Designation: F3454 – 21

Standard Practice for Alerting Methods in Aircraft[1]

This standard is issued under the fixed designation F3454; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice provides guidance for how an applicant can show compliance to the requirements for Warnings, Cautions, and Advisory Indications to the responsible crewmember.

1.2 An applicant intending to propose this information as Means of Compliance for a design approval must seek guidance from their respective oversight authority (for example, published guidance from applicable civil aviation authority (CAA)) concerning the acceptable use and application thereof. For information on which oversight authorities have accepted this practice (in whole or in part) as an acceptable Means of Compliance to their regulatory requirements (hereinafter "the Rules"), refer to the ASTM Committee F44 web page (www.astm.org/COMMITTEE/F44.htm).

1.3 *Units*—This document may present information in SI units, English Engineering units, or both; the values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

2.1.1 Following is a list of external standards referenced throughout this practice. In all cases, later document revisions are acceptable if shown to be equivalent to the listed revision, or if otherwise formally accepted by the governing CAA; earlier revisions are not acceptable.

F3060 Terminology for Aircraft

F3061/F3061M Specification for Systems and Equipment in Small Aircraft

F3180/F3180M Specification for Low-Speed Flight Characteristics of Aircraft

F3117/F3117M Specification for Crew Interface in Aircraft

F3230 Practice for Safety Assessment of Systems and Equipment in Small Aircraft

2.2 *FAA Document:*[3]

Advisory Circular (AC) 23-8 Flight Test Guide for Certification of Part 23 Airplanes

3. Terminology

3.1 *Definitions*—For general terminology, refer to Terminology F3060.

4. Significance and Use

4.1 This practice proposes the characteristics of alerting methods, including Stall Warning Alerts.

4.2 The Stall Warning Alerts may be used as part of the compliance approach for Stall Characteristics, Stall Warning, and Spins applicable to Normal Category Aeroplanes, using Specification F3180/F3180M, Stall Warning, while characteristics of all of the alert methods may be used to supplement Specification F3117/F3117M.

[1] This practice is under the jurisdiction of ASTM Committee F44 on General Aviation Aircraft and is the direct responsibility of Subcommittee F44.10 on General.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, http://www.faa.gov.

5. Alert Characteristics Specific to Stall Warning

5.1 Specific types of alerts discussed in this section are:

Sensory Path	Description
Aural	Constant sound
Aural	Interrupted sound
Aural	Voice
Tactile	Yoke or stick vibration
Visual	Visual indication independent of pilot focus
Visual	Visual indication in primary field of view

NOTE 1—A traditional "stick vibrator" provides only a vibration through the control stick or yoke, with no intentional aural component. A stick vibrator may be used for credit only for the tactile sensory cue in accordance with Specification F3180/F3180M. A traditional "stick shaker" (reference FAA AC 23-8, Section 23.207) vibrates the stick or yoke with an intentional accompanying mechanical sound. A stick shaker may be used for credit for both aural and tactile sensory cues in accordance with Specification F3180/F3180M if it meets the associated requirements of 5.2 through 5.4, and if it meets the applicable system safety requirements (reference Specification F3061/F3061M and Specification F3230). Each component (aural and tactile) must independently be unambiguous for that sensory path.

5.2 *Stall Warning Alerts – General:*

5.2.1 Stall warning alerts must be clearly differentiated from other alerts.

5.2.2 Stall warning alerts must be continuous or repeated, and non-cancelable, until the alerting condition no longer exists, except where permitted by Specification F3117/F3117M, Alerts.

5.2.3 Stall warning alerts must not interfere with the pilot's ability to control the aeroplane or communicate with crew or air traffic control (ATC).

5.3 *Aural Stall Warning Alerts:*

5.3.1 Tones/sounds associated with stall warnings must be unique (for example, perceptibly different from other tones or aural alerts).

5.3.2 Voice alerts associated with stall warnings must use words specific to the condition.

5.3.3 Aural alerts must be effective under all ambient noise conditions.

5.4 *Tactile Stall Warning Alerts:*

NOTE 2—While natural/airframe buffet may induce vibration, it is not a means of yoke or stick tactile warning for the purpose of this section.

5.4.1 Tactile alerts used for stall warning alert must not interfere with the pilot's control of the airplane.

5.4.2 Tactile alerts used for stall warning alert must be effective during all flight conditions.

5.4.3 Yoke or stick vibration used for stall warning alert must be effective with or without gloves.

5.5 *Visual Stall Warning Alerts:*

NOTE 3—Examples of a visual indication that is independent of the pilot's line of sight could be:
(1) multiple lights around cockpit area;
(2) illuminated cockpit window;
(3) head-mounted.
Examples of a visual indication that is in the pilot's primary field of view could be:
(1) stall warning annunciator on the instrument panel;
(2) warning presented on an electronic flight display;
(3) warning presented on a head-up display (HUD).

5.5.1 Visual alerts used for stall warning must follow the color for warning defined in Specification F3117/F3117M, Alerts.

5.5.2 Visual alerts used for stall warning must be effective under all lighting conditions.

6. Keywords

6.1 alerts; aural; stall; tactile; visual; warning

APPENDIX

(Nonmandatory Information)

X1. LIST OF CHANGES

X1.1 F3454-21

X1.1.1 Initial issue.