Shaft Earth Device Monitor

Model S4600-SEDM-001

Application

- Measures the electrical potential between the propeller shaft and the hull

Key benefits

- Provides a constant display of shaft potential - confirms that the bonding equipment is successfully maintaining this at a level not exceeding the value of 50 mV

- Uses high silver composition brushes running on a silver track - provides effective and sustained low conductivity necessary to ensure that the shaft bonding and its connections maintains a contact resistance no greater than 0.001 Ohms

- Combines earthing and monitoring in one installation
Shaft Earth Device Monitor

Introduction

When steel is immersed in water (e.g., a ship’s hull), small galvanic currents are initiated at anodic areas of the metal surface, causing corrosion.

Such corrosion predominates at the stern of the ship, where the combined effects of increased turbulence and differential metals results in accelerated corrosion rates.

Cathodic protection effectively suppresses these corrosion cells by applying an opposing current from external anodes. If the propeller is to benefit from Cathodic protection then there must be a continuous electrical circuit between the propeller and the ship’s structure. This circuit usually exists when the propeller is at rest, where a metal to metal contact is made between the shaft and the stern tube liners, or main engine bearings and journals.

However, whilst the shaft is turning, the bearing lubrication creates an intermittent high resistance which effectively insulates the propeller from the hull structure. Since the propeller presents a relatively large surface area of bare metal, it attracts Cathodic protection currents, which tend to discharge by arcing across the lubrication film and results in spark erosion which eventually leads to pitting and ‘stripping’ of white metal bearing surfaces.

It is generally accepted that the effects of arcing are minimised when the potential across the shaft/hull interface is less than 50 mV.

To overcome this undesirable condition of arcing, whilst at the same time ensuring that Cathodic protection is extended to the propeller, it is general practice to install shaft bonding equipment as an integral component of the ship’s Cathodic Protection System.

Overview

The AMOT Shaft Earth Device Monitor comprises a split slipring arrangement and ancillary brush gear, which is designed to be easily installed by proficient technical personnel and without the need for specialist tools.

The slipring is supplied as two identical halves, rolled to the specified shaft diameter.

The Shaft Earth Device Monitor provides a permanent and readily available indication on the condition, and therefore effectiveness, of the shaft bonding system.

To ensure a continuous cathode bond and the shaft bearing is not damaged, the monitor should display shaft potential not exceeding 50 mV. Readings in excess of this value are indicative of worn bonding brushes or poorly maintained brush gear and/or sliprings.

Measurement of the shaft potentials is achieved by the installation of a single monitoring brush which runs on the main shaft bonding slipring, but has its brush gear mounted on a separate and insulated spindle. This brush gear is connected directly to the condition monitor unit.
Shaft Earth Device Monitor

Dimensions

Slipring

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Cu/Ag Slipring - matched halves to suit</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>SS Tension band - length to suit dia.</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>SS Tension clamps</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Bonding brush holder - brass</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Bonding brush holder spindle - SS</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>AG.80 Bonding brush</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Insulated brush holder spindle</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Monitoring brush holder - brass</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>AG.80 Monitoring brush</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Bonding cable - 2M x 35 mm</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Clamp securing key</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>1 X 0.5mm CABLE TO CONDITION MONITOR SHIPYARD/CUSTOMER SUPPLY</td>
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</tbody>
</table>

Spindle distance table to determine dimension (Ba) between centre of brush spindle and slipring surface

<table>
<thead>
<tr>
<th>Slipring diameter ‘D’</th>
<th>Item 4 &amp; 5</th>
<th>Item 7 &amp; 8</th>
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</thead>
<tbody>
<tr>
<td>100</td>
<td>35.5</td>
<td>50.0</td>
</tr>
<tr>
<td>150</td>
<td>34.0</td>
<td>43.5</td>
</tr>
<tr>
<td>200</td>
<td>33.5</td>
<td>39.5</td>
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<tr>
<td>250</td>
<td>33.0</td>
<td>36.5</td>
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<tr>
<td>300</td>
<td>32.5</td>
<td>34.5</td>
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<tr>
<td>400</td>
<td>32.0</td>
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<tr>
<td>500</td>
<td>31.5</td>
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<tr>
<td>700</td>
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<td>29.0</td>
</tr>
<tr>
<td>800</td>
<td>31.0</td>
<td>29.0</td>
</tr>
</tbody>
</table>

All dimensions in mm
Europe, Middle East and Africa

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