

**PERSONAL PROTECTIVE**  
**EQUIPMENT (PPE) AND**  
**CORONAVIRUS**

- **Personal Protective Equipments (PPEs) are protective gears designed to safeguard the health of workers by minimizing the exposure to a biological agent.**
- **Healthcare workers rely on personal protective equipment to protect themselves and their patients from being infected and infecting others.**
- **Components of PPE:**

**Components of PPE are goggles, face-shield, mask, gloves, coverall/gowns (with or without aprons), head cover and shoe cover.**

# PPE categories

PPE Category	Category Description	Above-the-neck PPE Product Examples
Category I	Simple PPE (PPE designed to protect users against minimal risks)	Sweatbands Cold Weather Hood System Sun Capes
Category II	Intermediate PPE (PPE not covered within category I or III)	Safety spectacles Industrial helmets Bump caps
Category III	Complex PPE (PPE falling under this category includes exclusively the risks that may cause very serious consequences such as death or irreversible damage to health)	Respiratory PPE Industrial helmets claiming Molten Metal and Electrical Resistance(EU) 2016/425 PPE Regulation change: Hearing Protection

# Gloves

- **Nitrile gloves are preferred over latex gloves because they resist chemicals, including certain disinfectants such as chlorine. There is a high rate of allergies to latex and contact allergic dermatitis among health workers. However, if nitrile gloves are not available, latex gloves can be used. Nonpowdered gloves are preferred to powdered gloves.**

# EXAMINATION GLOVES

- The specification is for the non-sterile and sterile gloves examination gloves made from nitrile, vinyl, latex, or any other suitable material.
- Must be minimum of

	Gloves made of Rubbers (e.g. Latex)	Gloves made of Thermoplastics (e.g. Vinyl)
Force at Break (Newtons)	≥ 6.0	≥ 3.6

- All products must be powder free.
- All products must have a shelf life of at least 3 years from date of manufacture and 2 years on delivery.
- The inner glove box should fit neatly into a standard size glove dispensing unit

# Goggles

- **With transparent glasses, zero power, wellfitting, covered from allsides with elastic band/or adjustable holder.**
- **Good seal with the skin of the face**
- **Flexible frame to easily fit allface contours without too much pressure**
- **Covers the eyes and the surrounding areas and accommodates for prescription glasses**
- **Fog and scratch resistant**
- **Adjustable band to secure firmly so as not to become loose during clinical activity**
- **Indirect venting to reduce fogging**
- **May be re-usable (provided appropriate arrangementsfor decontamination are in place) or disposable**
- **Quality compliant with the below standards, or equivalent: a. EU standard directive 86/686/EEC, EN 166/2002 b. ANSI/SEA Z87.1-2010.**

# Face Shield

- **Made of clear plastic and provides good visibility to both the wearer and the patient**
- **Adjustable band to attach firmly around the head and fits snugly against the forehead**
- **Fog resistant (preferable)**
- **Completely covers the sides and length of the face**
- **May be re-usable (made of material which can be cleaned and disinfected) or disposable**
- **Quality compliant with the below standards, or equivalent:**
  - a. EU standard directive 86/686/EEC, EN 166/2002**
  - b. ANSI/SEA Z87.1-2010**

# Masks

- **The droplet precautions/airborne precautions using masks are crucial while dealing with a suspect or confirmed case of COVID-19/performing aerosol generating procedures.**
- **Two types of masks which are recommended for various categories of personnel working in hospital or community settings, depending upon the work environment:**
  - 1. Triple layer medical mask**
  - 2. Respirator mask:**
    - N95, FFP2, unvalved FFP2, valved FFP3, unvalved FFP3 valved.**



# Coverall/Gowns

- **Coverall/gowns are designed to protect torso of healthcare providers from exposure to virus.**
- Impermeable to blood and body fluids • Single use • Avoid culturally unacceptable colors e.g. black • Light colors are preferable to better detect possible contamination • Thumb/finger loops to anchor sleeves in place • Quality compliant with following standard a. Meets or exceeds ISO 16603 class 3 exposure pressure, or equivalent
- Isolation gowns are generally classified as “**disposable/single-use**” or “**reusable/multi-use**”. In the U.S., disposable isolation gowns are used more commonly, while in Europe the share of reusables is larger. Approximately 80% of hospitals in the U.S. use single-use gowns and drapes
- **Disposable (single-use)** isolation gowns are designed to be discarded after a single use and are typically constructed of nonwoven materials alone or in combination with materials that offer increased protection from liquid penetration, such as plastic films. They can be produced using a variety of nonwoven fiber-bonding technologies (thermal, chemical, or mechanical) to provide integrity and strength rather than the interlocking geometries associated with woven and knitted materials.

The basic raw materials typically used for disposable isolation gowns are various forms of synthetic fibers (e.g. polypropylene, polyester, polyethylene). Fabrics can be engineered to achieve desired properties by using particular fiber types, bonding processes, and fabric finishes (chemical or physical treatments).

- Reusable (multi-use) gowns are laundered after each use. Reusable isolation gowns are typically made of 100% cotton, 100% polyester, or polyester/cotton blends. These fabrics are tightly woven plain weave fabrics that are chemically finished and may be pressed through rollers to enhance the liquid barrier properties. Reusable garments generally can be used for 50 or more washing and drying cycles.
- Fluorocarbon-based finishes provide a fabric that is water resistant, but can be susceptible to penetration due to pressure increase or penetration by liquids of low surface tension, such as isopropyl alcohol

### **Gowns Types:**

- Sterile gowns.
- Non-sterile gowns – sometimes referred to as Isolation gowns.
- Thumb-looped aprons.

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**Sterile single use surgical gowns used to cover the wearer whilst in an operating theatre or environment.**

Type of gown	Hydrostatic pressure	Guidance for use/ comments
Standard Lite	>20cm H2O	Minimal pressure as stated in standard EN13795: 2019
Standard	>50cm H2O	Minimal exposure to fluids
Standard High performance	>100cm H2O	Potential risk of low levels of fluids for a limited period in all areas

**All products in this Lot must comply with the following:**

- Must be supplied sterile;
- Must be single use;
- Must be latex free;
- Must be individually packaged;
- Must contain within the packaging a sterile field to open the gown onto.
- Must be folded with the inside facing outward and the collar visible, the wearer must be able to don the gown without touching the patient facing side;
- Contain 2 absorbent hand towels placed on the top of the gown upon opening with a minimum size of 30cm by 40cm;
- Be anti-static;
- Tie lengths on the inside of the gown must be between 35cm and 50cm (+/- 10%);

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Non-Sterile Gowns or Isolation gowns are used for procedures that do not require a sterile product.

Type of gown	Hydrostatic pressure	Guidance for use/ comments
Fluid resistant isolation gown	>20cm H2O – 28.4cm H2O	Low exposure to fluids
Fluid resistant isolation gown	>57.3cm H2O	Medium exposure to fluids
Impervious Isolation gown	>91cm H2O	High exposure to fluids

All products in this Lot must comply with the following: ● Must be single use; ● Must be latex free; ● Be anti-static; ● Must be low linting; ● Be fire resistant; ● Cuffs must be knitted and attached to the gown via overlock stitching; ● Seams to be welded; ● Tie lengths on the inside of the gown must be between 35cm and 50 cm (+/-10%); ● Tie lengths on the outside of the gown must be between 35cm and 75cm (+/-10%) to prevent them touching the floor when being worn; and ● Must be available in sizes M, L, XL, XXL as a minimum.

# Shoe Covers

- **Made up of the same fabric as of coverall**
- **Should cover the entire shoe and reach above ankles**

# Head covers

- Coveralls usually cover the head. Those using gowns, should use a head cover that covers the head and neck while providing clinical care for patients. Hair and hair extensions should fit inside the head cover.

# BodyBags

## Specifications

- 1) Impermeable
- 2) 2) Leak proof
- 3) 3) Air sealed
- 4) 4) Double sealed
- 5) 5) Disposable
- 6) 6) Opaque
- 7) White
- 8) U shape with Zip
- 9) 4/6 grips
- 10) Size: 2.2 x 1.2 Mts
- 11) Standards: a) ISO 16602:2007 b) ISO 16603:2004 c) ISO16604:2004 d) ISO/DIS 22611:2003

# ANSELL



## KEY FEATURES AND BENEFITS

Elasticated back, hood, cuffs and ankles

Foot-loop to aid smooth closure of zip

Thumb loops to ensure a secure hold

Quick release press stud tabs for aseptic donning

Low-linting CleanTough material

PRODUCT COLOR WHITE

ELASTIC ANKLEYES

ELASTIC WRISTYES

TIE CLOSURE TYPE ZIPPER

CONSTRUCTION BOUND SEAMS WITH SINGLE NEEDLE STITCHING

CLEANROOM CLASS CLASS 10/ISO 4 & EU GMP GRADE A

PARTICLE SHEDDING HELMKE DRUM TEST  $\geq 0.5\text{MM}$  (COUNTS/MIN)  
<2000

STERILEYES

STERILITY ASSURANCE LEVEL  $10^{-6}$

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# 3M



**Disposable Hood**



**Disposable Non Woven Gown**



**3 Ply Mouth Mask**



**Surgical Gloves**



**Disposable Eye Gear**



**Disposable Shoe Cover**

## **Personal Protection Equipment (PPE KIT)**

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# Honeywell



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# DuPont

## P.P.E. KITS

PERSONAL PROTECTION EQUIPMENT KIT



## Product Description

### Product Specification

- Full body gown with hood
- 3 ply face mask - 1 pcs
- Shoe cover upto knees- 2 pcs
- Gloves - 2pcs
- Garbage -1 pcs
- Face Shield - 1 pcs
- 2 color available mix in carton
- 70 GSM Fabric , Non woven Fabric, Anti bacterial fabric

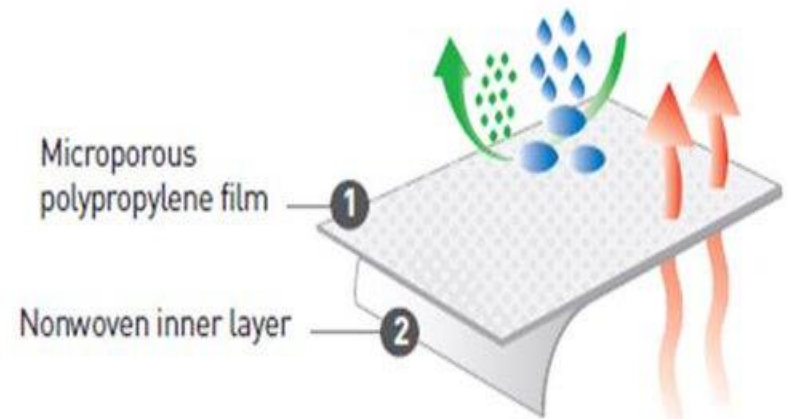
# Lindström Group



<https://mmdscientific.com>

# MICROGARD® 2500 is a unique material offering exceptional mechanical strength, liquid and particulate protection.

MICROGARD® 2500 is a durable microporous polypropylene laminate which provides an excellent barrier to chemical spray and infective agents. This specialist fabric is also breathable to help ensure user comfort. The fabric's physical strength and flexibility ensures protection and comfort even in the harshest environments.



## Features & Benefits

**Protection** - Achieves the highest classifications for protection from biological agents in accordance with EN 14126:2003 and ASTM F 1671 for penetration of blood, body fluids and blood-borne pathogens

**Comfort** - Moisture vapour permeable ("breathable") to help reduce the risk of heat stress

**Anti-static** - Tested according to EN 1149-5

**Low linting** - Reduced risk of contamination in critical areas

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# UVEX 4B



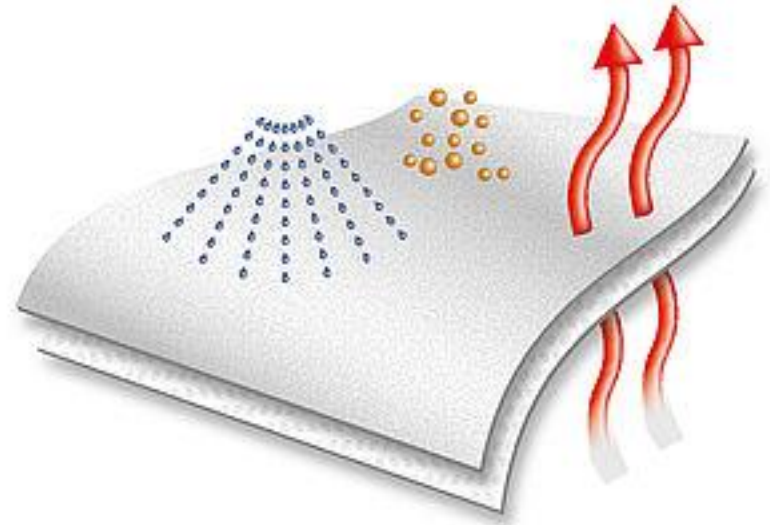
**uvex 4B chemical protection suit**

article number: 98375

type 4B (5/6) chemical protection, particle-tight and spray-tight

Polypropylene non woven laminated with Polyethylene film

colour: white, orange



# 3m Reusable PPE Kit



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**NOTES** Reference document: WHO Rapid Advice guideline for Personal Protective Equipment, published 31 October 2014

[http://apps.who.int/iris/bitstream/10665/137410/1/WHO\\_EVD\\_Guidance\\_PPE\\_14.1\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/137410/1/WHO_EVD_Guidance_PPE_14.1_eng.pdf)


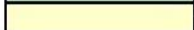
The information found in this document is publically available from the manufacturers.

This list is not exhaustive and is limited to coveralls tested for:

- resistance to blood penetration (ISO 16603) or blood penetration with virus (ISO 16604)
- whole suit performance of type 6, 5 or 4 (reference standards EN 14126, and EN 13034, EN ISO 13982-1-2 or EN 14605)

Other existing brands and models may comply with the minimum requirements of the WHO Rapid Advice guideline for Personal Protective Equipment

		COVERALLS - currently available on the market (alphabetical order), Type 6, 5 and 4 (EN 14126)								
		BRAND	3M		DuPont	Honeywell	MICROGARD		UVEX	
		MODEL TYPE	4545	4565	Classic Xpert (EU)	Mutex 2	2000	2000 TS plus	2500	uvex 4B
Test Title		WHO Rapid Advice Guideline for PPE								
Biohazard performance	Resistance to blood penetration*	Option 1: minimum ISO 16603 Class 3	3	6	3	conform/no class	6	6	6	6
	Resistance to blood penetration with virus*	Option 1: minimum ISO 16604 Class 2	0	0	no class	6	6	6	6	6
Other performance criteria										
physical performance	Tensile strength*	ISO 13934-1 (MD/CD)	1	1	2	2	1	1	2	1
	Tear Resistance*	EN ISO 9073-4	1	1	1	2/3	1	1	2	1
	Puncture resistance*	EN 863	1	1	2	2	1	1	2	1
	Abrasion resistance*	EN 530 Method 2	1	1	2	6	2	2	2	2
	Basis weight		49 gsm	49 gsm	41 gsm	69 gsm	63 gsm	63 gsm	65 gsm	
Whole suit perform	Seam strength*	EN ISO 13935-2	2	2	3	3	3	2		2
	Whole suit performance*	EN 14126	Type 5/6 (4545 model)	Type 4 (4565 model)	Type 5B/6B (Classic Xpert mdl)	5/6	Type 5B and 6B (Standard )	Type 4B (Standard and TS Plus mdls)	Type 4B (Standard and Plus models)	4B

 Green shaded cells indicate acceptable according to the WHO Rap  
 Yellow shaded cells indicate missing information

\* higher is better  
 \*\* lower is better  
 gsm grams per square meter  
 MD machine direction  
 CD cross direction



# REFERENCES

- [https://www.who.int/medical\\_devices/WHO\\_coverall\\_comparison\\_table.pdf?ua=1](https://www.who.int/medical_devices/WHO_coverall_comparison_table.pdf?ua=1)
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4791533/>
- <https://www.businesswire.com/news/home/20160905005103/en/Top-9-Vendors-Personal-Protective-Equipment-Market>
- <https://www.shponline.co.uk/ppe-personal-protective-equipment/>
- <https://www.mohfw.gov.in/pdf/GuidelinesonrationaluseofPersonalProtectiveEquipme nt.pdf>
- <https://www.uvex-safety.com/en/products/protective-clothing-and-workwear/7291/uvex-4b-chemical-protection-suit/>