CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

Advisory Circular
AC43-11

Revision 3

Aircraft Emergency Locator Systems

27 November 2019

General

Civil Aviation Authority (CAA) advisory circulars (ACs) contain guidance and information about standards, practices, and procedures that the Director has found to be an **acceptable means of compliance** with the associated rule.

Consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

Purpose

This AC describes an acceptable means of compliance with Part 43 and Part 91.

Related Rules

This AC relates specifically to Civil Aviation Rule Parts 43 *General Maintenance Rules* and Part 91 *General Operating and Flight Rules*, Subpart G.

Change Notice

Revision 3:

- updates the title of this AC
- revokes and replaces the content of this AC to include the design, installation and testing requirements for Aircraft Emergency Locator Systems.

Cancellation Notice

This AC cancels AC43-11 Revision 2 dated 12 June 2008.

Version History

History Log

Revision No.	Effective Date	Summary of Changes
0	03 March 1997	This was the initial issue of this AC.
1	12 March 2008	Revision 1 revised the AC to reflect the introduction of the mandatory carriage of 406 MHz Emergency Locator Transmitters.

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2	12 June 2008	Revision 2 revised the syllabus of training for the instructor rating at Appendices A, B and C into a specific objective format.
3	27 November 2019	Revision 3 changes the title of this AC; and revokes and replaces the content of this AC to include the design, installation and testing requirements for Aircraft Emergency Locator Systems.

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1. Definitions

1.1 Civil Aviation Rule Part 1

Emergency locator transmitter means an equipment that broadcasts a distinctive signal on a designated radio frequency to facilitate a search and rescue operation.

Emergency locator transmitter (automatic fixed) means an emergency locator transmitter that is automatically activated and permanently attached to an aircraft.

Emergency locator transmitter (survival) means an emergency locator transmitter that is stowed in an aircraft in a manner which facilitates its ready use in an emergency, is removable from an aircraft, and is manually activated.

Emergency position indicating radio beacon means an equipment that broadcasts a distinctive signal on a designated radio frequency to facilitate a search and rescue operation, is designed to float upright, and is manually activated.

Personal locator beacon means an equipment that broadcasts a distinctive signal on a designated radio frequency to facilitate a search and rescue operation, is designed to be carried on a person, and is manually activated.

1.2 Other terms.

Technical Standard Order (TSO) issued by the Federal Aviation Administration of the United States of America.

Aircraft Emergency Location System means a system that is installed in an aircraft and automatically broadcasts the aircraft location to search and rescue services in the event of a crash.

2. General

2.2 Parts 91, 121, 133, 135, and 137 each include a Subpart F that specifies the equipment requirements for aircraft operating in New Zealand.

2.3 Each Subpart F is augmented by Part 91 Appendix A that provides standards and specifications equipment that must be complied with.

2.4 Except for specified circumstances, under rule 91.529, a person must not operate a New Zealand registered aircraft within the New Zealand Flight Information Region unless it is equipped with an operable, approved AELS installed in the aircraft.

2.5 Furthermore, a person must not operate an aircraft with a New Zealand certificate of registration that is equipped with an ELT (which currently is an ELT (AF) that meets the standards in FAA TSO-C126) or carries an ELT (S), EPIRB, or PLB that operates on 406 MHz unless one of the circumstances in rule 91.529(f) applies.[1]

[1] Refer also to NTC 91.529 Aircraft Emergency Location Systems

2.6 This AC provides guidance for and summarises the requirements of performance, installation, and maintenance for AELS equipment.

3. Design and Installation Considerations

3.1 Conditions

3.1.1 For the maximum benefits of an AELS installation to accrue, the design and installation should be such that the system remains operable after an accident, as far as is reasonably practicable. The following conditions should be considered in the design and installation of the AELS.

Note: *The below are considerations only meant for guidance in developing a design and for installation for subsequent approval of technical data. This AC does not constitute Acceptable Technical Data and may not be referenced as such.*

(a) If a component of the AELS is required to be mounted to the aircraft, this should be to a primary load-carrying structure without reducing that structures capabilities. When a force of 450 newtons is applied to that component in the most flexible direction, it should not cause a static deflection of greater than 2.5 mm relative to a section of adjacent structure located between 0.3 m and 1.0 m from the attachment site.

(b) Attachment of AELS components to thin partitions or to panels, such as the sides of baggage compartments, solely by means of Velcro strips and other flexible materials is not acceptable.

(c) The AELS component can support a 100 g load in the plus and minus direction of the 3 principal axes of the aircraft.

(d) The AELS components are preferably mounted as far aft as possible.

(e) Any crash activation sensor should be designed and mounted so as to preclude inadvertent operation.

(f) Any crash activation sensor should be oriented to sense a primary crash pulse along the longitudinal axis of the aircraft.

(g) If the AELS includes an external antenna, it should be mounted to provide vertical polarisation with the aircraft in normal flight.

(h) Any required cabling between the antenna and the AELS component(s) to be made as short as practicable.

(i) Any external AELS antenna should not be mounted closer than 0.6 m from the nearest VHF antenna.

(j) Any internal AELS antenna should be insulated from metallic structure and exposed to a window of not less than 0.3 m square.

(k) The post-installation VSWR should ideally be less than 2:1 and not exceed 3:1.

(l) Components of the system should be fitted with vibration proof RF connectors as required for the operation of the AELS.

(m) Have the location(s) of the AELS identified as close as practicable to the point of access.

(n) Any manual activation switch should be mounted within easy reach of the pilot.

3.2. Aeroplanes

3.2.1 When an aeroplane is upright an antenna located externally on top of the rear fuselage provides better overall efficiency than an internal cockpit area antenna.

3.2.2 When an aeroplane is inverted:

(a) An internal antenna exhibits the best overall efficiency in a high-wing aeroplane.

(b) Neither an internal nor external antenna location has a significant advantage in a low-wing aeroplane.

3.2.3 Approximately one third of light aeroplanes come to rest inverted in a crash.

3.2.4 Select a location where the antenna can be installed close to the transmitter and preferably, where the aircraft structure can provide some protection to the system components in a crash.

3.3. Helicopters

3.3.1 In helicopter installations care needs to be taken to site the antenna so as to minimise vibratory response which could lead to premature fatigue failure.

3.3.2 Cases have been documented where AELS whip antenna installed on certain helicopters have fractured in only a few hours' time in service.

3.3.3 In at least one case, the antenna subsequently came in contact with the tail rotor.

3.3.4 Locate the antenna as close as practicable to the transmitter and consider likely crash events when selecting the location.

3.3.5 Avoid installing the antenna on the side of the helicopter that is likely to be on the bottom in a dynamic roll-over.

3.4. Antenna cable protection

3.4.1 As light aircraft accidents can result in fire, the coaxial cable between the AELS and its external antenna should be sleeved with fire resistant materials.

3.4.2 The antenna cable should be installed with sufficient free cable, so that the cable will not be damaged during any distortion of the airframe in normal flight situations.

3.4.3 The antenna cable should not pass over a fuselage production joint.

3.4.4 If possible, do not run the antenna cable through any bulkhead or other similar structure.

4. Emergency Locator Transmitter Registration

4.1 As required by rule 91.529(g) 406 MHz ELTs, EPIRBS or PLBs fitted to or carried in New Zealand registered aircraft must have a New Zealand country code (whether operating in New Zealand or overseas) and be registered with the Rescue Co-ordination Centre New Zealand (RCCNZ).

4.2 Information on the registration of 406 MHz ELTs is on the web site http://www.beacons.org.nz/.

4.3 As part of the installation certification, the beacon registration should be sighted by the certifying engineer.

4.4 Any changes to registration details such as emergency contact numbers or name of the aircraft operator must be notified to RCCNZ.

5. Maintenance Requirements

5.1 Scheduled maintenance

5.1.1 The AELS should be maintained in accordance with the manufacture's instructions for continued airworthiness, as well as any requirements called out in rule 91.605.

5.1.2 The testing as required by rule 91.605(e)(4) and specified in rule 43.65 and Appendix F of Part 43 set out the minimum NAA testing requirements as described by ELT manufactures.

5.1.3 There are other requirements imposed by relative manufactures including but not limited to, battery replacements, g switch tests, VSWR check and 406 MHz power checks, however different manufactures have differing time periods for these maintenance activities as stated in the relative ICAs and manual.

5.1.4 To satisfy the requirements of rules 91.605(e)(4) and (f), rule 43.65, and Appendix F of Part 43, conduct the following:

(a) Inspect the ELT or AELS and its mountings and aerial connection for general condition particularly for corrosion or corrosion deposits, as well as placards for legibility.

(b) Conduct a functional test of an ELT or AELS system in accordance with the manufacturer's instructions, checking for satisfactory performance. This does not necessarily require an on-air (RF transmission) test.

5.1.5 The intent of this test is to test the performance of the VHF guard (121.5 MHz) transmitter of the ELT or AELS. Testing of the 406 MHz transmitter is not required and should be avoided for this test as it requires special test equipment to prevent live 406 MHz transmissions. Any live 406 MHz transmissions received by rescue authorities are treated as real emergences regardless of time or length of transmission. If an unintentional live air transmission of 406 MHz occurs, RCCNZ should be informed immediately.

(a) Only conduct the test within the first five minutes after any hour.

(b) Contact the local air traffic control service unit and advise them of the intention to test.

(c) Tune a VHF receiver to 121.5 MHz to monitor the test.

(d) Activate the AELS/ELT for a maximum of 3 audio sweeps approximately 5 -10 seconds dependant on the manufacture's instructions.

Note: *the reason for limiting the on-air test to a maximum of three audio sweeps of the transmitter is to prevent the transmission of a 406 MHz data message, which typically occurs 50 seconds after the ELT being activated. Some manufactures also include a UHF guard frequency transmitter (243 MHz). If a suitable receiver is available, then this should also be monitored. Some ELTs will transmit a very brief 406 MHz burst when the ELT is first activated. This 406MHz transmission is acceptable and is coded in a way that will not alert rescue authorities.*

5.1.6 Batteries are required to be changed:

(a) when the life of the battery, as established by the manufacturer, has expired as required by rule 91.605(e)(4), or

(b) any other time specified in the manufacturer's instructions.

5.1.7 If a battery is replaced, the date stamped on the replacement battery becomes the new expiration date and should be recorded in Section 6 of the aircraft maintenance logbook or the equivalent maintenance tracking tool/program. This includes any remote control/indicator battery as applicable.

5.1.8 As stated above, manufactures manuals and ICAs should be reviewed to determine what other testing and maintenance is required and the associated time periods. These requirements should be entered into the aircraft log book and/or maintenance tracking tool/program.

5.2 Temporary removal of an AELS

5.2.1 Rule 91.529(c) provides circumstances in which an aircraft may be operated under Part 91 with an inoperative AELS or without an AELS fitted.

5.2.2 This operation is permitted to allow the aircraft to be ferried from a place where repairs or replacement of an AELS could not be made to a place where they could. No passengers may be carried for any such flight.

5.2.3 In the case of the above provisions the system, or a suitable cockpit location, is required to be placarded ***'Inoperative'*** and the appropriate maintenance entries made in the aircraft maintenance logbook in accordance with Part 43.