regulatory Ref: §§ 25.125(a), 25.21(b)(1).

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 ATR-GIE Model ATR42-300/ -320/ and -500 airplanes.

Background

ATR is seeking airworthiness certification for the Model ATR42-300/ -320/ and -500 airplanes to support operational approval for landings with approach path angles greater than 5.5 degrees. ATR requested a finding of equivalent safety to the requirement of Title 14 of the Code of Federal Regulations (14 CFR) section 25.125(a) that the landing distance be determined from a point 50 feet above the landing surface. ATR proposes to determine the landing distance for steep approach landing operations from a point lower than 50 feet above the landing surface.

Section 25.125(a) requires that landing distance be determined from a point 50 feet above the landing surface. Because a runway's defined threshold for landing (i.e., the beginning of the runway length that is available for landing) must comply with the obstruction clearance plane requirements, the beginning of the landing distance determined under § 25.125(a) normally coincides with the runway's landing threshold for showing compliance with the operating regulations.

The approach path angle associated with normal landing procedures is nominally 3 degrees. Most instrument landing systems (ILS) and landing visual guidance systems provide approach path guidance of approximately 3 degrees. The normal means of compliance used for landing certification is acceptable for use with approach path angles less than 4.5 degrees.

ATR proposes to determine the landing distance for steep approach landing operations at certain runways from a point lower than 50 feet above the landing surface in lieu of compliance with § 25.125(a). ATR proposes to determine the landing distance from a point beginning 35 feet above the runway because the precision vertical approach path guidance for those runways provide an actual height above the runway threshold of approximately 35-38 feet.

Applicable regulation(s)

§§ 21.21(b)(1) 25.125(a).

Regulation(s) requiring an ELOS finding

§ 25.125 at amendment 25-0

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)

The use of precision vertical approach path guidance that provides a runway threshold crossing height of approximately 35 feet on a steep approach, provides a compensating factor such that a finding of equivalent safety can be made for use of a landing distance beginning at a point no lower than 35 feet above the runway surface. This landing distance can only be used for landings on runways with precision vertical approach path guidance that provides a runway threshold crossing height of approximately 35 feet, and that this guidance is used.

In lieu of compliance with the § 25.125(a) requirement that the landing distance starts from a point at a height of 50 feet above the landing surface:

The landing distance for a steep approach for use at runways with a precision vertical approach path guidance that provides a runway threshold crossing height of approximately 35 feet may be determined to start from a point 35 feet above the landing surface provided:

The height above the landing surface that is used to determine the landing distance is based on flight test results obtained using the approved steep approach path angle and the procedures intended for use at runways where a steep approach will be used and that have precision vertical approach path guidance that provides a runway threshold crossing height of approximately 35 feet. Pilot action to flare the airplane for landing must not occur before this height is reached. The reference point for the height above the runway measurement should be the lowest point on the aircraft, typically the bottom of the main landing gear.

Compliance is substantiated with all other applicable aspects of part 25, subpart B and Advisory Circular (AC) 25-7C, paragraph 231, which provides the means of compliance criteria for airworthiness approval of landing capability for approach path angles of 4.5 degrees or more.

Airplane Flight Manual

The following information must be included in the Airplane Flight Manual:

1. Limitations, operating procedures, and performance information specific to steep approach operations to runways where this landing distance data will be used should be clearly identified and separated from similar data based on § 25.125(a) requirements;
2. The steep approach landing distance starting from a height of 35 feet above the runway surface may only be used for operations at runways where precision vertical approach path guidance provides a runway threshold crossing height of approximately 35 feet, and only when that guidance is used.

For use of steep approach landing distances starting from a height of 35 feet above the runway surface, operational approval for operations under 14 CFR 121, 135, and 91 Subpart K must include both approval from the appropriate authority to conduct steep approach operations and to use the published landing distance data. Approval to use the landing distance data may be obtained through exemption or waiver.

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

Explanation of how the compensating factors provide an equivalent level of safety is provided in the description of compensating features above.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding for the ATR-GIE Model ATR42-300/-320/ and -500 airplanes Issue Paper F-101 titled “Use of 35 Feet Height Above Landing Surface for Landing Distance Determination for Steep Approach. 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):
§ 25.125(a) Landing (documented in TAD ELOS Memo AT10109IB-T-F-101)

Original signed by Robert Duffer

2/27/14

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by International Branch	Project Manager Tom Rodriguez	Routing Symbol ANM-116
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