

# Tychem® 10,000

## NFPA AND LEVEL A TOTAL ENCAPSULATED SUIT MANUAL

Certified NFPA 1991 2000 Edition Model Numbers

11645

11655

12645

12655

DU PONT®

Tychem® 10,000

LEVEL A

### CAUTION!

Most performance properties of the vapor protective ensemble or individual elements cannot be tested by the user in the field.

NFPA 1991, 2000 Ed. Section 3-2.4 1D

MANUFACTURED BY

 **Lakeland**®  
INDUSTRIES, INC.

### NOTICE!

This user information manual is to be removed only by the end user.

NFPA 1991, 2000 Ed. Section 3-2.3



**Lakeland**  
INDUSTRIES, INC

# 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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# Tychem® 10,000 Level A Chemical Suit and NFPA Complete Ensembles

## **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 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 A CHEMICAL SUIT AND NFPA COMPLETE ENSEMBLES. 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 A CHEMICAL SUITS AND NFPA ENSEMBLES ARE MANUFACTURED AND SOLD IN THE U.S.A. BY LAKELAND'S CHEMICAL CLOTHING DIVISION, A WHOLLY OWNED DIVISION OF LAKELAND INDUSTRIES, INC.

# Warranty Card

Style Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Purchased From: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

End User Name: \_\_\_\_\_

Product Ship To: \_\_\_\_\_

Street \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

Zip: \_\_\_\_\_ Phone: \_\_\_\_\_

Lot Number(s): \_\_\_\_\_

Pressure Test Results: \_\_\_\_\_

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**Please rate the following:**

	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Quality of construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value versus price paid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comfort and fit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promptness of delivery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accuracy of order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Service given by distributor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will you purchase through the same distributor again?			<input type="checkbox"/> Yes	<input type="checkbox"/> No
When you purchase protective clothing again, will you ask for the Lakeland brand?			<input type="checkbox"/> Yes	<input type="checkbox"/> No
Comments: _____				

# Level A and NFPA Requirements

Level A represents the greatest danger of respiratory, eye or skin damage from hazardous vapors, gases, particulates, sudden splash, immersion or contact with hazardous materials. It calls for total encapsulation in a vapor-proof chemical suit with self contained breathing apparatus (SCBA) and appropriate accessories.

## **Level A Conditions:**

1. Unknown Hazards
2. Immediately Dangerous to Life Health (IDLH) Atmospheres
3. Atmosphere contains less than 19.5% oxygen
4. Percutaneous Chemicals
5. Vapors/Liquids Injurious to Skin

## **Personnel Protection Equipment Required:**

1. Self Contained Breathing Apparatus (SCBA), or positive pressure supplied air respirator with SCBA (NIOSH approved)
2. Fully encapsulating chemical resistant suit
3. Coveralls\*
4. Long underwear\*
5. Gloves-(outer), chemical resistant  
Gloves-(inner), chemical resistant
6. Boots-chemical resistant, steel toe and shank
7. Hard hat\* (under suit)

8. Disposable protective suit, gloves, and boots\*
9. Two-way radio communication\* (intrinsically safe)
10. An air leakage test to ensure suit is vapor proof.

\*Optional

In addition to meeting all OSHA Level A requirements, NFPA imposes even higher levels of protection on NFPA Complete Ensembles. The same conditions exist as Level A with additions to the personal protective equipment list.

1. Permeation test done on not only suit material, but on gloves and seams.
2. Flammability test.
3. Special labeling requirements.



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See “Specifications – Tychem® 10,000 Chemical Suit” section in this manual.

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# Letter of Certification



S A F E T Y E Q U I P M E N T I N S T I T U T E  
1307 Dolly Madison Blvd. Suite 3A, McLean, VA 22101

September 7, 2000

Mr. Raymond J. Smith  
President  
Lakeland Industries, Inc.  
711-2 Koehler Avenue  
Ronkonkoma, NY 11779

## Certification Letter

Dear Mr. Smith:

SEI is pleased to inform you that the models referenced below passed initial testing on September 5, 2000, and are certified by the Safety Equipment Institute as meeting the base requirements and the optional requirements for Liquefied Gas Protection, as contained in Chapter 5 of *NFPA 1991, Standard of Vapor Protective Ensembles for Hazardous Materials Emergencies, 2000 Edition*:

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<u>SEI Ref. #</u>	<u>Brand Name</u>	<u>Model</u>	<u>Test Completed</u>
VPS LKL 09	Tychem 10,000-Front Entry	12645	November 7, 1996
VPS LKL 10	Tychem 10,000-Rear Entry	12655	October 17, 1996
VPS LKL 11	Tychem 10,000-Front Entry	11645	April 4, 1997
VPS LKL 12	Tychem 10,000-Rear Entry	11655	October 18, 1996

The following pass thru's have been certified for use with the vapor protective suit models listed above:

VPS LKL 09, 10/Variant 01	Scott-Hansen Pass Thru	Option P1
VPS LKL 09, 10/Variant 02	Scott-Schrader Pass Thru	Option P2
VPS LKL 14 (Variant)	Standard Pass Thru	Option P3

The following glove option has been certified for use with the vapor protective suit models listed above:

VPS LKL 13 (Variant)	Quick Disconnect Glove Assembly	G7
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The SEI Certification Mark may be used in the marketing, packaging and promotion of the model detailed above, in accordance with the provisions of the SEI Certification Program Manual. As required by the SEI Certification Program, quality assurance audits of the manufacturing facilities will be performed annually.

Thank you for your participation in the SEI Certification Program. If you have any questions, please call the SEI Office.

Sincerely,

Stephen R. Sanders  
Technical Directors

# Safety and Health Program

An effective and comprehensive safety and health program is essential in reducing work-related injuries and illnesses and in maintaining a safe and healthful work environment. The standard, therefore, requires each employer to develop and implement a written safety and health program that identifies, evaluates, and controls safety and health hazards and provides emergency response procedures for each hazardous waste site or treatment, storage, and disposal facility. The program must be periodically updated and made available to all affected employees, contractors and subcontractors. The employer also must inform contractors and subcontractors and employees of any identifiable health hazards or potential fire or explosion hazards before they enter the worksite. This written program must include specific and detailed information on the following topics:

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1. An organizational workplan.
2. Site evaluation and control.
3. A site-specific program.
4. Information and training program.
5. Personal protective equipment program.
6. Monitoring.
7. Medical surveillance program.
8. Decontamination procedures.
9. Emergency response program.



# Cleaning and Marking the suit

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**!** *Cleaning procedures are not an acceptable procedure for decontamination. The user should develop and implement a decontamination procedure for each of the chemicals to which the suit has been exposed.*

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After decontamination, wash down the suit with a solution of low sudsing powered detergent and water. A product like *Tide*® would be acceptable. Use warm to moderately hot water to cleanse suit inside and out. Wash off solution according to federal, state, and local pollution regulations. This may mean using a catch basin, such as a wading pool. Hang dry at room temperature.

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**!** *Warning! Do not use garments that are not thoroughly cleaned and dried.*

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## ***Marking Recommendations and Restrictions***

Marking can be made on either your aluminumized overcover or Tychem 10000 suit by using a black laundry marker. Reflective lettering may be ordered for either your Tychem 10000 suit or overcover through Lakeland Industries, Inc. This lettering will be permanently attached without compromising the integrity of the suit.

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# Maintenance and Repairs

The Tychem® 10,000 suit should be tested after every use and at least annually, whether it is used or not. If the Tychem® 10,000 suit fails the test, see “Testing” for more information. In addition to testing, the Tychem® 10,000 suit must be inspected after every use and at least annually. A Tychem® 10,000 Inspection Checklist has been provided at the back of this manual to assist in the inspection.

Check the zipper for overall condition, worn or damaged teeth, and ease of operation. Lubricate zipper lightly with paraffin, which is readily available in most grocery stores. Paraffin should be applied lightly to the inner and outer elements. After cycling the zipper several times, the excess flakes should be removed. Do not use a sticky lubricant which could gather and hold particles of dirt, grease, or contaminant.

## Repairs

The gloves on the Level A Tychem® 10,000 suit can be replaced by the end user while in the field. See “Glove Replacements” for instructions. Any other modifications or repairs must be done only by Lakeland personnel.

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**!** **Warning: All NFPA modifications or repairs must be done by Lakeland personnel.**

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**!** **Do not send a contaminated suit to Lakeland! Suits must be decontaminated and cleaned before return or they will be sent back without inspection of suit.**

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**!** When returning a suit to Lakeland, follow the procedures listed below.

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1. Attach the following to the side of the return shipping container:

*If the suit has not been used*, a letter which states that the suit is in a new and unused condition.

*If the suit has been used*, a copy of the decontamination document, listing the procedures used, and a statement indicating that the suit contains no detectable residual contamination.

2. A Return Goods Audit number must be on each container returned. This number will be given out to you by Lakeland’s Customer Service Department.
3. The Tychem® 10,000 Suit should be shipped folded in a case or box.
4. The suit should not be pressurized during shipment.

# Frequency and Details of Inspection

## ***Inspection Record***

Before using the suit, look at the inspection record and check:

1. The date that the suit was last decontaminated.
2. The level of decontamination obtained.
3. The date when the suit was cleaned and sanitized.
4. The date that the suit was tested for leakage resistance with the Lakeland Test Kit (part number 0010).
5. The suit must be checked with Lakeland's Test Kit at least annually.
6. The date that the person making the inspection signed-off, indicating that the suit is ready for reuse. See “*Annual Inspection and Air Pressure Test Chart*”.

## ***Suit Physical Inspection***

1. Look at the suit closely, checking for missing or damaged parts.
2. Look for holes and tears in the fabric.
3. Look for wear or abrasion that could let a chemical penetrate the suit. Inspect all seams thoroughly.
4. Check the gloves and boots for tears or abrasions. Pull on the boots and gloves to make sure that they are firmly attached.
5. Check the lens for cracks or deep scratches.
6. Check that the zipper has been lubricated; see section entitled “*Maintenance and Repairs*”.

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Inspect the breathing apparatus according to the manufacturer's instructions. Check the pressure gauge to be sure that the cylinder is fully charged.



***If you find any signs of wear, damaged, or missing parts, do not use the suit!***

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## ***Retirement and Disposal Criteria***

Use department procedures for disposal of suit. Lakeland Tychem 10,000 suits can be incinerated.

# Test Equipment and Procedures

Tests should be conducted on your Lakeland Level A Suit after every use and annually, whether the suit is used or not. These test instructions are standard based on ASTM F1052 *“Practice for Pressure Testing of Totally Encapsulated Chemical Protective Suits”*. Note that air expands or contracts depending on temperature. Always let a chemical suit reach room temperature before testing. The supply air that is used should be the same temperature as the environment in which the suit is to be tested. Do not test the suit near an air conditioner or a heater. Also, before opening the suit storage container, make sure the suit is either new and unused or, if the suit has been used that it has been decontaminated. After decontamination has been confirmed, proceed as follows:

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1. Lay suit to be tested face down on a table free of obstacles; straighten to remove any folds/wrinkles.
2. Remove snap-on cover and diaphragm (flappers) from all exhaust valves.
3. Insert twist lock adapter from air source into exhaust valve located on the head of the suit; turn clockwise.
4. Insert twist lock adapter connected to gauge into exhaust valve located on the back of right body; turn clockwise.
5. Insert twist lock plug adapter into the third exhaust valve located on the back left body (If your garment is a NFPA complete ensemble) to serve as a plug to prevent air from escaping.
6. Close all openings. Make sure the zipper is completely closed! Check any pass-throughs.
7. Place test kit gauge on level surface. Check dial calibration – *needle should be at zero*; adjust if necessary. (Refer to manufacturers bulletin enclosed).
8. Remove tubing loop from storage brackets in lid, by depressing flat tab on end of brackets to release top of bracket. Separate tubing sections by depressing release tab on quick connect couplings.
9. Connect short tubing with male nipple to female quick connect on brass cross (*with ID and serial number*) and connect other end to adapter in the head of suit.
10. Connect long tubing with female body to male nipple quick connect on brass tee at gauge and connect other end of tubing to twist lock fitting located on the back right side of suit.
11. Turn the air flow control valve crosswise, to the off position. Connect outside compressed air source to the male quick connect fitting on brass manifold tee of test kit. (The most popular male fitting is supplied; if your air supply is not compatible with this fitting, remove and replace with a comparable fitting that is compatible.
12. Inflate suit by opening air control valve slowly! Pressurize the suit to 5 inches of water column indicated on gauge, hold for one (1) minute. This should fill out wrinkles in the suit.



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**Note: Check gauge dial frequently by closing air supply control valve to make certain suit pressure does not exceed 5 inches of water column pressure. Over inflation can damage suit material and seams beyond repair!**

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13. Remove countdown alarm timer from storage bracket in lid by depressing clip on back of timer, remove battery compartment lid on back of timer, invert battery and replace (refer to manufacturers bulletin enclosed).



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To extend service life of timer battery, remove battery, invert and replace during storage.

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14. Set countdown timer to exactly four (4) minutes. Reduce water column pressure to exactly four (4) inches of water column pressure by depressing the relief valve button located on the brass tee at air inlet manifold.

15. Begin test.



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**Do not move or touch the suit during timed test, as this will affect the water column pressure resulting in inaccurate reading.**

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Record suit pressure at the end of the four (4) minutes. Suit pressure of 3.2 inches or more indicates that the suit has passed as leak free. The suit is ready for service after test kit hoses and adapters have been removed and exhaust valves have been reassembled. Suit has failed test if pressure is less than 3.2 inches after the four (4) minute period.

# Glove Replacement Guides

## ***Instructions for Ring and Clamp Assembly Removal***

1. Turn sleeve inside out.
2. Remove tape and rubber band over clamp at top of glove.
3. Using a hex socket or ratchet, loosen screw on glove clamp, remove clamp. Do not use a screwdriver to loosen clamp, as screwdriver may slip and damage suit.
4. Remove rubber band.
5. Pull glove assembly out of sleeve.

## ***Installation***

1. Sleeve should be inside out.
2. Insert PVC ring in glove so that 2 inches of the glove is above top of ring.
3. Place glove in sleeve, fingers toward you and middle finger in line with shoulder seam. Pull until tight.
4. Place elastic band centered on line with PVC ring.
5. Center glove clamp on rubber band, using a hex socket driver or ratchet to tighten screw. Tighten clamp. Do not use a screwdriver to tighten screw, as screwdriver may slip and damage suit.
6. Turn the 2" glove overlap over clamp. Place wide rubber band over clamp.
7. Securely wrap area over PVC ring and clamp with flexible tape.
8. Turn suit sleeve right side out.

## ***Instructions for Quick Disconnect Assembly. (Installation).***

1. Sleeve should be inside out.
2. Insert Silvershield® glove through male glove ring, turn at least 3 inches of the glove edge back over the edge of the glove ring.
3. Insert the male glove ring through the suit opening down to the sleeve opening.
4. Place the clamp 3/8" from the edge of the glove ring, and tighten firmly in place using a hex driver.



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The locking pin must be centered with the middle finger of the glove and the sleeve seam to insure proper alignment.

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5. Place a 7/8" rubber band over the clamp to prevent it from puncturing the suit, cover the rubber band with at least 3 rounds of black electrical tape.
6. Pull sleeve back through suit and straighten.
7. Insert female glove ring (grooved side first) into outer glove so that the glove extends 3" past the groove in the ring. Place 5/8" rubber band over cuff clamp into the groove in the ring and tighten using a hex driver. Do not use a screwdriver, as screwdriver may slip and damage suit.
8. Cover the clamp with at least three rounds of black electrical tape to prevent clamp from damaging the suit.

9. Place a 5/8" wide rubber band between glove and clamp to prevent damage to glove. Place clamp in center of groove on top of rubber band.



Female notch in glove ring must be aligned with the thumb of the outer glove, this will allow the two glove system to align correctly and discourage loosening of the assembly due to movement in the wrist area.

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### **Removal**

1. Remove outer glove assembly by unlocking the Quick Disconnect System.
2. Remove tape over clamp at the top of glove.
3. Using a hex driver, loosen screw on glove clamp; and remove clamp. Do not use a screwdriver to loosen clamp, as screwdriver may slip and damage suit. Remove outer gloves.

# Recommended Training & Proper Use

Employers are required to develop and implement a program to inform workers (including contractors and subcontractors) performing hazardous waste operations of the level and degree of exposure they are likely to encounter.

Employers are also required to develop and implement procedures for introducing effective new technologies that provide improved worker protection in hazardous waste operations. Examples include foams, absorbents, neutralizers, etc.

▶14 Training makes workers aware of the potential hazards they may encounter and provides the necessary knowledge and skills to perform their work with minimal risk to their safety and health. The employer must develop a training program for all employees exposed to safety and health hazards when working with hazardous chemicals or working in hazardous waste operations. Both supervisors and workers must be trained to recognize and prevent hazards; to select, care for; and use respirators properly as well as other types of personal protective equipment ; to understand engineering controls and their use; to proper decontamination procedures; to understand the emergency response plan, medical surveillance requirements, confined space entry procedures, spill containment program, and any appropriate work practices. Workers must also know the names of personnel and their alternates responsible for site safety and health.

Employees at all sites must not perform any work in or around hazardous waste operations or sites unless they have been trained to the level required by their job function and

responsibility and have been certified by their instructor as having the necessary training. All emergency responders must receive refresher training sufficient to maintain or demonstrate competency annually.

Employee training requirements are further defined by the nature of the work (e.g., temporary emergency response personnel, firefighters, safety officers, Hazmat personnel, incident commanders, etc.) These requirements may include recognizing and knowing the hazardous materials and their risks, knowing how to select and use appropriate personal protective equipment, and knowing the appropriate control, containment, or confinement procedures and how to implement them. The specific training and competency requirements for each personal category are explained fully in the final rule (54 FR 42:9294, March 6, 1989).



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***It is your responsibility, as a user of this Tychem® 10,000 Total Encapsulated Suit, to be aware of and comply with all phases of your employer's safety and health program, including training. Failure to do so could lead to an accident which may result in severe personal injury or death.***

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"Proper Use" is consistent with NFPA 1500, "Standard on Fire Department Occupational Safety and Health Program, 29 CFR 1910.132." You can obtain a copy of this NFPA standard on the world wide web at "www.nfpa.org".



# Recommended Undergarments and Visor Agents

Wear cotton underwear and socks to help absorb perspiration. Coveralls made from flame resistant synthetic materials, such as Nomex®, offered by Lakeland Industries, are recommended, especially if exposure to flash-fire is a concern. Coveralls should have sleeves that can be closed tightly and legs that can be tucked into the socks. If the Tychem® 10,000 suit is to be worn in a cold environment, wear thermal underwear to help stay warm. Under extreme conditions, the lens may fog up. Carry a clean cloth with you to wipe the lens from the inside. Anti-fog agents can be purchased from most local stores. Lakeland Industries does not sell or apply any agents to the suit lens.

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For zipper lubes see “*Maintenance and Repairs*” for more information.

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# Donning Procedure



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Good safety practices require an assistant to help you don and doff the suit. This is easier and quicker, and you will avoid stumbling or tripping which may result in personal injury or damage to the suit.

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Follow these steps in putting on the suit:

1. Make sure the suit has been visually inspected, air pressure tested and is free from defects. Also make sure the correct suit has been selected for the intended use.
2. Underclothing should be worn under the chemical suit. As a minimum, a long sleeve shirt and long pants or “long underwear” are recommended.
3. Remove all personal affects which might result in damage to the suit (e.g. pens, badges, jewelry, etc.).
4. Remove shoes. Most boots don’t allow street shoes. Lakeland’s NFPA approved boots do not.
5. Tuck pant cuff into socks to make donning of suit legs and sock boot easier.
6. If using a SCBA (Self Contained Breathing Apparatus), check the level of air, complete all connections, make all adjustments in accordance with the manufacturer’s procedures. Do not put the face piece on, yet, unless required by the design of the SCBA.
7. While seated, place both legs into the suit. Stand up and attach the internal waist belt. Belt is intended to help adjust the fit of the suit.
8. Turn on the air supply, put on facepiece, and make sure air supply system is working properly.
9. Place arms and head inside the suit, close the zipper, then velcro shut the fly over the top of the zipper.
10. The person assisting should check to make certain the zipper covers are completely closed, all airline connections are tight, and suit appears to be working properly.

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# Safety Considerations

**!** *Like any piece of complex equipment, the Tychem® 10,000 suit will perform as designed only if used and serviced according to Lakeland's instructions. All individuals who have or will have the responsibility for using the Tychem® 10,000 suit must read these precautions carefully and understand them. Failure to do so may result in severe personal injury or death.*

1. Avoid direct flame contact. Do not use the Tychem® 10,000 near a fire or open flame. The Tychem® 10,000 material will melt.
2. Do not wear a suit without breathable air. An air supply is **mandatory** to prevent suffocation. An air-line alone is prohibited by OSHA regulations in IDLH atmospheres.
3. Do not use oxygen cylinder or oxygen generating breathing apparatus while wearing a Tychem® 10,000 Suit. A severe fire hazard could result.
4. Never work alone in hazardous areas. Always work with another person and have at least one person on standby with equal protective equipment.
5. Do not pull on air supply hose as a retrieval device. To do so may cause the air-supply hose to tear out of the suit and expose the wearer.
6. Avoid continuous exposure. Do not expose the suit to a constant liquid splash or deluge, or wade through liquid pools on purpose.
7. Prevent heat stress. Workers who wear total-encapsulating suits must be in good physical condition. Consult a medical doctor before donning Tychem® 10,000 suit to be sure you are capable of wearing it under expected use conditions. The wearer can take several steps which may prevent heat stress, such as wearing an ice-vest, feeding the suit with body-cooling air, and taking frequent rest periods during the work session.
8. Leave the "Hot Zone" **immediately** if you experience these symptoms; fever, nausea, dizziness, eye irritation, difficulty in breathing, becoming fatigued or any unusual order or taste.

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# Doffing Procedure



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The person assisting in the doffing procedure should be wearing the appropriate attire selected by Qualified Safety Personnel.

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1. The person assisting should open the zipper flaps by separating the velcro attached to the fly and open the zipper by pulling the zipper tab at the opening of the zipper.
2. The user should pull their arms back into the body of the suit, remove their hard hat, and hand hat to the assistant (this will prevent the assistant from touching the inner suit with their gloves that may be wet or contaminated).
3. Carefully remove the head and arms from the suit.
4. Loosen the air supply mask (allow the mask to hang around the neck until the air supply has been cut off. Remove the air system per the instructions provided with that particular system.
5. Loosen the suit belt and allow suit to fall. Assume a sitting position for stability. The assistant should remove the outer boots and hold the bottom of each leg to allow the user to remove legs from the suit more easily.

# Storage, Shelf Life & Decontamination

## **Recommended Storage Practices**

1. Store the Level A or NFPA Complete Ensemble in a clean, dry location, away from direct sunlight.
2. Suit should be stored laying flat, if possible.
3. Store the suit with zipper open.
4. At least annually perform inspection with checklist at the back of this manual, and perform the suit pressure test using the instructions under “*How To Use Test Equipment And Air Pressure Testing.*”
5. NFPA complete ensembles are to be stored the same as a Level A suit.
6. Suits can be stored in their original carry-bags, or on a hanger.

## **Shelf Life**

Chemical suits 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 suit, it is recommended that downgrading the suit to “*Training Use Only*” be considered after five years. If this is done; each suit will need to be visually marked on the outer side “*For Training Use Only*”, so that all personnel will notice it has been down graded.

## **Decontamination - Chemical**

Standard 1910.120 states that “*a decontamination procedure shall be developed, communicated to employees and implemented before any employees or equipment may enter areas on site where potential for exposure to hazardous substances exists*”.

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 (see “*Cleaning Instructions*” in this manual). 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.

Tychem® 10,000 suits are economically priced limited-use garments, and **not** designed for multiple wash and decontamination. Chemical suits which become contaminated with toxic chemicals or show signs of physical wear, (see “*Maintenance And Repairs*”), should be retired or disposed of in a safe manner.

## **Decontamination - Biological**

At the scene, place contaminated garments inside a leak-proof container and marked as “*Biological Contaminated.*” These garments must be destroyed by a Certified Waste Disposal Company. **DO NOT** attempt to decontaminate any garments that have come in contact with any Biological Threat.

# Chemical Resistance Guide

A protective garment must resist hazardous chemical attack from three different routes of entry: Permeation, Penetration and Degradation.

**Permeation** describes a process by which chemicals migrate through a material. It involves chemical solubility in a material and the ability for chemicals to “diffuse” through the material as a liquid, gas, or vapor. Measuring permeation is important because chemicals may penetrate protective materials without visible effects. Many of today’s chemicals are toxic in vapor form, through skin absorption or inhalation. The Tychem® 10,000 material resists permeation of these chemical vapors, depending on the type of challenge chemical. Method F739 provides flexibility for choosing different test hardware and conditions while specifying procedures.

**Penetration** occurs when a chemical enters the suit through a physical imperfection, such as a damaged seam or zipper, a tear, a pinhole, a loose glove, boot, or lens.

Suits must be leak-tested in the field to ensure their penetration resistance. Simple bubble-indicating leak tests, without measuring pressure-drop over time, are not practical.

The Lakeland Test Kit (part number 0010) measures penetration resistance by indicating pressure-drop over time. It permits the user to inflate the suit with an SCBA, measure the pressure put into the suit, and the rate at which the pressure may drop.

**Degradation** takes place when a chemical degrades one or more of the suit’s physical properties, such as material thickness, color, tear resistance, abrasion resistance, and so forth. Such a physical change may not necessarily affect the material’s permeation resistance. However just the opposite is also possible. A challenge chemical could permeate the garment material almost immediately without changing its physical appearance at all. Tests were performed under laboratory conditions-not actual workplace conditions. They address breakthrough characteristics and do not account for other performance characteristics. They are not, in and of themselves, recommendations.

Lakeland chemical suits are designed to be worn over regular work clothing, and are not designed to protect from all hazards in the work place. Additional equipment such as protective eyewear, protective boots, additional gloves, hard hats, cooling systems, communications systems, etc. may be required and should be selected by a safety professional.

Lakeland Industries, Inc. cannot guarantee that any Tychem® 10,000 suits is applicable to your particular situation, or assume responsibility for use thereof, because of such unknown variables as nature of work, type of exposure, concentration of exposure, etc.

# Summary of NFPA 1991, 2000 Edition Required Test Results

## *Overall Suit Requirements By NFPA 1991, 2000 Edition*

Test	Requirement	Test Method	Results
<b>Label Content</b>	3-1.1 and 3-1.2; specific content, specific letter height, English	Checklist Inspection	Compliant
<b>User information and Technical Data Package</b>	3-2; pre-use info, prep for use, inspection, don/doff, usage, maintenance/cleaning, retirement, disposal, etc.	Checklist Inspection	Compliant
<b>Design Criteria</b>	4-1; construction and sizing	Checklist Inspection	Compliant
<b>Gas Tight Integrity Test</b>	Ending pressure >80 mm Hg	ASTM F1052	Compliant >80 mm Hg
<b>Maximum Suit Ventilation Rate Test</b>	5-1.3; no internal pressure >38mm, end pressure >80mm	Section 6-5	Compliant internal pressure > 38mm, end pressure > 80 mm
<b>Liquid Tight Integrity</b>	Show no water penetration	ASTM F1359	Compliant > 1hr.
<b>Overall Ensemble Function &amp; Integrity Test</b>	5-1.3; end pressure >80, completion of tests, accommodate head pro., >20/35 vision, subject testing	Section 6-4, ASTM F1154	Compliant
<b>Material Burst Strength</b>	5-2.3; burst strength > 200N	Section 6-10 ASTM D751	Compliant > 200N
<b>Puncture Propagation Tear Resistance</b>	5-2.4; puncture propagation tear resistance > 49N	Section 6-11 ASTM 2582	Compliant > 49N
<b>Cold Temperature Performance Test One</b>	5-2.5; bending movement < 0.56N x m at an angular deflection of 60 degrees and -25° C	Section 6-12 ASTM D747 (modified)	Complaint 0.56N

# Summary of NFPA 1991, 2000 Edition Required Test Results, cont'd

## Primary Suit Materials Permeation Testing By NFPA 1991, 2000 Edition

Test	Requirement	Test Method	Results
<b>Garment Material</b>	Shall not ignite during the initial 3 second exposure period, shall not burn a distance of > 100 mm, shall not sustain burning > 10 seconds, shall not show evidence of melt by flowing or dripping during a 12 second exposure period.	Section 6-7 ASTM F1358	No ignition, char length < 100 mm. No melt, no drip. Self extinguishing within 10 seconds.
<b>Glove Material</b>	Requirement same as above	Section 6-7 ASTM F1358	No ignition, char length < 100 mm. No melt, no drip. Self extinguishing within 10 seconds.
<b>Visor Material</b>	Requirement same as above	Section 6-7 ASTM F1358	No ignition, char length < 100 mm. No melt, no drip. Self extinguishing within 10 seconds.
<b>Footwear Material</b>	Requirement same as above	Section 6-7 ASTM F1358	No ignition, char length < 100 mm. No melt, no drip. Self extinguishing within 10 seconds.

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## Primary Suit Materials Flammability Testing By NFPA 1991, 2000 Edition

Test	Requirement	Test Method	Results
<b>Visor Material Mullen Burst</b>	Shall have a bursting strength of not less than 200 N	Section 6-10 ASTM D751	Compliant Average of > 200N
<b>Visor Material Puncture Propagation</b>	Shall a puncture propagation tear resistance of not < 5 kg	Section 6-11 ASTM D2582	Compliant
<b>Visor Material Cold Temperature Bend Test Two</b>	Shall be tested for cold temperature bending at -25° C and not show cracks or show evidence of visible damage	Section 6-14 ASTM D2136	No cuts, cracks, or fractures



## Footwear Material Testing By NFPA 1991, 2000 Edition

Test	Requirement	Test Method	Results
Label Content	3-1.1 and 3-1.3; specific content, specific letter height; English	Checklist	Compliant
User Infor & Technical Data Package	3-2; pre-use info, prep for use, inspection, don/doff, usage, maintenance/cleaning, retirement, disposal, etc.	Checklist	Compliant
Footwear Design	Shall provide protection not less than 8.0 inches in height where measured from the plane of the sole bottom.	Section 4-2	Compliant
Footwear Cut Resistance Test	5-5.3; cut distance not more than 25mm.	Section 6-15 ASTM F1790	Compliant; <25mm
Footwear Permeation After Abrasion & Flexing	Shall be tested for abrasion resistance and shall not exhibit a normalized breakthrough detection time of 1 hr. or less	Section 6-6 ASTM F739	Compliant; >1hr
Footwear Puncture Resistance Test One	5-5.4; puncture resistance of not less than 3.6 kg	Section 6-16 ASTM F1342	Compliant; > 3.6 kg
Footwear Puncture Resistance Test Two	5-5.6; puncture resistance of not less than 123.4 kg	Section 6-19 Section 3 CSA Z195M	Compliant; >123.4
Footwear Sole and Heel Abrasion	Shall have an abrasion resistance rating of not less than 65 index	Section 6-20 ASTM D1630	Compliant; >65 index
Footwear Toe Compression & Impact Resistance	5-5.5; impact resistance not less than 101.7J, and a compression resistance not less than 11,121 N	Section 6-21 Section 1.4 ANSI Z41	Compliant; >101.7J. Impact Resistance > 11, 121 N compression resistance
Footwear Sole Bending Resistance	Shal not deflect more than 6mm.	Section 6-22	Compliant; < 6mm
Footwear Slip Resistance	5-5.9; static coefficient > 0.75	Section 6-23 ASTM F489	Compliant; >0.75 dry average, > 0.75 wet average

## Summary of NFPA 1991, 2000 Edition Required Test Results, cont'd

### *Seam Testing By NFPA 1991, 2000 Edition*

Test	Requirement	Test Method	Results
<b>Garment Seam Permeation Resistance</b>	Shall not exhibit normalized breakthrough detection times of 1 hr. or less for each chemical	Section 6-6 ASTM F1001 ASTM F739	Compliant; >480 min
<b>Visor Seam Permeation Resistance</b>	Requirements same as above	Section 6-6 ASTM F1001 ASTM F739	Compliant; > 1 hr.
<b>Garment Seam Breaking Strength</b>	Shall possess a breaking strength > 2.88 kN/m	Section 6-24 ASTM D751	Compliant; >2.88 kN/m
<b>Visor Seam Breaking Strength</b>	Shall possess a breaking strength not less than 134 N/50 mm	ASTM D751	Compliant; > 134 N/50 mm

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### *Closure Assembly Testing By NFPA 1991, 2000 Edition*

Test	Requirement	Test Method	Results
<b>Closure Assembly Penetration</b>	Shall allow no penetration for each chemical	Section 6-25 ASTM F1001 ASTM F903	Compliant Pass > 1hr.
<b>Closure Assembly Breaking Strength</b>	Shall possess a breaking strength > 2.88 kN/m.	Section 6-24 ASTM D751	Compliant > 2.88 kN/m

### *Suit Exhaust Valve Testing By NFPA 1991, 2000 Edition*

Test	Requirement	Test Method	Results
<b>Exhaust Valve Design</b>	Shall be designed to allow for their removal from and reinstallation or replacement in the vapor-protective suit	NFPA 1991, 2000 Edition	Compliant
<b>Exhaust Valve Spalsh Protection</b>	Must provide protection and access	NFPA 1991, 2000 Edition	Compliant
<b>Exhaust Valve Mounting Strength Test</b>	5-1.5; no failure force < 135N	Section 6-9 of the Standard	Compliant > 135N

### ***External Fittings Testing By NFPA 1991, 2000 Edition***

<b>Test</b>	<b>Requirement</b>	<b>Test Method</b>	<b>Results</b>
<b>External Fittings Design</b>	Shall be free of rough spots, burrs, or sharp edges that could tear primary materials	NFPA 1991, 2000 Edition	Compliant
<b>External Fittings Gas Tight Integrity</b>	Shall show as ending pressure of at least 3.2 inches	ASTM F1052	Compliant
<b>Fitting Pull Out Strength Test</b>	5-1.6; no failure force < 1000N	Section 6-13	Compliant <1000N

### ***Donning and Doffing Testing By NFPA 1991, 2000 Edition***

<b>Test</b>	<b>Requirement</b>	<b>Test Method</b>	<b>Results</b>
<b>Donning &amp; Doffing Times</b>	Time testinf shal be conducted on both donning and doffing	NFPA 1991, 94 Edition, Section 9-1.1	Donning – Average 147 seconds Doffing – Average 33 seconds

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### ***Glove Testing Requirements, NFPA 1991, 2000 Edition***

<b>Test</b>	<b>Requirement</b>	<b>Test Method</b>	<b>Results</b>
<b>Label Content</b>	3-1.1 and 3.1-3 specific content, specific letter height, English	Checklist	Compliant
<b>User Info</b>	3-2 pre-use info, prep for use, inspection, donn/doff, usage, maint/cleaning, retirement, disposal, etc.	Checklist	Compliant
<b>Design Criteria</b>	4-2; construction and sizing	Checklist	Compliant
<b>Cut Resistance Test</b>	5-4.3; cut distance <25mm	Section 6-15 ASTM F1790	Compliant; < 25mm
<b>Puncture Resistance Test</b>	5-4.4; puncture resistance > 2.3kg	Section 6-16 ASTM F1342	Compliant; > 2.3kg
<b>Cold Temperature Bend</b>	5-4.5; bending movement of 0.56N x m at an angular deflection of 60 degrees and -25° C	Section 6-12 ASTM D747 with modifications	Compliant > 0.56N
<b>Glove Hand Function Test</b>	5-4.6; average % of barehand control not exceeding 600%	Section 6-17	Compliant; < 600%

## Summary of NFPA 1991, 2000 Edition Required Test Results, cont'd

### *Optional Chemical and Biological Terrorism Protection Requirements Only, NFPA 1991, 2000 Edition*

Test	Requirement	Test Method	Results
<b>Cyanogen Chloride Chemical Permeation Resistance</b>	5-9.1; not exhibit normalized breakthrough detection times of 1 hour or less	Section 6-6 ASTM F739	Compliant; > 1hr.
<b>Permeation Resistance</b>	5-9.2; not exceed 1.25 ug cumulative permeation Sarin and V-agent, flexing and abraiding	Method 2.2 CRDC-SP-84010	Compliant; <1.25 ug
<b>Permeation Resistance</b>	5-9.3; not exceed 4 ug cumulative permeation sulfur, mustard and lewsite	Method 2.2 CRDC-SP-84010	Compliant; <4 ug
<b>Overall Ensemble Inward Leakage</b>	5-9.4; no inward leakage > 1.02%	Section 6-8	Compliant; no leakage

# Style Identification

To be certified to meet NFPA 1991, 2000 Edition. Base requirement, 5.9, Optional Chemical and Biological Terrorism Protection Requirements.

11645- A Front Entry Tychem® 10,000 Level A Chemical Suit (with) A Front Entry Aluminized Kevlar Overcover and NFPA approved Hazmat Boots.

11655- A Rear Entry Tychem® 10,000 Level A Chemical Suit (with) A Rear Entry Aluminized Kevlar Overcover and NFPA approved Hazmat Boots.

12645- A Front Entry Tychem® 10,000 Level A Chemical Suit (with) A Front Entry Aluminized Glass Overcover and NFPA approved Hazmat Boots.

12655- A Rear Entry Tychem® 10,000 Level A Chemical Suit (with) A Rear Entry Aluminized Glass Overcover and NFPA approved Hazmat Boots.

Lakeland Industries offers the following NFPA approved pass-thrus:

Option P1- Scott-Hansen Pass-thru

Option P2- Scott-Schraeder Pass-thru

Option P3- Standard Pass-thru

Option G7- Quick Disconnect Glove System

Lakeland Industries offers the following boots:

Tingley® Hazproof Boot, SEI Certified

Bata® Hazmat Boot, SEI Certified



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***Warning: The Overcover protects against unforeseen flash fires. The use of the Overcover by itself is not an acceptable Level A vapor-proof suit. They are not to be used for fire entry. Use of the Overcover for fire entry could result in severe personal injury or death.***

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# Specifications – Aluminized Overcovers

## ***Specifications and Component Descriptions for NFPA 1991, 2000 Edition Aluminized Overcovers***

1. Garment Materials-are of Aluminized PBI Kevlar® and Aluminized Glass. (Flash fire protective only)
2. Suit design is to be worn only in conjunction with a approved Tychem® 10,000 Level A Chemical suit that accommodates a self contained breathing apparatus inside the suit.
3. All seams are stitched with Nomex® thread on the inside and top stitched on the outside.
4. Closure is a 4” wide flap made out of the suit material; held in place with 1” black full-length velcro. Front Entry: starts at left side of hood front and across body. Rear Entry: center back.
5. Visor/Lens is 10 mil FEP Teflon® stitched in with Nomex® thread on the inside of the suit.
6. The head area is designed to accommodate a SCBA face piece and allow user to wear a hard cap or fireman’s helmet.
7. The optional pass-thrus; if purchased ; will be located on the right hip area to allow for hook-up of outside air for breathing and cooling. See “Style Identification” for more information.
8. Three valve covers designed to fit over the top of the Tychem® 10,000 Level A Chemical Suit pirelli valve system, 1-located on the right side of the back of the hood, 1-located on the right side of the

expanded back, 1-located on the left side of the expanded back.

9. Color of the suit is silver.
10. The spacious sleeve is designed to fit in conjunction with the requirements of the Level A Chemical Suit.
11. For sizing see “*Chemical Suit Size Charts*”.
12. The Overcover must pass the ASTM F1358, test Method for “*Resistance of Protective Clothing Materials to Flame Impingement*”, the ASTM D4157, Test Method for “*Abrasion Resistance of Textile Fabrics*” (*Oscillatory Cylinder Method*), the ASTM F392, Test Method for “*Flex Durability of Flexible Barrier Materials*”, as well as other tests required in the NFPA 1991, 2000 Edition of the Standards.

## ***Methods of Attachment***

Garment material	safety stitch
Visor material	single needle stitch
Glove material	N/A
Footwear material	N/A
Garment closure	single needle stitch
Attached overcover	N/A

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# Specifications – Tychem 10,000

## ***Specifications and component descriptions for NFPA 1991, 2000 Edition Chemical Suit***

1. Suit fabric to be laminated film- Tychem® 10,000.
2. Suit Design- Expanded back to accommodate wearing of self contained breathing apparatus inside suit.
3. All seams stitched with 50/2 Permaspun® thread and sealed with specialized seam tape inside and out.
4. Zipper closure is a 48” PVC OEB design zipper with a vapor-proof closure by a 4” wide flap of suit material, and held in place by 1/2” full length velcro. Front Entry: left side of hood and across back. Rear entry: center back.
5. Visor/Lens materials- is a 40 mil PVC lens and a 10 mil FEP Teflon® lens sandwiched together using a specialized seam tape and process. This Visor/Lens is designed to ensure maximum visibility.
6. Head area-is designed large enough to accommodate a SCBA face piece and to be able to allow user to wear a hard cap or firemen’s helmet.
7. The optional pass-thrus, if purchased, will be located on the right hip area to allow for hook-up to outside air for breathing and cooling.
8. Three Pirelli® valves designed to release at 1/2 lb. of pressure are located as follows:
  - 1- on the right side of the back of the hood,
  - 1- on the right side of the expanded back
  - and 1- on the left side of the expanded back.
9. Gloves are to be three separate components from inside out:
  - 10 mil Viton® Glove
  - North Silvershield®
  - Kevlar®
10. The suit has attached sock boots with a splash guard to fit over industrial NFPA approved boots. Both sock boots and splash guards are constructed of Tychem® 10,000 materials.
11. Color of the suit is lime green.
12. Spacious sleeve design allows wearer to have access to SCBA controls by pulling arm from sleeve while still in suit. The suit is designed to allow room for 2-way radio communication systems.
13. For sizes see “*Chemical Suit Size Charts.*”
14. Suit to pass a minimum 180 minutes in NFPA 1991 Battery of Challenge Chemicals, see “*NFPA Testing Results.*”
15. Suit must pass the ASTM F1052 pressure test.
16. Labeling in the suit contains the following: Warning Statement, Model Number, Serial Number, Date Manufactured, Pressure Test Results, an accompanying over boot style and marked if certified to optional chapters of the Standard.

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***Methods of Attachment***

Garment material	single needle, double sealed with seam tape
Visor material	single needle, triple sealed with seam tape
Glove material	ring and clamp assembly or quick-disconnect assembly
Footwear material	sock boot, single needle stitch
Garment closure	single needle stitch, triple sealed
Attached overcover	attached at valve cover with Velcro®

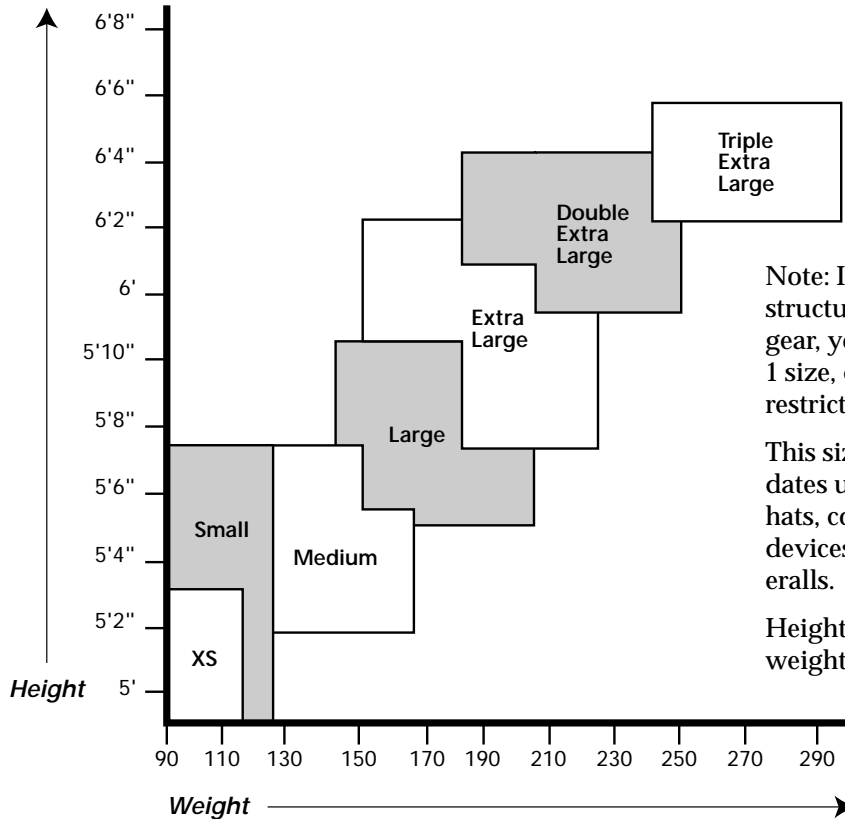


# Chemical Suit Size Charts

## Recommended Boot and Glove Size Chart – Chemical Suit Size versus Glove and Outer Boot Size

Suit Size	Boot Size	Glove Size
Extra Small – Medium	8-9	10-Large
Large	10-11	10-Large
Extra Large	12-13	11-Extra large
2 Extra Large	14-15	11-Extra Large

## Lakeland Industries, Inc. Total Encapsulated Suit Height and Weight Chart



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Note: If you are wearing structural fire-fighting gear, you may move up 1 size, depending on the restrictions of your gear.

This size chart accommodates use of SCBA, hard hats, communication devices and regular coveralls.

Height is in inches and weight is in pounds.

Note: See “Donning” for adjustment procedures.



# Tychem® 10,000 Inspection Checklist

Purchased From: \_\_\_\_\_ Date Purchased By: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Inspected By: \_\_\_\_\_

Style and Size: \_\_\_\_\_ Inspection date: \_\_\_\_\_

## **Material**

Check for any abrasions, holes, or tears.

## **Zipper**

Check for overall condition, worn or damaged teeth, ease of operation. Lubricate zipper lightly with paraffin, which is readily available in most grocery stores. Paraffin should be applied lightly to the inner and outer elements. After cycling the fastener several times, the excess flakes should be removed. Do not use a sticky lubricant, which could gather and hold particles of dirt, grease, or contaminant. Garment should be stored with the fastener open.

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## **Facepiece**

Check that there are no splits, cracks, or deep scratches.

## **Gloves**

Check glove integrity, PVC ring, quality of rubber bands, tightness of metal ring.

## **Exhalation valve**

Check for freedom from obstructions and dirt; if replacement of valves are needed, send back to Lakeland for replacement.

## **Seams**

Visually check for any split seams, tears, or separations of material.

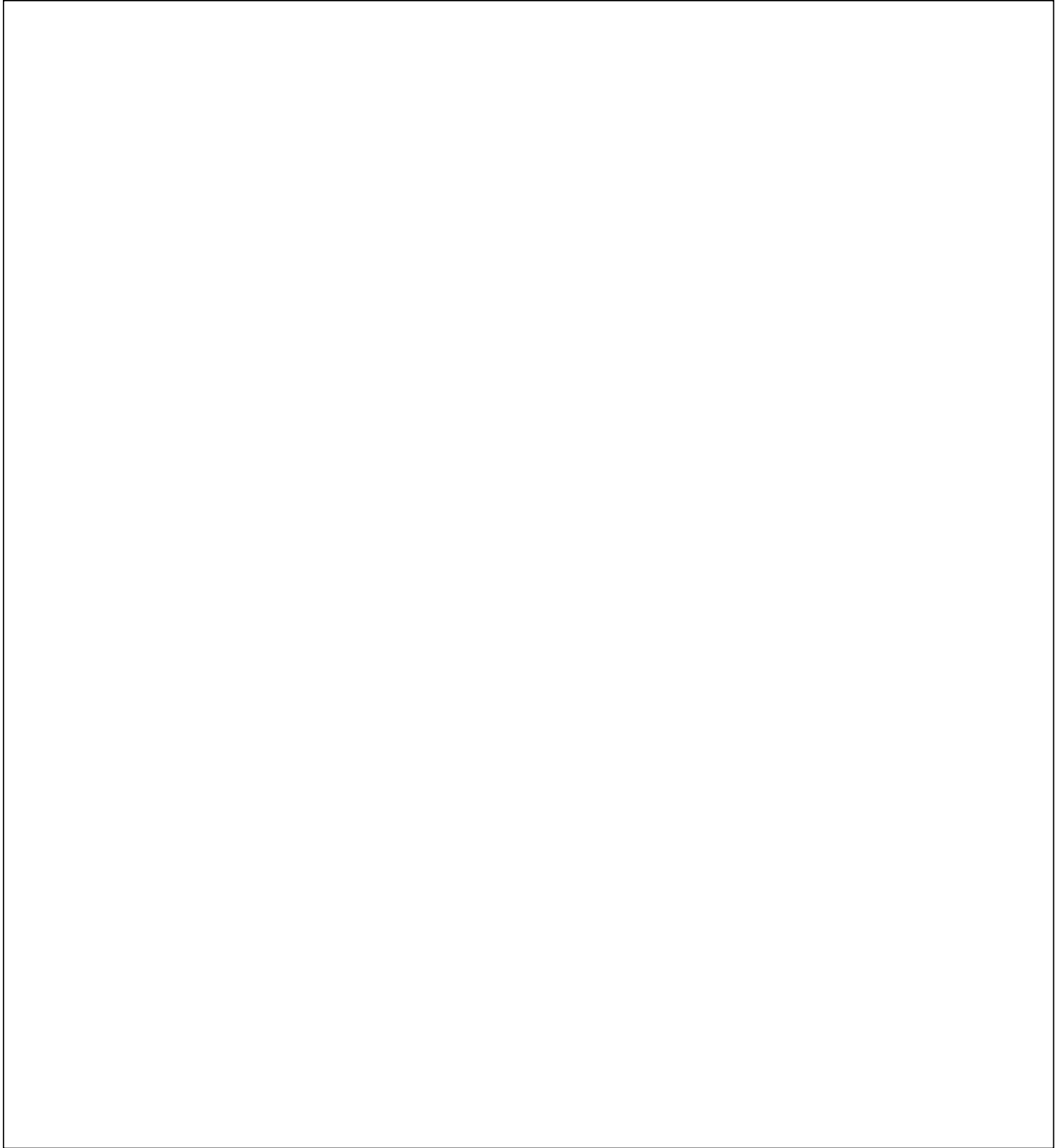
## **Leak Test**

Follow procedures out-lined under “*Testing*”

## **Log**

Please mark log according to your findings. Date and sign, so that the status of the suit will be known at all times.

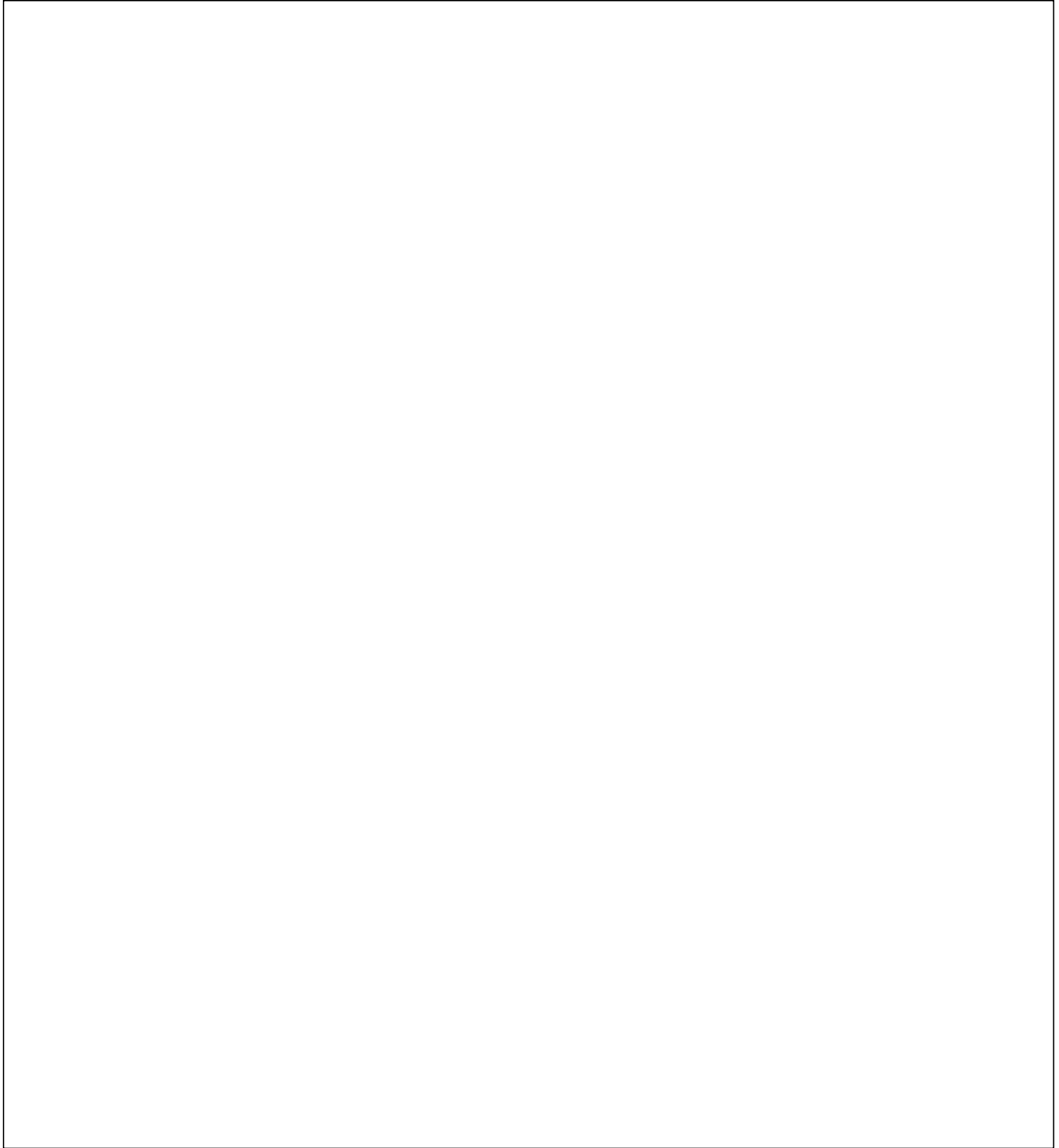
# Notes



# Notes



# Notes





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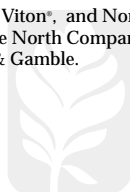
Tychem® 10,000

**LEVEL A**

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