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Effective Partnership is an underpinning of ANSI/ASSE Z88.2–2015 Practices for Respiratory Protection

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Abstract

In the U.S., respiratory protection is broadly supported by a system of coordinated efforts among governmental organizations, professional associations, researchers, industrial hygienists, manufacturers, and others who produce knowledge, best practice guidance, standards, regulations, technologies, and products to assure workers can be effectively protected. Ultimately, the work of these partners is applied by employers in establishing and implementing an effective ANSI/ASSE Z88.2–2015 conforming respirator program. This article describes key partners and their activities and/or responsibilities to assure an effective respirator program.

Keywords

Respiratory protection; Respirator program; Z88.2 standards

Background

Federal involvement in protecting workers health can be traced to the early 1900's with the U. S. Bureau of Mines (USBM). While the USBM no longer exists, it provided national expertise through research; evaluation and testing; and respirator approval regulations assuring respirators for mining and later industrial operations were “permissible,” or safe for their intended use.

Late in 1969, with the enactment of the Federal Coal Mine Health and Safety Act (Coal Act), followed in 1970 with the Occupational Safety and Health (OSHA) Act, and in 1977 with the Federal Mine Safety and Health Act, the Bureau's respirator approval role was transferred to the National Institute for Occupational Safety and Health (NIOSH) and the

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Mine Safety and Health Administration (MSHA). These federal agencies continue to provide national leadership, supporting respirator research, evaluation and testing methods, and regulations. Their expertise continues to support the development of national consensus standards including the American National Standard, Practices for Respiratory Protection, ANSI/ASSE Z88.2-2015. Annex A, provides background information on salient legislation and regulations that formed the foundation of national support to safeguard worker respiratory protection. It is not intended to be a complete review and does not contain current legislation, regulations, and standards.

Introduction

Experts in government and professional associations recognized that proper respiratory protection depends on USBM/MSHA/NIOSH approved respirators, their proper selection, fit, use, and maintenance. An early USA Standard, Z2.1-1959 provided important information about respiratory hazards, approved respirators, and considerations for proper selection, use, and care. Since then, the American National Standard, Practices for Respiratory Protection, Z88.2, was published in 1969 and has been updated three times, most recently on March 4, 2015. It identifies essential key partner roles and responsibilities that must be coordinated and carried out to obtain a complete respirator program.

Unfortunately, unlike a seat belt, achieving respiratory protection is not as easy as a simple click by one person. It requires multiple complex activities that must be properly performed by a number of knowledgeable partners within an effective program to achieve adequate respiratory protection by the wearer.

Two partners whose key roles have traditionally been underemphasized are the employer and the respirator wearer. However, as mandated in Section II d of the 1969 Coal Act and Section 5 of the 1970 OSHA Act, these two key partners have the primary responsibility for establishing safe working environments, including protection from inhalation hazards.

A major element found in each version of Z88.2 for nearly half a century is the requirement for establishing written standard operating procedures (SOPs). All respirator program operations are important and must be performed correctly every time.

Respirator Program Standard Operating Procedures [6]

Recommended practices are followed by Z88.2 section numbers in brackets. SOPs are a set of step-by-step directions, written in such detail that the described operation can be performed repeatedly with a consistent, desirable end result. An SOP must be written to establish coordination between the Respirator Program Administrator and individuals responsible for implementing the key roles for respirator program elements. SOPs must not just restate requirements that are written in respirator standards; SOPs need to state actual details including who will perform the operations, where and how the operation is accomplished and how frequently, and the qualifications and training required for key role partners. Written SOPs are required to ensure respirator program elements, such as medical evaluation, training, and fit testing are performed correctly every time.

Table I, Summary – Key Roles and Responsibilities, is a quick reference guide to the requirements in Z88.2. It identifies the essential partners, their responsibilities, and the associated Z88.2 sections. The following discussion provides a summary of essential roles and practices to assure an effective respirator program including: employer, respirator wearer, industrial hygienist, respirator program administrator, physician or other licensed health care professional (PLHCP), respirator trainer, respirator issuer, and fit test operator. A partner may perform more than one key role provided he/she is qualified.

Employer [4.3]

United States legislation and regulation places the obligation for worker protection squarely on the employer to protect their employees. Employers have the responsibility to ensure that key role partners, identified in the written respirator program, work together to fulfill their parts of the program to ensure employees are protected against workplace inhalation hazards. Regulations and national consensus standards define their roles and minimum requirements for respirator approval, and practices for respirator selection, use, and maintenance. When properly applied in an effective respirator program approved respirators are safe for their intended use.

Employers must implement permissible practices to minimize workplace exposures to oxygen deficient or contaminated air through effective control measures (e.g. ventilation, enclosure or containment, substitution of less toxic materials) [4.2]. When control measures are not feasible, approved respirators shall be used according to applicable regulations [4.3.1]. Z88.2 supports these regulations by defining specific employer practices to assure the design and implementation of an effective respirator program [4]. The following are essential employer practices:

- a. Establish, maintain, and evaluate a respirator program [4.3.2, 4.5].
- b. Develop written standard operating procedures providing all details for implementing each element of the respirator program [4.5.2, 6].
- c. Maintain a records retention program that is current with regulatory requirements and company policies [3.67, 13].
- d. Select approved respirators according to the specific workplace airborne hazards and wearer's unique factors [4.3.1].
- e. Select respirators with end of service life indicators or implement change schedules for respirators with filters, canisters, or cartridges [4.3.5, Annex A.1].
- f. Train the wearer in the proper and effective use of the respirator [4.3.6, 8].
- g. For all tight-fitting respirators, ensure wearers are fit tested annually [9] and perform seal checks with each donning [4.3.7, 4.4, 10].
- h. Allow wearers to leave the hazardous atmosphere for any respirator related cause [4.3.3].

- i. Investigate respirator malfunctions, take corrective measures, and report suspected defects to manufacturers and approval authority [4.3.4].

Additionally, the employer must assure that each partner in their respirator program properly carries out their responsibilities.

Wearer [4.4]

It is critical that wearers use the approved respirator according to the training and instructions provided [4.4.1]. The following practices are essential for the wearer to assure their own protection:

- a. Guard against respirator damage [4.4.2]. While properly trained individuals are responsible for respirator maintenance [4.5.7], this may or may not be the wearer, however, the wearer is responsible to inspect and ensure the proper working condition of the respirator prior to its use.
- b. Leave the contaminated area, according to established procedures, if the respirator is suspected of not performing properly or if the end of service period is reached. Report the situation immediately according to the SOP [4.4.3].
- c. Report any medical or physical condition impairing the wearer's ability to properly wear the respirator [4.4.4].
- d. Report to the respirator program administrator any concerns of wearer acceptability [9.4.2].
- e. Perform a wearer seal check each time the wearer dons a tight-fitting respirator [4.4.5]. This is an opportunity to inspect the respirator components to assure they are not damaged, are properly assembled, and functioning properly [4.5.7, 11.2.1].

Wearers should be aware that not wearing a respirator when one is needed for even short periods of time substantially reduces their protection from the contaminant exposure [A.7].

Industrial hygienist [7]

Typically, an employer will have qualified occupational safety and health professionals (safety specialists or industrial hygienists) perform the hazard assessment and determine appropriate administrative, engineering controls, and respiratory protection requirements.

The hazard assessment includes [7]:

- a. Identifying inhalation contaminants: physical state and chemical properties; estimating workplace concentrations and evaluating concentrations to occupational exposure limits and immediately dangerous to life or health limits; evaluating possible reduced oxygen atmospheres; and evaluating contaminant absorption through eye and skin [7.1 – 7.1.1.7].

- b. Determine if other hazards are present and their nature [7.1.1.8 – 7.1.1.8.2].
- c. Determine the proper approved respirator selection based on hazard assessment, wearer activity, duration of respirator use, and respirator limitations [7.2].

Respirator Program Administrator [5]

A single knowledgeable, qualified person, known to all respirator wearers, with direct communications to the site manager shall be assigned the authority and responsibility for administering the respirator program [4.5.1, 5.1, and 5.2]. The program administrator shall be identified in the standard operating procedures [4.5.1]. The following are the duties of the program administrator [5.3.1]:

- a. Prior to respirator selection and use assure workplace hazard assessment of airborne contaminants including oxygen deficiency is completed.
- b. Ensure medical evaluations, training, and fit testing is performed.
- c. Select the appropriate approved respirator.
- d. Document and maintain records to allow an evaluation of the program effectiveness.
- e. Evaluate the program and make revisions as necessary.
- f. Perform on-going surveillance, conduct an annual audit of the program, and update documentation including standard operating procedures to reflect revisions to the program [5.3.2].

A third party entity may serve as the program administrator provided they meet requirements and can effectively perform these requirements [5.1]. Additionally, to aid objectivity, an audit of the program shall be made by a knowledgeable person not directly associated with the program. The frequency of this independent audit can be based on the size and complexity of the program [5.3.2]. Z88.2 provides an audit checklist [5.3.2].

Physician or other licensed healthcare professional (PLHCP) [4.5.3]

The PLHCP determines if the wearer has any medical conditions that would preclude the use of a respirator, any limitations on use, or other restrictions unique to each wearer [4.5.3]. The PLHCP determines the frequency of medical evaluation and maintains medical records.

The respirator program administrator coordinates with the PLHCP for medical surveillance which, may include periodic bio-monitoring [5.3.3], keeps record of respirator wearers being medically qualified, and provides the following information so that the PLHCP can conduct a proper examination:

- a. Type and weight of respirator;
- b. Duration and frequency of respirator use, typical work activities, and environmental conditions such as temperature and humidity extremes;

- c. Hazards for which the respirator will be worn including reduced oxygen; and
- d. Additional personal protective equipment required to be worn.

Additional details of medical evaluations carried out by the PLHCP are contained in ANSI/AIHA Z88.6-2006.

Trainers [8]

Individuals delivering respirator-related training are essential and must be qualified and knowledgeable in the services provided [8]. Some areas where trainers may be required include; selection, use, and maintenance of specific brands and models of respirators; fit testing; proper ingress and egress while wearing respirators; use of emergency escape respirators and procedures, understanding and recognizing hazards, and reporting respirator malfunctions. Training shall be provided initially and every twelve months thereafter. Careful consideration and due diligence must be given to assure the trainers are properly qualified to provide these vital services.

Respirator Issuers [8.2.2]

Personnel issuing respirators shall be trained adequately to ensure respirators are in approved configurations and correct respirators are issued for each application according to the written standard operating procedure.

Respirator Fit Test Operator [9]

Z88.2 references ANSI Z88.10-2010 for guidance on how to conduct fit testing of tight-fitting respirators and appropriate methods to be used. Fit test operators shall be trained and evaluated according to Section 5 and Annex A1 of ANSI Z88.10-2010, which provides in-depth requirements for training fit test operators. In addition, Section 6, *General Considerations*, of Z88.10 includes important considerations for performing respirator fit testing protocols.

CONCLUSIONS

Effective respiratory protection is achieved only when employers and employees fulfill their legislative or regulatory responsibilities. All partners of a respiratory protection team must perform as defined in the respirator program. ANSI/ASSE Z88.2 provides standards of practice for key partners whose roles, authorities and responsibilities must be understood and properly followed to assure that respirator wearers derive the protection that can be afforded by wearing an approved respirator. ***Respiratory protection is achieved through effective partnerships within the framework of supporting legislation, regulation and, American national consensus respirator standards!***

ANNEX A – Salient Foundational U.S. Occupational Safety and Health Legislation

The Bureau of Mines came into existence because of hazardous mining conditions. From the years 1839 to 1992, 15,183 miners were killed in 716 mining disasters. It is not just mining disasters that kill miners. Every year 1,500 miners died from “Black Lung” disease caused by inhalation of coal dust. It is not surprising that the first federal regulation requiring employers to provide employees with approved respirators for protection against inhalation hazards was enacted for protection of miners. In fact, the first approved respirators were for mining operations.

The Federal Coal Mine Safety and Health Act of 1969 (Public Law 91–173), stated the first priority and concern of all in the coal mining industry must be the health and safety of its most precious resource – the miner. The Act gives operators with the assistance of miners the primary responsibility to prevent the existence of unsafe and unhealthful conditions. This Law was amended and expanded by the Federal Mine Safety and Health Act of 1977 (Public Law 95–164). These Acts require employers to provide employees with approved respirators. Both employers and employees are obligated to comply with mandatory health and safety standards of the Act.

Specifically, the Mine Acts required mine operators, when appropriate, to make available respirators which had been approved by the Secretary of the Interior and the Secretary of Health, Education and Welfare. Section 203(h) of the Act, states that approved respirators “*shall be made available to all persons whenever exposed to concentrations of respirable dust in excess of the levels required to be maintained under this Act. Use of respirators shall not be substituted for environmental control measures in the active workings.*” Section 204 required that dust from drilling rock be controlled by dust collectors, water, or ventilation, and that approved respirators shall be provided to “*persons exposed for short periods to inhalation hazards from gas, dusts, fumes or mists. When the exposure is for prolonged periods, the Act requires, other measures to protect such persons or to reduce the hazard shall be taken.*”

Concern for miner health parallels concern for the health and safety of the entire American workforce and the enactment of federal regulations requiring approved respirators for industrial operations. The Occupational Safety and Health Act of 1970, that created the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) (Public Law 91–596, 84 STAT. 1590), assigned the following Section 5, duties to employers and employees:

- a. Each employer –
 1. Shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees; and

2. Shall comply with occupational safety and health standards promulgated under this Act.

b. Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

In 1971, OSHA promulgated 29CFR 1910.134 requiring approved respirators and adopted the ANSI Z88.2-1969, Respirator Standard. This requirement was coordinated with the USBM and NIOSH, who in 1972 jointly promulgated 30CFR 11, which requires using approved respirators in accordance with the ANSI Z88.2-1969 standard.

A broad view of national respiratory protection initiatives reveals highly coordinated activities among U.S. congressional legislation, federal agency rulemaking, and industrial hygiene community in defining safe exposure limits with advancements in national consensus standards. This coordination is evident from the following early regulations and standards:

American Congress of Governmental Industrial Hygienists (ACGIH) in 1962 publishing the first edition of Threshold Limit Values (TLV);

Updates in Bureau of Mines respirator, Part 14, Schedule 21B approval requirements (1965 and 1969);

Congressional occupational safety and health Acts of 1969 and 1970;

Publication of the American National Standard, ANSI Z88.2 (1969);

Promulgation by OSHA of 29CFR 1910.134 (1971); and

Promulgation of enhanced respirator approval requirements in 30CFR Part 11 by the U.S. Bureau of Mines and NIOSH in 1972, which in 1995 were updated in 42CFR84.

Collectively, these foundational laws, regulations, and standards, defined minimum U.S. requirements for the approval, selection, and use of respirators – which when met provide assurance that respirators are safe for their intended use.

References

1. American National Standard Practices for Respiratory Protection; ANSI/ASSE Z88.2 – 2015.
2. American National Standard Respirator Use: Physical Qualifications for Personnel; ANSI/AIHA Z88.6 – 2006.
3. American National Standard Respirator Fit: Testing Methods, ANSI/AIHA Z88.10 – 2010.
4. [Federal Coal Mine Safety and Health Act, Pub. L. No. 91 173, §§ 203(h) and 204, 83 Stat. 742, 760 and 764].
5. [Federal Coal Mine Safety and Health Act, Pub. L. No. 91–173, Section 2 (a)–(g), 83 Stat. 742] and [Federal Mine Safety and Health Act, Public Law 95–164, Section 2 (a)–(g)].
6. [Federal Coal Mine Safety and Health Act, Pub. L. No. 91–173, §§ 203(h) and 204, 83 Stat. 742, 760 and 764].

Table I

Key Roles in Establishing and Implementing Respirator Programs

Key Roles	Responsibility	Z88.2-2015 Program Requirements
Employer	Ensure permissible practice (first control inhalation hazards using administrative/engineering controls before using respirators) Establish and maintain a proper respirator program	4.2 4.3
Respirator Wearers	Personnel required to properly wear respiratory protection	4.4
Industrial Hygienist	Hazard assessment and respirator selection	7.1 and 7.2
Respirator Program Administrator	Administer a proper respirator program	4.5.1, 5, and 6
Physician or Other Licensed health Care Professional	Respirator medical evaluation	4.5.3
Respirator Trainers	Train wearers, supervisors, issuers, emergency rescue teams	8
Respirator Issuers	Personnel assigned to issue respirators	8.2.2
Respirator Fit Test Operators	Personnel trained and Assigned to fit test respirators	9 and Z88.10

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