



# **TINKER & RASOR**

**1948      60 YEARS OF QUALITY      2008**



## **PRODUCT INSTRUCTIONS**

### **MODEL CSP-1 (Patent Pending) CARBON STEEL CORROSION SENSOR**

#### Unpacking Checklist

The Model CSP-1 Carbon Steel Corrosion Sensor Kit includes the following:

- (1) Model CSP-1 Corrosion Sensor
- (1) Cable, 10' flat ribbon, 15' round jacketed (attached)
- (1) 6 Pin, standard ER connector (attached)
- (1) Calibration sticker (attached)
- (1) Use and Installation instructions

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## PRODUCT INSTRUCTIONS

### INSTALLATION PROCEDURES

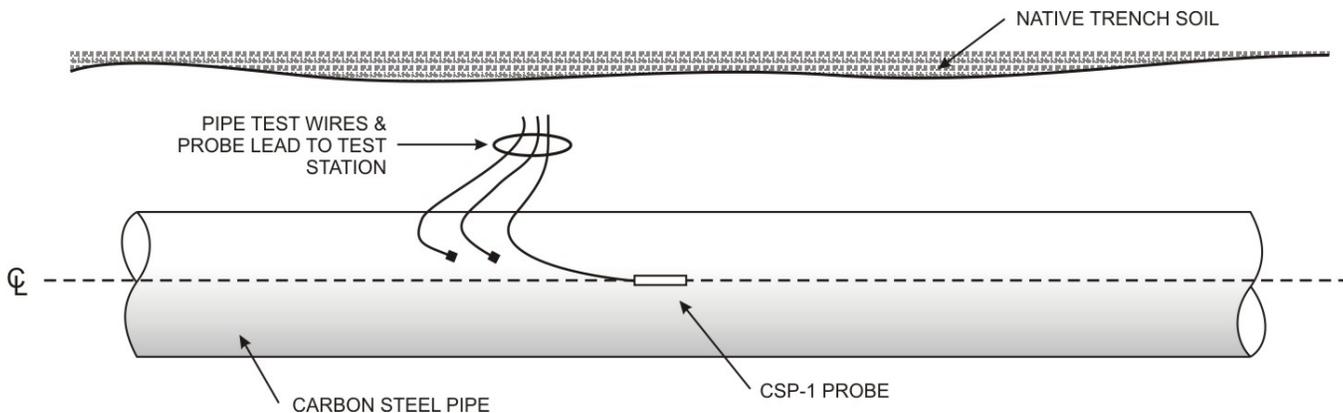
The CSP-1 probes have a 10-foot length of flat ribbon cable attached to the sensor with the other end spliced to a 15-foot length of round PVC jacketed cable which in turn is terminated with a standard 6-pin connector compatible with standard ER instruments.

For mounting the probe, a small amount of adhesive is used to attach the probe to the pipe at the desired location. This adhesive should be applied only to the back (non window) side of the probe. The ribbon cable should be dressed flat along the surface of the pipe to the point where it leaves the pipe towards the surface. Handle the ribbon cable with care as it can be easily damaged by mistreatment.

The round PVC cable can be routed so as to locate the connector conveniently for protection from the environment and to facilitate the taking of subsequent probe readings. The Model T-3 CP Test Station is recommended for this purpose.

If an instrument is on-site, initial readings should be taken to ensure that no damage has occurred during installation and backfilling.

An example of an installation is shown here.



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### USING THE CSP-1 SENSOR

The CSP-1 is an Electrical Resistance (ER) sensor with a Carbon Steel measurement element and a measurement span of approximately:

CSP-1 = 5 mils

Each measurement of the sensor provides a measure of cumulative metal loss due to corrosion. These sensors, in combination with other measurements such as pipe-to-soil potentials, can be very useful in determining if and when cathodic protection should be employed.

Typically the sensor is attached directly to carbon steel pipe (MEASURE element facing away from the pipe) with most common adhesives. After attachment the sensor cable is routed to the measurement location. Care should be exercised when backfilling to make sure that the flat ribbon cable is not damaged. To best emulate corrosion occurring on the pipe, the sensor should be at the same electrical potential. This can be accomplished by connecting the breakout lead at the instrument connector to the pipe. This is most easily done by connecting the breakout lead to one of the leads coming from the pipe at a potential test station. If corrosion measurements are being made in native soil; the native corrosion rate can be measured without making connection to the breakout lead and the corrosion rate under cathodic protection (CP) can be measured by connecting the breakout wire to the buried pipe or structure.

The CSP-1 sensor measurements can be taken with most industry standard ER instruments, i.e. Rohrback Cosasco Systems CK-3, CK-4, and CHECKMATE™; or the Metal Samples MS0500 and MS1500E (use CT 10 for probe selection on MS1500E). These instruments measure in “divisions” which represent 0.1% of the sensor span.

The corrosion rate is the slope of the metal-loss curve and corrosion rates between any two measurements are easily calculated with the following equation:

$$\text{CORROSION RATE} = \frac{(R_f - R_i)}{1000} \times (\text{SPAN}) \times \frac{365}{(\text{TIME})}$$

where-  
 $R_f$  = Final reading in divisions  
 $R_i$  = Initial reading in divisions  
 SPAN = Sensor span in mils

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TIME = Time in days between measurements

For the CSP-1 with a span of 25 mils, the above equation can be simplified to-

$$\text{CORROSION RATE (MPY)} = \frac{(R_f - R_i) \times 9.125}{(\text{TIME in days})}$$

It is recommended that the calculation of corrosion rates be performed only when the change of readings in divisions is greater than ten (>10) or the time between readings is one month or longer.

Additional information may be found on the Tinker & Rasor website:  
[www.tinker-rasor.com](http://www.tinker-rasor.com)

Please contact Tinker & Rasor with any questions or comments you may have regarding this or other Tinker & Rasor products.

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