

LEAD BASED ANODES

Lead based anodes were first used practically in the mid 1950's. Lead has a low melting point and is malleable and ductile. This makes it very easy to cast and machine. It is also easily bonded to tinned copper cables. For use as an impressed current anode the formation and maintenance of a lead oxide layer (PbO₂) on the surface is essential. This layer is actually the anode material that emits the current the lead itself only acts as a conductor and the source of the lead oxide. Lead oxide is insoluble in seawater so lead based anodes are very effective in seawater applications.

Applications

Jetties, quay walls & offshore structures Generally mounted in special assemblies and rigidly mounted to the structure.

Ships Cast in special dielectrical shields of glassfibre. Special consideration must be given to the design criteria because of the variety of electrolytes that a ship will move within (see operating data).

Operating Data

Pure lead is not suitable for use as an anode as it fails to form the required oxide film even in seawater. Several alloys have been tested and the two most commonly used today are:

1. Lead/Silver (93% lead, 6% antimony, 1% silver)
2. Lead/platinum bi-electrodes (99.5% lead, 0.5% antimony and platinum pins).

The normal operating current density is about 110 Amp/sq.m and the lead consumption rate about 0.09 kg/Amp. year in 16 ohm.cm seawater, 0.15 kg/Amp.year in 50 ohm.cm and 23kg/Amp. year in 1000 ohm.cm. Lead is a very dense material so these consumption rates are not significant.

Lead/Platinum Bi-electrodes

The insertion of small platinum electrodes into the surface of the lead actively promotes the formation of the lead oxide film in seawater environments. For this reason small pins of platinum are usually inserted flush into holes in the surface of the lead anode at approximately every 150-300mm. The lead oxide film on anodes without the platinum wires could easily be destroyed and not rapidly reformed so the lead/platinum bi-electrode type of anode is to be preferred.

Cable Connection

It is important to select the right cable connection for the environment in which the anode will be buried, therefore, cable is supplied according to individual requirements. For the complete range of CCEL KATHODICA cable see relevant data sheet.

Range Available

Lead may be easily cast into virtually any shape without difficulty. However, anodes are normally solid rods or cast in bars then moulded into wraparound anodes or ship type anodes. Full details of the range available can be obtained upon request.



Wraparound Anode



Lead Anode in glassfibre shield



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