

This presentation should not be considered a final statement of NIOSH policy or of any agency or individual who was involved. This information is intended for use in advancing knowledge needed to protect workers. Comments regarding this presentation may be submitted to the NIOSH Docket Office

# ANSI Z88 Consensus Standards for a Respirator Program



James S. Johnson, Ph.D., CIH, QEP  
Z88 Secretariat Chair  
CDC Workshop on Respiratory Protection  
for Airborne Infectious Agents  
December 1, 2004  
Atlanta, Georgia

# Background Perspective

- Proper protection of respirator users is the overall goal of a respirator program





## 3 Overall Points Emphasized in this Presentation

---

- Respirator fit is a long-standing foundational component of a respirator program
- Implementing the minimum respirator program is an art and a science
- The health care industry should follow the normal industrial respirator program



# ANSI Z88 Secretariat Historical Involvement

---

- The ANSI Z88 Secretariat and predecessor organization has been involved with respiratory protection programs since the 1930s
  - American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs, ASA Z2-1938
  - American Standard Safety Code for Head, Eye, and Respiratory Protection, ASA Z2.1-1959



# ANSI Z88 Secretariat Historical Involvement (con't)

---

- American National Standard Practices for Respiratory Protection, ANSI Z88.2-1969
  - ANSI Z88.2-1980
  - ANSI Z88.2-1992
  - ANSI Z88.2-200x (currently under appeal)



# ASA Z2-1938

---

- ASA Z2-1938 recognized three important qualities for a respirator to perform correctly
  - A good fit is needed to avoid leakage of air
    - The importance of individual fit
    - Referred to the use of the U.S. Bureau of Mines' "man test" to measure respirator performance in the laboratory



# ASA Z2-1938 (con't)

---

- A high efficiency in filtering the foreign material out of the air
- A low resistance to air flow, so as not to impede breathing



# ASA Z2.1-1959

---

- ASA Z2.1-1959 provided more details on how to select and use respirators properly
  - The respirator selection process outlined
    - The nature of the hazard
    - The severity of the hazard
    - The type of contaminant
    - The concentration of the contaminant



# ASA Z2.1-1959 (con't)

---

- The period for which respiratory protection must be afforded
- Location of contaminant area with respect to a source of respirable air
- The expected activity of the wearer
- The operational characteristics and limitations of available respirators



## ASA Z2.1-1959 (con't)

---

- ASA Z2.1-1959 outlined the operational characteristics and limitations of available respirators
  - Relied on U.S. Bureau of Mines approval schedules and related publications



# ASA Z2.1-1959 (con't)

---

- Identified gas-tight fit and dust-tight fit for testing for a satisfactory facepiece fit
  - Positive pressure check
  - Negative pressure check
- Qualitative man tests recommended for self-contained breathing apparatus
  - Test agents identified: formaldehyde, isoamyl acetate



# ANSI Z88.2-1969

---

- ANSI Z88.2-1969 introduced the Minimal Acceptable Respirator Program
  - Written standard operating procedures governing the selection and use of respirators
  - Respirators shall be selected on the basis of hazards to which the worker is exposed
  - Users shall be instructed and trained in the proper use of respirators and their limitations



## ANSI Z88.2-1969 (con't)

---

- Respirators should be assigned to individual workers
- Respirators shall be regularly cleaned and disinfected
- Respirators shall be stored in a convenient, clean, and sanitary location
- Respirators used routinely shall be inspected and maintained during cleaning



# ANSI Z88.2-1969 (con't)

---

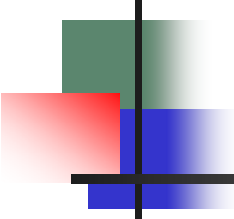
- Surveillance of work area conditions and degree of employee exposure or stress shall be maintained
- Regular inspection and evaluation to determine the continued effectiveness of the program shall be established
- Responsibility for the program shall be vested in one individual



# ANSI Z88.2-1969 (con't)

---

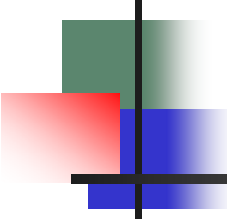
- Persons should be medically qualified to wear respirators and medical status periodically reviewed
- Approved or accepted respirators shall be used when they are available



# ANSI Z88.2-1969 and the Facepiece-to-face Seal

---

- ANSI Z88.2-1969 recognized the importance of facepiece-to-face seal
  - Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly
  - To assure proper protection, the facepiece fit shall be checked by the wearer each time the respirator is put on



# ANSI Z88.2-1969 and the Facepiece-to-face Seal (con't)

---

- Two simple field tests
  - Positive pressure test
  - Negative pressure test
- Qualitative test methods
  - Isoamyl acetate
  - Irritant smoke tube
- Recognized several methods for determining facepiece fit as outlined in the AIHA/ACGIH Respiratory Protective Devices Manual, 1963



# ANSI Z88.2-1980

---

- ANSI Z88.2-1980 expanded the Minimal Acceptable Respirator Program
  - Added a specific section titled “Respirator Fit”
    - Each respirator wearer shall be provided with a respirator fitted qualitatively or quantitatively
    - Each respirator wearer shall be required to check the seal of the respirator by appropriate means prior to entering a harmful atmosphere



# ANSI Z88.2-1980 (cont')

---

- Respirator Protection Factors were assigned based on which fit test was performed
- Fit testing shall be done while wearing personal protective equipment such as spectacles, goggles, face shield, hard hat or welding helmet, that will be worn during work activities and could interfere with fit
- An detailed eight-point training outline was also provided



# ANSI Z88.2-1992

---

- ANSI Z88.2-1992 continued to refine the Minimal Acceptable Respirator Program
  - Each person shall be fit-tested before being assigned a tight-fitting respirator
  - Each person using a tight-fitting respirator shall conduct a fit check of the respirator by appropriate means each time the respirator is donned or adjusted



# ANSI Z88.2-1992 (con't)

---

- Referenced OSHA Asbestos Standard, 29 CFR 1910.1001 for qualitative and quantitative respirator fit test requirements until ANSI Z88.10 on fit test methods was published
- A fit factor that is at least 10 times greater than the assigned protection factor of a negative pressure respirator shall be obtained before the respirator is assigned to an individual



# ANSI Z88.2-1992 (con't)

---

- Fit tests shall be carried out every 12 months
- Detailed respirator training continued to be emphasized



# ANSI Z88.2-200x

---

- ANSI Z88.2-200x maintains the focus on the Minimal Acceptable Respirator Program
  - Respirator fit testing is required
  - User seal check is required



# ANSI Z88.2-200x (con't)

---

- Requirements for acceptable qualitative and quantitative fit tests are referenced in Z88.10
- Detailed respirator training continues to be emphasized



# Respirator Sealing Surfaces Differ Significantly

---

- Respirator fit and performance is directly related to the performance of the sealing surface
- Respirator fit testing is intended to measure how well the respirator is sealing to the wearer's face, along with other component performance



# Respirator Sealing Surfaces Differ Significantly (con't)

---

- Respirator fit checks also measure how well the facepiece-to-face sealing surface is functioning

# Filtering Facepiece Respirators

## Sealing Surfaces



# Elastomeric Half-Mask Respirators Sealing Surfaces



# An Old Elastomeric Half-Mask Respirator vs. A New One



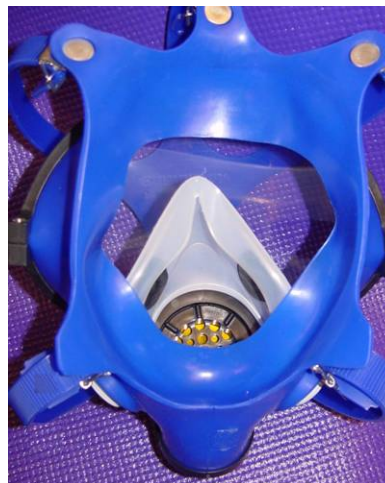
April 1960



May 1998

# Full-Face Respirators

## Sealing Surfaces



# Respirator Fit Checks and Proper Respirator Performance

- Respirator fit checks are also important in assuring proper respirator performance
  - Positive fit checks



# Respirator Fit Checks and Proper Respirator Performance

(con't)

- Negative fit checks





# Implementing the Minimum Respirator Program is an Art and a Science

---

- The overall success of the respirator program depends on the worker being provided the correct respirator and the worker understanding:
  - The hazard
  - How the respirator works
  - How to use the respirator properly
  - How to maintain the respirator and when to obtain a new/replacement respirator



# Implementing the Minimum Respirator Program is an Art and a Science (con't)

---

- Medical and respirator program elements, as well as workplace surveillance, is also required
- Fit testing is necessary for the correct selection of a respirator, as well as training the worker on how to wear the respirator, and understanding the respirator's limitations



# Implementing the Minimum Respirator Program is an Art and a Science (con't)

---

- All the elements of the Minimum Respirator Program are necessary to assure proper protection of the respirator user



# The Health Care Industry Should Follow the Normal Industrial Respirator Program

---

- The airborne hazards in the health care industry consist of particulates, aerosols, and vapors/gases
- Respirators can provide appropriate protection from these airborne hazards when engineering controls aren't practical, available, or in the case of maintenance activities or emergencies



# The Health Care Industry Should Follow the Normal Industrial Respirator Program (con't)

- All elements of the Minimum Acceptable Respirator Program are necessary to achieve the proper protection of respirator users in the health care industry

