



EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

Helicopter Ditching, Water Impact & Survivability Workshop

Session 5 Passenger/Crew Egress & Survivability

EASA ETSO List & Emergency Locator Transmitters (ELTs)

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1. ETSO Background

- CS-ETSO provides certification requirements for specific functions like radios, seats, pallets etc. having requirements independent from the specific aircraft model environment
- ETSO Authorisation (ETSOA) is optional. Compliance may be shown during installation approval as well. Manufacturer of the equipment becomes the authorisation holder and can issue a Form 1 based on the ETSOA.



2. ETSOs Supporting the Survivability I

- **CTSO-C13f LIFE PRESERVERS**
 - Known as life vest, inflatable (Type I) or non-inflatable (Type II) divided into categories “Adult,” “Adult-Child,” “Child,” and “Infant-Small Child”
- **ETSO-C27 TWIN SEAPLANES FLOATS**
 - Reference to NAS 807 (1951) not addressing specifically helicopter operation. No approvals listed.
- **ETSO-C69c Emergency Evacuation Slides, Ramps, Ramp/Slides, and Slide/Rafts**
 - Linked to Part 25 requirements and environment
- **ETSO-C72c Individual Flotation Devices**
 - Inflatable (by compressed gas) or
 - Noninflatable (seat cushions, head rests, pillow)



2. ETSOs Supporting the Survivability II

- ETSO-C85a Survivor Locator Lights
 - Lamp attached to life vest, slides, or rafts; reference to SAE AS 4492 (1995)
- ETSO-C142a Non-rechargeable Lithium Cells and Batteries
 - Used in applications demanding long time battery storage without performance degradation like ELTs
- ETSO-2C19b *) Fire Extinguishers, Portable Water Type
- ETSO-2C70a Liferafts (Reversible and non reversible)
 - TYPE I For use in any aircraft.
 - TYPE II For use in any aircraft except for large aeroplanes (CS-25) and large rotorcraft (CS-29)

*) The 2C indicates technical differences from FAA TSO



2. ETSOs Supporting the Survivability III

- ETSO–2C91a Emergency Locator Transmitter (ELT) Equipment
 - 121.5/243 MHz only, No 406 MHz capability
- ETSO–2C126 406 MHz Emergency Locator Transmitter (ELT)
 - See the specific part of the presentation
 - Expected to be updated to ETSO-C126a by Q2 2012



2. ETSOs Supporting the Survivability IV

- ETSO–2C502 *) Helicopter crew and passenger integrated immersion suits
 - An integrated immersion suit is defined as an immersion suit which incorporates the functionality of a lifejacket. The wearing of a separate lifejacket is not required.
- ETSO–2C503 Helicopter crew and passenger immersion suits for operations to or from helidecks located in a hostile sea area
 - Lifejacket function is not included
- ETSO–2C504 Helicopter constant-wear lifejackets for operations to or from helidecks located in a hostile sea area
 - Constantly worn life jacket, mouth freeboard above water, sprayhood, lifting becket for rescue; buddy line for group help

*) For the 2C500 series of ETSOs exist no corresponding FAA TSO



2. ETSOs Supporting the Survivability V

- ETSO–2C505 Helicopter liferafts for operations to or from helidecks located in a hostile sea area
 - Damage tolerant for contact with helicopter exterior in water
 - Insulated floor
 - Occupant weight of 90kg
 - Boarding facility
 - Internal and specific external light



3. ELT – Types

The following Emergency Locator Transmitter Types are defined:

➤ **Automatic Fix (AF)**

- Automatic: Activated Automatically by the integrated g-switch during impact plus manual activation means
- Fixed installed to the aircraft, antenna mounted outside the airframe, cockpit controls if no direct access is possible

➤ **Automatic Portable (AP)**

- Same as AF but unit can be easily removed from aircraft and operated with a second, than attached antenna

➤ **Survival (S)**

- No automatic activation only manual activation or if used in raft activated by water contact
- Certified to be compatible with aircraft environment, operate after an impact with defined performance

➤ **Automatic Deployable (AD)**

- Automatic activated by a g-switch or a water sensor
- Unit is separated from aircraft to swim separately during operation

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- **Personal Locator Beacon (PLB)** e.g. for maritime use, no airworthiness certification, some are similar to S-type ELT but e.g. no operation after crash is demonstrated



ETSO-2C126 406 MHz ELT High Level Certification Requirements

- Demonstration that carriage on board is not harming the equipment or the aircraft
- No false activation is allowed, activate by defined g levels (automatic types)
- Survive the defined crash scenario (shock, penetration, short fire, salt water immersion)
- Operate for 24 hours on 406 MHz (4 Watt), and for 48 hours on 121.5 MHz and 243 MHz (>100 mW, < 400 mW)
- Self buoyant or tethered to a raft or person (AP/S types)
- Detailed requirements are defined in document EUROCAE ED-62



Changes in ELT Requirements introduced by ED-62A/DO-204A

- 243 MHz transmitter capability is optional (military frequency)
- Reduce 121.5 MHz output power to minimum 50 mW (used for final homing only, not to reach the satellite any more)
- Introduce a Class identifier for self buoyant units and those to be tethered to a person or raft
- G-switch characteristic and all requirements harmonised with RTCA/DO-204A.
- Reliance on COSPAS SARSAT specifications for 406 MHz transmitter.



Issues linked to Deployable ELTs

- Unit may not withstand high altitude (3000 ft) deployment
 - Initial specification aimed for 200 ft deployments
 - Separation between impact point and survivors needs to be limited
 - EASA SIB 2010-22 is addressing the issue
- Water Sensor needs to be below the control unit or an additional sensor may be used to ensure timely activation (before the controller is watered)
- Sensor, control unit or wiring may be destroyed during impact before activation and separation takes place
 - General risk for all installations. RTCA DO-182 or EUROCAE ED-62A chapter 6.1 contain ELT installation guidance.



Issues Linked to 121.5 MHz Homing

- Homing to multiple targets is difficult as the resulting target may be shown at wrong position
- No international agreed specification how to activate the optional 121.5 MHz voice reception capability from the search vessel. The function if implemented is not used and the optional voice transmit capability is not used either from the survivor
 - Automatic reception function used as well to suppress multiple transmitter operation as implemented in some ELT may suppress transmission based on low power wrist watch ELTs as well. See EASA SIB 2011-18
- ELT not necessary buoyant and self erecting
 - Antenna is not erected above and free from water which is reducing the transmitted power and homing capability



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