ducing heat delivery by some 5 to 8 percentage points below the *favorable zone* and *tolerable zone* values included in the last column of Table 3. Accordingly, it is necessary the designers of electric heating installations obtain specific information from the local electric utility company on both existing and anticipated future conditions at the location, before specifying the capacity and voltage for equipment, wiring and controls.

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CHAPTER 42

CORROSION AND WATER-FORMED DEPOSITS, CAUSES AND PREVENTION

Definitions, Classification and Characteristics of Water, Causes and Prevention of Scales and Sludges, Causes and Prevention of Slimes, Underwater Corrosion, Atmospheric Corrosion, Buried Pipe Lines, Handling Water Treating Chemicals, Legal Regulations

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THE purpose of this chapter is to discuss some of the common problems arising from corrosion of heating and air conditioning equipment and to suggest methods of preventing or reducing corrosion.

DEFINITIONS

Common terms used in the field of water treatment and corrosion are defined as follows:

Alkalinity. The sum of the carbonate, bicarbonate and hydrate ions in water. Other ions such as phosphate or silicate may also partially contribute to alkalinity. Ordinarily the difference between the total hardness of a water and the alkalinity gives the amount of permanent or non-carbonate hardness present.

Anode. A positive electrode toward which negatively charged non-metallic ions migrate and at which reduction occurs in an electrolytic cell. In corrosion processes, the anode is usually the electrode having the greater tendency to go into solution.

Biological Deposits. Biological deposits[1] are water-formed deposits of biological organisms or the products of their life processes. Biological deposits may be microscopic in nature, such as slimes, or macroscopic, such as barnacles or mussels. Slimes are usually composed of deposits of a gelatinous or filamentous nature.

Cathode. A negative electrode toward which positively charged metallic ions migrate and at which reduction occurs in the electrolytic cell. In corrosion processes, the cathode is usually the electrode tending to resist corrosion.

Corrosion. Corrosion[2] is destruction of a metal by chemical or electrochemical reaction with its environment. In the corrosion process, the reaction products formed may be soluble or insoluble in the contacting environment. Insoluble corrosion products may deposit at or near the attacked area, or be carried along and deposited at a considerable distance therefrom.

Corrosivity. Corrosivity[3] is the capacity of an environment to bring about destruction of a metal by the process of corrosion. Corrosivity is a property of the environment, but it has no significance until the metal in question is specified.

Electrolyte. A solution through which an electric current flows.

Galvanic Corrosion. Corrosion generally resulting from the contact of two dissimilar metals in an electrolyte. It is characterized by an electron flow from the metal of higher potential (anode), to the metal of the lower potential (cathode), resulting in corrosion of the anodic metal. Galvanic cell corrosion may also result from the contact of two similar metals in an electrolyte of non-uniform concentration.

Hardness. The sum of the calcium and magnesium contents in water. It is this hardness that causes the water to resist the formation of soap lather. Temporary or carbonate hardness is that portion of the total hardness which can combine with the carbonate or bicarbonate ions. The balance of the hardness, principally that