

EBOLA



Ebola Virus Disease Protective Clothing Guide

This guide is Lakeland Industries' suggested minimum specification for Personal Protective Equipment (PPE) to be used by healthcare workers potentially exposed to the Ebola virus. Our aim here is to provide a clear and simple guide for garment selection and use for health care workers and those specifying garments for procurement.

Frequently Asked Questions Ebola Virus Disease (EVD)

How is the Ebola virus transmitted?	<i>The virus is transmitted via contact with body fluids such as blood, vomit, urine, etc. Thus, the key issue is to protect against contact with bodily fluids resulting from contact with blood or other fluids.</i>
What is the best way for a health-care provider to protect against the spread of the virus in case of contact with an infected person?	<i>If patient contact is necessary in the course of treatment, clearly worker training and the use of Personal Protective Equipment (PPE) are the primary protective mechanisms, and as such, the consequences of PPE failure should factor heavily in the selection process.</i>
If infected, how long does it take before symptoms begin to surface?	<i>Once contracted, the virus may take up to 15 to 20 days to incubate. This means that workers could be infected for 15 or more days BEFORE showing any symptoms and the infection being recognized. The implication of this is that there may well be workers who are infected have not been identified as such.</i>
What is the risk if infected?	<i>The mortality rate from the current Ebola outbreak is about 50% to 55%. To put this in context with other viral outbreaks in recent history, the U.S. Department of Health and Human Services estimates mortality due to Avian Flu (H5N1) to have been about 60% for the 650 cases reported since 2003 and 9% to 12% for the 8,000 reported cases in 2003 outbreak of SARS. While Avian Flu has a mortality rate about the same as Ebola, it was never easily transmitted human to human and thus the number of reported cases is significantly lower and it is not a good base line for PPE selection.</i>

U.S. Department of Health and Human Services, "H5N1 Avian Flu (H5N1 Bird Flu)," n.d., <http://www.flu.gov/> (accessed September 8, 2014).
 U.S. National Library of Medicine, National Institute of Health, U.S. Department of Health and Human Services, "Severe Acute Respiratory Syndrome". "Outlook – Prognosis," n.d., www.nlm.nih.gov/medlineplus/ (accessed September 7, 2014).

Personal Protective Equipment (PPE) • Guidance for PPE minimum standard suggestions:

1. A primary fabric that passes either of these standards

1.1

Has been certified per European Standards to EN 14126 and attained at least a Class 3 rating

OR

1.2

Has been tested and passed North American Standards, ASTM F1671

How Small Is The Ebola Virus?

Imagine a tiny needle hole of a garment measuring only 0.1 cm (1 mm) in diameter; a collection of approximately 12,500 Ebola viruses, side-by-side, are able to pass through this microscopic opening.

2. Coveralls made of fabric compliant with 1.1 or 1.2 above:



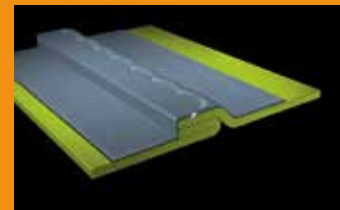
Can have an open collar OR attached hood with elastic face.

Must have a storm flap that can be taped or sealed shut over the zipper

Must have **sealed seams** that have been tested per ASTM F1670 and passed

Must have elastic around the wrists and ankles

What Is A Sealed Seam?



A sealed seam is sewn and then sealed with a heat activated tape. This method provides liquid-proof seams.

OR

Have been tested according to EN 14605:2005 and met the requirements for TYPE 4: "Protective Against Sprays and Splashes of Hazardous Liquids" certification

Other resources offering comprehensive information on the Ebola Virus Disease:

- [Centers for Disease Control \(CDC\)](#)
- [World Health Organization \(WHO\)](#)

Additional Articles found on Lakeland.com/home.html:

- [Ebola and Personal Protective Equipment](#)
- [Non-Profit Chooses Lakeland to Protect Medical Personnel in Liberia](#)
- [ChemMax1 Protecting Healthcare Workers in West Africa Ebola Crisis](#)
- [Lakeland Industries Announces Global Availability of Hazmat Suits for Ebola](#)

Lakeland Product Information and Suggestions

Lakeland's [ChemMax1](#) with sealed seams is well suited for protection in situations where exposure may occur. Lakeland's ChemMax1 fabric passes both ASTM F16701 and ASTM F16712 test methods for protection from blood penetration and bloodborne pathogens. ChemMax1 also goes above and beyond the ASTM tests by performing at the highest possible levels in the more comprehensive European Norms (EN) and ISO testing standards related to infectious agents. The performance of ChemMax1 in testing protocols from around the world, combined with sealed seams for increased protection against fluid penetration; makes it easy to see why many humanitarian groups are trusting Lakeland's ChemMax1 for protection.

ChemMax® 1
Style Number
C70110



ChemMax® 1
Style Number
C70130



ChemMax® 1
Style Number
C70150



¹ASTM F1670 - 08 Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Synthetic Blood:

This test determines the ability of a material to resist the penetration of synthetic blood under constant contact. The test sample is mounted on a cell separating the synthetic blood challenge liquid and a viewing port. The time and pressure protocol specifies atmospheric pressure for 5 minutes, 2.0 psi for 1 minute and atmospheric pressure for 54 minutes. The test is terminated if visible liquid penetration occurs before or at 60 minutes.

²ASTM F 1671 - 13 Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Blood-Borne Pathogens Using Phi- X174 Bacteriophage Penetration as a Test System:

This test determines the ability of a material to resist the penetration of a microorganism under constant contact using a method which has been specifically designed for modeling penetration of HBV, HCV, and HIV. Because these organisms are difficult to use, the test uses a bacteriophage, Phi-X174, one of the smallest known viruses, at 0.027 microns (μ) in diameter, similar in size and shape to Hepatitis C Virus (HCV), the smallest known bloodborne viral pathogen. A bacteriophage is a virus that attacks bacteria.

ChemMax® 1				
Test Method	Title	Classification Scale	Class	Test Result
ISO 16603	Clothing for Protection Against Contact with Blood and Body Fluids – Determination of the Resistance of Protective Clothing Materials to Penetration by Blood and Body Fluids _ Test Methods Using Synthetic Blood	1 through 6, 6 being the best rating	6	20 kPa @ 5 min. (2.9 psi)
ISO 16604	Clothing for Protection Against Contact with Blood and Body Fluids – Determination of the Resistance of Protective Clothing Materials to Penetration by Bloodborne Pathogens - Test methods using Phi X-174 Bacteriophage	1 through 6, 6 being the best rating	6	20 kPa @ 5 min. (2.9 psi)
ISO 22611	Clothing for Protection Against Infectious Agents – Test Method for Resistance to Penetration by Biologically Contaminated Aerosols	1 through 3, 3 being the best rating	3	log>5
ISO 22612	Clothing for Protection Against Infectious Agents – Test Method for Resistance to Penetration by Biologically contaminant Dust Through Protective Clothing Materials	1 through 3, 3 being the best rating	3	≤ 1 cfu
EN 14126 Annex A	Resistance to Penetration by Infectious Agents Due to Mechanical Contact with Substances Containing Contaminated Liquids	1 through 6, 6 being the best rating	6	>75 min
ASTM F1670	Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Synthetic Blood	Pass/Fail	Pass	2 psi @ 1 min. (13.8 kPa)
ASTM F 1671	Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Bloodborne Pathogens Phi X174 Bacteriophage Penetration as a Test System	Pass/Fail	Pass	2 psi @ 1 min. (13.8 kPa)