

For hazardous or dirty jobs...
protect your workers
with garments of

TYVEK®

Spunbonded Olefin



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TYVEK*

Answers the need to protect

The need for effective on-the-job worker protection is greater than ever as more and more materials are classified as hazardous. Local, state and federal regulations now require that all employees wear protective clothing wherever hazardous conditions exist or exposure to toxic liquids or dry particulates is likely. To avoid high costs and decontamination problems, the trend today is toward limited-use disposable garments. Ideally, such garments should meet the following criteria:

- Required protective properties
- Abrasion and tear resistant
- Lightweight
- Comfortable
- Cost-effective
- Worldwide availability
- Extensive local distribution

In response to this need, Du Pont has developed a unique family of synthetic fabrics based on TYVEK spunbonded olefin. TYVEK meets the basic criteria, and garment manufacturers have met the challenge by providing many functional styles that are readily available through more than 600 industrial and safety distributors.

Here's Why TYVEK is Uniquely Suitable for Protective Clothing

- Excellent particulate barrier properties (Type 14)
- High tensile strength and tear resistance
- Excellent barrier to broad range of chemicals
- Low static development
- Microporous construction — for light weight and comfort (Type 16)
- Dyeable
- Economical



*Du Pont registered trademark

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These properties enable TYVEK® to perform effectively in a wide variety of applications. Detailed descriptions of the properties of TYVEK begin on Page 8. For added versatility, TYVEK is available in several styles and weights. Type 14 and Type 16 are most commonly used in garment applications. The Type 14 series offers high strength and excellent barrier properties for safety and dirty job applications. Type 16 TYVEK is of microporous construction, which allows the fabric to breathe, and provides good barrier properties for dirty job applications. Coated and laminated products of TYVEK are available for extra protection from hazardous chemicals.

TYVEK is Now Being Used in These and Other Areas

- Asbestos
- Lead/Lead Oxide
- PCB/Transformer Oils
- Herbicides/Pesticides
- Chemicals/Acids and Caustics
- Fiberglass
- Food Processing
- Clean Rooms
- Sandblasting
- Nuclear/Radioactive
- Painting/Spraying
- Inks/Solvents
- U.S. Navy —

Asbestos Handlers MIL C-87069
Torpedo Handlers MIL C-87019
General Purpose MIL C-29133A*

*Spec approved pending publication

The following pages illustrate specific applications where limited use disposable garments of TYVEK provide reliable and economical worker protection.

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SAFETY

For on-the-job protection, where SAFETY comes first, here's how TYVEK® can work for you.



- Asbestos

During asbestos removal operations, workers wearing disposable coveralls of TYVEK are protected from asbestos fibers and dust down to sub-micron size.



- Radioactive Contaminants

In nuclear installations, the use of disposable clothing of TYVEK as a protective layer can greatly reduce the hazard of skin contact by radioactive contamination.



- Lead Dust

Garments of TYVEK prevent penetration of lead dust particles — either airborne or by direct contact with equipment and product surfaces.



• Clean Room Environments

TYVEK® keeps clean rooms CLEAN by holding in microscopic body particles. TYVEK is produced from continuous filaments of high density polyethylene and contains no additives to flake off and contaminate the room. Clean room laundries use certified TYVEK for Class 100 use (ASTM F5168).



• PCB

Garments of coated or laminated TYVEK are now being used by major power companies and railroads when servicing capacitors and transformers.



• Pesticide Sprays

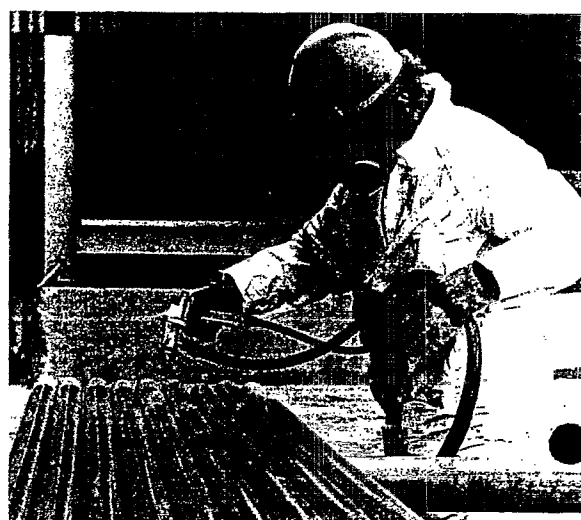
The unique, tightly-bonded construction of TYVEK forms an effective barrier against toxic chemicals. Various styles of garments protect workers during the manufacturing of products and in actual field application.



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GENERAL INDUSTRY

At the work-site, where conditions make it desirable to give your personnel added protection, TYVEK® has proved to be the low-cost answer.



- Paint

Painters stay cleaner when they wear coveralls of TYVEK. And, because TYVEK is lint-free, paint surfaces stay cleaner too.



- Routine Inspection

For general maintenance procedures where grime or unknown contaminants may be present, TYVEK provides dependable protection at low cost.



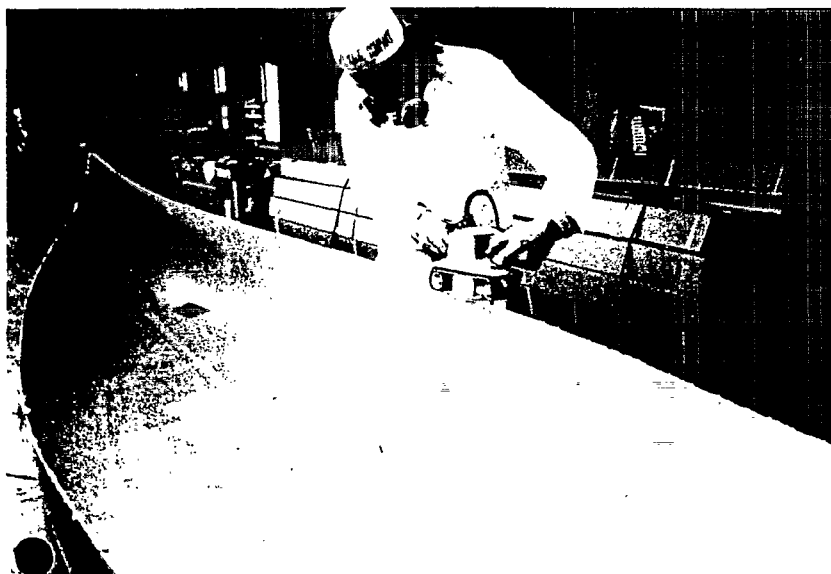
• Sandblasting

Garments of TYVEK® are ideally suited for sandblasting operations because of outstanding hold-out and durability.



• General Worker Protection

TYVEK is the answer for most protective clothing problem situations — from ordinary conditions of dirt and grime to those where toxic substances may be present.



• Fiberglass

Coveralls of TYVEK hold out irritating fiberglass particles which, though not classified as hazardous by state and federal agencies, cause considerable worker discomfort.

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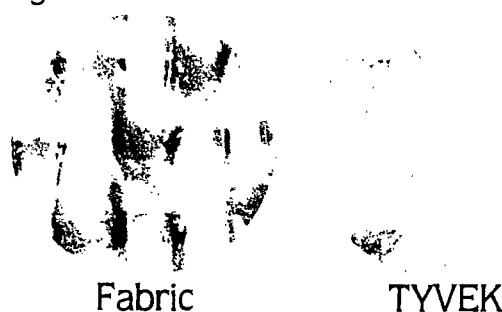
PROPERTIES

Disposable Clothing of TYVEK® Provides Maximum Protection at Minimum Cost

• Excellent Barrier Properties

TYVEK has a unique structure. Millions of very fine continuous polyethylene fibers overlap to form a dense sheet structure that functions as an excellent protective shield. The photomicrographs (25x magnification) in Figure 1 show why TYVEK acts as an effective particle barrier and resists liquid splash penetration.

Figure 1.



These photomicrographs compare a heavy duty 7.5-ounce twill coverall fabric on the left to TYVEK. The interstices in the woven fabric allow particles to penetrate freely while the spunbonded fiber structure of TYVEK holds out most particles down to half-micron size.

Particle Hold-Out — Laboratory tests show that TYVEK is an effective particle barrier. Figure 2 shows that essentially all particles down to half-micron are held out. In another test, TYVEK was challenged by asbestos fibers with a median diameter of 0.12 microns — it stopped (or filtered out) more than 98% of these fibers. A test with pesticide dust containing 5% carbaryl also confirmed its outstanding ability to stop penetration of very fine particles — more than 97% of the particles were held out. An additional advantage of TYVEK is that the relatively slick surface tends to prevent particle entrapment and therefore reduces garment contamination. Whether the particles are radioactive or bacteriological, organic or inorganic, carcinogenic or just plain dust, TYVEK reduces exposure to the wearer.

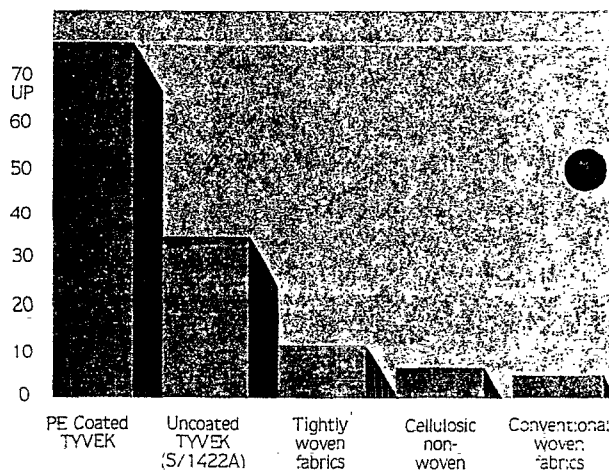
Figure 2. Particle Barrier...
TYVEK Style 1422A

Particle Diameter (microns)	Percent of Particles Stopped
0.5-0.7	99.9%
0.7-1.3	99.9%
1.3-3.0	99.9%
3.0-5.0	100%

Liquid Hold-Out — Where splash protection is needed, TYVEK again displays excellent hold-out properties to many liquids. Additional protection can be achieved by using a garment of coated TYVEK. The comparative liquid (water) hold-out properties for various protective clothing materials are shown in Figure 3.

Figure 3. Comparative Liquid (water)
Hold-Out Values

Hydrostatic
head
(inches of
water before penetration)



Chemical Protection — TYVEK is 100% polyethylene and essentially chemically and biologically inert. Its physical properties are virtually unaffected by most organic and inorganic chemicals including acids, bases and salts. It does, however, absorb certain organic solvents. This may cause slight swelling of the TYVEK before the solvent evaporates. The effectiveness of the barrier hold-out properties of TYVEK when exposed to chemicals, especially those in liquid or gaseous states, can only be determined by permeation testing. Depending on the challenge chemical, it can be a very simple test or it may involve sophisticated analytical procedures. Figure 4 summarizes the results of permeation tests on TYVEK. These data are to be used only as a guide. Appropriate tests should be conducted with the garment to determine if it provides the wearer the necessary protection in the complex work environment.

Figure 4. Preferred TYVEK® Candidates for Hazardous Chemical Protection

Chemical	Preferred TYVEK Candidate(s)	Permeation Data Summary
Polychlorinated Biphenyl (PCB)	Saranex** Laminated TYVEK	Breakthrough time greater than 60 minutes
1, 2, 4,-Trichlorobenzene	Saranex** Laminated TYVEK	Breakthrough time greater than 15 minutes
Cresols (Technical grades of 54% meta-cresol, 29% para-cresol and 19% other phenols)	Saranex** Laminated TYVEK	No detectable permeation after 2 hours of continuous exposure.
Ortho-Toluidine (Reagent grade an experimental carcinogen)	Saranex** Laminated TYVEK	No detectable permeation after 2 hours of continuous exposure
Sodium Dichromate (Metal Finishing Solution 10% sulphuric acid, 87% water and 3% Sodium dichromate, a suspect carcinogen)	PE Coated TYVEK or Saranex** Laminated TYVEK	No detectable permeation after 8 hours of continuous exposure
Sulfuric Acid (up to 98%)	PE Coated TYVEK or Saranex** Laminated TYVEK	No detectable permeation after 8 hours continuous exposure
Sodium Hydroxide (40% Solution)	PE Coated TYVEK or Saranex** Laminated TYVEK	No detectable permeation after 8 hours continuous exposure

**Registered trademark of Dow Chemical Company

• Toughness and Durability

TYVEK has high tensile/tear strength in all directions, wet or dry. Water has practically no effect on its strength and it retains its toughness and flexibility down to -100°F. The network of minute polyethylene fibers gives TYVEK good puncture and abrasion resistance. Unlike films, TYVEK has exceptional resistance to tear propagation. Because of this toughness and durability, garments of TYVEK can be worn and laundered repeatedly. Yet, they are inexpensive enough to be disposed of after one wearing.

• Flammability Characteristics

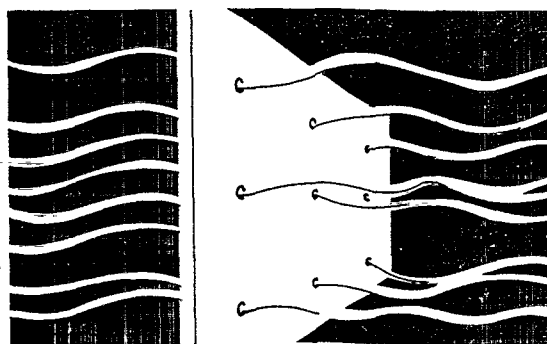
The flammability characteristics of TYVEK, a synthetic nonwoven material, are similar to those of most synthetic fibers. When exposed to a flame, TYVEK shrinks away rapidly. If the flame is made to follow the shrinking sheet, TYVEK will reach ignition temperature, 650°F, and burn. Type 14 and 16 TYVEK meet the flammability requirements of the Federal Flammable Fabrics Act for Clothing Textiles (16CFR-1610) NFPA #703 (Chapter 1) for Textile Wearing Apparel, and NFPA #702 (Chapter 5), the Vertical Flammability Test for "non-textiles."

• Static Protection

TYVEK Types 14 and 16 are treated with an antistatic agent to minimize static build-up and prevent garment cling. TYVEK passes NFPA - 56A requirements. This allows use in areas where flammable gases or solvent vapors are present. This antistatic coating, like that used on other materials of synthetic fibers, is water soluble and is removed by washing or dry cleaning. The antistat can be reapplied during a normal laundry rinse to regain static protection.

• Breathable/Comfortable Type 16 TYVEK

Type 16 TYVEK is lightweight and comfortable and allows free passage of air. It will not, of course, give the same degree of protection as Type 14 TYVEK. A typical coverall weighs only 5 ounces and has a FRAZIER air permeability of 45 cubic feet/minute or about the same as most work clothing fabrics. As a result, garments made of Type 16 are considered comfortable at most temperature/humidity levels. Garment comfort can be further enhanced by proper design and sizing.



• Cost/Performance Ratio

TYVEK costs many times less than woven or knit fabrics and protects far better. The low initial cost means that garments of TYVEK can be discarded after wearing, thereby eliminating costly handling, sorting and laundering of dirty garments. Garments of TYVEK are tough enough to be worn more than once in many applications and the reuse cost becomes surprisingly low.

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STYLES

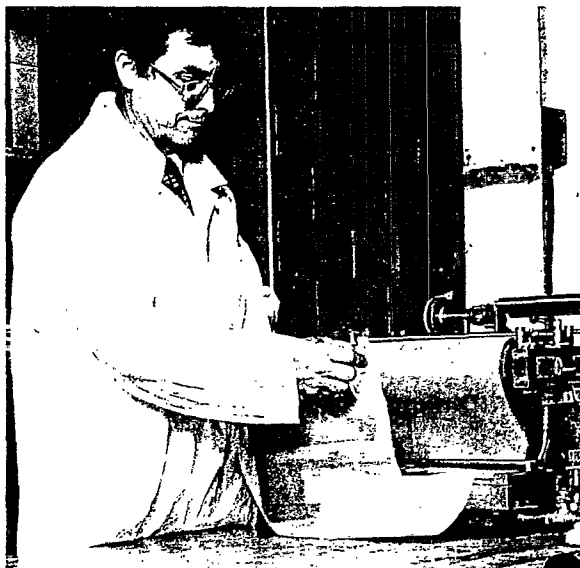
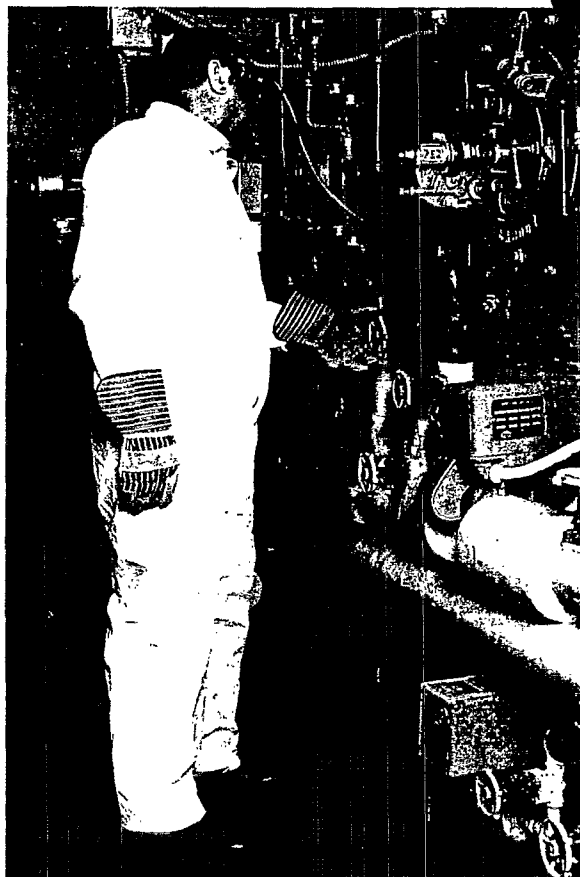
Garments of TYVEK® are Readily Available in These Styles

1. Two piece (pant and shirt)
2. Coverall
3. Lab coat
4. Full body suit (laminated TYVEK)
5. Two piece splash suit
6. Hooded asbestos suit with booties
7. Coated/laminated coverall
8. Colored coverall (multiple colors available)



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2



3

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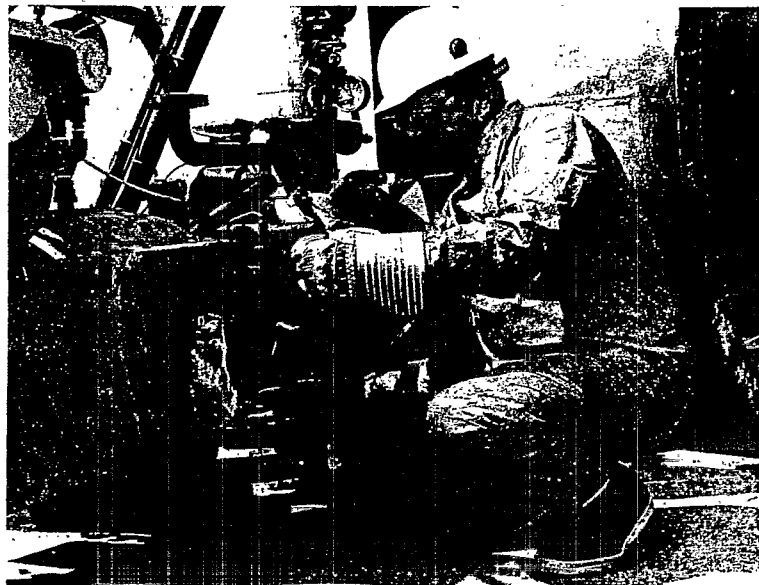
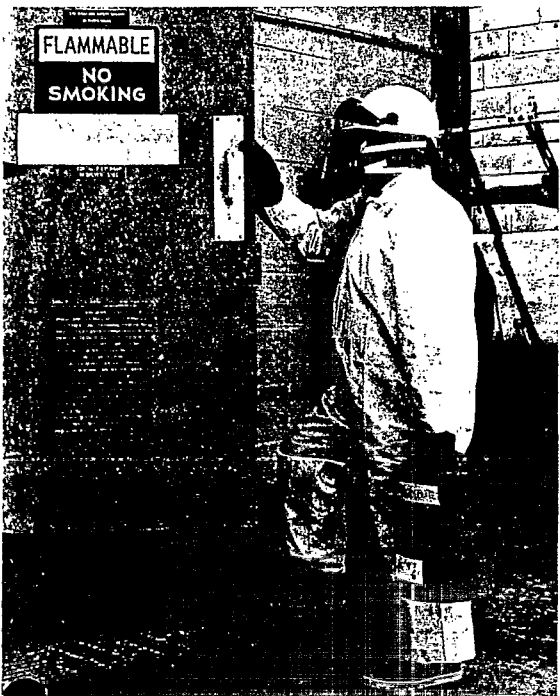
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5



6



8

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See for Yourself How TYVEK® Stacks Up

Compare the superior barrier performance, low cost and added convenience of protective clothing of TYVEK. See why TYVEK is industry's choice for limited-use protective garments. For additional technical information, request the following reports:

- Southwest Research Institute: Evaluation of Anticontamination Clothing Material: Permeability to Radioactive Contamination:
 - Part 1: Water Borne Contamination
 - Part 2: Tritiated Water
 - Part 3: Dry Particulate
- Clean Room Engineering: Lead Dust Penetration Through Protective Garment Material.
- Arthur D. Little, Inc: The Barrier Effectiveness of TYVEK (Uncoated, Coated or Laminated) to:
 - PCB, Trichlorobenzene and Mineral Spirits
 - Cresols, Ortho-Toluidine and Toluene
 - Sodium Dichromate, Sulfuric Acid & Sodium Hydroxide
 - Asbestos Fibers
 - Carbaryl Dust

Contact your Distributor, Garment Manufacturer, or write to:

E. I. du Pont de Nemours & Co. (Inc.)
Textile Fibers Department
Engineered Nonwoven Structures Division
Fibers Marketing Center
Wilmington, DE 19898
(302) 999-3095

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