COMMON BREATHING AIR QUALITY STANDARDS FOR SCBA AND AIRLINES

LIMITING CHARTACTERISTICS	CGA GRADE D[a] (2011)	CGA GRADE E[b] (2011)	OSHA[c] 1910.134 (2011)	NFPA 1989[d] (2013)	NFPA 1500[e] (2013)
Carbon Dioxide - ppm v/v	1000[(1)]	1000	1000	1000	reference to NFPA 1989 [Sec. 7.11]
Carbon Monoxide - ppm v/v	10[(1)(2)]	10	10	5	reference to NFPA 1989 [Sec. 7.11]
Dew Point (°F) / Water - ppm v/v	(3)	(3)	≤-50 / ≤63[(4)]	≤-63 / ≤24	reference to NFPA 1989 [Sec. 7.11]
Odor	(5)	(5)	no noticable odor	not pronounced	reference to NFPA 1989 [Sec. 7.11]
Oil (condensed) - mg/m^3 at NTP & Particulates	5[(6)]	5[(6)]	5	2	reference to NFPA 1989 [Sec. 7.11]
Percent Oxygen balance is predominantly nitrogen	19.5 - 23.5	20 - 22	19.5 - 23.5	Oxygen 19.5 - 23.5 Nitrogen 75 - 81%	reference to NFPA 1989 [Sec. 7.11]
Total Hydrocarbon Content (as methane) - ppm v/v	NA	25	NA	NA	reference to NFPA 1989 [Sec. 7.11]
Volatile Organic Compounds (VOCs) (non-methane) - ppm v/v	NA	NA	NA	25	reference to NFPA 1989 [Sec. 7.11]
Application	Industrial Airline or SCBA	SCUBA Diving	General Industry	Firefighting	Firefighting
Sampling Frequency	per supplier / customer agreement [Sec. 3.3.2]		not specified [Sec. (i)(7)] [(7)]	at least quarterly [(8)] [Sec. 5.1.1]	reference to NFPA 1989 [Sec. 7.11]
Sampling Location	samples shall be representative of air supply [Sec. 4.2]		not specified	[(9)] [Sec. 5.5.1]	reference to NFPA 1989 [Sec. 7.11]
Testing	tested by supplier or laboratory [Sec. 3.1]		reference to CGA [Sec. (I)(1)(ii)]	lab required [Sec. 5.1.2]	reference to NFPA 1989 [Sec. 7.11]
Accreditation / Certification	not required		not required	required [Sec. 4.1.1]	reference to NFPA 1989 [Sec. 7.11]
Breathing Air Quality	specified in Table 1		reference to 1989 CGA [Sec. (I)(1)(ii)]	specified in Sec. 5.6	reference to NFPA 1989 [Sec. 7.11]

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 2011

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OTHER RESPIRATORY PROTECTION PROGRAM REQUIREMENTS	CGA GRADE D[a] (2011)	CGA GRADE E[b] (2011)	OSHA[c] 1910.134 (2011)	NFPA 1989[d] (2013)	NFPA 1500[e] (2013)
Written Program	not specified		required [Sec. (c)]	not specified	required [Sec. 7.10.1]
Written SOPs	not specified		required [Sec. (c)]	not specified	required [Sec. 7.10.2]
Medical Evaluation / Certification	not specified		initially then as necessary [Sec. (e)]	not specified	annually [Sec. 10.2.3]
Facepiece Fit Testing	not specified		initially then annually [Sec. (f)]	not specified	initially then annually [Sec. 7.13]
Respiratory Protection Training	not specified		initially then annually [Sec. (k)(5)]	not specified	Reference to NFPA 1404 [(f)] [Sec. 5.3.5]
Respirator Selection	not specified		required [Sec. (d)]	not specified	required [Sec. 7.10.1]
Respirator Cleaning / Storage	not specified		required [Sec. (h)(1) & (h)(2)]	not specified	required [Sec. 7.10.1 & 7.10.6]
Respirator Inspection	not specified		required [Sec. (h)(3)]	not specified	required [Sec. 7.10.1]
Respirator Maintenance	not specified		repairs [Sec. (h)]	not specified	required [Sec. 7.10.1]
Cylinder Hydrostatic Testing	reference to DOT [Sec. 6.1.1]		reference to DOT [Sec. (l)(4)(l)]	not specified	required [Sec. 7.15.2]
Recordkeeping	not specified		required [Sec. (m)]	not specified	required [Sec. 4.6.5]
Reference to NFPA 1989	not specified		not specified	-----	[Sec. 7.11]

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References and Notes

a) Compressed Gas Association, Inc., CGA G-7.1-2011, 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-7.1-2011, 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 (6/08/11), Respiratory Protection

d) National Fire Protection Association, NFPA 1989 (2013), Breathing Air Quality for Emergency Services Respiratory Protection

e) National Fire Protection Association, NFPA 1500 (2013), Fire Department Occupational Safety & Health Program

f) National Fire Protection Association, NFPA 1404 (2013), Fire Service Respiratory Protection Training

(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) 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.

(6) Not required for synthesized air whose oxygen and nitrogen components are produced by air liquefaction.

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References and Notes

(7) "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

(8) In addition to regular periodic testing NFPA 1989 requires special testing for; maintenance conditions (including prior to changing purification filters and when contamination could occur (Sec. 5.2), synthetic breathing air (Sec. 5.3), and contaminated air (Sec. 5.4).

(9) Samples are taken directly at the point of air transfer, downstream from purification filters and prior to bypassing. If necessary, aremote fill hose may be used.