

CHAPTER 9: ATMOSPHERIC CORROSION

Read Chapter 9: ATMOSPHERIC CORROSION. Then answer the questions at the end of the chapter



PICTURE 6. ATMOSPHERIC CORROSION IN THE EXTERIOR OF A TANK'S ROOF FOUND DURING AN INSPECTION. THE TANK WAS LOCATED IN A MARINE ENVIRONMENT, SO THERE WERE MANY OF THESE

DEFINITION: Corrosion that occurs from moisture associated with atmospheric conditions.

Usually atmospheric corrosion will be higher under a recently affected coating. Metal loss will be acute. If there is no coating or it fails altogether, corrosion will be more general and widespread.

AFFECTED MATERIALS

Carbon steel, low-alloy steels, and copper alloyed aluminum.

ENVIRONMENT

The physical location of the plant will greatly influence the corrosion rate. Marine or contaminated environments are more corrosive than inland or rural environments. Piers, canals and docks are susceptible to atmospheric corrosion, because of the marine environment.

Corrosion rates increase with the amount of moisture present. Cooling tower and stabilization ponds mist greatly increase corrosion.

The presence of salts, sulfur compounds, dirt, or other contaminants in the air or contaminants as Chlorides, H₂S, fly ash, and other airborne accelerate corrosion.

COATING

Carbon steel and low-alloy steel piping and equipment which is not coated or insulated is susceptible to atmospheric corrosion. Metal below 250 °F (120 °C) where moisture can contact the surface. Above that temperature, water boils.

Localized coating failures will promote localized corrosion.



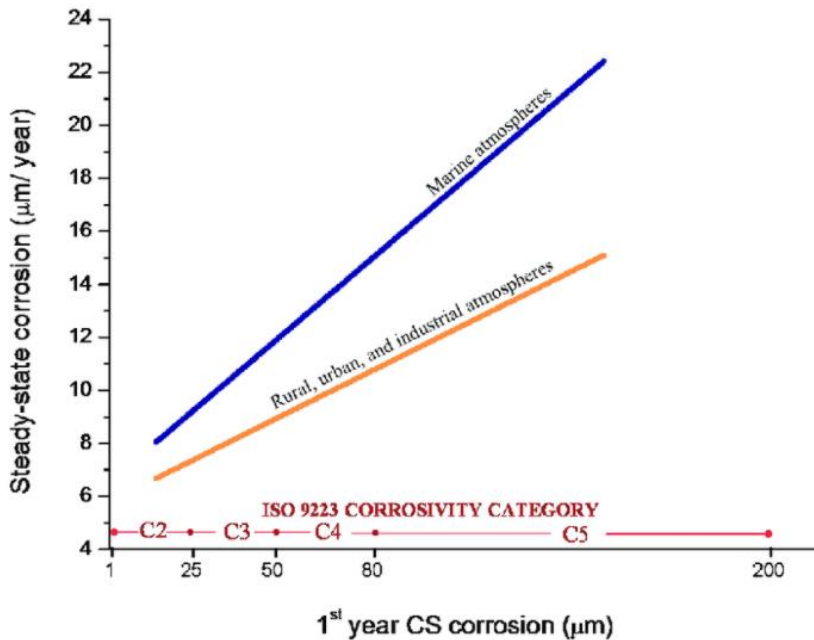
PICTURE 7. LOCALIZED COATING FAILURES IN A PIPE WILL PROMOTE LOCALIZED CORROSION

WETNESS

The design of your tank should not trap water or moisture in crevices, seams or penetrations.

Marine environments, like the ones found in offshore gas facilities are capable of corrosion rates as high as 20mpy, as are industrial environments that contain acids or sulfur compounds that can form acids. In these locations, equipment storage should be using special methods of protection against corrosion.

Inland locations are considered moderately corrosive environments. Dry rural environments usually have very low corrosion rates (<1 mpy).



The tank roof and other horizontal surfaces are very susceptible to atmospheric corrosion. Piping over supports is susceptible to atmospheric corrosion, because water forms pools in the top part of the support.



PICTURE 8. ATMOSPHERIC CORROSION IN THE LOCATION OF A SUPPORT IN A PIPE CLOSE. THE CORROSION RATE IS INCREASED BY A POND NEARBY

INTERFACES

Bimetallic connections such as copper to aluminum electrical connections are prone to atmospheric corrosion.

TEMPERATURE

There is corrosion in temperatures under 250 °F (120 °C). Above 250 °F (120 °C), the surface is too dry for corrosion, although it can happen if there is insulation installed.

EQUIPMENT

Equipment downwind of cooling towers and wet gas scrubbers.

Equipment may be susceptible if cycled between ambient and higher or lower operating temperatures.

Equipment shut down, transported or idled for prolonged periods unless properly mothballed is susceptible to atmospheric corrosion. This happens in our industry usually when oil prices drop and projects are kept on hold. Mothballing can include the use of special powder and gases that release corrosion inhibitors to the equipment surfaces and protect from corrosion.

A proper coating application is critical for long-term protection of the surface in corrosive environments.

QUESTIONS FOR CHAPTER 9: ATMOSPHERIC CORROSION

1. What is the limit temperature over which there is no atmospheric corrosion?
2. What would you do if you find paint blisters in a coating during inspection?
3. What should you do if you are going to shut down equipment for a long time, in a marine environment?