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MEMORIAL HOSPITAL

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Document Title:	USE AND CARE OF FILTERING RESPIRATORS

PURPOSE

1. To provide a ready to use, clean, sanitary, and in good working order filtering respirators.
2. To create guidelines for the use of reusable elastomeric particulate respirators providing respiratory protection to healthcare practitioners (HCP) during Emerging and Re-Emerging Infectious Disease Pandemic.

OBJECTIVE

To develop a standard or procedures in the use and care of filtering respirators.

RESPONSIBLE PERSON: All healthcare workers (HCW), Section and Department Heads

EQUIPMENT NEEDED:

Assemble the following equipment needed on a work surface near a sink with a warm water source:

2 pairs of gloves

1 liquid resistant gown

1 eye shield/face shield as needed

1 bucket

Sodium hypochlorite / bleach solution


warm water

1 soft brush

mild detergent

brown paper bags

N95 mask

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DEFINITION OF TERMS

Extended use refers to the practice of wearing the same N95 respirator for repeated close contact encounters with several patients, without removing the respirator between patient encounters. Extended use is well suited to situations wherein multiple patients are infected with the same respiratory pathogen and patients are placed together in dedicated waiting rooms or hospital wards. Extended use has been recommended as an option for conserving respirators during previous respiratory pathogen outbreaks and pandemics.

Reuse refers to the practice of using the same N95 respirator for multiple encounters with patients but removing it ('doffing') after each encounter. The respirator is stored in between encounters to be put on again ('donned') prior to the next encounter with a patient. For pathogens in which contact transmission (e.g., fomites) is not a concern, non-emergency reuse has been practiced for decades. For example, for tuberculosis prevention, CDC recommends that a respirator classified as disposable can be reused by the same worker as long as it remains functional and is used in accordance with local infection control procedures. Even when N95 respirator reuse is practiced or recommended, restrictions are in place which limit the number of times the same FFR is reused. Thus, N95 respirator reuse is often referred to as "limited reuse". Limited reuse has been recommended and widely used as an option for conserving respirators during previous respiratory pathogen outbreaks and pandemics.




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What are Air-Purifying Respirators?

Air-purifying respirators (APRs) work by removing gases, vapors, aerosols (droplets and solid particles), or a combination of contaminants from the air through the use of filters, cartridges, or canisters. These respirators do not supply oxygen and therefore cannot be used in an atmosphere that is oxygen-deficient or immediately dangerous to life or health. The appropriate respirator for a particular situation will depend on the environmental contaminant(s).



WARNING
Respirators do not provide protection in an oxygen-deficient atmosphere.

- Disposable
- Covers the nose and mouth
- Filters out particles such as dust, mist, and fumes
 - Select from N, R, P series and 95, 99, 100 efficiency level
 - Does NOT provide protection against gases and vapors
 - Fit testing required

- Reusable facepiece and replaceable cartridges or filters
- Can be used to protect against gases, vapors, or particles, if equipped with the appropriate cartridge or filter
- Covers the nose and mouth
- Fit testing required




- Reusable facepiece and replaceable canisters, cartridges, or filters
- Can be used to protect against gases, vapors, or particles, if equipped with the appropriate cartridge, canister, or filter
- Provides eye protection
 - More effective face seal than FFRs or elastomeric half-facepiece respirators
 - Fit testing required

- Reusable components and replaceable filters or cartridges
- Can be used to protect against gases, vapors, or particles, if equipped with the appropriate cartridge, canister, or filter
- Battery-powered with blower that pulls air through attached filters or cartridges
- Provides eye protection
- Low breathing resistance
- Loose-fitting PAPR does NOT require fit testing and can be used with facial hair
- Tight-fitting PAPR requires fit testing




Centers for Disease Control
and Prevention
National Institute for Occupational
Safety and Health

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GENERAL CONSIDERATIONS:

1. The manufacturer's procedures shall always be checked to see if certain cleaners or disinfectants might damage the respirator and should not be used. If this is the case, the manufacturer's instructions must be followed.
2. In general, cleaning and disinfecting consists of taking the respirator apart, washing it, disinfecting it, thoroughly rinsing it, and putting it back together when it is dry. Respirators must be cleaned as often as necessary to prevent them from becoming unsanitary. In addition, respirators worn by more than one user must be cleaned and disinfected before being worn by a different user, and emergency use respirators must be cleaned and disinfected after each use.
3. While filtering facepiece respirators cannot be cleaned or disinfected, it is still important that you inspect them for cleanliness and damage before each use.
4. All respirators must be inspected for basic function before each use and during the cleaning and disinfecting process. A respirator inspection must include a check of the respirator's ability to work properly; the tightness of any connections; and the condition of the various parts, such as the facepiece, head straps, valves, tubes, hoses, and any cartridges, canisters, or filters. In addition, elastomeric parts must be checked for pliability and signs of deterioration.
5. Regular care and maintenance of the respirator is important to be sure that it works properly.
6. If respirator fails an inspection or is defective, it must be remove from the service and either repair it or discard it. Repairs or adjustments must be made only by

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appropriately trained people. In addition, repairs must be made according to the respirator manufacturer's instructions and must use only NIOSH-approved parts that are designed for the respirator.


7. It is important for respirators to be stored properly to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Never leave your respirator hanging on a machine, lying on your workbench, or tossed into your toolbox or a drawer.

8. Respirators must always be stored in a way that prevents deforming the facepiece or exhalation valve. Avoid carrying a cup-shaped filtering facepiece respirator in your pocket or toolbox. This could crush it and cause the facepiece to be bent out of shape, preventing the respirator from sealing tightly to your face and properly protecting you.

9. Air-purifying respirators use a filter or cartridge to remove hazards from the air you breathe. A properly functioning air-purifying respirator can provide effective protection for as long as the filters or cartridges work correctly.

10. For respirators that use filters to clean the air, the filters must be replaced whenever they are damaged, soiled, or cause noticeably increased breathing resistance. Before each use, the outside of the filter material must be inspected. If the filter material is physically damaged or soiled, the filter must be replaced or, in the case of a filtering facepiece respirator, the respirator must be discarded.

11. Filtering facepiece respirators can be reused by the same worker, but *only* if the respirator is working properly, its shape remains unchanged, and the filter material is not physically damaged or soiled.

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12. Of course, there may be reasons for disposing of a filtering facepiece respirator that still appears to be functional. Your employer must identify the circumstances in which a filtering facepiece respirator will be considered to be contaminated, unsanitary, or otherwise not able to be reused so that you can recognize when a new respirator is needed.


13. Remember, if you don't know if a respirator is needed for the task you will be doing, or if you are unsure about how to properly use a respirator or which filter or cartridge to use, talk to your supervisor before entering the hazardous area.

14. Not all brands and models are donned (put on) the same way. That is why it is important that you always consult the manufacturer's user instructions before donning (putting on) a new brand or model of respirator. Typically, for N95 particulate respirators, the proper placement of head straps means that the lower strap should be worn around the neck and below the ears. The top strap should sit above the ears and around the crown of the head, securing the filter piece to the user's face. The facepiece should feel snug. On most N95 models, the nose piece is meant to be molded to the user's facial structure using his or her index fingers of both hands to press gently against the metal strip until it molds to a snug fit.

15. Discard N95 respirators following use during aerosol generating procedures.

16. Discard N95 respirators contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.

17. Discard N95 respirators following close contact with, or exit from, the care area of any patient co-infected with an infectious disease requiring contact precautions.


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18. Consider use of a cleanable face shield (preferred) over an N95 respirator and/or other steps (e.g., masking patients, use of engineering controls) to reduce surface contamination.

19. Perform hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator (if necessary for comfort or to maintain fit).

20. Hang used respirators in a designated storage area or keep them in a clean, **breathable container such as a paper bag between uses**. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly.


- Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator (if necessary for comfort or to maintain fit).
- Avoid touching the inside of the respirator. If inadvertent contact is made with the inside of the respirator, discard the respirator and perform hand hygiene as described above.
- Don N95 respirator and perform a user seal check. Make any adjustments to ensure the respirator are made to ensure the respirator is sitting comfortably on your face with a good seal.

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Cleaning, Disinfection, and Use

Generally, it is recommended that respirators be cleaned and disinfected immediately after doffing (i.e., removing). To avoid contact transmission, precautions should be taken during doffing and use.

1. Training on appropriate donning and doffing procedures should be provided to all employees expected to wear respirators. Elastomeric components vary among manufacturers and react differently to cleaning and disinfection solutions and procedures. The respirator facepiece components such as facepiece, valves, and straps require maintenance including cleaning, disinfection and inspection prior to reuse. OSHA only requires replacing filters "where necessary," for example, when soiled, contaminated, or clogged.
2. Viruses and bacteria that cause acute respiratory infections can survive on respirator components for variable periods of time, from hours to weeks. Consequently, contaminated respirators must be handled, cleaned, and disinfected carefully and properly to reduce the possibility of the device carrying infection and contributing to disease transmission.
3. Manufacturers recommend cleaning and disinfection procedures for their elastomeric respirator components such as facepiece, valve covers, valves, and straps. The materials that comprise the elastomeric components of NIOSH-approved respirators vary among manufacturers; consequently, cleaning and disinfection solutions and procedures recommended by manufacturers may also vary.

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Additionally, cleaning and disinfecting respirators can damage or deteriorate respirator facepiece component materials and adversely affect their performance when re-using after disinfection.

General Cleaning and Disinfection Information


Viruses and bacteria that cause acute respiratory infections can survive on respirator components for variable periods of time, from hours to weeks. Consequently, contaminated elastomeric respirators must be handled, cleaned, and disinfected properly to reduce the possibility of the device carrying infectious particles and contributing to disease transmission.

Each respirator manufacturer identifies the appropriate cleaning procedures, which typically involves

- 1) using soap and warm water or chemical disinfectants authorized for use with their specific elastomeric facepiece components and
- 2) discarding the filter cartridge.

Additional guidelines for cleaning and disinfecting elastomeric respirators are available from the CDC/NIOSH - sponsored JETFIT study, conducted in 2019-2020 at two academic medical centers to better understand the feasibility of rapidly fit testing and training HCP to use elastomeric respirators.

- Care needs to be taken during cleaning and disinfection to ensure the trained respirator cleaning staff does not contaminate or injure themselves. Centralizing this activity might be helpful for ensuring that it is being properly executed. Recent

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studies demonstrate that some elastomeric respirators continue to function and perform as expected after 150 cleaning and disinfection cycles.


PROCEDURE

Cleaning

- When removing organic and inorganic matter from the respirator, trained personnel should wear nitrile gloves to protect their hands and limit the potential for self-infection. Additional protective equipment such as gowns and face shields, as well as ventilation, may be required during cleaning and disinfection procedures. Cleaning solution contact with the filter media must be avoided.
- A detergent or soap and warm water could be used to clean the surface of the filter cartridge prior to disinfection. Carefully avoid contact with the filter media. Cleaning can be done using a clean, soft cloth dampened with warm water approximately 49°C (120°F) containing a mild pH neutral (pH 6-8) detergent and using a mechanical wiping action. Other elastomeric facepiece components may be cleaned using the manufacturer's recommended procedures.

REMOVAL


1. Perform hand hygiene
2. Check facepiece for cracks, tears and dirt. Be certain the facepiece, especially the face seal area, is not distorted.
3. Examine inhalation valves for signs of distortion, cracking or tearing.
4. Make sure that head straps are intact and have good elasticity.

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5. Examine all plastic parts for signs of cracking or fatiguing. Make sure filter gaskets or seal areas are in good condition.
6. Remove the exhalation valve cover and examine the exhalation valve and valve seat for signs of dirt, distortion, cracking or tearing. Replace exhalation valve cover.
7. Inspect the lens of full facepiece respirators for any damage that may impair its performance or vision.

Disinfecting

1. The effectiveness of an alternate filter cartridge disinfection solution and procedure may be uncertain:
 - All crevices of many filter cartridge housings may not be reached with sufficient disinfection solution or be contacted for the period of time required to be effective.
 - The filter media may be degraded from contact with the disinfectant.
2. Some elastomeric respirators have filter cartridges that prevent disinfectant contact with the filter media. If available, these filter cartridges should be used in the contingency capacity strategies approach. These filter cartridges provide added assurance that the filter media will not be contacted with the cleaning and disinfectant solutions. These cartridges may be wiped down repeatedly.
3. Practices not approved by the manufacturer can increase the risk and uncertainty of reusing damaged or degraded components. This must be balanced against other available HCP protection options to sustain effective HCP protection and patient care.


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Modified procedures used during emergencies should be assessed and documented in the written RPP, including alternate cleaning and disinfection practices.

4. For disinfection, diluted household bleach solutions, alcohol solutions with at least 70% ethyl alcohol, and EPA-registered household disinfectants should be effective against coronaviruses.

5. For use of diluted household bleach solutions, follow disinfectant manufacturer's instructions for proper disinfectant application, PPE, and ventilation.

- Check to ensure the bleach is not past its expiration date.
- Never mix household bleach with ammonia or any other cleanser. Unexpired household bleach will be effective against coronaviruses when properly diluted.
- Most Household bleach solutions vary in concentration from 5.25% sodium hypochlorite (~50,000 ppm available chlorine) to up to 12.5% sodium hypochlorite (~125,000 ppm). It is important to check the product label and follow the disinfection directions for use, dilution, and contact time. Adjust the ratio of bleach to water as needed to achieve appropriate concentration of sodium hypochlorite.
- Based on the EPA List N: Disinfectants for Use Against SARS-CoV-2 products, 2500 ppm (0.25%) for 5 minutes is effective. Most readily available bleach is approximately 6% so 2/3 cup of bleach per gallon of cold tap water (1:24 dilution) for 5 minutes is appropriate.
 - For bleach preparations containing 5.25% sodium hypochlorite, use ¾ cup of bleach per 1 gallon of cold tap water for 5 minutes.

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- If a lower concentration of bleach is desired, the EPA standard disinfection rate for hypochlorite products is 600 ppm for 10 minutes. That is, use 3 tablespoons of bleach per 1 gallon of cold tap water for 10 minutes.
- Prepare a fresh bleach solution each day in a well-ventilated area. Always add bleach to cold water, not water to bleach.


CAUTION: The following may degrade or damage the respirator components.

- Strong solutions such as hypochlorite, iodine, and high concentrations of alcohol may degrade, deteriorate or extract chemical additives from certain respirator materials.
- Healthcare sterilization processes including ethylene oxide should not be used unless authorized by the respirator manufacturer, as they may degrade and alter the shape of the facepiece.
- Steam sterilization equipment should not be used unless authorized by the respirator manufacturer.

Cleaning and Disinfecting Half and Full Facepieces

Cleaning is recommended after each use. Gloves should be worn during cleaning as well as other personal protective equipment (PPE) as indicated.

1. Perform Hand Hygiene
2. Wear protective equipment (gloves, goggles/faceshield, water resistant gown)

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3. Remove any filters or cartridges. The facepiece may be further disassembled as necessary.
4. Inspect the facepiece per the User Instructions to identify any damage or excessive wear. Replace components or the entire facepiece as necessary.
5. Manually clean the facepiece by immersing it in warm water not to exceed 49°C, and scrub with soft brush until clean. Add mild detergent. Do not use cleaners containing lanolin or other oils.

NOTE: Solvents and strong detergents may damage 3M facepieces and should not be used for cleaning.

6. Rinse thoroughly with fresh warm water, preferably running water.
7. Disinfect the facepiece by soaking in a solution of diluted sodium hypochlorite (1:10) with 1 minute contact time (5000PPM)
 - 1:10 is 1 part bleach; 9 parts water (e.g. 100ml bleach; 900ml water)

NOTE: Do not soak the 3M HF-800 facepiece in disinfectant solution. The 3M HF-800 facepiece has not been tested for compatibility with disinfection by soaking.

8. Remove gloves. Perform Hand Hygiene and wear 2nd pair of gloves.
9. Rinse, wipe or spray the facepiece thoroughly with fresh warm water.
10. Air dry in a non-contaminated area.

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11. Remove PPE

12. Perform Hand Hygiene

Inspection

All respirators used in routine situations must be inspected by properly trained individuals before each use and during cleaning. This includes a check of respirator function, tightness of connections, and the condition of the various parts, such as the facepiece, head straps, valves, cartridges, and canisters or filters.

Inspect elastomeric parts for pliability and signs of deterioration. Respirators that fail an inspection or are otherwise found to be defective should be removed from service and discarded, repaired, or adjusted in accordance with the following procedures:

- Repairs or adjustments to respirators must be made only by persons appropriately trained to perform such operations, and only using the respirator manufacturer's NIOSH-approved parts designed for the respirator.
- Repairs must be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed.
- Reducing and admission valves, regulators, and alarms must be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.



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Textured "No-Slip" Face Seal & Large, Flexible Rolled Sealing Edge

-Provides exceptional comfort & superior fit.



Unique Low Fitting Mask

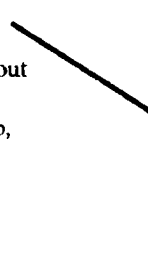
-Provides ample room for eyewear.

Low "Dead Air" Space

-Improves worker comfort from less re-breathing of exhaled air.

Swivel Retainers

-Generous 70° swivel allows natural fit without pressure points. Special clips hold strap, eliminating annoying strap tangles.



Multi-Position Cartridge Attachment

-#1 position is "sweptback" for maximum visibility. #2 & #3 change the cartridge positions for use under various PPE such as welding helmets & faceshields.



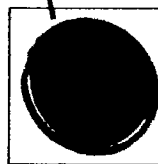
Extra Large Inhalation Valves

-Lower inhalation resistance & contributes to easier breathing.



Deep Chin Cup

-Gives a more secure universal fit.



Unique Corrugated Exhalation Valve Diaphragm

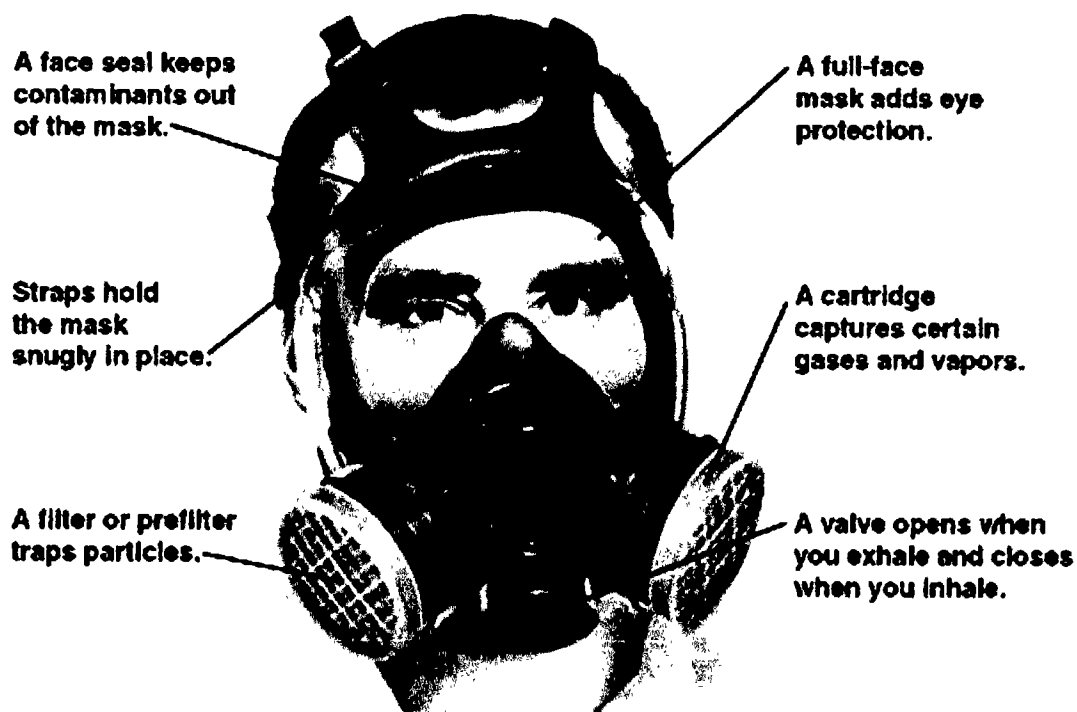
-Only available on Dentec Safety's half-mask, this large diameter valve opens quickly and allows maximum exhalation of hot, humid air from the mask. Heat build-up is reduced and wearer comfort increased.




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Anatomy of a Respirator

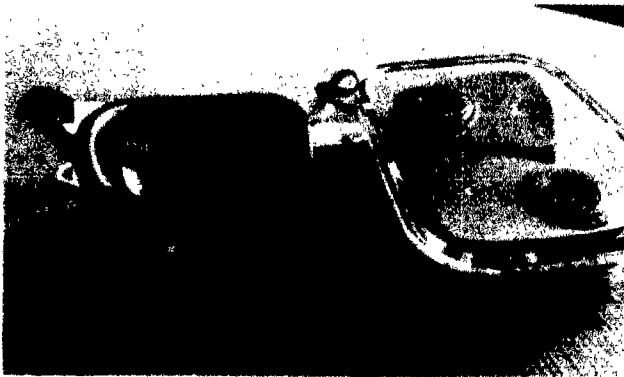
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DONNING OF ELASTOMERIC HALF-FACEPIECE RESPIRATORS (3M)

1. Adjust head cradle size (if possible) as needed to fit comfortably on head, and loosen straps.
2. Place respirator over your mouth and nose, then pull head harness over crown of your head.
3. Hook the bottom straps together behind your neck.
4. Adjust strap tension to achieve a secure fit. Pull the ends of the straps to adjust the tightness beginning with the adjustment points at the top of the respirator and then moving to the adjustment points at the back of the neck.
5. Do not over-tighten. Strap tension may be decreased by pushing out backside of buckles.
6. Check the position in a mirror or ask a co-worker if you have put it on properly, and adjust if necessary.
7. Conduct a user seal check (fit check) according to the user instructions.

If any leaks are detected, adjust the fit or, if you can't get a good seal, look for another respirator model that fits you better.

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1. Inspect the mask and filter for damage, paying attention to the inner gaskets and valves.



2. Align the indicators and rotate clockwise to attach cartridge to the mask without touching interior of the mask or the connector port.



3. Put on your PPE including your goggles, and then place the upper strap carefully followed by the lower strap.



4. Fit test by covering the exhale vent in the front of respirator.



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5. Then fit test via covering the filter air intake. (Fit test may vary depending on your respirator. Follow manufacturer instructions)



6. When removing the mask after use, remove lower strap followed by upper strap without it touching your face, and wipe mask with disinfectant wipe.




7. Then place your respirator on disinfected surface or on clean paper towel with mask facing down to keep it clean.

After each shift, place filters in non-airtight container, and avoid shaking or dropping the filter to minimize aerosol production

Mask should be disinfected in a bucket of dilute bleach with >5000 ppm free chlorine for 1 minute followed by soapy water rinse after each shift per 3M & CDC guidelines [28][29]

Soft filters without plastic casing cannot be wiped down with disinfectant wipe or be removed without generating aerosols, so store mask together with the




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DONNING OF ELASTOMERIC FULL - FACEPIECE RESPIRATORS (3M)

1. Fully loosen all headstraps. Pull hair back.
2. Hold the front of the facepiece with one hand and the straps away from the facepiece with the other hand, creating an opening for the head. Pull the respirator assembly down over the head. Place the nose in the nose cup and chin in the chin cup area, then press the facepiece firmly and evenly against the face.
3. While holding the facepiece in place, pull the straps over your head.
4. Tighten the straps one at a time, beginning with the bottom straps followed by the middle straps (if present) then top straps.
5. Check all straps and re-adjust if necessary, to ensure that they are tight and evenly tensioned so that the head harness is centered on the back of your head.
6. Check the position in a mirror or ask a co-worker if you put it on properly and adjust if necessary. Ensure that there are no creases or gaps around the facepiece perimeter.
7. Conduct a user seal check (fit check) according to the user instructions.

If any leaks are detected, adjust the fit or, if you can't get a good seal, look for another respirator model that fits you better.


If elastomeric facepiece respirators are used during care for patients with a suspected or confirmed infectious disease, the respirators should be carefully removed, touching

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only the straps and not the surface of the facepiece portion. Clean and disinfect facepiece and hard-sided filters after use or prior to re-use, according to applicable requirements and guidance.

Doff the Respiratory Protection Equipment in the clean zone with clean gloves.

1. Remove the P100 filters (or other particle filters) from the RPE and set them aside on a disposable alcohol wipe.
2. Wash the RPE by immersing it in lukewarm water (maximum 43°C) with a gentle detergent or any cleanser recommended by the manufacturer. Rub with a soft brush for 1 minute. **Do not use cleansers containing lanolin or other oils and do not use a brush with metal bristles.**
3. Rinse the parts in lukewarm running water.
4. The RPE must then be immersed for a minimum of 1 minute in a solution of sodium hypochlorite (5,000 ppm, see box) to be disinfected. Place the RPE face down to avoid the formation of air bubbles in the mask. Swish it around to remove any residual bubbles.
5. Rinse the RPE firmly with lukewarm running water for a minimum of 2 minutes. Drain. It is important to rinse well, since soap and disinfectant that dry on parts of the RPE can irritate the skin and cause dermatitis. In addition, some can degrade the rubber or corrode the metal parts.
6. The RPE must be dried with a clean cloth, paper towel or simply air-dried in a clean location.
7. Keep it in a clean container that is not hermetically sealed to avoid retaining moisture.

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8. Follow the procedure for inspecting and donning the RPE. Check its seal each time it is used.

Note: Although bleach can cause premature wear of the elastics, the procedure does not recommend removing them to facilitate its application in case of a pandemic.

The hypochlorite solution (approximately 5,000 ppm of available chlorine) can be made by adding 100 ml of bleach (5%) to 900 ml of lukewarm water. Since the concentration levels of commercial and industrial bleach vary, it is advisable to use the following calculator, developed in Ontario, to validate the necessary volumes to make your solution:

Note: 1% is equivalent to 10,000 ppm.

Be careful not to let liquids contact the filtering medium inside the shell, since that could affect the efficacy of filtration.

9. Dry with a clean cloth or simply air-dry in a clean location.


10. Keep in a (new, clean, well-maintained) non-hermetically sealed container separately from the RPE.

The calculation performed in this tool is based on the following equation: $C1 \times V1 = C2 \times V2$

- C1 is the initial concentration of the bleach (sodium hypochlorite) solution.
- V1 is the volume of the bleach to be diluted with water. This is what you are trying to calculate.
- C2 is the concentration of the diluted bleach solution you are preparing.
- V2 is the volume of bleach solution you are preparing.


Chlorine Dilution Calculator

<https://www.publichealthontario.ca/en/health-topics/environmental-occupational-health/water-quality/chlorine-dilution-calculator>

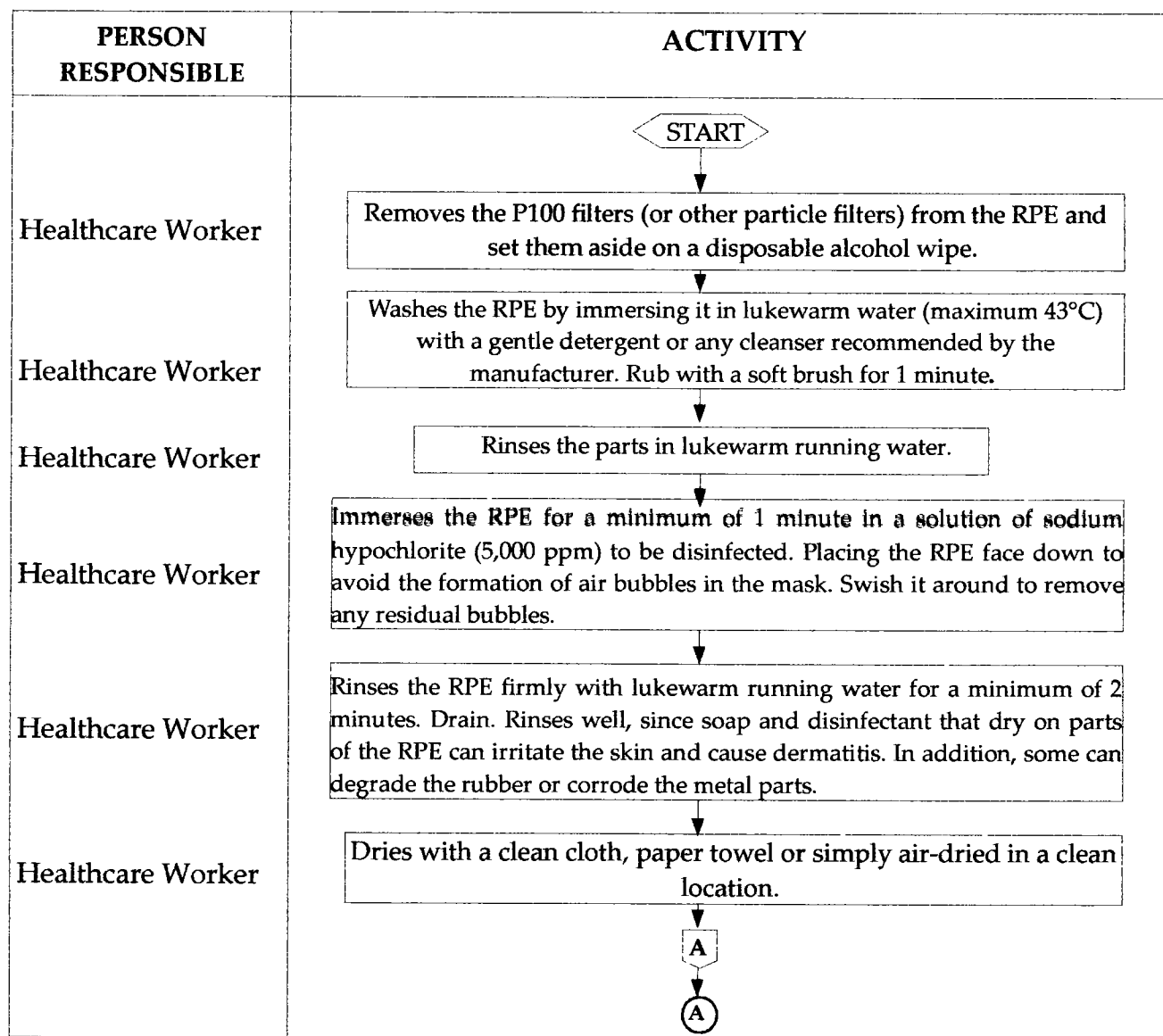
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FLOWCHART: DONNING OF ELASTOMERIC HALF-FACEPIECE RESPIRATORS (3M)

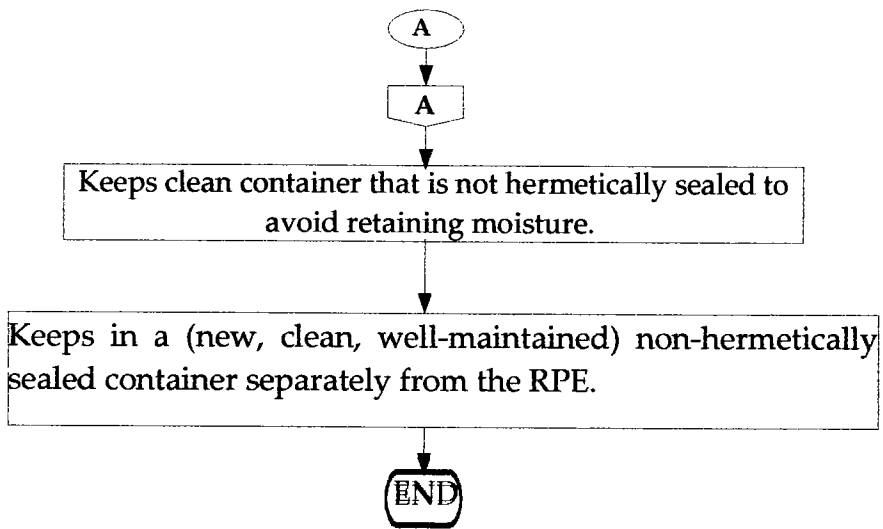
PERSON RESPONSIBLE	ACTIVITY
	<p>START</p> <p>↓</p> <p>Adjust head cradle size (if possible) as needed to fit comfortably on head, and loosen straps.</p> <p>↓</p> <p>Place respirator over your mouth and nose, then pull head harness over crown of your head.</p> <p>↓</p> <p>Hook the bottom straps together behind your neck.</p> <p>↓</p> <p>Adjust strap tension to achieve a secure fit. Pull the ends of the straps to adjust the tightness beginning with the adjustment points at the top of the respirator and then moving to the adjustment points at the back of the neck.</p> <p>↓</p> <p>Do not over-tighten. Strap tension may be decreased by pushing out backside of buckles.</p> <p>↓</p> <p>Check the position in a mirror or ask a co-worker if you have put it on properly, and adjust if necessary.</p> <p>↓</p> <p>Conduct a user seal check (fit check) according to the user instructions.</p> <p>↓</p> <p>END</p>
Healthcare Worker	
Healthcare Worker	
Healthcare Worker	
Healthcare Worker	
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Healthcare Worker	


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FLOWCHART: DOFFING & CLEANING OF ELASTOMERIC HALF-FACEPIECE RESPIRATORS (3M)




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PERSON RESPONSIBLE	ACTIVITY
Healthcare Worker	 <pre> graph TD A([A]) --> B[A] B --> C[Keeps clean container that is not hermetically sealed to avoid retaining moisture.] C --> D[Keeps in a (new, clean, well-maintained) non-hermetically sealed container separately from the RPE.] D --> E([END]) </pre>
Healthcare Worker	

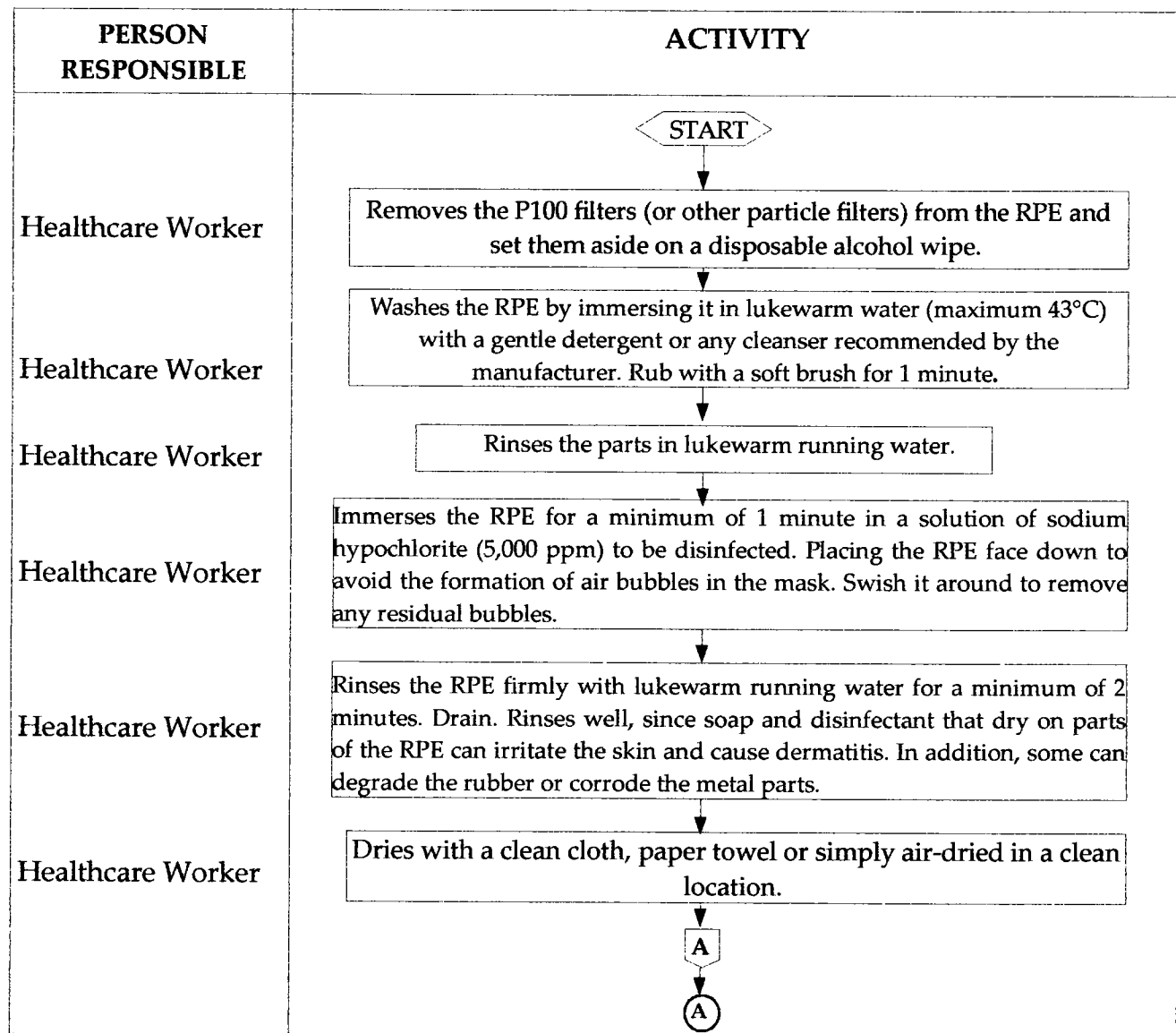
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FLOWCHART: DONNING OF ELASTOMERIC FULL-FACEPIECE RESPIRATORS (3M)

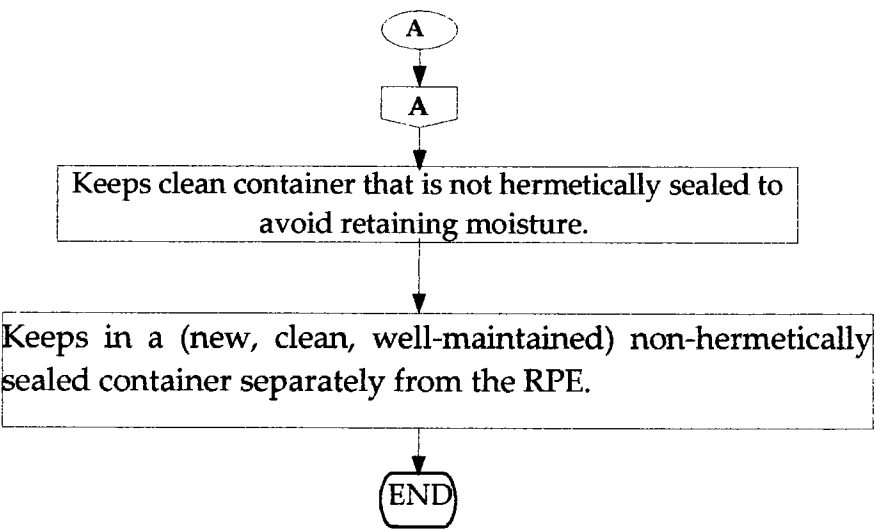
PERSON RESPONSIBLE	ACTIVITY
	<p style="text-align: center;">◇ START ◇</p> <p style="text-align: center;">↓</p>
Healthcare Worker	Fully loosens all headstraps. Pull hair back.
Healthcare Worker	Holds the front of the facepiece with one hand and the straps away from the facepiece with the other hand, creating an opening for the head.
Healthcare Worker	Pulls the respirator assembly down over the head. Places the nose in the nose cup and chin in the chin cup area, then press the facepiece firmly and evenly against the face.
Healthcare Worker	Pulls the straps over your head, while holding the facepiece in place
Healthcare Worker	Tighten the straps one at a time, beginning with the bottom straps followed by the middle straps (if present) then top straps.
Healthcare Worker	Check all straps and re-adjust if necessary, to ensure that they are tight and evenly tensioned so that the head harness is centered on the back of your head.
Healthcare Worker	Check the position in a mirror or ask a co-worker if you have put it on properly, and adjust if necessary.
Healthcare Worker	Conduct a user seal check (fit check) according to the user instructions.
	<p style="text-align: center;">↓</p> <p style="text-align: center;">○ END ○</p>


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FLOWCHART: DOFFING & CLEANING OF ELASTOMERIC FULL-FACEPIECE RESPIRATORS (3M)




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PERSON RESPONSIBLE	ACTIVITY
Healthcare Worker	 <pre> graph TD A([A]) --> B[A] B --> C[Keeps clean container that is not hermetically sealed to avoid retaining moisture.] C --> D[Keeps in a (new, clean, well-maintained) non-hermetically sealed container separately from the RPE.] D --> E([END]) </pre>
Healthcare Worker	

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FLOWCHART: REUSE OF N95 RESPIRATORS

PERSON RESPONSIBLE	ACTIVITY
Healthcare Worker	<p>START</p> <p>↓</p> <p>Doffs N95 mask properly and place it inside the brown paper bag with his name, day, and number (#1, #2, #3, & #4). Seals the brown paper bag.</p> <p>↓</p> <p>Places sealed brown paper bag with N95 respirator in the area/cubicle provided.</p> <p>↓</p> <p>Follows the same steps in using N95 respirators #2, #3 and #4.</p> <p>↓</p> <p>Uses the N95 mask #1 after the fourth mask has been used.</p> <p>END</p>
Healthcare Worker	
Healthcare Worker	
Healthcare Worker	

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Particulate Filter Replacement

Discard filter cartridges if they become visibly soiled or wet, if they are visibly damaged, or if the respirator becomes notably harder to breathe through. Otherwise, change out the filters periodically. Provided the cartridge integrity and filter have not been compromised, current practice shows that conservatively, the filters could be used for at least one year.


Disposal/change of filters shall be:

- 1.) Filter becomes dirty or physical damage occurred; and
- 2.) After 40 hours of use or 30 days after whichever comes first

Training

Workers must be educated and trained on how to safely use their elastomeric respirator. Employers should follow the respirator manufacturer's instructions and OSHA guidance to the greatest extent possible; and consider training recommendations described in the Bessesen protocol. The NIOSH JETFIT study provides excellent training for contingency situations.

To ensure respirator maintenance is conducted properly, employers should establish disinfection and cleaning procedures and train staff to perform the required maintenance including storage, inspection, distribution, repair or replacement, cleaning, disinfection, and disposal. Employers may identify a central location for disinfection or train individual users to clean and disinfect their respirators. Initial surface cleaning should be done at point of use before moving to a central location for disinfection.

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Respirator storage

Respirators must be stored in a clean, non-contaminated location in a manner that does not distort the facepiece or straps. Respirators need to be thoroughly air dried prior to storage.


Sharing elastomeric respirators

If it is impossible for individual HCP to have dedicated elastomeric respirators, the same elastomeric respirator may be used by multiple HCP. Elastomeric respirators issued to more than one employee should be cleaned, disinfected, and inspected before being worn by different individuals. One option is to label the respirator, conduct surface cleaning at the point of use, and return to a central location to be disinfected by central staff before reissuing the respirator to a different user.

Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of large numbers of elastomeric respirators. In general, the respirator's elastomeric components should not be cleaned with solvents (e.g., acetone, ethanol) or exposed to temperatures greater than 50°C (122°F). Post-cleaning inspection by personnel trained in the necessary maintenance tasks should still be conducted to assure respirator functionality has not been degraded.

Extreme care should be taken to limit tumbling, agitation, or exposure to temperatures above those recommended by the manufacturer, as these conditions may result in damage to the respirators.

Ultrasonic cleaners, clothes washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying elastomeric respirators.


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Considerations for Users of Corrective Lenses

- Conventionally, workers who wear a full facepiece respirator and need corrective lenses would have prescription inserts. In a surge situation, where multiple employees share respirators, the use of prescription inserts might not be feasible.
- Employees who use glasses could wear half facepiece respirators, with glasses worn over the respirator to avoid a situation where the arms of the glasses interfere with the respirator seal.
- The risks of contamination by solvent vapors do not apply in most healthcare settings. Therefore, individuals who wear contact lenses should be able to wear either full facepiece or half facepiece respirators. However, the use of contact lenses in general could present additional risks where SARS-CoV-2 exposures are known or suspected.

Storage and Transport

A health care facility that decides to use elastomeric respirators would have several options for how those respirators could be distributed to the staff members who need them. An elastomeric respirator could be assigned to an individual or could be available for the health care worker to select each day from a cart or other central location. Either approach poses challenges. The Texas Center for Infectious Disease (TCID), which focuses on care of patients with tuberculosis, is one of the few hospitals in the United States that uses elastomeric respirators exclusively and routinely; each staff member is assigned with a respirator and provided with a shoulder carrying bag to transport and store the respirator (Joint Commission, 2014; Kizilbash et al., 2018). The center has found that this is a workable solution because the staff members,

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who are regularly coming into contact with patients with tuberculosis, must use respirators frequently.

For health care facilities in which the usage of respirators is infrequent (possibly a few times per year) and unpredictable, asking health care workers to always carry this equipment with them while on duty would be cumbersome and could result in improper storage and maintenance of the respirator.

A study of the use of elastomeric respirators in three acute-care hospitals in British Columbia reported that storing on the unit can be challenging as there is very limited counter space and storage at the nurse's station outside the patient room. Due to similar reasons, it was challenging to identify and dedicate space for storing respirator supplies in both the clean supplies and soiled utility rooms. (Ciconte et al., 2018, p. 18)

From a warehousing perspective (i.e., storage prior to use), elastomeric respirators have both advantages and disadvantages. While the elastomeric respirators are bulkier and take up more space per unit in storage than the filtering facepiece respirators, far fewer of the elastomerics are required to meet pandemic needs.

In the model developed by Baracco and colleagues (2015), a box of 10 elastomeric respirators was estimated to take up a space of 7 × 13 × 18 inches of storage pallet space (with additional space for boxes of filters), while a box of 20 disposable respirators took up 12 × 6 × 6 inches of space. Meeting the pandemic planning needs for a population of 1 million was estimated to require 6,112,500 disposable filtering facepiece respirators, with warehouse and management costs of approximately \$207,000 per year (not including acquisition costs), compared with only 10,612


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elastomeric respirators, with warehouse and management costs of \$5,000 per year. The analysis also included PAPRs, which had larger boxes and higher warehouse and management costs.

Considerations Regarding Routine Use. If the decision is made to use reusable elastomeric respirators for routine health care at a facility, it will be necessary to develop a storage and transport system. The storage and transport system will need to become part of the initial staff training on respirators and also need to be incorporated into refresher training. Health care facilities that make the decision to use reusable elastomeric respirators routinely will need to have a staff whose members are fit tested, trained, and familiar with elastomerics, which will make it easier to move into a surge situation if needed, where the elastomeric respirators may be used more extensively.

Staffing and Respirator Issuance

The needs of the health care facility are paramount in decisions about the scope of the respiratory protection program; scope is raised here as one of many considerations regarding the use of various types of respirators. The respiratory protection program administrator, in partnership with infection prevention and control, value analysis, occupational health, and other pertinent departments, must determine the appropriate size and scope for the organization's respiratory protection program during both routine and surge situations. Consideration has been given to stratifying the risks experienced by health care workers according to the types of work that they do and the locations of their work. For example, health care workers performing aerosol-generating procedures on known or suspected pandemic patients would be at


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high exposure risk. This type of approach to stratifying risks (also termed the **control banding approach**) could be used for decision making on PPE selection and for prioritization during public health emergencies.

Considerations Regarding Routine Use

Risk perception is often a challenge in implementing respiratory protection protocols in routine health care. Health care workers become accustomed to dealing with life and death situations and may not take respiratory precautions seriously, particularly since the respiratory risks for health care workers (i.e., airborne viruses or bacteria) are invisible, the onset of disease from inhaling pathogens may not be immediate, respiratory protective devices may be perceived as interfering with patient care, and even when there is a high risk of transmission, not all workers acquire the infection (Chung et al., 2015). There was a study that explored safety culture and safety climate issues with attention to reusable elastomeric respirators. In a focus group of health care workers who had used elastomeric respirators, the workers noted the risk perception issues and said that they “would feel safer wearing ERs [elastomeric respirators], as they were viewed as offering more protection” (Hines et al., 2017, p. 101).

Having a strong safety culture in which compliance with respiratory protection is expected and frequently monitored can improve compliance with respiratory protection protocols. Furthermore, if a strong organizational safety culture is in place during routine health care, then when a pandemic or other crisis occurs, the staff can quickly and knowledgeably respond.

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	Document Title:	USE AND CARE OF FILTERING RESPIRATORS

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