



Federal Aviation Administration

Memorandum

Date: January 28, 2016

To: Manager, New York Aircraft Certification Office, ANE-170

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Stephen Kowalski, ANE-171

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for GA-A-03 on Model BD-700-2A12 & BD-700-2A13 airplanes, FAA Project # AT7180NY-T & AT7285NY-T

ELOS Memo #: AT7180NY-T-GA-A-03

Regulatory Ref: §§ 25.341, 25.343, 25.345, 25.371, 25.373, 25.391 and 25.1517

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 BD-700-2A12 & BD-700-2A13 airplanes.

Background

The Aviation Rulemaking Advisory Committee (ARAC), comprising regulatory authorities and industry, proposed revisions to gust and continuous turbulence loads of Title 14, Code of Federal Regulations (14 CFR) 25.341, 25.343, 25.345, 25.371, 25.373, 25.391, 25.395, and 25.1517. These proposed standards are captured by the European Aviation Safety Agency (EASA) Certification Specification (CS) at Amendment 25/1 (EASA NPA No. 11/2004). These standards have been incorporated in 14 CFR part 25 at amendment 25-141. The certification basis of the Bombardier Inc. BD-700-2A12 and BD-700-2A13 Series Aircraft was established prior to the FAA's issuance of amendment 25-141. Therefore, this equivalent safety finding is necessary for §§ 25.341, 25.343, 25.345, 25.371, 25.373, 25.391, 25.395, and 25.1517 at the amendment levels prior to amendment 25-141, which were the amendment level of these rules included in the certification basis of the Bombardier Inc. BD-700-2A12 and BD-700-2A13 Series Aircraft.

In lieu of:

- § 25.341 at amendment 25-86,
- § 25.343 at amendment 25-86,
- § 25.345 at amendment 25-91,
- § 25.371 at amendment 25-91,
- § 25.373 at amendment 25-86,
- § 25.391 at amendment 25-86, and
- § 25.1517 at amendment 25-86

the applicant is requesting to substitute the corresponding EASA rules at Amendment 25/1 (EASA NPA No. 11/2004).

Applicable regulation(s)

§§ 25.341, 25.343, 25.345, 25.371, 25.373, 25.391 and 25.1517

Regulation(s) requiring an ELOS finding

- § 25.341(a)(b) at amendment 25-86,
- § 25.343(b) at amendment 25-86,
- § 25.345 at amendment 25-91,
- § 25.371 at amendment 25-91,
- § 25.373(a) at amendment 25-86,
- § 25.391 at amendment 25-86, and
- § 25.1517 at amendment 25-86.

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 regulatory authorities and the aviation industries of the U.S., Canada and Europe convened under the ARAC with the aim of finding a single gust design methodology that would account for both discrete gust and continuous turbulence. After considering several methodologies, the ARAC recommended that a continuous turbulence criterion be utilized as this method accounts for aircraft response to realistic, atmospheric characteristics.

The ARAC proposal includes a revision to the gust intensity model used in the design envelope method for continuous turbulence, elimination of the mission analysis method, provisions for treating non-linearities, and reorganization and clarification of the requirement.

The design envelope criterion is retained with a revised gust intensity distribution with altitude. The gust intensities are based on analysis of gust measurements from the Civil Aircraft Airworthiness Data Recording Program (CAADRP). The CAADRP data is the most recent gust information available and it represents measurements of gusts and turbulence on transport airplanes in actual operation.

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

Section 25.341 at amendment 25-86 required consideration of non-linearities only in relation to stability augmentation systems; however, with modern transport airplanes it is possible that the primary flight control systems and the airplane itself could exhibit significant non-linearities. The ARAC proposal would require that any significant non-linearity be considered in a realistic or conservative manner, and it would provide additional criteria that can be used with other rational approaches that can account for non-linearities (e.g., time domain solutions). The ARAC proposed standards in this case provide a higher level of safety than the earlier rules, and have since been incorporated into 14 CFR part 25.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper GA-A-03 titled “Gust and Turbulence Loads 14 CFR 25.341(a), 25.343, 25.345, 25.371, 25.373, 25.391 and 25.1517.” 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):

- § 25.341 Gust and turbulence loads
- § 25.343 Design Fuel and Oil Loads
- § 25.345 High Lift Devices
- § 25.371 Gyroscopic Loads
- § 25.373 Speed Control Devices
- § 25.391 Control Surface Loads: General
- § 25.1517 Rough Air Speed, V_{RA}

(documented in TAD ELOS Memorandum AT7180NY-T-GA-A-03)

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by New York ACO:	ACO Manager	Routing Symbol: ANE-171
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