



A SAIT GROUP COMPANY

BSS Technologies Europe NV

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Cathodic Protection, Anti Fouling, AC Mitigation, Corrosion Engineering, Hypochlorination System, Concrete CP, Marine CP, Internal Corrosion Monitoring, Pin Brazing Equipment, Leak Detection, Construction & Manufacturing, Pipeline Information Management System, Advanced Pipeline Survey, Coatings & Field Joints, Insulation Joints, Wireless Remote Monitoring Systems, Valve Test & Repair Equipment, High Voltage Cables, Composite Repair Materials, Electric Heat Tracer, Lightning Protection & Grounding Solutions, AI Based Vision Platform for Digital Oil Field...

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GROUP ACTIVITIES

Cathodic Protection & Corrosion Engineering

Concrete Cathodic Protection

Marine Cathodic Protection

Anti Fouling System

Hypochlorination System

AC/DC Interference and Mitigation Study & Modelling

Internal Corrosion Monitoring

IECEX & ATEX Certified Transformer Rectifier Units

RMCS & Wireless Remote Monitoring System

Aluminium & Zinc Castings

Advanced Pipeline Surveys

Construction & Fabrication

AI Based VISION Platform for Digital Oil Field

Coatings, Wrapping & Field Joint Sleeves

Leak Detection System

Pin Brazing Equipment & Services

Pipeline Construction Management System

Electrical Grounding Backfills

Monolithic Insulation Joints

Calibration and Certifications Services for Test and Measuring Instruments

Electric Heat Tracer

High Voltage Cables

Composite Repair Solutions

Natural Gas Detection System

Power Quality, EMI/EMC Consulting, Lightning Protection & Grounding Solutions

Valve Test & Repair Equipment

Introduction:

BSS Technologies Europe NV, based in Belgium, addresses the growing corrosion control needs across Europe. It also functions as a satellite office for all subsidiaries of the Sait Group, promoting the group's comprehensive capabilities within the region.

BSS Technologies is a UAE-based organization specializing in Electrochemistry and Sustainable Energy solutions. Since its inception 26 years ago, it has become the leading solution provider across the MENA region and Asia Pacific. The group has evolved into a highly resourceful and responsive global company, with strategically positioned offices and facilities in Abu Dhabi, Dubai, Qatar, Saudi Arabia, Kuwait, India, Nigeria, Algeria, Tunisia, Belgium, and Canada. The company has developed its own manufacturing subsidiaries and capabilities in surveys, engineering, R&D, installation, construction, and maintenance, particularly in the fields of Cathodic Protection, Corrosion Engineering, and Electrochlorination solutions.

As a multi-disciplinary organization, BSS Technologies handles detailed surveys, audits, design, engineering, and manufacturing, offering comprehensive concept-to-commissioning solutions for asset integrity management. Managed by highly qualified and certified professionals with extensive experience, the company has successfully delivered numerous projects, playing a pivotal role in the development of global infrastructure across various industries, including Retail, Energy, Construction, Oil & Gas, Marine, and more.

Our areas of expertized deliverables include – Engineered Cathodic Protection & Corrosion Control Systems, detailed design and manufacturing of Power electronics and Electro Chlorination Systems.

In BSS Tech, Challenges Are Dealt Technically – hence, we do continuous product developments and alternates, especially the controllers and we allocate a certain percentage of our resources dedicated towards Research & Developmental activities at all times. Our familiarity in using these components has led our team to be able to recommend a various and alternate solutions to meet our client's specific needs. Technical training is also provided to our clients regularly to monitor and maintain the systems installed. In-house, online and / or site-based training is delivered as per client convenience.

Our primary focus is Customer Satisfaction and Delight. We have achieved zero harm continuously over years adhering high safety standards in hazardous work environments. Complete business activities from production to delivery follows international standards and best practices in the industry to deliver greater satisfaction to our clientele.

To meet our customer requirements, we have placed our Corporate Office in Abu Dhabi- UAE. This enabled us to provide reliable products expediently to our customers, we hold our Head Office, Engineering and Manufacturing Facilities in National Industries Park, Jebel Ali, Dubai, UAE. This facility produces Transformer Rectifier, Chlorination Rectifier, Anode Casting, Titanium Fabrication and all customization capabilities. This production facility operates with state-of-the-art technologies & equipment and have the layout to address the Quality, Safety and Environmental Requirements. Our cross-continent presence and strategic global positioning helped us to bridge our services and solutions to far away clients and enhanced our complete supply chain.

We have diversified our business into other fields of Asset Integrity & Value Engineering including Leak Detection, Internal Corrosion Monitoring solutions, AI based VISION platform for Digital Oilfield, Advanced Survey techniques, Coatings and Tapes, Pipeline Construction and Information Management Solutions (PCMS/PIMS), Pin Brazing, Monolithic Isolation Joints, Electric Heat Tracer, Specialized Electrical and Power solutions, Valve Test & Repair Equipment maintaining our consistent and reliable expertise for services in Cathodic Protection, Corrosion Engineering and Electro Chlorination systems.

We are Complete solution provider for Consulting, Engineering, Procurement, Manufacturing, Material & Equipment Suppliers and Turnkey Contractors for Engineered Cathodic Protection and Asset Integrity Management services for Retail, Energy, Construction, Oil & Gas, Marine industries in Middle East, Africa, Asia & Europe.



A SAIT GROUP COMPANY

TRANSFORMER RECTIFIER

Information

The key to any impressed Current Cathodic Protection System is an efficient and reliable Power Unit that can provide an uninterrupted Direct Current Power Supply for the Anode Energization. BSS Tech offers a fully comprehensive range of Transformer Rectifiers including IECEX & ATEX certified units.

We manufacture all types, standard, customized Transformer Rectifiers. We also manufacture explosion proof units with IECEX & ATEX certification.

Our Cathodic Protection Engineers are available to advice the most efficient & economical Transformer Rectifier units for specific application.

How to Order

To help our clients to select the right features in a Transformer Rectifier unit, BSS Tech developed a product code selection procedure. Pick the features from the following. A sample order code can be explained as below:

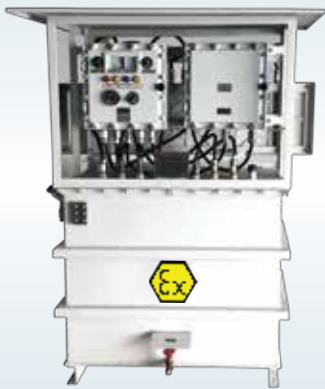
BSTR-48-100-A-1-A-A-O-S-BIS The Order Code is supplied with the below reference:

SAMPLE CODE	BS	TR	48	100	A	1	A	A	O	S	BIS
REFERENCE	1	2	3	4	5	6	7	8	9	10	11

Reference Detail:

- | | | |
|--|--|--|
| <p>1) BS</p> <p>2) TR</p> <p>3) DC volt*</p> <p>4) DC amp*</p> <p>5) AC Input:</p> <p style="padding-left: 20px;">A - 480V, 3Ph</p> <p style="padding-left: 20px;">B - 460V, 3Ph</p> <p style="padding-left: 20px;">C - 440V, 3Ph</p> <p style="padding-left: 20px;">D - 415V, 3Ph</p> <p style="padding-left: 20px;">E - 400V, 3Ph</p> <p style="padding-left: 20px;">F - 380V, 3Ph</p> <p style="padding-left: 20px;">G - 240V, 1Ph</p> <p style="padding-left: 20px;">H - 230 V,1Ph</p> | <p>6) Input Power Frequency :</p> <p style="padding-left: 40px;">1) 50 Hz</p> <p style="padding-left: 40px;">2) 60 Hz</p> <p>7) Mode of Operation:</p> <p style="padding-left: 20px;">A - Auto Potential</p> <p style="padding-left: 20px;">B - Manual CVCC</p> <p style="padding-left: 20px;">C - Manual Variac</p> <p style="padding-left: 20px;">D - Manual Tap</p> <p>8) Type of Control:</p> <p style="padding-left: 20px;">V - Variac Control</p> <p style="padding-left: 20px;">T - Thyristor Control</p> <p style="padding-left: 20px;">A - Tap Changer</p> <p>9) Cooling:</p> <p style="padding-left: 20px;">O - Oil Cooled</p> <p style="padding-left: 20px;">A - Air Cooled</p> | <p>10) Enclosure Type:</p> <p style="padding-left: 20px;">I - Safe Area Indoor</p> <p style="padding-left: 20px;">S - Safe Area Outdoor</p> <p style="padding-left: 20px;">AT - ATEX certified</p> <p style="padding-left: 20px;">Ex - IECEX Certified</p> <p>11) Special Features:</p> <p style="padding-left: 20px;">T - Timer</p> <p style="padding-left: 20px;">F - DC Fuse Alarm</p> <p style="padding-left: 20px;">O - 115V Outlet</p> <p style="padding-left: 20px;">B - Breather</p> <p style="padding-left: 20px;">D - Dual Inlet</p> <p style="padding-left: 20px;">I - Current Interrupter</p> <p style="padding-left: 20px;">S - Surge Arrester</p> <p style="padding-left: 20px;">R - Remote Control</p> <p style="padding-left: 20px;">M - Multi-Channel*</p> <p style="padding-left: 20px;">N - Remote Monitoring</p> <p style="padding-left: 20px;">A - Auto Change over</p> |
|--|--|--|

ATEX CERTIFIED TR



- Air Cooled
- Oil Immersed
- Explosion Proof
- Special Purpose
- Custom Design
- ATEX certified
- IECEX certified

Standard Rating TR units

10V, 10A	20V, 15A	20V, 20A	25V, 15A	25V, 25A
25V, 50A	50V, 50A	50V, 75A	75V, 75A	100V, 100A
				65V 300A

* For Multi-Channel Transformers, Reference No. 3 & 4 shall be indicated as V & I respectively. The details of the channel Voltage & Current shall be provided separately while ordering the Transformer Rectifier.

IECEx CERTIFIED TRANSFORMER RECTIFIER

Information

BSS Technologies proudly holds IECEx certification for a selection of Transformer Rectifiers tailored to meet the demand of their customers in the region. This strategic move reflects BSS Tech's dedication to meet international standards and enhancing the safety and quality of their products. The IECEx certification ensures that these Transformer Rectifiers adhere to globally recognized standards for equipment used in potentially explosive atmospheres. This proactive step showcases BSS Tech's commitment to addressing customer needs while upholding high industry standards.

Specifications

Rectifier Specifications	Electrical Specifications
Zone Classification: <ul style="list-style-type: none"> • Zone -2 Gas Groups • Primarily IIA and IIB+H2 • Protection Concept: Flame proof (Exd) • Oil immersed protection (O) 	Input power <ul style="list-style-type: none"> • 415V 3Phase • Frequency: 50Hz
Cooling and Protection: <ul style="list-style-type: none"> • Cooling Configuration: Oil-Cooled • Heat Dissipation: Heat-dissipating components are enclosed within an oil tank. • With radiators for higher power ratings. 	Output power <ul style="list-style-type: none"> • Output Voltage: 25V DC to 100V DC • Output Current: 25A DC to 300A DC
Control Section: <ul style="list-style-type: none"> • Cooling Design: Natural Air Cooling • Enclosure Type: Flame-proof Exd enclosures 	Control Modes: <ul style="list-style-type: none"> • Manual Control • Constant Voltage Constant Current (CVCC) • Automatic Control • Remote Monitoring and Control

Transformer Rectifier ratings and model types for Hazardous area applications.

Rating (w/o Radiator)	Model Type
25V/25A	BS-ExTR-N-25-25
25V/50A	BS-ExTR-N-25-50
25V/75A	BS-ExTR-N-25-75
25V/100A	BS-ExTR-N-25-100
25V/150A	BS-ExTR-N-25-150
25V/200A	BS-ExTR-N-25-200
25V/250A	BS-ExTR-N-25-250
25V/300A	BS-ExTR-N-25-300
50V/25A	BS-ExTR-N-50-25
50V/50A	BS-ExTR-N-50-50
50V/75A	BS-ExTR-N-50-75
50V/100A	BS-ExTR-N-50-100
50V/125A	BS-ExTR-N-50-125
50V/150A	BS-ExTR-N-50-150
75V/25A	BS-ExTR-N-50-25
75V/50A	BS-ExTR-N-75-50
75V/75A	BS-ExTR-N-75-75
75V/100A	BS-ExTR-N-75-100
Rating (with Radiator)	Model Type
50V/200A	BS-ExTR-Y-50-200
50V/250A	BS-ExTR-Y-50-250
50V/300A	BS-Ex-TR-Y-50-300
65V/150A	BS-Ex-TR-Y-65-150
65V/200A	BS-Ex-TR-Y-65-200
65V/250A	BS-Ex-TR-Y-65-250
65V/300A	BS-Ex-TR-Y-65-300
75V/150A	BS-Ex-TR-Y-75-150
75V/200A	BS-Ex-TR-Y-75-200
75V/250A	BS-Ex-TR-Y-75-250



- Flame Proof
- Oil Immersed
- IECEx Certified

REMOTE MONITORING & CONTROL SYSTEM

CATS-EYE™

Application

The Remote Monitoring and Control System (RMCS) is designed to monitor and control Impressed Current Cathodic Protection System Remotely. RMCS helps you to accomplish complete control of the Cathodic Protection operation in a plant, in desert or in deep sea. Features of RMCS consist of its own power supply units, software, communication and hardware for control monitoring & data logging. The site based equipment has local data logging facility which works on the embedded software and instructs the logic for monitoring and / or control. Power supply unit and the rest of the hardwares are placed in an instrument box or in a cabinet. The inbuilt hardware controls power supply output, communicates with remote PC in control room through various communication protocols. The software in Remote Computer communicates with RMCS Module for Control, Monitoring and Data logging. It provides access to all functions of the RMCS and a user-friendly interface with graphics. Major Monitoring and Controls available with RMCS are :



*Your eyes to
Cathodic Protection System*

- ▶ Auto Reference Mode
- ▶ Analytical Data Interpretation
- ▶ Depolarization Cycle
- ▶ Graphical Report Generator
- ▶ Interruption Cycle
- ▶ Real Time Monitoring
- ▶ Site Programming
- ▶ Reference Potential Monitoring & Control
- ▶ Alarms and call back
- ▶ Reference, DC Voltage, DC Current monitoring and control
- ▶ Data Recording
- ▶ SMS based alert system

Environmental Conditions		Electrical Interface		Communication Interface *	
Ambient Temp	-10°C to 60°C	Input Voltage	230VAC	Communication Protocol	Standard Modbus RTU
Storage Temp	-10°C to 60°C		Surge Protection	Yes	Wireless
Humidity	5 to 95%	Circuit Protection		Optical Isolation	Frequency
Size	Customized		Communication Interface *		Optical Interfacing
		TCP/IP			Yes
		Ethernet Topology			Yes
		GSM			Yes

**All other modes of communication like RS485, fibre optic and radio are available depending on requirement to be specified while ordering*



HARDWARE

CP RMU can be integrated with any existing CP power supply to collect and deliver the prescribed parameters to the base. CP RMU can be used as a replacement to any test station.

Real Time Voltage, Current, Reference Monitoring



Geoposition View



Information

The application named – “SAIT™ – CPDM” is a GEI enabled CP infrastructure life cycle monitoring software. Database application software is developed with Java virtual machine, data server and application server. The primary aspect of this software is to collect, store, safeguard the cathodic protection data and its asset details and provide custom made reports to evaluate the protection of various assets. The software provides unique facility to customize and store the entire cathodic protection components and structures. The software is compatible with all Windows platform. The Software is available as 'Single User', 'Server Based' and 'Web Based' – which makes 'SAIT™ – CPDM' the most flexible CP Data management software catering the needs of various industries from an individual user to multiple users in big operating industry. The key feature of this software is the GIS Viewer, which allows the user to view the respective locations of all their installation and CP Components.

GIS facilitate application in:

- Monitoring assets conditions to assist in infrastructure life cycle planning and replacement.
- Field crews can capture inspection information and quickly update centrally stored as-built in data.
- Engineers can monitor cathodic protection systems to view information in relation to the distribution system, diagnose problems, and ensure corrosion protection.

System Overview:

- The system involves developing a "WEB Desktop GIS*" based system by incorporating geographical database with real pipeline data consisting of rail/road/foreign pipeline crossings, CP locations, valve locations, etc. with facility of user-friendly retrieval of information.

Key functionality allows the user to:

- 100% Compatible with any structure or Installations
- 100% Customizable to any kind of CP Systems
- Historic data collection & analysis; GIS Compatibility
- Map showing actual location of all structures and CP Components
- Back up & Restore feature; Expandable to any number of fields
- High Security

**WEB Desktop GIS – A web desktop or webtop is a desktop environment embedded in a web browser or similar client application. A webtop integrates web applications, web services, and applications on the local client into a desktop environment using the desktop metaphor.*

Features & Benefits

Features	Benefits
Flexible data entry and ad-hoc reporting	Search, sort, and analyze data quickly
Year-to-year comparisons of various CP segments	Easy visualization of problem areas with graphical reports
Manage large quantities of data on asset types and other related maintenance information	See problem areas for test stations, rectifiers, galvanic anodes, foreign bonds, isolated services, tank performance, and hundreds of pipeline assets
User-configured hierarchical tree for organization and editing	Advanced organization and efficient editing for workflow
Multi-user design for replication and synchronization	Share critical data throughout an organization
Comparative line graphs, individual test point, rectifier and bond graphs, and continuous strip charts	Analyze distribution and transmission lines
Backup database	Restore database



An indispensable tool for Cathodic Protection professionals

- Manages multiple facility types and surveys
- Schedules routine field data collection
- Judges system effectiveness
- Pinpoints problems
- Prepares operators for regulatory audits



SACRIFICIAL ALUMINIUM ANODE

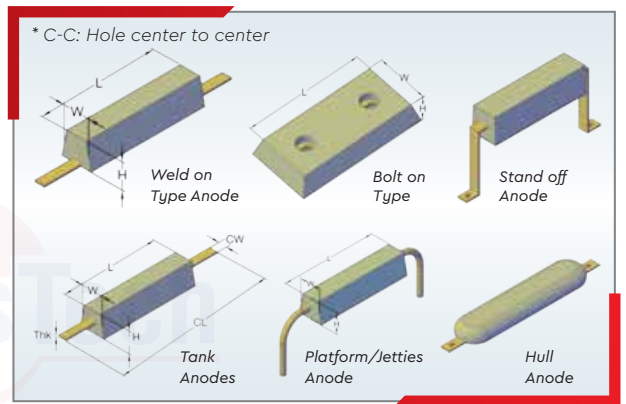
Information

Aluminium Anodes are usually used in low resistive environments like Water, Sea Water or Produced Brines. Standard Aluminium Anodes are supplied in variety of Sizes and Weights. Prolonged exposure above 50°C will result in excessive Consumption of Anode Material.

Aluminium Alloys			
Elements	MIL-A-24779	DNV RP B401	GALVALUM III
Silicon	0.08 – 0.20	0.12 max	0.08 – 0.20
Iron	0.08 max	0.09 max	0.13 max
Zinc	4.0 – 6.5	2.5 – 5.75	2 – 6
Indium	0.014 – 0.020	0.015 – 0.040	0.01 – 0.02
Copper	0.005 max	0.003 max	0.006 max
Others(each)	0.02 max	0.02 max	0.02 max
Aluminium	Remainder	Remainder	Remainder

Platform / Jetties Anodes						
Anode Type	L (mm)	W (mm)	H (mm)	Core	Net Wt. (mm)	Net Wt. (kg)
BTAA0866P	740	140	136	1"	35	39
BTAA1377P	740	190	162	1"	58	62
BTAA1644P	1520	136	126	1"	68	74
BTAA2044P	1520	138	152	1.5"	86	92
BTAA10088P	2450	306	261	4"	400	454
BTAA12622P	2450	340	260	4"	500	568
BTAA14333P	3050	282	286	4"	570	645

Bolt on Type						
Anode Type	L (mm)	W (mm)	H (mm)	C-C (mm)	Net Wt.(kg)	Gross Wt.(kg)
BTAA040B	200	100	30	110	1.4	1.8
BTAA046B	200	100	40	110	1.7	2.1
BTAA071B	300	150	25	160	2.8	3.2
BTAA082B	300	150	30	160	3.3	3.7
BTAA113B	300	150	40	160	4.7	5.1
BTAA128B	300	150	50	160	5.4	5.8
BTAA133B	300	200	40	160	5.6	6
BTAA237B	300	200	65	160	10.3	10.7
BTAA297B	400	180	70	180	13.1	13.4
BTAA344B	540	200	65	340	15.1	15.5



Tank Anodes									
Anode Type	Anode Dimensions(mm)			Core Dimensions(mm)			Weight (kg)		
	L	W	H	CL	CW	Thk	Net wt.	Gr. Wt.	
BTAA035T	200	95	33	300	25	5	1.2	1.6	
BTAA048T	290	90	40	440	30	5	1.7	2.2	
BTAA055T	300	90	40	400	25	5	2.1	2.5	
BTAA095T	340	155	35	450	38	5	3.7	4.3	
BTAA106T	400	150	33	540	40	5	4	4.8	
BTAA148T	440	105	60	560	30	5	6	6.7	
BTAA202T	550	130	50	680	50	5	8	9.1	
BTAA224T	550	130	50	650	40	5	8.4	10.1	
BTAA246T	550	135	58	680	50	5	10	11.1	
BTAA302T	550	130	75	680	50	5	12.5	13.6	
BTAA324T	920	130	50	1075	50	5	13	14.6	
BTAA437T	920	130	65	1075	50	5	18	19.7	
BTAA444T	920	160	60	1020	40	5	17.4	20	
BTAA504T	920	130	75	1075	50	5	21	22.7	

- Bolt on type
- Stand off Anodes
- Tank Anodes
- Hull Anodes
- Bracelet Anodes
- Weld on type Anode

Electrochemical Properties :

- Solution Potential: -1.1V w.r.t Ag/AgCl
 - Capacity: 2500 Ah/kg (min)
 - Density: 2750 kg/m³
- Customized Alloy, Dimensions and shape can be produced against order

SACRIFICIAL ZINC ANODE

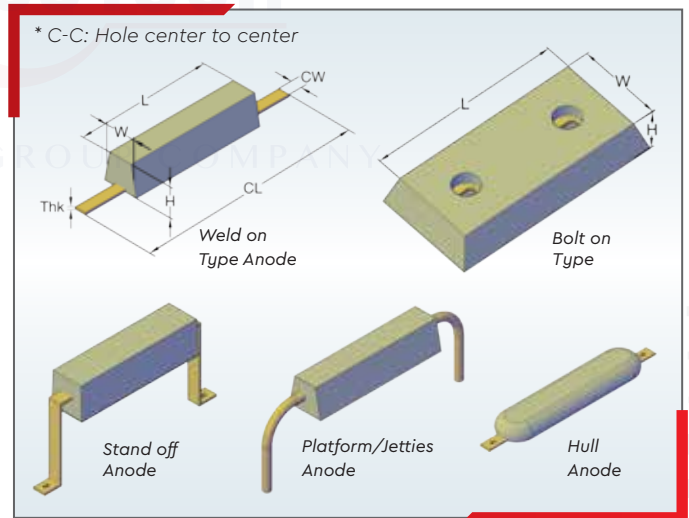
Information

Zinc Anodes are usually used in Low Resistivity Soils below 1000 Ω -cm and in Seawater or produced Brines. High temperature anodes shall be used when the ambient temperature exceeds 50°C. Pre packaged Anodes are used in standard backfill (75% Gypsum, 20% Bentonite and 5% Sodium Sulfate).

Zinc Alloys			
Elements	ASTM B 418 Type I & MILA-18001K	ASTM B 418 Type II	High Temperature
Aluminium	0.10 - 0.50	0.005 max	0.10 - 0.25
Cadmium	0.025 - 0.07	0.003 max	0.001 max
Lead	0.006 max	0.003 max	0.006 max
Iron	0.005 max	0.0014 max	0.002 max
Copper	0.005 max	0.002 max	0.001 max
Magnesium			0.05 - 0.15
Others(each)	0.02 max		
Total others	0.05 max		0.10 max
Zinc	Remainder	Remainder	Remainder

Zinc Anode Bolt On Type						
Anode Type	L (mm)	W (mm)	H (mm)	C-C (mm)	Net.Wt (kg)	Gr.Wt (kg)
BTZN084B	200	100	30	110	3.4	3.8
BTZN055B	200	100	40	110	4	4.4
BTZN166B	300	150	25	160	7.1	7.5
BTZN191B	300	150	30	160	8.2	8.6
BTZN244B	300	150	40	160	10.8	11
BTZN266B	300	150	50	160	11.6	12
BTZN337B	300	200	40	160	14.8	15.2

Weld on Type Anodes									
Anode Type	Anode Dimensions(mm)			Core Dimensions(mm)			Weight (kg)		
	L	W	H	CL	CW	Thk	Net wt.	Gr. Wt.	
BTZN053W	140	30	140	250	250	5	2	2.4	
BTZN082W	200	25	200	320	320	5	3.2	3.7	
BTZN100W	305	45	305	440	440	5	4	4.5	
BTZN111W	305	45	305	440	440	5	4.5	5	
BTZN122W	270	40	270	440	440	5	5	5.5	
BTZN146W	200	35	200	330	330	5	6	6.6	
BTZN191W	300	30	300	405	405	5	8	8.6	
BTZN240W	340	35	340	500	500	5	10	10.8	
BTZN262W	400	33	400	500	500	5	11	11.8	
BTZN284W	400	36	400	500	500	5	12	12.8	
BTZN288W	340	38	340	500	500	5	12.3	13	
BTZN355W	380	38	380	520	520	5	15	16	
BTZN422W	460	38	460	600	600	5	18	19	
BTZN466W	535	51	535	680	680	5	20	21	
BTZN511W	540	40	540	680	680	5	21.5	23	
BTZN555W	680	40	680	740	740	5	24	25	
BTZN577W	800	40	800	940	940	5	25	26	
BTZN600W	540	48	540	680	680	5	25	27	



- Bolt on type Anodes
- Stand off Anodes
- Weld on type Anodes
- Hull Anodes
- Bracelet Anodes
- Long Slender Anodes

Electrochemical Properties :

- Solution Potential: -1.05V w.r.t Ag/AgCl
 - Capacity: 780 Ah/kg
- Customized Alloy, Dimensions and shape can be produced against order

SACRIFICIAL MAGNESIUM ANODE

Information

Magnesium Anodes are used in high resistivity environments such as soil, potable water etc. Standard Magnesium Anodes are available in various sizes and weight.

High Potential Magnesium Anodes

Features: Produces high driving voltage compared to other Galvanic Anode.

Applications: At high resistivity or high current requirement. Buried Structures in soil of high resistivity such as pipelines, storage tanks etc.

Standard Magnesium Anodes

Features: Produces low driving voltage compared to high potential type.

Applications: This type of Anode is useful when the current requirement of the system is less.

Extruded Magnesium Anodes

Features: Influences larger structure surface uniformly, producing a greater amount of current than Cast Anodes.

Applications: Structures buried or submerged in high resistivity electrolytes, limited space applications such as pipe trenches & temporary CP systems.

The anodes are available as bare or with special backfill.

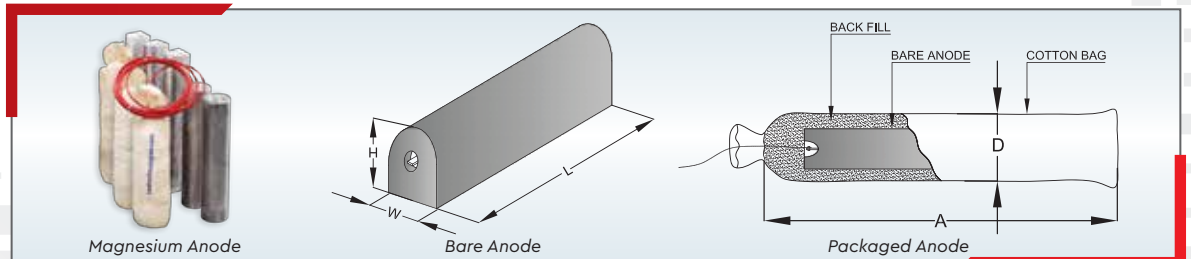
CHEMICAL COMPOSITION(%)					Si max	Cu max	Ni max	Fe max	Other Imp(max)	
Product	Mg	Al	Zn	Mn					Each	Total
HM	Remainder	0.01 max	-	0.5-1.3	0.05	0.02	0.001	0.03	0.05	0.3
SM	Remainder	5.3-6.7	2.5-3.5	0.15-0.7	0.10	0.02	0.002	0.003	-	0.3
Ribbon	Remainder	0.01 max	-	0.5-1.3	-	0.02	0.001	0.03	-	0.3

ELECTRO CHEMICAL PROPERTIES			
Product	Open-Circuit Potential (Volts) (with respect to Cu/CuSO4)	Actual Capacity at 50% efficiency (Ahr/kg)	Current Efficiency (%)
HM	1.7 - 1.77	1105 (min)	>50
SM	1.57 - 1.62	1115 (min)	>50
Ribbon	1.7 - 1.77	1105 (min)	>50

HIGH POTENTIAL MAGNESIUM ANODE						
Model No.	Weight (kg)	Anode Dimensions				
		L (mm)	A (mm)	D (mm)	H (mm)	W (mm)
BTMG30H	1.4	114	165	152	76	76
BTMG50H	2.3	191	343	152	76	76
BTMG90H-1	4.1	686	787	127	51	51
BTMG90H-2	4.1	345	700	150	95	90
BTMG170H-1	7.7	1295	1397	127	51	51
BTMG170H-2	7.7	645	750	200	90	75
BTMG200H	9.1	1524	1588	127	51	51
BTMG320H-1	14.5	1143	1549	152	76	76
BTMG320H-2	14.5	498	700	250	140	146
BTMG400H	18.1	1524	1626	152	76	76
BTMG480H	21.8	705	864	203	146	140
BTMG600H	27.2	1530	1750	200	100	100
BTMG600H-1	27.2	1558	1750	200	101.6	101.6

MAGNESIUM RIBBON ANODES	
Section (mm)	9.5x19.05 ± 0.04
Diameter of core (mm)	3.4
Core eccentricity	<1/16
Weight (kg/mm)	1.6
Standard coil length (m)	305
Coil weight (kg)	110

* Tolerance as per manufacturing standard



ZINC RIBBON ANODE

Information

Zinc has proven to be an excellent Anode material for Cathodic Protection and Grounding. Zinc Ribbon Anodes are widely used to protect various Steel Structures from Corrosion. These anodes are particularly effective in environments with high resistivity such as selected soils and brackish waters. Zinc Ribbon Anodes are also used as grounding electrode for AC Mitigation applications.

Electro Chemical Properties

Open Circuit Potential -1.05 V w.r.t Ag/AgCl, Current Capacity – 780 A-hr/kg, Galvanic Efficiency = 90 – 95 %

Features

- Easy to install.
- High current output to mass ratio.
- No stray current issues.
- Suitable to use for any cathode length.
- Used for current distribution to cathode.
- Suitable to use in low resistive soils of 1000 Ω -cm or less with gypsum-clay backfill or in high resistive soil with low cathode current requirement.

Applications

- Pipeline external surface cathodic protection.
- Tank bottom cathodic protection of above ground storage tank.
- In the limited space between casing and carrier Pipes.
- In the limited space between inner and outer casings of wells of various kinds.
- Grounding of pipelines.
- Interstitial spaces between old, corroded and new storage tank bottom.

Product Size	Plus	Standard	Small
Cross Section Inch (mm)	5/8" x 7/8" (15.88 x 22.22)	1/2" x 9/16" (12.7 x 14.28)	11/32" x 13/32" (8.73 x 10.32)
Weight lbs / Feet (kg / m)	1.2 (1.79)	0.6 (0.89)	0.25 (0.372)
Dia. of wire core Inch (mm)	0.135 (3.43)	0.130 (3.30)	0.115 (2.92)
Standard coil length Feet (m)	200 ⁺²⁰ ₋₀ (61) ^{+6.1} ₋₀	500 ⁺³⁰ ₋₀ (152) ⁺⁹ ₋₀	1000 ⁺⁵⁰ ₋₀ (305) ⁺¹⁵ ₋₀
Standard coil ID Inch (cm)	36 (91.44)	12 (30.5)	12 (30.5)



MIXED METAL OXIDE TUBULAR ANODE

Information

Titanium is chemically resistant & mechanically robust. Mixed Metal Oxide when coated over Titanium activates the latter. The Mixed Metal Oxide Coating has an excellent Electrocatalytic property. The evolution of Oxygen & Chlorine and / or mixtures of the two gases can be established with a low stable anode potential.

Composition

Mixed Metal Oxide Coating is a combination of precious groups of Metal Oxides. The Oxide composition has been extensively developed for optimized Electrochemical properties & Long lifetime in the various Cathodic Protection environments.

Lifetime

BSS Tech recognizes the simultaneous generation of Chlorine & Oxygen on the stringent environment where the anode inhabit. So we provide Mixed Metal Oxide to withstand these harsh conditions. Concurrent anodic generation of Chlorine & Oxygen occurs in Low Salinity / Brackish / Fresh Water. Hydrogen ions co-generated with Oxygen have a particular stagnant electrolyte flow, which results in very acidic conditions at the Coating-Electrolyte interface. Mixed Metal Oxide Anodes are designed to resist acidic conditions & the coating to the Titanium Interface is protected from anodic and chemical attack. It has a very low wear rate in the range of 0.5 to 4 mg/A(year); depending on the specified Cathodic Protection application & conditions. The long lifetime behaviour is only because of the low Electrochemical wear of the coating provided for a stable low Anodic Operating Potential. We design our Mixed Metal Oxide Tubular Anodes for a lifetime of 10 to 30 years or even longer depending upon the application & customer requirement.

Current Outputs

Mixed Metal Oxide Anodes have high current outputs. The recommended maximum current density depends upon the resistivity & composition of the electrolyte. As with all anode systems, the lifetime is a function of the current density.

The recommended maximum current outputs are:

Sea water	Soil (Carbonaceous Backfill)	Brackish/ Fresh water	Mud
750 A/m ²	100 A/m ²	150 A/m ²	50 A/m ²

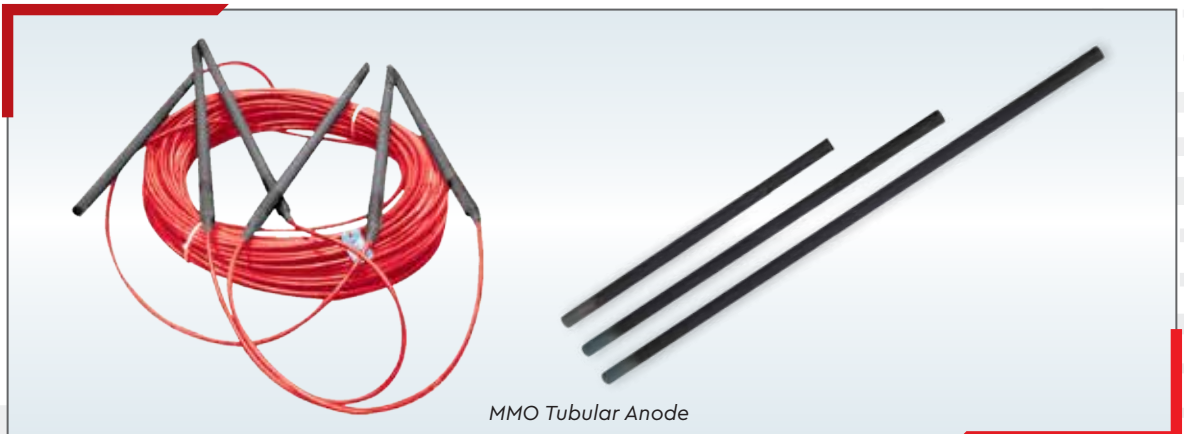
Dimension & Size

BSS Tech Mixed Metal Oxide Tubular Anodes are available in all lengths & diameters. We also provide other types of Mixed Metal Oxide Anodes which includes: Rods, Wires, Discs, Sheet, Expanded Mesh, Strip and can be tailor made to suit our customer's specification & requirements. Canistered MMO Anodes also available with different sizes.

Applications

Major applications for Mixed Metal Oxide Anodes include:

- Internal Cathodic Protection for Tanks, Condensers & Heat Exchangers, etc.
- External Cathodic Protection on Pipeline, Ships, Platforms, Jetty Structures, Offshore Structures, Seawater Intake structures.



MIXED METAL OXIDE RIBBON ANODE

Information

Titanium is chemically resistant & mechanically robust. Mixture of Metal Oxide when coated over Titanium, activates the latter. The Mixed Metal Coating has an excellent Electrocatalytic property. The evolution of Oxygen & Chlorine and / or mixtures of the two gases can be established with a low stable Anode Potential.

Composition

Mixed Metal Oxide Cathodic Protection Coating is a combination of precious groups of Metal Oxides. The Oxide composition has been extensively developed for optimized Electrochemical & long lifetime in the various Cathodic Protection environments.

Lifetime

BSS Tech recognizes the simultaneous generation of Chlorine & Oxygen on the stringent environment where the anodes inhabit. So we manufacture Mixed Metal Oxide to withstand these harsh conditions. Concurrent Anodic generation of Chlorine & Oxygen occurs in Low Salinity / Brackish / Fresh water. Hydrogen ions co-generated with Oxygen have a particular stagnant electrolytic flow, which results in very acidic conditions at the Coating-Electrolyte interface. Mixed Metal Oxide anodes are designed to resist acidic conditions & the coating to Titanium interface is protected from Anodic & Chemical attack. It has a very low consumption rate in the range of 0.5 to 4mg/ A(year); depending on the specified Cathodic Protection application & conditions. The long lifetime behaviour is only because of the Low Electrochemical wear of the Coating provided for a stable low Anodic operation potential. We design our Mixed Metal Oxide Ribbon Anodes for a lifetime of 10 to 30 years, or even longer depending upon the application & customer requirement.

Current Outputs

Mixed Metal Oxide Anodes can have different output ratings based on the life & current requirements. The recommended maximum current density depends upon the resistivity & composition of the Electrolyte as with all Anode systems, the lifetime is a function of the current density.

The recommended current outputs are:

Size (Width x Thickness)	Current Output				
0.25" x 0.025" (6.35mm x 0.635mm)	17 mA/m	33 mA/m	42 mA/m	70 mA/m	105 mA/m

Applications

Mixed Metal Oxide Ribbon Anode is primarily used for External Cathodic Protection of Tank Bottom Plates.

Packing

Mixed Metal Oxide Ribbon Anodes are available in rolls of 76 m or 152 m.



Mixed Metal Oxide Ribbon Anode

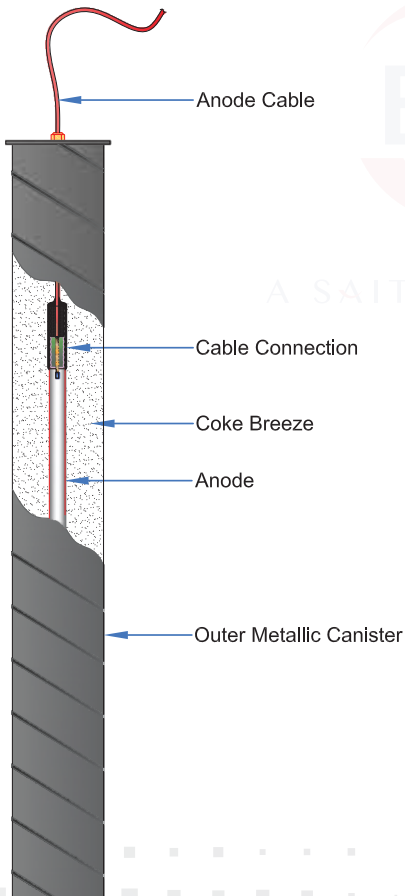
CANISTER ANODE

Information

BSS Tech supplies ready-assembled canister anodes consisting of anode with cable tail encased in a metallic canister filled with conductive coke breeze backfill. The ready-assembled anodes can be quickly and easily be installed directly into an excavation.

Technical Details

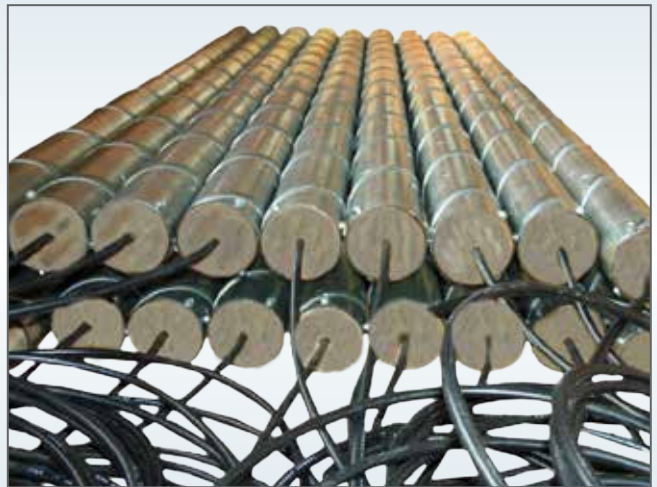
Anode Type	<ul style="list-style-type: none">• Mixed Metal Oxide• Silicon Iron• Graphite• Platinized Titanium
Anode Cable Tail	Standard: 1C x 16mm ² XLPE/PVC or HMWPE/Kyinar * Any cable tail type, size and colour can be connected to the tubular anode as per client and project requirements
Backfill	Coke Breeze
Canister Size	Standard Diameter: 150mm – 300mm Standard Length: 1m – 2m * Any size canister to be supplied as per client and project current requirements



Canister Anode

Typical Applications

- Plant Piping
- Short Pipelines
- Vessel External
- Buried Sheet / Tubular Piling
- Reinforced Concrete Foundations



Canister Anodes

MIXED METAL OXIDE MESH RIBBON ANODE – Concrete CP

Information

Anode Ribbon Mesh is a key component for Cathodic Protection systems in new or existing reinforced concrete structures. It is composed of a precious metal oxide catalyst sintered onto an expanded titanium mesh substrate.

Material Specifications

Anode Performance:

Maximum anode concrete interface current density:

FHWA limit: 110 mA/m²

Short-term limit: 220 mA/m²

Type	Width	Current Output		Electrical Resistance
		50 Years	100 Years	
A	10 mm	3.00	2.75	0.470 Ω/m
B	13 mm	3.80	3.50	0.362 Ω/m
C	20 mm	5.80	5.30	0.262 Ω/m

Catalyst: Mixed Metal Oxide

Expanded thickness: 0.9–1.3 mm

**Dimensions common to all types*

Substrate	
Material	Titanium, Grade 1, as per ASTM B265
Coefficient of thermal expansion	8.7 x 10 ⁻⁵ / K ¹
Thermal conductivity at 20°C	15.6 W/m ² K
Electrical resistivity at 20°C	5.6 x 10 ⁻⁵ Ω-cm
Modulus of elasticity	105 GPa
Tensile strength	245 MPa
Yield strength	175 MPa
Elongation	24% minimum

Titanium Conductor Bar		
Type	Solid Ribbon	
Material	Titanium, Grade 1, as per ASTM B265	
Dimension	12.7mm x 0.9mm	15mm x 0.9mm
Electrical Resistance	0.040 Ω/m	0.034 Ω/m



MIXED METAL OXIDE WIRE ANODE

Information

Titanium is chemically resistant & mechanically robust. Mixed Metal Oxide when coated over Titanium activates the latter. The Mixed Metal Coating has an excellent Electro-catalytic property. The anode wire shall be a Titanium substrate confirms to ASTM B 348 GRADE 1 / 2 with Mixed Metal Oxide (MMO) coating.

Composition

Mixed Metal Oxide Coating is a combination of precious groups of Metal Oxides. The Oxide composition has been extensively developed for optimized Electrochemical & Long lifetime in the various Cathodic Protection environments.

Lifetime

BSS Tech recognizes the simultaneous generation of Chlorine & Oxygen on the stringent environment the Anode inhabit. And so we provide Mixed Metal Oxide to withstand these harsh conditions. Concurrent Anodic generation of Chlorine & Oxygen occurs in Low Salinity / Brackish / Fresh Water. Hydrogen ions co-generated with Oxygen have a particular stagnant electrolyte flow, which results in very acidic conditions at the Coated Electrolyte Interface. Mixed Metal Oxide Anodes are designed to resist acidic conditions & the coating to the Titanium Interface is protected from Anodic and Chemical attack. It has a very low wear rate in the range of 0.5 to 4 mg/A(year); depending on the specified Cathodic Protection Application & Conditions. The long lifetime behaviour is only because of the Low Electrochemical wear of the Coating provided for a stable low Anodic Operating Potential. We design our Mixed Metal Oxide Tubular Anodes for a lifetime of 10 to 30 years or even longer depending upon the application & customer requirement.

Current Outputs

Mixed Metal Oxide Anodes have High Current Outputs. The recommended maximum Current Density depends upon the Resistivity & Composition of the Electrolyte. As with all Anode Systems, the lifetime is a function of the Current Density.

The recommended maximum current outputs are:

Sea Water	600 A/m ²
Brackish/ Fresh water	100 A/m ²

Dimension & Size

BSS Tech Mixed Metal Oxide wire Anodes are available in Diameter 1mm, 1.5mm & 3mm.

Applications

Major applications for Mixed Metal Oxide Anodes include:

- Internal Cathodic Protection for Tanks, Condensers & Heat Exchangers, etc.
- External Cathodic Protection on Platforms, Jetty Structures, Offshore Structures, Seawater intake structures.



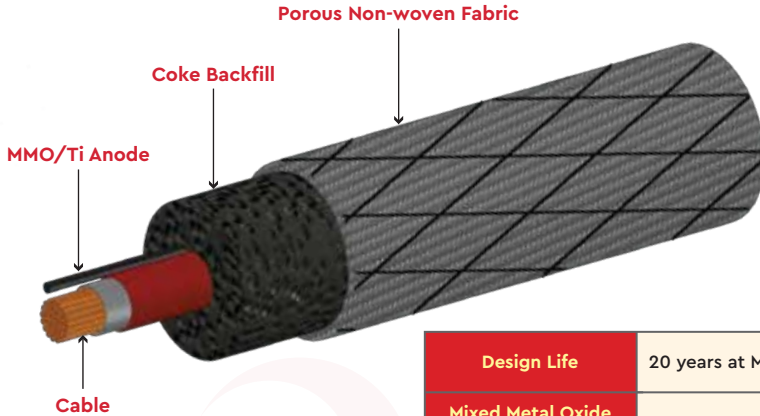
MMO Wire Anode

JACKMO™ WIRE ANODE

Information

JACKMO™ Wire Anode is a flexible anode used for impressed current cathodic protection of buried structures like tank bottom, underground vessel, Piping etc. Anode shall be placed in close proximity to buried metal structure. **JACKMO™** Wire Anode provides uniform cathodic protection to every point, with minimum interference from adjacent structures. This anode has the advantage of effective uniform current distribution, long life, flexible in construction, easy installation and lower ground contact resistance. The **JACKMO™** wire anode assembly is a Mixed Metal Oxide coated Titanium substrate (MMO/Ti) Anode piggy backed to a 10mm² HMWPE/Kynar cable. The assembly is pre-packed with coke breeze in a woven fabric tube sack. Cable size, type, and connection frequency can be customized to meet specific project requirements.

Specification:



Anode Wire Diameter	1mm	1.5mm	3mm
Maximum Current Output*	314 mA/m	471 mA/m	942 mA/m

Design Life	20 years at Max. Current output*
Mixed Metal Oxide Catalyst	Ir-Ta
Titanium substrate	ASTM B348 Grade I/II
Backfill	Calcium Petroleum Coke
Sock Material	Porous non-woven fabric
Sock dimension	38mm Diameter(Approx)
Length per reel	150 Meters (Customized length at request)
Cable	To suite design requirements

*Note : Other Rating are also available based on customer request



Jackmo™ Wire Anode

PYRAMID ANODE

Information

The Pyramid Anode consists of a four-vaned titanium substrate coated with mixed metal oxide, $\text{IrO}_2/\text{Ta}_2\text{O}_5$, conductive film, mounted on a high-density waterproof concrete pyramid to provide negative buoyancy and sea-bottom stability. Water seals are designed to be established engineering principles and do not rely upon the dubious effectiveness of fillers, mastics, resins and the like.

The anode, when fully assembled with special double-armoured insulated cable, requires only the installation contractor to lower the anode using lifting holes and sling on to the seabed and terminate the onshore end of the cable, resulting in minimal installation time, and further cost savings.

The Pyramid Anode is ideally suited for well casing, platforms, sheet piling, jetty piles and all similar offshore facilities.

Standard current output is 150A and other ratings are also available as per requirement.

The pyramid anode assembly has a minimum design life of 25 years which can be extended as per client requirements.

Top piece:

Titanium rod anode with four TIG-welded titanium vanes coated with MMO (Mixed Metal Oxide) coating.

One end of the central rod is provided with internal thread suited to assemble on base axle.

Base Piece:

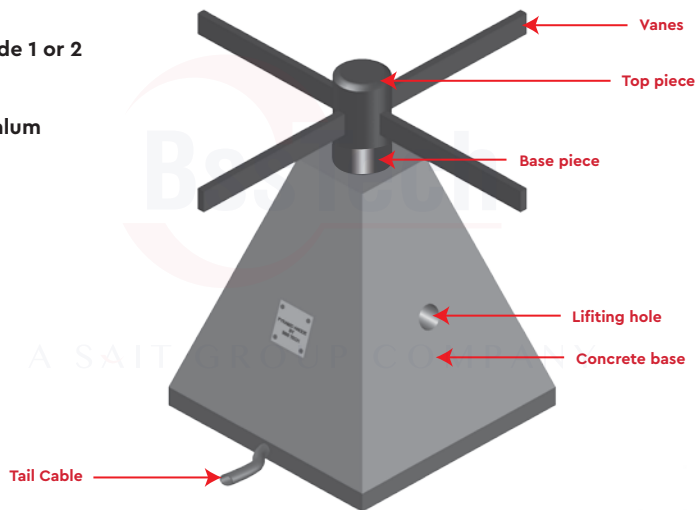
Titanium Base Axle coated with MMO. One end with an external thread to assemble the top piece and other end machined for cable connection with tubular PVC housing.

Substrate:

Titanium ASTM B265 Grade 1 or 2

Coating:

Oxides of Iridium & Tantalum



Pyramid Anode



Pyramid Anode with Cable

PLATINIZED TITANIUM ANODE

Information

The substrate, usually titanium, is chemically resistant and mechanically robust. The substrate is activated by platinum coating. The coating has excellent electrocatalytic properties. The evolution of oxygen and chlorine and/or mixtures of the two gases is therefore achieved at low stable anode potential.

Composition

Anode comprises of a thin layer of platinum coated on titanium substrate.

Type of Anodes

Anodes are available in all shapes and forms including the following:

Rods, Wires, Tubes, Discs, Sheet, expanded mesh, strip and are custom made to the customer application and requirements.

Copper Cored Anodes are also available.

Applications:

- Internal Cathodic protection of tanks, condensers, pipelines & heat exchangers.
- External Cathodic protection of ship hulls, platforms, piers, dams, offshore structures & powerstation inlets
- Buried structures (used with carbonaceous backfill)

PLATINIZED NIOBIUM ANODE

Information

In modern ICCP systems, Titanium and Niobium anodes are used. To realise a continuous current electrical conductivity and a long lifetime, the anodes are applied with a thin layer of Platinum.

Composition

The composition and thickness of these coatings determine the working and the lifetime of the ICCP systems. The construction, the electrical output, current density and the characteristics of the electrolyte (freshwater, seawater, etc.) determine the size and shape of the anodes

Type of Anodes

Anodes are available in Tube, Mesh, Rod, Wire and are custom made to the customer application and requirements.

Applications

- Internal Cathodic protection of storage tanks, condensers, pipes, pipelines, heat exchangers and boilers.
- External Cathodic protection of pipelines, ship hulls, platforms and other offshore constructions, piers, dams and cooling water inlet parts of power stations.

**We can provide this product to client specification and requirements.*



Platinized Titanium Anode



Platinized Niobium Anode

GRAPHITE ANODE

Typical Application

Graphite anodes perform best under dry soil conditions, though it operates in aqueous environment. The effectiveness of these anodes are increased with the use of backfill as it increases the anode discharge surface area & lowers the anode to earth resistance. Graphite anodes have been successfully used in both conventional & deep Ground-bed applications. They provide excellent protection in environments with high chloride.

Anode Consumption

Graphite is the most commonly used material as an anode in the impressed current Cathodic protection industry. It is an excellent conductor of electricity, chemically resistant and is easy to machine. Due to its proven long term performance & economics, solid graphite anode is very popular in ICCP systems.

With strict quality control guidelines, BSS Tech manages a complete line of graphite anode. These anodes are composed of high quality Petroleum Coke mixed with Coal Tar Binders & extruded into various diameter rods. Rods are heated repeatedly over 2,600°C and then cooled. The complete process results in anodes with high percentage of carbon, which in turn delivers effective protection at very low consumption rate. The consumption rate varies between 0.2 and 0.9 kg/year. (The recommended current Density for the Graphite Anode is 5.35 A/m².)

Graphite is Porous

To increase the anode life, Graphite anodes are treated with a Microcrystalline Wax. This limits any electrochemical activity to the surface of the anode and reduces any tendency for the reaction to occur in the pores. This also acts as a barrier against moisture intrusion which could cause deterioration of the anode and possibly the anode connection. An alternate treatment is a Phenolic Resin, which is recommended for use in severe application environments.

Fabrication Options

Treatment: Paraffin Wax, Phenolic Resin

Connections: Centre Connected, End Connected, Any Depth

Standard Connection

All Graphite anodes are drilled to the specified depth for the cable connection. Cable to be first pre-soldered to a brass connector and this connector is inserted in to the pre drilled tapped hole and tightened to the required torque. Maximum electrical resistance of the connection is 0.004 Ω & the minimum pullout strength is 454 kg (1000 lbs).

Sizes & Operating Data

Size	Untreated Weight	Treated Weight	Area	Recommended Maximum Amps		
				Backfill	Salt water	Fresh water
3" x 60"	12.25 kg. (27 lbs.)	13.6 kg. (30 lbs.)	0.37 m ² (4.0 ft ²)	1.5 - 2.0	2.0	1.0
4" x 80"	29.5 kg. (65 lbs.)	32.6 kg. (72 lbs.)	0.65 m ² (7.0 ft ²)	2.0 - 4.0	4.0	2.0



Graphite Anode

HIGH SILICON IRON ANODE

Information

The consumption rate of High Silicon Chrome Cast Iron Anodes have been found to be between 0.09 & 0.5 kg/A (year). For the anodes of the same chemistry & microstructure, variance in consumption is primarily due to the chemical & physical characteristics of the anode environment. The consumption rate does not appear to be significantly affected by current density (amperes per unit area of anode surface). The use of coke breeze around the anode in ground beds will tend to lower the consumption rate. A generally accepted design guideline for anodes buried in coke breeze is 0.3kg/A(year).

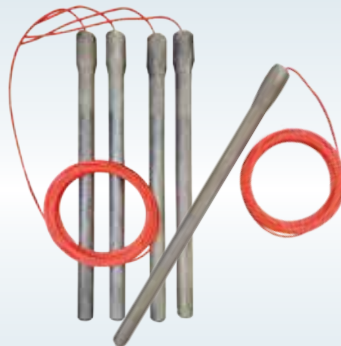
Stick Type

Type	Weight	Anode Discharge (A)	Diameter	Length	Area
BTSI-260C	12 kg. (26 lbs.)	1.5-2.0	1.5" (38mm)	60" (1520mm)	2ft ² (0.19 M ²)
BTSI-460C	20.9 kg. (46 lbs.)	3.0-4.0	2.3" (58mm)	58" (2134mm)	4ft ² (0.4 M ²)
BTSI-600C	27 kg. (60 lbs.)	2.0-2.7	2" (50mm)	60" (1520mm)	2.7ft ² (0.25 M ²)
BTSI-1100C	50 kg. (110 lbs.)	3.0-6.0	3" (76mm)	60" (1520mm)	4ft ² (0.37 M ²)

Stick Type

Type	Weight	Anode Discharge (A)	Diameter	Length	Area
BTSI-260T	12 kg. (26.4 lbs.)	1.8-2.2	1.5" (38mm)	60" (1520mm)	2ft ² (0.19 M ²)
BTSI-500T	23 kg. (50 lbs.)	3.2-3.8	2.2" (56mm)	84" (2130mm)	4.2ft ² (0.39 M ²)
BTSI-500T1	23 kg. (50 lbs.)	2.6-3.5	2.6" (66mm)	60" (1520mm)	3.5ft ² (0.39 M ²)
BTSI-700T	32 kg. (70 lbs.)	3.7-5.0	2.6" (66mm)	84" (2130mm)	4.9ft ² (0.46 M ²)
BTSI-950T	43 kg. (95 lbs.)	5.3-7.0	3.8" (97mm)	84" (2130mm)	7ft ² (0.65 M ²)
BTSI-1100T	50 kg. (110 lbs.)	3.8-5.0	3.0" (76mm)	60" (1520mm)	4ft ² (0.36 M ²)
BTSI-1220T	55 kg. (122 lbs.)	6.6-8.8	4.8" (122mm)	84" (2130mm)	8.8ft ² (0.8 M ²)
BTSI-1770T	80 kg. (177 lbs.)	6.6-10.0	4.8" (122mm)	84" (2130mm)	8.8ft ² (0.82 M ²)

Nominal Discharge : 0.75 - 1.0 A/ft²



High Silicon Iron Anode

CATHODIC PROTECTION TEST STATION – LOON

Information

BSS Tech introduces an innovative, economical and versatile solution for cathodic monitoring on buried metallic structures, LOON – Cathodic Protection Test Stations have been specially developed for monitoring of cathodic protection systems.

LOON is a high impact resistant, non conductive, above ground terminal for conveniently monitoring electrical currents & potentials associated with all type of cathodically protected structures.

LOON can be used as monitoring stations as well as junction boxes. Major applications are as listed below:

- 1) Underground structure potential monitoring as a test station.
- 2) Junction box for anodes; especially sacrificial anodes.
- 3) Reference electrode junction box.
- 4) Isolation Joint / Flange Test Station.
- 5) Grounding system termination.

Technical Features

- 1) Produced from High Impact Polycarbonate; One of the world's toughest plastic which is used in making aircraft windows, all kind of helmets from military to sports to crash helmets, etc.
- 2) Has 4 times the impact strength of aluminium with one half its weight.
- 3) Maintains dimensional & electrical stability in temperature range from -15.5°C to +121°C.
- 4) Remains stable under ultra violet rays.
- 5) Terminals completely accessible from both side of terminal board.
- 6) Polycarbonate being non metallic & extremely resistant, reduces electrical shock hazards drastically.
- 7) Available in wide range of colours to suit user preferences.

Materials Used

Test Station: Polycarbonate

Hardware: Machined Screws, Washers & Hex Nuts (All Stainless Steel)

Conduit (Optional): Ultra Violet Stabilized PVC or Galvanized Iron



Each Test Station consists of a cover, a terminal board clamped with nut & bolt to facilitate cable termination and installation of shunt & resistors. The Test Station can be locked in the conduit by twisting the head.



Test Station – LOON

JUNCTION BOXES

Information

Junction boxes are an integral part of many CP systems required for current distribution & control, bonding and monitoring of the CP system. BSS Tech custom make junction boxes to fit the projects requirements and specifications.

Technical Details

BSS Tech is flexible to offer junction boxes based on the requirement, below is a typical list of options available.

Typical Materials	Typical Coatings	IP Rating	Area Rating	Internal Components	Cable Entry	Accessories
<ul style="list-style-type: none"> • Stainless Steel • Mild Steel • Aluminium • GRP / FRP 	<ul style="list-style-type: none"> • Uncoated • Powder Coated • Sprayed • Galvanised 	<ul style="list-style-type: none"> • IP54 to IP66 	<ul style="list-style-type: none"> • Safe Area • Zone 1 • Zone 2 	<ul style="list-style-type: none"> • Resistors • Shunts • Reed Switch • Diode • Copper Links • Terminals • Cables 	<ul style="list-style-type: none"> • Conduit Hub • Cable Glands 	<ul style="list-style-type: none"> • Frame • Labels • Locks

Typical Applications

- Positive Distribution Box
- Negative Distribution Box
- Anode Junction Box
- Negative Junction Box
- Bond Box
- Test Box



CABLES

Information

BSS Tech stocks the most commonly used cables for cathodic protection, including HMWPE/PVDF, HMWPE/HALAR, XLPE/PVC, XLPE/PVC/SWA/PVC and HMWPE. In addition, BSS Tech can supply specialised cables according to client requirements.

Technical Details

Size (mm ²)	No. Core	Nominal Insulation Thickness (mm)	Nominal Sheathing Thickness (mm)	Nominal Armour Thickness (mm)	Approx. Overall Diameter (mm)	Approx. Weight (Kg/km)
XLPE/PVC						
2.5	1C	0.7	1.4	N/A	6	70
4	1C	0.7	1.4	N/A	7	90
6	1C	0.7	1.4	N/A	7.5	110
10	1C	0.7	1.4	N/A	8.5	160
16	1C	0.7	1.4	N/A	9.5	225
25	1C	0.9	1.4	N/A	11.0	330
35	1C	0.9	1.4	N/A	12.1	430
50	1C	1.0	1.4	N/A	14.2	560
70	1C	1.1	1.5	N/A	16.4	790
XLPE/PVC/SWA/PVC						
50	1C	1.0	Inner: 1.0 Outer: 1.8	1.25	19.0	1055
70	1C	1.1	Inner: 1.1 Outer: 1.8	1.25	21.0	1280
HMWPE						
6	1C	2.8	N/A	N/A	8.6	110
10	1C	2.8	N/A	N/A	9.5	160
16	1C	2.8	N/A	N/A	10.5	225
25	1C	2.8	N/A	N/A	12.0	325
35	1C	3.2	N/A	N/A	14.0	445
50	1C	3.2	N/A	N/A	16.0	570
70	1C	3.2	N/A	N/A	17.0	800
PVDF/HMWPE						
10	1C	0.5	1.65	N/A	8.5	150
16	1C	0.5	1.65	N/A	9.5	215
25	1C	0.5	1.65	N/A	11.0	315

* Other cable sizes, multi-core cable and different types are available



Cathodic Protection Cables

GPS CURRENT INTERRUPTER

Information

Current interrupters are used in CP survey. TR unit output is switched ON and OFF at same instant. Usually TR units are placed far away from each other and it becomes difficult to achieve time synchronization. GPS interrupter provides solution for time synchronization.

BSS TECH GPS interrupter has all necessary features required for CP survey.

The GPS interrupter is made rugged. The equipment has bright LCD displays which helps operator to use the display under the bright sun. The multiple keys membrane key pad makes it convenient for the operator. In built programme storage capability and the real time clock back up battery gives the freedom to leave the unit unattended for several days. Auto synchronisation does the checking of the clock with the satellites and continues with the accurate timer, which gives accurate interruption when multiple units are installed for surveys. Activating night sleep will enhance the battery service.

GPS

The global positioning system is a satellite-based navigation system consisting of a network of 24 orbiting satellites that are eleven thousand nautical miles in space and in six different orbital paths. The satellites are constantly moving, making two complete orbits around the Earth in just under 24 hours. One can receive satellite signals anywhere in the world, at any time. The biggest benefits over previous land-based navigation systems is GPS works in all weather conditions.

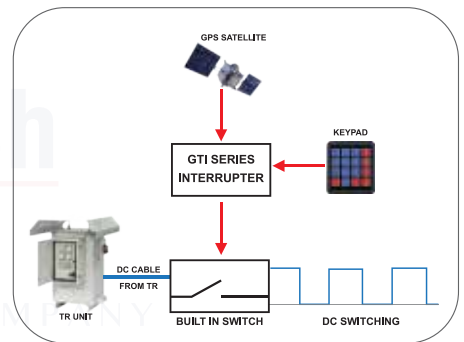
This satellite clock information is as accurate as atomic clock and this is used as time source for our timers achieving the most accurate synchronisation possible. The conventional electronic clock has limited time accuracy. Most commonly used industrial real time clock claim accuracy of ± 15 seconds per month i.e. $\frac{1}{2}$ second per day. Further the clock accuracy depends on various factors like external temperature, aging of components etc.

The system consists of

1. GPS Antenna.
2. Coaxial cable with MCX connectors.
3. GPS Interface Module.
4. Timer with User Interface.

Brief Specification

1. Microcontroller based digital circuitry.
2. ON time and OFF time independently adjustable from 0.1 to 999 Sec.
3. Built-in GPS module with Lat-Log display feature
4. Built-in real time clock with quartz crystal time base for high timing accuracy.
 - Typical accuracy +2 PPM (170mS per 24 Hrs.) in non GPS Mode.
 - Typical accuracy +5 PPB (1mS per 24 Hrs.) in GPS Mode.
5. Dust proof membrane key board for programming.
6. Digital LCD display for showing real time, ON/OFF cycle time, & Lat-Log parameters
7. Lithium battery back-up for real time clock.
8. Programmable operation for automatic start & stop of timing cycle.
9. Provision for synchronisation with other timers or with external master clock.
10. Night sleep feature
11. Power fail compensation and auto re-start during Synchronised operation
12. Power Supply: 12V DC or 230V AC
13. Capacity to Interrupt up to 100A DC or AC current
14. Battery back up



ZINC GROUNDING CELL

Applications

Zinc Grounding Cells are used for AC Mitigation. This is used to bleed off AC from the structures, which are subject to induced AC. Zinc Grounding Cell can be installed at high voltage O/H crossing or parallelism locations.

Information

Zinc Grounding Cells consist of one, two or four Standard Zinc electrodes separated with 1" Insulating Spacers (for more than 1 electrode). Nominal resistance of a two electrode Grounding Cell in wet area is 0.2 to 0.6 Ohm. Nominal resistance of a four electrode cell is one fourth to one half that of a two electrode cell. The Grounding Cells are packed in standard backfill (75% Gypsum, 20% Bentonite and 5% Sodium Sulphate) either in a unit of one, two or four.

Zinc grounding cell helps to bleed off unwanted voltages. They reduce danger of shock on a steel structure, arcing and burning of insulated joints. Zinc grounding cells form an unavoidable part of any induced AC power mitigation, protection of IJ's and IF's, earthing of a structure, etc.

Composition (ASTM B 418 TYPE 1)

Element	Content(%)
Cu	0.005 max
Al	0.10 – 0.50
Fe	0.005 max
Cd	0.025 to 0.07
Pb	0.006 max
Zn	Remainder

Potential: -1.05 Volts w.r.t Ag / AgCl

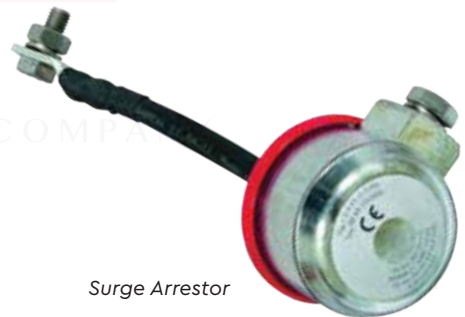
Capacity: 780 amps Hr./Kg.

Standard Zinc Grounding Cells

Model	Net Weight	Grounding Cell Dimension (L x W x D) (mm)	Gross Weight
BTZN-180G	8.1 kg.	37 × 37 × 915	32.0 kg.
BTZN-330G	14.9 kg.	37 × 37 × 1524	44.7 kg.
BTZN-570G	25.7 kg.	760 × 65 × 75	55.2 kg.
BTZN-600G	27.2 kg.	51 × 51 × 1524	58.9 kg.

ISOLATION FLANGE KITS AND SURGE ARRESTOR

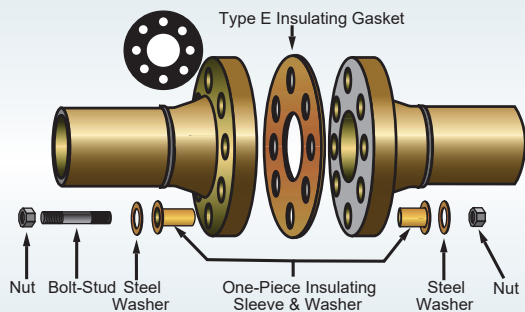
Isolation Flange Kits are used in flanges to electrically isolate the protected and un protected sides of the pipeline. It consists of non metallic gasket, washer, sleeve and metallic washer. Surge Arrestors are used to bypass the surges between isolated structures and protect the insulating materials.



Surge Arrestor



Zinc Grounding Cell



Isolation Flange Kit

POLARIZATION CELL REPLACEMENT (PCR)

Information

PCR is a solid-state device designed to simultaneously provide DC decoupling and AC continuity/ grounding when used with cathodically protected structures, such as pipelines, tanks, grounding systems, and cable casings. The PCR has very high AC fault current and lightning surge current ratings. Polarization Cell Replacement (PCR) is used in conjunction with grounding cells.

Applications

PCR Solid State Device "SSD" can decouple DC Cathodic Protection potential from AC interference and maintaining the grounding & CP requirements.

Typical Applications

- Automatically protect Flange Joint insulation.
- AC voltage mitigation, very low impedance to AC current.
- Block the DC outside the assigned threshold voltage.
- Decoupling electric equipment from grounding system.

Features

- Long term steady current (AC/DC) 50A and 100A two models.
- AC fault current rating for model "BSST-SSD-3.7kA" – 30 cycle 3.7 kA at 50 Hz and 4.0kA at 60 Hz.
- AC fault current rating for model "BSST-SSD-15kA" – 30 cycle 15.0kA at 50 Hz and 15.5kA at 60 Hz.
- Lightning impulse surge current 100kA (8×20) and (10/350) μ s "micro seconds".
- Voltage blocking threshold (DC) -3 /+1 V or -2 /+2 custom design.
- Temperature -45°C to 65°C.
- 2000 V Isolation.

Model

- BSST-SSD-3.7kA
- BSST-SSD-15kA



HANDHELD CORROSION MONITORING DEVICE - ReKorr®

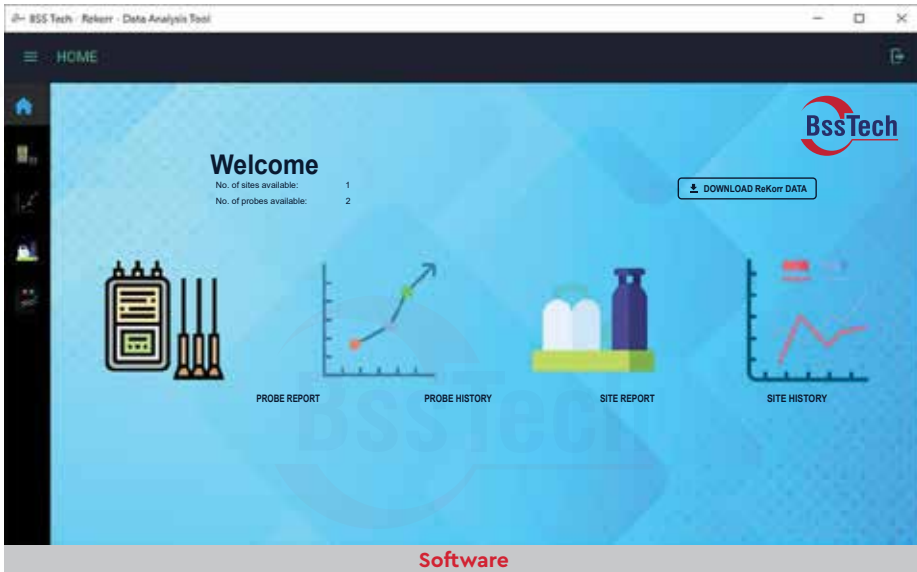
Information

ReKorr® Hand held Corrosion Monitoring unit allows the user to monitor the corrosion rate of the Steel Reinforced Concrete Structures using BSST-E4 corrosion monitoring probe which are designed for pre-installation in concrete structures.

Reinforcement Corrosion Monitoring

Exposure of the reinforced concrete to Chloride ions is the main cause of corrosion of reinforcements in concrete. Steel corrosion causes changes in the reinforcing bars mechanical properties, cracks, spalling of the concrete cover and a reduction of contact area between reinforcement and surrounding concrete. Reinforced structures must be tested regularly to detect early and prevent corrosion.

Early indication to predict corrosion risk in reinforced concrete will be a proactive measure by embedding appropriate sensors in the concrete.



Features

- Option to input parameters.
- 32 GB internal storage (SD Card).
- USB connectivity for data transfer to a PC.
- Internal rechargeable battery up to 12 hours back up.
- Provision to store 50 sites with 50 probes.
- Potential measurement to check the readiness of the probe.
- Selection of Reference Electrode.



ReKorr®

A Portable Solution for Corrosion Monitoring

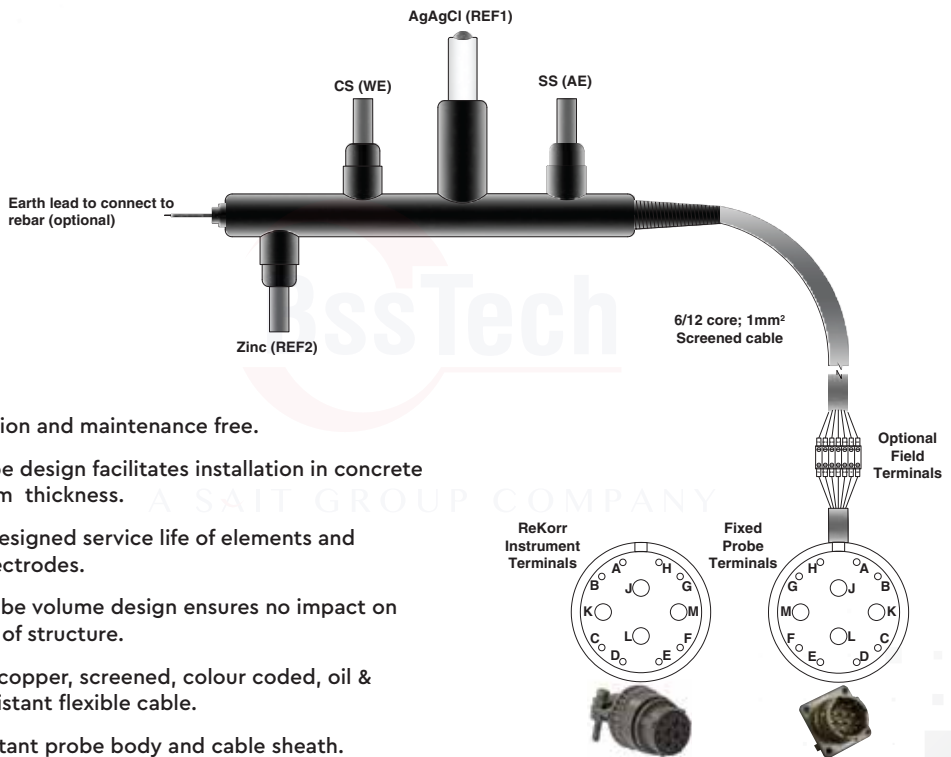
E4 LPR PROBE

Information

BSS Tech E4 corrosion monitoring probe uses linear polarization technique to detect reinforcement corrosion, by using suitable instrument (ReKorr® data collector), real time corrosion can be measured along with corrosion potential. Early detection of corrosion allows the user to implement corrosion protection facilities to avoid extensive damage to the structures.

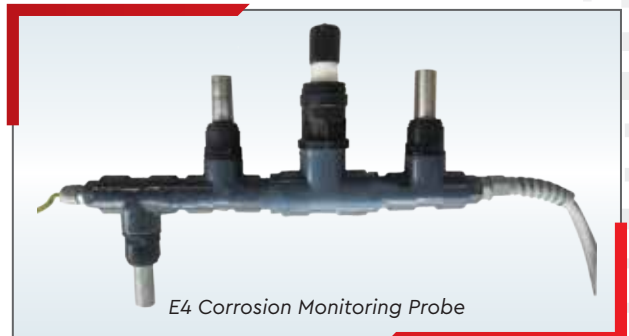
Corrosion current and corrosion potential can be measured without altering natural corrosion state of the reinforcement at the time of measurement. These measurements will be used to determine the corrosion rate. Measurement of additional parameters like temperature and steel potential can be useful in detailed analysis as these are directly linked to the corrosivity. LPR probes are used to monitor corrosion of rebar in reinforced concrete structures. Probes are to be installed next to the steel reinforcement in the concrete, where the corrosion ingress from the concrete is to be measured.

E4 Probe consists of CS (working electrode), SS (auxiliary electrode), Zinc reference electrode, Ag/AgCl reference electrode and a temperature sensor. Cable length can be customized from 5 to 10 meters. Monitoring equipment is provided with a durable 14 pin connector. Probes are fully compatible with BSS Tech ReKorr® hand-held corrosion monitoring equipment which records the data required to evaluate I_{corr} and Corrosion rate in micro mills per year.



Features

- Easy installation and maintenance free.
- Shallow probe design facilitates installation in concrete of even 30mm thickness.
- 25 years of designed service life of elements and reference electrodes.
- Minimum probe volume design ensures no impact on the integrity of structure.
- High quality copper, screened, colour coded, oil & chemical resistant flexible cable.
- Alkaline resistant probe body and cable sheath.
- Redundant cable cores for each element. Two cables per element considered.
- Supports open circuit potential and LPR measurement using ReKorr®
- Main (Ag/AgCl) and an auxiliary (Zinc) reference electrodes are provided in each probe.



REFERENCE ELECTRODES

PORTABLE REFERENCE ELECTRODES

Copper / Copper Sulphate

Liquid or Gelatine filled space age porous ceramic plugs high Impact ABS plastic (yellow) housing corrosive environment resistant chloride ion trap equipped copper sulphate.

- Connection Stud : ¼" – 20 Copper
- Stability : ± 10 mV with 3.0 microamp load
- Size : 1" dia. x 8" Housing
- Temperature Range : 0°C to 57.2°C (32°F to 135°F)

Silver / Silver Chloride

Liquid or Gelatine filled space age porous ceramic plugs high impact ABS Plastic (Blue) housing corrosive environment resistant chloride ion trap equipped silver chloride.

- Connection Stud : ¼" – 20 Brass
- Stability : ± 10 mV with 3.0 microamp load
- Size : 1" dia. x 8" Housing
- Temperature Range : 0°C to 65.5°C(32°F to 150°F)

Zinc/ Zinc Sulphate

Liquid or Gelatine filled space age porous ceramic plugs high impact ABS plastic (Red) housing corrosive environment resistant chloride ion trap equipped zinc sulphate.

- Connection Stud : ¼" – 20 Plated Brass
- Stability : ± 10 mV with 3.0 microamp load
- Size : 1" dia. x 8" Housing
- Temperature Range : 0°C to 57.2°C (32°F to 135°F)

Portable reference electrodes are available with extension rod water immersible cable connections and end weights for specific application.

PERMANENT REFERENCE ELECTRODES (FOR SEA WATER APPLICATION)

Zinc Reference Electrode

- Size : 2" dia. x 10" Long
- Weight : Approx. 30 lbs dimensions & sizes can be tailor made
- Lead Wire : Custom made
- Design life : 30 years

PERMANENT PRE PACKAGED UNDERGROUND REFERENCE ELECTRODES

Copper / Copper Sulphate

(for soil 200 ppm Chloride or less) High Impact ABS plastic tube packaged (yellow cotton bag) in special non-polarizing backfill.

- Size : 2" dia. x 7" Pack
- Weight : Approx.15 lbs dimensions & sizes can be tailor made
- Lead Wire : standard 50' of # 14 RHH – RHW / custom made
- Stability : ±5 mV with 3.0 microamp load
- Overall Size : Approx. 6" dia. x 14"
- Reinforced Rods : ¼" x 3" PVC @ Electrode End
- Design Life : 30 years
- Temperature Range : 0°C to 57°C (32°F to 132°F)

Silver / Silver Chloride

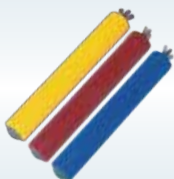
(for soil 200 ppm chloride or higher) High Impact ABS plastic tube packaged (blue cotton bag) in special non-polarizing backfill.

- Size : 2" dia. x 7" Pack
- Weight : Approx. 15 lbs Dimensions & Sizes can be Tailor Made
- Lead Wire : Standard 50' of # 14 RHH – RHW / Custom Made
- Stability : ±5 mV with 3.0 microamp load
- Overall Size : Approx. 6" dia. x 14"
- Reinforced Rods : ¼" x 3" PVC @ Electrode End
- Design Life : 30 years
- Temperature Range : 0°C to 65.5°C (32°F to 150°F)

Zinc / Zinc Sulphate

(for soil 200 ppm chloride or less) High Impact ABS plastic tube packaged (red cotton bag) in special non-polarizing backfill.

- Size : 2" dia. x 7" Pack
- Weight : Approx. 15 lbs Dimensions & sizes can be tailor made
- Lead Wire : Standard 50' of # 14 RHH-RHW / custom made
- Stability : ±5 mV with 3.0 microamp load
- Overall Size : Approx. 6" dia. x 14"
- Reinforced Rods : ¼" x 3" PVC @ Electrode End
- Design life : 30 years
- Temperature Range : 0°C to 57°C (32°F to 132°F)



Portable Reference Electrodes



Permanent Pre Packaged
Underground Reference Electrodes



Zinc Reference Electrode

MONITORING ANODE

Monitoring anode performance can help operators predict overall CP system life.

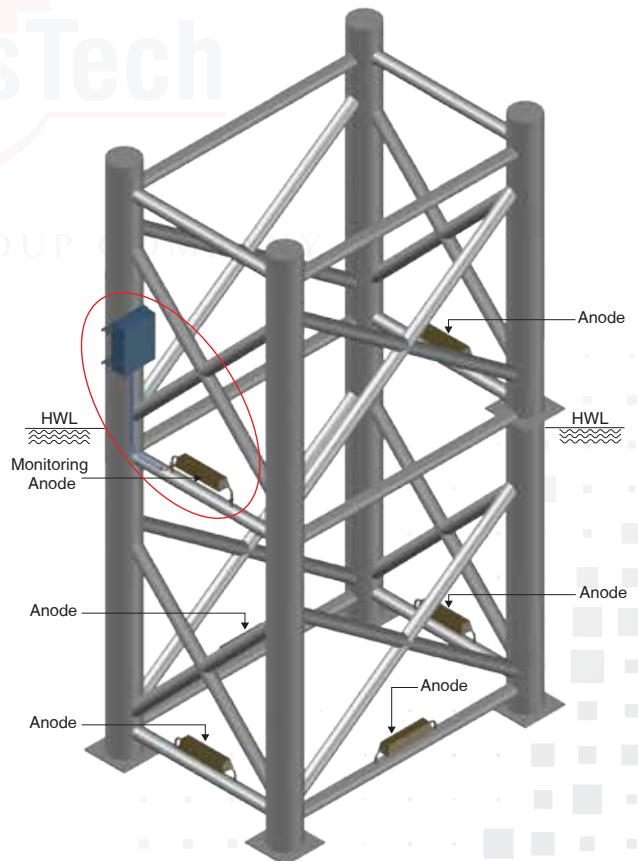
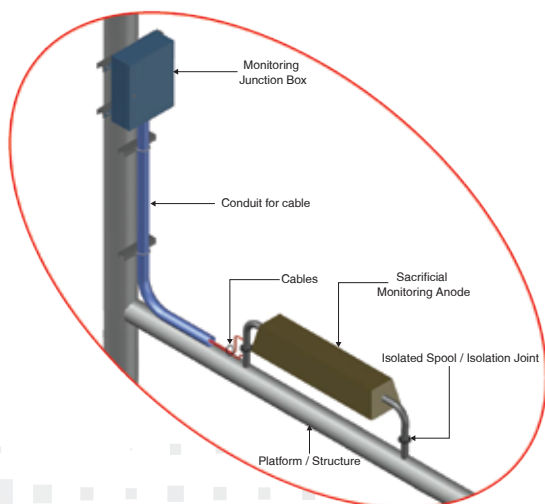
Anode monitoring system provides a reliable, accurate method for monitoring anode performance and consumption. This is designed to monitor and confirm performance of the Sacrificial Anodes. Monitoring Anode System have an excellent record of success and are found on more offshore structures worldwide than any other fixed-monitoring system. They have been applied to all galvanic anode types, including platform anodes, flush-mount anodes, onshore and offshore pipeline bracelets.

A standard monitoring anode consists of the sampled anode installed with isolation on structure and wired to the monitoring panel. Anode isolation from the structure is achieved by having an isolation joint.

A most sophisticated monitoring anode consists of total remote monitoring with switching capabilities.

Monitoring system shall be designed to meet the following requirements:

- Anode monitoring system allows operators to accurately measure anode consumption and remaining life without interference with the anode. The data for a handful of anodes will give general trends for the entire cathodic protection system.
- The performance of the Sacrificial Anodes are judged by the measurement of current output of individual anodes.
- Structure potential can be measured using Zn or Ag/AgCl Reference Cell for the potential at the rated current out from anodes
- Verification of anode performance allows corrosion engineers to evaluate not only the design of a particular system, but the design methodology in general.



CATHODIC PROTECTION OF REINFORCED CONCRETE STRUCTURES

Information

Cathodic protection is applied to reinforced concrete structures to either prevent or halt the problem of corrosion of the reinforcement. The corrosion reaction of reinforcement is catalyzed by chloride ions from salt. Once initiated all the corrosion reaction needs to proceed is Oxygen and Water, which are always in plentiful supply.

Cathodic Protection

Cathodic protection was first applied to concrete structures in 1973 in California. Since then, it has been applied to over 5 million square meters of concrete around the world of which over 3 million square meters of concrete CP are in the Middle East.

Practical Applications

Cathodic protection is applied under two distinctly different situations, i.e., in existing structures where corrosion has actually already occurred and in new structures to prevent it from starting.

The case of existing deteriorated conditions is typically addressed as shown in Fig. 1.

Protection for existing corroding structures can either be by applying anode mesh and encapsulating it in an exterior overlay or by cutting saw slots into the concrete and grouting in a ribbon mesh.

The case where CP is applied to stop corrosion from even starting has a common approach by use of Ti/MMO ribbon mesh mounted on the reinforcement using non-metallic spacers and secured by cable ties as shown in Fig. 2.

Prominent clients worldwide have adopted and implemented this technology across their operations.

Fig. 1



Installation of Anode System into slots cut into the concrete Surface

Final cabling being connected into the Zone Junction box

Fig. 2



Installation of anode system on to rebar cage using non-metallic clip

Final concrete casting after the CP System has been installed

The Technology

The key component of any cathodic protection system is the anode material as this determines the lifetime of the applied system.

In cathodic protection the anode material is introduced into the concrete and this is artificially made more negative than any part of the reinforcement using a DC Power Supply. This highly negative material releases its excess supply of electrons. These released electrons are spread to all areas of reinforcement where they electrolyze water and oxygen to make hydroxide ions. The corresponding reaction on the new anode reverses this process to convert hydroxide ions back into water and oxygen.

Therefore, all the time that the cathodic protection system is operating the reinforcement does not corrode. The anode materials used are all designed for lifetimes from 50 to 100 years and this becomes the design life of the protected structure.



SILVER/SILVER CHLORIDE REFERENCE ELECTRODE (AG/AGCL : KCL)

Information

Silver / Silver Chloride reference electrode is specially designed for concrete application having stable potential and long life. The components are silver metal, silver chloride, silver ions and chloride ions.

Life in concrete	Length	Diameter	Drift	Temperature Range
Minimum 25 years	82mm to 110mm	20mm to 22mm	± 5 mV (24 hrs.) @ 5 Micro Amp load	-5 to 70 °C

PSEUDO (MMO) REFERENCE ELECTRODE

Information

The purpose of a "pseudo" reference electrode is to provide a stable electrochemical interface by which to measure differences in potential such as depolarization shift measurements. It does not exhibit a true "half-cell potential" so absolute values are meaningless but as it does not interact with the concrete pore solution it's behavior remains constant.

Expected life	>75 years
Catalyst	Mixed Metal Oxide
Substrate Composition	Titanium, Grade 1, per ASTM B265
Coefficient of thermal expansion	$8.7 \times 10^{-5} / K^{-1}$
Thermal conductivity at 20°C	15.6 W/m° K
Electrical resistivity at 20°C	$5.6 \times 10^{-5} \Omega\text{-cm}$
Modulus of elasticity	105 GPa
Tensile strength	245 MPa
Yield strength	175 MPa
Elongation	24% minimum
MMO Length in mm	100
MMO Width in mm	10

REBAR CLIP

Application

Rebar clip (non-metallic support clamp) used to position and secure the ribbon mesh anode to the reinforcement.

Material – Nylon

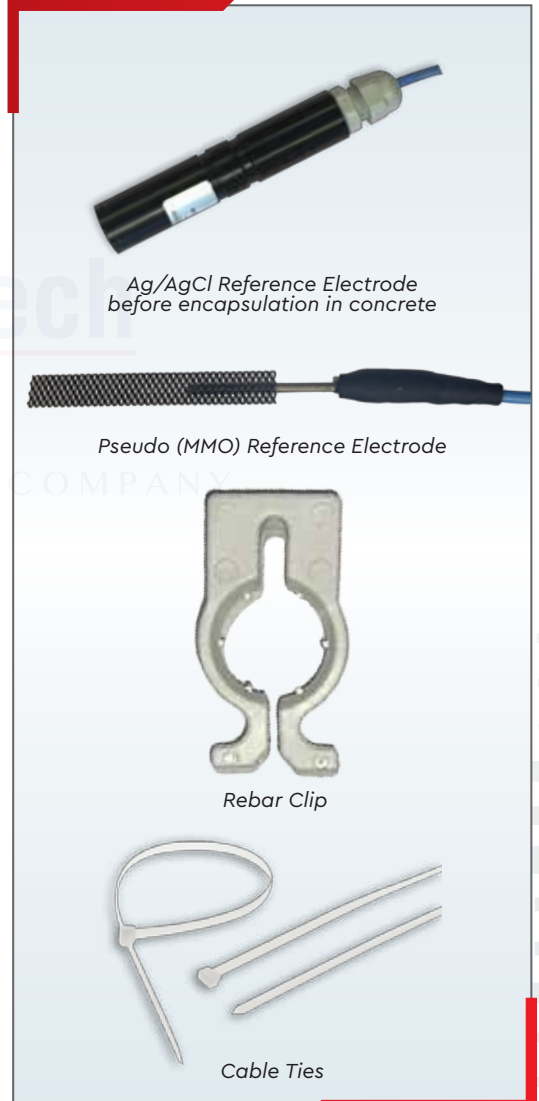
Diameter Range – 10mm – 32mm as standard products with options for smaller or larger diameter rebars.

CABLE TIES

Nylon cable tie used to secure the anode to the rebar clip and to secure the rebar clip to the rebar. To secure the cables to the rebar from components to concrete exit location.

Material – Nylon

Diameter Range – 4.8mm x 200mm as standard products.



MARINE CATHODIC PROTECTION

Information

BSS Tech has introduced marine cathodic protection services to serve the corrosion control needs of the marine industrial structures like **Offshore Platforms, Offshore Pipelines, Ships, Jack-up Rigs, Harbor Quays, Jetties, Piles, Submarines, Offshore Wind Foundations** etc.

Deep water platforms and pipelines present new challenges for design, maintenance, inspection and retrofit of corrosion control systems. Our expertise includes marine survey, CP systems, Anti-Fouling systems & retrofits

Marine Surveys

The advent of the remotely operated vehicle & other survey techniques has radically altered corrosion survey and inspection practices. BSS Tech can render the below mentioned surveys with our expert engineers to gather, analyze and interpret data as per international standards. Several factors like water depth, water currents, location, depth of burial, size or length, cathodic protection system age and cost etc, determines which type of method to be used.

We offer the following services for offshore pipeline & structures:

- ROV Surveys
- Towed Fish / Trailing Wire Surveys
- Drop Line Platform Survey
- Guy Line Platform Survey
- Remote Electrode Submersible Survey
- Trailing Wire Landfall / Outfall Surveys
- Hybrid / Trailing Wire Surveys



MMO Elliptical Anode for Vessel

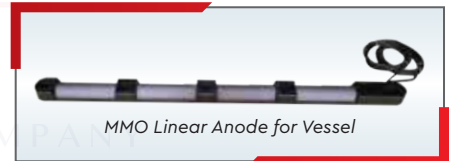
Marine/Offshore structures can be protected by different means of CP systems

Sacrificial Anode System (SACP)

The structures which are commonly protected using SACP systems includes ship's hulls, propellers, ballast tanks, sea water intakes.

Impressed Current Anode System (ICCP)

A well known reliable system used to protect marine offshore structures is by ICCP system. The correct placement of ICCP components is the critical factor for balanced operation and is necessary to provide uniform current distribution and sufficient current density.



MMO Linear Anode for Vessel

Anti Fouling System

An effective anti fouling system enhances the efficiency of the marine vessels and offshore structures by preventing bio fouling.

Different types of Anti Fouling system includes

1. Conventional grid Anti Fouling System
2. Strainer System
3. Skid Mounted Anti-Fouling System



MARINE GROWTH PREVENTION / ANTI FOULING SYSTEM

Information

The cathode is formed with an insulated steel frame containing copper and aluminium anodes making use of impressed current system basics. The anode/cathode unit is suspended / placed at the pump inlet so that all the water entering the pump must pass the electrode unit. Dosage levels of copper ions are extremely small and measured in micrograms per litre of seawater. Therefore, relatively small quantities of copper are required to provide protection dependent upon the flow rate and life required.

Anti fouling system consists of two parts, the electrode unit and the control panel. The electrode assembly contains mainly copper anodes. Aluminium Anodes are used in combination with copper in some applications. The actual number and size of the anodes is calculated to suit each installation and available space for mounting the electrode unit. The anodes are connected to the constant current rectifier located within a safe area. For variable pump flow, an intelligent logic is utilized in power supply to provide right dosage of ions.

Basically there are three types of systems.

1. Conventional grid Anti Fouling System – The conventional Grid Anti-Fouling system has the capability to deliver ions in the open sea at the mouth of the pipe or channel which is at risk of fouling.
2. Strainer System – Strainer Anti-Fouling systems are fairly small units shaped like Strainers and are attached at the mouth of the pipe or at the mouth of the pump inlet. These are mostly vertically installed.
3. Skid Mounted Anti-Fouling System – Skid Mounted produces the copper ions in a process vessel. The produced treated water is then delivered to the right part of the inlet in the right proportion to set the required ppb level.

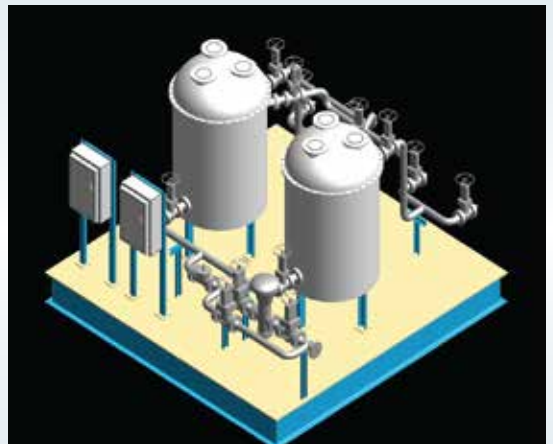
All these systems can be prepared with logics to control automatically the production of ions and dispatch of ions depending on the variation in flow rate. The system is intelligent enough to decide the production from minimum to the maximum designed while the flow is zero to the maximum for the pump.

Benefits of our Anti-Fouling System Include:-

- Reduction in power requirements
- Low maintenance system
- No handling or storage of chemicals required
- Environmentally acceptable



Conventional Grid Anti Fouling System



Skid Mounted Anti-Fouling System

AC MITIGATION MODELLING

Information

Pipelines running into close proximity with electric power transmission and distribution systems will occur electromagnetic field created by the alternating current (AC) (expands and collapses and changes direction 120 times per second). An alternating electromagnetic field will exhibit an induced voltage on the pipeline. In addition, power conductor faults to ground can cause substantial fault currents in the underground structure. Stray alternating currents can cause corrosion on pipelines, damage to the coating, resulted in metal loss and pipeline leak. Even though the corrosion weight loss for AC currents is less than for equivalent DC currents, the magnitude of AC stray current is often large—hundreds of amperes under electromagnetic induction and thousands of amperes during power line faults. These high current levels can produce a shock hazard for personnel and can damage the structure and related equipment. There are three basic methods by which AC currents and voltages appear on metallic structures near AC power lines such are Electrostatic coupling, Electromagnetic induction and Resistive coupling.

Need of Mitigation

AC interference on the pipeline due to inductive, capacitive and resistive coupling between the power line and the pipeline produces the following risks:

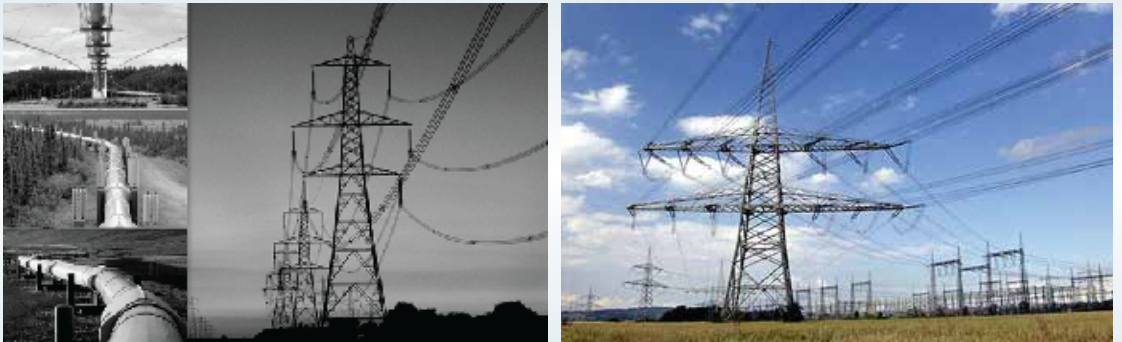
- Shock to personnel under normal (steady state) operation
- Shock to personnel under fault conditions
- Electrical arcing under fault conditions causing puncture or damage to pipeline
- AC-enhanced corrosion under steady state operation
- Damage to the coating due to electrical stress under fault condition

Mitigation Modelling

Mitigation Modeling is used to compute/model the AC interference pattern and to asses the interference levels and mitigation requirements.

Physical Testing

- AC Testing
- Measurement of AC voltage to Ground
- Pre Testing (In case of Existing OHL & Pipeline)
- Safety



COMPOSITE REPAIR SOLUTIONS

Information

As part of BSS Technologies enhancing its products and services to the existing clientele, we offer proven, reliable and cost-effective composite repair solutions.

These products were developed in response to the industry's need for cost-effective, reliable and environmentally friendly solutions.

Composite Repair Wrap – is developed for quick, fast curing, in-situ and cost effective repairs for high temperature application upto 250 °C. The product application is flexible for tight access and complex shaped piping, pipelines and equipment. The repair system can restore the functionality of corroded and leaking pipelines whilst providing protection against further corrosion attack and can be applied at high temperature operating pipelines.

Clamp Type Protection – effectively integrating three attributes of online leak sealing technology: clamp, sealant and injection tools. It is designed to contain the leak point by introducing higher pressure than leaking system pressure by hydraulic injection tools to fill the clamp cavity with sealant compound. The sealant compound are capable of covering leaks within wide range of temperatures and pressures, also compatible with most type of chemicals.

Anti Corrosion Cap – is proven to be cost effective in protecting nuts & bolts from corrosion.

Flange Protection – system prevents crevice corrosion problems at flanges. When applied together with Anti – Corrosion Cap for the nuts and bolts, it provides total corrosion protection for flanges. It involves injecting gel to temporarily fill the void. The material is heated to lower its viscosity allowing it to penetrate all the crevices. Flange Protection contains UV tracers which under UV light cause a light blue fluorescence for checking treatment.

Tubular Pile Protection – utilizes the natural power of currents, wave and tide to break down the marine colonization process on jetty piles, platform jacket legs and well conductors thus prevents marine growth.



Information

HypoKlor® systems are the ideal electrochlorination technology for on-site production of Sodium hypochlorite by electrolysis from seawater or brine. This process is conducted using direct current ranging from 1KA to 10KA for power ratings of 100kW to 1MW for disinfection in Desalination Facilities, Power Plants, Liquefied Natural Gas (LNG) Terminals, Cooling Towers, Marine Ballast Water Treatments and all coastal installations using seawater for cooling or other process needs. Hypochlorite is the most extensively used chemical disinfectants recognized for its extremely low toxicity, deodorizing power, longlasting effect, safe handling and storage possibilities. This powerful germicide has proved ideal for wide variety applications, ranging from small medium & large scale industrial applications.

Our expertise includes customized systems for on-site production of Sodium Hypo-chlorite by electrolysis from seawater or brine for various applications ranging from low flow rate (2 kg/h) to high flow rate (900 kg/h) of hypochlorite. The process is based on the electrolysis of seawater as it flows through an electrolytic cell consisting of MMO coated Titanium fins and Titanium fins as anode and cathode respectively using direct current to separate salt and water into their basic elements. Chlorine generated at the anode immediately goes through chemical reactions to form sodium hypochlorite and hypo-chlorous acid. At the cathode, Hydrogen and hydroxides are formed. The overall chemical reaction can be expressed as follows:



Technical Consultancy

We provide Technical Consultancy for clients to carry out in-house engineering work, such as building a brand new system or refurbishing existing electro-chlorination systems.

Refurbishment

We carryout Refurbishment of chlorinators and rectifiers of any type or brand of existing chlorination system

Training Workshops

We conduct Training Workshops for end-users to familiarize with the unique advantages of electro-chlorination technologies available in the international market. Selecting the correct electro-chlorination technology and Electrolyser type for a specific application is a complex matter and lack of knowledge can result in expensive mistakes.

Introduction

LORESCO® manufacture impressed current anode backfill for all field conditions. LORESCO® SC•3® is designed specifically for demanding anode systems. LORESCO® meets all standards for impressed current anode backfill. SC•3® carries an NSF certification. Other LORESCO® products are Replaceable Deep Anode Systems, AllVent™ and PermaPlug™ These products represent the finest innovations available for the deep-anode cathodic protection industry. For quality, service, and price, specify LORESCO®

INSTALLATION

LORESCO® SC•3®, being its dust-free product, is simple to install by either mixing and pumping or by pouring dry. With deep anode systems, pumping from the bottom up is recommended.

LORESCO® SC•3® has superb pumping qualities due to the addition of surfactants and when agitated in water, takes on the characteristics of heavy mud. A recommended mix is seven gallons of water per one-hundred pounds. After installing SC•3®, allow twenty-four hours settling time before energizing. The modified surface of the carbon particles coupled with the action of the surfactants in SC•3® will achieve positive electrical contact by settling. Vibrating or compacting is not necessary.

MATERIAL DESCRIPTION

LORESCO® SC•3® is a surface modified, blended, and sized carbon backfill with surfactants.

- Bulk Density: 74 lbs. per cubic foot
- Predominantly round particles
- All particles surface modified for maximum electrical conductivity
- Particle Sizing: To be dust free with a maximum particle size of 1 mm
- Minimum calcination temperature of base materials is 1250 °C
- Base materials are calcined under ISO 9001:2015 quality control
- Surfactants are added to assist pumping and settling
- No de-dusting oils are used during the manufacture of base particles

SPECIFICATIONS

Fixed Carbon: 99.35%

Ash: 0.6%

Moisture: 0.05%

Volatiles: nil (950°C)*

Bulk Density: 74 lbs. per cubic foot

The photo below is a magnification of Loreesco SC•3•



Particles Before Coating



Particles after Coating



Certified to
NSF/ANSI 60

LORESCO®

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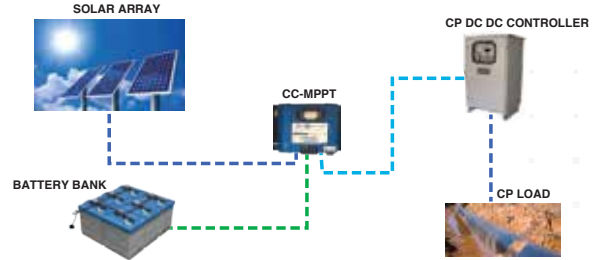
Introduction

MPPT charge controllers, CC series is for off-grid solar system and control the charging and discharging of the battery, especially suitable for Cathodic Protection Application. The controller features a smart tracking algorithm inside that maximizes the energy from the solar PV module(s) and charge the battery. CC series is very simple to configure and use. This series of charge controllers are optimized for long battery life and improved system performance.

Features:

- Intelligent Absorption charge time adjustment.
- Optimized battery charge protection
- Enhanced Sleeping Mode
- Enhanced Power Saver Modes
- Over charging and Short circuit protection
- Efficient Thermal Design and Cooling

Basic Architecture of CC Powered CP



Technical Feature:

	CC-MPPT-1224-20/40	CC-MPPT-36-20/40	CC-MPPT-48-20/40
Technology	Dual Channel Interleaved Buck Converter		
Battery bank voltage:	12/24 V	36 V	48 V
Maximum Charging Current:	20 A/40 A/80 A/100 A	20 A/40 A/80 A/1000 A	20 A/40 A/80 A/100 A
Maximum Solar Panel Voltage:	70 Volts	100 V	100 V
Maximum Power Point Voltage Range:	Battery voltage to 70 V	Battery voltage to 77 V	Battery voltage to 77 V
Buck Converter Duty Cycle Range:	0 - 100%	0 - 100%	0 - 100%
Idle Current from Battery (Typical):	21/18 mA (Sleep Mode)	21/18 mA (Sleep Mode)	21/18 mA (Sleep Mode)

Product Range:

MODELS	Nominal Battery Voltage	Maximum Charging Current	Maximum Solar Panel Voc
CC-MPPT-1224-20	12 / 24 V	20 A	70 V
CC-MPPT-36-20	36 V	20 A	100 V
CC-MPPT-48-20	48 V	20 A	100 V
CC-MPPT-1224-40	12 / 24 V	40 A	70 V
CC-MPPT-36-40	36 V	40 A	100 V
CC-MPPT-48-40	48 V	40 A	100 V
CC-MPPT-1224-20H	12 / 24 V	20 A	150 V
CC-MPPT-36-20H	36 V	20 A	150 V
CC-MPPT-48-20H	48 V	20 A	150 V
CC-MPPT-1224-40H	12 / 24 V	40 A	150 V
CC-MPPT-36-40H	36 V	40 A	150 V
CC-MPPT-48-40H	48 V	40 A	150 V
CC-MPPT-1224-80H	12 / 24 V	80 A	150 V
CC-MPPT-1224-100H	12 / 24 V	100 A	150 V



ENVOERA™
ENERGY FOR THE NEW ERA

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Introduction

3E is a company driven by a deep commitment to sustainability. We believe in creating a cleaner future by providing innovative and environmentally responsible energy solutions. We understand the critical role energy plays in our lives, and we are dedicated to helping you achieve energy independence while minimizing impact on the planet.

3E understand the critical role batteries and their chargers play in renewable energy systems and electric vehicles, hence we offer a comprehensive range of products and services to power your sustainable future.

Our range of sustainable solution includes:

Highly reliable, industrial-grade, deep-cycle, maintenance-free OPzV batteries:

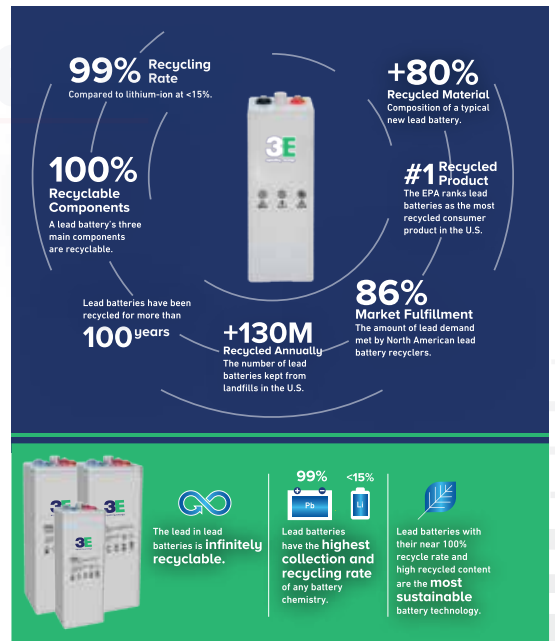
- Recognized as the most environmentally friendly and truly sustainable battery type.
- Ideal for demanding applications like solar power systems, telecom towers, and off-grid installations.
- Maintenance-free design ensuring effortless upkeep and minimized environmental impact.

Variety of Battery Tech to match your specific needs:

- Nickel-Cadmium (Ni-Cd) batteries: Offer exceptional deep discharge performance and durability, suitable for specialized uses.
- Lithium-Ion (Li-Ion) batteries: Lightweight, high-energy density option for versatile applications, with responsible end-of-life management practices.

Fast and Convenient EV Charging Solutions:

- DC and AC chargers: Equip your home, business, or fleet with the right charging infrastructure.
- Multiple connector types: Ensure compatibility with any electric vehicle on the road, eliminating charging concerns.
- Fast charging capabilities: Reduce charging time and maximize electric vehicle usage.



Enertech Energy Equations FZ-LLC

P-193, Al Ghail Free Zone, RAKEZ
Ras Al Khaimah, U.A.E

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Introduction

From a modest beginning in 1955, IGP group today provides over 55 products and services to the core sector. The group's products are well accepted in domestic and international markets.

IGP R&D team interacts with universities and technical associates to design new products. These products and processes are developed using in-house facilities.

IGP group has established long term relationship with its customers through custom designed world class products and services.

IGP is Asia's leading Gaskets Manufacturer. Apart from Gaskets, Monolithic Insulation Joints are developed & manufactured in-house at IGP-Unit 2 facilities since 2002.

Monolithic Insulation Joints

- Are boltless, rigid pipeline components, factory welded and ready for installation at site.
- Provides electrical resistance between the pipeline sections and adjoining structures, thus improving the effectiveness of the Cathodic Protection System (CP pipeline).
- Suitable for underground and above ground installations.
- Maintenance free – fit & forget.

Benefits:

- Eliminates electrical short circuits and stops stray current in pipeline systems.
- Most economical and reliable method that can be used for cathodic protection in all applications of the pipeline systems.
- Eliminates field assembly of bulky installations of Flanges, Gasket Kits with bolt & fasteners.

Mechanical Properties:

- The excellent mechanical properties are achieved by a rigid design of statically favourable form, using the thermos-setting plastic free from clod flow as insulating material.
- The welded unit provides safe and reliable connection even over extremely long period of operations without risk of the secured and locked unit losing or separating.
- The Joints have undergone all types of pressure tests requirements as per media of the fluid or application of the pipeline design adhering to the international standards & testing requirements or customer special requirements at our works facilities.

Electrical Properties:

- The dimensioning and practical arrangement of the insulating sections within the overall design in addition to technical production factors, in conjunction with insulation materials of a suitable quality, result in the ideal overall electrical behavior of the insulating joints large external insulating length, thus eliminating the possibility of spark over.
- Very good dielectric strength, substantially greater than conventional insulating flanges.

Quality Control:

- We are performing all pressure tests in-house, like Hydro, Pneumatic, Fatigue, Combined Cycle, Bent, Torsion, NACL Immersion, insulation resistance, Die-electric strength, adhsion and Holiday Tests.

Data Required for Manufacturing:

Pipeline application (fluid details), details of pipeline material, size, schedules, Design pressure and temperature.

**IGP Engineers Private Limited**

79, Valmiki Street, Thiruvanamiyur,
Chennai – 600 041, India



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Introduction

Safetrack provides the Cathodic Protection, Ground Circuit and Railway Industry with modern technologies for connecting cables to steel structure.

The Pinbrazing method were improved dramatically by Safetrack when the patented electronic (Constant Energy) were invented. Later the highly appreciated new S4 Automatic brazing gun were developed and fast become the only demanded gun at many users. The gun make sure to minimize any operator failure and brazing is used to ensure a safe electrical connection to different types of steel structures. The pin brazing method is the perfect method to use in cathodic protection systems for application of jumper bonds on pipes, connection of measuring cables, installation of sacrificial anodes, test posts and grounding installations. Using pin brazing for connecting bracelet anodes on pipe laying vessels (lay barges and reel barges) is the safest and quickest method which ensure high performance of the pipelaying.



The great benefits with Pinbrazing:

- Works in any weather condition, even rain and snow!
- Fast, a complete bond takes 1-2 minutes
- Can be used in all angles
- Ideal for pipelaying vessels
- Economical
- Safe for the operator
- Low temperature, much less than thermit welding Safe for the material as it does not melt the work material down.



Safetrack Baavhammar AB
 Möllebergavägen 339-24,
 245 93 Staffanstorp, SWEDEN

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Introduction

TechnoDX a global leader in cutting-edge digital products and product engineering services. We specialize in developing innovative digital solutions by harnessing the power of our digital products and industry-proven product development practices. We have successfully rolled out cutting edge digital solutions to enterprises by amalgamating digital stack of AI, IOT, Big Data Analytics and Data Science. TechnoDX combines its best of breed solutions component and domain expertise to deliver best in class solutions to expedite the digitalization process of our customers.

Products**Cantiz AI VISION Platform: Elevate work space safety with Cantiz AI VISION:****PPE KIT Detection****Corrosion Detection****Methane Gas Leak Detection****Fire & Smoke****Red Zone Violation Detection****Cantiz AI IoT Platform****Predictive Maintenance****Vibrations Monitoring****Temperature Monitoring****Flow rate, pressure monitoring**

TechnoDX is a niche digital solutions provider with a strong footprint in digital in terms of its state of the art digital product offerings and the in-depth product engineering skills distributed across AI, IoT, Big Data and analytics that can be used as the tool to build the solution foundation. TechnoDX has a strong Data Science team having in depth expertise across structured data engineering, unstructured Natural Language Processing and Computer Vision. Data Science team of TechnoDX has developed multiple AI implementations for its enterprise clients. Our products, solutions and services focus on providing strategic differentiation and operational superiority to our customers. Our software products are recognized by industry experts like Gartner who has named us as "vendor to watch". Our products are currently used by Oil & Gas, Healthcare and agriculture sector. Our AI VISION platform is being used by Oil & Gas companies to detect safety violations, red zone violations, corrosion detection, methane gas leak detection etc.



4502 Riverstone BIVD Ste1102
Missouri City, Houston, Texas 77459 – U.S.A.

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PRODUCTS

IMPRESSED CURRENT ANODES & ACCESSORIES

- Graphite Anodes
- Platinized Ti/Nb Anodes
- High Silicon Iron Anodes
- MMO Coated Titanium Anodes

GALVANIC ANODES

- Mg Anodes (High & Low potential Cast & Extruded)
- Zinc (Soil, Marine, Tank, Pier, Piling, Ribbon, Bracelet Etc)
- Aluminium (Flush Mount, Piling, Bracelet)

CATHODIC PROTECTION BACKFILL & ACCESSORIES

- Petroleum Coke Breeze Backfill
- Chemical Backfill
- Slotted PVC Casing Pipes
- Vent Pipes
- Metallic Casing Pipes etc

POWER SUPPLIES & MONITORING

- Air Cooled & Oil Cooled Transformer Rectifiers
- Pulse Rectifiers
- Solar Power Suppliers
- Remote Monitoring & Control Systems.

GROUNDING PRODUCTS

- Zinc Grounding Cells
- Zinc Ribbon Anodes
- Zinc Mats
- Grounding Backfills.
- Polarization Cell Replacement (Solid state)

CABLE & WIRE

- HMWPE
- XLPE/SWA/PVC
- HMWPE-HALAR
- XLPE/PVC
- HMWPE-KYNAR(PVDF)
- Survey Wire etc.

CONNECTIONS & ACCESSORIES

- Cable Splice Kits & Accessories
- Heat Shrink Tubes
- Coating Repair material
- Thermite Weld Material
- Pin Brazing Equipment & Accessories

TEST STATIONS & ACCESSORIES

- Junction Boxes
- Magnetic Reed Switches.
- Variable Resistors
- Shunts
- Cathodic Protection Test Stations
- Bond boxes
- Cathodic Protection Remote Monitoring Test Stations

REFERENCE ELECTRODES & ACCESSORIES

- Coupons
- Portable & Permanent
- Copper/Copper Sulphate, Silver/ Silver Chloride, Zinc

INSTRUMENTS & ACCESSORIES

- CP Potential Meter & Equipments
- CP Test Equipments
- GPS Synchronized Current Interrupters
- Pipe & Cable Locators
- Portable Power Supplies
- Survey Equipments
- Coating Thickness Gauges
- Insulation Test Equipments
- Pipeline Monitoring & Analysis Equipments.
- CP Data Recorder/loggers, Soil Resistivity Measuring Equipments

Application

Our Major Activity – Cathodic Protection – involves in all metallic structure buried / immersed in any electrolyte like Soil, Water, Concrete, etc... Structures can be like Pipelines, Tanks, Jetties, Berths, Jackets, Platforms, Reinforced Concrete, etc..

Major Activities/ Services Provided.

BSS Tech Offers a wide range of Activities , Surveys and Material / Equipment for the Industry's Corrosion and Cathodic Protection requirement

Few of The Major Activities We Provide are:

- + Cathodic Protection System Surveys.
- + Soil Resistivity Surveys.
- + Cathodic Protection System Designs – in accordance to NACE/AMPP Specifications & Practices, British Standard, Applicable Industry and Client Requirements.
- + Risk Assessment & Consequence Studies.
- + Formulation of Multilayer Rehabilitation Plans.
- + Computerized Surveys – CIPS, DCVG, Pearson
- + AC Mitigation Studies and Measures.
- + Insulating Flange Testing.
- + Interference Testing.
- + Manufacturing of Corrosion Control, Corrosion Monitoring and Cathodic Protection Equipment / Materials.
- + Supply and Installation of Cathodic Protection Systems.
- + Testing and Commissioning of Cathodic Protection Systems.
- + Remote Monitoring and Control Systems.
- + Maintenance Contracts.
- + Training Programs to Clients in Corrosion Related Subjects.

Product Development & Research

It is BSS Tech Managements special interest that, a good percentage of our annual profit is invested wisely in the areas of Research and Developing new Products. These are spend either directly in our facilities or in close co-operation with our raw material suppliers facilities. Our Research & Product Development includes the continuous and extensive search for new materials including the applicability and behaviour of existing Material / Equipment for different electrolytes and environments. A wide variety of designs are developed In-House and selected to customer satisfaction, strictly considering the environmental conditions and Material / Equipment are selected with thorough knowledge and fully understanding the properties and behaviour of the products.

Notes



A SAIT GROUP COMPANY

SAIT

BssTech

Abu Dhabi

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Dubai

BMC

Dubai

SSE Tech

India

RACE Tech

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AL JHAIKH

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SSEC

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renewing energy
Ras Al Khaimah

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Turisia

SSMI

Abu Dhabi

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3X ENGINEERING

CPCCC Ltd - UK

DEKOTEC

ipac

ATMOS INTERNATIONAL

allied engineers

PIPELINE INTEGRITY

GGG

OIL & GAS SYSTEMS

Heath

Your safety Our Commitment

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REVALVE

ELMED

BRUSSELS

Thermopads

JEF

TECHNOOX

RYSCO

INTERNATIONAL INC.

TKable

VP Engineers

Caspian Resources & Technical Services

Kazakhstan

Wave for Mining & Petroleum

Sudan

Hydrogen Egypt (H2EG)

Egypt

Fast Line Technical Services LLC

Oman

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