

# RAN SHIP ABANDONMENT SUIT

DESCRIPTION AND MAINTENANCE INSTRUCTIONS

OCTOBER 2015



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# TABLE OF CONTENTS

## **1.0 TESTING** **3**

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- 1.1 INSPECTION 3
- 1.2 LEAKAGE TESTING PROCEDURE 4

## **2.0 PACKING** **9**

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- 2.1 FOLDING METHOD 9
- 2.2 FOIL BAG PACKING METHOD 13

## **3.0 MAINTENANCE AND CARE** **20**

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- 3.1 GENERAL SUIT EXAMINATION 20
- 3.2 CLEANING 20
- 3.3 REPAIRS 20
- 3.4 DAMAGED 22

## **4.0 SUMMARY** **24**

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## **5.0 PARTS LIST** **25**

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# 1.0 TESTING

## 1.1 INSPECTION STANDARDS AND REQUIREMENTS

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Time: Inspection takes one worker 10 minutes.

The inspector is required to perform a visual inspection to make sure the garment is complying with standards.

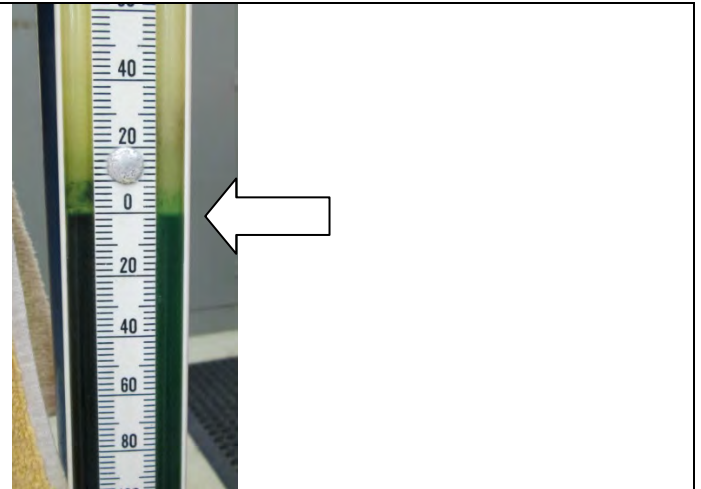
- The suit is to be complete with no holes or burn marks and no contamination of any kind (grease/ dirt).
- Tape should be secure and not lifting. Check to see by scratching gently along edges of tape with your fingernail to see if the tape will come off.
- All adjustment straps are adjusting freely and smoothly.
- The zipper is intact and operating smoothly. Unzip from left to right.
- Neck and wrist seals have not deteriorated: cuts, tears, detachment.
- Make sure all tape is trimmed off. No hanging pieces and no puckers in the tape.
- Any seams with a lot of tape layers need to be assessed. Too much tape is not optimal.
- Check and make sure the tape on the leg straps is secure. This is a problem area!
- Make sure all sewing is correct with no skips, no threads hanging and no visible tape showing between stitches (watch for misses at seam intersections). Use your stitch counter to confirm all stitching is 6 to 8 SPI.
- Make sure there are no holes in the cuff and neck gaskets and the seams are correctly placed.
- Make sure the sharkskin feet are secure and the edges are edge stitched with no puckers.
- Keeper pouches are in correct configuration.
- Check the sample suit to make sure this is attached properly (yellow webbing/elastics/waist strap folded correctly).

## 1.2 LEAKAGE TESTING PROCEDURE

Time: One tester takes an average of 20 minutes per suit.

Atmospheric conditions: Unless otherwise specified, all tests and inspections shall be performed at:

- (a) An atmospheric pressure of between 28 inches to 32 inches of mercury (94.8 kpa to 108.4 kpa);
- (b) A temperature of 20 plus or minus 2 degrees Celsius (68 plus or minus 4 F);
- (c) A relative humidity of 80 percent or less.



1. All RAN SAS garments are to be tested inside out. Securely fasten the zipper by reaching through the neck gasket. Lay flat on table zipper side up.

2. Check the levels on the manometer are set to Zero. If they are low; contact a supervisor to top them up.



Turn the air on using the red dial on the back of the testing column. Parallel with the brass pipe indicates the ON position.



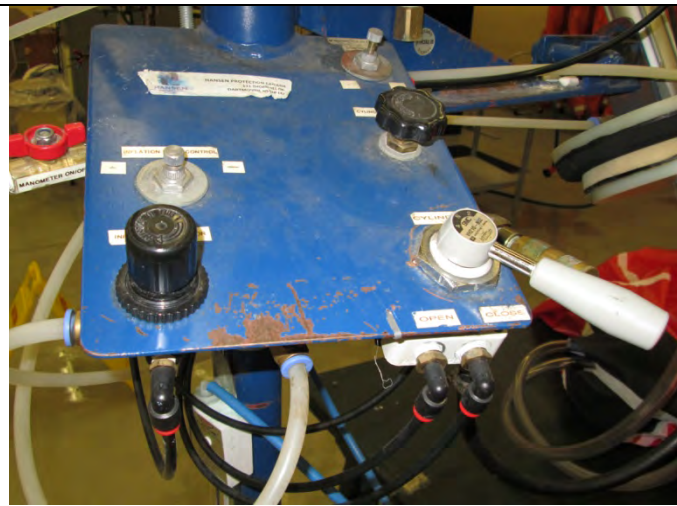
Ensure the inflation tubes are secured into the neck piece foam. Fold foam in half over the inflation tube ends and gently insert into the neck gasket of the suit.



Ensure the inflation tube foam is centered snug in the neck gasket.



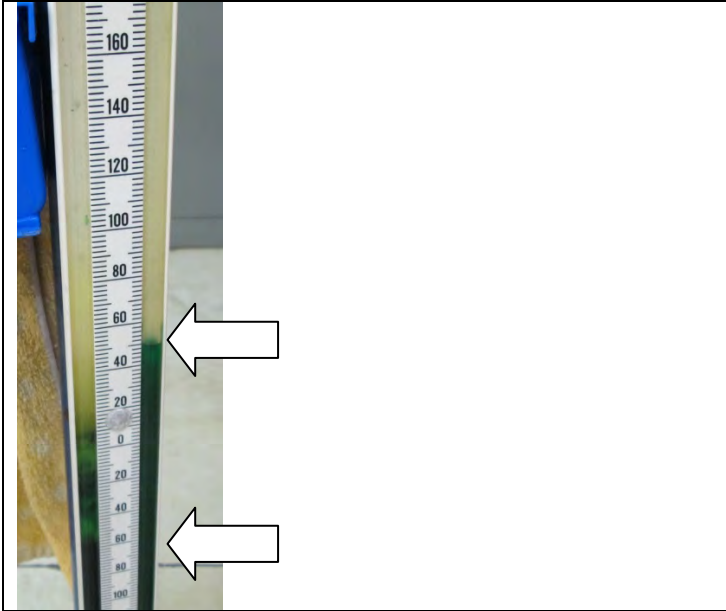
Roll the wrist gaskets, cover with neoprene scraps and clamp closed. The clamp must not be directly placed on the cuff.



Raise the testing ring by turning the lift lever to the right CLOSED position. This will remain in the closed position for the duration of the testing for all suits tested at one time.



When the manometer liquid starts to move reduce the air but turning the knob to the left quickly. The suit pressure will rise quickly when the liquid start to move. It is important not to over inflate.



The manometer must remain at the constant pressure of 50ml during testing. This image shows the 50ml mark. During testing keep an eye on the pressure level so it does not creep higher or drop below 50.

Turn on water at the wall. Make sure soap dispenser is at least half full. There are replenishment bottles of soapy water to top up when needed. Don't let the soap container get lower than 1/4 full.



To prime the soap turn the nozzle to JET and spray toward the drain until soapy. Then return to MIST. Set hose nozzle to MIST and test that soap is flowing through.



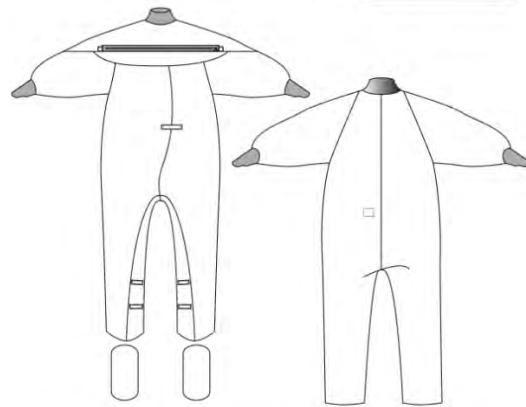
Mist the entire suit starting at the neck gasket. Work clockwise around the suit inspecting all seams and fabric for leaks. Leaks are detected by: Streaming bubbles, blowing air, slow forming bubbles. Mark all leaks by circling the area with chalk and



DND8580 - SAS Air Retention Testing

When misting the inflated garment, streaming bubbles and slow forming bubbles will be an indication of leakage. Indicate leaking areas by circling the part on the diagram.

DATE: \_\_\_\_\_  
 SERIAL #: \_\_\_\_\_  
 TEST #: \_\_\_\_\_  
 TESTER: \_\_\_\_\_



ADDITIONAL COMMENTS:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SAS ARTS 11.15

Thoroughly inspect the seams between the legs. Lift the garment onto each side to inspect the seams on the under sides.

Mark all leaks on the testing sheet. Show where the chalk marks were placed and write any additional comments.



This image shows the side seam on the neck gasket leaking. Streaming bubbles



This image shows a slow leak in one of the cross seams.





When finished testing:

1. Un-clip the cuffs
2. Turn the testing ring lever to the DOWN position.
3. Carefully remove the neck gasket from the ring.
4. Carry the suit to the drying rack, making sure nothing touches the floor.
5. Hang to dry by looping elastics over feet and hang upside down on alternating pegs as shown.

Turn fans on to aid in drying process.

The picture to the left shows how to hang several suits (3 shown)

## 2.0 PACKING

### 2.1 FOLDING METHOD

Time: The process from folding the garment to the garment being sealed in the foil bag takes 2 workers an average of 15 minutes.

All suits to be folded must have passed Air retention testing and visual inspection.

	<p>RAN PERSONAL ABANDONMENT SUIT NSN 8415-98-208-1765</p>  <p>DATE OF MANUFACTURE: OCTOBER 2015 SERIAL NUMBER:</p> <p>Safe Defence Ltd. 92 Annett Road. RD1 - Kumeu Auckland 0891, New Zealand</p> <p>PSAS9872</p>
<p>Using a permanent marker clearly print the serial number of the suit on the foil bag before folding.</p>	<p>Stamp the serial number on the pouch label using “Stays On” ink. The serial number must match the number in the suit. If the stamp is not readable on the pouch or suit it must be sent to repair for a new label.</p>
	
<p>1. Lay suit right side out and flat on the table.</p>	<p>2. Attach leg ties so that the Velcro just touches.</p>



3. Adjust waist belt pouch open and Velcro folded under.

4. Adjust waist belt ends to 4" long, from buckle to t-tab.



5. Make sure the zipper is open. Then fold excess material over zipper.

6. Cover the waist belt at the back of the suit by making a fold in the back enclosing the waist belt.



7. Fold one side to the center.

8. Fold leg in half.



9. Keep foot flat on top of the folded leg.



10. Fold arm down parallel to the side.



11. Fold second half to center.



12. Fold leg in half and lay the foot flat on top.



13. Fold down the sleeve keeping it parallel with the side.



14. Shown flat with the arms down.



15. Fold legs up to the neck.



16. Fold arm down parallel to the side.



17. Press air out of suit.



18. Fold in half length-wise, keeping the hood out.



19. Press air out.



20. Roll the suit, starting at the feet. Roll keeping the edges tucked in at the sides. Proceed to packing into foil bag

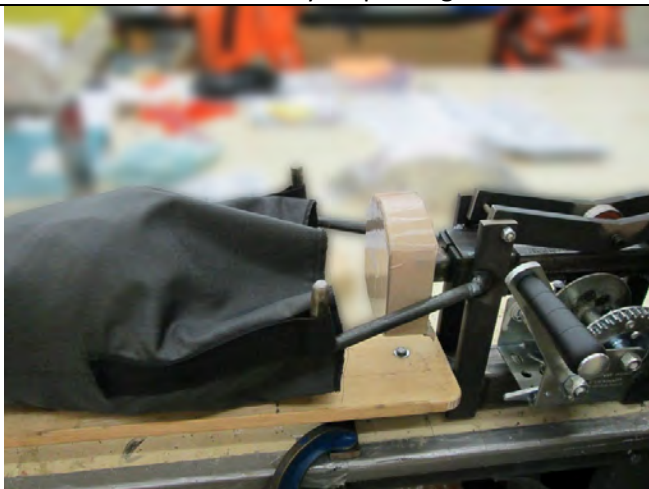
## 2.2 FOIL BAG PACKING METHOD



1. Place folded suit into nylon packing sleeve.



2. Push suit down into sleeve and place on the stuffer.



3. Place the sleeve loops over the hooks of the stuffer.



4. Place the foil bag over the end of the sleeve.



5. Turn the crank handle to push the suit down the sleeve and into the foil bag.



6. Line the side seam of the foil bag up with the side seam on the sleeve.



7. Remove the foil bag from the board when the suit has been pushed in as far as it will go.



8. Fold the flaps down at the closed end of the bag as shown to avoid tearing while in the packing machine.



9. Press the bag side seam to side seam so that it will easily fit into the packer.



10. Push suit into the packer, keeping the side seams centered at both sides. Push into the packer as possible.



11. When the suit is inserted into the packer it should



12. Pumping the handle will close the packer. Ensure

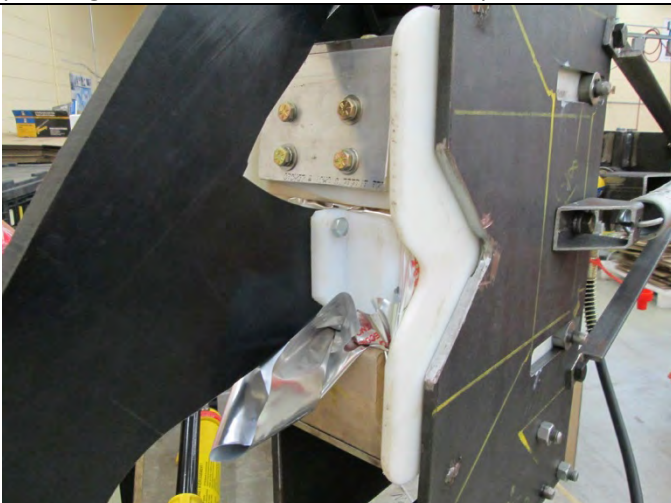
look like this image showing side seam positioning.



the hydraulic pump valve is fully closed to enable the packer.



13. The arm on top of the packer can be used to aid in pressing the excess suit further into the packer.



14. If needed, press the arm down onto the foil bag while another person is still pumping the packer closed.



15. Remove the arm before fully closing the packer.



16. When closed, make sure suit is fully inside the packer.







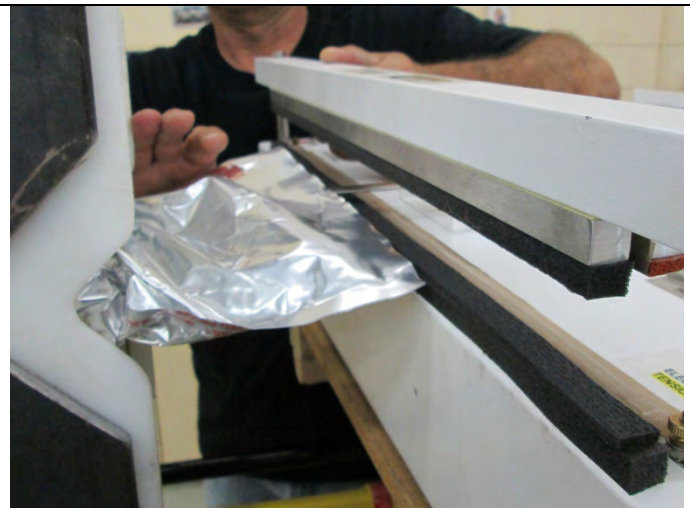
17. Straighten the bag opening so that it is extended away from the packer and both top and bottom parts are flat.



18. fully extended flat bag opening.



19. Turn the packer to face the vacuum sealer.

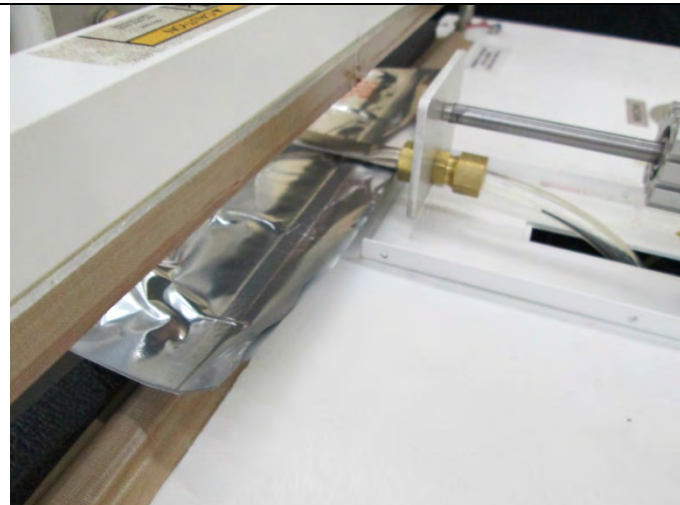


20. Pull the vacuum sealer drawer toward the packer and insert the vacuum nozzle into the bag opening. \*Be careful as the nozzle can puncture the foil.



21. When the foil is flat and in position under the presser bar. Start the vacuum sealer by pushing the black pedal. The pedal must remain pressed until ready to seal.

22. The vacuum gauge should reach 25 and hold before releasing the pedal and sealing the bag. The nozzle will retract when heat sealing is taking place.



23. If there is a problem or lack of suction during the sealing this can be stopped without sealing the bag by turning the switch to the OFF position. To restart, reposition the bag and turn the switch back to ON (a green light will show).

24. To ensure a lasting seal; after the first seal move the drawer back slightly and seal again.



25. Turn the packer away from vacuum sealer. Open the packer by turning the hydraulic valve to the open position (yellow knob at base of pump).



26. When the packer opens fully, remove the suit.



27. Check that all measurements are within tolerance. (Refer to measurement sheet for width, length, height and curve).



28. Fold ends of bag to reveal the "Tear Here" label.



29. Insert into Nomex pouch with the curve at the back. Make sure the suit is evenly positioned in the pouch.



30. Place the donning card and lanyard into the pouch behind the suit along the curve.



31. Close the Nomex pouch and secure 3 front snaps.



32. Secure Velcro tabs at both sides of the pouch.



33. Insert in to poly bag with serial number neatly printed on the bag with permanent marker.



34. Insert desiccant packet into poly bag. Desiccant label, Manufacture date label, Expiration date label are placed on the poly bag. Heat seal poly bag closed.

## 3.0 MAINTENANCE AND CARE

### 3.1 General Suit Examination

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Time: One worker 10 minutes.

Lay the suit on a clean, flat surface. Ensure the inside, and outside, of the suit is dry. Visually check for small rips, tears, or punctures, which may be repaired. Major rips, tears, or punctures cannot be repaired.

The work area where inspection and maintenance of the suit is performed should be smooth and flat, where the suit will not snag, tear or otherwise be punctured or damaged and should be cleared of all non-essential equipment and materials. The working surface should be free of harmful contaminants such as oil, grease, acids or solvents. Work areas, which are subjected to wide temperature variations, should be avoided.

Any defective parts should be repaired or replaced

### 3.2 CLEANING

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Time: One worker 20 minutes to clean, 20 minutes to re-test and 24 hrs to dry.

To increase the life of the garment, it is recommended to wash the suit only if required.

Do not use bleach or other chlorine products.

Do not use fabric softeners.

Do not dry clean.

Do not use commercial laundry facilities.

Fabric surface may be cleaned with a soft, non-abrasive cloth and water or mild cleanser. GOJO Industries (USA) all purpose cleanser (#1807) is recommended. Other cleaning agents or solvents must not be used. Brushing must be done lightly or the properties of the fabric will be destroyed. After cleaning, the suit should be re-tested for leakage and then thoroughly air-dried in a low humidity setting for 24 hours.

**CAUTION:** Never store the suit wet. Never hang the suit from the neck seal; doing so may result in suit damage.

### 3.3 REPAIRS

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The protection provided by this dry suit relies on its watertight characteristics. It is extremely important that damaged suits are handled in accordance with the following repair requirements. Qualified repair personnel can normally perform minor repairs, with adequate facilities. The manufacturer should do all major repairs. This section provides some information to assist with minor repairs to the suit and related components.

It is recommended that the following guidelines be used in determining potential for repair. A qualified technician

should make all repairs. The full description and part numbers of the materials required for repairs are detailed in section 5.0 of this manual.

**Replace wrist cuff (single):** Operation time for one worker is 15 minutes. Using scissors cut off the cuff at the seam where the neoprene and shell meet. Make the new cuff by sew right sides together. Tape the cuff inside and out. Sew back onto the sleeve. Re-tape the sleeve. Do not patch wrist cuffs.

**Replace neck seal:** Operation time for one worker is 23 minutes. Using scissors cut off the neck seal at the seam where the neoprene and shell meet. Make the new neck cuff by sew right sides together. Tape the neck seam inside and out. Sew the neck seam back onto the neck line. Re-tape the neck line. Do not patch neck seal.

**Replace Zipper:** Operation time for one worker is 24 minutes. Using a seam ripper, start to take off the zipper by placing the seam ripper between the zipper and the shell on the outside, detaching the stitches. Then use the seam ripper or scissors to slit the tape where it is attached. Pick out the left over thread from the zipper facing. Stitch the new zipper into the suit opening (or stitch the old zipper into the new suit stitching in the same stitch holes on the zipper). Tape the zipper.

**Patch pin hole (welder):** Operation time for one worker is 7 minutes. Weld on a small piece of tape over the pin hole.

**Patch pin hole (taper):** Operation time for one worker is 7 minutes. Tape a small piece of tape over the pin hole.

**Keeper pouch:** Operation time for one worker is 8 minutes. If the keeper pouch is damaged (ripped) pick off the folded ends of the waist belt and take the pouch off through the ladder locks. Replace with a new pouch and sew the folded ends back together. \*the damaged pouch can be harvested for pieces\*

**Stitching:** Seam repairs, stitching, and joining to be done using a single needle lockstitch, 6 stitches per inch for Nylon T70 Exoskin to Exoskin and 7 stitches per inch for Permacore T40 on all other seams. Securely backstitch all ends of stitching not less than 0.5 inch (1.27 cm). The seam allowance to be used is 0.125 inch (0.37 cm).


**Small tear - less than 0.375 inch (0.95 cm) in length:** Operation time for one worker is 7 minutes. Assess the reparability of the leak. Place each side the tear next to each other, closing the gap. Weld or tape a small piece of tape over the tear, the patch should extend 1 inch (2.54 cm) from the perimeter of the tear or hole. In cases of significant damage, the suit must be destroyed.

Always inspect and leak test the suit after completion of repairs.

### 3.4 DAMAGED

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The following examples show damages that should not be repaired. These damages compromise the fabric structure and create weak spots even after repair. It is recommended that all suits with these damages be discarded.

	<p>Burn hole in fabric next to seam:</p> <p><b>Damaged</b> Burn holes cannot be repaired. Remove the pattern piece that is burned and replace with a re-cut.</p> <p>If panel must be replaced and not more that 0.375 inch (0.95cm) fabric tolerance can be lost.</p>
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	<p>Burn hole in fabric taped:</p> <p><b>Damaged</b> Burn holes cannot be repaired. Remove the pattern piece that is burned and replace with a re-cut.</p> <p>If panel must be replaced and not more that 0.375 inch (0.95cm) fabric tolerance can be lost.</p>
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	<p>Unpicked Velcro on elastic:</p> <p><b>Damaged</b> This picture shows damaged elastic where the Velcro was picked off. There are holes in the elastic that compromise the integrity of performance so it must be replaced.</p>
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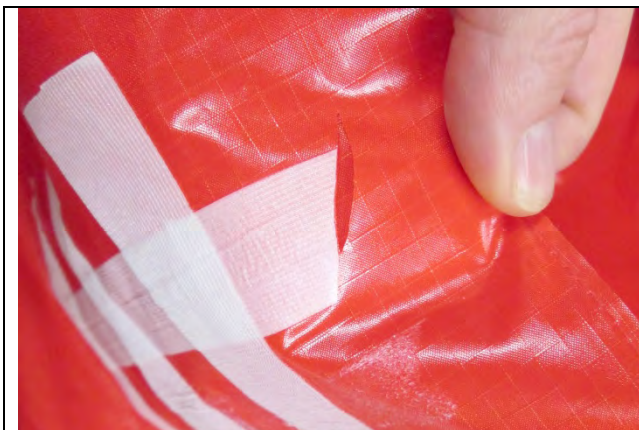


Melted hole:

**Damaged**

Burn holes cannot be repaired. Remove the pattern piece that is burned and replace with a re-cut.

If panel must be replaced and not more that 0.375 inch (0.95cm) fabric tolerance can be lost.



Slice or cut in fabric

**Damaged**

Holes cannot be repaired. Remove the pattern piece that is burned and replace with a re-cut.

If panel must be replaced and not more that 0.375 inch (0.95cm) fabric tolerance can be lost.



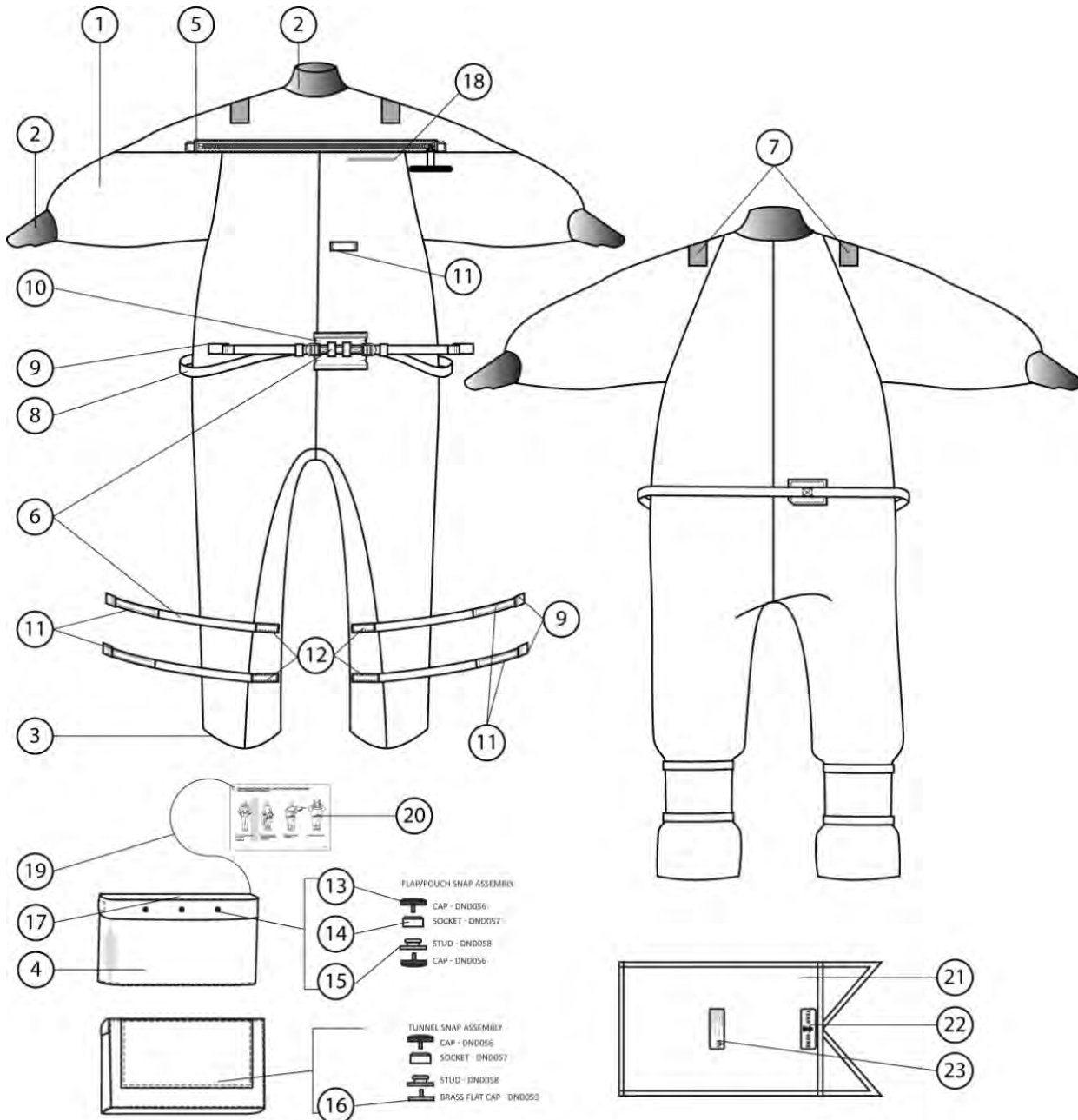
## 4.0 SUMMARY

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The RAN Ship Abandonment Suit is an emergency one time use dry suit that protects the wearer from getting wet offsetting the speed of hypothermia. The suit is designed for crewmembers working in Naval ships where cold-water immersion is possible. The suit does not contain any flotation properties on its own. The suit is easily donned, maintained and stored. Qualified approved technicians, with proper equipment, or the Manufacturer may make suit repairs. A well-maintained suit means survival in emergencies for which normal clothes were not designed.

## 5.0 PARTS LIST

These materials are highly recommended for repairs and replacements. Item order quantity is based on their availability. Qualified repair personnel can perform some repairs, with adequate facilities. The manufacturer should do all major repairs, unless otherwise authorized.



Index #	Part #	Description
1	DND104	70D NYLON 3.75+/- .25 OZ/YD2 56"WIDE. INT ORG - shell
2	DND106	EXOSKIN BLK/BLK NEOPRENE – cuff, neck
3	DND108	SHARKSKIN NEOPRENE - sole
4	DND004	FR 12 OZ/YD2 NEOPRENE COATED NOMEX - pouch
5	DND105	AQUASEAL 37" ZIP WITH SEALED ENDS
6	2021	25mm ELASTIC A302 Black – leg straps, keepers
7	DND055	SOLAS 3150-A TAPE 2", SELF ADHESIVE
8	DND051	WEBBING MILW-17337 1"WIDE COLOUR BLACK
9	2000114	WEBBING YELLOW
10	2000105	Ladder Lock Black 1 Super - waist
11	DND026	VELCRO 1" LOOP BLK
12	DND027	VELCRO 1" HOOK BLK
13	DND056	SNAP FASTENER, NYLON CAP
14	DND057	SNAP FASTENER, SOCKET PLASTIC
15	DND058	SNAP FASTENER STUD PLASTIC
16	DND059	SNAP FASTENER, BRASS/NICKEL EYELET
17	RAN102	POUCH LABEL
18	RAN103	SUIT LABEL
19	DND022	accessory lanyard BLK 1/8", MIL-C-5040Type1A - 40 cm for donning card
20	RAN104	DONNING CARD
21	DND107	FOIL BAG W V NOTCH CLASS 1 MIL-PRF-131K
22	RAN100	FOIL BAG LABEL "TEAR HERE"
23	RAN101	FOIL BAG LABEL "IDENTIFICATION"
	1800	T24 PERMACORE ORANGE - shell
	DND043	T-70 NYLON BLACK – webbing, sharkskin , Velcro
	10111	Permacore T40 black – Exoskin, Velcro on Exoskin
	2005	MELCO T2000X White 22mm
	DND068	POLY BAG 11" X 16" 5 MIL
	RAN106	BARCODE STICKER - polybag
	2063	EXPIRY DATE LABEL – 1 on polybag, 1 on carton
	DND070	DESICCANT GEL PACK
	RAN105	DESICCANT LABEL (no French) 2X3" - polybag