Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, DC

TSO-C159f

Effective
Date: xx/xx/xx

Technical Standard Order

Subject: Next Generation Satellite Systems (NGSS) Equipment

1. PURPOSE. This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of TSO design approval (LODA). In it, we (the Federal Aviation Administration, (FAA)) tell you what minimum performance standards (MPS) your Next Generation Satellite Systems (NGSS) equipment must meet for approval and identification with the applicable TSO marking.

2. APPLICABILITY. This TSO affects new applications submitted after its effective date.

a. TSO-C159e will remain effective until {*insert date 18 months after publication date of this TSO revision}*. After this date, we will no longer accept applications for TSO-C159e.

b. NGSS equipment approved under previous versions of this TSOA may still be manufactured under the provisions of its original approval.

3. REQUIREMENTS. New models of NGSS equipment (including the Aircraft Earth Station (AES) transceiver equipment, auxiliary equipment, and associated antenna) identified and manufactured on or after the effective date of this TSO must meet the requirements in RTCA, Inc. Document DO-262G / EUROCAE Document ED-243D, *Minimum Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)*, the aviation standards documents jointly published by RTCA, Inc., and EUROCAE in September 2025.

The MPS allows for different equipment classes and subclasses as defined by RTCA DO-262G/ EUROCAE ED-243D, supporting an aircraft SATCOM Short Burst Data (SBD), SATCOM SwiftBroadband (SBB), and SATCOM Certus Broadband (CBB) system. There are 10 applicable equipment classes and 11 equipment subclass components identified as shown in Tables 1A/B/C and Tables 2A/B of this TSO, respectively. Tables 1A and 2A show the requirements for SATCOM SBD equipment classes and subclass components, respectively. Tables 1B and 2B show the requirements for SATCOM SBB equipment classes and subclass components, respectively, and Table 1C shows requirements for SATCOM CBB. The manufacturer must declare the equipment class requirements from those identified in the applicable appendix. The equipment configuration must satisfy the relevant requirements of RTCA DO-262G/ EUROCAE ED-243D,

minimum operational performance standards (MOPS) as identified in Tables 1A/B/C and 2A/B of this TSO.

Table 1A. Equipment Class Identifiers supporting SATCOM SBD

Equipment Class Identifier	Description	Requirement
All SATCOM SBD Equipment Classes	All SATCOM SBD equipment produced under RTCA DO-262G / EUROCAE ED-243D, Appendix D, identified as Equipment Class AES1, AES2, or AES3	Appendix D, Section D.2.1 Appendix D, Section D.2.2 requirements applicable to all SATCOM SBD equipment classes
AES1	AES using a single channel Satellite Data Unit (SDU) that contains one SBD (96XX) transceiver for Aeronautical Mobile Satellite (Route) Services (AMS(R)S) data only applications. AES1 is a Short Burst Data (SBD)-only transceiver and cannot support voice calling. A passive Low Gain Antenna (LGA) is part of the AES1 system. Also see RTCA DO-262G / EUROCAE ED-243D, Appendix D, Figure D-13.	Appendix D, Section D.2.2 requirements specifically applicable to AES1, specifically including Section D.2.2.1.1
AES2	AES using a single or dual channel SDU that contains one or two LBT (95XX) transceivers for voice and/or data applications. A passive LGA is part of the AES2 system. Also see RTCA DO-262G / EUROCAE ED-243D, Appendix D, Figure D-14.	Appendix D, Section D.2.2 requirements specifically applicable to AES2, specifically including Section D.2.2.1.2
AES3	AES using two or more LBT (95XX) and/or SBD (96XX) transceivers for multiple channel data and/or voice applications. A passive LGA is part of the AES3 system. Also see RTCA DO-262G / EUROCAE ED-243D, Appendix D, Figure D-15.	Appendix D, Section D.2.2 requirements specifically applicable to AES3, specifically including Section D.2.2.1.3

Table 1B. Equipment Class Identifiers supporting SATCOM SBB

Equipment Class Identifier	Description	Requirement
All SATCOM SBB Equipment Classes	All SATCOM SBB equipment produced under RTCA DO-262G / EUROCAE ED-243D, Appendix E, identified as Equipment Class AES4, AES6, or AES7	Appendix E, Section E.2.1 Appendix E, Section E.2.2 requirements applicable to all SATCOM SBB equipment classes
AES4	AES using an Enhanced Low Gain Antenna (ELGA). AES4 is configured as a complete system. Also see RTCA DO-262G / EUROCAE ED-243D, Appendix E, Figure E-8.	Appendix E, Section E.2.2 requirements specifically applicable to AES4, specifically including Section E.2.2.1.1.1
AES6	AES using a High Gain Antenna (HGA), transceiver, and Diplexer Low Noise Amplifier (DLNA). AES6 is defined as an entire system. Also see RTCA DO-262G / EUROCAE ED-243D, Appendix E, Figure E-9.	Appendix E, Section E.2.2 requirements specifically applicable to AES6, specifically including Section E.2.2.1.1.2
AES7	AES using an Intermediate Gain Antenna (IGA), transceiver, and DLNA. AES7 is defined as an entire system. Also see RTCA DO-262G / EUROCAE ED-243D, Appendix E, Figure E-10.	Appendix E, Section E.2.2 requirements specifically applicable to AES7, specifically including Section E.2.2.1.1.3

Table 1C. Equipment Class Identifiers supporting SATCOM CBB

Equipment Class Identifier	Description	Requirement
All SATCOM CBB Equipment Classes	All SATCOM CBB equipment produced under RTCA DO-262G / EUROCAE ED-243D, Appendix F, identified as AES8, AES9, AES10, or AES11	Appendix F, Section F.2.1 Appendix F, Section F.2.2 requirements applicable to all SATCOM CBB equipment classes
AES8	An AES using either an omni L-Class (ALGA) or a steered M-Class antenna (MGA) for one carrier uplink. AES8 is configured as a complete system. Also see RTCA DO-262G/ EUROCAE ED-243D, Appendix F, Table F-9.	Appendix F, Section F.2.2 requirements specifically applicable to AES8
AES9	An AES using either an omni L-Class (ALGA) or a steered M-Class antenna (MGA) for two sub-carrier uplink. AES9 is configured as a complete system. Also see RTCA DO-262G/ EUROCAE ED-243D, Appendix F, Table F-9.	Appendix F, Section F.2.2 requirements specifically applicable to AES9
AES10	An AES using a steered H-Class antenna (HGA) for one carrier uplink. AES10 is configured as a complete system. Also see RTCA DO-262G/ EUROCAE ED-243D, Appendix F, Table F-9.	Appendix F, Section F.2.2 requirements specifically applicable to AES10
AES11	An AES using a steered H-Class antenna (HGA) for two sub-carrier uplink. AES11 is configured as a complete system. Also see RTCA DO-262G/ EUROCAE ED-243D, Appendix F, Table F-9.	Appendix F, Section F.2.2 requirements specifically applicable to AES11

Table 2A. Equipment Sub-Class Identifiers supporting SATCOM SBD

Sub-Class Identifier	Description	Requirement
LGA	Passive LGA for use with AES1, AES2 or AES3.	Appendix D, Section D.2.1 requirements that apply to LGA Appendix D, Section D.2.2 requirements applicable to all SATCOM SBD equipment Appendix D, Section D.2.2 requirements specifically applicable to LGA, specifically including Section D.2.2.3.1.1

Table 2B. Equipment Sub-Class Identifiers supporting SATCOM SBB

Sub-Class Identifier	Description	Requirement
All SATCOM SBB Equipment Sub-Classes	All SATCOM SBB system components produced under RTCA DO-262G / EUROCAE ED-243D, Appendix E, identified as Equipment Sub-Class HGA, IGA, 6J, 6F, 7J, 7F, 6D, 7D, DJ, or DFL	Appendix E, Section E.2.1 requirements applicable to the equipment sub-class Appendix E, Section E.2.2 requirements applicable to all SATCOM SBB equipment Appendix E, Section E.2.2

Sub-Class Identifier	Description	Requirement
		requirements specifically applicable to the equipment sub-class, specifically including the sections listed for each sub-class below
HGA	HGA for AES6.	Appendix E, Section E.2.2.3.1.2
IGA	IGA for AES7.	Appendix E, Section E.2.2.3.1.2
6J	A transceiver for AES6, using a DJ (or, in certain conditions, DFL) DLNA and HGA antenna.	Appendix E, Section E.2.2.1.1.4
6F	A transceiver for AES6, using a DFL DLNA and HGA antenna.	Appendix E, Section E.2.2.1.1.5
7J	A transceiver for AES7, using a DJ (or, in certain conditions, DFL) DLNA and IGA antenna.	Appendix E, Section E.2.2.1.1.6
7F	A transceiver for AES7, using a DFL DLNA and IGA antenna.	Appendix E, Section E.2.2.1.1.7
6D	Transceiver with integrated DLNA for AES6, using a HGA antenna.	Appendix E, Section E.2.2.1.1.8
7D	Transceiver with integrated DLNA for AES7, using an IGA antenna.	Appendix E, Section E.2.2.1.1.9
DJ	Type J diplexer (DLNA) as described in ARINC-781. Configures with 6J transceiver and HGA for use with AES6, or 7J transceiver and IGA for use with AES7.	Appendix E, Section E.2.2.1.1.10
DFL	Type F – LTE diplexer (DLNA) as described in ARINC-781. Configures with 6F (and, under certain conditions, 6J) transceiver and HGA for use with AES6, or with 7F (and, under certain conditions, 7J) transceiver and IGA for use with AES7.	Appendix E, Section E.2.2.1.1.11

a. Functionality. This TSO's standards apply to equipment intended for long range communication services, AMS(R)S by means of satellite communications between AES, corresponding satellites, and ground earth stations (GES). The NGSS supports voice and data communications between aircraft users and ground-based users, such as air navigation service

providers (ANSP), airline operational communication and aircraft operators. This TSO recognizes voice and three datalink protocols working within aeronautical telecommunication network (ATN): aircraft communications addressing and reporting system (ACARS), open systems interconnection (OSI), and internet protocol suite (IPS).

The functionality of NGSS supports four categories of priority communication service in the Aircraft Control Domain (ACD) and/or Aircraft Information Services Domain (AISD). Two are safety-of-flight communication used for Air Traffic Services (ATS) and Aeronautical Operational Control (AOC) communications. The other two are non-safety-of-flight communication used for Aeronautical Administrative Communication (AAC) and special-purpose Aeronautical Passenger Communication (APC; referred to as "Aeronautical Public Correspondence" in RTCA DO-262G / EUROCAE ED-243D, Appendix D) under the physical or virtual access control of the flight or cabin crew.

Appendix E and Appendix F of RTCA DO-262G / EUROCAE ED-243D also contain provisions for supporting a non-priority & non-safety-of-flight communications service known as Passenger Information and Entertainment Services (PIES) associated with PIES domain (PIESD). Though non-safety-of-flight services are outside the scope of these appendices, if supported, they must be partitioned from communications in the ACD and AISD for security reasons.

b. Failure Condition Classifications. The failure condition specified in paragraphs **3.b.(1)** and **3.b.(2)** of this TSO is based on NGSS voice or data communications equipment used in procedural/continental airspace area operations, its installation impact on own aircraft system, or impact to other aircraft operating in its vicinity.

(1) Failure of the function defined in paragraph **3.a** of this TSO, except for failure of AES described in paragraph **3.c.(1),** is a *minor* failure condition.

(2) Loss of the function as defined in paragraph **3.a** of this TSO, except for loss of security partitioning as described in paragraph **3.c.(1),** is a *minor* failure condition.

(3) Develop the system to, at least, the design assurance level, as applicable, equal to the above failure condition classifications.

c. Security Threat Classifications

(1) Failure of AES described in paragraph **3.a** of this TSO that enables unauthorized or inadvertent access to the ACD from outside the ACD is a *major* security threat, as defined in RTCA DO-326B / EUROCAE ED-202B, *Airworthiness Security Process Specification*, issued in September and October 2024, respectively.

(2) Develop the system to, at least, the security assurance level, as applicable, equal to the above security threat classifications.

d. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in Appendix D, E, or F section D2.4, E2.4, or F2.4 (as applicable), of RTCA DO-262G / EUROCAE ED-243D, that apply to the equipment class and subclass identifiers listed in Tables 1A/1B/1C and 2A/2B for which you are seeking TSO authorization.

e. Environmental Qualification. Demonstrate the required performance under the test conditions specified in Appendix D, E, or F section D2.3, E2.3, or F2.3 (as applicable)**,** of RTCA DO-262G / EUROCAE ED-243D, using standard environmental conditions and test procedures appropriate for airborne equipment. You may use a different standard environmental condition and test procedure than RTCA DO-160G / EUROCAE ED-14G, *Environmental Conditions and Test Procedures for Airborne Equipment*, provided the standard is appropriate for the NGSS equipment.

> **Note:** The use of RTCA DO-160D / EUROCAE ED-14D, *Environmental Conditions and Test Procedures for Airborne Equipment*, (with Changes 1 and 2 only, without Change 3 incorporated), or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph **3.i** of this TSO.

f. Software Qualification. If the article includes software, develop the software according to RTCA DO-178C / EUROCAE ED-12C, *Software Considerations in Airborne Systems and Equipment Certification*, issued in December 2011 / January 2012, respectively, including referenced supplements as applicable, to at least the software level consistent with the failure condition classification defined in paragraph **3.b** of this TSO. You may also develop the software according to RTCA DO-178B / EUROCAE ED-12B, issued in December 1992, if you follow the guidance in Advisory Circular (AC) 20-115D, *Airborne Software Development Assurance Using EUROCAE ED-12( ) and RTCA DO-178( )*, dated July 21, 2017.

g. Electronic Hardware Qualification. If the article includes airborne electronic hardware, then develop the component according to RTCA DO-254 / EUROCAE ED-80*, Design Assurance Guidance for Airborne Electronic Hardware*, issued in April 2000, and AC 20-152A, *Development Assurance for Airborne Electronic Hardware*, dated October 7, 2022, to at least the design assurance level consistent with the failure condition classification defined in paragraph **3.b** of this TSO.

h. Aircraft Information Security and Protection Qualification. Design and develop AES in accordance with, as applicable, guidance and methods of RTCA DO-326B/ EUROCAE ED-202B and RTCA DO-356A / EUROCAE ED-203A, *Airworthiness Security Methods and Considerations*, issued in June 2018.

(1) You must provide information security and protection to ATS priority communications services in the ACD, and AISD (if applicable) in accordance with this TSO.

(2) If AES interfaces with ACD, and/or AISD, and/or APC/PIES communications, then you must develop the system to provide partitioning for system protection for equipment intended to support such shared communications.

i. Deviations. We have provisions for using alternate or equivalent means of compliance with the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation pursuant to 14 CFR 21.618.

4. MARKING.

a. Mark at least one major component permanently and legibly with all of the information in 14 CFR 45.15(b).

(1) This TSO introduces a new identifier scheme to reflect voice and data-network level compatibility of AES for voice (V), ACARS (A), OSI (O), IPS (I) or any combination according to Table 4.

(2) For an article produced as a Complete System according to Table 3 of this TSO (AES1-1, AES2-3, AES3-5, AES4-101, AES6-106, AES7-111, AES8-1, AES8-2, AES9-3, AES9-4, AES10-5, or AES11-6), mark at least one major component of the system with the applicable Valid Combination for the system according to Table 4 of this TSO to reflect design compatibility of AES with the network designator(s).

(3) For an article produced as an individual component, additionally mark the article with the applicable Sub-Class Identifier according to Table 2A or 2B of this TSO; or for SBD (96XX) or LBT (95XX) transceivers, with “SBD” or “LBT” as applicable. Use Table 3 and Table 4 to include applicable AES and valid network designator.

Table 3. Valid Combinations of System Components
(Also see RTCA DO-262G / EUROCAE ED-243D, Tables D-6 and E-4)

Valid Combinations		DO-262G Normative Appendix	Transceiver							Transceiver & DLNA		DLNA		Antenna					Complete System
			SBD (96XX)	LBT (95XX)	BCX	6J	6F	7J	7F	6D	7D	DJ	DFL	LGA (Passive)	LGA (Active)	MGA (Steered)	HGA (Steered)	IGA	
AES1	1	D																	X
	2	D	X											X					
AES2	3	D																	X
	4	D		X										X					
AES3	5	D																	X
	6	D	X	X										X					
AES4	101	E																	X
AES6	102	E				X						X					X		
	103	E					X						X [1]				X		
	104	E								X							X		
	105	E				X							X [1]				X		
	106	E																	X
AES7	107	E						X				X						X	
	108	E							X				X [1]					X	
	109	E									X							X	
	110	E						X					X [1]					X	
	111	E																	X
AES8	a	F																	X
	b	F																	X
	1	F																	X
	2	F																	X
AES9	3	F																	X
	4	F																	X
AES10	5	F																	X
AES11	6	F																	X

Note: Systems with DLNA type DFL do not have blocking immunity to interfering signals in the 1526-1536 MHz band. These may be used in regions where this blocker is not present due to local Spectrum Management. See RTCA DO-262G / EUROCAE ED-243D, Appendix E, section 2.2.1.1.11 for description.

Table 4. Network Designators and Labeling Scheme

Valid Combinations		Appendix Reference	Voice Only / CS	ACARS	OSI	IPS	Combo
			V	A	O	I	V/A/O/I
AES1	1	D	AES1-1-V	AES1-1-A			
	2	D	AES1-2-V	AES1-2-A			
AES2	3	D	AES2-3-V	AES2-3-A			
	4	D	AES2-4-V	AES2-4-A			
AES3	5	D	AES3 -5-V	AES3 -5-A			
	6	D	AES3 -6-V	AES3 -6-A			
AES4	101	E	AES4-101-V	AES4-101-A			
AES6	102	E	AES6-102-V	AES6-102-A	AES6-102-O	AES6-102-I	AES6-102-V/ A /O /I
	103	E	AES6-103-V	AES6-103-A	AES6-103-O	AES6-103-I	AES6-103-V/ A /O /I
	104	E	AES6-104-V	AES6-104-A	AES6-104-O	AES6-104-I	AES6-104-V/ A /O /I
	105	E	AES6-105-V	AES6-105-A	AES6-105-O	AES6-105-I	AES6-105-V/ A /O /I
	106	E	AES6-106-V	AES6-106-A	AES6-106-O	AES6-106-I	AES6-106-V/ A /O /I
AES7	107	E	AES7-107-V	AES7-107-A	AES7-107-O	AES7-107-I	AES7-107-V/ A /O /I
	108	E	AES7-108-V	AES7-108-A	AES7-108-O	AES7-108-I	AES7-108-V/ A /O /I
	109	E	AES7-109-V	AES7-109-A	AES7-109-O	AES7-109-I	AES7-109-V/ A /O /I
	110	E	AES7-110-V	AES7-110-A	AES7-110-O	AES7-110-I	AES7-110-V/ A /O /I
	111	E	AES7-111-V	AES7-111-A	AES7-111-O	AES7-111-I	AES7-111-V/ A /O /I
AES8	a	F	AES08-a-V	AES08-a-A			
	b	F	AES08-b-V	AES08-b-A			
	1	F	AES08-1-V	AES08-1-A			
	2	F	AES08-2-V	AES08-2-A			
AES9	3	F	AES09-3-V	AES09-3-A			
	4	F	AES09-4-V	AES09-4-A			
AES10	5	F	AES10-5-V	AES10-5-A			
AES11	6	F	AES11-6-V	AES11-6-A			

b. If the article includes software and/or airborne electronic hardware, then the article part-numbering scheme must identify the software and airborne electronic hardware configuration. The part-numbering scheme can use separate, unique part numbers for software, hardware, and airborne electronic hardware.

c. You may use electronic part marking to identify software, airborne electronic hardware components, and equipment sub-classes where legible labelling is not possible, by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

d. If the article is implemented with the security measures described in this TSO, then the article must identify the security assurance level.

5. APPLICATION DATA REQUIREMENTS. You must give the FAA Aircraft Certification Office (ACO) manager responsible for your facility a statement of conformance, as specified in 14 CFR 21.603(a)(1), and one copy each of the following technical data to support your design and production approval. LODA applicants must submit the same data (excluding paragraph **5.h**) through their civil aviation authority (CAA).

a. Manuals containing the following:

(1) Operating instructions and article limitations sufficient to describe the equipment's operational capability.

(2) Detailed description of any deviations.

(3) Installation procedures and limitations sufficient to ensure the NGSS equipment class and subclass components, when installed according to the original equipment manufacturer's (OEM) installation manual or operational procedures, still meet this TSO's requirements for NGSS equipment. Limitations must identify any unique aspects of the installation, according to the valid combination of system components identified in RTCA DO-262G / EUROCAE ED-243D. See Table 3 of this TSO for the valid combinations of components used for complete system installation and marking. The limitations must include a note with the following statement:

"This article meets the minimum requirements of TSO–C159f.
Installation of this article requires separate approval."

(a) The OEM's installation manual must identify the components that may be installed based on a valid combination of system class in accordance with Table 3.

(b) For equipment intended to support communication service in ACD, and/or AISD, and/or APC/PIES communications, if the required security between ACD, AISD and APC/PIES communications specified in paragraphs **3.a** and **3.h** of this TSO is provided by the overall installation (either partially or wholly), you must specifically include installation procedures and limitations for provision of the security.

(c) For AES8 – AES11, include information on Antenna Installation, and Iridium Certus to GPS Required Isolation, as identified in Appendix F section F.3.1.8 of RTCA DO-262G / EUROCAE ED-243D. Also include reference to section F.6 for Iridium Certus to Glonass Interference Calculations.

Note: Table F-35 and Table F-36 of section F.3.1.8 only cover GNSS Fixed Radiation Pattern Antenna (FRPA). Controlled Radiation Pattern Antenna (CRPA) isolation requirements have not been evaluated.

(4) For each unique class and subclass configuration of software and airborne electronic hardware, reference the following:

(a) Software part number including revision and design assurance level,

(b) Airborne electronic hardware part number including revision and design assurance level, and

(c) Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article (for example, a form as described in RTCA DO-160G / EUROCAE ED-14G, Appendix A).

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the NGSS equipment. For equipment intended to support shared ACD/AISD and APC/PIES communications, this must specifically include a description of how the required security partitioning between ACD/AISD and APC/PIES communications is provided.

(7) By-part-number list of major components, such as antenna, transceiver, or diplexer, that make up the AES, complying with the standards prescribed under this TSO. Include vendor part number cross-references, when applicable. If the equipment can satisfy the applicable requirements of RTCA DO-262G / EUROCAE ED-243D only when used with a particular component, make the use of that component (by part number) a requirement for the installation. If the equipment is installed with standard components applicable only to single operational class equipment, include these requirements in the installation manual as a limitation.

(8) List of replaceable class and subclass components, by part number, that make up the NGSS equipment. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, to ensure that the NGSS continues to meet the TSO approved design. Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and a software accomplishment summary.

d. If the article includes simple or complex custom airborne electronic hardware: a plan for hardware aspects of certification (PHAC), a hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable).

e. If the article requires considerations for information security and protection to meet paragraphs **3.a, 3.c.(1),** and **3.h** of this TSO: a plan for security aspects of certification (PSecAC) Summary, and other supporting documentation, as applicable.

f. A drawing depicting how the article will be marked with the information required by paragraph **4** of this TSO.

g. Identify functionality or performance contained in the article not evaluated under paragraph **3** of this TSO (defined as non-TSO functions). Non-TSO functions can be accepted in parallel with the TSOA. For those non-TSO functions to be accepted, you must declare these functions and include the following information with your TSO application:

(1) Description of the non-TSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-TSO function(s) do not interfere with the article's compliance with the requirements of paragraph **3** of this TSO.

(2) Installation procedures and limitations sufficient to ensure that the non-TSO function(s) meets the declared functions and performance specification(s) described in paragraph **5.g.(1)**.

(3) Instructions for continued performance applicable to the non-TSO function(s) described in paragraph **5.g.(1)**.

(4) Interface requirements and applicable installation test procedures to ensure compliance with the non-TSO function(s) performance data defined in paragraph **5.g.(1)**.

(5) Test plans, analysis, and results, as appropriate, to verify that the performance of the hosting TSO article is not affected by the non-TSO function(s).

(6) Test plans and analysis as appropriate, to verify the function and performance of the non-TSO function(s) as described in paragraph **5.g.(1)**.

h. The quality manual required by 14 CFR 21.608, including functional test specifications. The quality system must ensure that you will detect any change to the approved design that could adversely affect compliance with the TSO MPS and reject the article accordingly. Applicants who currently hold TSOAs must submit revisions to the existing quality manual as necessary (not required for LODA applicants.)

i. A description of your organization as required by 14 CFR 21.605.

j. Material and process specifications list.

k. A list of all drawings and processes (including revision level) that define the article's design.

l. Manufacturer's TSO qualification report showing results of testing accomplished according to paragraph **3.d** of this TSO. For equipment intended to support shared ACD, AISD or APC/PIES communications where partitioning, and/or information security and protection functionality is incorporated into the equipment, this must specifically include verification of the proper function of the partitioning and/or information security and protection.

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to the responsible ACO, have the following technical data available for review by the responsible ACO:

> **Note:** The following data for a LODA applicant may be made available for review through its CAA. Refer to the applicable bilateral agreement for specific details regarding access to this data.

a. Functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

b. Article calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph **3.e** of this TSO.

g. If the article includes software, the appropriate documentation defined in the version of RTCA DO-178 / EUROCAE ED-12 specified by paragraph **3.f** of this TSO, including all data supporting the applicable objectives in Annex A, *Process Objectives and Outputs by Software Level*.

h. If the article includes airborne electronic hardware, and the failure condition of **3.b.(1)** of this TSO applies, the appropriate hardware life-cycle data for development assurance level in accordance with AC 20-152A and RTCA DO-254 / EUROCAE ED-80, Appendix A, Table A-1.

i. If the article contains non-TSO function(s), you must also make available the items in paragraphs **6.a** through **6.h** of this TSO as they pertain to the non-TSO function(s).

7. FURNISHED DATA REQUIREMENTS.

a. When furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy or online access to the data in paragraphs **5.a** and **5.b** of this TSO. Add any other data needed for the proper installation, certification, use, or for continued compliance with the TSO, of the NGSS equipment.

b. If the article contains declared non-TSO function(s), include one copy of the data in paragraphs **5.g.(1)** through **5.g.(4)**.

c. If the article contains software or complex custom airborne electronic hardware, include one copy of the open problem report (OPR) summary to type certification, supplemental type certification, or amended type certification design approval holders.

8. HOW TO GET REFERENCED DOCUMENTS.

a. Standards documents referred in this TSO can be purchased from respective organizations.

(1) RTCA documents from RTCA, Inc., 1150 18th Street NW, Suite 910, Washington, DC 20036, USA. Telephone: (202) 833-9339, fax: (202) 833-9434. You can also order copies online at http://www.rtca.org .

(2) EUROCAE documents from European Organisation for Civil Aviation Equipment, 9-23 rue Paul Lafargue, ‘‘Le Triangle’’ building, 93200 Saint-Denis, France. Telephone: +33-1-49-46-19-65. You can also order online at http://www.eurocae.net .

b. Order copies of 14 CFR parts 21 and 45 from the Superintendent of Documents, Government Publishing Office, P.O Box 979050, St. Louis, MO 63197-9000. Telephone (202) 512-1800, fax (202) 512-2104. You can also order online at: https://bookstore.gpo.gov, or find them on the FAA Internet website Dynamic Regulatory System (DRS) at https://drs.faa.gov.

c. You can find a current list of technical standard orders and advisory circulars on the FAA DRS at https://drs.faa.gov. You will also find the TSO Index of Articles at the same site.

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