

RESPIRATORY PROTECTIVE EQUIPMENT

The Supply Situation

Since the beginning of the pandemic, the City of Edmonton has taken actions to respond to Personal Protective Equipment (PPE) supply disruptions experienced worldwide and prevent these from impacting City operations as much as possible. In February of 2021, this guideline was updated to reflect these actions, and how the PPE supply disruption has evolved since the beginning of the pandemic. The following document outlines the most recent changes to the City's response, including recent changes proposed around the Modified Fit Testing Protocol.

The N95 is a NIOSH-approved filtering facepiece respirator and 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 respirators. 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 health 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. On March 17, 2020 the Alberta Government, through a ministerial order, approved the use of international equivalents to NIOSH approved N95 respirators to mitigate the disruption to the supply and accessibility of NIOSH approved N95 respirators. This order has been extended until August 2021, and may be found [here](#).

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 manufacturers 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 a safety inspection on the device and the device is not used if defects are found.

Surgical Masks, Procedure Masks and Cloth Face Coverings

Surgical masks, procedure masks and cloth face coverings have also been identified as another means of respiratory protection against the spread of COVID-19 if used correctly and so long as these devices are discarded and replaced with a new device once they become soiled and used in combination with proper hand washing practices. Additional reference materials on how to use procedure and surgical masks properly, may be found on the City's OneCity COVID-19 (Coronavirus) webpage (onecity.edmonton.ca/COVID-19).

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. 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, cloth face coverings and international 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 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, 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 must implement further controls by temporarily modifying our internal respiratory fit test protocol.

Existing Fit Testing Protocol

Existing 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 respirator. 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

Effective immediately, the City is implementing revised criteria to assist all business areas with determining how to prioritize respirator fit testing for employees using the modified fit testing protocol. These criteria will balance the need to continue to fit test and re-fit (refresher) test employees who are required to wear tight fitting respirators for protection against respirable workplace hazards, including COVID-19, with the necessary hazard controls to mitigate the risk of COVID-19 transmission arising from this activity.

Business areas should consider prioritizing fit testing activities in the following order, to determine which employees to focus fit testing activities on. After identifying which direction to follow in Table 1, proceed to Tables 2 and 3 for further direction on Health Screening and performing the fit testing. The prioritization criteria listed below may be applied to both internal and contractor provided quantitative fit testing services.

Table 1: Fit Testing Prioritization Criteria for Tight Fitting Respirators (including N95)

<i>Fit Testing Requirement</i>	<i>Priority</i>	<i>Direction and Rationale for Priority</i>
Employee (new hire and existing and/or redeployed) who has NOT been previously fit tested* with the City.	High	<p>Direction: Fit test this employee first according to the City's - Modified Fit Testing Protocol.</p> <p>Rationale: This employee is deemed a high priority because they may not have been required to use and care for tight fitting respirators in the past. Fit test this employee as a priority before all other categories. Additionally, there are no existing fit test records available to determine which respirators they may use safely based on respirator fit factor (facial seal). This also applies to employees who are required to wear respiratory protection for atmospheric conditions considered very dangerous due to contaminant concentration, multiple contaminants being present, and immediately dangerous to life and health (IDLH)*** conditions from the contaminant(s). For assistance in determining what atmospheric conditions may be IDLH, contact your Safety Engagement Lead (SEL) or Occupational Hygiene (contact information listed at the end of this document).</p>
Employee who has previously been fit tested* with the City, who has also had significant physical changes** which could affect respirator fit since the most recent City provided fit test.	High	<p>Direction: Fit test this employee first according to the City's - Modified Fit Testing Protocol.</p> <p>Rationale: This employee is deemed a high priority for being re-fit tested because there are factors that may have impacted respirator fit factor (facial seal) and therefore the employees ability to safely use a respirator. This also applies to employees who are required to wear respiratory protection for atmospheric conditions considered very dangerous due to contaminant concentration, multiple contaminants being present, and immediately dangerous to life and health (IDLH)*** conditions from the contaminant(s).</p>
Employee who has previously been fit tested* with the City, however it has been two (2) or more years since this most recent fit test and they have reported NO physical changes** through <i>Health Screening</i> which may impact respirator fit.	Low	<p>Direction: Fit test this employee after High and Moderate priority categories have been fit tested according to the City's - Modified Fit Testing Protocol.</p> <p>Rationale: This employee is deemed a lower priority for re-fit testing because there are no personal factors anticipated to affect and prevent an effective respirator fit factor (facial seal).</p>
Employee who has previously been fit tested* with the City, however it has been three (3) or more years since this most recent fit test and they have reported NO physical changes** through <i>Health Screening</i> which may impact respirator fit.	Moderate	<p>Direction: Fit test this employee after High priority categories have been fit tested and according to the City's - Modified Fit Testing Protocol.</p> <p>Rationale: This employee is deemed a moderate priority for fit testing because of the lapse in time since their most recent fit test is the only factor which may affect effective respirator fit factor (facial seal).</p>
Employee who has previously been fit tested* with the City, however it has been four (4) or more years since this most recent	High	<p>Direction: Fit test this employee first according to the City's - Modified Fit Testing Protocol.</p> <p>Rationale: This employee is deemed a high priority for fit</p>

fit test and they have reported NO physical changes** through <i>Health Screening</i> which may impact respirator fit.		testing because of the lapse in time since their most recent fit test is considered significant and is more likely to impact respirator fit factor (facial seal).
Where the business area is required to change the type and/or manufacturer of the supplied tight fitting respirator being used - where the employee has NOT been previously fit tested on this respirator at the City or elsewhere.	High	<p>Direction: If the business area is required to use a different type or manufacturer of tight fitting respirator, for which there are no previous fit testing records available for the employee - the employee is a high priority for re-fit testing using the new respirator.</p> <p>Rationale: A different type and manufacture of respirator will potentially have a different fit factor (facial seal) based on respirator design and size; therefore this employee must receive a fit test specific to this new respirator before they are required to use the respirator to ensure effective and safe respirator seal.</p>
<p>*Refers to quantitative fit testing.</p> <p>**Refer to the City of Edmonton's - OHS Standard for Respiratory Protective Equipment and CSA Standard Z94.4-18 for what constitutes significant physical changes which may affect respirator fit factor (facial seal).</p> <p>*** As defined in Part 1 of the Alberta OHS Code, IDLH means "circumstances in which the atmosphere is deficient in oxygen, or the concentration of a harmful substance in the atmosphere</p> <ul style="list-style-type: none"> (i) is an immediate threat to life, (ii) may affect health irreversibly, (iii) may have future adverse effects on health, or (iv) may interfere with a worker's ability to escape from a dangerous atmosphere." 		

When using the above table, plan fit testing for High, then Moderate to Low priority employees/groups. If the same employee falls under more than one *Priority* rating in the table above, prioritize fit testing based on the highest priority rating assigned to this employee/group. After determining which fit testing priority the employee/group falls under, proceed to the tables listed below for the process to follow.

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

Table 2: Employees NOT Requiring Fit Test OR Re-Fit Test	
Modified Process	Fill out the Respirator Health Screening form for clearance. If the worker answers " yes " to any of the health conditions listed in Part 4, submit the health screening form to ehsnurses@edmonton.ca . If the worker does not indicate they have a health condition in Part 4, they may continue wearing the respirator, for which they have previously achieved a successful fit test. A written record of the past fit test must be available, if not - the employee must be re-fit tested according to the process outlined in Table 3.
Applicable Priority (from Table 1)	Moderate to Low
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).

Table 3: Employees Requiring First Fit Test OR Re-Fit Test	
Modified Process	Fit test these workers according to the prioritization criteria established in Table 1 of this document and using the Modified Fit Testing Protocol. Have the worker 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 .
Applicable Priority (from Table 1)	High to Moderate
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)

**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.*

Further direction will be provided by the Workforce Safety and Employee Health Branch as to when fit testing for low priority employees/groups is recommended to resume. **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.**

Contracted Fit Testing Services

The use of contracted Fit Testing Services is acceptable in cases where high priority groups have been identified for testing and the contractor has sufficient COVID-19 transmission controls in place to fit test safely. Should a Business Area choose to use a contractor for fit testing services they are advised to contact the CoE Occupational Health and Hygiene team for help in assessing the contracts COVID-19 control methods. 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.

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 by another person.

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) Reassess 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 the 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

Lisa Marinic at lisa.marinic@edmonton.ca
OR
Erin Pierce at erin.pierce@edmonton.ca

Health screening and clearance, please contact:

CoE Occupational Health

Melissa Frame or JoAnne Seglie at
ehsnurses@edmonton.ca