

Protective Clothing for Avian Flu

TECHNICAL BULLETIN



This document provides general guidance for the use of DuPont Protective Apparel for avian flu response. Protective Apparel is only one component of a comprehensive Personal Protective Equipment program recommended for avian flu response. Specific guidance for Europe is available at <http://www.dpp-europe.com/en/pdf/flu.pdf> and specific guidance for China is available at <http://personalprotection.ap.dupont.com/en/index.html>. These suggestions are based on recommendations of the World Health Organization (WHO), the United Nations Food and Agriculture Organization (FAO), the U.S. Centers for Disease Control (CDC), the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Agriculture (USDA) and the U.S. Food and Drug Administration (FDA), as well as specific recommendations issued by the European Union and by the State Food and Drug Administration of China.

DuPont™
Tyvek®

DuPont™
Tychem®

DuPont™
RelyOn™

Protective clothing, and in general protective equipment are only part of any comprehensive response to avian flu. Public health management of avian flu involves a combination of techniques: quarantines, avoidances, engineering controls, work practices, administrative controls, and personal protective equipment. Consult with local authorities before undertaking any control or response activities. Ensure that the guidance is appropriate for the conditions and activities in which you will engage.

The current outbreak of avian flu in the eastern hemisphere is caused by the H5N1 strain of Type A influenza. This serotype is highly fatal to domesticated poultry, has decimated flocks in several Asian countries and has recently been detected in Central Europe and Eastern Asia. Traditional avian flu control procedures have not been effective in controlling the spread of this virus.

Considering the breadth of this outbreak, few humans have been infected. However, more than half of those people with confirmed infections have died. The World Health Organization (WHO) has confirmed 135 human cases and 69 fatalities from this strain between December 26, 2003 and December 7, 2005. WHO reports that most cases were caused by contact with infected poultry. In some cases, human-to-human transmission can not be ruled out.

Health experts are concerned with a global pandemic because of 1.) the difficulty in controlling the spread of this virus, 2.) the high percentage of death among confirmed human cases, and 3.) the inherent ability of flu viruses to mutate. The longer the H5N1 virus persists and is widespread, the more likely it will mutate into a form that will spread easily from human to human. Since humans have little immunity to this virus, person to person transmission could lead to a global influenza pandemic. The devastating flu pandemic at the end of World War I in which 20 to 50 million people died is believed to have arisen from this type of situation.



The miracles of science™

No one can predict when a pandemic might occur. Experts from around the world are watching the H5N1 situation in Asia and Europe very closely and are preparing for the possibility that the virus may begin to spread easily from person to person.

There are a number of avian flu related activities that require the use of protective clothing, including:

- veterinary surveillance
- poultry flock eradication
- cleaning and disinfection of farm equipment and buildings
- laboratory handling of avian flu infectious materials
- protection from infected humans in health-care settings

*** Protective Apparel is only one component of a comprehensive Personal Protective Equipment program recommended for avian flu response.*

In farm settings, fecal matter is the most significant route of transmission. Contaminated clothing and equipment should not be carried from farm-to-farm. During veterinary surveillance, clean disposable DuPont™ Tyvek® coveralls may be used. Sock boots attached to disposable coveralls are not durable enough for outdoor farm usage — separate boots should be worn. Footwear should be disinfected when leaving the area. DuPont Animal Health Solutions has specific guidance and products to address farm infection control (<http://www.antecint.co.uk/go.htm>).

Control of avian flu often involves the destruction of infected flocks, disposal of the carcasses and disinfection of premises. FAO estimates that more than 100 million birds had been culled in an effort to control this outbreak. CDC, WHO, FAO and OSHA have published detailed recommendations for worker protection during eradication activities and for preventing the spread of the infection. These recommendations include the use of an impermeable apron worn over a disposable coverall or an impermeable apron worn over a surgical gown. DuPont™ Tyvek® coveralls worn with a DuPont™ Tychem® apron meet these recommendations. When extensive, wet decontamination procedures are used, such as those mandated within the European Union, sealed seam DuPont™ Tychem® garments should be used.

Protective clothing should be removed and safely contained before workers leave the contaminated area. Additional personal hygiene, especially hand hygiene, is recommended after the protective clothing is removed. FAO recommends that all people who have been in close contact with infected animals clean their hands frequently. For more information on DuPont™ RelyOn™ antiseptic and disinfectant hand products, visit <http://relyon.dupont.com>. DuPont™ RelyOn™ products may be used as part of a “hand hygiene” program.

While protective clothing for the cleaning and disinfection of farm equipment and buildings has not been specified, the clothing seams, design and materials should be chosen to minimize skin contact with the disinfectants. Sealed seam DuPont™ Tychem® garments along with appropriate hand, face and foot protection may be used during these activities.

For laboratory activities involving avian flu specimens, WHO recommends use of a coverall, a laboratory coat, gown or full coverage apron which resembles a gown. An additional impermeable apron could be worn over the coverall or lab coat. The material from which the gown is made should provide sufficient liquid barrier for the task and anticipated exposure. Disposable booties fitted with non-slip soles or with a non-slip coating may also be considered in lieu of dedicated lab footwear. Protective clothing should be removed before leaving the lab. DuPont™ Tyvek® and DuPont™ Tychem® aprons, smocks, and disposable shirts, pants and footwear might be worn during laboratory activities, depending on the level of exposure.

In healthcare facilities, CDC and WHO recommend clean or sterile isolation gowns for healthcare providers, visitors and non-healthcare staff. The material from which the gown is manufactured and whether it should be sterile depends on the task and the anticipated exposure. Attention to hand hygiene is also highly recommended.

In the United States, Isolation Gowns must be registered as medical devices with the Food and Drug Administration (FDA). However FDA compliant gowns made from DuPont™ Softesse® and DuPont™ Suprel® Medical Fabrics are available. For more information on these products, visit <http://www.medicalfabrics.dupont.com>.

Other countries have their own rules and regulations regarding medical clothing. Healthcare professionals should consult local authorities for specific guidance on applicable requirements. For example, DuPont offers a Tyvek® garment that meets the infection control garment guidelines issued by the State Food and Drug Administration of China.

DuPont will continue to work with medical experts and public health officials to help identify and develop garments and materials to meet these critical needs and will continue to update our technical guidance as necessary and as more data becomes available.

Remember that management of avian flu involves a combination of techniques, including the use of Personal Protective Apparel and other Personal Protective Equipment. Consult with local authorities before undertaking any response activities. Ensure that the guidance is appropriate for the conditions and activities in which you will engage.

Questions and Answers

1. **Do garments made from DuPont™ Tyvek® and DuPont™ Tychem® protect you from getting avian flu?**

By themselves, Tyvek® and Tychem® garments will not protect the wearer from avian flu. WHO (World Health Organization), the United Nations Food and Agriculture Organization (FAO), the U.S. Centers for Disease Control (CDC), the U.S. Food and Drug Administration and U.S. Occupational Safety and Health Organization (OSHA) have issued recommendations for workers involved in veterinary surveillance, eradication of infected birds, disinfection of farm equipment and buildings, laboratory handling of avian flu specimens, and for caregivers and other people in health-care facilities. In certain circumstances, Tyvek® and Tychem® garments meet these recommendations for disposable apparel. There are some situations where Tyvek® and Tychem® garments would not be appropriate.

2. **Why are people wearing garments made of DuPont™ Tyvek® and DuPont™ Tychem® protective fabrics in areas with avian flu?**

Protective clothing that is discarded after use reduces the opportunity for contamination of skin and clothing by infectious materials and for migration of the infectious materials to non-contaminated areas.

3. **What is currently being recommended to protect against avian flu and who leading this effort?**

WHO (<http://www.who.org>), CDC (<http://www.cdc.gov>), OSHA (<http://www.osha.gov>) and FAO (<http://www.fao.gov>) have recommended farm and healthcare worker protection programs during avian flu activities.

4. **Do Tyvek® and Tychem® fabrics protect from viruses?**

Tyvek® protective garment materials have resisted viral penetration from a synthetic body fluid at 2 kPa (0.3 psi). Seams, closures and garment design are also important in the barrier performance of the Tyvek® garment. Sealed seams provide more barrier than sewn or bound seams. The barrier of a zipper closure can be improved with an over-flap. Similar testing of Tychem® fabrics shows that they are impervious to liquid-borne viral penetration at 13.4 kPa.

5. **What testing has DuPont done regarding the ability of DuPont™ Tyvek® and DuPont™ Tychem® fabrics to protect against avian flu?**

We are not aware any protective clothing material that has been tested with avian flu virus, including Tyvek® or Tychem® materials. We have tested Tyvek® and Tychem® protective garment materials for resistance to viral penetration from virus-laden synthetic body fluids and against particles.

6. **Do you plan to test DuPont™ Tyvek® and DuPont™ Tychem® garments and fabric against avian flu virus?**

We will follow the lead of organizations such as CDC and WHO in determining the priorities in testing the characteristics of avian flu virus. If the CDC and WHO ask for our help in testing Tyvek® and Tychem® materials, we will provide technical assistance to the best of our capabilities.

7. **When is DuPont™ Tyvek® not appropriate?**

When exposure to moderate-to-large volumes of body fluids, liquefied excrement, pooled body fluids or disinfectant solutions is expected, sealed-seam protective garments made of DuPont™ Tychem® fabrics, which are liquid impervious materials, should be considered or procedures should be used to reduce the risk of liquid contact. However, it is important to note that Tychem® material has not been tested against avian flu virus and Tychem® garments are not appropriate for all situations. Overall liquid barrier performance of a Tychem® garment also depends on the design of the garment and closures.

8. **How can someone find out if their protective garment meets guidelines?**

Not all protective clothing is adequate to prevent the spread of avian flu. Each situation should be assessed by a person trained in the selection and use of protective clothing and equipment. Confirm with the garment manufacturer the suitability of their garments for your particular intended use. Do not select a garment based solely on its color. Make sure the garment contains the right materials for your intended use.

9. **Are there enough DuPont™ Tyvek® and DuPont™ Tychem® garments available to meet world demand?**

DuPont is working to meet the global demand for Tyvek® and Tychem® garments.

10. **What is DuPont doing to make more garments available quickly?**

DuPont is monitoring the supply situation and adjusting inventories to meet expected demand.

11. **What is DuPont doing to help with this health crisis?**

DuPont is working to meet global demand for products, working to understand appropriate use of our products and preparing information to help users make informed decisions about what protection is appropriate to their needs, in conjunction with the guidance provided by WHO.

12. **What causes avian flu?**

Avian flu can be caused by several types of influenza virus, each with unique symptoms, species impact and severity. The current outbreak is associated with the H5N1 serotype of Type A influenza virus, according to the WHO and CDC. For more information on avian flu, consult the CDC and WHO websites.

13. To be used for protection against avian flu, must the garment material past ASTM F 1671?

No, according to 19 CFR 1910.1030, the OSHA Bloodborne Pathogens Regulation, the material is considered adequate if it prevents contamination of the skin and garment worn underneath under conditions of normal wear and use.

14. How do we know that DuPont™ Tyvek® garments will protect from avian flu?

Not all protective clothing is adequate to prevent the spread of avian flu. Each situation should be assessed by a person trained in the selection and use of protective clothing and equipment. Confirm with the garment manufacturer the suitability of their garments for your particular intended use. Do not select a garment based solely on its color. Make sure the garment contains the right materials for your intended use.

We will continue to monitor the recommendations issued by WHO regarding infection control procedures and update our information accordingly. The purpose of protective garments during these types of incidents is preventing the contamination of workers' clothes and to help prevent the migration of the infectious materials to uncontaminated locations.

15. Are DuPont™ Tyvek® or DuPont™ Tychem® garments approved as medical devices in the U.S.?

No.

16. Has the CDC issued worker protection and healthcare infection control guideline for avian flu?

Yes, consult the CDC website at <http://www.CDC.gov>.

17. What are CDC and WHO?

CDC are the Centers for Disease Control and Prevention, a part of the United States Department of Health and Human Services responsible for the understanding and control of public health issues in the United States. WHO is the World Health Organization, an agency of the United Nations responsible for world-wide public health understanding and control.

18. Why is this avian flu outbreak so serious?

Health experts are concerned with a global human pandemic because of 1.) the difficulty in controlling the spread of this virus, 2.) the high percentage of death among confirmed human cases, and 3.) the inherent ability of flu viruses to mutate. The longer the H5N1 virus persists and is widely distributed, the more likely it will mutate into a form that will spread easily from human to human. Since humans have little immunity to this virus, it can potentially spread from person to person and lead to a global influenza pandemic. The devastating flu pandemic at the end of World War I in which 20 to 50 million people died is believed to have arisen from this type of mutation.

19. Why does DuPont base their recommendation on the guidelines issued by the WHO and CDC?

The CDC and WHO are credible bodies chartered by the United States Government and the United Nations, respectively, and assigned the responsibility for understanding major public health issues and recommending control measures.

20. Does DuPont have products for disinfection of farm equipment and buildings?

Consult the DuPont Animal Health Solutions website at <http://www.antecint.co.uk/go.htm> for information on products and procedures for the disinfection of farm equipment and buildings.

21. Does DuPont have products for hand hygiene?

For more information on DuPont™ RelyOn™ disinfectant and antiseptic products, visit <http://www.relyon.dupont.com>.

This bulletin is based on information available to DuPont as of December 7, 2005. All readers are responsible for verifying and updating the information in this bulletin by consulting Public Health and agricultural resources and for ensuring that the personal protective apparel they select and wear is appropriate for their needs.

Product safety information is available upon request. This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own determinations. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. It is the user's responsibility to determine the level of risk and the proper protective equipment needed for the user's particular purposes. This information may be subject to revision as new knowledge and experience becomes available. Since we cannot anticipate all variations in actual end-use conditions, DUPONT MAKES NO WARRANTIES AND ASSUMES NO LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any trademark or patent right.

Copyright © 2006 DuPont. All rights reserved. The DuPont Oval Logo, DuPont™, The miracles of science™, Tychem®, Tyvek®, RelyOn™, Sofesse®, and Suprel® are registered trademarks or trademarks of E. I. du Pont de Nemours and Company or its affiliates. K-14208-1 (3/06) Printed in the U.S.A.

**DuPont
Personal Protection**

www.PersonalProtection.DuPont.com



The miracles of science™