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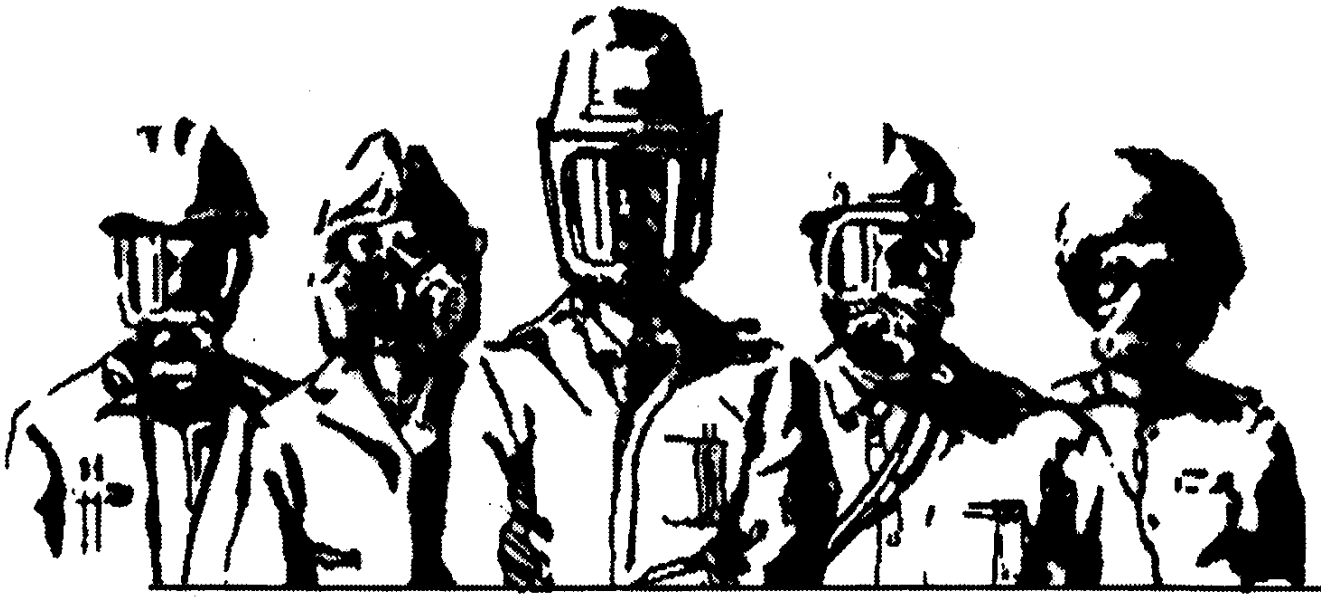

Respirator Speech Intelligibility Testing with an Experienced Speaker

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ABSTRACT

The United States' National Institute for Occupational Safety and Health (NIOSH) assesses speech intelligibility of commercial chemical, biological, radiological and nuclear air-purifying respirators using the Modified Rhyme Test (MRT). The speaker's loudness, enunciation, accent, and pronunciation may adversely affect respirator sound conveyance and speech intelligibility. It was postulated that an experienced speaker might induce higher intelligibility scores than a less trained speaker. A modified version of the NIOSH MRT was conducted to evaluate this hypothesis. Twelve respirators that were evaluated previously using the NIOSH method were tested with a unique listener panel on four separate test days. On each test date, the speaker read one word list while wearing each of the twelve masks and one word list without the respirator to the same panel of three listeners. A one way Analysis of Variance (ANOVA) showed that performance ratings (PR) with the experienced speaker (86.5% ± 0.6%) were significantly higher than those for the standard method (84.0% ± 0.6%). However, the average PRs across all respirators by listener for trials with the experienced speaker were 78.2% to 93.5%. So, while an experienced speaker will yield a small increase in speech intelligibility, there is still a large amount of variability in listener performance.

Keywords: Speech intelligibility, Air-Purifying respirator, Modified Rhyme Test.

Fit Assessment of N95 Filtering-Facepiece Respirators in the U.S. Centers for Disease Control and Prevention Strategic National Stockpile

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ABSTRACT

National Institute for Occupational Safety and Health (NIOSH)-approved N95 filtering-facepiece respirators (FFR) are currently stockpiled by the U.S. Centers for Disease Control and Prevention (CDC) for emergency deployment to healthcare facilities in the event of a widespread emergency such as an influenza pandemic. This study assessed the fit of N95 FFRs purchased for the CDC Strategic National Stockpile. The study addresses the question of whether the fit achieved by specific respirator sizes relates to facial size categories as defined by two NIOSH fit test panels. Fit test data were analyzed from 229 test subjects who performed a nine-donning fit test on seven N95 FFR models using a quantitative fit test protocol. An initial respirator model selection process was used to determine if the subject could achieve an adequate fit on a particular model; subjects then tested the adequately fitting model for the nine-donning fit test. Only data for models which provided an adequate initial fit (through the model selection process) for a subject were analyzed for this study. For the nine-donning fit test, six of the seven respirator models accommodated the fit of subjects (as indicated by geometric mean fit factor > 100) for not only the intended NIOSH bivariate and PCA panel sizes corresponding to the respirator size, but also for other panel sizes which were tested for each model. The model which showed poor performance may not be accurately represented because only two subjects passed the initial selection criteria to use this model. Findings are supportive of the current selection of facial dimensions for the new NIOSH panels. The various FFR models selected for the CDC Strategic National Stockpile provide a range of sizing options to fit a variety of facial sizes.

Keywords: Respirator Fit, N95 Filtering Facepiece Respirators, Strategic National Stockpile, Respirator Fit Test Panel.

American National Standard Practices for Respiratory Protection (ANSI/ASSE Z88.2-2015)

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On March 4, 2015 the American National Standards Institute (ANSI) approved a new standard, American National Standard Practices for Respiratory Protection, Z88.2-2015. It updates the 1992 revision of Z88.2. ANSI Z88.2 is a voluntary consensus standard, not a law or regulation. But, because it was drafted by a group of experts in the respiratory protection field, ANSI believes it represents the current state-of-the-art in respiratory protection practices. The Occupational Safety and Health Administration (OSHA) respiratory protection standard, 29 Code of Federal Regulations (CFR) 1910.134, is the law.

This revision of ANSI Z88.2, while actually a new standard, represents the fourth major revision of Z88.2. Past versions include:

- Z88.2-1992: American National Standard for Respiratory Protection.
- Z88.2-1980: American National Standard Practices for Respiratory Protection.
- Z88.2-1969: American National Standard Practices for Respiratory Protection.

Since the 1992 version of Z88.2, many regulatory changes have occurred. These include:

- The National Institute for Occupational Safety and Health (NIOSH) promulgated a new 42 CFR 84 replacing the respirator certification regulations located at 30 CFR 11 while also creating new categories of particulate filters along with new testing requirements. (June 8, 1995).
- OSHA promulgated changes to 29 CFR 1910.134 (January 8, 1998).
- OSHA added assigned protection factors to 29 CFR 1910.134 (August 24, 2006).

ANSI Z88.2-2015 is divided into thirteen major sections and has several appendices (annexes). After giving a brief introduction, references, and definitions, the standard discusses respirator program requirements, program administration, standard operating procedures, respirator selection, training, respirator fit tests, wearer seal checks, respirator maintenance, inspection storage and disposal, breathing gas and recordkeeping.