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SERVICE MANUAL

for

ISO 9650

THROW OVERBOARD LIFERAFTS

Ver.3

This manual: Part number 08863009
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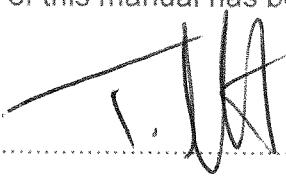
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STATEMENT OF CERTIFICATION
(for 4-12 Persons liferafts)

The equipment described in this manual has been accepted by Lloyds Register and refers to inflatable liferafts which comply with the following international conventions and regulations:

1. ISO 9650-1: 2005, ISO 9650-2: 2005, ISO 9650-3: 2009.

The technical accuracy of this manual has been verified and is certified as correct.

Signed:  Date: 28/2/11

Tommy Scott
Design Manager Marine

Important Notice

This publication is for reference purposes and its use restricted to trained service technicians in lawful possession of a current marine life raft servicing certificate granted by Survitec ('entitlement'). It is not a stand-alone text embodying the basic techniques or skills appropriate to life raft servicing.

The Survitec Group accepts no responsibility for loss, injury or death resulting from the partial, improper or unlawful application of the instructions herein.

If the requirements within this publication are believed to be contrary to legislated national or international requirements Survitec must be consulted prior to release into service of affected product.

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Communications regarding this publication should be addressed to the Technical Services Department or the Technical Publications Department at the applicable Survitec Group of companies.

The list of companies are as follows:

RFD Beaufort Ltd	RFD Beaufort Inc	Survitec Survival Products Inc (SSPI)	DSB	Eurovinil S.p.A.
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				Fax: +39 0564 487222
RFD Australia	RFD New Zealand	RFD France	RFD Japan	

STATEMENT OF INITIAL CERTIFICATION

It is certified that the material referred to in this Maintenance Manual has been validated in accordance with the Company Quality Control Procedures documentation.

APPROVED


.....
DATE
.....
8/5/12

NOTE:

The above certification does not apply to revisions or amendments made after the initial certification by other Approved Organisations.

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Letter of Transmittal

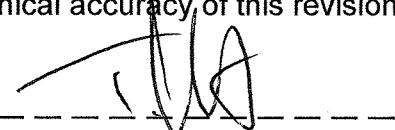
To: Holders of P/n 08863009 M283

Title: ISO 9650

VERSION No. 3 Dated APR/12

The technical accuracy of this revision has been verified and is certified as correct.

Signed



Date



Tommy Scott
Marine Design Manager

Pages affected	Revision highlights
This revision introduces the container cradle and updated the container labels. Also service life extended to 36 months. Appendix Leisure rafts configuration introduced.	
TITLE PAGE	Pg 1
VERSION RECORD	Pg 1
EFFECTIVE PAGES	Pgs 1,3 & 4
CHAPTER 1	Pgs 106
CHAPTER 2	Pgs 203-205
CHAPTER 4	Pgs 405
CHAPTER 8	Pgs 821,
CHAPTER 10	Pg 1005
CHAPTER 11	Pg 1105,1107,1114 Pg 1115-1119
APPENDIX A-1	Pgs A1-3 & A1-4
APPENDIX A-2	Pgs A2-32 to A2-33
APPENDIX A-3	Pgs A3-1 & A3-6
Version number updated. Version updated Pages updated Valise data updated Unpacking updated Fig 401 updated	
Cardboard dims updated Adhesive container correction Part numbers added Container cradle & labels added	
Container labels added Container labels added Leisure rafts configuration added	

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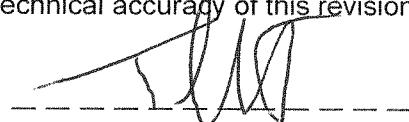
To: Holders of P/n 08863009 M283

Title: ISO 9650

VERSION No. 2 Dated OCT/11

The technical accuracy of this revision has been verified and is certified as correct.

Signed



Date

21/10/11

Tommy Scott
Marine Design Manager

Pages affected	Revision highlights
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This revision introduces Appendix 2, ISO 9650 liferaft packing into GLR containers.

TITLE PAGE	Pg 1	Version number updated.
VERSION RECORD	Pg 1	Version updated
EFFECTIVE PAGES	Pgs 1,2,3 & 4	Pages updated
CHAPTER 1	Pgs 106-108	Container/Valise data updated
CHAPTER 2	Pgs 203-207	Figs & Text amended
CHAPTER 4	Pgs 410-411	Text amended
CHAPTER 5	Pg 511 & 517	FIGURE 504 updated
CHAPTER 7	Pgs 703-709	Equipment tables updated
CHAPTER 8	Pgs 808-809,821-822, 834-837	Fid tool, Corrugated card, Firing line, Folding battery/light positions
CHAPTER 10	Pg 1004 & 1005	Heat tools added
CHAPTER 11	Pg 1111-1115	Container TABLES updated
APPENDIX A-1	Pgs A1-2	Container TABLE updated
APPENDIX A-2	Pgs A2-1 to A2-32	GLR container packing introduced
APPENDIX A-3	Pgs A3-1 to A3-2	Vacuum test TABLE introduced

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RECORD OF VERSIONS			
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Initial Ver 1	Feb/11		
Version 2	Oct/11		
Version 3	Apr/12		

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SERVICE BULLETIN LIST

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LIST OF ASSOCIATED PUBLICATIONS

INFLATION EQUIPMENT

M-07-IS-GIVT Gas Inflation System (Torsional) inlet valve installation instructions

M-07-UM-GIST General user manual for Gas Inflation System (Torsional)

The above manuals (latest versions) are published by the manufacturer:

Leaffield Marine Limited
Leaffield Way, Corsham, Wiltshire, SN13 9SS
Tel: +44 (0)12 2581 0771, Fax: +44 (0)12 2581 2057
E-mail: lml@leaffield.co.uk

Service bulletin 62/10 Approved spare parts, Non-operational liferafts and the Marine Equipment Directive.

The above service bulletin, (latest revision) is published by:

Eurovinil S.p.A.
Via Genova, 5.
58100 Grosseto - Italy
Tel: +39 0564 487301, Fax: +39 0564 487222
Web: www.eurovinil.it

MISCELLANEOUS

User Guide (latest revision) SART S4 Search And Rescue Transponder

The above manual is published by the manufacturer:

Daniamant Ltd.
Unit 3, The Admiral Park
Airport Service Road, Portsmouth
Hampshire, PO3 5RQ
United Kingdom

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1. General

- 1.1 This manual is intended for use by the people who will do the regular servicing work on the equipment. They will normally be employees of the Manufacturer or of Service Stations appointed by the Manufacturer.
- 1.2 The manual describes the procedures used to disassemble, inspect, repair and reassemble the equipment. These procedures must be strictly obeyed.
- 1.3 The Survitec Group is the Design Authority for the equipment. The company has invested much effort to create the equipment and its servicing procedures, so that the equipment will be capable of reliable use, regardless of climate, weather conditions or circumstances.

While comments intended to improve the efficiency of servicing procedures are always welcome, you must not make any changes to the servicing procedures without the permission of The Survitec Group.

Unauthorised changes may cause the equipment to malfunction. They may also void the approval of the equipment.

- 1.4 This manual covers the The Survitec Group ISO and Leisure family of liferafts.
- 1.5 Items included in the liferaft may be subject to approval by the administration of the country where the liferaft is intended for use.

2. Manual breakdown

2.1 Chapters and Page numbers

The Chapter and Page number blocks are as follows:

CHAPTER	PAGE No.	TITLE
-	1-99	Introduction
1	101-199	Description and data
2	201-299	Removal and Unpacking
3	301-399	Cleaning
4	401-499	Inspection and Checking
5	501-599	Testing and Trouble Shooting
6	601-699	Repair
7	701-799	Emergency Packs and Equipment
8	801-899	Assembly and Repacking
9	901-999	Storage Conditions and Instructions
10	1001-1099	Tools, Equipment and Materials
11	1101-1199	Illustrated Parts List

2.2 List of Effective pages

The List of Effective Pages details all the pages that are contained in the manual and indicates the issue dates of those pages allowing the manual content to be checked for completeness and latest update. This list is included in the introductory pages of the manual.

2.3 Record of revisions

- 2.3.1 Modifications to the equipment will be embodied in compliance with the ISO 9650 requirements. When required, the pages of this manual will be amended, approved and reissued as a revision.
- 2.3.2 A revision to the manual consists of a transmittal letter, a revised List of Effective Pages, and new or revised text and illustrations. Revised contents lists are issued when necessary.
- 2.3.3 The transmittal letter carries at its head the certification statement which authorises the revision. It describes, in general terms, the contents of the revision in the manual. All pages that are required to be removed without replacements are listed. All other out of date pages are to be removed when superseding pages of the same number are inserted. All additional pages to be inserted are also listed where applicable.

2.3.4 The transmittal letters are to be filed behind the Record of Revisions page at the front of the manual.

2.4 Associated publications

The list of Associated Publications containing details of the manuals published by the manufacturer of a component fitted to, or used in conjunction with, the equipment described in this manual. This list, where applicable, is located at the front of the manual.

3. WARNINGS, CAUTIONS and NOTES

Certain areas of the manual require particular attention. These are classified as follows:

WARNING: A WARNING CALLS ATTENTION TO A PROCEDURE WHICH IF INCORRECTLY PERFORMED IS LIABLE TO CAUSE INJURY OR DEATH TO PERSONNEL.

CAUTION: A CAUTION CALLS ATTENTION TO A PROCEDURE WHICH IF INCORRECTLY PERFORMED IS LIABLE TO CAUSE DAMAGE TO THE EQUIPMENT OR ITS COMPONENTS.

NOTE: A NOTE calls attention to methods which make the job easier.

4. Health and safety

The Survitec Group shall not be deemed by virtue of any of these instructions to have assumed any of the responsibilities of the service agent or operator under the HEALTH AND SAFETY AT WORK ENACTMENT or any such enactment.

5. List of abbreviations

The following list of abbreviations are used throughout the manual:

AR	- As required
assy.	- Assembly
C	- Celsius
cc	- Cubic Centimetre(s)
cm	- centimetre(s)
c/w	- Complete With
dia.	- Diameter
g	- Gramme
g/cm ²	- Grammes per square centimetre
iaw	- In accordance with
i/d	- Inside diameter
instl.	- Installation
kg	- Kilogramme
kgf	- Kilogramme force
L.H.	- Left Hand
R.H.	- Right Hand
m	- metre(s)
mm	- millimetre(s)
mm WG	- millimetres of Water Gauge
max.	- Maximum
min.	- Minimum
Mod.	- Modification
Nm	- Newton Metre(s)
o/d	- Outside diameter
Spec.	- Specification
P/N	- Part number
PU	- Polyurethane
PVC	- Polyvinylchloride
RF	- Reference

6. Service provision

- 6.1 The provision of service on liferafts, at the intervals required by governing legislation or by the Design Authority, is detailed in Chapters 2 to 8 of this manual.
- 6.2 Servicing work must not be done to Survitec products except by or under the direct supervision of The Survitec Group certificated service technicians employed by and working in the approved premises of Survitec accredited service agents.
- 6.3 In brief, the following tasks shall be carried out:
 - 6.3.1 The servicing record chart on reverse of the Liferaft Identification Label is to be completed at each servicing including:
 - The stamp of the Certified Operator who serviced the liferaft in the place designated.
 - The number of the Certificate of re-inspection is to be written in the space provided.
 - The Service Station Manager or Chief Inspector is to sign this card in the space provided.
 - 6.3.2 Liferafts shall be unpacked in accordance with Chapter 2.
 - 6.3.3 Liferafts and constituent items shall be cleaned and inspected in accordance with Chapters 3 and 4.
 - 6.3.4 Testing appropriate to the age of the liferaft (refer to Chapter 5, Paragraph C.1. onward) shall be carried out according to Chapter 5.
 - 6.3.5 Required repairs shall be carried out according to Chapter 6 provided the appropriate techniques are described there. In all other cases procedural advice shall be obtained from The Survitec Group Technical Services.
 - 6.3.6 Sub-assembly processes and repacking of the liferaft shall be in accordance with Chapters 7 and 8.

6.4 Installation and Removal (See also Chapter 1).

Satisfactory installation of liferafts on board is the responsibility of the vessel's master and operator. In relation to servicing, however, The Survitec Group servicing agents must ensure that the responsibility for reinstallation following servicing is identified within their contractual agreement with the operator and that, when the The Survitec Group agent reinstalls liferafts, the resulting installation is according to The Survitec Group recommendations and is in all respects satisfactory.

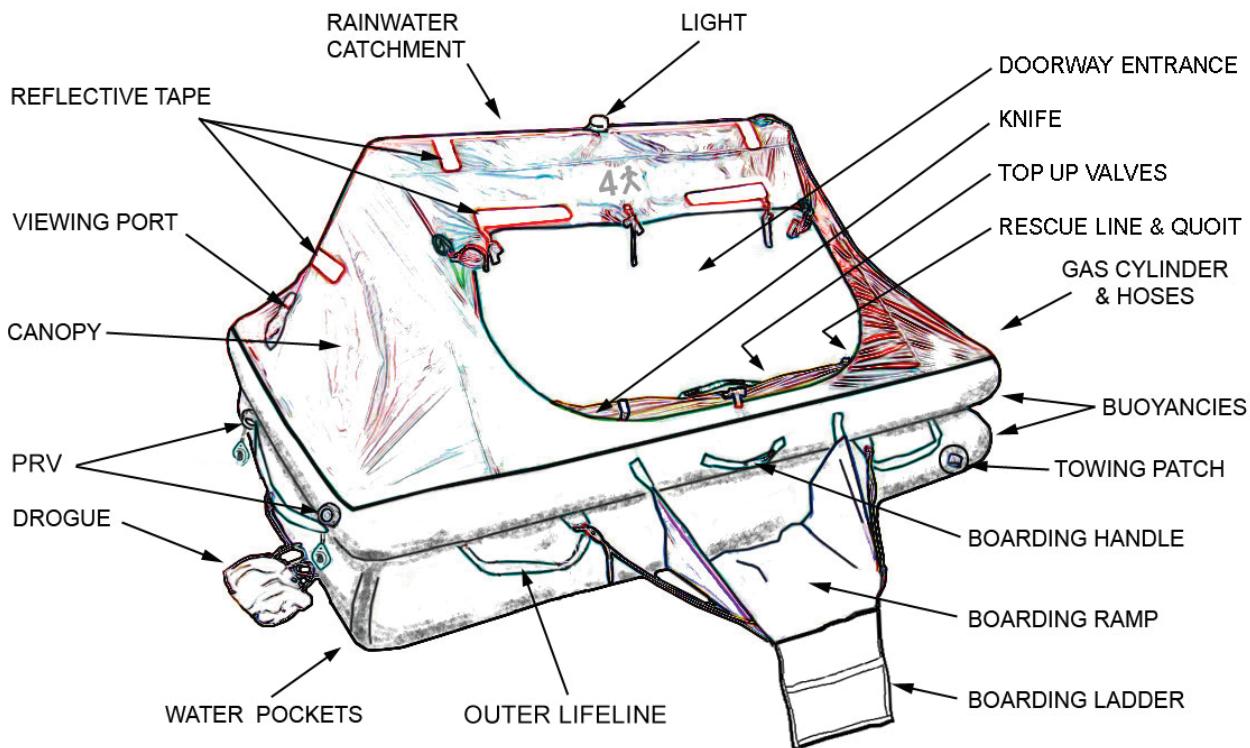
6.5 Special Tools, Equipment and Replacement parts

- 6.5.1** The special tools and equipment listed in Chapter 10 or in associated publications may not be substituted except by the explicit permission from The Survitec Group.
- 6.5.2** No replacement parts or materials other than those of The Survitec Group supply or approval may be used in the servicing of The Survitec Group products. Replacement parts are listed in Chapter 11, materials in Chapter 10 or in current service bulletins.

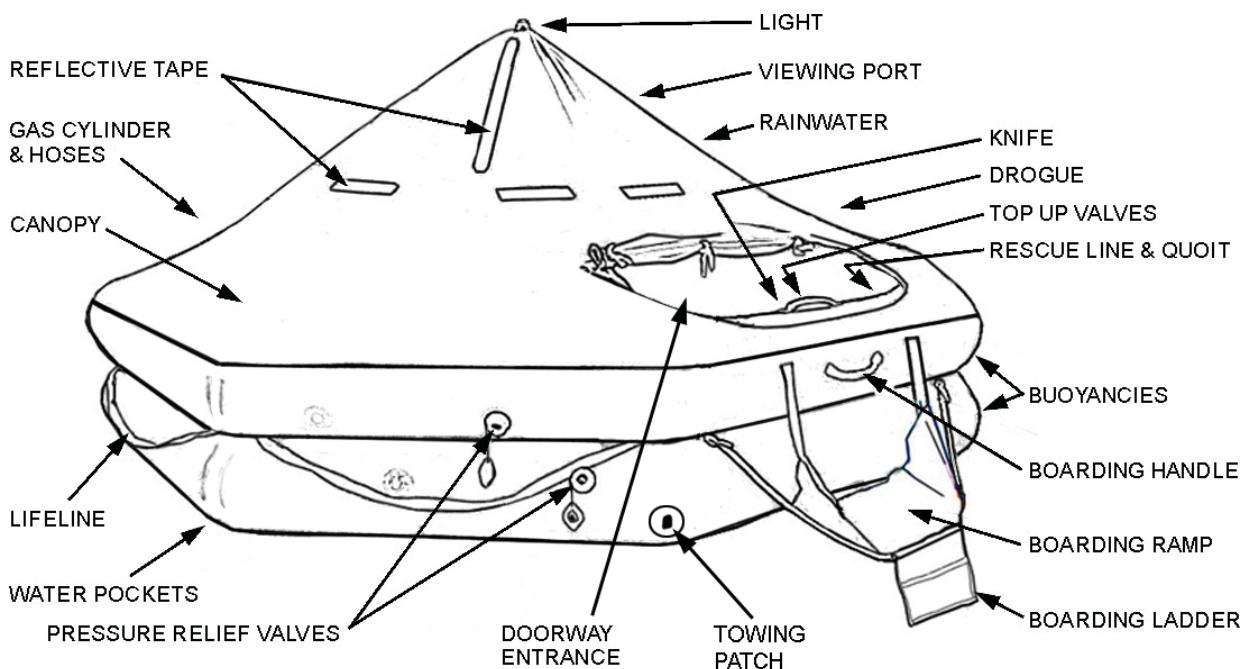
CHAPTER 1

DESCRIPTION AND DATA

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4-8 PERSON LIFERAFT



10-12 PERSON LIFERAFT

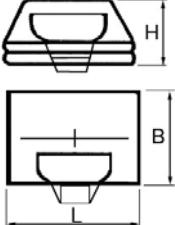
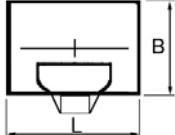
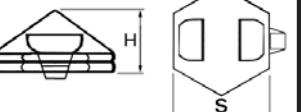
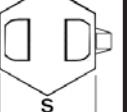
Typical Throw Over liferaft
FIGURE 101

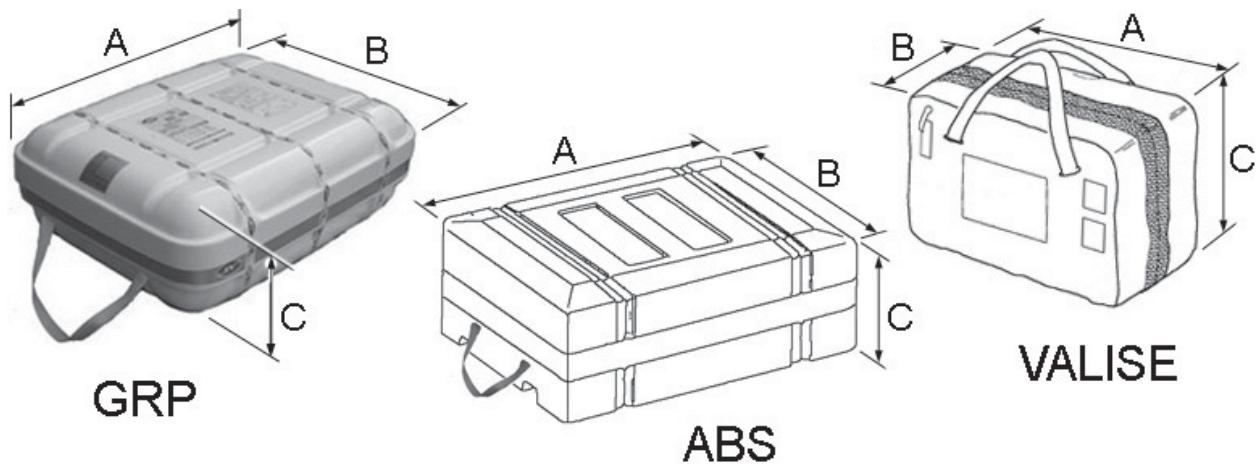
1. Description

- 1.1 The Survitec Group range of Throw Overboard liferafts are rated for 4, 6, 8, 10 or 12 persons (FIGURE 101). ISO9650 Type 1 and Type 2 liferaft hulls are the same, except the Type 2 liferaft does not have an insulated floor.
- 1.2 The design consists of two buoyancy chambers forming a high freeboard, an insulated floor and an automatically erected canopy for all-weather protection that incorporates doors, vents and rainwater catchment systems. The canopy is supported by an arch tube which is inflated via the upper buoyancy chamber.
- 1.3 Polychloroprene adhesive, (EV/C2 glue), must be used for service repairs.
- 1.4 The liferaft is made from the following parts, (FIGURE 101 or FIGURE 102):
 - 1.4.1 Two buoyancy tubes: one installed on top of the other with a floor suspended below them. This gives a high freeboard.
 - 1.4.2 A canopy, which is erected automatically by an inflated arch tube.
 - 1.4.3 Water pockets, which are installed on the base, make the liferaft stable and control the drift subsequent to the launch.
 - 1.4.4 The liferaft is made from PVC fabric. The buoyancy chambers of the liferaft are orange and the canopy is a high visibility colour.
- 1.5 The liferaft has the internal and external equipment as follows, (FIGURE 101):
 - 1.5.1 Lifelines which are attached around the interior and exterior of the buoyancy tubes.
 - 1.5.2 A rescue line and quoit which are located inside the liferaft.

- 1.5.3 Automatically deployed internal and external lights. (Leisure liferafts within this range may be supplied with only an external light).
- 1.5.4 Drogue (sea anchor), automatically deployed.
- 1.5.5 Survival equipment, which is contained in emergency pack valise(s), are stowed inside the liferaft.
- 1.5.6 A righting ladder on the base used to right an upturned Liferaft.
- 1.5.7 Boarding means by ladder or ramp.
- 1.5.8 Rainwater catchment device on canopy exterior.
- 1.5.9 Illustrations are given, (where possible), on the liferaft to show operation of the equipment.
- 1.5.10 Immediate action leaflets are provided in English and appropriate foreign language.

2. Liferaft nominal dimensions:

		LIFERAFT DIMENSIONS				
		4 person	6 person	8 person	10 person	12 person
LIFERAFT SHAPE						
DIMENSIONS	L (m) (")	1.64 (64.5)	2.29 (90)	2.72 (107)	-	-
	B (m) (")	1.7 (67)	1.7 (67)	1.85. (73)	-	-
	S (m) (")	-	-	-	2.66 (105)	2.86 (113)
	H (m) (")	1.12 (44)	1.14 (45)	1.16 (46)	1.52 (60)	1.56 (61)
	Diameter buoyancy tubes cm (")	19.7 (7.8)	22.8 (9)	24.7 (9.7)	27.5 (10.8)	28.8 (11)
	Vol. buoyancy tubes without arch dm ³ (ft ³)	400 (14.1)	576 (20.3)	777 (27.4)	977 (34.5)	1156 (40.8)
Floor	(m ²)	1.5	2.27	2.98	3.82	4.48
	(ft ²)	(16.1)	(24.4)	(32.0)	(41.1)	(48.2)



Typical Throw Over containers

FIGURE 102

Container nominal dimensions: (FIGURE 102)

ISO 9650 Type 1									
RATED CAPACITY	GRP DIMENSIONS THROW OVER RAFTS								
	>24 hours			<24 hours					
	mm			Approx. operation weight Kg				mm	
	A	B	C		A	B	C	Approx. operation weight Kg	
4	740	520	290	50	740	520	290	41	
6	820	540		59				47	
8			310	68				53	
10	820	640	350	80	820	540	290	61	
12			350	89	820	540	310	66	
RATED CAPACITY	ABS DIMENSIONS THROW OVER RAFTS								
	>24 hours			<24 hours					
	mm			Approx. operation weight Kg				mm	
	A	B	C		A	B	C	Approx. operation weight Kg	
4	710	490	290	50	710	490	290	45	
6				59				47.5	
8	800	490	310	68				54.5	
10				80	740	560	290	60.5	
12	900	560	350	89				66	
RATED CAPACITY	VALISE DIMENSIONS THROW OVER RAFTS								
	>24 hours			<24 hours					
	mm			Approx. operation weight Kg				mm	
	A	B	C		A	B	C	Approx. operation weight Kg	
4	695	495	230	46	695	495	230	34	
6	790	495	260	54				38	
8				69	790	495	260	45	
10	810	520	290	75	810	520	290	52	
12								71	

Container nominal dimensions: (FIGURE 102)

ISO 9650 Type 2					
RATED CAPACITY	GRP DIMENSIONS THROW OVER RAFTS				
	<24 hours			Approx. operation weight Kg	
	A	B	C		
4	740	420			
6	740	520			
8	740	520			
10	820	540			
12	N/A				
RATED CAPACITY	VALISE DIMENSIONS THROW OVER RAFTS				
	>24 hours			Approx. operation weight Kg	
	A	B	C		
4	700	410	260		
6	700	500	280		
8	700	500	310		
10					
12	N/A				

3. Inflation system and Gas charges:

Liferaft working pressure (Throw Over) 2.8 Psi / 77.5"WG /
 1970 mmWG

INFLATION SYSTEM AND GAS CHARGES		
	Kg Charging CO ₂	Kg Cylinder N ₂
4	1.98	0.06
6	2.25	0.09
8	3.38	0.14
10	4.17	0.17
12	4.17	0.17

4. Period to overhaul

Liferafts	36 months
Inflation system.....	See Associated Publications at the front this manual.

5. Torque settings

LEAFIELD INFLATION SYSTEM	Nm	(ft lb f)	Special tool required
M24 nut (inlet check valve)	30	22.2	YES
M16 connector (inlet check valve)	9	6.6	NO
Cylinder valve/gas cylinder	165	122	NO
Cylinder valve/hose	19	14	NO
Break stem seal assembly/valve body	40	29.5	YES
Torque drive assembly /valve body	4	2.95	YES
Operating head/cylinder valve (3 mm Hex)	1.12	0.83	NO
A10 pressure reliev valve (inner)	27	19.9	YES
Valve, topping-up	15	11.1	YES
H-Pack nylon nut	9.5	7.0	YES
Vacuum valve plug	6.5	4.8	YES
Vacuum valve retaining nut	6.5	4.8	YES

Torque settings

TABLE 101

6. Power unit activation cord lengths

RL5 Lighting system		
RATED CAPACITY	Throwover	
	Cut length mm ("")	
4		
6		
8		
10		
12		

700 (27.5)

Power unit activation cord lengths

TABLE 102

7. Installation notes:

NOTE: USE ONLY GENUINE EUROVINIL PARTS FOR INSTALLATIONS.

When more detailed instructions are necessary, refer to Eurovinil S.p.a. Customer Service Department.

7.1 Stowage positions

Stow the liferafts in a position which will make sure they will be serviceable when necessary. Make sure they can be easily launched (manually) or can float-free from a sinking ship .

NOTE: The liferafts must be stowed away from the propellers, side thrust apertures and stabilisers. The stow position must not prevent the operation of a survival craft or rescue boat at any other launching station.

7.2 Protection of stowed liferafts

- 7.2.1 Stow the liferafts in a position which will give the maximum possible protection from fire, smoke, vibration, funnel deposits, sparks, oil, heat, explosion, flooding and weather.
- 7.2.2 In conditions where ice is present, stow the liferafts in protected positions (adjacent to casings) so that they will not be frozen over.
- 7.2.3 Do not stow the liferafts in a positions where they can be in a pool of water.
- 7.2.4 Do not let the liferafts touch any material that has copper or copper compounds.
- 7.2.5 When using a power hose to wash the ship's deck and liferaft installation, do not point the hose directly at the liferaft container.

7.3 Magnetic deviation

In deciding on the stowage position of the liferafts, particularly in small vessels, consideration should be given to the possible effect on the ship's compass of any ferrous metal in the liferaft or its stowage arrangements. Under these conditions, liferafts and their stowage should, if necessary, be regarded as fixed magnetic material.

The end of the painter on every liferaft should be secured to a suitable strong point, so that on being launched the liferaft is held to the vessel. The securing arrangement for the *painter* will normally include a float free arrangement, such as a hydrostatic release unit, (HRU). Where a HRU is fitted the painter line should be attached only to the HRU weak link.

WARNING: IT SHOULD BE IMPRESSED UPON ALL MEMBERS OF THE CREW THAT, IF FOR ANY REASON A LIFERAFT PAINTER HAS TO BE UNFASTENED BEFORE A LIFERAFT IS LAUNCHED, THEN IT SHOULD BE MADE FAST AGAIN TO SOME OTHER SUITABLE STRONG POINT BEFORE LAUNCHING TAKES PLACE.

7.5 Height of stowage above the waterline

- 7.5.1 The liferafts should be stowed as close to the waterline as is safe and practical.
- (a) For ISO 9650-1 height should be within 6 metres.
 - (b) For ISO 9650-2 height should be within 4 metres.
 - (c) For Leisure height should be within 6 metres.

7.6 Installation and removal of liferafts

Be very careful when installing or removing the liferafts at their stowage positions. The container or the valise can be damaged and subsequently, the liferaft. They must not be rolled or dropped during removal/installation.

7.7 Stowage of liferafts in rigid containers

NOTE: Liferafts are usually packed in rigid containers with no other protection.

- 7.7.1 Install the container the correct way up with the drainage apertures at the bottom. Keep the drainage apertures clear of obstructions such as the launching cradle support structure.

NOTE: Each cradle must be of the correct dimensions for the type of container installed. The rack must be attached to the ship's structure.

7.8 Attachment of stowed liferafts

- 7.8.1 Make sure the liferaft can be released easily when a manual launch is necessary or for float-free operation (refer to Step 10).
- 7.8.2 Make sure the mechanism which holds the liferaft on the rack can be removed easily in an emergency:
A slip-link (Senhouse slip) or other release mechanism which can be operated by a single swift action should be provided.

7.9 Float-free attachment (hydrostatic release)

- 7.9.1 A float-free launch is operated by a mechanism which inflates and releases the liferaft automatically from a ship that is sinking.

NOTE: The hydrostatic release must be installed as per manufacturer's instructions.

NOTE: If the hydrostatic release is a type which requires servicing, it must be serviced by an approved servicing station. The service station must record the date of servicing on the data plate attached to the unit.

NOTE: If the hydrostatic release is a type that must be discarded (lifed item) it must be identified with the date of expiry and must be replaced by that date. They usually have an operational life which does not include a servicing period.

- 7.9.2 A weak-link must be installed in the hydrostatic system to make sure a liferaft is not pulled under the water by a sinking ship.
- 7.9.3 The weak-link in the system must have a breaking strength of 1.8 - 2.6 kN (404.66-584.5 lbf) to pull the painter from the liferaft container and activate its inflation system.
- 7.9.4 If it is necessary to launch the liferaft manually, make sure the painter line is attached to a strong point on the ship. The strong point must be sufficient to support the pull of the painter line to operate the inflation system.
- 7.9.5 A slip link, lashed to the holding down straps, should be provided between the hydrostatic release and the straps. This will enable manual quick release for the liferaft.

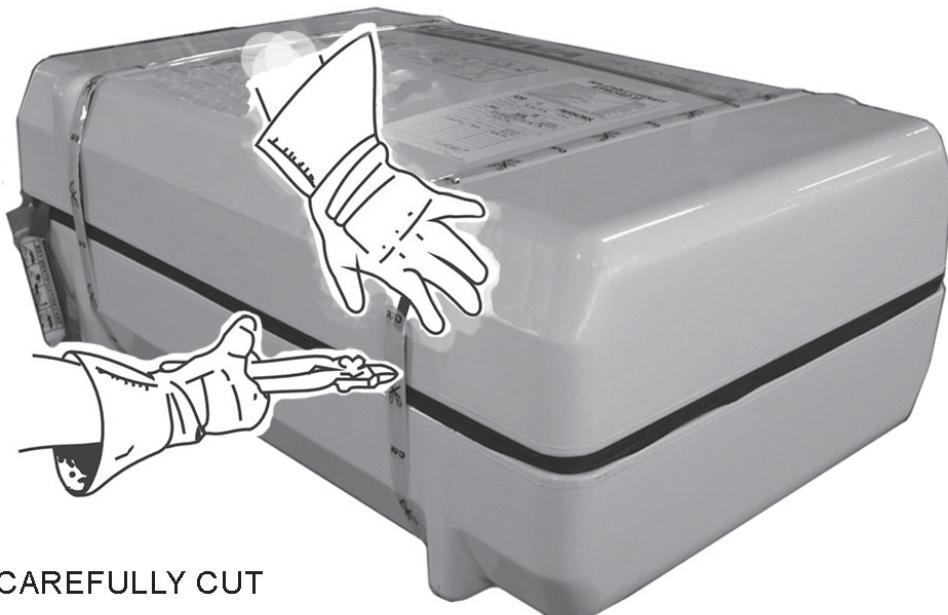
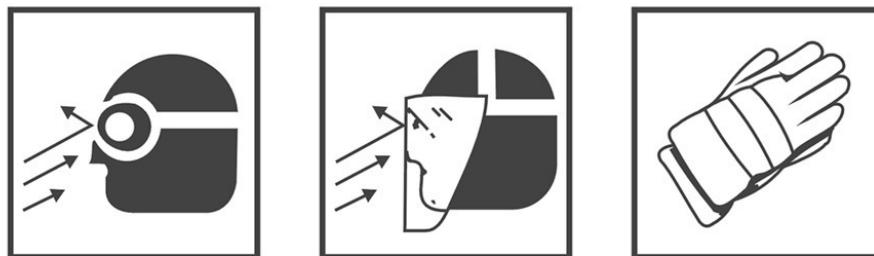
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CHAPTER 2

REMOVAL AND UNPACKING

Section	Title	Page
1	Safety procedures	203
2	Removal/Date of Manufacture	204
3	Unpacking procedure	204

WEAR EYE, FACE AND HAND PROTECTION



CAREFULLY CUT

Safety procedure
FIGURE 201

1. Safety procedures

- 1.1 Make sure the work area is clean and the lighting is sufficient.

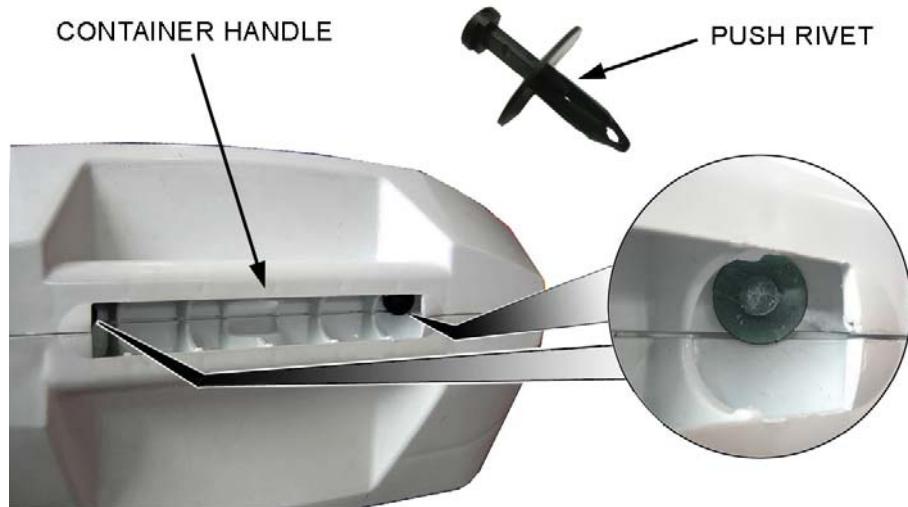
WARNING: PUT ON FACE PROTECTION EQUIPMENT SUCH AS GOGGLES OR A FACE SHIELD AND GLOVES WHEN CUTTING THE STRAP AROUND THE CONTAINER. THE STRAP CAN CAUSE INJURY TO FACE AND HANDS WHEN CUTTING IT.

- 1.2 Use the following procedure if cutting container straps:

- 1.2.1 Make sure personnel are at a safe distance from the container when cutting the strap.
- 1.2.2 Stand to one side of each strap when cutting it.
- 1.2.3 Hold the strap against the container before cutting it.
- 1.2.4 Cut each strap between the seal and the position where the strap is held, (FIGURE 203).

2. Removal/Date of Manufacture

- 2.1 Remove the liferaft containers from the ship at the recommended time period and subsequent service periods thereafter. Send them to an approved service station for inspection, testing and repair (if necessary).
- 2.2 Check the date of manufacture and servicing period of the gas inflation system. Refer to Chapter 5 for the test procedure. If a test is not necessary, continue this procedure at Step 3.



Remove push rivets (if fitted)
FIGURE 202



Opening the container
FIGURE 203

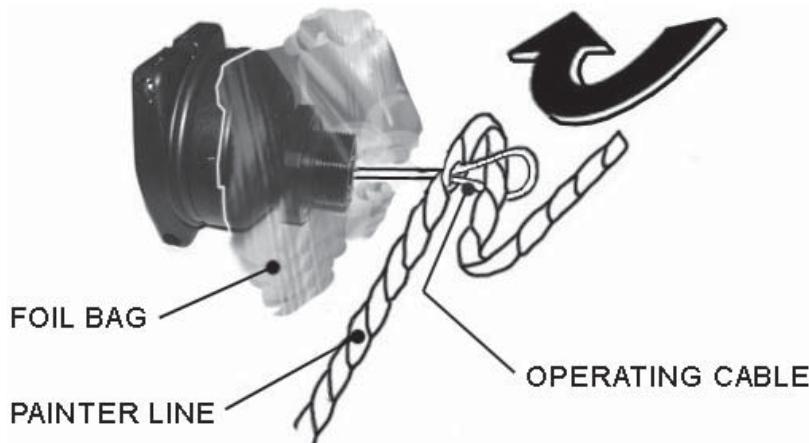
3. Unpacking procedure

3.1 Container and liferaft (FIGURE 203)

- 3.1.1 Put the container onto a suitable trolley or cradle. Make sure it is held securely with the top uppermost. Position the trolley so that the container is next to the packing table.

WARNING: OBEY THE SAFETY PROCEDURES IN STEP 1 AND FIGURE 201).

- 3.1.2 GLR container ONLY: Carefully remove the plastic rivets from the container handles. There are four in total, two on each side, (FIGURE 202).
- 3.1.3 When opening a container, cut the straps which hold each half together, as given in the safety procedure, FIGURE 203). Cut the straps of the container at the end grooves first and then the centre grooves.
- 3.1.4 Carefully remove the top half of the container, (FIGURE 203).
- 3.1.5 If opening a valise, open the zip which is positioned under the blue strip.



Disconnect painter line from operating head wire
FIGURE 204

3.2 Gas inflation system (FIGURE 204)

- 3.2.1 CAREFULLY open and fold back the protective foam covering the packed liferaft. Locate the painter patch. Untie the painter line from the painter patch.

CAUTION: TAKE CARE WITH THE NEXT STEP OR LIFERAFT COULD INFLATE UNINTENTIONALLY.

- 3.2.2 Disconnect the painter line from, the liferaft hull and the strong point on the H-pack.

NOTE: Strong point of the H-pack is located under the operating head.

- 3.2.3 Carefully disconnect the painter line and operating lanyard (if fitted) from the operating mechanism.

Exercising due caution, CAREFULLY pass the painter line back through the operating head wire loop, then gently remove painter line from wire loop.

- 3.2.4 Carefully remove the painter sachet from the H-bag.

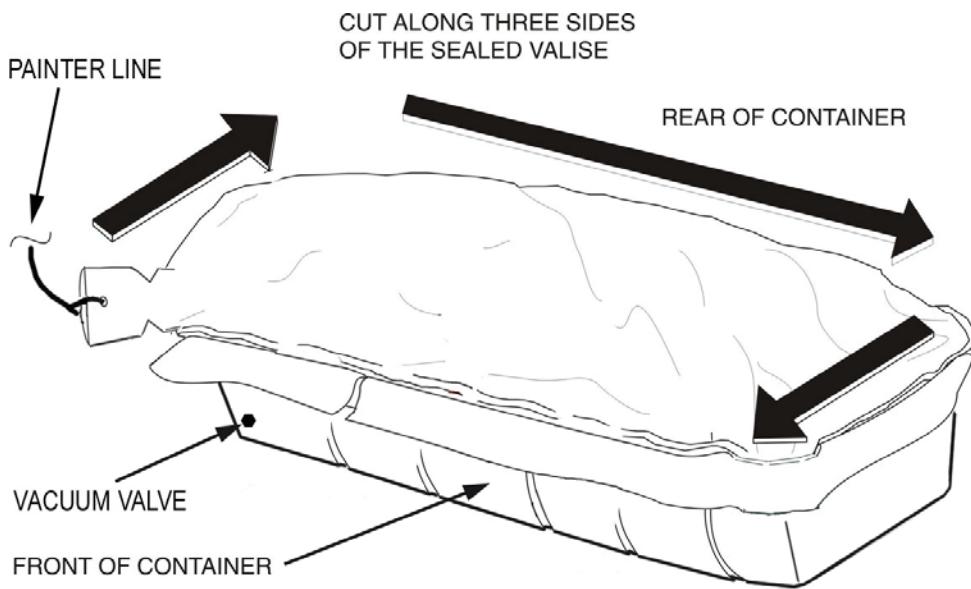
- 3.2.5 Remove the painter and painter sachet from the container.

- 3.2.6 Remove the container retaining line and identification tube attachment from the sealed H-bag.

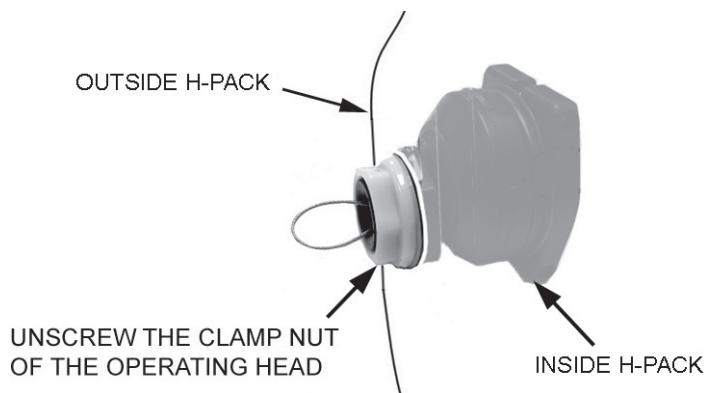
- 3.2.7 Unscrew the vacuum valve nuts, situated at the front of the container, (FIGURE 204). Remove all washers and discard all of the items.

CAUTION: MAKE SURE THE SEALED H-BAG IS PULLED AWAY FROM THE FABRIC OF THE LIFERAFT BEFORE CUTTING THE H-PACK OPEN.

- 3.2.8 Carefully cut around three sides of the sealed H-bag, making sure that the bag is pulled away from the liferaft fabric (FIGURE 205).



Open the sealed valise
FIGURE 205

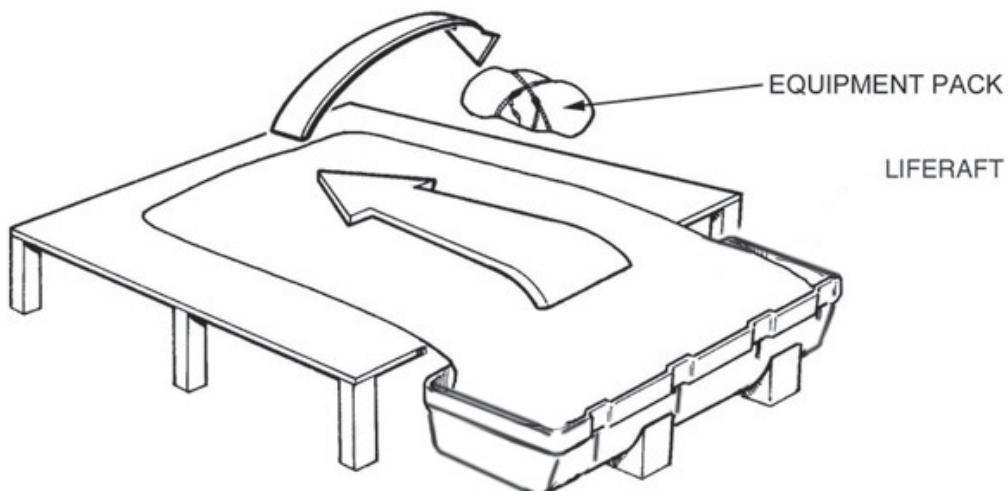


Unscrew the clamp nut
FIGURE 206

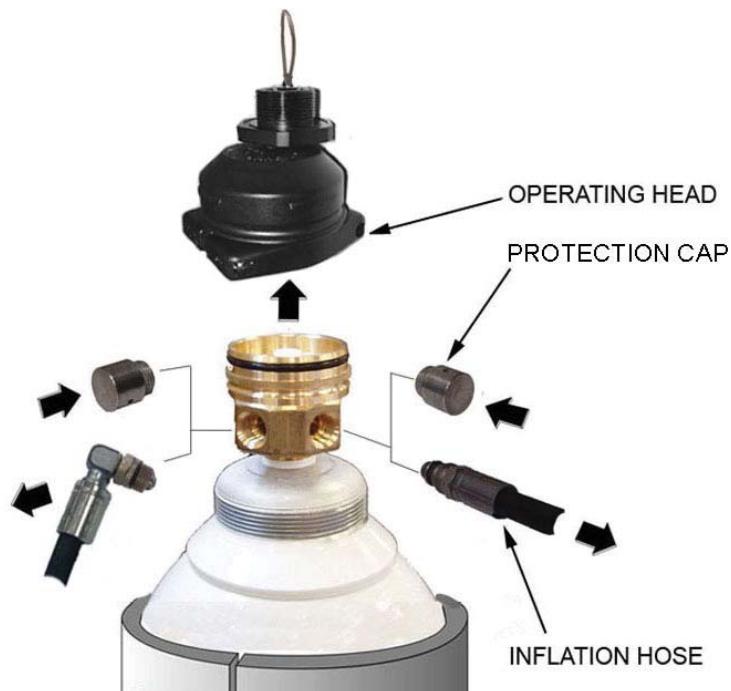
- 3.2.9 Unscrew the clamp nut on the operating head. This will allow the cylinder to be removed, (FIGURE 206).
- 3.2.10 Unroll the liferaft out of the container onto the packing table. Untie and remove the Emergency packs, (FIGURE 207).
- 3.2.11 CAREFULLY lift the liferaft out of the H-pack. Lift the raft out of the container and onto a packing table.
- 3.2.12 Disconnect the inflation hoses. Fit the cylinder protection cap and the recoil caps then remove the cylinder from the liferaft, (FIGURE 208).

WARNING: HOLD THE GAS CYLINDER IN A VICE OR SAFE CLAMPING MECHANISM WHEN INSTALLING OR REMOVING AN OPERATING HEAD.

- 3.2.13 CAREFULLY remove the operating head, (FIGURE 208).
- 3.2.14 Retain the nut, O-ring and plastic washer for re-packing.
- 3.2.15 The rubber washer, should be discarded. A new washer is required for re-packing.
- 3.2.16 Remove and discard the H-pack and the foam linings from the container.
- 3.2.17 Unfold the liferaft, disconnect all the power unit activation cords from the attachment patch on the floor. Keep the pins in their switch blocks. Remove the adhesive tape securing the lighting plug connectors and withdraw them.
- 3.2.18 Remove all dessicant packs from the liferaft and container and discard.



Liferaft and Equipment pack removal
FIGURE 207



Operating head removal
FIGURE 208

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CHAPTER 3

CLEANING

Section	Title	Page
1	General	303
2	Procedure	303
	Liferaft.....	304
	Rigid container.....	304

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1. General

CAUTION: DO NOT USE ANY SOLVENTS, OTHER THAN THOSE GIVEN IN TABLE 301. DAMAGE CAN BE CAUSED TO THE FABRIC.

2. Procedure

ITEM	DESCRIPTION	APPLICATION
1	PVC coated fabrics must only be cleaned using toluene. The solvent shall be applied by a lint free fabric pad, wet but not dripping with solvent.	To clean proofed fabrics
2	Hard soap	To wash the liferaft
3	Lint-free cloth (clean and dry)	To dry the liferaft
4	Sodium Hypochlorite (25 parts water, 1 part 14 % - 15 % solution)	Anti-mould treatment

Cleaning solvents and materials

TABLE 301

WARNING: DO NOT USE THE SOLVENTS NEAR A FLAME OR OTHER SOURCE OF IGNITION. THE SOLVENT IS FLAMMABLE.

WARNING: USE A BARRIER CREAM ON HANDS AND WASH THEM AFTER USING SOLVENTS. THE SOLVENT IS DANGEROUS AND CAN CAUSE DAMAGE TO SKIN. REFER TO THE MANUFACTURER'S SAFETY DATA SHEET.

WARNING: USE THE SOLVENT IN AN AREA THAT HAS GOOD AIR FLOW. AVOID BREATHING VAPOUR FROM THE SOLVENT AND AVOID CONTACT WITH THE EYES. THE SOLVENT IS DANGEROUS AND CAN CAUSE DAMAGE TO PERSONNEL. REFER TO THE MANUFACTURER'S DATA SHEET.

2.1 Liferaft

CAUTION: DO NOT LET PUDDLES OF CLEANING SOLUTION STAY ON THE LIFERAFT. TOO MUCH SOLVENT CAN CAUSE DAMAGE.

- 2.1.1 Wash the liferaft with a solution of hard soap and water.
- 2.1.2 Dry the liferaft with a clean, lint-free cloth.
- 2.1.3 Use recommended solvent in TABLE 301, to remove any oil or similar substance. Wash and dry the area as given in steps A1 and A2 above.

2.2 Rigid container (anti-mould treatment)

- 2.2.1 Wash the container outer surfaces with a solution of hard soap and water.
- 2.2.2 Apply the following anti-mould treatment to all rigid containers, at the normal overhaul period of the liferaft and on all containers that have been in damp storage conditions:
 - (a) Use a solution of hard soap and water to clean the inside of the container.
 - (b) Mix a solution of Sodium Hypochlorite, (25 parts water to 1 part of 14% to 15% solution).
 - (c) Use a sponge to apply the solution evenly over the inner surface of the container.
 - (d) Let all surfaces dry before packing the liferafts into the container.

CHAPTER 4

INSPECTION AND CHECKING

Section	Title	Page
1	General	403
	Fabric components	403
	Metal and plastic components	403
	Webbing, ropes, cordage and Velcro strips	404
2	Detail.....	406
	Gas inflation system	406
	Light unit and Power unit assembly	408
	Emergency pack	410
	Rigid container.....	411

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1. General

- 1.1 Using the intervals specified in Chapter 5, inspect the liferaft as follows to ensure:
 - 1.1.1 The inflatable chambers maintain the specified pressure.
 - 1.1.2 The inflation system functions efficiently. Refer to Chapter 5, Section 3 for test procedures.
 - 1.1.3 All the components and equipment are maintained in a serviceable condition.
- 1.2 Fabric components. Inspect all fabric components for:
 - 1.2.1 Slits, tears, apertures or abrasion.
 - 1.2.2 Proofing removal.
 - 1.2.3 Deterioration.
 - 1.2.4 Adhesion of seams and components.
 - 1.2.5 For seam slippage and edge lifting.
 - 1.2.6 Broken or worn stitching.
 - 1.2.7 Instructions and labels (make sure all of the pictograms are legible).
 - 1.2.8 Unwanted bonds between fabrics.
- 1.3 Metal and plastic components. Examine for:
 - 1.3.1 Cleanliness.
 - 1.3.2 Cracks.
 - 1.3.3 Distortion.
 - 1.3.4 Scoring and burrs.
 - 1.3.5 Damaged threads.
 - 1.3.6 Frayed cables.
 - 1.3.7 Corrosion.

- 1.4 Webbing, ropes, cordage and Velcro' strips. Check for:
 - 1.4.1 Damage and fraying.
 - 1.4.2 Discolouration and deterioration (including any material in contact with them).
 - 1.4.3 Incomplete bonds to fabric.
 - 1.4.4 Broken or worn stitching.
- 1.5 Marking
 - 1.5.1 Whenever the equipment is being serviced, the labelling and data labels are to be checked for legibility, for correct information and for secure attachment.
 - 1.5.2 The labels are located in the following positions on the Eurovinil product:
 - ID label at doorway entrance
 - outside surface of container
 - 1.5.3 If a label has become damaged or illegible, replace it with a new label containing the original information or request a replacement from The Survitec Group.
 - 1.5.4 If a label is to be updated, use an indelible marker pen.

2. Detail

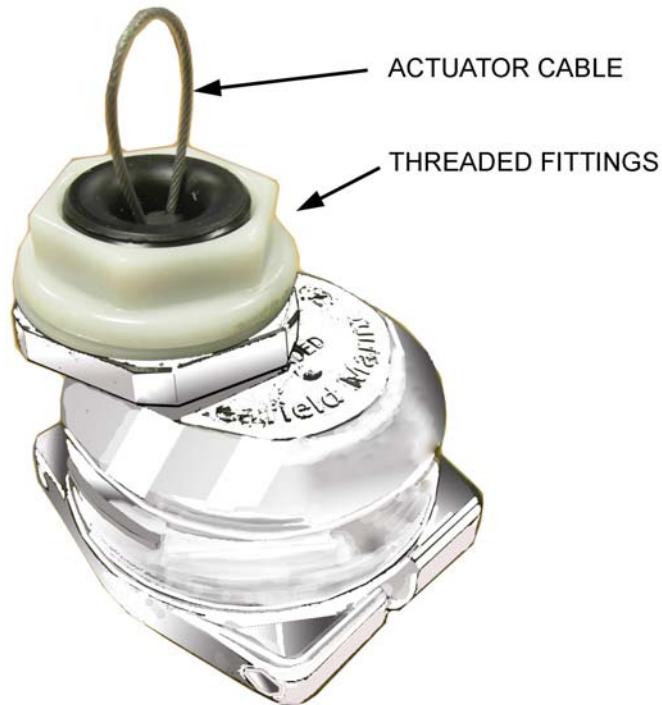
2.1 Gas inflation system:

NOTE: Refer to the manufacturer's manual listed at the front of this manual, in Associated Publications section.

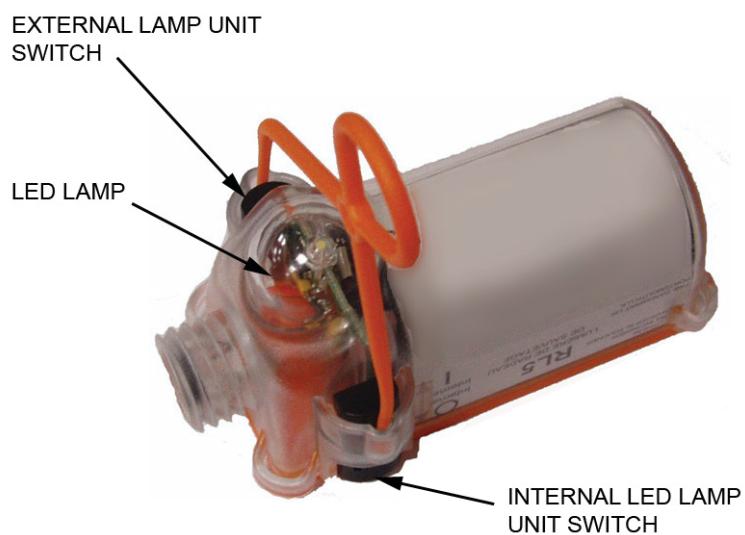
WARNING: A GAS CYLINDER CAN BE A LETHAL PROJECTILE IF IT DISCHARGES TO ATMOSPHERE. ALWAYS ATTACH A RECOIL CAP TO THE GAS OUTLET WHEN HANDLING A FULLY CHARGED CYLINDER. HOLD THE CYLINDER IN A VICE OR SAFETY CLAMPING DEVICE WHEN ATTACHING OR REMOVING AN OPERATING HEAD.

WARNING: OPERATING HEADS MUST NOT BE CHECKED UNTIL THEY HAVE BEEN REMOVED FROM THEIR CYLINDERS.

- 2.1.1 Operating heads must be tested. It is essential that they are removed from the cylinders before testing.



Operating heads activation
FIGURE 401



RL5 Internal lamp unit
FIGURE 402

2.1.2 If the loaded indicator is not aligned or the actuator cable is removed, this indicates that the head may have been actuated (FIGURE 401).

2.1.3 When the operating head is removed from its cylinder, pull the operating wire. The mechanism of the operating head must act immediately.

On a Leafield operating head, (FIGURE 401):

- (a) The wire loop will separate completely from the operating head.
- (b) The gear mechanism on the bottom of the head will rotate.

2.1.4 It is now necessary to service and reset the operating heads. The procedure used to service operating heads is given in the manufacturer's manual listed in the Associated Publications Section of this manual.

2.1.5 Compare the weight of the cleaned cylinders against the weight printed on the cylinder label. Cylinders are to be weighed without the transit cap.

2.1.6 The tolerance for the full weight is +0 g to -56 g. Record the actual weight on the log card and packing certificate.

A cylinder found to be outside the acceptable tolerance must be inspected and recharged.

2.1.7 Make sure the siphon tube inside the cylinder is still serviceable. Shake the cylinder. If the tube is still flexible, it will strike the wall of the cylinder with a ringing sound. If there is a noticeable delay before the sound is heard, the tube has stiffened and is no longer serviceable. You must therefore reject the cylinder.

CAUTION: ALWAYS USE CO₂ TO SPECIFICATION BS4105, TYPE 1, AND N₂ TO SPECIFICATION BS4366, TYPE 1, WHEN RECHARGING A GAS CYLINDER.

2.1.8 Refer to the associated publications (at the start of this manual) for recharging instructions. If a cylinder needs to be recharged, you must charge the correct quantities of gases (as specified in Chapter 1, Inflation System and Gas Charges section).

2.1.9 Find the date of the last hydraulic pressure test. The cylinder will require a re-test five years after this date.

- 2.1.10 The external condition of the cylinder must be checked in accordance with British Standard 5430 Pt.2. This standard gives the limits for surface damage. If the damage is more than the limits, reject the cylinder. The standard gives the following conditions for rejection and destruction of a cylinder:
- (a) Visible swelling of a cylinder.
 - (b) A dent which is deeper than 2 mm.
 - (c) A dent which has a diameter of less than 30 times its depth.
 - (d) A cut or gouge which is more than 2% of the cylinder length.
 - (e) A cut /gouge which is deeper than 5% of the cylinder wall thickness.
 - (f) A crack in the metal.
 - (g) Any delamination of the metal.
 - (h) The wear of the base end of the cylinder has reduced the thickness to less than 75% of the original.
 - (i) Heat damage has caused burning of the metal or distortion of the cylinder.
 - (j) Stamp marks have been made by a metal punch on the parallel section of the cylinder.
 - (k) Stamp marks are illegible.
- 2.1.11 Cylinders that have been submerged in water, i.e. those attached to liferafts that have been used in an actual emergency, must be hydraulically tested. They should be returned to the cylinder manufacturer (or an approved agent) for reconditioning and re-test before reuse.
- 2.1.12 Examine hoses, inlet valves and top-up valves for visual defects. Make sure all components are correctly attached.

2.2 Light unit and Power unit assembly

RL5 lighting system

NOTE: The Internal and External lamp unit are not serviceable items. If either unit displays a fault, replace the unit.

- 2.2.1 Illuminate the Internal lamp using the switch marked 'internal' on the side of the internal lamp unit. (FIGURE 402). If the LED lamp on the internal lamp unit fails to illuminate, replace the unit.
- 2.2.2 Check the expiry date on the Internal lamp unit. If the expiry date will be reached before the next scheduled service, replace the unit.
- 2.2.3 Examine the battery compartment on the Internal lamp unit for damage. If it is emitting an odour, it is possible that the unit is damaged, (refer to Step 5).
- 2.2.4 Make sure the Internal lamp unit is stored at a temperature below 65°C (149°F).

WARNING: KEEP THE INTERNAL LAMP UNIT AWAY FROM ANY SOURCE OF IGNITION. DO NOT HEAT THE INTERNAL LAMP UNIT ABOVE 50 °C OR BURN IT. THE CONTENTS OF THE POWER UNIT ARE FLAMMABLE. REFER TO THE MANUFACTURER'S DATA SHEET.

WARNING: DO NOT OPEN, CRUSH OR PUNCTURE THE INTERNAL LAMP UNIT. THE CONTENTS OF THE BATTERY ARE TOXIC AND CORROSIVE. REFER TO THE MANUFACTURER'S DATA SHEET.

WARNING: IF THE CHEMICALS FROM THE INTERNAL LAMP UNIT BATTERY TOUCH SKIN, CLOTHING OR EQUIPMENT, WASH THEM WITH LARGE QUANTITIES OF COLD WATER. REFER TO THE MANUFACTURER'S DATA SHEET.

NOTE: The Internal lamp unit cannot be recharged. When the life of the battery is expired, reject the unit and fit a replacement.

- 2.2.5 If the Internal lamp unit is damaged, or is emitting an odour, remove it as follows:

WARNING: PUT ON PROTECTIVE CLOTHING AND EQUIPMENT TO COVER EYES, HANDS AND BODY. THE CONTENTS OF THE BATTERY CAN CAUSE INJURY. REFER TO THE MANUFACTURER'S DATA SHEET.

NOTE: Make sure there is good air flow in the work area.

- (a) Put the defective unit in a cool area. Let it stand for approximately 24 hours. After this time the power unit should be odourless.
- (b) Insulate the electrical connections. Put the unit in a strong plastic bag or container to seal it from the atmosphere.
- (c) Discard the unit as given in the applicable regulations of the country.

- 2.2.6 Check the External lamp unit. Make sure the leads and connections have no signs of damage or deterioration.

- 2.2.7 Illuminate the External lamp using the switch marked 'external' on the side of the Internal lamp unit. (FIGURE 402). If the LED lamp in the External lamp unit fails to illuminate, replace the unit.

2.3 Emergency pack (lifed items)

NOTE: Each of the items given below may not be supplied in some emergency packs. Refer to the contents label for the contents of the pack.

- 2.3.1 The Survitec Group state that any 'lifed' item that has less than the time period remaining, between next the service date, it MUST be replaced in the emergency pack.
- 2.3.2 Discard any stock which is out-of-date, as given in the applicable regulations of the country.
- 2.3.3 Check correct pyrotechnics are being used. Only the pyrotechnics that are listed as an approved supplier are permitted.
Check the pyrotechnics for general condition. Any pyrotechnics with dents, corrosion or other visible damage should be replaced.
- 2.3.4 Check the handbooks and leaflets. Make sure they are in good condition and legible.
- 2.3.5 Test the Whistle and Bellows. Make sure they function correctly and are not damaged. Ensure any adaptor required is fitted to the bellows and is suitable for the top up valve fitted.
- 2.3.6 Test the torch/flashlight and batteries. Make sure they function correctly and are not damaged.

NOTE: Check the expiry date on the torch batteries. If the expiry date will be reached before the next scheduled service, replace the batteries.

- 2.3.7 Check the first aid kit, bailers and paddles. Make sure they are not corroded or damaged. If necessary, replace any defective parts.
- 2.3.8 Examine the repair kit, for damage to the contents. If necessary, replace any damaged items.
- 2.3.9 Visually check water sachets for any signs of damage, squeeze

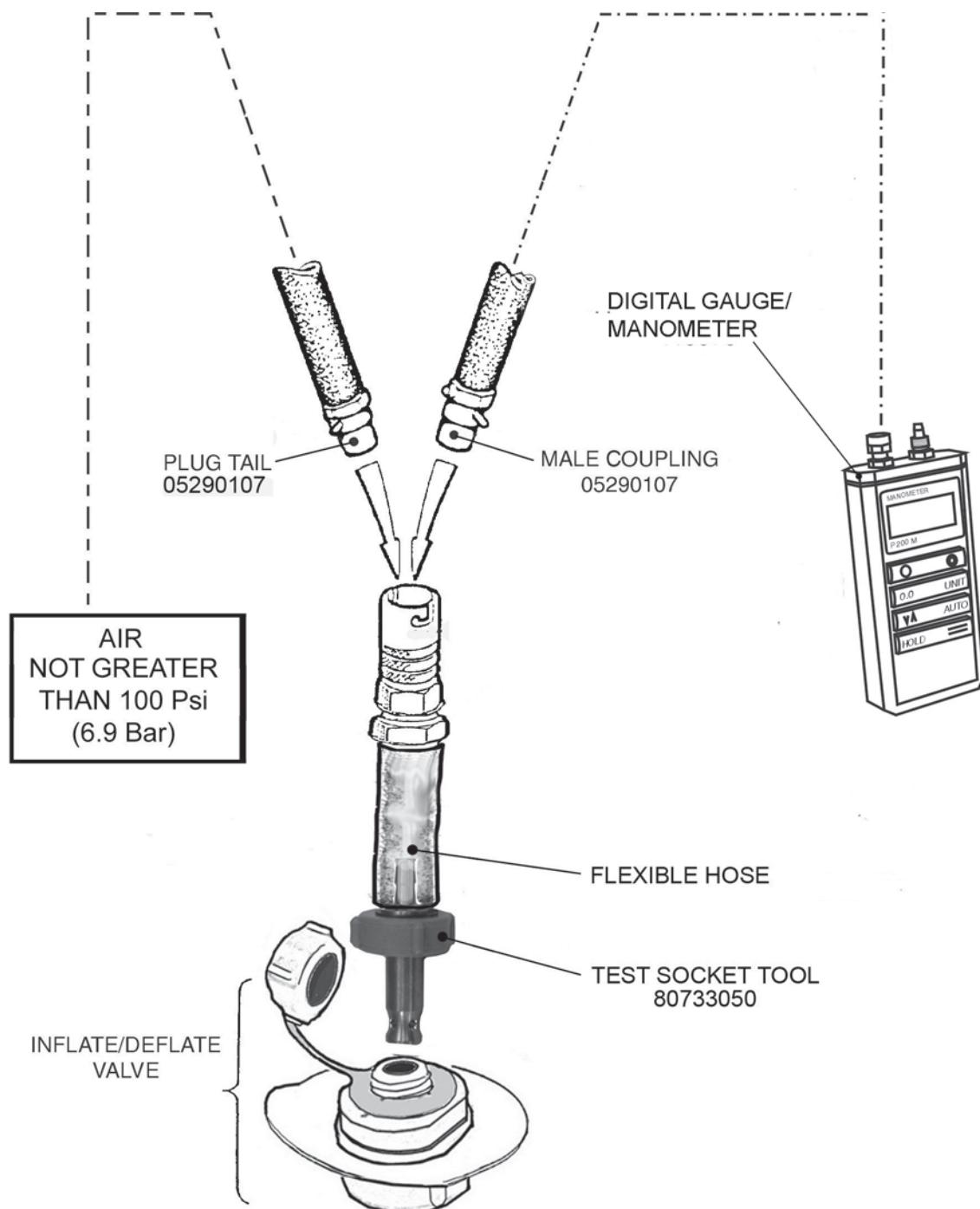
- 2.3.10 Ration packs are to be discarded if there is evidence of damage, defect or loss of vacuum which may affect the contents. Open a pack and check that the contents are fresh and fit for use.
 - 2.3.11 Check heliographs and leak stoppers for condition, corrosion and damage. Renew as necessary.
 - 2.3.12 Check the drogue. If damaged, replace. If not, re-pack (Please refer to Chapter 8).
 - 2.3.13 Examine the capsules of anti-seasickness tablets for condition and damage. Renew as necessary.
- 2.4 Rigid container, glass-reinforced plastic (GRP) , ABS and Valise
- Examine the container as follows:
- 2.4.1 Make sure the container is clean.
 - 2.4.2 Make sure there are no cracks. Minor gelcoat craze cracking is permitted.
 - 2.4.3 Examine the container for superficial and other damage.
 - 2.4.4 Check all the markings and the labels. Make sure they are legible.

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CHAPTER 5

TESTING AND TROUBLESHOOTING

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**Test layout
FIGURE 501**

1. General

- 1.1 The items described in CHAPTER 10 are necessary to test the liferaft.
When not in use, keep the test equipment and all special tools in conditions that protect them from damage:
- 1.2 The liferaft shall be submitted to pressure and other physical tests according to its age as defined in TABLE 502 and as described in this Chapter section 4.2.

2. Preparation

- 2.1 Keep the records of all the inflation tests. A recommended format for the test cards is shown in TABLE 501.
- 2.2 Keep the liferaft away from draughts and direct sunlight, as change in temperature affects pressure.
- 2.3 Keep a solution of hard soap (not detergent), water, and a quantity of clean, dry, lint free cloths in the area.
- 2.4 If a buoyancy tube needs to be tested separately because of a repair, carry out a working pressure test.
- 2.5 Calculate the change in the buoyancy tube pressure, caused by any change in temperature as follows:
 - 2.5.1 Subtract 38 mm WG from the manometer indication for each degree Celsius increase in temperature.
 - 2.5.2 Add 38 mm WG to the manometer indication for each degree Celsius decrease in temperature.

NOTE: The test result is not accepted if the temperature changes by more than 3.5° C.

- 2.6 Calculate the change in pressure caused by barometric pressure as follows:
 - 2.6.1 Subtract 10.2 mm WG from the manometer indication for each millibar decrease in pressure.
 - 2.6.2 Add 10.2 mm WG to the manometer indication for each millibar increase in pressure.

INFLATION TEST RECORD

LIFERAFT TYPE:		SERIAL No.:			
"PACK LIFERAFTS WITHIN 48 HOURS OF TEST, UNLESS STORED UNDER APPROVED CONDITIONS. RE-TEST if not operationally packed within 30 days of test."					
Time/Date of Test	Manometer Reading	Thermometer Reading	Barometer Reading	Temp/Pres Variation	Corrected Pressure

SURVEY RECORD

LIFERAFT TYPE:		SERIAL No.:	
REPAIRS REQUIRED			
PART	DAMAGE	FORM of REPAIR	INSPECTED BY:
UPPER BUOYANCY TUBE			
LOWER BUOYANCY TUBE			
FLOOR			
CANOPY SUPPORT TUBE			
INFLATION EQUIPMENT			
COMPONENTS			

Examples of test record cards
TABLE 501

3. Test procedures Part 1

3.1 Post operational packing vacuum test

CAUTION: ISO 9650 LIFERAFTS MUST ONLY BE TESTED USING THE CORRECT MANOMETER AS LISTED IN CHAPTER 10.

After every service, each liferaft must be subject to this test. This ensures that the liferaft's hermetic seal has not been compromised during service. A record of this test must be completed on a form similar to that in Appendix 4. Such records must be kept by the service station for a minimum of 10 years after the service date. These records must be available on demand, for inspection by staff of The Survitec Group. A similar record must be made when a service station operationally packs a new liferaft.

This test is to be completed after the container upper half has been fitted and the straps/crimps are installed. If desired the technician is permitted to perform this test prior to the installing of the container upper half. This will be an extra additional test. This additional test does not need to be recorded. It does not negate the requirement to perform the official test.

After every service, each liferaft must be subject to the post-service vacuum test as described in this chapter. This ensures that the liferaft's hermetic seal has not been compromised during service. A record of this test must be completed on a copy of the form provided, please see Appendix 4.

Such records must be kept by the service station for a minimum of 10 years after the service date. These records must be available on demand, for inspection by staff of The Survitec Group. A similar record must be made when a service station operationally packs a new liferaft.

3.2 Persons permitted to perform test

The Post operational packing vacuum test may only be completed (including recording – see subsequent Section) by two technicians who are trained, qualified and competent in packing ISO 9650 liferafts in question.

3.3 Post operational packing vacuum test details

- 3.3.1 Ensure the nut, (Item 2 FIGURE 503), has been torqued correctly. Please refer to Chapter 1, TABLE 1 for correct torque values.
- 3.3.2 Remove the plug, (Item 1 FIGURE 503), using the correct tool and a suitable 3/8" square drive wrench.
- 3.3.3 Insert a standard airline A8 adaptor into the vacuum plug hole. Connected the airline to a vacuum capable of sustaining 5 Psi (gauge).
- 3.3.4 Vacuum down the H-pack to between 5-6 Psi, through the point from which the plug was removed.

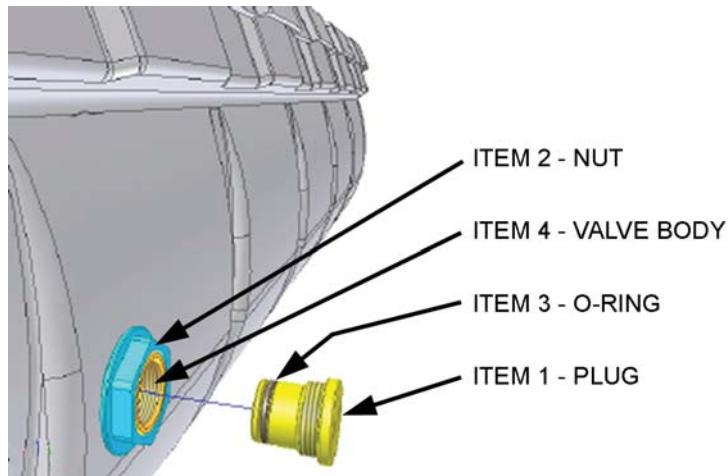
CAUTION: A VACUUM OF 6 PSI MUST NOT BE EXCEEDED. WORK QUICKLY THROUGH THE FOLLOWING STEP ONCE VACUUM IS APPLIED. THE VACUUM MUST NOT BE LEFT ON FOR EXTENDED PERIODS OF TIME, OTHERWISE DAMAGE WILL RESULT. IT IS RECOMMENDED THAT THE H-PACK SHOULD NOT BE SUBJECT TO VACUUM FOR PERIODS IN EXCESS OF 20 MINUTES.

- 3.3.5 Record the exact "Start Pressure". Allow liferaft to remain undisturbed stand for minimum 5 minutes and record "End Pressure".

NOTE: "End pressure" should not be corrected for atmospheric/temperature fluctuations. During the 5 minute test it is permissible to temporarily bung the valve body using either the plug provided with the H-pack, or a clean rubber bung from a standard Leafield A8 top-up valve. If using the plug, this will form a reliable temporary seal when hand-tightened.



Location of vacuum valve & Humidity indicator
FIGURE 502



Exploded diagram of vacuum valve

FIGURE 503

- 3.3.6 Insert a deflator pin into the vacuum valve body and leave the liferaft to settle to atmospheric pressure. (This takes approximately 5-10 minutes). When atmospheric pressure has been reached, a pressure reading will return 0 p.s.i.
- 3.3.7 Calculate the % gain of pressure (equal to the percentage loss of vacuum). This is calculated as follows:

$$\% \text{ gain} = 100 \left\{ \frac{(\text{Start Pressure} - \text{End Pressure})}{\text{Start Pressure}} \right\}$$

- 3.3.8 Fit the plug provided with the H-Pack (Item 1 FIGURE 503). Torque plug into vacuum valve body, using the correct tool and a calibrated 3/8" square drive torque wrench. Ensure that silicone grease doesn't come into contact with any threadforms on the plug or vacuum valve body.

NOTE: The plug supplied with H-Pack has an integral O-ring (Item 3 FIGURE 503). Silicone grease is already provided on the O-ring. This is sufficient for re-fitting the plug directly, provided the plug has been kept free of contaminants and grease provided hasn't been wiped off. If in any doubt, remove the O-ring using a suitable non-sharp implement and discard. Clean the plug using a clean lint-free cloth and refit a new O-ring coated liberally with silicone grease.

3.3.9 Pass/Fail Criteria

RAFT SIZE (persons)	4	6	8	10	12
PASS CRITERIA - % GAIN MUST NOT EXCEED	30	30	35	50	50

- 3.3.10 Recording of the Post Operational Packing Vacuum Test, shall be done on the testing card, Appendix 4. The Start Pressure, End Pressure and % gain are to be recorded. Pass/Fail must be deleted as appropriate. The operational technician or inspector's stamp must be put on the form.

3.4 Repair to the H-pack

After the container has been strapped:

If the container is failing the vacuum pressure tests, please carry out the following steps:

- 3.4.1 Remove the container straps.
- 3.4.2 Reapply the vacuum test and check /listen for leaks around the H-pack.
- 3.4.3 Check all welded seams, operating head seals, indicator valve and vacuum valve.
- 3.4.4 If a leak is detected, repair it with the heat sealing tool.
- 3.4.5 Finish the packing process.
- 3.4.6 Repeat the Post Operational Packing Vacuum test.

4. Test procedures Part 2

4.1 General - Test time intervals

- 4.1.1 Prior to servicing the liferaft, a copy of the liferaft's Inspection log form (QAF 311) must be received by the service station. (QAF 311) must be completed in its entirety (by the customer), the records being up to date, before servicing commences. In the event of the Inspection log form having incomplete records, the Service Station shall seek guidance from The Survitec Group.

NOTE: The Inspection log form may be used to record inspection details for a number of rafts, but not exceeding more than 15.

NOTE: Service requirements are to be calculated from date of first inspection. Date of first inspection, of the liferaft, begins when the liferaft was operationally packed for the first time. This information can be found on the data label fixed to the outside of the container, or on the liferaft identification label, or can be provided by contacting The Survitec Group.

- 4.1.2 If the liferaft's Inspection log form (QAF 311) is in order, the raft shall normally be serviced at 2 year intervals, until the raft has reached the end of its service life.
On occasion it may be necessary (due to the vessel becoming operational or in the unlikely event that the hermetic seal is compromised) to service the liferaft before 2 years have elapsed. In all cases the service should be in accordance with this manual.
- 4.1.3 On completion of a service, the Service Station shall forward a copy of the liferaft's Inspection log form, (QAF 311) to The Survitec Group. This Inspection log form is to be returned to Quality Department, along with Certificates of Re-inspection.
- 4.1.4 Test each compartment of the liferaft that inflates. Inflate the liferaft to the working pressure. The separate compartments of the liferaft that are inflated by the gas inflation system are:
- The lower buoyancy tube.
 - The upper buoyancy tube and the arch tube, (if no transfer valve is fitted).
 - The arch tube, (if transfer valve is fitted).

4.2 Additional test time intervals

Service schedule of testing, every 2 and a half years, shall be listed in TABLE 502.

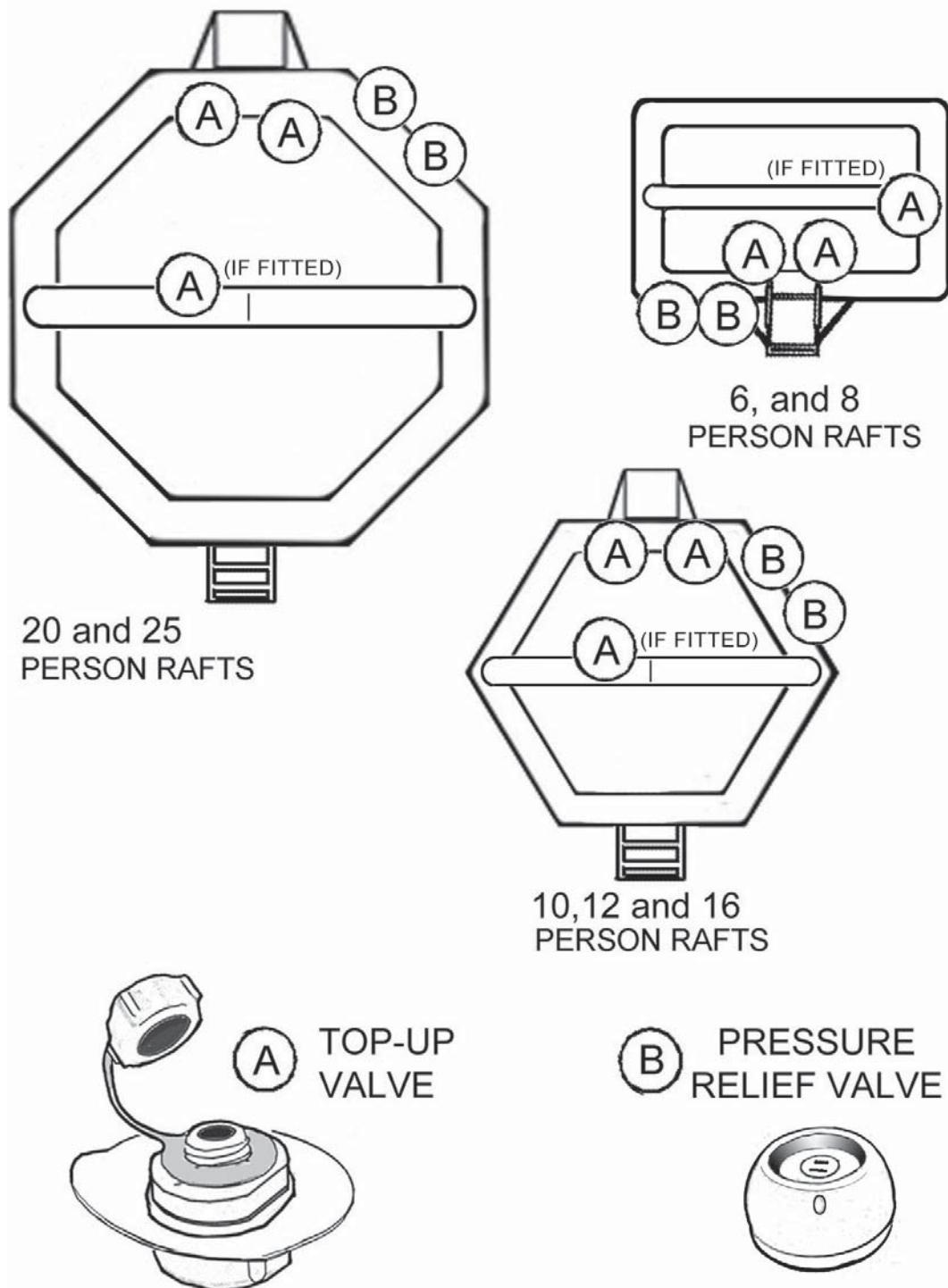
NOTE: Details below refer only to scheduled services and do not include annual onboard inspections. After 20 years continue with full tests on the liferaft.

NOTE: Date of first inspection, of the liferaft, begins when the liferaft was operationally packed for the first time. This information can be found on the data label fixed to the outside of the container, or on the liferaft identification label, or is provided by contacting The Survitec Group.

Time from date of first inspection of liferaft		INSPECTION / SERVICE
0 - 2	Years	SRI / CLT / POPVT
2 - 4	Years	SRI / CLT / POPVT
4 - 6	Years	SRI / GI / CLT / POPVT
6 - 8	Years	SRI / CLT / POPVT
8 - 10	Years	SRI / NAP / CLT / POPVT
10 - 12	Years	SRI / FS / GI / NAP / CLT / POPVT
12 - 114	Years	SRI / FS / NAP / CLT / POPVT
14 - 16	Years	SRI / GI / FS / NAP / CLT / POPVT

Inspection and servicing frequency
TABLE 502

- SRI = Annual Service/Raft Inflation/Working pressure
 CLT = Cylinder Leak test
 POPVT = Post Operational Packing Vacuum test
 GI = Gas Inflation test
 FS = Floor Seam test
 NAP = Necessary Additional Pressure test



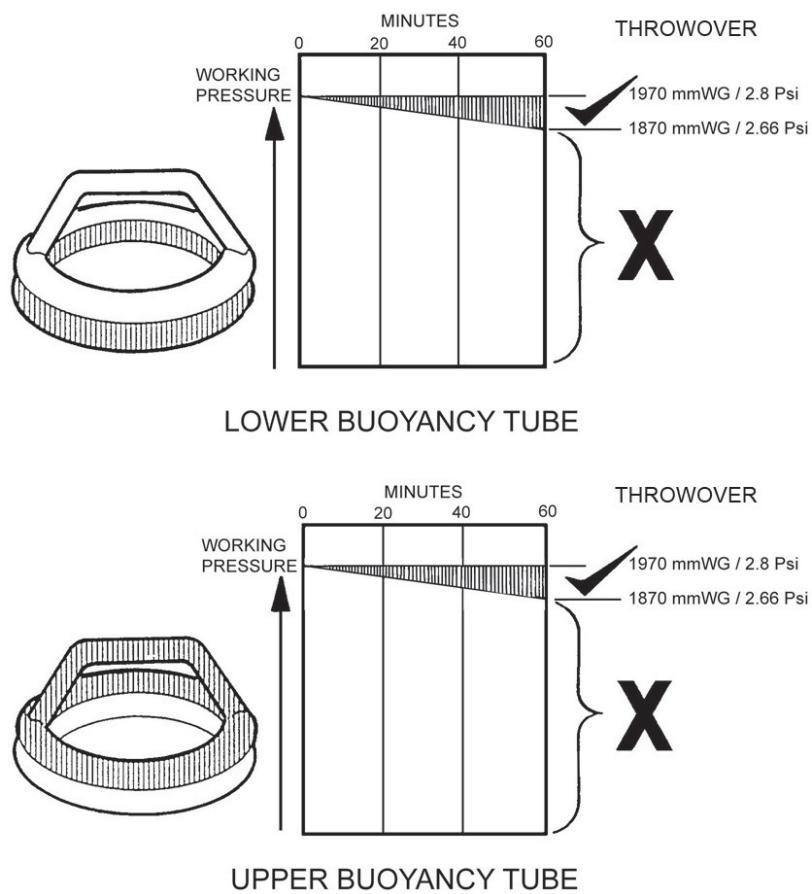
Location of valves

FIGURE 504

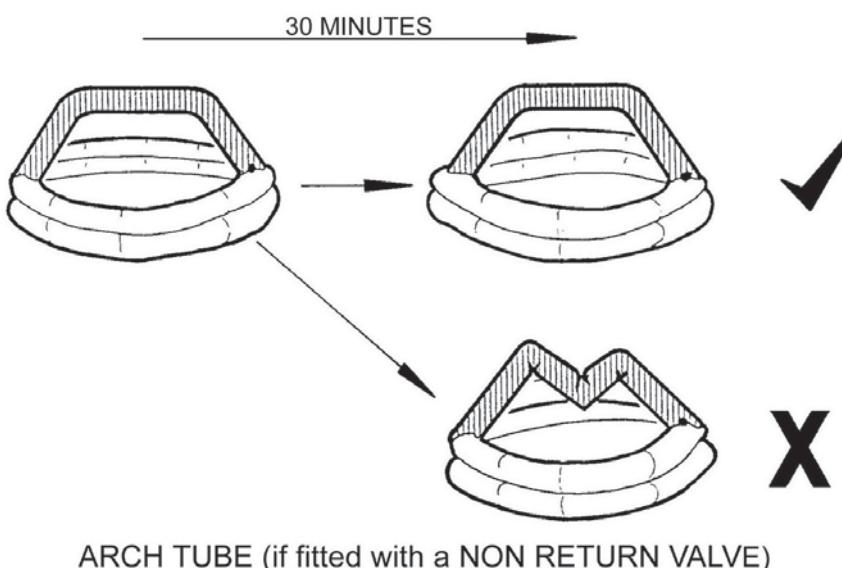
4.3 Necessary Additional Pressure (NAP) test

- 4.3.1 Carry out a NAP test as follows:
 - (a) Install the caps on both relief valves (FIGURE 504).
- 4.3.2 Inflate the liferaft slowly to twice the working pressure.
- 4.3.3 Let it stand for a minimum of 5 minutes after which there should be no seam slippage or cracking or other defects.
- 4.3.4 If the pressure decreases, allowing for temperature or barometric changes, by more than 5% the liferaft has failed the NAP test.
Look for leaks and porous fabric. If possible, repair the liferaft within the limits given, refer to Chapter 6. Carry out a re-test of the buoyancy tubes again.
- 4.3.5 If the pressure decreases abruptly during the NAP test and there is audible 'cracking' from the liferaft, condemn the liferaft.
- 4.3.6 Sounds from the liferaft with no drop in pressure may be ignored.
- 4.3.7 After testing remove both PRV caps together.

NOTE: After the raft has been deployed, the threads on the nut which clamps the foil bag to the Operating Head should be inspected, along with the corresponding male threads on operating head. If either thread form is damaged, or appears to be cross-threaded, the complete operating head should be replaced, with the old item to be discarded.



Working Pressure Test
FIGURE 505



Transfer valve test (if fitted)
FIGURE 506

4.4 Working pressure test

NOTE: The arch tube is mounted on the upper buoyancy tube. These will be fully inflated when the upper buoyancy tube is tested. Therefore they will be checked with the upper buoyancy tube. Each compartment will be tested over a period of 60 minutes.

- 4.4.1 For each inflatable compartment defined in this chapter section 4, carry out a working pressure test as follows, (FIGURE 503):
 - (a) Ensure caps on both relief valves are removed.
 - (b) Inflate the compartments to between values shown below. Record the temperature and barometric pressure.
 - (i) THROWOVER; Inflate the compartments to between 1970 and 2250 mm water gauge.
 - (c) Disconnect the air supply and connect the manometer (FIGURE 501).
 - (d) Make sure there are no leaks at the test equipment connections. Use a brush to apply a solution of soapy water, if necessary, to carry out a test at each joint.
 - (e) Leave pressurised compartments to settle undisturbed for 30 minutes. Note the pressure, provided the pressure is not less than:
 - (i) THROWOVER; 2.8 Psi / 1970 mm WG.
 - (f) Leave the pressure in the compartments for an additional 60 minutes, (FIGURE 503).
If the inflation pressure, corrected for temperature and barometric changes, decreases by more than 5% of the noted pressure, the liferaft fails this test.
 - (g) If the pressure decrease is more than 5%, look for leaks and porous fabric. If possible, repair the liferaft within the limits given, refer to Chapter 6.

4.5 Arch tube transfer valve test

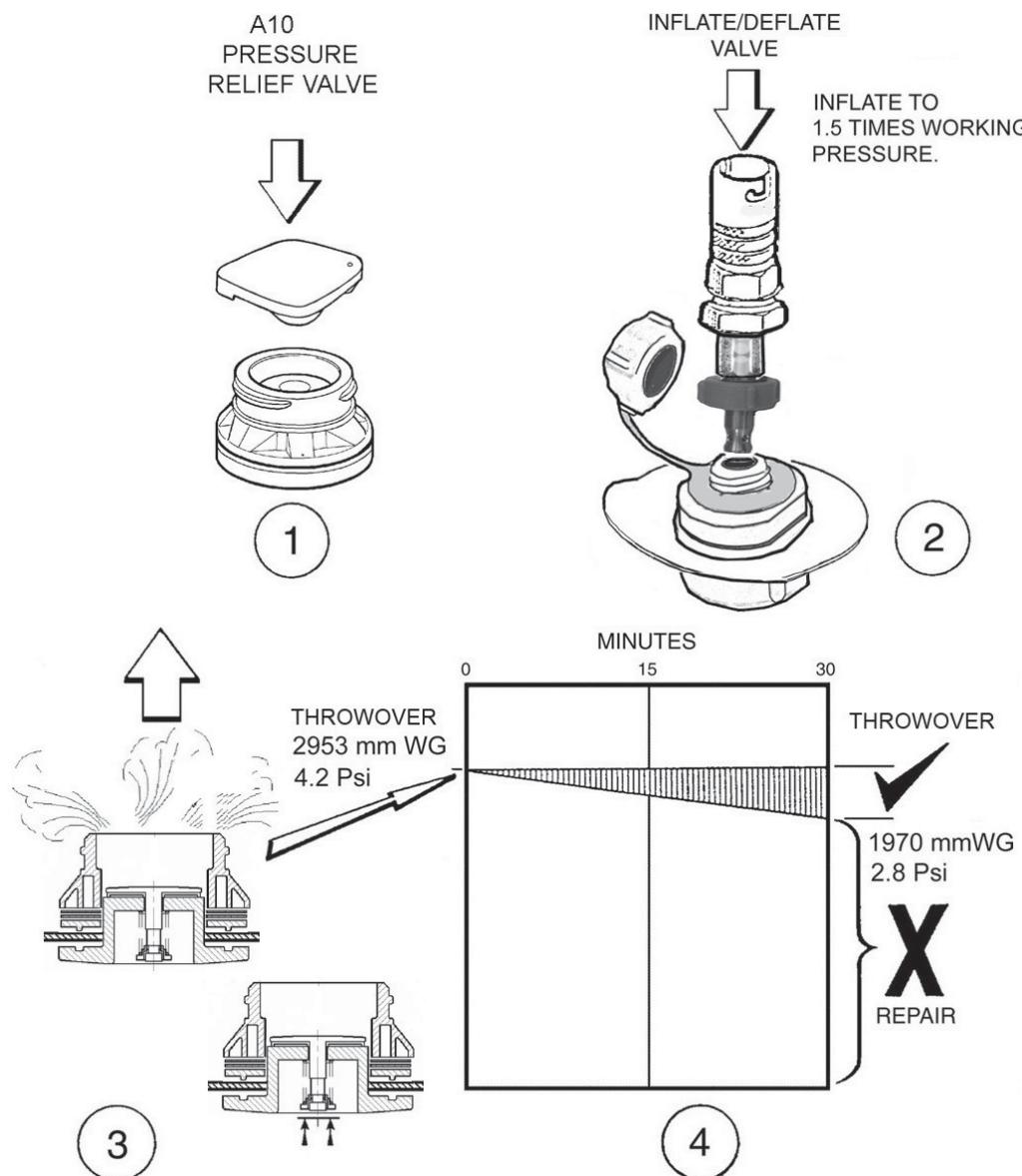
- 4.5.1 After the upper buoyancy tube has been deflated completely, the arch tube transfer valve can be tested.
- After 30 minutes the arch tube should maintain its full shape. Transfer valve which do not hold air must be replaced, (FIGURE 504).
 - If the arch tube does not maintain its full shape, look for leaks and porous fabric. If possible, repair the liferaft within the limits given, refer to Chapter 6.

4.6 Pressure relief valves test

Test the relief valves as follows:

- Install the caps on the pressure relief valves, (PRV) (FIGURE 504).
- Connect the manometer to the liferaft (refer to FIGURE 501).
- Inflate the liferaft to $1\frac{1}{2}$ times normal working pressure.
- Remove the caps from the relief valves.
- Make sure the valves open and release the excess pressure immediately, (FIGURE 505). After 30 minutes recheck the PRVs. The indicated pressure on the manometer when the valves are closed must not be:
 - THROWOVER; less than 1970 mmWG / 2.8 Psi.

NOTE: Any valves which do not close correctly, must be replaced (Refer to Chapter 6).



Pressure relief valves

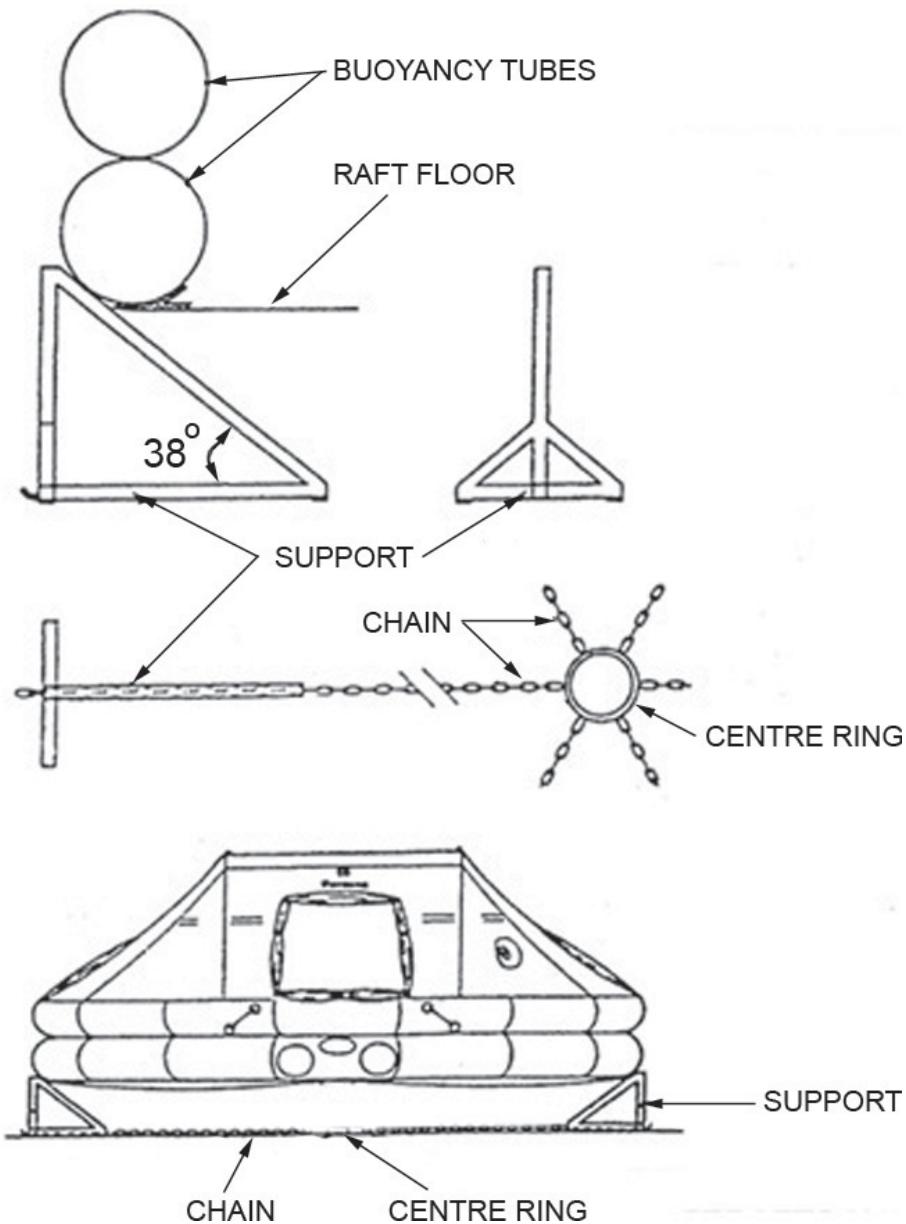
FIGURE 507

4.7 Floor seam test

- 4.7.1 A floor seam test is to be carried out on each liferaft at each service from the tenth year of the liferaft's life, unless earlier servicing is deemed necessary as a result of visual inspection.
- 4.7.2 To facilitate the test, a proper test frame as shown is recommended, (FIGURE 508).
- 4.7.3 Perform the floor seam test as follows:
 - (a) Make sure the liferaft is inflated to working pressure.
 - (b) Put the inflated liferaft on top of the floor seam test frame.
 - (c) A person of at least 82.5 kg (182 lbs) weight must walk around the perimeter of the floor for the entire circumference, close as possible to the buoyancy.
 - (d) Examine the floor seam around the underside of the lower buoyancy. If the floor has detached from the buoyancy at any point, repair within the limits of Chapter 6.

4.8 Function test

- 4.8.1 A full function test may be demanded by the local Inspecting Authority. This test may be done either with a packed or unpacked liferaft.
- 4.8.2 The load required to initiate inflation of the liferaft shall not exceed 15.3 kgf (33.73 lbf) when measured on a spring balance.
- 4.8.3 All buoyancy chambers must fully inflate and pressure relief valves function. Working pressure must be obtained after no more than 60 seconds at an ambient temperature of 18°C to 20°C (64.4°F to 68°F).
- 4.8.4 The working pressure should be determined by the reseat of the relief valves. The pressure relief valves should be fully operational.



Floor seam test supports

FIGURE 508

4.9 Gas inflation test

- 4.9.1 Unpack the liferaft, see Chapter 2, and put it on the packing table.
- 4.9.2 Reconnect the gas cylinder and operating head.
- 4.9.3 Pull the operating head actuator cable to inflate the liferaft.
- 4.9.4 Make sure the relief valves operate satisfactorily.
- 4.9.5 Let the liferaft settle for a minimum of 2 hours.
- 4.9.6 Use a manometer to make sure the gas pressure in each compartment of the liferaft is at or above working pressure. Record the gas pressure in each compartment. Record the temperature and barometric pressure.
- 4.9.7 Leave the pressure in the each compartment for an additional 60 minutes. If the inflation pressure, corrected for temperature and barometric changes, decreases by more than 5% of the noted pressure, the liferaft fails this test.
- 4.9.8 If the pressure decrease is more than 5%, look for leaks and porous fabric. If possible, repair the liferaft within the limits given, refer to Chapter 6. Carry out a re-test of the buoyancy tubes again.

4.10 Gas cylinders test

4.10.1 Cylinder valve installation

If a cylinder is required to be hydrostatically tested or if a cylinder adaptor has been removed then it must be refitted as follows:

- (a) Prior to the cylinder adaptor being fitted to the bare cylinder, apply the correct number of turns of PTFE tape, TABLE 504. The tape must be applied to the threads of the cylinder adaptor, (FIGURE 509).
- (b) The charge weight is specified in the IPL section of this service manual.
- (c) The cylinder is to be charged following the procedures recommended by the inflation system manufacturer. Reference to these can be found in the Associated Publication section in the relevant liferaft service manual.

4.10.2 Chemical leak testing

Testing for leaks must be carried out as follows, as per Method A or Method B:

Method A. 30-day quarantine period

- (a) Check the weight of the cylinder at regular intervals during the 30-day quarantine period.
- (b) After thirty (30) days the weight must be the same as when it was first filled.
- (c) If the weight has decreased, corrective action must be taken and the above process repeated.

WARNING: A CHARGED CYLINDER SHOWING LOSS OF WEIGHT,
CANNOT BE USED IN SERVICE.

- (d) If weight is the same, the cylinder can be used in service.

Method B. Chemical leak test

- (a) Before the gas cylinder is chemically leak tested, the mass of the gas in the cylinder is to be recorded, ensuring that it is within the limits specified in the service manual.

If there is insufficient gas in the cylinder, and/or a leak is detected, corrective action should be taken to determine the cause of the leak.

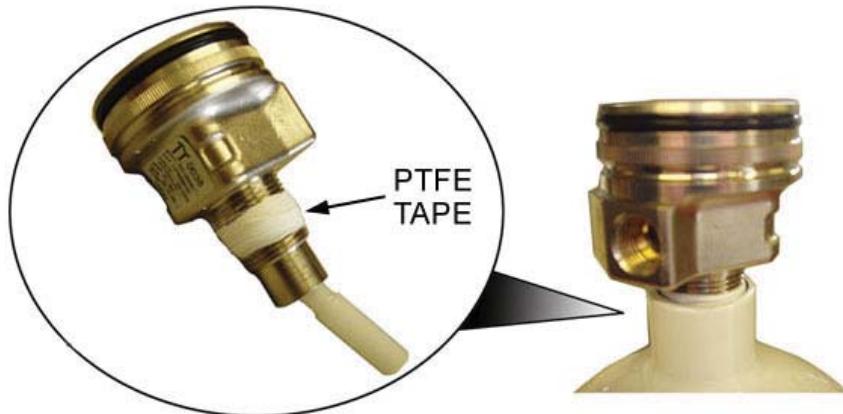
PTFE tape wrapping (Leafield)			
	PTFE tape	Cylinder adaptor	
		Plated	Unplated
Part No.	06168009		
Description	12 mm wide × 0.076 mm thick	12 wraps	12 wraps
Part No.	5X3117		
Description	3/4" wide × 0.002"-0.0025" thick	6-8 wraps	8-10 wraps

PTFE tape wrapping
TABLE 504

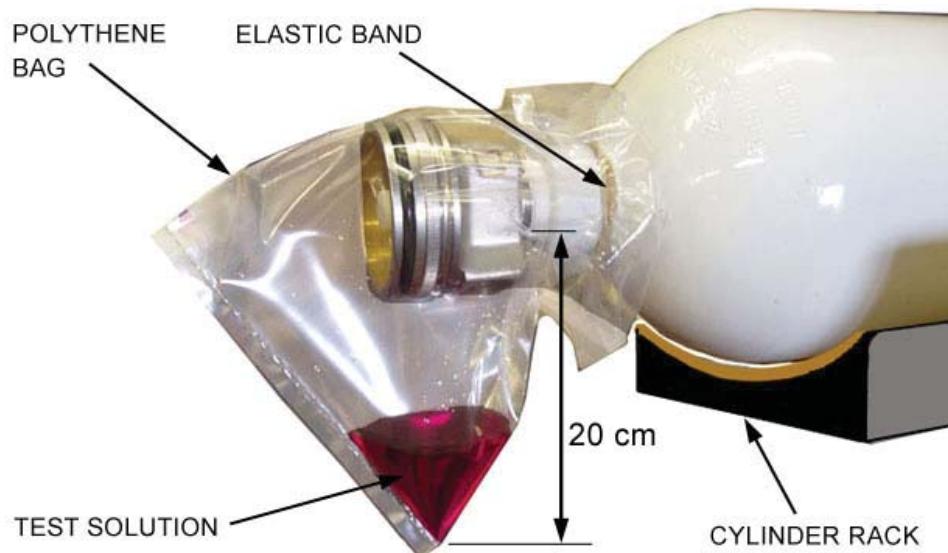
WARNING: A CHARGED CYLINDER SHOWING LOSS OF WEIGHT,
CANNOT BE USED IN SERVICE.

CAUTION: FOR THESE TESTS ONLY USE THE LEAK DETECTION
TEST KIT AS LISTED IN CHAPTER 10.

- (b) Lay the cylinder to be tested on its side, in a rack, so that the valve end is protruding, (FIGURE 510). Ensure the valve and shoulder of the cylinder are free from dust and other contaminates by carefully wiping using a clean, dry cloth. Remove the dust cap to clean the valve then replace the cap loosely.
- (c) Using the measuring cylinder provided in the test kit, transfer 25ml of the test solution into a polythene bag. The initial colour of the test solution will be a pink color.
- (d) Attach the open end of the bag over valve head and attach it to the cylinder body using one or more elastic bands. Make sure there are no air gaps in the seal, (FIGURE 510).
- (e) The polythene bag shall then hang 20 cm off the valve end of the cylinder with the test solution in one corner.
Alternatively the bag can be shaken while still hanging from the cylinder.
- (f) (Maintain the test for a period of **not less** than one hour. Remove the bag, (ends closed), and gently shake the solution. Make the observation as detailed below.
- (g) A control sample is necessary, this is made by introducing 25ml of test solution into a bag which is not fitted to a cylinder, but must be sealed at the open end, to exclude contamination from the atmosphere. This bag must be placed on the rack in the vicinity of the cylinders under test, and the above test method applied.



Typical Leafield operating head with PTFE tape applied
FIGURE 509



Chemical leak test applied
FIGURE 510

Observations

- (a) All tests are to be recorded on a sheet similar to sample provided in Appendix 4.
- (b) Carbon dioxide leaking from the cylinder will cause the pink color of the test solution to be lost and the test solution will become clear.
- (c) If no colour change is observed there is no leak of gas from the cylinder.
- (d) The control sample shall not change colour during the test.
If a colour change takes place, this indicates that the atmosphere in the test area is contaminated with carbon dioxide and tests carried out under this control sample are therefore invalidated.
- (e) Tests shall be repeated after corrective action has been taken on the atmosphere, i.e. area ventilated.

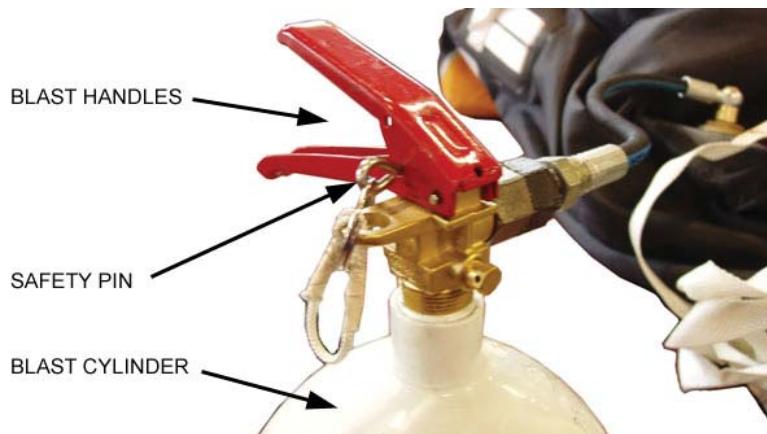
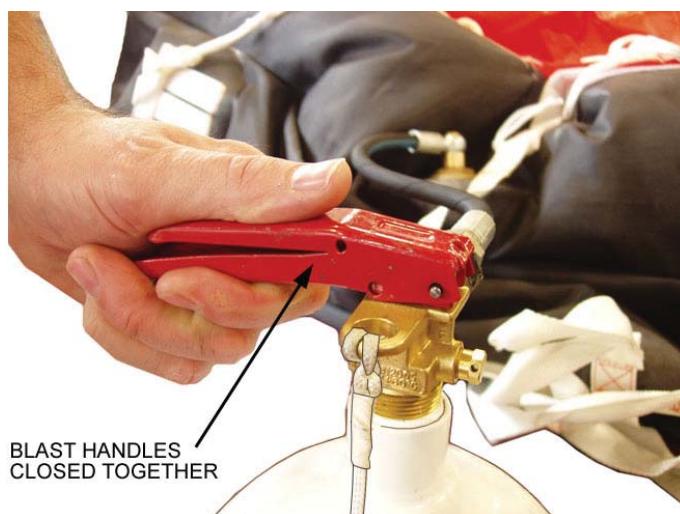
NOTE: This method may also be adapted to check CO₂ leakage from the base of cylinders, by taping a suitable sized plastic bag over the cylinder. Ensure the welded seam is inside the bag. The test is then carried out as per the above method.

4.10.3 Weight testing

Check the cylinder weight. The weight must be the same as that given on the cylinder data label. The weight recorded on the cylinder data label does not include the cylinder recoil caps.

WARNING: INSTALL A RECOIL CAP ON THE OUTLET OF A FULLY CHARGED GAS CYLINDER BEFORE MOVING IT. THE GAS CYLINDER CAN BECOME A PROJECTILE IF IT IS DISCHARGED ACCIDENTALLY AND CAN CAUSE INJURY AND DEATH.

WARNING: HOLD THE GAS CYLINDER IN A VICE OR SAFE CLAMPING MECHANISM WHEN INSTALLING OR REMOVING AN OPERATING HEAD.


Blast test set-up
FIGURE 511

Blast test operational
FIGURE 512

BLAST TEST KIT				
Liferaft Inflation system		Part Number	Item Description	Quantity per Service Station
A	Leafield	*08251009	Cylinder valve (blast test)	1
B	#	08351009	Cylinder valve (adaptor)	1

* This item to be purchased as required for ongoing service activity.

This item is only required when Part B, is to be used in conjunction with a USDOT compliant cylinder.

This item is not required when Part A, is fitted to a TPED compliant cylinder.

Blast test kit
TABLE 505

4.10.4 Blast testing

The high pressure inflation hose, attached to the inlet valve connection, must be pressure tested as follows:

NOTE: This Blast test must be performed using the purpose-made Blast test valve / Syphon tube (see TABLE 505). If a TPED compliant cylinder is to be used, then it is recommended that this is done so in conjunction with a 16.9 litre cylinder – bare cylinder (P/N 41947001), description CYLINDER M BARE 16.9lt 250bar. This cylinder for blast testing should be charged with 11.26kg CO₂ + 0.36kg N₂. The cylinder valve should be installed into the cylinder with 2 turns of PTFE tape & torqued to 240Nm (177ftLb) +10% -0%. This blast test cylinder assembly is not suitable for transportation in USA/Canada.

NOTE: If a USDOT compliant cylinder is to be used, then it is recommended that this is done in conjunction with a 960 cu.in. cylinder – bare cylinder (P/N 42117001). This cylinder for blast testing, should be charged with 8.80 kg CO₂ + 0.44 kg N₂. The cylinder valve should be installed into the cylinder with 2 turns of PTFE tape & torqued to 220 Nm +10% / -0 Nm. A cylinder adaptor is required to fit the valve onto the cylinder, (see TABLE 505).

- (a) The Blast kit required is listed in TABLE 505.

CAUTION: ENSURE THE SAFETY PIN IS IN PLACE AT ALL TIMES. IT SHOULD ONLY BE REMOVED FOR THE PERIOD OF THE BLAST TEST.

- (b) Disconnect the high pressure (HP) inflation hoses, which are currently fitted to the liferaft, from the operating head.
- (c) Connect one HP hose at a time, to the fitting on the blast test cylinder valve, (FIGURE 511/512). The correct torque value for this hose attachment can be found in Chapter1, TABLE 101, Torque settings.

CAUTION: FOR THE FIRST BLAST, KEEP HANDS AWAY FROM THE INLET VALVE IN CASE OF CO₂ BURN.

- (d) It is necessary to blast test each CO₂ inlet valve three times, (FIGURE 512).
- (e) For each blast, the red handles of the Blast test cylinder should be closed together, (FIGURE 512). The blast should last for 1 second.
- (f) If no gas leakage is observed on the first blast, then the second and third blasts should be conducted with the one hand near the inlet valve to detect leakage, BUT NOT IN CONTACT with it.
- (g) The hose should now be disconnected from the blast cylinder.

4.11 Radar reflectors test - (if installed)

4.11.1 Examine the radar reflector for damage.

4.11.2 Carry out the radar reflector test as follows:

- (a) Remove the radar reflector from its plastic bag.
- (b) Inflate the radar reflector to a pressure of 0.7 Psi. Let the pressure stay for a period of one hour. Make sure the pressure does not decrease to below 0.5 Psi.

4.12 Search & Rescue Transponder (SART) - (if installed)

The SART must be tested in accordance with the manufacturers instructions (refer to List of Associated Publications).

NOTE: If a SART is included in a liferaft, a radar reflector is not required.

5. Trouble shooting

The following TABLE is given to help you to find a fault if there is a malfunction during the function test. The table shows the possible causes and the corrective action. If there is a failure or malfunction you should also look for signs of damage which could have caused the failure.

FAILURE	POSSIBLE CAUSE	CORRECTIVE ACTION
Failure to inflate	The cylinder is not fully charged	Install a fully charged cylinder.
	The cylinder is empty.	Install the hose
	The hose is not installed.	
	The connections are loose.	Tighten the hose connections.
Pressure leaks	Damaged or porous fabric.	Repair the fabric or seam within the limits given in Chapter 6
	Damaged or porous seam.	
	Foreign body on a valve seat.	Clean or replace the relief/top up valves.
	Loose connections in the hose system.	Tighten all hose connections.
Relief valve does not relieve or reseat at the correct valve pressure.	Sealing cap is installed.	Remove sealing plug.
	A relief valve detect.	Replace the relief valve.
	Unwanted material	Clean the relief valve on the valve seat.
Operating head is not operating correctly.	Various reasons.	Replace the operating head.

Trouble shooting

TABLE 506

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CHAPTER 6

REPAIR

Section	Title	Page
1	General	603
2	Adhesive	604
3	Preparation of coated surfaces	605
4	Application of adhesive	605
5	Repair damaged areas	606
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1. General

- 1.1 Repairs to fabrics normally consist of patching the damage with fabric patches. The patching fabric must be the same type of material as the item under repair (e.g. PVC material must be replaced with PVC material).
 (Please refer to IPL for part number).
- 1.2 When marking fabrics, use wax (e.g. Chinagraph) crayon. If a 'major' repair is carried out record the repairs on the liferaft log card.
- 1.3 RAFT CONDEMNATION PROCEDURE: If a raft has been condemned, it must be damaged further so that it cannot be used.

The raft identification label should be separated from the raft and returned with a completed condemnation form, to the manufacturer.

All remaining material must be disposed of according to the local legislation.

The TABLE below lists a number of possible reasons, although further reasons may exist. A raft is condemned if:

POSSIBLE CAUSES OF LIFERAFT CONDEMNATION
Leakage - beyond economical repair
Wear/chafing
Condemned after vessel casualty
Damaged by strong heat (e.g. fire)
Vandalism
Damage by mould
NAP test - NEGATIVE
Floor Seam test - NEGATIVE
Separation of adhesive seams

Raft condemnation

TABLE 601

2. Adhesive

WARNING: ADHESIVES ARE FLAMMABLE. KEEP AWAY FROM NAKED FLAMES AND UNCOVERED LAMPS (NOT PROTECTED BY LAMP SHADE). USE ONLY IN WELL VENTILATED AREAS. AVOID CONTACT WITH EYES. AVOID BREATHING FUMES. USE BARRIER CREAM ON HANDS AND WASH THOROUGHLY AFTER USE.

2.1 The adhesive to be used for repairing must be of the EV/C2 type.

- 2.1.1 The adhesive has to be prepared each time in the required quantity. The adhesive can be used for a maximum of three hours, after activation through catalyst.
- 2.1.2 The catalyst should be added to the adhesive in the quantity of 8% by measure of weight and of 5% by measure of volume.
- 2.1.3 When the two components have been mixed, shake well until an even colour is achieved. It is important to get a complete blending to prevent the catalyst from separating.

2.2 EV/C2 adhesive must be used in environments as follows;

- (a) Temperature: between 12°C and 35°C;
- (b) Relative humidity, not greater than 70%.

WARNING: AS TEMPERATURE INCREASES, THE CATALYSIS PERIOD BECOMES SHORTER. AS TEMPERATURE DECREASES THE CATALYSIS PERIOD BECOMES LONGER.

3. Preparation of coated surfaces

- 3.1 The surfaces must be degreased with Methyl-Ethyl-Ketone, (MEK). Cleaning and degreasing should be thorough. The whole area for repairing should be cleaned and degreased as well as the edges of the torn part.

4. Application of adhesive

- 4.1 Using a brush, apply the adhesive in thin and even layers. Apply the adhesive to the surfaces to be joined. Proceed as follows:

- (a) Apply the adhesive.
- (b) Wait 4-5 minutes.
- (c) Apply the adhesive again.
- (d) Wait 7-9 minutes.
- (e) Join the surfaces, smoothing them out uniformly.

WARNING: THE REPAIRED PARTS SHOULD NOT BE SUBJECTED TO STRESS UNTIL A MINIMUM OF 12 HOURS HAS PAST.

5. Repair damaged areas

- 5.1 All of the seams in Eurovinil liferafts, particularly the air holding seams, are formed using adhesive. The liferaft buoyancies, floor and canopy (non air holding joints) are also held together with adhesive.
- 5.2 Note that a correct adhesive-jointed seam or assembly of PVC fabric and adhesive, is very strong. It is possible to cause damage to the proofed coat if careless attempts are made to tear apart two surfaces joined by adhesive, particularly if forces are applied in a manner not normally found during service.

WARNING: UNDER NO CIRCUMSTANCES SHOULD THE HOT AIR GUN BE USED IN CONJUNCTION WITH TOLUENE SOLVENT. TOLUENE IS EXTREMELY FLAMMABLE AND SHOULD BE KEPT AWAY FROM THE HOT AIR GUN.

NOTE: to RELEASE ADHESIVE JOINTED SEAMS or assemblies formed using PU adhesive, it is recommended that one of the following techniques is used, together with the careful use of a spatula or other suitable tool.

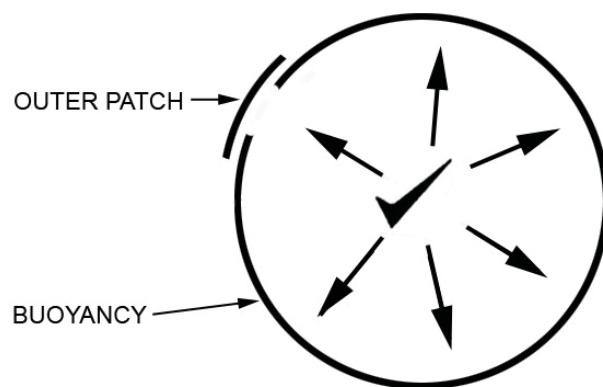
- A hot air gun (max.temperature 70°C [158°F]) or
- Toluene solvent.

5.3 Patches

Damage to pressure holding chambers requires the application of a single patch for the repair, please refer to (FIGURE 601).

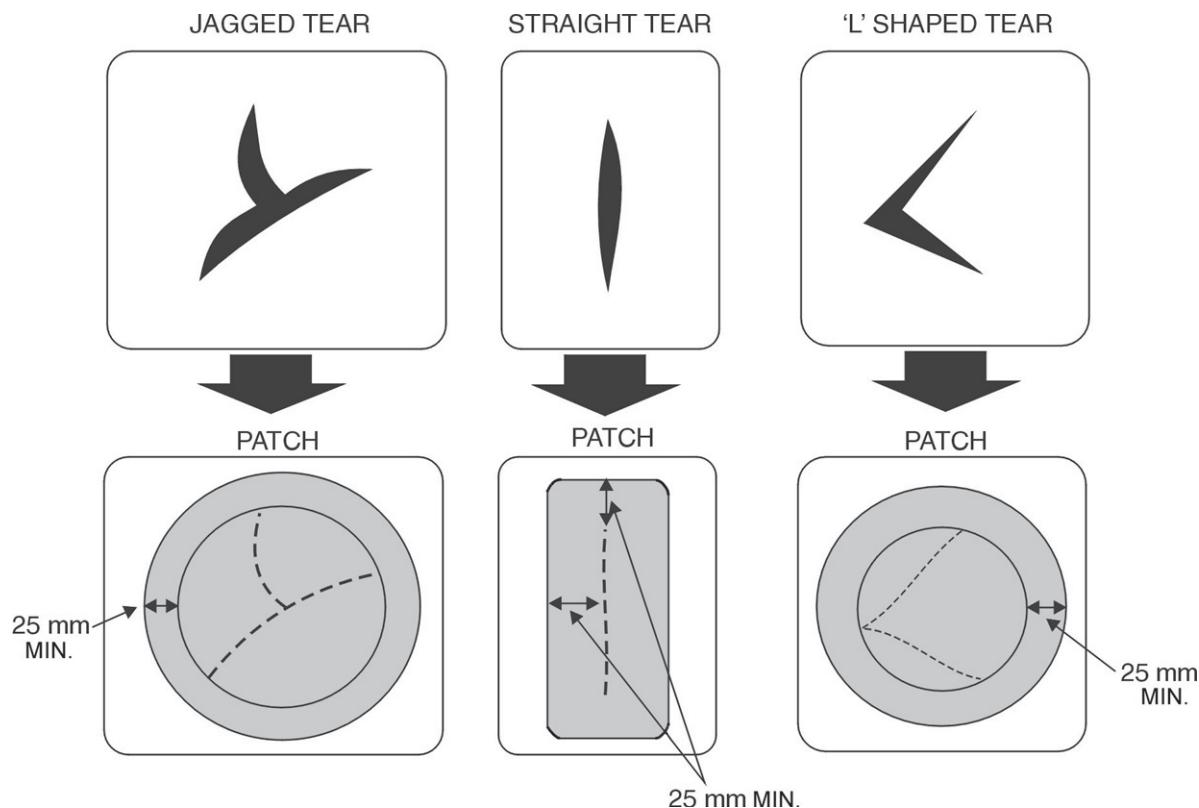
The outer patch provides additional mechanical strength to the damaged area in addition to the cosmetic improvement to the damaged area. Marking out patches should be done using a wax or chinagraph pencil. Never use a ballpoint pen for this task.

- 5.3.1 Thoroughly clear the damaged area, trimming any frayed edges as necessary.
- 5.3.2 Cut the outer patch so that it overlaps the area of damage by at least 25mm all round. Prepare the patch for gluing as per the requirements in this Chapter.
- 5.3.3 Allow the adhesive to dry. Test it by touching the adhesive with the back of a finger. If the adhesive is dry to the touch it is ready to be applied.



Application of the outer patch

FIGURE 601



Patching
FIGURE 602

- 5.3.4 Apply adhesive to the outer repair patch as per the requirements in this Chapter and allow to dry.
- 5.3.5 When the adhesive is touch dry, apply the patch to the repair area ensuring it is centrally aligned.
- 5.3.6 Use a spatula or roller to expel the air from under the patch, ensuring that there are no creases. Once again, press from the centre to the edge. Allow sufficient time for the repair to cure (recommended 24 hours), before making a pressure test on the repaired chamber prior folding and packing the liferaft.

5.4 Types of patches

- 5.4.1 Repair patches must overlap at least 25 mm (1") beyond the edge of the damage, (FIGURE 602) e.g:
 - (a) If the diameter of a jagged aperture is 25 mm (1"), the patch must be at least 75 mm (3") diameter.
 - (b) If a straight tear is 25 mm (1") long, the patch must be at least 75mm (3 in) × 50 (2") mm.
 - (c) Treat 'L' shaped tears as apertures; calculate the "diameter" as the distance between the ends of the tear.
- 5.4.2 Patches must be circular or rectangular with rounded corners, (FIGURE 602).
- 5.4.3 Repair patches on air-holding components may be made from the same material as that of the air-holding chamber.

5.5 Applying patches and tapes

- 5.5.1 To apply patches or tapes, the following procedure must be followed:
 - (a) Cut the patch to size.
 - (b) Prepare and clean the area as described in Step 3.
 - (c) When the adhesive coat develops an aggressive tack, put the patch in position and use a hand roller to roll it into firm contact. Ensure the patch is orientated correctly i.e. 'proof' surface to 'proof' surface. Adhesive joints are not permitted to join one or more textile surfaces.
 - (d) Use a spatula to remove any air bubbles from under the patch.
 - (e) After a repair to an inflatable chamber has cured, the inflatable chamber must be subjected to a pressure holding test.
 - (f) If damage is along the edge of a seam then the patch must extend across the central seam joint, (FIGURE 603).

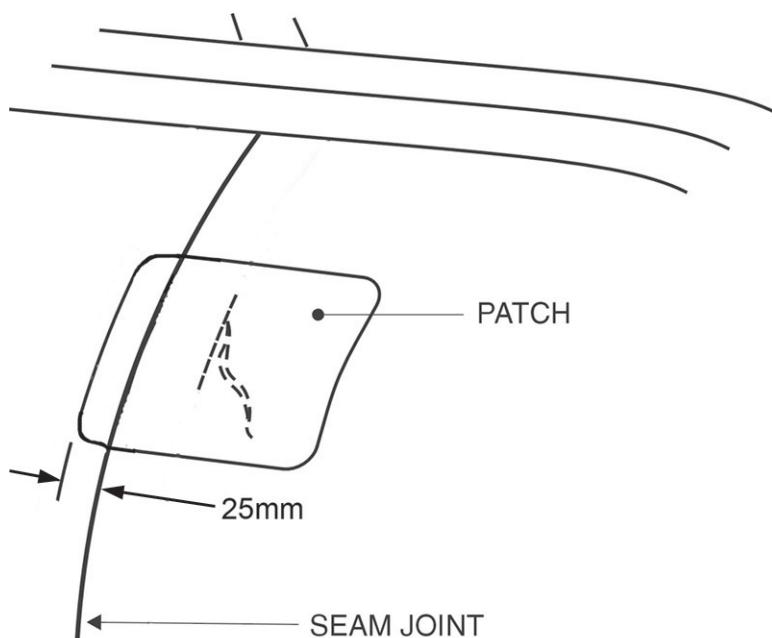
- 5.5.2 To apply tape, use exactly the same manner that is used for patches. Cut a radius on the corners of the tape ends before sticking the surfaces together; overlap tape ends by 50 mm (2").

5.6 Repair to insulated floor retaining straps

Use the following standard repair method, where insulated floor retaining straps have been fitted to the lower buoyancy ring, to replace them should they become damaged.

- 5.6.1 Remove the damaged retaining strap using the method described in 5B, in this Chapter,
- 5.6.2 Fit the repair strap in the same position and orientation.

NOTE: Where an insulated floor assembly is not fitted to a liferaft and the insulated floor retaining straps become damaged, there is no requirement for repair.



Patch application over seams
FIGURE 603

5.7 Testing repairs (Refer to Chapter 5)

- 5.7.1 Make sure the adhesive cures completely before testing.
- 5.7.2 When carrying out repairs to air holding compartments, carry out a working pressure test for each compartment.

5.8 Repair limits

Patches (External)

- 5.8.1 Use a patch to repair if:
 - (a) The damage does not enter a seam.
 - (b) The damage does not pass under a major anchorage point, such as a towing point or bowsing patch, or within 100 mm (4") of one of these points.
 - (c) The maximum area of the patch is not more than one eighth of the total panel area.

5.9 More extensive damage

Repairs not described in this manual are not permitted except by permission from the Design Authority. Separate application must be made for each occasion when repair is proposed.

6. Component repair

6.1 Pressure Relief Valve (Leafield PRV Type B10)

CAUTION: ENSURE WHEN CONDUCTING THE REPAIR TO THE SLIT, NO MEK COMES IN CONTACT WITH THE PRV. THE PRV IS TO BE FITTED WITH THE SEALING PLUG ATTACHED. NO OTHER CAP OR PLUG IS TO BE USED. PLEASE REMOVE CAP AT THE END OF THE PROCESS.

Disassembly of the pressure relief valve is not permitted. The Leafield B10 valve has no serviceable components — a faulty valve must be replaced with a new unit. Replace the complete assembly:

CAUTION: IT IS NOT PERMITTED TO ATTACH THE LEAFIELD PRV, WHEN PREASSEMBLED INTO A DOUBLER, TO ANOTHER COMPONENT USING ADHESIVE.

6.1.1 Removal method

- (a) A slit of approximately 150 mm (6"), must be made in the buoyancy tube in the vicinity of the affected valve to enable access to the inside of the buoyancy tube. The slit should be made along the length of the buoyancy. The end of the slit should be no closer than 100 mm (4") to the edge of the PRV doubler.
- (b) The slit should be made as small as possible and repaired subsequently by patching according to standard practice.
- (c) Loosen both parts of the valve using the appropriate tools.
- (d) Remove the valve.
- (e) Discard all parts of the faulty PRV. Do not reuse any of them.

6.1.2 Fitting a new PRV

WARNING: UNDER NO CIRCUMSTANCES SHOULD OLD COMPONENTS BE MIXED WITH NEW COMPONENTS. REPLACE THE ENTIRE PRV ASSEMBLY. DO NOT RE-USE ANY OLD COMPONENTS.

NOTE: Ensure all surfaces are clean and dry before fitting the new PRV.

- (a) Push the valve body into the hole from which the faulty one was removed.
- (b) Assemble the valve body as shown in (FIGURE 604).

NOTE: The ridged face of the clamp washer should be positioned towards the buoyancy tube.

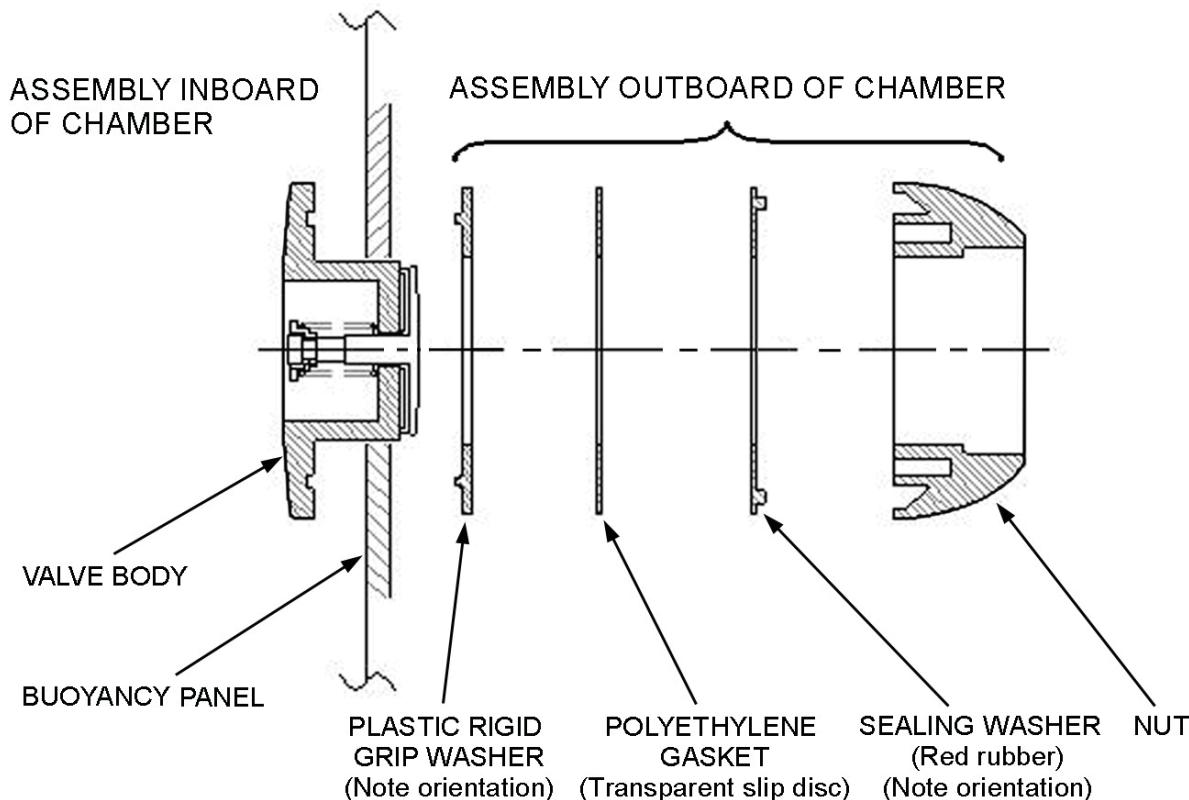
- (c) Holding the valve body in place, through the buoyancy fabric, hand-tighten the components of the PRV using the nut.
- (d) While holding the PRV on the inside, use a calibrated torque wrench and the correct adaptor tools, to tighten the PRV from the outside. Please refer to Chapter 1, TABLE 101 for torque settings.

WARNING: ONLY THE TORQUE VALUE SPECIFIED SHOULD BE APPLIED. WHEN THE CORRECT TORQUE IS ACHIEVED FOR THE FIRST TIME, THE PRV MUST NOT BE TIGHTENED AGAIN. IF RETIGHTENING IS NECESSARY A COMPLETE NEW PRV MUST BE FITTED.

- (e) The slit must then be repaired as detailed in this Chapter.

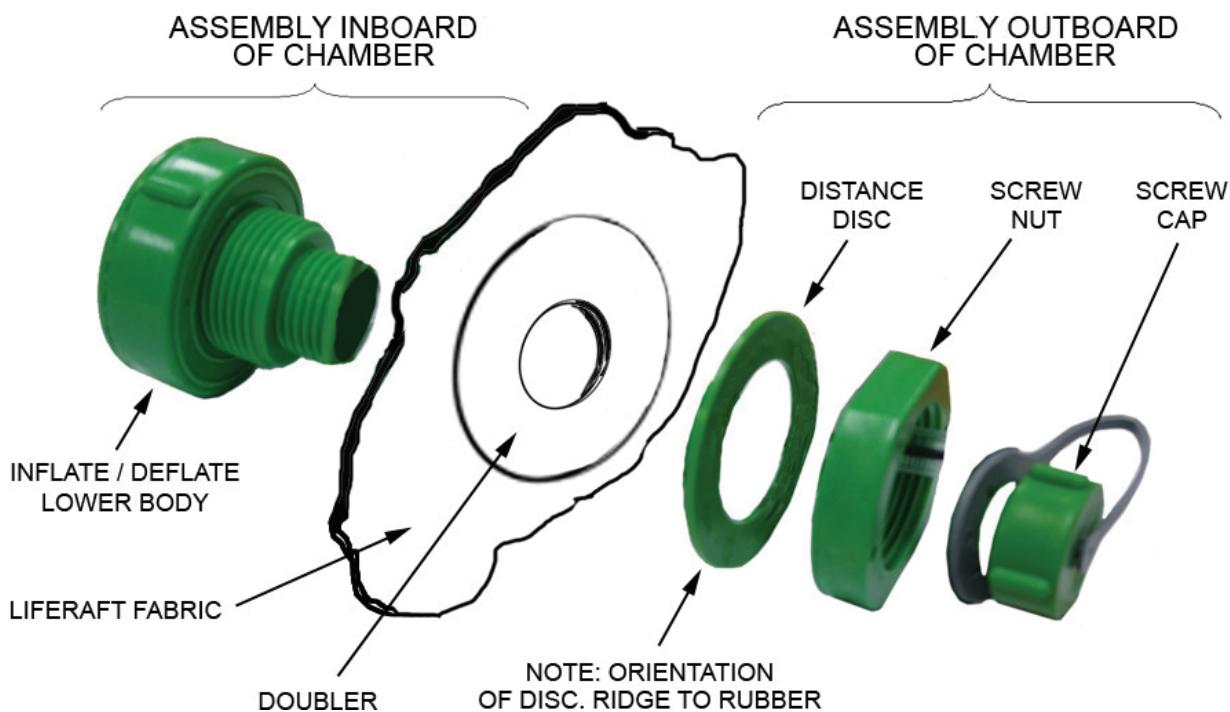
CAUTION: ENSURE THE PRV CAP(S) HAVE BEEN REMOVED BEFORE INFLATION.

- (f) After waiting the required time for the repair to cure please complete and record an air-holding test as described in Chapter 5. Record the relief and reseat pressures of the new PRV.



Leaffield PRV - B10

FIGURE 604



Inflate / Deflate valve

FIGURE 605

6.2 Inflate / Deflate valve

CAUTION: ENSURE WHEN CONDUCTING THE REPAIR TO THE SLIT, NO MEK COMES IN CONTACT WITH THE VALVE. THE VALVE IS TO BE FITTED WITH THE SEALING PLUG ATTACHED. NO OTHER CAP OR PLUG IS TO BE USED. PLEASE REMOVE CAP AT THE END OF THE PROCESS.

Disassembly of the valve is not permitted. The Inflate/ Deflate valve has no serviceable components — a faulty valve must be replaced with a new unit. Replace the complete assembly:

6.2.1 Removal method

- (a) A slit of approximately 150 mm (6"), must be made in the buoyancy tube in the vicinity of the affected valve to enable access to the inside of the buoyancy tube. The slit should be made along the length of the buoyancy. The end of the slit should be no closer than 100 mm (4") to the edge of the PRV doubler.
- (b) The slit should be made as small as possible and repaired subsequently by patching according to standard practice.
- (c) Loosen both parts of the valve using the appropriate tools.
- (d) Remove the valve.
- (e) Discard all parts of the faulty valve. Do not reuse any of them.

6.2.2 Fitting a new valve

WARNING: UNDER NO CIRCUMSTANCES SHOULD OLD COMPONENTS BE MIXED WITH NEW COMPONENTS. REPLACE THE ENTIRE VALVE ASSEMBLY. DO NOT RE-USE ANY OLD COMPONENTS.

NOTE: Ensure all surfaces are clean and dry before fitting the new Inflate/ Deflate valve.

- (a) Push the valve body into the slit, from which the faulty one was removed.
- (b) Assemble the valve body as shown in (FIGURE 605).

NOTE: The ridged face of the clamp washer should be positioned towards the buoyancy tube.

- (c) Holding the valve body in place, through the buoyancy fabric, hand-tighten the components of the valve using the nut.

- (d) While holding the valve on the inside, use a calibrated torque wrench and the correct adaptor tools, to tighten the valve from the outside. Please refer to Chapter 1, TABLE 101 for torque settings value.

WARNING: ONLY THE TORQUE VALUE SPECIFIED SHOULD BE APPLIED. WHEN THE CORRECT TORQUE IS ACHIEVED FOR THE FIRST TIME, THE VALVE MUST NOT BE TIGHTENED AGAIN. IF RETIGHTENING IS NECESSARY A COMPLETE NEW VALVE MUST BE FITTED.

- (e) The slit must then be repaired as detailed in this Chapter.

CAUTION: ENSURE THE VALVE CAP(S) HAVE BEEN REMOVED BEFORE INFLATION.

- (f) After waiting the required time for the repair to cure please complete and record an air-holding test as described in Chapter 5.

6.3 Inflation valve

Leaflet type (FIGURE 606)

6.3.1 The inflation valves have different jet bores, as stated below. The size of the jet bore is stamped in the flat surface of the valve body. The stamp also shows the direction of the jetholes.

- (a) The bore size for the lower buoyancy is 2.2 mm.
- (b) The bore size for the upper buoyancy is 2.8 mm.

6.3.2 There is only one size of hose for this valve.

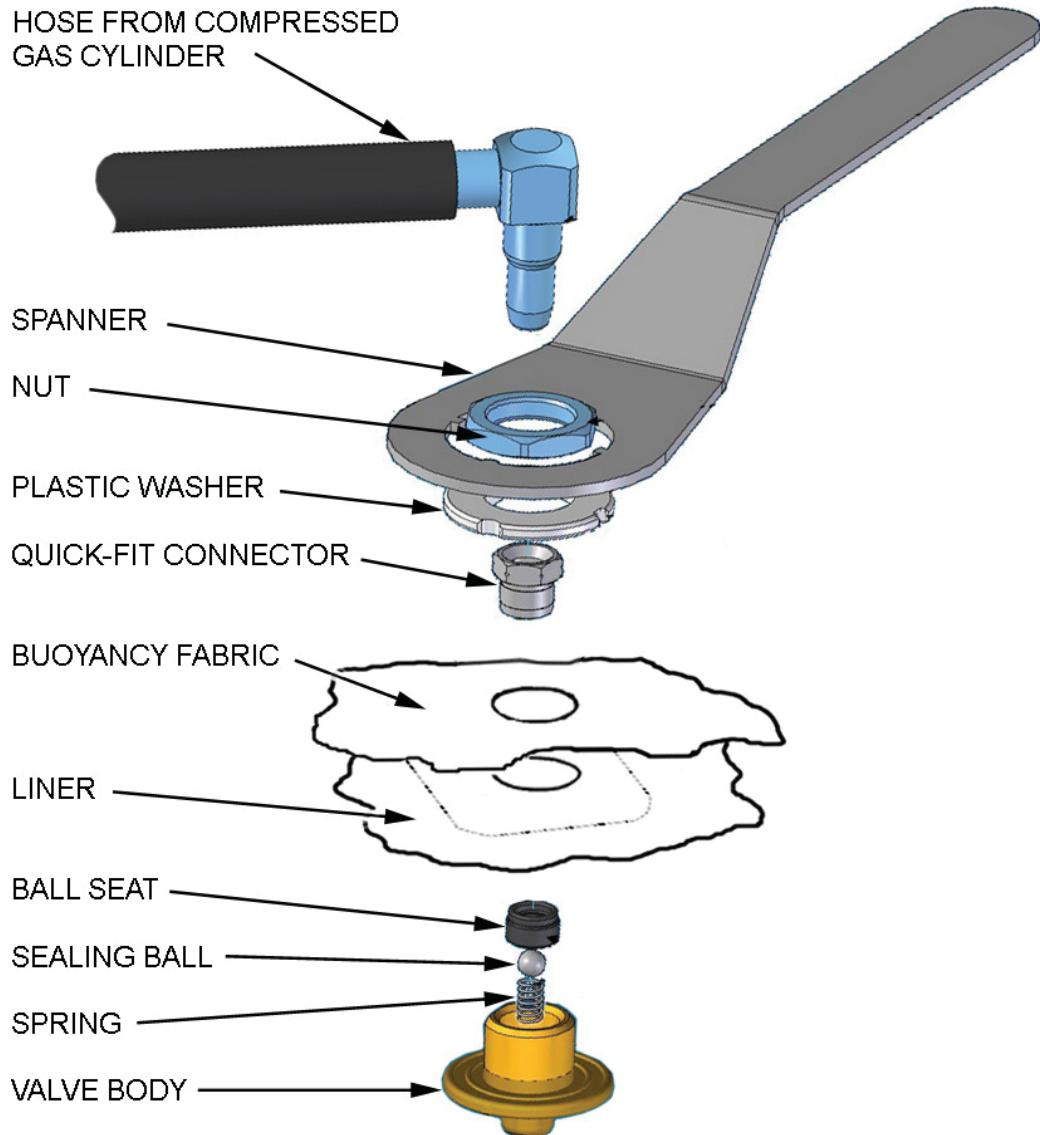
6.3.3 The assembly requires an aperture of 24 mm diameter in the buoyancy chamber. The aperture is reinforced at this point.

- (a) Deflate the liferaft for this repair.
- (b) To install an inflation valve access to the inside of the buoyancy chamber is required. This is achieved by making a slit in the buoyancy, approximately 150 mm (6 in) long.
 - (i) The slit is required close to the inlet valve position.

- (c) To disassemble the inflation valve, remove the fixing nut and the plastic washer from the valve.
- (d) Reach inside the liner, via this slit, and pull the body of the valve to the inside of the liner, then remove it from the buoyancy chamber.
- (e) To install a new inflation valve, first disassemble the nut and the plastic washer from the valve, (FIGURE 606).
- (f) Using all new components assemble the inflation valve unit. Pass the valve body through the liner and the 24 mm hole in the buoyancy panel, (FIGURE 606).
- (g) Fit the plastic washer and nut to the inflation valve body and tighten it by hand, (FIGURE 606).
- (h) Align the jets in the inlet valve by ensuring the arrows on the spanner are orientated, to point along the axis of the buoyancy tube and the liner.
- (i) A special tool, (Chapter 10), is shaped to match the body of the valve. Using a 33mm A/F socket and torque wrench, tighten the nut to the stated torque value in, Chapter 1, TABLE 101.
- (j) Remove the red plastic dust cap from the top thread of the inlet valve. The valve is now ready to accept the quick fit connector on the end of the high-pressure hose. Push the connector firmly into the hole and make sure a click is heard. Check that the connection has been correctly made by tugging firmly on the hose connector.
- (k) If the hose has not been correctly snapped into place, it may blow out during inflation. In this case, check the O-Ring is still in place in the M16 connector before pushing together as described above. If it is not present, replace the M16 connector.
- (l) Use the patching procedure to repair the access slits.

6.4 Miscellaneous

- 6.4.1 Replace damaged painter, operating lanyard or doorway bowsing lines with new assemblies.



NOTE: EXPLODED VIEW IS FOR ILLUSTRATION ONLY- ACTUAL VALVE UNIT MAY VARY

Leaffield inflation valve
FIGURE 606

7. Rigid containers

7.1 Classification of structural repairs

Only minor repairs to glass reinforced plastic (GRP) containers are permitted. These are listed below. When damage is more than these limits, send the container to an approved glass fibre repair depot for major repair.

No repair is permitted to Valise or ABS containers.

7.2 Repair limits

7.2.1 The limits of minor repairs are:

- (a) Damage to the gelcoat only, which does not penetrate the glass fibre mat.
- (b) Damage to the painted surface.

7.2.2 The limits of major repairs are:

- (a) Apertures or penetrating damage (i.e. through the glass fibre mat) over an area of less than 77 square centimetres (12 sq.in) on the outer surface of the container.
- (b) Apertures or penetrating damage over an area of less than 58 square centimetres (9 sq.in) on the inner surface of the container.
- (c) Breakage/cracks of the rims on either half of the container shell.

NOTE: The limits above, apply to the TOTAL area of damage, so that if, for example, repair is required at both ends of the container, then the permissible areas of repair for each end must not TOGETHER total more than the prescribed limits.

7.3 Other repairs

WARNING: WHEN WORKING WITH GLASS FIBRE SURFACES, HANDS, ARMS AND FACES MUST BE PROTECTED. WEAR A FACE MASK.

Replace damaged or illegible labels. Re-stencil illegible markings.

7.4 Gelcoat

7.4.1 This is the outer surface of the container. Damage to the gelcoat does not affect the GRP, although it may expose it to view. If only the gelcoat is damaged, repair it with a GRP filler, such as Isopon:

- (a) Clean the damaged area with acetone to remove all contamination.
- (b) Spread the GRP filler until it is higher than the adjacent surface of the container.
- (c) Cover the GRP filler with adhesive tape and allow it to cure.
- (d) Remove the tape and abrade the repaired area. Rub down the surface with abrasive papers until it is level with the container surface.

7.4.2 To paint the container:

- (a) Remove all loose labels.
- (b) Remove grease, tar etc. with a suitable solvent, e.g. toluene.
- (c) Wash the container with a solution of detergent and water and rinse with clean water.
- (d) Fill any cracks or voids in the gelcoat with GRP filler as per Step 1 above.
- (e) Spray paint one coat of white Epimide paint or Polyurethane paint.

7.5 Major structural repairs

7.5.1 A major repair is required for any damage to a container that is more serious than damage to the gelcoat only. Major repairs to the glass fibre containers are not permitted except by specially trained and approved personnel.

The limits of repair are given as follows. If container damage is more than these limits, do not attempt to repair the container. The damaged shell or shells of the container must be replaced.

7.5.2 The limits of repair are:

- (a) Holes or penetrating damage (i.e. through the glass fibre mat) over an area of more than 77 square centimetres on the outer surface of the container.
- (b) Holes or penetrating damage over an area of more than 58 square centimetres on the inner surface of the container.
- (c) Breakage of the rims on either half of the container shell.

NOTE: The limits above, apply to the TOTAL area of damage, so that if, for example, repair is required at both ends of the container, then the permissible areas of repair for each end must not TOGETHER total more than the prescribed limits.

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CHAPTER 7

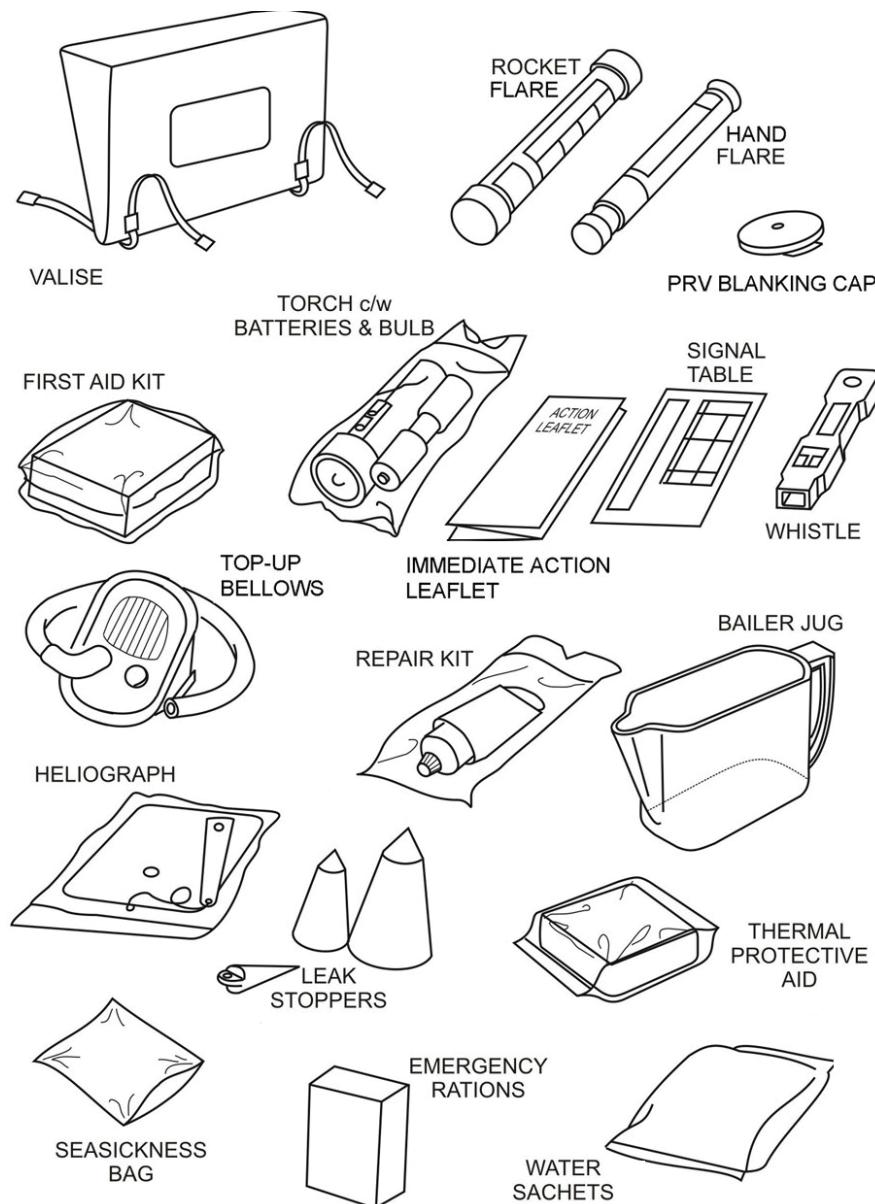
EMERGENCY PACKS AND EQUIPMENT

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4	Positioning the Emergency Packs	710
5	Sealing the valise.....	712

1. EMERGENCY PACKS

CAUTION: SURVIVAL AIDS MUST BE PACKED WITH THEIR VALISE(S) POSITIONED EITHER IN THE CONTAINER OR A JIG THAT SIMULATES THE SHAPE OF THE CONTAINER AND CYLINDER.

- 1.1 For liferafts packed into different containers pack the contents of each Emergency Pack into its valise, in accordance with TABLES 701-703.
- 1.2 Any 'lived' item in the Emergency Pack, that has expiry date before time to next service MUST be replaced in the Emergency Pack.



Typical Emergency Pack items

FIGURE 701

Liferaft size (persons)	Part number	4 TO	6 TO	8 TO	10 TO	12 TO
Bag, seasickness, poly 229 x 366 mm	11105001	4	6	8	10	12
Bailer, (jug) PVC, 1 pint	05720107	1	1	1	1	1
Bellows	45201002	1	1	1	1	1
First Aid Kit	E99930156	1	1	1	1	1
Flare, hand held	*2	6	6	6	6	6
Flare, parachute	*2	2	2	2	2	2
Heliograph	05829009	1	1	1	1	1
Sealing caps (Leafield B10)	08557009	2	2	2	2	2
Label E-pack	45036001	1	1	1	1	1
Immediate action leaflet	E15100208	1	1	1	1	1
Leak stopper, No. 1	40318001	2	2	2	2	2
Leak stopper, No. 3	05720019	1	1	1	1	1
Leak stopper, No. 5	05720023	1	1	1	1	1
Repair kit	*E10360009	1	1	1	1	1
Rescue signal table	02176011	1	1	1	1	1
Thermal protection aid	06317009	2	2	2	2	2
Torch (waterproof) c/w spares	06973009	2	2	2	2	2
Whistle	05090005	1	1	1	1	1
Valise 1050 mm	20993051	2	2	2	2	2

Emergency Equipment >24 Hour pack 1 — Type 1
TABLE 701

Please note:

- *1 These items are attached to the liferaft interior and are not packed in an Emergency Pack.
- *2 Denotes this item is listed in Service bulletin 62/10 (see associated publications for details).

Liferaft size (persons)	Part number	4 TO	6 TO	8 TO	10 TO	12 TO
Bag, seasickness, poly 229 x 366 mm	11105001	4	6	8	10	12
Bailer, (jug) PVC, 1 pint	05720107	1	1	1	1	1
Bellows	45201002	1	1	1	1	1
Flare, hand held	*2	3	3	3	3	3
Flare, parachute	*2	2	2	2	2	2
Heliograph	05829009	1	1	1	1	1
Sealing caps (Leafield B10)	08557009	2	2	2	2	2
Label E-pack	45036001	1	1	1	1	1
Immediate action leaflet	*E15100208	1	1	1	1	1
Leak stopper, No. 1	40318001	2	2	2	2	2
Leak stopper, No. 3	05720019	1	1	1	1	1
Leak stopper, No. 5	05720023	1	1	1	1	1
Repair kit	E10360009	1	1	1	1	1
Rescue signal table	02176011	1	1	1	1	1
Torch (waterproof) c/w spares	06973009	1	1	1	1	1
Whistle	05090005	1	1	1	1	1
Valise 1050 mm	20993051	1	1	1	1	1

Emergency Equipment <24 Hour pack 1 — Type 1 & Type 2
TABLE 702

Please note:

- *1 These items are attached to the liferaft interior and are not packed in an Emergency Pack.
- *2 Denotes this item is listed in Service bulletin 62/10 (see associated publications for details).

Liferaft size (persons)	Part number	4 TO	6 TO	8 TO	10 TO	12 TO
	Pack number	2	2	2	2	2
Water sachet 500 ml	1	12	18	24	24	36
Food rations 500 g	1	4	6	8	10	12
Valise 1050 mm	20993051	1	1	1	1	1

*¹ Denotes this item is listed in Service bulletin 62/10
 (see associated publications for details).

Emergency Equipment >24 hours pack 2,3 & 4

TABLE 703

- 1.3 All of the items in TABLE 703, along with the additional items listed in TABLE 705 below, are required for the Emergency Pack (Seasava - ISO complete with SOLAS B-Pack).

Liferaft size (persons)	Part number	4 TO	6 TO	8 TO	10 TO	12 TO
Sea anchor	45510101	1	1	1	1	1
Thermal protective aid	06317009	2	2	2	2	2
Smoke signal	08376009	1	1	1	1	1
Smoke, protection pipe	51765011	1	1	1	1	1
Smoke, protection foam	51765021	2	2	2	2	2
Radar reflector	06408009	1	1	1	1	1
First Aid Kit	E99930156	1	1	1	1	1

Additional Emergency Equipment (Seasava - ISO)

<24 Hour B-Pack 1

TABLE 704

2. ADDITIONAL WRAPPING / PREPARATION

2.1 Pyrotechnics - General

It is important to wrap pyrotechnics correctly with Pillowflex and/or protective foam. The types of pyrotechnics used in Emergency Packs are Smoke Canisters, Rockets and Hand Flares.

The method for wrapping pyrotechnics changes as the liferaft drop height increases.

- 2.1.1 Use the wrapping method as illustrated in (FIGURE 702). Use rubber bands or tape to retain the wrap.

2.2 Water sachet protection - Minimum of 4 layers of Pillowflex bubble wrap to be placed between food blocks and water sachets.

2.3 Bellows wrapping, (FIGURE 703)

It is important to wrap the bellows with sufficient foam as follows:

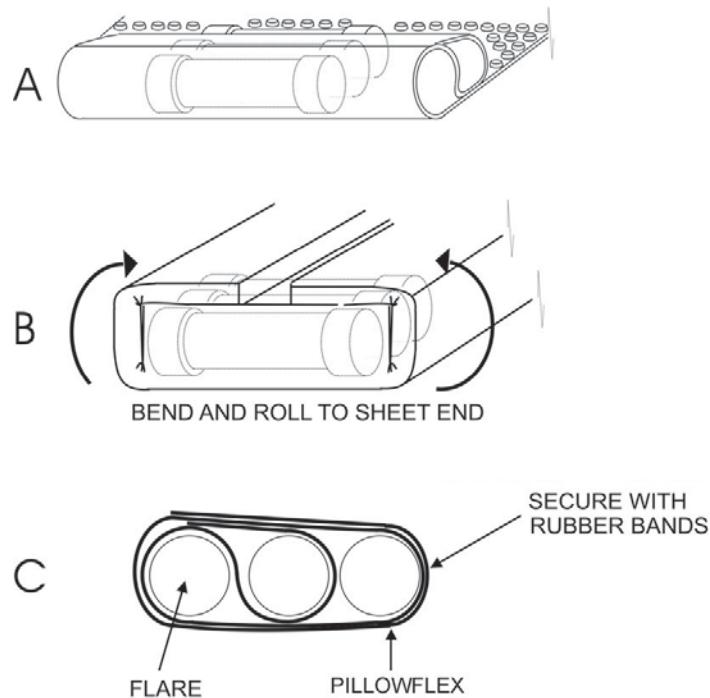
- 2.3.1 Wrap the bellows hosing around the bellows and secure the wrap with rubber bands.
- 2.3.2 Insert a protective foam into the socket as shown.
- 2.3.3 Place the bellows top down, as shown, on a large length of plastazote.
- 2.3.4 Wrap the bellows with 1 turn of the plastazote.
- 2.3.5 Fold in both ends of the wrap and tape securely. Use two lengths of tape.

2.4 Pyrotechnics - (Seasava - ISO SOLAS B-Pack (UK))

The method for wrapping the smoke pyrotechnics in a Flat Pack, for this configuration only, is as follows, (FIGURE 704);

- 2.4.1 Obtain the Smoke canister, two pieces of foam and the plastic tube.
- 2.4.2 Wrap the Smoke canister with the foam and tape it securely.
- 2.4.3 Place the Smoke canister fully inside the plastic tube.
- 2.4.4 Wrap the outside of the plastic tube with foam and tape it securely.

FLARE, HANDHELD & PARACHUTE



Pyrotechnics wrapping

FIGURE 702

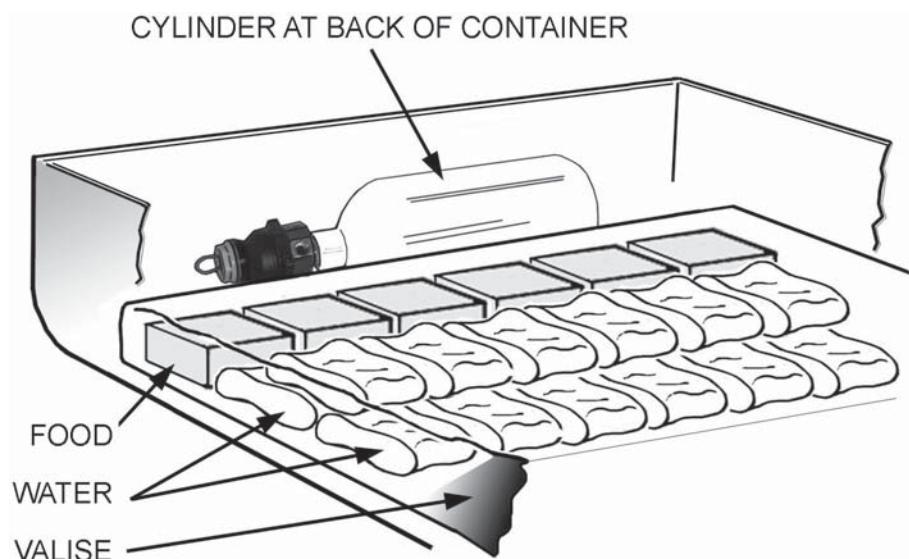


Bellow wrapping

FIGURE 703



Pyrotechnics wrapping - (Seasava -ISO B-Pack)
FIGURE 704



Food and Water valise packing for GRP, ABS & Valise
TYPE 1 only - (all sizes)
FIGURE 705

3. Packing the Emergency Packs

3.1 Using a GRP container, (FIGURE 705 & 706)

Arrange items into the valise as required, making sure the finished packs are long and thin. A layout is shown as a guide, but this can vary slightly from raft to raft.

- 3.1.1 E-Pack No.2 contains the water and food packs. (FIGURE 705) shows position and layout of both.
- 3.1.2 E-Pack No.1, shows the position and layout of the equipment.
- 3.1.3 Place both torches into the bailer. Ensure the on/off switches are placed inwards and insert the leak stoppers between them. This will prevent the torches being turned on accidentally.

3.2 Using a ABS container, (FIGURE 705 & 706)

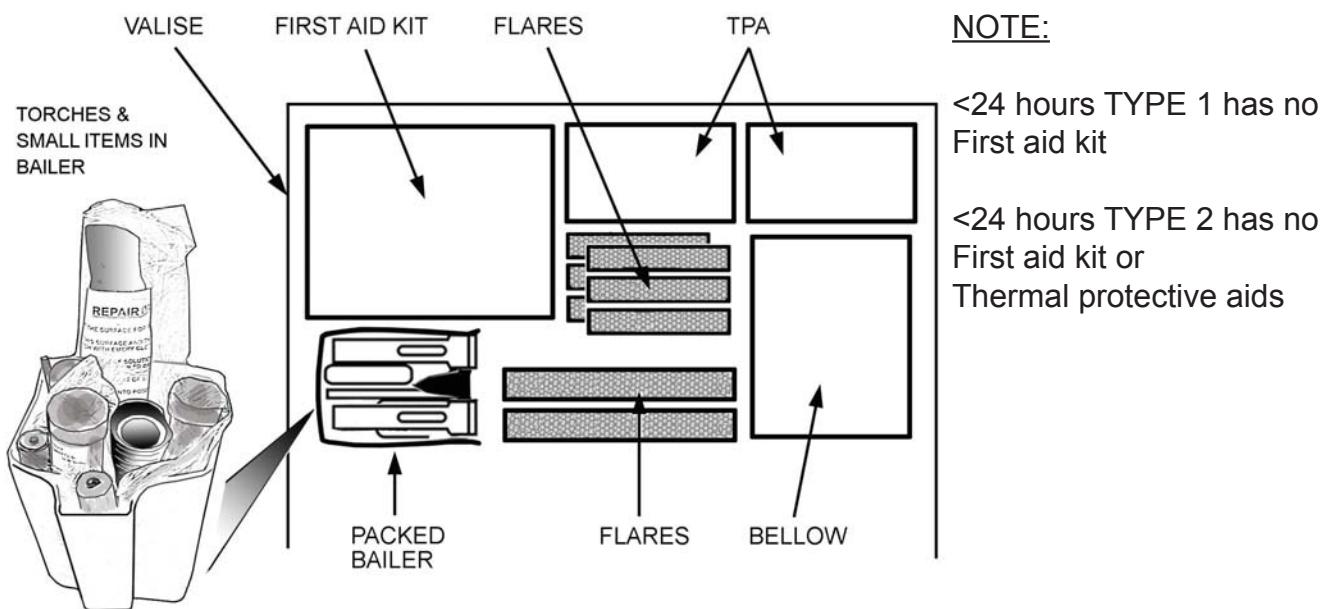
- 3.2.1 E-Pack No.1, shows the position and layout of the equipment.

3.3 Using a Valise, (FIGURE 705 & 706)

- 3.3.1 E-Pack No.1, shows the position and layout of the equipment.

4. Positioning of the E-Packs, (FIGURE 707)

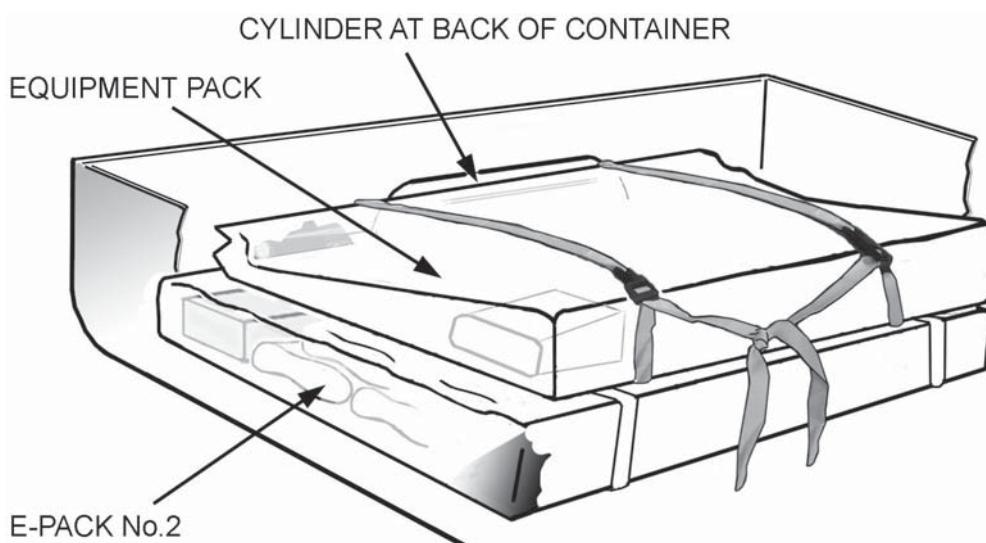
- 4.3.1 Position the food and water into the container. Place the food along the cylinder to hold it in place.
- 4.3.2 Position the equipment pack on top. Place the soft items on top of the cylinder.



Positioning the packs in GRP, ABS, Valise container

>24 hours TPYE 1 shown (typical layout)

FIGURE 706



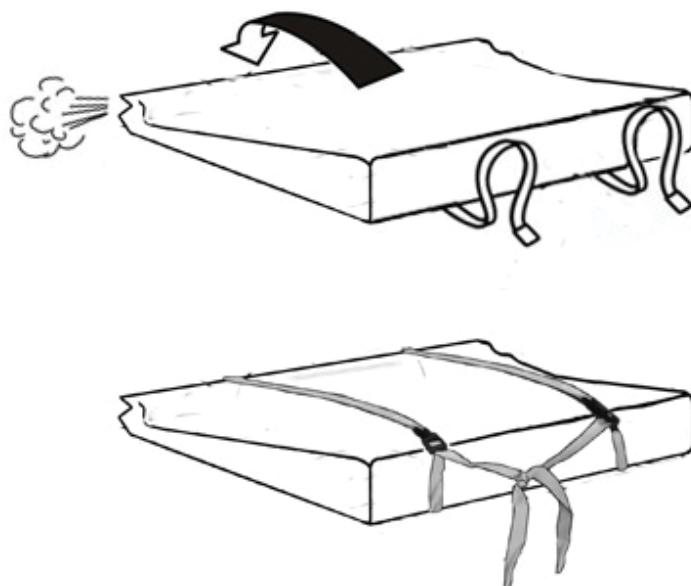
Positioning of E-Packs into GRP, ABS & Valise

TYPE 1 only - (all sizes)

FIGURE 707

5. Sealing the valise, (FIGURE 708)

- 5.1 Fold a length of 50 mm wide adhesive tape over the top opening of the valise leaving a 25 mm gap at one end.
- 5.2 Insert a vacuum line and remove the air from the valise.
- 5.3 Withdraw the line and quickly seal the open part with tape.
- 5.4 Fold the 'ears' at the top of the valise inwards and down. Secure these with 50 mm wide adhesive tape.
- 5.5 Roll down the excess valise tightly.
- 5.6 Attach the buckle straps together. Tie the flying ends together using a reef knot.



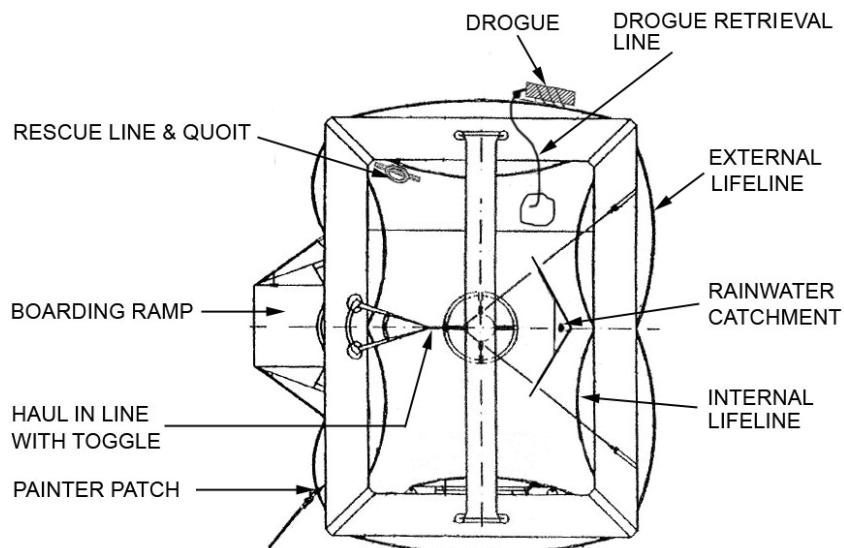
Sealing the valise
FIGURE 708

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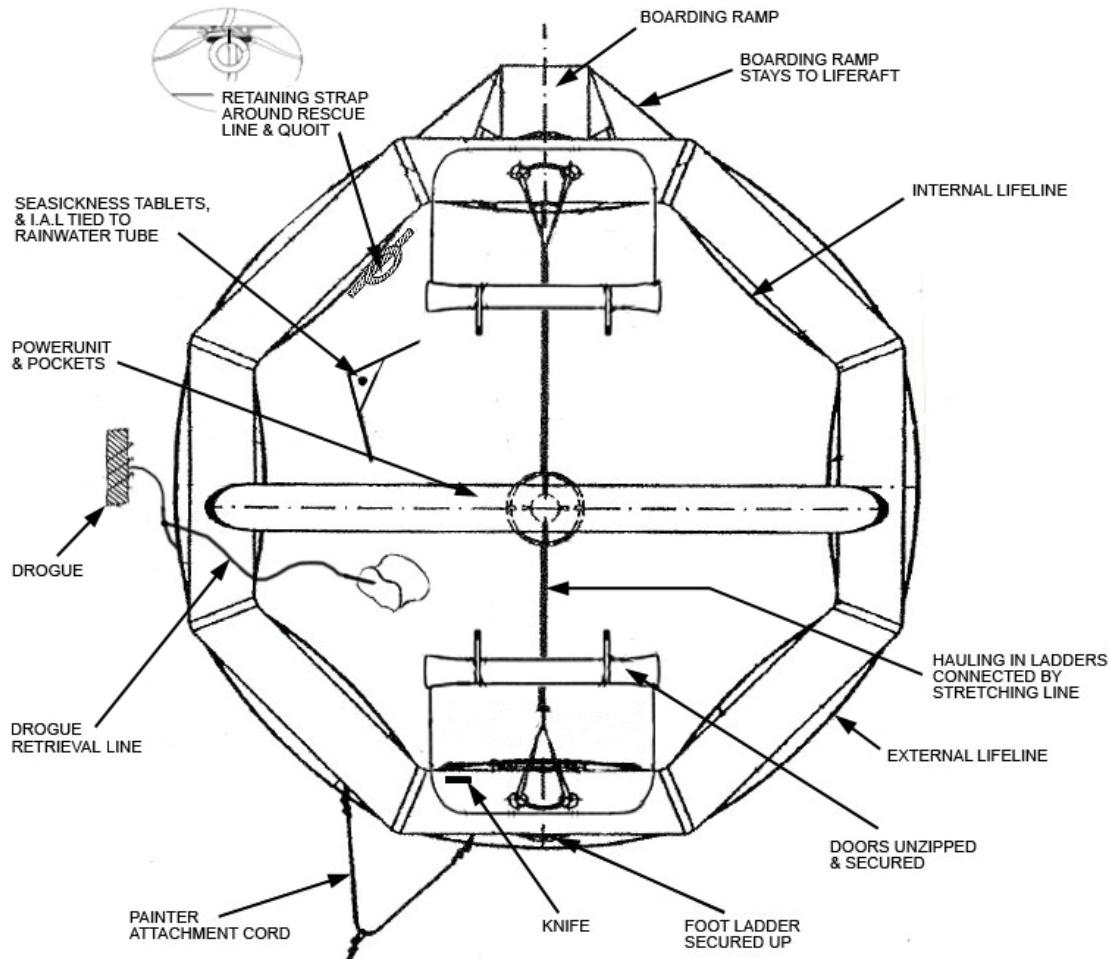
CHAPTER 8

ASSEMBLY

Section	Title	Page
1	General	803
2	Preparation of the liferaft.....	803
3	Inflation system preparation.....	814
4	Container preparation	818
5.	Packing a Throw Over liferaft into a container	822
6.	Container crimps heat sealing	842
7.	Container labelling	843



Typical 4-6 Person



Typical 8-12 Person

Throw Over liferaft - preparation for packing

FIGURE 801

1. General

- 1.1 The paragraphs of this chapter apply generally - unless a suitable qualification (in bold print) is present.
- 1.2 The work area must be clean, dry and free from sharp projections, with a smooth working surface, preferably of vinyl material.
- 1.3 Special Tools, Equipment and Materials:
 - 1.3.1 Refer to Chapter 10 for the list of relevant items that are required during the assembly and repacking of a liferaft.
- 1.4 Throughout the description of packing, components which are listed within the Illustrated Parts List (Chapter 11) and Consumables & Equipment (Chapter 10), appear in italic print.
- 1.5 Throughout preparation and packing of the liferaft and its associated equipment, all knots are to be bowlines with flying ends taped, using 25mm wide PVC self adhesive (SA) tape, unless stated otherwise. The ends of cords are to be heat sealed to prevent fraying.
- 1.6 Ensure that during unpacking, preparation and repacking of the liferaft no moisture is introduced to the liferaft.
- 1.7 The liferaft must be completely dry before packing.

2. Preparation of the liferaft

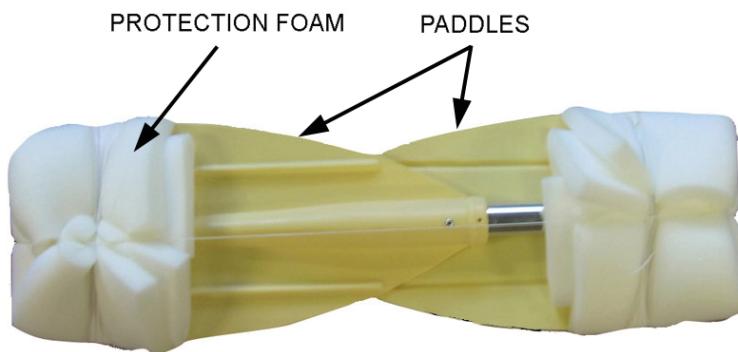
- 2.1 For each liferaft, carry out the following operations:

(Refer to FIGURE 801 for Throw Over):

- 2.1.1 Fit adaptors and valved sockets (female couplings) to the inflate/deflate valves.
- 2.1.2 Fit a plug, tail (male coupling) to a low pressure air line and to the manometer feed line. Connect the low pressure air line to each inflate/deflate valve as necessary. Inflate the liferaft to approximate working pressure.

NOTE: Inflation of the liferaft is advised, to ensure correct fitting and rigging of the equipment and to ensure the liferaft is the right shape for packing after deflation.

- 2.1.3 Secure the floating safety knife into its storage patch (FIGURE 801). Wrap the tethering cord around the handle and place the blade into its protective sheath. Ensure that the sheath is buttoned securely.
 - 2.1.4 Using 23 Kgf (50 Lb) cord, tie the paddles together at each end, with protection foam, (FIGURE 802). Tie the paddles to the internal lifeline (FIGURE 801).
 - 2.1.5 Tie the paddles opposite to each other, using 23 Kgf (50 Lb) cord (FIGURE 802). Place foam padding over the ends of the paddles
 - 2.1.6 Place the anti-seasickness tablets in their labelled bag. Tie them to the rain-water tube, using 23 Kgf (50 Lb) cord, (FIGURE 801).
 - 2.1.7 Tie the immediate action leaflet to the rain-water tube using 23 Kgf (50 Lb) cord, (FIGURE 801).
- NOTE: Ensure immediate action leaflet is the latest issue.
- 2.1.8 Fit the rubber plug to the rain-water catchment tube, (FIGURE 801).



Paddles tied opposite and padded
FIGURE 802

2.1.9 Install the lighting system RL5.

External unit

2.1.10 This operation is best performed with the arch-tube deflated.

2.1.11 Open the Velcro fastener on the top patch, (FIGURE 803).

2.1.12 From outside the liferaft, pass the connector and all of the cable from the External lamp unit through the open fastener into the hole on the patch on the top of the liferaft (FIGURE 803).

2.1.13 Slide the External lamp unit into the patch (FIGURE 804a).

2.1.14 Close the Velcro fastener to secure the External lamp unit in position (FIGURE 804b).



Top patch assembly, Velcro variant
FIGURE 803



(a) External lamp unit partially fitted

(b) External lamp unit fully installed

External lamp installation, Velcro variant
FIGURE 804

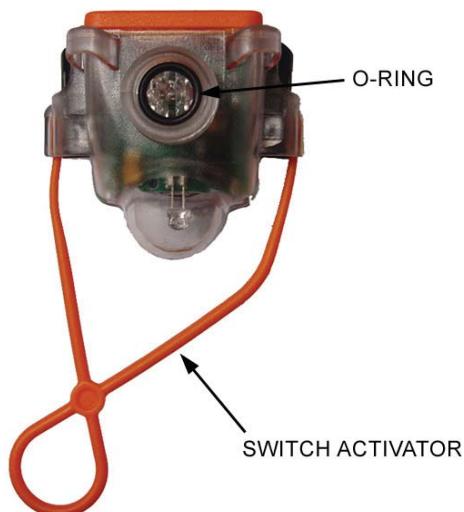
Installing the Internal RL5 Lamp unit

- WARNING:** KEEP THE INTERNAL LAMP UNIT AWAY FROM ANY SOURCE OF IGNITION. DO NOT HEAT THE INTERNAL LAMP UNIT ABOVE 65 °C OR BURN IT. THE CONTENTS OF THE POWER UNIT ARE FLAMMABLE. REFER TO THE MANUFACTURER'S DATA SHEET.
- WARNING:** DO NOT OPEN, CRUSH OR PUNCTURE THE INTERNAL LAMP UNIT. THE CONTENTS OF THE BATTERY ARE TOXIC AND CORROSIVE. REFER TO THE MANUFACTURER'S DATA SHEET.
- WARNING:** IF THE CHEMICALS FROM THE INTERNAL LAMP UNIT BATTERY TOUCH SKIN, CLOTHING OR EQUIPMENT, WASH THEM WITH LARGE QUANTITIES OF COLD WATER. REFER TO THE MANUFACTURER'S DATA SHEET.

Internal unit

The RL5 internal lamp is inserted into the existing retaining patch on the bottom centre line of the arch-tube, inside the raft.

- 2.1.15 Remove the protective cup and disc from the external lamp connector.
- 2.1.16 Attach the switch activator as shown in (FIGURE 805). Ensure the 'O' ring is seated correctly.
- 2.1.17 Locate the internal lamp retaining patch located on the bottom centre line of the arch-tube, inside the liferaft (FIGURE 806).



Internal lamp installation
FIGURE 805

- 2.1.18 Place the internal lighting unit into the patch and secure, (FIGURE 807a).
- 2.1.19 Attach the connector for the external lamp unit (FIGURE 807b).
- 2.1.20 Locate the appropriate length of battery activation line, (please refer to Chapter 1, TABLE 102).
- 2.1.21 Tie one end to the switch activator. Use a bowline knot, and tape the flying end.
- 2.1.22 Tie the remaining end to the floor patch, directly below. Use a bowline knot, and tape the flying end.



Internal lamp retaining patch
FIGURE 806



(a) Securing the internal lamp unit



(b) Connecting the cable from the external lamp unit.

Internal lamp unit assembly
FIGURE 807

- 2.2 Using a fid tool, splice the streaming line of the drogue to the drogue patch on the liferaft. The drogue patch is adjacent to the viewing port, (FIGURE 809). Tape the flying end with 25 mm (1") wide SA tape.

Carefully cut and discard the elastic bands. The rolled drogue is placed on the raft fold, just before raft rolling.

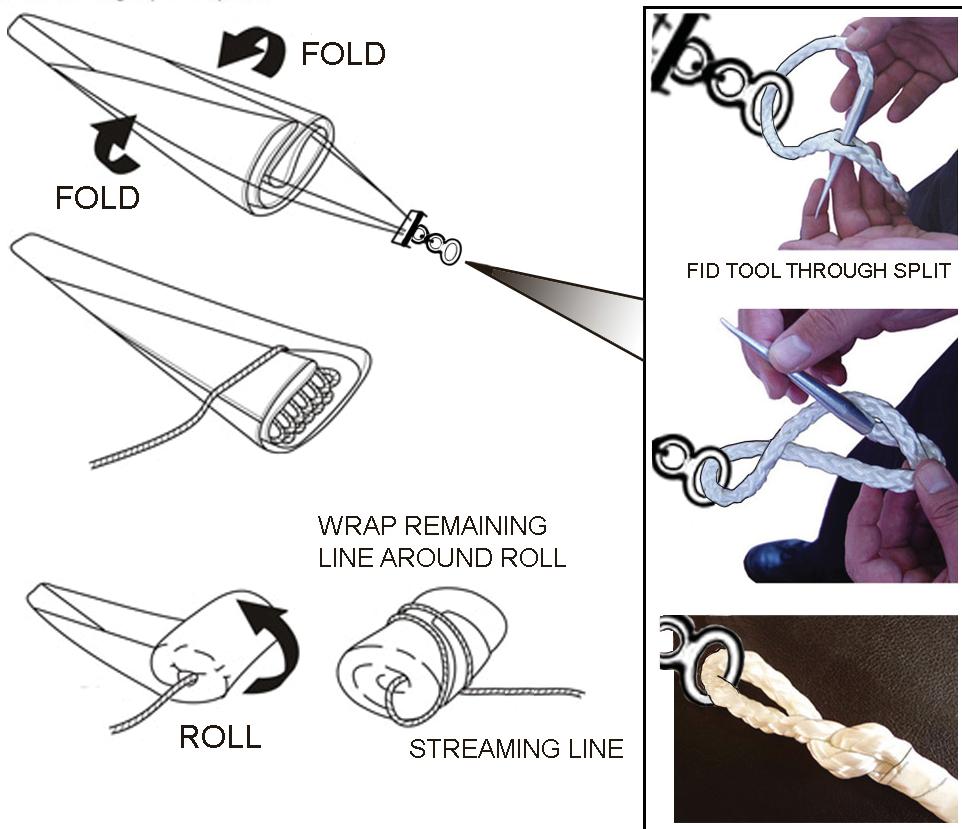
If the drogue streaming line needs to be replaced it must be attached to the swivel at the end of the drogue using a fid tool and splice knot. Tape the flying end with 25 mm (1") wide SA tape.

If the drogue assembly has been unrolled for any reason, it must be reassembled as follows, (FIGURE 808):

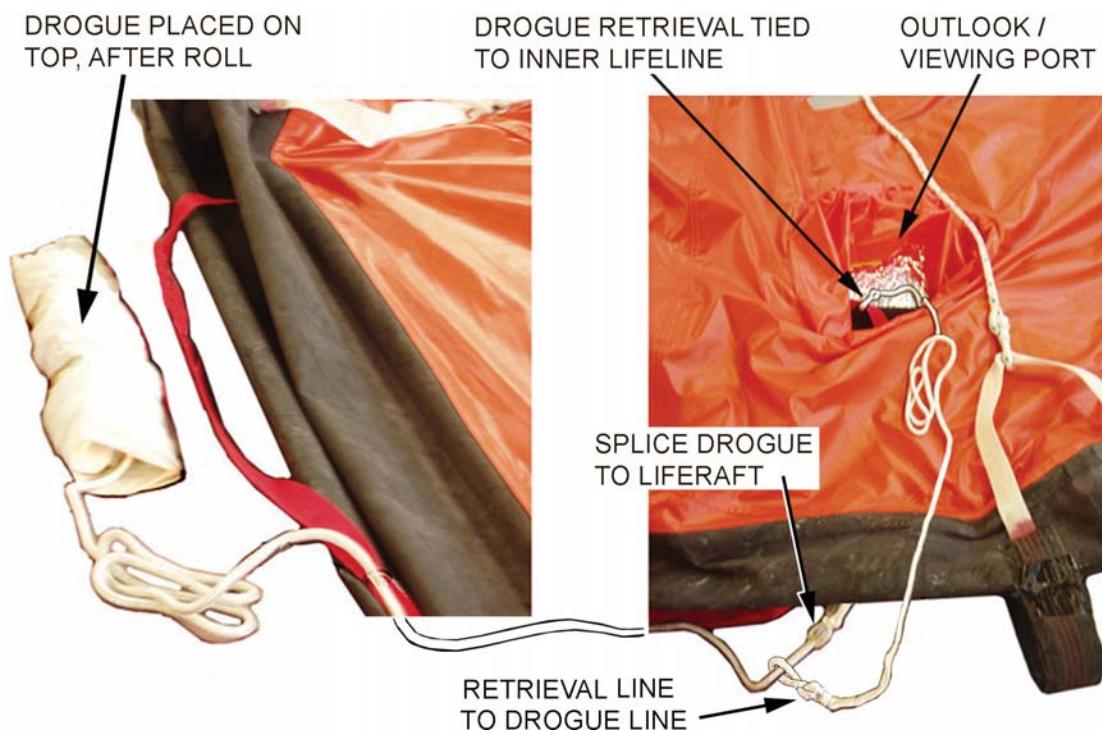
- 2.2.1 Flake the six attached cords and the single streaming line into the body of the drogue until approximately 1.8 m (70") of line remains outside.
- 2.2.2 Roll up the drogue from the ends. Stop the drogue from unrolling by temporarily securing it with two elastic bands.
- 2.3 Tie the drogue retrieval line to drogue streaming line, (FIGURE 809). Use 2 metres length of 1200 Lb cord. Use a loose bowline knot and tape the flying end with 25 mm (1") wide SA tape.
- 2.4 Tie the remaining end of the drogue retrieval line to the inner lifeline, (FIGURE 809). Access the inner lifeline through the viewing port. Use a bowline knot and tape the flying end.
- 2.5 Attach the end of the rescue line and quoit through the internal lifeline, using lark foot connection. Use the Velcro retaining strap to retain the quoit and rescue line to the liferaft, (FIGURE 801).

If the rescue line and quoit has been dismantled, it must be reassembled as follows, (FIGURE 810):

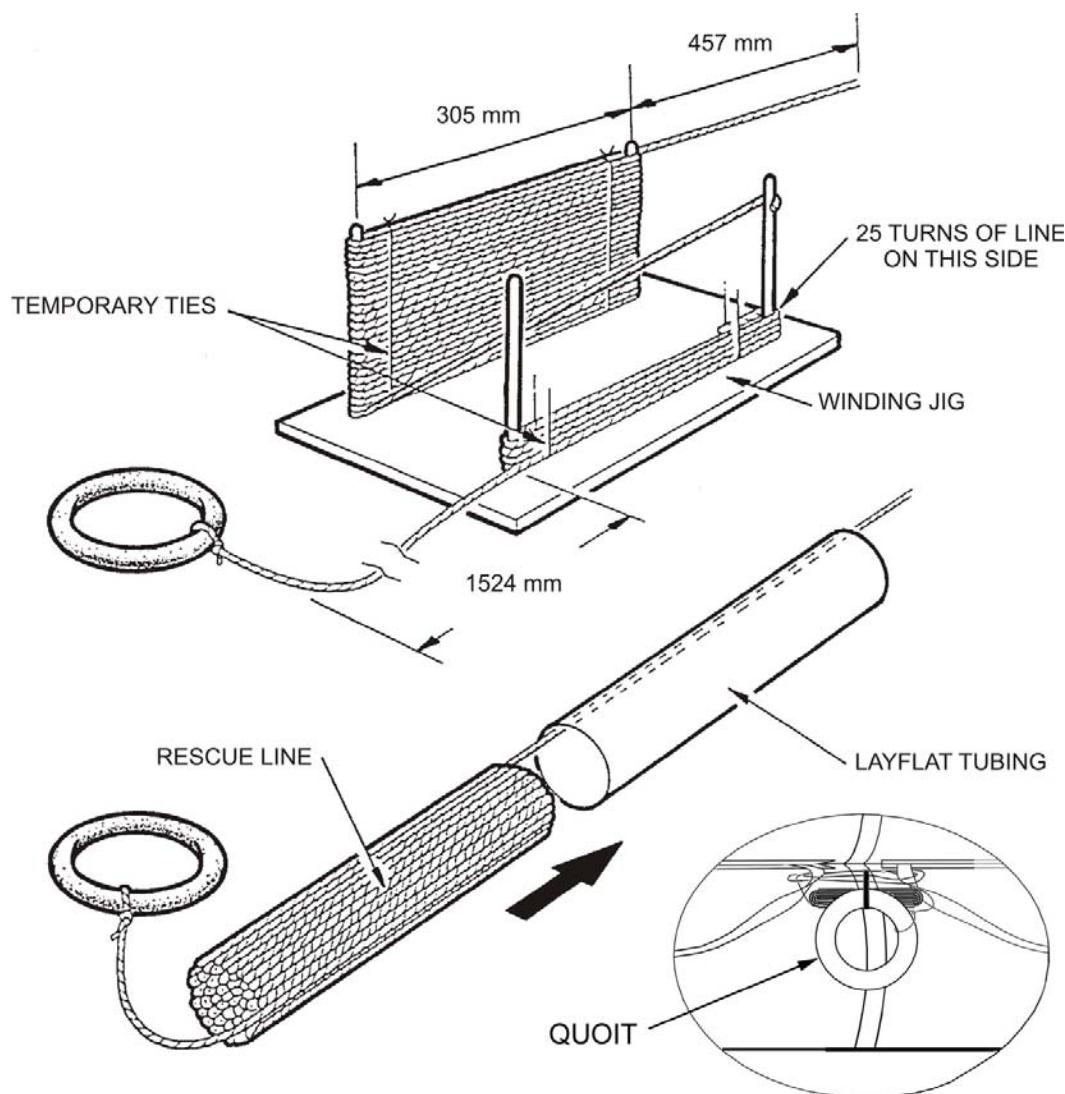
- 2.5.1 Construct a simple winding jig. Leaving 1.2 m (47") free, wind the cord 25 times around the posts, finishing at the post furthest away from the spare cord. Temporarily secure the wound cord with ties or adhesive tape.
- 2.5.2 Take the cord diagonally across the jig to the bottom of the remaining front post and wind the cord a further 25 times around the posts finishing with approximately 450 mm (17") of spare cord. Temporarily secure.
- 2.5.3 Attach the quoit to the cord at the end where winding started, using a bowline knot. Tape over the bowline and flying end with 25mm (1") wide adhesive tape.



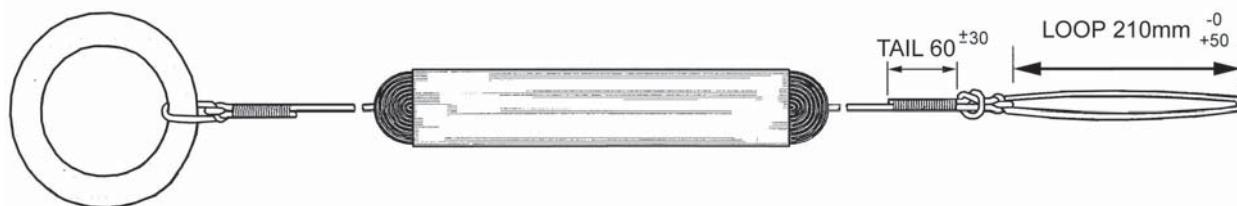
NOTE: Drogue shown white for clarity
Preparation for packing and splicing the Drogue
FIGURE 808



Attach the Drogue and Drogue retrieval line
FIGURE 809

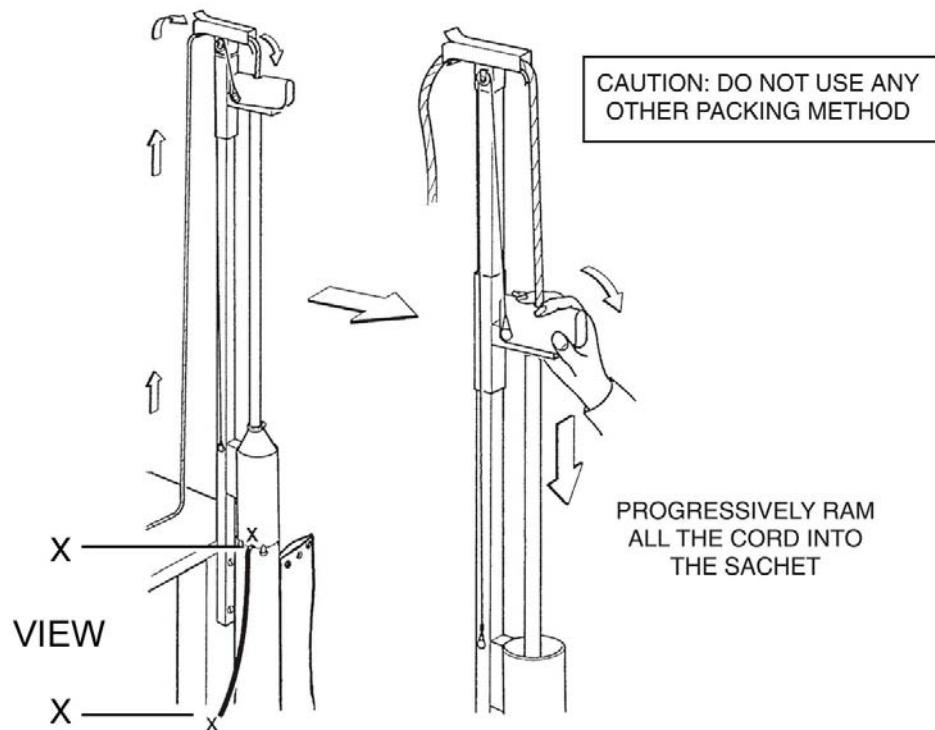


Preparation and fitting the Lifeline and Quoit
FIGURE 810



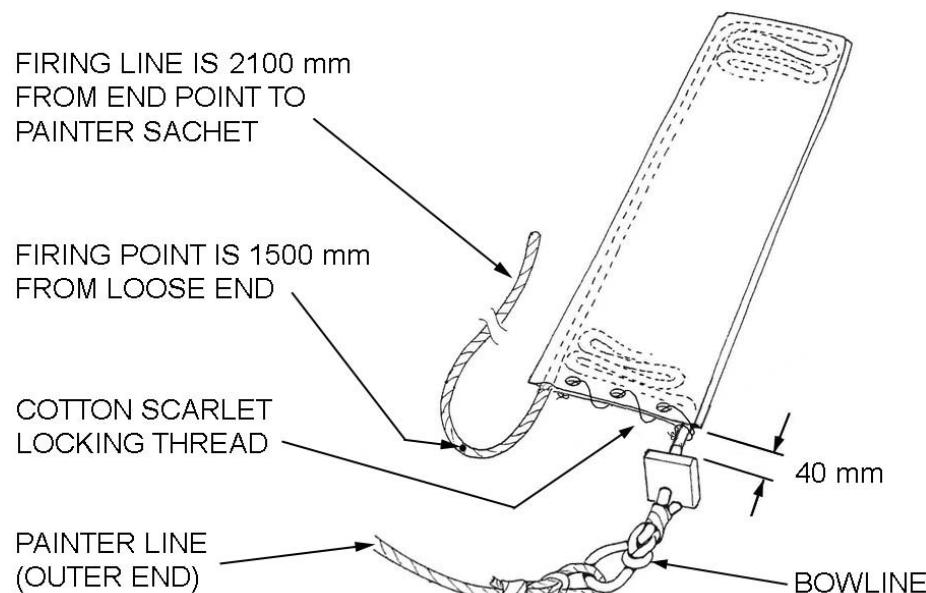
Rescue line and Quoit assembly
FIGURE 811

- 2.5.4 Bring the 450 mm (17") end back to the same end as the quoit. Remove the ties or adhesive tape and push all the cord into the polythene layflat tube.
- 2.5.5 Make a loop on the rescue line cord, opposite end to the quoit attachment. This loop must be prepared using a bowline knot, followed by one overhand 'lock' knot. Tape over the tail end using 25 mm (1") wide PVC (SA) tape, (FIGURE 811).
- 2.6 If the painter line has been removed from its sachet, it must be repacked as follows, (FIGURES 812 & 813):
 - 2.6.1 Take the painter line (FIGURE 812) and disconnect the painter extension. Pass the unsheathed end of the main painter through the top of the painter loading machine and into the sachet. Extract the end so that the firing point, marked in black, plus 600mm (24") of cord protrude from the sachet, 2100mm (83") in total (FIGURE 812 view X-X).
 - 2.6.2 Holding the line in this position, push the main part of the line to the bottom of the sachet. Progressively ram the remaining length into the compartment, using the plunger of the loading machine, until the cordage protruding measures 300 mm (12") to the start of the rubber sheathing, (FIGURE 813).
 - 2.6.3 Pass cotton scarlet thread through the first pair of sachet holes. The thread is to be secured to the bottom sachet hole with a reef knot and two half hitches.
 - 2.6.4 Pass the thread through the remaining holes. Tie the remaining end around the sheathed end of the painter cord, with two turns and ending in a reef knot with two half hitches, (FIGURE 813).
- 2.7 Check the boarding ramp stays, (2 in total), are attached to the liferaft, (FIGURE 801). Use bowline knot and tape the flying ends.
- 2.8 Check that all doorways are unzipped and properly furled (inwards). Using the tie tapes, tie the doorways in open position. Use a half bow knot for quick release, (FIGURE 801).
- 2.9 Check the painter plug/grommet has not been damaged or modified in any way.
- 2.10 If the Painter plug/grommet is cut or damaged or modified, it must be replaced.



Painter sachet loading machine

FIGURE 812



Painter assembly detail

FIGURE 813

2.11 Tie the hauling-in ladders. To carry out this step, the liferaft must be inflated.

2.11.1 10-12 PERSON:

Attach the stretching line from one ladder to the opposite ladder, using the toggle, (FIGURE 801).

Hauling ladder – Boarding ramp side

- (a) Retrieve the correct length of stretching line, (see IPL).
- (b) Retrieve the toggle and pull the stretching line, to half way through both holes of the toggle, (FIGURE 814A).
- (c) Insert the free ends of the stretching line through the hauling in ladder at the doorway. Secure the stretching line using an overhand knot and tape the flying ends, (FIGURE 814A).
- (d) Tie an overhand knot about (200 mm) above the toggle, (FIGURE 814A).

Hauling ladder – CO₂ cylinder side

- (a) Insert the toggle complete with stretching line through the red webbing-loop, of the hauling-in ladder, (FIGURE 814A).
- (b) Pull the stretching line tightly and pass toggle above the knot, between the stretching lines, (FIGURE 814A).
- (c) Stretching line should be left tight. Modify the position of the knot to adjust the tension.
- (d) Secure toggle in place using a rubber band, (see IPL). Place the rubber band behind the knot. Bring the ends of the rubber band up and over the edges of the toggle, (FIGURE 814A).

2.11.2 4-8 PERSON:

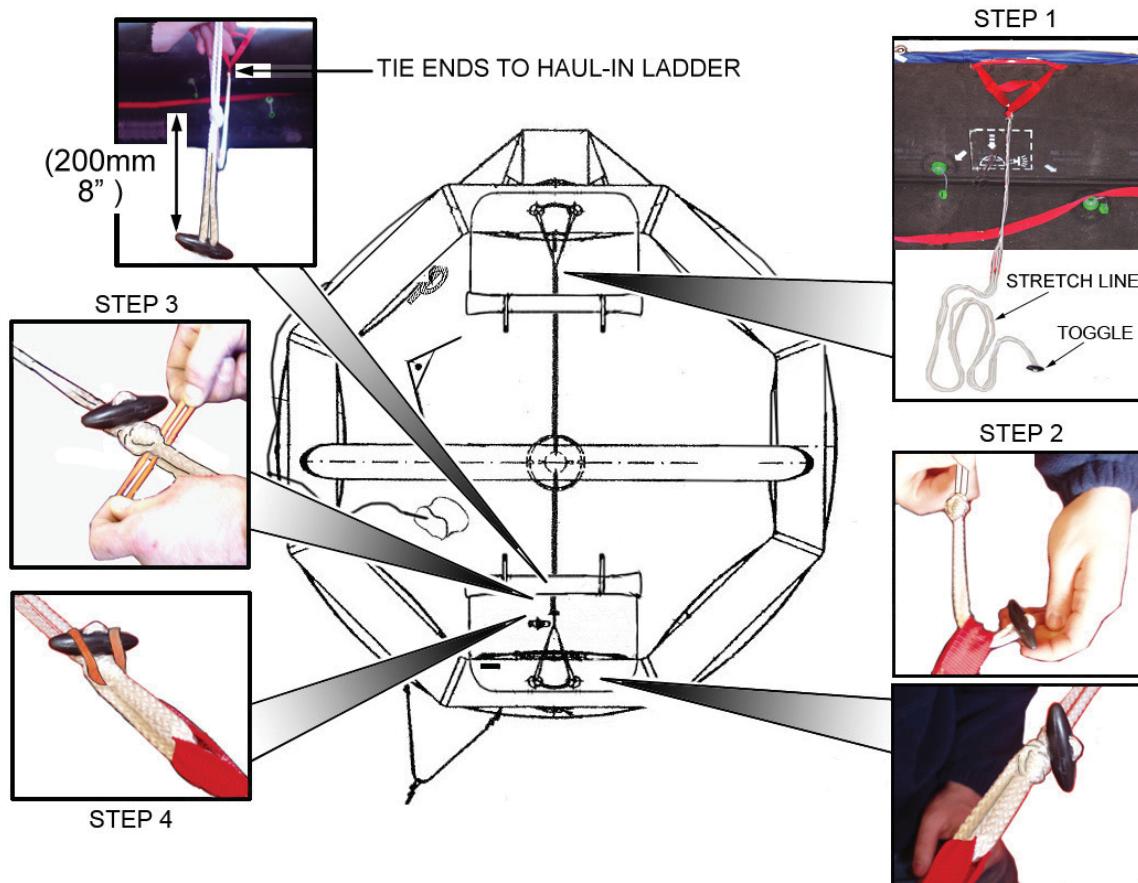
Tie the stretching line from hauling in ladder

- (a) Retrieve the toggle and pull the stretching line, (see IPL), to half way through both holes of the toggle, (FIGURE 814B).
- (b) Tie each free end of the stretching line to the two opposite loops located on the opposite buoyancy. Use a bowline knot and tape the flying end, (FIGURE 814B). There is no marking or dimension for the point of knotting necessary.
- (c) Tie an overhand knot about (200 mm) above the toggle.
- (d) Insert the toggle complete with stretching line through the red webbing-loop, of the hauling-in ladder, (FIGURE 814B).
- (e) Pull the stretching line tightly and pass toggle above the knot, between the stretching lines, (FIGURE 814B).
- (f) Secure toggle in place using a rubber band, (see IPL). Place the rubber band behind the knot. Bring the ends of the rubber band up and over the edges of the toggle, (FIGURE 814B).

3. Inflation system preparation

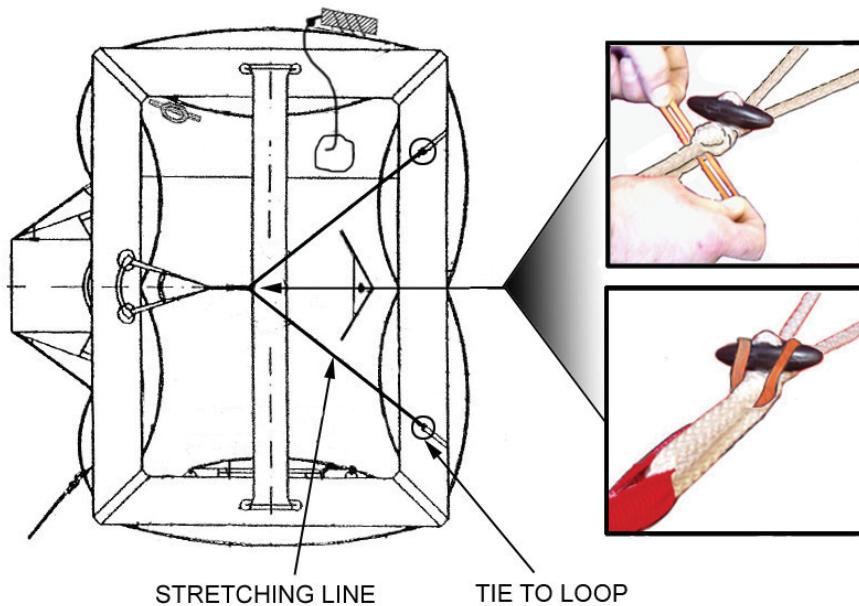
- 3.1 Insert deflators into the inflate/deflate valves of buoyancy chambers and arch tube and fully deflate each compartment.
- 3.2 On the Leafield inflation system, check the 'O-ring' is located in the valve and attach a hose using the quick-fit connector (FIGURE 815). Hoses should be aligned horizontally.
- 3.3 Ensure that the inflation valve has not rotated from its original position. Jets should be aligned axially along the buoyancy chambers. Flats on inlet check valve body line or face the same direction of the jets.

CAUTION: USE ONLY A TEST CYLINDER AND HOSE DESIGNATED FOR THE FOLLOWING STEP.



A

10-12 person ONLY - Hauling-in ladder assembly



B

4-8 Person only - Hauling-in ladder assembly

Hauling-in ladder assembly
FIGURE 814

- 3.4 While the liferaft is deflating and the tubes have become soft, check the function of each liferaft inflation valve. To do this use bursts of compressed CO₂ air or nitrogen for 5 to 10 seconds to ensure proper function.

When blast testing check there are no leaks coming from the valves.

- 3.5 Fit the valve protection pad, (FIGURE 816), 1 for each inflation valve, two in total. Secure them with a reef knot.

WARNING: A FULLY CHARGED CYLINDER CAN BECOME A LETHAL PROJECTILE IF DISCHARGED TO ATMOSPHERE WHEN NOT FITTED WITH A RECOIL CAP. ALWAYS FIT A RECOIL CAP TO A CYLINDER VALVE OUTLET WHEN HANDLING A FULLY CHARGED CYLINDER.

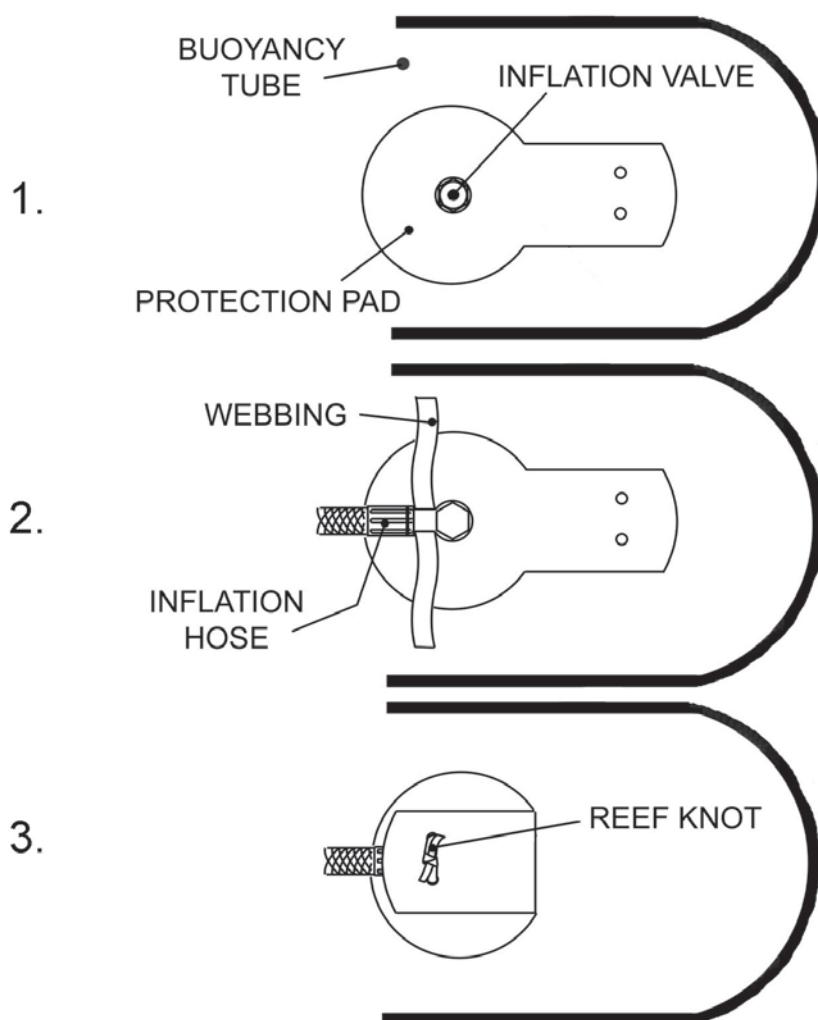
CAUTION: RELIABLE FUNCTIONING OF AN OPERATING HEAD DEPENDS UPON SCRUPULOUSLY OBSERVED RESETTING PROCEDURES. DO NOT TRY TO RESET BY FORCING THE CABLE BACK INTO AN ASSEMBLED HEAD.

- 3.5.1 Check and, if required, reset operating heads according to the manufacturer's documentation (refer to the Associated Publications section).
- 3.5.2 Refer to the List of Associated Publications for the correct filling data for gas cylinders and to the Illustrated Parts List for correct cylinder application. Check the weight of the gas cylinder against the data printed on the cylinder label. Reject a cylinder if the data on the label is illegible. Disassemble, check, test, assemble and charge cylinders according to the associated manual.



Attaching inflation valve

FIGURE 815



Inflation valve pad protection

FIGURE 816

4. Container preparation

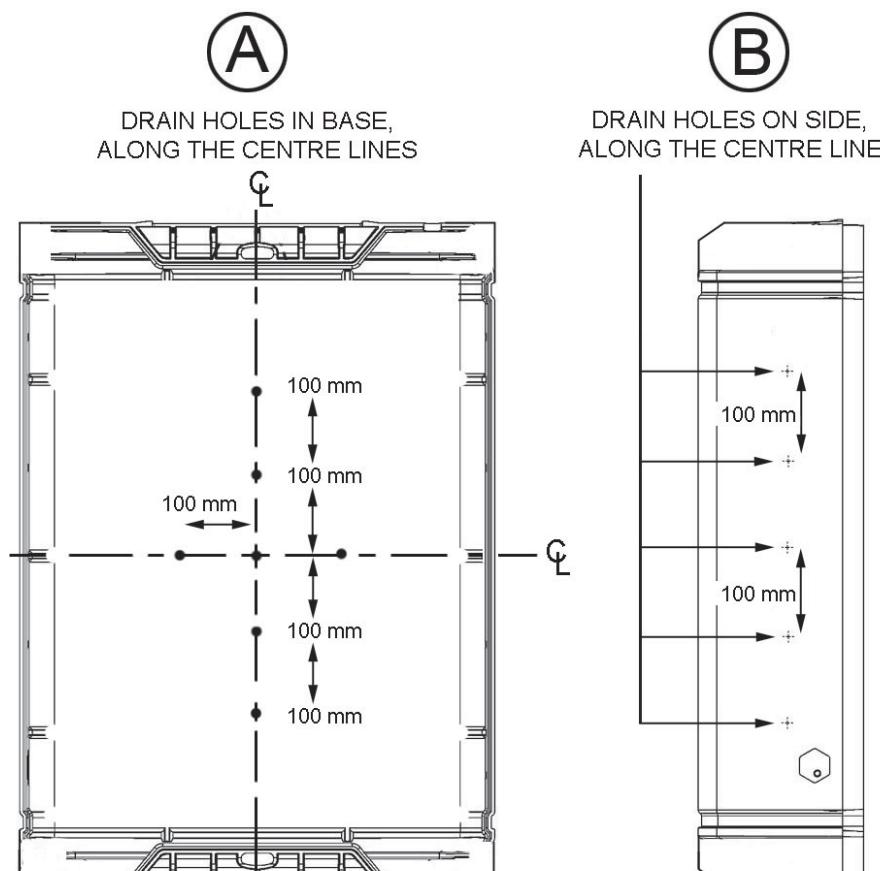
4.1 Drain holes

4.1.1 If the container requires drain holes to be drilled or if the configuration has changed, please refer to the following positions for the holes,

- (a) For Flat Pack see (FIGURE 817A).
- (b) For Side mounting see (FIGURE 817B).

NOTE: Drain holes must be made at the lowest point of the configuration.

4.1.2 Create 5 mm diameter holes in the container base or sides as required and shown below.



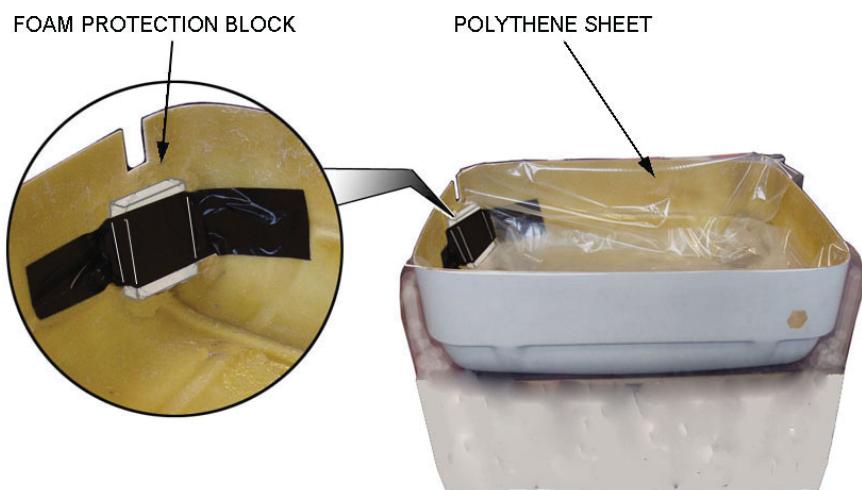
Container drain holes

FIGURE 817

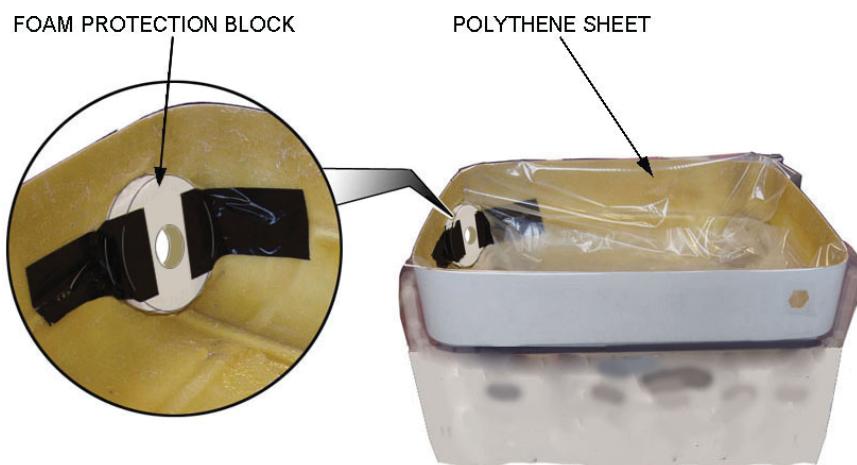
4.2 GRP container: (FIGURE 818A)

The following preparation is used for all Throw Over liferafts.

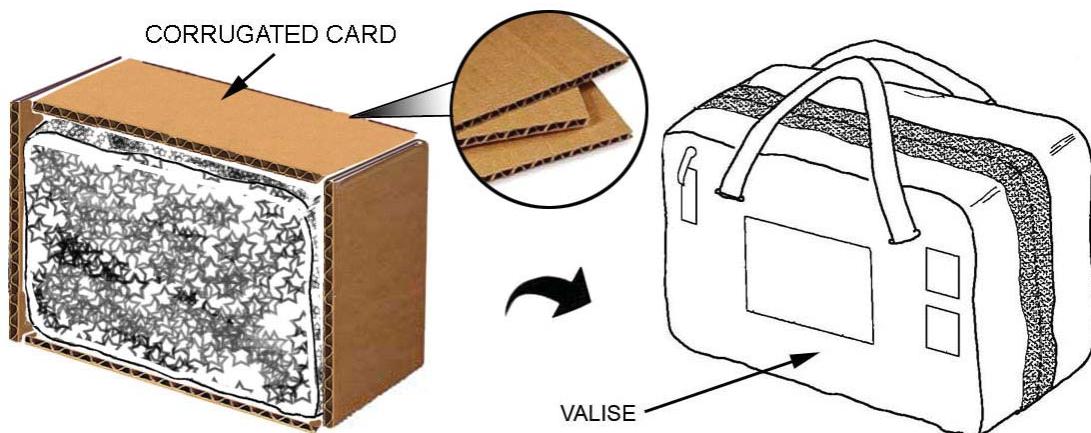
- 4.2.1 Fix protection foam to the inside of the container. This foam block prevents the cylinder operating head from impacting the container side during handling and deployment.
- 4.2.2 Retrieve the upper half of the container, (FIGURE 819). It is supplied with four small holes along both shorter sides. These holes are used to allow handles to be attached to each end.
 - (a) Retrieve the handles. Insert a strip of white 525 Kgf cord, (200 mm), into each loop at the end of the handles. From outside the container, insert the ends of the white cord through the holes.
 - (b) Inside the container, take both cords and pull them fully into the container. Make an overhand knot as close as possible to the inside of the container. Tape the flying ends.
 - (c) Repeat step 4.1.2 for the opposite handle.
- 4.2.3 Line the bottom half of the container with a polythene sheet. Ensure the sheet overlaps the front edge of the container by 200 mm.
- 4.2.4 Place the foil bag into the lower half of the container.



Preparation of GRP container
FIGURE 818A



Preparation of ABS container
FIGURE 818B



Preparation of Valise
FIGURE 818C

4.3 ABS container: (FIGURE 818B)

The following preparation is used for all Throw Over liferafts.

- 4.3.1 Fix protection foam to the inside of the container. This foam block prevents the cylinder operating head from impacting the container side during handling and deployment. Ensure the centre hole is aligned with the hole in the container.
- 4.3.2 Retrieve the upper half of the container, (FIGURE 819). It is supplied with four small holes along both shorter sides. These holes are used to allow handles to be attached to each end.
 - (a) Retrieve the handles. Insert a strip of white 525 Kgf cord, (200 mm), into each loop at the end of the handles. From outside the container, insert the ends of the white cord through the holes.
 - (b) Inside the container, take both cords and pull them fully into the container. Make an overhand knot as close as possible to the inside of the container. Tape the flying ends.
 - (c) Repeat step 4.2.2 for the opposite handle.
- 4.3.3 Line the bottom half of the container with a polythene sheet. Ensure the sheet overlaps the front edge of the container by 200 mm.
- 4.3.4 Place the foil bag into the lower half of the container.

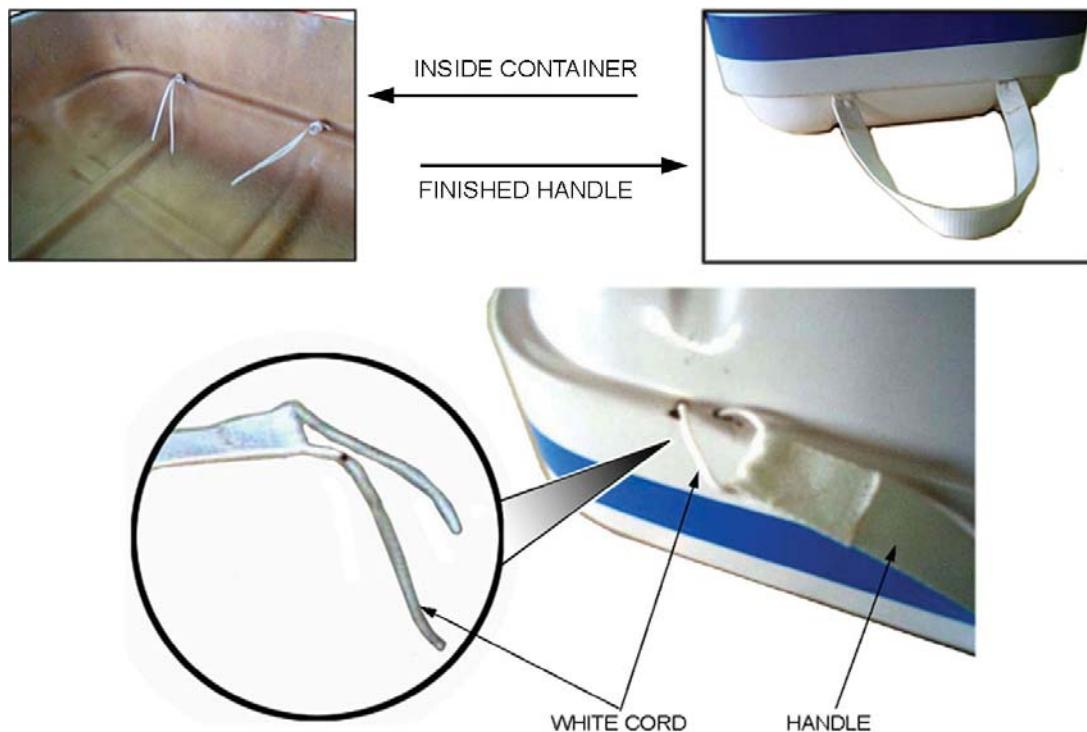
4.4 Valise container: (FIGURE 818C)

The following preparation is used for all Throw Over liferafts.

- 4.4.1 When placing a liferaft into a valise, it is first packed into the relevant ABS container or wooden jig (made to same dimensions). The container is firstly lined with three strips of corrugated card, (1 metre x 0.25 metres). This will provide a vertical edge for the foil bag.

NOTE: Cut the lengths across the corrugation.

- 4.4.2 Place the foil bag into the lower half of the container.
- 4.4.3 After packing, the foil bag, complete with the corrugated card, is then transferred and fitted into the valise. The corrugated card is located around the edges of the valise and the foil bag.



Attaching container handles

FIGURE 819

5. Packing a Throw Over liferaft into a container

CAUTION: DO NOT USE ANY OTHER PACKING METHOD.

- 5.1 Place the liferaft neatly on a packing table in an open area, with enough room to manoeuvre the container during packing. The inflation valves should be positioned adjacent to the edge of the packing table. Ensure all cordage is neat and tidy.

When most of the air has escaped naturally from the liferaft, it must be evacuated as follows:

- 5.1.1 Connect a vacuum device to a deflation adapter and evacuate all air from each compartment. Re-cap the inflate/deflate valves in each compartment.
- 5.1.2 As each chamber is evacuated, adjust the buoyancies so that they lie flat on each other.
- 5.2 Remove the transit plug from the operating head and fit each pre-set operating head, (FIGURE 820). Ensure the threads on the body of the operating head and cylinder valve are clean.

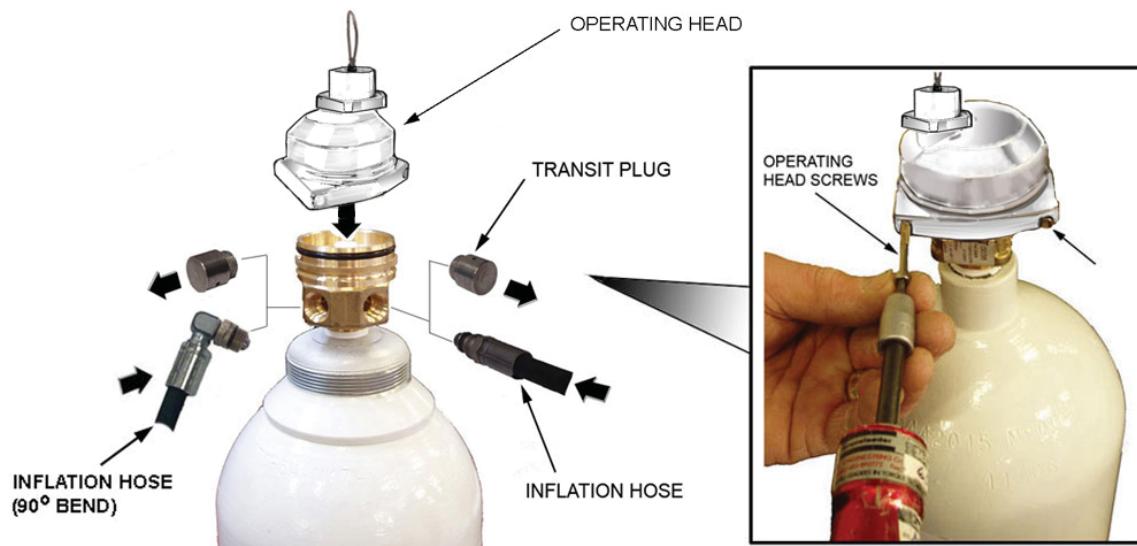
For Leafield equipment, ensure the operating head is pushed firmly on. Use a torque screwdriver, tighten both screws to the correct torque see CHAPTER 1, TABLE 101. The operating head must be tight on the cylinder valve.

WARNING: DO NOT REMOVE THE RECOIL CAPS FROM THE OPERATING HEAD YET.

- 5.3 Wrap the cylinder a sheet of white plastazote foam and secure with black tape.
- 5.4 Upturn the edge of the liferaft to reveal the cylinder stowage pocket. Place the cylinder into the cylinder stowage pocket.

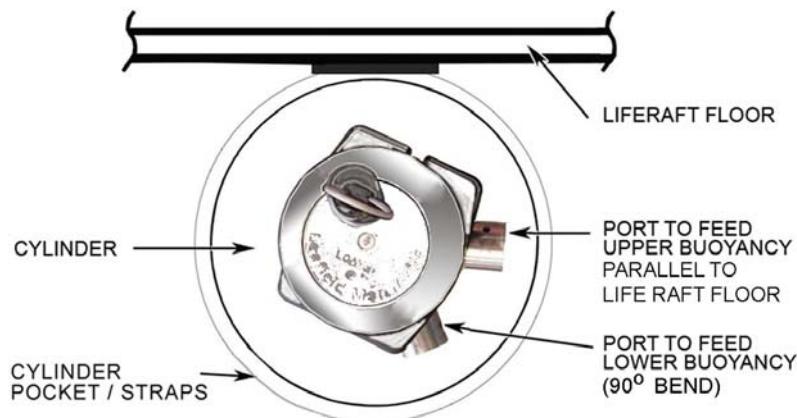
The cylinder must be orientated so that one of the operating head outlets runs parallel with the base of the liferaft while the other runs perpendicular towards the water (FIGURE 821).

- 5.5 Using the cord attached cylinder stowage pocket tie the cylinder neck securely. Tie with 2 turns around the cylinder neck and a bow knot.



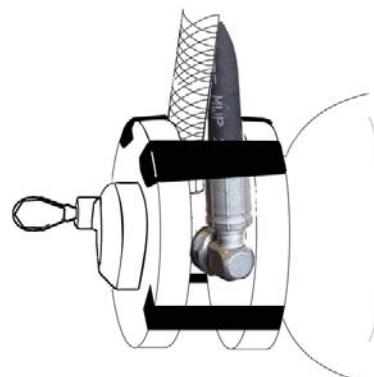
Assembly of inflation equipment

FIGURE 820



Cylinder attachment to liferaft

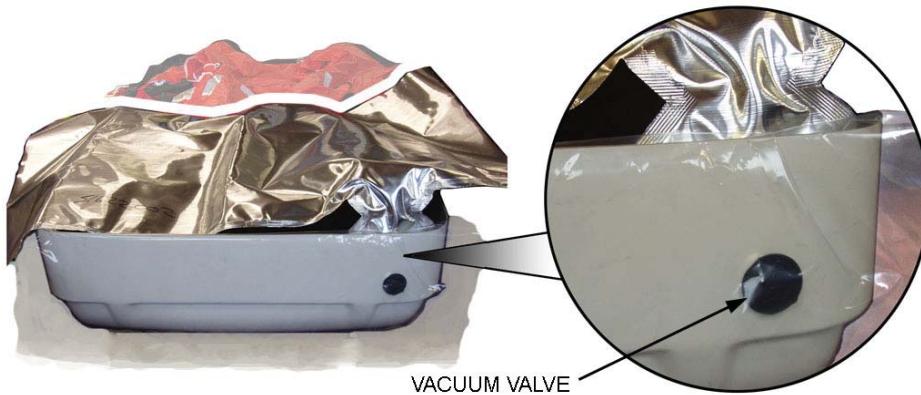
FIGURE 821



Operating heads protection pads

FIGURE 822

- 5.6 Remove the recoil caps from the operating head.
- 5.7 Connect each inflation hose, (FIGURE 820). Torque the hose connections as stated in Chapter 1, TABLE 101. Replace damaged or worn O-Rings if necessary. The bottom buoyancy uses the hose with the 90° ends.
- 5.8 Insert two protection pads onto operating head. Ensure the inflation hoses bypass each other as shown (FIGURE 822). Tape both pads together at either side of the upper buoyancy hose. Use 100 mm adhesive tape. Lay the liferaft flat on the table again.
- 5.9 Place the correct size of Hermetic bag (H-Pack), into the bottom half of the container.
- 5.10 Remove the 36 mm nut and washer from the vacuum valve. Carefully place both nut and washer on a clean surface.
- 5.11 Push the vacuum valve into the pre-cut location on the container, (FIGURE 823). Holding the back of the vacuum valve, attach the washer and nut on the outside of the container. Hand tighten the nut.
- 5.12 Using a torque wrench tighten the vacuum valve nut to the correct torque. Please refer to Chapter 1, TABLE 101 for torque values and Chapter 10 for special tools.
- 5.13 Open the H-Pack and let it hang outside of the container. Push the H-Pack down into the container. The inner painter line cordage will be visible, (FIGURE 824).
- 5.14 Tape the internal vacuum hose to the container rim, (FIGURE 824).
- 5.15 Grasp the liferaft and with the cylinder, drag the assembly over the container.
- 5.16 Place the cylinder at the back of the container. The cylinder operating head should be close to the container corner, (FIGURE 825). Leave space to allow for straight pull of line to reduce pull force values.



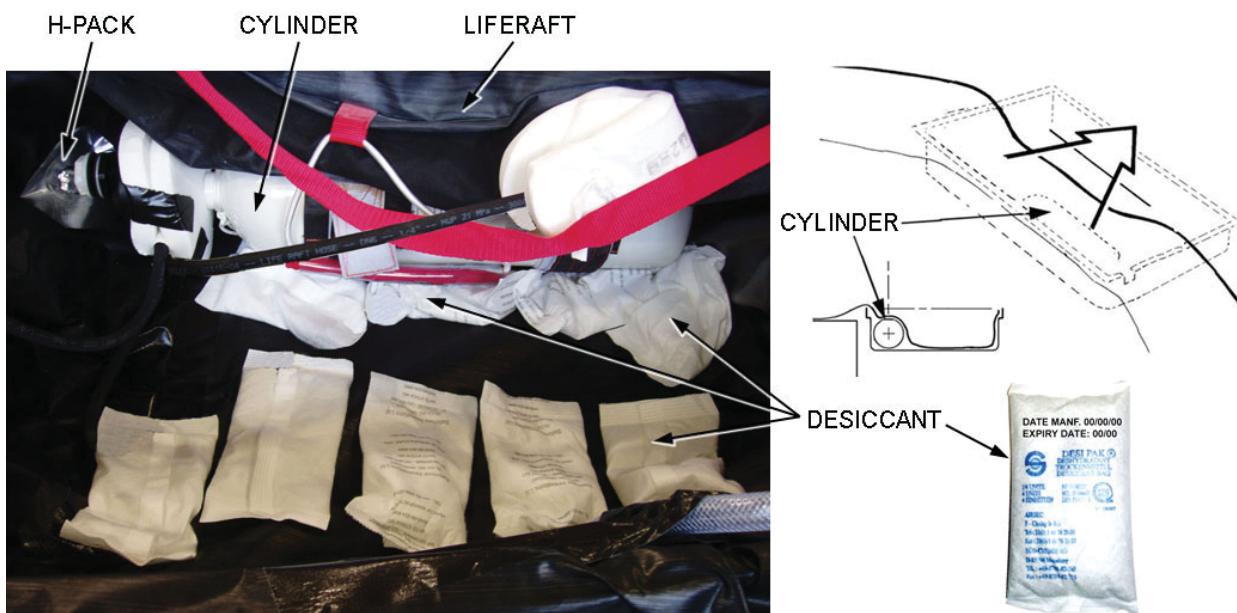
Insert the H-Pack

FIGURE 823



Inner painter line and internal vacuum hose

FIGURE 824



Cylinder placement and desiccant

FIGURE 825

5.17 Using a permanent marker, check and mark each desiccant sachet with the current date and expiry date, (FIGURE 825). Expiry date is determined as the date of the next scheduled service. Subsequent expiry dates will be from date of each service.

CAUTION: WHEN FOIL BAGS ARE OPENED, THE DESICCANT SACHETS INSIDE, MUST BE SEALED INSIDE THE H-PACK WITHIN 8 HOURS.

5.18 Place 10 desiccant sachets into the H-Pack, spaced out along the cylinder and base of the H-Pack, (FIGURE 825).

5.19 Fold the liferaft back to reveal the operating mechanism.

5.20 Remove the operating head nut and washers. Insert the H-Pack onto the operating head and replace the washer and nut, (FIGURE 826).

5.21 Using a torque wrench tighten the operating head nut to the correct torque. Please refer to Chapter 1, TABLE 101 for torque values and Chapter 10 for special tools.

5.22 Obtain the painter sachet and tape in place. The polythene sheet should extend over the open end of the sachet and the painter rope by at least 100 mm but no more than 150 mm.

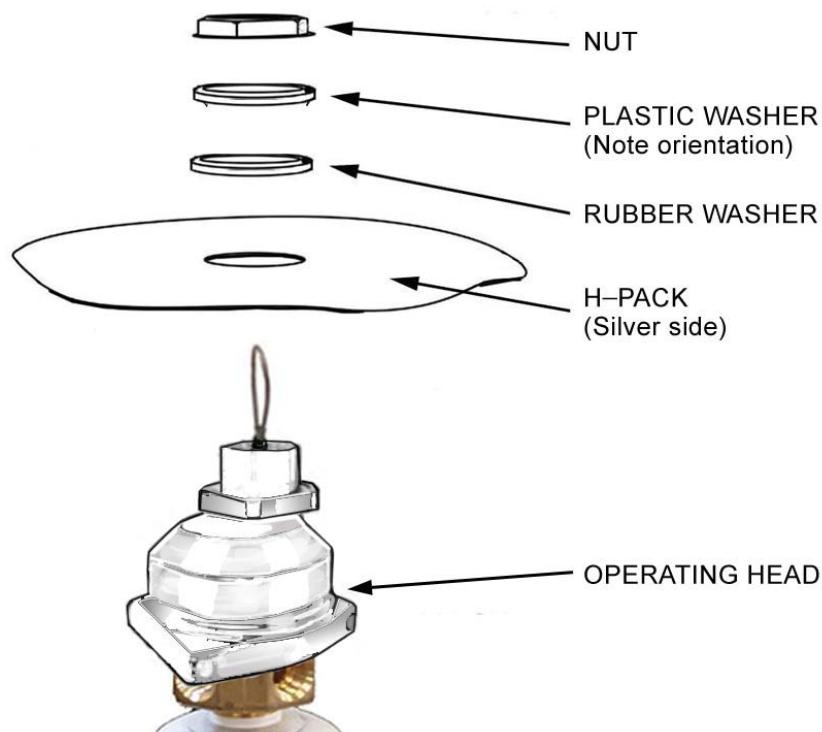
5.23 Ensure that 2.1 metres exits the painter sachet, (FIGURE 827).

5.24 The firing point is 1.5 metre from the end of the line. Measure forward 250 mm from the firing point and mark it clearly, (FIGURE 827).

5.25 At the firing point, (1.5 m) from the end of the line), pass the actuation cable of the operating mechanism, through the painter line. Thread the remaining painter line back through the actuation cable, (FIGURE 828).

WARNING: THE OPERATING MECHANISM IS NOW ARMED. EXTREME CARE MUST BE TAKEN DURING ALL FOLLOWING ACTIONS.

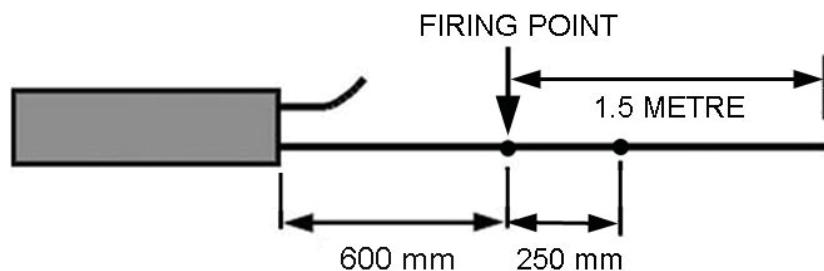
5.26 Insert painter line through the hole in the H-Pack. Pull it through until the 250 mm mark has been reached, (FIGURE 828). Tie the painter line off at this point, by splitting the cord and inserting the line through twice, then pull tight.



OPERATING MECHANISM SHOWN EXPLODED FOR CLARITY

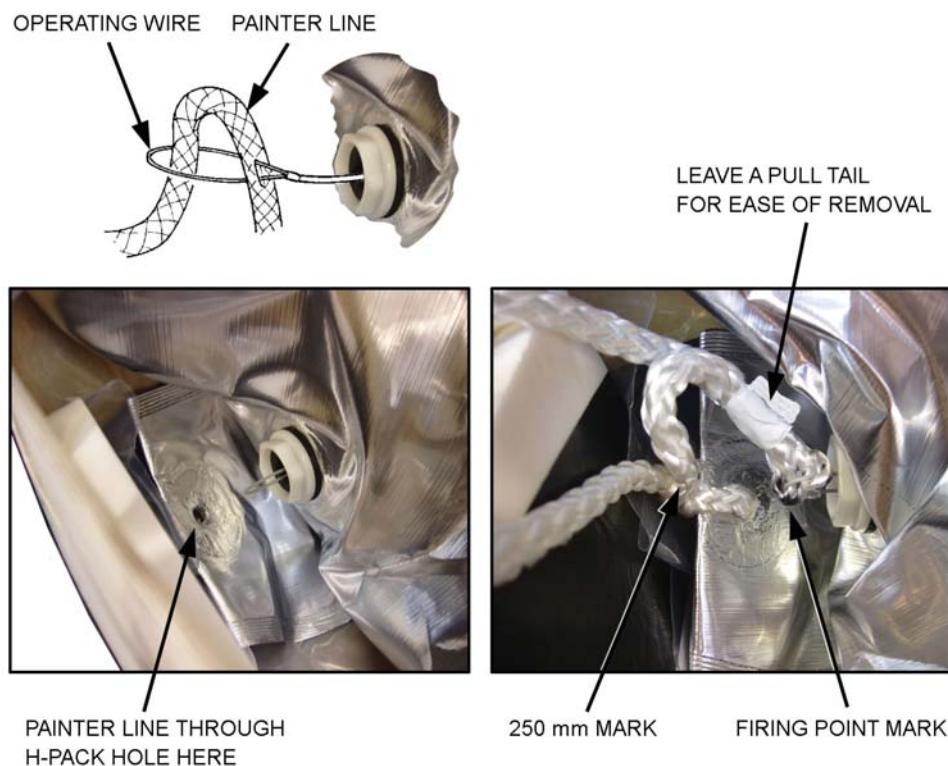
Operating head and H-Pack assembly

FIGURE 826



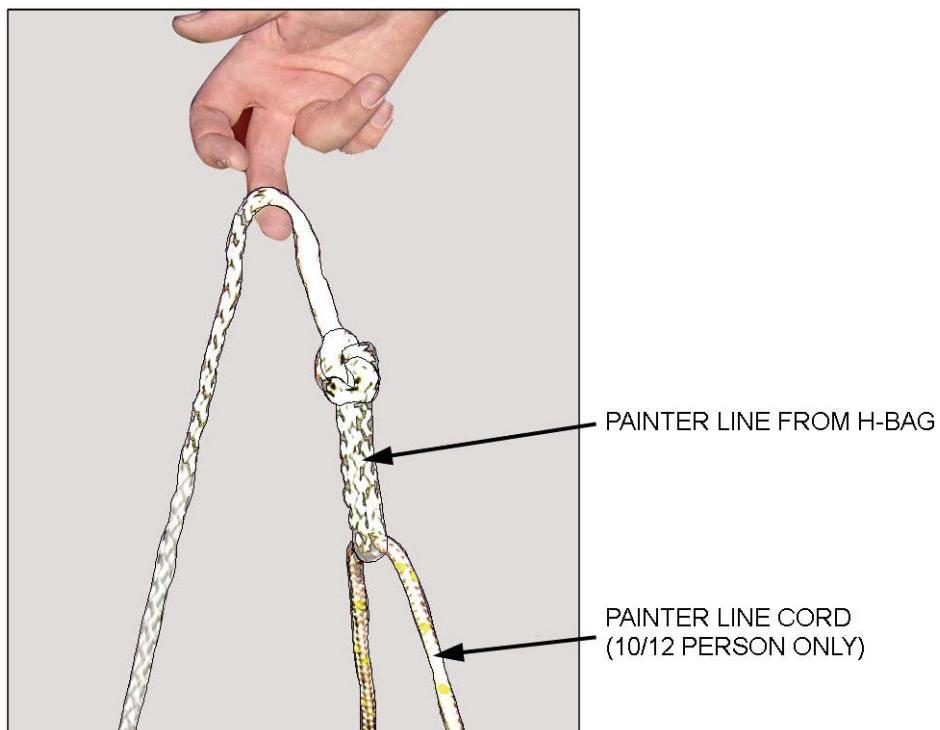
Painter assembly detail

FIGURE 827



Operating head attachment

FIGURE 828



Tie Painter line to painter cord

FIGURE 829

- 5.27 Ensure the painter cord is firmly attached to the operating head by lightly pulling on the cord, (FIGURE 828).

CAUTION: ONLY PULL THE CORD SLIGHTLY SO AS NOT TO DISLodge THE OPERATING HEAD CABLE. THE INFLATION SYSTEM IS ARMED.

- 5.28 Apply two turns of white tape around the painter cord, (FIGURE 828). Fold the end of the tape over on itself to create a pull tail. This will make it easy to remove the tape at the next service.

- 5.29 Using the painter line from the H-Pack, tie it to a strong point on the liferaft, (FIGURE 829).

5.29.1 On 6/8 Person use the liferaft painter patch.

5.29.2 On 10/12 Person use the liferaft painter cord line.

NOTE: The painter line should be able to move freely along the cord.

- 5.30 Set the painter sachet to the side of the container. Ensure the open end of the painter sachet is close to the container at the painter line cut-out.

CAUTION: EXERCISE EXTREME CARE DURING THE NEXT OPERATION IN ORDER TO AVOID OPERATING THE INFLATION SYSTEM.

- 5.31 Place the boarding ladder neatly under liferaft, (FIGURE 830).

NOTE: Applies to 10-12 Person ONLY.

- 5.32 Work the liferaft floor area down into the recesses towards each end of the container.

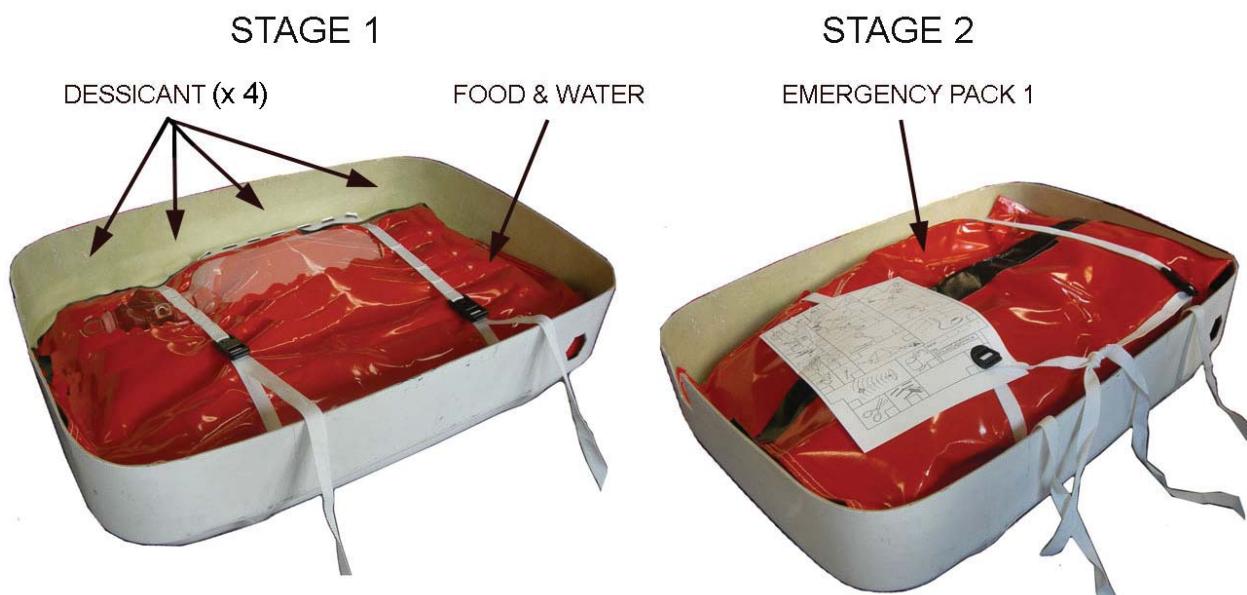
NOTE: Put a light coating of talc powder into the liferaft before placing the Emergency packs. This will help prevent the liferaft fabric from sticking.

- 5.33 Pack the Emergency Pack valises for the liferaft, (refer to Chapter 7). Ensure the straps on the equipment Emergency Pack valise are kept slightly loose so the pack can adjust during packing.



Boarding ladder under liferaft

FIGURE 830



Positioning of Emergency Packs into liferaft

NOTE: Foil bag omitted for clarity

FIGURE 831

- 5.34 Place the Emergency valise, containing food and water into the container first. The food is placed along the cylinder to keep it in place, (FIGURE 831).

NOTE: Do not place the food on top of the cylinder.

CAUTION: FOR 10-12 PERSON ENSURE THAT THE EMERGENCY PACKS ARE PLACED UNDER THE HAULING-IN LADDER. ENSURE NO PARTS OF THE CANOPY OR DOOR ARE TRAPPED BENEATH THE PACKS.

CAUTION: FOR 6-8 PERSON ENSURE THAT THE EMERGENCY PACKS ARE PLACED UNDER THE ARCH TUBE.

- 5.35 Place 5 desiccant sachets on top of the Emergency Pack/ cylinder, (FIGURE 831).

- 5.36 Place the paddles at the front of the liferaft, between the container and the Emergency Pack. Tie the paddles to the inner life line with 50 Lb breaking cord.

- 5.37 Place the No.1 Emergency Pack (containing survival items), on top, (FIGURE 831). Keep the valises as flat as possible.

NOTE: Keep soft items on top of cylinder. Do not place hard items on top of the cylinder.

- 5.38 Using the straps on each valise, tie them to the inner lifeline. Use an overhand knot. This will secure the packs to the liferaft.

- 5.39 Connect a suction hose to each of the two deflation points and fully deflate the buoyancies. These are located at the rear door, 1 on each buoyancy.

- 5.40 Enter the liferaft by the rear door and connect the switch activator to the internal light.

CAUTION: 6-8 PERSON ONLY: WRAP THE ARCH TUBE AROUND THE INTERNAL LIGHT, FIGURE 832.

- 5.41 Wrap the arch tube around the internal light and secure with 1 turn of 25 mm tape, (FIGURE 832). This will prevent the tension line from interfering with the lighting switch.



6-8 PERSON ONLY - Wrap arch tube around internal light

FIGURE 832



Preparation of liferaft for folding

FIGURE 833

5.42 Open the liferaft fully out. Place the remaining 3 desiccant bags on top of the liferaft pack, (FIGURE 833).

NOTE: Put a light coating of talc powder over the exposed areas of the liferaft before folding / rolling. This will help prevent the liferaft fabric from sticking.

5.43 Prepare to start the sequence of liferaft folding.

NOTE: The boarding ramp must be twisted and folded down before folding of liferaft can begin. For the 6-8 liferaft the boarding ramp must be laid parallel with the fold.

5.43.1 4-6 PERSON - 1 fold LHS, 1 fold RHS, then 2 folds. Refer to (FIGURE 834).

5.43.2 8-12 PERSON - 1 fold LHS, 1 fold RHS, then 3 folds. Refer to (FIGURE 835).

CAUTION: ENSURE THE LIGHT AND BATTERY ARE NOT PLACED ON TOP OF EACH OTHER. BOTH SHOULD BE PLACED TO THE LEFT OF THE ROLL AND OFF CENTRE, TOWARDS THE PAINTER EXIT.

NOTE: If the light and battery are found to be on top of the roll then liferaft must be unrolled and begin again.

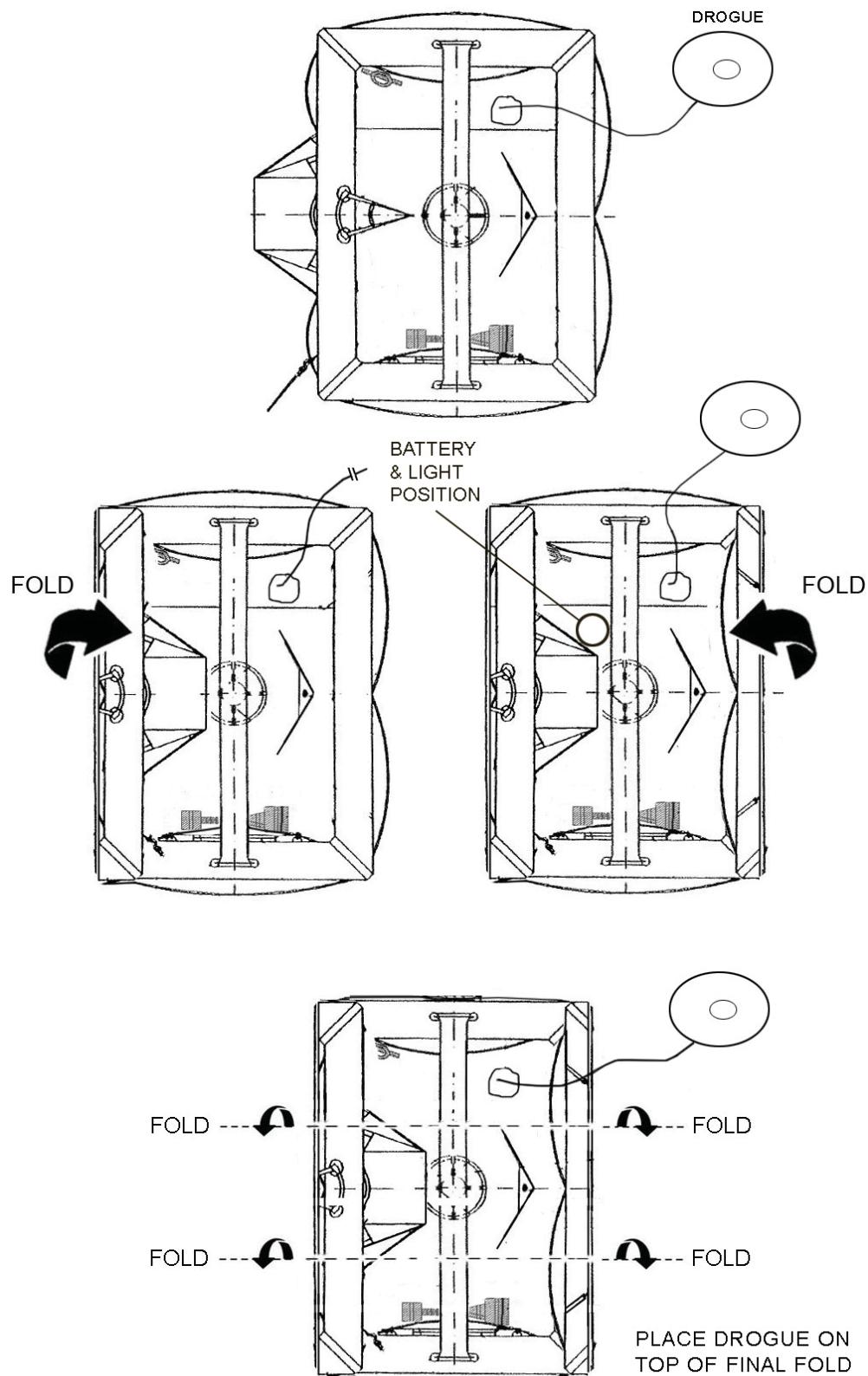
5.44 Pressing down as tightly as possible, fold the liferaft towards and then into the container.

5.45 Open the automatic drogue fully and place it on top of the folds.

5.46 Wrap the H-Pack over the liferaft, (FIGURE 836).

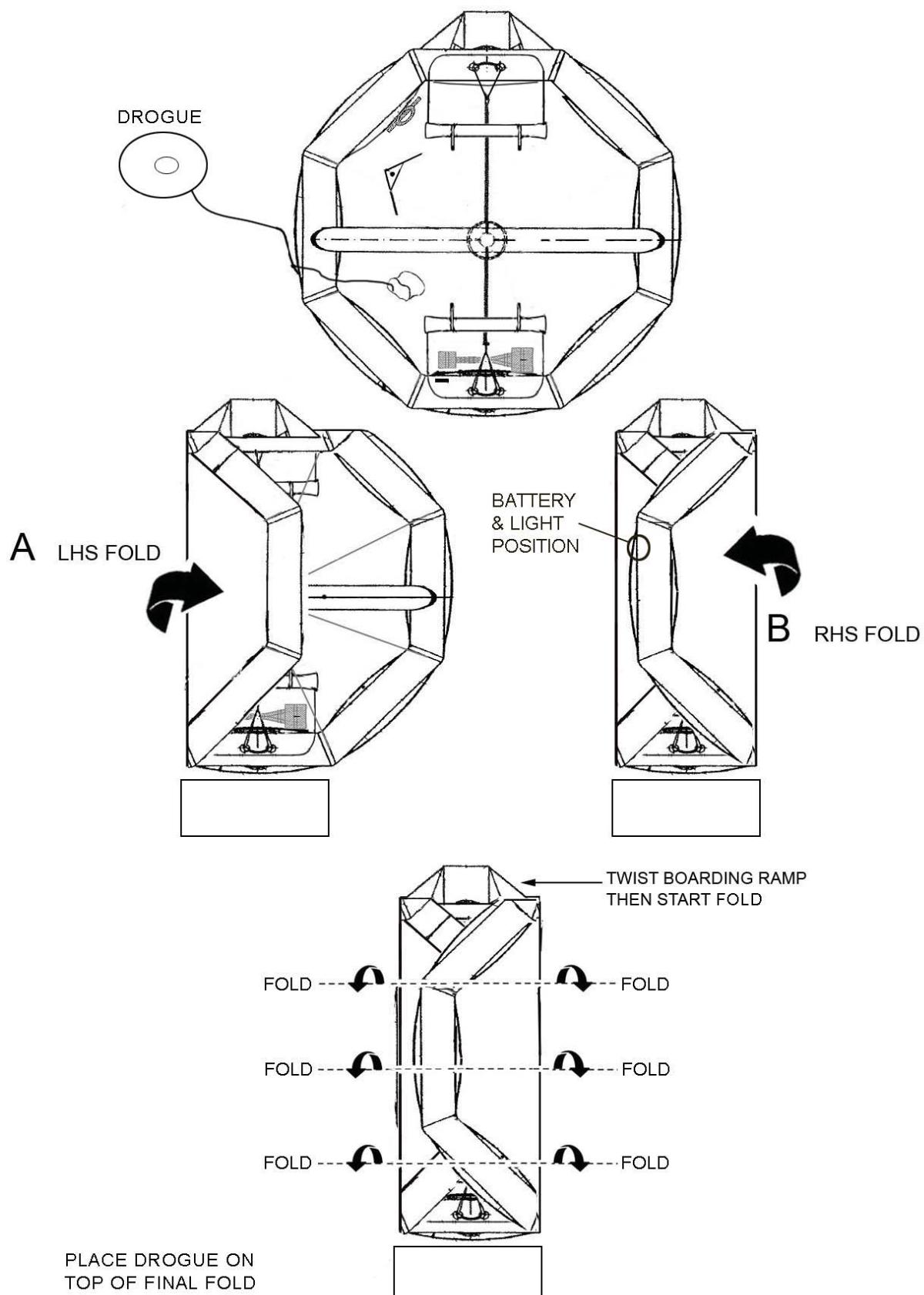
5.47 Tie the loose end of the painter line to the H-Pack, using a bowline knot, (FIGURE 836). Tape the flying end.

5.48 Insert the rubberised end of the painter line through the foam container plug/grommet.



4-8 PERSON - Folding the liferaft

FIGURE 834



10-12 PERSON - Folding the liferaft

FIGURE 835

- 5.49 Obtain the preheated, 150 mm long welding hand tool, (see listing Chapter 10).
- 5.50 The two sheets of the H-Pack are joined together using the preheated welding tool. This tool is to be used as follows.
 - 5.50.1 The tool should be plugged into a suitable mains outlet and left to heat up on setting three for 5-10 minutes to allow the tool to stabilise.
 - 5.50.2 Test welds are to be carried out on a piece of sample H-Pack to ensure the tool is at the correct temperature and is functioning correctly.
Test the welds by gently pulling the welded edges apart. They must be firmly welded to each other. Repeat if in doubt. Avoid pleats if possible.

WARNING: THE TOOL AND WELDED AREAS ARE VERY HOT, IT IS IMPERATIVE TO TAKE CAUTION WHEN USING THE SEALING TOOL TO AVOID INJURY.

- 5.50.3 Starting at the left corner of the H-Pack, place the two sheets inside the tool and clamp the jaws of the tool together. Squeeze the tool handles together firmly for 10 seconds, then release hand pressure, (FIGURE 837).
- 5.50.4 Seal the two sheets together along the 150 mm section, (the length of the tool). Slide the tool along the length of the sheet and clamp again to seal the next section.

NOTE: Each weld should be overlapped by minimum 10 mm lengthwise to ensure there are no unsealed gaps left between the sheets.

- 5.50.5 The heat seal should be completed so that it leaves 15 mm nominal weld width (minimum 10 mm) from the edge of the H-Pack.

NOTE: Take care when sealing the corners of the H-Pack.

- 5.50.6 The heat-sealing tool should be worked around the perimeter of the H-Pack until it is completed enclosed.
- 5.50.7 Test the welds by gently pulling the welded edges apart. They must be firmly welded to each other. Repeat if in doubt.



Wrap H-pack over liferaft

FIGURE 836

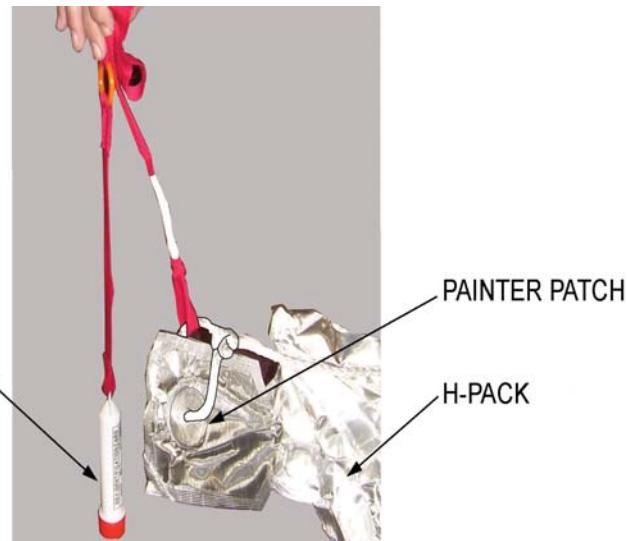


Heat seal

FIGURE 837

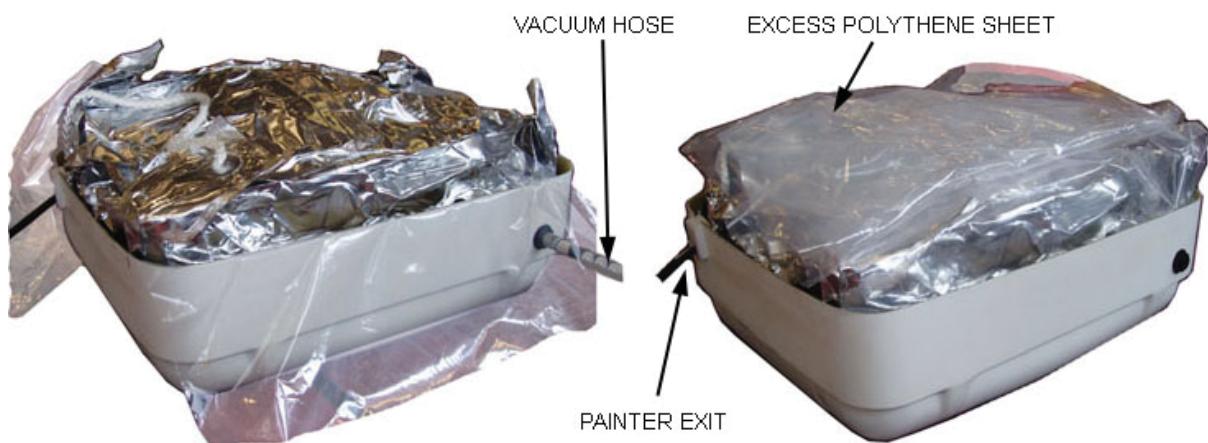
- 5.51 Attach the identification tube securely to the H-Pack, (FIGURE 839).
- 5.52 Remove the vacuum valve plug and insert a vacuum line with correct adaptor.
- 5.53 Remove the painter sachet from its temporary position on the side of the container.
- 5.54 Place the painter sachet along the back of the container. Attach the painter sachet to the H-Pack, using self-adhesive tape.
 - 5.54.1 Ensure the painter cord is in line with and close to the painter exit hole.
 - 5.54.2 Ensure the free run of painter from the sachet is not impeded.
 - 5.54.3 Adjust the painter sachet extension so that the distance from it to the painter exit is between 100-150 mm.
- 5.55 As the H-Pack is being vacuumed, use a soft rubber mallet to shape the liferaft so that it will fit easily within the boundaries of the container,
- 5.56 If a leak is detected, repair it with the heat sealing tool.
- 5.57 If the leak cannot be found or repaired, please refer to Chapter 5 Testing and Trouble shooting, Repair to the H-Pack.
- 5.58 When the H-Pack has been sealed tight, please refer to Chapter 5 Testing and Trouble shooting procedures and perform the post operational packing vacuum test (POPVT), before placing the lid onto the container.
- 5.59 If the POPVT is successful, wrap the remainder of polythene sheeting around the outside of the H-Pack. Place any excess on top of the H-Pack, (FIGURE 839).

WARNING: REMEMBER THE OPERATING MECHANISM IS ARMED.
EXTREME CARE MUST BE TAKEN DURING ALL FOLLOWING ACTIONS.



Tie Identification tube to painter patch

FIGURE 838



Vacuum H-Pack and wrap polythene sheet

FIGURE 839

5.60 Container or valise

5.60.1 Container: Place the top half of the container over the H-Pack.

5.60.2 Valise: Remove the sealed liferaft and corrugated card from the container. Place the top of the valise over the liferaft, while using the corrugated card as a guide. When the liferaft and card are fully inside, the valise can then be zipped closed.

5.61 Please refer to Chapter 5 Testing and Trouble shooting, to perform the post operational packing vacuum test, (POPVT).

5.62 If the POPVT is successful, position the Identification tube ring at the edge of the container. Tape it securely into place.

5.63 Check that the painter retaining plug/ grommet has not become displaced.

WARNING: WHEN TENSIONING OR CRIMPING STRAPS, THE OPERATOR MUST STAND TO ONE SIDE OF THE STRAP. PROPER CLOTHING AND EYE PROTECTION MUST BE WORN. PROPER FOOTING AND BALANCE MUST BE MAINTAINED WHEN OPERATING THE EQUIPMENT. USE SHORT HAND STROKES ONLY DURING TENSIONING.

WARNING: TOO MUCH TENSION WILL BREAK THE STRAP. THIS MAY RESULT IN INJURY TO PERSONNEL.

CAUTION: FOR ALL LIFERAFTS, IT IS ESSENTIAL THAT CRIMPS ARE ATTACHED ON THE OPPOSITE SIDE OF THE CONTAINER TO THE ROLL OF THE LIFERAFT (FIGURE

CAUTION: ENSURE CORRECT CRIMPING TOOLS ARE USED. (PLEASE REFER TO IPL FOR CORRECT LIST).

5.64 Obtain the straps and crimps. Tension and crimp each strap as follows:

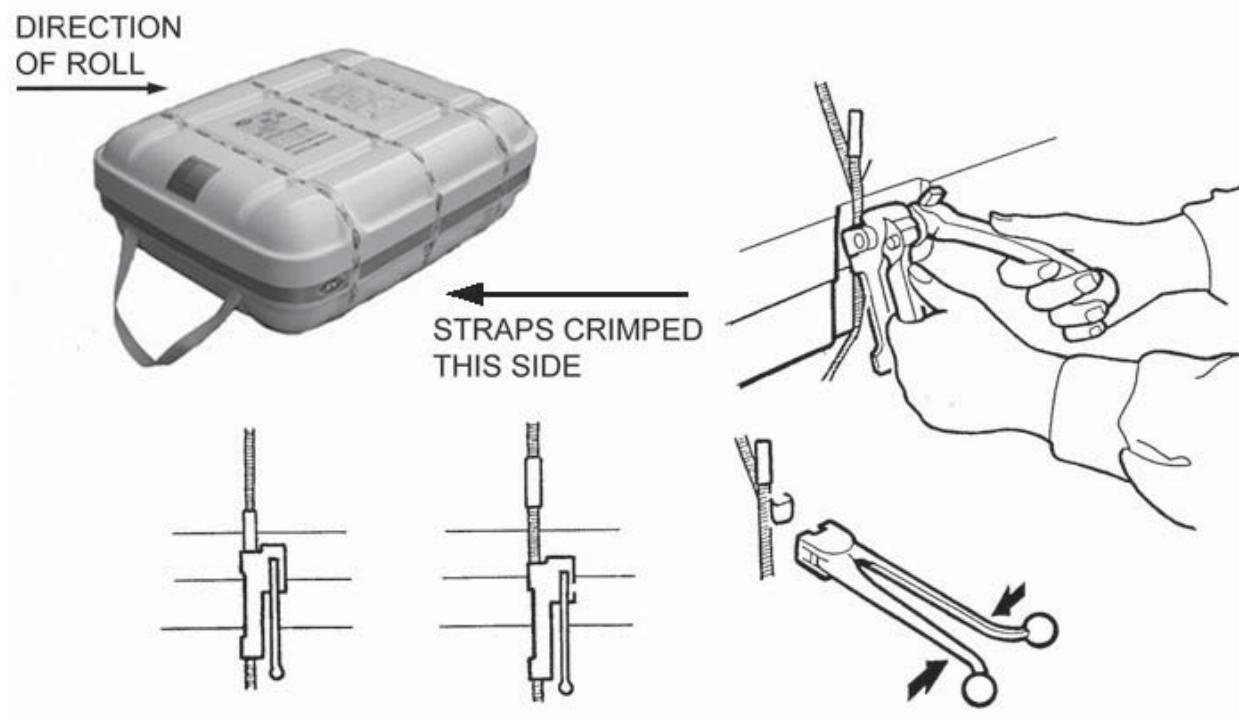
- 5.64.1 Adjust the ends of each strap so that the outer most strap end is facing upwards and is approximately 25 mm above the rim of the container, (FIGURE 840).
- 5.64.2 Apply the tensioning tool to the strap at a point half way across the two rims. Operate the handle to tension the strap until the base of the tensioning tool rests in the lower container rim. Secure the strap with a crimp, (FIGURE 840), using the crimping tool.

NOTE: It is acceptable to wrap the crimps with several layers of white PVC tape.

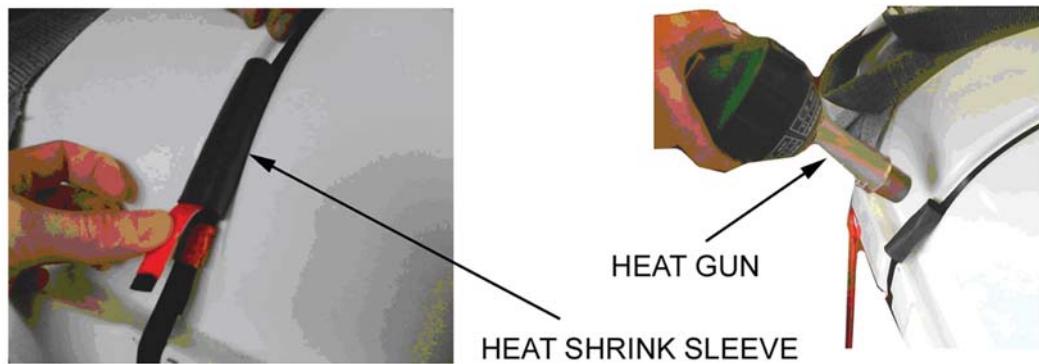
5.65 Put 'DO NOT CUT' tape over the top of the straps in each recess of the container.

5.66 Remove the ratchet straps if used.

5.67 This completes the packing sequence for the Flat Pack, Throw Over liferaft
The container is now ready for labelling. Please refer to Chapter 11 for container labelling.



Crimp straps
FIGURE 840



Crimp straps
FIGURE 841

6. Container crimps heat sealing

To encapsulate crimps with a heat shrink sleeve, (see IPL for part numbers), the following procedures should be observed:

- 6.1 Slide the strap through the heat-shrink sleeve. Keep the strap ID tag as close as possible to the crimp. The maximum installed separation between these is 10 mm, (FIGURE 841).
- 6.2 Apply the tensioning tool to the strap at a point half way across the two rims. Operate the handle to tension the strap until the base of the tensioning tool rests in the lower container rim. Secure the strap with a crimp, (FIGURE 841).

NOTE: The sleeve should be sitting loose in this temporary location. It must not be snagged against the container and strap or between the crimp and strap.

- 6.3 Using scissors, carefully trim off the tail of the strap as close as possible to the crimp, but do not trim off the strap ID tag. The maximum distance permitted between the end of the tail and the crimp is 15 mm.
- 6.4 Fold the strap ID tag back on itself and slide the heat-shrink sleeve over it. This will hold the folded back tag temporarily in place.

CAUTION: USE THE CORRECT HEAT SHRINK TOOL (SEE CHAPTER 10).

CAUTION: A HEAT SETTING GREATER THAN 6 WILL OVERHEAT THE STRAP, WEAKENING IT IN THE PROCESS. DO NOT TO OVERHEAT THE STRAP. DO NOT POINT HEAT GUN DIRECTLY AT THE STRAP. IF ANY DISCOLOURATION IS NOTED IN THE STRAP, IT HAS BEEN OVERHEATED. IN THIS CASE IT MUST BE CUT OFF, DISCARDED AND A REPLACEMENT FITTED.

WARNING: USE EXTREME CARE WITH THE HEAT GUN. ALLOW SUFFICIENT TIME FOR PARTS TO COOL, BEFORE HANDLING DIRECTLY. HEAT GUN NOZZLE WILL REMAIN HOT AFTER USE.

- 6.5 With the heat gun at setting at 6, apply heat evenly over the heat-shrink sleeve. The rear of the heat-shrink sleeve should be heated evenly from both left and right hand sides, (FIGURE 841).
- 6.6 Ensure that the entire crimp and tail are completely encapsulated and that the heat-shrink sleeve overlaps in both directions by at least 5 mm.
- 6.7 Using protective gloves, pinch the ends of the heat-shrink while it is cooling, to ensure that they have sealed tight against the strap.

7. Container labelling

- 7.1 Check that all labels are fitted and positioned correctly and securely. Please refer to Chapter 11, Section 3 Container label identification and position.
- 7.2 Record the liferaft details, onto the liferaft identification label and insert it into the identification tube. Check for legibility and correct details.
- 7.3 The liferaft identification container and any excess tether webbing shall be tucked between the container strapping and the container.
- 7.4 Tape the IAL compact disc to the container.

This completes the packing sequence and the liferaft is now ready for installation.

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CHAPTER 9

STORAGE CONDITIONS AND INSTRUCTIONS

Section	Title	Page
1	General	903
2	Procedure for liferafts not Operationally packed.....	903
3	Storage limiting period	904
4	Storage of Power units.....	905

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1. General

- 1.1 Storage conditions for liferafts depend on whether they have been Operationally Packed.

2. Procedure for liferafts not Operationally packed

- 2.1 Liferafts that are not operationally packed must be stored in a room that:
 - 2.1.1 Can be maintained at a temperature of 15 to 21°C (59 to 70°F).
 - 2.1.2 Is free from direct sunlight.
 - 2.1.3 Has a dry atmosphere.
 - 2.1.4 Is free from corrosive fumes or other harmful contamination.
- 2.2 Remove components that are easily detachable. Attach transit and recoil caps to the cylinders. Obey the procedure given in the manual 'Assembly and Charging of Transportable Gas Cylinders' to store the gas cylinders.
- 2.3 Deflate the liferaft until the fabric creases are sharp and well defined (Refer Chapter 8).

CAUTION: DO NOT STORE MORE THAN THREE LIFERAFTS ON TOP OF ONE ANOTHER.
- 2.4 Fold the liferaft to a manageable size and store it above floor level, preferably on slatted shelving to permit air circulation. The liferaft in the uninflated state should be enclosed in opaque polyethylene film to protect it against the effect of UV light. The protective material must be in accordance with ISO 2230 Section 5.2.
- 2.5 Tie a label to the liferaft recording the following:
 - 2.5.1 Liferaft Type, Mark and Serial Number.
 - 2.5.2 Date of last inflation test.
 - 2.5.3 Date of last service.
- 2.6 Store the liferaft accessories, except the gas cylinders, with the liferaft.
- 2.7 Attach dust caps to the delivery hoses. If caps for the hoses are temporarily not available, use adhesive tape to keep dirt out of the hoses.

3. Storage limiting period

- 3.1 Following a service, the storage limiting period for the liferaft is 12 months, provided that the storage conditions comply with approved standards (Paragraph A above) and meet with the concurrence of the approval authority of the country concerned. At the end of that period the liferaft must be:
 - 3.1.1 unfolded and inspected, before further storage.
 - 3.1.2 serviced and tested, prior to being operationally packed for installation on vessel stowages.
- 3.2 Liferafts not operationally packed and placed in store (for more than 30 days) must be re-tested before being operationally packed and installed on a vessel (Chapter 5).
- 3.3 If a liferaft is operationally packed in a container, it can operate in a wide range of temperature and humidity, equivalent to those found in service worldwide. Always make sure the drainage apertures in the bottom of the container point straight down; make sure they are not blocked by dirt. Do not deliberately make containers wet.
 - 3.3.1 Do not direct water from hoses at containers.
 - 3.3.2 Do not leave containers in flooded places.
- 3.4 All lines which go through the container to the Liferaft must have protective sheaths at their outer ends. These sheaths will prevent water from seeping into the container. If a line has been pulled from the container to expose a part of the line which is not covered by a sheath, call a Service Station to rectify the packing as soon as possible.
- 3.5 Do not roll a container when it is necessary to move it.
- 3.6 Operationally packed Liferafts are approved for use on board ships for 36 months. National Authorities may grant extensions to the original operational period. At the end of a period of operational use, Survitec Group recommend that all liferafts should immediately be opened for inspection and service. Any contaminants which may have entered the container will be removed before they cause damage.

4. Storage of Power units

- 4.1 The built-in power source, is a lithium-sulphur dioxide balanced cell. The component chemicals of the cell become neutralised after the cell is fully discharged. Obey these guidelines:
 - 4.1.1 Store power units at temperatures less than 65°C (149°F).
 - 4.1.2 For storage, the units must be isolated from materials which are flammable. Subject to satisfactory condition on receipt, they may remain in their original transit containers.
 - 4.1.3 If a unit is damaged, or suspected to be damaged, refer to Chapter 6 for the necessary actions.

WARNING: THE UNITS ARE NOT A FIRE RISK, BUT THEY COULD CAUSE A HEALTH RISK IF INVOLVED IN A FIRE. DISPOSAL OF DAMAGED UNITS SHALL BE IN ACCORDANCE WITH LOCAL REGULATIONS.

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CHAPTER 10

SPECIAL TOOLS, EQUIPMENT AND MATERIALS

Section	Title	Page
1.	Special tools.....	1003
2.	Equipment and materials	1004

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1. SPECIAL TOOLS
Part No.

1. Steel hand roller	05290024
2. Spatula (125mm × 25mm × 3mm) (5" × 1" × 1/8").....	05290055
3. Solution brushes:12 mm wide	05290004
25 mm wide	05290006
38 mm wide	05290007
4. 'Instantair' couplings:Female.....	20603001
Male (plug tail)	05290107
5. Spanner - Open End (3/4" BSP hose connector)	-
6. Packing machine (painter/operating line)	15389001
7. Ratchet strap	05654009
8. Tensioning tool - Container straps	see IPL
9. *Crimp securing tool - Container straps	see IPL
10. *Torque tools -	
Leafield A10 PRV (fitting tool inner)	08320009
Leafield A10 PRV (fitting tool outer)	08321009
11. *Torque tools -	
Leafield B10 PRV (fitting tool inner)	08320009
Leafield B10 PRV (fitting tool outer)	08556009
12. Spanner, Inlet valve, Leafield	08200009
13. Filling bung, Leafield	08252009
14. Cylinder valve filling tool, Leafield	08253009
15. *Torque drive assembly, Leafield	08218009
16. *Torque Resetting tool, Leafield operating heads.....	08254009
17. Deflation adaptor tool	DSB80733040
.....	DSB80733040
18. Test socket tool.....	DSB00801800
19. Vent plug tool.....	DSB00801800
20. *Torque tool, screw nut.....	DSB00724451
*Torque tool, lower part	DSB01106810

*Please note this tool must be serviced regularly.

SPECIAL TOOLS
Part No.

21. *Torque spanner 32 mm (indicator nut)	-
22. *Torque spanner 36 mm (humidity indicator).....	-
23. *Torque spanner	06754009
24. Heat sealing tool 15 cm (110V)	08179009
25. Heat sealing tool 15 cm (230V)	08244009
26. *Torque tool indicator housing, test valve & clamping nut	-
27. *Torque tool plug(vacuum test)	-
28. Spanner, Flange base, (Silver series)	08428009
29. Standard airline "A8" adaptor	20944001
30. Flow restrictor	50296001
31. Deflator pin	20701001
32. Vacuum valve plug tool	50292005
33. Fid tool.....	08457009
34. Heat gun, 230V (heat shrink sleeve)	08344009
35. Heat gun, 110V (heat shrink sleeve)	08245009

2. EQUIPMENT AND MATERIALS
Part No.

1. Vacuum cleaner c/w Hose	-
(Vacuum to be capable of providing negative pressure of -5 Psi)	
2. Digital pressure gauge (0-2000 mb)	06295009
3. Thermometer (hang on manometer)	-
4. Rubber tubing - $\frac{1}{8}$ " \times $\frac{3}{8}$ " i/d \times $\frac{1}{2}$ " o/d	-
(manometer connection)	
5. Dry, Oil-free air supply of 80 to 100 psig	-
(5.6 to 7.0 kg/cm ²) regulated to 2 psig	
(140 g/cm ²) for inflation purposes	
6. Solution of non-detergent soap and water	-

*Please note this tool must be serviced regularly.

7. Lint-free cloth, clean and dry -
 8. Adhesive EV/C2 (750 grams container) E96900005
 9. Methyl Ethyl Ketone (MEK) 04528009
 10. Self-adhesive waterproof tape, 100 mm (4") wide
Cloth Backed, Black 04834009
 11. Self-adhesive waterproof tape, 25 mm (1") wide
PVC, White 02096004
 12. Tape, double sided 25 mm (1") wide 08485009
 13. Tape, double sided 25 mm (1") wide TA175
 14. Fabric, PVC orange, (main structure and buoyancies) 08689009
 15. Fabric - Nylon, Single-ply (canopy outer fabric) 06785009
(RFD 1044/1)
- or-
16. Fabric - Nylon, Single-ply (canopy outer fabric) 08006009
(RFD 1044/2)
 17. Fabric - Nylon, Single-ply (canopy inner fabric) 06315009
 18. Toluene solvent (500 ml) 41445001
 19. Cord, Terylene, 22.5 kg/ 50 Lbs 02236006
 20. Cord, Nylon, 238 kg/ 525 Lbs 00933009
 21. Thread, Nylon, 4 kgf 02426001
 22. Thread, Scarlet, cotton (Painter sachet tie-off) 02403001
 23. (Tape S/A (Do Not Cut)) 15384002
 24. Webbing 13mm polyester undyed WE11
 25. Leak detector test kit 45435001
(This kit is sufficient to test 40 cylinders)

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CHAPTER 11

ILLUSTRATED PART LIST

Section	Title	Page
1	General	1102
2	Sub-Chapters.....	1102



1. GENERAL

The parts list has been prepared for the sole purpose of identifying and/or ordering replacement parts, it should not be used for any other purpose.

NOTE: Drawings are not to scale; dimensions, where given are in millimetres (mm) and inches (").

2. SUB-CHAPTERS

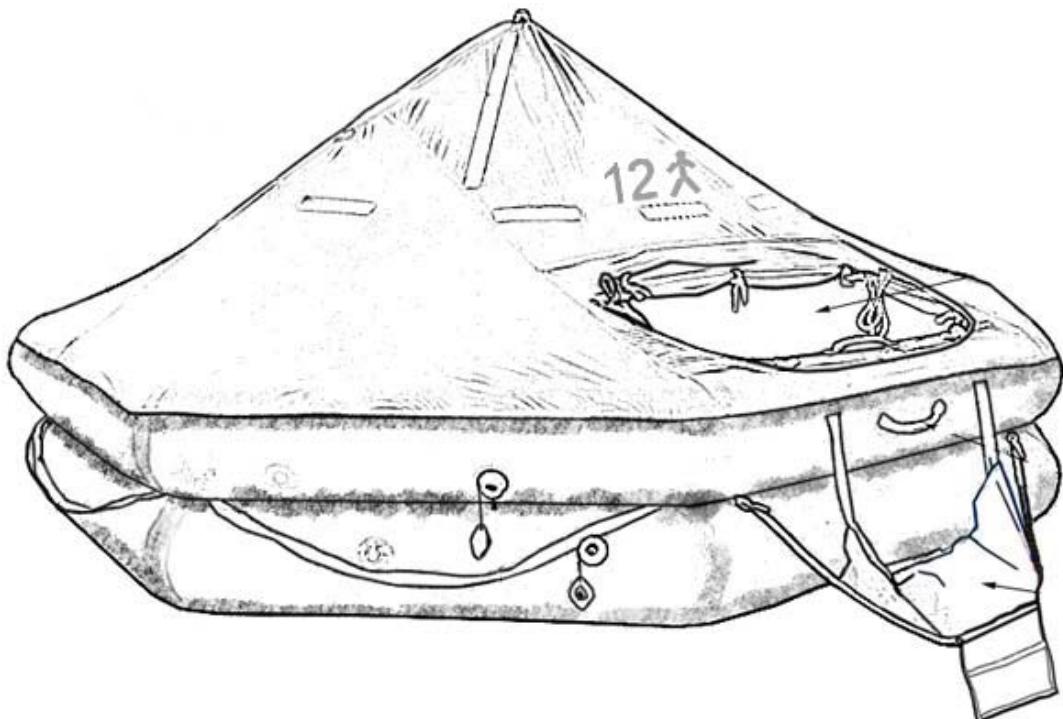
For ease of identification this chapter is broken down into the following sub-chapters.

- (1) Liferaft
- (2) Hull assembly
- (3) GRP container assembly
- (4) Inflation equipment

NOTE: Information on Emergency Pack types, contents and part numbers is given in Chapter 7 of this document.



1. Liferaft



Typical Throw Over liferaft
FIGURE 1101

2. Hull assembly

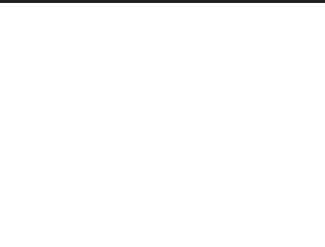
The following details the hull level spares in two sub-sections:

- 2.1 All-raft spares - defined as those items (including valves and fabrics) which are common to all raft sizes.
These spares form an integral part of, or are attached to, the core raft before specific customer and individual authority requirements are applied.
- 2.2 Raft specific spares - defined as those items which differ depending on raft size.
These spares form an integral part of, or are attached to, the core raft before specific customer and individual authority requirements are applied.

2.1 All-raft spares

The following sub-section details the all-raft spares in terms of nomenclature, part number and the location of the item in relation to the hull assembly.

	Description: Internal lamp unit (RL5)
	Found on: Bottom centre line of archtube
	Part Number: 08279009
	Description: External lamp unit (RL5)
	Found on: Top of canopy
	Part Number: 08280009
	Description: Knife, floating
	Found on: Upper buoyancy, inside raft
	Part Number: DSB00904040
	Description: Plug, rubber,
	Found on: Rain catchment tube assembly
	Part Number: DSB00107110
	Description: Drogue (less swivel)
	Found on: Drogue patch assembly
	Part Number: E10359063

	Description:	Line rescue and quoit assembly
	Found on:	Inner lifeline
	Part Number:	45932001
	Description:	Quoit, handle
	Found on:	Line rescue and quoit assembly
	Part Number:	11501009
	Description:	Strap, quoit line and rescue assembly
	Found on:	Quoit line and rescue assembly
	Part Number:	45932011
	Description:	Ramp, boarding, Marine
	Found on:	Upper/lower buoyancy
	Part Number:	4 Person (TO) 51643001
		6 Person (TO) 51643002
		8 Person (TO) 51643003
		10 Person (TO) 51643004
		12 Person (TO) 51643004
	Description:	Material PVC fabric. Coated both surfaces.
	Found on:	Liferaft
	Part Number:	08689009

	Description:	Inflate/deflate valve
	Found on:	Upper / lower buoyancy and arch tube
	Part Number:	DSB00812180
	Description:	Inflate/deflate valve cap
	Found on:	Upper / lower buoyancy and arch tube
	Part Number:	DSB00810070
	Description:	GIST Inlet chk valves 2.2 mm (Yellow)
	Found on:	Lower buoyancy
	Part Number:	08423009
	Description:	GIST Inlet chk valves 2.8 mm (Purple)
	Found on:	Upper buoyancy
	Part Number:	08424009
	Description:	GIST PRV B10 2.8 Psi (Green dot)
	Found on:	(Throw Over rafts) upper & lower buoyancy
	Part Number:	08554009
	Description:	B10 PRV Cap
	Found on:	B10 PRV
	Part Number:	08557009

2.2 Raft specific spares

The following sub-section details the raft specific spares in terms of nomenclature, part number, quantity and the location of the item in relation to the hull assembly.

Raft size (persons)	Max length		Part number
	(metres)	(feet)	
4			
6	3.30	10.8	51559001
8			
10	3.10	10.2	51559002
12	3.60	11.8	51559002

ADDITIONAL ITEMS (Hauling-in Stretching line)		
Item	Description	Part Number
	Rubber band	08442009

Hauling-in ladder Stretching line

TABLE 1101

	
Part number	
Cylinder retaining strap (x 2)	Cross patch
51071004 (LARGE)	51073002
51071003 (SMALL)	

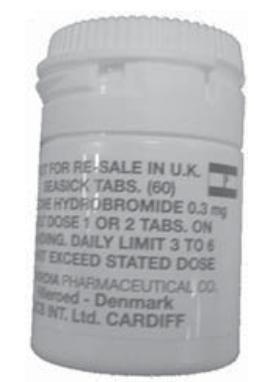
Cylinder retaining pocket/ Straps

TABLE 1102



Paddles, one piece		
Part number	Description	Raft/container application
05122009	510 mm long	All rafts

Paddle, one piece
TABLE 1103



Description:	Tablet, anti-seasickness (Pack of 60)	
Attached to:	Rainwater catchment tube	
Raft size	Part number	Qty per raft
4	01174009	1
6		
8		
10		
12		2

Anti-seasickness tablets - allocation by raft size
TABLE 1104



Typical insulated floor assembly appearance	Raft		Floor, insulated
	Size (persons)	Launch type	Part no.
	4	Throwover	51161001
	6		50850001
	8		50851001
	10		50852001
	12		50853001

Raft specific insulated floor assemblies
TABLE 1105

3. GRP container assembly spares

NOTE: The part numbers contained in this section are for WHITE GRP containers. Equivalent GREY containers are available on request.

The following sub-sections cover part numbers for the ordering of container assemblies in the form of complete containers or, sub-assemblies, that is, individual container halves (top or bottom) and the specific type and required quantities of Strap and Crimp assembly for each individual container.

The container requirement is determined in this section by one, or all, of the following criteria:

- 3.1 Launch method Throw Over.
- 3.2 Drop height, which determines the 'weight' of container. A drop height of up to, but not exceeding 6 metres.
- 3.3 Emergency Pack option(s) used.
- 3.4 Raft size.
- 3.5 Customer preference.

The following sub-sections group the relevant part numbers for containers as follows:

(3a) Throw Over containers

GRP containers

ABS containers

Valise

(3b) Common container spares

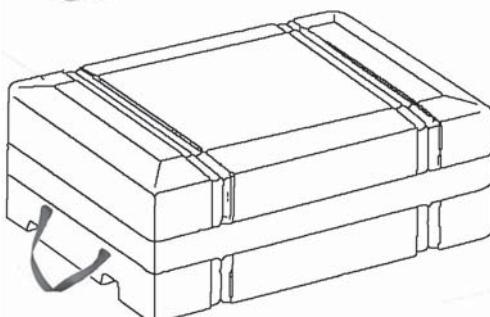
(3c) Container labelling

3a) Throw Over containers

The following sub-section details the part numbers for the GRP Throw Over container spares:



GRP



ABS



Valise

Throw Over containers

FIGURE 1102

THROW OVER rafts up to 6 metres stowed height											
ISO Type 1 >24 hours				ISO Type 1 <24 hours				ISO Type 2			
Container type	Rated capacity	Part number	Qty of straps	Container type	Rated capacity	Part number	Qty of straps	Container type	Rated capacity	Part number	Qty of straps
GRP	4	E99991583	2	GRP	4	E99991583	2	GRP	4	E99991583	2
ABS		E99991325	2	ABS		E99991325	2	ABS		N/A	-
VALISE		51796001	-	VALISE		51796001	-	VALISE		51796001	-
GRP	6	E99991581	2	GRP	6	E99991583	2	GRP	6	E99991583	2
ABS		E99991325	2	ABS		E99991325	2	ABS		N/A	-
VALISE		51796002	-	VALISE		51796001	-	VALISE		51796001	-
GRP	8	E99991584	2	GRP	8	E99991581	2	GRP	8	E99991581	2
ABS		E99991327	2	ABS		E99991326	2	ABS		N/A	-
VALISE		51796002	-	VALISE		51796002	-	VALISE		51796002	-
GRP	10	E99991585	2	GRP	10	E99991581	2	GRP	10	E99991581	2
ABS		E99991327	2	ABS		E99991326	2	ABS		N/A	-
VALISE		51796003	-	VALISE		51796002	-	VALISE		51796002	-
GRP	12	E99991585	2	GRP	12	E99991582	2	GRP	12	E99991582	2
ABS		E99991327	2	ABS		E99991326	2	ABS		N/A	-
VALISE		N/A	-	VALISE		51796003	-	VALISE		51796003	-

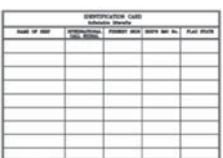
Container information
TABLE 1106

THROW OVER rafts up to 6 metres stowed height				
ISO Type 1 & SOLAS B-Pack				
ABS Container size	Rated capacity	Part number	Qty of straps	Dimensions
Sz 2	4	51801002	2	797 x 567 x 250
Sz 3	8	51801003	2	797 x 567 x 310
	6		2	
-	10	E99991585	2	820 x 640 x 350
-	12		2	


Throw Over container information (Seasava)
TABLE 1107

(3b) Common container spares

The following sub-section details the container spares common to all raft sizes:

	Description: Block, painter retaining
	Applications : All rafts
	Part number: 20883001
	Description: Sachet assembly, painter
	Applications: For applications and part numbers see sachet assy TABLE 1107
	Description: Strap and crimp
	Applications: All rafts
	Part number: For applications and part numbers see Strap & crimp TABLE 1108
	Description: Container assembly, liferaft identification
	Applications: All rafts
	Part number: 43858001
	Description: Label identification
	Applications: All rafts
	Part number: 43859011
	Description: Packing jig
	Applications: All rafts
	Part number: 51818001
	Description: Corrugated card
	Applications: Valise packing jig
	Part number: E99990180

Raft Capacity	H-PACK sizes			
	< 24 hrs		> 24 hrs	
	Part number	Sz	Part number	Sz
4			51622001	1
6	51622001	1	51622002	2
8			51622002	2
10	51622002	2	51622003	3
12				

Container H-Pack sizes

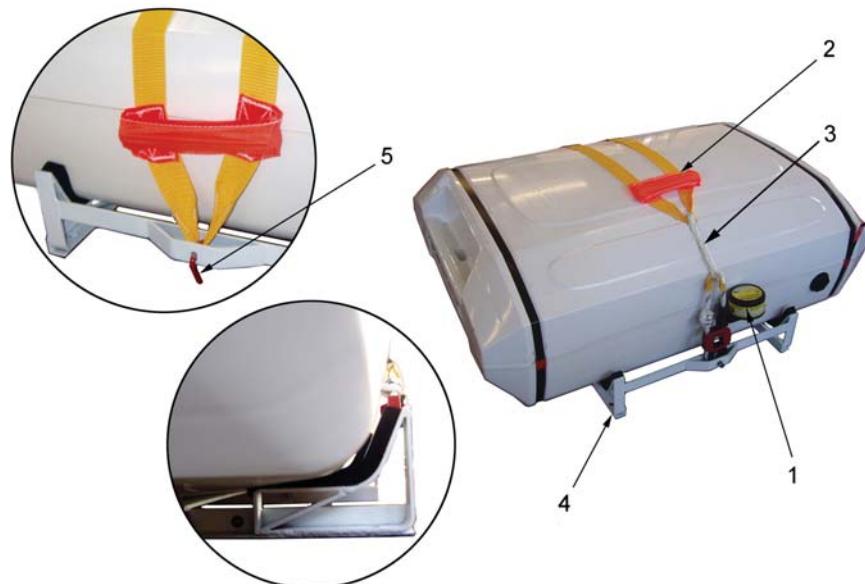
TABLE 1108

Container handles		
Part number	Description	Qty
52000002	Handle container, White	2
E52400429	Cord, for handles	4

GRP container handles

TABLE 1109

Container cradle				
Item	Size	Part number	Description	Qty
1		05618009	HRU	1
2	Sz 1	51794071	Webbing strap	1
	Sz 2	51794072	Webbing strap	1
	Sz 3	51794073	Webbing strap	1
3		00933009	Cord	1
4		51794003	Cradle - G Leisure	1
		51794004	Cradle - EV	1
5		51794081	Pin	A/R



The diagram illustrates the container cradle assembly. It features a grey cylindrical container held by a blue metal cradle. Numbered callouts point to specific components: 1 points to the bottom support arm; 2 points to the top strap; 3 points to the side strap; 4 points to the base support; and 5 points to an inset showing a close-up of the strap attachment.

Container cradle assessories
TABLE 1110

The following sub-section details the container spares which are specific to raft sizes.

Liferaft launch type	Maximum installation height 6 metres
Throwover	15323211

Sachet, painter assembly - applications

TABLE 1111

NOTE: The TABLE above quotes maximum installation height. It should be understood that actual painter cord length is 10 metres longer in total.

Crimp securing tool part no.	Description	Strapping material SIGNODE CODE No.	Strap and Crimp	Strap tensioning tool
04877009	Tool crimp securing	D508	41423002	04876009

Strapping material and corresponding crimping tools

TABLE 1112

Containers	Part number	Description	Length
All	50450002	Sleeve crimp corrosion protection	75 mm

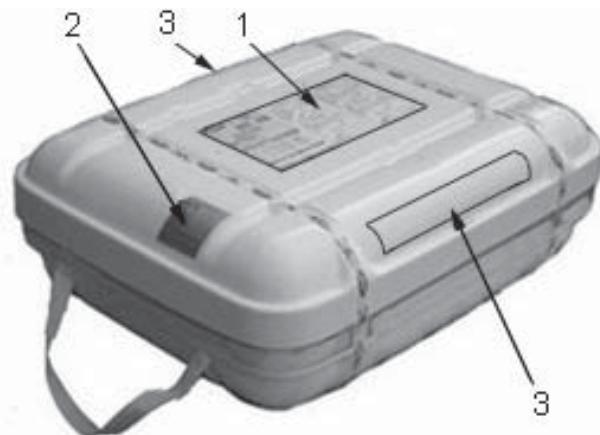
Sleeve protection

TABLE 1113

(3c) Container label identification and position

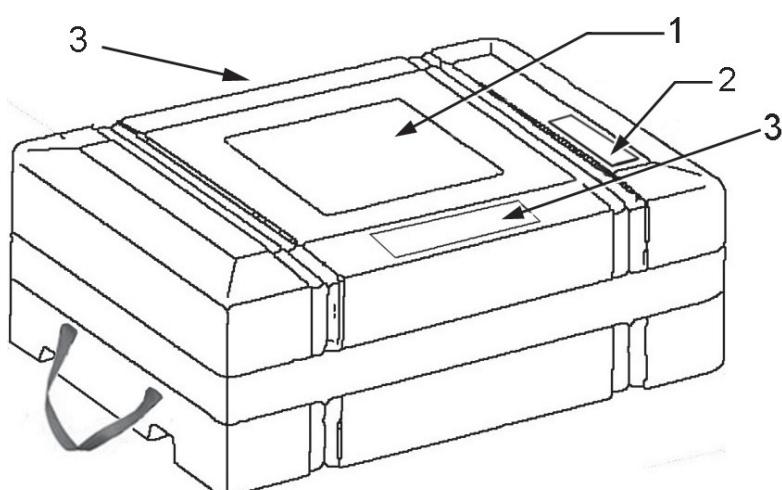
The following sub-section details the container label identification and position for the most commonly used container types:

1		Description:	Label, GRP container data
		Application:	All ISO GRP containers
		Part Number:	51791001
2		Description:	Label, Painter
		Application:	All ISO GRP containers
		Part Number:	E15110129
3	A		Description: Label, branding Application: All ISO GRP containers Part Number: 51797001
	B		Part Number: 51797002
	C		Part Number: 51797004
	D		Part Number: 51797005
	E		Part Number: 51797006
	F		Part Number: 51797007
	G		Part Number: 51797008
	H		Part Number: 51797010
	I		Part Number: 51797011
4		Description:	Label, Valise data
		Application:	All ISO Valise types
		Part Number:	51791003



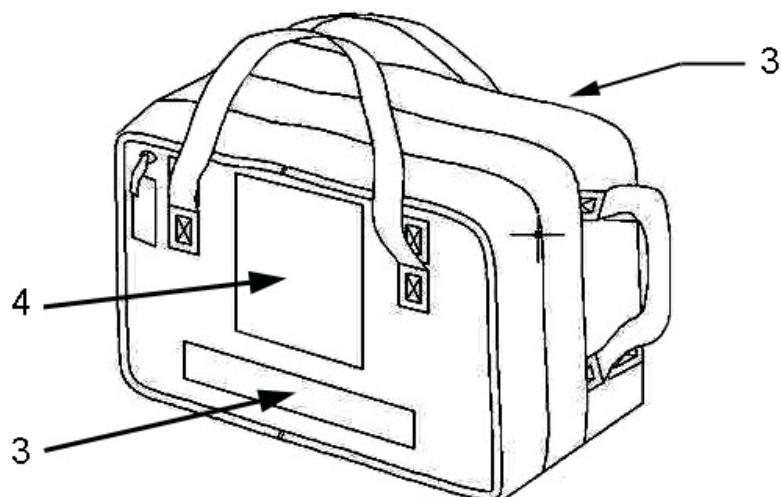
GRP Container label identification and positioning

FIGURE 1103



ABS Container label identification and positioning

FIGURE 1104



VALISE Container label identification and positioning

FIGURE 1105



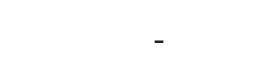
ABS Container label identification and positioning

FIGURE 1106

(4a) Inflation equipment

Common spares

This sub-section lists the hoses and protection pads, associated with the cylinders, which are common across the entire range of liferafts regardless of size or type.

	Description: GIST Hose assembly 800 mm
	Found on:: Leafield Inflation system
	Part Number: 08255009
	Description: GIST Hose assembly (Double bayonet 800 mm)
	Found on: Leafield Inflation system
	Part Number: 08718009
	Description: Nut Union c/w O-ring (double bayonet)
	Found on: GIST Hose assembly
	Part Number: 08719009
	Description: O-ring seal (Double bayonet)
	Found on: GIST Hose assembly
	Part Number: 08219009
	Description: Head, Operating, GIST Leafield c/w Actuator cable, Flange, Plastic washer & Nut
	Found on: Cylinder
	Part Number: 08426009
	Description: Rubber washer, (45x30mm)
	Found on: Operating head, cylinder
	Part Number: 11167873
	Description: Dust cover Leafield GIST
	Found on: Cylinder
	Part Number: 08322009
	Description: Plug transit/Recoil GIST
	Found on: Cylinder
	Part Number: 08220009

TRIPLE APPROVED CYLINDERS - Leaffield inflation system						
Liferaft	Description charged cylinders			Bare cylinder	Associated equipment	
Size (persons)	Launch type	Part No.	CO ₂ Charge (kg)	Bare Part No.	Volume (Litre)	Operating Head
4	Throw-over	51583001	1.98	0.06	51585001	3.5
6	Throw-over	51583010	2.25	0.09	51585001	3.5
8	Throw-over	51583009	3.38	0.14	51585002	5.4
10	Throw-over	51583008	4.17	0.17	51585003	6.7
12	Throw-over	51583008	4.17	0.17	51585003	6.7

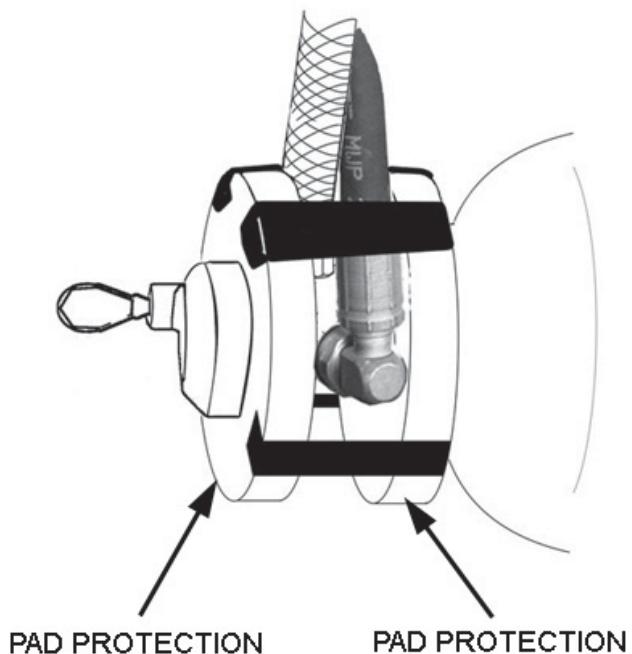
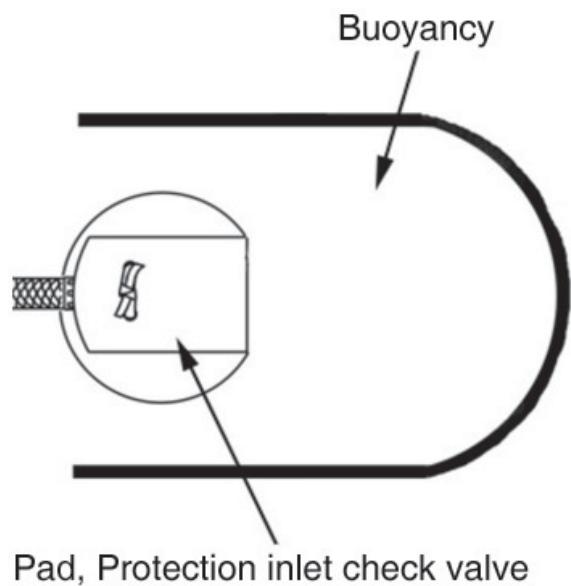
*NOTE: This part includes a membrane assembly

Triple approved cylinders (Leaffield inflation)
TABLE 1114

Foam protection - operating head and inflation system

The following sub-section details the foam protection pads directly associated with the operating head and inflation system.

	Description: Pad, protection, inlet check valve
	Found on: Inflation system
	Part Number: 50067002
	Description: Pad, protection, operating head
	Found on: GIST Inflation system, Leafield
	Part Number: 50067006
	Description: Pad, protection, operating head
	Found on: GIST Inflation system, Leafield
	Part Number: 50067003



Foam protection for operating head
and inflation system
FIGURE 1107



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APPENDIX 1

EV ISO Liferaft

The following information details the changes that apply to EV ISO liferafts only.

Chapter 10

EQUIPMENT AND MATERIALS

Part No.

1. Tape S/A, "Do not cut" E50300106
2. Container strap & crimp 21043002
(Same D508 tooling will apply)

Chapter 11

Section (3b) Common container spares

	Description:	Transparent bag for Log card
	Found on:	Liferaft
	Part Number:	E10359974
	Description:	Label identification, Log card
	Found on:	Type 1 Liferaft
	Part Number:	E15300185
	Description:	Label identification, Log card
	Found on:	Type 2 Liferaft
	Part Number:	E15300186

THROW OVER rafts up to 6 metres stowed height											
ISO Type 1 >24 hours				ISO Type 1 <24 hours				ISO Type 2			
Container type	Rated capacity	Part number	Qty of straps	Container type	Rated capacity	Part number	Qty of straps	Container type	Rated capacity	Part number	Qty of straps
GRP	4	E99991583	2	GRP	4	E99991583	2	GRP	4	E99991583	2
ABS		E99991325	2	ABS		E99991325	2	ABS		N/A	-
VALISE		E10391233	-	VALISE		E10391233	-	VALISE		E10391233	-
GRP		E99991581	2	GRP		E99991583	2	GRP		E99991583	2
ABS	6	E99991325	2	ABS	6	E99991325	2	ABS	6	N/A	-
VALISE		E10391233	-	VALISE		E10391233	-	VALISE		E10391233	-
GRP		E99991582	2	GRP		E99991581	2	GRP		E99991581	2
ABS	8	E99991327	2	ABS	8	E99991326	2	ABS	8	N/A	-
VALISE		E10391263	-	VALISE		E10391233	-	VALISE		E10391233	-
GRP		E99991584	2	GRP		E99991581	2	GRP		E99991581	2
ABS	10	E99991327	2	ABS	10	E99991326	2	ABS	10	N/A	-
VALISE		E10391253	-	VALISE		E10391263	-	VALISE		E10391263	-
GRP		E99991585	2	GRP		E99991582	2	GRP		E99991582	2
ABS	12	E99991327	2	ABS	12	E99991326	2	ABS	12	N/A	-
VALISE		N/A	-	VALISE		E10391263	-	VALISE		E10391263	-

Container information
TABLE 1106

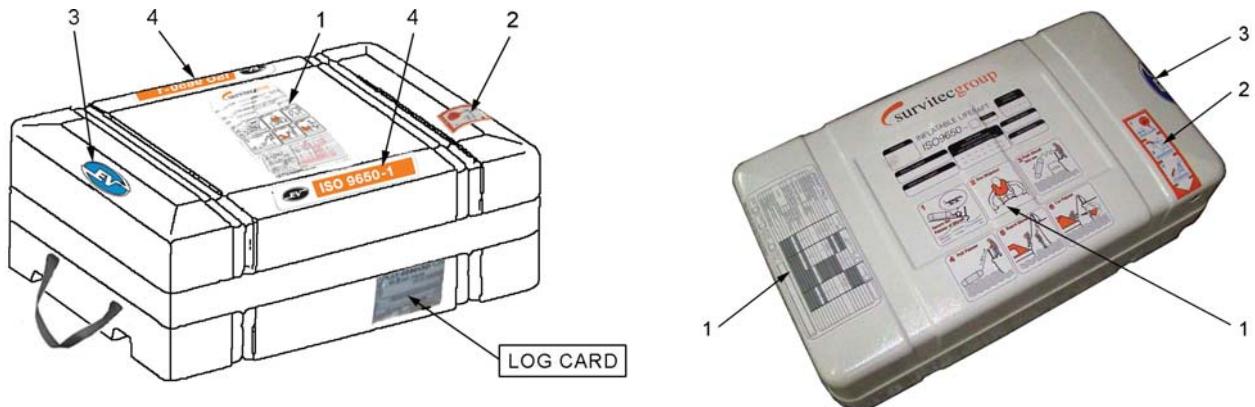
Chapter 11

Section (3h) Container label identification and position

1		Description:	Label, GRP container data
		Found on:	All ISO GRP containers
		Part Number:	51791001
2		Description:	Label, painter
		Found on:	All ISO GRP containers
		Part Number:	E15110129
3		Description:	Label branding
		Found on:	All ISO GRP containers
		Part Number:	E15310672
4	A  ISO 9650-1	Description:	Branding Type logo
		Found on:	All ISO GRP containers
		Part Number:	51797003
4	B  ISO 9650-2	Description:	Branding Type logo
		Found on:	All ISO GRP containers
		Part Number:	51797009
5		Description:	Blue tape
		Found on:	All ISO GRP containers
		Part Number:	E50300104
6		Description:	Label, Valise data
		Found on:	All ISO Valise types
		Part Number:	51791003



EV ISO GRP container
FIGURE A1-01



EV ISO ABS container
FIGURE A1-02

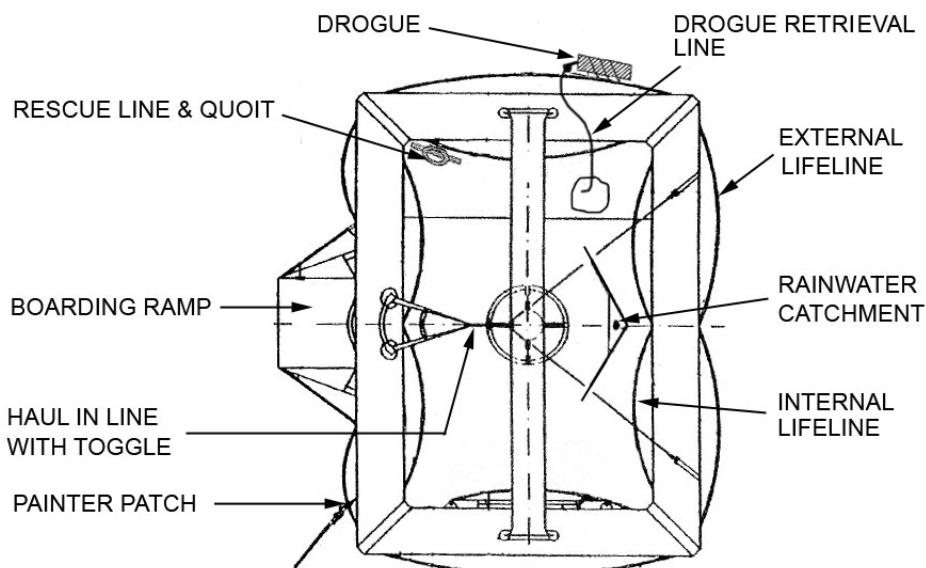


EV ISO Valise container
FIGURE A1-03

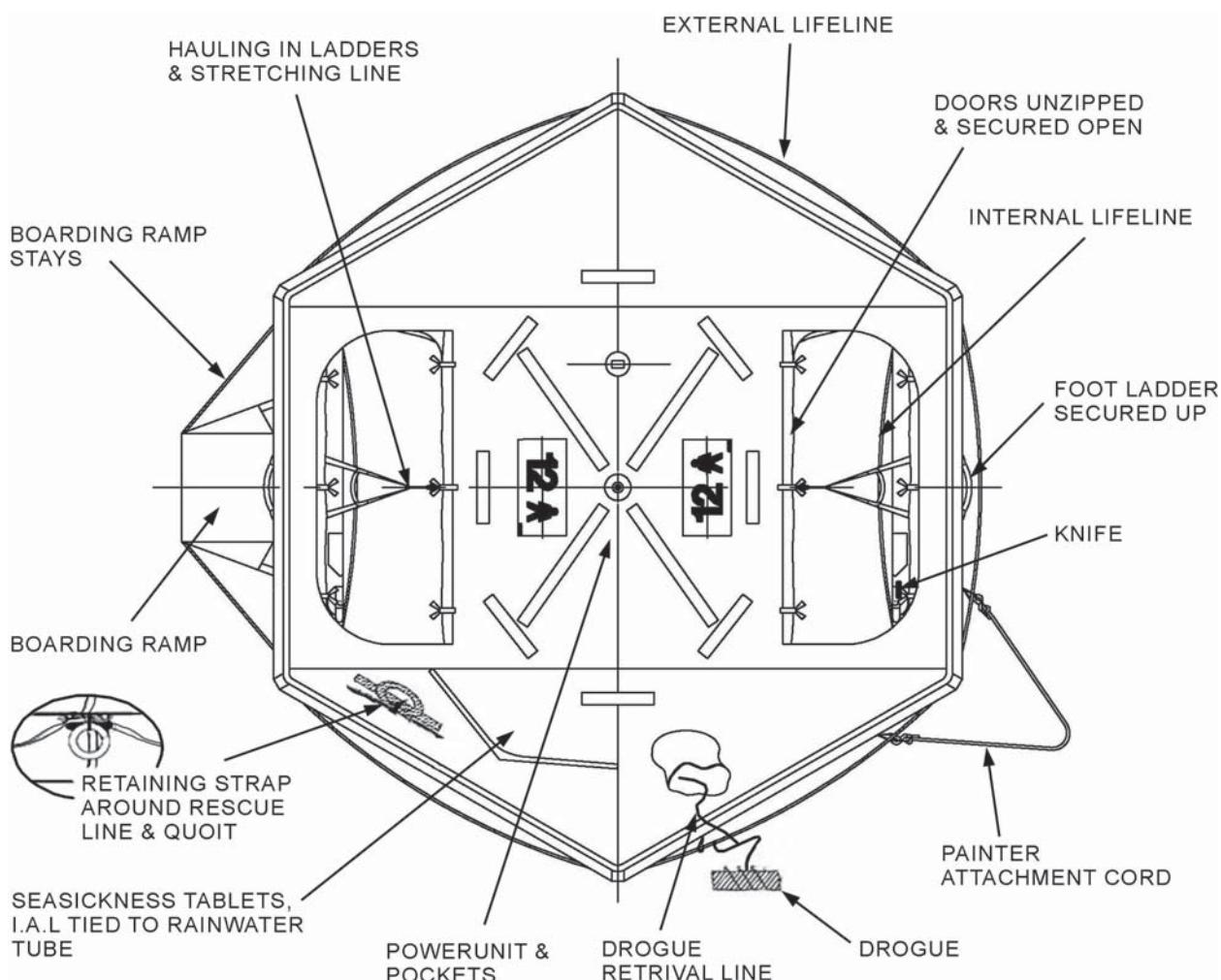
Appendix 2

Appendix for ISO 9650 liferafts operationally packed in GLR containers

Section	Title	Page
1.	Preparation of the container.....	A1-3
2.	Packing a Throw Over liferaft into a Flat Pack container	A1-5
3.	Test procedures	A1-24
4.	Container labelling	A1-27



Preparation for packing assembly of 6-8 Person Throw Over
FIGURE A2-01



Preparation for packing assembly for 10-12 Person Throw Over
FIGURE A2-02

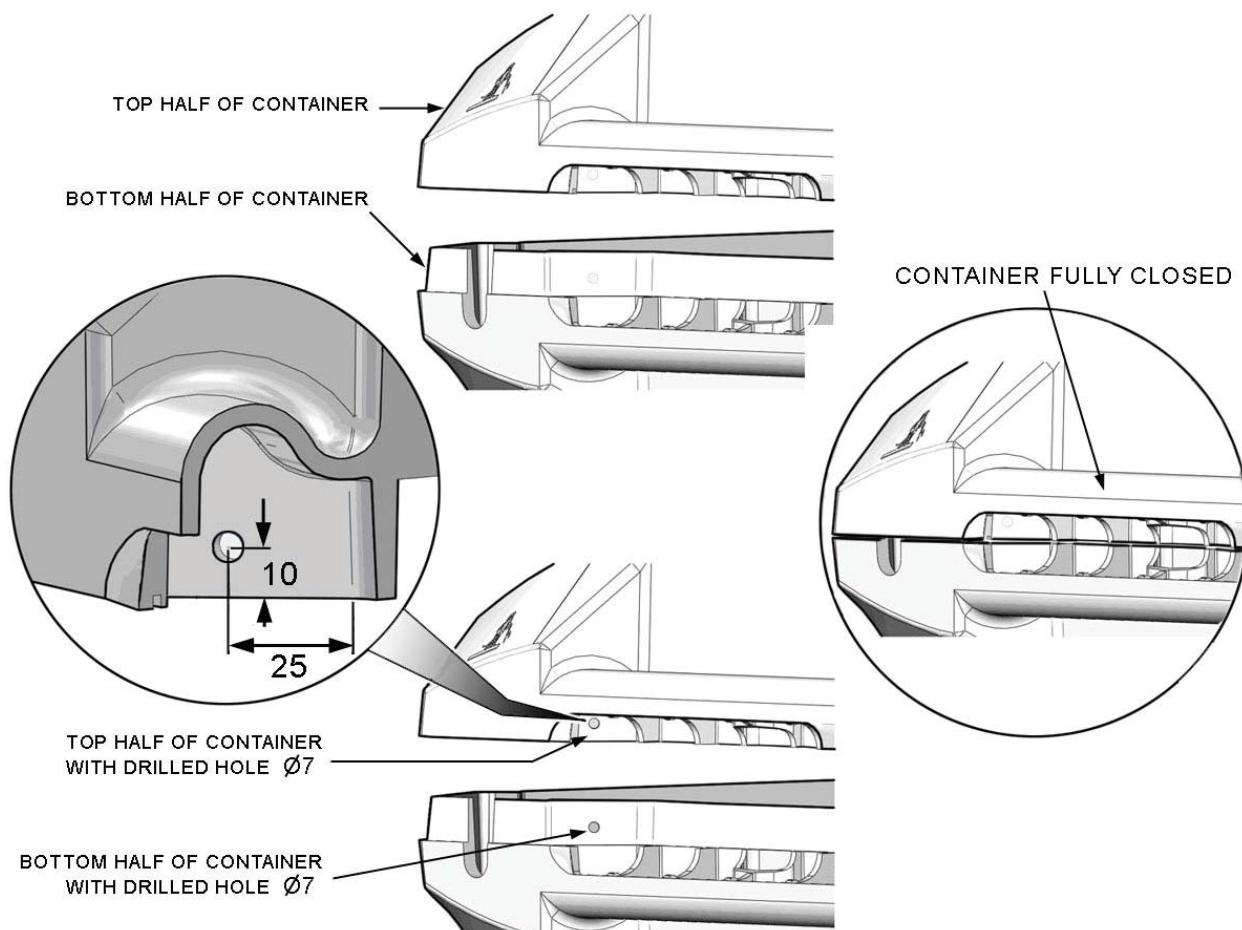
1. Container preparation

The following preparation is used for Throw Over liferafts 6-12 Persons.

- 1.1 Drill drain holes in the container if required. Holes are pre-marked.
- 1.2 Drill rivet holes in Flat Pack, new supply containers only, (FIGURE A2-03):

NOTE: Containers being opened for servicing will have holes present

- 1.2.1 Place the top half of the container onto the bottom half, so that the container is in the fully closed position.
- 1.2.2 Measure the hole positions at the left hand and right sides of the container handle. All dimensions are in millimetres.
- 1.2.3 Drill a 7 mm diameter hole through both halves of the container.
- 1.2.4 Repeat step 1.1.3 for the opposite container handle.



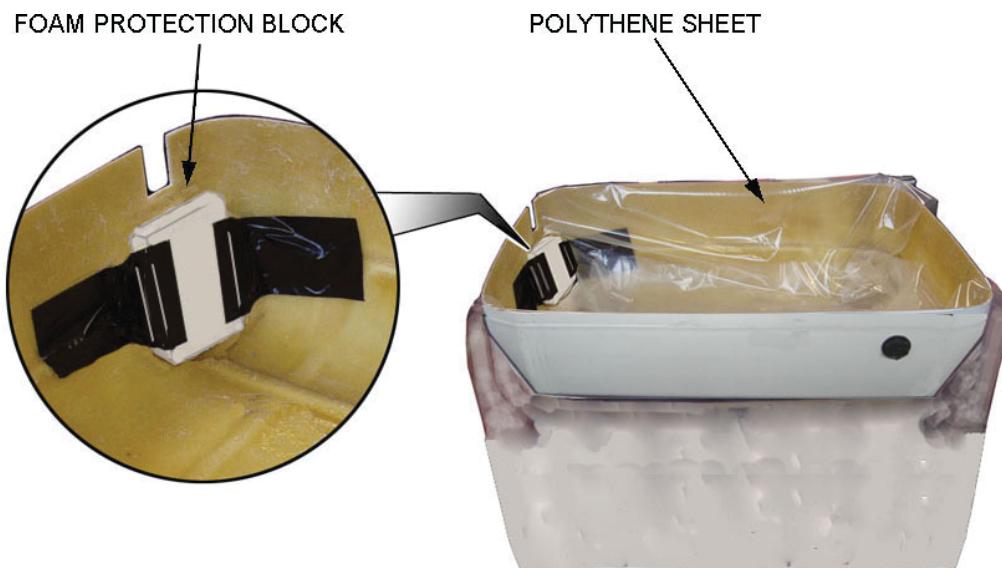
Preparation of Flat Pack container
FIGURE A2-03

1.3 Prepare the container bottom half, (FIGURE A2-04);

- 1.3.1** Fix protection foam block to the inside of the container, This foam block prevents the cylinder operating head from impacting the container side, during handling and deployment.

NOTE: This protection block will need to be cut to the correct size, depending on the container type being used.

- 1.3.2** Line the bottom half of the container with a polythene sheet.
Ensure this sheet overlaps the front edge of the container by 200 mm (8").



Preparation of Flat Pack container
FIGURE A2-04

2. Packing a Throw Over liferaft into a Flat Pack container

CAUTION: DO NOT USE ANY OTHER PACKING METHOD.

Place the liferaft neatly on a packing table in an open area, with enough room to manoeuvre the container during packing. The inflation valves should be positioned adjacent to the edge of the packing table. Ensure all cordage is neat and tidy.

When most of the air has escaped naturally from the liferaft, it must be evacuated as follows:

- 2.1 Connect a vacuum device to a deflation adapter and evacuate all air from each compartment. Re-cap the inflate/deflate valves in each compartment.
- 2.2 As each chamber is evacuated, adjust the buoyancies so that they lie flat on each other.
- 2.3 Remove the transit plug from the operating head and fit each pre-set operating head, (FIGURE A2-05). Ensure the threads on the body of the operating head and cylinder valve are clean.

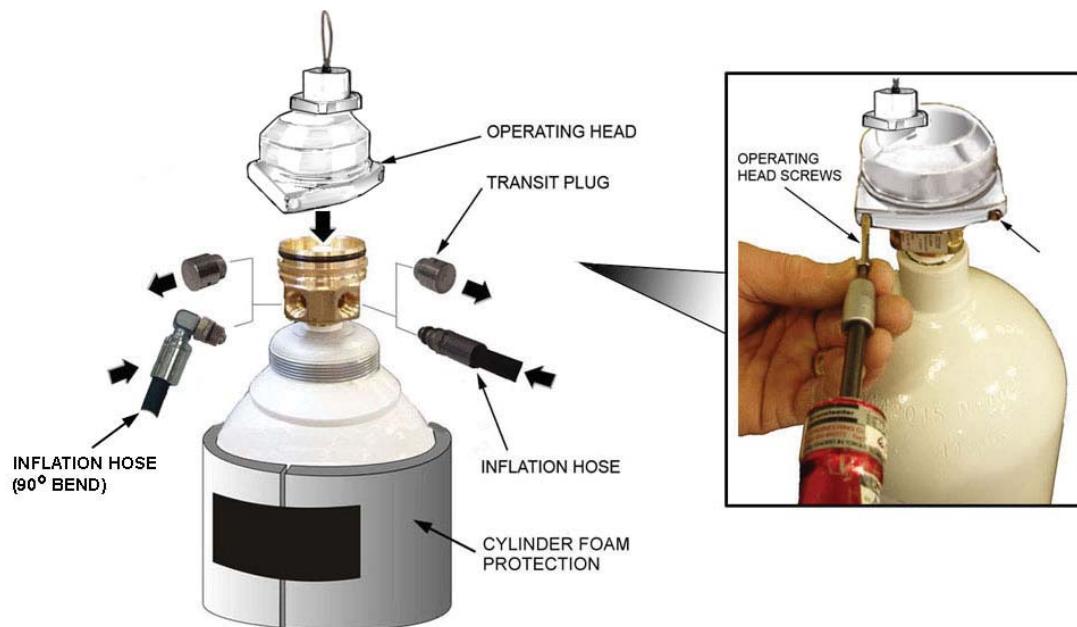
For Leafield equipment, ensure the operating head is pushed firmly on. Use a torque screwdriver, tighten both screws to the correct torque see CHAPTER 1, TABLE 101. The operating head must be tight on the cylinder valve.

WARNING: DO NOT REMOVE THE RECOIL CAPS FROM THE OPERATING HEAD YET.

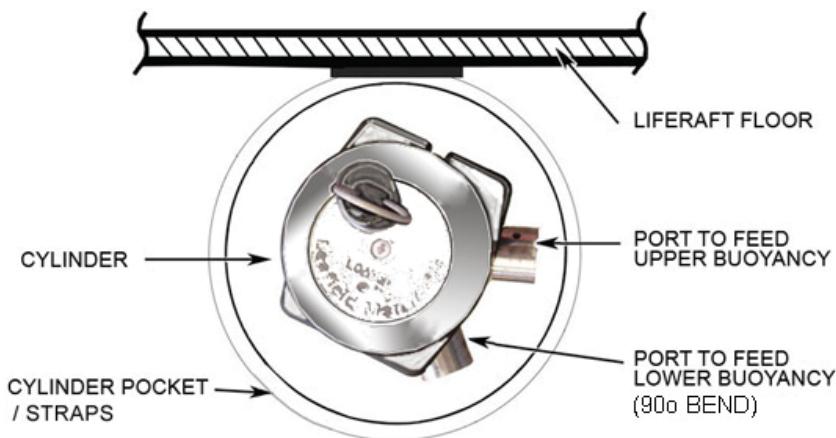
- 2.4 Wrap the cylinder a sheet of white rubazote foam and secure with black tape.
- 2.5 Upturn the edge of the liferaft to reveal the cylinder stowage pocket. Place the cylinder into the cylinder stowage pocket.

The cylinder must be orientated so that one of the operating head outlets runs parallel with the base of the liferaft while the other runs perpendicular towards the water (FIGURE A2-06).

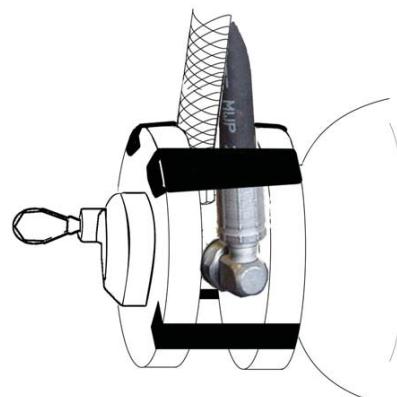
- 2.6 Using the cord attached cylinder stowage pocket tie the cylinder neck securely. Tie with 2 turns around the cylinder neck and a bow knot.
- 2.7 Remove the recoil caps from the operating head.
- 2.8 Connect each inflation hose, (FIGURE A2-05). Torque the hose connections as stated in Chapter 1, TABLE 101. Replace damaged or worn O-Rings if necessary. The bottom buoyancy uses the hose with the 90° ends.



Assembly of inflation equipment
FIGURE A2-05



Cylinder attachment to liferaft
FIGURE A2-06

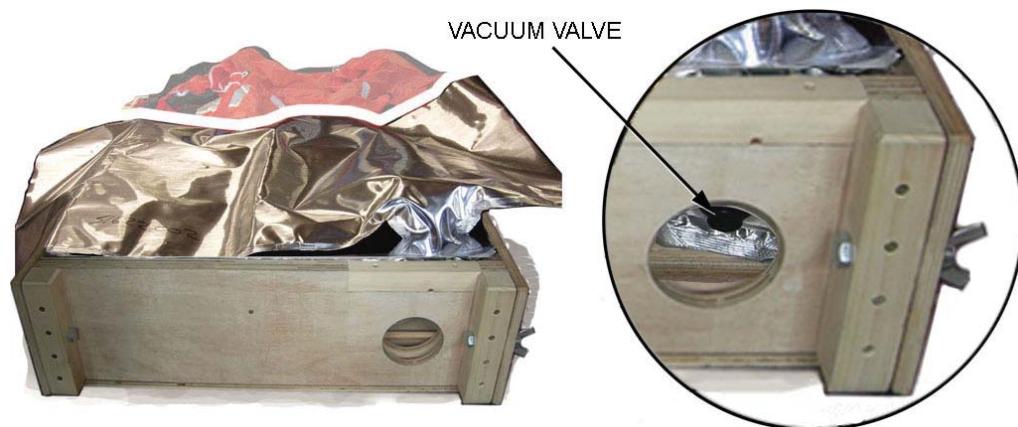


Operating heads protection pads
FIGURE A2-07

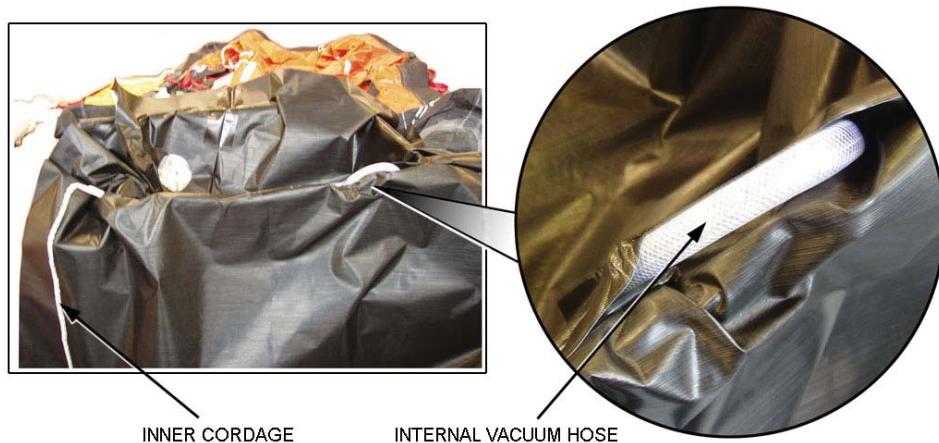
- 2.9 Insert two protection pads onto operating head. Ensure the inflation hoses by pass each other as shown (FIGURE A1-07). Tape both pads together at either side of the upper buoyancy hose. Use 100 mm (4") adhesive tape. Lay the liferaft flat on the table again.
- 2.10 Place the correct size of Hermetic bag (H-Pack), into the bottom half of the jig.
- 2.11 Remove the 36 mm nut and washer from the vacuum valve. Carefully place both nut and washer on a clean surface.
- 2.12 Push the vacuum valve into the pre-cut location on the jig, (FIGURE A2-08). Holding the back of the vacuum valve, attach the washer and nut on the outside of the container. Hand tighten the nut.
- 2.13 Using a torque wrench tighten the vacuum valve nut to the correct torque. Please refer to Chapter 1, TABLE 101 for torque values and Chapter 10 for special tools.
- 2.14 Open the H-Pack and let it hang outside of the jig. Push the H-Pack down into the jig. The inner painter line cordage will be visible, (FIGURE A2-09).
- 2.15 Tape the internal vacuum hose to the container rim, (FIGURE A2-09).
- 2.16 Grasp the liferaft and with the cylinder, drag the assembly over the jig. Place the cylinder at the back of the jig. The cylinder operating head should be close to the jig corner, (FIGURE A2-10).

Leave space to allow for straight pull of line to reduce pull force values.
- 2.17 Using a permanent marker, check and mark each desiccant sachet with the current date and expiry date, (FIGURE A2-10). Initial expiry date is determined as 36 months from the date of manufacture or date to next service, whichever is shorter. Subsequent expiry dates will be from date of each service.

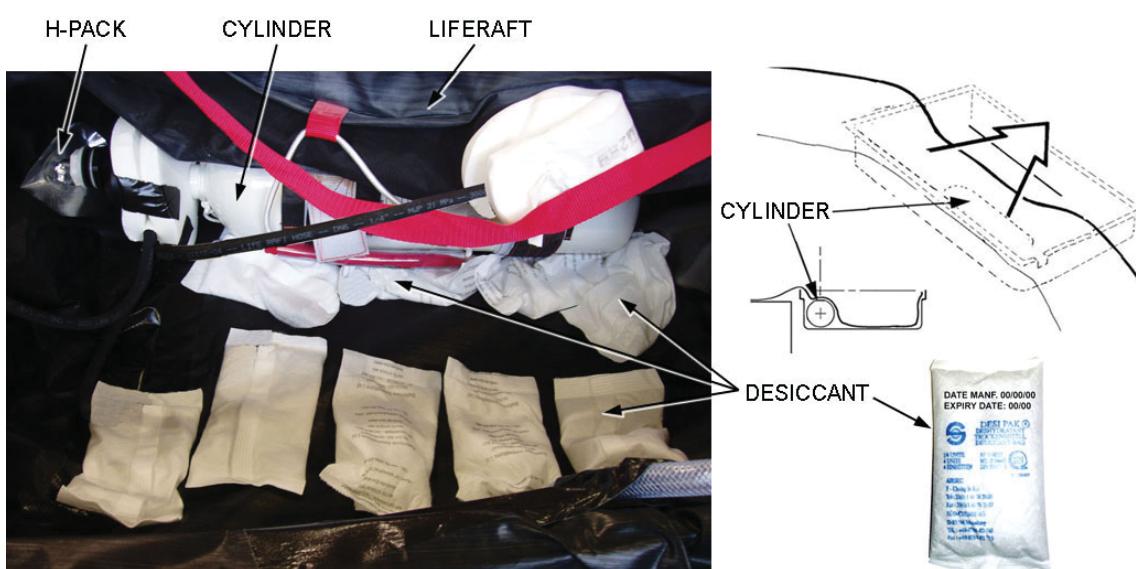
CAUTION: WHEN FOIL BAGS ARE OPENED, THE DESICCANT SACHETS INSIDE, MUST BE SEALED INSIDE THE H-PACK WITHIN 8 HOURS.



Insert the H-Pack
FIGURE A2-08



Inner painter line and internal vacuum hose
FIGURE A2-09



Cylinder placement and desiccant
FIGURE A2-10

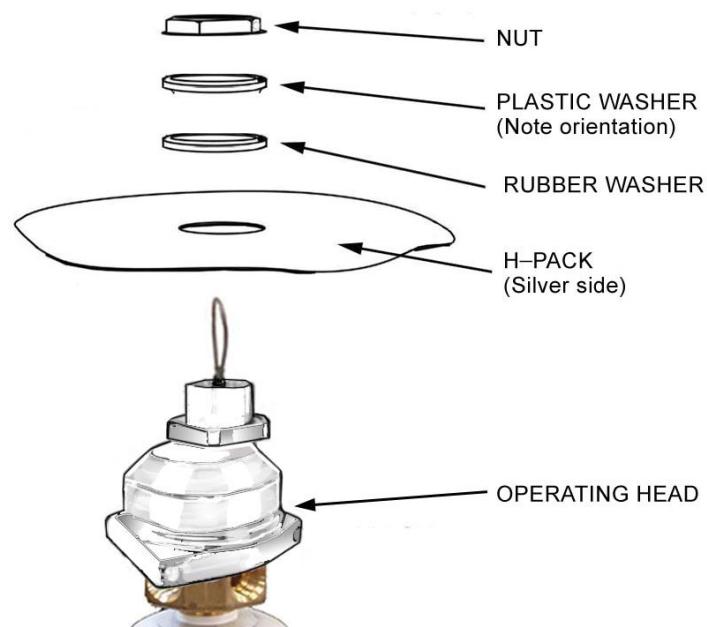
- 2.18 Place 15 desiccant sachets into the H-Pack, spaced out along the cylinder and base of the H-Pack, (FIGURE A2-10).
- 2.19 Fold the liferaft back to reveal the operating mechanism.
- 2.20 Remove the operating head nut and washers. Insert the H-Pack onto the operating head and replace the washer and nut, (FIGURE A2-11).
- 2.21 Using a torque wrench tighten the operating head nut to the correct torque. Please refer to Chapter 1, TABLE 101 for torque values and Chapter 10 for special tools.
- 2.22 Obtain the painter sachet.
- 2.23 Ensure that 2.5 m (100") exits the painter sachet, (FIGURE A2-12).
- 2.24 The firing point is 1.5 m (59") from the end of the line. Measure forward 250 mm from the firing point and mark it clearly, (FIGURE A2-12).
- 2.25 At the firing point, (1.5 m (59") from the end of the line), pass the actuation cable of the operating mechanism through the painter line. Thread the remaining painter line back through the actuation cable, (FIGURE A2-12).

WARNING: THE OPERATING MECHANISM IS NOW ARMED. EXTREME CARE MUST BE TAKEN DURING ALL FOLLOWING ACTIONS.

- 2.26 Insert painter line through the hole in the H-Pack. Pull it through until the 250 mm mark has been reached, (FIGURE A2-13). Tie the painter line off at this point, by splitting the cord and inserting the line through twice, then pull tight.
- 2.27 Ensure the painter cord is firmly attached to the operating head by lightly pulling on the cord, (FIGURE A2-13).

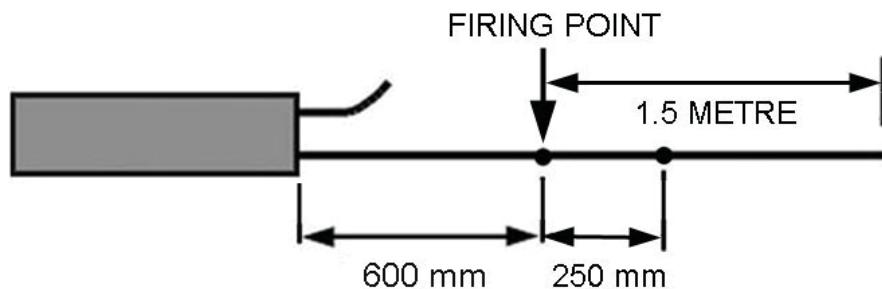
CAUTION: ONLY PULL THE CORD SLIGHTLY SO AS NOT TO DISLODGE THE OPERATING HEAD CABLE. THE INFLATION SYSTEM IS ARMED.

- 2.28 Apply two turns of white tape around the painter cord, (FIGURE A2-13). Fold the end of the tape over on itself to create a pull tail. This will make it easy to remove the tape at the next service.

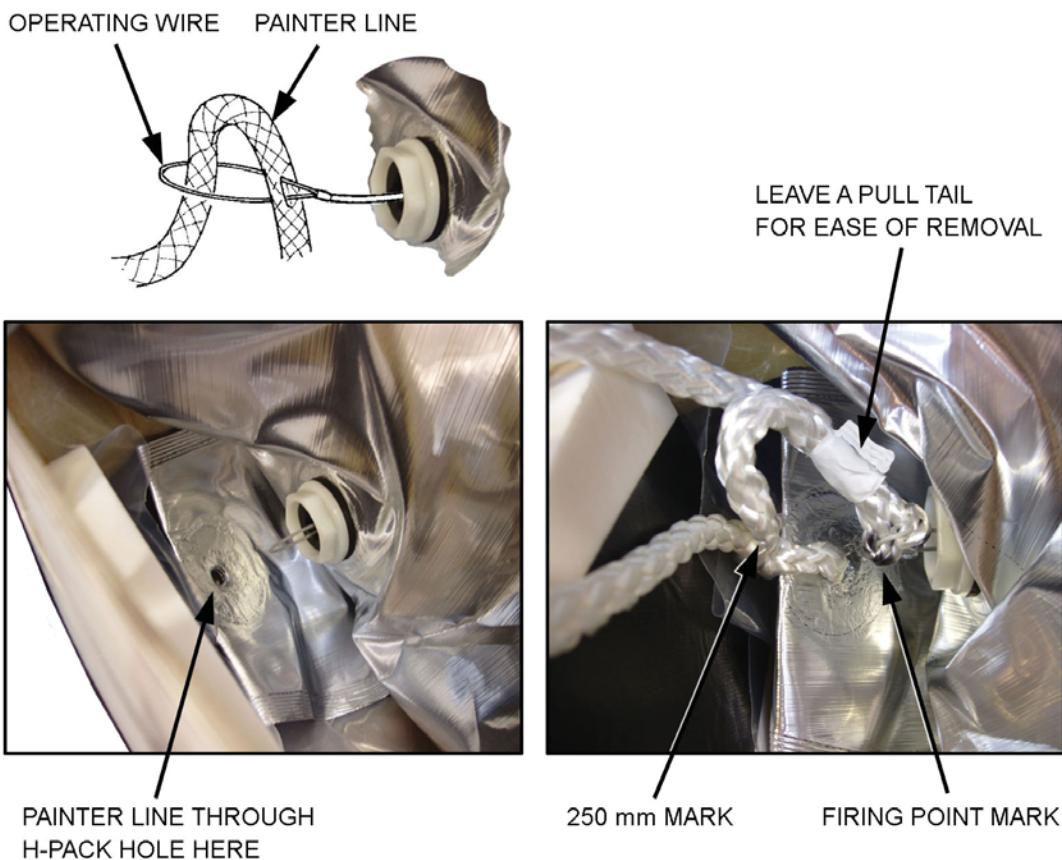


OPERATING MECHANISM SHOWN EXPLODED FOR CLARITY

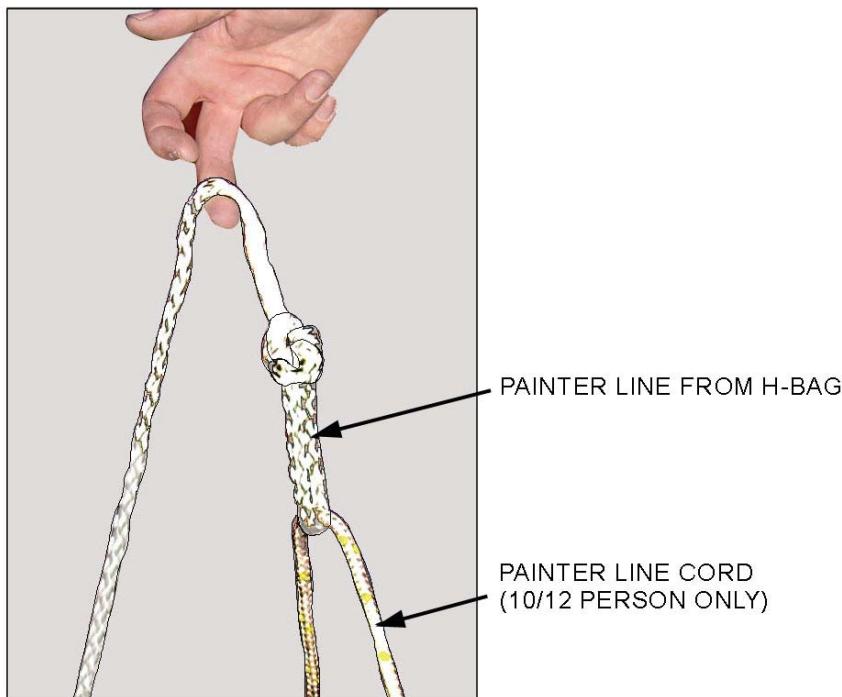
Operating head and H-Pack assembly
FIGURE A2-11



Painter assembly detail
FIGURE A2-12



Operating head attachment
FIGURE A2-13



Tie Painter line to painter cord
FIGURE A2-14

2.29 Using the painter line from the H-Pack, tie it to a strong point on the liferaft, (FIGURE A2-14).

- (a) On 6/8 Person use the liferaft painter patch.
- (b) On 10/12 Person use the liferaft painter cord line.

NOTE: The painter line should be able to move freely along the cord.

2.30 Set the painter sachet to the side of the jig. Ensure the open end of the painter sachet is close to the jig at the painter line cut-out.

CAUTION: EXERCISE EXTREME CARE DURING THE NEXT OPERATION IN ORDER TO AVOID OPERATING THE INFLATION SYSTEM.

2.31 Place the boarding ladder neatly under liferaft, (FIGURE A2-15).

NOTE: Applies to 10-12 Person ONLY.

2.32 Work the liferaft floor area down into the recesses towards each end of the jig.

2.33 Pack the Emergency Pack valises for the liferaft, (refer to Chapter 7). Ensure the straps on each Emergency Pack valise are tight.

2.34 Tie the paddles opposite to each other, (FIGURE A1-17). Place foam padding over the ends of the paddles.

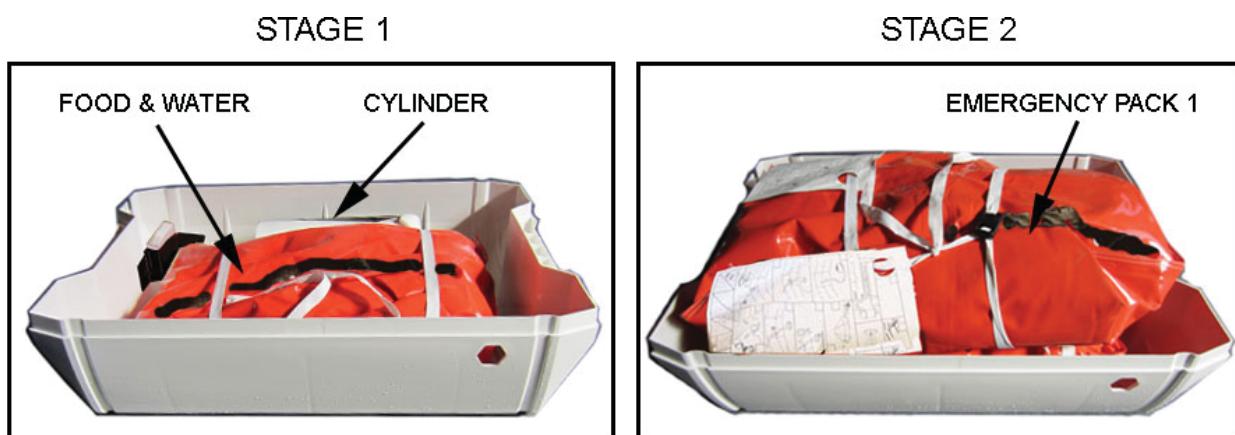
CAUTION: FOR 10-12 PERSON ENSURE THAT THE EMERGENCY PACKS ARE PLACED UNDER THE HAULING-IN LADDER. ENSURE NO PARTS OF THE CANOPY OR DOOR ARE TRAPPED BENEATH THE PACKS.

CAUTION: FOR 6-8 PERSON ENSURE THAT THE EMERGENCY PACKS ARE PLACED UNDER THE ARCH TUBE.



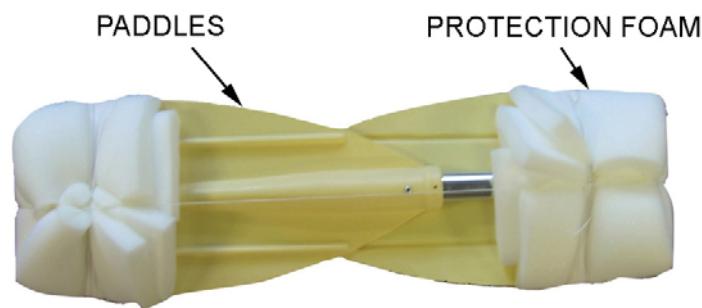
NOTE: For clarity foil bag is not shown.

**Boarding ladder under liferaft
FIGURE A2-15**

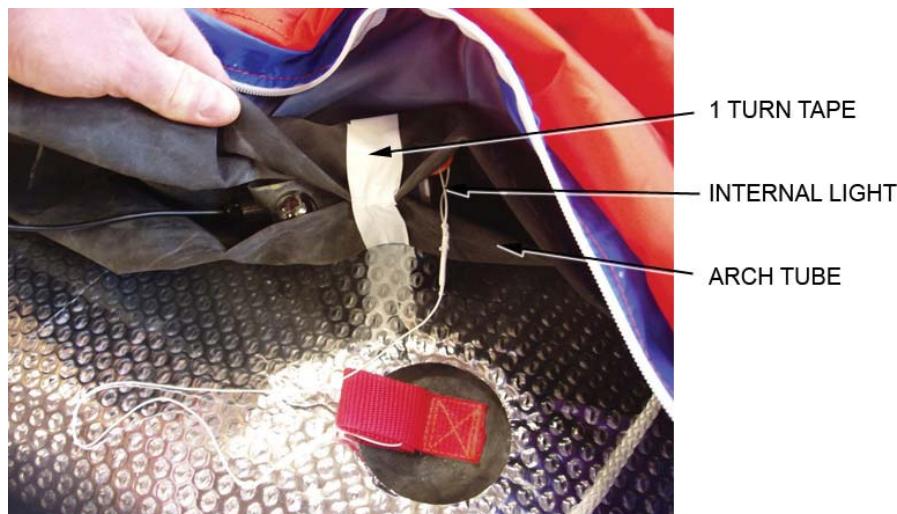


NOTE: Liferaft and polythene sheet removed for clarity.

**Positioning of Emergency Packs into liferaft
FIGURE A2-16**



Paddles tied opposite ends and padded
FIGURE A2-17



6-8 PERSON ONLY - Wrap arch tube around internal light
FIGURE A2-18

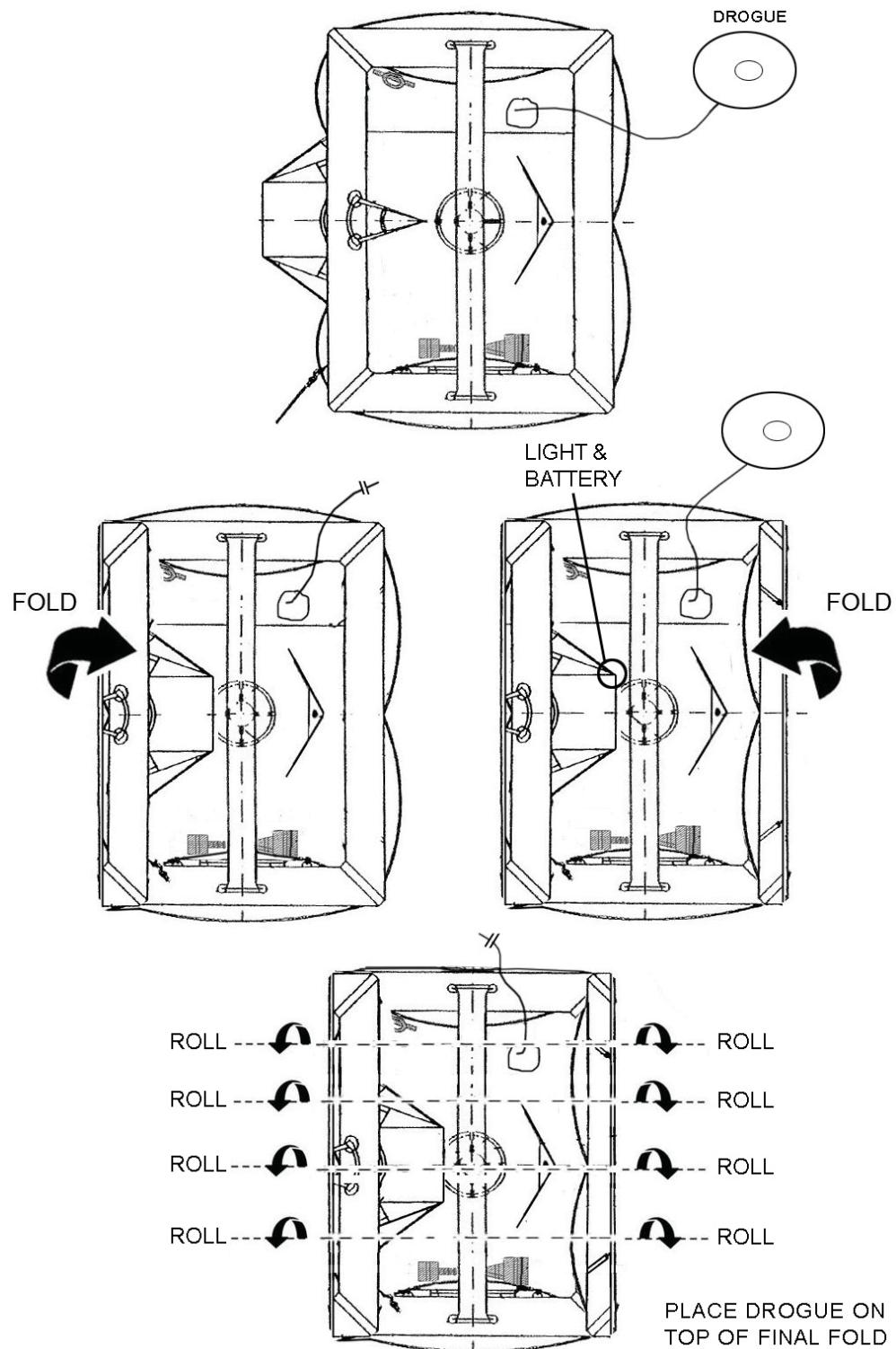


Preparation of liferaft for folding
FIGURE A2-19

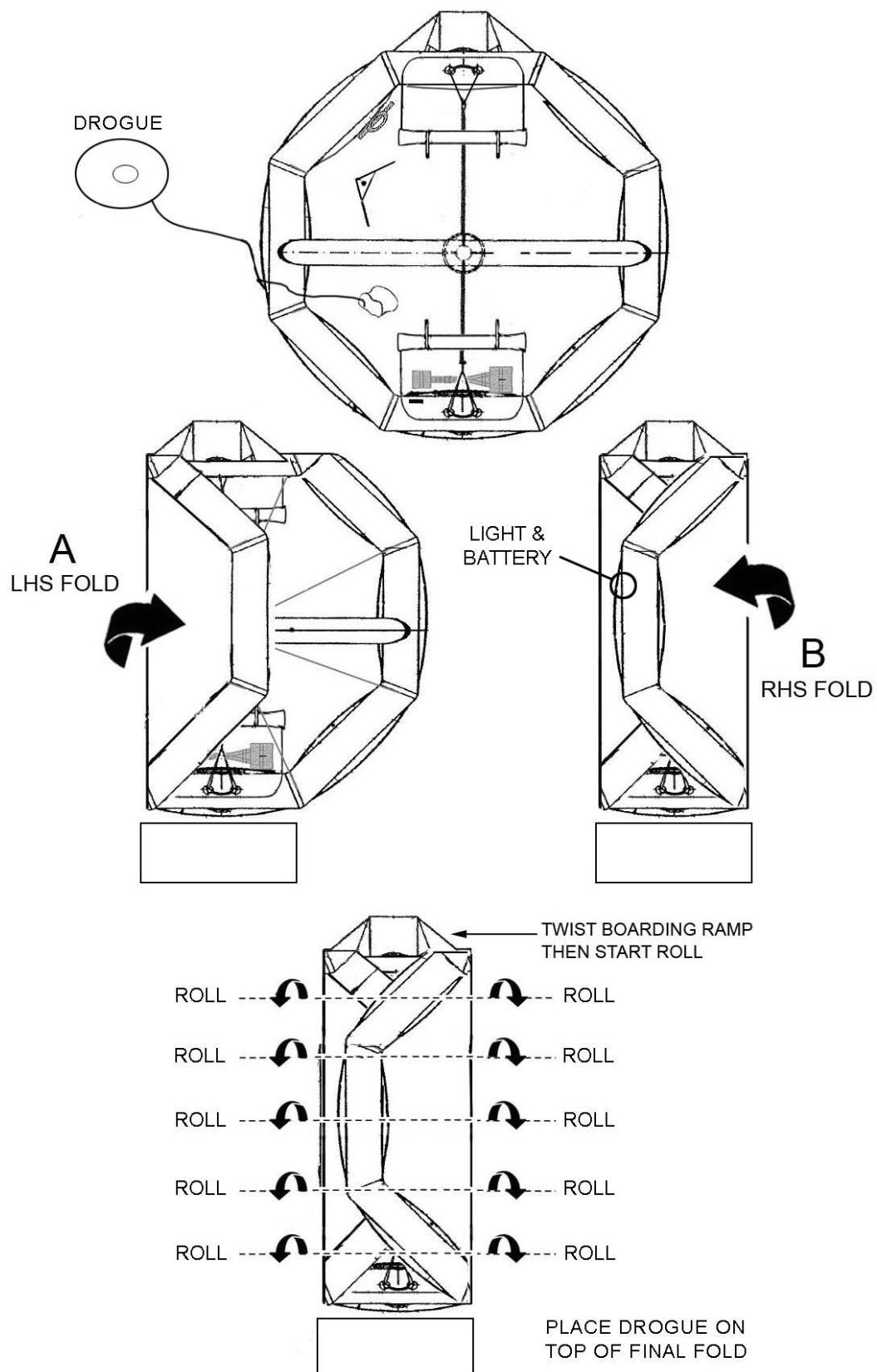
- 2.35 Insert the paddles at the front of the liferaft. Tie them securely to the inner lifeline, using 50 Lbs (22 Kgf) breaking thread.
- 2.36 Place the Emergency packs into the liferaft. Keep the valises as flat as possible, (FIGURE A2-16).
 - 2.36.1 Place Food and Water pack in first.
 - 2.36.2 Place Equipment pack on top.

NOTE: Do not place anything on top of the cylinder.
 - 2.36.3 Using the straps on each valise, tie them to the inner lifeline. Use an overhand knot. This will secure the packs to the liferaft.
- 2.37 Connect a suction hose to each of the two deflation points and fully deflate the buoyancies. These are located at the rear door, 1 on each buoyancy.
- 2.38 Enter the liferaft by the rear door and connect the switch activator to the internal light.

CAUTION: 6-8 PERSON ONLY: WRAP THE ARCH TUBE AROUND THE INTERNAL LIGHT, (FIGURE A2-18).
- 2.39 Wrap the arch tube around the internal light and secure with 1 turn of 25 mm (1") tape, (FIGURE A1-18). This will prevent the tension line from interfering with the lighting switch.
- 2.40 Place the remaining three desiccant bags along the front of the liferaft pack.
- 2.41 Open the liferaft fully out.



6-8 PERSON - Folding the liferaft into Flat Pack container
FIGURE A2-20



10-12 PERSON - Folding the liferaft
FIGURE A2-21

2.42 Prepare to start the sequence of liferaft rolling;

NOTE: The boarding ramp must be twisted and folded down before rolling of liferaft can begin.

For the 6-8 liferaft the boarding ramp must be laid parallel with the fold.

2.42.1 Flat Pack container; Refer to (FIGURES A2-20 to 22).

6 PERSON - 1 fold LHS, 1 fold RHS, then roll.

2.42.2 Flat Pack container; (Refer to FIGURE A2-21).

8-12 PERSON - 1 fold LHS, 1 fold RHS, then roll.

CAUTION: ENSURE THE LIGHT AND BATTERY ARE NOT PLACED ON TOP OF EACH OTHER. BOTH SHOULD BE PLACED TO THE LEFT OF THE ROLL AND OFF CENTRE, TOWARDS THE PAINTER EXIT.

NOTE: If the light and battery are found to be on top of the roll then liferaft must be unrolled and begin again.

2.43 Pressing down as tight as possible, roll the liferaft towards and then into the container. For the 6-8 liferaft ensure the boarding ramp bar remains horizontal with the jig.

NOTE: Liferaft bulk must be in the centre of the container. This will make the closing of the jig easier.

2.44 Open out and place the green drogue on top of the final roll, (FIGURE A2-22).

2.45 Flake the drogue line neatly along the back of the H-Pack, (FIGURE A2-22).

2.46 Wrap the H-Pack over the liferaft, (FIGURE A2-23).

2.47 Tie the loose end of the painter line to the H-Pack, using a bowline knot, (FIGURE A2-23). Tape the flying end.

2.48 Obtain the pre-heated, 150 mm long welding hand tool, (see listing Chapter 10).



6-8 PERSON - Final check
FIGURE A2-22

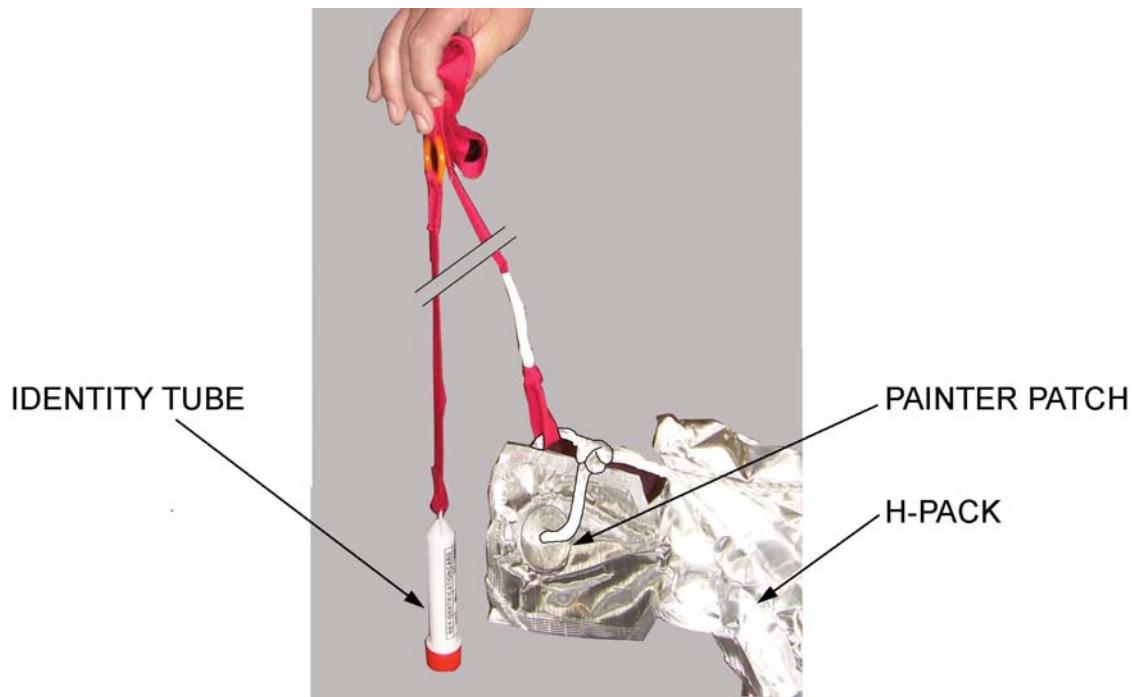


Wrap H-pack over liferaft
FIGURE A2-23

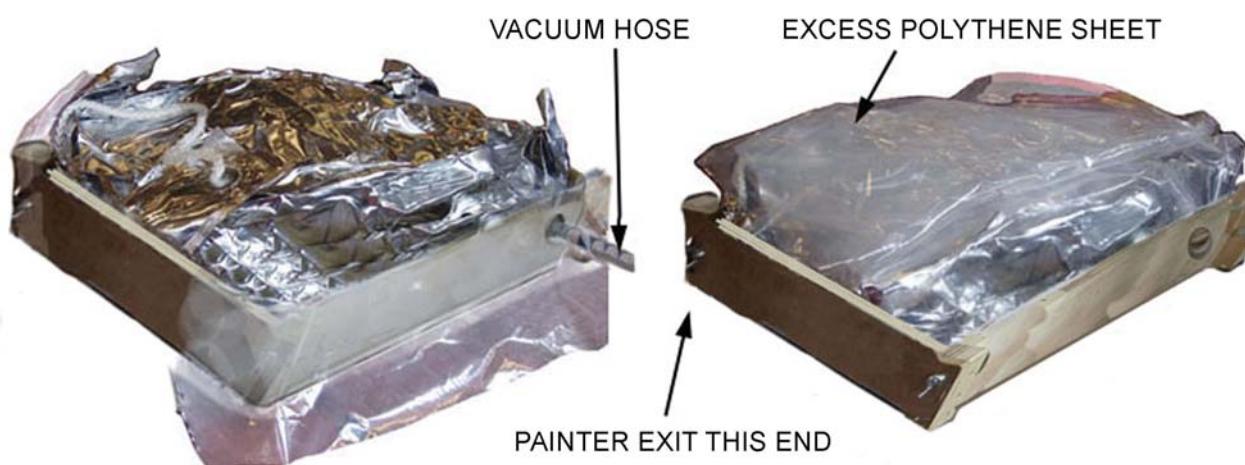


Heat seal
FIGURE A2-24

- 2.49 The two sheets of the H-Pack are joined together using the pre-heated welding tool. This tool is to be used as follows.
 - 2.49.1 The tool should be plugged into a suitable mains outlet and left to heat up on setting three for 5-10 minutes to allow the tool to stabilise.
 - 2.49.2 Test welds are to be carried out on a piece of sample H-Pack to ensure the tool is at the correct temperature and is functioning correctly.
Test the welds by gently pulling the welded edges apart. They must be firmly welded to each other. Repeat if in doubt. Avoid pleats if possible.
 - WARNING:** THE TOOL AND WELDED AREAS ARE VERY HOT, IT IS IMPERATIVE TO TAKE CAUTION WHEN USING THE SEALING TOOL TO AVOID INJURY.
 - 2.49.3 Starting at the left corner of the H-Pack, place the two sheets inside the tool and clamp the jaws of the tool together. Squeeze the tool handles together firmly for 10 seconds, then release hand pressure, (FIGURE A2-24).
 - 2.49.4 Seal the two sheets together along the 150 mm section, (the length of the tool). Slide the tool along the length of the sheet and clamp again to seal the next section.
NOTE: Each weld should be overlapped by minimum 10 mm lengthwise to ensure there are no unsealed gaps left between the sheets.
 - 2.49.5 The heat seal should be completed so that it leaves 15 mm nominal weld width (minimum 10 mm) from the edge of the H-Pack.
NOTE: Take care when sealing the corners of the H-Pack.
 - 2.49.6 The heat-sealing tool should be worked around the perimeter of the H-Pack until it is completed enclosed.
 - 2.49.7 Test the welds by gently pulling the welded edges apart. They must be firmly welded to each other. Repeat if in doubt.
- 2.50 Attach the identification tube securely to the H-Pack, (FIGURE A2-25).
 - 2.51 Remove the vacuum valve plug and insert a vacuum line with correct adaptor.



Tie Identification tube to painter patch
FIGURE A2-25

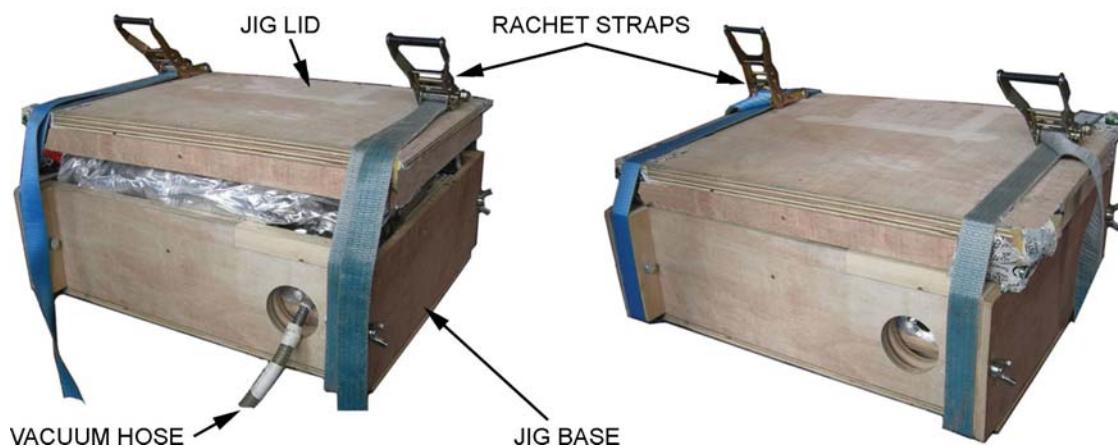


Vacuum H-Pack and wrap polythene sheet
FIGURE A2-26

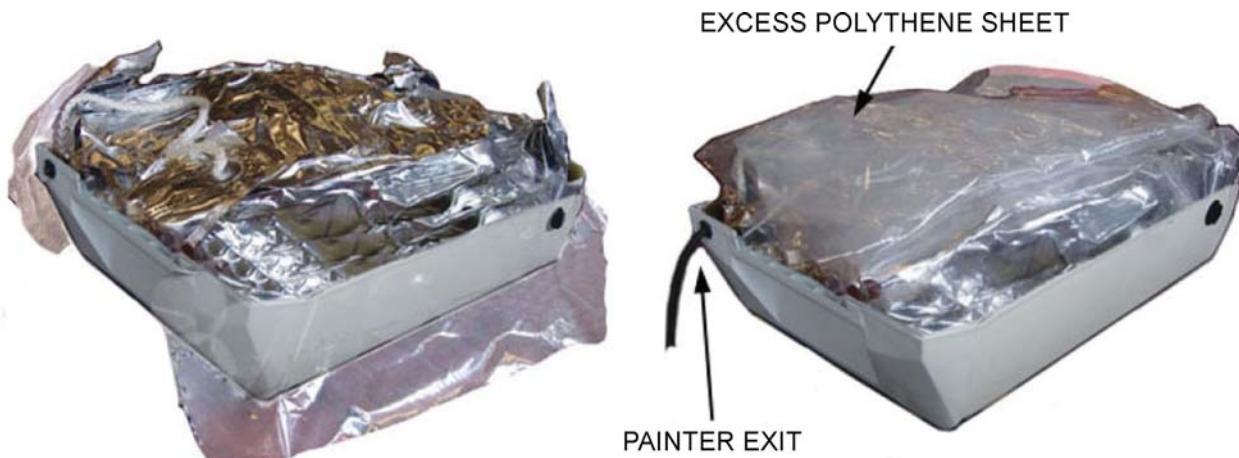
- 2.52 Remove the painter sachet from its temporary position and place it along the side of the jig.
- 2.53 Attach the vacuum hose to the H-Pack plug and vacuum the H-Pack down.
- 2.54 If a leak is detected, repair it with the heat sealing tool.
- 2.55 If the leak cannot be found or repaired, please refer to this Appendix, Section 3, Test procedures, Repair to the H-Pack.
- 2.56 When the H-Pack has been sealed tight, please refer to this Appendix, Section 3, Test procedures. Perform the post operational packing vacuum test (POPVT), before placing the lid onto the container.
- 2.57 If the POPVT is successful, wrap the remainder of polythene sheeting around the outside of the H-Pack. Place any excess on top of the H-Pack, (FIGURE A2-26).

WARNING: REMEMBER THE OPERATING MECHANISM IS ARMED.
EXTREME CARE MUST BE TAKEN DURING ALL FOLLOWING ACTIONS.

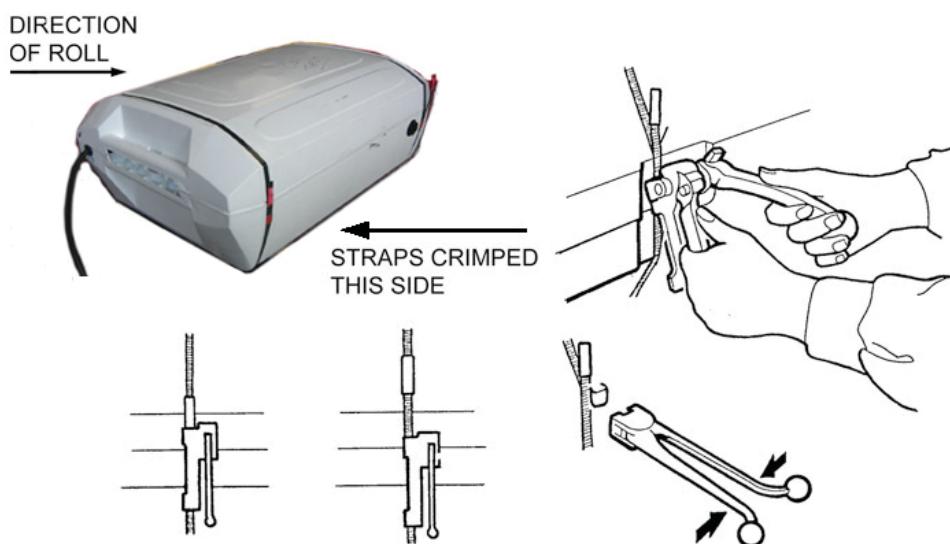
- 2.58 Place the jig lid on top of the H-Pack and attach the ratchet straps, (FIGURE A2-27).
- 2.59 Slowly tighten the ratchet straps until the jig lid has closed fully, (FIGURE A2-27).
- 2.60 After the container has been closed, leave the ratchet straps for a 12 hour period or overnight with the vacuum released.
- 2.61 After the settling period, the H-Pack can now be transferred to the correct container. Remove the ratchet straps and vacuum hose.
- 2.62 Using two people, carefully lift the H-Pack from the jig to the container, (FIGURE A2-28).
- 2.63 Reattach the vacuum hose and vacuum the H-Pack down again. Keep vacuum on until straps and crimps are in place.
- 2.64 Position the Identification tube ring at the edge of the container. It should remain on the outside.



Closing the jig
FIGURE A2-27



Transfer from jig to container
FIGURE A2-28



Crimp straps
FIGURE A2-29

2.65 Place the painter sachet along the back of the container. Attach the painter sachet to the H-Pack, using self-adhesive tape.

- (a) Ensure the painter cord is in line with and close to the painter exit hole.
- (b) Ensure the free run of painter from the sachet is not impeded.
- (c) Adjust the painter sachet extension so that the distance from it to the painter exit is between 100-150 mm (4"-6").

2.66 Insert the rubberised end of the painter line through the rubber grommet.
Insert the rubber grommet into the painter exit position of the jig.

2.67 Place the container lid on top, (FIGURE A2-29).

WARNING: WHEN TENSIONING OR CRIMPING STRAPS, THE OPERATOR MUST STAND TO ONE SIDE OF THE STRAP. PROPER CLOTHING AND EYE PROTECTION MUST BE WORN. PROPER FOOTING AND BALANCE MUST BE MAINTAINED WHEN OPERATING THE EQUIPMENT. USE SHORT HAND STROKES ONLY DURING TENSIONING.

WARNING: TOO MUCH TENSION WILL BREAK THE STRAP. THIS MAY RESULT IN INJURY TO PERSONNEL.

CAUTION: FOR ALL LIFERAFTS, IT IS ESSENTIAL THAT CRIMPS ARE ATTACHED ON THE OPPOSITE SIDE OF THE CONTAINER TO THE ROLL OF THE LIFERAFT.

CAUTION: ENSURE CORRECT CRIMPING TOOLS ARE USED.
(PLEASE REFER TO IPL FOR CORRECT LIST).

2.68 Obtain the straps and crimps. Tension and crimp each strap as follows:

2.68.1 Adjust the ends of each strap so that the outer most strap end is facing upwards and is approximately 25 mm (1") above the rim of the container, (FIGURE A2-29).

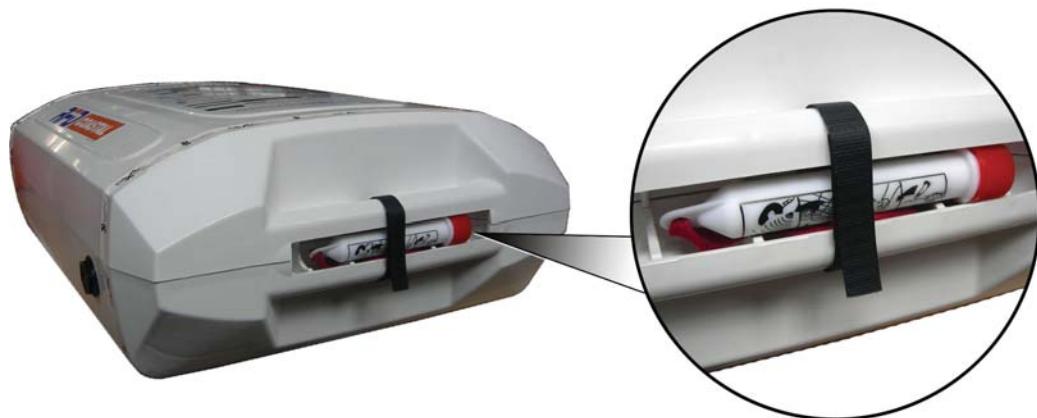
2.68.2 Apply the tensioning tool to the strap at a point half way across the two rims. Operate the handle to tension the strap until the base of the tensioning tool rests in the lower container rim. Secure the strap with a crimp, (FIGURE A2-29), using the crimping tool.

NOTE: It is acceptable to wrap the crimps with several layers of white (1") PVC tape.

- 2.69 Check that the painter grommet or retaining block has not become displaced.
- 2.70 Keeping all straps in place, insert the push rivets into the container handles, (4 in total, 2 for each handle), (FIGURE A2-30).
- 2.71 Place 'DO NOT CUT' tape over the top of each strap.
- 2.72 Remove the vacuum hose.
- 2.73 Remove the ratchet straps if used.
- 2.74 Fit the ID tubes into the space provided in the handles, (FIGURES A2-31 & A2-32). Use self adhesive black webbing to secure both tubes in place.
- 2.75 This completes the packing sequence for the Flat Pack, Throw Over liferaft. The container is now ready for labelling. Please refer to Section 3 of this Appendix, for container labelling.



**Insert push rivets
FIGURE A2-30**



Fit ID tube (RHS)
FIGURE A2-31



Fit ID tube (LHS)
FIGURE A2-32

2.76 Cradle assembly, (FIGURE A2-33)

Please refer to Chapter 11, for cradle assessories and part numbers.

NOTE: The adjustment screws underneath the cradle, allow it to facilite various sizes of container.

- 2.76.1 The completed container is then positioned into the cradle. Place the correct size of webbing strap over the container.
- 2.76.2 Attach one end of the strap to the rear of the cradle using the red release pin.
- 2.76.3 Securely tension the other end of the webbing strap to the HRU with the cord.
- 2.76.4 When the liferaft is to be released, rotate the red release pin upwards to align the keyway and pull it out.



Cradle assembly
FIGURE A2-33

3. Test procedures

3.1 Post operational packing vacuum test

CAUTION: LIFERAFTS MUST ONLY BE TESTED USING THE CORRECT MANOMETER.

After every service, each liferaft must be subject to this test. This ensures that the liferaft's hermetic seal has not been compromised during service. A record of this test must be completed on a form similar to that in Appendix 4. Such records must be kept by the service station for a minimum of 10 years after the service date.

These records must be available on demand, for inspection by staff of Eurovinil. A similar record must be made when a service station operationally packs a new liferaft.

This test is to be completed after the upper half of the container has been fitted and the straps/crimps are installed. If desired the technician is permitted to perform this test prior to the installation of the container upper half. This will be an extra additional test. This additional test does not need to be recorded. It does not negate the requirement to perform the official test.

3.2 Persons permitted to perform test

The Post operational packing vacuum test may only be completed (including recording – see subsequent Section) by two technicians who are trained, qualified and competent in packing Eurovinil liferafts in question.

3.3 Post operational packing vacuum test details, (FIGURE A2-34)

3.3.1 Ensure the nut, (Item 2), has been torqued correctly. Please refer to Chapter 1, TABLE 1 for correct torque values.

3.3.2 Remove Plug, (Item 1), using the correct tool and a suitable 3/8" square drive wrench.

3.3.3 Insert a standard airline A8 adaptor into the vacuum plug hole. Connected the airline to a vacuum capable of sustaining 5 Psi (gauge).

3.3.4 Vacuum down the H-pack to between 5-6 Psi, through the point from which the plug was removed.

CAUTION:

A VACUUM OF 6 PSI MUST NOT BE EXCEEDED. WORK QUICKLY THROUGH THE FOLLOWING STEP ONCE VACUUM IS APPLIED. THE VACUUM MUST NOT BE LEFT ON FOR EXTENDED PERIODS OF TIME, OTHERWISE DAMAGE WILL RESULT. IT IS RECOMMENDED THAT THE H-PACK SHOULD NOT BE SUBJECT TO VACUUM FOR PERIODS IN EXCESS OF 20 MINUTES.

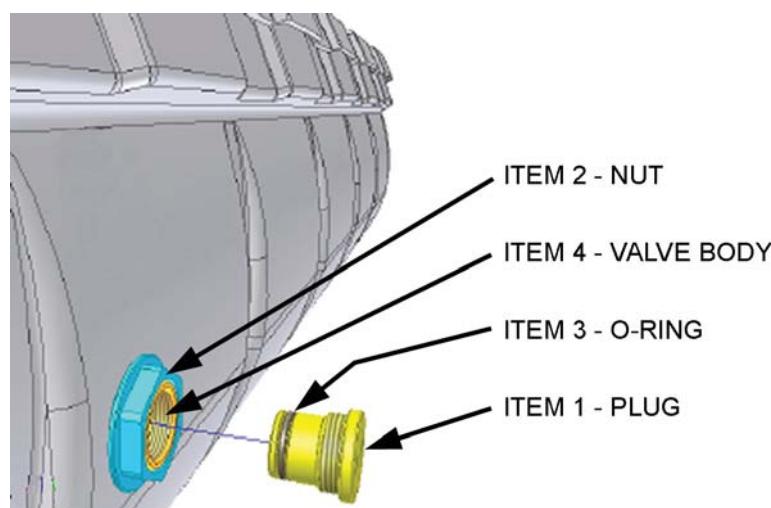
- 3.3.5 Record the exact "Start Pressure". Allow liferaft to remain undisturbed stand for minimum 5 minutes and record "End Pressure".

NOTE:

"End pressure" should not be corrected for atmospheric/temperature fluctuations. During the 5 minute test it is permissible to temporarily bung the valve body using either the plug provided with the H-pack, or a clean rubber bung from a standard Leafield A8 top-up valve. If using the plug, this will form a reliable temporary seal when hand-tightened.

- 3.3.6 Calculate the % gain of pressure (equal to the percentage loss of vacuum). This is calculated as follows:

$$\% \text{ gain} = 100 \left\{ \frac{(\text{Start Pressure} - \text{End Pressure})}{\text{Start Pressure}} \right\}$$



Exploded diagram of vacuum valve
FIGURE A1-34

- 3.3.7 Insert a deflator pin into the vacuum valve body and leave the liferaft to settle to atmospheric pressure. (This takes approximately 5-10 minutes). When atmospheric pressure has been reached, a pressure reading will return 0 p.s.i.
- 3.3.8 Fit the plug provided with the H-Pack (Item 1 FIGURE A2-34). Torque plug into vacuum valve body, using the correct tool and a calibrated 3/8" square drive torque wrench. Ensure that silicone grease does not come into contact with any threadforms on the plug or vacuum valve body.

NOTE:

The plug supplied with H-Pack has an integral O-ring (Item 3 FIGURE A2-34). Silicone grease is already provided on the O-ring. This is sufficient for re-fitting the plug directly, provided the plug has been kept free of contaminants and grease provided hasn't been wiped off. If in any doubt, remove the O-ring using a suitable non-sharp implement and discard. Clean the plug using a clean lint-free cloth and refit a new O-ring coated liberally with silicone grease.

- 3.3.9 Pass/Fail Criteria

RAFT SIZE (persons)	6	8	10	12
PASS CRITERIA - % GAIN MUST NOT EXCEED	30	35	50	50

- 3.3.10 Results of the Post Operational Packing Vacuum Test, shall be recorded on the testing card, Appendix 4. The Start Pressure, End Pressure and % gain are to be recorded. Pass/Fail must be deleted as appropriate. The operational technician or inspector's stamp must be put on the form.

3.4 Repair to the H-pack

If the container is failing the vacuum pressure tests, please carry out the following steps:

- 3.4.1 Re-apply the vacuum test and check /listen for leaks around the H-Pack.
- 3.4.2 Check all welded seams, operating head seals, indicator valve and vacuum valve.
- 3.4.3 If a leak is detected, repair it with the heat sealing tool.
- 3.4.4 Finish the packing process.
- 3.4.5 Repeat the Post Operational Packing Vacuum Test.

4. Container labelling

- 4.1 Check that all labels are fitted and positioned correctly and securely (FIGURE A2-35).
- 4.2 Record the liferaft details onto the liferaft identification label and insert it into the identification tube. Check for legibility and correct details.
- 4.3 The liferaft identification container and any excess tether webbing shall be placed between the container strapping and the container.
- 4.4 Tape the IAL compact disc to the container.
- 4.5 This completes the packing sequence and the liferaft is now ready for installation.

5. Container IPL

- 5.1 Please refer to TABLE A2-01 for Flat pack container part numbers and assessories.

ABS Container label identification and position

1		Description:	Label, ABS container data
		Found on:	All ISO ABS containers
		Part Number:	51791001
2	A	Description:	Label, branding
		Application:	All ISO GRP containers
		Part Number:	51797001
	B	Part Number:	51797002
	C	Part Number:	51797004
	D	Part Number:	51797005
	E	Part Number:	51797006
	F	Part Number:	51797007
	G	Part Number:	51797008
3		Description:	Label, s/a Firing lanyard
		Found on:	EV & RFD ISO liferafts
		Part Number:	E15110129
4		Description:	Tape, Cross & Scissors
		Found on:	RFD ISO liferafts
		Part Number:	15384002
5		Description:	Velcro strap
		Found on:	Liferafts (4 & 6 Persons)
		Part Number:	51801051



Container label positions

FIGURE A2-35

LESS THAN <24				Container accessories required				Container accessories (Optional)			
Persons	Pack	Container used	Number of straps	Part number	Description	Qty	Part number	Description	Qty	Part number	Description
4		51801001									
6		51801002									
8	< 24 Hr	51801002	2	08166009	Rivets	4	51801041	ID Tube assembly	1	51801051	ID tube strap
10		51801003									
12		51801003									
 GREATER THAN >24											
4		51801002	2	08166009	Rivets	4	51801041	ID Tube assembly	1	51801051	ID Tube strap
6		51801003									
8	> 24 Hr	E99991584			N/A						
10		E99991585	2								
12											

Flat Pack container
TABLE A2-01

NOTE: For Valise options please refer to Chapters 1 & 11

APPENDIX 3

Leisure Liferaft Configuration

The following information details the changes that apply to Leisure liferaft configurations only. The packing procedures remain the same.

1. Chapter 8 - Install the lighting system.

- 1.1 Replace the external light with the RL1 light and RB2 battery.
- 1.2 Insert one power unit into the battery pocket.
- 1.3 Insert the lamp plug into the power unit, ensuring the pins have engaged. Secure the plug to the adjoining tethering loop, using light cable ties (05789009). Ensure the joint of the cable tie is into the tethering loop.
- 1.4 Depress the test switch to check that the lamp unit illuminates.
- 1.5 Using the appropriate length of 23 Kgf thread, tie one end around the powerunit toggle. Using a bowline knot, secure the remaining end to the nearest light activation tie off point. Seal the flying ends with 25mm PVC tape (02096004).

2. Chapter 8 - Remove the thermal floor.

- 2.1 Carefully remove the thermal floor if it is installed.

3. Chapter 8 - Emergency packs / Containers.

- 3.1 Use the <24 configurations throughout the manual for the Emergency packs and Container sizes.

4. Chapter 11 - IPL additional spare parts.

	Description: Lamp unit, external (RL1)
	Found on: Archtube assy
	Part Number: 06727009
	Description: Power Unit, Marine (RB2)
	Found on: Inner Canopy
	Part Number: 06729009

RECORDS OF POST OPERATIONAL PACKING VACUUM TEST Service Station Name
(As defined in Service Manual M282 P/n 08863009) Service Station ID No.

Pass criteria is dependent on raft size - Refer to relevant manual for details

This form must be kept by the service station for a minimum of 10 years after the earliest test date on this sheet.
These records must be made available on demand for inspection by Eurovinil staff.

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