

OREX ULTRA

THE FUTURE OF
CONTAMINATION
CONTROL

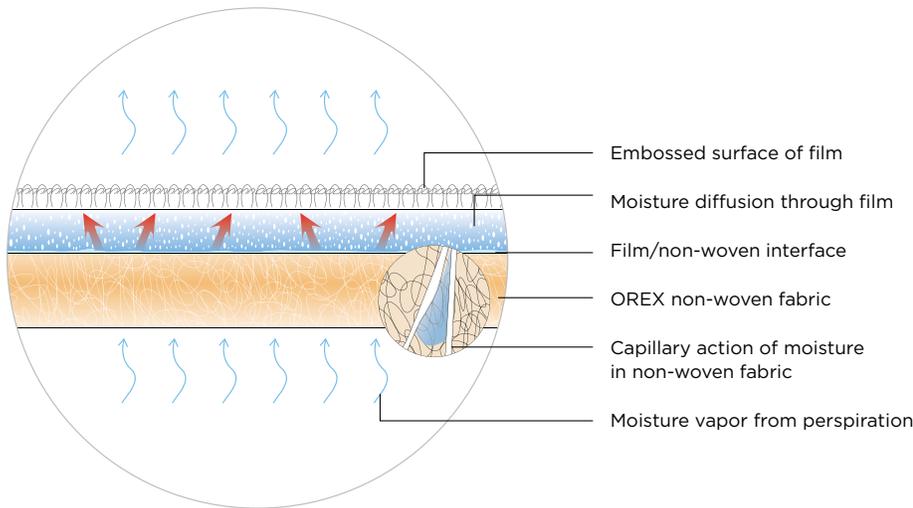
PERSONNEL CONTAMINATION
EVENTS ARE NOW A THING OF
THE PAST WITH THE NEW OREX
ULTRA COVERALL. NEVER
BEFORE HAS THERE BEEN SUCH
A LIGHTWEIGHT, STRONG AND
COMFORTABLE GARMENT FOR
THE NUCLEAR INDUSTRY.



The OREX Ultra has undergone two years of extensive testing, more than any other garment in the business, and is the only garment, either single-use or reusable, that is actually tested and certified to protect workers from radioactive contamination.

OREX® Ultra is constructed of the revolutionary new Enviro-stasis™ fabric, which not only offers unprecedented protection from radioactive particulate contamination but also unparalleled moisture vapor transport ability. The Enviro-stasis fabric consists of a non-woven fabric layer and a specially engineered OREX film layer bonded together in a special process. The film layer forms an impermeable barrier to contamination while the inner, non-woven layer is soft and comfortable against the skin. The unique properties of the fabric-film composite and the interactions between the two layers yield an extremely high water vapor transmission rate. The result is a lower heat stress index never before achievable in such a protective barrier fabric.

DIFFUSION, ABSORPTION-DESORPTION AND CONVECTION OF VAPOR PERSPIRATION, ALONG WITH WETTING AND WICKING OF LIQUID PERSPIRATION, ALL PLAY A SIGNIFICANT ROLE IN REGULATING THE WEARER'S CORE BODY TEMPERATURE IN THE FIELD.



OREX Ultra is the most impressive, full-featured, protective coverall on the market, at a value you can afford to dress your entire workforce. Designed by nukes for nukes, the OREX Ultra is the only coverall you'll ever need:

- Certified and Tested per EN1073-2 Protection from Radioactive Contamination
- CE approved Category III Protective Apparel—Highest Category of Protective Clothing
- Moisture Vapor Transfer Rate (MVTR) comparable to OREX Deluxe Coverall
- Lightweight and Strong
- 100% Compatible with OREX Dissolution Processing Technology
- Clo Value (OSHA - Heat Stress Index) comparable to Cotton Garments
- Trademark OREX Double Sleeve Design
- Engineered and Reinforced Seams in High Stress Points
- Reinforced Knees
- "See-through" Dosimetry Pocket Flap
- Zipper Flap
- OREX Signature Thumb Holes on Inner Sleeves
- Large Cargo Pocket on Right Thigh

"The Ultras were great. They worked well for the heavy work that we performed and I appreciated not coming out of the area contaminated due to sweat through."

WESTINGHOUSE REFUELING WORKER



Unrivaled Particulate Pass-through Protection

Historical test protocols to evaluate protective ability of garments, such as ASTM test methods which evaluate air or water filter media efficiencies, fall short in replicating the actual field mechanics involved in particulate migration.

THE OREX ULTRA HAS BEEN TESTED AND CERTIFIED TO MEET THE ONLY STANDARD IN THE WORLD, EN1073-2, DESIGNATED TO TEST THE ABILITY OF A GARMENT TO PROTECT AGAINST RADIOACTIVE CONTAMINATION.

Such tests often fail to reasonably simulate the migration of particulate contamination through the clothing to the skin or undergarments of the wearer.

The majority of protective clothing being used today

in many facilities does not come close to passing the EN1073-2 test standard. Every OREX Ultra coverall bears this special certification.

EN1073-2 challenges the garment to penetration by 0.5 micron diameter aerosol particulate in an enclosed test chamber while several prescribed exercise routines are performed by human test subjects. Test probes are positioned at several locations both inside and outside the garment to collect and measure particulate penetration through the clothing.

In order to replicate field conditions, an additional test method was devised for quantifying the relative barrier protection properties of coverall fabrics used in the industry today:

- The test fabric is placed over the opening of a container into which powdered graphite along with 3.175 mm glass beads are placed.

- This assembly, fabric end down, is then allowed to drop repeatedly from a predetermined height onto a white surface. Some amount of the powdered graphite penetrates most fabrics and produces an “imprint” on the white background test surface.
- A precision light meter is then used to measure the darkness of the graphite “imprint” compared to the original white background surface to provide a quantitative assessment of a fabric’s ability to resist penetration by radioactive particulate.
- An independent laboratory provided a spectral analysis of the graphite mixture; the particulate size ranges from about 0.7 um to 90 um in size with a mean diameter of 23 um, very representative of nuclear power plant contamination sizing.

Proven Protection and Comfort

Most often “protection” and “comfort” are inversely proportional to one another. The OREX Ultra coverall is designed to provide an impervious barrier to particulate contamination, while at the same time providing the wearer with the highest degree of relative comfort for a barrier fabric of its kind.

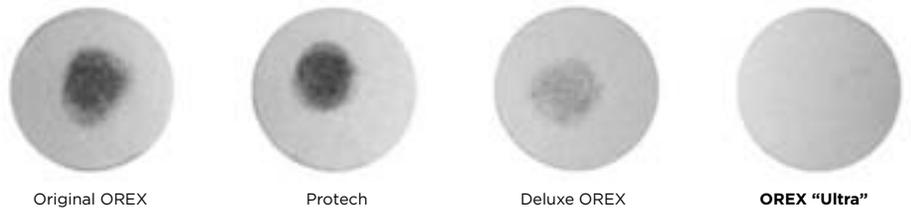
Several tests can provide good indication of relative comfort or “breathability” of a fabric to be used for worker protection. Comfort of protective clothing is determined by a number of factors such as breathability, moisture vapor transfer rate, weight, feel, fit, etc.

Two years of extensive development testing have gone into the OREX Ultra.

Moisture Vapor Transfer Rate (MVTR) is determined under specific conditions of temperature, relative humidity, and airflow in a test chamber.

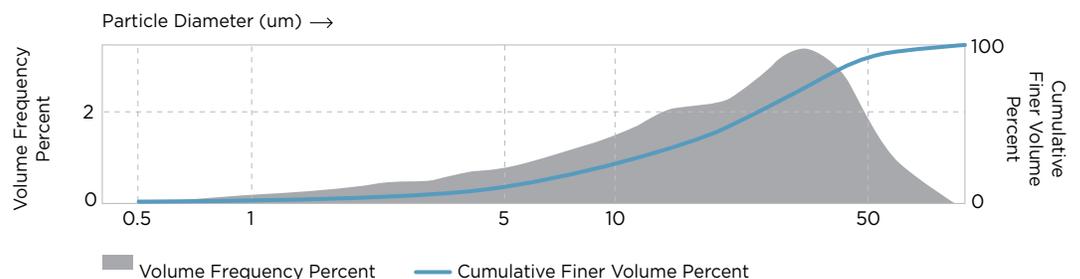
Particulate Pass-through

Fabrics used in the industry today

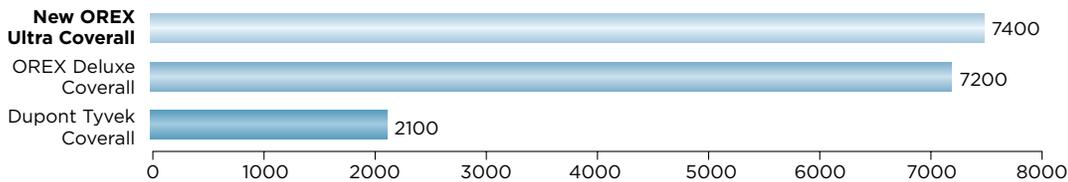


Graphite Size Distribution

Volume frequency vs. diameter



Moisture Vapor Transmission Rate (MVTR) Fabric comparison



Moisture transfer (gms/24 hr-m²). Higher value means greater comfort.

- The results are reported as grams of moisture/area/time. The higher the number, the more effective the fabric or material is at moving moisture and moisture vapor (perspiration) away from the skin and out of the garment.
- Test results are shown on the graph above.

Reeve's Test measures "Clo" value and its relationship to "heat stress index," the metric to which OSHA standards are applied.

- The OREX Ultra was tested by a certified, independent laboratory and its Clo value is 0.875.
- Based on the test results, the OREX Ultra is between lightweight summer working clothing (Clo value = 0.6) and cotton coveralls (Clo value = 1.0).
- The approximate Wet Bulb Globe Temperature correction for the OREX Ultra would be "-1" degree.

Since laboratory testing cannot truly reflect the physiological effect on a person during use in a field environment, the OREX team established a test scenario using human test subjects and a treadmill to evaluate various types of protective clothing and the effect

of the clothing on core body temperature under adverse conditions.

The American Council of Government Industrial Hygienists (ACGIH) states that workers should not be permitted to work if core body temperature exceeds 100.4° Fahrenheit. OSHA defines various intensity levels for work activities: light work is defined as involving energy expenditure of up to 200 kcal/hr.; medium intensity work is defined as that between 200-350 kcal/hr.; and heavy work would be activity of 350-500 kcal/hr.

In the OREX test, body core temperature was measured and recorded prior to, during and after the exercise regimen. After core temperature had initially stabilized, each test subject would then jog at a speed of 8 km/hr for 16 minutes.

This routine is calculated to require upwards of 800 kcal/hr energy and would clearly be classified as "heavy" work per the OSHA guideline.

Six clothing ensembles were tested:

- Dupont Tyvek with OREX scrub underlayer
- Protech 2000 Plus with OREX scrub underlayer
- OREX Xtreme with OREX scrub underlayer
- OREX Deluxe with OREX scrub underlayer
- OREX Ultra with OREX scrub underlayer
- OREX scrubs alone

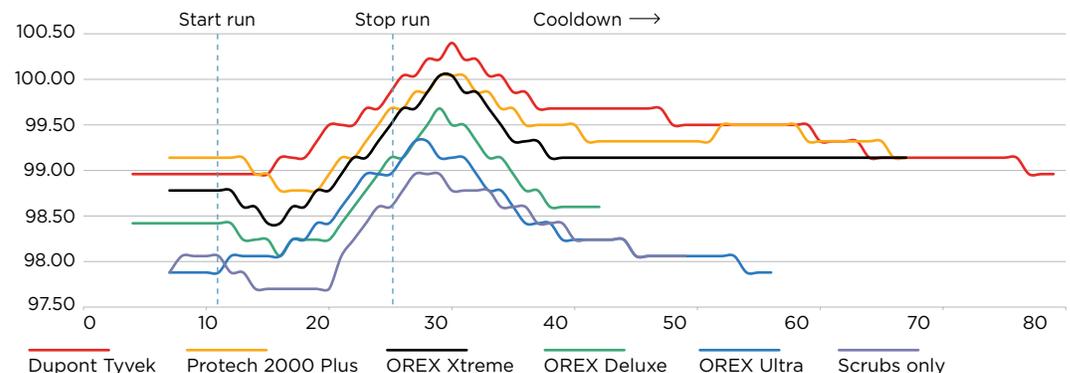
The graph below shows the results on the typical test subject.

- Test subjects perspired profusely in Tyvek, OREX Xtreme and Protech apparel and cool down, or recovery times, were typically extended.

- Both OREX Ultra and OREX Deluxe ensembles performed comparatively against each other on all tests conducted. Recovery times were much shorter in both OREX Ultra and OREX Deluxe. The OREX Ultra (membrane barrier) has the added advantage of providing a far superior protective barrier to particulate contamination.

While "comfort" is a relative term, work environment temperature and humidity play a role in the ability of any "breathable" garment to wick or diffuse moisture vapor. Testing and field feedback has shown that upon donning the OREX Ultra coverall, some body heat will be retained until the wearer begins to perspire, at which point vapor transfer will start to occur. The coverall and worker will actually reach an equilibrium that will act to regulate core body temperature and maintain a reasonable level of comfort equal to that provided by the OREX Deluxe coverall, but at a much higher level of protection.

Core Body Temperature Fahrenheit, over elapsed minutes



OREX...experts in performance-engineered, eco-friendly disposables. Created with revolutionary, organic polymers, designed to be dissolved, sterilized, decontaminated and ultimately returned safely back to nature. Disposables without the waste! Great for your business...good for the planet. OREX...innovation is our specialty. Protecting you, and the world in which you live.

OREX[®]
ADVANCED PROTECTIVE
CLOTHING TECHNOLOGY