English Translation Version for Reference Only

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China Civil Aviation Technical Standard Order

This China Civil Aviation Technical Standard Order (CTSO) is issued according to Part 37 of the China Civil Aviation Regulations (CCAR-37). This CTSO is a criterion which the concerned aeronautical materials, parts or appliances used on civil aircraft must comply with when it is presented for airworthiness certification.

Portable Oxygen Cylinder Assembly

1. Purpose.

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for Portable Oxygen Cylinder Assembly CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards (MPS) that Portable Oxygen Cylinder Assembly

Only must first meet for approval and identification with the applicable CTSO marking.

2. Applicability.

This CTSO affects new application of Portable Oxygen Cylinder Assembly submitted after its effective date.

3. Requirements

The equipment identified and manufactured on or after the effective date of this CTSO and intended to be marked with this CTSO marking must meet the MPS qualification in Appendix 1.

a. Functionality.

This CTSO's standards apply to the Portable Oxygen Cylinder Assembly that provides emergency breathing oxygen to passengers.

b. Failure Condition Classifications

There is not the standard minimum FCC for this CTSO. Applied

FCC of equipment depends on its intended use in particular aircraft. Should record the functional failure and FCC in equipment design.

c. Functional Qualification.

Equipment should meet the performance requirement according to the minimum requirement in Appendix 1 of this CTSO.

d. Environmental Qualification.

Equipment should meet the performance requirement according to the minimum requirement in Appendix 1 of this CTSO, adopting the standard environmental condition and test procedure which applied to this equipment.

e. Deviations.

For using alternative or equivalent means of conformance to meet the MPS in this CTSO, the applicant must show that the equipment maintains an equivalent level of safety and shall apply for a deviation under the provision of 21.368(a) in CCAR-21-R4.

4. Marking.

a. Mark at least one major component permanently and legibly with all the information in 21.423(b) of CCAR-21-R4. The marking must include the serial number., CTSO standard code, manufacturer name, product code, product volume, working pressure, test pressure, product weight, media type, flammable and explosive logo, knob switch direction identity, lifetime, manufacture date, operation identity, flow rate, operation instructions, precautions, etc.

b. Mark the following component permanently and legibly, with at least the manufacturer's name, subassembly part number, and this CTSO number, category, and subcategory identification:

(1) Each component that is easily removable (without hand tools); and,

(2) Each subassembly of the equipment that the manufacturer determined to be interchangeable.

5. Application Data Requirements.

The applicant must furnish the responsible certification personnel with the related data to support design and production approval. The application data includes a statement of conformance as specified in Section 21.353(a)(1) in CCAR-21-R4 and one copy of the following technical data:

a. A Manual(s) containing the following:

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

(2) Detailed description of any deviations.

(3) Installation procedures and limitations sufficient to ensure that the portable oxygen cylinder assembly, when installed according to the installation or operational procedures, still meets this CTSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statement:

"This article meets the minimum performance and quality control standards required by this CTSO. Installation of this article requires separate approval."

(4) Summarizing the test condition of temperature qualification to each part of the equipment. For example, adopting the described content of Annex A of RTCA/DO-160G "Environmental Conditions and Test Procedures for Airborne Equipment".

(5) Schematics and other documents necessary for equipment installation

(6) List of replaceable parts for the equipment (with part number indicated). If applicable, include cross-indexing of supplier part numbers.

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of the airborne equipment. Include recommended inspection intervals and service life, as appropriate.

c. Nameplates drawing, which stipulates how to mark the identity information according to the Chapter 4 of CTSO.

d. Instructions on the quality system, including functional test specifications, are required as required in Section 21.358 and subsequent versions of CCAR-21-R4. Quality systems should ensure that any changes that may adversely affect compliance with CTSO's minimum performance standards are detected and reject the product accordingly.

e. List of materials and process specifications

f. Define drawings and process lists (including revisions) of the equipment design

g. The manufacturer's CTSO appraisal report showing the results of the test completed in accordance with section 3.c of this CTSO.

6. Manufacturer Data Requirements.

Besides the data given directly to the authorities, the following technical data shall be available for review by the authorities:

a. Functional qualification specifications for qualifying each production equipment to ensure compliance with this CTSO.

b. Equipment calibration procedures.

c. Schematic drawings.

d. Material and process specifications.

e. The results of the environmental qualification tests conducted according to paragraph 3.d of this CTSO.

7. Furnished Data Requirements

If furnishing one or more articles manufactured under this CTSO to one entity (such as an operator or repair station), provide one copy or technical data and information specified in paragraphs 5.a and 5.b of this CTSO. Add any data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the equipment shall be added.

8. Availability of Referenced Documents.

a. Order RTCA documents from:

Radio Technical Commission for Aeronautics, Inc.

1150 18th Street NW, Suite 910, Washington D.C. 20036

You may also order them online from the RTCA Internet website at: www.rtca.org.

Appendix 1

Minimum Performance Standard for Portable Oxygen Cylinder Assembly

This Appendix specifies minimum performance standards for portable oxygen cylinder assembly.

1. Minimum Performance Standard

Portable oxygen cylinder assembly should consist of the following basic components:

1) Oxygen Cylinder

2) Oxygen Regulator

3) Individually equipped devices (face shield, harness, flow indicator, face shield storage box or face shield storage bag).

1.1 Oxygen Cylinder

The manufacture and acceptance of oxygen cylinders should comply with the requirements of GB/T5099.1-2017, GB/T5099.3-2017, GB/T5099.4-2017 or GB/T28053-2011 or DOT and other effectiveness standards, of which the water pressure test pressure shall not be less than 5/3 times the working pressure.

1.1.1 Filling pressure

The filling pressure should not exceed the nominal working pressure of the oxygen cylinder

Note: The nominal working pressure refers to the normal state (referred to as NTPD, is 20 °C, 101.3kPa, the gas state under dry gas conditions) When the gas in the bottle reaches a completely uniform state, the pressure is defined.

1.1.2 Filling medium

The oxygen filled in the oxygen cylinder shall comply with the technical requirements of chapter 3 of GB/T8982-2009 for aviation breathing oxygen.

1.1.3 Color

The color of the oxygen cylinder should be green. When the oxygen cylinder indicates compliance according to GB/T7144, it can be specified as light (phthalic) blue according to GB/T7144.

1.1.4 Connection of oxygen cylinder and oxygen regulator

The following methods can be used:

1) When using threaded connections, the relevant provisions on threads in the corresponding cylinder manufacturing standards should be met.

2) The sealing gasket material should be compatible with high-pressure oxygen and should comply with the relevant provisions of GB/T15382-2009.

1.2 Oxygen Regulator

Oxygen regulators are generally divided into demand oxygen regulators and continuous oxygen regulators

The demand oxygen regulator should comply with the requirements of CTSO-C89a and subsequent versions and subsequent versions. The requirements for oxygen regulators in this section are for continuous regulators.

Continuous regulators typically consist of the following components, each of which meets the corresponding requirements of this section:

(1) Pressure gauge;

(2) Switch mechanism for oxygen supply;

(3) High pressure safety pressure relief mechanism;

(4) Flow regulation mechanism;

(5) Low pressure safety pressure relief mechanism;

(6) filler device;

(7) Oxygen outlet;

(8) Pressure reduction mechanism.

1.2.1 Pressure Gauge

1) Regardless of whether the oxygen regulator is on or off, the pressure gauge should show the gas pressure inside the cylinder (pressure unit is

expressed in PSI).

2) The pressure gauge should indicate the range of normal filling pressure and minimum dispatch pressure

3) The calibration accuracy of the pressure gauge should not be greater than ± 100PSI

1.2.2 Switch mechanism for oxygen supply and delivery;

1) The oxygen supply and delivery switch mechanism should have one of the following ways: rotary knob, rotary lever or push-pull type.

2) The switch should have a fully open and fully closed stroke limit mechanism to ensure the sealing of oxygen in the closed state

3) The torque required to close or open the switch should not be greater than 5N·m.

4) The switch should have a clear sign indicating the direction, such as the "ON" direction indication and the "OFF" direction indication.

1.2.3 High pressure safety pressure relief mechanism

1) The role of the high-pressure safety pressure relief mechanism is to release the medium in the cylinder within the specified pressure range, which should meet the relevant requirements of GB/T15382-2009 pressure release device. The design of the outlet of the high-pressure safety pressure relief mechanism should minimize the propulsion of the escaped gas.

2) The opening pressure of the high-pressure safety pressure relief mechanism should be set to 1.38 times to 1.5 times the nominal working pressure of the oxygen cylinder.

1.2.4 Flow regulation mechanism

1) The role of the flow regulation mechanism is to select the oxygen output flow rate to meet the requirements of use according to the needs.

2) Unless otherwise specified, its flow rate shall meet the requirements of the minimum supplementary oxygen flow applicable in the requirements of Article CCAR25.1443 and subsequent versions of CCAR-25-R4.

3) When the flow regulator adjusts the flow rate, the different gears

should be clearly marked to show the corresponding flow rate

1.2.5 Low pressure safety pressure relief mechanism

1) The low pressure safety pressure relief mechanism should have the ability to release the gas exceeding the safe pressure from the low pressure area, and when the pressure is restored to the safe pressure, it is closed again.

2) The opening pressure of the low pressure safety pressure relief mechanism should be set to 1.1 times to 2 times the maximum pressure reduction pressure.

1.2.6 Filler device

The oxygen regulator should be equipped with an filler device through which the oxygen cylinder can be filled with a gas oxygen source. The filler device shall meet the following requirements:

1) Equipped with a filter of not less than 200 purposes or equivalent filler device, and equipped with a protective device to prevent damage or contamination of the filler device.

2) The filler device should be able to prevent the gas from flowing back (check valve)

1.2.7 Oxygen outlet

1) When the pre-set oxygen regulator is connected, the oxygen flow should be marked on the connector. Clearly identifiable, ensuring easy maneuverability for flight attendants. The oxygen outlet should have error proofing design and be equipped with protective devices to prevent damage or contamination of the oxygen outlet.

2) The outlet port should be equipped with a filter of not less than 200 purposes or an equivalent filter device to prevent foreign matter from entering the human body through the outlet.

1.2.8 Pressure reduction mechanism

The reduce pressure should match the working pressure of the oxygen mask.

1.3 Personal equipment (mask, harness, mask storage box or mask storage bag)

1) The harness should be able to fix the oxygen cylinder, effectively carry it, and do not interfere with the harness.

2) The mask storage box or mask storage bag should be safely and reliably fixed to the oxygen cylinder.

3) Mask are generally divided into demand oxygen masks and continuous oxygen masks. Demand oxygen masks should meet the requirements of CTSO-C78a and subsequent versions. Continuous oxygen masks should comply with the requirements of CTSO-C64a or CTSO-C103 and subsequent versions.

1.4 Other Requirements

1.4.1 Fire, Flammability

The materials used shall meet the requirements for flammability in CCAR-25-R4, Section 25.853(a) and subsequent versions.

1.4.2 Fixed inspection period

Unless otherwise specified, the gas cylinders used in portable oxygen cylinder assemblies are inspected for a period of 5 years

1.4.3 Cleaning Requirements

Unless otherwise specified, portable oxygen cylinder assembly cleaning shall be performed in accordance with the requirements of HB8483-2014.

1.4.4 Air tightness Requirements

1) When the pressure in the oxygen cylinder is the nominal working pressure, the high pressure plenum of the oxygen regulator and the connection part between the oxygen regulator and the oxygen cylinder should be do the airtight test.

2) The leakage amount of the low pressure plenum of the oxygen regulator should not exceed 0.01L/min.

1.4.5 Proof Pressure

The pressurization element in the portable oxygen cylinder assembly shall comply with the provisions of CCAR-25-R4, Section 25.1438(a) and subsequent versions

2 Environmental Test Requirements

Unless otherwise specified, portable oxygen cylinder assemblies shall meet the following requirements:

1) Conduct relevant tests in accordance with the requirements of Chapters 4, 5, 6, 7, 8, 10, 11 and 26 of RTCA/DO-160G and subsequent versions.

2) The portable oxygen component shall be charged to the nominal working pressure, and the performance test shall be carried out after the test, including the regulated pressure, flow rate, and air tightness, and meet the requirements of Section 1.2.8, Section 1.4.1 and Section 1.4.5 of the Appendix of this CTSO Standard. If the test medium is not oxygen, the molecular weight should be corrected according to the flow test results.

3) High temperature work and low temperature work shall be tested at the corresponding temperature to meet the requirements of Section 2.2 of this Appendix

3 Reference documents

GB/T5099.1 Seamless steel gas cylinders - Part 1: Quenched and tempered steel cylinders with tensile strength less than 1100 MPa

GB/T5099.3 Seamless steel gas cylinders - Part 3: Normalized cylinders

GB/T5099.4 Seamless steel gas cylinders - Part 4: Seamless stainless steel gas cylinders

GB/T7144 Colored cylinder mark for gases

GB/T8982 Oxygen supplies for medicine and aircraft breathing

GB/T15382 General specifications of gas cylinder valves

GB/T28053 Composite cylinders for breathing apparatus

HB8483 Cleaning and packing requirements for supply oxygen system of civil aircraft

CTSO-C64a Passenger Oxygen Mask Assembly, Continuous Flow

CTSO-C78a Crewmember Demand Oxygen Mask

CTSO-C89a Crewmember Oxygen Regulators, Demand

CTSO-C103 Continuous Flow Oxygen Mask Assembly (For

Non-Transport Category Aircraft)

RTCA/DO-160G Environmental Conditions and Test Procedures for Airborne Equipment

(The English version is for reference only. In case of any discrepancy or ambiguity of meaning between this English translation and the Chinese version, the latter shall prevail.)