

Respirator Training Handbook – N95

GENERAL INFORMATION

A **respirator** is a device that protects an individual from the inhalation of harmful airborne substances and/or an oxygen-deficient atmosphere. Respirators filter air in the work area or supply clean air from outside the work area. Respirators are designed as an enclosure that covers the nose, and mouth or the entire face or head.

CODES AND STANDARDS

CSA Z94.4-93 *Selection Care and Use of Respirators* promotes the correct use of respiratory protection but does not specify performance criteria. The CSA regulation defaults to the NIOSH requirements.

NIOSH Standard 42 CFR 84 (1995) for Non-Powered Particulate Filtering Respirators:

As of July 1998, all non-powered particulate filtering respirators used in Canada must comply with one of the nine classes of NIOSH approved respirators. There are three basic series of filters: **N**, **R**, and **P** and each series comes in three filtration efficiencies: 95%, 99% and 99.7% at 0.3 microns where particle capture process are least efficient. The series are defined as follows:

N Series: Non-oil for dust, mist or fumes that are not oil.

R Series: Oil-resistant. These can be used for up to eight hours in an atmosphere containing a particulate oil or oil based substances.

P Series: Oil-proof. This can be used indefinitely in an atmosphere containing particulate oil, subject to considerations of hygiene, damage and breathing resistance.

NIOSH Respirator Standard 30 CFR 11 (1972)

The NIOSH respirator standard applies to respirators worn to protect against gases (i.e. ammonia) and vapours (i.e. evaporated fuel or solvents)

For more information about NIOSH standards see www.cdc.gov/niosh



RESPONSIBILITIES UNDER THE MCMASTER RESPIRATORY PROTECTION PROGRAM

Role of Supervisors (Administrative and Academic)

The responsible supervisor shall:

- ◆ consider the feasibility of implementing engineering controls before implementing procedures that require the use of respirators;
- ◆ contact Environmental & Occupational Health Support Services (EOHSS) before implementing respiratory protection procedures which call for the use of a respirator;
- ◆ develop a Standard Operating Procedure (SOP) for all work involving the use of respirators and have all SOP's approved by EOHSS;
- ◆ contact the Respirator Protection Program Administrator in all situations where a persons fitness or ability requires a medical opinion before wearing a respirator;
- ◆ ensure that all persons required to wear SCBA undergo pre-use and annual cardio respiratory performance evaluations;
- ◆ ensure that all persons required to use respirator protection receive initial and ongoing training as prescribed in Section 6 of the Respiratory Protection Program and as required by the conditions outlined in the SOP;
- ◆ ensure that all persons required to use respiratory protection, use and maintain the respirator in the prescribed manner;
- ◆ evaluate the effectiveness of the respiratory protection program on an ongoing basis and conduct annual audit of the program in consultation with the JHSC.

Role of Authorized Person;

People authorized by their supervisor to wear respiratory protection equipment shall;

- ◆ work in compliance with the procedures outlined in the Respiratory Protection Program and the SOPs related to the work being conducted.;
- ◆ use, clean and store their respiratory equipment in the prescribed manner
- ◆ participate in safety training, respirator fit testing, medical assessments and medical surveillance as required by the program;
- ◆ notify their supervisor immediately if and when respiratory equipment needs servicing or replacement;
- ◆ provide input on the effectiveness of the respiratory protection program and participate in annual assessments of the program by the JHSC.

Training

Training for persons who are required to wear respirators, shall be provided prior to such use and reviewed on an annual basis. Training shall include but not be limited to the following:

<ul style="list-style-type: none">◆ Responsibilities ;◆ Regulatory requirements;◆ Codes and Standards;◆ Workplace Hazards;◆ Engineering controls;◆ Selecting a respirator for specific hazards;	<ul style="list-style-type: none">◆ Limits on the type and size and capabilities of respirators;◆ How to inspect, put on and remove a respirator;◆ How to inspect, maintain and store a respirator;◆ How to conduct positive and negative seal checks
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AIRBORNE (RESPIRATORY) HAZARDS

The proper selection and use of a respirator depends on determining the concentration of the hazard or hazards present in the workplace or the presence of an oxygen deficient atmosphere. A hazard analysis must be completed involving the principal investigator or supervisor, the appropriate safety office and the individual working in close contact with the hazard.

Airborne hazards generally fall into **seven** basic categories:

- **Dusts** – particles that are formed or generated from solid organic or inorganic materials that have had their size reduced through some mechanical process such as crushing, grinding, abrading or blasting.
- **Fumes** – particles formed when a volatilized solid, such as a metal, condenses in cool air. The physical change is often accompanied by a chemical reaction, such as oxidation.
- **Mists** – mists are formed when a finely divided liquid is suspended in the air. The suspended liquid droplets can be generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing.
- **Gases** – gases are formless fluids that occupy a space or enclosure and can be changed to a liquid or solid state through the combined effect of increased pressure and decreased temperature.
- **Vapors** – vapors are the gaseous form of substances that are normally in a solid or liquid state at room temperature and pressure. Vapors are formed by evaporation from a liquid or solid, and can be found where parts cleaning and solvents are used.
- **Smoke** – smoke consists of carbon or soot particles resulting from incomplete combustion of carbonaceous materials. Smoke generally contains droplets as well as dry particles.
- **Oxygen deficiency** – an oxygen deficient atmosphere has oxygen content below 19.5% by volume. This may occur in confined spaces such as storage tanks, process vessels, towers, drums, tank cars, sewers, septic tanks, underground utility tunnels, manholes and pits.

RESPIRATOR SELECTION

Respirators can only provide adequate protection if:

- respirators are properly selected for the task
- respirators are fitted to the wearer
- respirators are consistently put on and worn properly.
- respirators are stored appropriately when not in use (Clean, Dry, Safe from contamination)

Respirators must be properly maintained in order to continue to provide the protection required for the work situation.

The respirator selected must:

- Be adequate to effectively reduce the exposure of the user to the hazard being worked with.
- Reduce exposure under all conditions, including emergency situations.

Selecting the proper respirator involves choosing a device that fully protects the worker from the respiratory hazard they may be exposed to and permits the worker to perform their job with the least amount of physical burden.

When selecting a respirator you need to consider:

- the nature and extent of the hazard
- other requirements, (personal protection, etc.) encountered when working with the hazard
- the working conditions (temperature, humidity, etc.) under which work is completed.
- the characteristics and limitations of the respirator.

Important factors when selecting a respirator include:

◆ **Nature of the hazard and the physical and chemical properties of the airborne contaminant**

◆ **Concentration of the contaminants**

◆ **Permissible or occupational exposure limits**

◆ **Nature of the work operation or process**

Tasks and movements associated with the work being completed need to be considered so that the respirator does not limit movement. Particularly if supplied-air respirators are used requiring an individual to stay linked to the source of the air being supplied.

◆ **Fit Testing**

Some workers may be unable to achieve an adequate fit with certain respirator models or types of respirators. As an employer, McMaster provides a number of respirator models and sizes from which workers can choose a respirator that fits correctly. MUST be completed every 2 Years or immediately if shape of face changes: shift in weight of 10% or oral surgery or facial surgery

◆ **Physical Characteristics, functional capabilities and limitations of the respirator**

When selecting a respirator, steps need to be taken to ensure that the respirator does not impair the worker's vision, hearing, communication, and movement necessary to safely perform their job.

A NIOSH (National Institute for Occupational Safety and Health) certified respirator must be selected after taking the above criteria into consideration. If NIOSH does not specifically certify a respirator for use against the contaminant being encountered McMaster University will select a NIOSH-certified respirator that has no limitation prohibiting its use for the particular contaminant. The selected respirator must be appropriate for the contaminant's physical form and chemical properties and suitable for the conditions under which it will be used. (RMM#311)

Each time an individual dons a particulate (Disposable) or elastomeric (half or full face respirator) he or she must do their own fit check to determine that the respirator is working properly. The steps below outline positive and negative pressure fit checks for various respirators.

Positive Pressure Fit Check – Particulate Respirator (two straps)

Place the palm of your hand over the front (cover exhalation valve if applicable) and exhale gently

If the face piece bulges slightly and no air leaks are detected between your face and the face piece, a proper fit has been obtained.

If air leakage is detected, reposition the respirator on your face and/or readjust the tension of the elastic straps to eliminate the leakage.

Repeat all of the above steps.

Never enter a contaminated area if you cannot fit check your respirator.



Image taken from 3M training manual

Negative Pressure Fit Check Particulate Respirator (two straps)

Do not disturb the position of the respirator (mask)

Cover the front of the respirator completely with both hands.

Inhale sharply.

A negative pressure should be felt inside the respirator.

If any leakage is detected, readjust the position of the respirator and/or tension of the straps and retest the seal.

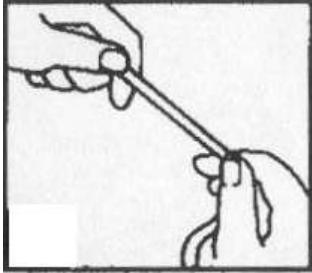
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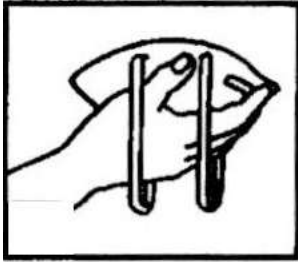
Image taken from 3M training manual

Donning and Doffing a N95 Mask

Images taken from 3M training manual



Inspect the mask before donning. Pre-stretch the straps (3M 8210 ONLY) before placing the respirator on your face.



Cup the respirator in your hand, nosepiece at your fingertips. Allow the straps to hang freely below your hand.



Position the respirator under your chin, nosepiece up. Pull the top strap over your head and rest it high at the top of your head. Pull the bottom strap over your head and position it on the neck below the ears.



Using two hands, mold the nose area to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece. Pinching with one hand may result in improper fit and less effective performance.



Perform a user fit check before you enter the contaminated area. See package manual for steps.

If you do **CANNOT** achieve a proper fit, **DO NOT** enter the contaminated area. Contact your supervisor.

To remove (Doffing): Handle respirator by straps only to ensure no contamination from the front filter. Bring straps back over the head and dispose of respirator in supplied receptacle.