STELTH® 7
MULTI-METAL COUPON PROBE

Its **patented** application and methodology compare the behavior of **carbon steel vs. copper, stainless steel or any other metals joined to your structure** at different levels of applied Cathodic Protection to calculate the **CP current loss** to joined systems.

DETECTING CURRENT LOSS TO JOINED METAL SYSTEMS:

You might be losing 50%-80% of your Cathodic Protection current to the Copper grounding / AC neutral copper system joined to your carbon steel structure. General experience indicates that copper is less effective at polarization compared to carbon steel. Due to this and its excellent electrical conductivity—11 times better than that of steel for the same conductor size—copper tends to absorb a larger share of cathodic protection (CP) current. As a result, carbon steel structures receive significantly less protection than they require. The **STELTH® 7** Multi-Metal coupon provides you all the readings necessary to diagnose this problem.

SOLUTIONS FOR DC READINGS:

The **STELTH® 7** provides structure ON-potential readings and IR-free OFF-potential readings without errors caused by any outside influences, such as nearby rectifiers, anode beds, electric transmission lines, electric trains, etc.
Eliminates the need for expensive GPS and interrupters for rectifiers. Instead, disconnect your DC coupon to take your OFF-potential readings.
Produces on- and off-potential readings of pipelines with sacrificial anode systems.
Retrieves current density readings of the **STELTH® 7** coupon representing the structure in your cathodic protection system.
An all-in-one solution, combining all the features of the long-life-stability **STELTH®** Reference Electrodes, with coupons precisely sized to match the aged conditions of your structure. With the Reference Electrode and coupons integrated, this solution is far superior to using separate external coupons. Learn more about the **STELTH®** technology at **borin.com/products/stelth**

SOLUTIONS FOR AC READINGS:

Monitor AC interference to determine if you need an AC mitigation system to stop corrosion due to AC currents. After installation, monitor its efficiency to check that the AC mitigation system is working correctly and complies with the law to avoid dangerous levels of AC.
Achieve valid potential readings at sites with AC current interference, like high-density utility corridors and urban areas with uncontrollable foreign influences.

READINGS:

The **STELTH® 7** with coupons (see coupon size options below) can give you readings for:

- Structure ON Potential DC & AC
- Structure DC Instant OFF Potential
- Structure DC Depolarized Potential
- Multi-Metal Coupons ON Potential DC & AC
- Multi-Metal Coupons DC Instant OFF Potential
- Multi-Metal Coupons DC Depolarized Potential
- Multi-Metal Coupons DC Current density DC & AC
- Multi-Metal Coupons Native DC Potential

APPLICATIONS:

- Detecting CP current loss to other metal joined systems
- Instant Off - IR Free Readings
- AC and DC current densities
- AC mitigation monitoring
- Readings affected by AC interference
- Readings in cities with congested pipe-line distribution systems

SO, YOU HAVE A CARBON STEEL STRUCTURE WITH CP THAT IS JOINED TO COPPER GROUNDING/AC NEUTRAL COPPER SYSTEM. WHAT'S NEXT?

The **STELTH® 7 Multi-Metal Coupon Reference Cell** Gives You the Following Benefits:

- A true native carbon steel coupon. Structure-to-electrolyte (soil usually) voltage-on tells where the carbon steel's true polarization curve starts. Remember that this true native voltage will become slightly more positive over time, as the native coupon never receives CP current;
- A native copper coupon. Structure-to-soil (S/S) voltage-on that tells you how the copper being joined to steel pulls the steel S/S voltages more positive. That degree of positive shift is an indicator of how much copper surface area is in electrolyte contact, compared to the exposed carbon steel surface area contacting the same electrolyte;
- The active carbon steel coupon is measured for "CP current on" and "current-interrupted" S/S voltages as part of the mixed-metal system;
- Of great importance, you can directly measure the DC current received by the carbon steel coupon. From this, you determine DC current density in milli-amps per square foot, or per square meter, on the carbon steel;
- The active copper coupon is then measured for "CP current on" and "current-interrupted" voltages as part of the mixed-metal system;
- You then measure the DC current received by the copper coupon, determine its DC current density, and compare it to steel behavior. If the copper total surface area is large compared to the exposed carbon steel surface area, copper may take 50 to 80 percent of the total CP current available. Direct comparisons of current density for copper versus steel will show you how much copper is dominating the CP current distribution;
- At this point, you can (1) turn up CP system output and measure again to see if steel gains additional protection or (2) look at whether de-coupling some copper grounding or bonding attachments may help steel structures gain protection. Doing both may be prudent, as one de-coupler may not successfully get rid of all the bonds between steel and copper.

By gradually increasing the CP system's current output, one can even do a polarization curve on each metal type, in effect, the Tafel Slope analysis, and finally arrive at the point where carbon steel is getting enough protection.

Based on the results you get, the carbon steel structure can show sufficient CP applied if you meet either of these two criteria related to NACE International Standard SP0169:

- The combined-metal structure meets -850 mV DC current-interrupted structure-to-electrolyte voltage;

General experience shows that copper polarizes ineffectively compared to carbon steel. Due to this and its excellent electrical conductivity (11 times better than steel for the same conductor size), it preferentially takes large CP current deliveries, and carbon steel structures receive far less protection than they need. Without the use of the two different metal coupon sets, it is very difficult to judge whether and how badly the carbon steel structure is under-protected. And often, anode beds are depleted much faster with the copper involved. These new coupon reference cells will help the CP practitioner protect assets more effectively and may also – through proper de-coupling – help anode beds last much longer, with smaller CP capital expenses over time.

Yet another point to consider about facilities with pipelines and electrical grounding present, along with structural steel. The entire facility may also be tied to the AC neutral system in the power grid. That AC neutral can be successfully de-coupled, and this could remove a substantial portion of the total copper involvement. Talk with Chapman Engineering about testing that can identify this issue and then put together possible remedies.

REFERENCE ELECTRODE FEATURES:

Uses	Coupon CP readings and detecting CP current loss to other metals joined systems
Size	Ceramic is 5.50" (13.97 cm) x 1 1/2". Overall diameter is 2"; the total length of the electrode varies depending on the number of coupons.
Material	Ceramic with Moisture Retention Membrane (MRM™) and coupons of different metals including carbon steel, copper, stainless steel, aluminum, etc.
Service Life/Shelf Life/Stability	Minimum 20-year service life; Infinite shelf life, infinite stability
Long Term Stability Range	±5 millivolts
Certified Potential Range	±5 millivolts vs. standard
Maximum Continuous Current	3.0 microamps
pH Range	4–9 pH
Working Temperature Range	32° F to +176° F (0° C to 80° C)
Material Temperature Range	-60° F to +185° F (-51° C to 85° C)
Coupon Configuration	Available in multiple numbers of coupons, sizes, and metal combinations.
Patents	Chapman Engineering's U. S. Patent #12,235,205 B1. International Patents Pending

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