

1 Purpose	To outline the requirements for the safe use of respiratory protective equipment.
2 Application	Applies to all NTPC employees and contractors required to use respiratory protective equipment and devices.
3 Definitions	<p>Airline Respirator A breathing device that consists of a full-face mask with a long hose that connects to a freestanding tank of compressed air.</p> <p>Air-Purifying Respirator A respirator with an air-purifying filter or cartridge that removes specific air contaminants by passing ambient air through the air-purifying element.</p> <p>Air-Supplying Respirator A respirator that delivers clean breathing air from a compressor and/or a cylinder to a worker.</p> <p>Cartridge A component of a respirator that removes vapours and/or gases from the air inhaled by the person wearing the respirator.</p> <p>Facial Seal The seal of the tight-fitting respirator face mask to the face.</p> <p>Immediately Dangerous to Life or Health (IDLH) 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"> • is an immediate threat to life; • may affect health irreversibly; • may have future adverse effects on health; or • may interfere with a worker's ability to escape from a dangerous atmosphere. <p>Particulate Respirator A disposable half-face mask used for protection against airborne particles (i.e., dust, mist, fumes).</p> <p>Respirator An apparatus worn over the mouth and nose or the entire face to prevent the inhalation of dust, smoke, or other noxious substances.</p> <p>Seal Check An action conducted by the user to determine if the respirator is properly seated to the face.</p> <p>Self-Contained Breathing Apparatus (SCBA) A respirator with independent air supply carried by the user.</p>

	<p>Tight-fitting Face Mask A respirator inlet covering that forms a complete seal with the face. This includes:</p> <ul style="list-style-type: none"> • Quarter-face mask (covers nose and mouth above chin). • Half-face mask (covers nose and mouth under chin). • Full-face mask (covers eyes, nose, and mouth under chin).
4 References	<ul style="list-style-type: none"> • NWT Safety Act 1988 • NWT Occupational Health & Safety Regulations 2015 • NWT Code of Practice: Respiratory Protection PPE • CSA Standard Z94.4: Selection, Use and Care of Respirators • CSA Standard Z180.1: Compressed Breathing Air and Systems • Health & Safety Management System Element 06: Personal Protective Equipment • Health & Safety Management System Element 14.07: Respiratory Protection • SWP 4.01: Personal Protective Equipment • SWP 4.11: Self-Contained Breathing Apparatus
5 Equipment	<ul style="list-style-type: none"> • Nil
6 PPE	<ul style="list-style-type: none"> • Respiratory protective equipment
7 Training	<ul style="list-style-type: none"> • NTPC Respiratory Protection <ul style="list-style-type: none"> ○ Includes fit testing along with training in the use, care, maintenance, and limitations of the respiratory protective equipment.
8 Work Practice	<p>General</p> <ul style="list-style-type: none"> • Respirators are devices designed to protect wearers from inhaling a hazardous atmosphere. • Respiratory protective equipment (RPE) shall be used wherever a worker is or may be exposed to airborne contaminant that may be present in amounts that are harmful or offensive to the worker (e.g., dust, fumes, gas, mist, aerosol, vapour). • Examples of situations requiring RPE include: <ul style="list-style-type: none"> ○ Grinding or cutting materials that produce dust. ○ Welding (produces fumes). ○ Mixing chemicals that produce vapours or mists.

- Entry into confined spaces.
- Work in areas containing toxic substances.
- Clean-up procedures that use solvents, acids, alkalis, and/or create dusts or fumes.
- NTPC shall provide RPE suitable to site-specific airborne hazards.
- RPE shall meet the requirements of *CSA Standard Z94.4: Selection, Use and Care of Respirators*.
- Employees shall requisition RPE through their manager, selecting only items listed on *Form 6.2: Approved HSE Equipment Purchasing List*.

Types of Respirators

- There are three types of respirators:
 1. Particulate respirators (i.e., dust masks)
 2. Air-purifying respirators
 3. Air-supplying respirators
- **1. Particulate Respirators**
 - Disposable masks (see Figure 1) used to protect against nuisance dusts (e.g., from grinding, sanding, sweeping, dusty operations).
 - Not suitable for concrete dust.
 - Do not provide a facial seal.
 - Of all respirators, these provide the least protection.
 - Worker shall ensure the metal nose clip forms snugly over the bridge of the nose.

Figure 1: Particulate Respirator



- **2. Air-Purifying Respirators**
 - Reusable respirators that remove airborne

contaminants including gas, vapour, and particulate matter from the air inhaled by a worker.

- Require a facial seal.
- Consist of a half-face mask (see Figure 2) or full-face mask (see Figure 3) with either filters or cartridges.
- Half-face mask respirators protect the mouth, nose, and breathing while full-face mask respirators also protect the eyes from liquid splashes and flying particles.
- Air-purifying respirators have a number of limitations:
 - Do not protect against oxygen-deficient atmospheres, which require supplied air.
 - Cannot be used for entry into atmospheres that are immediately dangerous to life or health (IDLH) (e.g., hydrogen sulfide, carbon monoxide).
 - Cannot be used against substances with poor warning properties (e.g., odourless gases or vapours).

Figure 2: Half-Face Mask Respirator with Filters



Figure 3: Full-Face Mask Respirator with Cartridges



• **3. Air-Supplying Respirators**

- Deliver clean breathing air to a worker from a compressor and/or a cylinder.

- Require a facial seal.
- Approved for use under conditions where air-purifying respirators will not be effective:
 - In atmospheres where contaminants do not emit a detectable odor or taste or cause irritation at safe concentrations.
 - To protect against substances that would generate a high heat reaction with the absorbent in an air-purifying respirator.
 - Where chemicals in the atmosphere are absorbed very poorly by the absorbents used in air-purifying respirators, causing very short service life, or where the chemicals are not absorbed at all.
 - Where there are two or more contaminants in the atmosphere for which different air-purifying elements are recommended, such as ammonia and benzene, and a combination element is not available.
 - When the concentration of a substance is greater than the approved limit for an air-purifying respirator.
- Supplied air must meet certain standards for purity and moisture content set out in Table 1 of *CSA Standard Z180.1: Compressed Breathing Air and Systems*.
 - If an oil-lubricated compressor is used to supply breathing air, a continuous carbon monoxide monitor equipped with an alarm (preferably audible) must be provided.
 - If an ambient breathing air system is used the air intake must be located in a clean outdoor area away from vehicle and building exhausts, in accordance with Appendix B of *CSA Standard Z180.1: Compressed Breathing Air and Systems*.
- Only competent workers trained in the use of the equipment and job procedures shall enter an atmosphere requiring an air-supplying respirator.
- An individual under 18 years of age shall not conduct work requiring the use of an air-supplying respirator.
- There are three main types of air-supplying respirator:
 - a) Airline respirators (including supplied air masks, hoods, and body suits).
 - b) Self-Contained Breathing Apparatus (SCBA).
 - c) Combination respirators.

- a) Airline Respirators
 - Normally used when there are extended work periods required in atmospheres that are not immediately dangerous to life and health (IDLH).
 - Use a hose to deliver clean, safe air from a stationary source of compressed air to a mask, hood, or body suit (see Figure 4).
 - Provide clean air for long periods of time.
 - Light weight for the user.
 - Limited range of user-mobility.
 - May fail due to hose damage.

Figure 4: Airline Respirator



- b) Self-Contained Breathing Apparatus
 - A special type of air-supplying respirator that provides an independent air supply from a pressurized tank on the user's back.
 - Normally used when there is a short-time need to enter and escape from atmospheres which are or may be immediately dangerous to life and health (IDLH).
 - Consists of a wearable, clean-air supply pack and full-face respirator mask (see Figure 5).
 - Does not restrict movement as there is no hose connection.
 - Closed-circuit SCBAs provide air for up to 4 hours.
 - Open-circuit SCBAs provide air for only 30-60 minutes.
 - Refer to *SWP 4.11: Self-Contained Breathing Apparatus* for more information on SCBA.

Figure 5: Self-Contained Breathing Apparatus



- c) Combination Air-Supplying Respirators
 - Air is supplied with an airline; however these have an auxiliary self-contained air supply that can be used if the primary supply fails (see Figure 6).
 - The self-contained portion can be small since it only needs to supply enough air for escape.
 - Can be used for entry into confined spaces.
 - Normally used when there are extended work periods required in atmospheres that are or may be immediately dangerous to life and health (IDLH).

Figure 6: Combination Air-Supplying Respirators



Filters and Cartridges

- The air purifying respirator will only provide protection if the proper filter or cartridge is used for the specific contaminant.
- There are three types of filters/cartridges:
 1. Particulate filters
 - Made of material designed to trap particles in the air (e.g., dust, mist, fumes) as the user breathes.
 - Do not protect against gases or vapours.
 - Have the same efficiency guidelines that apply to disposable particulate respirators.
 - When breathing becomes difficult, it is time to change the filter.
 2. Gas/vapour cartridges
 - Contain a material that absorbs gases and vapours.
 - Do not protect against airborne particles.
 - Various cartridges are available specific to particular contaminants.
 - There is little to indicate when the filter is used up, so the wearer shall be aware of time limits for the particular hazard.
 3. Combination cartridges
 - Provide users with both gas/vapour and particulates protection.
 - Have both particulate filters and gas/vapor cartridges.
 - May be heavier than other filters/cartridges.
- Particulate filters are divided into three distinct groups:
 1. N-Series
 - The “N” stands for “not resistant to oil.”
 - Provide protection against solid and liquid aerosol particulates that do not contain oil.
 2. R-Series
 - The “R” stands for “resistant to oil.”
 - Provide protection against solid and liquid aerosol particulates that may contain oil.
 - Certified for only up to 8 hours of service life.
 3. P-Series.
 - The “P” stands for “oil-proof.”
 - Provide protection against solid and liquid aerosol particulates that may contain oil.

- Certified for up to 40 hours or 30 days of service life, whichever comes first.
- Each series of particulate respirator filters (i.e., N, R, P) has three different efficiency possibilities: 95, 99, and 100. These refer to the percentage of particulates filtered out – the higher the efficiency, the more particulates the respirator will filter out.

Respirator Selection

- Select the proper type of air-purifying respirator based on the type of contaminant present (see Table 1).
- Consult Safety Data Sheets (SDS) for guidance on the requirements for the particular respiratory hazard.
- Respirator suppliers may be able to assist in selecting the appropriate filter/cartridge type.
- The following questions can be used when selecting a respirator:
 - Is it to be used in firefighting or emergencies?
 - Is it to be used in oxygen-deficient atmospheres (less than 19.5%) oxygen in air?
 - What is the nature of the hazard (chemical properties, concentration in the air, warning properties)?
 - Is there more than one contaminant present?
 - Is the airborne contaminant a gas, vapour, or particulate (mist, dust, or fume)?
 - Are the airborne levels below or above the exposure limit, or are they above levels that could be immediately dangerous to life or health (IDLH)?
 - What are the health effects of the airborne contaminant (e.g., carcinogenic, potentially lethal, irritating to eyes, absorbed through the skin)?
 - What are the characteristics of the operation or the process (e.g., hot temperatures, confined space)?
 - What activities will the worker be doing while wearing the respirator (e.g., strenuous work)?
 - How long will the worker need to wear the respirator?
 - Does the selected respirator fit the worker properly?
 - Where is the nearest safe area that has respirable air?
- Selection of respirators may change from task to task. For assistance with selecting appropriate respiratory protection, contact your Health & Safety Department representative.

Table 1: Air-Purifying Respirator Selection

Substance	Respirator Type	Minimum Rating
Acid gases	Chemical cartridge	NA
Allergens	Particulate filter	N95
Ammonia	Chemical cartridge	NA
Asbestos	Particulate filter	N100
Bacteria, viruses	Particulate filter	N95
Bleach	Particulate filter	N95
Dust	Particulate filter	N95
Fibers	Particulate filter	N95
Insulation	Particulate filter	N95
Lead	Particulate filter	N100
Mold	Particulate filter	N95
Organic vapour	Chemical cartridge	NA
Paint	Particulate filter	R95
Pesticides, sprays	Particulate filter	R95
Pollen	Particulate filter	N95
Sanding	Particulate filter	N95
Welding	Particulate filter	N95

Fit Testing

- Workers shall undergo fit-testing with their assigned respiratory protective equipment prior to use in a hazardous environment. The fit test shall ensure a satisfactory fit and effective face seal when using a tight-fitting face mask.
- Retesting shall be performed a minimum of every two years, or more often if changes to the user's physical condition occur that could affect respirator fit. Examples include:
 - A shift in weight by 10 lbs.
 - Dental modifications that change the contour of the jaw.
 - A traumatic or medical change to the facial contour or skin.

Inspection

- All respiratory protective equipment (RPE) shall be inspected before and after each use and during cleaning to ensure it is in satisfactory working condition.
- Any defects identified during the RPE inspection shall be corrected immediately by a competent worker or the RPE shall be immediately taken out of service.
- Face Mask
 - Ensure no cracks, holes, or tears are present.
 - Ensure face mask edges are not rippled or distorted.
 - For a full-face mask respirator, check for missing mounting clips and cracked, scratched, or loose-fitting lenses.
- Head Strap/Harness
 - Check webbing for breaks.
 - Look for deterioration of elasticity or fraying edges.
- Inhalation and Exhalation Valves
 - Ensure the valve and valve seat are free of dust particles or dirt that may cause a poor seal or reduce efficiency.
- Filters and Cartridges
 - Ensure filters/cartridges and mask are certified for use together.
 - Ensure filters/cartridges are approved for the hazard.
 - Inspect filter/cartridge threads and mask threads for wear.
 - Ensure filters/cartridges and mask are screwed together properly with no cross threading.
 - Check filter/cartridge housing for cracks or dents.
 - Check “end of service life” indicator and expiration date on respirators fitted with organic vapour cartridges.

Facial Seal

- Air-purifying and air-supplying respirators require an effective facial seal for safe use.
- Respirators requiring a tight fit in order to perform effectively shall not be worn when an effective seal to the face of the user cannot be achieved and maintained.
- Workers wearing these respirators shall be clean shaven where the face mask of the equipment seals to the skin of the face and shall adhere to the facial hair standards (see

Figure 7). Note: The red area is the face mask seal surface. No hair is permitted in this area.

Figure 7: Facial Hair Standards

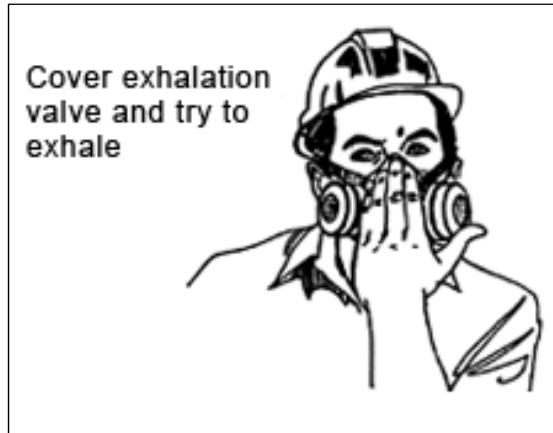


- Side arms on eyeglasses or any other materials such as hair, cloth, tissue, straps, or jewellery shall not pass between the face and the sealing surface of the face mask or interfere with the seal of the tight-fitting face mask to the face or with the operation of the respirator.
- Other personal protective devices or equipment shall not interfere with the seal of the face mask to the user's face.
- The respirator user shall perform a pre-use inspection of the respirator to ensure it is in proper operating condition with an air tight seal, a functional exhaust valve, and an intact lens seal. Immediately after donning the respirator the user shall conduct the following seal checks:
 - Positive Pressure Seal Check
 - Close off the exhalation outlet with the palm of the hand (see Figure 8);
 - Exhale gently to slightly inflate the face mask; and
 - Hold the breath for 10 seconds.
 - If the face mask puffs away from the face slightly and no outward leakage is detected, the respirator

fit is adequate.

- If outward leakage is detected the respirator fit is inadequate.

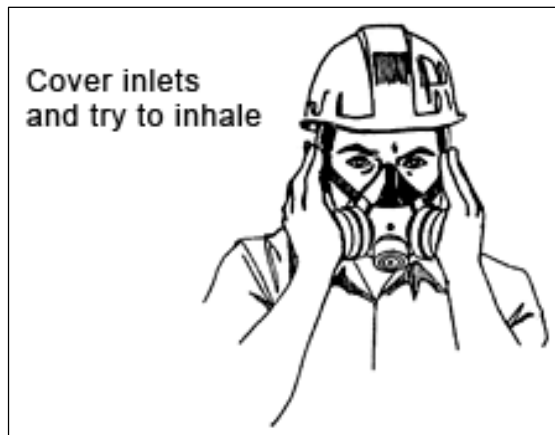
Figure 8: Positive Pressure Seal Check



○ Negative Pressure Seal Check

- Remove the cartridges and close off the inlets with the palm of the hand (see Figure 9);
- Inhale gently to slightly collapse the face mask; and
- Hold the breath for 10 seconds.
- If the face mask remains collapsed and no inward leakage is detected, the respirator fit is adequate.
- If inward leakage is detected the respirator fit is inadequate.

Figure 9: Negative Pressure Seal Check



Cleaning

- Respiratory protective equipment (RPE) shall be maintained in a clean and sanitary condition.
- Do not clean with solvents.
- Wash hands before cleaning the respirator to protect it from further contaminants.
- Disassemble the respirator, taking care not to lose any seals or washers that may be in place with the filters or cartridges. If required, consult the written instructions that came with the mask.
- Filters and cartridges cannot be washed; only wiped clean. Set them aside while cleaning the mask.
- Hand-wash the respirator face mask in warm water with a mild dish detergent or a combination of detergent and disinfectant.
- A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- Individually wrapped respirator cleaning wipes and respirator cleaning kits are also available, if required.
- Rinse with clean water, or rinse once with a disinfectant and once with clean water. The clean water rinse removes excess detergent or disinfectant that can cause skin irritation or dermatitis.
- Hand-dry the respirator with a clean lint-free cloth, or air-dry it away from direct sunlight and direct sources of heat on a rack or clean surface. Position the respirator so that the face mask rubber will not set crookedly as it dries.
- Once dry, reassemble the respirator.
- Test the respirator to ensure all components work properly.

Maintenance

- Particulate filters shall be replaced when:
 - They become damaged or unhygienic.
 - Breathing becomes difficult.
 - As recommended by the manufacturer.
- Cartridges shall be replaced when the odours of the filtered substances can be detected or as recommended by the manufacturer.
- Replace all respirator parts that are cracked, torn, broken, missing, or worn.
- Only certified personnel shall repair respirators.

- Do not mix parts from different manufacturers.

Storage

- Proper storage of respiratory protective equipment helps to maintain its protective qualities. Keep your respirators in good condition so they can protect you.
- Store respirators in a readily accessible area.
- Heat, ultraviolet light, and certain chemicals can damage respiratory protection. Store respirators in a place where they will not be subject to:
 - Direct sunlight.
 - Chemicals.
 - Temperature extremes.
- Store respiratory protection at the end of each use so that it is protected from dirt, moisture, and potential damage from other objects (e.g., in a locker or case rather than on a bench, in a pocket, or on the seat of a vehicle).
- To protect filters or cartridges while not in use, they should be removed and placed in a zip-lock bag for storage. Half-face mask respirators will fit into large zip-lock bags without having to remove the cartridges (see Figure 10).
- Organic vapour cartridges will continue to absorb any gas or vapour they are exposed to, even if a worker isn't pulling air through the mask.

Figure 10: Respirator Storage



9 Documentation

- Form 6.2: Approved HSE Equipment Purchasing List



Safe Work Practice:
Respiratory Protective Equipment

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Monitor:
Director, Health, Safety & Environment

SWP #:
4.09

Development

Name	Position	Date
Prepared by: J. Clark	Environmental Analyst	Oct. 21, 2014
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Approved by: E. Smith	Director, Health, Safety & Environment	Jul. 07, 2016

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#	Revised Sections	Description of Revisions	Revised by (name, position)	Approved by (name, position)	Issue Date
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