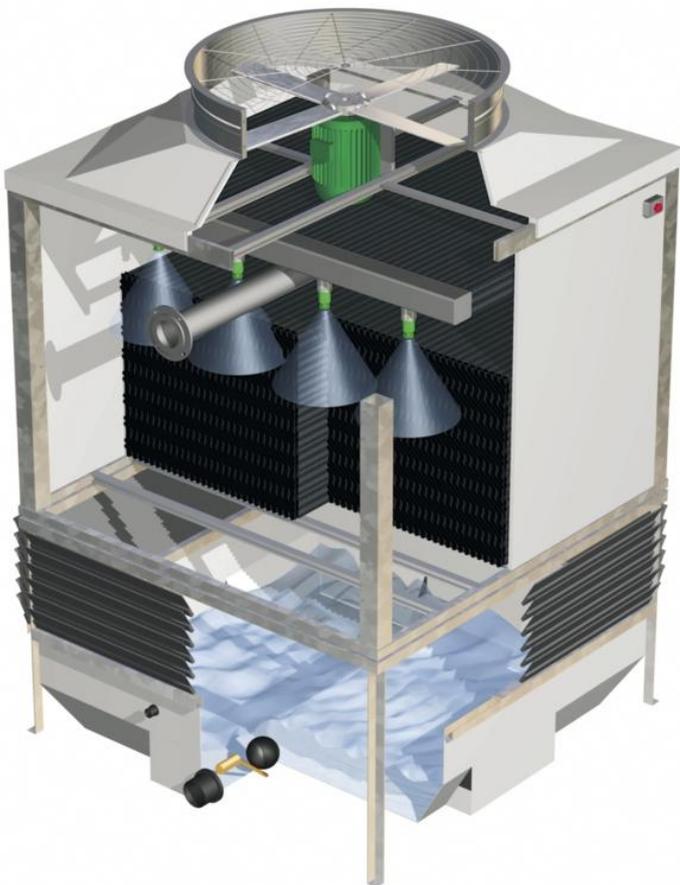


“PME-E” SERIES WATER COOLING TOWER
Counterflow tower
“Film” type filling pack
Filling air/water channels 19 mm, standard

TECHNICAL AND DESCRIPTIVE SPECIFICATION



The cooling tower type PME-E described in this specification shall include the technical and constructive features quoted here below.

WATER BASIN SECTION

- The **structure** shall be mainly formed by steel profiles, steel equal angles sections (UNI EU 66) e UPN (UNI EU 54), with dimensions, thickness and properties adequate to the tower model.
The structure standard protection shall be granted by hot-galvanization process in compliance with UNI EN ISO 1461-99 standard, purity defined by UNI 1179 (99,95% Zn).
The zinc thickness present as structure protection will be not less than 80 micron.
All cuts and drillings of the profiles and of the steel plates shall be done before the hot-galvanization process, so to have a total protection against corrosion.
The height of the structure and the air intake openings' section shall be calculated in order to maximize the "plenum" effect below the heat exchange pack, and to grant an optimal air distribution.
- The **water basin** shall be completely made of FRP, manufactured according to the process of continuous lamination on mould. The basin shall be in one single piece (without any in-between junctions) and it shall be smooth internally finished by means of water-repellent paraffin-based gelcoat, in order to grant perfect waterproofness.
The external finish shall be made during the moulding phase, using isophthalic gelcoat (neutral colour), UV rays resistant.
The basin floor shall be sloped for a surface not inferior to 70% of its total area. It shall have rounded corners and it shall not have areas in which water can stagnate, in compliance with EUROVENT 9/7 Guidelines for the Prevention of Uncontrolled Bacteriological Contamination (Legionella Pneumophila).
The basin shall not be made of press-formed steel sheets, in order to avoid corrosion phenomena and possible areas in which water could stagnate due to sharp corners and junctions.
- The **hydraulic connections** (cooled water outlet, overflow, and drain plug) shall be realised in plastic material, the make-up valve shall be equipped with floating ball.
The outlet water connection shall be complete of free flange UNI 2277 – PN 10 with gaskets.
The make up water system shall be of the "silent" type (the charge piping shall be under the water level), equipped with a variable position floating ball in order to allow a correct adjustment of the water level in the basin. The construction material shall be press-formed brass for the body and the valve casing shall be in stainless steel.
- The **windbreak and spray-suppression flaps** (louvers) shall be made of FRP. They shall be located in the air intake openings, which shall have section and dimension such as to grant an optimal side-covering in presence of wind.
The quantity and the slope of the flaps shall be such as to direct the air flow evenly under the heat exchange pack.
The flaps shall be easy to remove from their seat (made of plastic material), in order to grant an easy access to the basin in case of cleaning or maintenance operations.



BODY SECTION

- The **structure** shall be formed by drilled and press-folded steel S235JR (classification EN 10027-1) sheet profiles.
The structure standard protection shall be granted by hot-galvanization process in compliance with UNI EN ISO 1461-99 standard, realised in a basin of spindle zinc with purity defined by UNI 1179 (99,95% Zn).
The zinc thickness present as structure protection will be not less than 80 micron.
All cuts and drillings of the profiles and of the steel plates shall be done before the hot-galvanization process, so to have a total protection against corrosion.
The top of the structure shall be provided of lifting eye bolts in compliance with DIN 582 standard, Certificate 2483, with suitable capacity depending on the weight of the tower body.
 - The **side walls** shall be made of FRP sandwich panels. The sandwich panels shall have a constant thickness of 22 mm and they shall be protected on both sides by a layer of isophthalic gelcoat (neutral colour), resistant to UV rays.
The inner layer of the sandwich panel shall be made of expanded material whose function is to support and stiffen the whole FRP surface, in order to constitute a structurally strong and resistant assembly.
The **man-sized access door** for the inspection of the tower internal (included in the supply as a standard) shall be integrated in drilled and press-folded steel S235JR (classification EN 10027-1) sheet profiles, subsequently hot galvanized (see above).
The man-sized access door shall have a rectangular section and its opening shall have a net dimension of not less than 520 mm x 720mm.
It shall be provided with handles to ensure an easy handling as well as with gaskets to grant water tightness.
 - The **heat exchange pack*** shall be made of self-extinguishing PVC material and it shall be suitable for operation with water with maximum temperature + 55 °C. The blocks constituting the heat exchange pack shall be made of thermoformed under vacuum and subsequently welded together PVC sheets.
The use of any kind of glue and/or solvent for the union of the sheets and the making of the blocks shall NOT be allowed.
The air/water channels shall have a width not inferior to 19 mm.
- * Depending on the inlet water temperature and/or quality, other fill pack types and materials are available
- The **water distribution piping** shall be made of plastic material (PVC, PP or PE), depending on the field of application and on the operation temperature. Every piping shall be formed by one main header which is equipped of a free flange UNI 2277 -PN 10 on the water inlet side.
The header is provided of several branch pipes equipped with threaded connections for the spray nozzles.
The diameter of the main header and of the branch pipes shall be calculated in order to allow a flow inside with a speed not superior to 2 m/sec, in order to make uniform the distribution of the water to all spray nozzles.



- The **spray nozzles** shall be made of isotactic polypropylene, with tangential type water inlet. The body of the single nozzle shall be thick enough to grant a long working life without being subject to abrasion phenomena and it shall not have any part or element inside that could cause its clogging, even in case of suspended solids. The water jet shall be even and full, cone-shaped with width 120°; the spray shall be such as to grant a perfect and even distribution on the filling pack.
The optimal operating pressures shall be comprised between 15 and 50 kPa.
The tangential type water inlet spray nozzles, located along an axis in line with the header and the branch pipes shall allow a reduction of the height of the water distribution system in favour of the available “plenum” between drift eliminators and cooling tower body’s top.
The water distribution systems shall be equipped with pressure gauges (supplied separately as an integration) with pointer dipped in glycerine in a stainless steel AISI 304 casing, in order to adjust the correct water inlet pressure (corresponding to the design flow rate).
- The **drift eliminator panels** shall be made of polypropylene. Their efficiency shall be such as to grant water losses due to liquid droplets entrained in the exhaust air inferior to 0,01% of the circulating water flow rate, in compliance with EUROVENT 9/7 Guidelines 2011.
The panels shall be formed by thermoformed and subsequently welded together sheets.
The use of any kind of glue and/or solvent for the union of the sheets and the making of the panels shall NOT be allowed.
- The **upper part of the cooling tower**, equipped with the **cylindrical fan casing** shall be completely made of FRP, manufactured according to the process of continuous lamination on mould. The whole upper part with fan casings shall be smooth internally finished by means of water-repellent paraffin-based gelcoat, in order to grant perfect water-proofness.
The external finish shall be made during the moulding phase, using isophthalic gelcoat (neutral colour), UV rays resistant.
The connection between the square/rectangular upper part’s base and the cylindrical fan casing shall have a pyramid-shape, in order to improve the geometric quality of the cell and to encourage the “Venturi” effect of the air flow from the drift eliminators to the fan.
- The **electrical motor shall be SIEMENS brand, international protection rating IP 56 (first digit “5”: “protected against dust deposits” / second digit “6”: “protected against powerful water jets”)**, and it shall be manufactured in accordance to the constructive specification fixed for this type of application.
The construction form shall be V6 (with cast feet, shaft above), with tropicalized winding, the temperature class shall not be inferior to F/B.
The bearings shall be watertight, without lubrication, SKF brand or equivalent, adequately reinforced to withstand the axial down-thrust.
In order to increase its water-tightness, the motor will not be provided with self-ventilation system. Therefore the length of the rotor shaft shall be adequately reduced, and the back cover shall be sealed.
The motor cooling shall therefore occur by means of the air flow induced by the ventilator.
The outer protective finish shall be given by a double cycle epoxy coating, in compliance with standard DIN IEC 60721, Part. 2-1.



Design Features

- The **3-pole isolating switch** for the ON/OFF control of the electric motor shall be lockable. It shall be built inside a suitable IP 65 box. The isolating switch shall include the terminals for the motor supply line connection, for the earthing, and for the connections of PTC and anticondensation heater (both are optional items for the motor). The wiring between motor and isolating switch shall be factory made and tested before the delivery of the unit.
- The **ventilator** shall be of axial type directly coupled with the electrical motor statically and dynamically balanced in the factory.
For energy saving and reliability reasons the belt-coupling shall not be accepted.
The fan shall be composed of steel hub and wing profile blades made of plastic material reinforced with glassfibre.
The number of blades, their pitch angle and their profile shall be such as to grant the necessary performances together with a fan-group efficiency not inferior to 70%.
The diameter of the ventilator shall be such, so that its area is not inferior to 30% of the surface of the relevant cooling tower.
- The **fan protection grid** shall be in stainless steel AISI 304, cone-shaped, designed to avoid vibrations caused by the air flow.
- All **nuts and bolts** shall be made of A2 – AISI 304 stainless steel, self-piercing type screws shall not be used, in order to avoid damages of the surface protection of the steel.

OPTIONAL ITEMS

- **Totally removable side-wall** (*registered utility model*) to simplify routine maintenance operations to the tower internals (filling pack, spray nozzles, water distribution pipe, drift eliminators). The removable wall shall be provided with handles to ensure an easy handling as well as with gaskets to grant water tightness. The opening shall have a net dimension of not less than 1800 mm x 2150 mm.

