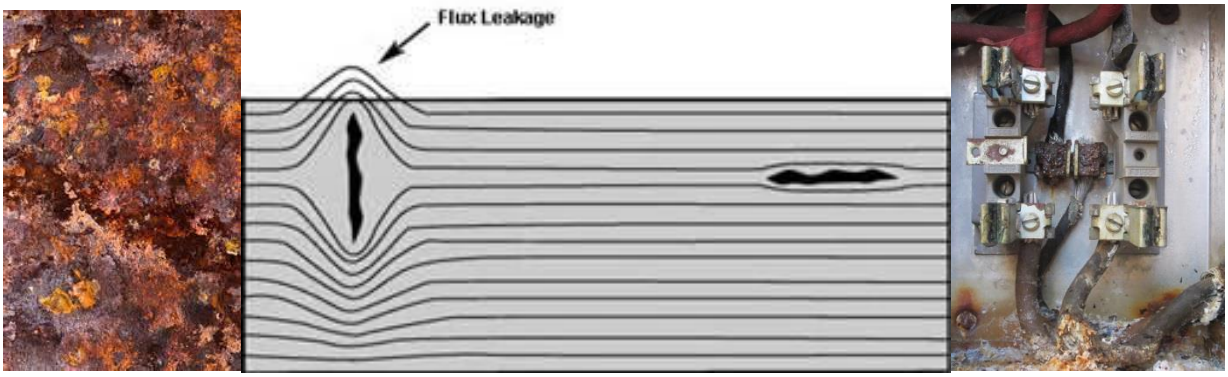
Current Transformer Corrosion

White Paper

Learning about corrosion's effect on Current Transformers (CTs) and knowing which CTs are built to endure corrosive environments can save you time and money in the long run. Sentran has a line of corrosion proof CTs engineered for use in outdoor and submerged environments.

The impact of a corroded CT is more than just an unsightly component in an electrical panel. CTs are precision instruments that rely on the precise transfer of magnetic fields to accurately reflect the current flowing in a conductor. Corrosion interferes with the purity of this magnetic field transfer.



CTs perform best when they're made with the right materials that fit together properly. Corrosion changes both the materials and the fit. Corrosion is typically caused by oxidation, which changes the composition of the material at the molecular level.

When iron is alloyed with carbon, a basic carbon-steel is created. Other elements are added to form a wide variety of proprietary steels. One unpopular alloy is oxygen. When oxygen is alloyed with iron, it forms iron-oxide, commonly known as "rust". A clean, dry environment, such as an electrical cabinet, doesn't usually support the conditions needed for these two elements to alloy. A chemical reaction is necessary. Water is often the catalyst needed to make the two combine. When steel corrodes, the affected metal expands chaotically as added oxygen molecules leave pockets of space in the steel material. These pockets allow more water to be trapped, creating a non-virtuous circle of increasing corrosion. When this happens the proprietary mix of metals is compromised, leaving less capable core material.

Junctions and metallic joints are particularly susceptible to corrosion since any water that gets in is protected from the sunlight and wind that would otherwise dry it out. If unwanted air gaps or spaces, even very small spaces, are created in the core material of a CT it will have a negative effect on performance.

Whether corrosion is in the core's linear structure or its junctions, it will adversely affect magnetic properties. There are a variety of methods used to keep corrosion from finding its way

into the core material and components of a CT. These include protective coatings, intrusion resistant designs and the use of potting to fill any voids that would allow moisture intrusion. All of these precautions are employed when Sentran builds weatherproof CTs, but none are going to prevent the corrosion of exposed metal surfaces.

Surfaces of a split core CT are designed to have exposed metal. Preventing corrosion on these exposed surfaces is typically a function of the metal composition, not coatings or fillings. The core material used for **Sentran's all-weather CTs** is a predominantly nickel alloy that does not corrode when it's exposed to moisture. Even though these CTs are more expensive, they are often seen as a good value considering the costs associated with early CT failures or losing revenue due to a bad sensor.