



Federal Aviation Administration

Memorandum

Date: February 14, 2011

To: Aircraft Certification Service employees

From: Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM-100

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Subject: Policy Statement on Testing of Flightcrew Oxygen Masks for Transport Category Airplanes

Memo No.: ANM-03-111-07

Regulatory Reference: Title 14, Code of Federal Regulations (14 CFR) 25.1447(c)(2)(1)

Summary

The purpose of this memorandum is to clarify Federal Aviation Administration (FAA) certification policy on methods of compliance with 14 CFR 25.1447(c)(2)(i), which requires that flightcrew oxygen masks be installed so that they can be donned within five seconds. This memorandum provides acceptable test methods used to show compliance with this requirement.

Definition of Key Terms

In the policy statement below, the terms used (“must,” “should,” or “recommend”) have a specific meaning that is explained in Attachment 1.

Current Regulatory and Advisory Material

Section 25.1447(c)(2)(i) requires the following [bold text added to identify the portion of the rule that is covered by this policy memorandum]:

- (c) If certification for operation above 25,000 feet is requested, there must be oxygen dispensing equipment meeting the following requirements:
- (2) Each flight crewmember on flightdeck duty must be provided with a quick-donning type oxygen dispensing unit connected to an oxygen supply terminal. This dispensing unit must be immediately available to the flight crewmember when seated at his station, and installed so that it:

(i) Can be placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand, with one hand, within five seconds and without disturbing eyeglasses or causing delay in proceeding with emergency duties;

Relevant Past Practice

Previous methods for showing compliance normally include testing, with mask donning performed by test pilots (FAA and/or designated engineering representative (DER)) in the actual airplane, usually while on the ground. The test procedures and conditions have been variable from program to program in terms of parameters such as these:

1. The number of test runs.
2. Pilot positioning of hands at test initiation.
3. The wearing of glasses and/or headsets.
4. Pass/fail criteria (i.e., how many trials must be less than or equal to five seconds).

These non-standardized approaches to testing can yield uneven results. The purpose of this policy is to encourage more standardized methods for evaluating the quick donning mask when showing compliance with § 25.1447(c)(2)(i).

Policy

Many transport airplanes are being fitted with full-face oxygen masks for the flightcrew. In addition, some applicants are storing these masks in smaller compartments. As a result, some of the designs have longer or more variable donning times. As the donning time for these masks has gotten closer to the five-second limit, it has become increasingly important to have well-defined and standardized testing methods.

Showing compliance with this rule involves measuring human performance, which is inherently variable. The requirement is on the design - that the mask can be placed on the face within five seconds. In order to determine if the design meets this requirement, we ask pilots to don the mask a number of times, which is a way of sampling pilot performance. Remembering that pilot performance will most likely result in a distribution of donning times, there are two key aspects of donning performance that should be considered:

1. The average performance of test cases should indicate that the five-second requirement is met.
2. Even if the average performance is five seconds or less, it would be possible for 50 percent or more of the trials to be over five seconds. Therefore, it is also important to establish a criterion regarding the distribution of test results in order to ensure that the mask can be consistently donned within five seconds.

The FAA considers the following an acceptable method for demonstrating compliance with the requirements of § 25.1447(c)(2)(i):

TEST CONDITIONS AND METHOD:

1. A donning test must be conducted from each required flight crewmember station whenever the oxygen mask, storage location, or means of stowing the mask is established or changed. Each donning test should consist of at least five donning events. The donning tests

may be conducted in an airplane, in a simulator, or in a flightdeck mockup that accurately reflects the proposed design.

2. The test should be witnessed by a FAA or DER test pilot. It is acceptable, but not required, to use appropriately qualified flight crewmembers as test subjects.

3. Prior to the initiation of each mask-donning event at a pilot station, the pilot should be seated at the design eye reference position with the seat belt and shoulder harness fastened, with one hand on the control wheel and the other on the throttles. For other required flight crewmember positions intended for performance of official duties relating to the performance of the crew or operation of the airplane (e.g., flight engineer), appropriate seating and hand positions may be determined on a case-by-case basis. Either hand may be used to don the mask.

4. The test subjects must wear glasses during the test. Daytime lighting conditions may be used, unless flightdeck arrangement and lighting systems suggest that locating and retrieving the mask may be difficult in nighttime lighting conditions.

5. Timing should begin when the start of the test event is announced by the test director, and end when the mask is properly sealed on the pilot's face with eyeglasses in place. The method of initiating the test event and determining when the mask is sealed is at the discretion of the test participants. A stopwatch, or other means shown to be reasonably accurate, may be used to time the tests.

SUCCESS CRITERIA:

For each donning test:

1. At least 80 percent of the donning events should be completed in five seconds or less.
2. The average time for each donning test must be five seconds or less.

During these tests, events, such as a failure of the timing device, may occur which preclude including a specific donning event in the results. In such events, individual test points may be omitted from the success criteria at the discretion of the FAA or DER test pilot witnessing the test.

The donning tests at each flight crewmember station must be successful.

This policy is not intended to change the level of safety required by § 25.1447(c)(2)(i).

However, use of this policy will help standardize the methods of compliance and produce more consistent compliance findings for all applicants.

Effect of Policy

The general policy stated in this document does not constitute a new regulation. The FAA individual who implements policy should follow this policy when it is applicable to a specific project. Whenever a proposed method of compliance is outside this established policy, that individual has to coordinate it with the policy issuing office using an issue paper. Similarly, if the implementing office becomes aware of reasons that an applicant's proposal, meeting this policy, should not be approved, the office must coordinate its response with the policy issuing office.

Applicants should expect that certificating officials would consider this information when making findings of compliance relevant to new certificate actions. In addition, as with all

advisory material, this statement of policy identifies one means, but not the only means, of compliance.

Implementation

This policy discusses compliance methods that should be applied to type certificate, amended type certificate, supplemental type certificate, and amended supplemental type certification programs. The compliance methods apply to those programs with an application date that is on or after the effective date of the final policy. If the date of application precedes the effective date of the final policy, and the methods of compliance have already been coordinated with and approved by the FAA or its designee, the applicant may choose to either follow the previously acceptable methods of compliance or follow the guidance contained in this policy.

/s/ KC Yanamura (for)

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Attachment 1: Definition of Key Terms

Attachment 1

Definition of Key Terms

Table A-1 defines the use of key terms in this policy. The table describes the intended functional impact.

Table A-1 Definition of Key Terms

	Regulatory Requirements	Acceptable Methods of Compliance (MOC)	Recommendations
Language	Must	Should	Recommend
Meaning	Refers to a regulatory requirement that is mandatory for design approval.	Refers to instructions for a particular MOC.	Refers to a recommended practice that is optional.
Functional Impact	No design approval if not met.	Alternative MOC has to be approved by issue paper.	None, because it is optional.