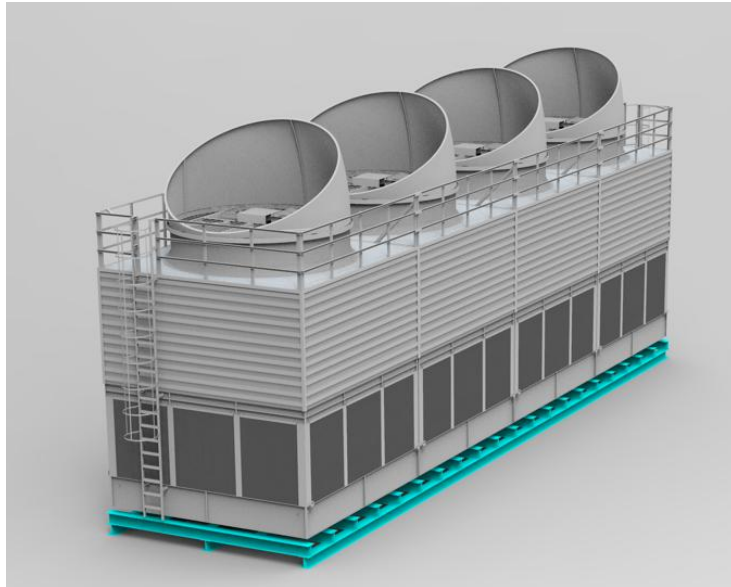


Several Ways to Reduce The Cooling Tower Noise

Both natural ventilation cooling tower and mechanical ventilation cooling tower will produce noise, affect people's life, cause environmental pollution. So what are the factors that produce noise?



As for the mechanical ventilation cooling tower, the noise is mainly caused by the following aspects:

Aerodynamic noise

Aerodynamic noise is one of the main noise sources of mechanical ventilation cooling tower. It comes from fan and consists of rotating noise and eddy current noise. The fundamental frequency of rotating noise is directly proportional to impeller speed and the number of blades. The fundamental frequency of eddy current noise is directly proportional to the relative speed of air flow and blades and inversely proportional to the thickness of objects in the direction of air flow incidence. This kind of noise is characterized by frequency bandwidth and medium and low frequency. Low frequency propagates far and is not easy to attenuate.

Water spray noise

Drenching noise is the main noise source of counter flow cooling tower, which is directly proportional to drenching density and drop height, and is also related to ventilation speed in the tower. It is a high-intensity steady-state noise dominated by medium and high frequency.

Mechanical noise

The vibration and noise of rotating machinery such as motor, fan and transmission parts under the periodic action of eccentric force caused by the imbalance of rotating system. Among them, the noise intensity of the fan is related to the fan diameter, speed and ventilation. Under the condition of the same ventilation, the larger the fan diameter, the lower the noise, which is directly proportional to the relative speed of the blade and fluid.

Other noise

It is mainly the secondary noise generated by tower vibration. It is a kind of noise radiated outward when the vibration of solid parts is caused by power equipment and propagates in the wall plate.

Generally speaking, the noise control of cooling tower shall be carried out according to the nature of surrounding places and environmental assessment requirements, and the current national standards environmental quality standard for noise (GB 3096) and emission standard for environmental noise at boundary of industrial enterprises (GB 12348). China has made detailed provisions in GB / T 7190 series national standards, and the noise index classification treatment is carried out for tower types with different nominal cooling water flow under standard working conditions. To promote the improvement of environmental protection performance of cooling tower. So, what are the effective measures to reduce noise?

The recommended measures in GB / T 50392-2016 code for process design of mechanical ventilation cooling tower are as follows:

1. Low noise fan is adopted;
2. Add vibration reducing pads between power equipment and tower frame;
3. Silencing device shall be adopted at the air outlet;
4. Silencing louvers or silencers shall be adopted for air inlet;

5. Improve the water distribution or collection system to reduce the water pouring noise;

6. A combined sound barrier shall be set between the cooling tower and the control point

.It should be noted that the noise reduction effect of general sound absorption measures ranges from 15dB(A) to 20dB(A), and the noise reduction effect of water splashing noise on the water surface ranges from 6dB(A) to 10dB(A). The noise reduction effect of sound insulation measures ranges from 10dB(A) to 15dB(A).

The noise of the cooling tower can be reduced from the following three steps.

Firstly, for mechanical ventilation cooling tower, noise source control is the first step of noise control, which can be achieved through the following aspects

Measure 1: reduce the overall airflow resistance of mechanical ventilation cooling tower, according to the requirements of process and site layout, determine the form of cooling tower, as far as possible to increase the flow area of airflow, airflow through the components, should be in line with the fluid flow characteristics, to reduce the tower resistance.

Measure 2: choose low noise fan, choose the type of fan blade with anti-noise design to reduce the specific noise of the fan, and choose low speed fan

Measure 3: the noise of the motor mainly comes from the fan of the motor. The noise of the one-way fan can be reduced by 4 ~ 12dB. The two-speed fan can also be selected to operate at low speed when the temperature is low at night to reduce the noise.

Measure 4: in the cooling tower collecting tank layout falling water impact material (silencing pad), reduce the noise of water droplets, can choose soft foam plastic. The semi-soft drip packing can also be arranged in the rain area of the cooling tower inlet to slow down the falling speed of water droplets and reduce the noise by about 9 ~ 15dB.



Damping pad

Measure 5: For small mechanical ventilation cooling tower, vibration isolation measures can be adopted to reduce the vibration of the cooling tower body. Fan for low frequency vibration, installed on the roof without vibration isolation measures, vibration along the solid structure propagation far, at this time can be used damping isolator.

when the cooling tower noise source governance still cannot meet the requirements, can be set in the inlet and outlet of the cooling tower muffler, export decorate muffler noise can be reduced after about 20 db (A), air intakes than general export 10 db (A) low noise, of course, can also be designed to cooling tower outlet for directional and then mounted muffler, Make the direction of the exit noise away from the sensitive points such as residential areas. However, the muffler will increase the airflow resistance of the cooling tower, so it is necessary to calculate the process conditions of the cooling tower carefully, and adjust the design of the cooling tower if necessary.



Cooling tower with muffler

In some special cases, such as residential areas and other noise-sensitive points in multiple directions of cooling tower, directional control can be carried out by setting sound insulation board.



Cooling tower with sound insulation

Of course, the specific use of what kind of noise reduction measures also need to depend on the site environment and owner requirements. But no matter which way is used, as long as it can effectively reduce the noise to meet the environmental requirements without affecting the core performance of the cooling tower.