

## Information on Ebola

October 17, 2014

This letter is for informational purposes only. The description of medical and other health-related subjects is no substitute for professional medical advice. Although the authors of this letter have taken great care to ensure that the information corresponds to the current state of knowledge at the time of first publication, this does not release the reader from the responsibility to make his/her own, informed decisions after consultation with trained medical personnel.

The products discussed below are solely intended for use by qualified professionals.

This informational letter contains basic information on Ebola and links to additional references. Please keep yourself up-to-date on the current situation by reading the web pages listed in this document.

Current information on the Ebola virus as well as behavioral recommendations can be found on the following websites:

United States Centers for Disease Control and Prevention (CDC)

<http://www.cdc.gov/vhf/Ebola/about.html>

World Health Organization (WHO):

<http://www.who.int/mediacentre/factsheets/fs103/en/>

European Centre for Disease Prevention and Control:

[http://www.ecdc.europa.eu/en/healthtopics/Ebola\\_marburg\\_fevers/information-travellers/Pages/information-travellers.aspx](http://www.ecdc.europa.eu/en/healthtopics/Ebola_marburg_fevers/information-travellers/Pages/information-travellers.aspx)

Robert Koch Institute (RKI):

<http://www.rki.de/DE/Content/InfAZ/E/Ebola/Uebersicht.html#doc5045280bodyText3>

National Institute for Occupational Safety and Health (NIOSH):

<http://www.cdc.gov/niosh/>

The following information about Ebola is based on the information provided by the above-mentioned institutions.

### What is Ebola?

Ebola is a rare, often fatal virus originating in tropical Africa and associated with symptoms of hemorrhagic fever. This means both internal and external bleeding (hemorrhages) of the body. The mortality rate is around 90%. However, the risk of infection for people without any direct contact to those infected is very low.

### What are the symptoms?

The illness begins suddenly with symptoms such as fever, feelings of weakness, headache and muscle pains, conjunctivitis and sore throat. Additional indications can be nausea, vomiting, diarrhea and skin rash, leading up to liver and kidney failure. The incubation time (the period between contracting the virus and the occurrence of symptoms), is 2 to 21 days.

### How is the virus transmitted?

The virus is transmitted by direct contact with blood and bodily fluids of an infected person or animal. The virus can also be transmitted via contaminated objects, such as needles. Unprotected contact to infected corpses can also result in the spread of the virus.

### What preventive measures are there?

Currently, there are no vaccines or specific therapy for Ebola. The risk of an Ebola infection when travelling is very low, but non-essential travel to affected countries is not recommended.

The most effective protection against transmission is to avoid contact with the blood and bodily fluids of an infected person. In case of contact, the affected parts of the body must be washed immediately with soap and water and treated with disinfectant. In case of close contact with infected people, wearing personal protective equipment (PPE) and the observance of strict hygiene are indispensable.

Comprehensive information on Ebola and necessary precautions can be located at the CDC's website:  
<http://www.cdc.gov/vhf/ebola/index.html>

The Robert Koch Institute provides information on suitable protective equipment to be used and worn when in contact with infected persons:  
[http://www.rki.de/DE/Content/Infekt/Biosicherheit/Schutzmassnahmen/Schutzkleidung/Sc\\_hutzkleidung\\_node.html](http://www.rki.de/DE/Content/Infekt/Biosicherheit/Schutzmassnahmen/Schutzkleidung/Sc_hutzkleidung_node.html)

A comprehensive guideline on "Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in Health- Care Settings, with Focus on Ebola" is available at the WHO website:  
<http://www.who.int/mediacentre/factsheets/fs103/en/>

Additional information on protective measures when dealing with patients infected by viruses from risk group 4 (e.g. Ebola virus) is contained in Appendix 1 of the Technical Rules for Biological Agents TRBA 250 (for PPE, see item 1.4):  
<http://www.baua.de/de/Themen-von-A-Z/Biologische-Arbeitsstoffe/TRBA/pdf/TRBA-250.pdf?blob=publicationFile>

Wearing protective equipment alone is no guarantee for protection against bacteria, viruses or biologically-contaminated fluids! Correct donning and doffing of the appropriate PPE as well as thorough disinfection according to manufacturer instructions, provides protection to a wearer from possible infection and the spread of contamination.

**Suitable protective equipment should always be selected on site after individual risk analysis.**

### Respiratory protection

Currently, there are no indications of transmission of the virus from inhalation. However, infection may be spread by the mouth, nose and eyes from fluid splashes or drops such as the aerosols released when coughing, sneezing or as a consequence of medical treatment methods. The risk of Ebola entering the respiratory system can be reduced by using suitable respiratory protection.

**Particulate Filtering Facepiece Respirators (FFRs)** are available in different types and protection classes. Respirators of the highest protection class as designated by NIOSH (National Institute for Occupational Safety and Health) offer a higher degree of protection than masks of lesser protection values. This product is designed for one-time use.

**NIOSH Filtering Facepiece Respirators (FFR) are divided into various classes based on their filtration capabilities.** “N95 respirator” is a term used to describe the class of respirators which use N95 filters to remove particles from the air that is breathed through them. The NIOSH respirator approval regulation defines the term N95 to refer to a filter class that removes at least 95% of airborne particles during testing. Filters meeting the criteria are given a 95 rating by NIOSH. Many filtering facepiece respirators have an N95 class filter and those meeting this filtration performance are often referred to simply as N95 respirators. Similarly, a N99 refers to a filter class that removes 99% of airborne particles. P100 is the highest class of particulate filtration, removing 99.97% of particles.

In contrast to a particulate filtering facepiece respirator (FFR), an **elastomeric half -mask respirator** can be disinfected and can therefore be used repeatedly when following manufacturer recommended procedures. FFR's can be combined with various classes of particulate filters including a NIOSH P100 class. The fit of the respirator to the face can be improved by individual size selection. Recommended fit testing procedures should always be followed when using any type of respirator.

Dräger elastomeric half-mask respirators include: X-plore 3300 or 3500, available in three sizes S, M, L.

In addition to protecting airways, **full-face respirators** also provide eye protection. They can be disinfected and can therefore be used repeatedly. They can be combined with various classes of particulate filters including a **NIOSH P100 class or combination filters Multi-Gas+/P100**, whereby a filter can also absorb gases. A full-face respirator usually has a better sealing line between the respirator and face compared to a elastomeric half-mask respirator or a particulate filtering facepiece respirator (FFP). Normally, a full-face respirator also makes it easier to seal interface areas between the respirator and other PPE. Recommended fit testing procedures should be followed when using any type of respirator.

**Dräger full facepiece respirators include: X-plore 6300/6500 (single-filter system) or X-plore 5500 (dual- filter system)**

### Eye protection

Suitable eye protection can reduce the risk of contracting the Ebola virus via the eyes.

**Protective eyewear** must be tight fitting and achieve a good seal between the eyes and the face. Full-view protective glasses with a soft and tight, all-round seal (without ventilation slots) are better suited to stop fluids, fluid splashes or airborne infectious agents than protective glasses that are open at the side and top. The latter should therefore not be used for protection against infection.

**Full-facepiece respirators** offer combined eye and respiratory protection. They have a sealing area around the face, protecting both the respiratory tract and eyes.

For further information on Dräger full-facepiece respirators, see the *Respiratory Protection* section of this document.

The following table provides an overview of Dräger products that comply with the specified guidelines:

Product type	Product	Approval	Protection category	Protection		
				Respiratory*	Eye	Face
<b>Respiratory protection products</b>						
Elastomeric Half-mask respirator + particulate filter	Dräger X-plore 3300 -Part No. R55331 (Small) -Part No. R55330 (Medium) -Part No. R55332 (Large)  -Particle filter bayonet P100 Part No. 6738012 -Pure P100 Filter (Low Profile) Part No. 6738350	NIOSH	P100	Yes	No	No
	Dräger X-plore 3500 -Part No. R55351 (Small) -Part No. R55350 (Medium) -Part No. R55352 (Large)  -Particle filter bayonet P100 -Part No. 6738012 -Pure P100 Filter (Low profile) Part No. 6738350	NIOSH	P100	Yes	No	No
Full-facepiece respirator + particulate filter	Dräger X-plore 5500 -Part No. R55270 -Part No. R56655 (Stainless Steel Lens Frame & Triplex Glass Lens) -Particle filter bayonet P100 Part No. 6738012  -Pure P100 Filter (Low profile) Part No. 6738350	NIOSH	P100	Yes	Yes	Limited
Full-facepiece respirator + combination filter	Dräger X-plore 5500 -Part No. R55270 -Part No. R56655 (Stainless Steel Lens Frame & Triplex Glass Lens) -Combination filter bayonet MultiGas+/P100 Part No. 6738361	NIOSH	MultiGas+/P100	Yes	Yes	Limited

\*within the scope of the indicated protection category

### Protective clothing

Chemical protective suits are divided into different types. A differentiation is made between gas-tight and liquid-proof, or simple particle protection suits.

For a complete description of protective clothing and relevant standards refer to NIOSH Publication Guidance on Emergency Responder Personal Protective Equipment (PPE) publication number DHHS (NIOSH) Publication No. 2008-132.

According to recommendations of the Robert Koch Institute, chemical protective suits must comply with Category III, Type 1 (gas-tight) or Type 3 (liquid-proof) as per Guideline 89/686/EEC to protect against Ebola.

In hazardous situations, in which emergency teams are subjected not only to biological risks but also to other hazardous substances, fully encapsulated protective suits with self-contained breathing apparatus are used (compressed air breathing apparatus or compressed airline system).

A compressed air breathing apparatus worn on the inside of the protective suit has the advantage that it is protected against contamination, allowing easy disinfection. Supplemental to this, additional breathing air can be fed into the compressed air breathing apparatus by an external air source. Physical and mental strain limit the time the suit can be worn. Local requirements and safe operating practices regarding maximum working times in a gas-tight protective suit must be observed.

In North America, Dräger offers the protective suit CPS 7900. This one-piece chemical protection suit with liquid-tight and gas-tight heat-sealed seams is designed for use with compressed air breathing apparatus worn on the inside (standard configuration) or on the outside of the suit (customized configuration). This protective suit has attached gloves and socks made of suit material, allowing the user to wear individual boots or permanently attached boots.

Product name	CPS 7900
Image	
Part No.	R58351 (Small) R58352 (Medium) R58353 (Large) R58354 (XL) R58355 (XXL)
NFPA 1991 Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies	X
EN 943-1 (Type 1)	X

Product name	CPS 7900
EN 943-2 (Type 1 for emergency responders; higher requirements)	X
EN 14126 (Protection against contamination from infectious agents)	X
Abrasion resistance (EN 530)	Class 6/6
Tear resistance (ISO 9073-4)	Class 3/6
Puncture resistance (EN 863)	Class 3/6
Resistance to penetration by infectious agents induced by mechanical contact with substances containing contaminated liquids	Class 6/6
Resistance to penetration of contaminated liquids under hydrostatic pressure	Class 6/6