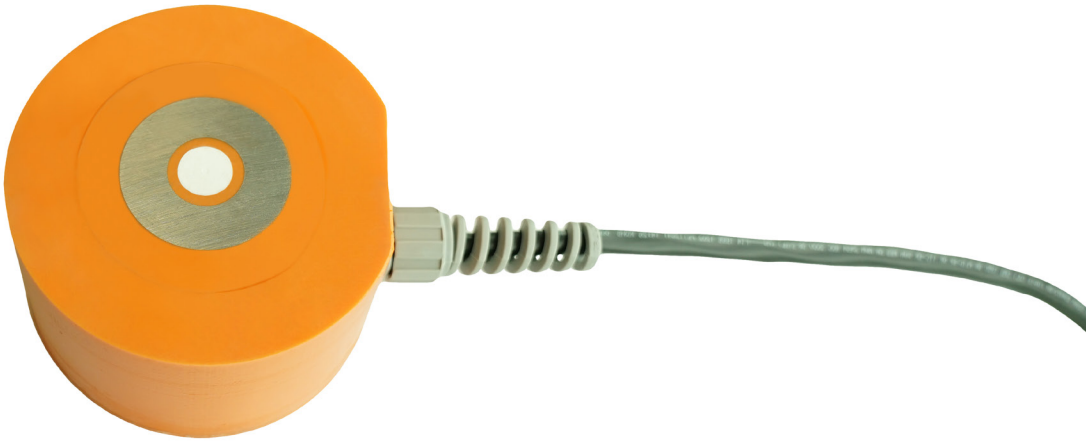
IR Free DC Coupon

Model CPMP-4 for Permanent Burial - with STABLE Backfill



The CPMP-4 version of the IR Free DC Coupon CPMP series incorporates moisture-wicking material and our patent pending engineered STABLE backfill that significantly improves accuracy, durability and usability. The CPMP-4 is ready to install off the shelf and does not require complicated mixing procedures in the field.

Reliability

With ever-increasing scrutiny on the energy industry, providing reliable and easy to understand corrosion protection system operation data has become a key requirement for regulatory bodies to assess if critical infrastructure is protected from the risk of failure. However, sources of interference from foreign structures, overhead power lines, and congested pipeline networks make this task increasingly complex and prohibitively expensive.

This is why Corrosion Service engineered the CPMP series of IR Free DC Coupons, which provides a true reliable picture of corrosion protection system operation. The CPMP is accepted by major pipeline, refinery and facility operators as a critical component of their asset integrity programs.

Accuracy

Suitable for use with both new build and existing structures, the CPMP is installed adjacent to the protected structure and contains an encased permanent internal reference electrode positioned to sense the true carbon steel coupon potential. This innovative design shields the reference electrode from external interference, allowing for highly accurate measurements of the coupon potential and polarization decay even while the coupon is connected to an active CP system. When used in conjunction with the Corrosion Service ZRA (zero resistance ammeter), the CPMP provides a direct measurement of cathodic protection current density and further validation of corrosion prevention system operation.

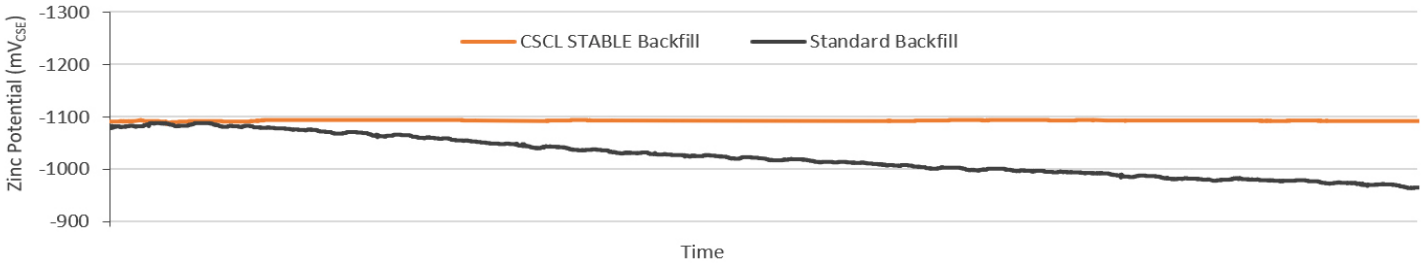
Features & Benefits

+ Validates corrosion prevention system operation on buried/immersed infrastructure.
+ Reduces operating costs by eliminating the need to interrupt foreign sources of interference.
+ Allows confirmation of actual versus design operating parameters.
+ Includes industry first engineered STABLE zinc backfill.
+ Integrated permanent zinc reference electrode.
+ Moisture wicking materials that improve soil contact.
+ Easy hydro-vac or hand excavation for installation in native backfill.
+ Compatible with remote monitoring and data recording hardware.
+ Closely represents a pipeline coating defect.
+ Serialized for improved traceability.
+ Available in 10 sq. cm and 50 sq. cm coupon sizes.
+ Made of carbon steel.

CORROSION SERVICE

STABLE

Following years of research, we are proud to include the use of our patent pending engineered STABLE backfill that provides predictable potential measurements vs. standard backfills.



PURPOSE

The coupon is intended to represent a coating holiday on a coated structure or a discrete surface area on a bare structure.

INSTALLATION INSTRUCTIONS

Step 1	Install the coupon in the pipe trench at pipe depth, 300 mm to 500 mm away from the external pipe wall or as per design drawing, normally with the white reference port facing up or on its side, facing away from the pipe.
Step 2	Carefully backfill the coupon within a 200 mm layer of rock-free native soil and lightly compact by hand.
Step 3	Cut the cables to the required length; some cable may be coiled inside the test station to accommodate settling of the soil.
Step 4	Terminate the coupon wires in the test station or junction box as per design drawings.
Step 5	Connect either the red or the black coupon lead to the pipe lead following coupon installation, as per the operator procedures.

Note

- Remove the protective tape and black cap covering the ceramic plug.
- White lead is connected to internal zinc reference electrode.
- Red and black leads are connected to the coupon.

EXAMPLES OF DATA INTERPRETATION AND CALCULATIONS

Validation of instant OFF polarized potential

Rectifiers ON. Internal reference electrode (ZRE) recently calibrated to -1103 mV$_{CSE}$. Coupon disconnected reading with respect to internal ZRE is 97 mV. Instant OFF potential with respect to Cu/CuSO$_4$ reference electrode will be: -1103 + 97 = -1006 mV, indicating that the pipe is protected, according to NACE -850 mV$_{CSE}$ OFF criterion.

Current Requirement Test under Dynamic Stray

Rectifiers ON. Significant dynamic stray current from a DC traction system, so measurements from grade vary from -435 mV$_{CSE}$ to -1254 mV$_{CSE}$. Coupon connected reading with respect to internal ZRE has minimal variation around +349 mV. A temporary rectifier injects an average of 0.66 A for 1 hour and the coupon polarizes to +283 mV$_{ZRE}$. Current required: 283 mV - 349 mV = 66 mV of polarization from test, so 100 mV / 66 mV * 0.66 A = 1 A would be sufficient to polarize by an additional 100 mV.

Calculation of DC current density

The current measured between the 10 cm^2 coupon and the pipe using a Zero Resistance Ammeter (ZRA) is 100 µA, with the current returning to the pipeline. The DC current density will be the ratio between the current and the surface area of the coupon. With 100 µA converted in 100 x 10^{-3} mA and 10 cm^2 converted in 10 x 10^{-4} m^2 = 10^{-3} m^2, the DC current density will be 100 x 10^{-3} mA / 10^{-3} m^2 = 100 mA/m^2.

CORROSION SERVICE

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