Retrofit Anode Systems
Imenco is a major EPC-contractor to the maritime industry. We design, develop, and manufacture a wide range of systems and products such as Diving Systems, Helicopter Refuelling Systems, Ex Cameras, Lifting and Handling products, Subsea Cameras and Subsea Tools including Subsea Lights and Lasers. Our customers benefit from over thirty years’ experience in the industry, adding value and providing smart solutions.

ALL INFORMATION IS CORRECT AT TIME OF GOING TO PRESS: 11/2012
Imenco

Imenco has produced ROV installable Retrofit Anode Systems since 1999, which have proved to be very effective and installation friendly.

The smart solution caters for compact design, enabling great flexibility in anode attachments.

The main advantages offered by the Piranha™ and Humboldt™ anode clamps are the ease of operation and the reduced vessel time during installation.

Contents

INTRODUCTION 03
CATHODIC PROTECTION SYSTEMS 04
PIRANHA™ PLATE CLAMP 05
HUMBOLDT™ RADIAL BOLT CLAMP 06
HUMBOLDT™ AXIAL BOLT CLAMP 07
GENERAL FEATURES FOR ALL CLAMPS 08
TORQUE TOOL 09
ANODE AND CLAMP CONFIGURATION 10
TYPICAL ANODE INSTALLATION 11

Introduction

Imenco has produced ROV installable Retrofit Anode Systems since 1999, which have proved to be very effective and installation friendly.

The smart solution caters for compact design, enabling great flexibility in anode attachments.

The main advantages offered by the Piranha™ and Humboldt™ anode clamps are the ease of operation and the reduced vessel time during installation.

For further information regarding the content of this brochure, contact:

Kjell Ole Pedersen
kop@imenco.com
+47 957 01 008
Cathodic Protection Systems

Metal that has been extracted from its primary ore (metal oxides and other free radicals) has a natural tendency to revert to that state under the action of oxygen and water.

The principle of Cathodic Protection (CP) is connection of a metal to be sacrificed by turning the base metal into a Cathode and allowing the attached anode to deplete.

Imenco appreciates the complexity of subsea operations and the ever changing requirements. As Cathodic protection solutions need to adapt to project requirements, Imenco offers special anode package solutions that meet the strict project needs combined with the ‘ease of use’ that has come to be associated with Imenco “Smart Solutions”. Through client issued design requirements or through a solution development partnership, Imenco will ensure focus for operational success.
Piranha™ Plate Clamp

The Piranha™ range is intended for plate mounting use, operated with two standard ranges 10–35mm and 35–54mm, these ranges will cater for most requirements.

The anode clamps will be installed by using the Imenco Torque Tool. Due to the flexible design Imenco can easily make custom built solutions.

<table>
<thead>
<tr>
<th>Clamp type</th>
<th>Plate thickness</th>
<th>Clamp dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Piranha™ (S)</td>
<td>10-35</td>
<td>75</td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piranha™ (M)</td>
<td>35-54</td>
<td>74</td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Bespoke anode clamps can be made for special projects.
Humboldt™ Radial Bolt Clamp

**THE HUMBOLDT™ RANGE IS MADE FOR EASY INSTALLATION ONTO BOLTS OR RODS, AS A RADIAL MOUNT. THIS DESIGN IS BASED ON THE PRINCIPLE OF TORQUING THE CLAMP TO ADEQUATE TENSION.**

The anode clamp provides easy handling and mating up with the ROV manipulator arm. The torque tool can be fitted with a “monkey fist” or similar arrangement for easy handling by the ROV.

<table>
<thead>
<tr>
<th>Clamp type</th>
<th>Bolt diameter (mm)</th>
<th>Clamp dimensions (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Humboldt™ Radial 19 - 22 (¾&quot; - 7⁄8&quot;)</td>
<td>72</td>
<td>20</td>
</tr>
<tr>
<td>Humboldt™ Radial 40 - 45 (1⅜&quot; - 1⅞&quot;)</td>
<td>72</td>
<td>20</td>
</tr>
</tbody>
</table>

*Bespoke anode clamps can be made for special projects.*

---

[Image of Humboldt™ Radial Bolt Clamp]

---

[Image of Humboldt™ Radial Bolt Clamp]

---

[Image of Humboldt™ Radial Bolt Clamp]
Humboldt™ Axial Bolt Clamp

The Humboldt™ Range is made for easy installation onto bolts or rods, as an axial mount. This design is based on the same principle of torquing the clamp to adequate tension.

The anode clamp provides easy handling and mating up with the ROV manipulator arm. The torque tool can be fitted with a “monkey fist” or similar arrangement for easy handling by the ROV.

<table>
<thead>
<tr>
<th>Clamp type</th>
<th>Bolt diameter (mm)</th>
<th>Clamp dimensions (mm)</th>
</tr>
</thead>
</table>

*Bespoke anode clamps can be made for special projects.*
General features for all Clamps

EASY TO INSTALL AND FLEXIBLE CLAMP ARRANGEMENT

Fastening by expanding bolt in:
• Clamping on rod or bolt
• Clamping on plate edges
• Standardized torque tool and interface
• Provides excellent mechanical attachment
• Provides excellent electrical contact / bonding
• Can be removed by use of extraction tool

Alternative application:
• Mounting of plates to existing constructions
• Mechanical reinforcement to structures
• Fixation of lift pads to existing structures
• Attachment in concrete structures
Torque Tool

For easy installation of Imenco’s cathodic protection systems a purpose-built torque tool has been developed.

The tool interfaces with the anode clamp by using a “bayonet” front-end to ensure the anode clamp is kept in position while the expansion bolt is being torqued up and the anode is fixed into its position. The torque tool can also be used to remove the anode.

Technical data (Torque tool):
- Operating hydraulic pressure: 0 – 200 bar
- Variable torque from: 100Nm
- Max torque @ 200 bar is: 2000Nm
- Weight in air: 35kg
- Weight in water: 30kg
- Standard equipped with ROV “Fish tail” handle
Anode and Clamp Configurations

Anode Banks can be configured to suit any operational requirement including size, location and attachment method. Subsea protection to project requirement.

Anode Basket

**GENERAL DIMENSIONS:** 350 X 350 X 228 | 520 X 520 X 270  
**ANODE MASS:** 5KG | 5 - 15KG

Standard Imenco anode baskets include the desired anode mass as well as a separate clamp port for transportation and optimal operational functionality. Wire length will be adapted to suit project requirements. Larger units in this style can be produced to suit larger applications.

Orbital Bracket

**GENERAL DIMENSIONS:** 394 X 403 X 200  
**ANODE MASS:** 3 X 5KG

Where quick installation without the need for cabling in the area is desired, Imenco’s standard Orbital bracket surrounding the clamp unit is an effective solution for operational needs. Installation and protection are covered in one go.

Anode Sleds

**GENERAL DIMENSIONS:** 2792 X 2792 X 2562  
**ANODE MASS:** 450KG

For large protection applications, the Anode sled offers long life as well as a stable sea bed located solution. These units can be used as standalone sled units or connected together in series. Sled frames can be adapted to suit operational needs and placement restrictions. The unit is offered as standard in a box profile with shackle lifting points.
Typical Anode Installation


It is assumed that the ROV has conducted a General Visual Inspection (GVI) prior to commencement of the anode installation sequence and that all parts of the selected Anode Clamp grip positions have been cleared for debris or marine growth.

It is recommended that the actual plate thickness is checked as part of the ROV pre-survey. If necessary, the plate grip jaws can be replaced, see separate procedure given in section 5. For torque tool operation details, see section 4. Reference is also made to the separate torque tool instruction manual. The following procedure describes the preparation work (Task 1-6) and the typical installation sequence.

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install the Torque Tool on the ROV.</td>
</tr>
<tr>
<td>2</td>
<td>Adjust torque to correct value.</td>
</tr>
<tr>
<td>3</td>
<td>Check the tool’s holding capacity by lifting the anode clamp (while eg: located in its parking holder.)</td>
</tr>
<tr>
<td>4</td>
<td>Place the anode clamps in ROV tool basket with the torque tool.</td>
</tr>
<tr>
<td>5</td>
<td>A securing line should be fitted to the anode clamp bracket.</td>
</tr>
<tr>
<td>6</td>
<td>Deploy the ROV and locate the Anode Clamp on installation site.</td>
</tr>
<tr>
<td>7</td>
<td>Ensure that the securing line(s) is connected between the anode clamps and ROV frame.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Caution:</strong> Ensure that the fingers on the tool end fully engage between the clamp fingers.</td>
</tr>
<tr>
<td>9</td>
<td>Lift the torque tool with the Anode Clamp attached.</td>
</tr>
<tr>
<td>10</td>
<td>Verify the clamp jaw to be fully engaged onto the plate edge. Fig. 3.1.</td>
</tr>
<tr>
<td>11</td>
<td>Apply pressure to operate the torque tool CW.</td>
</tr>
<tr>
<td>12</td>
<td>Keep the torque tool stable and verify the rotation.</td>
</tr>
<tr>
<td>13</td>
<td>Remove the torque tool from the Anode Clamp by pulling it straight off the clamp nut. Verify that the installation is correct by inspecting the clamp grip on the stiffener plate edge. Fig. 3.2.</td>
</tr>
<tr>
<td>14</td>
<td>Remove or cut any security line from the ROV frame and the Anode Bracket.</td>
</tr>
</tbody>
</table>