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Superseding AS452A

Oxygen Mask Assembly, Demand and Pressure Breathing, Crew

RATIONALE

The A-10 Committee concluded that the content of this document will not be updated in the future. Other Aerospace Standards have replaced the requirements cited in this document. Therefore, the Committee decided to stabilize this document in its current state.

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This document has been declared "Stabilized" by the SAE A-10 Aircraft Oxygen Equipment Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. PURPOSE:

The purpose of this standard is to establish optimum standards for crew demand and pressure-breathing oxygen mask assemblies for use by crew members in civil aircraft.

2. SCOPE:

This standard covers both general type and quick-donning type mask assemblies in the following classes:

- a. Class A, oronasal, demand
- b. Class B, oronasal, pressure-demand
- c. Class C, full face, demand
- d. Class D, full face, pressure-demand

3. GENERAL REQUIREMENTS:

3.1 Performance:

The performance of the mask assembly shall be satisfactory when worn on the face, connected to a separately mounted or mask-mounted regulator of the appropriate type, demand or pressure demand. Demand masks and regulators are those designed for delivering to the user either pure (100%) oxygen or a mixture of oxygen and air, in any volume or at any rate of flow required by the natural respiration of the user. The demand equipment is suitable for routine use up to 35,000 ft cabin altitude and is intended to be suitable for emergency (few minutes) use up to 40,000 ft cabin altitude.

Pressure-demand masks and regulators function as demand or diluter demand equipment up to approximately 30,000 ft. Above this altitude the regulator delivers to the user oxygen under pressure varying with altitude, and is intended to be suitable for routine use up to 42,000 ft cabin altitude and emergency (few minutes) use up to 45,000 ft.

3.2 Oxygen Supply System:

The mask assemblies described herein are for dispensing gaseous oxygen from demand or pressure-demand breathing type oxygen regulators, including mask-mounted regulators.

The mask when connected with the appropriate type of regulator (demand or pressure demand) becomes an integral part of the oxygen system. Therefore, certain performance requirements in this standard stem from, or are established to assure compatibility with, the oxygen regulator requirements.

3.3 Components:

Each mask assembly shall consist of the following components where applicable:

- a. Facepiece
- b. Suspension device
- c. Valve or valves
- d. Supply tube assembly
- e. Microphone
- f. Miscellaneous additional accessories as required

3.4 Materials and Workmanship:

3.4.1 Materials: The materials used in the manufacture of mask assemblies shall not:

- a. Contaminate oxygen
- b. Be adversely affected by continuous contact with oxygen
- c. Contain or cause objectionable odors
- d. Be allergenic or irritating when in contact with the skin
- e. Be affected by ozone to a harmful extent
- f. Be less than flame resistant, by treatment or by selection. A flame resistant material is defined as one which will not support combustion to the point of propagating a flame, beyond safe limits, after the removal of the ignition source, in an atmosphere of air at ground level.

3.4.1.1 Finish: The finish of the facepiece and other components within the field of vision of the user shall be non-reflective.

3.4.2 Workmanship: Shall be consistent with accepted high grade aircraft equipment practice.

3.5 Identification:

The following information should be legibly and permanently marked on the mask assembly:

- a. SAE AS 452A
- b. Class, per paragraph 2 of this standard
- c. Type, as follows:

NQD (Non-Quick Don)
QDW (Quick-Donning Wear)
QDS (Quick-Donning Stow)
QDW/S (Quick-Donning Wear or Stow)

- d. Cure date of the oldest natural or synthetic rubber or rubberlike part.
- e. Manufacturer's part number.
- f. Manufacturer's name or trademark.
- g. Size (small, medium, large, regular normal, regular wide, etc. or universal fit). Abbreviations S, M, L, RN, Rw or UF may be used.
- h. Maximum approved altitude.

3.6 Cleaning:

It shall be possible to clean and sterilize the mask without adverse effects on its operation and performance. The manufacturer shall provide adequate cleaning instructions with each unit.

4. DETAIL REQUIREMENTS:

4.1 Designation:

The following type designations shall be used as applicable:

- 4.1.1 Type NQD (Non-Quick Don): This mask shall be designed to be worn on the person only when in use. When not in use this mask may be stowed in the aircraft accessible to the crew members but not necessarily connected to an oxygen outlet.
- 4.1.2 Type QDW (Quick-Donning Wear): This mask shall be designed to be worn on the person, ready for quick donning and immediate use and connected to the oxygen outlet.
- 4.1.3 Type QDS (Quick-Donning Stowage): This mask shall be designed for stowage in the aircraft, within reach of the crew member, ready for quick donning and immediate use, connected to the oxygen outlet.
- 4.1.4 Type QDW/S (Quick-Don Wear or Stow): This mask combines the requirements of 4.1.2 and 4.1.3 above.

4.2 General:

Each mask assembly shall be designed so that it shall be capable of being quickly and easily connected to an oxygen outlet and without interfering significantly with eyeglasses capable of being easily placed on the face from its ready, or stowed position, properly secured, sealed, and supplying oxygen.

In addition, upon completion of the donning action, the assembly does not prevent the crew member from being able to communicate immediately over the aircraft communication and intercommunication systems.

- 4.2.1 Masks for Use with Mask-Mounted Regulators: With the exception of the oxygen supply tube, no specific requirements are indicated as optional or not applicable since, depending on the design, all could be applicable. Where a requirement is also covered in the breathing oxygen regulator standard, the mask standard should apply since the mask is the end result and depends on the performance of the regulator in any event. Therefore, the test report showing compliance with the requirements of this standard may reference and include regulator test data as applicable or, where testing to meet both standards can be accomplished by a single test (or series of tests), such as life cycle endurance testing, this can be appropriately accomplished and documented.

4.3 Quick-Donning Type:

Each quick-donning type mask assembly shall be capable of meeting the criteria specified under general requirements of mask assemblies. In addition, the quick-donning mask assemblies shall be capable of being donned, within 5 sec, with either hand, independently, without preventing the crew member from executing his assigned normal and emergency duties.

4.4 Oronasal:

In addition to complying with the general requirements of 4.2, the oronasal mask shall be designed to cover at least the nostrils and mouth. The mask shall be capable of being used as a protective breathing mask when used in conjunction with protective goggles. The mask assembly shall not interfere significantly with the field of vision of the wearer.

4.5 Full Face:

In addition to complying with the general requirements of 4.2, the full-face mask shall be designed to cover at least the mouth, nose, and eyes, and to protect the user from the harmful effects of gases or vapor.

- 4.5.1 Vision: The full-face mask assembly shall be of such size and contour that the user will have an adequate field of vision. The viewing lens(es) in meeting the following minimum requirements will provide adequate vision.

The minimum visual area provided for each eye, when measured from a point at the center of the eye, shall extend horizontally to 75 deg in a temporal or outward direction, 50 deg in a nasal or inward direction, and vertically to 50 deg upward and 60 deg downward. This minimum visual area shall transition smoothly between these limits and shall contain no fittings or other projections that might restrict visibility, such as the mask structure between the eye-pieces of a dual-lens-type face mask.

- 4.5.2 Lenses: The lenses shall be of optical quality safety glass or appropriate clear plastic without optical or other defects. Provisions should be made for replacement of the lens when required or desired.
- 4.5.3 De-Fogging: Means shall be provided in the full face mask which will preclude any unsatisfactory fogging of lenses and permit the mask to be used under conditions of expected temperature and pressure changes. Gas circulation within the mask shall be directed to preclude a direct flow of gas into the eyes which would interfere with vision of the wearer.

4.6 Size and Fit:

The mask shall be designed to fit at least the 5 through 95 percentile flight crew population. Reference may be made to USAF WADC TR 52-321 "Anthropometry of Flying Personnel" for basic facial measurements. A sizing and/or fit program shall be established to assure compliance. An example of a satisfactory sizing program is described in USAF WADC TR 58-505 "Anthropometric Sizing and Fit-Test of the MC-1 Oral-Nasal Oxygen Mask." The use of facial forms as described in this report is recommended particularly if the forms can also simulate the relative resiliency of the human face. Tests on representative human subjects shall also be made.

4.7 Connector Warning Means:

If quick disconnect fittings are installed at the free (or regulator hose) end of the mask supply tube, means shall be provided to alert the user when his tube has inadvertently become disconnected. If valving is used to increase the inhalation resistance with the tubing disconnected, the negative pressure should be within the range of 7 to 9 in. of water. For universal use and interchangeability the connector should mate with the MS 24552 (or equivalent) connector. The fit of the connector components shall be positive and require a pull applied parallel with the longitudinal axis of the tube of at least 15 lb to separate.

4.8 Defrost:

Means shall be provided for simple removal of frost, manually or otherwise, to prevent the formation of ice at the exhalation valve or any other location which could interfere with the effective operation of the mask.