User Information for DuraChem® 500 Protective Ensemble for Hazardous Materials Emergencies and CBRN Terrorism Events

Certified Models NFPA 1990 (1994) – 2022 Edition
Class 1 and 2 • D5H457-94 • D5H458-94

Kappler®

Know What You're Getting Into.®

RM 31655 REV 11-2025

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SAFETY CONSIDERATIONS

It is the user's responsibility to read, understand and follow the information in this manual and on Kappler's website, www.kappler.com and all applicable Federal, State, and local occupation safety and health statutes. For users outside the United States, please consult national or other applicable personal protective equipment regulations. Proper use should be consistent with NFPA 1500 *Standard on Fire Department Occupational Safety and Health Program*, and 29 CFR 1910.132 "Personal Protective Equipment: General Requirements."

The Authority Having Jurisdiction (AHJ) responsible for approving equipment must comply with the requirements of NFPA 1891 *Standard on Selection, Care, and Maintenance of Hazardous Materials, CBRN, and Emergency Medical Operations Clothing and Equipment*.

SAFETY SYMBOLS USED IN THIS MANUAL

While reading this manual, you will see a number of warnings concerning some of the risks and dangers you may face while using the device. These warnings contain "signal" words that will alert you to the degree of hazard you may encounter. These words, and the hazards they describe, are as follows.

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product. It may also be used to alert against unsafe practices.

WARNINGS AND LIMITATIONS

This garment must be used in combination with additional PPE, which includes the following:

- Separate NIOSH approved full-face respiratory protection such as a self-contained breathing apparatus (SCBA).
- RESPIRATOR CONSIDERATION FOR CERTIFIED ENSEMBLES: Certified ensembles must be used with NIOSH CBRN approved SCBA. The SCBA tested with this DuraChem® ensemble were: Scott AV 3000 HT Sure Seal, Scott AV 3000, MSA Ultra Elite, MSA G1, Dräger DHR 7000 and Dräger FPS 7000.

CAUTION

Respirators used for NFPA 1990 (1994) certification testing of non-encapsulated garments have not been evaluated for chemical permeation resistance consistent with the other ensemble elements.

- Adhesive tape may not be used as a means to create interfaces between ensemble elements.
- Separate foot and lower leg protection such as chemical protective boots.
    - Chemical protective boots tested with this DuraChem® ensemble were: OnGuard HazMax #87012 or Tingley #82330

ADDITIONAL EQUIPMENT

Additional personal protective equipment that might also be considered includes:

- Head protection. The DuraChem® 500 ensemble will accommodate a Type 1 Class G helmet.
- Hearing protection may be required due to high levels of external noise or high noise levels generated by supplied air systems.
- Other protective equipment that may be warranted based on the situation.

WARNING

There are uses, environments, and chemicals for which these garments and/or fabrics are unsuitable. It is the responsibility of the user to review available data and verify that the garment and/or fabric is appropriate for the intended use and meets all specified and/or industry standards.

WEARERS MUST BE PHYSICALLY FIT

Garments should only be worn by persons who are in good physical condition. Working in a chemical protective garment is strenuous. In an emergency situation or hot environment, the wearer may experience heat stress. Persons who show symptoms of heat stress such as nausea, dizziness, or excessive heat build-up should leave the work area immediately and doff the garment as quickly as possible. Persons in doubt about their physical condition should check with a physician before wearing these garments.

If any of the following symptoms develop during use of this garment, immediately leave the hot zone, undergo field decontamination (if exposed), and doff the garment:

- Fever
- Difficulty breathing
- Nausea
- Excessive tiredness
- Dizziness
- Numbness
- Any unusual odor or taste
- Eye or skin irritation
- Narrowing or dimming of vision
- Claustrophobia
- Loss of balance or orientation

⚠ CAUTION ⚠

Always Use the Buddy System

Never work in this garment alone. A minimum of two people should enter contaminated areas together. It is important to have someone available to assist in the event of an emergency. That person will require the same level of protection as the person needing emergency assistance.

MANAGE AND PREVENT HEAT STRESS

This garment interferes with the natural regulation of body temperature. This can lead to a rise in core body temperature and heat stress. The wearer should be aware of the symptoms and treatment of heat stress. The wearer can take several steps to limit and/or prevent heat stress, such as use of a cooling system, and working in accordance with a conservative work/rest schedule. The maximum time the garment can be worn depends on such variables as the air supply, ambient condition, climate inside the garment, physical and psychological condition of the wearer, work rate and work load. The TLV™ pocket guide from the American Conference of Governmental Industrial Hygienists (ACGIH, Cincinnati) provides corrected heat stress limits for totally encapsulating garments. Similar information is available on the federal OSHA website (www.OSHA.gov).

OTHER ADVICE

Chemical Permeation Data

Before using a garment in a chemical situation, consult the chemical permeation data appropriate to the garment material. This information is to be used as a guide only. The permeation performance of any material depends on a number of factors including chemical concentration, temperature, time and amount of exposure, etc. Due to the large number of variables, it is impossible for all garment materials to be tested against all chemicals, all combinations or mixtures, and all temperatures at which the chemical might be encountered.

Chemical permeation tests are performed under laboratory conditions – not actual workplace conditions. They address chemical breakthrough characteristics and do not account for physical performance characteristics that affect barrier such as abrasion, flex fatigue, puncture, tear, oxidative degradation, or degraded performance due to previous contamination. No single protective material will protect against all chemicals for all situations. The best course of action is to test the primary garment materials against the specific chemical hazard, at the temperature and in the concentrations to be encountered. Kappler, Inc. will provide free swatches of primary garment materials for testing and help arrange to have these tests performed.

Avoid Continuous Exposure

This garment should not be immersed in chemicals. This garment should not be exposed to continuous hazardous liquid chemical splash or deluge. Do not wade through liquid pools of hazardous chemicals if not necessary. Direct chemical exposure to the garment should be as limited as possible. If exposed to direct splash or deluge of hazardous chemicals, leave the area immediately and decontaminate.

Static Electricity

Under certain conditions, such as cold and dry weather, it is possible for garments to build and discharge static electricity. Discharges are not normally dangerous except in situations where generation of an electrical spark could ignite a flammable atmosphere. When working around flammable chemicals, steps to eliminate potential static discharges should be used. In these situations, recommended precautionary steps include raising humidity level of the work area and/or using a commercial, anti-static application.

Sock Booties
The sock booties attached to this garment are designed to be worn inside outer boots. These sock booties do not have sufficient durability or slip resistance to be worn as outer boots.

Closure Lubricants
There are no lubricants recommended for the closure system.

Marking Recommendations and Restrictions
Ensembles may be marked with Kappler ChemTape®.

Sizing Considerations
The garment sizing chart should be used to determine accurate fit. The correct size garment should be worn. See Appendix A.

Recommended Undergarments
The wearer should consider wearing inherently flame resistant, woven clothing, with long sleeves and pants under this garment.

Retirement Considerations
It is recommended this garment be retired from service if any of the following criteria are met:

- Garment does not pass visual inspection.
- Garment is abraded, cut, torn, punctured, or otherwise in any way breached.
- Garment has received an exposure to a toxic chemical.
- Zipper has separated or imperfections are noted.

Retired garments that are not contaminated may be labeled and used “For Training Use Only.” The labeling should be done with a permanent marker.

WARRANTY INFORMATION

It is the responsibility of the user to select garments which are appropriate for each intended use and which meet all specified government and industry standards. Kappler DuraChem® 500 garments are designed for multiple use, single exposure. It is the responsibility of the wearer to inspect garments periodically to ensure that all components, including fabric, valves, visors, gloves, zippers, seams, and interfaces are in good working condition and provide adequate protection for the operation and chemicals to be encountered. Failure to fully inspect garments may result in serious injury or death to the wearer. Never wear garments that have not been fully inspected prior to use. Any garment which does not pass the visual inspection should be removed from service immediately.

Kappler warrants for a period of 90 days after the delivery of a DuraChem®500 garment, that the garment is free from defects in materials and workmanship when used in accordance with the instructions contained in this care and use manual. NO OTHER EXPRESSED OR IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR OF MERCHANTABILITY OR OTHERWISE IS MADE. Purchaser and all garment users shall promptly notify Kappler of any claim, whether based on contract, negligence, and strict liability or otherwise. The sole and exclusive remedy of the purchaser and all end users and the limit of liability of Kappler for any and all losses, injuries or damages shall be the refund of the purchase price or the replacement or repair of any product found to be defective within 90 days after the product is delivered. In no event shall Kappler be liable for any special, incidental or consequential damages, whether in contract of in tort, arising out of any warranties, representations, instructions, or defects from any cause in connection with the DuraChem® 500 series garment, or the sale thereof.

Purchaser and all users are responsible for inspection and proper care of this product as described in this care and use manual and are responsible for all loss or damages from use or handling which results from conditions beyond the control of the manufacturer. DuraChem® 500 is a Kappler registered trademark.

GARMENT INFORMATION

INSPECTION OF THE GARMENT

To perform a full visual inspection:

- Choose a clean, dry area that is free of potential sources of snags, tears and punctures.
- Mark suspected defects with colored adhesive tape.
- Visually inspect seams for tape lift or de-lamination.
- Visually inspect for surface damage or discoloration on material, respirator interface, gloves and closure.
- Check zipper closure for worn or damaged parts. Run your fingers along the zipper length to feel for imperfections or separations.
- Check function of zipper and slider.

⚠ CAUTION ⚠

The garment should undergo a full visual inspection at the following times:

- Upon receipt to ensure no damage has occurred during shipment.
- Prior to donning of garment.
- After a garment is worn and before the garment is made available for reuse.
- Annually. However, most performance properties of a vapor-protective ensemble cannot be tested by the user in the field.

Garments with visible holes, tears, rips, punctures, serious discoloration or abrasions should not be used.

Returning the Garment

If a garment fails a visual inspection or pressure test, the garment may be returned for inspection and possible replacement. Contact Kappler Inc. to authorize the return. No contaminated garments will be accepted for return. Discoloration or odors are evidence of contamination. Garments being returned must be accompanied by the inspection log and with a letter stating that the garment has not been contaminated. Note: Charges may be incurred. See warranty information.

PRESSURE TESTING

Durachem® 500 non-encapsulating coveralls are designed to be vapor tight. Although non-encapsulating garments are not required to be pressure tested per NFPA 1891 *Standard on Selection, Care, and Maintenance of Hazardous Materials, CBRN, and Emergency Medical Operations Clothing and Equipment*, Kappler has designed an adaptor (Kappler part AKM007) to be used with the pressure test kit (Kappler part AKMOC) so that the vapor-tight integrity of the garment can be verified using ASTM F1052. The Pressure Test Kit User Manual can be found at www.kappler.com.

Note any remarks in the Inspection Log. If the garment is unsuitable for use by visual inspection, the garment may be retired for training use after being permanently labeled "For Training Use Only," or disposed of properly.

STORAGE LIFE AND STORAGE CONDITIONS

Storage Life

Kappler's Durachem® 500 garments have a predicted storage life of 10 years from the date of manufacture when stored properly (see Storage Conditions), based on accelerated aging studies. Storage life is defined as the period in which a garment or element has undergone proper care and maintenance in accordance with this instruction manual, but has not been used in either training or in response to actual incidents. It is the responsibility of the employer or purchaser to determine when the garment should be taken out of service. It is recommended that garments be labeled and retired to "Training Use Only," if they do not pass the recommended visual and/or pressure test inspections.

Storage Conditions

In alignment with NFPA 1891 *Standard on Selection, Care, and Maintenance of Hazardous Materials, CBRN, and Emergency Medical Operations Clothing and Equipment,* routine storage of hazmat/CBRN/EMO PPE should be as follows:

- Garments must be stored away from direct sunlight or UV exposure.
- Garments must be stored in a cool (between 40º -90º F), dry, well-ventilated location that is not subjected to extreme hot or cold conditions.
- Garments must be stored dry to prohibit the formation of condensation, in their original boxes, in bags, or on hangers. Garments must be stored with the closures in the open position.

⚠ CAUTION ⚠

Failure to store garments in the proper environment as described above can adversely affect the protective performance of the garment and may void the Kappler warranty.

DONNING THE GARMENT

1. Conduct a brief visual inspection of the garment before beginning donning procedure. Garment should be free of discoloration, or physical damage.
2. An assistant should help the wearer don the garment.
3. Remove all jewelry and personal items (pens, key rings, badges, knife cases, etc.) that might damage the garment.
4. Check function of respirator and place nearby donning location.
5. Visually check size and condition of outer boots and place nearby donning location.
6. Ensure garment zipper is completely open.
7. Read garment size label to assure proper fit.
8. Remove shoes. The sock booties on this garment are worn inside outer chemical boots. These sock booties do not have adequate durability or slip resistance to be worn over footwear as an outer covering.
9. While seated, insert feet into garment legs and down into sock booties. Stretch legs out to maximum extension while pulling garment up toward hips.
10. Pull boot splash flaps up and don outer boots. Fold splash flaps down over boots as far as possible.
13. Don respirator face piece and tighten head straps to secure.
11. Place one hand in the sleeve, pull garment sleeve to shoulder and place hand into gloves.
12. Place other hand in sleeve and place hand into gloves.
14. Pull hood over the head and secure, ensure proper fit between respirator face piece and garment elastomeric face seal.
15. Slowly close the zipper. After checking that the zipper is completely closed, the flaps should be closed and sealed over the zipper.
16. The user should squat down and expel the air inside the garment through the face seal interface.
18. Don appropriate SCBA, and adjust straps for fit.
17. For Class 1 applications, don the provided outer glove.

Interface Issues

The user should ensure respirators, boots and gloves, as applicable, are properly interfaced. There are no special procedures for donning outer boots.

> ⚠ CAUTION ⚠
> Ensuring proper seal and fit between the respirator and the face piece and the elastomeric face seal is critical to the overall performance of the ensemble.

DOFFING THE GARMENT

1. An assistant should help the wearer doff the garment after gross decontamination.

> ⚠ CAUTION ⚠
> If the garment has been contaminated or suspected of being contaminated:
> *The assistant should wear protective clothing and respiratory equipment.
> *The wearer should continue to use his respirator until the garment has been doffed and removed.

2. While the wearer stands, the assistant should remove the SCBA harness (as applicable), open the closure and peel the garment down and away from the wearer's shoulders.
3. The wearer should hold the respirator facepiece in place, while the assistant works the elastomeric face seal away from the respirator facepiece.
4. The assistant should help the wearer remove his arms from the sleeves.
5. Lower the garment below the hips and sit down. Have the assistant remove the boots and pull the garment off the legs.
6. Once the wearer is out of the garment, the air supply (as applicable) can be detached, and the garment removed to a remote location.
7. The wearer can doff the respiratory facepiece.

DECONTAMINATION OF CHEMICAL AND BIOLOGICAL CONTAMINATION

⚠ CAUTION ⚠

This garment is designed for multiple uses, single exposure. This garment is not designed to be repaired. Contaminated garments should be discarded. Contaminated garments are not suitable for training purposes.

The AHJ should develop and implement a decontamination procedure for each of the chemicals to which the garment has been exposed. The decontamination procedure should include complete information on the type of contamination, as well as the level of contamination involved.

Decontamination Solutions

The only decontamination solutions to use with this garment are water and mild household dishwashing liquid. Do not use any oxidative, corrosive or reactive decontamination solutions with this garment.

Gross Decontamination

The purpose of gross decontamination is to allow the wearer to doff the garment without being harmed by contaminants on the garment surface. Garments that have been exposed to or that are suspected to have been exposed to chemical or biological contamination should be gross decontaminated before doffing. Gross decontamination does not make a garment safe for reuse. If you suspect or know that a garment has been contaminated, it must be discarded after gross decontamination.

Garment Contamination

After gross decontamination, place contaminated items inside a leak-proof container and marked appropriately. Dispose of these items according to the AHJ Standard Operating Procedure (SOP).

Inspections Before Reuse

It is the responsibility of the safety professional having jurisdiction over usage of the garment to determine whether the garment has not been contaminated and can be safely re-used.

Cleaning of Durachem® 500
The purpose of cleaning a garment is to remove soils caused by non-hazardous substances (i.e. dirt) and for hygienic purposes.

Only garments that have been thoroughly cleaned and dried may be considered for use. Garments contaminated with toxic chemicals or blood/body fluids, excluding sweat from the wearer, should not be considered for use.

- Water and mild household dishwashing liquid should be used to clean this garment.
- This garment may be lightly rubbed with a soft brush or hand towel, thoroughly rinsed with clean, fresh water and air- dried.
- Do not use any oxidative, corrosive or reactive decontamination solutions with this garment.
- Do not dry-clean this garment.
- Do not use hot air or a tumbling air dryer to dry this garment.
- Hang the garment in a cool, dry area to ensure proper drying of the garment.

TECHNICAL INFORMATION

NFPA 1990 (1994) Class 1 and 2 Performance Data
Available on request from Kappler.

Sizing Information
Sizes available: XS, SM/MD, LG/XL, 2X/3X, and 4X.
See attached chart (Appendix B).

Garment Material and Component Descriptions
Garment Material
The primary garment material is Kappler DuraChem® 500 chemical barrier fabric.

Elastomeric Interface Material
The interface material is butyl.

Glove Material and Assembly

The glove assembly consists of two layers:

- Inner glove: AirBoss® Molded Glove
- Outer glove: Kevlar® or Kevlar® and leather tip glove

These gloves are unlined and have no surface treatments applied.

Sock Bootie Material

The garment is made with an integrated sock bootie of DuraChem® 500 material. The user must wear separate outer safety boots.

Physical Foot Protection

The OnGuard HazMax #87012 or Tingley #82330 boot must be worn over the integrated bootie for compliance to NFPA 1990 (1994) - 2022.

The OnGuard HazMax #87012 is one piece injection molded with anti-slip resistance and steel toe, steel shank and steel midsole. Polyester lining. Men sizes 6-15. Green. The Tingley Hazproof #82330 is one piece injection molded with anti-slip resistance and steel toe, steel shank and steel midsole. No linings or surface treatments. Men sizes 7-13. Orange.

Zipper/Closure Type and Material

The zipper is a 40-48" long gas-tight polyurethane coated zipper with heavy duty molded nylon teeth. The slider components are stainless steel. The outside of the zipper is protected by a flap composed of garment material. The closure is fastened by a hook/loop system.

⚠ CAUTION ⚠

The Zipper/Closure system has not been tested for permeation resistance.

Material Seam Types and Composition

Seam Material - Garment
The seam is made using a single needle lock stitch seam. The sewing thread is Nylon. The tapes are composed of a chemical barrier film that is heat-sealed over the inside seam.

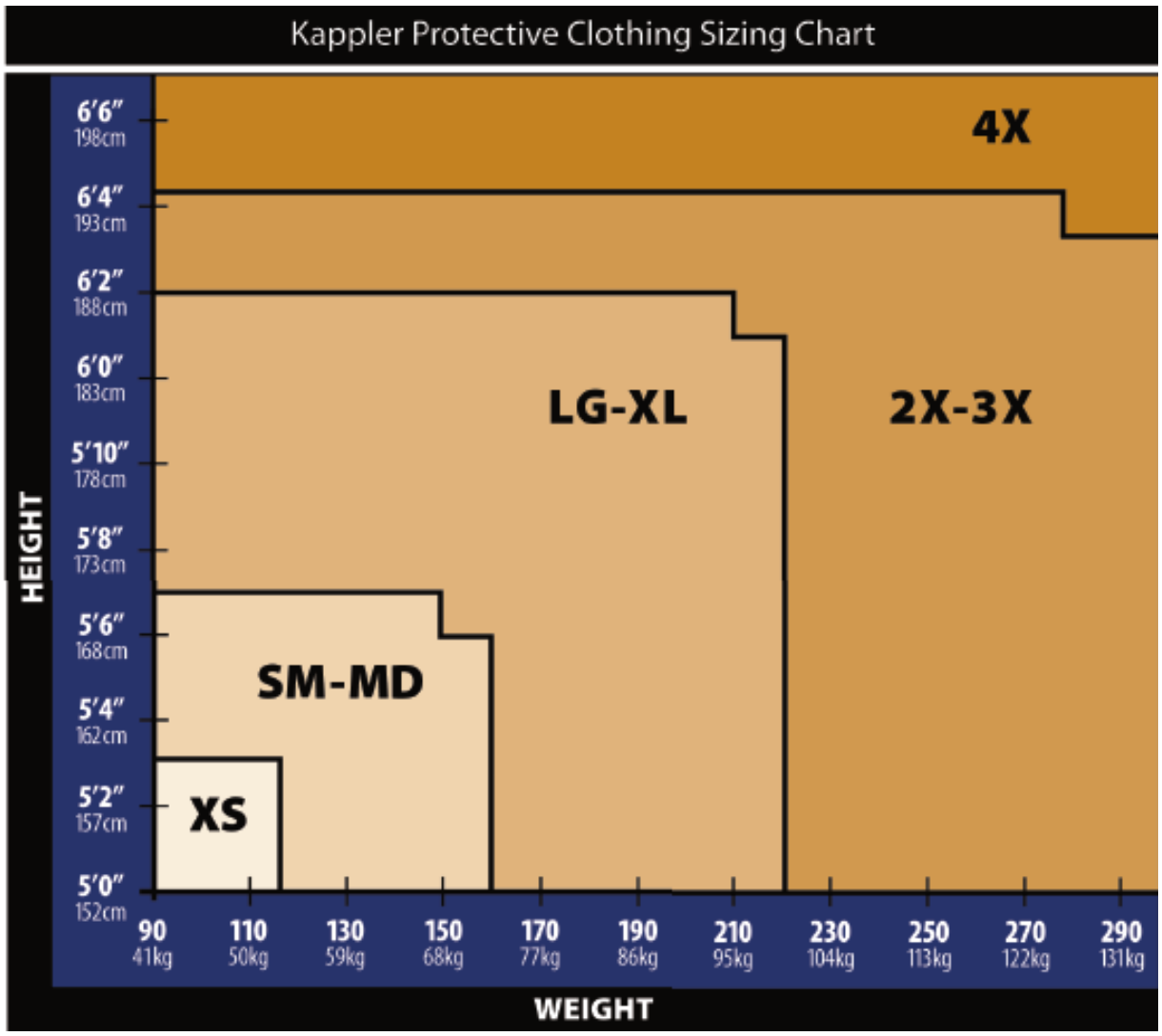
Seam Material - Interface Material
The visor is sewn to the outside of the garment material. The edge of the interface is covered with the same barrier film tape as the garment seams.

Seam Material - Glove
The glove assembly is permanently connected to the sleeve.

Seam Material - Footwear
The footwear is not attached to the garment material. The protective footwear is worn over the integral sock bootie.

Seam Material - Garment Closure
The closure is sewn to the outside of the garment material. The edge of the zipper is covered with the same barrier tape used on material seams.

APPENDIX A - SIZING CHARTS



Please Note: This chart is based on individuals wearing SCBA, safety helmet and suggested underclothing (see Recommended Undergarments).

Durachem Glove Sizing Chart

Glove Size	Hand Circumference (in)	Hand Length (in)	Garment Size Option
Extra Small	7	6-3/4	XS
Small	7	6-3/4	SM/MD
Medium	8	7-3/16	SM/MD
Large	9	7-9/16	LG/XL
X-Large	10	8-1/16	LG/XL
2X-Large	11	8-7/16	2X/3X, 4X

APPENDIX B - DURACHEM 500 INSPECTION LOG

Serial # _____

DATE	INSPECTOR	REMARKS	TEST RESULTS