

### RetroSAM

#### General

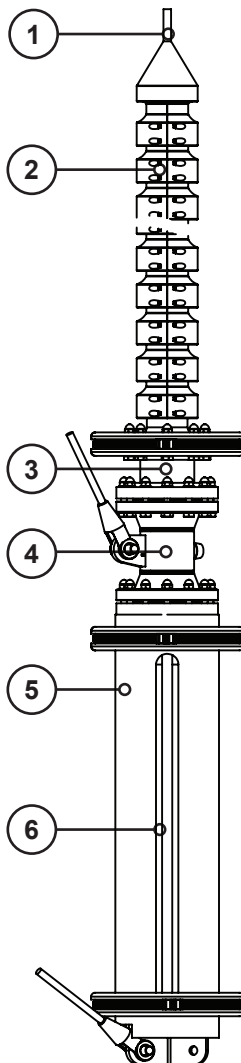
RetroSAM is a modular suspended impressed-current anode system rated at 150 Amperes for 15 years. Cable termination to the anode cable is made via a re-enterable junction box. The entire system can be deployed without any subsea intervention. The anode system is designed to be recovered during periods of foul weather.

#### Standard feeder cable (Item 1)

Type	3-Core 2 AWG flexible cable [ 35 mm <sup>2</sup> ] 600/1000V grade marine power cable (19 strands minimum)
Core Insulation	2 Pass insulation extrusion (TPU/XLPE) Each single wrapped with 100% Mylar tape
Overall	HDPE insulated & bedded, Contra-helical double galvanized steel wire armor package, PE overall jacket. Cable size and quantity is confirmed during detailed design phase.
Filler	Various HDPE filler elements
Water blocking	Yarn filled all voids
Minimum bend radius	Static - 19.7" [ 500 mm ] Dynamic - 29.5" [ 750 mm ]
Umbilical safe working load	8 kip [ 37kN ]
Minimum breakload	33 kip [ 148kN ]

#### Main feed cable entry

Entry size	The ICCP anode array can be connected to a wide range of feed cables depending on method of deployment and cable routing.
(VBR) Vertebrate bend restrictor (Item 2)	Cable will enter through a segmented articulated polyurethane bend restrictor suited to the cable. This is attached to the junction box frame via a flange.
Armor termination (Item 3)	Behind the bend restrictor is a customized steel armor termination assembly that is anchored to the main frame. Provides entry of the main feed cable with armor removed. The termination flange is designed such that the anode module will be fully supported by the armor. The flange on the termination can be suited to match the bend restrictor.
Junction box entry	Provides entry of the inner conductor(s) and primary insulation only.



#### Anode module shell (Item 5)

Outer material	PE injection-molded shell
Dimensions	Ø 12.75" x 61.76" long [ Ø 324 x 1568 mm long ]
Base plate	6" 300# RF blind flange ASTM A105 forged steel
Ballast	Concrete and resin with steel frame

#### MMO anode elements (Item 6)

Base material	Titanium tube – Grade ASTM B338 grade 1 or 2
Outside diameter	1.25" [ 31.75 mm ]
Wall thickness	0.035" [ 0.9 mm ]
Length	48" [ 1220 mm ]
Coating	Mixed metal oxide activation coating comprising of iridium dioxide / tantalum pentoxide, proprietary application method.
Current density	384 mA/in <sup>2</sup> [ 60 mA/cm <sup>2</sup> ]
Quantity	3

#### Overall weights & dimensions

Dimensions (D x H)	Ø 19.69" x 177.25" [ Ø 500 x 4503 mm ]
Weight (air)	815 lb [ 370 kg ] ±5% fully ballasted
Weight (water)	485 lb [ 220 kg ] ±5% fully ballasted

#### Junction box (Item 4)

Dimensions	Body - Ø 6" Sch XX x 5" [ 127 mm ] Flange - 6" 300# SO with Flexitallic gasket Overall - Ø 12.5" x 12.7" [ Ø 317 x 323 mm ]
Steel grade	Body - ASTM A53 Spigot / Fill port - ASTM A105 forged steel fitting Flange - ASTM A105 forged steel
Interior volume	330 in <sup>3</sup> [ 5.3 l ]
Coating	Shot blast SA2.5 [white metal] 2 part epoxy paint system DFT 14 mils [ 350 microns ] Applied in accordance to NORSOK M-501 system no. 7 Final color 'Zinc Yellow' RAL 1018
Coupling lugs	Encapsulated inline solder butt splice
Water block	Re-enterable / self-healing gel

## Technical datasheet

### Back-up tether (Item 7)

Back-up tether	Ø ½" [ 13 mm ] Polypropylene synthetic rope
Tensile strength	3,580 lb [ 15 kN ]
Rigging (Item 8)	Safety open spelter socket clevis pin, 1" rated WLL 5 ton [ 4750 kg ] forged steel, SermaGard® coated

### Fenders (Item 9)

Material	Polyurethane A 70
Color	Black
Thickness	3" [ 76 mm ]
Attachment	Subsea strapping

### Sacrificial cathodic protection

Anode type	Al-In-Zn alloy
Anode dimensions	Ø 6" x 4.5" [ Ø 150 x 115 mm ]
Anode core	Ø ½" [ 12 mm ] round rod
Net weight	12 lb [ 5.5 kg ]
Gross weight	13 lb [ 5.9 kg ]
Capacity	1140 Ahr/lb [ 2500 Ahr/kg ]
OC potential (sw)	(-) 1.080 V vs Ag/AgCl
Quantity	1
Electrical continuity	Fasteners and fittings to be Sermagard® coated; continuity cables as required

### MMO anode cable connection

Method	Tin alloy expanding compression fitting (internal)
Sealing	Flexible resins (2 stage)
Cable OD	0.423" [ 10.7 mm ]
Weight (air)	0.23 lb/ft [ 0.34 kg/m ]
Cable length / Anode	4' [ 1.2 m ]
Type	2 AWG flexible cable [ 35 mm² ] 600/1000V marine-grade power cable
Conductor	Soft annealed stranded tinned copper conductor to ASTM B33
Insulation	Type P XLPO
Ampacity	162 A @ 200°F [ 95°C ]

### Tether system (Item 10)

Tether	Ø ½" [ 13 mm ] Single-strand HMPE synthetic rope
Tensile strength	22,000 lb [ 98 kN ]
Abrasion resistance	Non-load bearing braided polyester and aramid jacket
Water absorption	0% Hygroscopic
Weight (air)	0.064 lb/ft [ 0.0088 kg/m ]
Weight (water)	0.021 lb/ft [ 0.0029 kg/m ] positive

