

# QUENCH TOWERS



*Quench Tower for gas conditioning prior to baghouse dust collector, AL6XN alloy construction*

**Monroe Environmental**® Quench Towers provide temperature reduction and control of hot process gasses through evaporative cooling or direct heat transfer. A Quench Tower is often the first step in conditioning a high temperature, polluted air stream so that particulate, acid gasses, metals, and other emissions can be adequately removed. Quench Towers are often used following thermal treatment systems such as incinerators, reactors, kilns, boilers, furnaces, oxidizers, and other process systems that produce contaminated gas streams at elevated temperatures.

Monroe Environmental engineers have the experience to provide a customized Quench Tower design that will meet the needs of your application without the use of excessive water consumption. Using the air temperature and moisture content (lb. water per lb. of dry air), the temperature at full saturation can be

predicted. Systems which require only partial saturation to meet specific temperature targets can also be designed by Monroe engineers.

## Quench Tower Design

The proper design of a Quench Tower takes into account many factors, including:

- Inlet temperature
- Inlet moisture content
- Target temperature
- Target moisture content
- Effect of quenching on particulate formation and control
- Chemicals present in air/gas stream
- Velocity of the gas stream and gas retention time
- Nozzle design and spray patterns

- Materials of construction to withstand temperature and chemical attack
- And many others

Monroe Environmental can assess these and other application factors and custom design a quench tower that is suitable for your application.

## Applications

- Pre-conditioning of gasses before scrubbers and other air pollution control technologies
- Treating off-gasses from:
  - Incinerators and thermal oxidizers
  - Furnaces, boilers, and kilns
  - Dryers, reactors, and gasifiers





*High temperature and corrosion resistant evaporative Quench Tower*



*Vertical Quench Tower with Packed Bed Scrubber*



*Dry sump quench*

## Materials of Construction

The materials of construction are especially important as they must be selected to both withstand attack from the various pollutants contained within the airstream and be resistant to high incoming temperatures. Common materials of construction include:

- Hastelloy
- AL6XN steel
- Duplex stainless steel
- 304 and 316 stainless steel
- Refractory and ceramic linings
- Other specialty alloys

## Configurations

**Vertical Quench Tower:** The traditional and most common quench design. Incoming gas stream usually enters at the top of the tower and exits at the bottom or the side of the unit. Nozzles and spray patterns may operate in a co-current or counter-current mode depending on application specifics.



*Inlet duct quench with horizontal spray configuration*

**Inlet Duct Quench:** Inlet duct quenching can often be achieved when the inlet gas temperature is only moderately higher than the desired quench temperature and the gas is relatively dry.

**Dry Sump Quench:** A dry sump quench uses a carefully controlled water feed to achieve partial quenching (not fully saturated) with no excess liquid in the quench sump, hence the name "dry sump quench".