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PERSONAL PROTECTIVE EQUIPMENT FOR THE RESPIRATORY SYSTEM

Producers who plant, nurture, harvest or transport crops, care for animals, and perform other tasks such as welding or applying chemicals are exposed to lung hazards. Contact with dusts, mists, gases, fumes and vapours occurs during activities like:

- working in dusty fields or animal confinement buildings
- handling mouldy hay
- working in or uncapping silos
- working around moving grain
- cleaning grain bins
- feeding animals or working with feed
- contacting animal hair and dander
- applying agricultural chemicals (eg: fertilizers or pesticides)
- welding and working with toxic paints or solvents

Sometimes, it is not possible to reduce a hazard by eliminating it, substituting a less hazardous process or product, making changes to buildings or equipment, or even by changing how you do the job. That=s when you need personal protection. Personal protective equipment includes items like gloves, goggles, boots, hearing protection and respirators.

Respirators filter out particles or block gases and vapours that can harm the respiratory system. With a surface area well supplied with blood vessels and equal in size to a tennis court, the lungs are the quickest and most direct route for absorbing harmful substances into your body.

Respirator Types

There are two main classes of respirator:

Air-purifying respirators remove particles such as grain dust and some mists and fumes from the air. Examples include disposable masks; half-mask and full-face respirators with chemical-absorbing cartridges; and batter-

powered air hood respirators. This class of respirator provides adequate protection for most farm respiratory hazards.

Air-supplying respirators deliver clean air from a powered source to the respirator wearer. This class of respirator is required when dangerous gases or lack of oxygen pose an immediate threat to life or health. Examples include a full-face respirator attached by air line to a central air source; and a full-face respirator attached to a portable air or oxygen canister (SCBA or self-contained breathing apparatus). Some agricultural activities that require an air-supply respirator are:

- uncapping a silo and encountering concentrated silo gases
- emptying or cleaning a manure tank and being exposed to hydrogen sulphide
- entering a confined space where oxygen may be low (eg: cleaning a well).

Choosing Respiratory Protection

Ask yourself the following questions when you choose respiratory protection for a job:

- Is it the right type of protection for the hazards I will encounter?
- Does it fit? Perform a fit check to find out.
- Is it comfortable enough that I will wear it? Some facepiece materials are more comfortable than others.
- How cost-effective is it? Inexpensive pre-filters may extend the service life of chemical cartridges.
- Will it interfere with other necessary equipment (eg: welding helmet, prescription eyewear)?
- How easy is it to clean and maintain? Are replacement parts readily available?

Respirator Types			
Air-Purifying Respirators	**Advantages**	**Disadvantages**	**Approximate Cost**
Disposable mask or filter	Filters out particles such as grain dust and some mists and fumes. Optional exhalation valve reduces glasses fogging. Maintenance free. Good for short-term projects.		<$1 - $10
Half-face respirator with dual cartridges and filters	Filters out particles, mists and fumes; absorbs and blocks chemical vapours and gases. Fairly easy to wear.	User must be clean shaven. May be hot to wear in warm weather.	$50 - $80

Full-face respirator with dual cartridges and filters	Filters out particles, mists and fumes; absorbs and blocks chemical vapours and gases. Gives a better seal than a half-face respirator and protects eyes as well as nose and lungs.	User must be clean shaven. Hot to wear in warm weather. Glasses wearers need special eyewear mounted on interior of respirator facepiece.	$100 - 125
Battery-powered air-hood respirator with cartridges and filters.	Filters out particles, mists and fumes; absorbs and blocks chemical vapours and gases. Requires less effort than user-powered respirators; may enable a producer with a heart or lung problem to continue farming.	Cumbersome, may impede movement. Blowing air feels cold in winter.	$800 - $1,000
Air-Supplying Respirators	**Advantages**	**Disadvantages**	**Approximate Cost**
Full-face respirator attached to air line	Provides clean air from a central source.	Requires special training & fit-testing. User must be clean shaven. Glasses wearers need special eyewear mounted on interior of respirator facepiece. Attached air line may limit movement.	$2,000 - $4,000
Full-face respirator attached to air or O2 cannister (SCBA)	Provides clean air from an independent source.	Requires special training & fit-testing. User must be clean shaven. Glasses wearers need special eyewear mounted on interior of respirator facepiece. Canister heavy and cumbersome.	$2,000 - $4,000

Selecting a Mask or Filter

(graphic: b&w line drawing of two-strap particle mask)

Disposable particle masks and cartridge filters protect against dusts, and some mists and fumes. Particle masks should have two straps and a mouldable aluminum nosepiece, to ensure a close fit. Filters are integral or added on to half-face cartridge-type respirators. Reputable products show the following information on the product or container:

- **Certification:**
  Evidence that the respirator=s performance has been certified by the National Institute of Occupational Safety and Health (NIOSH) or by the Canadian Standards Association (CSA).
- **Filter type:**
  The mask or filter shows a number indicating filter effectiveness and a letter

indicating resistance to oil:

N95 Filters at least 95% of airborne particles.
Not resistant to oil.

N99 Filters at least 99% of airborne particles.
Not resistant to oil.

N100 Filters at least 99.7% of airborne particles.
Not resistant to oil.

R95 Filters at least 95% of airborne particles.
Somewhat resistant to oil.

R100 Filters at least 99.7 % of airborne particles.
Somewhat resistant to oil.

P95 Filters at least 95% of airborne particles.
Strongly resistant to oil.

P99 Filters at least 99% of airborne particles.
Strongly resistant to oil.

P100 Filters at least 99.7% of airborne particles.
Strongly resistant to oil.

An **N100, R100 or P100 filter** (formerly known as a HEPA filter) is required for exposure to very small hazardous particles such as mould spores and viruses (eg: Hantavirus). **An R or P filter** is required when you are exposed to oil particles (eg: oil-based pesticides, lubricants or cutting fluids).

Selecting cartridges for a half-face respirator

(Graphic: b&w line drawing of dual cartridge half-face respirator)

Respirator cartridges protect you from particles, mists, fumes, vapours and gases. Be sure to get the right cartridge for the hazards you=ll be exposed to. As well as certification and filter type (see above), look for:

- **Cartridge application:**
  A coded designation indicates which chemicals the cartridge absorbs, for example:
  OV(Organic Vapour) - recommended for working with laquer and enamel paints and most commercially available pesticides. If the pesticide is oil-based, make sure cartridges have an R or P type filter.
  Some cartridges absorb more than one chemical, for example:
  AG/OV (Acid Gas/Organic Vapour Combination) - recommended for welding machinery coated with oil and grime.

Fit checking a half-face respirator

Every time you wear a half-face respirator, inspect it and perform a fit check. If the respirator does not seal snug against your face, you will be exposed to respiratory hazards.

Positive Pressure Fit Check

- Put respirator on and adjust straps.
- Place hand over exhalation valve.
- Gently breathe out and hold for 10 seconds.
- Respirator should bulge out from face.

Negative Pressure Fit Check

- Put respirator on and adjust straps.
- Place hands over cartridges.
- Breathe in and hold your breath.

Respirator should suck to face and stay there for 10 seconds.
If there is a leak, tighten straps. Try the fit check again. If there is still a leak, obtain a new respirator. You may require a different size.

Cleaning and storing a half-face respirator

Wash the facepiece (but not pre-filters or cartridges!) periodically with soap and water. Store the respirator in a dry, sealed container such as a Zip Lock bag or a two pound coffee can with a tight lid. Avoid storing it in direct sunlight since light and heat cause deterioration of the face-piece and straps.

When to replace personal protective equipment

Many factors influence how long a respirator remains effective. As well as hours of use, an air-purifying respirator=s service life is affected by the concentration of dust and other contaminants in the environment; the user=s body size; how strenuously the user works while the respirator is worn; and how the respirator is stored. As a result, it=s not possible to specify a length of time after which a respirator should be replaced.

In general, replace a mask or filter when it is visibly dirty or damaged or when you experience difficulty breathing through it. **Replace respirator cartridges** when you can smell or taste chemical while or after using the respirator, or according to the manufacturer=s recommendations.

Purchasing personal protective equipment

Purchasing disposable respirators in bulk, (a box of twenty masks, for example) is more cost-effective than buying one or two at a time. Some farm supply centres stock half-mask respirators, but a safety supply store will have the best selection of models and sizes. When you purchase a half-mask respirator, ask for assistance so you get a good fit. One size does not fit all.

Suppliers

Purchase personal protective equipment locally or by mail, telephone or e-mail from suppliers such as:

- Acklands-Grainger (over 25 Saskatchewan outlets)
  Website: www.acklandsgrainger.com
- Co-op Agro Centres (over 100 Saskatchewan outlets)
  Website:www.fcl.ca (click on: Retail Locations)
- Hagemeyer North America (formerly Century-Vallen)

Regina: Tel: (306) 721-2223
Saskatoon: Tel: (306) 242-1166
Website: www.centuryvallen.com

- National Mine Service
  Saskatoon Tel: (306) 244-1584
- Mid-North Mine and Safety Supply
  Regina: Tel: (306) 525-9505
  Saskatoon: Tel: (306) 374-3635
  Website: www.midnorthsafety.com
- Seton Safety and Identification Solutions (Canada)
  Tel: 1-800-263-1623
  Website: www.seton.ca

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