



HM CORROSION

ENGINEERING & CONSULTING

ABOUT US

HM Corrosion is comprised of cathodic protection and corrosion control engineering. We have been providing engineering, service, procurement, and material supply since 2000. Cathodic protection, in short, means; a technique that controls and prevents corrosion of metals by making them the cathode of an electrochemical cell. Without cathodic protection, metals lose electrons and corrode.

HM Corrosion has been performed successfully after being used in the service industry for over 15 years.



ENGINEERING

Our engineering team has extensive field experience and technical knowledge that enables us to work in excellence in every cathodic protection application all over the world for gas, water, petroleum, and other power plants as well as for other structures. Some of the corrosion engineering services we submit are:

- Study.
- Identification of corrosion.
- Feasibility.
- Design.
- Survey.
- Consulting.
- Planning.
- Current requirement analysis.
- Grounding system diagnostics.
- Evaluating existing CP system and remediation; if required.
- Training and seminars.

FIELD SERVICES

Our dedicated technical team has experience in providing comprehensive field services at various cathodic protection applications. Those services are including but not limited to the following:

- Field test: Pipe to soil test, soil resistivity test, CIPS (Close internal pipe to soil survey).
- Coating and corrosion inspection.
- Environmental parameters reporting.
- Horizontal & deep anode ground-bed installation.
- Impressed current CP system installation.
- Sacrificial anode CP system installation.
- Rectifier, test station, installation.
- Test and commissioning.



MATERIAL DESIGN & SUPPLY

HM Corrosion values R&D therefore, has its own division to design and manufacture some of the field equipment to meet the needs of top quality services to customers. Corrosion engineering is not a simple task and often times generalization lowers the quality of the application while increasing expenses. By designing and manufacturing our own equipment; we ensure to address each individual project's unique requirements efficiently, while at the same time following global and local codes as well. Our design & manufacturing team and partners supply many standard materials and are always ready to find quick custom design and manufacturing solutions with high quality at reasonable prices. Some of our readily available CP equipment and materials are:

- Transformer-Rectifiers for cathodic protection. (Wide range of customizable units with remote monitoring options).
- All types of anodes for impressed current & galvanic CP systems:
- MMO Titanium anodes; tube, wire, stripe, rode anodes.
- Magnesium anodes.
- Zinc anodes.
- High silicone cast iron (HSCI) anodes.
- Cable & connectors.
- Test boxes.
- Line markers.
- Insulating flanges and gasket kits.
- Reference electrodes. (Both; stationary and portable).
- Polarization cells and surge arresters.
- Thermal welding consumables.



WHAT WE DO (SCOPE OF APPLICATION)

HM Corrosion provides cathodic protection systems for a wide range of metallic structures, not limited but including:

- Pipelines. (Water, gas, fuel , etc.).
- Storage tanks.
- Rebar in concrete.
- Fire hydrant lines.
- LPG tanks.
- Heat exchangers.
- Plant & facility piping.
- Bridges.
- Pier piles.
- Offshore structures.
- Ship hulls.
- Any other buried or immersed metallic structures.

Our usual work flow breaks down as follows:

We prepare an application report based on feasibility analysis after which required instruments are installed by a technical field team according to the work order. Upon installation; we inspect the system to make sure, whether structure (the cathode) is under protection and drawing the required voltage rates at Test Boxes. All of these activities should be carried out by cathodic protection specialists with proper education and experience.

We also design and manufacture some of cathodic protection equipment. Survey, training, consultancy, test & inspection, procurement & installation are other services that we offer in the scope of Engineering -Consultancy.

Beside complete turn-key solutions, HM Corrosion may also be involved only partially to the above workflow. For instance; some institutes already have an engineering team to complete the project, but fall short of labor and equipment. In this case, we get involved only with supplying required materials and providing installation or vice versa.



AIR / OIL COOLED CATHODIC PROTECTION RECTIFIERS

Protects buried pipelines and storage tanks from corrosion. Our Air and Oil cooling Rectifiers includes wide range of protection and measurement features. The ultimate solution for continuous supervisory operation.

• **Advantages at a Glance:**

- Microprocessor control.
- Internal interrupter.
- Input for external interrupter.
- Input and output lightning strike protection.
- Single Phase (110/220 VAC) - Three Phase (380 VAC).
- Current rating: 20, 40,100,200 ,300 Amperes DC all at 50V DC.
- Variac Control with Motor.
- 63 step tap adjustment (4 coarse, 4 medium, 4 fine.)
- 3 Reference inputs.
- Mode of operation: Pre-adjusted Constant voltage, Constant current, Constant potential (Instant off).
- Selectable; manual or protect.
- Communications – GSM.
- RS485 Modbus.
- 4-20 mA.
- Diode –Thyristor / IGBT Module control.
- Oil level and heat monitor.
- Zn Reference input.
- Silica-Gel protect.
- High resolution current and voltage adjustment.
- Built in Analog-Digital display with Voltage, Current, Energy and Potential measurements.
- System efficiency: 85% min.
- Variety of enclosure types with built-in accessories (lightning arrestors, etc.).

Protection Features:

- Over current on the output.
- Phase loss (power down).
- Over voltage on the input side (Lightning protected).
- Over voltage on the output side (Inductive voltage from external sources).

Alarms:

- Input voltage failure.
- Output current error.
- Output voltage error.
- Reference potential error.
- Anode line error.
- Cathode line error.
- Over Hydrogen.
- Enclosure over temperature.

RMU Remote Monitoring Unit:

- Volt, Ampere and Potential measurements.
- RS485 with Modbus protocol.
- GSM Communication.
- Interrupter control Optional external interrupter.
- Under Voltage and No Current alarm.

Scope of applications:

- Pipelines (Water, sewage, gas, crude oil, etc.).
- Ships hulls.
- Storage tanks.
- Water-circulating systems.
- Jetties and harbor structures.
- Storage tanks (Fuel, oil and water).
- Offshore platforms, floating and immersed structures.

EASY and MASTER CATHODIC PROTECTION RECTIFIERS

Protects buried pipelines and storage tanks from corrosion.

Our Air and Oil cooling Rectifiers includes wide range of protection and measurement features. The ultimate solution for continuous supervisory operation.

- Micro processor control.
- Internal interrupter.
- Input for external interrupter.
- Input and output lightning strike protection.
- Single Phase (110/220 VAC).
- Current rating: 20, 40 Amperes DC all at 50V DC.
- Mode of operation: Pre-adjusted Constant voltage, Constant current, Constant potential (Instant off).
- Communications – GSM.
- RS485 Modbus.
- 4-20 mA.
- 8 Relays - Contacts outputs.
- 9 Reference input.
- Zn reference input.
- Modular rectifier unit.
- Input solar source.
- Thyristor / IGB Module Control.
- High resolution current and voltage adjustment.
- Built in LCD display with Voltage, Current, Energy and Potential measurements.
- System efficiency: 85% min.
- Variety of enclosure types with built-in accessories (lightning arrestors, etc.).

Protection Features:

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TR UNITS (Transformer Rectifier Units)

TR Unit is a combination of transformer and rectifier devices. It feeds cathodically protected structures converting AC power of electrical grid to DC power and reduces voltage under 50V. It is our own product with variable types, such as; air/oil cooled and manual/automatic. Also available with; remote monitoring & controlling.



MMO TITANIUM ANODES

This anode type consists of a coating "Mixed Metal Oxide" and Titanium substrate. Titanium provides high rate current for Impressed Current System as MMO coating catalyzes reaction accelerating current flow. MMO Titanium anodes are well-known for their stability; Oxide in coating bulks during chemical reaction thus prevents corrosion of substrate Titanium and anode maintains its shape for a long-term.



SILOCONE ANODES

Silicon Anode is another type of anode used in impressed current cathodic protection system. Its alloy contains Si and Cr (Silicon and Chrome) these elements provide long life especially for the underground and submerged applications.



TEST BOXES

Boxes are a termination point for cable connections between anodes to structure. Thus it allows the monitoring of stability of the cathodic protection system by voltage degrees obtained through connection points. Voltage measured by means of reference electrode and voltmeter. Hot-dip galvanized and painted types are available. Each organization might request its own specific design for the test boxes.



LINE MARKER

Line Marker is a metal sign post that designates pipeline route information.



CABLES

Cables are part of a complete electrical circuit which consists of anode, test box, and protected structure. Cables connect main components to each other thus allowing electrical flow.

We have variable cable types including but not limited: NYY, XLPE, EPR/CSPE, KYNAR/HMWPE, and NYRY.



INSULATING FLANGES

The Cathodic Protection System runs based on feeding a structure electrically and compensating for its electron loss. Keep in mind that this electrical feed can leak without insulation which causes insufficient protection. Insulating Flanges isolates cathodically protected structure from external conduction and keeps it under protection.



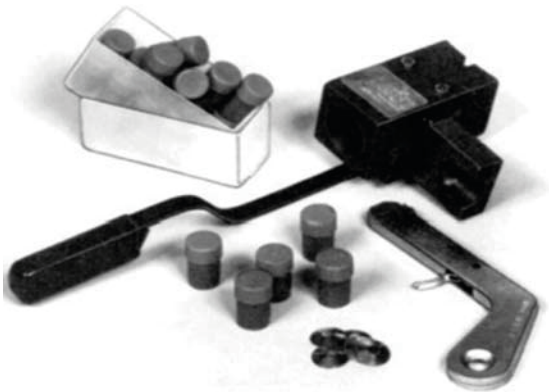
REFERENCE ELECTRODE (PORTABLE)

Portable Copper-Copper Sulfate (Cu-CuSO_4) reference electrodes, used for measuring structure potential in CP. Systems. One of our own designs and fabrications.



REFERENCE ELECTRODE (BURIED)

Buried, stationary type Copper-Copper Sulfate (Cu-CuSO_4) reference electrodes, used for measuring structure potential. One of our own design and fabrication has an extended service life.



EXOTHERMIC WELDING

We also recently developed our own exothermic welding system which is available under the brand name of DEM-WELD.

Exothermic welding, also known as aluminothermic welding is the process of welding copper on copper, steel on steel, and copper on steel in the absence of an external system providing electrical or other types of power.

The process employs an exothermic reaction of a thermite composition to heat the metal, and requires no external source of heat or current. An exothermic weld has higher mechanical strength than other forms of weld, and excellent corrosion resistance. We use and supply numerous products, accessories, and consumables from the well-known manufacturers for an exothermic application.



SPARK GAP

A Spark Gap is a lightning protection device discharging the lightning strike through grounding, instead of pipe/tank. It is placed in a test box at insulating flange points or inserted to a grounding system on storage tanks.



POLARIZATION CELL

It is an instrument used to minimize the interference effects on the pipeline, caused by; high voltage lines, railway electrification systems, and other electrical high voltage emitter systems.



HM CORROSION ENGINEERING & CONSULTING	
POLARIZATION CELL (SOLID STATE) TYPE A	
Peak Reverse Voltage,	: 1200 V
Max. Forward Current (Single Phase, Half Wave, TC = +138 °C), IF(AV)	: 70 A
Max. Forward Surge Current (Single Cycle Amps), IFSM	: 1200 A
Max. Forward Voltage Drop (IO = 200A, TC = +25 °C), VF	: 1.25 V
Max. Reverse Current (FCA at +150 °C), IR	: 2 mA
Fusing Current (Less than 5ms), I ² t	: 6000 A ² S
Reverse Power for Bulk Avalanche	: 0.6 Joules
Operating Temperature Range, Topr	: -65° to +190°C
Storage Temperature Range, Tstg	: -65° to +200°C
Max. Thermal Resistance, Junction - to - Case, RthJC	: 0.65°C / W
Threshold Voltage	: -1.1 / + 0.4 V
Protection Class	: IP67



GROUNDING

Grounding systems are used to discharge of electrical leakages and to protect a structure from lightning strike, directing the lightning through the earthing system and into the ground rod rather than passing through the structure. The grounding resistance must be low enough to enable discharge of electricity into the ground.



MAGNESIUM ANODE

They are sacrificial anodes generally used for underground structures and water heater systems.



ALUMINUM ANODE

Aluminum alloy anodes have been specifically designed for sea water. Its indium (In) content sustains disintegration of aluminum oxide layer over the anode surface. This way anode functions efficiently.



ZINC ANODE

They can be used in; sea water, fresh water and in soil, where resistivity is low. (< 20 Ohm.M.)



REFERENCES

HM Corrosion has completed many projects throughout the Turkey across many different industries, as well as some important projects at the Middle East. Now we are excited and proud of expanding our business by opening a branch office in The United States of the America, at the hearth of the energy industry, in Houston. Some of the Cathodic Protection project we have done:

- Approximately %60 of city gas supply pipelines all over the Turkey.
- Kayseri-Ceyhan section of the Bakü-Tiflis-Ceyhan Crude Oil Pipeline. (BTC-BOTAŞ) In collaboration with Corrpro).
- Petkim Petrokimya Holding A.Ş.
- 1200 MW Hamitabat Combined Cycle Power Plant for GAMA in Kırklareli.
- Enerya Energy A.Ş.
- 840 MW Ic Anadolu Combined Cycle Power Plant for GAMA in Kırıkkale.
- 2X150MW Khabat thermal Power Plant for GAMA
- Undersea pipelines of the EREN Energy in Zonguldak. (8 km., $\Phi=3700$ mm.)
- EREN Energy Thermal Power Plant ÇATALAĞZI water intake system, water cooling line.
- İgdaş İstanbul Gas Distribution San. Tic. A.Ş.
- Ministry of National Defense West District Agent.
- Ministry of National Defense East District Agent.
- Procurement of Zinc Anodes for IDO Istanbul Seabuses and Fast Ferries.
- Beylikduzu Steel Naturel Gas Pipeline for IGDAŞ (Corporation of the Istanbul Naturel Gas Distribution) (21.500mt Φ 400mm)
- Kocaeli-Kandıra-Hira Clean Water Pipeline (In collaboration with Federation of the Redcrescent-Redcross Associations and The Administration of the Kocaeli Rural Services)
- Corn Products Plant of Cargill Agriculture Corporation.
- Natural Gas depressurization stations for IETT (Istanbul Electricity Tramway Tunnel) Garages.
- Natural Gas Pipeline of Halkalı Paper Plant.
- Yatağan Thermal Power Plant.
- Material Supplying for Cathodic Protection of ANT / Malatya of National Defence Ministry.
- Natural Gas Pipeline of the Istanbul Asphalt Plants Corporation.
- Gebze Fire Hydrant Pipeline of ÇBS Color Industry.
- Çorlu Drill Pipes of the Coca Cola
- Alanyurt - Ordu clean water pipeline of the İller Bankası Gen.Md.(Provinces Bank General Administration).
- Akcaabat-Trabzon clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Mersin-Trabzon clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).



REFERENCES

- Gebze-Kocaeli clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Çorum-Merkez clean water pipeline of the İller Bankası Gen.Md.(Provinces Bank General Administration).
- Çaycuma-Zonguldak clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Karaman-Merkez clean water pipeline of the İller Bankası Gen.Md.(Provinces Bank General Administration).
- Yeşildere-Karaman clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Kitreli-Niğde clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Beycuma-Zonguldak clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Hereke-Kocaeli clean water pipeline of the İller Bankası Gen.Md. (Provinces Bank General Administration).
- Lüleburgaz Municipality clean water pipeline.
- Dörtyol-Hatay ground and undersea oil pipelines of Aytemiz Petroleum.
- Dudullu-Ferhatpaşa Transport Line of ISKI (Istanbul Water Channels Administration) (8.500mt- Φ 1.200mm)
- Material Supply and Project of Cathodic Protection of Clean Water Pipeline for Yomra Municipality in Trabzon
- Çaycuma / Zonguldak Industrial Zone.
- Tekirdağ Natural Gas Pipeline for Thrace Basın Natural Gas (Turkey) C.O (Aprox 148km.)
- Steel Pipeline (25km.) of AGDAŞ (Adapazarı Natural Gas Corporation)
- Maintenance of Anode Beds for Bursa District Administration of BOTAŞ (Oil Transporting Pipelines Corporation) (Work of 6 Anode Beds)
- Clean water pipeline of Sivas Municipality.
- Pendik-Küçükyalı Displaced Pipeline (GAP Architecture) (Φ 2200 – Φ 1800 – F Φ 1600 mm - 16,5 Km.)
- Gebze Natural Gas Pipeline of PALGAZ.
- Inegol Natural Gas Pipeline of INGAZ
- Çatalzeytin/Kastamonu Municipality clean water pipeline.
- Adana Natural Gas Connection Pipelines of ENERJİ –SA.
- Kayseri-Ceyhan oil pipeline of BOTAŞ-BTC (Bakü-Tiflis-Ceyhan Crude Oil Pipeline)(34" & 42" - 323 km.)
- Clean water pipeline of Edirne Municipality.
- Kayseri natural gas distribution pipelines of Zorlu Enerji.
- Fatsa sea decharge line of İller Bank Samsun District Administration.
- Kütahya-Kırka Connection Line of BOTAŞ. (8" – 54 km.)

REFERENCES

- Clean water pipeline of the Muğla University. (55 Km.)
- Cathodic Protection of Samsun Natural Gas Pipeline of SAMGAZ. (40 km.)
- Cathodic Protection of Kütayha-Emet natural gas distribution pipeline (8" – 38 Km.)
- Cathodic Protection of natural gas distribution line of the Hacı Sabancı Industry Zone.
- Yalova – Karamürsel – Orhangazi natural gas lines of ARMAGAZ.
- Mersin undersea pipeline of ALPET. (10" – 1.700 mt.)
- Samsun undersea pipeline of ALPET. (14" – 4.590 mt.)
- Mersin undersea pipeline of AYTEMİZ PETROL. (16"- 3.630mt)
- Inter-Islands undersea natural gas pipeline of İGDAŞ.
- LPG Tanks of HABAŞ. (5 pcs.)
- Examination & Reporting of Cathodic Protection works for GAMA POWER Enerji in JORDAN.
- Kahramanmaraş natural gas pipelines of ARMADAŞ.
- Supervising for Tajikistan cathodic protection work of ENKA.
- East Blacksea natural gas Phase-1 line of BOTAŞ.
- Edirne - Tekirdağ natural gas pipelines of BOTAŞ.
- Çorlu natural gas pipelines of ÇORDAŞ.
- Yozgat natural gas pipelines of SÜRMEİGAZ.
- Natural gas pipeline works of ÇORUMGAZ.
- Cathodic Protection of Çaycuma –Zonguldak- Bartın pipelines of BOTAŞ.
- Natural gas pipelines of ZORLU ENERJİ in Trakya and Gaziantep Districts.
- East Blacksea natural gas Phase-2 line of BOTAŞ.
- East Blacksea natural gas Phase-3 line of BOTAŞ.
- Istanbul Operation Directorate of BOTAŞ.
- Kütahya natural gas distribution lines of ÇİNİGAZ.
- Natural gas pipelines of KARGAZ.
- Antalya pipelines of AKDENİZ OIL.
- Konya natural gas pipelines of GAZNET.
- Diyarbakır - Batman – Siirt natural gas line of BOTAŞ.
- Nazilli-Umurlu natural gas pipelines of AYDINGAZ.
- Material Export to IRAQ for Cathodic Protection.
- Main transmission lines of ASAT Antalya Municipality. (2012)
- Trakya District natural gas 2.Stage lines of ZORLU – GAZDAŞ. (2012)
- Trabzon undersea Oil & LPG lines of AYTEMİZ.(2012)
- Clean water pipelines of GERDE BELEDİYESİ.
- Diyarbakır – Batman – Siirt natural gas pipelines of BOTAŞ.(180 km.)
- Nazilli-Umurlu natural gas lines of AYDINGAZ.
- Projections of Cathodic Protection jobs of AKSA DOĞALGAZ.(40 Districts)



REFERENCES

- ISTANBUL MAINTENANCE & FORTIFICATION COMMAND CENTER (12 Pcs. Oil tanks).
- Natural gas works of SAMGAZ in SAMSUN. (120 Km.)
- Söke natural gas lines of AYDINGAZ.
- ÇORUMGAZ.
- Material Supply for AKSA ENERGY.
- Delta - Batıkar- Gepa natural gas pipelines of AKMERCAN. (150 Km.)
- Kütahya natural gas lines of ÇİNİGAZ.
- GÖLCÜK NAVY COMMAND CENTER. (24 Pcs. Oil tanks).
- Bingöl – Muş- Bitlis natural gas pipeline of BOTAŞ. (325 km.)
- Mardin natural gas pipeline of BOTAŞ. (74km)
- Yasmak Building clean water line of DSİ (Water Affairs of State), (80km.)
- ENERYA NİĞDE Natural Gas pipeline.

CONDUCTED SEMINARS AND EDUCATIONS

- İLLER BANKASI / İZMİR District Administration Seminar -1
- İLLER BANKASI / GAZIANTEP District Administration Seminar -2
- İLLER BANKASI / SAMSUN District Administration Seminar -3
- GİRESUN RURAL SERVICES Cathodic Protection Education
- PAŞABAĞÇE GLASS INDUSTRY Cathodic Protection Education
- İGDAŞ İstanbul District Administration Cathodic Protection Education
- AGDAŞ Cathodic Protection Education
- GAMA Power Systems Engineering and Contracting Inc. Cathodic Protection Education.
- Aksa Power Generation. Education and Certificate.
- PALGAZ Cathodic Protection Education
- UGETAM Cathodic Protection Education
- AKMERCANGAZ Cathodic Protection Education
- ÇİNİGAZ Cathodic Protection Education and Certification
- ASAT ANTALYA Cathodic Protection Education and Certification
- NORT OIL COMPANY / IRAK Cathodic Protection Education

QUALITY DOCUMENTS AND CERTIFICATES

- ISO 9001 : 2000 QUALITY MANAGEMENT SYSTEM
- ISO 14001:2004 ENVIRONMENTAL MANAGEMENT SYSTEM
- OHSAS 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM
- EPDK (ENERGY MARKET REGULATORY AUTHORITY) CERTIFICATE OF AUTHORITY
- İSTANBUL TECHNICAL UNIVERSITY ANALYSIS REPORTS
- KOSGEB ANALYZ REPORTS





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