

**Motors IP  
Enclosure rating  
in cooling  
towers**



**General**

The purpose of a cooling tower is removal of excess heat from water used in industrial processes to cool various systems. Removal of the heat from the water is done carried out by the flow of the water counter (or across) to an air flow. The cooled water flows to the various users, which are responsible for transferring the heat between the industrial systems and the tower water. (heat exchangers)

In order to ensure the expected life time of the motors installed in the cooling tower’s mechanical system, each motor requires a certain level of sealing as per environmental conditions. The International Protection Marking standard sets forth degrees of protection and sealing of certain instruments against particulate (dust) and water. The degrees all begin with “IP” plus a two-digit code defined by IEC standard 60529, where the first digit indicates the sealing level against particulate and solids in the environment, and the second indicates sealing against water.

The relevant sealant ratings for cooling tower motors are IP55, IP56, IP65, and IP66, where each combination of digits indicates a differing level of sealing according to the environmental conditions in the locale of the cooling tower.

IP5X	Protection against particulate penetration (dust) and buildup at a level that could damage the product
IP6X	Total sealing against particulate penetration (dust)
IPX5	Protection against water jets – testing by spray onto the casing of the product from any direction. Jet of 12.5 liters per minute from a 6.3-mm nozzle
IPX6	Protection against strong water jets or stormy seas -testing by jet spray onto the casing of the product from any direction. Jet of 100 liters per minute from a 12.5-mm nozzle

**Determining the cooling tower motor’s IP enclosure rating**

Determining the required sealant in cooling towers depends upon constraints of environmental conditions, location of motors in the tower, and unique client requirements. In principle, the standard rating of sealant in cooling tower motors is IP55.

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### ***Environmental conditions***

A cooling tower operating in a harsh environment wherein the level of suspended particulate in the air is high, such as open desert, a manufacturing facility that produces dust, or an area of heavy industry, in most cases must use sealant rating IP6X, which offers full protection against airborne dust.

A cooling tower erected in areas known for storms or heavy rain needs to use sealant rating IPX6, which enables full protection against water droplets entering the electric motor.

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### ***Location of motors in the cooling tower***

The location of the motors and how they are positioned in the cooling tower, as well as the operating conditions of the tower, affect the required sealant rating for the tower motors, which might be positioned in the path of air flow, or outside it. When the latter is the case, the environmental conditions more strongly affect the choice of sealant rating. In such a case, sealant rating IP55 or IP65 is chosen.

**Matching the sealing level to the tower's operating conditions and environment is an important tool for extending the life of the electric motor.**

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### ***Terminal box***

A standard electric motor terminal box needs sealant rating IP55. Using a sealant rated IP56 for the fuse box is recommended for preventing water droplets from entering the electricity. In principle, the seal rating for the terminal box should always be equal to or higher than that of the motor.

The terminal box can be located alongside the electric motor or atop it, as per constraints on the site.