Some Suggestions for Cooling Tower Fills Selection

As we know, the cooling performance of conventional cooling tower is often inseparable from the fills. Studies have shown that the heat dissipation capacity of the fills can reach more than 70% of the conventional cooling tower, so the choice of fills is crucial. The factors influencing the choice of fills are various, and many factors such as cooling tower form, thermal characteristics, cooling task, circulating cooling water quality, ventilation conditions, thermal resistance characteristics of fills, support mode of fills and cost of fills need to be comprehensively considered.

So how can we choose the right fills? Here are some suggestions for your reference.

(1) According to the quality of cooling water

When it is possible to leak raw material oil in the water or the concentration of suspended matter in the water with fiber or cooling water is greater than 100mg/L, drop fills should be selected; When there is no leakage and good water quality control or the concentration of suspended matter in cooling water is less than 50mg/L when the choice of fills; When the site is limited and the concentration of oil pollutants of

raw materials or suspended matter of cooling water is between 50mg/L and 100mg/L, dropping film mixed packing should be selected.

(2)Choose according to cooling tower type

Counter flow cooling tower packing is often installed above the air inlet of the cooling tower, it will make the tower total height and cost reduced if use fill film type or drip film type, the general engineering design is preferred; And the cross flow cooling tower fills height and tower air inlet height is the same, conducive to the use of high drip type fills. Of course, drip film type or film type height is not a restriction, can also be used. However, the fills packing depth has a direct impact on the overall size of the cooling tower, so the fills should be compared with the height of the cooling tower body. Generally speaking, the ratio of the fills height and depth of the leaching packing is between 2.0 ~ 2.5.

(3)Select according to the inlet water temperature

It is well known that the fills of different materials has its different applicable temperature. In fact, even if the material is the same, the type is different, the temperature resistance and physical properties may also be very different. Such as the current widely used plastic cooling tower material: modified polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polypropylene (PP). Research data show that modified polyvinyl chloride (PVC) in the tower water temperature is not more than 45℃ when the use of the best, and chlorinated polyvinyl chloride (CPVC) hydrophilicity is worse than modified polyvinyl chloride (PVC), heat dissipation performance is not as good as the former, Polypropylene (PP) is poor in aging resistance and flammable in low temperature environment; When the inlet water temperature is over 45℃, the temperature resistance of chlorinated polyvinyl chloride (CPVC) and polypropylene (PP) fills is obviously better than that of modified Polyvinyl chloride (PVC), so the fills should be preferentially used. When the water temperature into the tower exceeds 60℃, polypropylene (PP) has a better selection effect because of its higher temperature resistance. When the water temperature in the tower exceeds 70℃ or higher, the three plastics mentioned above are no longer suitable, and other high-temperature resistant materials such as aluminum alloy should be considered.

(4)Select one based on the fan characteristics

The thermal and resistance characteristics of the fills should be evaluated comprehensively in combination with the characteristics of the fan, and the one with the greatest cooling capacity should be selected under the same design conditions. Because the thermal performance of the fills is good, the resistance is often high. In the natural tower, the resistance of the fills is balanced by the pumping force of the tower, and the pumping force is proportional to the density difference of the air in and out of the fills. Generally speaking, the fills with high thermal performance, the gas-water ratio is relatively low, and the air density difference is larger, which can improve the pumping force. In the ventilating mechanical cooling tower, the suction force is provided by the wind pressure of the fan, and the actual working wind pressure of the fan is proportional to the air density. When the fills with a relatively low gas-water ratio is used, the air density at the outlet of the tower is relatively low, which has the effect of reducing the wind pressure, which is just the opposite to the former. It can be seen from the calculation and comparison of some examples that the order of some fills with better thermal performance will be reversed when they are used in the mechanical ventilation cooling tower in the natural tower, so the selection of fills should be combined with the characteristics of the fan for comprehensive evaluation.

(5)Select according to packing arrangement

For large cooling towers, when the fills installation method is lifting, the shaking of the fills should be fully considered. The fills assembly form should be stable, convenient for construction and daily maintenance. In addition, when the fills block is simply supported on the supporting trabecula, the supporting beam should adopt the structure of small width and small ventilation resistance, and the middle distance of the beam should match the optimal size of the simply supported fills block. When supporting grids are used, the design span of simply supported grids should be the same as the span of supporting beams, the corrosion resistance of the grids should be suitable for the fills, and the influence of the grids on the ventilation resistance should be considered.

In short, for the fills, after fully considering various conditions, it is advisable to choose fills with good thermal and resistance properties, good stiffness, corrosion resistance, aging resistance, and flame retardant properties.

References

[1] Mechanical draft cooling towers - Part 2: large open cooling towers
[2] Code for process design of mechanical draft cooling tower
[3] Quality standard for plastic parts of wet cooling tower cores