

Product Description:

Four High Silicon Cast Iron Anodes are securely mounted on a substantial corrosion resistant Frame. Nominal Discharge Amperage: 20 to 40 Amps.

The 4-anode sled is about 2 ft (0.6 m) high, with nominal footprint of 7 ft x 6.5 ft (2.1 m x 1.2 m).

Sleds may be shipped assembled, or in component form for assembly by others. Nominal maximum shipping measure is: 1200 kg / 1.5 m³, for one fully assembled sled including concrete, excluding the shore-lead. Bare components in kit form have a nominal shipping measure of 800 kg / 1.5 m³, exclusive of concrete and shore lead cable, but with rebars.

Application Information:

Although HSCI in sea water can withstand current discharge amperages exceeding 5 A / sq ft (55 A / sq m), the following factors should be considered.

- (a) **Environmental Regulations** may restrict sled discharge current to lower values. (i.e. less than 1 volt / meter electric field strength in natural waters).
- (b) **Sled Life** will depend upon the weight of anodes, the amperage, their consumption rate and utilization efficiency. For purposes of example only, the following values have been assumed to predict Life Expectancy, according to Anode Model (Size) and Sled Current Discharge (Amps). Refer to Figure 2, based on:
 - **Consumption Rate:** Assume 1.00 lb / A-Yr (0.45 kg / A-yr) Note: in practice 0.75 lb / A-yr is achievable.
 - **Utilization Efficiency:** 85% (percentage of anode mass that can be reasonably expected to perform CP).
 - **Anode Mass Options:** Refer to Z-Series Bulletin 04-14 on www.anotec.com.

Based on the assumptions, Figure 2 charts 4-anode Sled Life in relation to Sled Discharge Amperage for the following Z-Series Tubular anode Sizes.

- 3884 Z 90 lb (41 kg)
- 4884 LZ 123 lb (56 kg)
- 4884 HZ 175 lb (80 kg)
- 4884 XZ 237 lb (108 kg)
- 4884 SZ 315 lb (143 kg)

Note: Traditional, "Centertec" tubulars of larger outer diameter can also be used when low resistance is critical (i.e. solar rectifier voltage limitations).

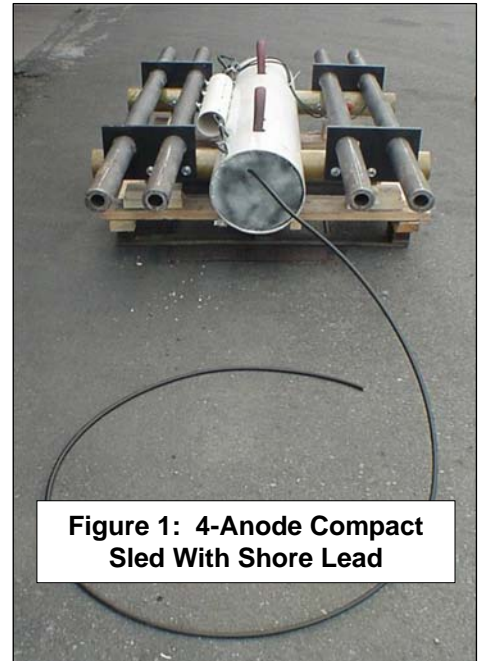
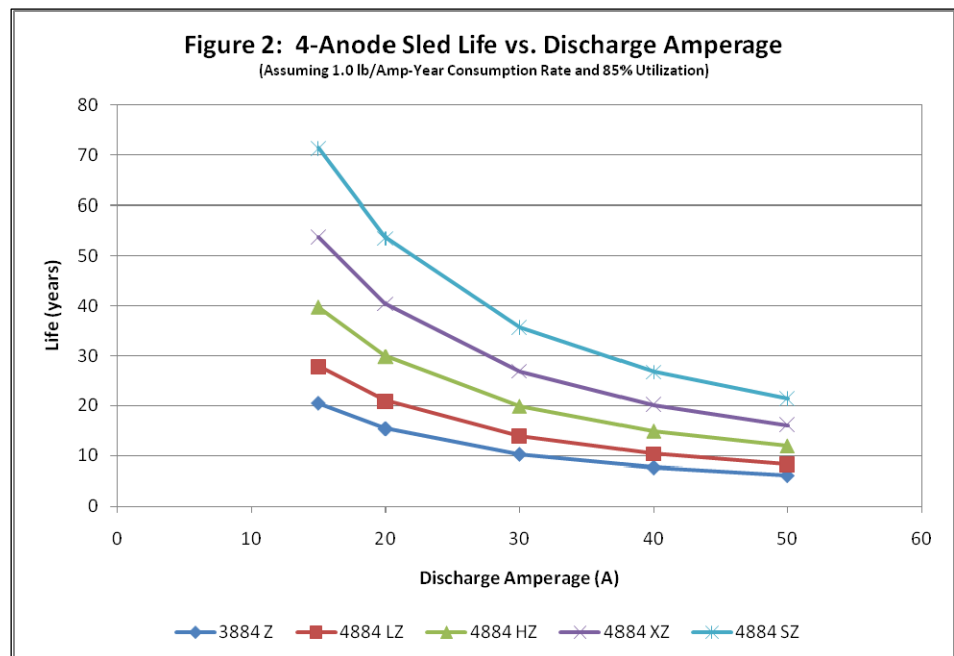
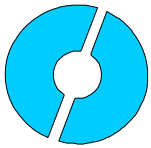


Figure 1: 4-Anode Compact Sled With Shore Lead





Sled Construction: Refer to Drawing ANO-200 attached (page 3).

Each sled-mounted anode has a single Anode-Lead of #8 Halar / Kynar HMWPE cable, connected to a Shore Based DC Rectifier (not included) by means of one or 2 insulated Shore-Lead cables (usually, but not limited to, #6, #4 or #2 HMWPE 600V), optionally protected by EPDM rubber hose. Shore-Lead length permitting, dual shore-lead cables of #2 or smaller may be protected by a single hose.

Each Anode-Lead exits the side of the anode, approximately ~350 mm (~14") from the center connection. The Anode-Lead wire is protected by a sleeve of rubber hose at the hole in the anode wall. The cable connection and protective hose inside the anode is encapsulated with epoxy. Each anode has spare external lead wire, slack-coiled as an allowance for on-sled repairs or replacement of the Shore Leads, if ever required.

The on-sled junction between Anode-Leads and Shore-Leads utilizes ground connectors (copper alloy), sealed and protected by:

- Electrical Anti-corrosion Coating (Glyptol), Insulation Putty (Scotchfill) and Taping (Scotch 130C and Super 33).
- Epoxy (Polyspec 757 or DuoChem 8113) mixed with sand (Anotec WI 4.9.4) encapsulate the wrap within a PVC tube (Junction Case). The mixture of epoxy and sand has been carefully developed and tested by Anotec to insure that the epoxy mass cures gradually and evenly for optimum sealing quality.

Shore-Lead cable(s) and optional protection hose(s) are securely encased in concrete within the Sled Frame, as shown in Figure 3.

The Sled frame consists of one, 12" (300 mm) PVC Class 63 pipe, 60" (1.5 m) long, filled with reinforced concrete, which secures 2 Cross-Arm Anode Supports of 4" (100 mm) fiberglass tube filled with 35 MPa reinforced concrete.

The Sled frame includes:

- 2 steel lifting eyes powder coated with epoxy; cover protected by a heat shrink sleeve and a 1" EPDM rubber hose jacket, before being cast into the sled.
- 4 anode retention plates manufactured from $\frac{3}{4}$ " HMWPE and secured into the sled with $\frac{5}{8}$ NC steel fasteners coated with epoxy or mastic, within PVC sleeves cast into concrete. Exposed threads, nuts and washers are epoxy / mastic coated, and capped by plastic-plugs fitted tightly into the system.

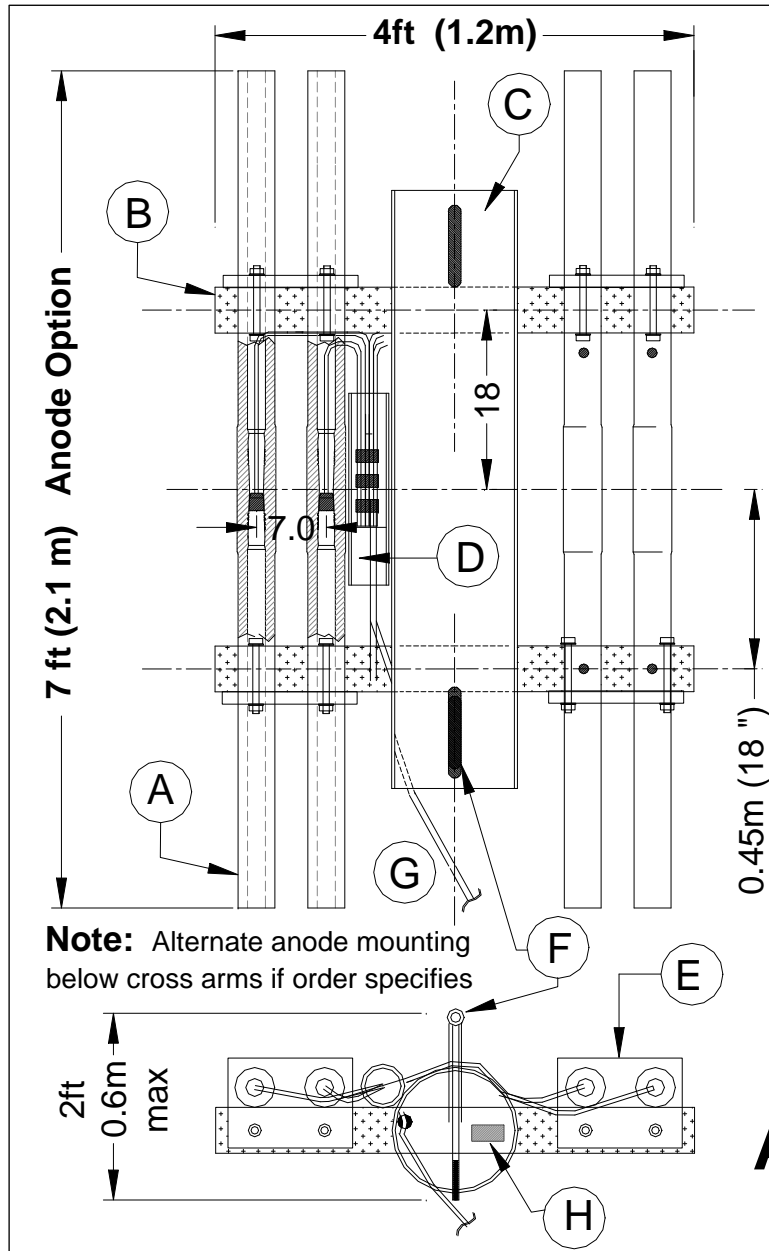
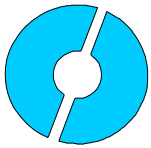
Heavy-duty, all-plastic tie-wraps are cast into the pipes and tubes to secure on-sled cables, as well as the junction casing, to structural members.

Similar sleds have been operating since 1993. More than 220 sleds are in service, primarily on the British Columbia coast. Most of these protect B.C. Ferry Corporation wharf structures in turbulent and silting conditions.

Each complete sled assembled by Anotec, or kit of sled components shipped for assembly by others, is manufactured, inspected and tested in accordance with Anotec's ISO 9001 Quality Program. A name plate secured into concrete should list: Anotec; the Sled Serial Number; Date of Manufacture; and, Anotec content status (i.e. whether Component Kit or Anotec Assembled Sled, with other Customer Project data optional).



Figure 3: 4 Anode Compact Sled



- (A) High Silicon Cast Iron Tubular Anodes**
 Example Configuration Option:
 "4 only 4884LZ 123lb net, 3.2"od (80mm) x 7ft (2.2m)"
 Refer to Anotec Bulletin 04 -14
 Sled-specific modifications include:
 1 only Anode Lead #8 Halar HMWPE x 10ft.
 1 only Retention Stop per anode (into FRP)
- (B) Cross Arm** 4"Ø x 4ft FRP
 concrete fill w rebars
- (C) Ballast Pipe** 12" PVC x 5ft (nominal)
 concrete filled w rebars
- (D) Junction Case** for Shore Lead
 3"Ø PVC x24". Epoxy fill.
- (E) Retainer Plate:** nominally
 PE 3/4" x 10" x 13" w 2 only
 5/8NC bolts x 7" galv & denso
 in PVC sleeves cast into Item B.
- (F) Lift Eyes** 2 only 5/8"NC
 Epoxy coated, in HS Sleeve
 w 1" rubber hose cover
- (G) Shore Lead** : Example Configuration Option:
 "Dual Cables, each #2 AWG x 150ft HMWPE bare."
- (H) Name Plate**

Maximum Nominal Ship Weight: 1020 kg / 1.5 CuM
 based on 4 of 4884 SZ anodes net of Shore Lead.

ANOTEC Compact Anode Sled

Drawing ANO-200 Rev 2.3 10 Jan 2008