Level B Chemical Clothing

TECHNICAL MANUAL

Finding Your Way Around

Each section in a given chapter begins with an overview of the topic or task discussed. In addition, icons are shown where a topic is important and needs particular attention.

Information that follows this icon provides a warning. Serious injury or death could result if procedures are not followed.

Information that follows this icon includes helpful tips, procedures or references to help you avoid problems or save time.

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Level B Chemical Suits

WARNING:

THERE ARE USES AND CHEMICALS FOR WHICH LAKELAND SUITS ARE NOT APPROPRIATE. THE SUIT WILL PERFORM AS DESIGNED ONLY IF IT IS USED AND SERVICED ACCORDING TO THE INSTRUCTIONS. IT IS THE RESPONSIBILITY OF THE USER TO SELECT A SUIT WHICH IS APPROPRIATE FOR THE INTENDED USE AND WHICH MEETS ALL NATIONAL, STATE AND LOCAL HEALTH AND SAFETY REGULATIONS.

LAKELAND DOES NOT WARRANT THAT THIS SUIT MEETS THE REQUIREMENTS OF ANY SAFETY CODE OF ANY STATE , MUNICIPALITY OR OTHER JURISDICTION.

LAKELAND WARRANTS FOR A PERIOD OF 90 DAYS AFTER THE DELIVERY OF A LAKELAND SUIT THAT THE SUIT IS FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP WHEN USED IN ACCORDANCE WITH THE LEVEL A INSTRUCTIONS CONTAINED IN THIS MANUAL.

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THE PURCHASER AND ALL SUIT USERS NEED TO PROMPTLY NOTIFY LAKELAND OF ANY CLAIM, WHETHER BASED ON CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE.

THIS MANUAL GIVES A GENERAL DESCRIPTION OF LAKELAND'S LEVEL B AND SPLASH SUIT GARMENTS. WHILE SOME USES AND PERFORMANCE CAPABILITIES ARE DESCRIBED, UNDER NO CIRCUMSTANCES SHOULD THE PRODUCT BE USED EXCEPT BY QUALIFIED, TRAINED PERSONNEL, AND NOT UNTIL THE INSTRUCTIONS, LABELS, OR OTHER LITERATURE ACCOMPANYING THE PRODUCT HAVE BEEN CAREFULLY READ AND UNDERSTOOD AND THE PRECAUTIONS SET FORTH THEREIN FOLLOWED. ONLY THEY CONTAIN THE COMPLETE AND DETAILED INFORMATION CONCERNING THIS PRODUCT. ANY PERSON WHO READS THIS MANUAL AND IS STILL UNCERTAIN ABOUT HOW TO SAFELY OPERATE OR SERVICE THIS SUIT SHOULD CONTACT LAKELAND INDUSTRIES FOR MORE INFORMATION.

ALL LAKELAND LEVEL B AND SPLASH SUIT GARMENTS ARE MANUFACTURED AND SOLD IN THE U.S.A. BY LAKELAND'S CHEMICAL CLOTHING DIVISION, A WHOLLY OWNED DIVISION OF LAKELAND INDUSTRIES, INC.

Precautions

Precautions

Level B requires the highest level of respiratory protection. Level B protective clothing would include either a one piece or two-piece ensemble with the SCBA worn outside the garment. Level B requires hand and foot protection either attached in a permanent manner to the garment or "taped" at the interface areas to minimize chemical penetration. Level B garments are to be worn where Level B type chemicals are not vapors or gases with skin toxicity or carcinogenic (cancer causing).

OSHA 1910.120 hazardous Waste Operations and Emergency Response requires that employers develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations and should include in detail the following:

- An organizational work plan
- Site evaluation and control procedures
- A site specific program
- A personal protective equipment program
- A training and information program
- A monitoring program
- A medical program
- A decontamination procedure
- An emergency response procedure

Visual Inspection Checklist

1. Inspect your suit in a clean environment, with good lighting.
2. Inspect the seam tape for lifts or delamination, mark any areas which need to be repaired.
3. Inspect the visor lens for a tight seal and make sure the lens offers a clear vision.
4. Inspect the glove system to make sure they are in good condition and are free from holes, cuts, wear cracks from repeated use, or any other questionable markings.
5. Inspect the suit zipper or closure system, making sure it is in good working condition and performs as intended. If needed metal snaps and zippers may be lubricated with a small amount of paraffin.
6. Inspect all options, velcro, snaps, pockets, etc., to make sure they are in good working order and are in the correct location needed on the protective clothing unit.
7. Inspect the suit material for any signs of deterioration such as cracks, holes or discoloration.

Lakeland suits are designed for limited number of uses and must be replaced when they show signs of defects such as material deterioration, or malfunctioning closure systems.

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Donning & Doffing

Putting on your Lakeland protective garment (Donning)

Make sure the correct suit has been selected for the intended use. Underclothing must be worn under the chemical garment. Coveralls should have sleeves that can be closed tightly and legs that can be tucked into the socks. Coveralls made from flame resistance synthetic materials, such as GoldLeaf®, SilverLeaf®, or BronzeLeaf® Nomex*, offered by Lakeland Industries, are recommended, especially if exposure to flash-fire is a concern. Under extreme conditions, the lens if applicable, may fog up. Carry a clean cloth with you to wipe the lens from the inside. Remove all personal effects such as, pens, badges, jewelry, etc. which might damage the suit.

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If you are using a fully encapsulated suit use the “Buddy System”; have someone available to assist while donning the suit as well as while you are wearing the suit. If you are using a “SCBA” (Self Contained Breathing Apparatus), donn the system according to the manufacturer’s instructions. Make sure the system is working properly before you suit entirely up. If you are using a “Supplied Air Breathing System” make sure all connections are secure before donning the garment.

1. Tuck pant cuff into socks to make donning a suit leg and sock boot easier.

2. While seated place both legs into the suit, pull the suit up until both feet are touching the bottom of the sock boots if applicable, or are through the leg opening of the garment.

3. Place both feet into outer work boots, and pull the boot flaps down over the top of the outer work boots if applicable. The work boots you have selected should be one to two sizes larger than a normal “street” shoe to allow for the sock boot.

4. Stand up and buckle the internal waist belt, if applicable.

5. Place your SCBA face mask on and make sure that it is working properly. make any adjustments needed.

6. Place your arms inside the suit and secure the closure. If you are wearing a fully encapsulated suit place your arms and head inside the suit and secure the closure.

All Lakeland Fully Encapsulated suits are designed to allow the user to easily remove their arm from the sleeve while wearing the suit this allows adjustments to the SCBA and cleaning of the lens.

Removing your Lakeland protective garment (Doffing)

Make sure you leave the “Hot Zone” while enough air remains to safely decontaminate and remove the garment.

Remove the garment by following in reverse order the steps given for donning your protective garment. Avoid touching the outside of the garment. Your employer should have a written procedure to use for decontaminated garments.

Decontamination & Storage

Decontamination Issues:

The Environmental Protection Agency considers decontamination to be a complex operation that requires a detailed plan of procedures. Actual decontamination procedures must be developed by those with full information on the type and level of the contaminant. Consult the Materials Safety Data Sheet for the hazardous substance you are working with.

After decontamination, suits may be hand washed using warm water and a mild detergent. Appropriate equipment should be worn during these activities to prevent contact with any residual contamination. After washing, suits should be rinsed well with warm water and hung away from intense heat or sunlight to dry. Before reuse, a qualified health professional must determine that an adequate level of decontamination has been achieved.

Lakeland chemical protective garments are economically priced limited-use garments, and are not designed for multiple wash and decontamination. Chemical suits which become contaminated with toxic chemicals or show signs of physical wear, should be retired or disposed of in a safe manner.

Lakeland chemical suits may be stored in their original shipping containers. All chemical protective garments should be stored in a cool, dry area away from direct sunlight.

Chemical protective garments contain components made from various polymer or rubber materials for which there is no specific life data currently available. based on the physical condition of the garment, it is recommended that you dispose of the garment according to State, and Local health and Safety regulations.

Prevent Garment Exposure to Cold Environments

Different suit materials perform differently in cold environments. It is the responsibility of the user to evaluate the situation and the useable temperature range of the suit materials available. In situations where extremely cold chemicals may be encountered, the user should wear additional thermal protective clothing which has been selected by a safety professional.

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Concerns of Static Electricity

It is possible for garments to build and discharge static electricity, especially in cold or dry weather. Discharges are not normally dangerous except in situations where generation of an electrical spark could ignite a flammable atmosphere. When operating around flammable chemicals, steps to eliminate potential static discharges should be used. In these situations, recommended precautionary steps include the use of a overcover or raising the humidity level of the workplace.

Permeation Data for ASTM Recommended List of C

		Tyvek QC		Tychem SL		Tychem
Chemical Name	**Physical Phase**	**Normalized Breakthrough Time in Minutes**	**Permeation Rate (μg/cm2/min)**	**Normalized Breakthrough Time in Minutes**	**Permeation Rate (μg/cm2/min)**	**Normalized Breakthrough Time in Minutes**
Acetone	L	Immediate	10	24	1.6	338
Acetonitrile	L	Immediate	16	13	2.8	14
Ammonia	G	Immediate	3.1	32	0.15	125
1,3-Butadiene	G	Immediate	12	>480	<.001	>480
Carbon Disulfide	L	Immediate	High	Immediate	>50	>480
Chlorine Gas	G	Immediate	>50	>480	<.07	>480
Dichloromethane	L	Immediate	High	Immediate	>50	Immediate
Diethylamine	L	Immediate	64	12	>50	>480
N, N-Dimethylformamide	L	Immediate	0.72	109	0.84	>480
Ethyl Acetate	l	Immediate	12.7	Immediate	0.54	>480
Ethylene Oxide	G	Immediate	168	Immediate	8.4	75
n-Hexane	L	Immediate	High	146	0.48	>480
Hydrogen Chloride	G	Immediate	9.3	>480	<0.1	195
Methanol	L	Immediate	2.2	>480	<.001	71
Methyl Chloride	G	Immediate	0.27	>480	>.006	>480
Nitrobenzene	L	Immediate	18	102	2.3	>480
Sodium Hydroxide, 50%	L	>480	<.001	>480	<.001	>480
Sulfuric Acid (conc.)	L	>480	ND	>480	ND	>480
Tetrachloroethylene	L	Immediate	High	Immediate	5.7	>480
Tetrahydrofuran	L	Immediate	183	Immediate	>50	316
Toluene	L	Immediate	High	Immediate	30	>480

Numbers reported are average of samples tested by the ASTM F739 test method. Sample results do vary and therefore

ND = None Detected > = greater than < = less than G = gas

Chemicals (ASTM F1001)

7500	Barricade		Tychem 9400		Tychem 10,000	
Permeation Rate (μg/cm2/min)	Normalized Breakthrough Time in Minutes	Permeation Rate (μg/cm2/min)	Normalized Breakthrough Time in Minutes	Permeation Rate (μg/cm2/min)	Normalized Breakthrough Time in Minutes	Permeation Rate (μg/cm2/min)
0.16	>480	<.001	>480	<.001	>480	<.001
180	>480	<.004	>480	<.004	>480	<.007
0.5	45	0.69	45	0.69	>480	<.07
<.001	>480	<.001	>480	<.001	>480	<.001
<.07	>480	<.001	>480	<.001	>480	<.001
<.09	>480	<.02	>480	<.02	>480	<0.17
0.3	391	0.09	391	0.09	>480	<.001
<.001	>480	<.001	>480	<.001	>480	<.001
<.001	>480	<.001	>480	<.001	>480	<.001
<.001	>480	<.001	>480	<.001	>480	<.001
2.7	>480	<.03	>480	<.03	>480	<.02
<.001	>480	<.001	>480	<.001	>480	<.001
0.33	>480	<0.1	>480	<0.1	>480	<0.1
0.17	150	0.91	150	0.91	>480	ND
<.001	>480	<.001	>480	<.001	>480	<.03
<.001	>480	<.001	>480	<.001	>480	<.001
<0.7	>480	<.001	>480	<.001	>480	<.001
ND	>480	<.1	>480	ND	>480	ND
<.001	>480	<.001	>480	<.001	>480	<.001
0.19	>480	<.001	>480	<.001	>480	<.001
<.001	>480	<.001	>480	<.001	>480	<.001

averages for thsse results are reported.

L = liquid

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Chemical Warfare Agents - Permeation

Agent	Common Name	Protocol	Average Breakthrough Time	Minimum Detectable Permeation
Tychem® 10,000 Fabric				
GA	Tabun	DN6	>12Hrs	<0.0002
GB	Sarin	DN6	>12Hrs	<0.0002
GD	Soman	DN6	>12Hrs	<0.0002
HD	Sulfur Mustard	DN4	>12Hrs	<0.2000
L	Lewisite	DN4	>12Hrs	<0.0120
VX		DN6	>12Hrs	<0.0002
Tychem® 9400 Fabric				
GA	Tabun	DN5	>12Hrs	<0.0001
GB	Sarin	DN5	>12Hrs	<0.0001
GB	Sarin	DN6	>12Hrs	<0.0001
GD	Soman	DN5	>12Hrs	<0.0001
HD	Sulfur Mustard	DN3	>12Hrs	<0.1000
HD	Sulfur Mustard	DN4	>12Hrs	<0.1000
L	Lewisite	DN3	>12Hrs	<0.0060
L	Lewisite	DN4	>2Hrs	<0.0042
VX		DN5	>12Hrs	<0.0001
VX		DN6	>12Hrs	<0.0002

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Test Methods:

All tests performed in triplicate for DuPont Nonwovens by an independant accredited laboratory.
Protocol DN3-MIL-STD-282, Method T-209 (HD) or modified for Lewisite, for 12 hours at 10 g / m^2
Protocol DN4-MIL-STD-282, Method T-209 (HD) or modified for Lewisite, for 12 hours at 100 g / m^2 (total coverage)
Protocol DN5-MIL-STD-282, Method T-209 (GB) or modified for GA, GD, and VX, for 12 hours at 10 g / m^2
Protocol DN6-MIL-STD-282, Method T-209 (GB) or modified for GA, GD, and VX, for 12 hours at 100 g / m^2 (total coverage)

Physical Property Data

Material	Basis Weight	MIL	Mullen Burst	Breaking Strength Grab (MD/XD)	Seam Breaking Point	Tearing Strength Trapezoid (MD/XD)
Tyvek® QC Bound Seam	2.1 oz / yd2	6 mils	66 psi	25 / 35 lbs	>17.9 lbf / 2in2	7 / 5 lbs
Tyvek® QC Sealed Seam	2.1 oz / yd2	6 mils	66 psi	25 / 35 lbs	>38.0 lbf / 2in2	7 / 5 lbs
Tychem® SL Bound Seam	3.1 oz / yd2	10.3 mils	78 psi	42 / 45 lbs	>19.0 lbf / 2 in2	11 / 9 lbs
Tychem® SL Sealed Seam	3.1 oz / yd2	10.3 mils	78 psi	42 / 45 lbs	>33.6 lbf / 2 in2	11 / 9 lbs
Tychem® 7500 Bound Seam	3.7 oz / yd2	16 mils	130 psi	64 / 51 lbs	>27.5 lbf / 2in2	21 / 16 lbs
Tychem® 7500 Sealed Seam	3.7 oz / yd2	16 mils	130 psi	64 / 51 lbs	>50.4 lbf / 2 in2	21 / 16 lbs
Tychem® 9400 Sealed Seam	6.1 oz / yd2	17 mils	110 psi	107 / 71 lbs	>57.6 lbf / 2 in2	48 / 27 lbs
Barricade Sealed Seam	5.3 oz / yd2	21 mils	190 psi	99 / 95 lbs	NT	25 / 24 lbs
Tychem® 10,000 Single Seal Seam	9.5 oz / yd2	29 mils	204 psi	197 / 178 lbs	>69.7 lbf / 2 in2	36 / 50 lbs
Tychem® 10,000 Double Seal Seam	9.5 oz / yd2	29 mils	204 psi	197 / 178 lbs	>106.0 lbf / 2 in2	36 / 50 lbs

Test Methods: Basis Weight: ASTM D3776-90, Thickness: ASTM D1777-75,
Mullen Burst: ASTM D3786-87, Breaking Strength: ASTM D5034-90, Seam Breaking Point: ASTM D751,
Tearing Strength: ASTM D1117-80. NT = Not Tested

Sizing Chart - Limited Use

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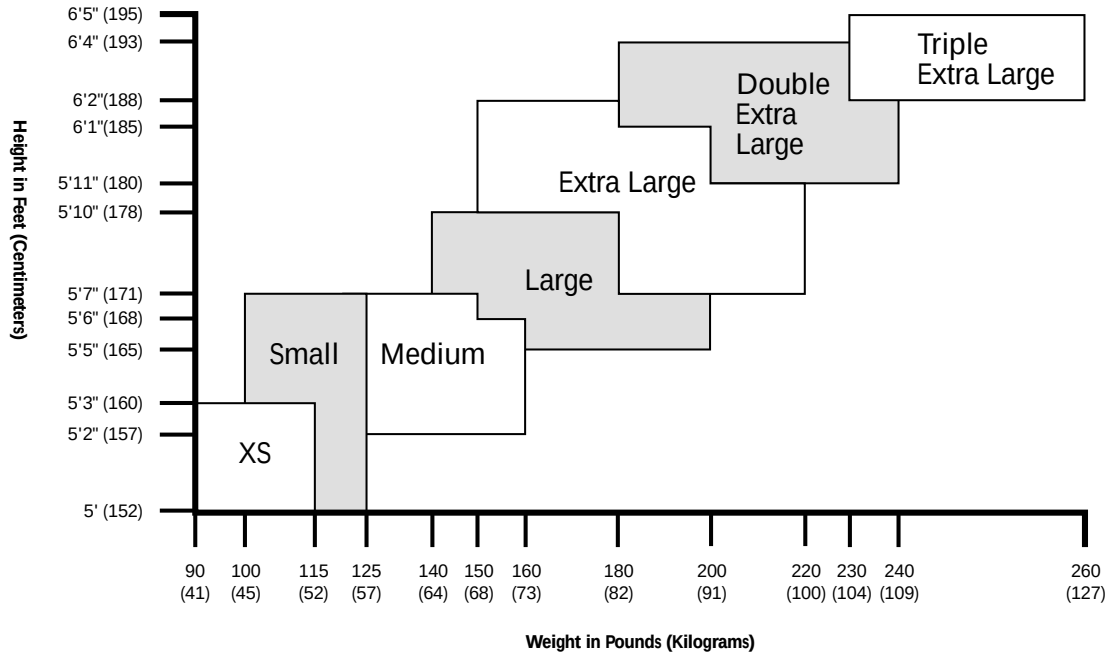
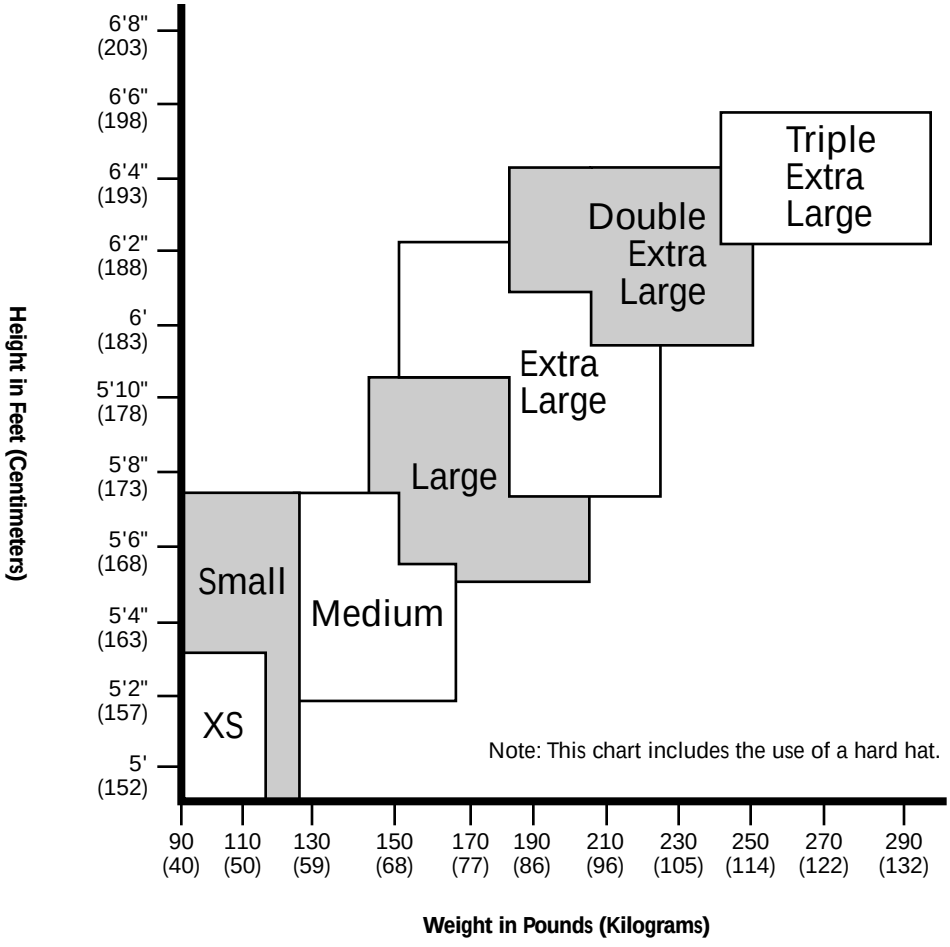
Recommended Sizing Chart for Limited–Use and Disposable Coveralls



Sizing Chart - Chemical Protective Clothing

Recommended Sizing Chart for Total Encapsulated Suits



Inspections

Quarterly Inspections Chart

Inspection Date	Inspected By	Remarks	Inspection/ Air Test Results

Alliance Suppliers Inc.
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