RB15 Manganese Dioxide Reference Electrode Datasheet

General Description

The RB15 Manganese Dioxide Reference Electrode has been designed to provide a superior long life manganese oxide based reference electrode used to measure steel potentials in reinforced concrete and steel framed buildings. The function of the manganese oxide reference electrode is to monitor the effectiveness of impressed current or galvanic cathodic protection systems and steel corrosion activity. It is ideal for monitoring cathodic protection systems to the international standard ISO 12696:2016.

The RB15 Manganese Dioxide Reference Electrode comprises a manganese oxide core containing an alkaline environment. This is contained in a nylon casing with a cementitious mortar cap. The electrode is conditioned to provide a very stable reference electrical potential. The mortar cap ensures good contact with the parent concrete and eliminates errors due to ion diffusion.

RB15 manganese dioxide reference electrodes are connected to a data logger to monitor readings which may be manually downloaded or transmitted remotely via modem to an external “off site” office. Measurements may also be performed by use of a handheld volt meter with high input impedance (>100 M Ω).

The RB15 manganese dioxide reference electrode functions as a solid state electrode (no internal gels) and does not require aggressive materials, for example chloride ions, to function.

Advantages

1) 50 year design life.
2) Consistent long-term function.
3) No release of aggressive salts – contains no chloride ions.
4) Constant potential when current is drawn from the reference electrode.
5) Protected mortar tip reduces possible damage on installation.
6) Simple installation to new or old structures.
7) Large contact 3-D interface with parent concrete (175 mm²).
8) May be exposed to chloride and carbonated environments.
9) Can be supplied without cable tails for specific cable attachment on site.

Technical Data

The function of the Castle RB15 manganese oxide reference electrode is founded on the reduction of manganese oxide within the electrode body. The resulting potential of the manganese oxide reference electrode is nominally + 175mV versus saturated calomel electrode (SCE) at 25°C in saturated calcium hydroxide. A salt bridge is used for this measurement. After installation the exact potential will depend slightly on the pH of the concrete pore water and temperature.

The polarisation characteristics of the manganese oxide reference electrode are detailed below:

<table>
<thead>
<tr>
<th>Applied current For 30 seconds (μA)</th>
<th>Potential shift (mV) (Negative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>10.0</td>
<td>60</td>
</tr>
</tbody>
</table>

The manganese oxide reference electrode design provides an extremely stable potential when low currents are drawn from the electrode. This property means that the MnO₂ reference electrode can easily accept current being drawn from the measurement surface without losing its reference potential.

The Castle RB15 manganese oxide reference electrode is capped with a formulated cementitious mortar which provides compatibility with the parent concrete. The nylon casing has end contact and side contact surfaces. This minimises errors during installation and reduces the potential for loss of contact following installation.

Quality Assurance/Quality Control

All Castle RB15 manganese oxide reference electrodes are provided with a unique identification number and Calibration Certificate for Project Quality Assurance & Control records traceability purposes.
Specification

Size /Dimensions: Nominally 78mm long 15mm diameter.
Housing: Nylatron casing with IP68 cable gland.
Cable: Standard cable is XLPE/XLPE blue/blue 2.5mm2.
Shelf Life: 12 Months.
Packaging: Supplied in minimum 10 unit packs.
Storage: Dry and constant temperature (between 5˚ and 25˚C).
Calibration: Each electrode is calibrated before delivery to site and a calibration certificate issued. It is not feasible to check this calibration on site.

Support Services

Castle Electrodes have been supplying reference electrodes to the construction industry since 1994. For technical and Sales support please contact:

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