

Does a cooling tower require treatment?

Cooling towers and condenser systems are particularly vulnerable to corrosion and fouling. Read on to find out why and what to do about it.

Cooling systems for comfort air conditioning and industrial processes usually have a cooling tower. The purpose of the cooling tower is to remove heat from a circulating stream of water, sometimes referred to as condenser water. By causing some of the water to evaporate, the rate of cooling is greatly increased. This is accomplished by making the water fall in a stream of fine droplets and drawing air through the stream using a fan mounted at the top of the tower.



Since the air contains particles of dust and dirt of various kinds, (depending upon the local environment), the recirculating water becomes contaminated with a variety of materials. This creates fouling on the inside surfaces of the condenser system which can lead to under-deposit corrosion and loss of heat-transfer efficiency. In addition, air dissolves in the water making it saturated with corrosive oxygen at all times during tower operation and creating conditions that are ideal for corrosion.

Loss of heat-transfer efficiency translates directly into increased cooling costs. Corrosion of condenser system components such as chillers, circulating pumps, and cooling towers can be very costly in terms of service disruption, tenant complaints, loss of production, increased maintenance and capital equipment replacement.

Since towers contain warm water, are open to sunlight and trap a variety of life forms and nutrient sources, they are perfect breeding grounds for algae, fungi and bacteria. Some of these forms circulate throughout the condenser system, while others attach themselves to convenient surfaces. Corrosion is frequently found beneath these deposits as a result of under-deposit corrosion or direct attack from species that consume iron in order to propagate.

Cooling towers have been found to provide ideal breeding conditions for pathogenic bacteria such as *Legionella pneumophila*. **Legionnaires' Disease** is a potentially fatal form of pneumonia thought to be transmitted to humans via airborne water droplets. The forced air design of cooling towers creates droplets of the correct size to be easily drawn into heating and cooling ducts and transported to working and living areas. Refer to the **PACE Policy Guideline LEG 2015-07** for our **"Cooling Tower Maintenance Plan for Legionella Awareness & Risk Management"**.

Implementing a properly designed chemical treatment program involves maintaining adequate levels of corrosion inhibitors, scale inhibitors and biocides in the condenser water system. These agents should be carefully chosen to suit the local conditions under which the tower operates, for example, raw water quality, air quality, and materials of construction.

In order for these agents to work effectively they must also be properly fed into the system. Corrosion and scale inhibitors should be maintained at a constant level at all times, whereas biocides are most effective when applied in slug doses on a product-alternated basis. Even if the cooling tower is not used during the winter months, chemical levels must still be maintained and provision made for circulation of the condenser water at least once daily.

Proper implementation of an appropriate chemical treatment program will accomplish the following:

- Prevent metal corrosion
- Prevent scale deposits
- Inhibit biological fouling
- Reduce water usage and discharge
- Operate at higher cycles of concentration

Regular testing of the condenser water and observation of the condition of the equipment is necessary to maintain adequate chemical levels and to ensure prompt action in the case of sudden system disruptions. Remember, it is much easier to **keep** a system under control than to **get it back** under control.

Your **PACE** Representative can advise you on all your water treatment needs. Also, refer to our technical bulletin, **"Tower operation during the winter months"**.