ROV Operated Shackles

6,5 Te to 150 Te

OPERATION & MAINTENANCE MANUAL

AVIATION | DIVING | ENGINEERING & DEVELOPMENT | LIFTING & HANDLING | SUBSEA | WORKSHOP

imenco
SMART SOLUTIONS

Revision History

Rev.No.	Description	Date of Rev.
0	Issued for use	11/06/2013
1	Changes to 7.1: Connection of ROV Shackle	04/09/2015
2	Amendments to Section 8: Maintenance	30/03/2016
3	Formatting corrections	23/05/2016
4	Included updated attachment of "Certificate of Test & Thorough Examination"	12/12/2017

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1 General Description

1.1 Regarding This Operations & Maintenance Manual

The intended use of this manual is to provide and guide the operator / user of the lifting device with instructions on the technical specifics of the product, how it functions, the safety aspects of its use, how to prepare, operate and maintain the product.

Note: This Manual is intended as a guide for Imenco's line of Standard ROV Operated Shackles, with a capacity of 6,5 Te to 150 Te.
Where the Shackle is modified to meet with Clients specification, the appropriate data, values, capacities etc. shall be changed to meet the specification of the shackle design.
General data in this manual is common for all shackle types in this range, unless otherwise specified.
For other shackle types and capacities, please refer to separate OMM Manuals.
The original language of this manual is in English.

1.2 Introduction

The Imenco Standard ROV Operated Shackle was researched & developed by Imenco in 2007, and is recognised worldwide as a leading technically innovative product for safe and efficient subsea connections to Lifting Eyes, Master Links and similar lifting attachments to subsea structures.

The shackles are available in a wide range of capacity, from the smallest 6.5 Te to our largest heavy duty 150 Te model. Other, larger capacity models which are hydraulically operated, are covered in a separate OMM manual.

The shackles are designed in accordance with the following requirements:

- NMD Rules
- DnV Rules for Lifting Appliances / Loose Gear
- EN13889:2003 - Forged steel shackles for general lifting purposes

Additionally, the shackles are tested, certified and marked in accordance with the Machine Directive, where destined for use within the European Union

The shackle consists of three main parts:

- Main Body

- Shackle Pin Assembly with Locking Arrangement
- ROV Grab Ring

The main body is machined in one piece from high strength stainless steel. The lower part is shaped as a fork with pin hole and the upper part is formed like a pad-eye for attachment of a standard shackle.

1.3 Main features

Reliable design
Incorporates a pin locking mechanism to avoid any movement of the shackle pin under load
Compatible with standard Bow & Dee type shackles
Clearly marked for capacity/maximum load
Minimum breaking load (MBL) equals 5 x WLL
Low maintenance requirements
Design allows easy modification to suit customer's individual requirements

2 Technical Specification

Load bearing parts - Material certificates according to NS-EN 10204 3.1
Lifting Certificate – ILO Form 3 equivalent (see attachment 2)

Table 1

ROV Shackle WLL	6,5Te through 150 Te
L x H x D (with ROV handle)	Refer to specific data sheet
Width of shackle opening	Refer to specific data sheet
Thickness of shackle fork body	Refer to specific data sheet
Diameter of Shackle Pin	Refer to specific data sheet
Top pad-eye size	Refer to specific data sheet
Proof load	Refer to specific data sheet
Weight	Refer to specific data sheet

2.1 Main dimensions

2.2 Materials

Shackle housing, pin housing:	High strength st.st S165M
Shackle Pin:	Forged 34 CrNiMo6
Lock Plate, ROV Grab Ring:	AISI 316 st.st.
Springs:	SIS 2331 st.st.
Bolts etc.:	A4 st.st.

2.3 Surface Treatment

ROV Handle & Locking Plate	Teflon Coated – Orange colour

3 Functional Description

The function of the shackle is to connect to a Lifting Eye / Pad Eye / Master Link or similar on a subsea structure, by means of ROV manipulation, in order to facilitate a lift. The shackle will self-lock onto the Lifting Eye by means of inbuilt automatic function.

The Shackle Pin Assembly includes a spring loaded Shackle Pin protected inside a housing, a Locking Plate and a spring loaded Pin Retainer.

The Shackle Pin is fitted with a compression spring pushing it to locked position and a U-shaped wire loop for pulling out the pin and release the load from the shackle.

The Locking Plate is ROV operated and has two positions; Locked position "L" providing mechanical locking of the Shackle Pin, and Unlocked position "U".

The spring activated Pin Retainer is fitted in the shackle fork opening. In its lower position this will retain the shackle pin in its retracted position enabling the shackle to be entered and connected to a master link ring or similar. During this entering action the Pin Retainer will be pushed up thus allowing the shackle pin to be automatically pushed into its locked position.

The ROV Grab Ring allows the shackle to be handled by ROV work manipulator providing access from all sides.

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4 Abbreviations

CE:	Conformité Européenne -
COC:	Certificate of Conformity
Deg:	Degrees
DOC:	Declaration of Conformity
Drg:	Drawing
FAT:	Factory Acceptance Test
GA:	General Assembly
GP:	Guidepost
GPE:	Guidepost Extension
ILO:	International Labour Organisation
kg:	Kilograms
kN:	KiloNewton
lbs:	Pounds (Weight)
LOLER:	The Lifting Operations and Lifting Equipment Regulations 1998 No.2307
mm:	Millimetres
MRB:	Manufacturers Record Book
Nm:	Newtonmeter
NMD	Norwegian Maritime Directorate
NS:	Norsk (Norwegian) Standard
OMM:	Operations & Maintenance Manual
PMS:	Planned Maintenance System
PPE:	Personal Protection Equipment
Rev:	Revision
ROV:	Remotely Operated Vehicle
St.St.	Stainless Steel
SWL:	Safe Working Load
Te:	Metric Tonnes
WLL:	Working Load Limit

5 Safety

Safety Recommendations associated with the product

5.1 Basic Safety Information

Safety Recommendations associated with the product.

Read and follow these instructions carefully. They contain important information concerning the product. Please pay particular attention to all safety and warning notices.

Keep these instructions in a safe place for later reference!

5.2 Basic Safety Information

The following safety notices are based on EN 7010 and apply to use of this product:

WARNING! DO NOT operate the shackle before reading these instructions

Shackle operator shall **READ** this Manual in conjunction with the Safety Instructions sheet.

CAUTION! Pinch points – Keep hands clear.

CAUTION! Heavy Object

Every use of lifting equipment or loose gear comes with a certain risk. To minimize or remove the risks when using such equipment, the following guidelines shall be observed at all times:

If the operator(s) are in any doubt of the product function, please contact Imenco – contact details on page 1.
Imenco AS shall not be held liable for any damage, loss or injury arising out of misuse of this product or failure to read the Safety Instructions.

- The shackle is to be used as specified in this manual
- Use only certified undamaged equipment in lifting operations.
- Use the equipment only in the way it is designed. The shackle shall not be overloaded. This means that the wire tension shall not exceed the certified load
- Connection and release should be performed by skilled personnel with sufficient technical background in lifting operations, both theoretical and practical.
- The shackles are heavy, and precautions should be taken when lifting by hand.
- There is danger for finger/hand crushing – keep fingers clear – read instructions!
- Do not touch the shackle and keep to a safe distance whilst it is in use. Under no circumstances shall any personnel approach the suspended load area.

- When the pin is charged, do not attempt to engage pin by hand
- When slacking off the wire rope, it is important to avoid the shackle falling or moving uncontrolled.
- Respect local rules / requirements for use of lifting equipment.
- The shackle is to be used between temperatures of -20 deg. C to +40 deg C.

5.2.1 Danger from System Malfunction

If during operation the shackle pin does not move all the way in, it will prevent the locking plate from being operated. This may cause the pin to release under load and cause damage to the load or to objects hit by the load. No lifting should be attempted if locking plate is not fully engaged!

5.2.2 Qualification

Both deck personnel and ROV operators shall be trained in the use of the ROV Shackle prior to any lifting operations, using this manual as a guide.

5.2.3 Safety Education

Major subsea operating companies operate regular health and safety seminars for all employees, including special courses for deck personnel in operation of lifting appliances. This manual will form the basis for personnel education in the use and safe handling of Imenco ROV Shackles.

5.2.4 Duty of Supervision

The responsibility for the safe use and operation of the Imenco ROV shackles lies with the ROV vessels deck foremen and ROV supervisors who in turn will educate their crew members on safety issues related to Imenco ROV Shackles.

5.3 Product specific safety information

The Imenco ROV Shackle create no specific hazards provided instructions given in this operation manual are adhered to.

5.4 Protective Measures

Personnel on deck shall use protective gloves when preparing the Imenco ROV Shackle for operations, i.e. charging the load pin by pulling the load pin retraction wire loop. Make sure that the shackle is in a stable position to avoid it falling over on the side risking foot injuries.

5.5 Protective Equipment

Use of the Shackle shall be carried out in such a manner that it does not endanger the health & safety of any personnel. Precautions shall include the use of PPE, footwear, gloves, eye protection etc.

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5.6 Recovery

In the event of breakdown or accident with the Imenco ROV Shackle, the product should be released from the load and retrieved to deck / workshop for proper evaluation of what went wrong. If any damages are obviously preventing normal operation, the shackle should be taken out of operation and returned to Imenco for refurbishment.

5.7 Foreseeable Misuse

1. Shackles shall not be overloaded
2. Shackles shall not lift loads if locking plate is not fully engaged
3. Shackles shall not be used with severely damaged / worn load pin
4. Shackles shall not be used if any deformations are found on any part of the device.
5. Shackles shall have appropriate connection to lifting device / wire

5.8 Residual Risks

Inherent safe design measures, safeguards and complementary protective measures have been taken in the development of this product. Due to the remote subsea operational conditions, this product is considered to be free from residual risks.
A copy of the "Risk Evaluation" report for the product is contained in the Product Technical File retained at Imenco.

6 Equipment Preparation

In order to ensure safe user operation, the ROV shackle requires regular inspection intervals for continuous deployment and after storage.
Before the ROV Shackle is used a visual inspection and a functional test shall be performed.

6.1 Visual Inspection of the ROV Shackle

The following punch list to be checked before deployment:

- No visible damage to the shackle body and pin that can affect the shackle design strength and function
- All bolting is properly tightened and secured by the respective locking wire
- The U-wire release strap has no visible damage
- The shackle is clean and there are no debris or particles in the Shackle Pin housing and in the Locking Plate area preventing proper function
- Shackle parts shall be wiped clean of excess lubricating grease

Cleaning and subsequent repair of minor dents etc. to be made as deemed necessary.
If major damages, the shackle is to be subjected to inspection and possible recertification by Imenco. Any damage detected shall be assessed by a person with relevant competence to judge the severity of the damage and advice on actions to be taken.

For connecting to a standard shackle, relevant, in-force health & safety rules shall be observed.

6.2 Functional Test

A simple manual connection and release operation of the ROV Shackle is to be performed as follows:

1. Lift the Locking Plate to the upper position "U"
2. Pull the U-strap and fully retract the pin, thus allowing the spring loaded Retainer to be pushed fully downwards and retain the pin in its retracted position
3. Insert a bar or other handle from the side under the Pin Retainer and push it upwards

WARNING! Do not use the hand to push the Pin Retainer!

When the spring loaded pin is released there is a risk of pinching between the bolt and the bolt hole!

4 Check that the Shackle Pin is in its fully extended position
5 Push down the Locking Plate to "L" position

Important! The ROV Shackle is to be stored and transported in its locked position (fig. 6.1)

6.3 Preparation for use

Before operation the ROV Shackle shall be hooked up and prepared as follows (fig.6.2):

1. Connect the ROV Shackle (while still in its locked position) to the lifting arrangement by using a certified shackle with equal WLL rating (use of shackles with other WLL ratings are not permitted)
2. Lift the Locking Plate to its upper position "U"
3. Finally pull the U-strap and fully retract the pin. Verify visually that the Pin Retainer is in its lower position

Fig.6.1 ROV Shackle in locked position

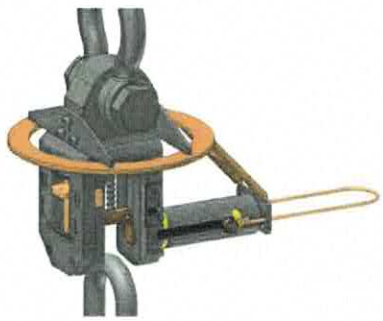

Fig.6.2 ROV Shackle prepared for connection

7 Operational Instructions

It is assumed that all personnel involved in the use / handling of such equipment as covered in this manual will have been trained in the use of such equipment, and are familiar with the safety requirements in use of same.
If necessary, training of operators can be provided by Imenco A/S.

Operation of the ROV Shackle
It is assumed that the operation of the ROV shackle is normally performed by an ROV with a work manipulator. The main steps of operation for connection and release of the ROV Shackle are described below.

7.1 Connection of the ROV Shackle (ref. Fig. 7.1-7.6):

1. Prior to starting an operation, the shackle shall be fully charged, i.e.: the shackle pin shall be fully retracted, and the locking plate in the upper "U" position.

2. Grip the ROV Grab Ring and guide the ROV Shackle opening over the actual lift point, e.g. Master Link, Lifting Eye or a standard Shackle

3. Enter the shackle opening over the target lift point (while keeping the lift point located in the ROV shackle centre as well as possible) thus pushing the Pin Retainer upwards. The ROV Shackle Pin will then be released and snap into the closed position.

If this operation is performed manually keep the hands and fingers away from the shackle opening!

4. A visual check MUST be made at this point to ensure that the yellow pin indicator (arrowhead) is in alignment with the yellow strip marker on the spring housing (see fig. 7.4). If the yellow arrow and the yellow strip are not in alignment (see fig. 7.5) this may be due to the locking plate being lowered to locked "L" position prematurely – thus not allowing the pin to fully engage (see fig. 7.6).

In this event, the lift operation **MUST BE STOPPED**, as the shackle pin could disengage during the lifting operation.

Attempt nudging the locking plate slightly upwards to release the locking pin fully home. If this attempt fails, check the shackle for foreign materials and remove if found. Restart the operation from point 1 above, ensuring the locking plate is in upper position.

5. When the Shackle Pin is fully engaged, push the Locking Plate downwards to locked position "L" securing the pin.

The lifting operation can now commence.

ROV Shackle Connection Sequence

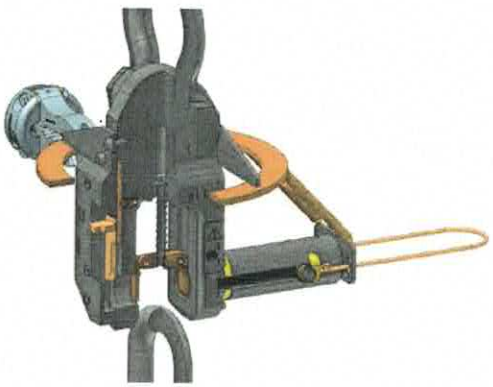

Fig.7.1

Step 1-2: Guide the ROV Shackle opening over the lifting point
(ROV Shackle shown partly sectioned)

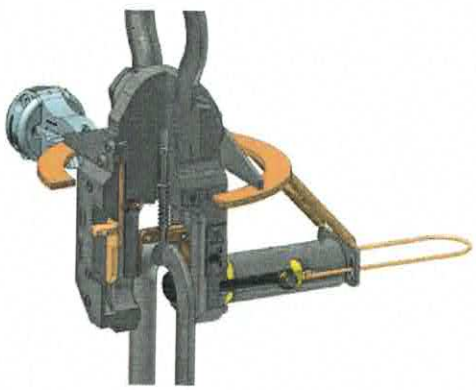

Fig.7.2

Step 3-4: Enter the lift point in the ROV shackle opening pushing the Pin Retainer upwards and thus releasing the Shackle Pin

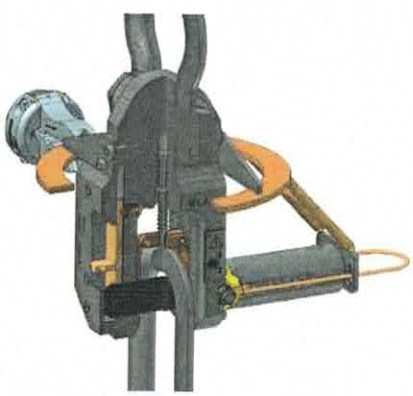

Fig.7.3

Step 5: When the Shackle Pin is fully engaged, push the Locking Plate downwards to the locked position "L" securing the pin

WARNING! If this operation is performed manually keep hands and fingers away from the ROV Shackle opening

The ROV Shackle is now connected and ready for the lifting operation

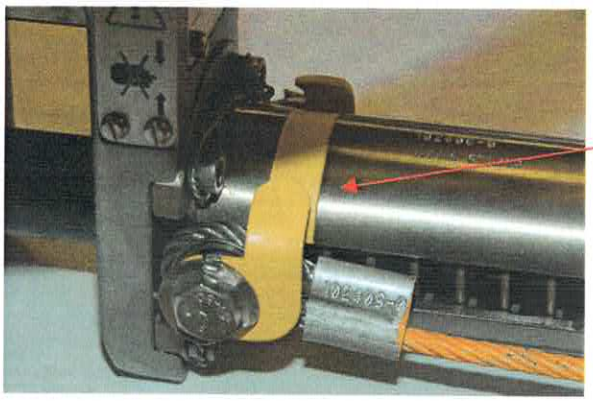

Fig. 7.4

The yellow pin indicator shall be in alignment with the yellow strip marker on the spring housing

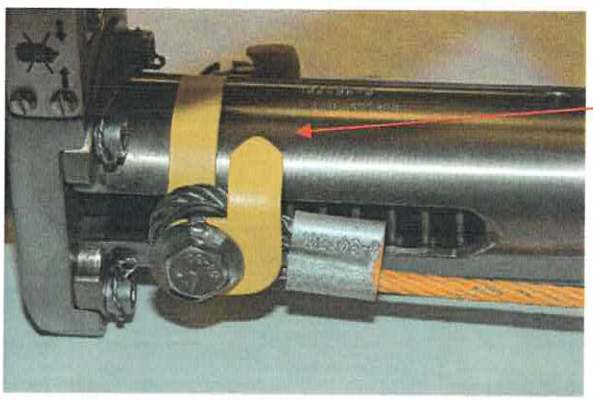

Fig. 7.5

If the yellow arrow and the yellow strip are not in alignment – DO NOT proceed with lift operation!

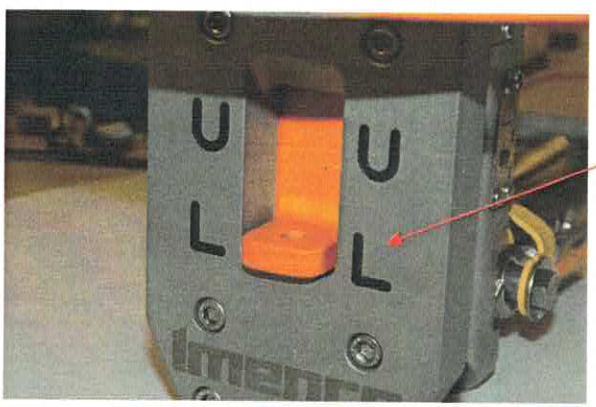

Fig. 7.6

Locking Plate in lowered locked "L" position premature. Stop and restart operation.

7.2 Release of the ROV Shackle (ref. Fig. 7.7-7.9):

In order to release the ROV Shackle the Shackle Pin has to be retracted as described below:

1. Slacken the lifting arrangement and unload the ROV Shackle
2. Lift the Locking Plate to upper (Unlocked) position "U"
3. Pull the U-strap and fully retract the Shackle Pin. Verify visually that the Pin Retainer moves to its lower position

The ROV Shackle is now released and ready for a new connection.

Important: When the ROV Shackle shall be transported or stored for shorter or longer periods the Shackle Pin shall always be left in its engaged position and secured as described in section - "8.7 Preservation & Storage"

ROV Shackle Release Operation

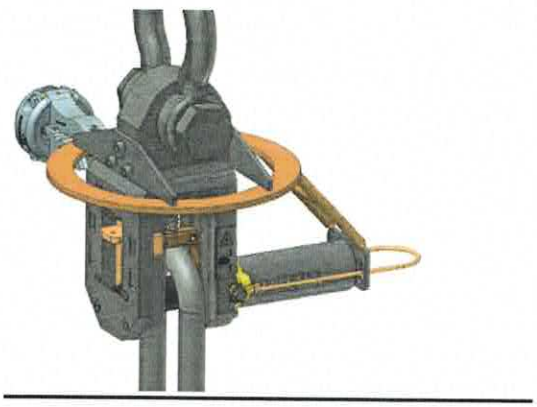

Fig.7.7

Step 1: Slacken the lifting arrangement to unload the ROV Shackle

(ROV Shackle shown partly sectioned)

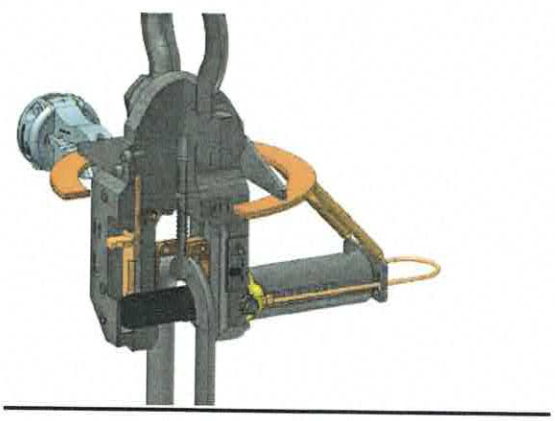

Fig.7.8

Step 2: Lift the Locking Plate to its upper position "U"

(ROV Shackle shown partly sectioned)

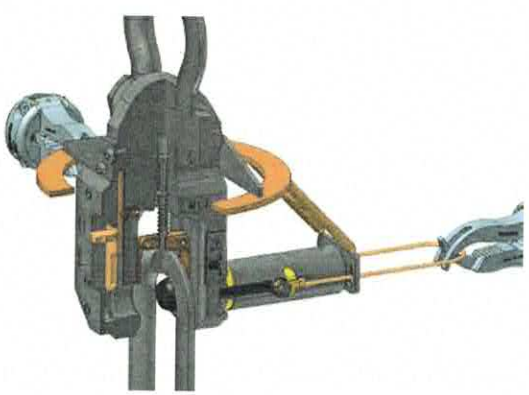

Fig.7.9

Step 3: Pull the U-strap and fully retract the shackle pin, ensuring that the Pin Retainer moves fully down keeping the Shackle Pin retracted

The shackle is now free to be lifted off of the lift point

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8 Maintenance & Testing:

8.1 General Maintenance

The purpose of the maintenance is to prolong the lifetime of the shackle and maintain the safety of the shackle in use. The following points are recommended:

Lubrication of the main lifting pin: Greasing intervals and amount of grease is dependent of the use of the shackle and the environment in which it is operating.

As an indication of the time between lubrication, the following may be used:

For shackles being used continuous: Greasing prior to each use.
For shackles being used more infrequent: Greasing prior to storage.

Additionally, the interior machined grooves shall be greased after use.

Experience with the use of the shackle may yield other intervals.

8.2 Safe Maintenance

Where maintenance & inspection operations shall be carried out, all operators/personnel shall observe all safety precautions as set out in this manual, and any local safety measures imposed.

8.3 Preconditions maintenance

Prior to any maintenance program, all necessary workshop facilities, tools, testing equipment, consumables etc. should be prepared.

8.4 Planned Maintenance Programme

Imenco recommend that the owner shall incorporate the maintenance of the Shackle into their PMS, to include inspection, service and refurbishment processes as described below.

8.5 Examination & Inspection

The tests, examinations & inspection criteria of Imenco's range of ROV Shackles are based on the requirements of ILO Convention 152 and Recommendation 160, together with the internationally recognised Health & Safety standard "The lifting Operations and Lifting Equipment Regulations 1998 No.2307" (LOLER) which defines "lifting equipment" as "all equipment used for lowering loads, and includes its attachments used for anchoring, fixing or supporting it".
Imenco ROV Shackles fall into this category, and inspections shall be carried out in accordance with the following schedules:

8.5.1 Initial Examination and Certification

General: Every lifting appliance, loose gear and main accessory gear shall be examined and certified by a competent person before being taken into use for the first time to ensure that it is of good design and construction and of adequate strength for the purpose for which it is intended.

8.5.2 After each operation

In addition to maintenance as per section 8.1 above, the following shall be carried out after each shackle operation:

The ROV Shackle to be cleaned and inspected as follows:

- Make sure that the Pin is in the closed position.
- Flush the unit with fresh water. The Pin may be pushed in and out to ensure thorough cleaning of holes. Clean / flush inside the Pin Housing and in the Locking Plate area to remove any dirt and particles that may harm the function. Move the locking plate whilst flushing in order to remove any trapped debris. Make sure that all dirt / debris has been removed.
- Perform a visual inspection and check that there is no visual damage that can affect the strength and function of the ROV Shackle.
- Check in particular the shackle pin for any damages or severe corrosion.
- Check that all bolts are tightened and secured.
- Check the U-strap retraction wire for any damages

Apply thin layer of water resistant grease on sliding faces as required.
The shackle pin may be protected from corrosion using a thin layer of a proper coating, e.g. zinc rich primer or paint.
Repair of minor damage can be performed as deemed necessary.

Important! If major damage is observed that may affect the strength or integrity of the shackle, or after eventual overloading, the shackle shall be thoroughly inspected and subsequently recertified by Imenco / competent body (see section 8.5.3 below.)

If the shackle shall be dismantled or other maintenance operations carried out, the load and the wire rope shall be removed, and shackle brought to workshop.

The shackle has to be supported in a stable position and a safe manner before any work commence on it.

8.5.3 Periodic Inspection and re-testing

All ROV Shackles shall be subjected to a "thorough examination and inspection" every 12 months by a "competent person" - who shall prepare and distribute a "thorough examination" report in accordance with an approved inspection & service schedule. A new Load Test is highly recommended, but not mandatory during the annual inspection.

Where exceptional circumstances may have jeopardised the safety of the shackle – or after any substantial alteration or renewal, or after repair of any stress/load bearing part the shackle shall be withdrawn from use, and an interim "thorough examination" shall be carried out.

A new load test is mandatory for ROV Shackles in this category.

Irrespective of above, a new load test shall be carried out at least once in every 5 years.

- Definition: "competent person" – means any responsible person having qualifications and experience appropriate to the duties required by him and necessary to allow him to carry out the inspection work satisfactorily.
- Definition: the term "thorough examination" means a detailed visual examination by a competent person, supplemented if necessary by other suitable means or measures in order to arrive at a reliable conclusion as to the safety and condition of the gear examined. The examination shall be carried out by a competent person in accordance with an approved inspection schedule.
- The term "inspection" means a visual inspection carried out by an expert person to decide whether, so far as can be ascertained in such manner, the loose gear and/or main accessory gear is safe for continued use.

Imenco "Competent Persons" and workshops offer in-house annual inspections to meet with above criteria.

The thorough examination & inspection comprises:

- ✓ Complete disassembly and inspection
- ✓ Replacement of possible damaged parts
- ✓ Cosmetic refurbishment
- ✓ Assembly and function test
- ✓ New proof load test & issue of new Certificate upon specific request of customer
- ✓ New proof load test & issue of new Certificate (mandatory upon replacement of any main load bearing parts
- ✓ "Thorough examination" inspection/service report in accordance with an approved inspection schedule.

8.6 Repair

Any major damage that may affect the shackle load capacity & function shall be evaluated by the local responsible Lifting Operations Manager.

Damage detected during inspection shall be repaired as soon as possible. It shall be carried out by qualified personnel. In general, damaged parts shall be replaced by new ones.
In order to maintain the validity of the Imenco warranty, it is necessary to inform Imenco, and use of original Imenco replacement parts shall be implemented.
Shackles shall be considered for re-certifying in the event of any significant repair that may have some impact upon the function and/or safe use of the unit.
No welding or heat treatment shall be carried out on the Shackle.

8.7 Preservation & Storage

After usage, and prior to long term storage it is recommended that the shackle be inspected (Ref. section 8.5.2 above), to detect any imperfections/damage. Where any damage is found, this must be repaired as above.
It is recommended to apply a recognised type of light anti-corrosion lubricant to the body, and grease the main pin and internal machined grooves before longer storage. After preservation, the shackle may be placed in storage until further use is needed.
The shackles shall be stored in purpose made aluminium boxes, such that they can be lifted mechanically rather than require manual lifting & handling.
The shackles (in aluminium boxes) shall be stored in such a manner that they will not tip, collapse or fall and that they can be removed or withdrawn without endangering the safety of any worker.
The shackles (in aluminium boxes) should, as a minimum, be placed in a dry area, preferably under cover, and protected from the elements and contamination.
All storage areas shall be approved for storage of such items, and shall be located, constructed and signposted in accordance with ships/platforms/workshops safety regulations.

8.8 Fault Diagnosis / Troubleshooting Chart

FAULT	POSSIBLE CAUSE	REMEDY
Load pin movement restricted	Heavy load imprints have deformed concentricity	Send to Imenco for repair and re-testing
Load pin retainer movement restricted	Foreign object or dirt in / around machined groove	Remove foreign objects, clean machined groove and apply a thin coating of water resistant grease
Load pin engagement wire has broken strands	Strands cut during manipulator work	Replace wire to avoid deck hand operation injuries
ROV main handle (Halo) near top severely bent/damaged	Trapped during lifting operations	Request new handle from Imenco or send for service

8.9 Recommended Spare Parts

The main strength parts (shackle housing body and Pin) can only be overhauled and eventually replaced by Imenco. This will require recertification of the unit.

Other non-loaded parts can be replaced as required.

Spare parts should be ordered referring to Item No. on the assembly drawing which is a part of the documentation supplied with the delivery.

Example of spare part ordering specification:

Locking Plate to be specified "Locking Plate Drg. No: 1-1919 (35Te) item 11"

The shackle WLL and "serial no." should be given when ordering spare parts.

RECOMMENDED SPARE PARTS LIST				
PART NAME	**ITEM No.**	**DRG No.**	**SERIAL No.**	**REC. QUANTITY**
Lifting Pin Spring	WLL specific	WLL specific	WLL specific	1
Locking Plate	WLL specific	WLL specific	WLL specific	1
Shackle Halo	WLL specific	WLL specific	WLL specific	1

9 Lifting & Handling

Lifting & Handling of the shackle shall be carried out in such a manner that it does not endanger the health & safety of any personnel. Precautions shall include the use of safety / protective clothing, footwear, gloves etc.
The shackles shall be handled in such a manner that they will not tip, collapse or fall.
Where lifting is carried out manually, proper lifting techniques and safe postures shall be used to minimise strain. Refer to section 5: Safety for instructions on potential "pinch-points" for hands.
Where the weight of the shackle exceeds 25 kg it is highly recommended to use mechanical assistance- in the form of a crane, hoist, block & tackle or like.

10 Packing & Shipping

The packing & shipping of the goods shall generally be according to Imenco's approved procedures, unless otherwise stated in Client's specific instructions.

Important! The ROV Shackle shall be transported and stored in its locked position (fig. 8.1). The shackle to be locked and prepared for storage as follows:

1. Insert a bar or other handle from the side under the Pin Retainer and push this upwards

WARNING! Do not use the hand to push the Pin Retainer!

When the spring loaded pin is released there is a risk of pinching between the bolt and the bolt hole!

2. Check that the Shackle Pin is in its fully extended position
3. Push down the Locking Plate to "L" position securing the pin

10.1 Main marking of packages

Affixed to each products packing case (in a sealed watertight envelope) will be a packing list showing:

- Shipment address
- Project reference
- P.O. Number
- Equipment description
- Equipment identification no's.
- Customer identification

10.2 Shipping Documentation

The buyer shall be informed prior to shipment.
A hard copy of this O & M Manual, Product Data Sheet plus the Certificate of Test & Thorough Examination (where relevant) shall accompany the product.

11 Manufacturers Records

11.1 Identification Marking of Shackle

Full identification of the product will be given. A Name Plate is affixed to the shackle, using hard stamps or laser engraving
Stamp marking letter size will be 5 mm height.

The main components of the shackle are hard stamped/etched with unique and traceable identification, i.e.: – part number/material I.D.

12 Certification

12.1 Certificate & Test reports

A Certificate of Conformity (COC) shall be issued with each Shackle to verify the product meets with all applicable standards, specifications and directives.

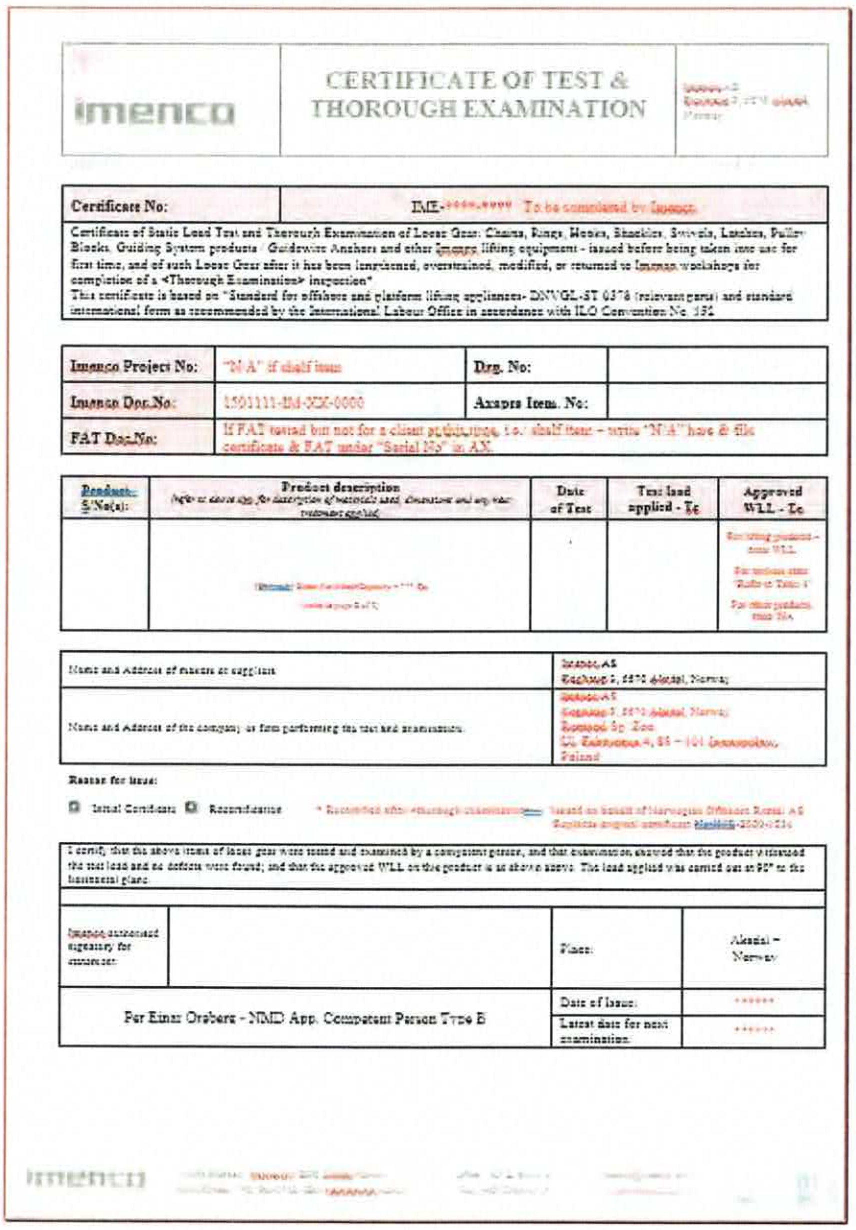
A Declaration of Conformity (DOC) is available on request for Shackles destined for use in the European Union - to verify the product meets with all applicable directives necessary to qualify for CE marking and approval.

A Certificate of Test & Thorough Examination shall be issued where thorough examination/load testing has been carried out.

For material certification, refer to product final documentation package-relevant section.

13 Attachments

Attachment 1: Example of Certificate of Test & Thorough Examination



CERTIFICATE OF TEST & THOROUGH EXAMINATION

Certificate No:	IME-****-**** To be completed by Imenco

Certificate of Static Load Test and Thorough Examination of Loose Gear: Chains, Rings, Hooks, Shackles, Swivels, Latches, Pulley Blocks, Guiding System products / Guidewire Anchors and other Imenco lifting equipment - issued before being taken into use for first time, and of such Loose Gear after it has been lengthened, overstrained, modified, or returned to Imenco workshops for completion of a <Thorough Examination> inspection"
This certificate is based on "Standard for offshore and platform lifting appliances- DNVGL-ST 0378 (relevant parts) and standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152

Imenco Project No:	"N/A" if shelf item	Drg. No:	
Imenco Doc.No:	1501111-IM-XX-0000	Axapta Item. No:	
FAT Doc.No:	If FAT tested but not for a client at this time, i.e. shelf item – write "N/A" here & file certificate & FAT under "Serial No" in AX.		

Product S/No(s):	Product description	Date of Test	Test load applied - Te	Approved WLL - Te

Name and Address of makers or suppliers	Imenco AS Kophaug 3, 5570 Aksdal, Norway
Name and Address of the company or firm performing the test and examination	Imenco AS Kophaug 3, 5570 Aksdal, Norway

Reason for issue:

Initial Certificate Recertification

I certify that the above items of loose gear were tested and examined by a competent person, and that examination showed that the product withstood the test load and no defects were found; and that the approved WLL on the product is as shown above. The load applied was carried out at 90° to the horizontal plane.

Imenco authorised signatory for statement:		Place:	Aksdal – Norway
Per Einar Orsbere - NMD App. Competent Person Type B		Date of Issue:	******
		Latest date for next examination:	******

imenco	LOAD TEST CERTIFICATE	

This certificate is issued by Imenco AS in accordance with current standards as described above. Responsibility for the application of the product in lifting operations will ultimately rest with the on-site Lifting Operations Supervisor or equivalent based on the products placement and role in the lifting chain. Every item of loose gear involved in lifting & handling operations shall be tested and thoroughly examined before being put into use for the first time and should be returned to Imenco workshops for thorought examination every 12 months. As a minimum, a new load test shall be carried out at least once in every 5 years.

Important: Repair or replacement of any product's vital loadbearing components, or any substantial alteration or repair to any part liable to effect its safety shall render this certificate obsolete and a thorough inspection and new load test shall be performed, prior to a new certificate being issued by a competent person.
For all Imenco products, refer to product's specific Operations & Maintenance Manual for detailed Examination & Testing requirements.

Notes:

1) For single sheave blocks, including those with beckets - the SWL shall be taken as one half of the resultant load on the head fitting.
2) The SWL of a multiple sheave block shall be taken as the resultant load on the head fitting.
3) For single sheave blocks with a permissible load at the head fitting exceeding 25 tonnes, the test load may be reduced as permitted for the chains, hooks, shackles, swivels, etc. in the table. In this case the SWL notation shall be the resultant load on the head fitting.
4) Where the dynamic factor ψ exceeds 1.33, the reference SWL in this table shall be taken as: $0.75 \times \psi \times$ SWL (see note 3)
5) Load test carried out with solid shear pin fitted
6) For Imenco Standard Gundewire Anchors used in lifting operations – anchors shall be fitted with either a safety release sleeve or safety clip, and loads shall not exceed specified value. Vessel/Platform responsible person for lifting operations shall verify anchor meets with all requirements prior to lifting operation. Refer to Operations & Maintenance Manual for instructions.
7) For load test values applicable for Dynamic testing, refer to DAF factor in Table 14-1, Section 14.2.3 – DNV GL "Standard for offshore and platform lifting appliances- DNVGL-ST 0378 (relevant parts)
8) Refer to relevant product Operations & Maintenance Manual for information on lifting operations

The test load values for Loose Gear and other Lifting Accessories to be applied shall be in accordance with table 1.

imenco | LOAD TEST CERTIFICATE

Table 1 Test load values for Loose Gear and other Lifting Accessories

Product Description	Test Load – Te [1]
Hooks, Shackles, Swivels etc:	
SWL ≤ 25Te	2 x SWL
SWL > 25Te	(1,22 x SWL) + 20
Multi-Sheave Blocks: [2]	
SWL ≤ 25Te	2 x SWL
25Te < SWL ≤ 160Te	(0,933 x SWL) + 27
SWL > 160Te	1,1 x SWL
Single- Sheave Block [3,4]	4 x SWL
Imenco Standard Guidewire Anchors [5,6]	
7,5" lbs Mini-Anchor w/Release Sleeve &Wire Socket	4,25
22" lbs Standard GWA w/Release Sleeve & Shackle	10
22" lbs Standard GWA w/Release Sleeve & Wire Socket	10
22" lbs Standard GWA w/Safety Sleeve & Wire Socket	10
22" lbs Standard Ext. GWA w/Release Sleeve & Wire Socket	10
22" lbs Slimline GWA w/Release Sleeve & Wire Socket	10
22" lbs Slimline GWA w/Safety Sleeve & Wire Socket	10
36" lbs Slimline GWA w/Release Sleeve & Wire Socket	20,4
75" lbs Standard GWA w/Release Sleeve & Wire Socket	36
100"lbs Standard GWA w/Release Sleeve & Wire Socket	48,4
100"lbs Standard GWA w/Release Sleeve & Shackle	48,4
150" lbs Standard GWA w/Release Sleeve & Wire Socket	62,4
150" lbs Standard GWA w/Release Sleeve & Shackle	62,4
Imenco Lifting Anchors [5]	
SWL ≤ 25Te	2 x SWL
SWL > 25Te	(1,22 x SWL) + 20
Lifting Anchor – 10"lbs	12
Lifting Anchor – Extended - 10"lbs	12
Latches[7]	
SWL ≤ 20Te	SWL + 25%
SWL > 20Te up to ≤ 50Te	SWL + 5Te
SWL > 50Te	SWL + 10%
GPTR/GPBR and GPS	Dependent on anchor and spec.*

* The test load is described in FAT schedule for the product

Product Description	Test Load – Te (based on max. allowed lifting capacity-ref (snagg design basis)
Snagger Weaklink [3,4]	
Snagger 6,5	13
Snagger 12	24
Snagger 25	40

Lifting capacities for variable shear pin strengths fitted in standard Guidewire Anchors[5]
(Refer to Operations & Maintenance Manual for information on using standard guidewire anchors for lifting operations)

Anchor Size	Shear Pin fitted - Te	Lifting Capacity SWL - Te
7,5" lbs	1,12	0,2
	2,27	0,4
	2,99	0,5
	3,4	0,6
22" lbs	4,5	0,75
	6,3	1,1
	8,2	1,4
	10	1,7
36" lbs	7,5	1,25
	9,07	1,5
	12	2
75" lbs	10	1,6
	12	2
	15	2,5
	18	3
	20	3,3
	24	4,1
	34	5,7
100" lbs	15	2,5
	20	3,3
	24	4
	43,1	7,2
150" lbs	65	11,2

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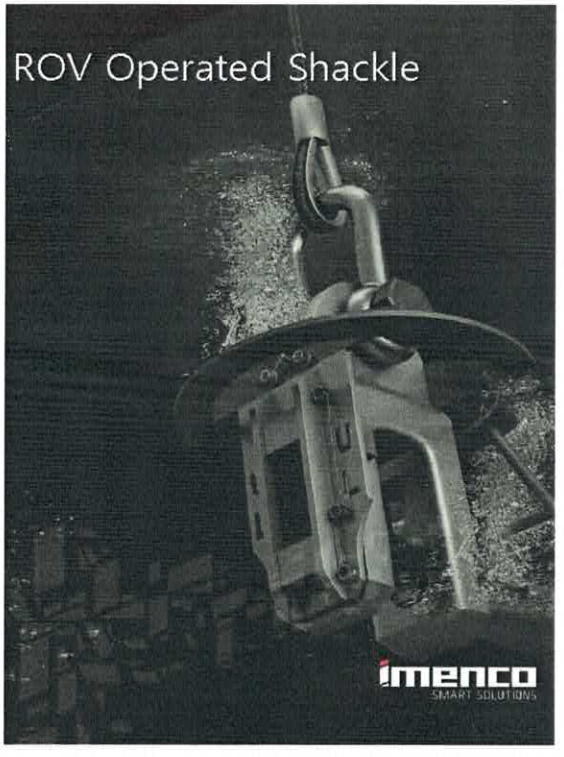
SMART SOLUTIONS

PRODUCT DATA SHEET

PRODUCT:	ROV SHACKLE
DESCRIPTION:	25 TE ROV OPERATED SHACKLE

MAIN FEATURES:



- ✓ SIMPLE AND RELIABLE DESIGN.
- ✓ INCORPORATES A PIN LOCKING MECHANISM TO AVOID ANY MOVEMENT OF THE SHACKLE PIN UNDER LOAD
- ✓ COMPATIBLE WITH STANDARD BOW & DEE TYPE SHACKLES
- ✓ CLEARLY MARKED FOR CAPACITY/MAXIMUM LOAD
- ✓ MINIMUM BREAKING LOAD (MBL) EQUALS 5 X WLL
- ✓ LOW MAINTENANCE REQUIREMENTS
- ✓ DESIGN ALLOWS EASY MODIFICATION TO SUIT CUSTOMER'S INDIVIDUAL REQUIREMENTS
- ✓ DESIGNED IN ACCORDANCE WITH DNV RULES FOR APPLICATION OF LIFTING APPLIANCES – LOOSE GEAR
- ✓ SUPPLIED WITH LIFTING CERTIFICATE, STANDARD DOCUMENTATION & INSTRUCTIONS

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