

CS-ETSO AMENDMENT 14 — CHANGE INFORMATION

EASA publishes amendments to Certification Specifications — European Technical Standard Orders (CS-ETSO) as consolidated text for each constituent European Technical Standard Order (ETSO) individually.

Consequently, except for the revision indication letter and revised issue date in the header of each ETSO, the consolidated text of each individual ETSO does not allow readers to see the detailed changes introduced by the amendment. To allow readers to see these detailed changes, this document has been created. The same format as for the publication of notices of proposed amendments (NPAs) has been used to show the changes:

- deleted text is ~~struck through~~;
- new or amended text is highlighted in grey;
- an ellipsis '[...]' indicates that the rest of the text is unchanged.

CS-ETSO

SUBPART A — GENERAL

1. APPLICABILITY

- 1.1 Requirements for the issue of European Technical Standard Order (ETSO) authorisations are found in Part-21, Section A, Subpart O.
- 1.2 Marking requirements for the issue of European Technical Standard Order authorisations are found in Part-21, Section A, Subpart Q.

2. ENVIRONMENTAL AND SOFTWARE STANDARDS TO MEET TECHNICAL CONDITIONS

2.1 Environmental standards

Unless otherwise stated in the paragraph 3.1.2 of the specific ETSO, the applicable environmental standards are contained in EUROCAE/RTCA document ED-14D, Change 3/DO-160D 'Environmental Conditions and Test Procedures for Airborne Equipment', Change 3, dated December 2002, ED-14E/DO-160E dated March 2005, ED-14F/DO-160F dated March 2008, ED-14G/DO-160G dated December 2010, or ED-14G Change 1/DO-160G Change 1 dated January 2015.

~~It is not permissible to mix versions within a given qualification programme~~ Compliance shall be demonstrated entirely with one of the versions of the applicable environmental standards.

2.2 Software standards

When the equipment ETSO article includes airborne software, unless otherwise stated in paragraph 3.1.3 of the specific ETSO, one acceptable means of compliance for the

development of the airborne software is outlined in the latest revision of AMC 20-115 entitled ~~on~~ Software Considerations in Airborne Systems and Equipment Certification.

The ~~S~~software level, also called known as the 'item development assurance level (IDAL)', may be determined by using the guidance proposed in ~~S~~Section 2.4. The applicant must declare the software level(s) to which the software has been developed and verified.

2.3 Airborne electronic hardware (AEH)

If the article contains a complex Application Specific Integrated Circuit (ASIC) or a complex programmable logic device (such as e.g. a Programmable Array Logic components (PAL), a Field-Programmable Gate Array components (FPGA), a General Array Logic components (GAL), or an Erasable Programmable Logic Device (EPLD), summarised all of which are known as 'complex Electronic hardware' to accomplish the function, develop the component according to EUROCAE/RTCA document ED-80/DO-254 'Design Assurance Guidance for Airborne Electronic Hardware', dated April 2000.

Supplemental guidance material for all ~~other~~ airborne electronic hardware (including boards, simple electronic hardware or SEH, and simple use of COTS devices) included in the ETSO article may be found in '[EASA CM-SWCEH-001 Development Assurance of Airborne Electronic Hardware](#)' Issue 01, revision 01, dated March 2012.

The ~~D~~design Assurance Level, also called known as the 'item ~~D~~development Assurance Level (IDAL) for Airborne Electronic Hardware (AEH)', may be determined by using the guidance proposed in Section 2.4. The applicant must declare the ~~D~~design Assurance Level(s) to which the AEH has been developed and verified.

2.4 Failure conditions classification and development assurance

During the development of ~~equipment~~ an ETSO article, consideration should be given to failure conditions, and the ~~equipment~~ ETSO article should then be developed in accordance with their possible effects of those failure conditions at the system and aircraft levels (see AMC CS xx.1309 for further guidance; for CS-23 aircraft, further guidance can be found in FAA AC 23.1309-1E).

The ETSO article ~~equipment~~ shall be developed according to, at least, the development assurance level appropriate to the failure condition classifications expected for the intended installation.

Where the effects at system or aircraft level are not known, due to the non-availability of aircraft or system design data, assumed failure classifications may be used but at a minimum to the level required in the ETSO.

Classification of failure conditions at the level of the ETSO article ~~equipment~~ level may change as a result of particular aircraft installation architecture and characteristics.

EUROCAE/SAE document ED-79A/ARP 4754A, 'Guidelines for Development of Civil Aircraft and Systems', dated December 2010, may be used to assign the development assurance level of the ETSO article ~~equipment~~, software and AEH. The document may be used as well as guidance to ensure a proper development, validation and verification of the ETSO article and its the functional ~~equipment~~ requirements.

2.5 ETSO article using an ETSO-2C153-authorized IMA platform or module

When the ETSO article implements one (or several) ETSO-2C153-authorized integrated modular avionics (IMA) platforms/modules and for which the applicant seeks compliance credit from this (these) ETSOA authorisation(s) to demonstrate compliance with one or several functional ETSO standard(s), the applicant shall apply for authorisation to the ETSO-C214 standard, together with the intended functional ETSO standard(s).

Note: A functional ETSO standard is any ETSO standard of CS-ETSO describing an 'aircraft' function, i.e. typically the majority of all ETSO standards except ETSO-2C153 and ETSO-C214.

3. ADDITIONAL INFORMATION

3.1 In some ETSOs, reference is made to an associated FAA standard. In these cases the corresponding FAA technical standard order (TSO) can be consulted on [http://rgl.faa.gov/Regulatory and Guidance Library/rgTSO.nsf/Frameset?OpenPage](http://rgl.faa.gov/Regulatory%20and%20Guidance%20Library/rgTSO.nsf/Frameset?OpenPage).

3.2 The following addresses are provided below. Standards documents referred to in this CS-ETSO may be purchased or obtained from the following organisations:

— EUROCAE documents may be purchased from:

European Organisation for Civil Aviation Equipment

9-23 rue Paul Lafargue, "Le Triangle" building, 93200 Saint-Denis-102 rue Etienne
Dolet, 92240 Malakoff, France

Telephone: +33 1 49 46 19 65 +33 1 40 92 79 30; Fax +33 1 46 55 62 65;

(E-mail: eurocae@eurocae.net, website: www.eurocae.net)

— RTCA documents may be purchased from:

Radio Technical Commission for Aeronautics, Inc.

1828 L Street NW, Suite 805, Washington DC 20036, USA

(Website: www.rtca.org)

— SAE documents may be purchased from:

Society of Automotive Engineers, Inc.

400 Commonwealth Drive, WARRENDALE, PA 15096-001, USA

(Website: www.sae.org)

— NAS specifications may be obtained from:

Aerospace Industries Association (AIA)

1327 Jones Drive, Ann Arbor, MI 48105, USA

(Website: www.techstreet.com)

— FAA Standards may be purchased from:

Superintendent of Documents, Government Printing Office

732N Capitol Street NW, Washington DC 20401, USA

(Website: www.gpoaccess.gov)

— MIL Specifications may be obtained from:

DODSSP, Standardization Documents Order Desk

Building 4D, 700 Robbins Avenue, PHILADELPHIA, PA 19111-5094, USA

or from the ASSIST Customer Service Desk, telephone (215) 697-6396

(Website: <http://dodssp.daps.mil/> <http://quicksearch.dla.mil/>)

- ASTM documents may be purchased from:
American Society for Testing and Materials, ASTM International,
100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania 19428-
2959, USA
(Website: www.astm.org)
- Global System, Inc., documents may be purchased from:
Global Systems, Inc., 2144 Michelson Drive, Irvine, California 92715, USA
Telephone: (714) 851-0119

SUBPART B — LIST OF ETSOs (INDEX 1 AND INDEX 2)

Index 1

EASA ETSO ref.	Title	Last amended by
ETSO-C1e	Cargo Compartment Fire Detection Instruments	CS-ETSO/13
ETSO-C2d	Airspeed Instruments	CS-ETSO/Initial Issue
ETSO-C3e	Turn and Slip Instruments	CS-ETSO/11
ETSO-C4c	Bank and Pitch Instruments	CS-ETSO/Initial Issue
ETSO-C5f	Direction Instrument, Non-Magnetic (Gyroscopically Stabilized)	CS-ETSO/11
ETSO-C6e	Direction Instrument, Magnetic (Gyroscopically Stabilized)	CS-ETSO/6
ETSO-C7d	Direction Instrument, Magnetic Non-Stabilized Type (Magnetic Compass)	CS-ETSO/Initial Issue
ETSO-C8e	Vertical Velocity Instrument (Rate-of-Climb)	CS-ETSO/6
ETSO-C10b	Aircraft Altimeter, Pressure Actuated, Sensitive Type	CS-ETSO/Initial Issue
ETSO-C13f	Life preservers	CS-ETSO/1
ETSO-C14b	Aircraft Fabric, Intermediate Grade; External Covering Material	CS-ETSO/Initial Issue
ETSO-C15d	Aircraft Fabric, Grade A; External Covering Material	CS-ETSO/Initial Issue
ETSO-C16b	Electrically Heated Pitot and Pitot-Static Tubes	CS-ETSO/13
ETSO-C20	Combustion Heaters	CS-ETSO/Initial Issue
ETSO-C21b	Aircraft Turnbuckle Assemblies and/or Turnbuckle Safetying Devices	CS-ETSO/Initial Issue
ETSO-C22g	Safety Belts	CS-ETSO/Initial Issue
ETSO-C23f	Personal Parachute Assemblies and Components	CS-ETSO/13
ETSO-C25a	Aircraft Seats and Berths (Type I Transport 6g Forward Load)	CS-ETSO/Initial Issue
ETSO-C26d	Aircraft Wheels and Wheel-Brake Assemblies (CS-23, 27 and 29 aircraft)	CS-ETSO/12
ETSO-C27	Twin Seaplane Floats	CS-ETSO/Initial Issue
ETSO-C28	Aircraft Skis	CS-ETSO/Initial Issue
ETSO-C30d	Aircraft Position Lights	CS-ETSO/13
ETSO-C39c	Aircraft Seats and Berths Certified by Static Testing only	CS-ETSO/6
ETSO-C42	Propeller Feathering Hose Assemblies	CS-ETSO/Initial Issue

EASA ETSO ref.	Title	Last amended by
ETSO-C43c	Temperature Instruments	CS-ETSO/Initial Issue
ETSO-C44c A1	Fuel Flowmeters	CS-ETSO/8
ETSO-C45b A1	Manifold Pressure Instruments	CS-ETSO/8
ETSO-C46a	Maximum Allowable Airspeed Indicator System	CS-ETSO/Initial Issue
ETSO-C47a A1	Pressure Instruments — Fuel, Oil, and Hydraulic (Reciprocating Engine-Powered Aircraft)	CS-ETSO/8
ETSO-C49b	Electric Tachometer: Magnetic Drag (Indicator and Generator)	CS-ETSO/Initial Issue
ETSO-C53a	Fuel and Engine Oil System Hose Assemblies	CS-ETSO/Initial Issue
ETSO-C54	Stall Warning Instruments	CS-ETSO/Initial Issue
ETSO-C55a	Fuel and Oil Quantity Instruments	CS-ETSO/7
ETSO-C56b A1	Engine-Driven Direct Current Generators/Starter Generators	CS-ETSO/8
ETSO-C59b	Airborne Selective Calling Equipment	CS-ETSO/13
ETSO-C62e	Aircraft Tyres	CS-ETSO/7
ETSO-C63e	Airborne Weather Radar Equipment	CS-ETSO/13
ETSO-C64b	Oxygen Mask Assembly, Continuous Flow, Passenger	CS-ETSO/12
ETSO-C69c	Emergency Evacuation Slides, Ramps and Slide/Rafts Combinations	CS-ETSO/Initial Issue
ETSO-C70b	Life Rafts	CS-ETSO/11
ETSO-C71	Airborne Static ('DC to DC') Electrical Power Converter (for Air Carrier Aircraft)	CS-ETSO/Initial Issue
ETSO-C72c	Individual Flotation Devices	CS-ETSO/Initial Issue
ETSO-C73	Static Electrical Power Inverter	CS-ETSO/Initial Issue
ETSO-C76b	Fuel Drain Valves	CS-ETSO/11
ETSO-C78a	Crewmember Demand Oxygen Mask	CS-ETSO/13
ETSO-C79	Fire Detectors (Radiation Sensing Types)	CS-ETSO/Initial Issue
ETSO-C80	Flexible Fuel and Oil Cell Material	CS-ETSO/Initial Issue
ETSO-C85b	Survivor Locator Lights	CS-ETSO/12
ETSO-C87a	Airborne Low-Range Radio Altimeter	CS-ETSO/8
ETSO-C88b	Automatic Pressure Altitude Reporting Code Generating Equipment	CS-ETSO/11

EASA ETSO ref.	Title	Last amended by
ETSO-C89a	Crew Member Oxygen Regulators, Demand	CS-ETSO/11
ETSO-C90d A1	Cargo Pallets, Nets and Containers	CS-ETSO/11
ETSO-C92c	Ground Proximity Warning, Glide Slope Deviation Alerting Equipment	CS-ETSO/Initial Issue
ETSO-C95a	Mach Meters	CS-ETSO/7
ETSO-C96b	Anticollision Light Systems	CS-ETSO/13
ETSO-C99a	Flight Deck (Sedentary) Crew Member Protective Breathing Equipment	CS-ETSO/11
ETSO-C100c	Aviation Child Safety Device (ACDS)	CS-ETSO/11
ETSO-C101	Overspeed Warning Instruments	CS-ETSO/Initial Issue
ETSO-C102	Airborne Radar Approach and Beacon Systems for Helicopters	CS-ETSO/Initial Issue
ETSO-C103	Continuous Flow Oxygen Mask Assembly (for Non-Transport Category Aircraft)	CS-ETSO/Initial Issue
ETSO-C105	Optional Display Equipment for Weather and Ground Mapping Radar Indicators	CS-ETSO/Initial Issue
ETSO-C106 A1	Air Data Computer	CS-ETSO/8
ETSO-C109	Airborne Navigation Data Storage System	CS-ETSO/Initial Issue
ETSO-C110a	Airborne Passive Thunderstorm Detection Systems	CS-ETSO/Initial Issue
ETSO-C112e	Secondary Surveillance Radar Mode S Transponder	CS-ETSO/11
ETSO-C113a	Airborne Multi-purpose Electronic Displays	CS-ETSO/11
ETSO-C114 A1	Torso Restraint Systems	CS-ETSO/8
ETSO-C115d	Required Navigation Performance (RNP) Equipment using Multi-Sensor Inputs	CS-ETSO/13
ETSO-C116a	Crew Member Portable Protective Breathing Equipment	CS-ETSO/11
ETSO-C117a	Airborne Wind Shear Warning and Escape Guidance Systems (Reactive Type) for Transport Aeroplanes	CS-ETSO/Initial Issue
ETSO-C118a	Traffic Alert and Collision Avoidance System I (TCAS I)	CS-ETSO/13
ETSO-C119d	Airborne Collision Avoidance System II (ACAS II) Version 7.1 with Hybrid Surveillance	CS-ETSO/11
ETSO-C121b	Underwater Locating Device	CS-ETSO/8
ETSO-C123c	Cockpit Voice Recorder Systems	CS-ETSO/13

EASA ETSO ref.	Title	Last amended by
ETSO-C124c	Flight Data Recorder Systems	CS-ETSO/13
ETSO-C126b	406 and 121.5 MHz Emergency Locator Transmitter	CS-ETSO/11
ETSO-C127b	Rotorcraft, Transport Aeroplane, and Small Aeroplane Seating Systems	CS-ETSO/11
ETSO-C132a	Geosynchronous Orbit Aeronautical Mobile Satellite Services Aircraft Earth Station Equipment	CS-ETSO/12
ETSO-C135a	Large Aeroplane Wheels, and Wheels and Brake Assemblies	CS-ETSO/6
ETSO-C139a	Aircraft Audio Systems and Equipment	CS-ETSO/11
ETSO-C141	Aircraft Fluorescent Lighting Ballast/Fixture Equipment	CS-ETSO/Initial Issue
ETSO-C142a	Non-Rechargeable Lithium Cells and Batteries	CS-ETSO/3
ETSO-C144a	Passive Airborne Global Navigation Satellite System (GNSS) Antenna	CS-ETSO/6
ETSO-C145e	Airborne Navigation Sensors Using the Global Positioning System Augmented by the Satellite-Based Augmentation System	CS-ETSO/13
ETSO-C146e	Stand-Alone Airborne Navigation Equipment Using the Global Positioning System Augmented by the Satellite-Based Augmentation System	CS-ETSO/13
ETSO-C147a	Traffic Advisory System (TAS) Airborne Equipment	CS-ETSO/12
ETSO-C151c	Terrain Awareness and Warning System (TAWS)	CS-ETSO/11
ETSO-C154c	Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B) Equipment	CS-ETSO/7
ETSO-C155b	Recorder Independent Power Supply	CS-ETSO/13
ETSO-C157b	Flight Information Services-Broadcast (FIS-B) Equipment	CS-ETSO/12
ETSO-C158	Aeronautical Mobile High Frequency Data Link (HF DL) Equipment	CS-ETSO/7
ETSO-C159c	Next Generation Satellite Systems (NGSS) Equipment	CS-ETSO/13
ETSO-C160a	VDL Mode 2 Communications Equipment	CS-ETSO/8
ETSO-C161a	Ground-Based Augmentation System Positioning and Navigation Equipment	CS-ETSO/7
ETSO-C162a	Ground-Based Augmentation System Very High Frequency Data Broadcast Equipment	CS-ETSO/7
ETSO-C164	Night-Vision Goggles (NVG)	CS-ETSO/8

EASA ETSO ref.	Title	Last amended by
ETSO-C165a	Electronic Map Systems for Graphical Depiction of Aircraft Position	CS-ETSO/9
ETSO-C166b A3	Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Service-Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz)	CS-ETSO/13
ETSO-C170	High-Frequency (HF) Radio Communication Transceiver Equipment Operating Within the Radio Frequency 1.5 to 30 Megahertz	CS-ETSO/7
ETSO-C172a	Cargo Restraint Strap Assemblies	CS-ETSO/12
ETSO-C173a	Nickel-Cadmium, Nickel Metal-Hydride, and Lead-Acid Batteries	CS-ETSO/11
ETSO-C174 A1	Battery-Based Emergency Power Unit (BEPU)	CS-ETSO/8
ETSO-C175	Galley Cart, Containers and Associated Components	CS-ETSO/3
ETSO-C176a	Aircraft Cockpit Image Recorder Systems	CS-ETSO/13
ETSO-C177a	Data Link Recorder Equipment	CS-ETSO/12
ETSO-C178	Single Phase 115 VAC, 400 Hz Arc Fault Circuit Breakers	CS-ETSO/8
ETSO-C179a	Rechargeable Lithium Cells and Lithium Batteries	CS-ETSO/7
ETSO-C184	Galley Equipment	CS-ETSO/7
ETSO-C190	Active Airborne Global Navigation Satellite System (GNSS) Antenna	CS-ETSO/6
ETSO-C194	Helicopter Terrain Awareness and Warning System (HTAWS)	CS-ETSO/7
ETSO-C195b	Avionics Supporting Automatic Dependent Surveillance-Broadcast (ADS-B) Aircraft Surveillance	CS-ETSO/12
ETSO-C196a	Airborne Supplemental Navigation Sensors for Global Positioning System Equipment Using Aircraft-Based Augmentation	CS-ETSO/7
ETSO-C198	Automatic Flight Guidance and Control System (AFGCS) Equipment	CS-ETSO/8
ETSO-C199	Traffic Awareness Beacon System (TABS)	CS-ETSO/13
ETSO-C200a	Low-Frequency Underwater Locating Device (ULD)	CS-ETSO/12
ETSO-C201	Attitude and Heading Reference Systems (AHRS)	CS-ETSO/11
ETSO-C202	Cargo Stopper Devices	CS-ETSO/11
ETSO-C203 A1	Fire containment covers (FCC)	CS-ETSO/13

EASA ETSO ref.	Title	Last amended by
ETSO-C207	Aeronautical Mobile Airport Communication System (AeroMACS)	CS-ETSO/12
ETSO-C209	Electronic Flight Instrument System (EFIS) Display	CS-ETSO/13
ETSO-C210	Airborne Head-Up Display	CS-ETSO/13
ETSO-C214	Functional ETSO equipment using an ETSO-2C153-authorized IMA platform or module	CS-ETSO/14

Index 2

EASA ETSO ref.	Title	Last amended by
ETSO-2C11e	Power Plant Fire Detection Instruments (Thermal and Flame Contact Types)	CS-ETSO/Initial Issue
ETSO-2C19c	Portable Water-Solution Type Hand Fire Extinguishers	CS-ETSO/12
ETSO-2C34f	ILS Glide Slope Receiving Equipment Operating within the Radio Frequency Range of 328.6–335.4 Megahertz (MHz)	CS-ETSO/Initial Issue
ETSO-2C35d	Radar Marker Receiving Equipment	CS-ETSO/Initial Issue
ETSO-2C36f	Airborne ILS Localizer Receiving Equipment Operating within the Radio Frequency Range 108–112 Megahertz	CS-ETSO/Initial Issue
ETSO-2C40c	VOR Receiving Equipment Operating within the Radio Frequency Range of 108–117.95 Megahertz	CS-ETSO/Initial Issue
ETSO-2C41d	Airborne Automatic Direction Finding (ADF) Equipment	CS-ETSO/Initial Issue
ETSO-2C48a	Carbon Monoxide Detector Instruments	CS-ETSO/6
ETSO-2C66b	Distance Measuring Equipment (DME) Operating within the Radio Frequency Range 960–1215 Megahertz	CS-ETSO/Initial Issue
ETSO-2C75	Hydraulic Hose Assembly	CS-ETSO/Initial Issue
ETSO-2C93b	Airborne Interim Standard Microwave Landing System Converter Equipment	CS-ETSO/Initial Issue
ETSO-2C104a	Microwave Landing System (MLS) Airborne Receiving Equipment	CS-ETSO/Initial Issue
ETSO-2C122	Devices That Prevent Blocked Channels Used in Two-Way Radio Communications Due to Simultaneous Transmissions	CS-ETSO/Initial Issue
ETSO-2C128	Devices That Prevent Blocked Channels Used in Two-Way Radio Communications Due to Unintentional Transmissions	CS-ETSO/Initial Issue
ETSO-2C153	Integrated Modular Avionics (IMA) Platform and Modules	CS-ETSO/10
ETSO-2C169a	VHF Radio Communications Transceiver Equipment Operating within the Radio Frequency Range 117.975 to 137 Megahertz	CS-ETSO/6
ETSO-2C197	Information Collection and Monitoring Systems	CS-ETSO/7
ETSO-2C500a	Combined ILS/MLS Airborne Receiving Equipment	CS-ETSO/Initial Issue
ETSO-2C501	Mode S Aircraft Data Link Processor	CS-ETSO/Initial Issue
ETSO-2C502	Helicopter Crew and Passenger Integrated Immersion Suits	CS-ETSO/1
ETSO-2C503	Helicopter Crew and Passenger Immersion Suits for Operations to or from Helidecks Located in a Hostile Sea Area	CS-ETSO/1

EASA ETSO ref.	Title	Last amended by
ETSO-2C504	Helicopter Constant-Wear Life Jackets for Operations to or from Helidecks Located in a Hostile Sea Area	CS-ETSO/1
ETSO-2C505	Helicopter Life Rafts for Operations to or from Helidecks Located in a Hostile Sea Area	CS-ETSO/1
ETSO-2C509	Light Aviation Secondary Surveillance Transponders (LAST)	CS-ETSO/2
ETSO-2C512	Portable Gaseous Oxygen Supply (PGOS)	CS-ETSO/3
ETSO-2C513	Tow Release	CS-ETSO/3
ETSO-2C514a	Airborne Systems for Non-Required Telecommunication Services (in Non-Aeronautical Frequency Bands) (ASNRT)	CS-ETSO/13
ETSO-2C515	Aircraft Halocarbon Clean Agent - Hand-Held Fire Extinguishers	CS-ETSO/11

~~(*)= this index is prepared on the basis of the changes proposed by NPA 2017-08 related to regular update of CS-ETSO~~

European Technical Standard Order

Subject: FUNCTIONAL ETSO EQUIPMENT USING AN ETSO-2C153-AUTHORISED IMA PLATFORM OR MODULE

1 - Applicability

This ETSO standard is applicable to any equipment presented for an ETSO authorisation to a functional¹ ETSO standard, where the equipment implements one (or several) ETSO-2C153-authorized IMA platforms/modules for which the applicant seeks compliance credit from these ETSO authorisations to demonstrate compliance with a functional ETSO.

Note: This ETSO standard is also applicable to any equipment for which an applicant is seeking an ETSO authorisation of a functional ETSO standard where the applicant performs additional development on an already authorised ETSO-C214 'open' class article and intends to take compliance credit from this authorisation to demonstrate compliance with further functional ETSO standards.

This ETSO standard provides the requirements which functional ETSO equipment using an ETSO-2C153-authorized IMA platform or module or integrating further an ETSO-C214-authorized article that is designed and manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

EUROCAE ED-124 and RTCA DO-297 recognise incremental IMA system approval by introducing intermediate acceptance steps. ETSO-2C153 authorisation is the first step in the ETSO IMA authorisation process. This ETSO-C214 standard is an intermediate step to authorise functional ETSO equipment (F-ETSO equipment)² implementing an ETSO-2C153-authorized IMA platform or IMA module, when the applicant is seeking compliance credit from these preceding authorisations to demonstrate compliance with a functional ETSO standard. This ETSO standard defines the requirements and delta activities that shall be performed for the authorisation of the integrated F-ETSO equipment.

¹ Functional ETSO standard: any ETSO standard of CS-ETSO describing an aircraft function, i.e. typically the majority of all ETSO standards except ETSO-2C153 and this ETSO-C214.

² 'F-ETSO equipment' is the integrated equipment for which the applicant is seeking an ETSO standard approval, using ETSO-2C153 platform(s)/module(s).

Note: This ETSO standard does not define the minimum operational performance specifications of the defined function; these are defined by the individual ‘functional’¹ ETSO standard, with which the applicant may elect to comply (refer to CS-ETSO Subpart A, Section 2.5).

2 - Procedures

2.1 - General

The applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

2.2.1 - Access to the information of the selected ETSO-2C153 platforms/modules

The applicant is responsible for establishing the necessary communication channels with the ETSO-2C153 holder company.

The applicant shall have access to all necessary design data as a ‘user’ of the ETSO-2C153 platform (for instance, the declaration of design performance, user guide/manual per ETSO-2C153 Appendix 3, installation manual, environmental qualification plans/reports, etc.).

The applicant’s organisation shall establish a communication means to obtain timely notifications of design changes, open problem reports (at least the ones impacting the usage of the platform), occurrence reports and airworthiness directives (ADs) that affect or relate to the ETSO-2C153 platforms/modules.

2.2.2 - Assessment of design changes

The applicant shall perform a change impact analysis on ETSO-2C153 platform design evolutions on the functional ETSO equipment, and shall perform the necessary development life cycle activities that are impacted by the ETSO-2C153 changes.

Note: The functional ETSO holder is responsible for assessing the classification of the changes to the F-ETSO equipment as minor or major as per Part 21.A.611 and for providing the necessary associated justification.

Change management processes shall be compliant with AMC 20-170 Section 5.4.

2.2.3 - Assessment and reporting of open problem reports (OPRs)

The management, analysis and classification of OPRs shall be performed by the applicant following the objectives of AMC 20-170 Section 5.5, for which objective a) of that section is adapted to the F-ETSO context as follows:

- a) *The reporting of open problem reports (OPRs) between the different ETSO-2C153 platforms/modules and the F-ETSO equipment shall be established and assessed by the F-ETSO applicant.*

3 - Technical conditions

3.1 – Basic

3.1.1 - Minimum performance standard

This section provides the minimum performance standard requirements for the process of further development of equipment using an ETSO-2C153-authorized platform(s)/module(s) for which a functional ETSO authorisation (defined as the F-ETSO equipment) is sought.

The process requirements will cover the environmental qualification, the hardware development assurance, software development assurance and finally the integration of these developed items into the F-ETSO equipment to demonstrate compliance for the intended function, using the credit of the authorised ETSO-2C153 platform(s)/module(s).

Definition of classes

This ETSO is an incremental step between ETSO-2C153 and complete IMA systems certified during an aircraft type certification. Depending on the future evolution of the F-ETSO equipment, two classes have been defined:

- ‘open’ class, and
- ‘closed’ class.

‘Open’ class refers to an ETSO article that has been integrated taking into account the provisions for future evolution (*) of the ETSO article but restricted to an IMA context. That means that there are still shared resources available after the integration of all the functions of the F-ETSO article, and that the performance and usage constraints of the remaining resources have been characterised.

‘Closed’ class refers to ETSO articles that have been integrated and where no evolution (*) has been anticipated, with all IMA-related activities considered closed. The performance of the remaining resources is not characterised. An F-ETSO ‘closed’ class article no longer offers the capability for IMA development. Design changes may still be performed in accordance with the Part-21 provisions, as for other ETSO articles.

() The term ‘evolution’ in these sentences refers to further development of functions using the remaining resources of the IMA, and without affecting the performance of the already authorised F-ETSO function.*

Class	Minimum performance standard
‘Open’	Section 3 of this document and Appendix 1
‘Closed’	Section 3 of this document

3.1.1.1 - Use of ‘ETSO-2C153’-authorised platforms/modules

Identification of the ETSO-2C153 platforms/modules used

- (a) The applicant shall clearly define the ETSO-2C153 platforms/modules used in the design and the associated ETSO-2C153 authorisation credit that is intended to be used for the F-ETSO

equipment compliance demonstration.

- (b) The ETSO approval and the part number of the ETSO-2C153 platforms/modules used shall be clearly referenced in the ETSO certification programme. The ETSO approval and the part number, including the issue/minor revisions of the ETSO-2C153 platforms/modules used, shall be clearly referenced in the declaration of design and performance (DDP).
- (c) Any resources/functions included in the ETSO-2C153 platforms/modules but unused in the current F-ETSO equipment shall be clearly identified in the ETSO certification programme or any related software/hardware plans.
- (d) The applicant shall identify and quantify the usage (used and unused features) of the ETSO-2C153 platform resources, including the usage of its health monitoring and fault management resources.

Proper use of the ETSO-2C153 platform(s)/module(s)

- (e) The applicant shall demonstrate the proper use of the ETSO-2C153 platform(s)/module(s), including compliance with the ETSO-2C153 platform integration requirements/user requirements and with the requirements for the correct use of platform safety features. In particular, the applicant shall demonstrate that the use, the partitioning, the configuration of the resources and the installation of the items are performed on the ETSO-2C153 platform/modules in compliance with the ETSO-2C153 user manual, installation manual or equivalent data (as documented per ETSO-2C153 Appendix 3). This also includes the deactivation or disabling of unused ETSO-2C153 functions/modules, when available, or the means to ensure that the intended function is performed without any interference from unused ETSO-2C153 functions/modules.

3.1.1.2 - Equipment/hardware/software development

The ETSO certification programme shall describe the F-ETSO equipment and its structural breakdown. This shall include the use and integration of the ETSO-2C153-authorized platform(s)/module(s) within the F-ETSO equipment. The F-ETSO equipment certification programme shall introduce the planning, the organisation, the division of tasks and the development, validation, integration, and verification activities conducted on the F-ETSO article, including the tool environment used for those activities.

Considerations regarding the content of this ETSO certification programme and guidance can be found in ED-124 Chapter 4.4.3, referring to 'IMA system certification plans'.

In particular, the ETSO certification programme shall indicate the structure of the life cycle data that will support the compliance demonstration with the ETSO requirements.

Non-ETSO functions

Any non-ETSO function embedded in the equipment shall be developed and integrated in conformance to the requirements of this section, in order to be able to demonstrate that it does not interfere with the ETSO functions.

Any non-ETSO functions embedded in the equipment shall be clearly identified as non-ETSO functions in the ETSO certification programme.

3.1.1.2.1 - Hardware development

- (a) The applicant shall clearly define the additional hardware part that will be developed and integrated with the ETSO-2C153 platforms/modules that are used.
- (b) The development of the hardware shall be compliant with CS-ETSO Subpart A Section 2.3.

3.1.1.2.2 - Software/application development

- (a) The applicant shall clearly define the software applications that will be developed and integrated with the ETSO-2C153 platforms/modules that are used and with any possible additional hardware.
- (b) The development of hosted applications shall be compliant with CS-ETSO Subpart A Section 2.2.
- (c) The development of the hosted applications executing on an ETSO-2C153 platform shall comply with the Task 2 objectives defined in ED-124/DO-297 Table A-2 and Chapter 4.3.1, except Objective 4.3.1.d, and with the following adaptation for Objective 4.3.1.a, where the ED-124/DO-297 text is replaced by:

Objective 4.3.1.a:

‘Demonstrate that each application performs its intended function and satisfies the related ETSO standard and Subpart A Section 2.2 requirements and the F-ETSO article requirements while properly utilising the appropriate platform resources and interfacing with other modules and/or applications.’

Particularly it shall be demonstrated that the hosted application on the ETSO-2C153 platform/module complies with the user requirements provided by the ETSO-2C153 provider (see the CS-ETSO/ETSO-2C153 standard — Appendix 3).

- (d) Any non-ETSO application embedded in the ETSO article shall be developed in conformance to the above requirements (b) and (c) in order to be able to demonstrate that it does not interfere with the ETSO functions.

The associated life cycle data to demonstrate the above requirements shall be produced and organised to support the functional ETSO system integration objectives, and to show that the applications are executing correctly within the platform and module requirements and limitations.

Even though the objectives for the development of hosted applications remain applicable, when relevant, some activities/life cycle data might be combined with F-ETSO equipment activities/data (next section).

3.1.1.2.3 - Equipment integration process

There are several levels of integration that are possible for functional ETSO equipment using ETSO-2C153-authorized platforms/modules, of which some examples are listed below:

- the integration of software applications on an ETSO-2C153 platform;
- the integration of several ETSO-2C153 modules to build an integrated equipment and its software applications; and
- the integration of additional hardware simultaneously with software applications, together with an ETSO-2C153 platform/module or additional hardware, into an ETSO-2C153 rack platform (class RH).

General objective

- (a) The applicant shall perform the integration of the ETSO-2C153 platform(s) and modules used with any additional hardware and the hosted software applications. These integration activities have to be compliant with the ED-124/DO-297 Task 3 objectives defined in ED-124/DO-297 Table A-3 and Chapter 4.4.1, except Objective 4.4.1.a, and with the following adaptation for Objective 4.4.1.d where the ED-124/DO-297 text is replaced by:

Objective 4.4.1.d:

'Demonstrate compliance with the applicable functional ETSO standards and related MOPS.'

Note: Even though the integration activities have their own objectives, when relevant, some activities/data might be combined with some activities/life cycle data of the development of the hosted applications (see Section 3.1.1.2.2).

Health monitoring and fault management

- (b) The applicant shall describe how the ETSO-2C153 health monitoring and fault management resources are used and integrated with the other platform/modules/application features, resulting in the health monitoring and fault management of the functional ETSO equipment.

In particular:

Principles and mechanisms shall be defined in order to allow the consistent sharing of fault management data between ETSO-2C153 module/platform resources and the functions of the ETSO article.

Recovery mechanisms shall be defined to ensure the continuity of the functions of the ETSO article when needed.

Guidance on health monitoring and fault management can be found in ED-124 Chapters 3.6.1 to 3.6.7.

Guidance about health monitoring and fault management at the platform and application levels respectively can also be found in ED-124 Chapters 3.1.1.b.5 and 3.1.2.d.

Configuration data/parameter data items

- (c) AMC 20-170 Section 5.2 shall be followed.

Use of tools and tool qualification

(d) AMC 20-170 Section 5.3 shall be followed.

3.1.1.2.4 - Safety assessment

The safety assessment of the F-ETSO equipment shall consider the possible failures in the ETSO-2C153 platform/modules used in the equipment that are described by the platform provider in their failure modes and effect analysis and the safety assessment of the F-ETSO equipment. If any assumptions have been made at the ETSO-2C153 platform/modules level, they shall be validated by the F-ETSO safety assessment process.

Note: If additional hardware is added to an ETSO-2C153 platform/module, it shall also be considered in the safety assessment.

3.1.2 - Environmental standard

The applicant shall demonstrate the compliance of the integrated F-ETSO equipment with the environmental requirements identified in CS-ETSO Subpart A paragraph 2.1.

If the applicant intends to reuse evidence from an earlier demonstration of compliance achieved by the ETSO-2C153 platform/module, an assessment of the achieved performance shall be performed so as to identify any gaps between the earlier qualification of the ETSO-2C153 platform/module and the intended F-ETSO environment, in compliance with the requirements of Subpart A Section 2.1. The qualification test plan of the F-ETSO shall clearly identify any additional qualification activities and any tests that need to be (re)performed considering the impact of the integration of several hardware platforms/modules, as well as the possible differences between the intended environment of the F-ETSO equipment and the environment for which the ETSO-2C153 platform/modules were qualified.

3.1.3 – Software

See Section 3.1.1.2.2 of this ETSO standard.

3.1.4 – Airborne electronic hardware

See Section 3.1.1.2.1 of this ETSO standard.

3.2 - Specific

The installation manual shall include all the data necessary for the proper installation and use of the F-ETSO equipment.

The installation manual shall document a means to ensure the compatibility between the authorised ETSO-2C153 platform/module and the authorised F-ETSO article. In particular, the installation manual shall provide compatibility and mixability information between the IMA ETSO-2C153 platform/module and the F-ETSO hosted application(s).

3.2.1 Failure condition classification

See CS-ETSO Subpart A paragraph 2.4.

The failure condition classification that is appropriate for the ETSO article will not be driven by this ETSO standard, but driven by the intended aircraft function and the minimum classification indicated in the functional ETSO standard with which the ETSO article is intended to comply.

4 - Marking

4.1 - General

See CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

The applicant shall mark the ETSO article with ETSO-C214 and the selected class of the equipment:

- ETSO-C214 'Open', or
- ETSO-C214 'Closed'.

The applicant shall maintain the original ETSO marking of the ETSO-2C153 platform and modules used in the F-ETSO equipment. When the technique of electronic marking was used, this electronic marking shall remain available, even after having developed additional software.

5 - Availability of referenced document

See CS-ETSO Subpart A paragraph 3.

Appendix 1 for ‘open’ class IMA equipment

This Appendix is applicable to ‘open’ class IMA equipment.

1 - IMA resources of ‘open’ class equipment

When the C214-ETSO article is of ‘open’ class, the F-ETSO applicant needs to properly characterise and document the resulting platform resources and partitioning features for the next user.

Three main cases of ‘open’ equipment are distinguished in order to adapt the requirements to the development specificities of the F-ETSO article as follows:

- a) When the applicant uses only one ETSO-2C153 platform and does not augment its resources, as illustrated below:

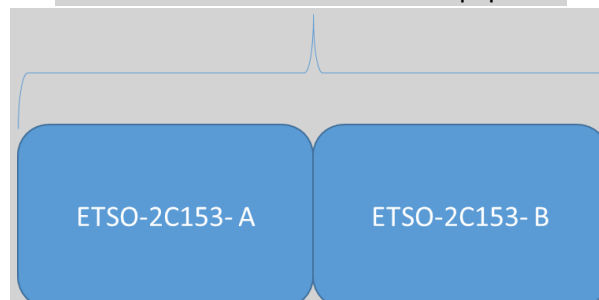
Shared resources of the F-ETSO equipment



...then the applicant shall describe the use of the original ETSO-2C153 platform with regard to the ETSO-2C153 Appendix 3 data (such as the user guide) and describe the remaining resources with respect to that Appendix 3 data so that it is clear which shared resources remain available for future incremental development by an independent user or aircraft manufacturer. In particular, the resources that are used and allocated shall be described and quantified.

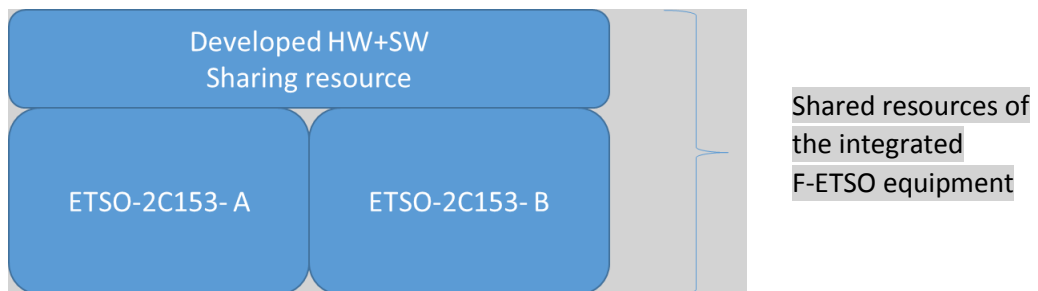
- b) When the F-ETSO equipment integrates multiple ETSO-2C153-authorized resources without augmenting the IMA sharing capability, as illustrated below:

Shared resources of the F-ETSO equipment



...the F-ETSO applicant shall characterise the resulting platform using the individual characterisation of the ETSO-2C153 platform and document the resulting ETSO-C214 'open' platform in compliance with ETSO-2C153 Appendix 3.

- c) When the F-ETSO equipment augments the IMA sharing resources with additional development (hardware and/or software), as illustrated below:



...the F-ETSO equipment development shall comply with ETSO-2C153 Appendix 2 and the related classes and document the augmented 'open' platform C214 in compliance with ETSO-2C153 Appendix 3.

The applicant can use the Appendix 3 ETSO-2C153 data of the ETSO-2C153 platform/modules that are used and augment or amend them to elaborate the ETSO-C214 'open' platform user data, in compliance with ETSO-2C153 Appendix 3.

Within the characterisation effort of resources, the applicant should in particular document the instructions for configuration of the ETSO-C214 article so that the next user can ensure the integrity and continuity of the system configuration, and ensure that the resource allocation, partitioning, and health monitoring would not be impaired when integrating the ETSOA article.

2 - Continuous health monitoring capability

As a user of an ETSO-2C153 platform/modules, the F-ETSO applicant should pay particular attention to ensuring that there is a continuous health monitoring capability. Health monitoring features provided in an 'open' class platform shall be continuously maintained and characterised throughout the integration process, and the health monitoring capability shall be made available for any potential further incremental development.