

Personal Protective Equipment and Segregation Supply Specifications for Health Care Waste Management



January 2010



Table of Contents

Introduction.....	2
Protective Gloves for Waste Handlers.....	3
Protective Gloves for Incinerator Operators.....	5
Protective Eyewear for Incinerator Operators.....	7
Protective Respirators for Incinerator Operators.....	8
Protective Footwear for Waste Handlers.....	10
Medical Waste Plastic Bin Liners.....	12

Introduction

Several Making Medical Injections Safer (MMIS) project countries have expressed an interest in specifications that would help them select and purchase locally available equipment for the protection of medical waste handlers and the safe segregation of health care waste.

PATH developed this resource to guide selection and purchasing decisions. These specifications are guidelines that can be adapted to local policies and product availability. For example, bin liners have a specified minimum acceptable thicknesses, rather than a specific thickness requirement.

Web links provide pictures and product information that demonstrate commercial equipment that meet these specifications. PATH is not endorsing any one product; these have been included for illustrative purposes. Although many of these are from the United States and of high price, they can serve as examples to show local dealers and manufacturers.

These specifications do not cover all medical waste equipment. Some things, such as waste bins, are too variable and locally specific to try to specify.

PATH is available to work with MMIS staff on a country-by-country basis to help define and select equipment not included in this resource.

Protective Gloves for Waste Handlers

Managers may use these product specifications to select gloves suitable for cleaning staff to achieve protection against biological hazards present during handling and transport of biomedical waste in the clinic setting.

Purpose:

To protect cleaners and other staff who process health care waste from biological hazards that may be present in medical waste. Gloves should be made of materials that are resistant to puncture from contaminated sharps and that are designed to enable staff to safely and effectively perform their duties.

Basic performance specifications:

1. Durable, reusable design that is able to withstand periodic disinfection.
2. Available in sizes appropriate for all cleaning staff in the health facility.
3. Prevent contact with bloodborne pathogens contained in health care waste.
4. Made from puncture-resistant materials to protect against needlesticks and cuts from other sharps.

Materials:

To prevent contact with infective agents and to resist puncture from contaminated sharps, gloves should be made of heavy-weight neoprene, latex, nitrile, or other water-impervious material. Do not use PVC if there is a chance the gloves will be disposed of by burning or incineration.

Design specifications:

Glove design	Hand-specific, designed for dexterity and comfort in addition to protection. Texture in palm area should provide grip and tactile sensation to enable safety during janitorial activities.		
Cuff design	Straight cuff for maximum protection from contaminated liquids. Cuff should reach at least 75 mm from the upper arm surface when the elbow is flexed at 90°.		
Palm thickness	Minimum of 0.5 mm/20 mil.		
Sizes	Small (7)	Medium (8)	Large (9)
Palm width (mm)	90	102	120
Typical length (mm)	350–370	350–370	350–370

Examples of products:

http://www.perfectfitglove.com/products/product_detail.asp?id=34&catID=6&pseriesid=10

http://www.perfectfitglove.com/products/product_detail.asp?id=28&catID=6&pseriesid=10

<http://www.ansellpro.com/main/productSearch3.asp?pid=90>

<http://www.ansellpro.com/main/productSearch3.asp?pid=89>

<http://www.ansellpro.com/main/productSearch2.asp>

<http://www.ansellpro.com/main/productSearch3.asp?pid=29>

<http://www.professionalequipment.com/xq/ASP/ProductID.3059/id.8/subID.360/qx/default.htm>

Relevant international standards:

- (a) *AS/NZS 2161: 1998: Occupational Protective Gloves (excluding electrical and medical gloves).*
- (b) *AS/NZS 2161.2: Occupational Protective Gloves—General Requirements*
- (c) *AS/NZS 2161.10.1-3: Occupational Protective Gloves—Selection for Use With Chemicals and Microorganisms.*

Protective Gloves for Incinerator Operators

Managers may use these product specifications to select gloves suitable for incinerator operators to achieve hand protection against intermittent heat and infectious sharps present when handling biomedical waste during incineration.

Purpose:

To protect operators of small-scale medical waste incinerators, gloves must protect against heat and be resist to punctures from contaminated sharps. Gloves must be designed to enable the incinerator operator to safely and effectively perform their duties, while being made of appropriate protective materials.

Basic performance specifications:

1. Resistant to puncture by used injection equipment.
2. Provide protection against contact, convective, or radiant heat.
3. Flame retardant.
4. Will not interfere with dexterity and tactile sensation required for work duties either by design or poor fit.
5. Durable, reusable design without compromised performance.
6. Available in sizes appropriate for all incinerator operators.

Materials:

For heat protection, gloves can be made of leather and/or insulated with aramid blends, Terrycord, or cotton blends. (www.gloveassociation.org) Newer, specialized knit materials such as KEVLAR[®] are available that offer heat protections and puncture resistance. A heavy neoprene design can provide needle resistance; however, this glove design will need a specialized liner to protect against radiant heat.

Design specifications:

Glove design	Hand-specific, designed for dexterity and comfort in addition to protection.		
Cuff design	Safety cuff design that protects upper wrist but allows for quick glove removal in emergency situations.		
Thickness	Will be material dependant.		
Sizes	Small (7)	Medium (8)	Large (9)
Palm width (mm)	90	102	120
Typical length (mm)	Minimum 127 (5 inches)	Minimum 127 (5 inches)	Minimum 127 (5 inches)

Examples of products:

<http://www.ansellpro.com/main/productSearch3.asp?pid=108>

<http://www.ansellpro.com/main/productSearch3.asp?pid=125>

http://www.perfectfitglove.com/products/product_detail.asp?id=47&catID=1&pseriesid=13

http://www.perfectfitglove.com/products/product_detail.asp?id=23&catID=1&pseriesid=6

<http://www.perfectfitglove.com/images/downloads/Perfect%20Fit%20Carbtex%20Brochure.pdf> (see *Heavyweight Terry Cloth with Leather Palm and Seamless Knit with Leather Palm options*)

Relevant international standards:

- (a) *AS/NZS 2161: 1998: Occupational Protective Gloves (excluding electrical and medical gloves).*
- (b) *AS/NZS 2161.2: Occupational Protective Gloves—General Requirements.*
- (c) *AS/NZS 2161.3-9: Occupational Protective Gloves—Selection for Use Against Mechanical Risks, Thermal Risks (Fire and Heat), Cold, Hand Knife Cuts and Stabs, Ionizing Radiation and Radioactive Contamination.*

Protective Eyewear for Incinerator Operators

Managers may use these product specifications to select protective eyewear for incinerator operators to achieve eye protection against uncontained infectious sharps and intermittent heat during handling and incineration of infectious health care waste.

Purpose:

Incinerator operators should be provided with protective eyewear to protect them from falling debris, potential bloodborne pathogens contained in medical waste, and heat.

Basic performance specifications:

1. Provide adequate protection against the particular hazards for which they are designed.
2. Reasonably comfortable when worn under the designated conditions.
3. Fit snugly and not unduly interfere with the movements of the wearer.
4. Durable.
5. Capable of being disinfected.
6. Able to be worn without disturbing the adjustment of any existing prescriptive eyewear.

Material:

Polycarbonate.

Design specifications:

Design	Glasses with side protection or goggle design.
Lens	Impact and heat resistant, molded, and 2.2 mm thick with anti-fog coating.
Heat Resistant	Self-extinguishing foam and heat-resistant materials.
Ventilation	At minimum, four indirect ventilation slots.
Fit	Wide contact between goggle and face.
Visibility	Unobstructed peripheral vision.
Strap	Adjustable support strap.

Examples of products:

<http://www.professionalequipment.com/xq/ASP/ProductID.2732/id.8/subID.436/qx/default.htm>

<http://www.elvex.com/goggles.htm>

<http://www.hlbouton.com/hlblist.html>

Relevant international standards:

- (a) *CSA Standard CAN/CSA-Z94.3-92: Industrial Eye and Face Protectors.*
- (b) *ANSI Standard Z87.1-1989: Practice for Occupational and Educational Eye and Face Protection.*
- (c) *AS/NZS 1336: 1997: Recommended Practices for Occupational Eye Protection.*
- (d) *AS 1337-1992: Eye Protectors for Industrial Applications.*

Protective Respirators for Incinerator Operators

Managers may use these product specifications to select respiratory protection for incinerator operators for use during the incineration of medical waste.

Purpose:

To protect incinerator operators against particulates (dust, fiber, fumes, mist, soot, and smoke) generated during incineration. Paper or cloth surgical masks do not protect from hazards inherent in the incineration of infectious medical waste and should not be substituted for an air-purifying respirator (with cartridges).

Respiratory protection is only needed for personnel remaining in the immediate vicinity of the incinerator. Personnel should be properly fitted for an air-purifying respirator, and replacement cartridges must be made available approximately every six months depending on frequency of use.

A protective air-purifying respirator consists of two main parts—a face mask (half-mask) and two cartridges. The mask and cartridges are sold separately. The same brand of mask and cartridges should be purchased for compatibility.

Basic performance specifications for the face mask (half-mask):

1. Provides protection against dust, fiber, fumes, mist, soot, and smoke.
2. Is reasonably comfortable when worn under the designated conditions.
3. Fits snugly and does not unduly interfere with the movements of the wearer.
4. Is made of material that is capable of being disinfected regularly.
5. Has a strap that is either elastic or adjustable.
6. Is made of silicone or thermal plastic polymer.
7. Is available in a minimum of three sizes: small, medium, and large. Size dimensions will vary by manufacturer and should be requested prior to ordering.

Basic performance specifications for the cartridges:

1. Is able to achieve the National Institute for Occupational Safety and Health P100 or N100 rating, or equivalent European Committee for Standardization certification. P100 cartridges will protect against any particulates, including oil-based materials. N-series cartridges protect against solid and water-based particulates such as nuisance dust.
2. Contains a granular or porous material—such as carbon or coconut—which removes specific air particulates.
3. Is available in bayonet, push-in mounted cartridge, or canister form; is able to remove 99.9% of dusts and non-oil-based mists.
4. Enables easy breathing during use.

Maintenance guidance:

1. Ensure that the cartridges are replaceable and that adequate quantities of spare cartridges are purchased and provided to incinerator operators.

2. Replace filter cartridges approximately every six months (depending on frequency of use) or when breathing becomes difficult; this signifies that the cartridges are full and need to be replaced.
3. Train handlers on the cleaning and maintenance of protective respirators.
4. Each operator should have his or her own dust mask; if shared it should be cleaned and disinfected after each use.
5. Ensure the mask fits correctly and all parts are in good working order.
6. A mask must be inspected for damage before use and whenever it is cleaned. Defective respirators must be discarded or repaired by an appropriately trained person.
7. Incinerator operators must store their protective respirators in a place free from dust, sunlight, extreme temperatures, and moisture so that the face mask is not damaged.

Materials:

Silicone or TPE mask with replaceable cartridges.

Design specifications:

Design	P100 or N100 replaceable dual-cartridge, half-mask respirator.
Cartridge/canister filter	Bayonet, push-in mounted cartridge, or canister form; able to remove 99.9% of dusts and non-oil-based mists.
Heat resistant	Self-extinguishing, heat-resistant materials.
Ventilation	Adequate inhalation and exhalation valve to enable easy breathing.
Fit	Wide sealing flange for a secure seal with special nose bridge.
Visibility	Unobstructed peripheral vision.
Strap	Elastic or adjustable straps for a good fit.

Examples of products:

<http://www.anisafety.com/index.aspx?Command=GroupInfo&GroupID=10580>

http://www.moldex.com/pdfs/datasheets/8900_filter.pdf

<http://www.msaafrica.co.za/catalog/product502998.html>

<http://www.gemplers.com/half-mask-respirator>

<http://www.gemplers.com/product/124374/Premier-Half-mask-Respirator>

Example of instructions for use and maintenance:

<http://www.moldex.com/pdfs/datasheets/8000seriesinstructionmanual.pdf>

Relevant international standards:

(a) *BS EN 143: 2000 : Respiratory Protective Devices—Particle Filters, Requirements, Testing and Marking.*

(b) *NIOSH-42 CFR Part 84: US Standards for Respiratory Protective Devices.*

(c) *Law No. 57 of 1972: Japanese Standard for Dust Mask to Enforce the Industrial Safety and Health Law (<http://www.niosh.go.jp/icpro/jicosh-old/english/law/DustMask/index.html>).*

Protective Footwear for Waste Handlers

Managers may use these product specifications to select protective footwear for waste handlers and incinerator operators to protect against uncontained infectious sharps and other hazards during handling and incineration of infectious health care waste.

Purpose:

Waste handlers and incinerator operators should be provided with protective footwear to protect from falling debris, potential bloodborne pathogens contained in medical waste, and occupational heat exposure.

Basic performance specifications:

1. Made from cut-resistant materials.
2. Slip-resistant sole.
3. Puncture-resistant sole.
4. Protective against minimal impact.
5. Fit snugly and not unduly interfere with the movements of the wearer.
6. Durable.
7. Capable of being disinfected.
8. Available in sizes to fit all waste handlers (toes should be about 12.5 mm from the front).
9. For incinerator operators, boots should be made from heat-resistant materials when available.

Materials:

Uppers should be made from polyurethane. Soles may be made of polyurethane if a single mold design is used. A vulcanized nitrile rubber sole will also resist punctures and heat.

Design specifications:

Toe impact protection	Toe impact energy up to 90 joules.
Siding	Sole construction.
Sole puncture protection:	Minimum protection of 1200 Newtons.
Slip resistant sole	Deep tread with coefficient of friction >0.5.

Examples of products:

<http://www.idml.com/shop.asp?catid=38&ProdId=279>

<http://shop.actecs.co.uk/ProductDetails.aspx?productID=709&Categoryid=457>

<http://www.dickiesstore.co.uk/dickies-workwear/safety-boots-and-footwear/safety-wellington-boots/FW13105/0/>

Relevant international standards:

- (a) *CSA Standard CAN/CSA-Z195-M92: Protective Footwear.*
- (b) *ANSI Standard Z41-1991: American National Standard for Personal Protection—Protective Footwear*
- (c) *AS/NZS 2210.1: Occupational Protective Footwear—Guide to Selection, Care, and Use.*

- (d) *British Safety Institution Standard BS EN 345: 1993: Specification for Safety Footwear for Professional Use.*
- (e) *British Safety Institution Standard BS EN 346: 1993: Specification for Protective Footwear for Professional Use.*

Medical Waste Plastic Bin Liners

Managers may use these specifications to select plastic liners appropriate for safe segregation of infectious, non-sharp health care waste. Special attention will be required to ensure that the plastic liners are manufactured to quality standards outlined in this specification sheet.

These specifications do not apply to plastic autoclave bags.

Purpose:

Regulated medical waste must be properly packaged to ensure effective containment throughout the handling, storage, transport, and treatment processes.

General performance specifications:

1. The bin liners must be leak resistant, impervious to moisture and be tear resistant.
2. The bin liners must be a distinctive red or yellow color, or clear. If a clear bag is used then the universal biohazard symbol must be appropriately displayed on the bag.
3. A container used to hold regulated medical waste must have either a red or orange plastic bag plainly visible; or if a clear bag is used then the universal biohazard symbol must be displayed on the container as well as on the bag.
4. Plastic bin liners used for the packaging of medical waste must be managed as regulated medical waste and must not be reused.

Materials:

Polyethylene. Product manufactured from low density (LD)/linear low density (LLD) resin shall have a density between 0.915 grams/cc to 0.923 grams/cc. Liner material shall be formulated from polyethylene containing metallocene, octane, butane, or hexane-type copolymer resins with a maximum of 15% post-consumer reprocessed polymer. Polyvinyl chloride is not recommended since bags may be burned or incinerated.

Dyes used in the coloration of plastic bin liners will be no greater than 100 ppm of sum incidental concentrations of lead, mercury, hexavalent chromium, and cadmium.

Autoclave bags or liners must be made of a polypropylene plastic that does not melt at the temperatures achieved during autoclave sterilization (116–135 °C).

Design specifications:

Minimum thickness (mandatory)	1.5 mil (should be double-bagged if off-site transport is to be performed).
Material density	LD or LDD polyethylene.
Bag size	Dimensions will depend on bin size. Must not exceed 44 gallons (38 in x 46 in) to ensure load endurance is not exceeded.
Impact resistance	165 g.
Load rating (min.)	35 kg.
Tear strength by MD & TD methods	480 g.
Color and markings	Red or yellow with “Biohazard” or “Infectious Waste” printed in black. Marking should include the universal biohazard symbol.
Closure	Twist ties or other restraining devices are required to be either included in each case of liners or otherwise supplied in adequate quantities to cover the amount of liners procured.

Examples of products:

http://www.heritage-bag.com/products/h_red.asp

<http://www.allmed.net/catalog/item/134/2241>

<http://www.sharpssupply.com/mcart/>

http://www.mfasco.com/index.php/infection-control/misc-biosafety-products/cPath/20_405?SID

Relevant international standards:

- (a) *ASTM - D2103-86: Standard Specification for Polyethylene Film and Sheeting.*
- (b) *ASTM - D1709-91: Impact Resistance of Polyethylene Film by the Free-Falling Dart Method.*
- (c) *ASTM - D1922-89: Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method.*