COMMON BREATHING AIR QUALITY STANDARDS FOR SCBA AND AIRLINES

LIMITING CHARTACTERISTICS	CGA GRADE D[a] (1997)	CGA GRADE E[b] (1997) includes SCUBA Diving	OSHA[c] 1910.134 (1998)	ANSI Z88.2[d] (1992)	NFPA 1404[e] (2002)	NFPA 1500[f] (2002)	NFPA 1852[g] (2002)	NFPA 1989[h] (2003)
Carbon Dioxide - ppm v/v	1000[(1)]	1000	1000	1000	1000	1000	1000	1000
Carbon Monoxide - ppm v/v	10[(1)(2)]	10	10	10	10	10	10	10
Dew Point (°F) / Water - ppm v/v	(3)	(3)	≤-50 / ≤63[(4)]	≤-65 / ≤25[(5)]	≤-63 / ≤24	≤-63 / ≤24	≤-63 / ≤24	≤-63 / ≤24
Odor	(7)	(7)	no noticable odor	(7)	(7)	(7)	(7)	(7)
Oil (condensed) - mg/m³ at NTP & Particulates	5[(8)] NA	5[(8)] NA	5 NA	5 NA	5 5	5 5	5 5	5 5
Percent Oxygen, balance is predominantly nitrogen [(9)]	atm 19.5 - 23.5	atm 20 - 22	atm 19.5 - 23.5	atm 19.5 - 23.5	atm 19.5 - 23.5	atm 19.5 - 23.5	atm 19.5 - 23.5	atm 19.5 - 23.5
Total Hydrocarbon Content (as methane) - ppm v/v	NA	25	NA	NA	NA	NA	NA	25
Sampling Frequency	per supplier / customer agreement [Sec. 3.3.2]		not specified [Sec. (i)(7)] [(10)]	not specified [Sec. 10.5.4.3] [(11)]	reference to NFPA 1500 [Sec. 9.1]	at least quarterly [Sec. 7.10.3]	reference to NFPA 1500 [Sec. 7.3.2]	at least quarterly [Sec. 5.1.1.1]
Sampling Location	samples shall be representative of the air supply [Sec. 4.2]		not specified	[(12)] [Sec. 10.5.4.3]	reference to NFPA 1500 [Sec. 9.1]	[(13)] [Sec. 7.10.3]	reference to NFPA 1500 [Sec. 7.3.2]	[(13)] [Sec. 5.2.1]
Testing	tested by supplier or laboratory [Sec. 3.1]		reference to CGA [Sec. (I)(1)(ii)]	not specified [(14)]	reference to NFPA 1500 [Sec. 9.1]	reference to CGA [Sec. 7.10.1]	reference to NFPA 1500 [Sec. 7.3.2]	lab required [Sec. 5.1.1.1]
Accreditation / Certification	not required		not required	not required	not required	not required	not required	required [Sec. 4.1.1]
Breathing Air Quality	specified in Table 1		reference to 1989 CGA [Sec. (I)(1)(ii)]	reference to 1989 CGA [Sec. 10.5.1]	reference to NFPA 1500 [Sec. 9.1]	reference to CGA [Sec. 7.10.1]	reference to NFPA 1500 [Sec. 7.3.2]	specified in Sec. 5.3

NA = "indicates no maximum limiting characteristic. The absence of a listed quality verification level does not imply that the limiting characteristic is or is not present, but merely indicates that the test is not required for compliance with the characteristics specification." CGA 1997

Comparison of Respiratory Protection standards prepared by Air Quality Laboratories, Inc. as a guideline document only. Not intended to replace the official standards.

COMMON BREATHING AIR QUALITY STANDARDS FOR SCBA AND AIRLINES

OTHER RESPIRATORY PROTECTION PROGRAM REQUIREMENTS	CGA GRADE D[a] (1997)	CGA GRADE E[b] (1997) includes SCUBA Diving	OSHA[c] 1910.134 (1998)	ANSI Z88.2[d] (1992)	NFPA 1404[e] (2002)	NFPA 1500[f] (2002)	NFPA 1852[g] (2002)	NFPA 1989[h] (2003)
Written Program	not specified		required [Sec. (c)]	required [Sec. 4]	required [Sec. 1.2.1 & 5.1.1]	required [Sec. 7.9.1]	required [Sec. 4.2.1]	not specified
Written SOPs	not specified		required [Sec. (c)]	required [Sec. 6]	required [Sec. 5.1.3]	required [Sec. 7.9.2]	required [Sec. 4.2.1]	not specified
Medical Evaluation / Certification	not specified		initially then as necessary [Sec. (e)]	referred to ANSI Z88.6 [Sec. 4.5.3]	initially then annually [Sec. 6.3.6]	initially then annually [Sec. 10.2.2]	not specified	not specified
Facepiece Fit Testing	not specified		initially then annually [Sec. (f)]	annually [Sec. 9.1.4]	initially then annually [Sec. 6.1.4]	initially then annually [Sec. 7.12.1]	not specified	not specified
Respiratory Protection Training	not specified		initially then annually [Sec. (k)(5)]	initially then annually [Sec. 8.2]	initially then annually [Sec. 5 & 6]	initially then annually [Sec. 5.3.8]	not specified	not specified
Respirator Selection	not specified		required [Sec. (d)]	required [Sec. 7]	required [Sec. 4.2.1 & 4.3]	required [Sec. 7.9.1]	required [Sec. 5]	not specified
Respirator Cleaning / Storage	not specified		required [Sec. (h)(1) & (h)(2)]	required [Sec. 10.1 & 10.4]	required [Sec. 4.1.4 & 8.1.3]	required [Sec. 7.9.1 & 7.9.6]	required [Sec. 6]	not specified
Respirator Inspection	not specified		required [Sec. (h)(3)]	required [Sec. 10.2]	required [Sec. 7.2.2 & 8.1.2]	required [Sec. 7.9.1]	required [Sec. 7.2]	not specified
Respirator Maintenance	not specified		repairs [Sec. (h)]	required [Sec. 10.3]	required [Sec. 8]	required [Sec. 7.9.1]	required [Sec. 7]	not specified
Cylinder Hydrostatic Testing	reference to DOT [Sec. 6.1.1]		reference to DOT [Sec. (l)(4)(l)]	reference to DOT [Sec. 10.5.4.1]	reference to DOT [Sec. 9.2.1]	reference to DOT [Sec. 7.13.2]	reference to DOT [Sec. 7.3.5 & 7.1.2.4]	not specified
Recordkeeping	not specified		required [Sec. (m)]	required [Sec. 4.5.1 & 5.3]	required [Sec. 6.1.2]	required [Sec. 4.6.5]	required [Sec. 4.4.1]	not specified
Reference to NFPA 1989	not specified		not specified	not specified	not specified	not specified	not specified	-----

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a) Compressed Gas Association, Inc., CGA G-7.1-1997, Commodity Specification for Air
CGA G-7 (Compressed Air for Human Respiration) specifies Grade D as the minimum grade for routine use in self-contained or supplied-air protective breathing equipment as used in general industry and firefighting.
b) Compressed Gas Association, Inc., CGA G-7.1-1997, Commodity Specification for Air
CGA G-7 (Compressed Air for Human Respiration) specifies Grade E as the minimum grade to be used for SCUBA diving to 130 feet.
c) Occupational Safety & Health Administration, OSHA 29 CFR 1910.134 (1/8/98), Respiratory Protection
d) American National Standards Institute, ANSI Z88.2 (1992), Respiratory Protection
e) National Fire Protection Association, NFPA 1404 (2002), Fire Service Respiratory Protection Training
f) National Fire Protection Association, NFPA 1500 (2002), Fire Department Occupational Safety & Health Program
g) National Fire Protection Association, NFPA 1852 (2002), Selection, Care, and Maintenance of Open-Circuit SCBA
h) National Fire Protection Association, NFPA 1989 (2003), Breathing Air Quality for Fire and Emergency Services

(1) Not required for synthesized air when oxygen component was produced by air liquefaction & meets USP specification.
(2) Not required for synthesized air when nitrogen component was previously analyzed & meets NF specification.
(3) The water content of compressed air may vary with the intended use from saturated to very dry. For breathing air use in conjunction with SCBA in extreme cold where moisture can condense and freeze causing the breathing apparatus to malfunction, a dew point not to exceed -65 °F (24 ppm v/v) or 10 degrees Fahrenheit lower than the coldest temperature expected in the area is required.
(4) Employers shall ensure that cylinders of purchased breathing air have a certificate of analysis from the supplier that the air meets the requirements for Grade D breathing air and the moisture content in the cylinder does not exceed a dew point of -50 °F at 1 atmosphere pressure. The employer shall ensure that compressors used to supply breathing air to respirators minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees below the ambient temperature.
(5) The driest air obtainable (dew point of -100 °F or lower) should be used for recharging SCBA cyclinders to be used in environments with ambient temperatures below -25 °F.
(6) Or 10 °F lower than the coldest temperature expected in the area.
(7) Specific measurement of odor in gaseous air is impractical. Air may have a slight odor but the presence of a pronounced odor should render the air unsatisfactory.
(8) Not required for synthesized air whose oxygen and nitrogen components are produced by air liquefaction.
(9) The term "atm" (atmospheric) denotes the oxygen and nitrogen content normally present in atmospheric air; the numerical values denote the oxygen limits for synthesized air.

(10) "The employer must ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm. Methods for ensuring that the carbon monoxide level does not exceed 10 ppm include the placement of the air intake for the compressor in an area to be free from contaminants, frequent or continuous monitoring of the breathing air supply, the use of carbon monoxide filters, or the use of high temperature alarms or shut off devices where necessary."
"If only a high temperature alarm is used then the breathing air must be tested for the presence of carbon monoxide at intervals sufficient to ensure that carbon monoxide levels do not exceed 10 ppm."
"The frequency of monitoring will depend on the breathing air system in place in the facility, adherence to required maintenance procedures, and the location of the air intake for the compressor. For example, keeping in mind that a given measurement represents only that instant in time and must be representative of long-term air quality, periodic monitoring may be appropriate in situations where the compressor is well maintained and the air intake for the compressor is located in an area free from contaminants. In contrast, continuous monitoring would be warranted for older compressors where oil blow-by is more likely due to piston ring and cylinder wear,…or the maintenance history is not known." OSHA Instruction & Inspection Guidelines CPL2-0.120 9/25/98

(11) Prior to initial use and to ensure a continued high-quality air supply samples should be collected on a periodic basis, as directed by the program administrator.

(12) To account for any distribution system contamination input, a representative sample should be taken at the distribution supply points.

(13) A sample of breathing air obtained directly from the point of transfer from the filling system to the SCBA cylinders.

(14) Table 3 & Table 4 differentiate between analysis guidance for purchased breathing air and a compressed source. No reference is made to "laboratory testing".