



ELECTRO PROTECTION SERVICES INDIA PRIVATE LIMITED



Corrosion Specialist

Profile

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1. Introduction



1.1 THE COMPANY



Electro Protection Services India Private Limited is a well established autonomous organized Company in the field of Cathodic Protection since 1982. It is a fast growing organization led by a competent management, comprising professionally qualified and richly experience technocrats.

EPS is primarily integrated to provide wide spectrum of comprehensive services in the field of Cathodic Protection of onshore structures, offshore structures, Floating structures, Process Equipments and related Corrosion control activities. We offer complete assortment of material, Installation, testing, maintenance and total project management. It is also an innovative company that helps to build solutions to client's needs.

EPS is one of the leading companies in the manufacture of various types of Sacrificial anodes and impressed current anodes.

More recently in 2009, EPS received the updated ISO 9001 - 2008 accreditation from BV

We have highly dedicated qualified and richly experienced team of cathodic protection engineers, field technicians and well trained installation personnel.

EPS afford the greatest value in the field of pollution prevention engineering, corrosion control engineering, and programmatic support. The company is dedicated to quality, efficiency, and strong management.

EPS is committed to providing the products to our customers of the highest quality by utilizing the technical expertise and services to its customers on time and at competitive prices. We are full understanding of the specialized nature of our products and continuously promoting the deftness and systems to meet the customer's dynamic requirement at higher standards.

Our technologies and techniques is grounded in the knowledge that corrosion prevention is an integral part of integrity management, helping improve the reliability and safety of customer operations, reducing costs, and giving a competitive advantage in an ever - changing industry.

1.1 THE COMPANY



Our Vision

The company foresees is to be a centre of excellence and bringing an exemplar shift in the field of cathodic protection and undertaking various projects of bigger magnitudes.

Our Strength

The Strength of our well esteemed Organization lies with its translating technology innovations into strategic Impact through working in a team environment in which the experience of our people, innovative and practical technology, service, commitment, and clear communication are seamlessly interconnected to boost the performance and profitability.

Our Mission

Our Mission is to achieve focus our energy and resources on creating the preeminent of solution for unique corrosion problems.

For Our Clients: To operate in a manner that contributes to the success of their business objectives by setting higher standards of quality and reliability.

For Our Society: To be of valued social service at all times now and in the future.

For Our Employees: To inspire and enable talented, hard working people to achieve their carrier goals in a healthy, challenging and rewarding environment.

Our Objective

The objective of the company is to recognize and follow the most suitable and applicable international standards in the cathodic Protection field and to preserve a safe work environment. Our Solutions focus on providing strategic differentiation and operational Superiority to clients.

1.1 THE COMPANY



Field of Application

■ Onshore

- ✧ Underground Pipelines
- ✧ Tank Bottom Internal
- ✧ Tank Bottom External
- ✧ Vessel External

■ Offshore

- ✧ Offshore Platforms
- ✧ Submarine Pipelines
- ✧ Jetties and Wharfs
- ✧ Offshore Rig
- ✧ Seawater Intaking System

■ Floating Structures

- ✧ Ship Hull
- ✧ Ballast Tank
- ✧ Barge
- ✧ Small Craft Boat
- ✧ Pontoons
- ✧ Offshore sea going vessels

■ Process Equipments

- ✧ Heat Exchanger
- ✧ Condenser
- ✧ Boiler

1.1 THE COMPANY



Name	-	ELECTRO PROTECTION SERVICES INDIA (P) LTD.
Registered Office	-	# 86/1, Vengaivasal Main Road Gowrivakkam, Chennai – 601 302, India Phone:009144 22781210/22780211/212 Fax : 0091 44 22780209 Email: sales@epsipl.com: md@epsipl.com
Factory	-	Plot No. 59 & 60 Kottaiyur Main Road Karaikudi – 630 002 Phone: 04565 225228 Email: works@epsipl.com
Year of establishment	-	1982
Nature of company	-	Private Limited
Management	-	Dr. R.Thangappan - Chairman Dr. T.Jayamohan - Managing Director Er. T.Jeyananth - Director

1.3 C.V. OF KEY PERSONNEL



Dr. R. THANGAPPAN, Chairman (B.Sc., (Tech) Chem. Engg. Ph.D., M.I.E., MIChE, FSAEST)

In the year 1981 Dr. R.Thangappan, B.Sc (Tech) Chem. Engg., Ph.D., MIE., MIChE, FSAEST, identified corrosion as a major threat to the chemical industry. Though new materials were being developed worldwide every day, very little attention was being paid to fabricate equipments using exotic metals, due to the complexity involved. .

His invention of ' ACTIVATED TITANIUM METAL ANODES' was the start to his mission, “ To be the company of choice to customer of value in providing Solution to Corrosion, by Engineering Excellence in Exotic Metals Since 1981.



Today, EPS stands as a reliable partner to all its clients in providing solutions to almost all their corrosion problems.

Dr. T. JAYAMOHAN, Managing Director

A Physician by qualification, he has excellent skills of an executive to relate, supervise and control the vital departments of the factor. He is entrusted with the management of entire administration and finance control, production and all the activities of EPSIPL.

Er. T, JEYANANTH, Director

A chemical Engineering graduate with hands on experience in Titanium and other exotic metals industry. He has been involved in design, production and marketing of high-tech products including Titanium Anode s , Heat Exchangers , Pressure Vessels, Pumps and Blowers, heat transfer coils etc., Fabricated out of exotic metals.

2. Facilities



2.1 FOUNDRY



Machineries available in foundry shop for casting anode materials

Rotary furnace for Aluminum casting	-	Capacity : 2000 Kg
Rotary Furnace for anode casting	-	Capacity : 1000 Kg
Furnace for Magnesium Casting (Tilting Furnace Type)	-	Capacity : 200 Kg
Furnace for Magnesium Casting	-	Capacity : 200 Kg
Furnace for Aluminium Casting	-	Capacity : 300 Kg
Furnace for Aluminium Casting	-	Capacity : 160 Kg
Furnace for Aluminium Casting	-	Capacity : 500 Kg
Furnace for Zinc Casting	-	Capacity : 200 Kg
Furnace for Zinc Casting	-	Capacity : 200 Kg
Furnace for Zinc Casting	-	Capacity : 350 Kg

2.2 MACHINE SHOP



Machineries available in machine shop

Drilling & Machining	-	Lathes (4.5 to 8ft) Milling Machine Shaping Machine Drilling Machine
Forming Equipments	-	Fly Press
Material Preparations	-	Pedestal Grinding Machine Flexible Grinding Machine Straight Grinder Power Hacksaw Machine Bansaw machine Sand Blasting Machine Bench Grinder Air Compressors
Welding Facilities	-	Arc Welding Machine
Handling Facilities	-	EOT Crane
Hand Tools	-	Ag7 & Ag5

2.3 TESTING FACILITIES



Chemical Testing

Chemical testing are carried out by conventional chemical methods using EDTA for high percentage Elements in the alloy like aluminum, zinc etc. Chemical testing with respect to Minor constituents lime Indium, silicon, Iron, mercury etc are carried out using imported Bausch & Lomb Spectronic 20 Spectrophotometer. Spectrophotometer are capable of operating in the ranging of 200 to 950 microns with wide range of elements.

Electrochemical testing

1. Potentials of the anodes are measured using Ag/AgCl Reference electrodes as per the details specified by DET NORSKE VERITAS RP B 401.
2. Capacity test are carried out on specimen for 96hours duration as per short term test described by DNV RP B 401.1986.

(In addition to the above routine testing, we also carry out on random samples polarization studies at high current density. The equipment's needed are simple and instant current generators are used.)

Destructive testing

Destructive testing can be carried out randomly as per the procedures specified by DNV RP B 401 1986.

Cutting Facilities are available with us.

If radiography testing is needed; we can engage a private testing lab for Radiography test.

2.3 SURVEY & TESTING EQUIPMENTS



Pearson survey equipment (Tinker & Razor)

Pipe and cable locator

Nilson Soil resistivity meter

Tricoder

Wave form analyser

Holiday detector

Ultrasonic thickness meter

DCVG survey equipment

Insulation checker

High impedance multi meter

Online current tester

Copper / copper sulphate reference electrode

Silver / Silver chloride reference electrode

3. Engineering Services



3.0 CATHODIC PROTECTION ENGINEERING SERVICES



EPSIPL can provide turnkey basis cathodic protection engineering services. The services offered are given in a nutshell as given below:

3.1 Pre-Design Surveys

Pre and post construction surveys can be made with cathodic protection specialist personals who are qualified to carry out a variety of site surveys / investigations which includes,

- Soil resistivity survey
- Soil analysis
- Potential and line current surveys
- Holiday inspection of pipe coatings and cable insulation tests
- Interaction testing on foreign structures
- Current drainage surveys
- Ground bed location

3.2 Engineering Design of CP System

Based on the technical and commercial viabilities of cathodic protection in-house design facilities are available for all types of cathodic protection systems. The design package usually consist of the following components:

- Design criteria
- Basis of design
- Description of the system
- List of materials
- Calculations
- Materials specification
- Reference drawings

3.0 CATHODIC PROTECTION ENGINEERING SERVICES



EPSIPL can provide turnkey basis cathodic protection engineering services. The services offered are given in a nutshell as given below:

3.3 Supply of Materials

- Sacrificial Anodes
- Impressed Current Anodes
- Backfill
- Test Station
- CP Cables
- Different Types of Reference Electrodes
- Transformer Rectifier Unit
- Anode Junction Box
- Cathode Junction Box
- Insulating Flange Kits
- Surge Diverter
- Grounding Cell
- Polarization Cell
- Other Miscellaneous items

3.0 CATHODIC PROTECTION ENGINEERING SERVICES



EPSIPL can provide turnkey basis cathodic protection engineering services. The services offered are given in a nutshell as given below:

3.4 Installations of CP System

- Anode (groundbed Horizontal/Vertical/Deepwell)
- Cable laying
- Test Station
- Transformer Rectifier Unit
- Permanent Reference Cell
- Grounding Cell
- Anode Junction Box
- Cathode Junction Box
- Cable to Pipe Connections

3.5 Testing and Commissioning of CP System

The Installation and Commissioning, provisioning and regular maintenance of the solution is provided by EPSIPL have rich experience in the field of Cathodic Protection.

3.0 CATHODIC PROTECTION ENGINEERING SERVICES



EPSIPL can provide turnkey basis cathodic protection engineering services. The services offered are given in a nutshell as given below:

3.6 Monitoring and Maintenance of CP System

Inspection of a cathodically protected system are necessary to ensure that protection of the structure is in accordance with applicable criteria, that all are noted by Engineer and if changes are noted, then action is taken to return the system to a protection conditions.

3.7 Post Commissioning Surveys

- Closed Interval Potential Logging Survey
- Direct Current Voltage Gradient Survey
- Current Attenuation Test Survey
- Interference Survey and Mitigation measures

3.8 Post Commissioning Surveys

- Tests shall be carried out to verify compliance with the established criteria.
- Identification of Stray current Source.
- Ascertaining the Interference
- Locating the Current Drainage to secondary structures.
- Remedial action shall if necessary be taken, followed by re-testing to verify the result of the action taken, and routine maintenance to ensure continued compliance.

4. Products Manufactured



4.1 SACRIFICIAL ANODES



Aluminium Anodes

Aluminium anodes can be used for the protection of storage tanks and are frequently installed on ship hulls and jetties. They also have a particular use in the protection of sub sea pipelines, oil rigs and semi submersibles.



Composition and Characteristics

Iron	0.13% max
Silicon	0.08 - 0.2 %
Copper	0.006 % max
Zinc	2 - 6 %
Indium	0.01 - 0.02 %
Others	0.02% max
Aluminium	Remainder
Potential Ag/AgCl	-1.05V (min)
Anode Capacity Ah/Kg	2550 (mini)

In addition to the standard compositions mentioned above, EPSIPL also manufactured to other compositions to suit the requirements of various sites and structures.

4.1 SACRIFICIAL ANODES



MAGNESIUM ANODES

Anodes made of magnesium have been used for many years for the cathodic protection of steel and have been developed to meet a wide variety of application from the buried pipelines and storage tanks to fresh water tanks and marine structures.

Magnesium anodes are most economical when used on land where high driving potentials make them suitable for high resistivity soils and in brackish water and estuaries locations where the combination of salt and fresh water also gives high resistivities.



EPS offer magnesium anodes in two grades.

- Standard Magnesium Anodes
- High Potential Magnesium Anodes

Composition

Elements	Standard (Wt. %)	High potential (Wt. %)
Aluminium	5.3 - 6.7 %	0.01% max
Zinc	2.5 - 3.5 %	0.03% max
Manganese	0.15 % min	0.5 - 1.3%
Copper	0.02 % max	0.02% max
Silicon	0.1 % max	0.05% max
Iron	0.003 % max	0.03% max
Others	0.03 % max	0.03% max
Magnesium	Remainder	Remainder

4.1 SACRIFICIAL ANODES



Characteristics

Grades	Capacity	Open circuit potential	Efficiency
Standard Potential	1200 - 1300 Ah/Kg	-1.5 V or more negative	50 - 60%
High Potential	1100 - 1200 Ah/Kg	-1.75 V (deviation 0.029)	48 - 52%

Anodes for Buried Structures

The anodes for buried pipelines, tanks and similar structures are normally supplied packaged in a cotton bag containing a rapid wetting, moisture retaining backfill, which reduces the electrolyte resistivity adjacent to the anode, improved performance.

The standard backfill composition for magnesium anodes used of protecting underground structures is as given below :

- ☆ Gypsum - 75 %
- ☆ Sodium Sulphate - 5 %
- ☆ Bentonite - 20 %



The anode supplied with PVC/XLPE insulated copper cables of standard size and length as per requirements.

4.1 SACRIFICIAL ANODES



ZINC ANODES

Zinc anodes has been used as a sacrificial anode material in seawater since 1824, when Sir Humphery Davy used zinc blocks to prevent corrosion of the copper cladding on the hulls of British warships.

zinc anodes used for cathodic protection are cast from high purity zinc (99.995 %) alloyed with aluminium and silicon to combat impurities and cadmium to give uniform dissolution with loose dispersible corrosion products.



The most widely used specification for zinc anodes is US Mil Spec 18001J are the most widely used, for cathodic protection.

Composition

Elements	Standard (Wt. %)	High potential (Wt. %)
Copper	0.005% max	0.005% max
Aluminium	0.10 - 0.50%	0.005% max
Iron	0.005% max	0.0014% max
Cadmium	0.025 - 0.07%	0.003% max
Lead	0.006% max	0.006% max
Others	0.10% max	----
Zinc	Remaining	Remaining

Characteristics

Open circuit potential Vs Ag/AgCl--1.05 V
Capacity-780 Ah/kg

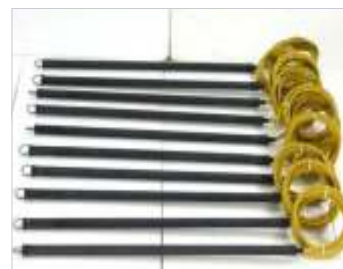
Zinc anodes perform reliably in water and mud with resistivities up to 1000 Ohm cm and have a driving potential of 250 mV against protected steel at normal ambient seawater temperatures. This driving potential reduces as the temperature rises and zinc should not be used where temperatures above +50 Deg C are likely to occur.

4.2 IMPRESSED CURRENT ANODES



MIXED METAL OXIDE COATED TITANIUM ANODES

Mixed metal oxide (MMO) coated titanium anodes comprise a family of electrodes made from commercially pure titanium to which an electro catalytic layer is applied by thermal decomposition. The electro catalytic layer is composed of a mixture of noble and base metal oxides, the selection of which and their ratio is dictated by the electrolyte conditions in which the anode is immersed.



These anodes can be used to advantage in aggressive solutions or other difficult applications.

The manufacturing route of MMO coated anodes varies depending on the composition of the electro catalytic layer. In general the route involves multiple application by thermal decomposition of mixtures of noble metals as their oxides.

A variety of shapes and forms are available including Tubular, Bar, Rod, Sheet, Wire, Disc and Mesh. Individually fabricated anodes are available to suit customers specific requirements.

MMO coatings can be specifically formulated to withstand the simultaneous generation of oxygen and chlorine, which occurs in dilute sea water or fresh water containing low chloride levels. MMO coated anodes are also durable in highly acidic media and are often used in deep well ground beds.

The advantages using mixed metal oxide titanium are,

- Improved resistance for oxygen/chlorine mixed evolution
- Range of compositions for various duties available
- Improved resistance in acidic media
- Low wear rate

For cathodic protection applications it is anticipated that the Faradaic wear rate will be approximately 0.5 to 1.0 micrograms of coating per ampere hour. Wear rates for other applications are generally low but depend on current density and other operating conditions.

4.3 WATER HEATER ANODES



Anodes Rods are designed to protect the tank of a water heater by reducing internal corrosion. Periodic replacement of the anode rod prolongs the tank life. The anode rod includes a hex head for easy installation.



Chemical Composition

Aluminium	2.5 - 3.5%
Manganese	0.2 - 1%
Zinc	0.7 - 1.3%
Silicon	0.05%
Copper 0.01%	0.01%
Nickel	0.001%
Iron	0.002%
Magnesium	Balance

Chemical Composition

Anode Dia(in)	Internal Thread	External Thread	A (in)	B (in)	C (in)	D (in)
Manganese	1/4 - 18 NPT	3/4 - 14 NPT	1.060	0.81	0.19	0.63
Zinc	3/8 - 18 NPT	3/4 - 18 NPT	1.060	0.87	0.19	0.63
Silicon	1/2 - 14 NPT	3/4 - 14 NPT	1.060	0.87	0.19	0.63
Copper 0.01%	3/4 - 14 NPT	1 - 11 1/2 NPT	1.310	1.19	0.38	1.00
Nickel	1 - 11 1/2 NPT	1 1/4 - 11 1/2 NPT	1.813	1.19	0.44	1.00

4.4 TANK ANODES



Above ground storage tanks in hydrocarbon process plants which are located in aggressive soil at coastal areas, are at a risk from bottom plate corrosion, due to formation of a galvanic corrosion cell between the tank bottom and the soil. This galvanic corrosion cell formation effect is more predominant if the content of the tank is stored at high temperature.



At such situations traditional methods of passive barrier protection systems such as sand bitumen tank foundation pad or soil side paint / coating of the bottom plates cannot prevent corrosion.

Tank leakage due to corrosion poses significant treat for the safety of the plant equipment and personnel due to possibility of occurrences of the fire hazards, if the tank content is hazardous material. The replacement of the bottom plate due to corrosion damage is also found to be costly.

Suitable designed cathodic protection system using either close or remote anode ground bed supplemented with the soil side paint or coating of bottom plate is the appropriate protective measure to ensure the integrity of the bottom plates against soil side corrosion for a longer period.

Aluminium Tank Anodes

Aluminium tank anodes are used to complement the coating at areas of exposed steel prolonging the life of the coating and structure.

5. Quality Control



5.1 QUALITY CONTROL & ASSURANCE



EPS maintains a comprehensive in-house quality control / quality assurance procedure and manual.

All products and services undertaken by EPS are subjected to rigorous inspection procedures and monitoring in accordance with internal controls and those specified by the client.

Our personnel monitor the progress a customers orders every step of the way during fabrication and assembly of materials. Packaging and shipment are also carefully controlled to provide the highest quality cathodic protection materials with consistently fast delivery.

QA/QC tasks also include procedures for production, documentation & system planning.

The quality checks are carried out on behalf of the client where third party inspection is waived and in compliance with customer specifications.

Typical design codes and standards followed currently includes the following

National Association of Corrosion Engineers (NACE)



Recommended Practices (RP)

British Standards

DNV

CP 1021

ASTM



5.1 QUALITY CONTROL & ASSURANCE



EPSIL also issues, where required, test and conformity certificates from the nodal agencies for all products, design and services provided.

When requested, EPSIPL can produce a quality plan tailored to the customer's particular requirements and criteria.

EPSIPL has been regularly working under various Third party and nodal agencies for most of its supplies. Few of them are being listed below:

- DNV
- LLOYDS
- BVQI
- EIL
- CECRI
- SGS
- RIS
- DGQA
- JOHN BROWN



6. Projects



PROJECTS



Client		Description of Cathodic Protection Job
Ennore Thermal Power station, Ennore, Chennai	-	Cathodic protection of pipelines
Indian Oil Corporation Ltd., KAPL project	-	Cathodic protection of underground pipelines
G.N.F.C. Narmadhanagar, Gujarat	-	Cathodic protection maintenance work for underground pipelines
Tuticorin Alkali Chemicals & Fertilizers Ltd., Tuticorin	-	Survey, Design, Installation and Maintenance of underground pipelines
The Fertilizers & Chemicals Travancore Ltd., Udyogamandal	-	Cathodic protection of underground piping for Ammonium sulphate / Caprolactum project
Bharat Petroleum Corporation Ltd., Cochin	-	Cathodic protection system of underground pipeline at No. 1 Cochin
The Andhra Petrochemicals Ltd., Visakhapatnam.	-	ICCP system of underground pipelines
Indian Oil corporation Ltd., Ernakulam	-	Cathodic protection system of underground pipeline from Ernakulam junction to Jetty
Mobil Peevees Co. Ltd., Chennai	-	Cathodic protection system for mounted storage tanks
Biecco Lawrie Ltd., Calcutta	-	Turnkey CP system for underground pipeline of GCGSC
SWCC, Al-Khobar, Saudi	-	Turnkey CP system for 15.4 Km Gas Transmission line
SWCC, Al-Khobar, Saudi	-	Turnkey CP system for 140 Meters Natural Gas Transmission line

7. Photo Gallery





Offshore Anodes



Jetty Anodes



725lbs Platform Anodes



Jacket Anodes



Wharf Anodes



D-Shaped Aluminium Anodes



Tank Anodes



Bare Magnesium Anodes with cable



Pre-packed Magnesium Anodes



D-shaped Magnesium anodes



Magnesium anodes (5 ton each)



Bare Magnesium Anodes



Zinc Hull Anodes



Aluminium Hull Anodes



MMO Tubular Anodes



Aluminium Tank Anodes



Barge Anodes



Industrial Anodes



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