

**§ 23.1441 Oxygen equipment and supply.**

(a) If certification with supplemental oxygen equipment is requested, or the airplane is approved for operations at or above altitudes where oxygen is required to be used by the operating rules, oxygen equipment must be provided that meets the requirements of this section and §§ 23.1443 through 23.1449. Portable oxygen equipment may be used to meet the requirements of this part if the portable equipment is shown to comply with the applicable requirements, is identified in the airplane type design, and its stowage provisions are found to be in compliance with the requirements of § 23.561.

(b) The oxygen system must be free from hazards in itself, in its method of operation, and its effect upon other components.

(c) There must be a means to allow the crew to readily determine, during the flight, the quantity of oxygen available in each source of supply.

(d) Each required flight crewmember must be provided with—

(1) Demand oxygen equipment if the airplane is to be certificated for operation above 25,000 feet.

(2) Pressure demand oxygen equipment if the airplane is to be certificated for operation above 40,000 feet.

(e) There must be a means, readily available to the crew in flight, to turn on and to shut off the oxygen supply at the high pressure source. This shutoff requirement does not apply to chemical oxygen generators.

[Amdt. 23-9, 35 FR 6386, Apr. 21, 1970, as amended by Amdt. 23-43, 58 FR 18978, Apr. 9, 1993]

**§ 23.1443 Minimum mass flow of supplemental oxygen.**

(a) If continuous flow oxygen equipment is installed, an applicant must

show compliance with the requirements of either paragraphs (a)(1) and (a)(2) or paragraph (a)(3) of this section:

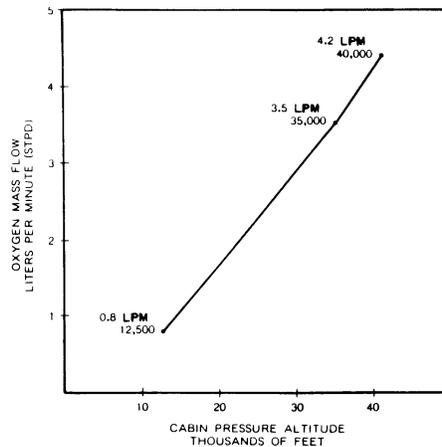
(1) For each passenger, the minimum mass flow of supplemental oxygen required at various cabin pressure altitudes may not be less than the flow required to maintain, during inspiration and while using the oxygen equipment (including masks) provided, the following mean tracheal oxygen partial pressures:

(i) At cabin pressure altitudes above 10,000 feet up to and including 18,500 feet, a mean tracheal oxygen partial pressure of 100 mm. Hg when breathing 15 liters per minute, Body Temperature, Pressure, Saturated (BTPS) and with a tidal volume of 700 cc. with a constant time interval between respirations.

(ii) At cabin pressure altitudes above 18,500 feet up to and including 40,000 feet, a mean tracheal oxygen partial pressure of 83.8 mm. Hg when breathing 30 liters per minute, BTPS, and with a tidal volume of 1,100 cc. with a constant time interval between respirations.

(2) For each flight crewmember, the minimum mass flow may not be less than the flow required to maintain, during inspiration, a mean tracheal oxygen partial pressure of 149 mm. Hg when breathing 15 liters per minute, BTPS, and with a maximum tidal volume of 700 cc. with a constant time interval between respirations.

(3) The minimum mass flow of supplemental oxygen supplied for each user must be at a rate not less than that shown in the following figure for each altitude up to and including the maximum operating altitude of the airplane.



(b) If demand equipment is installed for use by flight crewmembers, the minimum mass flow of supplemental oxygen required for each flight crewmember may not be less than the flow required to maintain, during inspiration, a mean tracheal oxygen partial pressure of 122 mm. Hg up to and including a cabin pressure altitude of 35,000 feet, and 95 percent oxygen between cabin pressure altitudes of 35,000 and 40,000 feet, when breathing 20 liters per minute BTPS. In addition, there must be means to allow the crew to use undiluted oxygen at their discretion.

(c) If first-aid oxygen equipment is installed, the minimum mass flow of oxygen to each user may not be less than 4 liters per minute, STPD. However, there may be a means to decrease this flow to not less than 2 liters per minute, STPD, at any cabin altitude. The quantity of oxygen required is based upon an average flow rate of 3 liters per minute per person for whom first-aid oxygen is required.

(d) As used in this section:

(1) BTPS means Body Temperature, and Pressure, Saturated (which is, 37 °C, and the ambient pressure to which the body is exposed, minus 47 mm. Hg, which is the tracheal pressure displaced by water vapor pressure when the breathed air becomes saturated with water vapor at 37 °C).

(2) STPD means Standard, Temperature, and Pressure, Dry (which is, 0 °C at 760 mm. Hg with no water vapor).

[Doc. No. 26344, 58 FR 18978, Apr. 9, 1993]

**§ 23.1445 Oxygen distribution system.**

(a) Except for flexible lines from oxygen outlets to the dispensing units, or where shown to be otherwise suitable to the installation, nonmetallic tubing must not be used for any oxygen line that is normally pressurized during flight.

(b) Nonmetallic oxygen distribution lines must not be routed where they may be subjected to elevated temperatures, electrical arcing, and released flammable fluids that might result from any probable failure.

[Doc. No. 26344, 58 FR 18978, Apr. 9, 1993]

**§ 23.1447 Equipment standards for oxygen dispensing units.**

If oxygen dispensing units are installed, the following apply:

(a) There must be an individual dispensing unit for each occupant for whom supplemental oxygen is to be supplied. Each dispensing unit must:

- (1) Provide for effective utilization of the oxygen being delivered to the unit.
- (2) Be capable of being readily placed into position on the face of the user.
- (3) Be equipped with a suitable means to retain the unit in position on the face.