ANSI / ASSE Z88.2

American National Standard Practices for Respiratory Protection (1992 rev. versus 2015 rev.)

BACKGROUND:

- A substantial body of research has been published since the 1992 revision of Z88.2. This information related to the proper use and performance of respiratory protection in general, including workplace and laboratory evaluation of NIOSH-approved particulate respirators and the effectiveness of fit-testing. The Z88.2 standard was withdrawn in 2002 due to age and inability to effectively develop a consensus standard that reflects the rapid change in new developments in prudent respiratory protection practices. ANSI considers Z88.2 (2015) to be a new standard since so much has changed relative to the 1992 standard.
- Many of the terminology, definitions, and program management element changes from the 1992 to 2015 versions of Z88.2 have been adopted in the OSHA respiratory protection standards (29 CFR 1910.134 & 1926.103) since 2008. This gap analysis will focus solely on new inclusions in Z88.2 (2015) that are not reflected in the OSHA standards.

CHANGES:

- **Assigned protection factors (APF):** The new definition of APF listed in the 2015 revision of Z88.2 aligns more closely with the definition provided in the 1998 revision to the OSHA Respiratory Protection standards. The APF definition is considered the **minimum** protection provided by a respirator when used by "properly fitted and trained wearers when all elements of an effective respirator program are established and are being implemented."
- **Bioaerosols:** New guidance is provided regarding respirator selection for protection against bioaerosols and refers to the Canadian Standards Association CAN/CSA Z94.4-2010 (*Selection, Use, and care of Respirators).* The Public Health Agency of Canada has classified many airborne biohazards into Risk Groups, which can be used in decision-making in required level of respiratory protection. The CAN/CSA standard also provides common bioaerosol exposure situations and exposure factors to further aid in respirator selection.

ANSI / ASSE Z88.2 (CONTINUED)

American National Standard Practices for Respiratory Protection (1992 rev. versus 2015 rev.)

- **Breathing air quality - standards:** Z88.2 (2015) has been updated to the 2011 revision of CGA G-7.1 (*Commodity Specification for Air*) regarding breathing air quality, versus the older 1989 version of CGA G-7.1 that is referenced in the OSHA respiratory protection standards. All aspects of Grade D breathing air remain the same with the exception of Dew Point and Water parameters. Grade D breathing air must now be certified to contain no more than 67 ppm(v/v) water with a dew point that does not exceed -50F.
- **Breathing air quality – carbon monoxide:** Breathing air systems that utilize an oil lubricated compressor, or air compressors powered by internal combustion engines, must have a continuous carbon monoxide monitor with alarm detectible by the wearers. This requirement differs slightly from OSHA in the fact that high temperature alarms are not permitted in lieu of CO sensors & alarms.
- **Breathing air quality – sampling:** A breathing air sampling process must be in place to ensure continued high quality air that complies with CGA G-7.1 requirements. Air quality sampling must be performed prior to initial use, at a periodic frequency determined by the RPPA (e.g., quarterly), following major modifications to breathing air systems, prior to reuse if the compressor has been idle for a long period as defined by the RPPA, or whenever inadequate air quality is suspected. Sampling of purchased, compressed breathing air will include some combination of CO, % oxygen, and odor depending on previous cylinder usage / contents. Sampling of on-site compressed breathing air will include some combination of water vapor, CO, condensed hydrocarbons, CO_2, and odor depending on the type of compressor.
- **Emergency escape respirator SOP:** A written SOP must be developed that is unique for each instance where respirators are maintained and expected to be used for emergency escape purpose. A hazard assessment process is provided to assist in determining whether emergency escape respirators are necessary, conditions in which emergency respiratory conditions may be produced, the type of emergency escape respirator that is necessary, and inspection & maintenance requirements.

ANSI / ASSE Z88.2 (CONTINUED)

American National Standard Practices for Respiratory Protection (1992 rev. versus 2015 rev.)

- **End of service life (ESLI) & cartridge change-out schedules:** The employer must now use a respirator equipped with an ESLI or establish a change schedule for filters, cartridges, and canisters. Several methods are provided for determining filter service life estimates such as manufacturer estimator tools and testing chemical breakthrough in simulated exposure scenarios (for complex mixtures or chemicals with no established OEL's). Precautions are provided regarding the fact that organic vapor cartridges should be discarded after any confirmed exposure to low boiling-point solvents due to the continued / prolonged migration through filter media, as well as decomposition / consumption of hopcalite filter media in catalytic filter media after initial exposure to ambient air. Warning properties (odors) may not be used as a method of determining end of service life.
- **Negative- or positive-pressure atmospheres:** Closed-circuit respirator with enriched oxygen source must be used in negative-pressure (i.e., hypobaric) atmospheres below 122 mmHg. For positive pressure (i.e., hyperbaric) atmospheres, RPPA's must consider the potential for increased arterial carbon dioxide ($PaCO_2$) levels resulting from increasing inspired CO_2 concentrations while using closed-circuit SCBAs.
- **Operating procedure elements:** A list of topics is provided that must be covered in the employer's written respiratory protection Standard Operating Procedure. Many of the topics closely mimic what would be included in an OSHA-compliant respiratory protection written program. However, there are a few elements that differ, such as periodic re-evaluation of respiratory hazards, and a description of employer-specific 3-tiered audit process.
- **Program evaluations:** A 3-tier system for program evaluation is provided. The first tier includes an expectation that on-going surveillance of respirator wearers by the RPPA will be performed. Second, an annual audit by the RPPA must be performed. Any findings must be documented with corrective actions. Finally, an annual external audit must be performed (does not have to be outside the organization, but by qualified individual other than the RPPA). A listing of audit focus areas is provided in the 2015 Z88.2 standard.
- **Program managers:** The Respiratory Protection Program Administrator (RPPA) must now be identified as one single person to ensure that lessons-learned can easily be compiled and shared across program areas. Also, this will help facilitate easy communication to upper management regarding issues with program effectiveness.

ANSI / ASSE Z88.2 (CONTINUED)

American National Standard Practices for Respiratory Protection (1992 rev. versus 2015 rev.)

- **Qualifications of the Respirator Trainer:** A list of required competencies is provided for anyone performing respiratory protection training. Specific training length or certifications are not provided.
- **Reduced oxygen density (elevation):** Guidance for respirator selection in situations where there may be a combined effect of reduced oxygen density at high altitudes and reduced capacity to absorb oxygen into the blood for workers who are not acclimated to higher altitudes.
- **Respirator "users" vs. "wearers":** A respirator "wearer" is now delineated from those who may be involved in respirator purchasing or maintenance program. The intent is that certain practices, such as user seal checks, are actually performed by the individual wearing the respirator.
- **Training for Persons Issuing Respirators:** Any person assigned the task of issuing respirators must be given adequate training to ensure that the respirator is in an approved configurations, and that the correct respirator is issued for each application in accordance with the written SOP. This training is to be provided at a frequency determined by the RPPA to ensure the these individuals' jobs are performed effectively. Competencies and training requirements / lengths are not provided.
- **Training for personnel maintaining and servicing breathing air systems:** All personnel who service and maintain breathing air systems shall be trained by the system manufacturer and receive appropriate certifications as may be required. No training duration or frequency is established.
- **Workplace Supervisor training:** Any individual with responsibility of overseeing work activities of one or more respirator wearers is expected to receive training so that they can identify respirator use deficiencies and assist with emergencies involving respirator malfunction. This training is to be provided at a frequency determined by the RPPA to ensure the Supervisor's job is performed effectively. A list of competencies is provided, but training length and certification are not specified.

ANSI / ASSE Z88.10

Respirator Fit Testing Methods (incorporated by reference in Z88.2)

BACKGROUND

- ANSI Z88.10 – *Respirator Fit Testing Methods (2010)* is considered a normative reference in Z88.2. This standard provides more detail surrounding actual fit testing procedures for various approved qualitative and quantitative methods. There are very few programmatic requirements. However, any significant provisions beyond requirements found in the OSHA respiratory protection standards are included here.

SIGNIFICANT PROVISIONS

- **Qualifications of Fit Test Operators:** This standard provides a list of items that fit test operators must be able to demonstrate in terms of respirator use deficiencies, practical performance of fit test methods, fit test failures, and troubleshooting techniques. A specific training program length or re-training frequency requirement is not provided. However RPPA's are encouraged to develop a formal training program and use the fit test operator evaluation form provided in Annex A1.
- **Comfort Assessment Period:** For first-time respirators users or those who have changed make / model of masks, a 5 minute waiting period is required after donning the mask and prior to performing the fit test. The purpose of the comfort assessment period is to give the wearer time to re-adjust mask positioning, strap length, etc. while getting used to how it fits.
- **Fit Test Exercises:** A table of required and elective (optional) fit test exercises are provided, which align closely with the OSHA fit testing procedures Appendix (A). Additional optional fit testing methods are provided and encouraged depending on the respirator wearers' job requirements.
- **Criteria for Evaluating New Fit Test Methods:** Annex A2 provides performance and statistical confidence criteria for evaluating a new (quantitative or qualitative) fit testing method. This is only required for methods other than those described in the standard (aerosol differential, direct particle counting, constant negative pressure, isoamyl acetate, saccharin, and Bitrex).