

Humidity Control during Bridge Construction

Bridges are constantly exposed to the moisture and salts from the water bodies and air. In concrete bridges the process of electrolytic corrosion decreases the shelf life.

Effects of Uncontrolled Humidity

Regular exposure to external environment can lead to:

- Oxidation and Corrosion
- Reduce life
- Reduce capacity of loading vehicles
- Increase life cycle

The Root Causes

The major cause is moisture during construction. When moisture in air comes in contact with these ferrous metals such as iron and steel (used in bridge construction), a chemical reaction occurs and causes rust.



General Recommendations

It is generally recommended that the RH to be maintained for preventing corrosion in bridges is below 40%. The dew point to be maintained is -10°C at ambient temperature.

Bry-Air Solution

In order to prevent corrosion of ferrous parts, the controlled space is maintained at specific relative humidity and temperature so that the products or material in the controlled space do not adsorb moisture from the surrounding.

Metalizing: One efficient option for increasing the life-cycle cost and durability is through metalizing with active metals such as zinc, aluminium, and their alloys. This is helpful in producing long-lasting protective coating on all concrete and steel structures.

Wire Bridge: Also known as suspension bridges, these are made up from small steel wires which are bundled up to increase the strength and thereafter anchored on the ground and the top of the bridges. These bundled wires have small air gaps in between and these gaps are continuously fed by dehumidified air to avoid any type of corrosion.

In general suspension bridge/ wire have benefited from dehumidification in two areas:

- Cable anchorage
- Cable protection

At the base of the bridge where these wires are anchored with girders and concrete, the small rooms are dehumidified. At the anchorage of main cables the dehumidifier maintains a Rh of 40% all the time. At this humidity level corrosion rate drops to negligible value.

Booster fans are required to maintain the flow of the air across the wires.

Girder Bridge: These bridges are without the wire. Moisture is adsorbed in the dehumidification sector by the fluted metal silicate desiccant synthesized rotor and is exhausted in the reactivation sector by a stream of hot air in the counter flow.

Following the reactivation process, the adsorption sector is again ready to adsorb the moisture. Positive sealing between chambers prevents mixing of process and reactivation air stream.

The relative humidity inside the chambers is thus reduced to about 35%, which is low enough to stop the cables from corroding.

Bry-Air's recommendation is to install a Bry-Air desiccant dehumidifier as they are capable of maintaining dew point as low as -60°C regardless of ambient conditions and thus are ideal for preventing corrosion in bridges.