

Water Rescue PPE Guidelines

#	Title of Information / Guideline	Page
1	GUIDELINES FOR CARE OF PERSONAL PROTECTIVE EQUIPMENT	2
2	GUIDELINES FOR DONNING PPE	3
3	GUIDELINES FOR DOFFING PPE	6
4	GUIDELINES FOR INSPECTION OF PPE	7
5	GUIDELINES FOR MAINTENANCE OF PPE	8
6	LIMITATIONS OF PPE	9
7	CAPABILITITES OF PPE	11
8	GUIDELINES FOR SELECTION OF PPE	12
9	GUIDELINES FOR IDENTIFING AND MANAGING HEAT AND COLD STRESS TO THE RESCUER WHILE UTILIZING PPE	13

References:

“Dressing / Care and Maintenance for Typhoon Dry Suits”, Typhoon Water Wares, LTD., Pocomoke City, MD

“Drysuit Instructions”, Typhoon International Limited, London, England

“Think Safe – Choose the Right Personal Floatation Device (PFD)”, Swiftwater Inc., Miami, FL

“The Chest Harness in Swiftwater Rescue”, Slim Ray and Charlie Walbridge, Swiftwater Inc., Miami, FL

“Swiftwater Rescue Technician 1, Student Manual, 2nd Edition”, Rescue 3 International, Elk Grove, CA, 1997

“Swiftwater Rescue Technician Advanced, Student Manual”, Rescue 3 International, Elk Grove, CA, 2000

Information Sheet #1

TOPIC: GUIDELINES FOR CARE OF PERSONAL PROTECTIVE EQUIPMENT

INTRODUCTION: General SOP for normal care of PPE.

Refer to Manufacturer's Recommendations for Definitive Care of PPE

PFD, Dry Suit, Wet Suit, Exposure Suit, Helmet, Diver Coveralls, Whistle, Dive Gloves, Dive Booties, Dive Hood

Wash – Use Mild Soap (Ivory Liquid Soap) in Warm Water, Rinse

Drying – Hang Dry (Never Dry Clean), Do Not Dry With Direct Heat Source

Storage – Well Ventilated, Cool, Dark, Dry Area

Thermal Diver's Underwear, Nomex Coverall, Mechanic Coveralls

Wash – Machine Wash on Cold or Mild Soap in Warm Water Mild Soap (Ivory)

Drying – Tumble Dry on Low Heat or Hang Dry (No Direct Heat Source)

Storage – Well Ventilated Cool, Dark, Dry Area

Dry Suit

Wax Zippers With Beeswax

Orange Suits – Store With Zippers Open

Store With Velcro Flap Sealed

Military Suits – Store With Zipper Open 3-4"

Powder Seals (Inside and Out) With Talc Powder (In Nylon)

Exposure Suit

Wax Zippers With Beeswax

Dive Knife – Disassemble as Needed

Wash – Use Mild Soap (Ivory Liquid Soap) in Warm Water, Rinse

Drying – Dry Laying on Ground Outside of Sheath or Wipe With Rag

Storage – Return to Sheath in Well Ventilated, Cool, Dark, Dry Area

Protect Metal With Silicon Grease As Needed

Information Sheet #2

TOPIC: GUIDELINES FOR DONNING PPE

INTRODUCTION: General SOP for putting on PPE.

Refer to Manufacturer's Recommendations for Definitive Wearing of PPE

PFD – Fit Comfortably and Securely (Snug to Body)

Close Front Zipper – Pull Side Compression Tabs to Snug Fit

Clip Waist Buckle – Pull Flap to Tighten

Lace Webbing Through Harness Glide and Buckle (Do Not Tie Off Loose End)

Check and Secure Open Zippers and Loose Flaps

Dry Suit – Use Assistant to Help Don / Doff as Able, Apply Talc Power as Needed

Precheck Latex Seals for Holes, Nicks, Creases or Cracking

Remove Watches, Rings or Other Jewelry That Could Damage Seals

Sit Down if Able, Put Both Legs in Suit

 Booted Suits – Wear Heavy Socks Inside of Boots

 Latex Seal at Ankles – Open Seals With Hands, Don't Push Foot Through

 Check Seal for Smooth, Flat Seal (No Clothing Underneath)

Stand Up and Pull Suit Up to Chest

Put One Arm Through and Then the Other Into Other Sleeve – Ease Into Seal

 Diagonal Entry Suits – 1st Arm Inserted On Same Side as Shoulder Zipper

 Pull Suit Over Shoulder Till Zipper Close To Neck Before 2nd Arm

 Front or Back Entry – Insert Either Arm First

 Check Seal for Smooth, Flat Seal (No Clothing Underneath)

Ease Neck Seal Over Head

 Put Head Into Suit So That Neck Seal Is Resting on Top of Head

 Stretch Neck Seal Open By Inserting Fingers, Ease Over Head

 For Too Tight Neck Seal – Stretch Out Latex With Hands

 May Use Neck Ring to Stretch Seal When Awaiting Operations

 Check Seal for Smooth, Flat Seal (No Clothing Underneath)

Zip Close Suit - Do Not Force Zipper(s), Ensure Zipper(s) Are Fully Closed

 One Hand on Suit Apron, One Hand on Zipper

Vent Suit – Squat Down While Cracking Open Neck Seal

Secure Loose Straps

Wet Suit – Other Types of Wetsuits May Require Different Techniques

Remove Watches, Rings or Other Jewelry That Could Damage Suit

Trousers

 Sit Down if Able, Put Both Legs in Suit

 For Tight Fitting Suits May Need to Roll Back Lower Suit Legs

For Damp Suits May Need to Use Plastic Bag Over Foot to Slide In
 Stand Up and Pull Suit Up to Chest
 Put Arms Through Shoulder Holes
 Compression Zippers On Suit – May Leave Open Before Operations

Top

Put One Arm Fully Through One Sleeve Before Other Arm Inserted
 For Damp Suits May Need to Use Plastic Bag Over Foot to Slide In
 Zip Front of Suit
 Pull Beaver Tail Flap Under Crotch and Secure to Front of Top Section

Helmet – Adjust and Buckle Chinstrap When Wearing

Petzel – Place Squarely on Head, Adjust Fit With Side Adjustments at Ears
 Kayak – Place Squarely on Head, Check for Fit With Padding in Helmet

Diver Coveralls – Use Assistant to Help Don / Doff as Able, Wear Over Dry Suit

Sit Down if Able, Put Both Legs in Suit
 Stand Up and Pull Suit Up to Chest
 Put One Arm Through and Then the Other Into Other Sleeve
 Zip Up Suit
 Snug Compression Bands On Coveralls

Whistle – Should Be Staged With Lanyard Inside Top Right Pocket of Lifejacket

Dive Gloves – Same for All Types, Sizes of Dive Gloves

Insert Hand into Glove, Snug Glove Around Base of Fingers
 If Equipped With Velcro Strap, Secure Around Wrist
 Wearing With Wetsuit – If Able, Wear Glove Inside Sleeve of Wetsuit

Dive Booties – Same for All Types, Sizes of Dive Booties (R and L Types)

Sit Down if Able
 Insert Foot Into Bootie (No Sock)
 Close Compression Zipper and Close Velcro Strap if Equipped
 Wearing With Wetsuit – If Able, Wear Bootie Inside Ankle of Wetsuit

Exposure Suit – Some Floatation, Use for Wet, Cold Weather

Sit Down if Able, Put Both Legs in Suit
 Stand Up and Pull Suit Up to Chest
 Put One Arm Through and Then the Other Into Other Sleeve
 Zip Up Suit
 Use Velcro Compression Tabs As Needed to Snug Fit

Thermal Diver's Underwear – Use Under Drysuit or On Shore for Warmth

Sit Down if Able, Put Both Legs in Suit
 Stand Up and Pull Suit Up to Chest
 Put One Arm Through and Then the Other Into Other Sleeve
 Zip Up Suit

Use Hand and Foot Stirrups As Needed (Keeps From Bunching Up)

Nomex Coverall – Use Under Drysuit or On Shore As Light Jumpsuit

Sit Down if Able, Put Both Legs in Suit

Stand Up and Pull Suit Up to Chest

Put One Arm Through and Then the Other Into Other Sleeve

Zip Up / Button Up Suit

Use Wrist and Ankle Snaps To Snug Fit As Needed (Keeps From Bunching Up)

Mechanic Coveralls– Use Over Nomex Coverall, Diver's Underwear, Or Other Clothes

Sit Down if Able, Put Both Legs in Suit

Stand Up and Pull Suit Up to Chest

Put One Arm Through and Then the Other Into Other Sleeve

Zip Up / Button Up Suit

Dive Knife – Should Be Staged on Left Lower Chest of Lifejacket

Dive Hood – Do Not Force Over Head (May Strain Neck)

With Both Hands Open Neck Opening And Place at Top of Head

Ease Over Head and Adjust So Face Is at Front Opening

Tuck Flap Around Shoulders Under Wet Suit as Needed

Information Sheet #3

TOPIC: GUIDELINES FOR DOFFING PPE

INTRODUCTION: General SOP for taking off PPE.

Refer to Manufacturer's Recommendations for Definitive Wearing of PPE

PFD – Loosen All Flaps After Use
Doffing Process is the Reverse on Donning

Dry Suit – Use Assistant to Help Don / Doff as Able, Open Loosen All Flaps After Use
Remove Watches, Rings or Other Jewelry That Could Damage Seals
Zip Open Suit - Do Not Force Zipper(s), Ensure Zipper(s) Are Fully Closed
One Hand on Suit Apron, One Hand on Zipper
Ease Head Out of Neck Seal
Stretch Neck Seal Open By Inserting Fingers, Ease Over Head
Pull One Arm Through and Then Other Out of the Sleeves – Ease Over Hands
Easiest to Remove by Pulling Arm Through Sleeve Behind Back (Helper)
Remove Seals By Inserting Two Fingers Under Seal, Stretch Over Hand
Diagonal Entry Suits – Remove 1st Arm on Opposite Side of Shoulder Zip
Front or Back Entry – Remove Either Arm First
Pull Suit Down Past Waist
Sit Down if Able, Pull Both Legs Out of Suit
Latex Seal at Ankles – Open Seals With Hands, Don't Pull Foot Through
Remove Seals By Inserting Two Fingers Under Seal, Stretch Over Foot

Wet Suit –
Remove Watches, Rings or Other Jewelry That Could Damage Suit
Release Compression Zippers On Suit
Doffing Process is the Reverse of Donning

Helmet – Doffing Process is the Reverse of Donning, Loosen Adjustments After Use

Diver Coveralls, Dive Gloves, Dive Booties, Thermal Diver's Underwear, Nomex Coverall, Mechanic Coveralls, Exposure Suit, Diver Hood
Doffing Process is the Reverse of Donning

Whistle, Dive Knife – Left Staged On Lifejacket

Information Sheet #4

TOPIC: GUIDELINES FOR INSPECTION OF PPE

INTRODUCTION: General SOP for general inspection of PPE.

Refer to Manufacturer's Recommendations for Definitive Inspection of PPE

Fading of Color or Discoloration May Indicate Weakness of Materials

Zippers – Check for Obstructions or Debris in Zipper Teeth, Check for Corrosion
Open and Close Zipper Feeling for Snags in Operation

Inspect Body of PPE FOR Rub Marks, Scrapes, Rips, Tears, Holes, Fraying

PFD, Exposure Suit –

Check for Shrinkage, Mildew Odor, Water Logging of Buoyant Materials
Test All Zippers, Straps and Buckles for Function

Dry Suit –

Seals – Check Creases or Folds Especially for Tears, Cracks, or Nicks
Stretch, Look for Slight Parallel Cracks Perpendicular to Stress Direction
Lightly Pull on Base of Seals to Check for Delaminating
Body of Suit – Check for Rub Marks, Holes, Scraps, Tears
Zipper – Check for Deformation of Rubber Around Closure, Check if Waxed

Wet Suit – Cuffs at Ankle and Wrist – Check for Fraying or Loose Threads

Helmet – Inspect Helmet Padding and Chin Strap Function

Shell – Check for Dents, Cracks

Harness – Check for Fraying of Straps and Attachment of Harness to Helmet
Test Adjustment Wheels on Petzel Helmets

Diver Coveralls – Inspect Velcro Straps Checking for Ability to Secure and Release

Dive Gloves, Dive Booties, Thermal Diver's Underwear, Nomex Coverall, Mechanic Coveralls, Dive Hood – Check for Fraying of Materials

Whistle – Test Function, Inspect Lanyard to PFD

Dive Knife – Test Attachment in Sheath, Inspect Knife for Corrosion

Information Sheet #5

TOPIC: GUIDELINES FOR MAINTENANCE OF PPE

INTRODUCTION: General SOP for general working on PPE.

Refer to Manufacturer's Recommendations for Definitive Maintenance of PPE

Zippers – Clean With Toothbrush If Needed, Lubricate With Beeswax (Metal)

PFD – May Trim Strap If Excessive Length With Rope Cutter
Do Not Repair (Voids USCG Certification), Return to Swiftwater Inc.

Dry Suit – Use Neoprene Glue, Large Repairs Require Authorized Service Dealer
Seals – Replace Seals That Are Cracked, Ripped or Develop Holes
Repair Delamination With Neoprene Glue
Replace / Repair By Removing Old Seal
Rough Up Area With Sand Paper and Clean Area With Acetone
Apply Glue to Both Seal and Area to Apply Seal To – Dry Till Tacky
Secure Seal in Place
Body of Suit – Glue Patch Over Area
Zipper – Authorized Service Dealer

Wet Suit – Clip Loose or Frayed Stitching
Restitch With Dental Floss or Nylon Thread, Patch With Neoprene Glue
Surplus Suits That Are Not Cost Effective to Service

Helmet – Destroy Damaged Helmets in Not Meet Manufactuer Spec (Unrepairable)

Diver Coveralls, Exposure Suit, Dive Gloves, Dive Booties, Dive Hood –
Resew Material Together With Nylon Thread

Thermal Diver's Underwear, Nomex Coverall, Mechanic Coveralls –
Sew Together With Normal Sewing Techniques and Thread

Whistle – Discard and Retain Lanyard

Dive Knife – Disassemble Knife
Clean Rusty Areas With Fine Grain Sand Paper or Wire Brush
Straighten Blade as Needed and Able
Discard Unsalvagable Parts (Retain Undamaged Parts)

Information Sheet #6

TOPIC: LIMITATIONS OF PPE

INTRODUCTION: Non-inclusive listing of limitations of PPE

Use of Any Water Rescue Equipment Is Dangerous if Used Incorrectly or in An Unsafe Manner. Training and Experience is Required for Safe Usage

PFD (Type V) – Approved for Use Only as a Substitute for a Type III PFD
Use of Chest Harness Is Inherently Dangerous
Will Not Hold the Face of an Unconscious Wearer Clear of the Water
In Rough Water a Wearer's Face May Often Be Covered By Waves
Not for Extended Survival In Rough Water
Wearer May Have to Lift Head Back to Avoid Turning Face Down

Dry Suit –

Difficult to Swim in Suit
Leaking Suit or Open Zippers Will Hold Water and Make Swimming Difficult
Improperly Vented Will Retain Excessive Amount of Air
 May Blow Out Neck Seal on Helo 10 – 10 Entry
 Will Cause Difficulty Swimming
 May Cause Legs to Fill With Air and Put Rescuer Head Down in Water
Suit May Be Punctured or Ripped by Sharp Objects
Neck Seal May Restrict Blood Flow, Extreme Case of Breathing Restriction
Wrist or Ankle Seals May Cause Edema in Limbs Distal to Seal
Fully Compressed Suit Against Body With No Insulation May Cause Heat Loss
Fully Compressed Suit Against Body May Restrict Movement
Rescuer May Develop Hypothermia or Hyperthermia Wearing Suit

Wet Suit –

Will Not Provide Protection Against Wind
Rescuer May Develop Hypothermia or Hyperthermia Wearing Suit
Suit Will Not Provide Contamination Protection

Helmet – Petzel Helmets Have Limited Ear and Back of Head Protection
Kayak Helmets Have Limited Ballistic Impact Protection (Rockfall)

Diver Coveralls – Difficult to Swim in, May Catch on Underwater Debris
Very Limited Use in Swiftwater Conditions – Drag of Suit on Water

Dive Gloves – May Combine Layer of Leather Over Latex As Needed
Kevlar – Cut Protection Good, No Contamination, No Insulation

Leather – Cut Protection Good, No Contamination, No Insulation
Neoprene – Limited Cut Protection, No Contamination, Insulation Good
Latex – No Cut Protection, Contamination, No Insulation

Dive Booties –

Limited Sole of Foot Protection
No Contamination Protection

Thermal Diver's Underwear

Rescuer May Overheat While Wearing Under Dry Suit

Nomex Coverall

Rescuer May Require Additional Insulation for In Water or Cold Weather
Operations While Wearing Under Dry Suit

Exposure Suit

Difficult to Swim In, Retain Water (Will Drain After Exiting Water)

Dive Hood

May Chafe Chin, Difficult to Hear With (May Have Ear Holes for Sound)

Mechanic Coveralls –

Coveralls Will Retain Water, Difficult to Swim In

Whistle – May Not Function Properly if Not Cleared of Water

Dive Knife –

Knife May Release From Sheath When Chest Contacts Object
Self Extrication Into Boat, Lifeguard Skills
Sharp Edges of Knife May Cut Person or Materials
Knife / Sheath May Hang Up on Line Running Across Chest

Information Sheet #7

TOPIC: CAPABILITIES OF PPE

INTRODUCTION: General capabilities of available water rescue PPE

PFD (Type V) – Floatation, Required on Any Operations Around the Water
Padded PFD – Blunt Trauma Protection – Some Chest / Abdomen Protection
Padded PFD – Can Use for Some Warmth

Dry Suit – Contamination Protection, Required for In Contaminated Water Operations
Temperature Control – Use With Nomex or Diver's Underwear Underneath
Wind / Rain Protection – Use For Protection From Wind / Rain
Limited Buoyancy – Use In Addition to Lifejacket

Wet Suit – Temperature Protection, Limited Blunt Trauma and Cut Protection

Helmet – Blunt Trauma Protection to Head

Dive Hood – Warmth, Limited Wet Weather Protection

Diver Coveralls – Protect Dry Suit From Sharp Objects

Dive Gloves – May Combine Layer of Leather Over Latex As Needed
Kevlar – Cut Protection Good, No Contamination, No Insulation
Leather – Cut Protection Good, No Contamination, No Insulation
Neoprene – Limited Cut Protection, No Contamination, Insulation Good
Latex – No Cut Protection, Contamination, No Insulation

Dive Booties – Limited Sole of Foot Protection, Warmth of Foot

Thermal Diver's Underwear – Warmth, Chaffing of Dry Suit Protection

Nomex Coverall – Some Warmth, Chaffing of Dry Suit Protection
Nomex Coverall Can Also Be Use As Overgarment For Fire Protection

Mechanic Coveralls – Warmth, Soiled Clothing Protection

Exposure Suit – Warmth, Wet Weather Protection, Some Buoyancy

Whistle – Signaling

Dive Knife – Cutting, Some Use As Pry Tool, Limited Use as Flat Head Screwdriver

Information Sheet #8

TOPIC: GUIDELINES FOR SELECTION OF PPE

INTRODUCTION: General Use Categories of PPE

Select PPE As Needed From Available Equipment Grouped in Categories for Safe Operations

Contamination Protection – Dry Suit Required (Suits With Integral Boots Preferred)
Limited Protection – Latex Dive Gloves

Thermal Protection – Dry Suit With Nomex Standard (Additional Insulation as Needed)
Diver's Underwear (2 Weights of Dive Underwear) and Dry Suit
Nomex Suit and Dry Suit (May Enter Water Safely to Cool Off As Needed)
Wet Suit (May Enter Water Safely to Cool Off As Needed)
Dive Hood
Dive Gloves
Limited Thermal – Helmet and Padded Lifejacket

Blunt Trauma Protection – Helmet Required for Rescue Operations
Padded Lifejacket
Limited Blunt Trauma Protection – Wet Suit, Dive Gloves, Dive Booties
Diver's Underwear and Dry Suit
Note – Use Hiking Boots Instead of Booties for Ground Ops As Needed

Cut Protection – Use Early When Potentially Operating Around Sharp Edges
Helmet
Padded Lifejacket
Leather Gloves
Diver's Coveralls
Limited Cut Protection – Some Wetsuits, Dive Gloves, and Dive Booties

Floatation – Lifejacket Required Within 10' of Water Operations
River Board
Limited Floatation - Exposure Suit, Wet Suit, Dry Suit

Signaling – Use Standard Signals As Given in Communication Guidelines
Strobe Light
Whistle or Air Horn
Limited Signaling – Chemlights, Helmet Lights, Flashlights, Spot Lights

Information Sheet #9

TOPIC: GUIDELINES FOR IDENTIFYING AND MANAGING HEAT AND COLD STRESS TO THE RESCUER WHILE UTILIZING PPE

INTRODUCTION: Prevention, early recognition and treatment of heat and cold stress critical to safe use of PPE

.

Prevention – Incident Action Plan SOP and Tactical SOP

- Team Briefing – Predicted Weather Conditions for Operational Period
- Regular Rest Periods Planned for Level of Exertion (Incident Action Plan SOP)
- Regular Hydration Break Planned Every 30 Min (Incident Action Plan SOP)
- Pre-operational Physical Exam (Incident Action Plan SOP)
- Meals at Beginning, Mid-Point and End of Shift (Incident Action Plan SOP)
- Safety Message and Regular Check When Using PPE With Increased Risk for Heat or Cold Stress (I.e. Dry Suits, Wet Suits ...)
- (Standard Tactical Operating Guidelines)

Contributing Factors – Refer to Risk Management of Hyperthermia and Hypothermia

- General – Tired, Lack of Food, Dehydration, Lack of Preparation (Extended Ops)
- Heat Stress – Hot Temp Outside, Dry or High Humidity, No Shade, Wearing Dry Suit (Especially Out of Water), Too Much Insulation, Heavy Labor
- Cold Stress – Cold, Wet, Night, Wearing Wet Suit (Windy or Wet conditions), Lack of Insulation, Heavy Labor Followed by Inactivity,

Identification – Refer to EMT Text (Some Signs and Symptoms Follow)

- Heat Stress – Warm or Flushed Skin, Sweating, Level of Consciousness Change
- Cold Stress – Cold Skin, Shivering, Blue Tinge to Skin, Loss of Muscle Coordination

Mitigation - – Refer to Risk Management of Hyperthermia and Hypothermia

- General – Rest, Hydration, Food, Checkup Periods, Rotational Assignments
- Heat Stress – Shade, Cool Environment (Enter Water), Rest Out of PPE
- Cold Stress – Out of Wet Clothing / Water, Wind Break, External Heat Source