

Respirator Use and Practices in Instruments and Related Products Manufacturing Establishments: Results of a National Survey of Private Sector Employers

Brent Doney,¹ Mark Greskevitch,¹ Dennis Groce,² Girija Syamlal,¹ and Ki Moon Bang¹

¹National Institute for Occupational Safety and Health (NIOSH), Division of Respiratory Disease Studies, Morgantown, WV, USA

²EG&G Technical Services, Inc., Pittsburgh, PA

Abstract: In 2001, the *Survey of Respirator Use and Practices* gathered information on respirator use from 40,002 private U.S. establishments including the types of respirators used by workers, assessment of medical fitness to wear respirators, types of respirator fit tests, and presence of substances that prompted respirator use. Of respirator-using *Instruments Manufacturing* establishments, 22% did not provide training regarding the need, use, limitations, and capabilities of respirators; 37% did not provide assessment for medical fitness to wear respirators or didn't know if such an assessment was conducted; and 68% had three or more indicators of a potentially inadequate respiratory protection program.

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Address correspondence to Mark Greskevitch, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, 1095 Willowdale Road, Mail Stop HG-900.2, Morgantown, WV 26505, USA. E-mail: bdoney@cdc.gov

INTRODUCTION

In 2001, the *Survey of Respirator Use and Practices* gathered information on respirator use from 40,002 randomly selected private U.S. establishments.^[1] The survey collected data on the types of respiratory protection used by workers at an establishment, assessment of medical fitness to wear respirators, types of respirator fit tests performed, and presence of substances that prompted the decision to use respiratory protection.

The findings of the survey raise questions regarding respirator usage practices in companies where you work and how these practices compare with Occupational Safety and Health Administration (OSHA) regulations^[2] and National Institute for Occupational Safety and Health (NIOSH) recommendations.^[3]

This report focuses on information from the respirator use and practices survey collected from establishments in the *Medical and Optical Goods; Measuring, Analyzing, and Controlling Instruments; and Photographic, Watches and Clocks* manufacturing industry, hereafter called *Instruments and Related Products* (Standard Industrial Classification 38,^[4] approximately 839,000 workers in 2001).^[5] This industry includes establishments that manufacture instruments (including professional and scientific) for measuring, testing, analyzing, and controlling; surgical, medical, and dental instruments, equipment, and supplies; ophthalmic goods; optical instruments and lenses; surveying and drafting instruments; hydrological, hydrographic, meteorological, and geophysical equipment; search, detection, navigation, and guidance systems and equipment; photographic equipment and supplies; and watches and clocks. During manufacturing processes various dusts, fumes, and chemicals might be released causing adverse health effects in workers. In circumstances where ventilation or substitution with a less toxic chemical is not an option respiratory protection may be the only protection available to workers.

FINDINGS AND DISCUSSION

In 2001, approximately 10.4% or an estimated 1,318 establishments in the *Instruments and Related Products* industry used respirators for required purposes as compared with 4.5% of establishments in *All Private Industry*. Workers in *Instruments and Related Products* used respirators in similar proportions as workers in *All Private Industry* (2.6% vs. 3.1%).^[1] Compared with *All Private Industry*, a larger proportion of respirator-using establishments in *Instruments and Related Products* used air-supplied respirators (4.6% vs. 0.7%).

Respiratory Protection Program Quality Indicators—Survey Results

Each of the elements listed below (developed on the basis of OSHA requirements^[2] and NIOSH recommendations^[3]) examines an important part of an effective respirator program. The percentages of respirator-using establishments in the *Instruments and Related Products* industry with indication of a potentially inadequate respiratory protection program are listed along with suggestions to improve respirator programs.

1. Does the program require use of the manufacturer user's instructions or NIOSH certification labels to adjust the airflow for airline respirators?

Survey Results: Of establishments using airline respirators, 94% did not require such use of instructions or labels or didn't know how airflow was adjusted.

Suggestions: Air flow must be properly adjusted for the airline respirator to ensure adequate flow to the user and prevent infiltration of dusts and chemicals. In addition, the length of air hoses is limited by NIOSH certification to assure sufficient air flow.

2. Is there a written change-out schedule for air-purifying gas/vapor filters?

Survey Results: Of respirator-using establishments using gas/vapor filters, 69% did not have a written change-out schedule.

Suggestions: Many substances have poor warning properties (e.g., isocyanates in paint) so a change-out schedule to replace spent cartridges is needed. Filtering elements need to be changed often enough to prevent saturation with chemicals or clogging with dust. Cartridge change-out schedules are available from OSHA at http://www.osha.gov/SLTC/etools/respiratory/change_schedule.html and NIOSH at <http://www.cdc.gov/niosh/npptl/multivapor/multivapor.html>.

3. Has management adopted a written respirator program that determines how respirators are used?

Survey Results: Of respirator-using establishments, 56% had not adopted a written program.

Suggestions: OSHA requires a written program with work-site specific procedures for: selecting respirators; using respirators; evaluating the respirator program; fit testing; maintaining and storing respirators; medically evaluating workers; training workers about respiratory hazards and respirator use and limitations, maintaining respirators; and ensuring adequate quality, quantity, and flow of air for air-supplying respirators.

4. Are wearers of tight-fitting respirators fit tested?

Survey Results: Of respirator-using establishments with tight-fitting

respirators, 44% did not provide fit testing or didn't know if fit testing was conducted.

Suggestions: A fit test (as described by OSHA²) such as those using banana oil, saccharine, or Bitrex, or quantitative techniques must be conducted to determine that a selected respirator fits and can be adjusted to prevent leaks.

5. Do written procedures include regularly scheduled evaluations of the effectiveness of respirators used at the establishment?

Survey Results: Of respirator-using establishments, 38% did not include such an evaluation or were unaware if evaluations had been conducted.

Suggestions: The employer should conduct an evaluation to determine if the proper respirators are being used for changing conditions, and feedback from workers should be obtained to see if respirators are interfering with work performance.

6. Are employees assessed for medical fitness to wear respirators?

Survey Results: Of respirator-using establishments, 37% did not provide the assessment or didn't know if such an assessment was conducted.

Suggestions: Respirators may overly burden susceptible workers. The employer must obtain a written determination from a physician or other licensed health care provider regarding the worker's ability to use a respirator. The physician or other licensed health care provider determination may be based upon responses to the OSHA screening questionnaire, and, if necessary, a medical examination.²

7. Is the respirator program administered by a trained person?

Survey Results: Of respirator-using establishments, 30% did not have a trained program administrator.

Suggestions: A trained respirator program administrator is needed to oversee the program for that company or site. The amount and type of training needed depends on the complexity of the respirators used and hazards encountered.

8. Does the program include written procedures for maintaining respirators?

Survey Results: Of respirator-using establishments, 28% did not include such procedures or didn't know if any procedures were included.

Suggestions: Respirators must be cleaned after each day's use and stored properly to prevent skin rashes. Respirators must be periodically inspected for degradation of straps, facepieces, and valves, with repairs or replacements made as needed. Respirators used in routine situations must be inspected before each use and during cleaning, respirators maintained for emergency situations must be inspected at least monthly and checked for proper function before and after

each use, and emergency escape-only respirators must be inspected before being carried into the workplace for use.

9. Does the program provide training regarding the need, use, limitations, and capabilities of respirators?

Survey Results: Of respirator-using establishments, 22% did not provide such training.

Suggestions: Worker training is needed to ensure that workers wear respirators properly, use the right type of respirator for the job, know the limitations of the respirator, and understand the health effects of dusts and chemicals.

10. Are dust masks (filtering-facepiece respirators) used to protect only against dusts, but not gases or vapors?

Survey Results: Of respirator-using establishments, 21% did not use dust masks only against dust.

Suggestions: Dust masks should be used only for dusts. If gases or vapors are a hazard, respirators with chemical filtering cartridges or air-supplied respirators may be needed.

11. Are airline respirator couplings incompatible with other gas systems at the establishment?

Survey Results: Of airline respirator-using establishments, 13% did not assure the incompatibility.

Suggestions: If respirator hose couplings can be connected to a source that may contain nitrogen, argon, or another asphyxiant, a fatality could result.

Overall, of the respirator-using *Instruments and Related Products* establishments, 68%, or an estimated 900 establishments, had three or more of the previously described indicators of a potentially inadequate respiratory protection program.

Certain hazardous airborne chemicals can be present during manufacturing activities in the *Instruments and Related Products* industry (e.g., metal fumes from welding, silica dust from abrasive blasting, solvent vapors from metal cleaning, and solvent and isocyanate vapors from painting and coating metals^[6]) and can cause adverse health effects. For example, exposure to welding fumes can cause metal fume fever or lead intoxication,^[6] exposure to silica dust can cause silicosis,^[7,8] and exposure to isocyanate vapors can cause asthma.^[8-11]

While the survey design does not allow determination of particular substances that prompted respirator use specifically for *Instruments and Related Products*, results of the survey provide such information for the parent industry, *Manufacturing* (approximately 16.4 million workers in 2001).^[5] In *Manufacturing*, dust, paint vapors, solvents, welding fumes, and silica dust were the substances for which respirators were most frequently used. Historical data from a NIOSH exposure survey conducted

in 1981–1983 estimated that 71,000 workers were potentially exposed to silica dust and that 48,000 were potentially exposed to xylene (used as a solvent) in the *Instruments and Related Products* industry.^[12]

The survey findings are subject to some limitations. Public sector, self-employed, and agriculture establishments with less than 11 workers were not included in the survey. Although the instructions stated that the person most familiar with respiratory protection should complete the questionnaire, this may not have always happened. In spite of the cognitive and field testing of the survey at small, medium, and large establishments prior to its mailing, recipients may have misinterpreted the written questions. The survey was not designed to collect exposure information specifically for *Instruments and Related Products*, though it did collect such information for the broader industry category of *Manufacturing*.

CONCLUSIONS AND RECOMMENDATIONS

Respirators are used extensively by *Instruments and Related Products* establishments to protect against a wide variety of dusts and chemicals that are health hazards. There is a need for improvement in the respiratory protection programs at many *Instruments and Related Products* establishments.

Employers who suspect their respiratory protection program is in need of improvement should consider contacting the OSHA free confidential consultation service available for small businesses in every state. OSHA also has a *Small Entity Compliance Guide for the Revised Respiratory Protection Standard* available at <http://www.osha.gov/Publications/secgrev-current.pdf>. Another resource is the American Industrial Hygiene Association list of consultants at <http://www.aiha.org/Content/AccessInfo/consult/consultlisting.htm>.

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