EKİN ENDÜSTRİYEL

Cooling Towers
User Guide

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EKİN ENDÜSTRİYEL
Isıtma-Soğutma San. Tic. Ltd. Şti.

The first condition of innovation is to question. And the first condition of sustainable innovation is to question constantly.

The journey of innovation has started with a question for us too: “How can we develop value-added technologies in Turkey?”. First turning point in this long journey was the birth of MIT (Made in Turkey) brand. MIT made us the first plate heat exchanger producer of Turkey and it’s founding vision was not to become a local alternative, it was to build a high-quality brand that can compete on a global level.

While we are working towards this goal in the past 15 years, our products and processes deemed worthy for documentation by many national and international quality assessment institutions such as ISO, TSE, CE, GOST and many more. This was the natural outcome of our constant questioning of the status-quo and our desire to outperform ourselves.

New Generation Engineering

With our engineering approach that focuses on the process, not the problem, we do not just specialize in a product, we consider the entire ecosystem of that product. Ergo, we produce all the other components of a system in addition to plate heat exchangers and we focus on the constant development of engineering staff required to provide an end-to-end application.

We provide a “solution” rather than a product with our business development, presales, sales and after sales services provided by our expert engineers.

In our 15th year, we continue to grow as a solution partner for projects that need high technology in more than 60 countries with our internationally approved high-quality plate heat exchangers; components such as accumulation tanks, boilers, industrial pumps and installation materials that completes these exchangers to form a system; and complementary services provided by our expert engineer staff.

ISO CE GOST CERTIFICATE 799 33 13 TSE-HYB TURQUM® TURKISH QUALITY OF MACHINERY

APPLICATION FIELDS

HEAT TRANSFER PRODUCTS

• Gasketed Plate Heat Exchangers • Brazed Heat Exchangers • Shell & Tube Heat Exchangers • Air Fan Oil Cooler • Economizers • Coils and Radiators

PRESSURE VESSELS

• Water Heater Tanks • Water Storage Tanks • Buffer Tanks • Expansion Tanks • Stainless Steel Process Tanks • Balance Tanks / Dirt Separators / Air Separators • Vapour Separator • Pressured Air Tanks • Neutralization Tanks • Air Tubes • Steel IBC Tanks with ADR

COMPLETE SYSTEMS UNITS

• Heat Stations • Steam Package Systems
• Special Designed Systems • Dosing Systems
• Substations • Thermoregulators

FOOD GRADE SYSTEMS

• Pasteurizers with Plate Heat Exchangers • Hygienic Pasteurizers with Shell & Tube Heat Exchangers
• Cheese and Whey Systems • UHT - Sterilization Systems
• CIP Systems • Hygienic Storage and Process Tanks
• Homogenizers • Standardization Systems • Evaporators
• Turn-key Projects

FLUID TRANSFER PRODUCTS

• Lobe Pumps • Hygienic Centrifuge Pumps • Turbo / Roots / Centrifuge Blowers • Drum Pumps • Acid Pumps
• Dosing Pumps • Monopumps • Air Operated Double Diaphragm Pumps (AODD)

FLOW CONTROL UNITS

• Butterfly Valves • Ball Valves • Globe Valves • Knife Gate Valves • Actuators • Check Valves • Strainers
• Thermoplastic Valves • Plastomatic Valves

ENERGY SYSTEMS

• Boiler Systems
• Solar Collectors
• Water Heater Tanks For Solar

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CONTENTS

INTRODUCTION

These operating instructions are intended as a guide for the installation, operation and maintenance of forced cooling Industrial Cooling towers. Following these guidelines ensures optimum performance and maximum service life of the equipment.

The manufacturer cannot be held liable for possible damages if the instructions specified in this manual are not followed.
The general terms and conditions of Ekin Industrial which are valid with the order approval are valid. Please see our order confirmation for technical details. Technical changes can be made to the products.

OPERATING

MIT-SK (S) type cooling towers are mechanical series draft type cooling towers which work with counter flow principle.

In this type of cooling tower, the water to be cooled is evenly distributed on a package ventilated from below. Heat and mass transfer takes place in this seal. The partial evaporation of water reduces the heat in the water circuit and transmits it to the air. Compared to dry coolers, such wet cooling towers can achieve a lower water temperature even at high air temperatures.

Figure 1.3 shows the section from the plate bundle. Inlet inlet and transition areas are prevented from mixing the fluids with double sealing system (Figure 1.4).

GENERAL INFORMATION

Cooling Tower

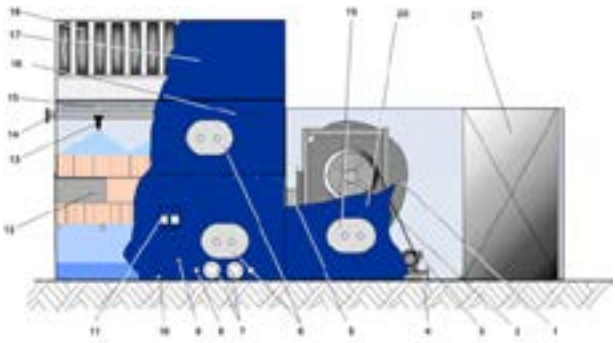


Figure 1.3, Cooling Tower with forced fan assembly, type MIT-SK (S)

OPERATING		
Fan	Immersion Type Electric Heater	Drop Holder
V-Belt Drive Shaft	Overflow and Float Valve	Safe
Fan Motor	Overflow and Float Valve	Air Purge Silencer
Engine Base Plate	Thermostat	Air Discharge Curtain
Fan Discharge	Packing	Belt Shaft Access Cover
Access Cover	Water Distribution Heads	Air Inlet Muffler Chamber
Water Outlet Connection	Water Inlet Connection	Air Inlet Curtain

The Cooling Tower casing and water tank are made of polyester resin reinforced with fiberglass resistant to corrosion. Control caps for maintenance of the spray heads and on the adjustable float valve are available.

Hydraulic Parts

Water Distribution System

Water flows from the main distribution pipes made of stainless steel to the plastic caps. The arrangements provide optimum water distribution within the tower.

Salmastra

The seal consists of layers of a high-performance cooling tower fill made of long-life plastic material. For standard applications a film-type filler is included, splash filler can be included on request (Standard PVC; see order confirmation).

Drop Holder

A droplet is mounted on the water distribution system to reduce water loss. It consists of seals placed side by side. The specially developed profile form provides low pressure loss and high elimination effect.

Flexible Connection

The fan outlet section can be connected to the cooling tower housing by a flexible duct. This is recommended for low noise or low vibration application of the cooling tower, because the flexible connection prevents spreading of the noise emitted by the structure through the cooling tower enclosure.

Strainer Net

It can be installed in the water tower or in a separate pool of the cooling tower and prevents small particles from entering the cooling water circuit.

INSTALLATION

During the installation

- Installation must be done according to the basic drawings.
- The installation location should allow easy access to all parts of the cooling tower. Free air flow to the air inlet and outlet.
- Avoid installing directly near the roof edges and public roads in case of fog and ice formation in winter.
- Avoid contact with damp walls and buildings.
- To keep the cooling water circuit as clean as possible, do not install the cooling tower in the vicinity of trees or outlets.

Electrical Installation

- Before connecting, check the voltage of the motors given on the nameplate with the available voltage.
- The motor cables must be selected so that the voltage load does not exceed 5% of the full load.
- To prevent water from entering the terminal box, close the cover carefully and make sure the rubber seal is firmly seated in the groove, then screw it in.
- Place the cable in the motor terminal box and connect the control and regulation devices according to Figure 4. all these studies should be carried out carefully.

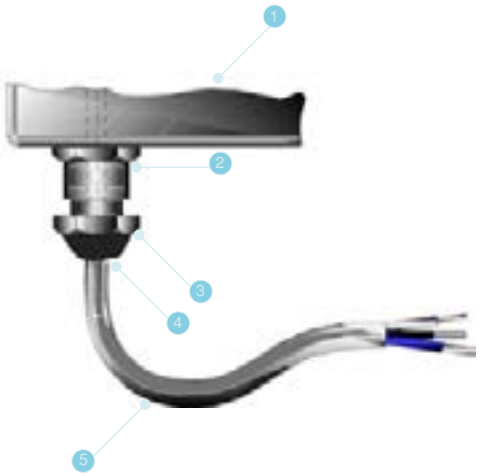


Figure. 4

Terminal Box Cable Entry Fittings with Gland;

1	Terminal box
2	Rubber stopper with cutout rings
3	Pressing nut
4	Gasket
5	Cable

FAN MOTOR INSTRUCTION

For two-speed motors, the following points must be observed:

The high-speed stage is always switched on at the low-speed stage. Thanks to the time delay relay, the high speed will open when the low speed range is reached (Setting range approx. 5 to 30 sec).

The time delay should be set to remain voltage-free as long as the low speed range is reached or falls below the engine shutdown. Only then can the low speed contact be switched on (setting range for time delay relay is about 5 to 30 sec).

> ! General rule: The time setting for the time delay relay may be too long, but it should never be too short.

The motors must be protected against overloading by thermally delayed overload relays. The bimetallic relays must be adjusted according to the indications in the corresponding wiring diagram.

Engines should not shift from higher speeds to more than 20 circles a day and no more than 3-4 times per hour from low speeds to vice versa.

FIRST AND TEMPORARY WORK

Before first start-up or after a long shutdown, the unit must be thoroughly checked and cleaned.

- Turn the fan by hand to ensure unobstructed rotation.
- Switch on the fan and check for proper rotation as indicated by the arrow on the motor.
- Set the overload fuses to the rated current according to the nameplate.
- Check the current consumption of each phase and compare it with the indicators on the motor nameplate.
- Check the inlet pressure in the water distribution of the cooling tower when the pump starts. To obtain guaranteed cooling capacity, the pressure head must correspond to the required pressure (see nameplate / order confirmation). The pump must be operated against the closed valve. The maximum pressure must not exceed 0.7 bar, a minimum pressure of 0.2 bar is required for the proper function.
- Adjust the water level in the water collection chamber of the cooling tower. Safe water supply. Water regulation can be achieved by means of a float valve or other devices. When the water level is set correctly, the suction curvature and indentations of the pump are sufficiently covered with water, thus preventing the suction of air.
- Also, it should be noted that there is water flow in the reservoir when stopping the pump. Therefore, the maximum water level must always be fixed below the overflow level.

MAINTENANCE SCHEDULE

	First and Temporary Run and Temporary Run	Weekly	Monthly	6 Months	After closed	Yearly
Motor: Check current and voltage.	a X X					X
V-belt drive shaft: Check belt tension and adjust if necessary.	X (4 hours later)		X			
Fan: Check the deposits on the blades. Make sure it's secure. Lubricate the bearings.	X			X X X	X	
Spray nozzles: Check spray pattern and nozzle pressure.	X X		X	X		
Filling: Check the accumulated particles and clean if necessary.				X	X	
Strainer: Check for blockages and clean if necessary.	X	X	X		X	
Water tank: Check for deposits and clean if necessary.	X			X	X	
Evacuation: Make sure that it works.	X X		X			

WATER QUALITY

The water composition is of particular importance for the operation of the cooling tower. It has an impact on heat exchange capacity, service life and profitability of the cooling tower. For this reason, it is recommended to carry out a water analysis at the planning stage or at least before the first commissioning and, if necessary, consult the water treatment specialist.
This manual only provides general information.

Required Completion Water Ratio

This ratio is necessary for water loss due to evaporation, splashing and slipping, swelling and leaks that may occur.

$$m_{wz} = m^{wv} + m^{ws} + m^{wa} + m_{wL}$$

According to this:

m_{wz} Water completion rate
m_{wv} Evaporation loss
m_{ws} Water splashes and slippage
m_{wa} Discharge
m_{wL} Loss due to leakage

Evaporation Loss

Evaporation loss depends on cooling capacity and atmospheric conditions. A precise calculation can be made if the operating conditions are known. In most cases, the following simplified calculation is sufficient for an approximate estimate.

The simplified calculation method of evaporation loss mwv is as follows:

$$m = \frac{mt\ (-tW)\ m^5}{W\ M\ 2\ 1}$$
$$WV\quad 600\quad L^h\ J$$

According to this:

m_w = Water to be cooled [m3 / h]
tw_1 = Cooling tower water inlet temperature [°C]
tw_2 = Cooling tower water outlet temperature [°C]

Splash and Slip Water Loss

This occurs more often in the air purge of the cooling tower. Due to the high efficiency anti-slip, it is generally below 0.1% of the spray water flow rate. Splash loss at the air inlet is generally negligible.

Circulating Water Quality Guide

For optimum efficiency and maximum equipment life, the quality of the circulating water must be within the limit values shown in the table below.

See also VDI 3803 Ch. 10

Carbonate Hardness	7-9 °dH
Carbonate Hardness With	20 °dH'a kadar
Approximate Chloride Content	300 mg/l
Approximate Austenitic Steels	50 mg/l
PH value	7-8
For Lightweight Metals	7-7,5
Approximate Sulphate Content	500 mg/l
Approximate Iron Content	0,3 mg/l
Total Mineral Content	2000 mg/
Approximate Accumulation Content	50 mg/l
Conductivity	1200 µS/c m

Cleaning

The table below shows the main elements of the maintenance program required for proper control of the circulation water system:

Servis Açma	First Trip	Weekly	Monthly	6 Monthly	After Closed	Yearly
Check the general conditions of the unit.	X	X			X	
Remove any debris from the unit.	X		X		X	
Check oil pan and wash if necessary.	X			X		
Clean the hopper strainer.	X		X			
Check and adjust oil pan level and boost.	X		X			
Check for contamination and clean if necessary.	X		X			
Check the water distribution.	X		X			
Check the drip trap.	X	X				
Make sure that the water quality complies with the general values.	X	X				
Check chemical feed equipment.	X	X				
Check and adjust the overflow rate.	X	X				
Check the heaters and accessories.			X			
Drain the drain pan and piping.						
Check the protective coating.						X

SAFETY

Welding and Sharpening Works

There is a risk of fire of plastic parts during welding and sharpening. Therefore, the following precautions should be taken:

- Ensure that a foam extinguisher is near and easily accessible.
- Close the upper air opening of the fluid cooler to prevent airflow. Local protective measures must be taken in case of explosion hazard. Retain the explosion protection guide.

Easy Access to Cooling Tower

If work is required in the tower or silencers, make sure the main switch is disconnected. A legible panel must be installed in the main switch with the following statements.

Water Connections

According to sanitary hygiene regulations (see DIN 1988), water pipes for general use and drinking water may only be connected if a specially designed pipe separator is used.

Keep away from flammable equipment! Keep it closed. Danger to life!

FIXING

Problem Type	Mossible Reasons
Reduced Cooling Capacity	Higher air temperature than designed for design
	Accumulation of dirt and sediment in water circuits
	Foreign bodies in air ducts or ice formation
	Prevention of air circulation
	Impairment of fan control
	Faulty fan drive
	Contamination of cooling tower fill
Low Air Supply from Fan	Engine failure
	Loop in the wrong direction
	Control failure
	V-belt drive defective or belt tension too low
	Air flaps closed (if equipped)
Unclear Voice	Bearing failure on motor or fan
	Belt tension too low (especially in opening position)
	Incorrect alignment of belt pulleys
	Incorrect setting of the time delay relay for switching the fan motor to low delay speedı
	Belt drive damage
	Flexible connection between fan and enclosure defective
Excessive Wear on Belts	Incorrect alignment of belt pulleys
	Belt tension too low
	Bushings loose
	High differential tension between parallel V-belts during On / Off (replace belt sets only.)
Vibration	Fan wheel unstable due to dirt or damage
	Bearing damage

DURABILITY

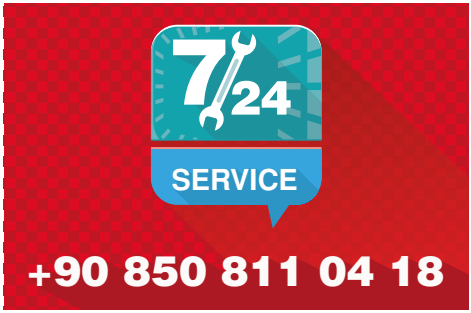
Details of material resistance only belong to the most important data. If there are special substances in the water that can cause destruction, please contact us. Other suitable materials may be used depending on the application.

Material	Max. Temp	pH Value
PVC Cooling Filler	60 °C	6,5-8,5
Modified PVC	80 °C	6,5-8,5
Polypropylene	80 °C	6,5-8,5
Polystyrene (unstable to hydracarbons)	65 °C	6-10
Drop Holder PVC	60 °C	6,5-8,5
Modified PVC	80 °C	6,5-8,5

PROFESSIONAL SYSTEM SOLUTION CENTER

From our MIT professional system solution center, you can get help with your problems with your pumps, heat exchangers and your system. Our solution center consisting of expert mechanical engineers will be happy to help you.

- Domestic hot water installations.
- Central and district heating systems.
- Milk, yoghurt, heating, cooling and pasteurization systems.
- Industrial cooling and heating systems.
- Oil cooling systems.
- Energy recovery systems.
- Pool heating systems.
- Steam installations.



It is vital for your system to be designed and implemented correctly in the first installation in order to be able to operate at the desired capacity, smoothness and long life. For this reason, you can get first-hand the technical support you need during the installation phase of your system and the problems that may arise in the business; You can reach us **24 hours +90 (216) 232 24 12 in 7 days**.

We would like to reiterate that we will be happy to share our knowledge accumulated over many years with our valued customers in order for your system to work correctly and performance. Ekin will continue to be the best solution partner for you in all applications with all kinds of heating and cooling applications.

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