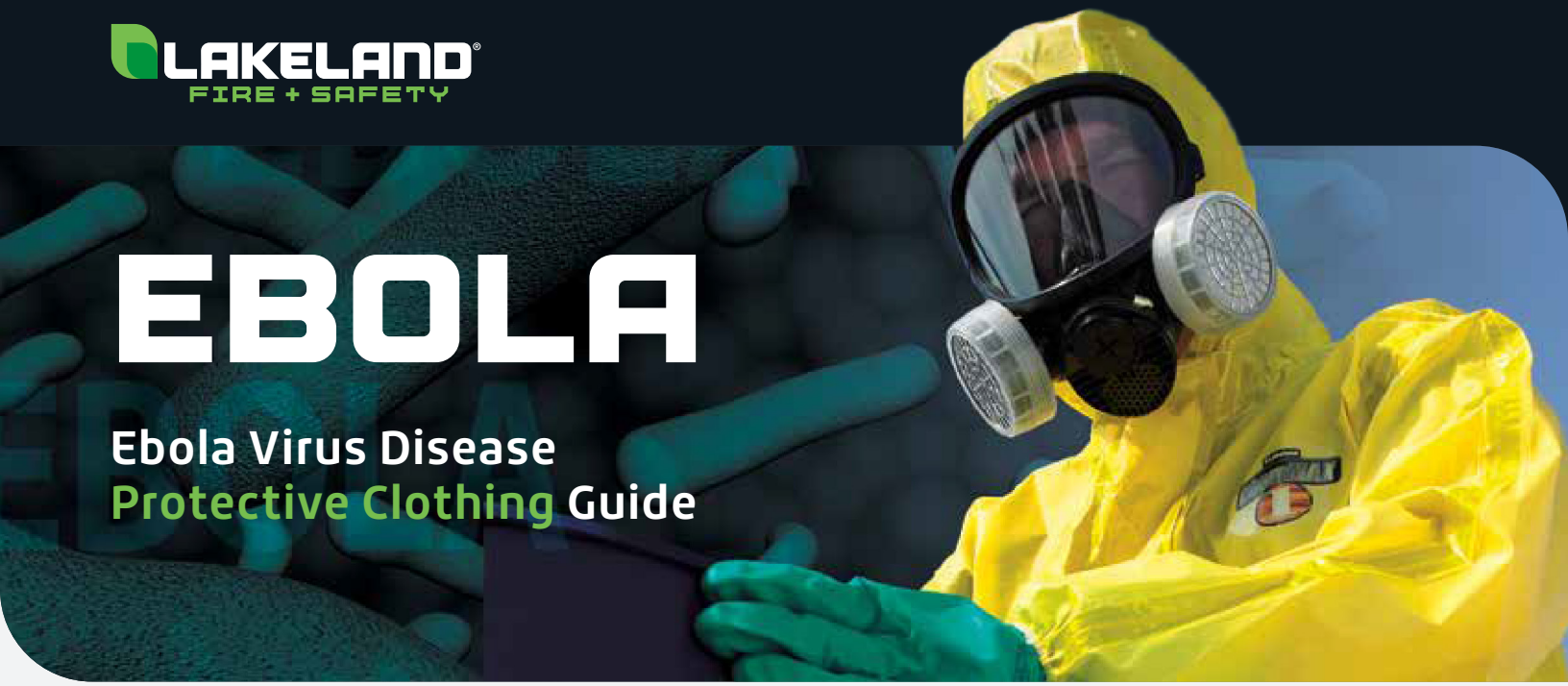
LAKELAND FIRE + SAFETY



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?	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.
What is the best way for a healthcare provider to protect against the spread of the virus in case of contact with an infected person?	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.
If infected, how long does it take before symptoms begin to surface?	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.
What is the risk if infected?	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.

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).

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PERSONAL PROTECTIVE EQUIPMENT (PPE)

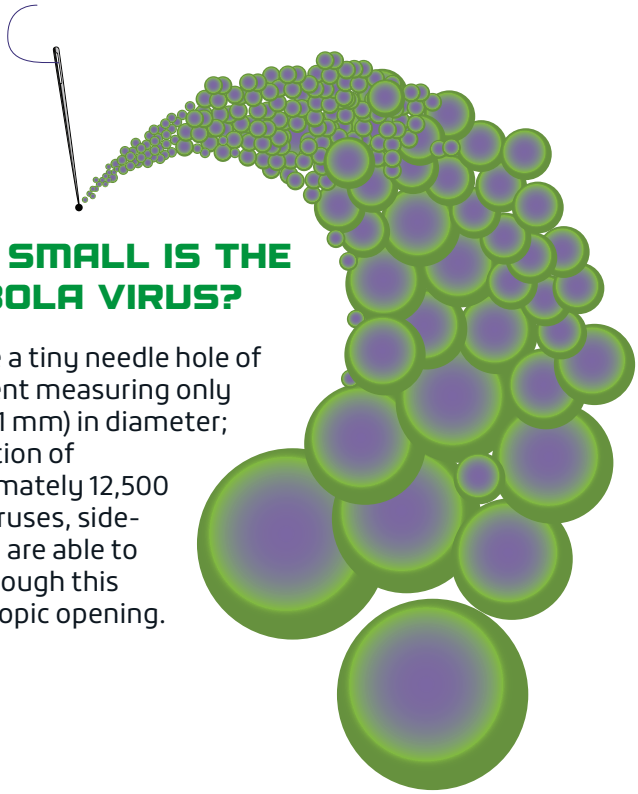
Guidance for protective clothing minimum standard suggestions*:

1 A primary fabric that passes the below standards

1.1 EN 14126 certified, achieving Class 3 in ISO 22611 and ISO 22612, and Class 6 in ISO 16604 and EN 14126 Annex A/ISO 22610 tests

2 Coveralls made from fabric compliant with 1.1 above:

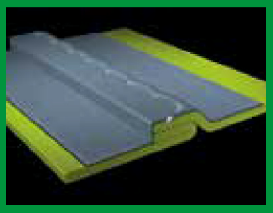
- Attached hood with elastic face
- Must have a storm flap that can be taped or sealed shut over the zipper
- Must have sealed seams
- Can have elastic around wrists and ankles or booties
- Have been tested and certified to EN14605:2005 and met the requirements for Type 4 clothing



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.

WHAT IS A SEALED SEAM?



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

*This guidance focuses on protective clothing/garments only. Additional PPE, such as gloves, boots, masks, respirators, and eye or face protection, may also be required depending on the application and risk assessment.

OTHER RESOURCES OFFERING COMPREHENSIVE INFORMATION ON THE EBOLA VIRUS DISEASE:

Centers for Disease Control (CDC)

World Health Organization (WHO)

LAKELAND PRODUCT INFORMATION AND SUGGESTIONS

Lakeland's ChemMax 1 and MicroMax TS, both featuring sealed seam construction, are well suited for protection in situations where exposure to infectious agents, blood, body fluids, or contaminated liquids may occur.

Both garments meet the requirements of EN 14126 for protective clothing against infective agents, achieving the highest available performance classifications across the applicable EN 14126 test methods. This includes testing against penetration by contaminated liquids, biologically contaminated aerosols, dry microbial particles, and bloodborne pathogens, using the relevant EN and ISO test methods referenced within EN 14126.

The combination of EN 14126 highest-level infectious-agent protection and sealed seam construction for enhanced resistance to fluid penetration provides a strong basis for use where reliable biological and liquid barrier protection is required. This performance profile is why many humanitarian and emergency response organisations trust Lakeland's ChemMax 1 and MicroMax TS for protection in challenging environments.

Both products also pass ASTM F1670 and ASTM F1671 test methods for resistance to synthetic blood penetration and bloodborne pathogen penetration.

ChemMax® 1EB
Style Number
CT1SL428IEB

ChemMax® 1
Style Number
CT1S428

MicroMax® TS
Style Number
EMNT428

[1]**ASTM 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.

[2]**ASTM 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/MICROMAX® TS

Test Method	Title	Classification Scale		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)