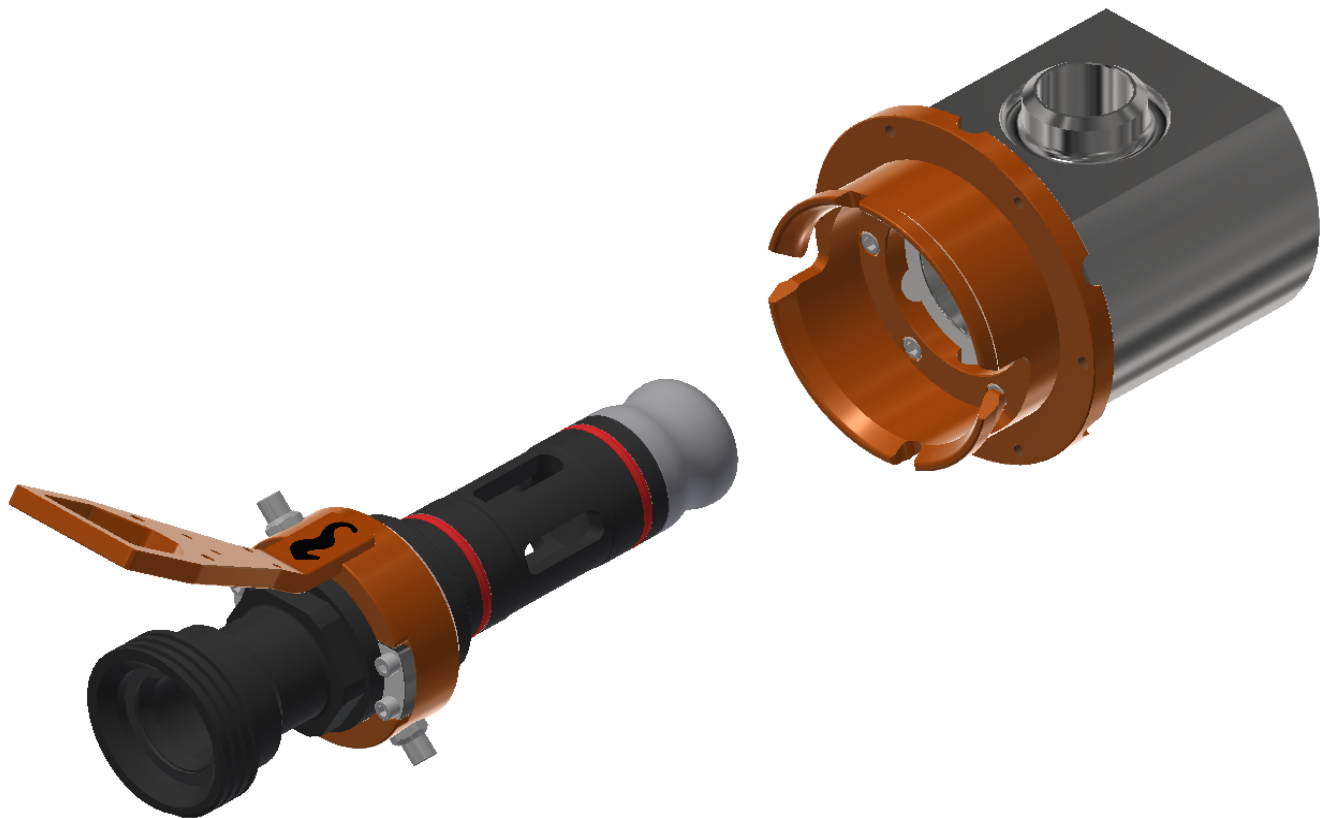




TECHNICAL DOCUMENT

DOCUMENT TITLE: Operation and Maintenance Manual Ø100 API 17H 3rd edition
Type 4 Hot Stab Program
PROJECT TITLE: 600159 -Ø100 Hot Stab System
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OBJECTIVE

The objective of this document is to present an Operation and Maintenance Manual for the Blue Logic Ø100 Hot Stab Program delivered by Blue Logic. All relevant aspects with regards to safe and correct use, installation, operation, maintenance and storage are covered.

ABSTRACT

The Blue Logic Ø100 Type 4 Hot Stab program is a High Flow Hot Stab system designed according to API 17H 3rd edition Type 4, for operation by use of ROV. The system consists of Male Hot Stabs, Receptacles and related equipment and components.

For full program overview and further technical details, please visit:

<http://e-sea.bluelogic.no/main.aspx>

REVISION CHANGE/RECORD

REV	REASON FOR REVISION/ DESCRIPTION OF CHANGES
01	Issued for Use (Copy from 600141-TD-0003 Ø80 Stab)
02	Update according to API 17H 3rd edition

TABLE OF CONTENT

1. INTRODUCTION 5

1.1. DOCUMENT USE..... 5

1.2. REFERENCES..... 5

1.3. ABBREVIATIONS..... 5

2. TECHNICAL DESCRIPTION..... 6

2.1. DESIGN AND TEST 6

2.2. TECHNICAL PERFORMANCE..... 6

2.3. PROGRAM OVERVIEW 7

2.4. HOT STAB..... 7

2.4.1. Hydraulic Ports 7

2.5. PRESSURE STAB..... 8

2.6. PROTECTION STAB..... 9

2.7. ADDITIONAL LOCK 9

2.8. RECEPTACLE 10

2.9. TEST PANEL11

2.10. PRESSURE GAUGE12

2.11. CHECK VALVE.....13

3. INSTALLATION.....14

3.1. RECEPTACLE14

3.1.1. Installation of Receptacle.....14

4. OPERATION15

4.1. PRE-DIVE CHECK..... 15

4.1.1. Stab 15

4.1.1.1. Dual Entry Pressure Stab..... 15

4.1.2. Receptacle..... 15

4.2. CONNECTION 16

4.3. DISCONNECTION..... 16

4.4. POST DIVE CHECK 16

TEST PANEL17

4.5. 17

5. MAINTENANCE18

5.1. SEAL REPLACEMENT..... 18

5.1.1. Removal of Seal 18

5.1.2. Installation of new Seal..... 18

5.2. ROV INTERFACE..... 18

5.3. FLEX JOINT 18

5.4. SPARE PARTS..... 19

6.	STORAGE AND TRANSPORT	20
6.1.	PRESERVATION FOR STORAGE.....	20
6.2.	TRANSPORT	20

1. INTRODUCTION

The Blue Logic Ø100 Hot Stab Program is a very compact and light weight pressure balanced high-flow fluid connector system designed for ROV use where high flow and easy connection is required. The system design is based on API 17H 3rd edition Type 4

For a complete program overview, please visit: <http://e-sea.bluelogic.no/main.aspx>

1.1. DOCUMENT USE

This document shall be used as a guideline and reference document with regards to installation, operation and storage of the Ø100 Hot Stab System.

1.2. REFERENCES

<http://e-sea.bluelogic.no/main.aspx>

1.3. ABBREVIATIONS

ROV: Remotely Operated Vehicle
HPU: Hydraulic Power Unit
FAT: Factory Acceptance Test

2. TECHNICAL DESCRIPTION

2.1. DESIGN AND TEST

The Blue Logic Hot Stab program are calculated, designed, tested and documented in accordance with API 6A (ISO10423) and API 17H with regards to calculations, material usage and pressure test. All Hot Stab equipment is pressure tested to 1.5 x Design Pressure accordingly.

2.2. TECHNICAL PERFORMANCE

The Blue Logic Ø100 Hot Stabs are Based on API 17H 3rd edition Type 4. They can be delivered in different types and configuration. Hot Stabs for Permanent use, ROV use, and different pressure ratings. What is important to consider when selecting a Hot Stab is the flow capacity. As the flow increase you will experience pressure loss over the connection. This means that you will have less pressure available to do the hydraulic job.

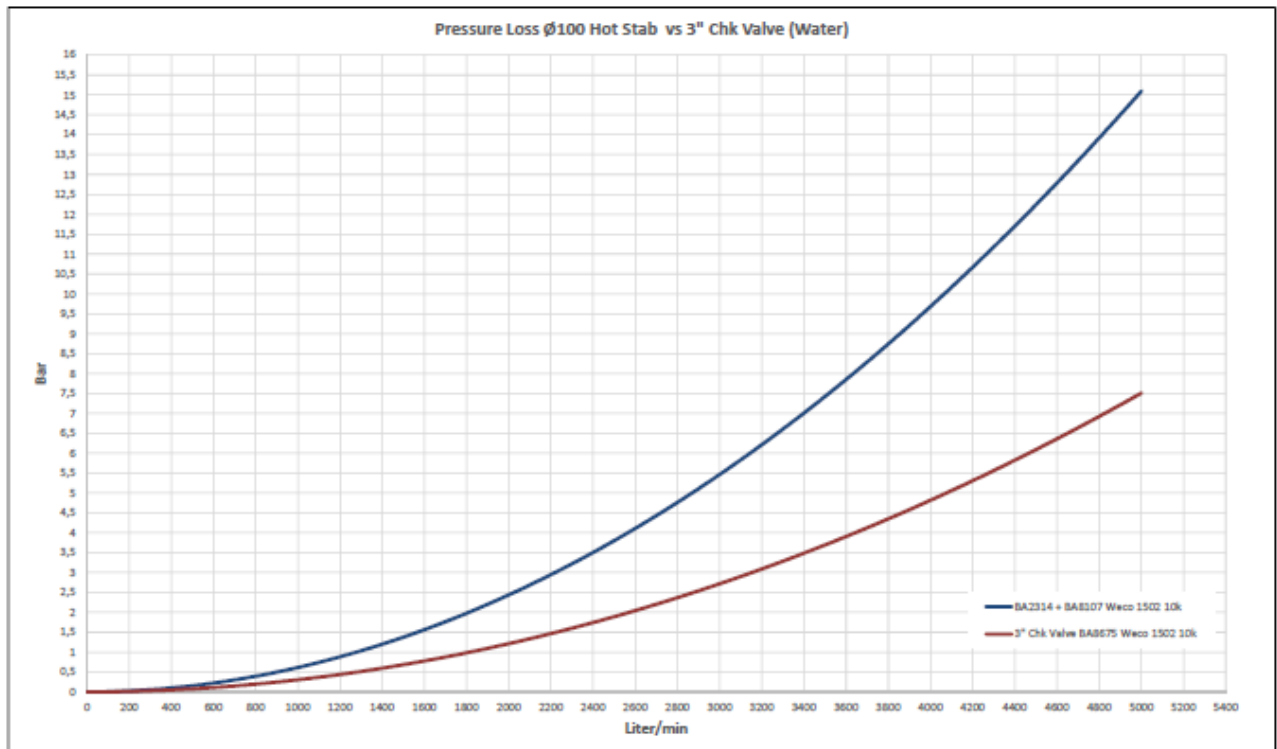


Figure 1 Typical Pressure vs Flow diagram Ø100 Hot Stab

2.3. PROGRAM OVERVIEW

The Ø100 Hot Stab Program can be delivered with alternative ROV Handles, seals and hydraulic interfaces. Contact Blue Logic for further information, or visit:

<http://e-sea.bluelogic.no/main.aspx>

2.4. HOT STAB

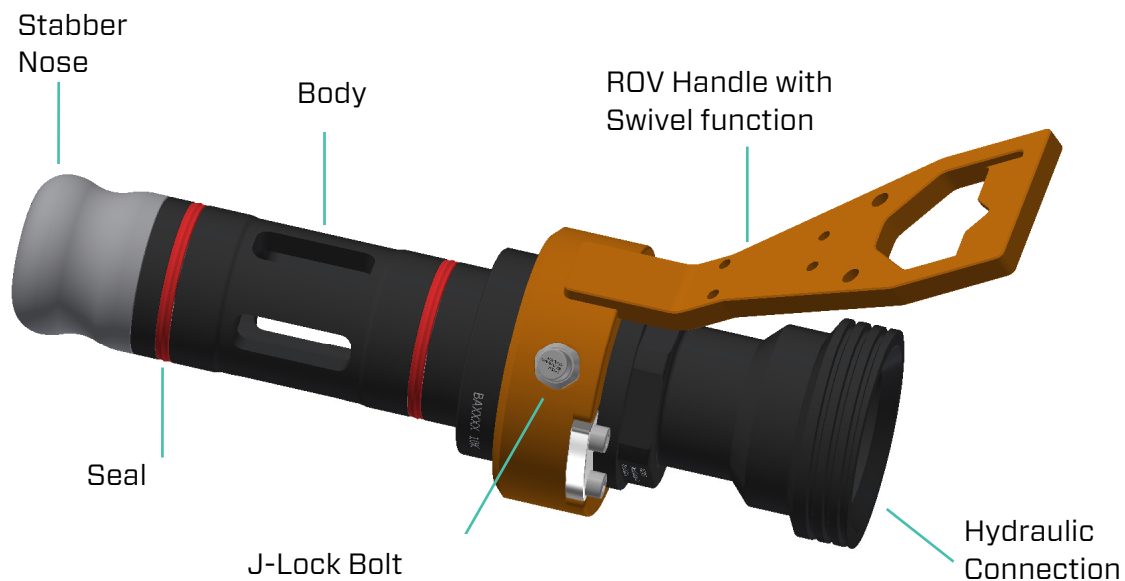


Figure 2 Typical Ø100 Stab with J-Lock Interface and 3" fig. 1502 Weco connection

2.4.1. Hydraulic Ports

The Ø100 Hot Stab is delivered with 3" Fig 1502 as standard but can be delivered with other types of hydraulic connection on request.

Please see product assembly drawing for further detailed information

2.5. PRESSURE STAB

Pressure stabs can be delivered both for intervention and permanent installation.

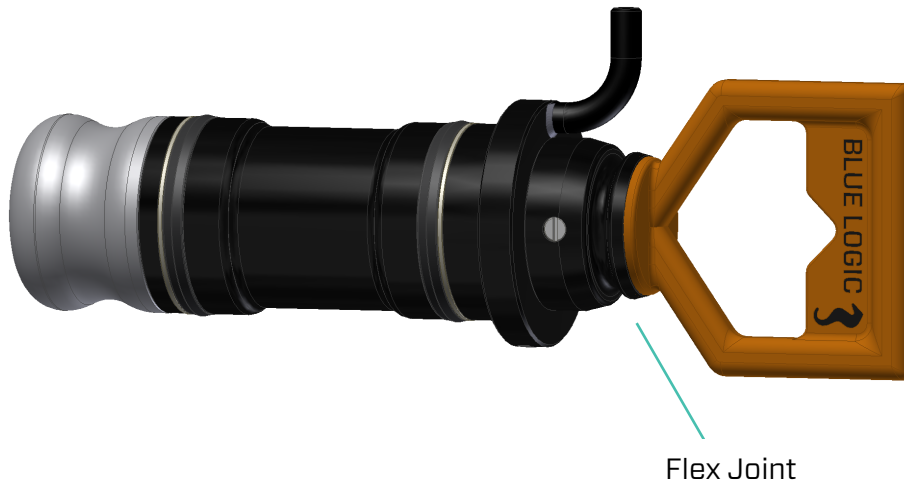


Figure 3 Typical Ø100 Permanent Pressure Stab with J-Lock Interface

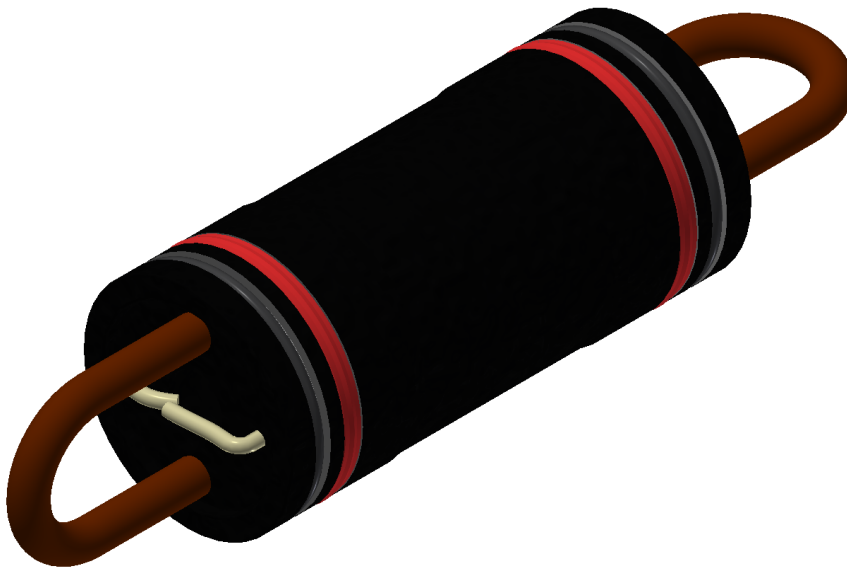


Figure 4 Typical Ø100 Permanent Pressure Stab for dual entry

Dual entry pressure stabs is typically used for pull-in heads and dual entry receptacles. The orange handles are flexible to prevent damage to the seal areas when being stabbed. Because of the flexible handles the stab is not initially made for being inserted into an receptacle by an ROV, only extracted/removed. It has O-rings outside the red seals to keep it from falling from the receptacle before it's intentionally removed.

2.6. PROTECTION STAB

Protection stabs are delivered for permanent installation, both vented and non-vented versions.

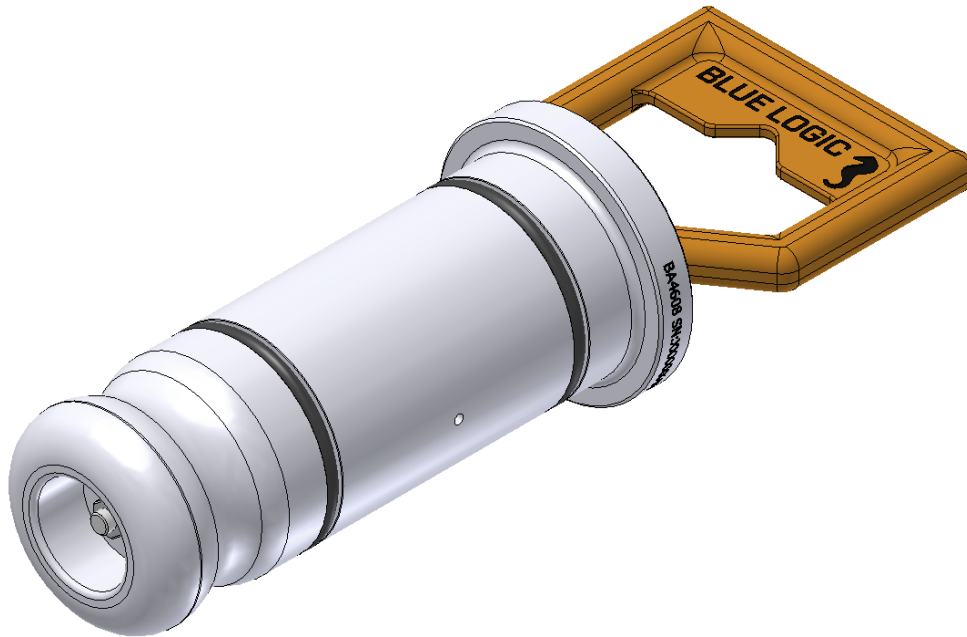


Figure 5 Typical Ø100 Permanent Protection Stab

2.7. ADDITIONAL LOCK

The Ø100 Hot Stab system is locked on place by use of a J-lock function. The stab is inserted into receptacle and then rotated slightly clockwise to lock. This prevents the stab from being pulled from the receptacle. But if the hose with stab is twisted left then the stab might be freed from the J-lock. This is considered unlikely but as an extra safety we can provide a bolt-on spring loaded lock to the Hot Stab. With this ad-on the ROV must pull the spring-loaded lock pin whilst rotating the stab towards left to release the stab from receptacle. There will be fitted a wire-loop, monkey-fist or similar, to the lock pin to make it operable by an ROV.

Anti Rotation Slot

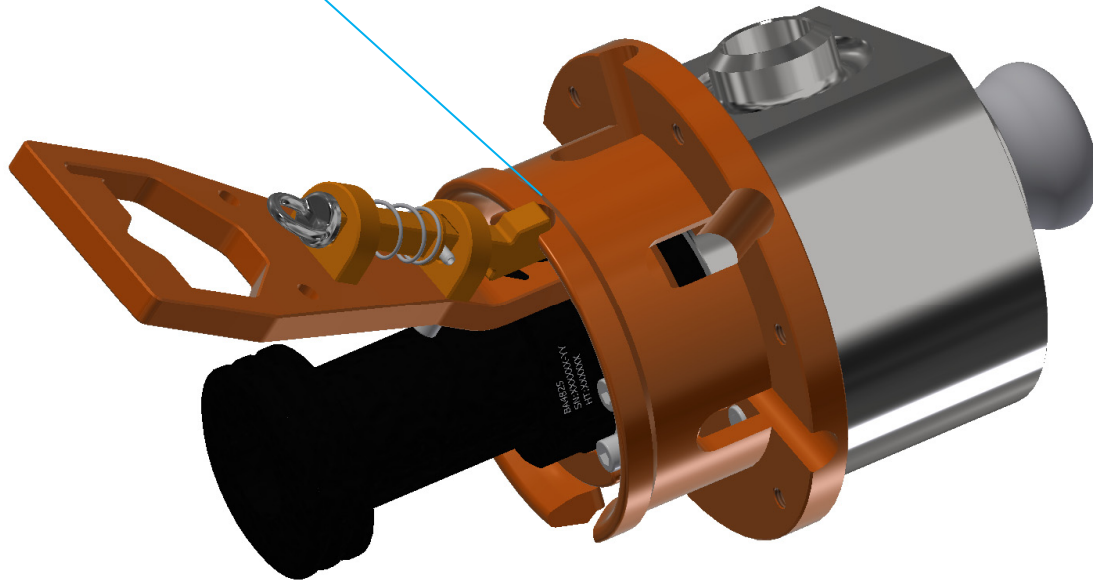


Figure 6 Typical $\varnothing 100$ Hot Stab w. Additional lock installed and inserted into receptacle

2.8. RECEPTACLE

Receptacles are delivered in alternative materials with different hydraulic ports. See product assembly drawing for detailed information

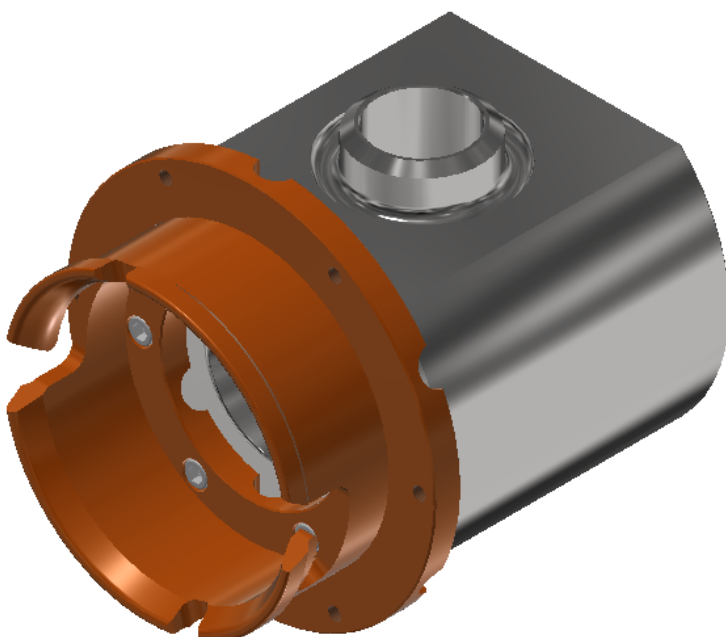


Figure 7 Typical $\varnothing 100$ Single Port Receptacle with J-Lock Interface and Weld Neck

2.9. TEST PANEL

For pressure testing subsea and/or for lowering hoses with pressure, there is a Test Panel available. The panel consists of a receptacle and a ROV valve for bleeding off the pressure. The Test Panel can be placed and locked onto a docking panel subsea by an ROV.

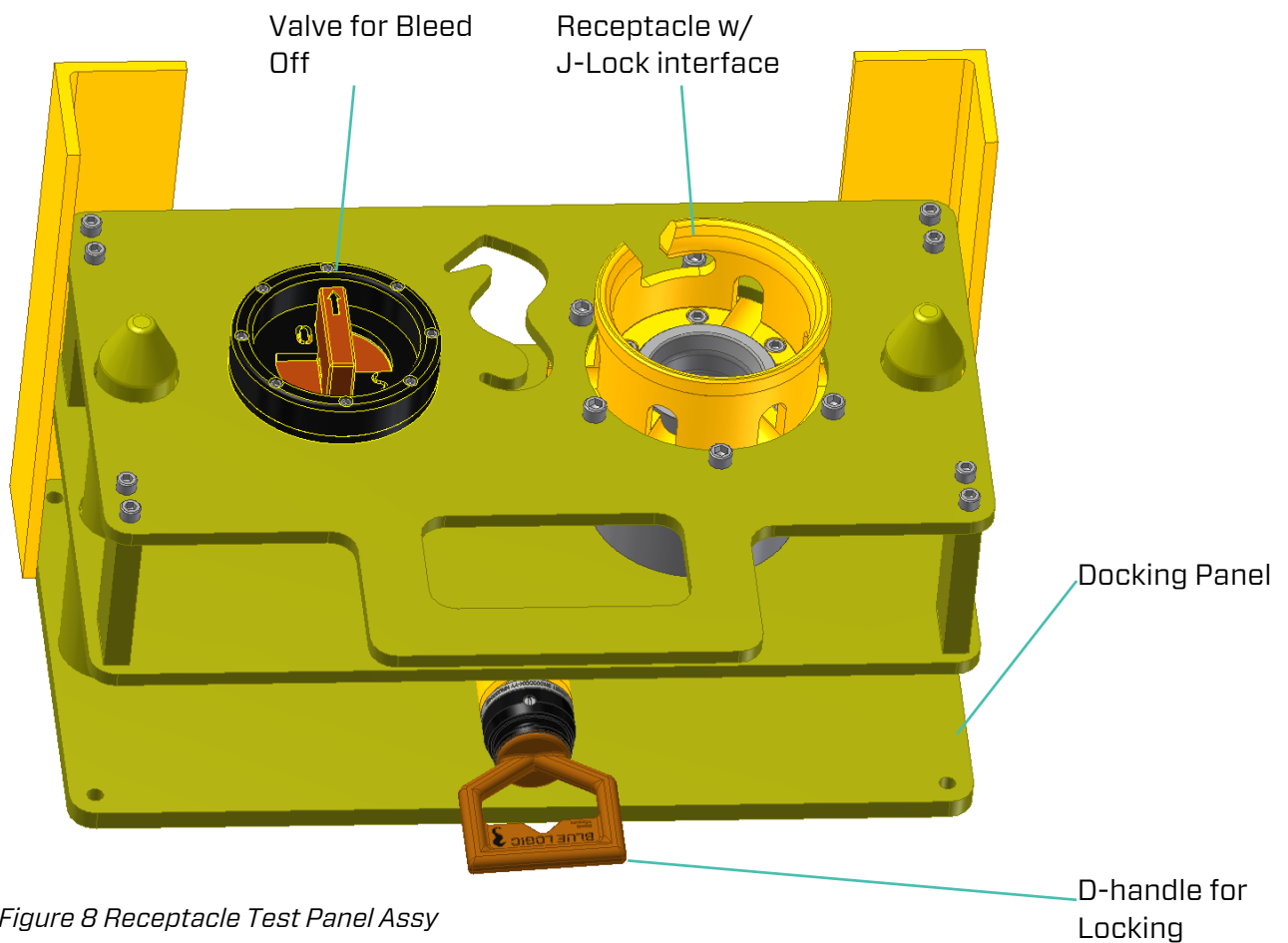


Figure 8 Receptacle Test Panel Assy



2.10. PRESSURE GAUGE

The pressure gauge unit is based on a 3" fig. 1502 Hammer Lug coupling. The unit can be mounted to a Blue Logic Ø100 Hot Stab with 3" fig 1502 Hammer Lug as shown below. The pressure gauge is fully pressure balanced, this means the gauge will show how much greater the pressure is relative to ambient. Different scaling and pressure rating on gauge are available upon request.

$$\Delta P = P_1 - P_2$$

Pressure in system= P_1
Pressure in surrounding environment= P_2
Pressure shown on gauge= ΔP



Figure 9 & 10 Pressure Gauge unit with 0-700Bar scale

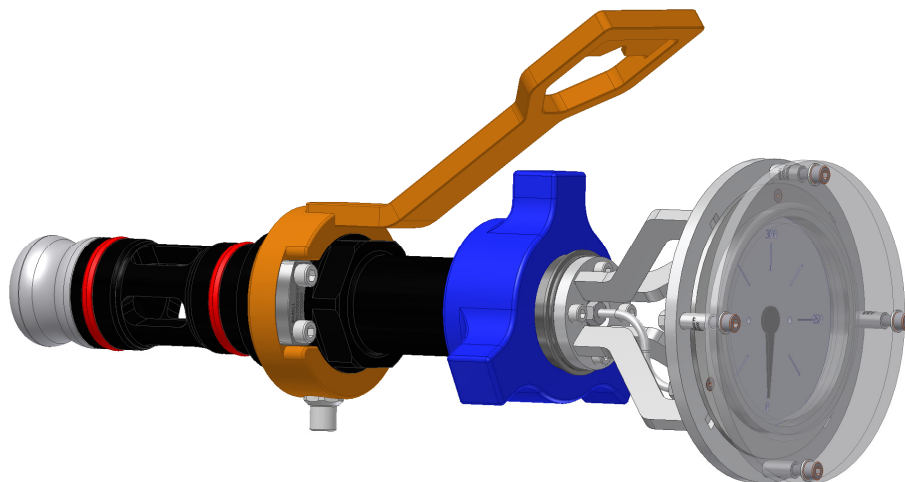


Figure 11 Pressure Gauge fitted on an Ø100 Hot Stab

2.11. CHECK VALVE

One-way check valve for connection to stab or receptacle thru 3" fig. 1502 Weco. The Check Valve will let you extrude the contents without anything returning. Cracking pressure is 2 bar to ambient as standard. Other cracking pressure available on request.

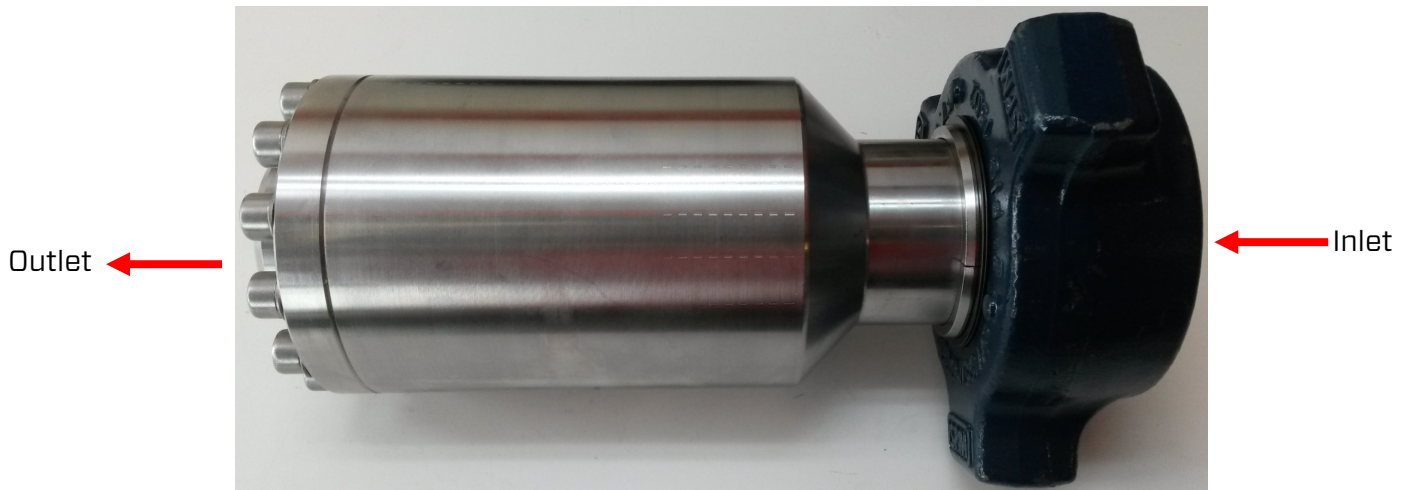


Figure 12 3" One-way check valve w. fig. 1502 hammer lug connection

3. INSTALLATION

3.1. RECEPTACLE

3.1.1. Installation of Receptacle

The Ø100 Receptacle is recommended to be bolted onto the subsea structure by use of the pre-drilled and threaded mechanical interface.

The receptacles may have different interfaces for installing, the interfaces for each receptacle is available thru the Product drawing for each receptacle.

All Ø100 receptacles are symmetrical and can be mounted and stabbed from both sides. Depending on material selection; electrical connection between the receptacles and structure should be verified as part of the installation. Serrated washers or dedicated earth cables should be considered.

A variety of hydraulic port interface can be delivered upon customers' request. Examples shown in below figures.

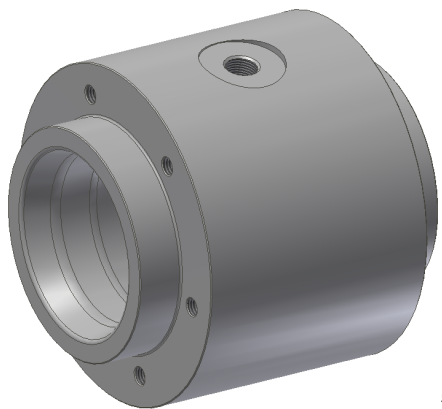


Figure 13 Ø100 Test Receptacle with 3/8" BSP connection, mainly for On-Deck pressure testing

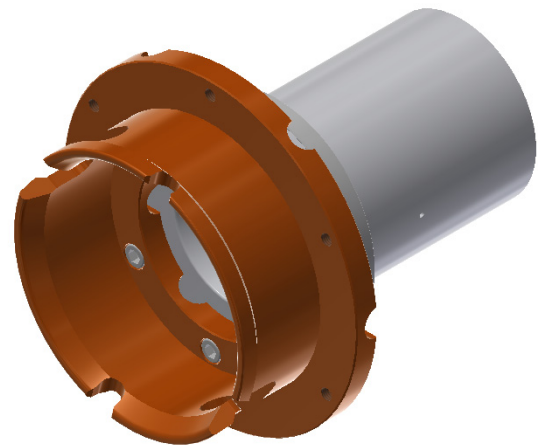


Figure 14 Ø100 Parking Receptacle with J-Lock

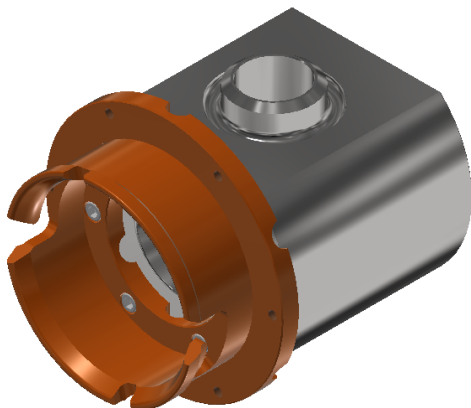


Figure 15 Ø100 Receptacle with 3" WN and J-Lock

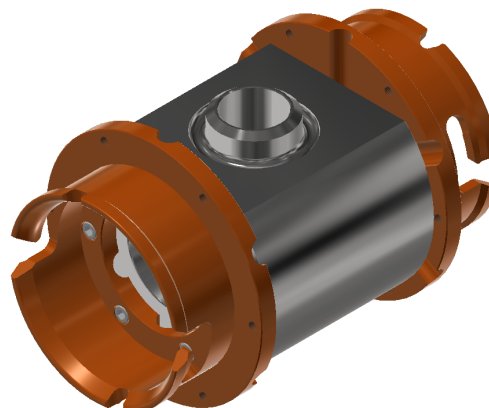


Figure 16 Ø100 Receptacle with 2x J-Lock

4. OPERATION

4.1. PRE-DIVE CHECK

4.1.1. Stab

No.	Description	Chk/Verified
01	Verify all fittings and hoses correct installed and secured	
02	Verify no leakages from hoses and connections	
03	Inspect all seals for damage. Replace if required	
04	Inspect Hot stab nose and body for mechanical damages and harmful scratches	
05	Inspect ROV handle for damages	
06	Inspect flex joint properly secured to stab body and ROV handle (if present)	
07	Verify functionality of flex joint. Ensure free to bend in all directions (if present)	
08	Inspect all hydraulic connectors, seals and valves	
09	Inspect all check valves for leakage (if relevant)	
10	Verify functionality of the locking system (Optional equipment)	

4.1.1.1. Dual Entry Pressure Stab

No.	Description	Chk/Verified
01	Inspect all seals and O-rings for damage. Replace if required	
02	Inspect ROV handles (rope and orange hose) for damages and check all knots.	
03	Inspect all pressure relief ports and fittings (if applicable)	

4.1.2. Receptacle

No.	Description	Chk/Verified
01	Visual inspect receptacle internal surface finish and entrance area if possible.	
02	Ensure correct installation of the receptacle and free distance for hot stab guide nose behind rear receptacle opening	
03	Verify no leakages from hoses, piping and receptacle check valves.	
04	Verify ROV access and free space in front of receptacle and panel.	

4.2. CONNECTION

Stabs without J-lock system can be inserted directly into the receptacle without special preparations independent of axial rotation.

Stabs with J-lock system must be aligned with the corresponding J-lock slot in the receptacle prior to insertion. When fully inserted into the receptacle and J-lock groove, the stab handle should be rotated clockwise 30 degrees (until full stop) to lock the stab into the receptacle.

During insertion of the Hot Stab into the Receptacle there will be friction between Receptacle and stab seal system. Approximate stab force is 200N. This will however vary depending of temperature, lubrication etc.

Dual entry pressure stabs are only made to be extracted by an ROV not inserted/stabbed. This is done by hand on deck before subsea installation. When inserting make sure stab is placed fairly in centre. O-rings should be fully visible from both sides.

4.3. DISCONNECTION

Note; prior to disconnection, hydraulic pressure in the system should be bled off in order to reduce leakages to the environment. Since the Hot Stab system is a pressure balanced connection system, disconnection can be performed independently of system pressure.

Note; stab force will increase significantly if the system is pressurised.

4.4. POST DIVE CHECK

No.	Description	Chk/Verified
01	Inspect all fittings and hoses for damages and loose connection	
02	Inspect all seals for damage. Replace if required	
03	Inspect Hot stab nose and body for mechanical damages and harmful scratches	
04	Inspect ROV handle for damages	
05	Inspect flex joint (if present), verify functionality	
06	Clean all equipment and flush thoroughly with fresh water	
07	Dry the Hot Stab by use of pressurised air or by use of dry clean rags	
08	Apply preservation oil and secure in storage box.	

4.5. TEST PANEL

The Test Panel is generally secured onto a Docking Panel; this is done by guiding of the ROV. ROV will grab the Test Panel by the ROV bar and guide it onto the two guide pins. Once lowered completely the Lock Pin can be engaged. The lock pin is engaged by grabbing the D-handle and pushing it. When pushed completely to the end it can be turned 90° to the right. Now the Test Panel is locked onto the Docking Panel.

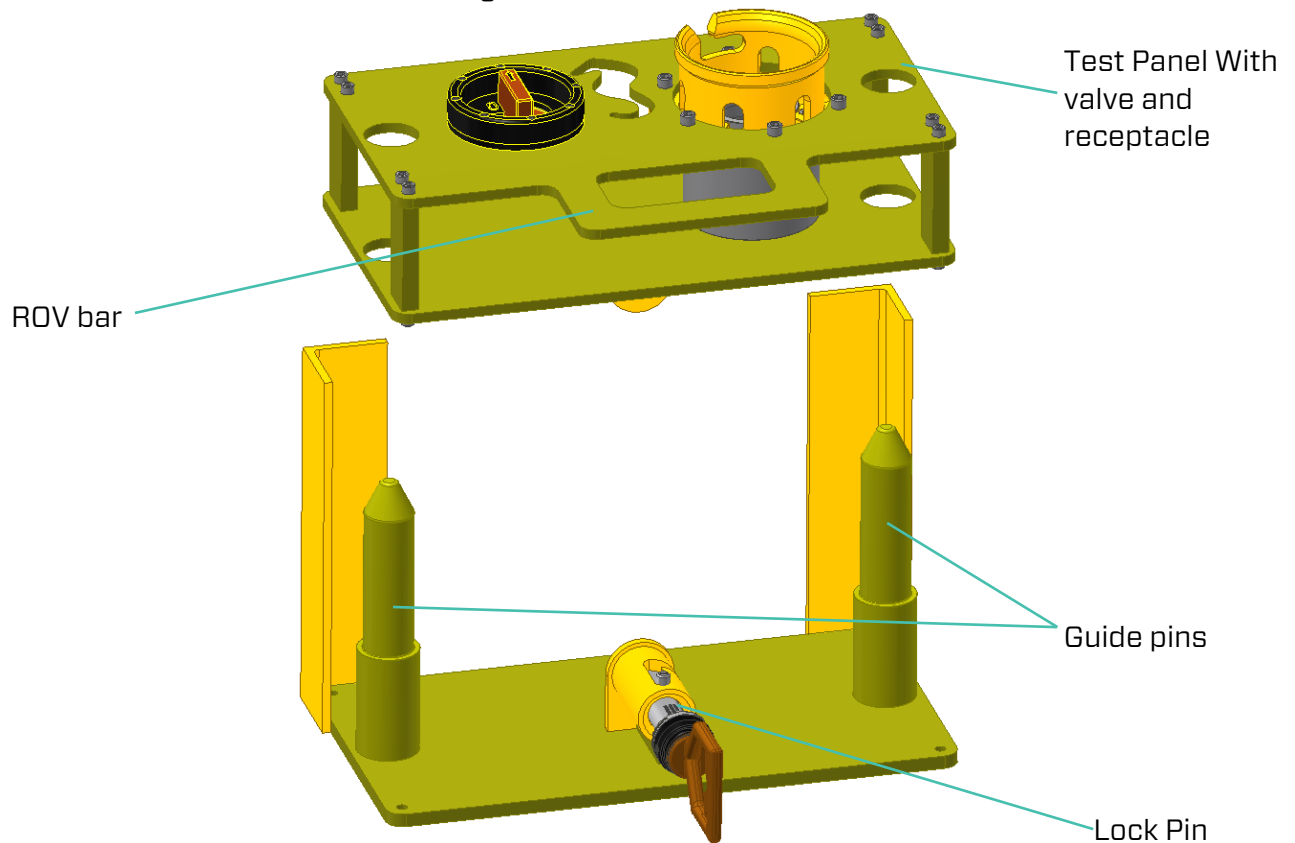


Figure 17 Test Panel and Docking Panel

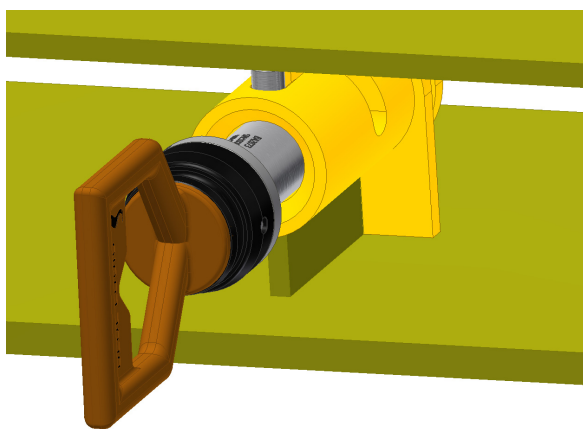


Figure 18 Locking Pin open

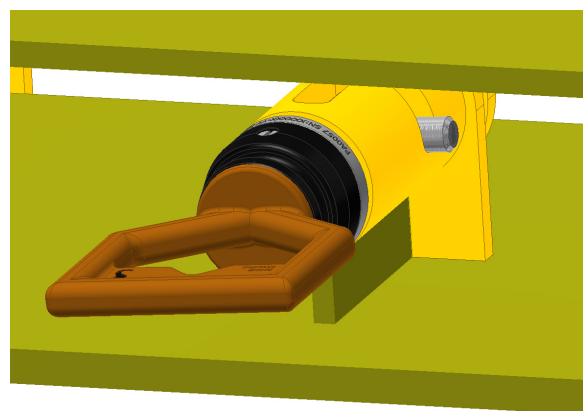


Figure 19 Locking pin close

5. MAINTENANCE

5.1. SEAL REPLACEMENT

In standard configuration, the Blue Logic standard Hot Stab's are delivered with primary seal of HPU (PUR) material. These are of a special robust material and will handle numerous connections and mechanical wear and tear for many years. This seal type has a clear red colour.

Alternative seal materials are available upon request when special requirements with regards to fluid compatibility are required.

5.1.1. Removal of Seal

In order to remove old seals on the Hot Stab; gently cut by use of a knife or similar, to split the seal. When cut, the seals can be easily removed by hand or by use of pliers. A thin awl (not sharp! Make the tip little rounded) can also be used to get beneath the seal to get it clear of the groove.

Note; special attention should be made to avoid damages in the Stab seal area when using knives or other sharp objects.

5.1.2. Installation of new Seal

Prior to installation, new seals should be heated in hot water to approx. 80-100°C. When the seals have been heated, they can be easily pulled into the stab and inserted into the seal groove.

5.2. ROV INTERFACE

No special maintenance is required for the ROV handle/ ROV interface. Inspect for damages and replace if required.

5.3. FLEX JOINT

The flex joint can be removed and replaced by the following sequence:

1. Secure the Stab in a vice thus applying axial force between the Stab body and ROV Interface according to figure 20
2. Unscrew the securing pin by use of a standard screwdriver
3. Remove the securing pin
4. Remove the Hot Stab from the vice
5. Remove the Flex element and ROV handle from Hot Stab body
6. Insert the new flex joint
7. Secure the Hot Stab in a vice and apply force between the Hot Stab body and ROV interface until the securing pin can be easily inserted by hand.
8. Apply a thin layer of Loctite 243 on threads and rotate the securing pin by use of a screwdriver and secure by applying approx. 3Nm torque.
9. Remove the Hot Stab from the Vice
10. Inspect Hot Stab and verify functionality of flex joint.

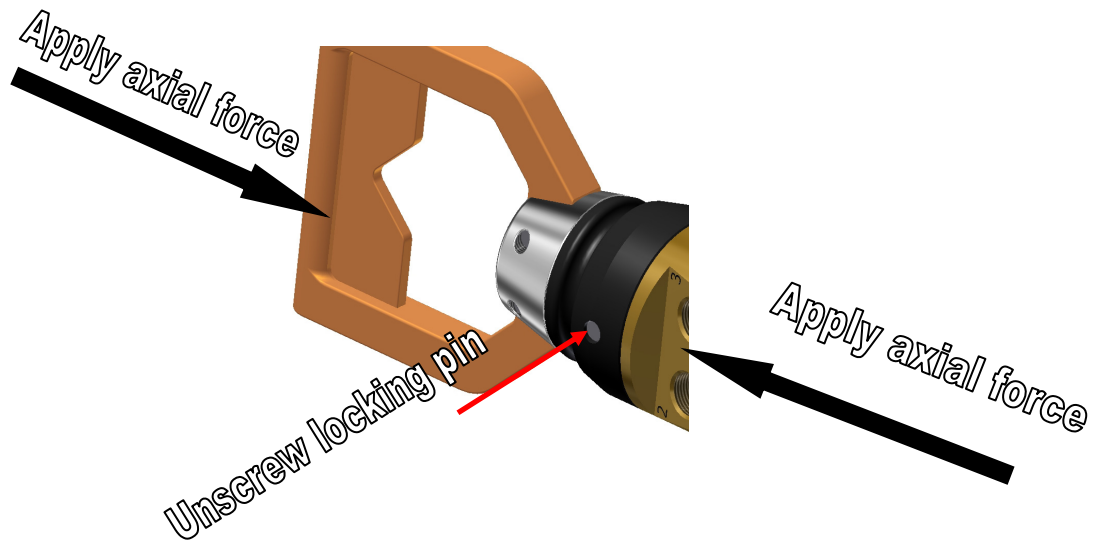


Figure 20 Flex joint installation

5.4. SPARE PARTS

For available spare parts, please visit: <http://e-sea.bluelogic.no/main.aspx>

6. STORAGE AND TRANSPORT

6.1. PRESERVATION FOR STORAGE

No.	Description	Chk/Verified
01	Visual inspect the Hot Stab for damages and wear.	
02	Ensure correct post dive sequence followed (se above sections)	
03	Apply preservation oil and secure in storage box.	

6.2. TRANSPORT

No special precautions are needed for transport. However, the following should be verified:

Correct packing; preferably by use of aluminium transport box

Verify the following

1. Sender Name and Address clearly visible
2. Receiver Name and address clearly visible
3. Inventory list correct filled out