

PROTECTIVE GARMENTS

Comfort that Protects

Kimberly-Clark Professional Protective garments are designed to protect workmen while providing them comfort and helping the production to comply with global standards.

Industrial hygienists surveyed agree :

'COMFORT DRIVES COMPLIANCE'

If workers feel uncomfortable and hot they either modify the protective garment or avoid wearing.

This leads to -

- Unsafe conditions for workers
- Production faces the difficulty to comply with standards

KIMBERLY-CLARK* has developed nonwoven fabric for protective garment which is superior in :

Breathability - breathable fabric allows heat and perspiration to evaporate leading to comfort and the microfine layer of the garment acts as the barrier, keeping out the hazardous particles out providing protection.

Design - made from patented REFLEX* Coverall design which exceeds ANSI minimum standards. With this design the K-C garments are larger in size and 7.5 times less likely to rip out Vs. ANSI sized garment. That means they provide longer wear which results in lower cost-in-use and increased worker productivity.



At Kimberly-Clark, we don't think your employees should have to choose between comfort and protection. That's why our protective garments offers both.

BREATHABILITY

There are numerous methods for measuring the protection a garment offers, but the issue of comfort has been more difficult to gauge quantitatively. The question remains, how can you tell what the material tests will actually mean to the person working in the garment? Researchers are now starting to look at a new method for assessing the ability of a garment to feel comfortable when worn—the micro-environment inside a protective suit.



The micro-environment, or the space between the skin and the clothing, can tell you more about how the wearer perceives comfort than any analytical methods that measure the breathability of only the material.

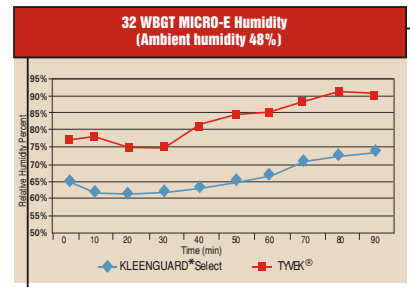
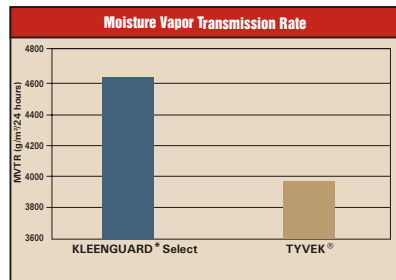
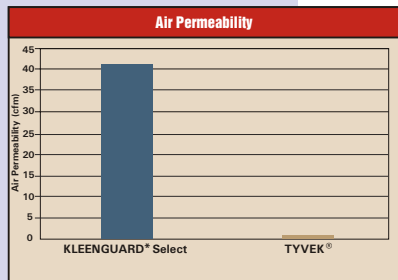
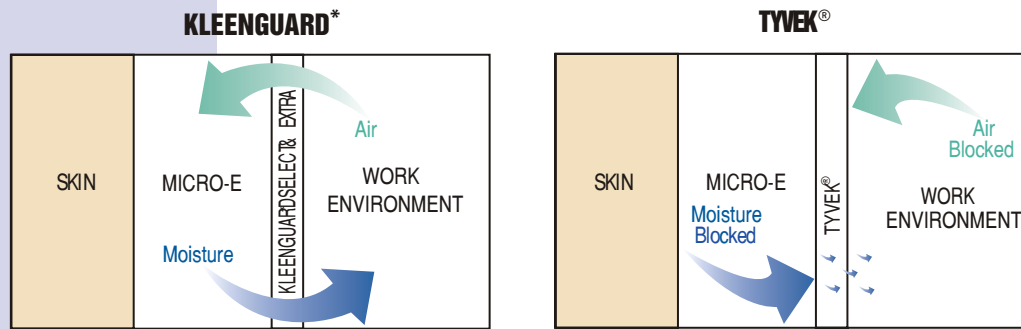
Within the micro-environment there are two factors that determine comfort:

- 1) humidity in the space between the suit and the skin, and
- 2) the skin temperature.

The body’s primary cooling mechanism uses the evaporation of sweat to dissipate body heat. A material capable of supporting this natural cooling cycle allows moisture to pass freely through to the exterior. As moisture leaves, a lower humidity level is recorded in the micro-environment.

In controlled comfort studies utilizing simulated working conditions (moderate work rate at 300 Kcalories per hour for up to 90 minutes—equivalent to drilling or abatement work tasks) in warm and hot environments, Kleenguard* were shown to have low micro-humidity over the duration of the work period.

Lower micro-humidity means that more sweat is evaporated through the material and the worker remains cooler, longer. A more comfortable worker can be more productive.



KLEENGUARD* Select - MICROFORCE™ Barrier 3-layer spunbond-meltblown-spunbond
 TYVEK® - flash-spun polyethylene

These results were confirmed by working subjects who selected both Kleenguard*A20 and Kleenguard* A30 coveralls as overall more comfortable than Tyvek®.

DESIGN

REFLEX* COVERALL DESIGN vs. MINIMUM ANSI SIZING

GENEROUS CUT — The shoulders and body (including the seat and crotch) have a fuller cut, to enhance comfort while reducing pulls, tears, and ripouts.

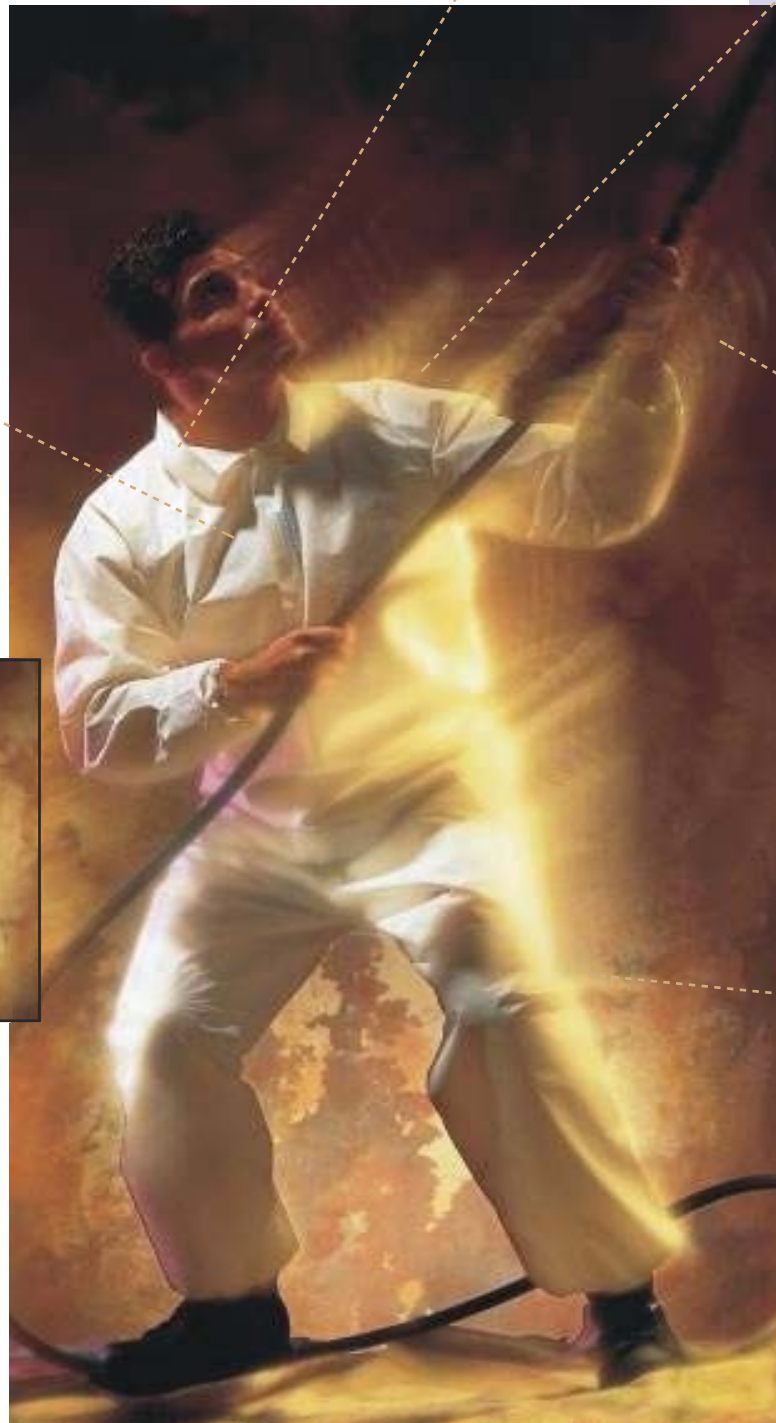
SIZED TO PLEASE — The REFLEX* design is cut larger than ANSI minimums, which means you don't need to stock as many garments. Plus, it's available in up to six versatile sizes for a greater range of wearers.

**9% More
Total Yards
of Fabric**

SEAMLESS FRONT — The seams are in the back, in order to provide more protection in the primary exposure areas.



ELASTIC WAIST — An elastic waist on general protection coveralls acts as a belt for a better fit and increased comfort.



**12% More
Chest Room**

**UNSURPASSED
DETAILING** — All general protection coveralls feature three-thread overlap stitching for strength and durability.

**7½ Times
Less Likely
To Rip Out**

ROOM TO MOVE — There's more fabric in key stress areas for greater range-of-motion.

**6% Longer
Body Length**

Our REFLEX* Coverall Design Means Extra Comfort And Longer Wear.

KIMBERLY-CLARK* Protective Garments features our unique, patented REFLEX* Coverall Design which exceeds ANSI minimum standards. Kimberly-Clark* garments with the REFLEX* Coverall Design are larger and 7.5 times less likely to rip out vs. coveralls sewn to ANSI minimum sizing. That means they provide longer wear, which results in a lower cost-in-use and increased worker productivity.

Our Quality Shows In Every Seam.



A **SERGED SEAM** is a basic stitched seam that's appropriate for exposure to non-hazardous substances. Overlap stitching provides strength and durability.



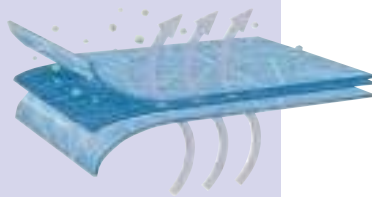
A **BOUND SEAM** is a serged seam that's reinforced with binding for strength and tear resistance.



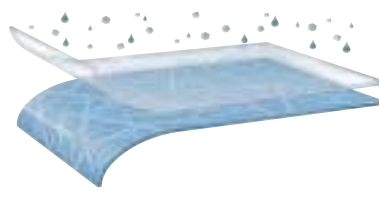
A **TAPED SEAM** is serged, then reinforced with a film tape that's resistant to water and many liquid chemicals.

If your application requires a taped seam that is chemical resistant, you should ensure that the tape offers appropriate resistance to the chemical involved.

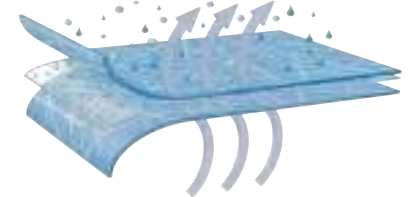
Our Quality Shows In Every Fabric.



KLEENGUARD* Apparel MICROFORCE™ Barrier SMS Fabric
Outer layers — Cloth-like, yet tough and abrasion-resistant spunbond polypropylene
Middle layer — Intricate web of microfibers that filters out many water-based liquids and dry particulates



KLEENGUARD* A70 and KLEENGUARD* A80 Apparel Fabrics
Outer layer — Film coating resists splash and spray from many liquids and dry particulates
Inner layer — Cloth-like, yet tough and abrasion-resistant spunbond polypropylene



KLEENGUARD* A60 Apparel Fabric
Outer layers — Cloth-like, yet tough and abrasion-resistant spunbond polypropylene
Middle layer — Breathable microporous film offering resistance to many liquids and dry particulates



Made from a breathable, micro-porous film laminate, KLEENGUARD* A40 is an excellent replacement for TYVEK® . . .

- better liquid barrier
 - better particulate barrier
 - lower in lint
 - meets ANSI/ISEA 101-1996 sizing standard
 - passes NFPA 99 criteria for antistatic materials
- . . . at an everyday value price!

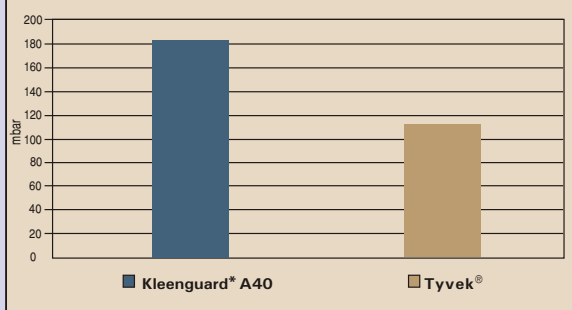




PROPERTIES OF APPAREL FABRICS				
PHYSICAL PROPERTIES		TEST METHOD	KLEENGUARD [®] A40	TYVEK [®]
Tensile Strength	(MD)	ASTM D5034	30.6 lbs	24 lbs
	(CD)		21.4 lbs	17.5 lbs
Trapezoidal Tear	(MD)	INDA IST 100.2	11.0 lbs	6.2 lbs
	(CD)		7.2 lbs	5.2 lbs
Elongation	(MD)	ASTM D5034	72%	31%
	(CD)		89%	23%
Lint - # of particles > 0.5 microns		INDA 160.1-92	761	1847
Flammability		CPSC 1610	Class 1	Class 1
BARRIER PROPERTIES		TEST METHOD	RESULTS	RESULTS
Hydrohead		AATCC 127-194	187 mbar	112 mbar
Particle Holdout (0.3-0.5 microns)		Outside Lab	100%	88.4%

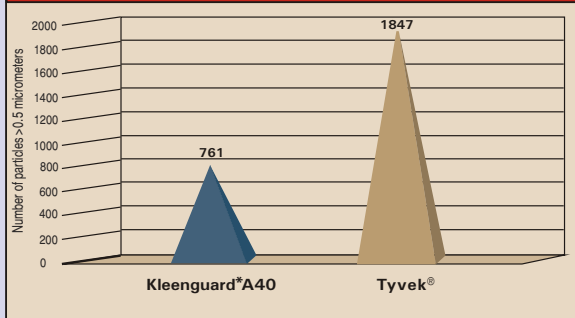
PRODUCT COMPETITIVE ANALYSIS

Liquid Hydrohead Barrier Properties



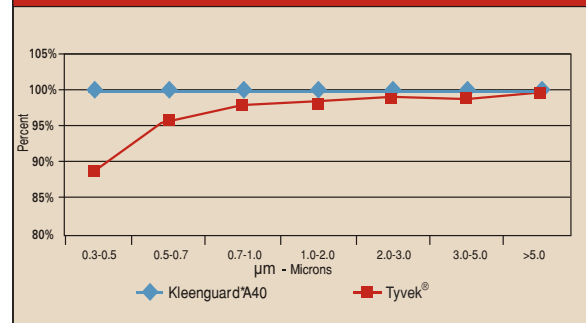
67% BETTER
LIQUID PROTECTION!

Lower Linting



Study conducted by KC-USA

Dry Particle Holdout



PARTICLES : 0.3 - 0.5 - MICRONS
KLEENGUARD XP : 100% HOLDOUT
TYVEK : 88.4% HOLDOUT

Suggested Area of Use

- Maintenance/General Clean Up/ Shut down Operations
- Dusty Environments/Fine particle protection/Fiberglass
- Asbestos/Lead Abatement
- Food processing
- Laboratories/Pharmaceuticals
- Agricultural
- Electronics
- Aerospace



With all the protection you expect from KLEENGUARD[®] but now even more durable, KLEENGUARD[®]A30 is made from heavier fabric. Patented MICROFORCE[™] Barrier fabric enhances the performance of this premium SMS fabric, giving it superior particle holdout while allowing excellent breathability. Available in white.

(KLEENGUARD[®] Coveralls meet the criteria for pesticide application for California's Department of Pesticide Regulation, a division of the state EPA.)



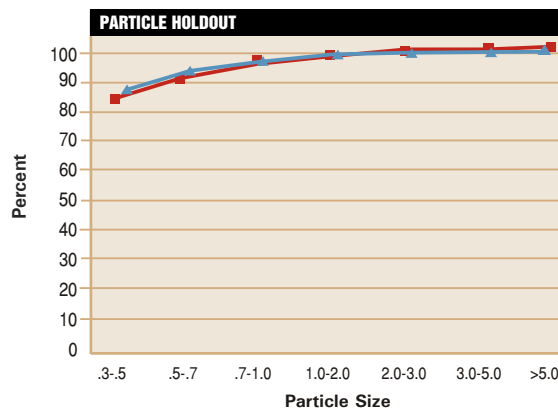
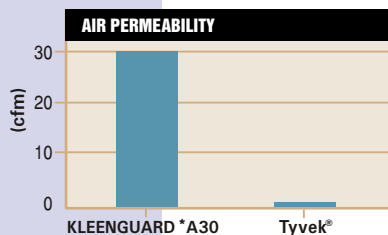


PROPERTIES OF KLEENGUARD [®] A30 Apparel Fabric		
PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength (MD)	ASTM D5034	29.7 lbs
(CD)		20.8 lbs
Trapezoidal Tear (MD)	INDA IST 100.2	9.9 lbs
(CD)		6.9 lbs
Elongation (MD)	ASTM D5034	41%
(CD)		53%
Mullen Burst	ISO 13938-1	42.5 psi
Static Decay (<0.5 sec)	NFPA 99	Pass
Flammability	CPSC 1610	Class 1
BARRIER PROPERTIES	TEST METHOD	RESULTS
Hydrohead	AATCC 127-194	88.2 cm
COMFORT PROPERTIES	TEST METHOD	RESULTS
Air Permeability	ASTM D737	29.5 cfm
MVTR	ASTM E96	4506 g/m ² /24 hr

Suggested Area of Use

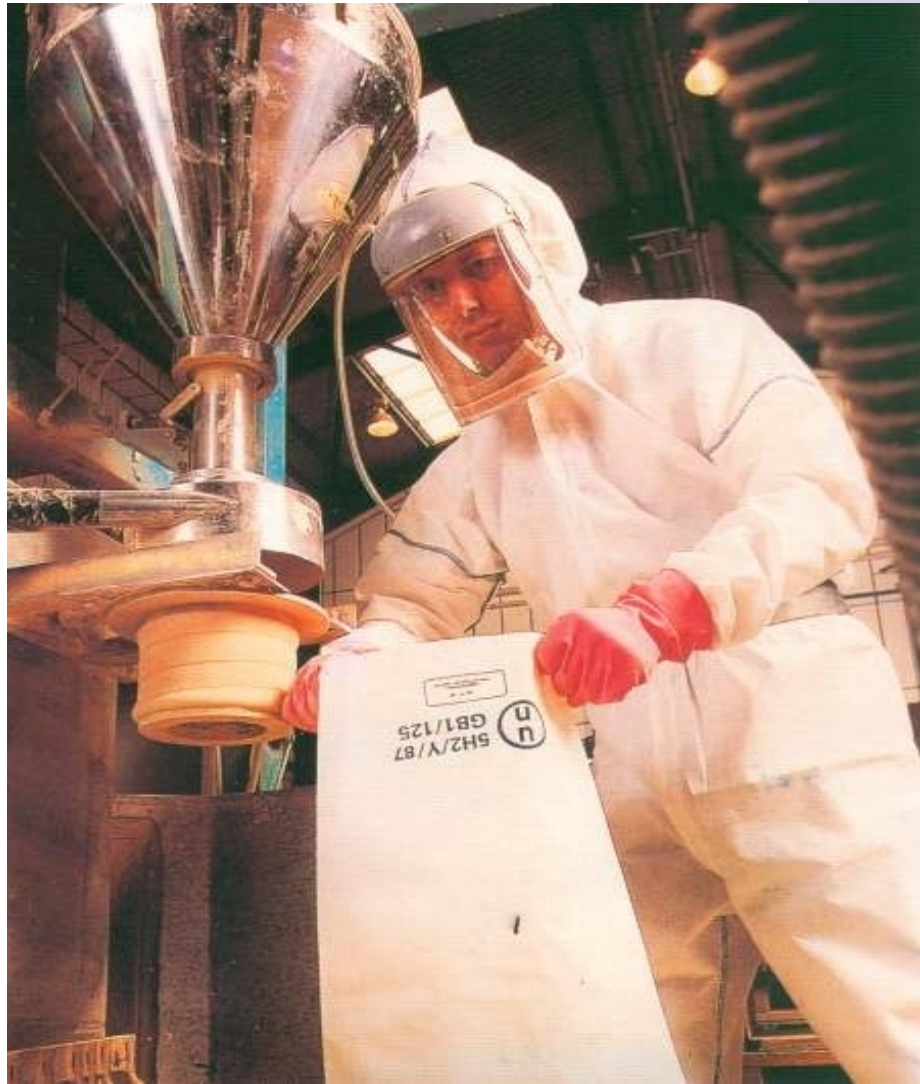
- Maintenance/General Clean Up/Shutdown Operations
- Working with oil and grease
- Manufacturing/Assembly Operations
- Dusty Environments/Fine particle protection/Fiberglass
- Asbestos/Lead Abatement
- Food processing
- Laboratories/Pharmaceuticals
- Agricultural
- Electronics
- Aerospace
- Printing
- Mold Remediation

PRODUCT COMPETITIVE ANALYSIS



Study conducted by KC-USA





Made from a breathable patented MICROFORCE™ Barrier SMS Fabric that offers significantly improved barrier protection on submicron size particles (0.26 micrometers). Strong and abrasion-resistant for extended wear. Offers protection against dry particulates and light liquid sprays. Available in denim blue and white.

(KLEENGUARD* Coveralls meet the criteria for pesticide application for California's Department of Pesticide Regulation, a division of the state EPA.)



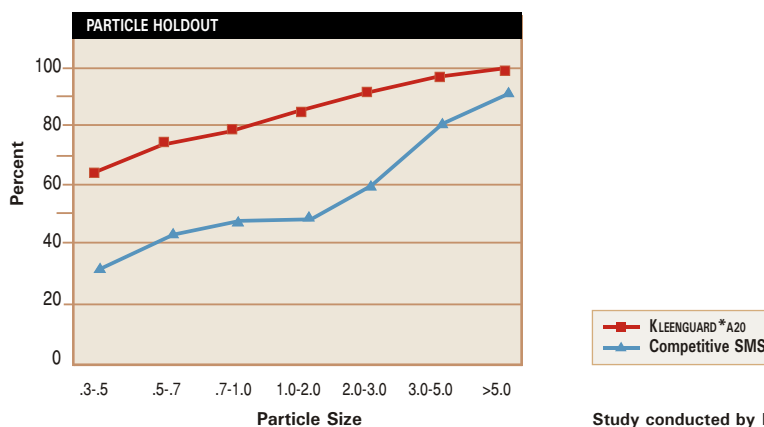


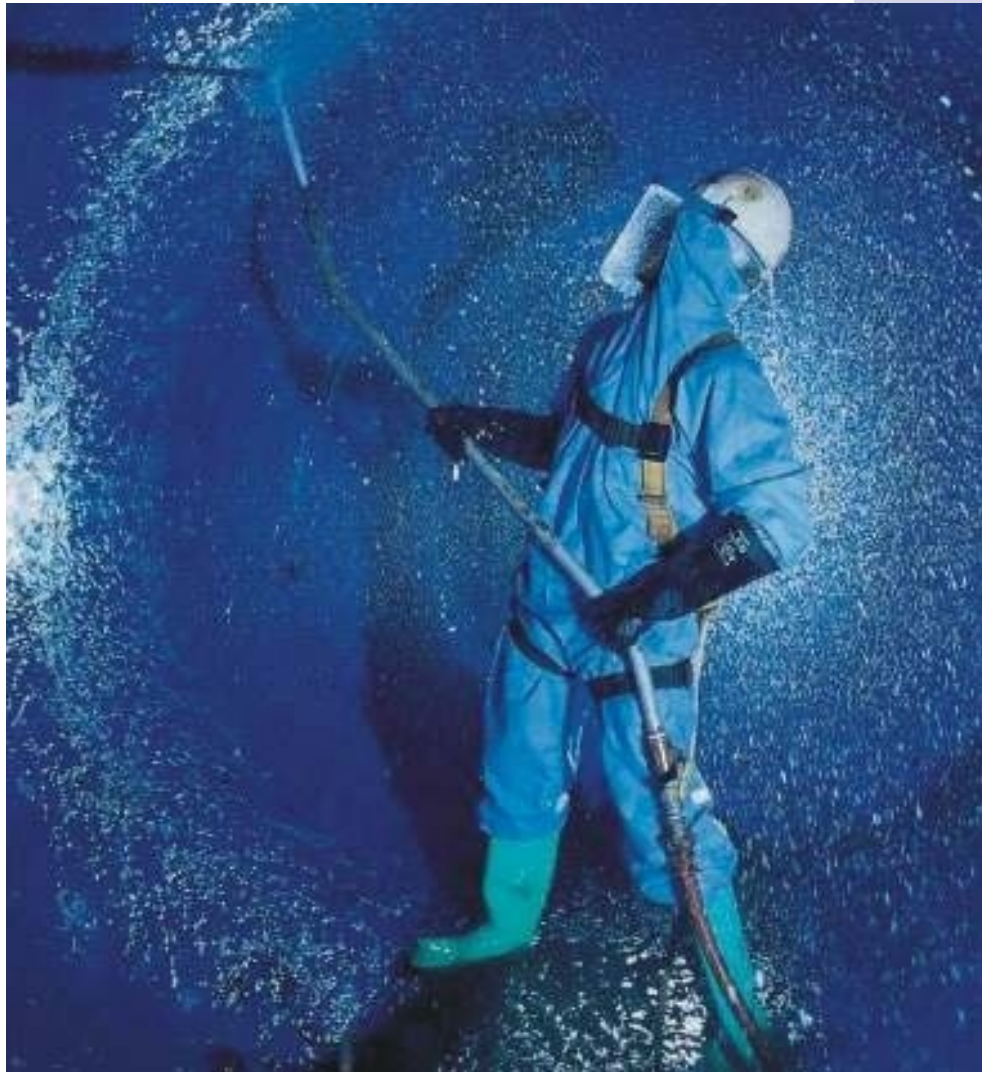
Suggested Area of Use

- Maintenance/General Clean Up/
Shut down Operations
- Working with oil and grease
- Manufacturing/Assembly Operations
- Dusty Environments/Fine particle
protection/Fiberglass
- Asbestos/Lead Abatement
- Food processing
- Laboratories/Pharmaceuticals
- Agricultural
- Electronics
- Aerospace
- Printing

PROPERTIES OF KLEENGUARD [®] A20 Apparel Fabric		
PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength(MD)	ASTM D5034	26.4 lbs
(CD)		17.2 lbs
Trapezoidal Tear (MD)	INDA IST 100.2	9.2 lbs
(CD)		4.8 lbs
Elongation (MD)	ASTM D5034	45%
(CD)		56.7%
Mullen Burst	ISO 13938-1	36.4 psi
Static Decay (<0.5 sec)	NFPA 99	Pass
Flammability	CPSC 1610	Class 1
BARRIER PROPERTIES	TEST METHOD	RESULTS
Hydrohead	AATCC 127-1998	72.8 cm
COMFORT PROPERTIES	TEST METHOD	RESULTS
Air Permeability	ASTM D737	41.8 cfm
MVTR	ASTM E96	4639 g/m ² 24 hr

PRODUCT COMPETITIVE ANALYSIS





The patented three-layer fabric construction of **KLEENGUARD[®] ULTRA** features a middle layer of microporous film that allows heat and sweat vapor to escape, yet protects against many dry particulates and liquids, even under pressure. It also passes **ASTM F1670/1671** testing for penetration of blood, body fluids and blood-borne pathogens. And the thicker, more uniform outer layers provide even better protection of the film barrier against tearing and abrasion. This results in the ultimate combination of durability, comfort and protection. Available in denim blue.





PROPERTIES OF KLEENGUARD [®] A60 Apparel Fabric		
PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength (MD)	ASTM D5034	27.2 lbs
(CD)		18.7 lbs
Trapezoidal Tear (MD)	INDA IST 100.2	7.1 lbs
(CD)		4.3 lbs
Elongation (MD)	ASTM D5034	37.9%
(CD)		61.7%
Mullen Burst	ISO 13938-1	40.6 psi
Static Decay (< 0.5 sec)	NFPA 99	Pass
Flammability	CPSC 1610	Class 1
BARRIER PROPERTIES	TEST METHOD	RESULTS
Hydrohead	AATCC 127-1998	226 cm
Blood Penetration	ASTM F1670	Pass
Blood-Borne Pathogens	ASTM F1671 ‡	Pass
COMFORT PROPERTIES	TEST METHOD	RESULTS
MVTR	ASTM E96	2725 g/m ² /24 hr

‡ 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.

Suggested Area of Use

Ideal for wet jobs in:

- Manufacturing plants
- Tank cleaning
- Emergency medical response
- Liquid handling
- Cleaning applications
- Rubber manufacturing
- Pressure washing
- Farm and agricultural settings
- Fiberglass handling
- Utilities
- Nuclear facilities
- Embalming/Forensics
- Crime Scene Clean-up

LIQUID CHEMICAL RESISTANCE TEST / KLEENGUARD [®] A60 FABRIC	
CHEMICALS	PENETRATION ASTM F903 (PROCEDURE D)
Carbon Disulfide	Pass Δ
Dichloromethane	Pass Δ
n-Hexane	Pass
Sodium Hydroxide (50%)	Pass
Sulfuric Acid (97%)	Pass
Tetrahydrofuran	Pass
Sodium Hypochlorite (100% household bleach)	Pass
Valspar Isocyanate Hardener	Pass

Δ WARNING: Fabric passes Penetration testing; however, the chemical is considered a known/suspected carcinogen or skin absorbed toxin.

PRODUCT COMPETITIVE ANALYSIS

KLEENGUARD[®] A60 PROVIDES BLOODBORNE PATHOGEN BARRIER

	KLEENGUARD [®] A60	Tyvek [®]
ASTM F1670		
Blood Penetration	Pass	Fail
ASTM F1671‡		
Blood Borne Pathogen	Pass	Fail

Study conducted by KC-USA



Made from a polyethylene-coated fabric that's lightweight and resistant to many water-based liquids, greases and oils, and liquid chemical splashes and sprays. KLEENGUARD[®]A70 Protective Garments pass ASTM F903 penetration testing for the wide range of liquid chemicals represented by ASTM F1001. KLEENGUARD[®]A70 passes the ASTM F1670/1671† testing for penetration of blood, body fluids and blood-borne pathogens. Also, California's Department of Pesticide Regulation, a division of the state EPA, has approved KLEENGUARD[®]A70 Protective Garments as chemical protection in pesticide applications. KLEENGUARD[®]A70 is an excellent lower-cost alternative for basic chemical splash protection.

PROPERTIES OF KLEENGUARD [®] Apparel Fabric		
PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength (MD)	ASTM D5034	25.1 lbs
(CD)		9.6 lbs
Trapezoidal Tear (MD)	INDA IST 100.2	9.4 lbs
(CD)		6.6 lbs
Elongation (MD)	ASTM D5034	47%
(CD)		56.6%
Mullen Burst	ISO 13938-1	36.8 psi
Flammability	CPSC 1610	Class 1
Hydrohead	AATCC 127-1998	277 cm
Blood Penetration	ASTM F1670	Pass
Blood-Borne Pathogens	ASTM F1671†	Pass

LIQUID CHEMICAL RESISTANCE TEST/REPEL [®] Apparel Fabric	
ASTM F1001 Liquid Chemicals	PENETRATION ASTM F903 PROCEDURE C
Acetone	Pass
Acetonitrile	Pass Δ
Carbon Disulfide	Pass Δ
Dichloromethane	Pass Δ
Diethylamine	Pass Δ
n,n-Dimethylformamide	Pass Δ
Ethyl Acetate	Pass
n-Hexane	Pass
Methanol	Pass Δ
Nitrobenzene	Pass Δ
Sodium Hydroxide (50%)	Pass
Sulfuric Acid (98%)	Pass
Tetrachloroethylene	Pass Δ
Tetrahydrofuran	Pass
Toluene	Pass Δ

Δ **WARNING:** Fabric passes penetration testing; however, the chemical is a known or suspected carcinogen or skin absorbed toxin.

Suggested Area of Use

Ideal for general protection and splash exposure chemical applications, including:

- Agricultural mixing and spraying
- Chemical handling
- Environmental clean-up
- Oil refining
- Acid/caustic splash
- Tank cleaning
- Pesticide application
- Biohazard clean-up
- Paint booth

For more information log on to www.kc-safety.com/tech_crg.html



PRODUCT COMPETITIVE ANALYSIS

PROTECTIVE APPAREL	KLEENGUARD [®] A70	TYVEK [®]
CHEMICALS	PENETRATION ASTM F903 PROCEDURE D	PENETRATION ASTM F903 PROCEDURE D
Toluene Diisocyanate (TDI)	Pass	Fail
Methylene bisphenyl isocyanate (MDI)	Pass	Fail
Hexamethylene diisocyanate (HMDI)	Pass	Fail
Malathion (50%)	Pass	Fail
ROUNDUP [®] (100%)	Pass	Fail
ORTHENEX [®] (50%)	Pass	Fail

Study conducted by KC-USA



Made from a nonwoven fabric with an exterior that is laminated with a 1.3 mil polyethylene film and an interior that has a comfortable, cloth-like feel against the skin. Designed with no seams in the front of the garment (the primary splash area). Available with serged or bound seams.

PROPERTIES OF KLEENGUARD [®] A70 Apparel Fabric		
PHYSICAL PROPERTIES	TEST METHOD	RESULTS
Tensile Strength (MD)	ASTM D5034	40.1 lbs
(CD)		31.1 lbs
Trapezoidal Tear (MD)	INDA IST 100.2	14.8 lbs
(CD)		9.4 lbs
Mullen Burst	ISO 13938-1	46.8 psi
Flammability	CPSC 1610	Class 1
Hydrohead	AATCC 127-1998	378 cm
Blood Penetration	ASTM F1670	Pass
Blood-Borne Pathogens	ASTM F1671‡	Pass

LIQUID CHEMICAL RESISTANCE TEST/ KLEENGUARD [®] A70			
ASTM F1001 Liquid @ ml/sal	PENETRATION ASTM F903	PERMEATION ASTM F739 Normalized Breakthrough (min.)	Rate µg/cm ² /min
Acetone	Pass	Immediate	High
Acetonitrile	Pass	△	Immediate 2.5
Carbon Disulfide	Pass	△	Immediate High
Dichloromethane	Pass	△	Immediate High
Diethylamine	Pass	△	Immediate High
n,n-Dimethylformamide	Pass	△	Immediate 1.9
Ethyl Acetate	Pass		Immediate 5.8
n-Hexane	Pass		Immediate High
Methanol	Pass	△	Immediate 1.0
Nitrobenzene	Pass	△	Immediate 10.6
Sodium Hydroxide (50%)	Pass	> 480	0.08
Sulfuric Acid (98%)	Pass	> 480	0.04
Tetrachloroethylene	Pass	△	Immediate High
Tetrahydrofuran	Pass		Immediate 32.8
Toluene	Pass	△	Immediate High

Suggested Area of Use

- Hazardous waste remediation
- Environmental clean-up
- Petrochemical/Oil refining
- Acid/caustic handling
- Biohazard clean-up

When selecting chemical protective clothing, it's important to be sure that the garment offers adequate resistance to the chemicals being handled in your workplace.

△ **WARNING:** Fabric passes penetration testing; however, the chemical is a known or suspected carcinogen or skin absorbed toxin.

‡ 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.

