

Respiratory Protection in Chemical Product Labels and Safety Data Sheets



Julia K. Diebol, Ph.D., CSP, C.P.S.M.
 jdiebol@exponent.com | (425) 519-8739
and Sunil D. Lakhiani, Ph.D., P.E., CSP
 slakhiani@exponent.com | (630) 658-7524



Observed Chemical Product Labels

Chemical product labels sometimes contain statements regarding respiratory protection, such as the examples to the right.

VAPOR HARMFUL. Use with adequate ventilation. Avoid continuous breathing of vapor and spray mist. To avoid breathing vapors or spray mist, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air or wear respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using.

BREATHING HAZARD: Vapor Harmful. Do not breathe asbestos, dust particles, or vapors. Use only in a well-ventilated area, open doors and windows to prevent vapor build up. NIOSH approved respirator recommended. May be required for professional users, consult MSDS for exposure limits. Mechanical ventilation is necessary to prevent a hazardous concentration of vapors when used indoors. **INHALING CONCENTRATED VAPORS, INTENTIONALLY OR OTHERWISE, CAN CAUSE PERMANENT ORGAN DAMAGE OR CAN BE FATAL.** Combustion or high heat should be avoided as toxic decomposition may occur.

Observed Criticism of Label Statements

Criticisms of label statements sometimes claim that they are not specific:

- Type of respirator not stated explicitly
- How will users know which respirator to use?

“Warnings are frequently not detailed or specific enough.”

“Severe Lung Damage, Toxic Chlorine Vapor, Must Use Respirator Type 1234.”

Source: Wogalter, M.S., Laughery, K.R., & Mayhorn, C.B. (2012). Warnings and Hazard Communications. In G. Salvendy (Ed.), Handbook of Human Factors and Ergonomics, 4th Edition. Hoboken, NJ: John Wiley & Sons.

Factors Affecting Respiratory Protection Statements and Respirator Selection

- Regulatory Requirements (OSHA, CPSC, EPA, ...)
- Industry-Specific Guidelines (NIOSH, NPCA, ...)
- Non-regulatory Standards (ANSI, ISO, ...)

Manufacturers' Bases
 Generally Conditional and Not Explicit

- Product End-Use Conditions (Amount, Engineering Controls, Confined Space, ...)
- Exposure (Body Position, Ventilation, Air Monitoring, ...)

Cannot be controlled or determined by manufacturers
 User/Employer's Responsibility

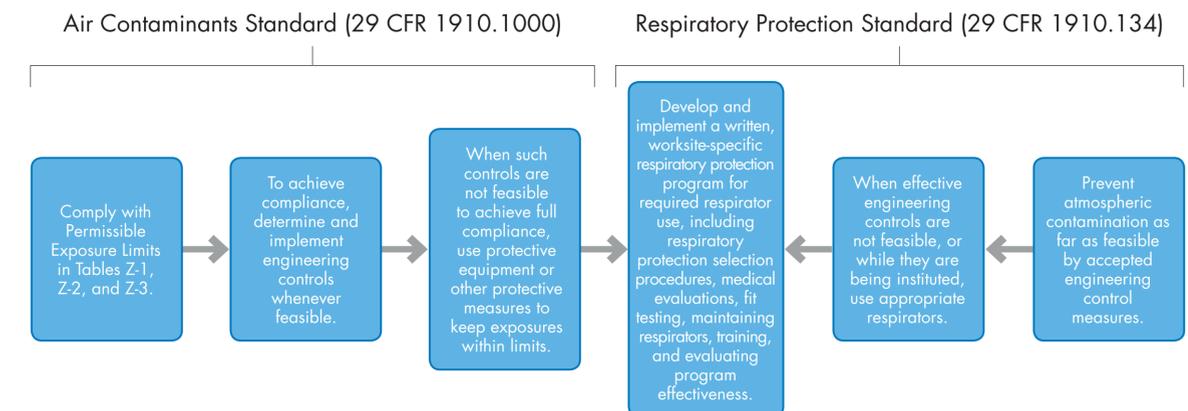
Example Label Statements – Regulatory and Non-Regulatory Standard and Guidance

Example Guidance	Example Label Statements
OSHA HazCom 2012, Appendix C	[In case of inadequate ventilation] wear respiratory protection.* * Text in square brackets may be used if additional information is provided with the chemical at the point of use that explains what type of ventilation would be adequate for safe use.
ANSI Z129.1/Z400.1-2010, Table J – Additional optional precautionary measures statements	Always wear NIOSH-approved, positive-pressure, air-supplied respirator when handling this material. Use NIOSH approved respiratory protection. Have available emergency self-contained breathing apparatus or full-face airline respirator when using this chemical. Always wear a self-contained breathing apparatus or full-face airline respirator when using this chemical.
NPCA Industry Labeling Guide, 5th ed. Sample Label 8	If you experience eye watering, headache or dizziness or if air monitoring demonstrates vapor/mist levels are above applicable limits, wear an appropriate, properly fitted respirator (NIOSH approved) during and after application. Follow respirator manufacturer's directions for respirator use.
Sample Label 11	Wear an appropriate, properly fitted respirator (NIOSH approved with approved dust pre-filter) during application unless air monitoring demonstrates dust level is below applicable limits. Follow respirator manufacturer's directions for use.
EPA Pesticide Labeling, Worker Protection Statements, Personal protective equipment statements, Liquids in toxicity category II (40 CFR 156.212(g)(3)(vii))	For handling activities during (select uses applicable to the product: airblast, mistblower, pressure greater than 40 p.s.i. with fine droplets, smoke, mist, fog, aerosol or direct overhead) exposures, wear either a respirator with an organic-vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix 14G). For all other exposures, wear a dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C).
CPSC, Special Labeling Requirements for Art Materials (16 CFR 1500.14(b)(8)(i)(F))	Wear NIOSH-certified mask for dusts/mists/fumes. Wear NIOSH-certified respirator with an appropriate cartridge for (specify). Wear NIOSH-certified supplied-air respirator.

Example SDS Statements – Regulatory and Non-Regulatory Standards and Guidance

Source	Example SDS Guidance
OSHA HazCom 2012, Appendix D	Individual protection measures, such as personal protective equipment.
GHS Purple Book, Rev. 7, Annex 4	Respiratory protection: Specify appropriate types of respiratory protection based on the hazard and potential for exposure, including air-purifying respirators and the proper purifying element (cartridge or canister) or breathing apparatus.
ANSI Z129.1/Z400.1-2010, Annex A Example 1: Unobtainium Gas	Always wear a NIOSH-approved, positive-pressure, air-supplied respirator when handling this material.
Example 2: XYZ Chemical	Use NIOSH-approved air-purifying respirator with organic vapor cartridge or canister, as appropriate.

Employer Responsibilities Under OSHA's Hierarchy of Controls



Employer's Duty to Select Appropriate Respirator

According to OSHA guidance, employers must do the following to select an appropriate respirator:

1. Conduct an exposure assessment to determine the type and amount of hazardous exposure
2. Take into account other factors that can influence respirator selection, such as:
 - The physical configuration of the job site
 - Worker medical condition(s)
 - Worker preferences and comfort
3. Determine the level of protection needed (assigned protection factor)
4. Select the kind of respirator desired based on its characteristics.

Source: https://www.osha.gov/SLTC/etools/respiratory/respirator_selection.html



Conclusions

- Respirator selection is a user/employer responsibility.
 - Product manufacturers cannot control or determine end use conditions and exposure levels.
- A variety of respiratory protection statements may be appropriate in labels and safety data sheets in light of:
 - Regulatory and non-regulatory standards and guidance,
 - Employer responsibilities under OSHA standards,
 - Factors influencing respirator selection, and
 - Human factors associated with respirator use.

Human Factors Associated with Respirator Use

Many factors influence behavior regarding respiratory use, including, but not limited to:

- Perceived cost of compliance and other value-expectancy constructs (DeJoy, 1996):
 - Cost and availability of respiratory protection,
 - Comfort/discomfort during respirator use,
 - Social norms/normative expectations regarding respirator use,
 - Perceived response efficacy of respirator use,
 - Self-efficacy regarding respirator use,
 - Threat-related beliefs regarding respiratory hazards.
- Training, supervision, and enforcement:
 - Training by employer or others
 - Consequences of non-compliance
- Benign experience (previous experience with a product or similar products)