

# RESPIRATORY PROTECTIVE EQUIPMENT

## The Supply Situation

The current worldwide demand for N95 filtering facepiece respirators has resulted in significant supply chain disruption and reduced quantities being made available from suppliers and manufacturers for this type of respirator. The increased demand for N95 filtering facepiece respirators has arisen from both private consumer purchase, but also allocation being sent to emergency responders and health care providers for use in both routine operations in addition to COVID-19 response activities.

The N95 filtering facepiece is the standard level of suitable respiratory protection used for the treatment and care of confirmed COVID-19 cases, or circumstances where there is a risk of potential exposure to the pathogen through mucous and aerosols (Public Health Agency of Canada (PHAC), Alberta Health Services (AHS)). The latter circumstances include many of the essential services the City of Edmonton provides, such as Peace Officers, and Edmonton Fire Rescue Services.

In order to ensure continuity of services reliant on N95 filtering facepiece respiratory protection as well as to ensure that the health and safety of frontline responders are protected, a number of solutions have been proposed below to mitigate the disposable N95 filtering facepiece respirator supply disruption.

## Solutions and Options for Affected Business Areas

### Other N95 Model Types

Alternative N95 filtering facepiece respirators to the 3M Brand 8210 model are also considered adequate protection from COVID-19. Throughout the City of Edmonton there are several 3M branded N95 filtering facepiece models used in operations, including the following models: 1870, 9210 and 8822. Each specific model of N95 filtering facepiece respiratory protection is required to be fit tested by CSA Standard Z94.4-18 as they are considered tight fitting face pieces. Should 3M manufactured filtering facepiece respirator supply run out, respirator models made by other manufacturers such as Honeywell or Moldex may be examined for suitability for business areas and procured as required.

### Alternative Respirator Types

N95 filtering facepiece respirators are the most basic level of respiratory protection deemed suitable for protection against the spread of the COVID-19 virus. These masks are typically purchased and used due to a number of factors, such as:

- inexpensive supply cost,
- lack of maintenance from this device being a single use disposable product, which is discarded after one time use,

- ease of use, portability and broad user fit acceptability; and
- ease of fit testing this device to the user, which is usually performed qualitatively especially in healthcare settings

Other alternatives to the N95 filtering facepiece type respirator, which have been less impacted to date by the current demand and supply chain disruptions, are Half facepiece and Full facepiece air purifying respirators (APR) with hazard specific filters and/ or cartridge types.

Reusable Half face and Full face respiratory protection with hazard specific filters and/or cartridges also provide protection from the current hazard of COVID-19. These respirators are intended for reuse and can be easily decontaminated after responding to medical assistance calls where there may have been potential exposure risk to COVID-19 or other biological pathogens. Most filters and/ or cartridge types used in conjunction with the above may be easily decontaminated, stored and reused according to the cartridge life guidelines established by the cartridge manufacturer and US Centres for Disease Control (CDC) guidelines for reuse. It is important to note that these types of respirators require additional user and respirator specific training in respirator use, care (cleaning), maintenance, inspection, storage practices, and cartridge change-out in addition to quantitative fit testing and medical screening clearance prior to use. Occupational Health and Hygiene recommends the use of alternate respirators types, should N95 filtering facepiece supply run out or as part of the strategy to prolong the supply.

### **Limited Reuse of N95 Respirators**

Given the current strain placed on N95 filtering facepiece supply, the CDC has developed a protocol and risk decision matrix for determining when it is acceptable and not acceptable to reuse N95 filtering facepiece respirators for routine operations given the current COVID-19 transmission risk. Refer to the CDC's: [Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings](#), for information necessary to develop a N95 filtering facepiece reuse procedure or protocol. N95 filtering facepiece respirator limited reuse has been recommended as an option for conserving supply during previous respiratory pathogen outbreaks and pandemics, both in Canada and the United States. It is very important to be aware that N95 filtering facepiece respirator reuse poses an inherent risk, given what is currently known about the COVID-19 virus, such as asymptomatic transmissibility, potential for cross-contamination and recently discovered data for long-lived persistence on certain environmental surfaces ([Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1](#)). The CDC has also identified specific circumstances where it is not acceptable under any circumstance to reuse N95 filtering facepiece respirators (ie. aerosol exposure, blood and/or body fluid exposure, confirmed COVID-19 contact exposure) and should a reuse program be instituted, CoE Occupational Health and Hygiene recommends strict business area adherence to these guidelines.

### **International Equivalencies**

A highly effective alternative is the procurement and use of international equivalents to the NIOSH approved N95 filtering facepiece. Many countries deploy their own respirator testing and approval standards, which measures the same conformity standards and parameters that NIOSH measures to certify respirators. To support this, NIOSH has compared the issuing country's respirator certifying standards to the NIOSH standard to fully verify equivalence. As such, the CDC (NIOSH) has published an [International Equivalencies List](#) to assist with selecting internationally equivalent N95 filtering facepiece respirators. CoE Occupational Hygiene deems the respiratory model types identified on this list as acceptable alternatives to NIOSH approved N95 filtering facepiece respirators.

### **Use Beyond Manufacturer Shelf-life**

The CDC has also identified N95 respirator use beyond the manufacturer recommended shelf-life although this is not an ideal solution in certain circumstances, due to the following factors:

- N95 respirator effectiveness (performance standard) past the manufacturer's shelf-life is not tested under NIOSH methods, and as such effectiveness for protection against respiratory hazards, including COVID-19 cannot be verified past shelf-life; and,
- Over time, components such as the straps and nose bridge material may degrade, which can affect the quality of the fit and seal (degradation worsens over a longer period of time).

In circumstances where N95 filtering facepiece respirators are being used past the manufacturer's recommended shelf-life, and in order to minimize the above mentioned risks, it is very important for user's to complete safety inspection on the device and the device is not used if defects are found.

### **Surgical or Procedure Masks**

Surgical or procedure masks may be deemed an acceptable alternatives to N95 filtering facepieces, only where the surgical/procedure masks are rated as fluid resistant and used for protection against biological respiratory hazards. PHAC has recommended regional health authorities use surgical/procedure masks in combination with a face shield to ensure adequate droplet and contact protection against COVID-19 transmission. This recommendation is found in the the following PHAC document: [Infection prevention and control for coronavirus disease \(COVID-19\): Interim guidance for acute healthcare settings](#).

### **City of Edmonton Actions**

The City of Edmonton Occupational Hygiene and Health teams are continually monitoring for additional suitable solutions and alternatives to the currently disrupted N95 filtering facepiece respirator supply chain. Should additional solutions and alternatives be identified, a revised memorandum communicating this information will be distributed to all stakeholders. Additional personal protective equipment may be deemed necessary based on point of care risk assessment for business areas providing first responder medical response services and treatment (ie. Peace Officers, and Edmonton Fire Rescue Services (EFRS)). CoE Occupational Health and Hygiene is working with CPSS to mitigate PPE supply disruption to essential service providers in the organization, including the N95 filtering facepiece respirators using all options available. A [COVID-19 RPE Code of Practice](#) has been developed for and distributed to all business areas having to utilize surgical/procedure masks, and internal equivalents to the NIOSH N95 in essential operations to provide respiratory protection against COVID-19 to ensure these devices are being used according to manufacturer and City requirements.

## **Modifications to the City's Fit Testing Protocol**

### **Purpose**

Provide direction to all City of Edmonton (CoE) business areas with respect to modifications to respiratory protective equipment (RPE) fit testing requirements and protocol in response to Alberta Health Services (AHS) requirements for [physical distancing](#) under the COVID-19 public health response measures.

### **Categories of Respiratory Protection**

Respiratory protection comes in a variety of makes and styles, which are selected by a user in consideration of their work tasks, work environment and potential respiratory hazards. Respirator selection must consider the atmospheric conditions and respiratory hazards under which the user will be wearing the respirator, such as oxygen levels, and the presence of biological, chemical and physical respirable air contaminants. A respirator providing a suitable level of protection, also called protection factor for all of the identified potential contaminants and their perceivable concentration in the air being breathed, must be examined during normal operations conditions and also during the COVID-19 pandemic. For additional information regarding internal fit testing protocol and approved respirators respectively, consult the [CoE OH&S Program and Standards Manual](#) and the [NIOSH Respirator Trusted Source Information](#).

## Why Modify Fit Testing Protocol

At this time, to ensure the safety of City designated business area fit testers and to adhere to the AHS guidelines to prevent the additional community spread of COVID-19 through physical distancing measures, modifications to normal fit testing protocol are being immediately instituted city wide. Respiratory fit testing, both qualitative and quantitative, places the fit tester in close proximity to the respirator user. The fit tester has to perform a visual inspection of the mask fit on the user's face as well as handle the respirator pre and post test. When the respirator is doffed by the user, it is contaminated and needs to be cleaned and sanitized, putting the fit tester at risk of exposure to biological hazards. Although controls are in place to reduce this exposure, with COVID-19 exposure risk, we have decided to implement further controls by temporarily modifying our internal respiratory fit test protocol.

## Normal Fit Testing Protocol

Normal fit testing protocol applies to the activity being performed by both internal CoE certified fit testers, and also externally contracted fit testing services. Tight fitting respiratory protective equipment requires fit testing in accordance with the requirements set forth under the CSA Standard Z94.4-18 and as legislated through the Alberta *Occupational Health and Safety Act* and *Code*. Fit testing is performed to verify a user's ability to obtain an effective facial seal and acceptably comfortable fit for a selected tight-fitting respirators. CSA Z94.4-18 states that a fit test must be carried out:

- After completion of user health screening;
- After or during initial training;
- Prior to initial use of a tight-fitting respirator;
- When changes to a user's physical condition (e.g., significant weight change or changes to facial or dental features) could affect the respirator fit;
- When there is a change in the respirator (e.g., make, model, size);
- When a respirator user experiences continued significant discomfort during use or difficulty in completing a successful user seal check;
- When there is a change in the PPE use that could affect the respirator; and
- At least every two years.

## Modified Fit Testing Protocol

The modified fit testing protocol is broken down into two circumstances, which are explained in detail below.

Workers Requiring Biennial Fit Test	
Modified Process	Fill out the <a href="#">Respirator Health Screening form</a> for clearance. If the worker answers "yes" to any of the health conditions listed in Part 4, submit the health screening form to <a href="mailto:ehsnurses@edmonton.ca">ehsnurses@edmonton.ca</a> . If the worker does not indicate they have a health condition in Part 4, they may continue wearing the respirator, with which they previously achieved a successful fit test.
Exemption Allowed	If the worker has had significant weight change or changes to facial or dental features since their previous fit test.
Respirator Types Covered*	Filtering Facepiece respirators (N95, N99), Half face air purifying respirators, Full face air purifying respirators, Powered-air purifying

	respirators (PAPR), Full face self contained breathing apparatus (SCBA) or Supplied air breathing apparatus (SABA)
--	--

New Employees Requiring First Fit Test (Disposable Filtering Facepiece Only)	
Modified Process	Have these workers perform tasks that do not require the use of a respirator; use other engineering and administrative exposure controls.
Exemption Allowed	If the worker is required to wear a Filtering facepiece respirator (N95) as a barrier, have the worker fill out the <a href="#">Respirator Health Screening form</a> for clearance. If they answered “ <b>yes</b> ” to any of the health conditions listed in Part 4, submit the health screening form to <a href="mailto:ehsnurses@edmonton.ca">ehsnurses@edmonton.ca</a> .
Respirator Types Covered*	Filtering Facepiece respirators (N95, N99)

*\*Should you have questions or concerns regarding a respirator type not covered on the above lists, please contact CoE Occupational Hygiene, using the contact information listed below.*

Due to the limited supply of our typical N95 filtering facepiece respirators, a variety of makes and models have been acquired by the City of Edmonton to protect our workers. Although during regular activities respiratory fit tests are required on each make and model, as we will be utilizing these respirators as a barrier rather than protection from airborne contaminants, respiratory fit testing will be suspended for these filtering facepiece respirators. Workers using these filtering facepiece respirators will still be required to fill out the [Respirator Health Screening form](#) for clearance. If they answered “**yes**” to any of the health conditions listed in Part 4, submit the health screening form to [ehsnurses@edmonton.ca](mailto:ehsnurses@edmonton.ca).

CoE fit testing activities may resume once AHS has lifted the COVID-19 public health measures such as physical distancing, at the business area and/ or contractors' earliest convenience. **Exemptions to the modified fit testing protocol are granted on a case-by-case basis, and only for City employees delivering essential services on the approval of Workforce Safety and Legal Services.**

### Modified Fit Testing Procedure

Where business areas providing essential services are required to fit test their employees and are subject to the above mentioned exemption, they may be permitted to fit test their employees provided they receive the appropriate pre-approval and strictly adhere to the [Modified Fit Testing Procedure](#).

### Contracted Fit Testing Services

The contractor fit testing service provider, Levitt Safety, has also ceased all fit testing services at this time to comply with AHS physical distancing requirements and to protect the health and safety of their staff from potential COVID-19 transmission. Levitt Safety provides only fit testing services and not health screening form review, therefore the CoE Occupational Health Nurses (OHN's) will continue to perform health screening form review for employees from the business areas served by this contractor.

The contractor fit testing service provider, Lifemark, performs both fit testing services and health screening form review for Edmonton Fire Rescue Services (EFRS) members. At this time, EFRS members are to continue arranging fit testing and health screening form review through Lifemark, as they are considered an essential service and subject to the exemption listed above.

## Respirator Cleaning & Storage

Alberta *Occupational Health and Safety Code* indicates that employers must adhere to CSA Standard Z94.4-18, *Selection, Use and Care of Respirators*, for all respiratory protective equipment requirements. The following information comes from CSA Standard Z94.4-18.

At the City of Edmonton, “program administrators” as mentioned in this section, are members of the Corporate Safety and Employee Health Services, Occupational Hygiene team.

### Cleaning and Sanitizing

Respirators shall be cleaned and sanitized in accordance with the respirator manufacturer’s instructions or in accordance with procedures authorized by the program administration in consultation with the respirator manufacturer.

When respirators are not individually assigned, cleaning and sanitizing shall be performed before the next use.

### Procedures for cleaning respirators

- 1) Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, pressure-demand valve assemblies, hoses, and any other components as recommended by the manufacturer. Discard or repair any defective parts.
- 2) Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- 3) **Rinse components thoroughly** in clean, warm, preferably running water. Drain.
- 4) When the cleaner does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
  - a) Hypochlorite solution (50 ppm of chlorine), made by adding approximately 1 mL of laundry bleach to 1 L of warm water; or
  - b) Aqueous solution of iodine (50 ppm of iodine), made by adding approximately 0.8 mL of tincture of iodine (6 to 8 g ammonium or potassium iodide/100cc of 45% alcohol) to 1 L of warm water; or
  - c) Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- 5) **Rinse components thoroughly** in clean, warm, preferably running water. Drain.
- 6) Hand-dry components with a clean, lint-free cloth or air dry components.
- 7) Reassessment the facepiece, replacing filters, cartridges, and canisters where necessary.
- 8) Ensure that all components work properly in accordance with the manufacturer’s instructions.

The importance of thorough rinsing cannot be over emphasized!  
Detergents or disinfectants that dry on facepieces can result in adverse skin reactions.

### Procedures for cleaning and disinfection of respirators or equipment for workers exposed to bioaerosol contaminants

The World Health Organization recommends specific chemical germicides:

- Stabilized hydrogen peroxide (6%);
- Peracetic acid (variable concentrations, but equal to or less than 1% is sporicidal);
- Sodium hypochlorite (5.35%, diluted to 1000 ppm available chlorine - 1:50 dilution) and procedures for preparing and using diluted bleach solution (sodium hypochlorite).

Cleaning agents can present hazards requiring personal protective equipment and/or cause degradation of the equipment being disinfected. The manufacturer's guidance should be followed.

### **Respirator Storage**

Respirators shall be stored in a manner that will protect them against dust, ozone, sunlight, heat, extreme cold, excessive moisture, vermin, damaging chemicals, oils, greases, or any other potential hazard that can have a detrimental effect on the respirator. A common method of respirator storage is in an airtight container such as a ziplock bag. If this method is used, please ensure the filters, cartridges, or canisters, are removed from the respirator and stored in a separate airtight container such as a ziplock bag. This will prevent potential cross contamination of the hazardous agent from the filter, cartridge or canister to inside of the respirator.

Respirators shall be stored in a manner that will prevent deformation of the facepiece or the straps.

Please also see the [Respirators, Masks & Face Coverings FAQ](#).

## **Questions and Follow-up**

RPE selection and fit testing, please contact:

### CoE Occupational Hygiene

Chase Kuziw at [chase.kuziw@edmonton.ca](mailto:chase.kuziw@edmonton.ca)  
OR  
Erin Pierce at [erin.pierce@edmonton.ca](mailto:erin.pierce@edmonton.ca)

Health screening and clearance, please contact:

### CoE Occupational Health

Melissa Frame or JoAnne Seglie at  
[ehsnurses@edmonton.ca](mailto:ehsnurses@edmonton.ca)