



بن ساري للتقنية المتخصصة
متخصص في الكيمياء الكهربائية

B.S.S. Technologies
Specialized in Electrochemistry

A S A I T GROUP COMPANY

www.bsstechnologies.com

Cathodic Protection, Anti Fouling, AC Mitigation, Corrosion Engineering, Hypochlorination System, Concrete CP, Marine CP, Internal Corrosion Monitoring, Pin Brazing Equipment, Gas Flow Measurement & Regulation, 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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Your True Partner for Asset Integrity Management



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Sait Group is a diversified entity doing business within the Oil & Gas, Utilities, Infrastructure, Marine, Construction, Media Print, FMCG and Real Estate. Since its conceptualization in 1998 with its first born technology company BSS Technologies based in UAE, the group has transformed into a front-runner in multiple business sectors. Our greatest strength lies in our in-house technical expertise with vast experience and ability to stay in tune with latest technological advancements. Going with our motto of providing specialized services, we have formed strategic partnerships with organizations looking to establish a strong presence in the Middle East & Far East Asia. Our advantage is the extensive knowledge and invaluable expertise we possess of the MENA business landscape and our commitment to advancing the interests of our partners. We strive to provide service excellence and a unique experience to all clients through our professional and passionate team.

The group has its state of art manufacturing facilities in UAE, Saudi Arabia, Qatar & India. The production and assembly units operate with modern technologies and equipment with the layout to address the quality, safety and environment requirements. With over 600+ employees worldwide, we are committed to customer satisfaction through continuous training, research & development and improvement of our qualified technical and non-technical staff.

Bin Sari Specialized Technologies (BSS Technologies) is the backbone of Sait Group, specialized in Electrochemistry. Since inception, it has become the leading solution provider in MENA and Asia Pacific. Over the last 26 years, the group has developed into a highly resourced, responsive global company with strategically positioned offices and facilities in Abu Dhabi, Dubai, Qatar, Saudi Arabia, Kuwait, India, Nigeria, Algeria, Tunisia, Belgium and Canada. With its capabilities in Cathodic Protection, Corrosion Engineering and Electrochlorination solutions, it has developed its own subsidiaries in manufacturing and has capabilities in surveys, engineering, R & D, installation, construction and maintenance.

Bin Sari Metal Casting (BSMC), our manufacturing unit specialized in Transformer Rectifiers, Remote Monitoring and Control systems, Hypochlorite Rectifiers, Electrolyzers, casting of Sacrificial Anodes, is located at National Industries Park, Jebel Ali - Dubai. We keep stock of all major materials required in the field of Cathodic Protection and Corrosion Engineering. Major supply includes Transformer Rectifiers, Solar Power Systems, Sacrificial Anodes, Impressed Current Anodes, RMCS, Cables, Test Stations, Junction Boxes, Corrosion Coupons, Corrosion Monitoring Probes, Backfill Materials, etc.

Sait Specialized Engineering and Contracting (SSEC) is an independent and multi-discipline Sait Group Company providing engineering and contracting services to Oil & Gas, Petrochemical, Water and Power industries. They are turnkey/EPC project experts in Instrumentation, Electrical, Pipeline, Civil, Mechanical and Electromechanical sectors.

RACE Tech is the research and development division of BSS Technologies located at Mumbai, India. Sait Group management invests a good percentage of its annual profit in this R&D division especially in the field of power electronics and software for developing innovative and advanced products. Budgets are spent either directly in our facilities or in close co-operation with our raw material supplier's facilities. All developments are in strict accordance with quality, environmental and material standards. New technologies are selected with thorough knowledge and understanding of the product properties.

Sait Specialized Engineering Technologies Private Limited (SSE Technologies) is an independent arm of Sait Group and caters to the ever-increasing corrosion control needs in southern India. It also serves as a satellite office of all the subsidiaries of Sait Group and promotes all capabilities of the group in its region.

Al Shaikh Int. Group Cathodic Protection System Co. (Al Shaikh CP) is the division of Sait Group established in the Kingdom of Saudi Arabia providing specialized engineering services in the Saudi region. The manufacturing facility is located in Jubail. It also serves as a satellite office of all the subsidiaries of Sait Group and promotes all capabilities of the group in its region.

Sait Specialized Engineering Technologies Kuwait W.L.L (SSE Technologies W.L.L) is an independent arm of Sait Group, which caters to the ever-increasing corrosion control needs of Kuwait. It also serves as a satellite office of all the subsidiaries of Sait Group and promotes all capabilities of the group in its region.

Bin Sari Specialized Technologies W.L.L (BSS Technologies W.L.L) is an independent arm of Sait Group, based in Qatar and has a manufacturing facility which caters to the corrosion control needs in Qatar region.

BSS Tech CP (I) PVT LTD is a dedicated business unit providing Cathodic Protection & Corrosion Engineering services in Northern India. It also serves as a satellite office of all the subsidiaries of Sait Group and promotes all capabilities of the group in its region.

SARL BSS Protection Cathodique Algerie is a dedicated business unit providing CP based products and solutions in the African region. It also serves as a satellite office of all the subsidiaries of Sait Group and promotes all capabilities of the group in its region.

Sait Specialized Metal Industries (SSMI) is an emerging facility in UAE for metal fabrication activities including structural works. We undertake blasting activities along with environment friendly painting and coating services.

BSS Technologies, is a UAE based organization specializing in Electrochemistry and Sustainable Energy solutions. We have developed into a multi-disciplinary organization handling detailed survey, audit, design, engineering and manufacturing from concept-to-commissioning solutions for asset integrity management. The company is managed by highly qualified and certified personnel holding extensive experience. Over the last 26 years we have delivered a multitude of projects and were pivotal in contributing to building global infrastructure in various industries like Retail, Energy, Construction, Oil & Gas, Marine etc.

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. We hold certifications for ISO 14001:2015 and ISO 45001:2018, further affirming our commitment.

Our ISO-9001:2015 certification affirms the highest commitment to our motto "The Key to Customer Delight is Quality"

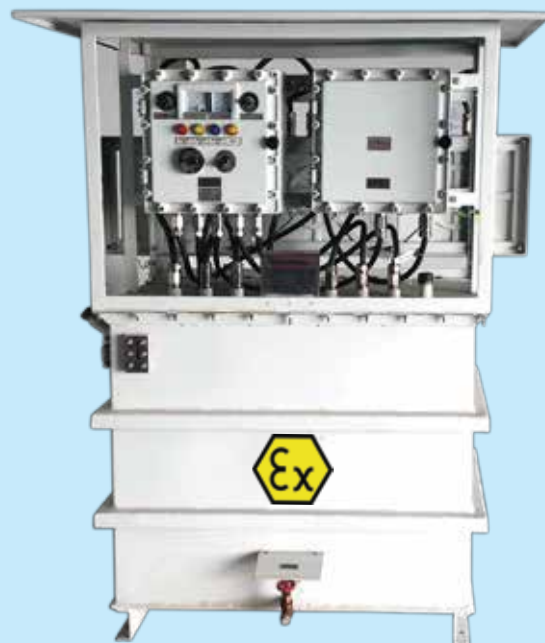
To meet our customer requirements, we have placed our Corporate Office in Abu Dhabi- UAE. This enabled us to provide reliable products expediently to our customers, we hold our Head Office, Engineering and Manufacturing Facilities in National Industries Park, Jebel Ali, Dubai, UAE. This facility produces Transformer Rectifier, Chlorination Rectifier, Anode Casting, Titanium Fabrication and all customization capabilities. This production facility operate 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.

TRANSFORMER RECTIFIER



- 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				

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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:

BSSTR-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:

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

* 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 seperately 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

Rating(w/o Radiator)	Model Type
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

IECEx CERTIFIED TR



- Flame Proof
- Oil Immersed
- IECEx Certified

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REMOTE MONITORING & CONTROL SYSTEM

CATS-EYE™



**Your eyes to
Cathodic Protection System**

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.



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08

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 it's 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 :

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

Environmental Conditions

Ambient Temp	-10°C to 60°C
Storage Temp	-10°C to 60°C
Humidity	5 to 95%
Size	Customized

Electrical Interface

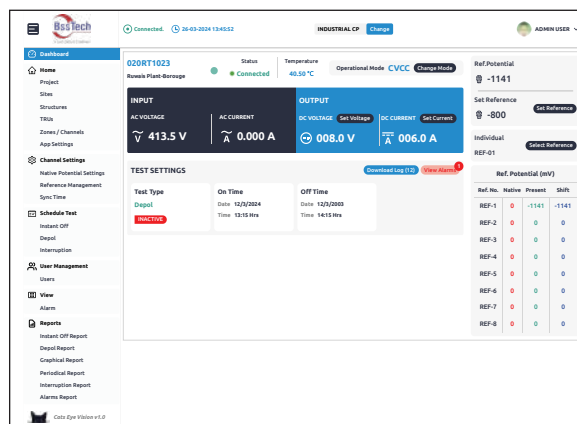
Input Voltage	230VAC
Surge Protection	Yes
Circuit Protection	Optical Isolation

Communication Interface*

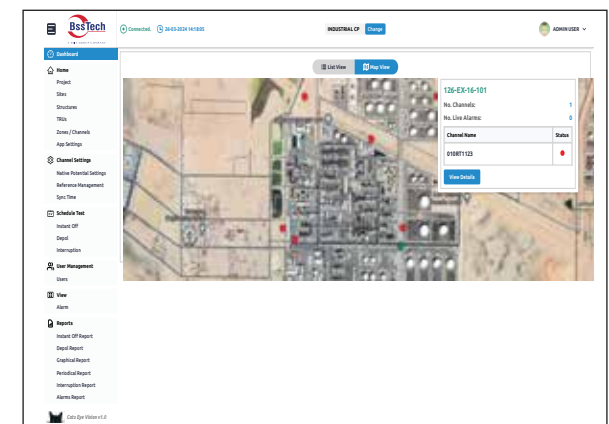
Communication Protocol	Standard Modbus RTU
Wireless	Yes
Frequency	2.4 GHz
Optical Interfacing	Yes
TCP/IP	Yes
Ethernet Topology	Yes
GSM	Yes

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

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.

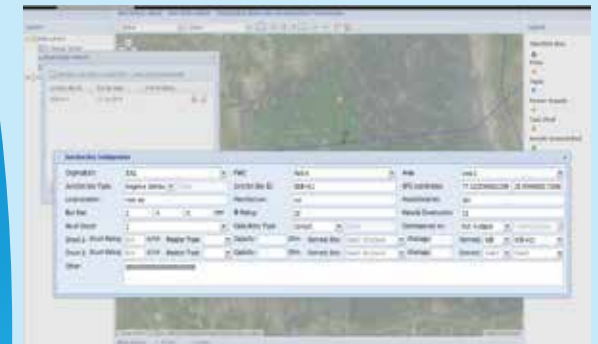
Features & Benefits

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

SAIT™ - CPDM

Software for Asset Integrity Techniques

- CP DATA MANAGER



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

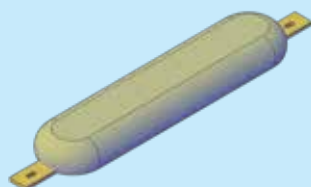
SACRIFICIAL ALUMINIUM ANODE



Aluminium Anode



Bracelet Anode



Hull Anode

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

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

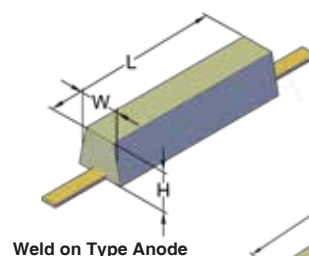
Platform / Jetties Anodes

Anode Type	L (mm)	W (mm)	H (mm)	Core	Net Wt. (kg)	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

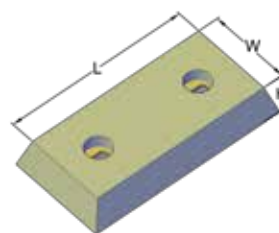
Bolt on Type

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

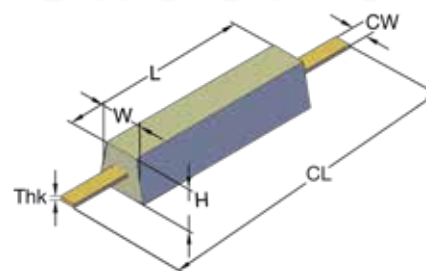
* C-C: Hole center to center



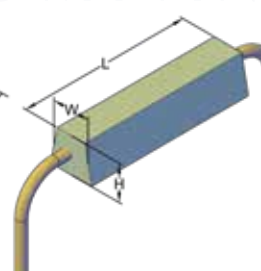
Weld on Type Anode



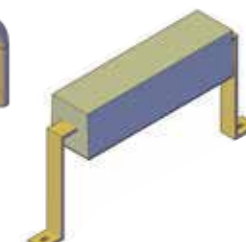
Bolt on Type



Tank Anodes



Platform / Jetties Anode



Stand off Anode

Tank Anodes

Anode Type	Anode Dimensions(mm)			Core Dimensions(mm)			Weight (kg)	
	L	W	H	CL	CW	Thk	Net wt.	Gross 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

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 & MIL A-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

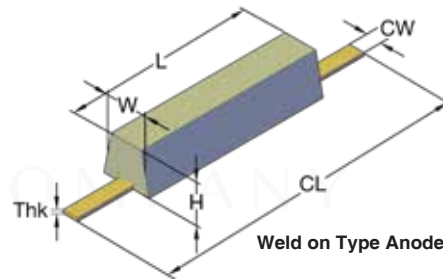
Weld on Type Anodes

Anode Type	Anode Dimensions (mm)			Core Dimensions (mm)			Weight (kg)	
	L	W	H	CL	CW	Thk	N.Wt	G.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

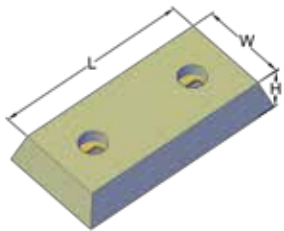
Zinc Anode Bolt On Type

Anode Type	L (mm)	W (mm)	H (mm)	C-C (mm)	Net Wt. (kg)	Gross 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

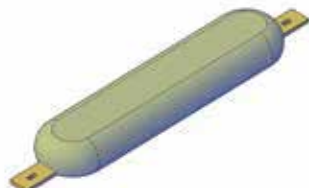
*C-C: Hole center to center



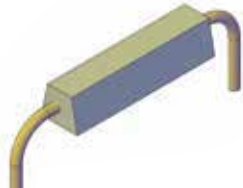
Weld on Type Anode



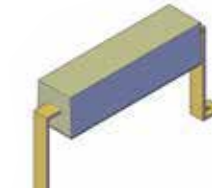
Bolt on Type



Hull Anode



Platform / Jetties Anode



Stand off Anode

Electrochemical Properties :

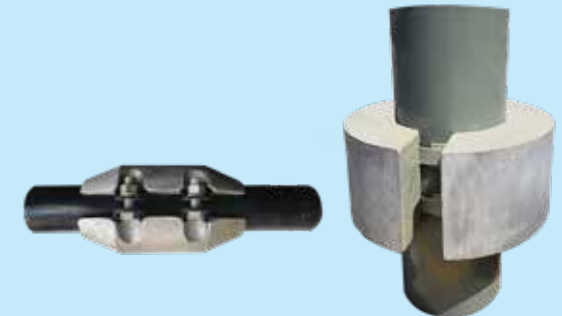
- Solution Potential: -1.05V w.r.t Ag/AgCl
- Capacity: 780 Ah/kg

Customized Alloy, Dimensions and shape can be produced against order

SACRIFICIAL ZINC ANODE



Zinc Anode



Bracelet Anode

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

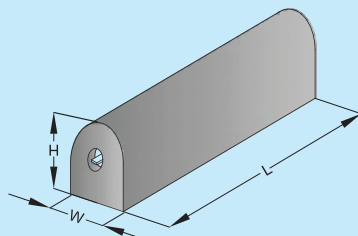
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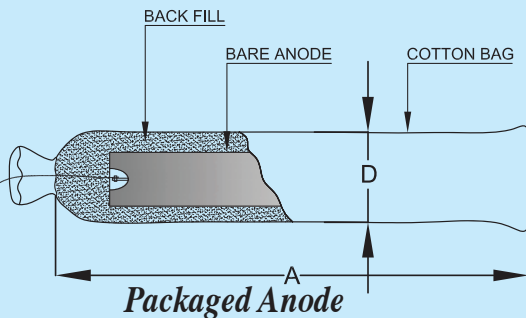
SACRIFICIAL MAGNESIUM ANODE



Magnesium Anode



Bare Anode



Packaged Anode

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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/CuSO ₄)	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

DIMENSIONAL & WEIGHT TABLE

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

* Tolerance as per manufacturing standard

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

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)

ZINC RIBBON ANODE



Zinc Ribbon



*Zinc Ribbon for Road Crossing,
AC mitigation, etc...*

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IMPRESSED CURRENT ANODES



MMO Tubular Anode

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

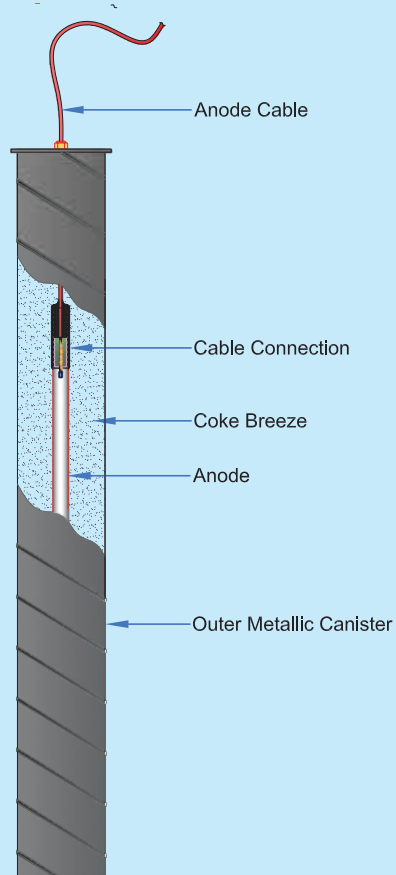
Mixed Metal Oxide Ribbon Anodes are available in rolls of 250 feet or 500 feet.

IMPRESSED CURRENT ANODES



Mixed Metal Oxide Ribbon Anode

IMPRESSED CURRENT ANODES



Canister Anode

CANISTER ANODE

Information

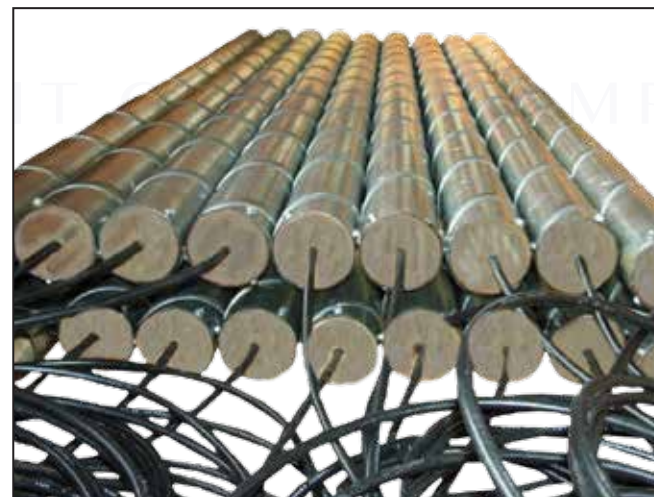
BSS Tech supplies ready-assembled canister anodes consisting of anode with cable tail encased in a metallic canister filled with conductive coke breeze backfill. The ready-assembled anodes can be quickly and easily be installed directly into a excavation.

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

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*

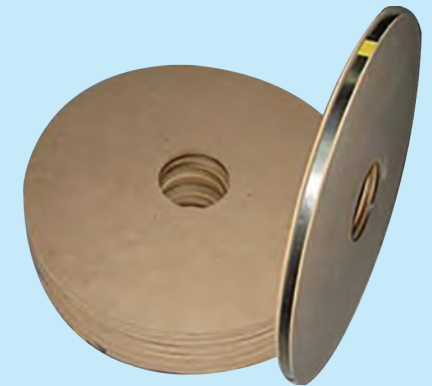
Substrate	
Material	Titanium, Grade 1, as per ASTM B265
Coefficient of thermal expansion	$8.7 \times 10^{-5} / K^{-1}$
Thermal conductivity at 20°C	15.6 W/m°K
Electrical resistivity at 20°C	$5.6 \times 10^{-5} \Omega\text{-cm}$
Modulus of elasticity	105 GPa
Tensile strength	245 MPa
Yield strength	175 MPa
Elongation	24% minimum

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

IMPRESSED CURRENT ANODES



MMO Mesh Ribbon Anode



Titanium Conductor Bar

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IMPRESSED CURRENT ANODES



MMO Wire Anode

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 Electrochemical 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:

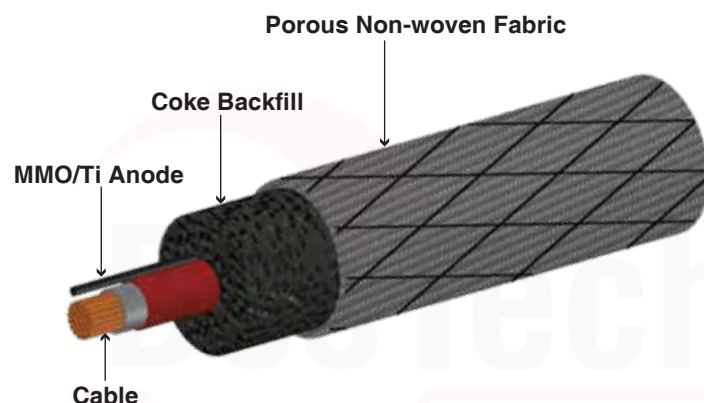
- Internal Cathodic Protection for Tanks, Condensers & Heat Exchangers, etc.
- External Cathodic Protection on Platforms, Jetty Structures, Offshore Structures, Seawater intake structures.

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

IMPRESSED CURRENT ANODES



Jackmo™ Wire Anode

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IMPRESSED CURRENT ANODES



Pyramid Anode with Cable

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:

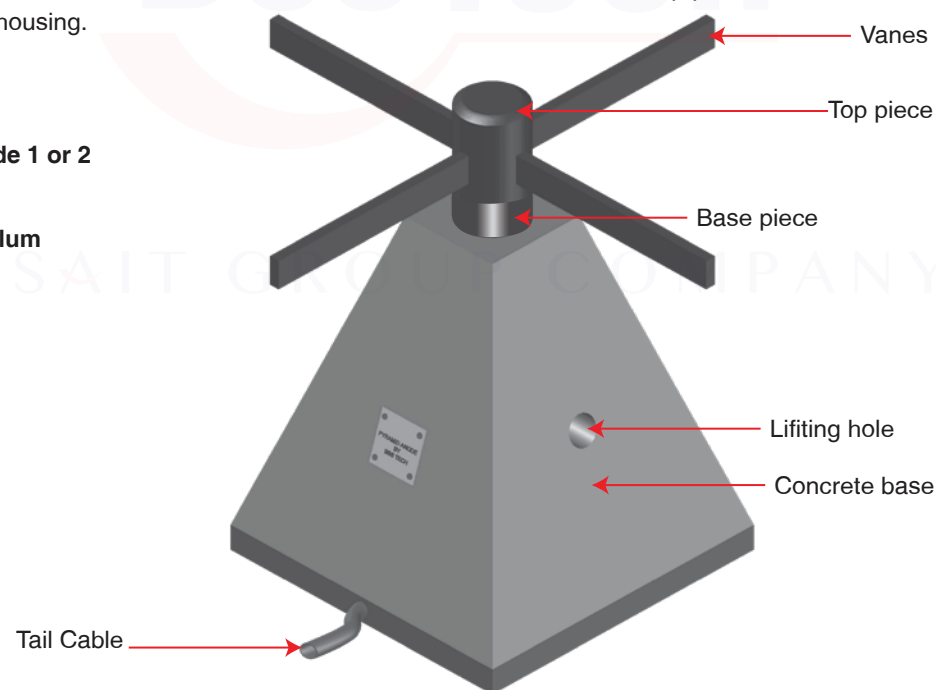
Titanium Base Axle coated with MMO. One end with an external thread to assemble the top piece and other end machined for cable connection with tubular PVC housing.

Substrate:

Titanium ASTM B265 Grade 1 or 2

Coating:

Oxides of Iridium & Tantalum



Pyramid Anode

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 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 & power station 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.*

IMPRESSED CURRENT ANODES



Platinized Titanium Anode



Platinized Niobium Anode

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IMPRESSED CURRENT ANODES



Graphite 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 0.5 A/ft².)

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 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 m2 (4.0 ft2)	1.5 - 2.0	2.0	1.0
4" x 80"	29.5 kg. (65lbs.)	32.6 kg. (72 lbs.)	0.65 m2 (7.0 ft2)	2.0 - 4.0	4.0	2.0

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

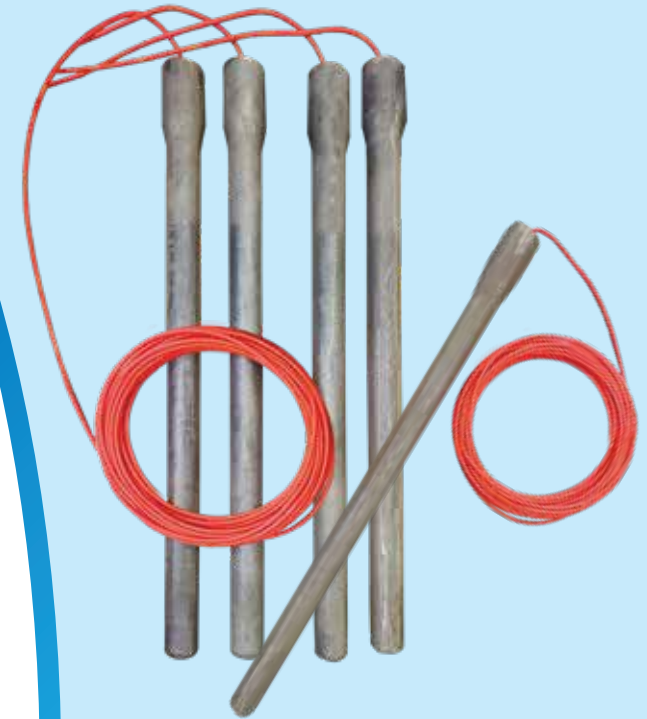
Type	Weight	Anode Discharge (A)	Diameter	Length	Area
BTSI-260C	12 kg. (26 lbs.)	1.5-2.0	1.5" (38mm)	60" (1520mm)	2ft ² (0.19 M ²)
BTSI-460C	20.9 kg. (46 lbs.)	3.0-4.0	2.3" (58mm)	58" (2134mm)	4ft ² (0.4 M ²)
BTSI-600C	27 kg. (60 lbs.)	2.0-2.7	2" (50mm)	60" (1520mm)	2.7ft ² (0.25 M ²)
BTSI-1100C	50 kg.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

Tubular 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	23kg. (50 lbs.)	3.2-3.8	2.2" (56mm)	84"(2130mm)	4.2ft ² (0.39 M ²)
BTSI-500T1	23kg. (50 lbs.)	2.6-3.5	2.6" 66mm)	60" (1520mm)	3.5ft ² (0.39 M ²)
BTSI-700T	32kg. (70 lbs.)	3.7-5.0	2.6" (66mm)	84" (2130mm)	4.9ft ² (0.46 M ²)
BTSI-950T	43kg. (95 lbs.)	5.3-7.0	3.8" (97mm)	84" (2130mm)	7ft ² (0.65 M ²)
BTSI-1100T	50kg. (110 lbs.)	3.8-5.0	3.0" (76mm)	60" (1520mm)	4ft ² (0.36 M ²)
BTSI-1220T	55kg. (122 lbs.)	6.6-8.8	4.8" (122mm)	84" (2130mm)	8.8ft ² (0.8 M ²)
BTSI-1770T	80kg. (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

IMPRESSED CURRENT ANODES



High Silicon Iron Anode

CP MONITORING SYSTEM



Test Station - LOON

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 (-60°F to +250°F).
- 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.

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



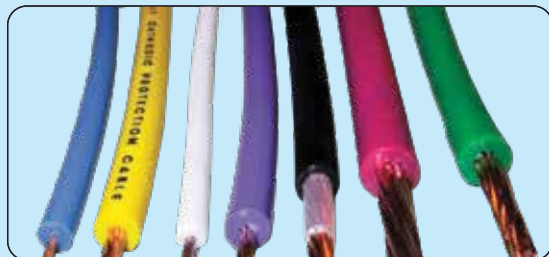
JUNCTION BOXES



www.bsstechnologies.com

1024R14

CATHODIC PROTECTION CABLES



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 also 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

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.

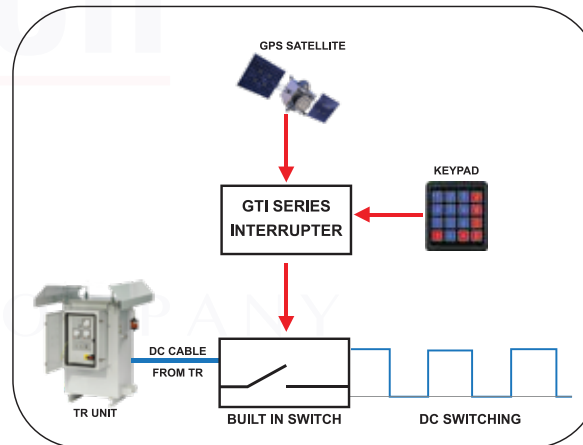
This satellite clock information is as accurate as atomic clock and this is used as time source for our timers achieving the most accurate synchronisation possible. The conventional electronic clock has limited time accuracy. Most commonly used industrial real time clock claim accuracy of ± 15 seconds 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



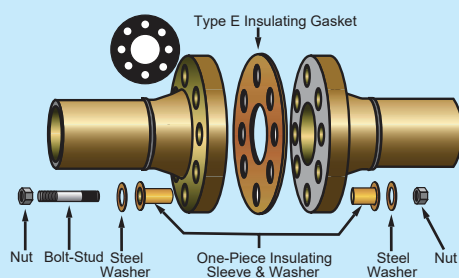
GPS CURRENT INTERRUPTER



GROUNDING PRODUCTS



Zinc Grounding Cell



Isolation Flange Kit

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 overhead line 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 one electrode). Nominal resistance of a two electrode Grounding Cell in wet area is 0.2 to 0.6Ω. 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 current mitigation, protection of Isolation joints and Isolation flanges, 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 x 37 x 915	32.0 kg.
BTZN-330G	14.9 kg.	37 x 37 x 1524	44.7 kg.
BTZN-570G	25.7 kg.	760 x 65 x 75	55.2 kg.
BTZN-600G	27.2 kg.	51 x 51 x 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

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 (8x20) 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

POLARIZATION CELL REPLACEMENT (PCR)



PCR

ReKorr®

A Portable Solution for Corrosion Monitoring



HANDHELD CORROSION MONITORING DEVICE - ReKorr®

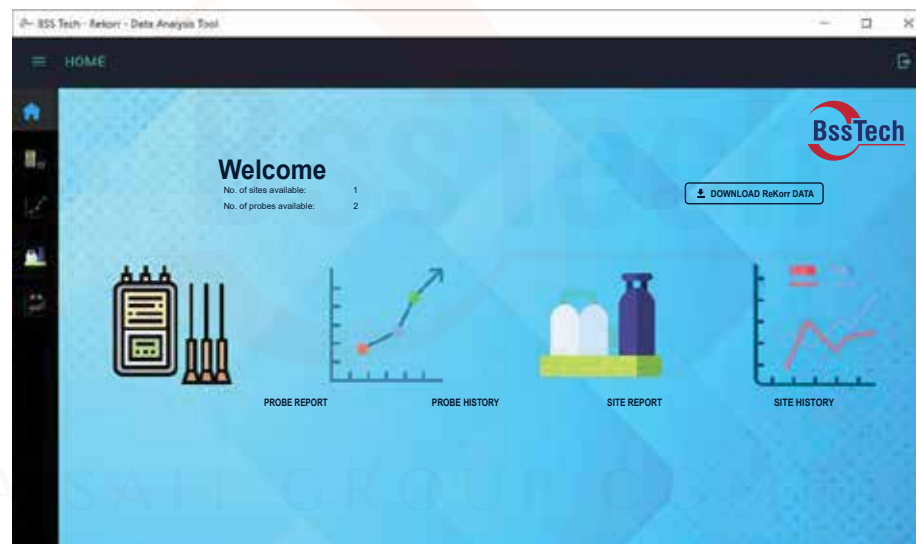
Information

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.



Software

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.

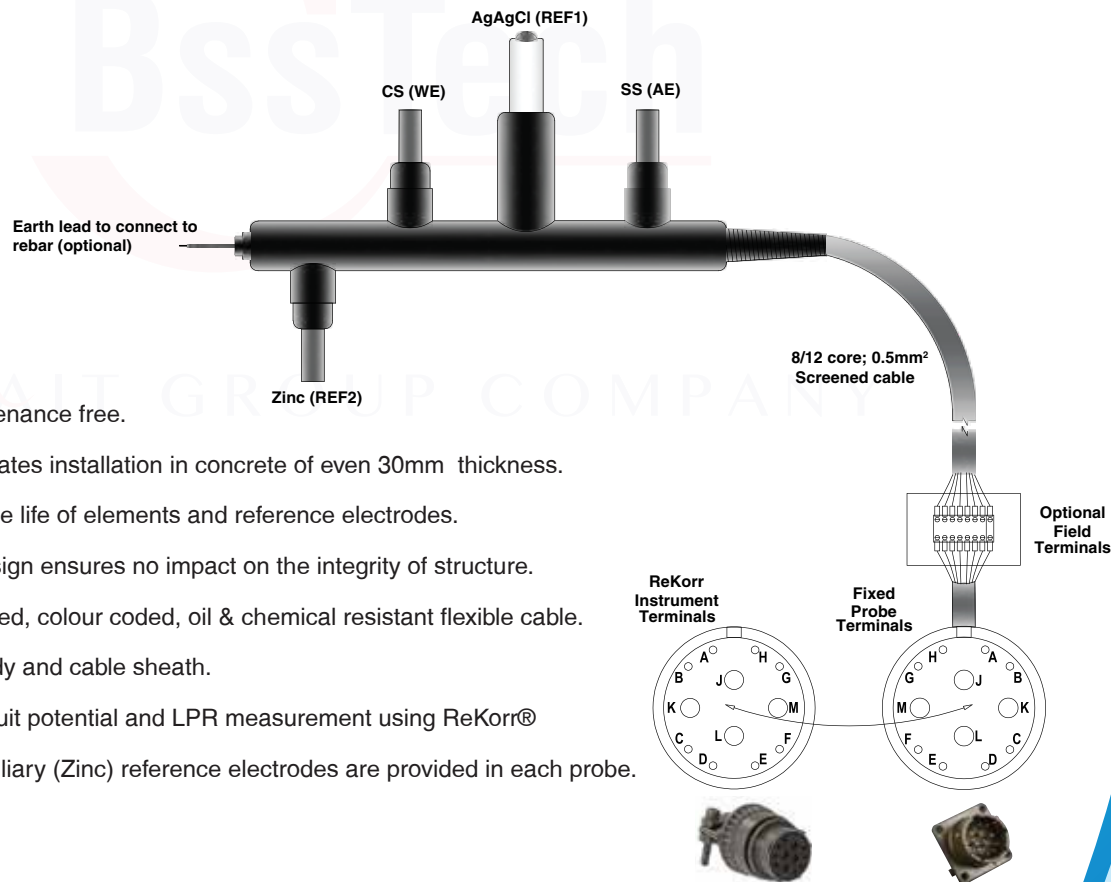
E4 LPR PROBE

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 12 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.
- Supports reading open circuit potential and LPR measurement using ReKorr®
- Main (Ag/AgCl) and an auxiliary (Zinc) reference electrodes are provided in each probe.

CORROSION RATE MONITORING PROBE



E4 Corrosion Monitoring Probe

REFERENCE ELECTRODES



Portable Reference Electrodes



*Permanent Pre Packaged
Underground Reference Electrodes*



Zinc Reference Electrode

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** : 1/4" - 20 Copper
- **Size** : 1" dia. x 8" Housing
- **Stability** : ± 10 mV with 3.0 microamp load
- **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** : 1/4" - 20 Brass
- **Size** : 1" dia. x 8" Housing
- **Stability** : ± 10 mV with 3.0 microamp load
- **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** : 1/4" - 20 Plated Brass
- **Size** : 1" dia. x 8" Housing
- **Stability** : ± 10 mV with 3.0 microamp load
- **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 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 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** : 1/4" 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 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** : 1/4" 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 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** : 1/4" x 3" PVC @ Electrode End
- **Design life** : 30 years
- **Temperature Range** : 0° C to 57° C (32° F to 132° F)

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.

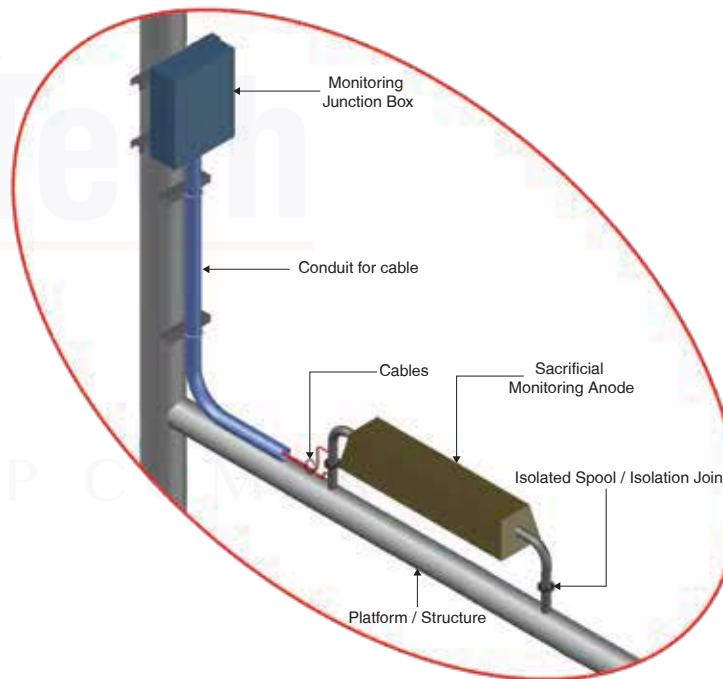
A standard monitoring anode consists of the sampled anode installed with isolation on structure and wired to the monitoring panel. Anode isolation from the structure is achieved by having an isolation joint.

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

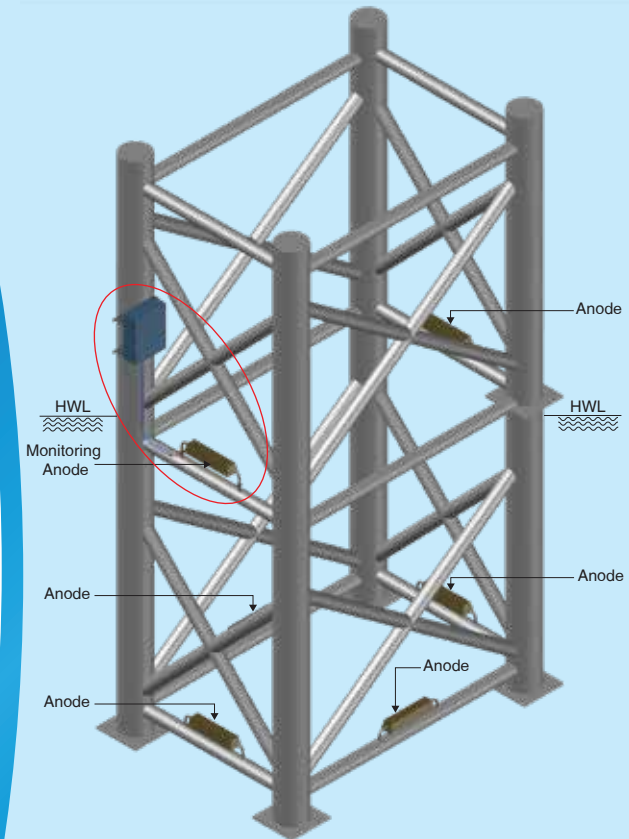


Monitoring system shall be designed to meet the following requirements :

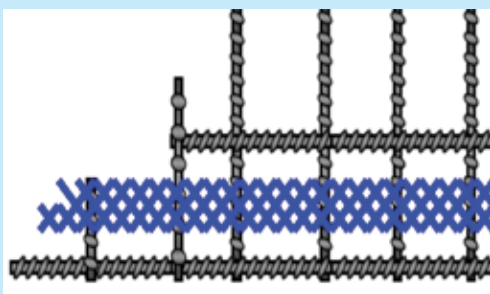
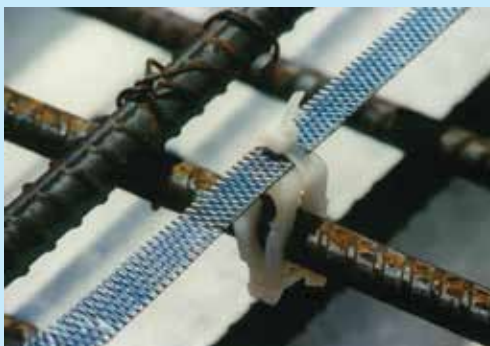
- Anode monitoring system allows operators to accurately measure anode consumption and remaining life without interference with the anode. The data for a handful of anodes will give general trends for the entire Cathodic Protection system.
- The performance of the Sacrificial Anodes are judged by the 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.



MONITORING ANODE



CONCRETE CP



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	$8.7 \times 10^{-5} / \text{K}^{-1}$
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

Application

REBAR CLIP

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.

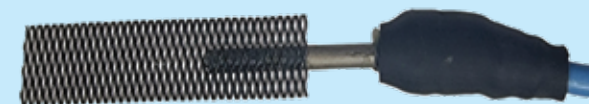
Material – Nylon

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

CONCRETE CP



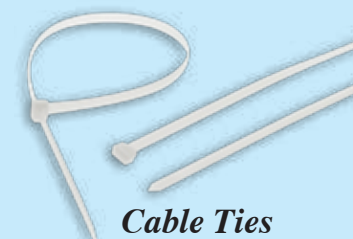
*Ag/AgCl Reference Electrode
before encapsulation in concrete*



Pseudo (MMO) Reference Electrode



Rebar Clip



Cable Ties

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MARINE CP



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



Aqua Disc MMO Anode

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

GALVALLOPOD

Information

GALVALLOPOD is a retrofit anode developed to serve the cathodic protection of offshore structures. It provides an easy and fast solution for upgrading the cathodic protection systems of existing structures with galvanic anodes. Aluminum anodes are predominantly used in seawater applications.

Multiple galvanic anodes are mounted on a POD and the whole assembly can be installed on the seabed by lowering using a crane. This system has the following advantages and is preferred over conventional single anodes for the protection of existing structures with completely/partially depleted anodes.

- Easy and fast installation as these anodes can be laid on the seabed using cranes.
- Anode can be connected to the structure using clamps or cable.
- Anodes are designed to maintain the stability on the seabed and prevent burial by sediments.
- High current produced from a single assembly as multiple anodes are accommodated.
- Easy to replace.

Anodes are approximately 2 - 3 meters in length with cross-section of 0.3m x 0.2m but they can be customized to meet specific project requirements.

ANODE SLED

Information

Anode sleds are developed to serve the cathodic protection of offshore structures, particularly submerged pipelines. These sleds can utilize either galvanic anodes or by impressed current (MMO) anodes. Multiple anodes are installed on a base made of concrete. Sledges with MMO anodes can cater very high current requirements, providing an efficient and quick solution to revamp cathodic protection systems for existing structures equipped with either galvanic anode or impressed current systems. Aluminium or MMO anodes are commonly used in seawater applications.

Multiple galvanic anodes or MMO anodes are mounted on a concrete base, and the entire assembly can be installed on the seabed by lowering using a crane. This system has the following advantages and is preferred over conventional single anodes for protecting existing structures with a non performing cathodic protection system in place.

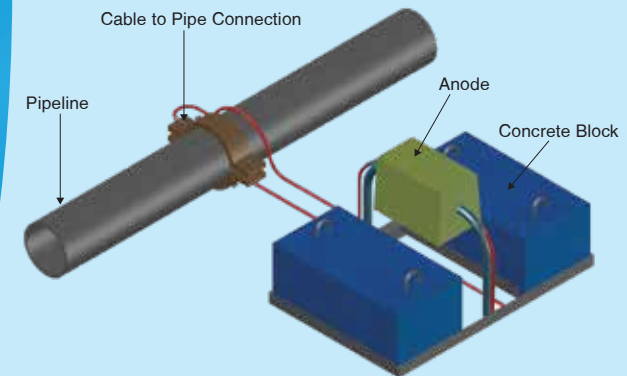
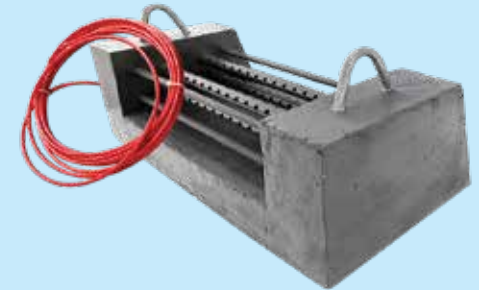
- Easy and fast installation as these anodes can be laid on the seabed using cranes.
- Galvanic anode sledges will be supplied with sufficient length cable and can be connected to the structure using clamps.
- Sledges with impressed current anodes will be supplied with sufficient quantity of cable to reach the termination location.
- Anodes are designed to maintain the stability on the seabed and prevent burial by sediments.
- High current produced from a single assembly as multiple anodes are accommodated.
- Easy to replace.

Anodes are supplied with lifting arrangements. Dimensions and number of anodes per assembly are customizable based on the actual project requirement.

RETROFIT ANODES



Galvallopod



Anode Sled

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AC MITIGATION MODELLING



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

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.

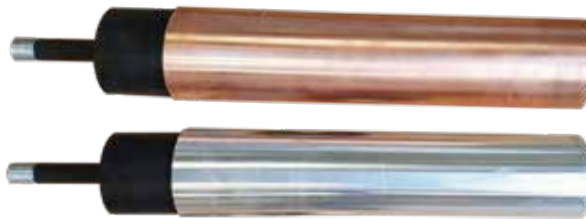
Basically there are three types of systems.

- 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



Aluminum Anode & Copper Anode

ANTI FOULING SYSTEM (MGPS)



Conventional Grid Anti-Fouling System



Skid Mounted Anti-Fouling System

HypoKlor®



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ELECTROCHLORINATION SYSTEM

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 Hypochlorite 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 electrochlorination 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 electrochlorination technologies available in the international market. Selecting the correct electrochlorination technology and electrolyser type for a specific application is a complex matter and lack of knowledge can result in expensive mistakes.

Applications



Fresh Water Generation



Marine Growth Prevention



Power Plant



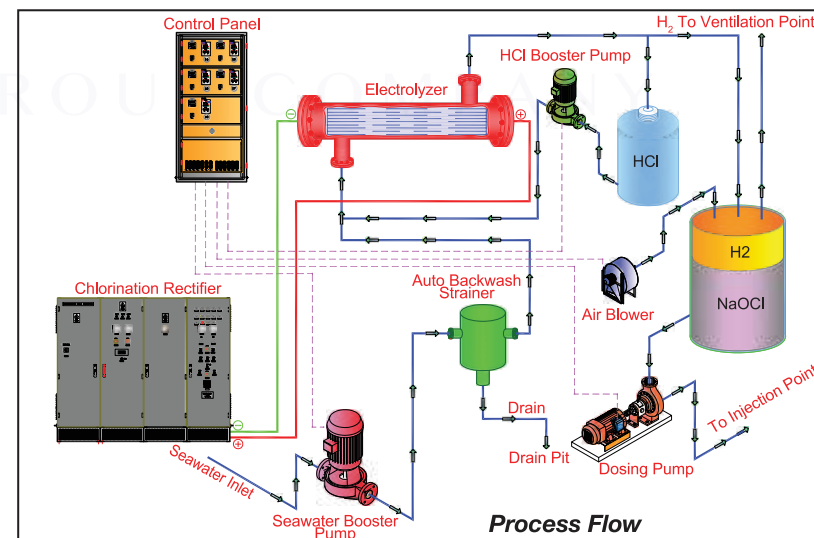
LNG Terminal



Desalination Plant



Aqua Park



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.

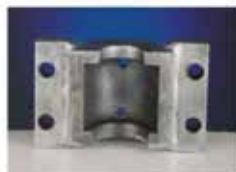
Clamp Type Protection – effectively integrating three attributes of online leak sealing technology: clamp, sealant and injection tools. It is designed to contain the leak point by introducing higher pressure than leaking system pressure by hydraulic injection tools to fill the clamp cavity with sealant 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.

Clamp Type Protection



Straight Pipe Clamp

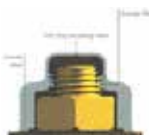


Flange Clamp



Elbow Clamp

Anti-Corrosion Cap



Tubular Pile Protection



Flange Protection



COMPOSITE REPAIR SOLUTIONS



Composite Repair Wrap

LORESCO®



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SC-3® EARTH CONTACT BACKFILL

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 Loresco SC-3



Particles Before Coating Particles after Coating



Certified to
NSF/ANSI 60

Introduction

ELMED specialises in the design and manufacture of measuring and testing equipment. For over 60 years customers in many technical fields have been relying on this family-owned company. The ISOTEST product range is a handy tool in the detection of coating defects and offers a reliable solution to corrosion protection within the framework of quality control. By means of high voltage impulses coatings on a conductive basis can be gently NDT-tested. This method spots even the tiniest defects that are often missed during the normal visual inspection. Further advantages of the ISOTEST: testing with reserves of energy, guarantee of stability of selected test voltages, testing even on dirty or damp surfaces, very flexible at use thanks to numerous accessories.



ELMED Dr. Ing. Mense GmbH

Weilenburgstr. 39

42579 Heiligenhaus, Germany



Products

- ISOTEST inspect 35
- ISOTEST inspect 8.0
- ISOTEST 4S
- ISOTEST 4S plus
- ISOTEST HV

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Thermopads

Thermopads Pvt Ltd

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THEMOPADS PVT LTD

Information

Thermopads is a multi-product, multi-service organization – one stop destination for all heating needs, with sales service points covering every part of India and overseas branches in U.K, Germany, Singapore and U.S.A. The array of company's products have applications in almost all industries – Petroleum, Power Plants, Metallurgical, Cement, Fertilizers, Textiles, Food and confectionery, Parma, Paints, Edible oils, etc.

Thermopads manufactures/provides – Surface/immersion electrical heating equipments suited to hazardous and non-hazardous environments.

Thermopads are leading manufacturers of heat tracing and heating cables in the world.

Electric Heat Tracers are specialized heating cables with low watt density for applications.

- To maintain temperature of fluids in pipelines at elevated temperatures for ease of handling, storage and transfer
- To heat-up process fluids in pipelines/tanks/equipment.

Electric Surface Heating:

The main principle of ESH is that heat is applied to the exterior surface vessels/equipment being heated.

Thermotrace – HTT: Power limiting tracers, Cut to required length at site and in wide range of wattages. These Tracers are ATEX certified

Thermotrace – CTL: Constant output, parallel circuit type, cut to required length at site and in wide range of wattages.

Self-Limiting Self Regulating Tracer – STP: Self-Limiting & Self-Regulating (SLSR) with variable output, temperature dependent, parallel circuit type, cut to required length at site and in a wide range of wattages. These Tracers are ATEX certified.

Heating Cables – HC: Constant output, Series circuit type, heating cables insulated with PTFE, metal braided if required, outer PVC or insulation combinations for use in both process heating and freeze protection applications. These Tracers are ATEX Certified.

Heated Hose: This product finds application in Gas analyzer sampling, Hot melt transfer in Petroleum, Chemical, Glue, Paint, Food processing etc. where in the product inside the process tube (part of heated hose) needs to be maintained at critical temperatures to avoid condensation / solidification of the gas or temperature drop in the fluid.

Floor Heating Cables & Mats: These are constant output, Series circuit type heating cables/mats for floor heating applications in homes/offices, driveways, green houses in cold countries / places.

Salient features :

- Simple
- Economical and Reliable
- Uniform Heating
- No Corrosion Problems
- Low capital and running costs
- Maintenance free
- Ease of handling
- Precise temperature control

Information

GGG is a fully independent system integration company / solution supplier. Specialist in design, production and implementation of complete integrated flow metering solutions for custody transfer gas and LNG projects, worldwide. GGG can also be your partner in gas filtration, pressure reduction, flow control or gas treatment installations. As part of the package GGG Oil & Gas Systems can provide turnkey flow metering systems including:

- Fully integrated metering skids
 - Flowmeters (Ultrasonic, Coriolis mass, etc)
 - Valves and piping
 - Instrumentation (Temperature, pressure, etc)
- Analyzer solutions with
 - Sampling systems
 - Analyser systems
 - Density, viscosity
 - Gas composition
 - LNG sampling systems
 - Mercury analyzer, H₂S and Total Sulphur analyzer, Oxygen analyzer
- Supervisory and flow computer systems including flow computers, control panels and customer interfaces
- Validation and calibration services

From upstream to downstream

GGG Oil & Gas Systems delivers flow metering systems for offshore and onshore locations, from platforms to (off-)loading facilities FSRU & FNLG, for pipeline operations, and refineries. We work closely with our customers to provide the most cost-effective, highest quality solutions. Every solution we deliver is a tailor made job; designed, engineered and built based on the customer's specifications and requirements, as well as international industry standards and best practices.

Turnkey solutions from concept to start-up

- Design and engineering
- Project management
- Manufacturing of complete skids
- Calibration, integrated testing, and certification
- Shipping and packing
- Start-up and commissioning, training and support

Experienced project engineering

GGG has an experienced in-house team of specialists in mechanical engineering, (flow) instrumentation, electrical engineering and process automation. (PLC, DCS/ SCADA)

From project definition to engineering and on site installation, quality assurance is the key to any project.

GGG follows a 360°-degree solution driven approach Total commitment; support in every phase of the project



GGG Oil & Gas Systems

Onderzeel 6 – 2920 Kalmthout - Belgium



LNG and Gas Metering Systems



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IGP Engineers Private Limited

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



Monolithic Insulation Joints

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IGP ENGINEERS PRIVATE LIMITED

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, adhesion and Holiday Tests.

Data Required for Manufacturing:

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

Introduction

The group TELE-FONIKA Kable S.A (TF Kable) is a recognized and trusted provider of copper and aluminum cables and wires, optical fiber cables, used by the world's leading companies in Mining, Energetics, Renewable Energy, Railway industry, Automotive Industry, Telecommunication, Welding Industry, Shipbuilding Industry, Oil and Gas, Automatics. We offer a comprehensive assortment of wires and cables. Apart from the standard assortment of products, we also offer special cables made to meet individual customer orders. Our product assortment includes 25 thousand of cable types.

Types of Cables

High Voltage cables:

- HV XLPE cable with copper wires screen and aluminium laminated foil.
- HV XLPE cable with corrugated aluminum sheath.
- HV XLPE cable with lead alloy sheath

Marine and Offshore cables

- Shipboard instrumentation, control and telecommunication cables
- MV Single-core halogen-free shipboard power cables
- MV three-core halogen-free shipboard power cables
- Shipboard power cables

Oil and Gas / Offshore

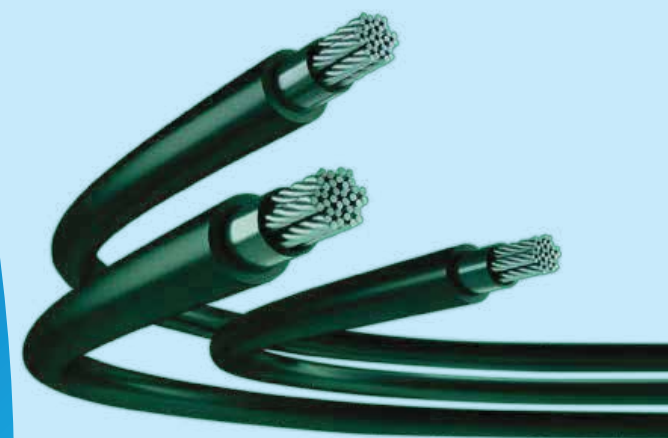
- BS66883/BS7917 (UKOOA)
- NEK606



TF Kable

Tele-Fonika Kable S.A

Hipolita Cegielskiego 1
32-400 Myslenice, Poland



*Leading producer of cables &
cable systems*

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ATMOS INTERNATIONAL

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0724R14

ATMOS INTERNATIONAL

Introduction

We are deeply passionate about technology, innovation and customers, with a purpose to deliver the best pipeline leak detection, simulation solutions and customer service in the industry. More than 1,500 pipelines and 60 countries within the oil, gas, chemical, water, aviation and mining industries benefit from our technology.

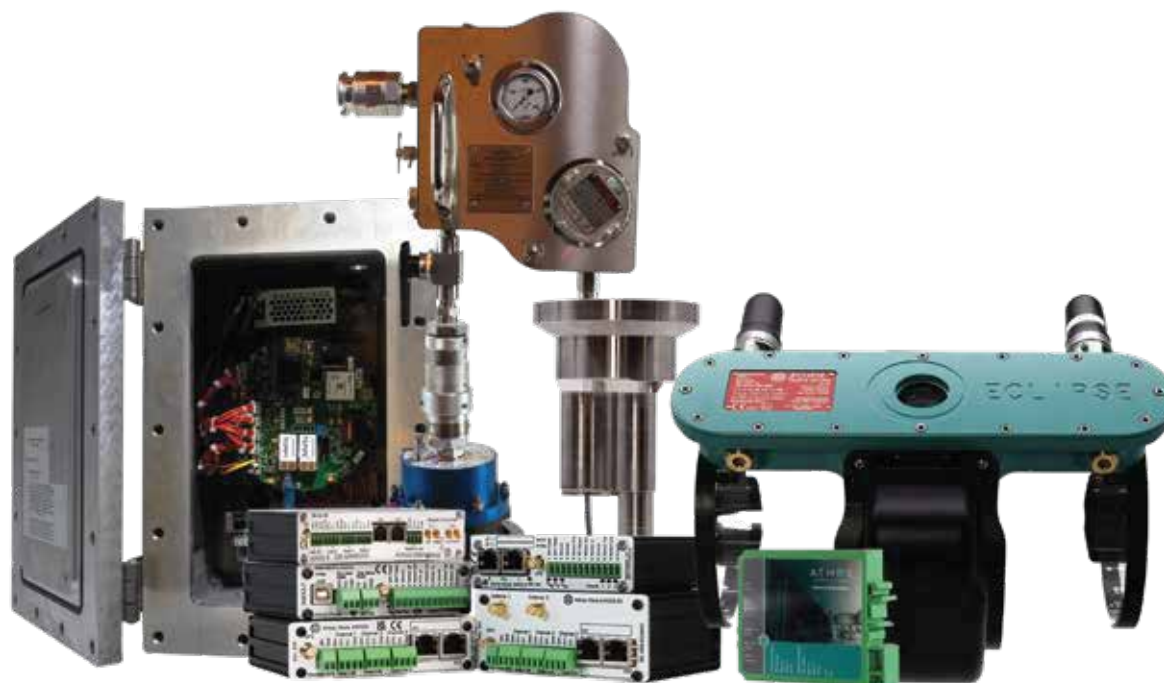
R&D's continuous innovation for better performance and reducing deployment costs makes it possible for every pipeline to have the best integrity monitoring tools.

Excellent customer service gives pipeline operators more sensitive and accurate solutions.

As the world's leading leak detection provider, we help ensure any leak is detected reliably and located accurately.

Major activities include

- Statistical pipeline leak detection and location
- Negative pressure wave leak detection and location
- Model based pipeline leak detection and location
- Non-intrusive instrumentation for leak and theft detection hardware
- Airport hydrant leak detection
- Theft detection system
- Online and offline hydraulic simulation
- Batch tracking
- Pig or scraper tracking
- Operator training simulator
- Gas management system
- Tank farm management
- Maintenance



Introduction

Since 1933, Heath has established itself as the premier service provider, manufacturer, and distributor of gas detection, pipe and cable locating, and odorant analysis equipment. Our commitment to innovation has revolutionized survey practices for gas utilities, ensuring safer operations. This success is attributed to our dedicated team of engineering and marketing experts, who continuously research and develop cutting-edge products through strategic partnerships with renowned research organizations and industry associations. With a focus on the midstream, upstream, and downstream markets, Heath maintains a stellar reputation both in the United States and globally.



Heath Consultants Incorporated

9030 Monroe Road
Houston, Texas 77061 USA



*Leading product manufacturer for the
Utility Protection, Asset Management &
Damage Prevention*

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Proven Products & Advanced Technologies

- Remote Methane Leak Detector (RMLD-CS™)
- Discover® Advanced Mobile Leak Detection (AMLD)
- Detecto Pak-Infrared+ (DP-IR+™)
- Detecto Pak 4
- Mobile Kits
- ODORTAOR 2™
- Combustible Gas Indicators (CGI)
- SEMTECH HI-FLOW 2
- Confined Space Monitors
- Sure-Lock® All Pro Pipe & Cable Locator
- EI5 - Ethane Identifier
- Plunger Bars and Purgers

www.bsstechnologies.com



TECHNODX

TechnoDX

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1024R14

TECHNODX

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.

MPPT CHARGE CONTROLLER

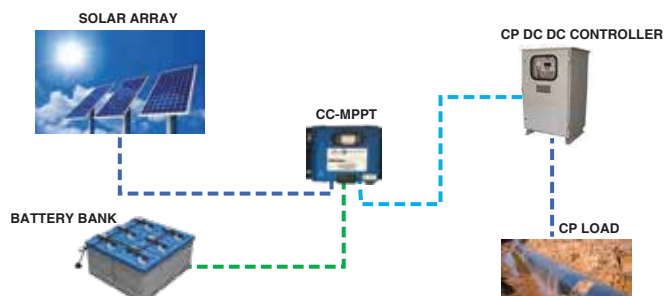
Introduction

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 / 24V	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 70V	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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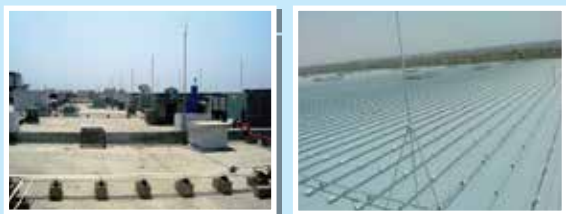
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JEF Techno Solutions Pvt. Ltd

KR Square, No.1073, 15th Cross, 30th Main
Banashankari 2nd Stage, Bengaluru-560070, India



In-house software for Comprehensive Lightning risk assessment and design as per IS/IEC 62305.

- Evaluates all risks R1, R2, R3 & R4
- Optimises Solution
- Automatically generates tentative BOQ

Lightning Protection

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Introduction

JEF is a widely accredited technology-enabled company, focused on solving the toughest problems in the electrical engineering space with a comprehensive and innovative set of products and solutions.

It was founded in 1994 with a clear vision to provide expertise about the most comprehensive solutions to the toughest challenges relating to the safety of electrical equipment. Over the last couple of decades, with our help, our clients have been able to assure the long-term safety of their manpower and machinery.

Our Services

Grid Code Compliance Studies

Earthing / Grounding Studies

Power System Studies

Lightning Protection Studies

Insulation Co-ordination & Transient Studies

Power Quality & Root Cause Analysis

EMI/EMC Studies

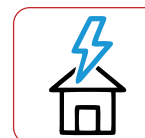
Design and Detailed Engineering

Innovations – Way of life in JEF



JEF SAMEEKSHA

The world's first AI-based safety and risk assessment tool developed by JEF. Detect anomalies and generate audit reports that are accurate.



JEF E-BUILD

Automated tool to aid remote installation of Lightning Protection System through realtime monitoring.



JEF SHIELD

Automated tool to evaluate the need of Lightning Protection System as per IS/IEC 62305-2. Get your report, concept design and BOQ in < 99 Seconds.

600+ Certified Products for Lightning Protection and Grounding



Air Terminal



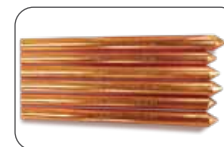
AT Base



Double Sided Clamp



Universal Cross & T Splicer



Earth Electrodes
UL Listed Electrodes:
Available in
14.2 mm / 17.2 mm /
25mm / 32 mm dia
electrodes of 3 mtr. length

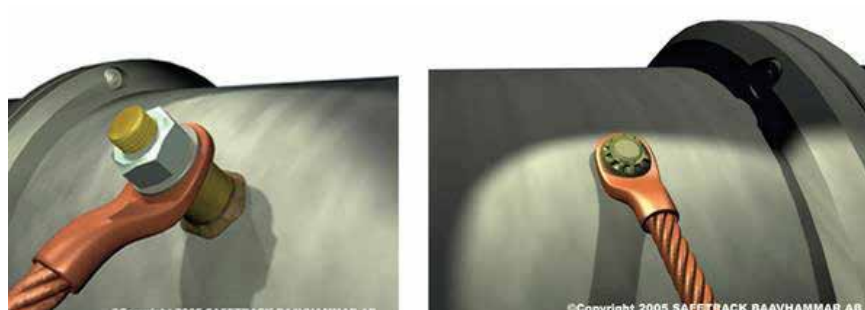


JEF Ecosafe Set
Compound type tested as per
IEC-62561-7, IS3043-2018,
BS-7430 & IEEE 80.
Resistivity
<0.12 Ohm. Mtr.

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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**PKTBA CJSC**

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440060, Russia

VALVE TEST BENCHES**VALVE REPAIR EQUIPMENT****VALVE MANUFACTURING
EQUIPMENT****TEST EQUIPMENT FOR
CHRISTMAS TREE VALVES &
ANTI-BLOWOUT EQUIPMENT****MOBILE WORKSHOP**

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REVALVE VALVE TEST & REPAIR EQUIPMENT**Introduction**

REVALVE by PKTBA is a leading Russian manufacturer of high quality industrial equipment for valve testing, production and repair, test systems for gas cylinders with proven technology excellence since 1962.

Well-engineered REVALVE technical solutions have proven their efficiency in the main energy sectors, such as: oil and gas exploration and production, chemical and petrochemical industry, shipbuilding yards, nuclear, thermal and gas power generation, metallurgical and mining sector, as well as, valve manufacturing and service companies.

REVALVE wide product range allows us to create full cycle maintenance workshops, and consists of:

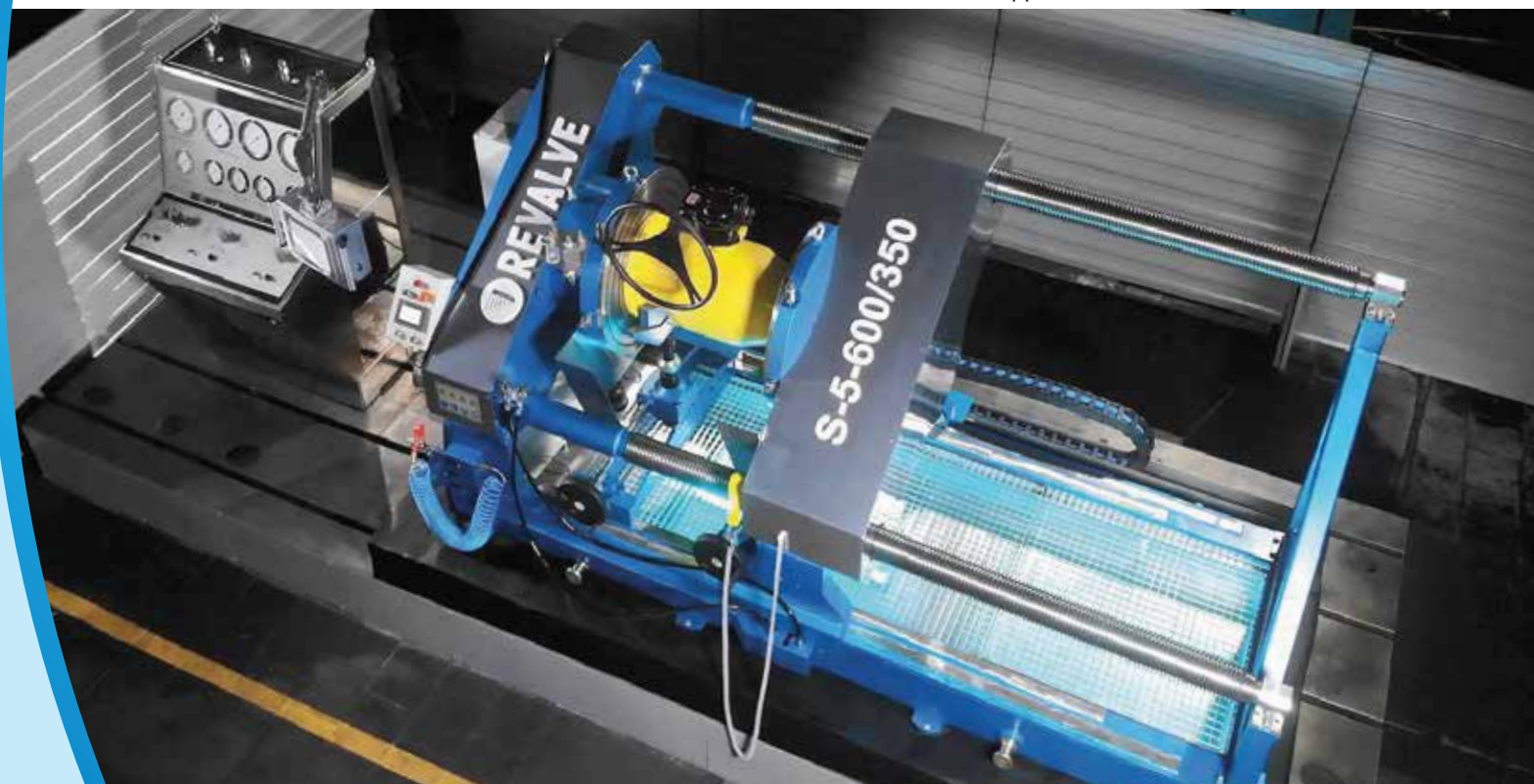
- Heavy duty valve test benches with range of DN from ½" up to 56" and clamping force up to 4000 tonnes.
- Advanced product line of grinding /lapping units.
- Stationary CNC and conventional type boring machines.
- Welding overlaying and hard-facing automation.
- Portable valve test and repair systems.
- Mobile workshops efficiently operated in the harsh onshore climatic conditions from Siberia to Middle East and on the deep-water offshore installations.
- Cutting-edge solutions for testing and recertification of automobile and technical gas cylinders are implemented in both mobile workshops and stationary designs.

Our solutions deliver superior performance, while reducing operational costs of valve test, production and repair process.

Our expertise in turnkey design of the valve maintenance workshops is embraced by world known engineering and consulting companies.

Unique full-cycle in-house production process allows to build tailor-made equipment.

We strive to continuously enhance our production technologies to become a sole supplier of choice.



Introduction

JPAC Technologies Pvt. Ltd, along with its flagship solution “Pipeline Construction Management System” has been serving the Oil and Gas Pipeline industry. PCMS is an affordable, easy-to-use solution that integrates planning, GIS, construction, documentation and asset management into one program with a built-in interface to enter and retrieve information. Location and Status of each Pipe and Fitting gives the answers to when and where.

The system is designed to help you remember every single line item, right down to the last nail. Using a proven dynamic query generation method that's much faster than a traditional spreadsheet, PCMS draws from an extensive database of field data. Its flexible reports provide you with a number of ways to analyze construction progress linked with work procedures and material certificates.

Work smarter and faster with better document control and improved collaboration between clients, vendors, subcontractors and consultants. Our comprehensive features will enable you to track, monitor, analyze, observe, Locate and store data and much more. Our online Project Center will capture essential document information, making business processes more efficient and effective. Since PCMS is web-based software it provides a lot more benefits than traditional software, such as, on demand accessibility, fast setup, quick customization requests etc.



The Major areas of Specialization

- Pipeline Construction Management System
- Document Tracking & Completions
- Pipe & Material Tracking
- Network Planning
- Construction Management
- Asset Management
- Customer Mapping
- Safety & Outage Management
- Field Survey & Mapping
- Infrastructure Management Solution
- Web GIS Solutions and Services
- Remote Sensing and Photogrammetry

SALIENT FEATURES

Hosted Application
 Pipe Tracking using BarCode
 Field Entry From Handhelds
 Handheld App with BarCode
 Instant Report Generation
 Report Approval System
 Generation of PipeBook
 Generation of Progress
 View Color Coded Activities
 Assets with Attributes
 Cut Pipe Nomenclature
 Linked Quality Reports
 Linked NDT Films
 Inbuilt Report QC
 Mechanical Completion
 Completions Management



JPAC Technologies Pvt. Ltd.

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SPECTRUM XLI

Introduction

Spectrum XLI is a complete system for proactive above ground inspection of buried pipelines. Unlike conventional above ground inspection tools – which often collect only a single data source in each pass – the XLI system collects multiple sources of data in a single pass.

We are excited to present state-of-the-art “eXternal Line Inspection”(XLI) technology to Pipeline Integrity landscape. Now you can conduct extremely high-resolution multiple “auto-integrated” above ground CP and Coating surveys in ONE SINGLE PASS of the pipeline!

XLI Includes:

- GPS/GIS, Depth of cover
- Cathodic protection survey (CIPS-DC)
- Direct current voltage gradient (DCVG),
- Alternating current voltage gradient (ACVG),
- Alternating current-current attenuation (ACCA)
- Soil corrosivity measurements (optional)
- Depth at water crossings (optional)
- Gas leak detection (optional)

XLI Auto Records :

- Sub-meter DGPS at 1 time per Second
- ACCA/CAT, DoCat 7 times per Second
- CIPS, DCVG and ACGV at 35 times per Second
- Encrypted data with Traceable and Auditable raw logs
- Surveyors' movement is continuously recorded
- Field concerns automatically highlighted in XLI Software
- Immediate action with Real Time Information
- “TRUE” and “Auditable” survey data provided to owner



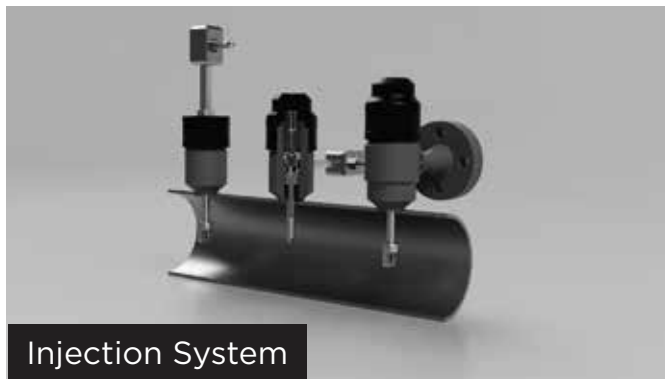
Introduction

Rysco International, a global division of the Rysco Group, is committed to providing best in class corrosion monitoring/measurement products and field services. With extensive industry experience, multi-discipline subject matter experts, and wide variety of specialized products, we can provide affordable and practical solutions to all our clients...thus protecting infrastructure and getting the most of their integrity programs.

To illustrate our "first in class" culture, Rysco International also maintains registered ISO certifications in ISO 9001, ISO 14001, and ISO 45001. These internationally recognized management systems are integrated into an IMS that includes Quality Management, Environmental Management, and Occupational Health and Safety Management.

Products & Services

- High Pressure Access Fittings
- Corrosion Coupons
- ER Probe
- ER Data Logger
- ER Transmitter
- Erosion/Corrosion Probes
- Bio Probes
- Injection & Sampling quills
- Low Pressure Fittings
- Custom Equipment Manufacturing
- Erosion Monitoring



Rysco International Inc.

102 - 8024 Edgar Industrial Cres
Red Deer, AB, T4P 3R3, Canada



*Corrosion Monitoring
Service Vendor and
Equipment Manufacturer*

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DEKOTEC GMBH

Information

Buried steel pipes for the transport of liquid and gaseous media are protected against corrosion by coating with thermoplastic material or thermosetting compounds. While coating of the pipe is done in the factory, some parts and installations of a pipeline remain that have to be coated on the construction site. Depending on pipe laying method, trenchless or in open trench, only welded joints or also bends, T-pieces, flanges and valves have to be protected in the field. Based on materials like polyurethane, polyethylene, butyl rubber, petrolatum and combinations thereof, DEKOTEC is able to offer a broad variety of proven corrosion prevention systems as well as tailor made solutions for special fields of application.



Major Products

- BUTYLEN tapes and systems
- DEKOMAT wrapping machines for BUTYLEN-Tapes
- LIQUITOL polyurethane coatings
- Plastelen tapes and mastics
- DEKOTEC Heat Shrink Sleeves
- Bitumen tapes
- DEKOTEC Rockshield DRM-PP



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 Certification Services for Test and Measuring Instruments

Solar System for ICCP & SCADA Power Supply

Electric Heat Tracer

High Voltage Cables

Composite Repair Solutions

Natural Gas Detection System

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

Integrated Flow Metering Solutions for Gas

Valve Test & Repair Equipment

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 Guages
- 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 or Equipment are selected with thorough knowledge and fully understanding the properties and behaviour of the products.

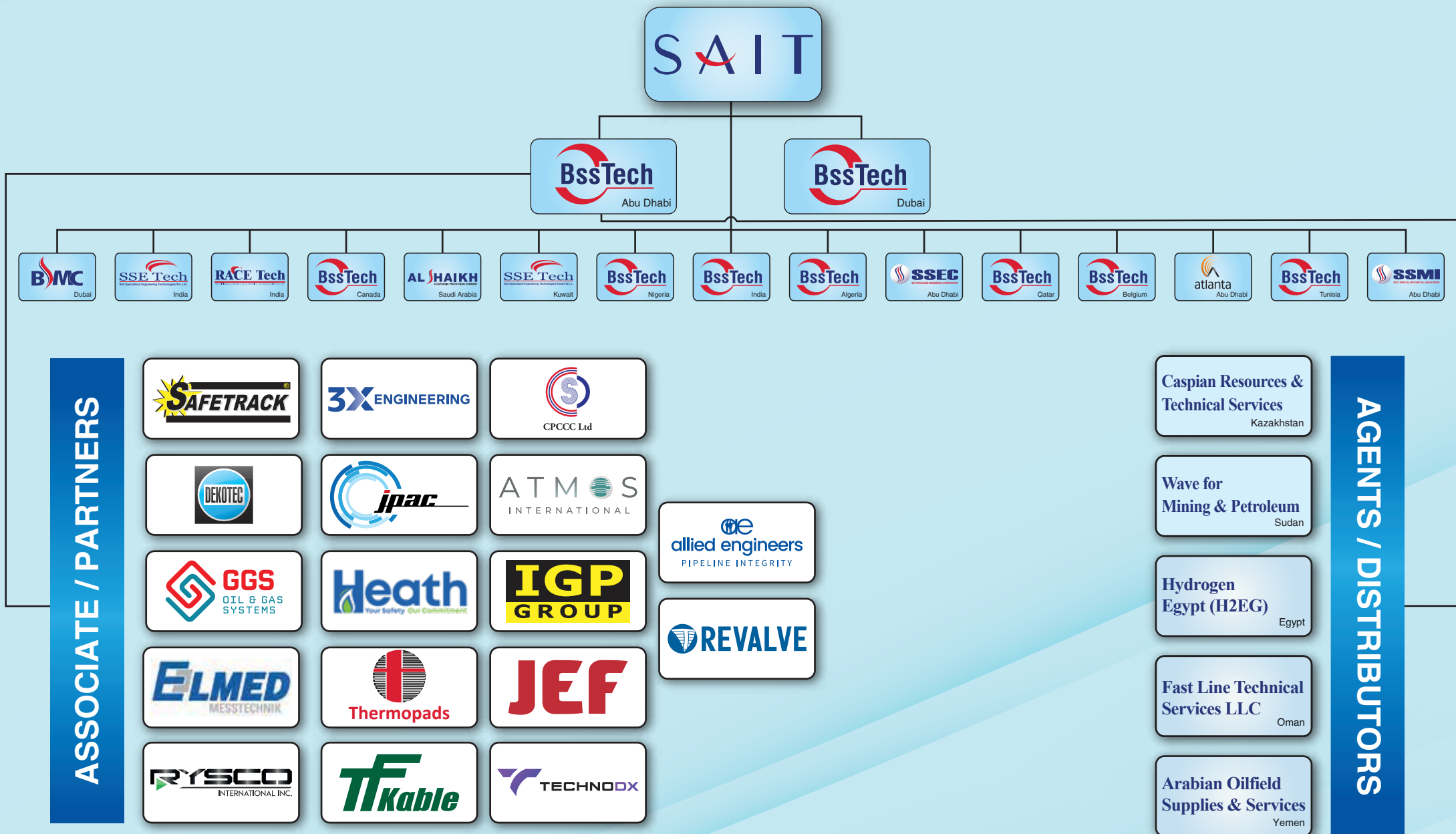


A SALT GROUP COMPANY

Notes



A SALT GROUP COMPANY



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متخصص في الكيمياء الكهربائية
B.S.S. Technologies
Specialized in Electrochemistry
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- ▲ SSE Tech Kuwait W.L.L - Kuwait
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- ▲ RACE Tech - Mumbai, India
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- Satellite Offices

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