

# COOLEX

## ACC Series Air Cooled Chillers With Brazen Plate Heat Exchangers

Range 03 TR to 017 TR (11 kW to 60 kW)



50 Hz

**RESIDENTIAL AND COMMERCIAL  
AIR COOLED SCROLL WATER CHILLER**



For more technical information please visit [www.coolex.com.kw](http://www.coolex.com.kw)



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## OTHER COOLEX PRODUCTS

1. **Air Handling Units**
2. **Residential Packaged Units**
3. **Commercial Packaged Units**
4. **Air Cooled Screw Water Chillers**
5. **Ducted Split Units**
6. **Concealed Split Units**
7. **Fan Coil Units**

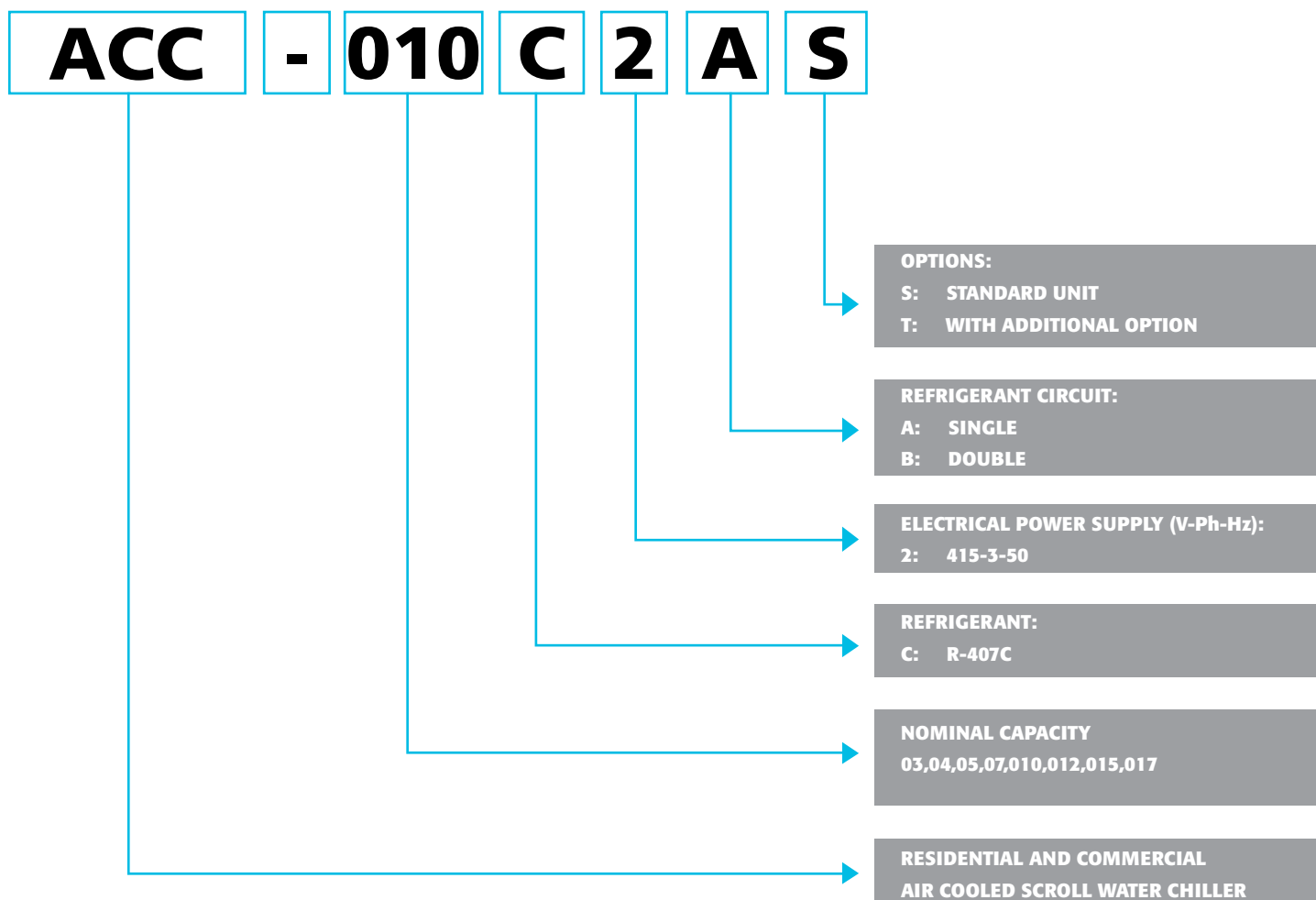
## INTRODUCTION

**AIR COOLED CHILLER (ACC)** design to be suitable for gulf's extremely high climatic conditions utilize with R-407C Scroll Hermetic Compressor (One or more), Insulated DX Brazed Plate Heat Exchangers (BPHE), Condenser Coils with fan motor (s), control panel and other auxiliaries to meet market and customer's demand.

**ACC** series chillers were designed and manufactured to provide central cooling for Residential and commercial applications with the optimum performance, high efficiency, reliability, easy installation, minimal sound operation and vibration ideal for noise sensitive environment. Each ACC unit is fully charge with R-407C refrigerant, fully factory tested and is ready for installation.

**ACC** series are available in capacity range 3.0 TR - 017 TR (11 kW to 60 kW) are rated with AHRI Conditions.

## NOMENCLATURE



### NOTE:

COOLEX reserves the rights to update/change in part or as a whole the specifications of the product for the purpose of product improvement and enhancement. Therefore the above information is subject to changes without prior notice.

## OUT STANDING FEATURES

Design and manufacturing engineering excellence in the Air-cooled Chiller marketplace to provide comfort air conditioning. These chillers incorporate a wide range of important design Advances and Features including:

- **Designed conform to ASHRAE 15-2016 (Safety Standard for Refrigeration Systems).**
- **Performance Data are rated in accordance to AHRI standard 550/590.**
- **Painted panel Salt Spray test in accordance to ASTM B 117 Operating Salt Spray (Fog) Testing.**
- **Steel sheet panels lock forming quality conforming to ASTM A653-CS Type B G90.**
- **Control panel design is equivalent to NEMA 4 (IP55 Weather proof and dust free).**
- **Internal power Connection High Voltage & control wire cables identification & markers as per NEC standard.**
- **Complete wired control panel with advanced microprocessor controller matching with Building Management System.**
- **High efficiency scroll compressors with R-407C optimized design.**
- **Low noise aerodynamic design condenser fan, direct drive with rolled for venture design to eliminate short circuiting of airflow.**
- **All fans are propeller type with aerodynamic design, top discharge & provided with protective grill.**
- **All fan motors are Totally Enclosed Air Over (TEAO) type with class "F" winding insulation, ball bearings & internal thermal protection of automatic reset.**
- **Thermostatic expansion valve as standard accessories.**
- **All major service components are close to the unit edge for safe and easy maintenance.**

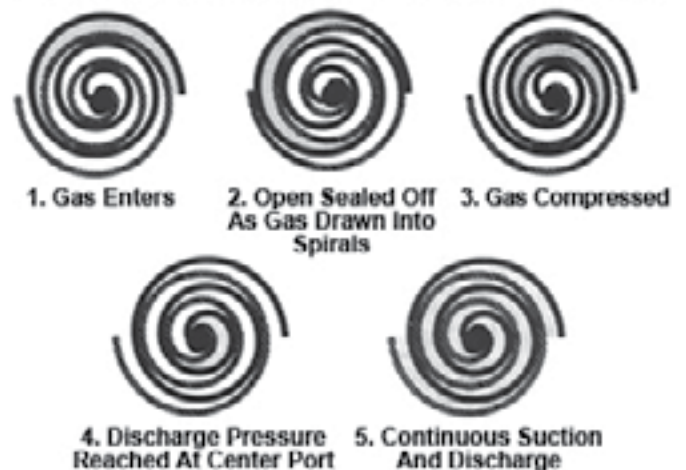
## MAIN STANDARD FEATURES

### COMPRESSORS

Scroll Compressor has proven to be the most reliable, most efficient and quietest compressor technology available today. Compressor exclusive design features both axial and radial compliance, which allows the compressor to be more tolerant of liquid refrigerant or debris. Compliant Scroll compressors perform at higher efficiency levels than reciprocating compressors, and last longer over time. Scroll compressors have 50% fewer moving parts, which increases reliability and reduces sound levels. They also operate without suction valves, for added reliability and ease of maintenance.



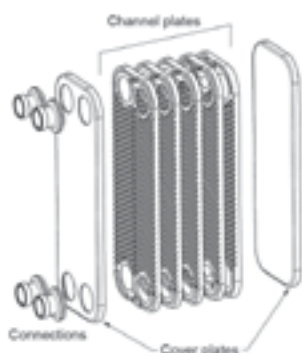
### HOW THE SCROLL COMPRESSOR WORKS



## MAIN STANDARD FEATURES

### EVAPORATOR

High efficiency DX Brazed Plate Heat Exchanger (BPHE) cooler consists of thin corrugated stainless steel plates vacuum brazed together using copper as the brazing material. Although ideal for numerous applications. Plates are brazed at all contact points, ensuring optimal heat transfer efficiency and pressure resistance. The plates are designed to provide the longest possible lifetimes.



**Material of the BPHE :**

- Channel plates: Stainless steel AISI 316L
- Cover plates: Stainless steel AISI 304L
- Connections: Stainless steel AISI 304L
- Brazing material: Copper

STANDARD WATER CONNECTION: IC-NPT Threaded Male & Victaulic Flexible Couplings

Coolers are tested and stamped for refrigerant/ water side, design/ test pressure as follows:

COOLER	WATER SIDE	
	DESIGN PRESS.	TEST PRESS.
	BAR/PSIG	BAR/PSIG
STD	30/435	38/551
UL	30/435 (20/290 )	30/435 (20/290 )

COOLER	REFRIGERANT SIDE	
	DESIGN PRESS.	TEST PRESS.
	BAR/PSIG	BAR/PSIG
STD	30/435	38/551
UL	30/435	30/435



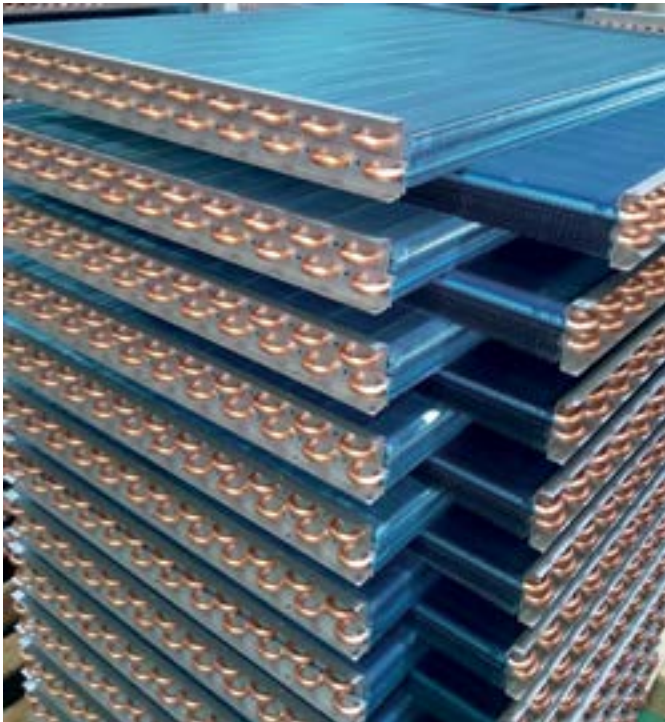
ALL Evaporator are insulated with 1 inch (25mm) flexible closed cell insulation, K factor 0.28 Btu.In/hr.ft<sup>2</sup>.°F (0.038 W/m°C).



## MAIN STANDARD FEATURES

### CONDENSER COILS

The coils are built up seamless copper tubes and mechanically bonded to scientifically designed aluminum fins for maximum heat transfer efficiency. The assembled coils are factory leak tested under water at a pressure of 450 psig for quality and leak free unit. They also undergo dry chemical cleaning after manufacturing for optimum system cleanness.



### CONDENSER FAN MOTOR

All condenser fan motors are totally enclosed air over type (TEAO) with class "F" winding insulation and ball bearings for high ambient application. The motors shall be three (3) phase with inherent thermal protection of automatic reset type.



### CONDENSER FANS

Condenser fans are constructed of die cast aluminum blades/hubs with direct driven motors. All fans are statically and dynamically balances to operate at minimum noise and vibration.

### UNIT CASING / STRUCTURE FRAME

The unit casing are perfectly designed to eliminate the corrosion problem usually associated with outdoor equipment. The casing sheet metal is fabricated from hot dipped heavy gauge (G90), zinc coating and zero spangle galvanized steel, oven-baked powder coated.

### EXPANSION VALVE

Thermal expansion valves, or thermostatic expansion valves, are the expansion devices used most commonly with BPHE evaporators. TEVs are popular expansion devices due to their simplicity and availability, and their relatively good sensitivity and accuracy in regulation. The large choice of expansion valve sizes and bulb charges means the capacity and temperature ranges are very good.

## MAIN STANDARD FEATURES

### CONTROL PANEL

The control panel design is equivalent to NEMA 4 (IP55) with hinged door for easy access ensuring dust and weatherproof construction. Internal power and control wiring is neatly routed, adequately anchored and all wires identified with cable markers as per NEC standards applicable to HVAC industry. The control voltage is 240V-1Ph-50Hz. The electrical controls used in the control panel are UL approved which are reliable in operation at high ambient conditions (Up to 70°C) for a long period.

### MICROPROCESSOR CONTROL

The advanced microprocessor controller is designed with the latest technology to give the best performance of the chiller and to ensure its efficiency and reliability.

It is not only monitoring the digital and analogue inputs but also responds very quickly to any problem before and during the operation of the chiller.

The user friendly display is a very effective tool for troubleshooting with multi linked back illuminated LCD Panel.

It shows all the required data of the chiller while it is running and keep all the faults in the alarm history.

The push buttons on the display board allows accessing to the operating conditions, control set points & alarm history.

The controller is capable to communicate with the building management system (BMS) open protocols like BacNet, LON, Modbus through optional gateway interfaces.

The microprocessor controller is especially designed to withstand the high ambient temperature; it can withstand more than 70 degree C without any ventilating or cooling.

The microprocessor controller consists of the following hardware:

#### 1- Display Board:

Provided with simple push buttons (6 Nos) on the display board and menu driven software to access operating conditions, control set points and history that are clearly displayed on the LCD panel.

#### 2- Master Board:

This controls up to four (4) compressor system.

- Temperature Control (Water inlet/outlet): The user can select the temperature control based on either leaving water temperature or returning water temperature. The software will control system using a Proportional Integral Derivative (PID) for precise control logic.
- Compressors hour equalization.
- Condenser Fan hour equalization.
- Software update through PC programming or hardware key.
- Discharge pressure transducer.
- Head pressure control by fan cycling.
- Short cycling protection for compressors (time delay).
- Compressor locking option through parameter or digital input.
- Pump management.
- Free terminal for general alarm output.

## MAIN STANDARD FEATURES

### MICROPROCESSOR CONTROL

#### System Protection / Alarms:

- Low suction pressure.
- High discharge pressure.
- Anti freeze protection.
- Flow switches alarm.
- Sensor alarm management.
- Pump alarm management.
- Power supply alarm.
- Compressor windings temp/SSPS alarm.

#### Data Display:

In the normal operating mode the graphic LCD displays the system status, the inlet and outlet water temperatures, the set point, run time of the chiller, the alarm history. In addition, for each compressor:

- Discharge pressure.
- Compressor status.
- Fan status.
- Run time of each compressor.
- Alarm history with time stamp.
- The Leaving or Return water temperature is continuously displayed.





## MAIN STANDARD FEATURES

### CONSTRUCTION AND REFRIGERATION

- **INDEPENDENT REFRIGERATION CIRCUIT PER COMPRESSOR**
- **LIQUID LINE THERMAL EXPANSION VALVE**  
Used to regulate the refrigerant flow to the water cooler and maintain a constant Superheat and load optimization.
- **LIQUID LINE MOISTURE INDICATOR SIGHT GLASS**  
Installed in the liquid line. An easy to read color indicator shows moisture contents and provides a mean for checking the system refrigerant charge.
- **LIQUID LINE FILTER DRIER**  
Refrigerant circuits are kept free of harmful moisture, sludge, acids and oil contaminating particles by the filter drier.
- **FULLY CHARGED UNIT WITH R-407C REFRIGERANT**
- **DISCHARGE, SUCTION LIQUID LINE PIPES**  
All hard copper pipes and minimize pipe brazed joints which in turn increases the system reliability.
- **COMPRESSOR/COOLER GUARD**  
Protects the compressor from vandalism.
- **BLUE-COATED ALUMINUM FINS CONDENSER COILS**  
For seashore or acid corrosive environments.

### ELECTRICAL

- **COMPRESSOR IN-BUILT PROTECTION DEVICE**
- **STARTER**  
The starter is operated by the control circuit and provides power to the compressor motors. These devices are rated to handle safely both RLA and LRA of motors.
- **CRANKCASE HEATERS**  
Each compressor has crankcase heater. The compressor crankcase heater is always on when the compressors are de-energized. This protects the system against refrigerant Migration, oil dilution and potential compressor failure.
- **HIGH PRESSURE SWITCH**  
This switch provides an additional safety protection in case of excessive discharge pressure.
- **LOW PRESSURE SWITCH**  
This switch provides safety protection in case of low suction pressure.
- **UNIT ON-OFF SWITCH**  
On Off Switch is provided for manually switching the unit control circuit.
- **INDICATOR LIGHTS**  
LED lights indicates power ON to the units, MENU adjustment and FAULT indications due to trip on safety devices.
- **UNDER VOLTAGE AND PHASE PROTECTION.**  
This feature protects the chiller against low incoming voltage as well as single phasing , phase reversal and phase imbalance by de-energizing the control circuit.
- **CONTROL CIRCUIT TRANSFORMER**
- **EXTERNAL OVERLOAD RELAY FOR EACH COMPRESSOR**
- **CONTROL FUSED FOR SHORT CIRCUIT PROTECTION**

## OPTIONAL FEATURES

### CONSTRUCTION AND REFRIGERATION

- **WATER FLOW SWITCH**

Paddle type field adjustable flow switch for water cooler circuits, Interlock into safety circuits so that the unit will remain off unit water flow is determine.

- **PRESSURE GAUGES:**

Suction & discharge pressure gauges

- **PROTECTIVE COATING FOR COPPER/ALUMINUM FINS CONDENSER COILS**

For seashore or acid corrosive environment.

- **UNIT MOUNTING SPRING ISOLATORS**

Spring type or rubber-in-shear (neoprene friction pad) vibration isolators are available for field installation under the unit base rails assembly on sound sensitive applications. Vibration isolators are recommended for all mounted installations or wherever vibration transmission is a consideration. **(Field Installed)**

### ELECTRICAL

- **NON-FUSED MAIN DISCONNECT SWITCHES**

De-energize power supply during servicing/repair works as well as with door interlock.

- **COOLER HEATER TAPE**

Prevent freezing up of water on low ambient.

- **GROUND CURRENT PROTECTION**

Additional protection for compressor in the case of abnormal current leakage.

- **EXTERNAL OVER LOAD RELAY**

Overload relay can be provided for Condenser fan Motor.

- **BUILDING MANAGEMENT SYSTEM (BMS)**

MODBUS & BACNET protocol.

- **COMPRESSOR CIRCUIT BREAKERS**

Protects compressor against overload and short circuit. When tripped, the breaker opens the power supply to the compressor. These circuit breakers are provided with thermal adjustable switch for precise over load setting.

## PHYSICAL DATA

UNIT MODEL (ACC)		03	04	05	07	010	012	015	017
COOLING CAPACITY *	TR	3.1	4.0	5.3	7.0	10.0	12.4	14.9	17.1
	kW	10.9	14.1	18.5	24.7	35.1	43.7	52.4	60.1
COMPRESSOR		Hermetic Scroll							
QUANTITY	(No.)	1	1	1	1	2	2	2	2
REFRIGERANT		R-407C							
CONDENSER - Type		Enhanced Fins and Tubes							
ROW /FPI		2/14	2/14	2/14	2/14	2/14	2/14	3/14	3/14
TOTAL AREA	(Sq.ft)	15.3	15.3	18.3	22.9	32.0	39.0	39.0	39.0
CONDENSER FAN		Propeller Direct Driven (Axial)							
QUANTITY	(No.)	1	1	1	1	2	2	2	2
AIR FLOW	(CFM)	3605	3605	6995	6995	10000	18300	18300	18300
COOLER		Direct Expansion Brazed Plate Heat Exchanger							
QUANTITY	(No.)	1	1	1	1	1	1	1	1
WATER CONNECTION SIZE (IN/OUT) DIAMETER	(in)	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2
CONNECTION TYPE		NPT Threaded Male							
EXPANSION DEVICE		Thermostatic							
GENERAL									
REFRIGERATION CIRCUITS	(No.)	1	1	1	1	2	2	2	2
REFRIGERANT CHARGE (Comp 1/comp 2)	(Kg)	2.3	3.0	3.8	5.3	7.5	9.0	11.3	12.8
OPERATING WEIGHT	(Kg)	139.3	172.8	192.4	270.2	303.0	494.4	540.2	546.0

\* Capacity Rating are Based on AHRI Standard 550/590 Conditions Of 95°F (35°C) Ambient, 44°F (6.7°C) Leaving Chilled Water Temperature, 10°F (6°C) Range and 0.0001 h-ft<sup>2</sup>·°F/Btu (0.000018 m<sup>2</sup>·°C/W) Fouling factor.

## ELECTRICAL DATA

Model #	Supply Voltage: (415v-3ph-50hz)		Compressor Type-1			Compressor Type-2			Condenser fan motor			MCA	MOCP
	Min.	Max.	RLA (Ea)	LRA (Ea)	Qty	RLA (Ea)	LRA (Ea)	Qty	FLA (Ea)	Qty	Total Kw		
ACC-03	374	457	7.9	50.0	1	-	-	-	1.4	1	0.69	11.3	15
ACC-04	374	457	10.0	65.5	1	-	-	-	1.4	1	0.69	13.9	20
ACC-05	374	457	12.1	101.0	1	-	-	-	2.4	1	0.75	17.5	25
ACC-07	374	457	17.3	111.0	1	-	-	-	2.4	1	0.75	24.0	40
ACC-010	374	457	10.0	74.0	1	10.0	74.0	1	1.6	2	1.11	25.7	35
ACC-012	374	457	16.4	95.0	1	16.4	95.0	1	3.0	2	2.24	42.9	50
ACC-015	374	457	17.3	111.0	1	17.3	111.0	1	3.0	2	2.24	44.9	60
ACC-017	374	457	19.2	118.0	1	19.2	118.0	1	3.0	2	2.24	49.2	60

### Legend:

RLA Rated Load Amps  
LRA Locked Rotor Amp

FLA Full Load Amps  
MCA Minimum Circuit Ampacity as per NEC 430-24

MOCP Maximum Over Current Protection

### Note:

- i Main power must be provided from a single field supply with mounted fused disconnects using dual element time delay fuse or circuit breaker.
- ii Neutral line is required on 415V-3Ph-50Hz(4Wires) power supply.
- iii The compressor crankcase heaters must be energized for 12 hours before the unit is initially started or after a prolonged power failure.
- iv The  $\pm 10\%$  voltage variation from the nominal is allowed for a short time only, not permanent.
- v All field wiring must be in accordance with NEC or local standard.

## CORRECTION FACTOR TABLES

### Altitude Correction Factor:

The Unit ratings are based on sea level.

This correction factor is to be used for above sea level in order to get the required cooling capacity.

See table (1-a) and table (1-b)

ELEVATION ABOVE SEA LEVEL (F.T.)	CAPACITY CORRECTION FACTOR
0	1.00
2000	0.99
4000	0.98
6000	0.97
8000	0.96
10000	0.96

TABLE (1-a)

ELEVATION ABOVE SEA LEVEL (METER)	CAPACITY CORRECTION FACTOR
0	1.00
600	0.99
1200	0.98
1800	0.97
2400	0.96
3000	0.96

TABLE (1-b)

### Cooler Fouling Correction Factor:

The Chillers are rated at a fouling factor of 0.00010 ft<sup>2</sup>.hr.°F/btu (0.000018 m<sup>2</sup>.°C/W)

This correction factor is to be used for other fouling factor values in order to get the required cooling capacity and power input.

See table (2-a) and table (2-b)

EVAPORATOR FOULING FACTOR (h-ft <sup>2</sup> .°F/Btu)	CAPACITY CORRECTION FACTOR	POWER INPUT FACTORS	AHRI STANDARDS
0.00010	1.000	1.000	AHRI-550/590
0.00025	0.992	0.997	AHRI-550/590
0.00050	0.978	0.990	AHRI-550/590
0.00075	0.965	0.984	
0.00100	0.951	0.978	

TABLE (2-a)

EVAPORATOR FOULING FACTOR (m <sup>2</sup> .°C/W)	CAPACITY CORRECTION FACTOR	POWER INPUT FACTORS	AHRI STANDARDS
0.000018	1.000	1.000	AHRI-550/590
0.000044	0.992	0.997	AHRI-550/590
0.000088	0.978	0.990	AHRI-550/590
0.000132	0.965	0.984	
0.000176	0.951	0.978	

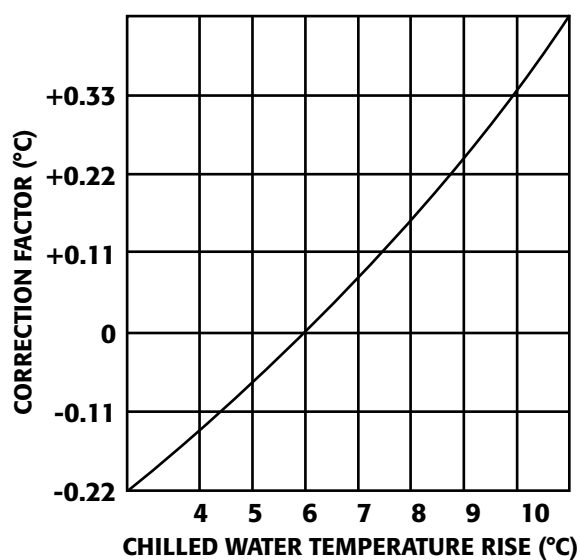
TABLE (2-b)

## CORRECTION FACTOR CURVES

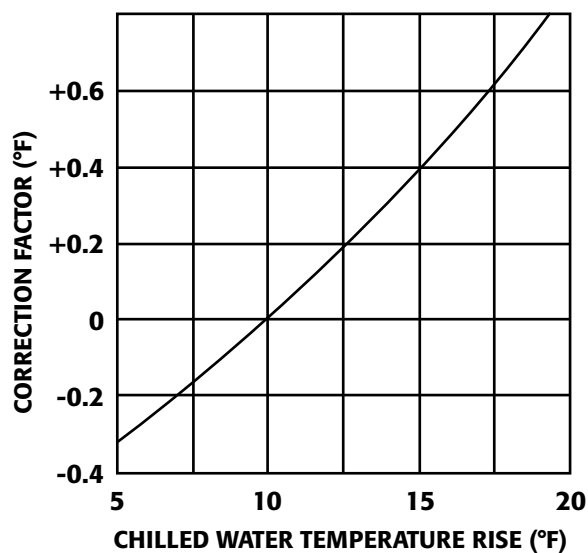
### • $\Delta T$ Correction Factor :

Cooling Capacity ratings are based on 10 °F (6 °C) for Chilled water  $\Delta T$ .

This correction factor is to be used for other range of  $\Delta T$  in order to get the required cooling capacity .  
See Curve (1-a) and Curve (1-b)



Curve (1-a)



Curve (1-b)



## SELECTION PROCEDURE

Coollex ACC Chiller should be selected with specific Design considerations, requirements and parameters of the intended application. Sample of the selection procedures are shown below:

### Example 1 ( English system)

- Design requirement
  - 1-Cooling Capacity in tons (TR)
  - 2- Leaving chilled water temperature in °F (LCWT)
  - 3- Chilled water flow rate in GPM
  - 4- Chilled water cooling range in °F
  - 5- Design ambient temperature in °F
  - 6- Altitude
  - 7- Electrical power supply

### ● Selection sample

Select an air cooled chiller giving capacity of 10 TR to cool water from 54°F to 44°F ,altitude is 2000 ft above sea level ,water cooler fouling Factor is 0.00010 ft<sup>2</sup>.hr.°F/Btu , design ambient temperature is 95°F and power supply is 415V/3Ph/50Hz

### STEP-1

Entering the capacity performance data at given LCWT and ambient temperature. ACC-010 chiller unit at sea level will produce 10.0 tons and 8.8 kW compressor Power input at 44°F leaving chilled water temperature with 10°F water temperature difference and 95°F ambient temperature.

For the conditions required, apply the correction factors for altitude 0.99 table (1-a) and fouling factor 1 table (2-a) for actual unit capacity and actual power input

Capacity=10.0x0.99x1=9.90 TR, which then exceeds the requirements. So the selection is correct

Power input =8.8x1=8.8 KW

### Example 2 ( Metric system)

- Design requirement
  - 1-Cooling Capacity in kilowatt (kW)
  - 2- Leaving chilled water temperature in °C (LCWT)
  - 3- Chilled water flow rate in LPS
  - 4- Chilled water cooling range in °C
  - 5- Design ambient temperature in °C
  - 6- Altitude
  - 7- Electrical power supply

### ● Selection sample

Select an air cooled chiller giving capacity of 35.2 kW to cool water from 12.2°C to 6.7°C ,altitude is 600 meter above sea level, water cooler fouling Factor is 0.000018 m<sup>2</sup>.°C/w, design ambient temperature is 35°C and power supply is 415V/3Ph/50Hz

### STEP-1

Entering the capacity performance data at given LCWT and ambient temperature. ACC-010 chiller unit at sea level will produce 35.2 kW and 8.8 kW compressors Power input at 6.7°C leaving chilled water temperature with 5.5°C water temperature difference and 35°C ambient temperature.

For the conditions required, apply the correction factors for altitude 0.99 table (1-b) and fouling factor1 table (2-b) for actual unit capacity and actual power input

Capacity=35.2x0.99x1= 34.8 kW, which then exceeds the requirements. So the selection is correct

Power input =8.8x1=8.8 KW

## SELECTION PROCEDURE

### STEP-2

#### ● CHILLED WATER FLOW (GPM):

$$\text{Water GPM} = \frac{\text{Rated capacity (Tons)} \times 24}{\text{Cooling Range, } \Delta T}$$

$$= \frac{10 \times 24}{10} = 24.0 \text{ GPM}$$

Referring to pressure drop curve (page # 16),

Pressure drop at 24.0 GPM = 11.1ft.H<sub>2</sub>O of water for selected model.

### STEP-2

#### ● CHILLED WATER FLOW (LPS):

$$\text{Water LPS} = \frac{\text{Rated capacity (KW)} \times 0.239}{\text{Cooling Range, } \Delta T}$$

$$= \frac{35.2 \times 0.239}{5.5} = 1.53 \text{ LPS}$$

Referring to pressure drop curve (page # 16),

Pressure drop at 1.53 LPS = 33.18 kPa of water for selected model.

## NOTES:

### 1- ELECTRICAL

Refer to electrical data at 415V/3Ph/50Hz, the main power wire size for ACC-010 is to be sized for a minimum circuit ampacity (MCA) of 25.7 Amps and maximum over current protection (MOCP) of 35 Amps.

### 2- CHILLED WATER PUMP SELECTION

For chilled water pump selection, add all pressure drop in the closed chilled water loop piping to the pressure drop calculated step 2.

### 3- LCWT CORRECTION

Refer to curve (1-a) & (1-b) Add correction factor to design leaving chilled water temperature (LCWT) when chilled water temperature range is above 10°F or 6°C and subtract correction from design leaving chilled water temperature (LCWT) when water temperature range is below 10°F or 6°C.

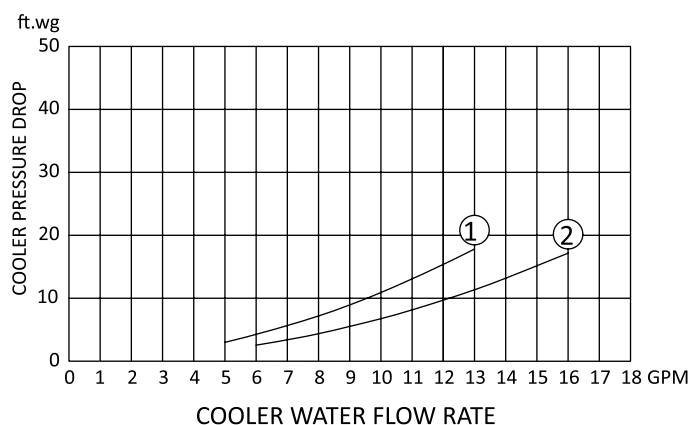
## WATER FLOW LIMIT AND COOLER WATER PRESSURE DROP CURVES

CURVE NO.	1	2		3	4		5	
MODELS	ACC-03	ACC-04	ACC-05	ACC-07	ACC-010	ACC-012	ACC-015	ACC-017
MINIMUM GPM	5	6		10	13		18	
Maximum GPM	13	16		26	31		41	

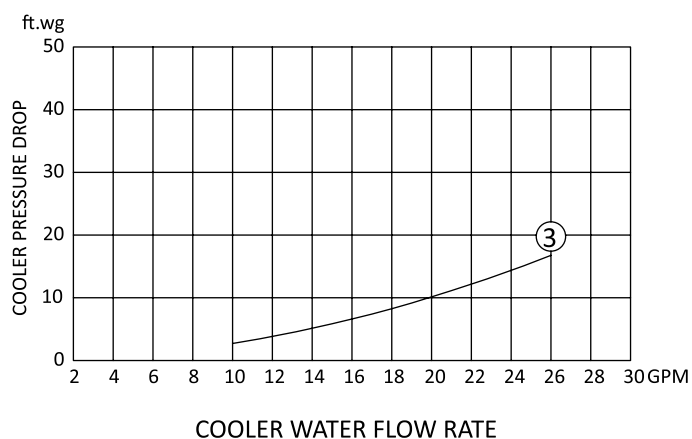
CONVERSION : GPM = 0.063 L/S  
FACTOR : ftH<sub>2</sub>O = 2.989 kPa

NOTES: 1- If the water flow rate outside these limits, please consult the factory.

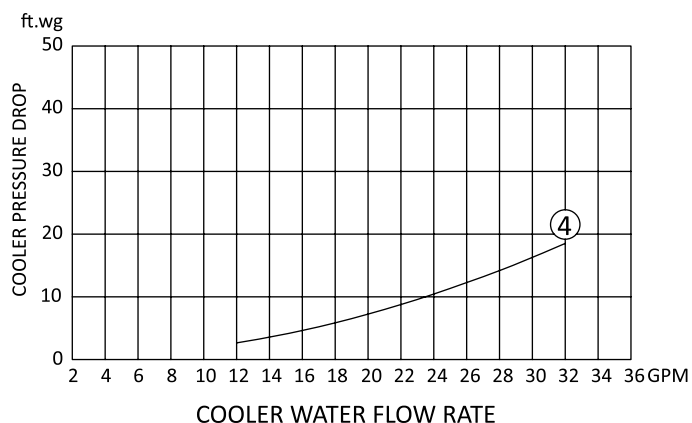
**ACC-03, 04, 05**



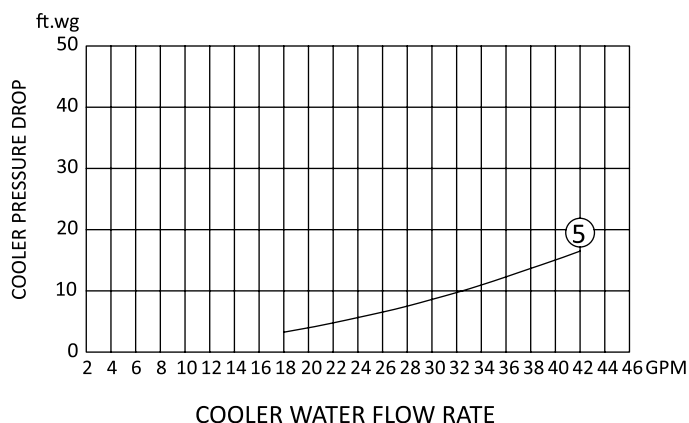
**ACC-07**



**ACC-010, 012**



**ACC-015, 017**



## PERFORMANCE DATA TABLES-ENGLISH SYSTEM

LEAVING CHILLED WATER TEMP. (LCWT)	UNIT SIZE	95°F AMBIENT TEMPERATURE				105°F AMBIENT TEMPERATURE				115°F AMBIENT TEMPERATURE				118.4°F AMBIENT TEMPERATURE				125°F AMBIENT TEMPERATURE			
		CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)
40°F	ACC-03	2.9	2.8	6.9	5.3	2.7	3.2	6.5	5.1	2.6	3.6	6.1	4.2	2.5	3.7	5.9	3.9	2.4	4.0	5.7	3.9
	ACC-04	3.7	3.7	8.9	5.3	3.5	4.2	8.5	5.1	3.3	4.7	7.9	4.2	3.2	4.9	7.8	4.4	3.1	5.1	7.5	3.9
	ACC-05	4.4	4.6	10.6	8.8	4.4	5.2	10.6	7.9	4.1	5.8	9.8	7.4	4.0	6.0	9.5	6.7	4.1	6.5	9.9	6.5
	ACC-07	6.4	6.2	15.4	6.2	6.1	7.0	14.6	5.5	5.7	8.0	13.7	4.9	5.6	8.1	13.4	4.6	5.4	8.7	13.0	4.2
	ACC-010	9.2	8.6	22.2	7.9	8.7	9.8	20.9	6.9	8.9	11.0	21.5	6.0	8.0	11.5	19.2	6.0	7.5	12.5	18.1	5.3
	ACC-012	12.4	10.9	29.7	13.6	10.9	12.3	26.2	12.2	10.1	13.9	24.2	10.4	9.6	14.5	23.1	9.9	9.2	15.7	22.0	9.0
	ACC-015	13.6	11.8	32.6	9.7	12.8	13.3	30.8	8.5	12.2	14.9	29.2	7.4	11.8	15.5	28.4	7.4	12.0	16.7	28.8	6.5
	ACC-017	14.2	14.1	34.0	12.5	14.1	15.9	33.8	11.3	13.2	17.9	31.6	9.7	12.9	18.7	30.9	9.2	12.3	20.2	29.6	8.5

42°F	ACC-03	3.0	2.8	7.2	5.8	2.8	3.2	6.8	5.3	2.7	3.6	6.4	4.6	2.6	3.8	6.2	4.4	2.5	4.1	6.0	4.2
	ACC-04	3.9	3.8	9.3	5.8	3.7	4.2	8.8	5.3	3.4	4.7	8.2	4.6	3.4	4.9	8.1	4.6	3.2	5.2	7.8	4.2
	ACC-05	4.8	4.6	11.6	9.5	4.6	5.2	11.0	8.5	4.3	5.9	10.4	7.9	4.2	6.1	10.2	7.4	4.3	6.6	10.2	6.9
	ACC-07	6.7	6.3	16.2	6.7	6.4	7.0	15.3	6.0	6.0	8.0	14.3	5.3	5.8	8.2	14.0	5.1	5.6	8.8	13.4	4.6
	ACC-010	9.6	8.7	23.1	8.5	9.1	9.8	21.7	7.6	8.9	11.1	21.3	6.7	8.3	11.6	19.9	6.5	7.9	12.6	18.9	5.8
	ACC-012	12.4	11.0	29.7	14.8	11.3	12.4	27.1	13.2	10.5	14.0	25.2	11.3	10.3	14.6	24.6	10.9	9.7	15.8	23.2	9.7
	ACC-015	14.2	11.9	34.2	10.6	13.4	13.4	32.2	9.5	12.7	15.0	30.4	8.3	12.3	15.6	29.6	8.1	12.4	16.8	29.8	7.2
	ACC-017	15.6	14.2	37.5	13.6	14.7	16.0	35.3	12.2	13.8	18.1	33.1	10.6	13.4	18.8	32.2	10.2	12.8	20.4	30.7	9.2

44°F	ACC-03	3.1	2.8	7.4	6.2	2.9	3.2	7.0	5.5	2.8	3.6	6.6	5.1	2.7	3.8	6.5	4.9	2.6	4.1	6.2	4.4
	ACC-04	4.0	3.8	9.6	6.2	3.8	4.3	9.1	5.5	3.6	4.8	8.6	5.1	3.5	5.0	8.4	4.9	3.3	5.3	8.0	4.4
	ACC-05	5.3	4.6	12.6	10.2	4.8	5.2	11.4	9.2	4.6	5.9	11.0	8.3	4.5	6.2	10.8	8.1	4.4	6.6	10.6	7.4
	ACC-07	7.0	6.3	16.9	7.2	6.6	7.1	15.9	6.5	6.2	7.9	15.0	5.8	6.1	8.2	14.6	5.5	5.8	8.9	13.9	5.1
	ACC-010	10.0	8.8	23.9	9.2	9.4	9.9	22.6	8.3	8.8	11.2	21.2	7.4	8.6	11.7	20.7	6.9	8.2	12.7	19.7	6.2
	ACC-012	12.4	11.0	29.8	15.9	11.7	12.5	28.1	14.1	10.9	14.1	26.2	12.2	10.9	14.7	26.1	11.8	10.2	15.9	24.4	10.4
	ACC-015	14.9	12.0	35.7	11.6	14.0	13.4	33.6	10.4	13.2	15.1	31.6	9.2	12.8	15.7	30.8	8.8	12.9	16.9	30.9	7.9
	ACC-017	17.1	14.3	41.0	14.8	15.3	16.2	36.8	13.2	14.4	18.2	34.6	11.6	14.0	19.0	33.6	11.1	13.3	20.6	31.9	9.9

### NOTES:

- 1- The ACC chillers are rated with ARI - 550/590 standard.
- 2- (CAP.) Capacity ratings (Tons) are based on (10°F) water range , (0.0001 h-ft<sup>2</sup>·°F/Btu) fouling factor in evaporator and zero altitude.
- 3- Direct interpolation is permissible. Do not extrapolate.
- 4- (LCWT) Leaving chilled water temperature.
- 5- Power input (kW) is for compressor (COMP.) only.
- 6- (WFR) Water flow rate in Gallons Per Minute (GPM).
- 7- (WFD) Water pressure drop (ft.wg).

## PERFORMANCE DATA TABLES-ENGLISH SYSTEM

LEAVING CHILLED WATER TEMP. (LCWT)	UNIT SIZE	95°F AMBIENT TEMPERATURE				105°F AMBIENT TEMPERATURE				115°F AMBIENT TEMPERATURE				118.4°F AMBIENT TEMPERATURE				125°F AMBIENT TEMPERATURE			
		CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)	CAP. (Tons)	COMP. (kW)	WFR (GPM)	WPD (ft.wg)
46°F	ACC-03	3.2	2.8	7.7	6.7	3.0	3.2	7.3	5.8	2.9	3.7	6.8	5.5	2.8	3.8	6.8	5.3	2.7	4.1	6.4	4.6
	ACC-04	4.2	3.8	10.0	6.7	3.9	4.3	9.4	5.8	3.7	4.8	8.9	5.5	3.6	5.0	8.7	5.1	3.4	5.4	8.3	4.6
	ACC-05	5.7	4.7	13.6	10.9	4.9	5.3	11.9	9.9	4.9	6.0	11.6	8.8	4.8	6.2	11.4	8.8	4.6	6.7	10.9	7.9
	ACC-07	7.3	6.4	17.6	7.6	6.9	7.2	16.5	6.9	6.5	7.9	15.6	6.2	6.3	8.3	15.2	6.0	6.0	9.0	14.3	5.5
	ACC-010	10.3	8.9	24.8	9.9	9.8	10.0	23.4	9.0	8.8	11.3	21.0	8.1	8.9	11.8	21.4	7.4	8.5	12.8	20.5	6.7
	ACC-012	12.5	11.1	29.9	17.1	12.1	12.5	29.1	15.0	11.3	14.2	27.2	13.2	11.5	14.8	27.6	12.7	10.6	16.0	25.5	11.1
	ACC-015	15.5	12.1	37.3	12.5	14.6	13.5	35.0	11.3	13.6	15.2	32.8	10.2	13.3	15.8	31.9	9.5	13.3	17.0	31.9	8.5
	ACC-017	18.6	14.5	44.5	15.9	15.9	16.3	38.3	14.1	15.0	18.4	36.1	12.5	14.5	19.1	34.9	12.0	13.8	20.8	33.1	10.6

48°F	ACC-03	3.3	2.8	8.0	7.2	3.2	3.2	7.6	6.0	3.0	3.7	7.1	6.0	3.0	3.8	7.1	5.8	2.8	4.2	6.6	4.9
	ACC-04	4.3	3.9	10.3	7.2	4.1	4.4	9.8	6.0	3.9	4.9	9.3	6.0	3.7	5.1	9.0	5.3	3.5	5.5	8.5	4.9
	ACC-05	6.1	4.7	14.6	11.6	5.1	5.3	12.3	10.6	5.1	6.0	12.3	9.2	5.0	6.3	12.0	9.5	4.7	6.7	11.3	8.3
	ACC-07	7.6	6.4	18.3	8.1	7.2	7.2	17.2	7.4	6.8	7.8	16.2	6.7	6.6	8.4	15.8	6.5	6.2	9.1	14.8	6.0
	ACC-010	10.7	8.9	25.7	10.6	10.1	10.1	24.3	9.7	8.7	11.4	20.9	8.8	9.2	11.8	22.2	7.9	8.9	12.9	21.2	7.2
	ACC-012	12.5	11.2	30.0	18.2	12.5	12.6	30.1	15.9	11.7	14.3	28.2	14.1	12.2	14.9	29.2	13.6	11.1	16.1	26.7	11.8
	ACC-015	16.2	12.1	38.9	13.4	15.2	13.6	36.4	12.2	14.1	15.3	33.9	11.1	13.8	15.9	33.1	10.2	13.7	17.2	32.9	9.2
	ACC-017	20.0	14.6	48.0	17.1	16.6	16.5	39.7	15.0	15.7	18.6	37.6	13.4	15.1	19.3	36.2	12.9	14.3	21.0	34.3	11.3

50°F	ACC-03	3.5	2.8	8.3	7.6	3.3	3.2	7.8	6.2	3.1	3.7	7.3	6.5	3.1	3.8	7.4	6.2	2.8	4.2	6.8	5.1
	ACC-04	4.5	3.9	10.7	7.6	4.2	4.4	10.1	6.2	4.0	4.9	9.6	6.5	3.9	5.1	9.3	5.5	3.7	5.5	8.8	5.1
	ACC-05	6.5	4.7	15.6	12.2	5.3	5.3	12.7	11.3	5.4	6.0	12.9	9.7	5.3	6.3	12.6	10.2	4.8	6.7	11.6	8.8
	ACC-07	7.9	6.4	19.0	8.5	7.4	7.2	17.8	7.9	7.0	7.8	16.9	7.2	6.9	8.4	16.5	6.9	6.3	9.1	15.2	6.5
	ACC-010	11.1	8.9	26.6	11.3	10.5	10.1	25.1	10.4	8.6	11.4	20.7	9.5	9.6	11.8	22.9	8.3	9.2	12.9	22.0	7.6
	ACC-012	12.5	11.2	30.0	19.4	13.0	12.6	31.1	16.9	12.2	14.3	29.2	15.0	12.8	14.9	30.7	14.6	11.6	16.1	27.9	12.5
	ACC-015	16.8	12.1	40.4	14.3	15.7	13.6	37.7	13.2	14.6	15.3	35.1	12.0	14.3	15.9	34.2	10.9	14.2	17.2	34.0	9.9
	ACC-017	21.5	14.6	51.5	18.2	17.2	16.5	41.2	15.9	16.3	18.6	39.0	14.3	15.6	19.3	37.5	13.9	14.8	21.0	35.4	12.0

### NOTES:

- 1- The ACC chillers are rated with ARI - 550/590 standard.
- 2- (CAP.) Capacity ratings (Tons) are based on (10°F) water range , (0.0001 h-ft<sup>2</sup>·°F/Btu) fouling factor in evaporator and zero altitude.
- 3- Direct interpolation is permissible. Do not extrapolate.
- 4- (LCWT) Leaving chilled water temperature.
- 5- Power input (kW) is for compressor (COMP.) only.
- 6- (WFR) Water flow rate in Gallons Per Minute (GPM).
- 7- (WPD) Water pressure drop (ft.wg).

## PERFORMANCE DATA TABLES-METRIC SYSTEM

LEAVING CHILLED WATER TEMP. (LCWT)	UNIT SIZE	35°C AMBIENT TEMPERATURE				40°C AMBIENT TEMPERATURE				46°C AMBIENT TEMPERATURE				48°C AMBIENT TEMPERATURE				52°C AMBIENT TEMPERATURE			
		CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)
4.5°C	ACC-03	10.1	2.8	0.4	15.9	9.5	3.2	0.4	15.2	9.0	3.6	0.4	12.4	8.7	3.7	0.4	11.7	8.4	4.0	0.4	11.7
	ACC-04	13.1	3.7	0.6	15.9	12.4	4.2	0.5	15.2	11.6	4.7	0.5	12.4	11.4	4.9	0.5	13.1	11.0	5.1	0.5	11.7
	ACC-05	15.5	4.6	0.7	26.2	15.5	5.2	0.7	23.5	14.3	5.8	0.6	22.1	14.0	6.0	0.6	20.0	14.5	6.5	0.6	19.3
	ACC-07	22.6	6.2	1.0	18.6	21.5	7.0	0.9	16.6	20.1	8.0	0.9	14.5	19.6	8.1	0.8	13.8	19.0	8.7	0.8	12.4
	ACC-010	32.5	8.6	1.4	23.5	30.6	9.8	1.3	20.7	31.5	11.0	1.4	18.0	28.1	11.5	1.2	18.0	26.6	12.5	1.1	15.9
	ACC-012	43.5	10.9	1.9	40.7	38.3	12.3	1.7	36.6	35.5	13.9	1.5	31.1	33.9	14.5	1.5	29.7	32.3	15.7	1.4	26.9
	ACC-015	47.8	11.8	2.1	29.0	45.2	13.3	1.9	25.5	42.8	14.9	1.8	22.1	41.7	15.5	1.8	22.1	42.2	16.7	1.8	19.3
	ACC-017	49.8	14.1	2.1	37.3	49.5	15.9	2.1	33.8	46.3	17.9	2.0	29.0	45.3	18.7	2.0	27.6	43.3	20.2	1.9	25.5

5.6°C	ACC-03	10.5	2.8	0.5	17.3	9.9	3.2	0.4	15.9	9.3	3.6	0.4	13.8	9.1	3.8	0.4	13.1	8.7	4.1	0.4	12.4
	ACC-04	13.6	3.8	0.6	17.3	12.9	4.2	0.6	15.9	12.1	4.7	0.5	13.8	11.9	4.9	0.5	13.8	11.4	5.2	0.5	12.4
	ACC-05	17.0	4.6	0.7	28.3	16.1	5.2	0.7	25.5	15.2	5.9	0.7	23.5	14.9	6.1	0.6	22.1	15.0	6.6	0.6	20.7
	ACC-07	23.7	6.3	1.0	20.0	22.4	7.0	1.0	18.0	21.0	8.0	0.9	15.9	20.5	8.2	0.9	15.2	19.7	8.8	0.8	13.8
	ACC-010	33.8	8.7	1.5	25.5	31.8	9.8	1.4	22.8	31.2	11.1	1.3	20.0	29.2	11.6	1.3	19.3	27.7	12.6	1.2	17.3
	ACC-012	43.6	11.0	1.9	44.2	39.8	12.4	1.7	39.4	37.0	14.0	1.6	33.8	36.1	14.6	1.6	32.5	34.0	15.8	1.5	29.0
	ACC-015	50.1	11.9	2.2	31.8	47.2	13.4	2.0	28.3	44.5	15.0	1.9	24.9	43.4	15.6	1.9	24.2	43.7	16.8	1.9	21.4
	ACC-017	55.0	14.2	2.4	40.7	51.7	16.0	2.2	36.6	48.5	18.1	2.1	31.8	47.2	18.8	2.0	30.4	45.1	20.4	1.9	27.6

6.7°C	ACC-03	10.9	2.8	0.5	18.6	10.3	3.2	0.4	16.6	9.7	3.6	0.4	15.2	9.5	3.8	0.4	14.5	9.0	4.1	0.4	13.1
	ACC-04	14.1	3.8	0.6	18.6	13.4	4.3	0.6	16.6	12.6	4.8	0.5	15.2	12.3	5.0	0.5	14.5	11.7	5.3	0.5	13.1
	ACC-05	18.5	4.6	0.8	30.4	16.7	5.2	0.7	27.6	16.1	5.9	0.7	24.9	15.8	6.2	0.7	24.2	15.5	6.6	0.7	22.1
	ACC-07	24.7	6.3	1.1	21.4	23.3	7.1	1.0	19.3	21.9	7.9	0.9	17.3	21.4	8.2	0.9	16.6	20.3	8.9	0.9	15.2
	ACC-010	35.1	8.8	1.5	27.6	33.1	9.9	1.4	24.9	31.0	11.2	1.3	22.1	30.3	11.7	1.3	20.7	28.8	12.7	1.2	18.6
	ACC-012	43.7	11.0	1.9	47.6	41.2	12.5	1.8	42.1	38.4	14.1	1.7	36.6	38.3	14.7	1.6	35.2	35.7	15.9	1.5	31.1
	ACC-015	52.4	12.0	2.3	34.5	49.2	13.4	2.1	31.1	46.3	15.1	2.0	27.6	45.1	15.7	1.9	26.2	45.2	16.9	1.9	23.5
	ACC-017	60.1	14.3	2.6	44.2	53.9	16.2	2.3	39.4	50.7	18.2	2.2	34.5	49.2	19.0	2.1	33.1	46.8	20.6	2.0	29.7

### NOTES:

- 1- The ACC chillers are rated with ARI - 550/590 standard.
- 2- (CAP.) Capacity ratings (kW) are based on (5.5°C) water range, (0.000018 m<sup>2</sup>.°C/W) fouling factor in evaporator and zero altitude.
- 3- Direct interpolation is permissible. Do not extrapolate.
- 4- (LCWT) Leaving chilled water temperature.
- 5- Power input (kW) is for compressor (COMP.) only.
- 6- (WFR) Water flow rate in Liters Per Second (L/S).
- 7- (WPD) Water pressure drop (kPa).



## PERFORMANCE DATA TABLES-METRIC SYSTEM

LEAVING CHILLED WATER TEMP. (LCWT)	UNIT SIZE	35°C AMBIENT TEMPERATURE				40°C AMBIENT TEMPERATURE				46°C AMBIENT TEMPERATURE				48°C AMBIENT TEMPERATURE				52°C AMBIENT TEMPERATURE			
		CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)	CAP. (kW)	COMP. (kW)	WFR (L/S)	WPD (kPa)
7.8°C	ACC-03	11.3	2.8	0.5	20.0	10.7	3.2	0.5	17.3	10.0	3.7	0.4	16.6	10.0	3.8	0.4	15.9	9.4	4.1	0.4	13.8
	ACC-04	14.6	3.8	0.6	20.0	13.8	4.3	0.6	17.3	13.1	4.8	0.6	16.6	12.7	5.0	0.5	15.2	12.1	5.4	0.5	13.8
	ACC-05	19.9	4.7	0.9	32.5	17.4	5.3	0.7	29.7	17.1	6.0	0.7	26.2	16.7	6.2	0.7	26.2	16.0	6.7	0.7	23.5
	ACC-07	25.8	6.4	1.1	22.8	24.3	7.2	1.0	20.7	22.9	7.9	1.0	18.6	22.3	8.3	1.0	18.0	21.0	9.0	0.9	16.6
	ACC-010	36.4	8.9	1.6	29.7	34.3	10.0	1.5	26.9	30.8	11.3	1.3	24.2	31.4	11.8	1.4	22.1	30.0	12.8	1.3	20.0
	ACC-012	43.8	11.1	1.9	51.1	42.7	12.5	1.8	44.9	39.8	14.2	1.7	39.4	40.5	14.8	1.7	38.0	37.4	16.0	1.6	33.1
	ACC-015	54.7	12.1	2.4	37.3	51.3	13.5	2.2	33.8	48.0	15.2	2.1	30.4	46.8	15.8	2.0	28.3	46.7	17.0	2.0	25.5
	ACC-017	65.2	14.5	2.8	47.6	56.1	16.3	2.4	42.1	52.9	18.4	2.3	37.3	51.1	19.1	2.2	35.9	48.5	20.8	2.1	31.8

8.8°C	ACC-03	11.7	2.8	0.5	21.4	11.1	3.2	0.5	18.0	10.4	3.7	0.4	18.0	10.4	3.8	0.4	17.3	9.7	4.2	0.4	14.5
	ACC-04	15.1	3.9	0.7	21.4	14.3	4.4	0.6	18.0	13.6	4.9	0.6	18.0	13.2	5.1	0.6	15.9	12.5	5.5	0.5	14.5
	ACC-05	21.4	4.7	0.9	34.5	18.0	5.3	0.8	31.8	18.0	6.0	0.8	27.6	17.6	6.3	0.8	28.3	16.5	6.7	0.7	24.9
	ACC-07	26.8	6.4	1.2	24.2	25.2	7.2	1.1	22.1	23.8	7.8	1.0	20.0	23.2	8.4	1.0	19.3	21.6	9.1	0.9	18.0
	ACC-010	37.7	8.9	1.6	31.8	35.6	10.1	1.5	29.0	30.6	11.4	1.3	26.2	32.5	11.8	1.4	23.5	31.1	12.9	1.3	21.4
	ACC-012	43.9	11.2	1.9	54.5	44.1	12.6	1.9	47.6	41.3	14.3	1.8	42.1	42.7	14.9	1.8	40.7	39.1	16.1	1.7	35.2
	ACC-015	56.9	12.1	2.5	40.0	53.3	13.6	2.3	36.6	49.7	15.3	2.1	33.1	48.5	15.9	2.1	30.4	48.3	17.2	2.1	27.6
	ACC-017	70.4	14.6	3.0	51.1	58.2	16.5	2.5	44.9	55.0	18.6	2.4	40.0	53.0	19.3	2.3	38.7	50.2	21.0	2.2	33.8

10°C	ACC-03	12.2	2.8	0.5	22.8	11.5	3.2	0.5	18.6	10.7	3.7	0.5	19.3	10.8	3.8	0.5	18.6	10.0	4.2	0.4	15.2
	ACC-04	15.7	3.9	0.7	22.8	14.8	4.4	0.6	18.6	14.1	4.9	0.6	19.3	13.6	5.1	0.6	16.6	12.8	5.5	0.6	15.2
	ACC-05	22.9	4.7	1.0	36.6	18.6	5.3	0.8	33.8	18.9	6.0	0.8	29.0	18.5	6.3	0.8	30.4	17.0	6.7	0.7	26.2
	ACC-07	27.8	6.4	1.2	25.5	26.1	7.2	1.1	23.5	24.7	7.8	1.1	21.4	24.1	8.4	1.0	20.7	22.3	9.1	1.0	19.3
	ACC-010	39.0	8.9	1.7	33.8	36.9	10.1	1.6	31.1	30.4	11.4	1.3	28.3	33.6	11.8	1.4	24.9	32.3	12.9	1.4	22.8
	ACC-012	44.0	11.2	1.9	58.0	45.5	12.6	2.0	50.4	42.7	14.3	1.8	44.9	44.9	14.9	1.9	43.5	40.9	16.1	1.8	37.3
	ACC-015	59.2	12.1	2.6	42.8	55.3	13.6	2.4	39.4	51.5	15.3	2.2	35.9	50.2	15.9	2.2	32.5	49.8	17.2	2.1	29.7
	ACC-017	75.5	14.6	3.3	54.5	60.4	16.5	2.6	47.6	57.2	18.6	2.5	42.8	55.0	19.3	2.4	41.4	51.9	21.0	2.2	35.9

### NOTES:

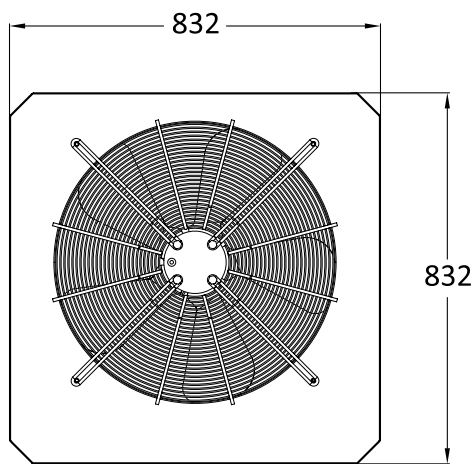
- 1- The ACC chillers are rated with ARI - 550/590 standard.
- 2- (CAP.) Capacity ratings (kW) are based on (5.5°C) water range, (0.000018 m<sup>2</sup>.°C/W) fouling factor in evaporator and zero altitude.
- 3- Direct interpolation is permissible. Do not extrapolate.
- 4- (LCWT) Leaving chilled water temperature.
- 5- Power input (kW) is for compressor (COMP.) only.
- 6- (WFR) Water flow rate in Liters Per Second (L/S).
- 7- (WPD) Water pressure drop (kPa).

## UNIT DIMENSIONS

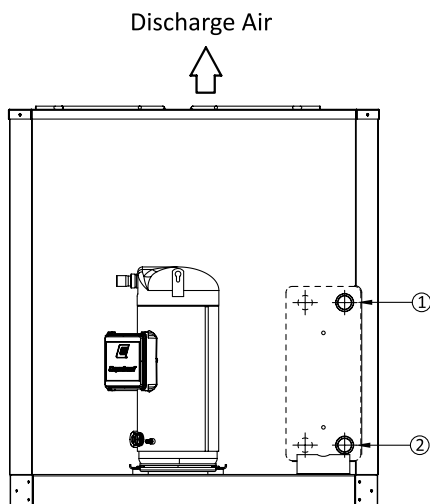
### ACC-03, 04

ALL DIMENSIONS ARE IN MM

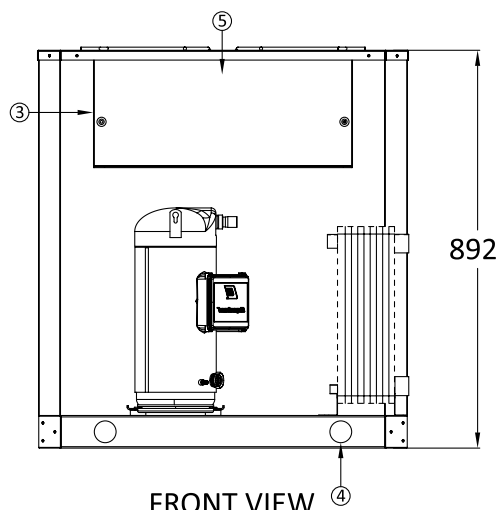
- ① Water In
- ② Water Out
- ③ Electrical Power Inlet
- ④ Lifting Points
- ⑤ Electrical Control Box



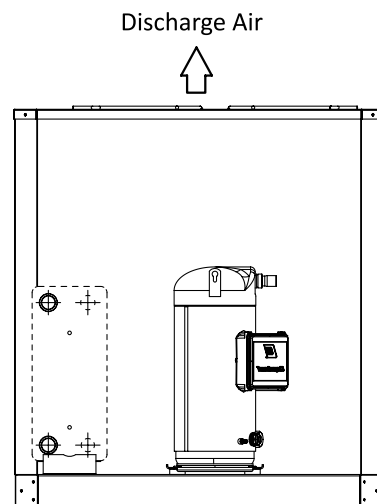
TOP VIEW



END VIEW



FRONT VIEW



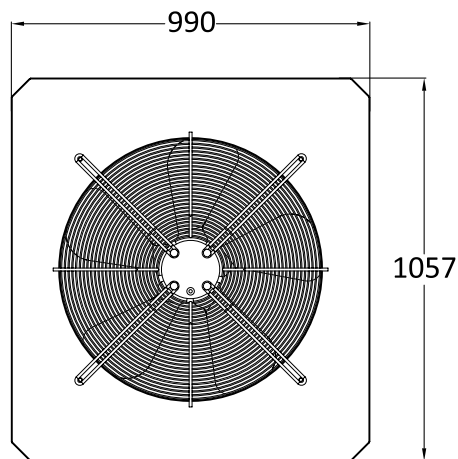
END VIEW

## UNIT DIMENSIONS

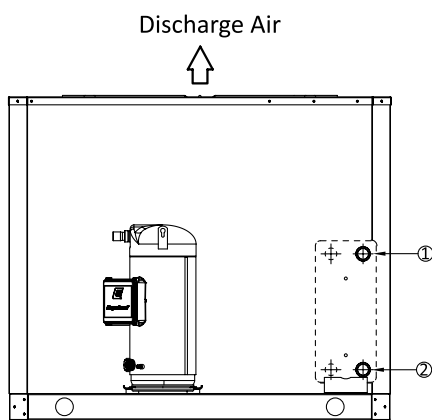
### ACC-05

ALL DIMENSIONS ARE IN MM

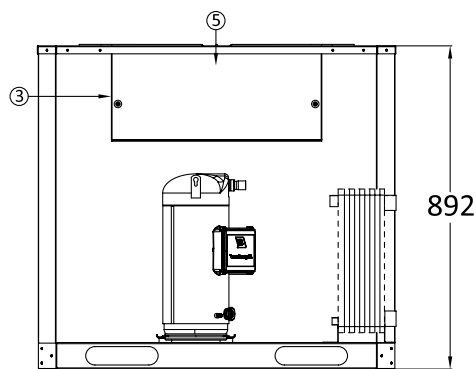
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- ③ Electrical Power Inlet
- ④ Lifting Points
- ⑤ Electrical Control Box



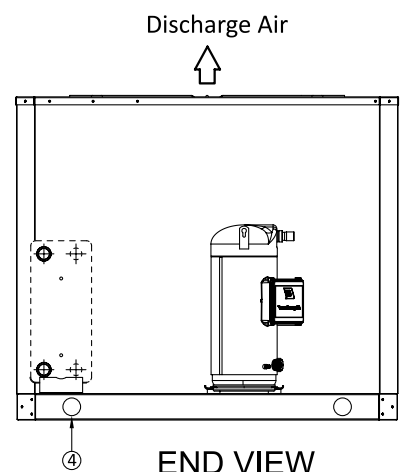
TOP VIEW



END VIEW



FRONT VIEW



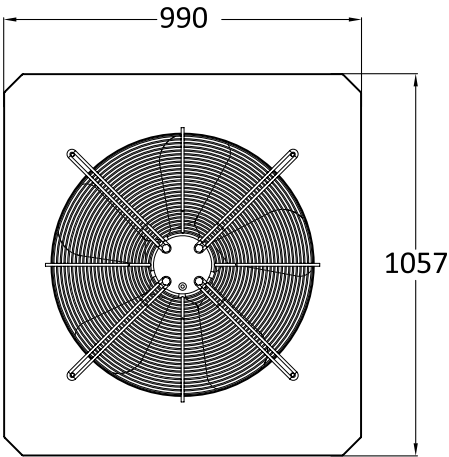
END VIEW

## UNIT DIMENSIONS

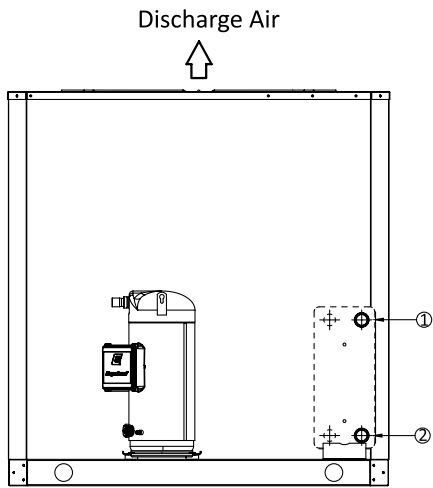
### ACC-07

ALL DIMENSIONS ARE IN MM

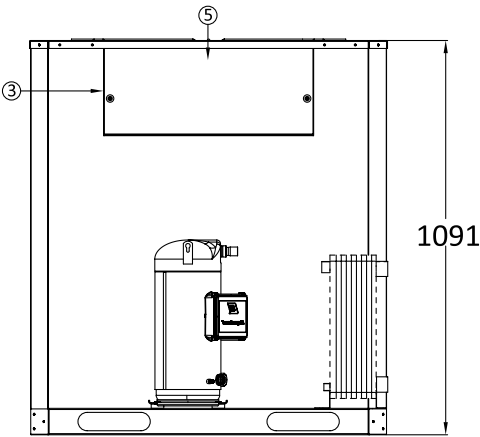
- ① Water In
- ② Water Out
- ③ Electrical Power Inlet
- ④ Lifting Points
- ⑤ Electrical Control Box



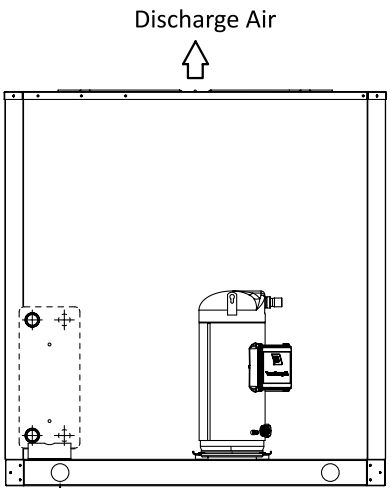
TOP VIEW



END VIEW



FRONT VIEW



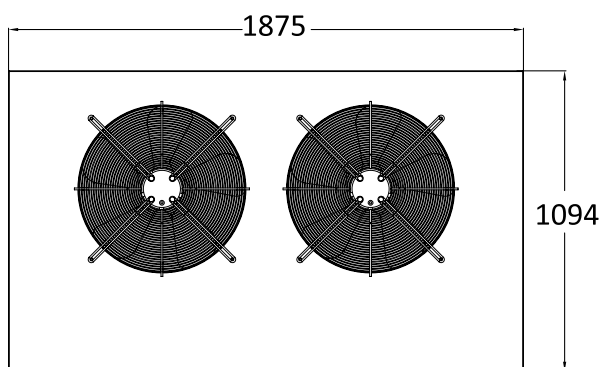
END VIEW

## UNIT DIMENSIONS

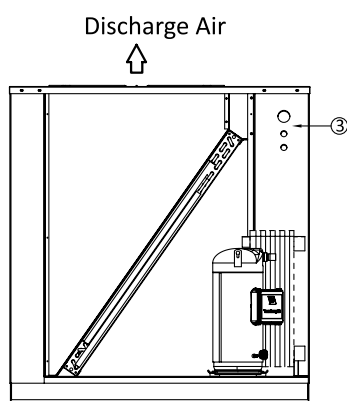
### ACC-010

ALL DIMENSIONS ARE IN MM

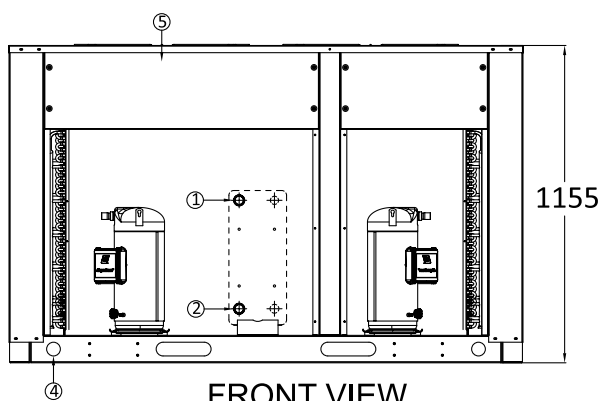
- ① Water In
- ② Water Out
- ③ Electrical Power Inlet
- ④ Lifting Points
- ⑤ Electrical Control Box



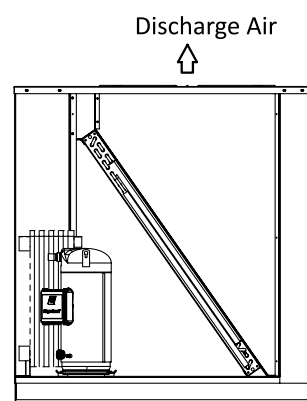
TOP VIEW



END VIEW



FRONT VIEW



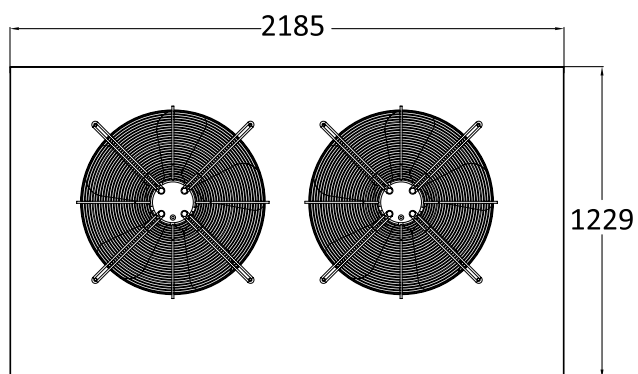
END VIEW

## UNIT DIMENSIONS

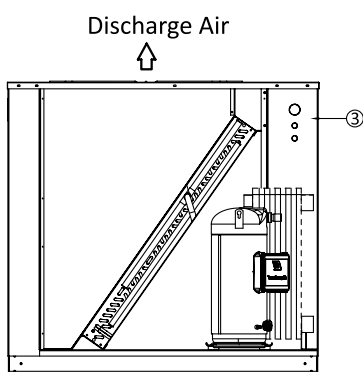
**ACC-012, 015, 017**

ALL DIMENSIONS ARE IN MM

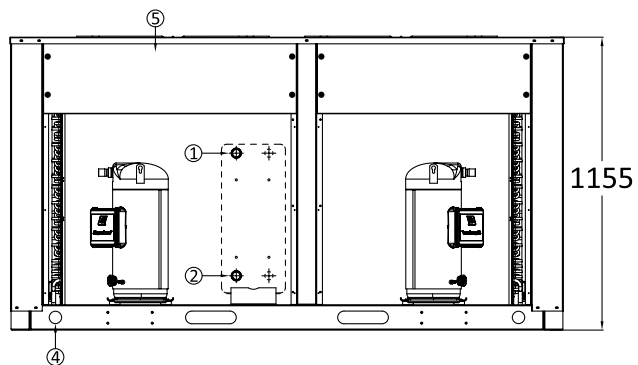
- ① Water In
- ② Water Out
- ③ Electrical Power Inlet
- ④ Lifting Points
- ⑤ Electrical Control Box



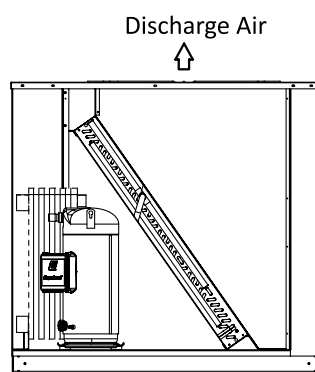
**TOP VIEW**



**END VIEW**



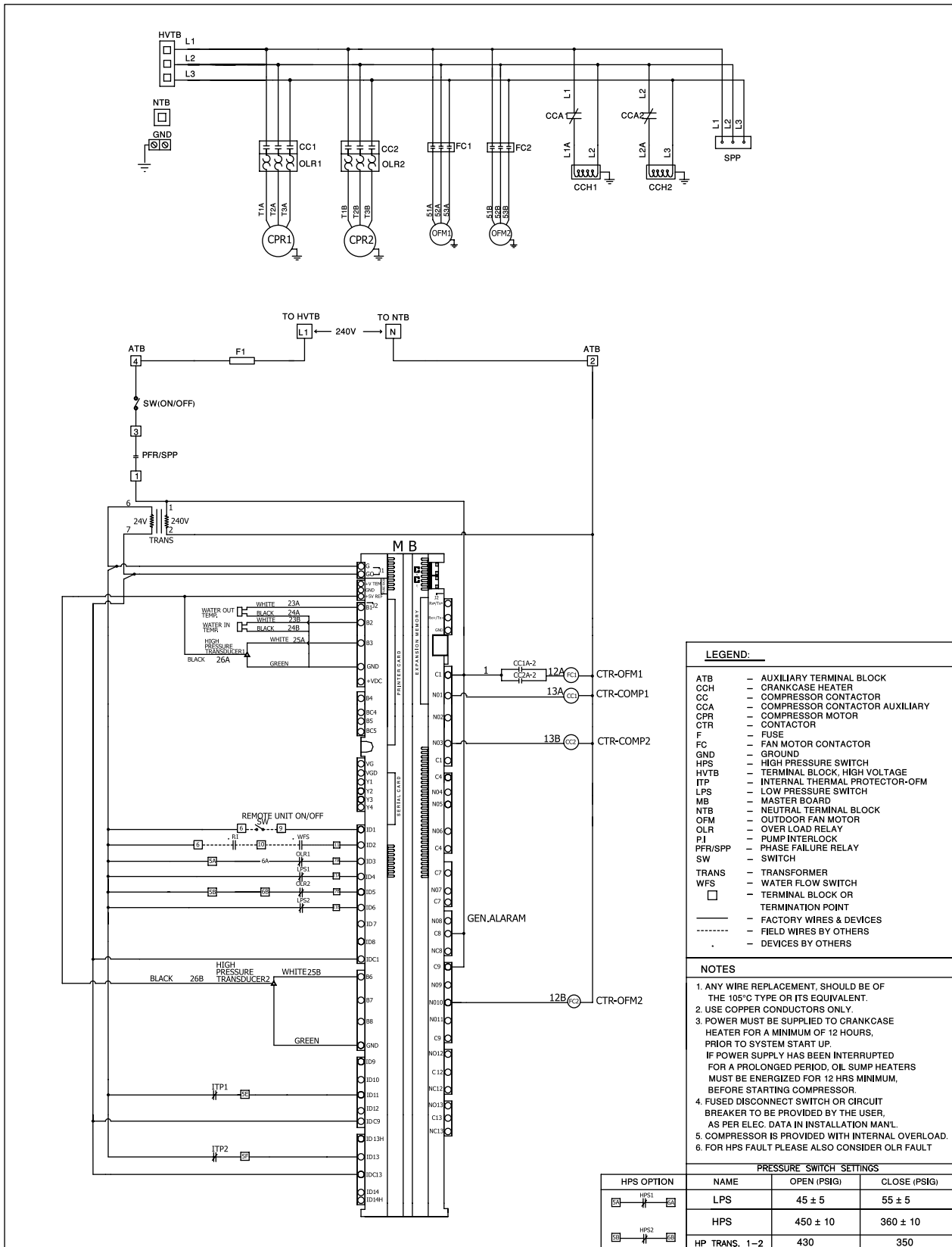
**FRONT VIEW**



**END VIEW**



## TYPICAL WIRING DIAGRAM



## CHILLED WATER PIPING SYSTEM

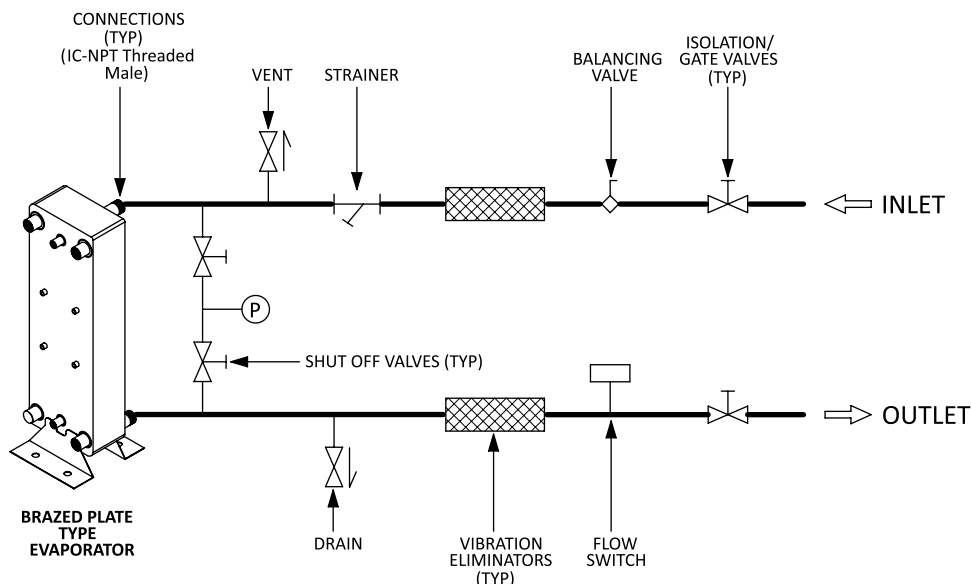
### WATER PIPING CONNECTIONS

The chilled water piping system should be laid out with the following components it should have. It is recommended that the field installed water piping to the chiller must include. Failure to follow these recommendations may cause improper operation and loss of performance, damage to the unit and difficulty in servicing and maintenance. The inlet and outlet cooler water connection are given in PHYSICAL DATA on page 10.

Start-up procedures should confirm that the chilled water piping system had been properly flushed out before being connected to the chiller unit.

- Water pressure gauge connection taps and gauges at the inlet and outlet connections of the cooler for measuring water pressure drop. Pressure gauges must be installed on the same level.
- Hand stop valves are recommended for use in all pipe lines to facilitate servicing or during maintenance.
- Purge air from the water system before unit start-up to provide adequate flow through the evaporator with an air vent located at the piping system high point.
- Drain connection should be provided at all low points to permit complete drainage of the cooler and system piping.
- The cooler must be protected by a cleanable strainer installed at the water inlet to protect from water debris and impurities before they reach the evaporator, causing damage.
- The vibration eliminators in inlet and outlet chilled water piping connections to reduce vibration transmitted to the building.
- The flow switch must be installed in the outlet chilled water piping of the cooler (in the horizontal piping of the supply) to avoid evaporator freeze-up under low or no water flow conditions.
- Recommended to regular water analysis and chemical water treatment for the evaporator loop at equipment start-up.
- The inlet and outlet chilled water piping's that are exposed to outdoor ambient should be wrapped or covered with insulation.

### TYPICAL CHILLED WATER PIPING FOR BPHE COOLER



## CHILLED WATER VOLUME

The chilled water systems required sufficient volume of water in the piping system to avoid short cycling of the compressor, unstable system operation or loss control.

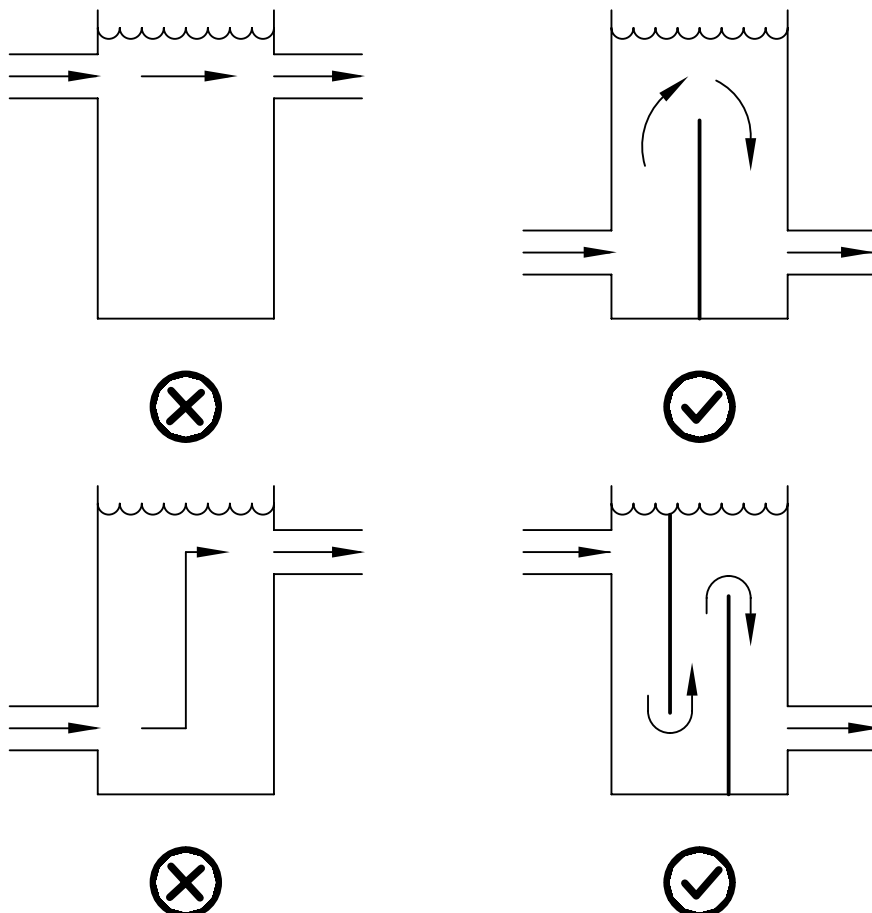
The possible for short water loop or short cycling usually when the building piping water system load falls below the minimum chiller plant capacity with very small water volumes.

To ensure the total volume of water in the piping system, a rule of thumb of "gallons of water volume is equal to 2 to 3 times the chilled water GPM flow rate".

To prevent this "short water loop", a storage tank should be installed to increase sufficient water volume. This tank should be provided on the return water side to the chiller and tank should be baffled to ensure there is no stratification and that water entering tank is to satisfactory mixed with liquid in the tank.

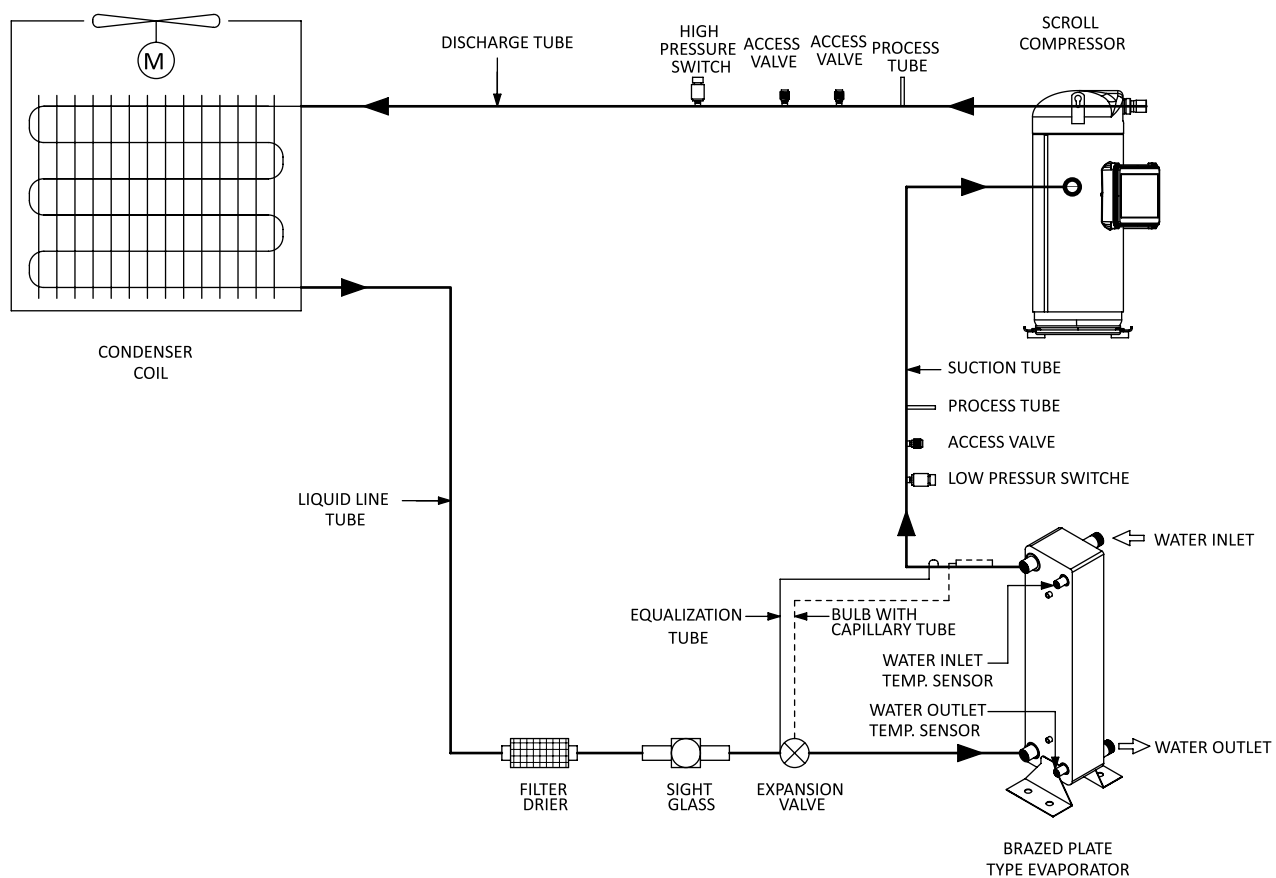
A properly designed storage tank should be added if the system components do not provide sufficient water volume as shown in figure below.

## TANK INSTALLATION



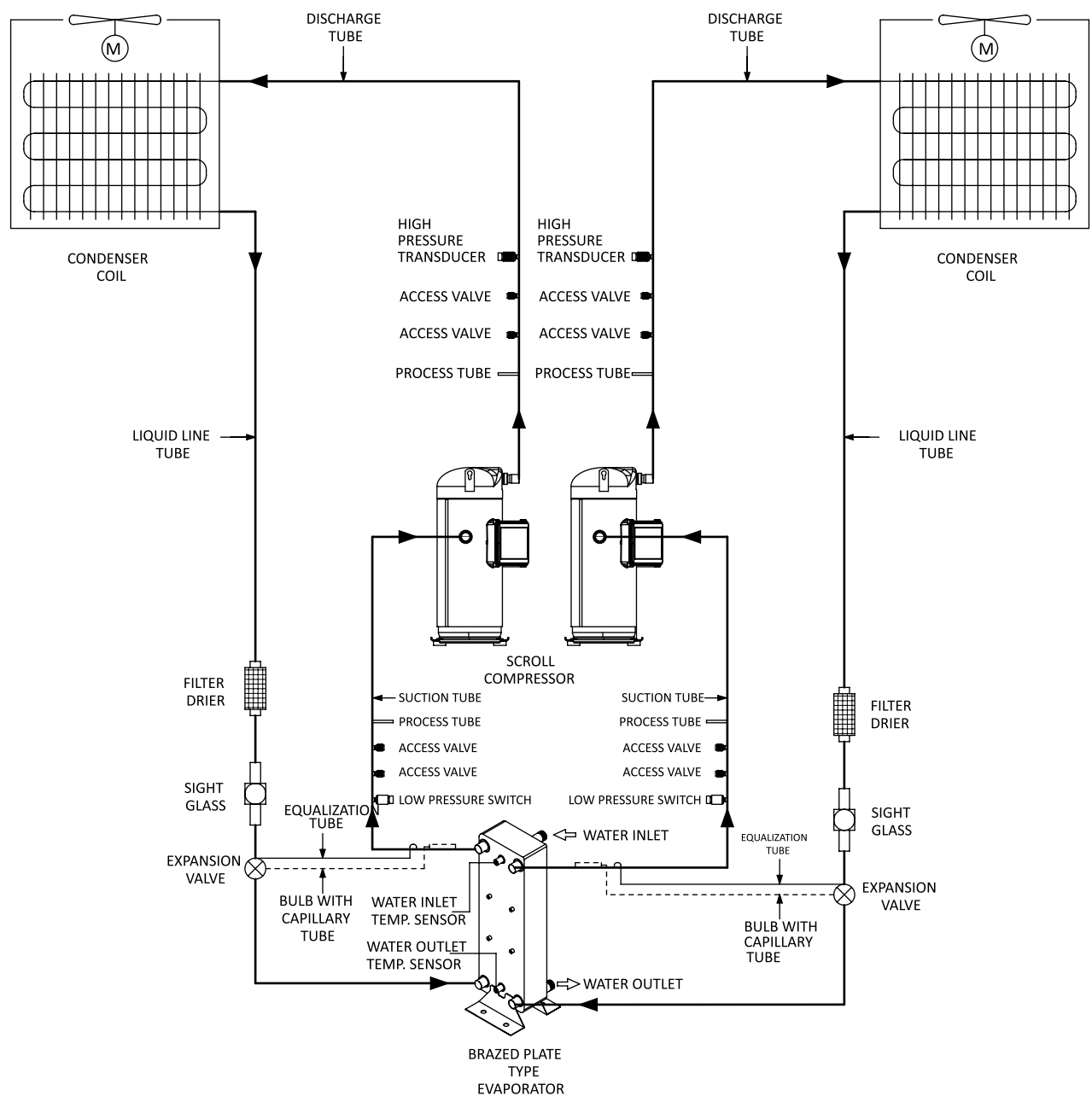
## PIPING DIAGRAM

**ACC-03, 04, 05, 07**



## PIPING DIAGRAM

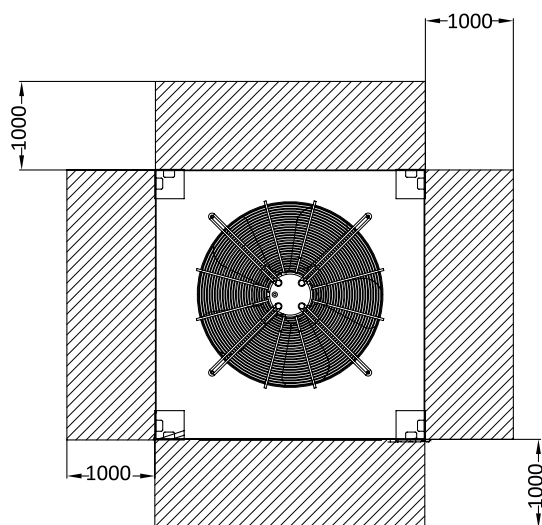
**ACC-010, 012, 015, 017**



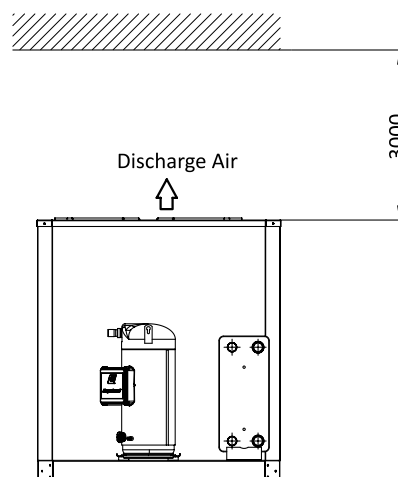
## INSTALLATION CLEARANCE

### ACC-03, 04, 05, 07

ALL DIMENSIONS ARE IN MM



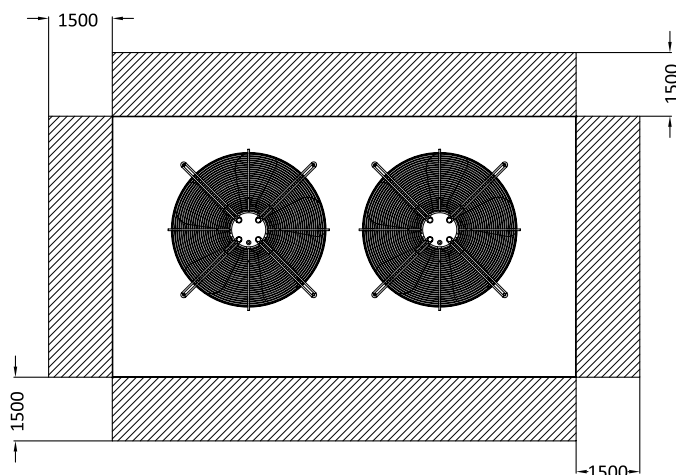
TOP VIEW



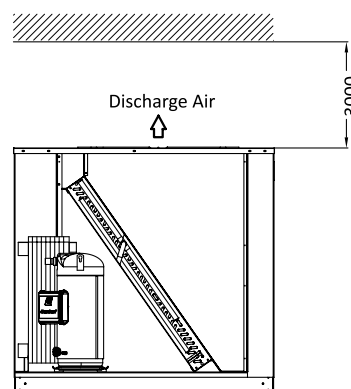
END VIEW

### ACC-010, 012, 015, 017

ALL DIMENSIONS ARE IN MM



TOP VIEW



END VIEW

#### NOTE:

*Pit installations are not recommended where circulation of hot condenser air can take place and it will severely affect unit efficiency (EER) causing high pressure or fan motor temperature trips.*



## RIGGING INSTRUCTIONS

COOLEX chillers are designed for overhead rigging only, for this purpose the base channel has been extended beyond the sides of the unit with rigging holes. Use a spreader frame above the unit to keep the cables vertical and away from the sides.

Run the cables to a central suspension point so that the angle from the horizontal is not less than  $45^\circ$ . As an added protection, put plywood sheets on the sides of the unit behind cables while rigging. Raise and set the unit carefully.

### ATTENTION TO RIGGERS

The positions of the rigging slings should be as per the below given drawings.

Lifting points are so provided in the unit as to evenly distribute the units load.

Center of gravity of the unit is not necessarily its center line.

Ensure that the center of gravity aligns with the main lifting pole before lifting the unit.

To avoid damage to the unit by the rigging slings, use spreader bars as shown below.

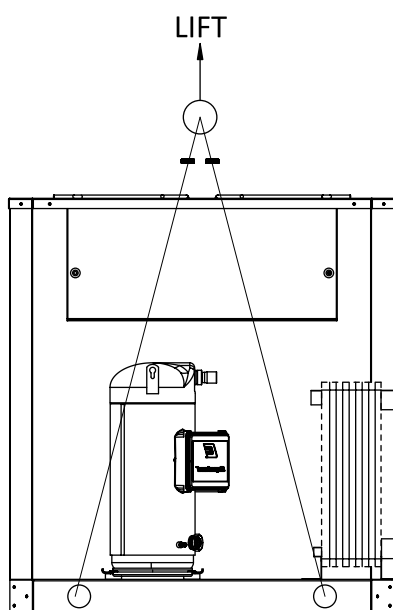
### CAUTION

All panels should be in place when rigging.

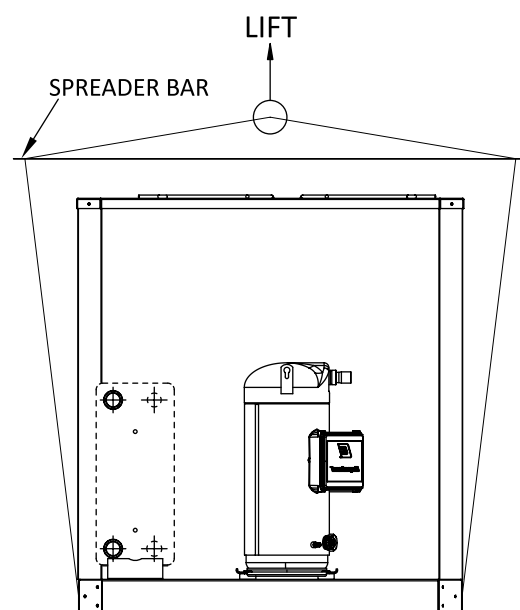
Care must be taken to avoid damage to the coils during handling.

Insert packing material between coils & slings as necessary.

### ACC-03, 04, 05, 07



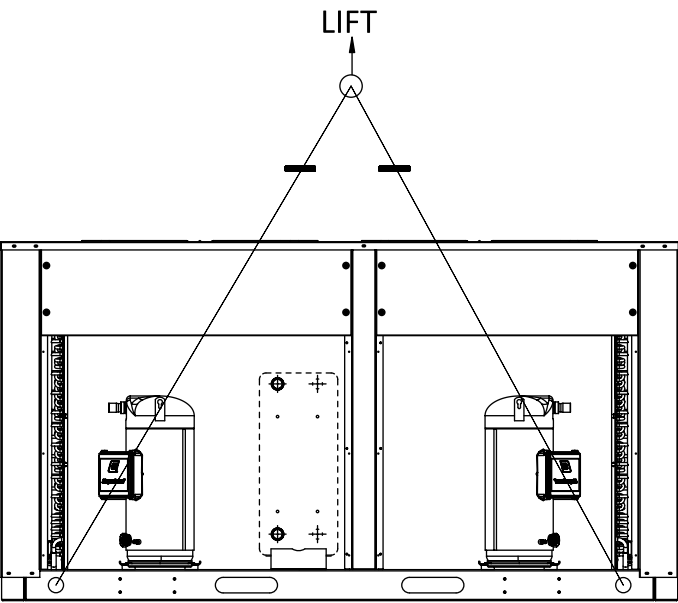
FRONT VIEW



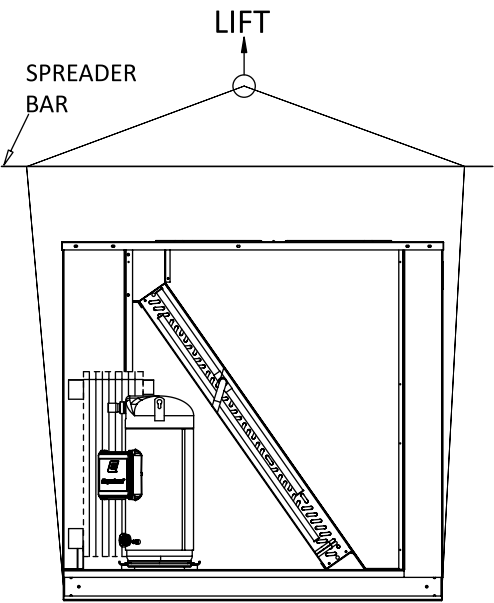
END VIEW

## RIGGING INSTRUCTIONS

[ACC-010, 012, 015, 017](#)

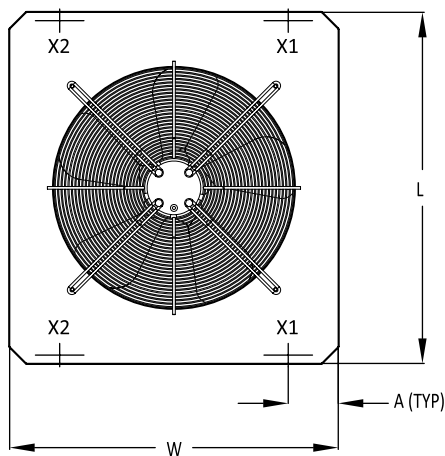


FRONT VIEW

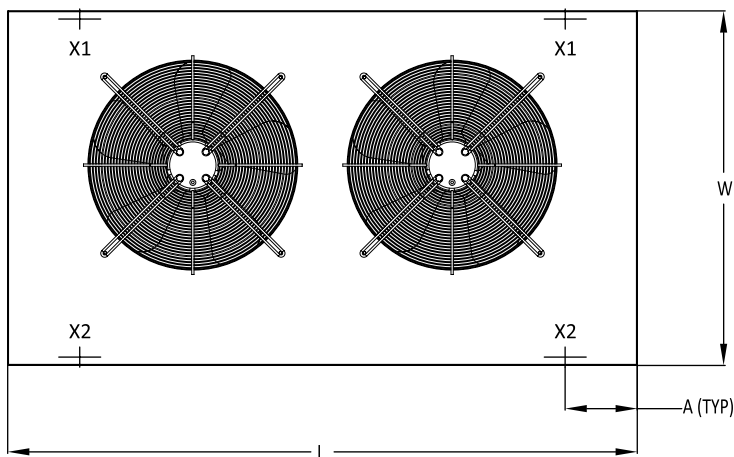


END VIEW

# MOUNTING LOCATION AND DISTRIBUTION LOAD



LOAD DISTRIBUTION					
MODEL	L (mm)	W (mm)	A (mm)	X1 (kg)	X2 (kg)
ACC-03	832	832	150	30.0	37.0
ACC-04	832	832	150	32.5	51.0
ACC-05	1057	990	150	43.5	49.0
ACC-07	1057	990	150	52.5	78.0



LOAD DISTRIBUTION					
MODEL	L (mm)	W (mm)	A (mm)	X1 (kg)	X2 (kg)
ACC-010	1875	1094	250	55.0	86.0
ACC-012	2185	1229	250	137.5	98.0
ACC-015	2185	1229	250	131.5	119.0
ACC-017	2185	1229	250	135.0	122.0

## GUIDE SPECIFICATION

### GENERAL

Air Cooled Chiller, provide and install as shown on the plans factory assembled, factory-R 407C charged in the quantity specified. Each Chiller utilizing of double & more hermetic scroll compressor, insulated DX Brazed Plate Heat Exchangers (BPHE) evaporator, microprocessor control system, low sound condenser fan motor and all components required for controlled unit operation prior to field start-up.

Air Cooled Chiller shall be rated in accordance with AHRI (Air Conditioning, Heating and Refrigeration Institute) Standard 550/590 2018 and Designed conform to ASHRAE 15-2016 (Safety Standard for Refrigeration Systems).

Each Air Cooled Chiller shall be full load run tested at the factory to verify operation.

### Compressors:

Compressor shall be sealed hermetic scroll type. Each compressor shall be equipped with crankcase heaters to minimized oil dilution. The compressor motor shall be refrigerant gas cooled, high torque with inherent thermal protection.

### Evaporator / Cooler:

Evaporator shall be compact, high efficiency, single or dual circuit, braze plate type heat exchanger consisting of parallel stainless steel plates construction. ALL Evaporator are insulated with 1 inch (25mm) flexible closed cell insulation, K factor 0.28 Btu.in/hr.ft<sup>2</sup>.°F (0.038 W/m<sup>2</sup>.°C). Evaporators shall be designed and constructed according to CEPED & UL. Suitable refrigerants are all HCFCs, HFCs and others. Inlet & outlet pipe shall be IC-NPT Threaded Male Connections.

### Condenser Coil:

The coils are built up seamless copper tubes and mechanically bonded to scientifically designed aluminum fins for maximum heat transfer efficiency. The assembled coils are factory leak tested under water at a pressure of 450 psig for quality and leak free unit. They also undergo dry chemical cleaning after Manufacturing for optimum system cleanness.

### Condenser Fan Motor:

Fans shall be propeller type arranged for vertical discharge and individually driven by direct drive fan motors. All condenser fan motors are totally enclosed air over type (TEAO) with class "F" winding insulation and ball bearings for high ambient application. The motors shall be three phase with inherent thermal protection of automatic reset type. Condenser fans are constructed of die cast aluminum blades/hubs with direct driven motors. All fans are statically and dynamically balances to operate at minimum noise and vibration.

### Unit Casing / structure Frame:

The unit casing are perfectly designed to eliminate the corrosion problem usually associated with outdoor equipment. The casing sheet metal is fabricated from hot dipped heavy gauge (G90), zinc coating and zero spangle galvanized steel, oven-baked powder coated. Steel sheet panels lock forming quality conforming to ASTM A653-CS Type B G90. Painted panel Salt Spray test in accordance to ASTM B 117 Operating Salt Spray (Fog) Testing.

### Refrigerant Piping Components:

Refrigerant pipe should be purity 99.9% or above Phosphorus Deoxidized Copper without joint, and it should be piped for fluent refrigerant flow between each component. Each refrigeration circuit shall include filter drier, moisture liquid indicating sight glass, thermostatic expansion valve and shut off valve. Suction line shall be insulated with closed cell pipe insulation.

## GUIDE SPECIFICATION

### **Control Panel System:**

Control panel shall contain the field power connection points, control interlock terminals and control system. The control box panel designed in accordance with NEMA 4 (IP55) with hinged access doors shall be lockable ensuring dust and weatherproof construction. Internal power and control wiring is neatly routed, adequately anchored and all wires identified with cable markers as per NEC standards applicable to HVAC industry.

### **Microprocessor Controller:**

Microprocessor controller with an attractive user-friendly interface to fully manage the unit's operation and safety. The advanced microprocessor controller is designed with the latest technology to give the best performance of the chiller and to ensure its efficiency and reliability.

### **Safety Devices:**

The Air Cooled Chiller shall be protected with safety devices of the following;

1. Pressure for low & high cut-off.
2. Starters.
3. Under/Over voltage and phase protection.
4. Compressor motor internal inherent protection.
5. Crankcase heaters.
6. Microprocessor Controller.

## About RIC

Refrigeration Industries Company (KSE 504) is a group holding company with diversified interests in manufacturing, contracting and services. Recognized regionally for our engineering capabilities and management excellence, RIC and its subsidiaries offer a wide range of high quality products and services that cater to both residential and commercial customers, in the areas of climate control technologies and specialized storage solutions.

In view of the growing Kuwait infrastructure and the limitations imposed on it by the country's arid climate, the Refrigeration Industries Company was established 43 years ago in 1973, by Amiri Decree. The company's operations began with the construction of the first cold stores in the region, to enable the storage of the imported foods, on which Kuwait relied. Along with the development and advancement of the country, so has RIC prospered and expanded, and is now a milestone in the history of modern Kuwait.

RIC takes pride in its successful record and the many accolades it has garnered over time, but the greatest achievement has been the provision of comfort and protection from the harsh climate, to the people of Kuwait.

More than 43 years of uninterrupted service, overcoming extreme weather conditions, war, economic recessions and ever increasing competition, is testimony to the fact that RIC has met the expectations and responsibilities that was envisioned at the beginning and also highlights the tenacity and vision to exceed them in the future.

## Facts throughout the years

- 1973 Warehouses were established by Amiri Decree.
- 1979 RIC Constructed the Medical Cold Stores Complex, the world's largest at that time.
- 1980 RIC Air Conditioning manufacturing plant set up in Sulaibya.
- 1981 Production of Package & Mini-Split A/Cs started under York-Gulf.
- 1984 RIC was listed in Kuwait Stock Exchange.
- 1986 COOLEX brand Production Launched.
- 1991 RIC rebuilt the manufacturing plant destroyed during the war.
- 1997 Achieved ISO Certification ISO 9001:1994.
- 2002 ETL Designed testing lab became fully operational.
- 2004 Privatization of RIC.
- 2010 COOLEX becomes the first A/C Unit to Pass MEW's new regulations.
- 2010 RIC Factory Renovation and Expansion into neighboring countries.
- 2012 Achieved UL & AHRI Certification for Coolex Units.
- 2014 Achieved SASO Certification for Concealed Ducted Split Series.
- 2014 Achieved EUROVENT Certification for Air Handling Units AHU.
- 2014 Achieved UL Certification for Air Cooled Chillers.
- 2015 Achieved ISO 17025 Certification for Psychrometric Laboratory.
- 2016 Achieved Energy Efficiency Certification for Concealed Ducted Split Series & Rooftop Package units (Kingdom of Bahrain).

## نبذة عن الشركة

شركة صناعات التبريد (متداولة في سوق الكويت للأوراق المالية برقم 504) هي شركة متنوعة الأنشطة تعمل في مجال التصنيع والمقاولات والخدمات. ونحن نقدم مجموعة كبيرة من المنتجات والخدمات والحلول التقنية في مجال مواجهة الظروف المناخية وحلول التخزين. وقد حازت الشركة على إقرار إقليمى بقدراتها الهندسية وكفاءتها الإدارية.

شركة صناعات التبريد هي مجموعة شركات تهدف إلى توفير أعلى مستويات الجودة من حيث المنتجات والخدمات التي تلبي احتياجات عملائها السكنية والتجارية. وعلى مدى ثلاثة وأربعين عاماً مضت على إنشاء شركتنا فقد إستطعنا أن نوطد أقدامنا في جميع قطاعات السوق الكويتي. ونحن إذ نفتخر بالإنجازات التي حققناها، إلا أننا أشد فخرًا بأننا تمكنا من الوقوف إلى جانب أهل الكويت على مدى سنوات طويلة في مواجهة تقلبات الظروف المناخية القاسية سواء من حيث درجات الحرارة العالية أو الأتربة أو الرطوبة.

وباعتبارها إحدى الشركات الصناعية العاملة في دولة الكويت، فقد واجهت الشركة تحديات وأمال كبيرة في سعيها لتحقيق النجاح، وقد كانت الشركة - ولا تزال - معلماً من المعالم المهمة في نظر أهل الكويت لما قدمته من منتجات وخدمات إستطاعت أن تغير الطبيعة القاسية لمناخ الكويت. فبعد نحو 43 عاماً تقريباً، لا يزال السؤال مطروحاً حول تحقيقنا لهذه التوقعات، فهل إستطاعت الشركة أن تتحمل مسؤولياتها على الوجه الأكمل؟ ويأتي الرد بالإيجاب، فعلى مدى ثلاثة وأربعين عاماً تقريباً لم تتوقف الشركة خلالها عن الإستمرار في تقديم خدماتها وأعمالها رغم الصعوبات التي تمثلت في ظروف الطقس القاسية أو الحروب أو الكساد الاقتصادي أو إرتفاع حدة المنافسة، فقد كانت كل واحدة من هذه الظروف بمثابة شهادة على أننا حققنا ما وعدنا به وما عقدنا العزم على تنفيذه.

## حقائق وتواريخ

- 1973 تم إنشاء المستودعات بناء على مرسوم أميري.
- 1979 عهدت وزارة الصحة الكويتية لشركة صناعات التبريد بإنشاء مجمع مستودعات مخازن التبريد الطبية، وقد كان هذا المجمع حينها هو الأضخم من نوعه على مستوى العالم، وقد وصلت تكلفته إلى 12,000,000 دينار كويتي.
- 1980 تم إنشاء مصنع مكيفات الهواء التابع لشركة صناعات التبريد في الصليبية.
- 1981 بدء إنتاج أجهزة التكييف المدمجة والمنفصلة الصغيرة تحت علامة York-Gulf.
- 1984 تم قيد شركة صناعات التبريد في سوق الكويت للأوراق المالية.
- 1986 بدء إنتاج مكيفات علامة كولكس.
- 1991 قامت شركة صناعات التبريد بإعادة بناء مصنعها الذي دمرته الحرب.
- 1997 الحصول على شهادة الأيزو 9001:1994.
- 2002 بدء تشغيل مختبر فحص وحدات التكييف (ETL).
- 2004 خصخصة شركة صناعات التبريد.
- 2010 كانت وحدات كولكس أول وحدات تكييف هواء تجتاز اللوائح التي أقرتها (وزارة الكهرباء والماء).
- 2010 تم تجديد مصنع شركة صناعات التبريد وبدء التوسع والتصدير إلى الدول المجاورة.
- 2012 الحصول على شهادة UL و AHRI لأجهزة التكييف كولكس.
- 2014 الحصول على شهادة SASO لأجهزة التكييف المنفصلة.
- 2014 الحصول على شهادة EUROVENT لأجهزة مناولة الهواء.
- 2014 الحصول على شهادة UL لمبردات الهواء الشيلر.
- 2015 الحصول على شهادة الأيزو 17025 ISO لمختبر السيكمرومترية.
- 2016 الحصول على شهادة كفاء الطاقة لأجهزة التكييف المنفصلة والوحدات المدمجة (مملكة البحرين).

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Website: www.agtek.com.pk

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#### Total Group Egypt Company

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