

Chillers

Commercial and Technical Data

Water Cooled Chiller



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EWWD-H-

Index

Features and advantages	3
Application flexibility	3
Superior control logic	3
Extensive option list	3
Code requirements – Safety and observant of laws/directives	3
Certifications	3
Versions	3
Sound Configuration	3
General characteristics	4
Cabinet and structure	4
Screw compressors	4
Ecological HFC 134a refrigerant	4
Evaporator	4
Condensers	4
Electronic expansion valve	4
Refrigerant Circuit	4
Electrical control panel	5
Standard accessories (supplied on basic unit)	6
Options (on request)	7
Nomenclature	9
Technical specifications	10
High temperature kit electrical data	14
Sound levels	15
Operating limits	16
Water charge, flow and quality	18
Water content in cooling circuits	19
Standard ratings	20
High water temperature kit ratings	26
Evaporator and condenser pressure drops	37
Dimensions	38
EWW370~530H-XS – 1 circuit	38
EWW610H-XS – 1 circuit	39
EWW750~C12H-XS – 2 circuits	40
Installation notes	41
General	42
Refrigerant	42
Performance	42
Unit description	42
Noise level and vibrations	42
Dimensions	42
Chiller components	43

Features and advantages

The water cooled chillers, featuring single R-134a refrigerant circuit with one or two single screw compressors, shell & tube 'flooded type' exchangers and Microtech III controller, are manufactured to provide high efficiency and superior control for a broad spectrum of comfort and industrial applications.

Chiller design experience, combined with outstanding features, makes this chiller range unmatched in the industry.

Application flexibility

The new range boasts a wide operating range thanks to the use of the electronic expansion valve. This makes possible condenser leaving water temperatures (CLWT) of 50°C. The addition of an optional high temperature kit allows CLWT's up to 65°C.

A heat pump version is also available for supplying hot water, and is well suited to geothermal applications.

Superior control logic

The new range features the Microtech III controller that provides an easy to use control environmental. The control logic is designed to provide maximum efficiency, to continue operation in unusual operating conditions and to provide a history of unit operation. One of the greatest benefits is the easy interface with external systems such as building management systems and sequencing panels.

Extensive option list

The base model includes several standard factory mounted options such as: electronic expansion valve, double set point, main switch interlock, etc. Moreover, the new range features an extensive option list, including the heat pump version, the high temperature kit, the sound proof system, etc. The long list of additional options makes it ideal for a broad range of comfort and cooling applications.

Code requirements – Safety and observant of laws/directives

All water cooled units are designed and manufactured in accordance with applicable selections of the following:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204-1 / EN 60335-2-40
Manufacturing Quality Stds	UNI – EN ISO 9001:2004

Certifications

All units manufactured are CE marked, complying with European directives in force, concerning manufacturing and safety. On request units can be produced complying with laws in force in non European countries (ASME, GOST, etc.), and with other applications, such as naval (RINA, etc.).

Versions

Available in high efficiency version:

X: High Efficiency

11 sizes, covering a cooling capacity range from 370 up to 1,215 kW, EER up to 6.17 and ESEER up to 7.43.

The EER (Energy Efficiency Ratio) is the ratio of the Cooling Capacity to the Power Input of the unit. The Power Input includes: the power input for operation of the compressor, the power input of all control and safety devices.

The ESEER (European Seasonal Energy Efficiency Ratio) is a weighed formula enabling to take into account the variation of EER with the load rate and the variation of water inlet condenser temperature.

$$\text{ESEER} = A \times \text{EER}_{100\%} + B \times \text{EER}_{75\%} + C \times \text{EER}_{50\%} + D \times \text{EER}_{25\%}$$

	A	B	C	D
Coefficient	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
Condenser water inlet temperature (°C)	30	26	22	18

Sound Configuration

Available in standard sound level configuration:

S: Standard sound

General characteristics

Cabinet and structure

The cabinet is made of galvanized steel sheet and painted to provide a high resistance to corrosion. Colour Ivory White (Munsell code 5Y7.5/1) ($\pm$ RAL7044). The base frame has eye-hook for lifting the unit with ropes for an easy installation. The weight is uniformly distributed along the profiles of the base and this facilitates the arrangement of the unit.

Screw compressors

The compressor is semi-hermetic, single-screw type with gate-rotors made of carbon impregnated engineered composite material. The compressor has one slide managed by the unit microprocessor for infinitely modulating the capacity between 100% to 25%. An external high efficiency oil separator maximizes the oil separation. Standard start is Wye-delta (Y- Δ).

Ecological HFC 134a refrigerant

The compressors have been designed to operate with R-134a, ecological refrigerant with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential) that means low TEWI (Total Equivalent Warming Impact).

Evaporator

Each unit is equipped with flooded shell & tube evaporator with water flowing inside the tubes and refrigerant boiling outside. The tubes are enhanced for maximum heat transfer and rolled into steel tube sheet and sealed. The tubes are individually replaceable. The evaporators are designed according to the 97/23/EC directive (PED). The water side is designed for 10 bar of maximum operating pressure; vents and drain are provided. Water connections are designed with Victaulic system, anyway flanges are available under request.

Condensers

Each unit is equipped with shell & tube condenser with water flowing inside the tubes and refrigerant condensing outside. The bottom of the condenser is provided with subcooler section for better refrigerant capacity. The tubes are enhanced for maximum heat transfer and rolled into steel tube sheet and sealed. The tubes are individually replaceable. The condensers are designed according to the 97/23/EC directive (PED). The water side is designed for 10 bar of maximum operating pressure; vents and drain are provided. Water connections are designed with Victaulic system, anyway flanges are available under request.

Electronic expansion valve

The unit is equipped with the most advanced electronic expansion valves to achieve precise control of refrigerant mass flow. As today's system requires improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory.

Electronic expansion valve proposes features that make it unique: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, highly linear flow capacity, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.

Electronic expansion valve strength point is the capacity to work with lower ΔP between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant Circuit

Each unit has single refrigerant circuit including:

- One or two single screw compressor with external oil separator
- Evaporator
- Condenser
- Oil pressure transducer
- High pressure switches
- High pressure transducer
- Low pressure transducer
- Moisture liquid indicator
- Electronic expansion valve

Electrical control panel

Power and control are located in the main panel that is manufactured to ensure protection against all weather conditions. The electrical panel is IP54 and (when opening the doors) internally protected with Plexiglas panel against possible accidental contact with electrical components (IP20). The main panel is fitted with a main switch interlocked door.

Power Section

The power section includes compressors fuses and control circuit transformer.

MicroTech III controller

MicroTech III controller is installed as standard; it can be used to modify unit set-points and check control parameters. A built-in display shows chiller operating status plus temperatures and pressures of water, refrigerant, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors and electronic expansion valve to keep stable operating conditions to maximise chiller energy efficiency and reliability.

MicroTech III is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.

Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in Pressure / Temperature conversions.

Control section - main features

- Management of the compressor stepless capacity.
- Chiller enabled to work in partial failure condition.
- Full routine operation at condition of:
 - high ambient temperature value
 - high thermal load
 - high evaporator entering water temperature (start-up)
- Display of evaporator entering/leaving water temperatures.
- Display of condensing-evaporating temperatures and pressures, suction and discharge superheat for each circuit.
- Leaving water evaporator temperature regulation. Temperature tolerance = 0,1°C.
- Compressor and evaporator pumps hour counters.
- Display of Status Safety Devices.
- Number of starts and compressor working hours.
- Optimized management of compressor load.
- Re-start in case of power failure (automatic / manual).
- Soft Load (optimized management of the compressor load during the start-up).
- Start at high evaporator water temperature.
- Return Reset (Set Point Reset based on return water temperature).
- Set point Reset.
- Application and system upgrade with commercial SD cards.
- Ethernet port for remote or local servicing using standard web browsers.
- Two different sets of default parameters could be stored for easy restore.

Safety device / logic for each refrigerant circuit

- High pressure (pressure switch).
- High pressure (transducer).
- Low pressure (transducer).
- High compressor discharge temperature.
- High motor winding temperature.
- Phase Monitor.
- Low pressure ratio.
- High oil pressure drop

- Low oil pressure.
- No pressure change at start.

System security

- Phase monitor.
- Low Ambient temperature lock-out.
- Freeze protection.

Regulation type

Proportional + integral + derivative regulation on the evaporator leaving water output probe.

MicroTech III

MicroTech III built-in terminal has the following features.

- 164x44 dots liquid crystal display with white back lighting. Supports Unicode fonts for multi-lingual.
- Key-pad consisting of 3 keys.
- Push'n'Roll control for an increased usability.
- Memory to protect the data.
- General faults alarm relays.
- Password access to modify the setting.
- Application security to prevent application tampering or hardware usability with third party applications.
- Service report displaying all running hours and general conditions.
- Alarm history memory to allow an easy fault analysis.

Supervising systems (on request)

MicroTech III remote control

MicroTech III is able to communicate to BMS (Building Management System) based on the most common protocols as:

- ModbusRTU
- LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology
- BacNet BTP certified over IP and MS/TP (class 4) (Native)

Chiller Sequencing

MicroTech III controller allows an easy plug-in sequencing technology based on digital or serial panel

Digital Sequencing Panel

This panel is basically a step inserter that switches ON/OFF up to 11 units (chillers or heat pumps operating in the same cooling/heating mode) depending on the selected set point; the units are connected with the panel through standard cables and no serial card is requested.

Serial Sequencing Panel

Basically this panel sequences a chiller plant by switching on/off the units (up to 7 chillers) taking into account their running hours and the requested plant load, in order to optimise the number of working units for each condition; serial cards and shielded cables are requested to connect the panel with the units and, if installed, a BMS.

Standard accessories (supplied on basic unit)

Wye-Delta Compressors starter (Y-Δ) – For low inrush current and reduced starting torque.

Double set-point – Dual leaving water temperature set-points

Phase monitor – The phase monitor controls that phases sequence is correct and controls phase loss.

Evaporator Victaulic Kit - Hydraulic joint with gasket for an easy and quick water connection.

Evaporator Water side design pressure 10 bar

20 mm evaporator insulation

Condenser Victaulic Kit - Hydraulic joint with gasket for an easy and quick water connection.

Condenser Water side design pressure 10 bar

Condenser 2 passes (DT 4-8°C)

Electronic expansion device

Discharge line shut-off valves - Discharge shut-off valve installed on the discharge of the compressor to facilitate maintenance operations.

Hour Run meter - Digital compressors hour run meter

General fault contactor - Contactor for alarm warning.

Set-point reset, demand limit and alarm from external device – The leaving water temperature set-point can be overwritten with the following options: 4-20mA from external source (by user); outside ambient temperature; evaporator water temperature Δt . Moreover the device allows the user to limit the load of the unit by 4-20mA signal or by network system and the microprocessor is able to receive an alarm signal from an external device (pump etc... - user can decide if this alarm signal will stop or not the unit).

Main switch interlock door

Emergency stop

Evaporator 2 passes

Options (on request)

Soft start - Electronic starting device to reduce the mechanical stress during compressor start-up

Heat pump version

Brine version – Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required).

Compressor thermal overload relays - Safety devices against compressor motor overloading in addition to the normal protection envisaged by the electrical windings.

Under/Over Voltage – This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.

Energy Meter – This device allows to measure the energy absorbed by the chiller during its life. It is installed inside the control box mounted on a DIN rail and show on a digital display: Line-to-Line Voltage, Phase and Average Current, Active and Reactive Power, Active Energy, Frequency.

Capacitors for power factor correction – To increase the operating power factor of the unit at nominal operating conditions. The capacitors are “dry” self-regenerating type with over pressure disconnecting safety device insulated with a no toxic dielectric mix with no PCB or PCT.

Current limit – To limit maximum absorbed current of the unit whenever is required.

Evaporator marine water box

Condenser double flanges kit

20mm Condenser Insulation

Condenser marine water boxes

Cu-Ni 90-10 exchangers - to work with sea water the heat exchangers are fitted with Cu-Ni tubes and special protection inside the end covers.

Condenser 1/3 passes

Evaporator / condenser flow switch for the water piping

Suction line shut off valve - Suction shut-off valve installed on the suction of the compressor to facilitate maintenance operation.

High/Low Pressure Side Manometers

Container kit

Rubber type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal to reduce the vibrations when the unit is floor mounted.

Sound Proof System - Made of sheet metal and internally insulated, the cabinet is "integral kind" (around the whole chiller, not only around the compressors) to reach the best performance in noise reduction.

Witness test – Every unit is always tested at the test bench prior to the shipment. On request, a second test can be carried out, at customer's presence, in accordance with the procedures indicated on the test form. (Not available for units with glycol mixtures).

Dual Pressure Relief Valve

Automatic circuit breakers

Ground fault relay

Evaporator 1/3 passes

Evaporator double flange kit

High temperature kit – optional kit to allow the unit to operate up to 65°C leaving condenser water temperature. The unit operation diagram must be checked to evaluate when this option is required.

Nomenclature

E	W	W	D	3	7	0	H	-	X	S	0	0	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Machine type

EWA = Air-cooled chiller, cooling only
 EWY = Air-cooled chiller, heat pump
 EWL = Remote condenser chiller
 ERA = Air cooled condensing unit
 EWW = Water-cooled chiller, cooling only
 EWC = Air-cooled chiller, cooling only with centrifugal fan
 EWT = Air-cooled chiller, cooling only with heat recovery

Refrigerant

D = R-134a
 P = R-407c
 Q = R-410a

Capacity class in kW (Cooling)

Always 3-digit code
 Idem as previous

Model series

Letter A, B,... : major modification

Inverter

- = Non-inverter
 Z = Inverter

Efficiency level

S = Standard efficiency (N.A for this range)
 X = High efficiency
 P = Premium efficiency (N.A for this range)

Sound level

S = Standard noise
 L = Low noise (N.A for this range)
 R = Reduced noise (N.A for this range)
 X = Extra low noise (N.A for this range)
 C = Cabinet (N.A for this range)

Warranty

0 = 1 year of warranty
 B = 2 years of warranty
 C = 3 years of warranty
 ... = ... years of warranty

Sequential number

000 = Base model
 001 = First order for this model (1 or more units)
 002 = Second order for this model (1 or more units)
 ... = ... order for this model
 B01 = First order for this model + 1year warranty
 B02 = Second order for this model (1 or more units)
 ... = ... order for this model

Technical specifications

EWWD~H-XS

TECHNICAL SPECIFICATIONS			EWWD~H-XS	370	450	530	610	750
Capacity (1)	Cooling		kW	369	445	521	608	748
Capacity control	Type		---	Stepless				
	Minimum capacity		%	25	25	25	25	12.5
Unit power input (1)	Cooling		kW	62.8	75.4	87.0	101	125
EER (1)			---	5.88	5.90	5.99	6.02	5.98
ESEER			---	6.44	6.47	6.56	6.57	7.16
IPLV			---	6.95	6.99	7.08	7.10	7.73
Capacity (2)	Heating		kW	419	505	589	687	837
Unit power input (2)	Heating		kW	84.5	101	117	136	159
COP (2)				4.96	4.98	5.03	5.06	5.28
Casing	Colour		---	Ivory White				
	Material		---	Galvanized and painted steel sheet				
Dimensions	Unit	Height	mm	2121	2121	2121	2048	2048
		Width	mm	1353	1353	1353	1384	1689
		Length	mm	3341	3341	3419	3417	3609
Weight	Unit		kg	3089	3370	3603	3781	5289
	Operating Weight		kg	3250	3588	3870	4163	5694
Water heat exchanger Evaporator	Type		---	Flooded Shell & Tube				
	Water volume		l	78	107	134	160	172
	Nominal water flow rate	Cooling	l/s	17.63	21.26	24.89	29.05	35.74
	Nominal Water pressure drop	Cooling	kPa	48	40	38	42	48
	Insulation material			Closed cell				
Water heat exchanger Condenser	Type		---	Flooded Shell & Tube				
	Water volume		l	83	111	133	222	233
	Nominal water flow rate	Cooling	l/s	20.63	24.86	29.05	33.87	41.71
	Nominal Water pressure drop	Cooling	kPa	35	30	32	28	34
	Insulation material (Heat pump only)			Closed cell				
Compressor	Type		---	Semi-hermetic single screw compressor				
	Oil charge		l	30	30	30	30	60
	Quantity		No.	1	1	1	1	2
Sound level	Sound Power	Cooling	dB(A)	96.7	97.7	98.7	99.1	100.2
	Sound Pressure (3)	Cooling	dB(A)	78.0	79.0	80.0	80.0	81.0
Refrigerant circuit	Refrigerant type		---	R-134a	R-134a	R-134a	R-134a	R-134a
	Refrigerant charge		kg.	210	190	180	210	220
	N. of circuits		No.	1	1	1	1	1
Piping connections	Evaporator water inlet/outlet		mm	168.3	168.3	219.1	219.1	219.1
Piping connections	Condenser water inlet/outlet		inches	6	6	6	8	8
Safety devices	High discharge pressure (pressure switch)							
	High discharge pressure (pressure transducer)							
	Low suction pressure (pressure transducer)							
	Compressor motor protection							
	High discharge temperature							
	Low oil pressure							
	Low pressure ratio							
	High oil filter pressure drop							
	Phase monitor							
	Water freeze protection controller							

- Notes (1) Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 12/7°C; condenser 30/35°C, unit at full load operation.
- Notes (2) Heating capacity, unit power input in heating and COP are based on the following conditions: evaporator 12/7°C; condenser 40/45°C, unit at full load operation, with High Temperature kit
- Notes (3) The values are according to ISO 3744 and are referred to: evaporator 12/7°C, condenser 30/35°C, full load operation.

TECHNICAL SPECIFICATIONS			EWWD~H-XS	830	930	980	C10	C11
Capacity (1)	Cooling		kW	827	932	978	1050	1133
Capacity control	Type		---	Stepless				
	Minimum capacity		%	12.5	12.5	12.5	12.5	12.5
Unit power input (1)	Cooling		kW	138	151	163	174	188
EER (1)			---	5.99	6.17	6.00	6.03	6.03
ESEER			---	7.23	7.32	7.37	7.40	7.43
IPLV			---	7.81	7.90	7.96	8.00	8.02
Capacity (2)	Heating		kW	924	1036	1093	1173	1265
Unit power input (2)	Heating		kW	175	192	206	221	238
COP (2)				5.27	5.40	5.30	5.31	5.32
Casing	Colour		---	Ivory White				
	Material		---	Galvanized and painted steel sheet				
Dimensions	Unit	Height	mm	2048	2048	2048	2161	2161
		Width	mm	1689	1711	1711	1711	1711
		Length	mm	3609	3609	3609	3509	3509
Weight	Unit		kg	5375	5654	5707	6066	6105
	Operating Weight		kg	5835	6174	6262	6709	6773
Water heat exchanger Evaporator	Type		---	Flooded Shell & Tube				
	Water volume		l	201	261	272	295	310
	Nominal water flow rate	Cooling	l/s	39.51	44.53	46.73	50.17	54.13
	Nominal Water pressure drop	Cooling	kPa	40	38	35.0	35.0	37.0
	Insulation material			Closed cell				
Water heat exchanger Condenser	Type		---	Flooded Shell & Tube				
	Water volume		l	259	259	283	348	358
	Nominal water flow rate	Cooling	l/s	46.11	51.74	54.52	58.48	63.12
	Nominal Water pressure drop	Cooling	kPa	30	37	35.0	33.0	33.0
	Insulation material (Heat pump only)			Closed cell				
Compressor	Type		---	Semi-hermetic single screw compressor				
	Oil charge		l	60	60	60	60	60
	Quantity		No.	2	2	2	2	2
Sound level	Sound Power	Cooling	dB(A)	100.7	101.2	101.7	102.2	102.7
	Sound Pressure (3)	Cooling	dB(A)	81.5	82.0	82.5	83.0	83.5
Refrigerant circuit	Refrigerant type		---	R-134a	R-134a	R-134a	R-134a	R-134a
	Refrigerant charge		kg.	250	300	300	300	330
	N. of circuits		No.	1	1	1	1	1
Piping connections	Evaporator water inlet/outlet		mm	219.1	219.1	219.1	219.1	219.1
Piping connections	Condenser water inlet/outlet		inches	8	8	8	8	8
Safety devices	High discharge pressure (pressure switch)							
	High discharge pressure (pressure transducer)							
	Low suction pressure (pressure transducer)							
	Compressor motor protection							
	High discharge temperature							
	Low oil pressure							
	Low pressure ratio							
	High oil filter pressure drop							
	Phase monitor							
	Water freeze protection controller							

Notes (1) Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 12/7°C; condenser 30/35°C, unit at full load operation.

Notes (2) Heating capacity, unit power input in heating and COP are based on the following conditions: evaporator 12/7°C; condenser 40/45°C, unit at full load operation, with High Temperature kit

Notes (3) The values are according to ISO 3744 and are referred to: evaporator 12/7°C, condenser 30/35°C, full load operation.

TECHNICAL SPECIFICATIONS				EWWD~H-XS	C12				
Capacity (1)	Cooling		kW	1215					
Capacity control	Type		---	Stepless					
	Minimum capacity		%	12.5					
Unit power input (1)	Cooling		kW	201					
EER (1)			---	6.04					
ESEER			---	7.42					
IPLV			---	8.02					
Capacity (2)	Heating		kW	1356					
Unit power input (2)	Heating		kW	255					
COP (2)				5.31					
Casing	Colour		---	Ivory White					
	Material		---	Galvanized and painted steel sheet					
Dimensions	Unit	Height	mm	2161					
		Width	mm	1711					
		Length	mm	3509					
Weight	Unit		kg	6156					
	Operating Weight		kg	6859					
Water heat exchanger Evaporator	Type		---	Flooded Shell & Tube					
	Water volume		l	327					
	Nominal water flow rate	Cooling	l/s	58.05					
	Nominal Water pressure drop	Cooling	kPa	40					
	Insulation material			Closed cell					
Water heat exchanger Condenser	Type		---	Flooded Shell & Tube					
	Water volume		l	376					
	Nominal water flow rate	Cooling	l/s	67.65					
	Nominal Water pressure drop	Cooling	kPa	35					
	Insulation material (Heat pump only)			Closed cell					
Compressor	Type		---	Semi-hermetic single screw compressor					
	Oil charge		l	60					
	Quantity		No.	2					
Sound level	Sound Power	Cooling	dB(A)	102.7					
	Sound Pressure (3)	Cooling	dB(A)	83.5					
Refrigerant circuit	Refrigerant type		---	R-134a					
	Refrigerant charge		kg.	330					
	N. of circuits		No.	1					
Piping connections	Evaporator water inlet/outlet		mm	219.1					
Piping connections	Condenser water inlet/outlet		inches	8					
Safety devices	High discharge pressure (pressure switch)								
	High discharge pressure (pressure transducer)								
	Low suction pressure (pressure transducer)								
	Compressor motor protection								
	High discharge temperature								
	Low oil pressure								
	Low pressure ratio								
	High oil filter pressure drop								
	Phase monitor								
	Water freeze protection controller								

Notes (1) Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 12/7°C; condenser 30/35°C, unit at full load operation.

Notes (2) Heating capacity, unit power input in heating and COP are based on the following conditions: evaporator 12/7°C; condenser 40/45°C, unit at full load operation, with High Temperature kit

Notes (3) The values are according to ISO 3744 and are referred to: evaporator 12/7°C, condenser 30/35°C, full load operation.

ELECTRICAL SPECIFICATIONS			EWWD~H-XS	370	450	530	610	750
Power Supply	Phase		---	3	3	3	3	3
	Frequency		Hz	50	50	50	50	50
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
Unit	Maximum starting current		A	330	330	330	464	447
	Nominal running current cooling		A	106	123	140	166	213
	Maximum running current		A	146	174	199	236	293
	Maximum current for wires sizing		A	161	191	219	260	322
Compressor	Phase		Hz	3	3	3	3	3
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
	Maximum running current		A	146	174	199	236	146+146
	Starting method		---	Wye – Delta type (Y – Δ)				

ELECTRICAL SPECIFICATIONS			EWWD~H-XS	830	930	980	C10	C11
Power Supply	Phase		---	3	3	3	3	3
	Frequency		Hz	50	50	50	50	50
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
Unit	Maximum starting current		A	469	469	489	489	623
	Nominal running current cooling		A	230	247	263	280	306
	Maximum running current		A	320	347	373	398	435
	Maximum current for wires sizing		A	352	382	410	438	479
Compressor	Phase		Hz	3	3	3	3	3
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
	Maximum running current		A	146+174	174+174	174+199	199+199	199+236
	Starting method		---	Wye – Delta type (Y – Δ)				

ELECTRICAL SPECIFICATIONS			EWWD~H-XS	C12				
Power Supply	Phase		---	3				
	Frequency		Hz	50				
	Voltage		V	400				
	Voltage Tolerance	Minimum	%	-10%				
		Maximum	%	+10%				
Unit	Maximum starting current		A	653				
	Nominal running current cooling		A	331				
	Maximum running current		A	472				
	Maximum current for wires sizing		A	519				
Compressor	Phase		Hz	3				
	Voltage		V	400				
	Voltage Tolerance	Minimum	%	-10%				
		Maximum	%	+10%				
	Maximum running current		A	236+236				
	Starting method		---	Wye – Delta type (Y – Δ)				

Notes	Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
	Maximum starting current: starting current of biggest compressor + current of the compressor at 75% maximum load
	Nominal current in cooling mode is referred to the following conditions: evaporator 12°C/7°C; condenser 30/35°C
	Maximum running current is based on max compressor absorbed current in its envelope
	Maximum unit current for wires sizing is based on minimum allowed voltage
	Maximum current for wires sizing: (compressors full load ampere) x 1,1.

High temperature kit electrical data

Max leaving water temperature 65°C

ELECTRICAL SPECIFICATIONS			EWWD~H-XS	370	450	530	610	750
Power Supply	Phase		---	3	3	3	3	3
	Frequency		Hz	50	50	50	50	50
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
Unit	Maximum starting current		A	330	464	464	464	488
	Nominal running current cooling		A	111	136	153	175	223
	Maximum running current		A	197	236	276	315	395
	Maximum current for wires sizing		A	217	260	304	347	434
Compressor	Phase		Hz	3	3	3	3	3
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
	Maximum running current		A	197	236	276	315	197+197
	Starting method		---	Wye – Delta type (Y – Δ)				

ELECTRICAL SPECIFICATIONS			EWWD~H-XS	830	930	980	C10	C11
Power Supply	Phase		---	3	3	3	3	3
	Frequency		Hz	50	50	50	50	50
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
Unit	Maximum starting current		A	622	653	685	685	716
	Nominal running current cooling		A	248	273	290	306	328
	Maximum running current		A	433	472	512	552	591
	Maximum current for wires sizing		A	477	519	563	607	650
Compressor	Phase		Hz	3	3	3	3	3
	Voltage		V	400	400	400	400	400
	Voltage Tolerance	Minimum	%	-10%	-10%	-10%	-10%	-10%
		Maximum	%	+10%	+10%	+10%	+10%	+10%
	Maximum running current		A	197+236	236+236	236+276	276+276	276+315
	Starting method		---	Wye – Delta type (Y – Δ)				

ELECTRICAL SPECIFICATIONS			EWWD~H-XS	C12				
Power Supply	Phase		---	3				
	Frequency		Hz	50				
	Voltage		V	400				
	Voltage Tolerance	Minimum	%	-10%				
		Maximum	%	+10%				
Unit	Maximum starting current		A	716				
	Nominal running current cooling		A	349				
	Maximum running current		A	630				
	Maximum current for wires sizing		A	693				
Compressor	Phase		Hz	3				
	Voltage		V	400				
	Voltage Tolerance	Minimum	%	-10%				
		Maximum	%	+10%				
	Maximum running current		A	315+315				
	Starting method		---	Wye – Delta type (Y – Δ)				

Notes	Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
	Maximum starting current: starting current of biggest compressor + current of the compressor at 75% maximum load
	Nominal current in cooling mode is referred to the following conditions: evaporator 12°C/7°C; condenser 30/35°C
	Maximum running current is based on max compressor absorbed current in its envelope
	Maximum unit current for wires sizing is based on minimum allowed voltage
	Maximum current for wires sizing: (compressors full load ampere) x 1,1.

Sound levels

EWWD~H-XS

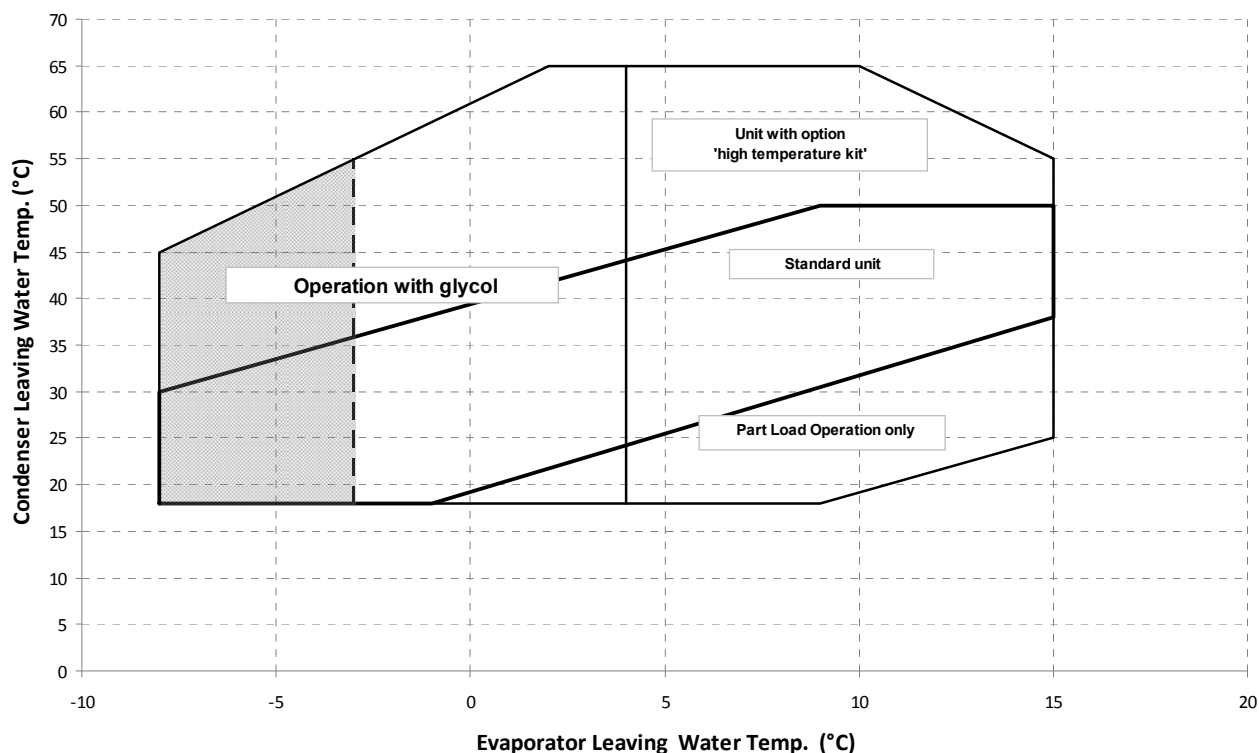
Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2×10^{-5} Pa)									Power	
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)	dB(A)
370	63.5	70.5	80.0	74.5	74.0	68.5	60.5	50.5	78.0	96.7	
450	64.5	71.5	81.0	75.5	75.0	69.5	61.5	51.5	79.0	97.7	
530	65.5	72.5	82.0	76.5	76.0	70.5	62.5	52.5	80.0	98.7	
610	65.5	72.5	82.0	76.5	76.0	70.5	62.5	52.5	80.0	99.1	
750	66.5	73.5	83.0	77.5	77.0	71.5	63.5	53.5	81.0	100.2	
830	67.0	74.0	83.5	78.0	77.5	72.0	64.0	54.0	81.5	100.7	
930	67.5	74.5	84.0	78.5	78.0	72.5	64.5	54.5	82.0	101.2	
980	68.0	75.0	84.5	79.0	78.5	73.0	65.0	55.0	82.5	101.7	
C10	68.5	75.5	85.0	79.5	79.0	73.5	65.5	55.5	83.0	102.2	
C11	69.0	76.0	85.5	80.0	79.5	74.0	66.0	56.0	83.5	102.7	
C12	69.0	76.0	85.5	80.0	79.5	74.0	66.0	56.0	83.5	102.7	

(1) The values are according to ISO 3744 and are referred to: evaporator 12/7° C, condenser 30/35° C, full load operation.

(2) The above sound pressure levels will decrease by 6dB(A) when the sound proof system (option) is installed.

Operating limits

EWWD~H- XS



The unit can not reach the minimum capacity when working in part load conditions

Table 1 - Evaporator/Condenser minimum and maximum water Δt

Max evaporator water Δt	°C	8
Min evaporator water Δt	°C	4
Min condenser water Δt	°C	4
Max condenser water Δt	°C	8

Table 2 - Evaporator fouling factors

Fouling factors $m^2 \cdot ^\circ C / kW$	Cooling capacity correction factor	Power input correction factor	EER correction factor
0.0176	1.000	1.000	1.000
0.0440	0.978	0.986	0.992
0.0880	0.957	0.974	0.983
0.1320	0.938	0.962	0.975

Table 3 - Condenser fouling factors

Fouling factors $m^2 \cdot ^\circ C / kW$	Cooling capacity correction factor	Power input correction factor	EER correction factor
0.0176	1.000	1.000	1.000
0.0440	0.978	0.986	0.992
0.0880	0.957	0.974	0.983
0.1320	0.938	0.962	0.975

Table 4.1 - Minimum glycol percentage for low water temperature

Evaporator Leaving Water Temperature (°C)	2	0	-2	-4	-6	-8
Ethylene glycol (%)	10	20	20	20	30	30
Propylene glycol (%)	10	20	20	30	30	30

Minimum glycol percentage to be used with evaporator leaving water temperature below 4°C to prevent freezing of water circuit.

Table 4.2 - Minimum glycol percentage for low air temperature

Air Ambient Temperature (°C) (2)	-3	-8	-15	-23	-35
Ethylene glycol (%) (1)	10%	20%	30%	40%	50%
Air Ambient Temperature (°C) (2)	-3	-7	-12	-20	-32
Propylene glycol (%) (1)	10%	20%	30%	40%	50%

(1): Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature

(2): Air ambient temperature do exceed the operating limits of the unit, as protection of water circuit may be needed in winter season at non-working conditions

Table 5 - Correction factors for low evaporator leaving water temperature

Evaporator Leaving Water Temperature (°C)	2	0	-2	-4	-6	-8
Cooling Capacity	0.842	0.785	0.725	0.670	0.613	0.562
Compressor Power Input	0.950	0.940	0.920	0.890	0.870	0.840

Correction factors have to be applied at working conditions: evaporator leaving water temperature 7°C

Table 6 - Correction factors for water and glycol mixture

	Ethylene Glycol (%)	10%	20%	30%	40%	50%
Ethylene Glycol	Cooling Capacity	0.991	0.982	0.972	0.961	0.946
	Compressor Power Input	0.996	0.992	0.986	0.976	0.966
	Flow Rate (Δt)	1.013	1.04	1.074	1.121	1.178
	Evaporator Pressure Drop	1.070	1.129	1.181	1.263	1.308
Propylene Glycol	Cooling Capacity	0.985	0.964	0.932	0.889	0.846
	Compressor Power Input	0.993	0.983	0.969	0.948	0.929
	Flow Rate (Δt)	1.017	1.032	1.056	1.092	1.139
	Evaporator Pressure Drop	1.120	1.272	1.496	1.792	2.128

How to use the Correction factors proposed in the previous tables

A) Mixture Water and Glycol --- Evaporator leaving water temperature > 4°C

- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size: EWWD610H-XS

Mixture:

Water

Working condition:

ELWT 12/7°C – CLWT 30/35°C

- Cooling capacity:

608 kW

- Power input:

101 kW

- Flow rate (Δt 5°C):

29.05 l/s

- Evaporator pressure drop:

42 kPa

Mixture:

Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)

Working condition:

ELWT 12/7°C – CLWT 30/35°C

- Cooling capacity:

608 x 0.972 = 591 kW

- Power input:

101 x 0.986 = 99.6 kW

- Flow rate (Δt 5°C):

28.23 (referred to 591 kW) x 1.074 = 30.33 l/s

- Evaporator pressure drop:

45 (referred to 30.33 l/s) x 1.181 = 53 kPa

B) Mixture Water and Glycol --- Evaporator leaving water temperature < 4°C

- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size: EWWD610H-XS

Mixture:

Water

Working condition:

ELWT 12/7°C – CLWT 30/35°C

- Cooling capacity:

608 kW

- Power input:

101 kW

- Flow rate (Δt 5°C):

29.05 l/s

- Evaporator pressure drop:

42 kPa

Mixture:

Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)

Working condition:

ELWT -1/-6°C – CLWT 30/35°C

- Cooling capacity:

608 x 0.613 x 0.972 = 362 kW

- Power input:

101 x 0.870 x 0.986 = 86.6 kW

- Flow rate (Δt 5°C):

17.29 l/s (referred to 362 kW) x 1.074 = 18.58 l/s

- Evaporator pressure drop:

19 kPa (referred to 18.58 l/s) x 1.181 = 22 kPa

Water charge, flow and quality

Items ^{(1) (6)}		Cooling Water			Cooled Water		Heated water ⁽²⁾			Tendency if out of criteria		
		Circulating System		Once Flow	Cooled Water		Low temperature		High temperature			
		Circulating water	Supply water ⁽⁴⁾		Circulating water	Supply water ⁽⁴⁾	Circulating water	Supply water ⁽⁴⁾	Circulating water		Supply water ⁽⁴⁾	
				Flowing water								

1 Names, definitions and units are according to JIS K 0101. Units and figures between brackets are old units published as reference only.
2 In case of using heated water (more than 40°C), corrosion is generally noticeable.
3 In the cooling water using hermetic cooling tower, close circuit water is according to heated water standard, and scattered water is according to cooling water standard.
4 Supply water is considered drink water, industrial water and ground water except for genuine water, neutral water and soft water.
5 The above mentioned items are representable items in corrosion and scale cases.
6 The limits above have to be considered as a general prescription and can not totally assure the absence of corrosion and erosion.
Some particular combinations of elements or the presence of components not listed in the table or factors not considered may trigger corrosion phenomena.

Water content in cooling circuits

The cooled water distribution circuits should have minimum water content to avoid excessive compressors start and stop.

In fact, each time the compressor starts up, an excessive quantity of oil goes from the compressor sump and simultaneously there is a rise in the temperature of the compressor motor's stator due to the inrush current during the start-up.

To prevent damage to the compressors, it has been envisaged the application of a device to limit frequent stops and restarts.

During the span of one hour there will be no more than 6 starts of the compressor. The plant side should therefore ensure that the overall water content allows a more constant functioning of the unit and consequently greater environmental comfort.

The minimum water content per unit should be calculated using this simplified formula:

$$\begin{aligned} &\text{For 1 compressor unit} \\ M (\text{liters}) &= (0.94 \times \Delta T(^{\circ}\text{C}) + 5.87) \times P(\text{kW}) \end{aligned}$$

$$\begin{aligned} &\text{For 2 compressors unit} \\ M (\text{liters}) &= (0.1595 \times \Delta T(^{\circ}\text{C}) + 3.0825) \times P(\text{kW}) \end{aligned}$$

where:

M minimum water content per unit expressed in litres
P Cooling Capacity of the unit expressed in kW
 ΔT evaporator entering / leaving water temperature difference expressed in $^{\circ}\text{C}$

This formula is valid for:

- standard microprocessor parameters

For more accurate determination of quantity of water, it is advisable to contact the designer of the plant.

Standard ratings

EWWD~H-XS

		370					450				
		Entering Condenser Water Temperature (°C)					Entering Condenser Water Temperature (°C)				
ELWT (°C)		25	30	35	40	45	25	30	35	40	45
4	Cc (kW)	347	332	316			419	400	381		
	Pi (kW)	55	62	70			66	74	84		
	Hc (kW)	402	394	386			485	475	465		
	Qwe (l/s)	16.60	15.85	15.09			20.02	19.12	18.20		
	Pdwe (kPa)	43	40	36			36	33	30		
5	Cc (kW)	360	344	328			434	415	395		
	Pi (kW)	55	62	70			66	75	84		
	Hc (kW)	415	406	398			500	489	479		
	Qwe (l/s)	17.19	16.43	15.65			20.73	19.82	18.87		
	Pdwe (kPa)	46	42	39			38	35	32		
6	Cc (kW)	373	356	340	323		449	430	410	389	
	Pi (kW)	55	63	70	79		66	75	84	95	
	Hc (kW)	428	419	410	401		515	505	494	484	
	Qwe (l/s)	17.80	17.02	16.23	15.41		21.47	20.53	19.57	18.58	
	Pdwe (kPa)	49	45	41	38		41	38	34	31	
7	Cc (kW)	386	369	352	334		465	445	424	403	
	Pi (kW)	55	63	71	79		66	75	85	95	
	Hc (kW)	441	432	423	414		531	520	509	498	
	Qwe (l/s)	18.42	17.63	16.82	15.98		22.22	21.26	20.28	19.27	
	Pdwe (kPa)	52	48	44	40		43	40	37	34	
8	Cc (kW)	399	382	365	347		481	461	440	418	
	Pi (kW)	55	63	71	79		66	76	85	95	
	Hc (kW)	454	445	436	426		547	536	525	513	
	Qwe (l/s)	19.06	18.25	17.42	16.56		22.98	22.01	21.01	19.97	
	Pdwe (kPa)	55	51	47	43		46	43	39	36	
9	Cc (kW)		395	377	359	340		477	455	433	410
	Pi (kW)		63	71	80	89		76	86	96	107
	Hc (kW)		459	449	439	429		553	541	529	517
	Qwe (l/s)		18.88	18.03	17.16	16.25		22.77	21.75	20.69	19.60
	Pdwe (kPa)		54	50	46	41		45	42	38	35
10	Cc (kW)		409	391	372	352		493	471	448	425
	Pi (kW)		63	72	80	89		76	86	96	107
	Hc (kW)		472	462	452	442		569	557	545	532
	Qwe (l/s)		19.53	18.66	17.77	16.84		23.55	22.51	21.42	20.31
	Pdwe (kPa)		58	53	49	44		48	44	41	37
11	Cc (kW)		423	404	385	365		510	487	464	440
	Pi (kW)		64	72	80	90		76	86	97	108
	Hc (kW)		486	476	465	455		586	574	561	548
	Qwe (l/s)		20.19	19.30	18.39	17.44		24.35	23.28	22.17	21.03
	Pdwe (kPa)		61	56	52	47		51	47	43	39
12	Cc (kW)			418	398	378			504	480	456
	Pi (kW)			72	81	90			87	97	108
	Hc (kW)			490	479	468			590	577	564
	Qwe (l/s)			19.96	19.02	18.05			24.07	22.93	21.77
	Pdwe (kPa)			60	55	50			50	46	42
13	Cc (kW)			432	412	391			520	496	471
	Pi (kW)			72	81	91			87	98	109
	Hc (kW)			504	493	481			607	594	580
	Qwe (l/s)			20.62	19.66	18.67			24.87	23.71	22.52
	Pdwe (kPa)			64	58	53			53	49	44
14	Cc (kW)			446	425	404			538	513	487
	Pi (kW)			73	82	91			87	98	109
	Hc (kW)			518	507	495			625	611	596
	Qwe (l/s)			21.30	20.32	19.30			25.69	24.50	23.28
	Pdwe (kPa)			67	62	57			56	52	47
15	Cc (kW)			460	439	417			555	530	503
	Pi (kW)			73	82	91			88	98	110
	Hc (kW)			533	521	509			643	628	613
	Qwe (l/s)			21.99	20.99	19.95			26.52	25.31	24.06
	Pdwe (kPa)			71	66	60			60	55	50

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

ELWT (°C)		530					610				
		Entering Condenser Water Temperature (°C)					Entering Condenser Water Temperature (°C)				
		25	30	35	40	45	25	30	35	40	45
4	Cc (kW)	490	468	446			572	547	520		
	Pi (kW)	76	86	97			88	100	112		
	Hc (kW)	566	554	542			660	646	632		
	Qwe (l/s)	23.43	22.38	21.30			27.35	26.12	24.86		
	Pdwe (kPa)	34	31	29			38	35	32		
5	Cc (kW)	508	486	463			593	567	540		
	Pi (kW)	76	86	97			88	100	113		
	Hc (kW)	584	572	559			681	667	652		
	Qwe (l/s)	24.27	23.20	22.10			28.33	27.07	25.79		
	Pdwe (kPa)	36	33	31			40	37	34		
6	Cc (kW)	526	503	480	455		614	587	560	531	
	Pi (kW)	76	87	97	109		89	101	113	127	
	Hc (kW)	602	590	577	564		702	688	673	658	
	Qwe (l/s)	25.13	24.04	22.91	21.76		29.33	28.05	26.74	25.39	
	Pdwe (kPa)	39	36	33	30		43	39	36	33	
7	Cc (kW)	544	521	497	472		635	608	580	551	
	Pi (kW)	76	87	98	110		89	101	114	127	
	Hc (kW)	621	608	595	582		724	709	694	678	
	Qwe (l/s)	26.01	24.89	23.74	22.56		30.35	29.05	27.71	26.33	
	Pdwe (kPa)	41	38	35	32		45	42	39	35	
8	Cc (kW)	563	539	515	489		657	629	601	571	
	Pi (kW)	77	87	98	110		89	101	114	128	
	Hc (kW)	640	627	613	599		746	731	715	699	
	Qwe (l/s)	26.91	25.77	24.59	23.38		31.40	30.07	28.70	27.29	
	Pdwe (kPa)	44	40	37	34		48	45	41	38	
9	Cc (kW)		558	533	507	480		651	622	592	561
	Pi (kW)		88	99	111	123		102	115	128	143
	Hc (kW)		646	632	618	604		753	737	720	704
	Qwe (l/s)		26.66	25.46	24.22	22.95		31.11	29.71	28.27	26.78
	Pdwe (kPa)		43	40	36	33		48	44	40	36
10	Cc (kW)		577	551	525	498		674	644	613	581
	Pi (kW)		88	99	111	124		102	115	129	144
	Hc (kW)		665	651	636	622		776	759	742	725
	Qwe (l/s)		27.57	26.35	25.08	23.78		32.18	30.75	29.27	27.75
	Pdwe (kPa)		46	42	39	35		50	47	43	39
11	Cc (kW)		597	570	543	515		696	666	634	601
	Pi (kW)		88	100	112	124		102	116	129	144
	Hc (kW)		685	670	655	640		799	781	763	746
	Qwe (l/s)		28.51	27.25	25.96	24.62		33.27	31.80	30.29	28.73
	Pdwe (kPa)		49	45	41	37		54	49	45	41
12	Cc (kW)			590	562	533			688	656	622
	Pi (kW)			100	112	125			116	130	145
	Hc (kW)			690	674	658			804	786	767
	Qwe (l/s)			28.18	26.85	25.48			32.88	31.34	29.74
	Pdwe (kPa)			48	44	40			52	48	44
13	Cc (kW)			609	581	552			711	678	644
	Pi (kW)			100	113	125			117	131	146
	Hc (kW)			710	694	677			828	809	789
	Qwe (l/s)			29.11	27.76	26.36			33.98	32.40	30.76
	Pdwe (kPa)			50	46	42			56	51	47
14	Cc (kW)			629	600	570			735	701	666
	Pi (kW)			101	113	126			117	131	146
	Hc (kW)			730	713	696			851	832	812
	Qwe (l/s)			30.07	28.69	27.25			35.09	33.48	31.80
	Pdwe (kPa)			53	49	45			59	54	49
15	Cc (kW)			650	620	589			758	724	688
	Pi (kW)			101	113	127			117	132	147
	Hc (kW)			751	734	716			876	856	835
	Qwe (l/s)			31.05	29.63	28.16			36.23	34.58	32.87
	Pdwe (kPa)			57	52	47			63	57	52

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

ELWT (°C)		750					830				
		Entering Condenser Water Temperature (°C)					Entering Condenser Water Temperature (°C)				
		25	30	35	40	45	25	30	35	40	45
4	Cc (kW)	705	673	641			778	743	708		
	Pi (kW)	109	123	139			120	136	153		
	Hc (kW)	813	796	779			898	880	861		
	Qwe (l/s)	33.66	32.15	30.61			37.18	35.51	33.80		
	Pdwe (kPa)	43	40	36			36	33	30		
5	Cc (kW)	730	698	664			806	770	734		
	Pi (kW)	109	124	139			121	137	154		
	Hc (kW)	839	821	804			927	907	888		
	Qwe (l/s)	34.87	33.33	31.74			38.51	36.81	35.06		
	Pdwe (kPa)	46	42	39			38	35	32		
6	Cc (kW)	756	723	689	654		835	798	761	723	
	Pi (kW)	110	124	140	157		121	137	155	173	
	Hc (kW)	865	847	829	811		956	936	916	896	
	Qwe (l/s)	36.10	34.53	32.91	31.26		39.88	38.14	36.35	34.52	
	Pdwe (kPa)	49	45	41	38		41	38	34	31	
7	Cc (kW)	782	748	714	678		864	827	788	749	
	Pi (kW)	110	125	141	157		121	138	155	174	
	Hc (kW)	892	873	854	836		985	965	944	923	
	Qwe (l/s)	37.37	35.76	34.11	32.41		41.27	39.50	37.67	35.80	
	Pdwe (kPa)	52	48	44	40		43	40	37	33	
8	Cc (kW)	809	775	739	703		894	856	817	777	
	Pi (kW)	110	125	141	158		122	139	156	175	
	Hc (kW)	919	900	881	861		1015	994	973	951	
	Qwe (l/s)	38.66	37.01	35.33	33.59		42.70	40.88	39.02	37.10	
	Pdwe (kPa)	55	51	47	43		46	43	39	36	
9	Cc (kW)		802	766	728	690		885	845	804	762
	Pi (kW)		126	142	159	177		139	157	175	196
	Hc (kW)		928	907	887	867		1025	1002	980	958
	Qwe (l/s)		38.30	36.57	34.80	32.97		42.30	40.40	38.44	36.41
	Pdwe (kPa)		54	50	46	42		45	42	38	35
10	Cc (kW)		829	792	754	715		916	875	833	790
	Pi (kW)		126	143	160	178		140	157	176	197
	Hc (kW)		955	935	914	893		1055	1032	1009	986
	Qwe (l/s)		39.61	37.85	36.03	34.16		43.75	41.81	39.80	37.73
	Pdwe (kPa)		58	53	49	44		48	44	41	37
11	Cc (kW)		857	819	780	740		947	905	862	818
	Pi (kW)		127	143	160	179		140	158	177	197
	Hc (kW)		984	963	941	919		1087	1063	1039	1015
	Qwe (l/s)		40.95	39.15	37.29	35.37		45.23	43.24	41.19	39.07
	Pdwe (kPa)		61	57	52	47		51	47	43	39
12	Cc (kW)			847	807	766			936	892	846
	Pi (kW)			144	161	179			159	178	198
	Hc (kW)			991	968	946			1094	1070	1045
	Qwe (l/s)			40.48	38.57	36.61			44.71	42.60	40.43
	Pdwe (kPa)			60	55	50			50	46	42
13	Cc (kW)			875	835	793			967	922	875
	Pi (kW)			144	162	180			159	179	199
	Hc (kW)			1020	996	973			1126	1101	1074
	Qwe (l/s)			41.82	39.88	37.87			46.20	44.05	41.83
	Pdwe (kPa)			64	58	53			53	49	44
14	Cc (kW)			904	863	819			999	953	905
	Pi (kW)			145	162	181			160	179	200
	Hc (kW)			1049	1025	1000			1159	1132	1105
	Qwe (l/s)			43.20	41.21	39.15			47.72	45.52	43.24
	Pdwe (kPa)			68	62	57			56	52	47
15	Cc (kW)			934	891	847			1031	984	935
	Pi (kW)			145	163	182			160	180	201
	Hc (kW)			1079	1054	1029			1191	1164	1136
	Qwe (l/s)			44.60	42.57	40.46			49.27	47.02	44.69
	Pdwe (kPa)			72	66	60			60	55	50

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

ELWT (°C)		930					980				
		Entering Condenser Water Temperature (°C)					Entering Condenser Water Temperature (°C)				
		25	30	35	40	45	25	30	35	40	45
4	Cc (kW)	877	838	797			921	879	837		
	Pi (kW)	132	149	168			142	160	180		
	Hc (kW)	1009	987	965			1062	1040	1018		
	Qwe (l/s)	41.90	40.02	38.09			43.99	42.02	40.00		
	Pdwe (kPa)	34	31	29			31	29	26		
5	Cc (kW)	908	868	827			954	912	868		
	Pi (kW)	132	150	168			142	161	181		
	Hc (kW)	1040	1018	995			1096	1073	1050		
	Qwe (l/s)	43.40	41.48	39.51			45.57	43.55	41.49		
	Pdwe (kPa)	36	33	31			33	31	28		
6	Cc (kW)	941	900	857	814		988	944	900	855	
	Pi (kW)	132	150	169	189		143	162	182	204	
	Hc (kW)	1073	1050	1027	1004		1130	1106	1082	1059	
	Qwe (l/s)	44.94	42.98	40.97	38.90		47.18	45.12	43.01	40.85	
	Pdwe (kPa)	39	36	33	30		36	33	30	27	
7	Cc (kW)	973	932	889	844		1022	978	933	887	
	Pi (kW)	133	151	170	190		143	163	183	205	
	Hc (kW)	1106	1083	1059	1035		1165	1141	1116	1091	
	Qwe (l/s)	46.51	44.51	42.45	40.34		48.83	46.73	44.57	42.36	
	Pdwe (kPa)	41	38	35	32		38	35	32	29	
8	Cc (kW)	1007	964	920	875		1057	1012	966	919	
	Pi (kW)	133	152	171	191		143	163	184	206	
	Hc (kW)	1140	1116	1091	1066		1201	1176	1150	1125	
	Qwe (l/s)	48.12	46.07	43.97	41.81		50.52	48.37	46.17	43.90	
	Pdwe (kPa)	44	40	37	34		40	37	34	31	
9	Cc (kW)		998	953	907	859		1048	1000	952	902
	Pi (kW)		152	172	192	214		164	185	207	231
	Hc (kW)		1150	1124	1099	1073		1212	1185	1158	1132
	Qwe (l/s)		47.67	45.52	43.32	41.04		50.06	47.80	45.48	43.09
	Pdwe (kPa)		43	40	36	33		40	36	33	30
10	Cc (kW)		1032	986	939	890		1084	1035	986	934
	Pi (kW)		153	172	193	215		164	185	208	231
	Hc (kW)		1185	1158	1132	1105		1248	1221	1193	1166
	Qwe (l/s)		49.31	47.11	44.85	42.52		51.77	49.47	47.09	44.64
	Pdwe (kPa)		46	42	38	35		42	39	35	32
11	Cc (kW)		1067	1020	971	921		1120	1071	1020	967
	Pi (kW)		153	173	194	216		165	186	208	232
	Hc (kW)		1220	1193	1165	1137		1285	1257	1228	1200
	Qwe (l/s)		50.97	48.73	46.42	44.03		53.52	51.16	48.73	46.22
	Pdwe (kPa)		48	45	41	37		45	41	38	34
12	Cc (kW)			1054	1005	954			1107	1055	1001
	Pi (kW)			174	195	217			187	209	233
	Hc (kW)			1228	1200	1171			1294	1265	1235
	Qwe (l/s)			50.38	48.01	45.57			52.90	50.41	47.84
	Pdwe (kPa)			47	44	40			44	40	37
13	Cc (kW)			1090	1039	987			1144	1091	1036
	Pi (kW)			174	195	218			188	210	234
	Hc (kW)			1264	1234	1204			1332	1301	1270
	Qwe (l/s)			52.06	49.64	47.13			54.66	52.12	49.49
	Pdwe (kPa)			50	46	42			46	43	39
14	Cc (kW)			1125	1074	1020			1182	1127	1071
	Pi (kW)			175	196	219			188	211	235
	Hc (kW)			1300	1270	1239			1370	1338	1306
	Qwe (l/s)			53.77	51.30	48.73			56.46	53.86	51.17
	Pdwe (kPa)			53	49	45			49	45	41
15	Cc (kW)			1162	1109	1054			1220	1164	1107
	Pi (kW)			175	197	220			189	212	236
	Hc (kW)			1337	1306	1274			1409	1376	1343
	Qwe (l/s)			55.52	52.98	50.36			58.29	55.63	52.87
	Pdwe (kPa)			57	52	47			52	48	44

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

ELWT (°C)		C10					C11				
		Entering Condenser Water Temperature (°C)					Entering Condenser Water Temperature (°C)				
		25	30	35	40	45	25	30	35	40	45
4	Cc (kW)	989	944	899			1066	1018	969		
	Pi (kW)	152	172	193			163	185	208		
	Hc (kW)	1140	1116	1092			1230	1203	1178		
	Qwe (l/s)	47.25	45.13	42.95			50.94	48.66	46.31		
	Pdwe (kPa)	31	29	26			33	31	28		
5	Cc (kW)	1024	979	932			1104	1056	1005		
	Pi (kW)	152	172	194			164	186	209		
	Hc (kW)	1176	1151	1126			1268	1241	1215		
	Qwe (l/s)	48.94	46.77	44.55			52.76	50.43	48.04		
	Pdwe (kPa)	33	31	28			35	33	30		
6	Cc (kW)	1060	1014	967	918		1143	1094	1042	990	
	Pi (kW)	153	173	195	218		165	187	210	235	
	Hc (kW)	1213	1187	1162	1136		1308	1280	1253	1225	
	Qwe (l/s)	50.67	48.46	46.19	43.87		54.63	52.25	49.81	47.30	
	Pdwe (kPa)	36	33	30	27		38	35	32	29	
7	Cc (kW)	1098	1050	1002	952		1183	1133	1080	1027	
	Pi (kW)	153	174	196	219		165	188	211	236	
	Hc (kW)	1251	1224	1198	1171		1348	1320	1291	1263	
	Qwe (l/s)	52.44	50.19	47.87	45.49		56.54	54.11	51.61	49.05	
	Pdwe (kPa)	38	35	32	29		40	37	34	31	
8	Cc (kW)	1135	1087	1038	987		1224	1172	1119	1064	
	Pi (kW)	153	175	197	220		165	188	212	237	
	Hc (kW)	1289	1262	1234	1207		1390	1361	1331	1301	
	Qwe (l/s)	54.25	51.95	49.58	47.14		58.50	56.01	53.46	50.83	
	Pdwe (kPa)	40	37	34	31		43	39	36	33	
9	Cc (kW)		1125	1074	1022	968		1213	1158	1102	1044
	Pi (kW)		175	198	221	247		189	213	238	266
	Hc (kW)		1300	1272	1243	1215		1402	1371	1341	1310
	Qwe (l/s)		53.75	51.33	48.84	46.27		57.96	55.35	52.66	49.89
	Pdwe (kPa)		40	36	33	30		42	39	35	32
10	Cc (kW)		1164	1112	1058	1003		1255	1199	1141	1082
	Pi (kW)		176	198	222	248		190	214	239	267
	Hc (kW)		1340	1310	1281	1251		1444	1413	1381	1349
	Qwe (l/s)		55.59	53.12	50.57	47.94		59.94	57.28	54.53	51.69
	Pdwe (kPa)		42	39	36	32		44	41	37	34
11	Cc (kW)		1203	1150	1095	1039		1297	1240	1181	1120
	Pi (kW)		176	199	223	249		190	215	240	268
	Hc (kW)		1379	1349	1318	1288		1487	1455	1422	1388
	Qwe (l/s)		57.47	54.94	52.33	49.64		61.97	59.24	56.43	53.52
	Pdwe (kPa)		45	41	38	34		47	44	40	36
12	Cc (kW)			1189	1133	1075			1282	1222	1159
	Pi (kW)			200	224	250			216	242	269
	Hc (kW)			1389	1357	1325			1498	1463	1429
	Qwe (l/s)			56.81	54.14	51.38			61.25	58.37	55.40
	Pdwe (kPa)			44	40	37			46	42	39
13	Cc (kW)			1229	1171	1112			1325	1263	1199
	Pi (kW)			201	225	251			216	243	270
	Hc (kW)			1429	1397	1363			1541	1506	1470
	Qwe (l/s)			58.70	55.97	53.15			63.29	60.35	57.30
	Pdwe (kPa)			46	43	39			49	45	41
14	Cc (kW)			1269	1211	1150			1368	1305	1240
	Pi (kW)			201	226	252			217	244	272
	Hc (kW)			1470	1437	1402			1585	1549	1512
	Qwe (l/s)			60.63	57.84	54.95			65.37	62.36	59.24
	Pdwe (kPa)			49	45	41			52	48	44
15	Cc (kW)			1310	1250	1188			1413	1348	1281
	Pi (kW)			202	227	253			218	245	273
	Hc (kW)			1512	1477	1441			1630	1593	1554
	Qwe (l/s)			62.60	59.74	56.78			67.50	64.41	61.22
	Pdwe (kPa)			52	48	44			55	51	46

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		C12				
		Entering Condenser Water Temperature (°C)				
ELWT (°C)		25	30	35	40	45
4	Cc (kW)	1144	1092	1040		
	Pi (kW)	175	199	223		
	Hc (kW)	1319	1291	1263		
	Qwe (l/s)	54.64	52.19	49.67		
	Pdwe (kPa)	36	33	30		
5	Cc (kW)	1184	1132	1078		
	Pi (kW)	176	199	224		
	Hc (kW)	1360	1332	1303		
	Qwe (l/s)	56.59	54.09	51.52		
	Pdwe (kPa)	38	35	32		
6	Cc (kW)	1226	1173	1118	1062	
	Pi (kW)	176	200	225	252	
	Hc (kW)	1403	1373	1343	1314	
	Qwe (l/s)	58.60	56.04	53.42	50.73	
	Pdwe (kPa)	41	38	34	31	
7	Cc (kW)	1269	1215	1159	1101	
	Pi (kW)	177	201	226	253	
	Hc (kW)	1446	1416	1385	1354	
	Qwe (l/s)	60.65	58.04	55.36	52.60	
	Pdwe (kPa)	43	40	37	34	
8	Cc (kW)	1313	1257	1200	1141	
	Pi (kW)	177	202	227	255	
	Hc (kW)	1490	1459	1428	1396	
	Qwe (l/s)	62.74	60.08	57.34	54.52	
	Pdwe (kPa)	46	43	39	36	
9	Cc (kW)		1301	1242	1182	1120
	Pi (kW)		203	228	256	285
	Hc (kW)		1504	1471	1438	1405
	Qwe (l/s)		62.16	59.36	56.48	53.51
	Pdwe (kPa)		45	42	38	35
10	Cc (kW)		1346	1286	1224	1160
	Pi (kW)		203	229	257	286
	Hc (kW)		1549	1515	1481	1447
	Qwe (l/s)		64.29	61.43	58.48	55.44
	Pdwe (kPa)		48	44	41	37
11	Cc (kW)		1391	1330	1267	1202
	Pi (kW)		204	230	258	288
	Hc (kW)		1595	1560	1525	1489
	Qwe (l/s)		66.46	63.54	60.52	57.41
	Pdwe (kPa)		51	47	43	39
12	Cc (kW)			1375	1310	1244
	Pi (kW)			231	259	289
	Hc (kW)			1606	1569	1532
	Qwe (l/s)			65.69	62.61	59.42
	Pdwe (kPa)			50	46	42
13	Cc (kW)			1421	1355	1286
	Pi (kW)			232	260	290
	Hc (kW)			1653	1615	1576
	Qwe (l/s)			67.88	64.73	61.46
	Pdwe (kPa)			53	49	44
14	Cc (kW)			1468	1400	1330
	Pi (kW)			233	261	291
	Hc (kW)			1700	1661	1621
	Qwe (l/s)			70.12	66.89	63.54
	Pdwe (kPa)			56	52	47
15	Cc (kW)			1515	1446	1374
	Pi (kW)			234	262	293
	Hc (kW)			1749	1708	1667
	Qwe (l/s)			72.39	69.09	65.67
	Pdwe (kPa)			60	55	50

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

High water temperature kit ratings

		370							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	347	332	316	299	283	265	248	225
	Pi (kW)	62	68	75	82	91	101	113	125
	Hc (kW)	409	400	391	382	374	367	361	350
	Qwe (l/s)	16.60	15.85	15.09	14.31	13.51	12.68	11.84	10.75
	Pdwe (kPa)	43	40	36	33	30	27	23	20
5	Cc (kW)	360	344	328	311	294	276	258	235
	Pi (kW)	63	69	76	83	92	102	113	125
	Hc (kW)	423	413	403	394	385	378	371	360
	Qwe (l/s)	17.19	16.43	15.65	14.85	14.03	13.19	12.32	11.23
	Pdwe (kPa)	46	42	39	35	32	28	25	21
6	Cc (kW)	373	356	340	323	305	287	268	246
	Pi (kW)	64	70	76	84	92	102	113	125
	Hc (kW)	436	426	416	406	397	389	382	371
	Qwe (l/s)	17.80	17.02	16.23	15.41	14.57	13.71	12.82	11.75
	Pdwe (kPa)	49	45	41	38	34	31	27	23
7	Cc (kW)	386	369	352	334	316	298	279	257
	Pi (kW)	64	67	77	84	93	102	114	125
	Hc (kW)	450	436	429	419	409	400	393	382
	Qwe (l/s)	18.42	17.63	16.82	15.98	15.12	14.23	13.32	12.28
	Pdwe (kPa)	52	48	44	40	36	33	29	25
8	Cc (kW)	399	382	365	347	328	309	290	268
	Pi (kW)	65	71	78	85	94	103	114	125
	Hc (kW)	464	453	443	432	422	412	404	393
	Qwe (l/s)	19.06	18.25	17.42	16.56	15.68	14.77	13.84	12.80
	Pdwe (kPa)	55	51	47	43	39	35	31	27
9	Cc (kW)	412	395	377	359	340	321	301	279
	Pi (kW)	66	72	79	86	94	104	114	125
	Hc (kW)	478	468	456	445	434	424	415	404
	Qwe (l/s)	19.71	18.88	18.03	17.16	16.25	15.33	14.37	13.33
	Pdwe (kPa)	59	54	50	46	41	37	33	29
10	Cc (kW)	426	409	391	372	352	333	312	291
	Pi (kW)	67	73	80	87	95	104	115	125
	Hc (kW)	493	482	470	459	448	437	427	416
	Qwe (l/s)	20.37	19.53	18.66	17.77	16.84	15.89	14.90	13.90
	Pdwe (kPa)	62	58	53	49	44	40	35	31
11	Cc (kW)	441	423	404	385	365	345	323	
	Pi (kW)	67	74	81	88	96	105	116	
	Hc (kW)	508	497	485	473	461	450	439	
	Qwe (l/s)	21.05	20.19	19.30	18.39	17.44	16.46	15.45	
	Pdwe (kPa)	66	61	56	52	47	42	38	
12	Cc (kW)	455	437	418	398	378	357	335	
	Pi (kW)	68	75	82	89	97	106	116	
	Hc (kW)	523	512	500	487	475	463	451	
	Qwe (l/s)	21.74	20.86	19.96	19.02	18.05	17.05	16.01	
	Pdwe (kPa)	70	65	60	55	50	45	40	
13	Cc (kW)	470	451	432	412	391	369		
	Pi (kW)	69	76	83	90	98	107		
	Hc (kW)	539	527	514	502	489	476		
	Qwe (l/s)	22.45	21.55	20.62	19.66	18.67	17.64		
	Pdwe (kPa)	74	69	64	58	53	48		
14	Cc (kW)	485	466	446	425	404	382		
	Pi (kW)	69	77	84	91	99	108		
	Hc (kW)	554	542	530	516	503	490		
	Qwe (l/s)	23.17	22.25	21.30	20.32	19.30	18.25		
	Pdwe (kPa)	78	73	67	62	57	51		
15	Cc (kW)	500	481	460	439	417	395		
	Pi (kW)	70	78	85	92	100	109		
	Hc (kW)	570	558	545	531	517	504		
	Qwe (l/s)	23.90	22.96	21.99	20.99	19.95	18.87		
	Pdwe (kPa)	83	77	71	66	60	54		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		450							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	419	400	381	361	341	320	299	273
	Pi (kW)	74	82	90	99	109	122	136	146
	Hc (kW)	493	482	471	460	450	442	435	419
	Qwe (l/s)	20.02	19.12	18.20	17.25	16.29	15.30	14.28	13.04
	Pdwe (kPa)	36	33	30	27	25	22	20	17
5	Cc (kW)	434	415	395	375	354	333	311	285
	Pi (kW)	75	83	91	100	110	122	136	146
	Hc (kW)	509	497	486	474	464	455	447	431
	Qwe (l/s)	20.73	19.82	18.87	17.91	16.92	15.91	14.86	13.62
	Pdwe (kPa)	38	35	32	29	27	24	21	18
6	Cc (kW)	449	430	410	389	368	346	323	298
	Pi (kW)	76	84	92	100	111	122	136	146
	Hc (kW)	526	513	501	489	478	468	460	444
	Qwe (l/s)	21.47	20.53	19.57	18.58	17.57	16.53	15.46	14.24
	Pdwe (kPa)	41	38	34	31	28	25	23	19
7	Cc (kW)	465	445	424	403	382	359	336	311
	Pi (kW)	77	80	93	101	111	123	136	146
	Hc (kW)	542	525	517	505	493	482	473	457
	Qwe (l/s)	22.22	21.26	20.28	19.27	18.23	17.16	16.07	14.86
	Pdwe (kPa)	43	40	37	34	30	27	24	21
8	Cc (kW)	481	461	440	418	396	373	349	324
	Pi (kW)	78	86	94	102	112	124	137	147
	Hc (kW)	559	546	533	520	508	497	486	471
	Qwe (l/s)	22.98	22.01	21.01	19.97	18.91	17.82	16.69	15.48
	Pdwe (kPa)	46	43	39	36	32	29	26	23
9	Cc (kW)	497	477	455	433	410	387	363	338
	Pi (kW)	79	87	95	103	113	124	137	147
	Hc (kW)	577	564	550	537	523	511	500	485
	Qwe (l/s)	23.77	22.77	21.75	20.69	19.60	18.48	17.32	16.15
	Pdwe (kPa)	49	45	42	38	35	31	28	24
10	Cc (kW)	514	493	471	448	425	401	376	353
	Pi (kW)	80	88	96	105	114	125	138	147
	Hc (kW)	594	581	567	553	539	526	514	500
	Qwe (l/s)	24.57	23.55	22.51	21.42	20.31	19.16	17.97	16.87
	Pdwe (kPa)	52	48	44	41	37	33	30	26
11	Cc (kW)	531	510	487	464	440	416	390	
	Pi (kW)	81	89	97	106	115	126	139	
	Hc (kW)	612	599	584	570	555	542	529	
	Qwe (l/s)	25.39	24.35	23.28	22.17	21.03	19.85	18.63	
	Pdwe (kPa)	55	51	47	43	39	35	32	
12	Cc (kW)	549	527	504	480	456	430	404	
	Pi (kW)	82	90	98	107	116	127	140	
	Hc (kW)	631	617	602	587	572	557	544	
	Qwe (l/s)	26.22	25.16	24.07	22.93	21.77	20.56	19.31	
	Pdwe (kPa)	58	54	50	46	42	38	34	
13	Cc (kW)	567	544	520	496	471	445		
	Pi (kW)	83	91	99	108	117	128		
	Hc (kW)	649	635	620	604	589	573		
	Qwe (l/s)	27.07	25.99	24.87	23.71	22.52	21.28		
	Pdwe (kPa)	62	57	53	49	44	40		
14	Cc (kW)	585	562	538	513	487	461		
	Pi (kW)	83	92	101	109	119	129		
	Hc (kW)	668	654	638	622	606	590		
	Qwe (l/s)	27.94	26.83	25.69	24.50	23.28	22.01		
	Pdwe (kPa)	65	61	56	52	47	43		
15	Cc (kW)	603	580	555	530	503	476		
	Pi (kW)	84	93	102	111	120	130		
	Hc (kW)	687	673	657	640	623	607		
	Qwe (l/s)	28.82	27.69	26.52	25.31	24.06	22.76		
	Pdwe (kPa)	69	64	60	55	50	45		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		530							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	490	468	446	423	399	375	350	320
	Pi (kW)	86	94	104	114	126	140	157	171
	Hc (kW)	576	563	549	537	525	515	507	491
	Qwe (l/s)	23.43	22.38	21.30	20.20	19.07	17.91	16.72	15.29
	Pdwe (kPa)	34	31	29	26	24	21	19	16
5	Cc (kW)	508	486	463	439	415	390	364	334
	Pi (kW)	87	95	105	115	127	141	157	171
	Hc (kW)	595	581	567	554	541	531	521	505
	Qwe (l/s)	24.27	23.20	22.10	20.97	19.81	18.62	17.40	15.96
	Pdwe (kPa)	36	33	31	28	25	23	20	17
6	Cc (kW)	526	503	480	455	431	405	379	349
	Pi (kW)	88	97	106	116	128	141	157	171
	Hc (kW)	614	600	585	571	558	546	536	520
	Qwe (l/s)	25.13	24.04	22.91	21.76	20.57	19.35	18.10	16.67
	Pdwe (kPa)	39	36	33	30	27	24	21	18
7	Cc (kW)	544	521	497	472	447	421	394	364
	Pi (kW)	89	92	107	117	129	142	157	171
	Hc (kW)	634	613	604	589	575	563	551	535
	Qwe (l/s)	26.01	24.89	23.74	22.56	21.35	20.10	18.81	17.39
	Pdwe (kPa)	41	38	35	32	29	26	23	20
8	Cc (kW)	563	539	515	489	463	437	409	380
	Pi (kW)	90	99	108	118	130	143	158	172
	Hc (kW)	654	638	623	608	593	579	567	552
	Qwe (l/s)	26.91	25.77	24.59	23.38	22.14	20.86	19.54	18.16
	Pdwe (kPa)	44	40	37	34	31	28	25	22
9	Cc (kW)	582	558	533	507	480	453	425	396
	Pi (kW)	91	100	109	119	131	144	159	172
	Hc (kW)	674	658	642	626	611	596	583	568
	Qwe (l/s)	27.83	26.66	25.46	24.22	22.95	21.64	20.28	18.92
	Pdwe (kPa)	46	43	40	36	33	30	26	23
10	Cc (kW)	602	577	551	525	498	469	440	413
	Pi (kW)	92	101	111	121	132	145	159	173
	Hc (kW)	694	679	662	646	629	614	600	586
	Qwe (l/s)	28.77	27.57	26.35	25.08	23.78	22.43	21.04	19.73
	Pdwe (kPa)	49	46	42	39	35	32	28	25
11	Cc (kW)	622	597	570	543	515	486	457	
	Pi (kW)	93	103	112	122	133	146	160	
	Hc (kW)	715	699	682	665	648	632	617	
	Qwe (l/s)	29.72	28.51	27.25	25.96	24.62	23.24	21.82	
	Pdwe (kPa)	52	49	45	41	37	34	30	
12	Cc (kW)	643	617	590	562	533	504	473	
	Pi (kW)	94	104	113	123	134	147	161	
	Hc (kW)	737	720	703	685	668	650	634	
	Qwe (l/s)	30.70	29.46	28.18	26.85	25.48	24.07	22.61	
	Pdwe (kPa)	55	51	48	44	40	36	32	
13	Cc (kW)	663	637	609	581	552	521		
	Pi (kW)	95	105	115	125	136	148		
	Hc (kW)	759	742	724	706	687	669		
	Qwe (l/s)	31.70	30.43	29.11	27.76	26.36	24.91		
	Pdwe (kPa)	59	55	50	46	42	38		
14	Cc (kW)	685	657	629	600	570	539		
	Pi (kW)	96	106	116	126	137	149		
	Hc (kW)	781	764	746	727	707	688		
	Qwe (l/s)	32.71	31.41	30.07	28.69	27.25	25.77		
	Pdwe (kPa)	62	58	53	49	45	40		
15	Cc (kW)	706	679	650	620	589	558		
	Pi (kW)	97	108	117	128	138	150		
	Hc (kW)	803	786	767	748	728	708		
	Qwe (l/s)	33.74	32.42	31.05	29.63	28.16	26.64		
	Pdwe (kPa)	66	61	57	52	47	43		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		610							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	572	547	520	493	466	437	408	370
	Pi (kW)	100	109	120	132	146	163	182	197
	Hc (kW)	672	656	641	626	612	600	590	567
	Qwe (l/s)	27.35	26.12	24.86	23.57	22.26	20.90	19.51	17.66
	Pdwe (kPa)	38	35	32	29	26	23	21	17
5	Cc (kW)	593	567	540	512	484	455	425	386
	Pi (kW)	101	111	121	133	147	163	182	197
	Hc (kW)	694	677	661	646	631	618	607	583
	Qwe (l/s)	28.33	27.07	25.79	24.47	23.12	21.73	20.30	18.43
	Pdwe (kPa)	40	37	34	31	28	25	22	19
6	Cc (kW)	614	587	560	531	502	473	442	403
	Pi (kW)	102	112	123	135	148	164	182	197
	Hc (kW)	716	699	682	666	651	637	624	600
	Qwe (l/s)	29.33	28.05	26.74	25.39	24.00	22.58	21.12	19.26
	Pdwe (kPa)	43	39	36	33	30	27	24	20
7	Cc (kW)	635	608	580	551	521	491	459	420
	Pi (kW)	104	107	124	136	149	165	183	198
	Hc (kW)	739	715	704	687	671	656	642	618
	Qwe (l/s)	30.35	29.05	27.71	26.33	24.91	23.45	21.95	20.09
	Pdwe (kPa)	45	42	39	35	32	29	25	22
8	Cc (kW)	657	629	601	571	541	509	477	439
	Pi (kW)	105	115	126	137	150	166	183	198
	Hc (kW)	762	744	726	708	691	675	661	637
	Qwe (l/s)	31.40	30.07	28.70	27.29	25.84	24.34	22.80	20.97
	Pdwe (kPa)	48	45	41	38	34	31	27	23
9	Cc (kW)	680	651	622	592	561	529	495	457
	Pi (kW)	106	116	127	139	152	167	184	199
	Hc (kW)	786	768	749	730	712	695	680	656
	Qwe (l/s)	32.47	31.11	29.71	28.27	26.78	25.25	23.67	21.85
	Pdwe (kPa)	51	48	44	40	36	33	29	25
10	Cc (kW)	703	674	644	613	581	548	514	477
	Pi (kW)	107	118	128	140	153	168	185	200
	Hc (kW)	810	791	772	753	734	716	699	677
	Qwe (l/s)	33.57	32.18	30.75	29.27	27.75	26.18	24.56	22.79
	Pdwe (kPa)	54	50	47	43	39	35	31	27
11	Cc (kW)	726	696	666	634	601	568	533	
	Pi (kW)	108	119	130	142	154	169	186	
	Hc (kW)	834	816	796	776	756	737	719	
	Qwe (l/s)	34.69	33.27	31.80	30.29	28.73	27.12	25.46	
	Pdwe (kPa)	58	54	49	45	41	37	33	
12	Cc (kW)	750	719	688	656	622	588	552	
	Pi (kW)	110	121	132	143	156	170	187	
	Hc (kW)	859	840	820	799	778	758	739	
	Qwe (l/s)	35.83	34.38	32.88	31.34	29.74	28.09	26.38	
	Pdwe (kPa)	61	57	52	48	44	40	35	
13	Cc (kW)	774	743	711	678	644	608		
	Pi (kW)	111	122	133	145	157	172		
	Hc (kW)	885	865	844	823	801	780		
	Qwe (l/s)	36.99	35.51	33.98	32.40	30.76	29.07		
	Pdwe (kPa)	65	60	56	51	47	42		
14	Cc (kW)	799	767	735	701	666	629		
	Pi (kW)	112	123	135	146	159	173		
	Hc (kW)	911	891	869	847	825	803		
	Qwe (l/s)	38.17	36.66	35.09	33.48	31.80	30.07		
	Pdwe (kPa)	69	64	59	54	49	45		
15	Cc (kW)	824	792	758	724	688	651		
	Pi (kW)	112	125	136	148	161	175		
	Hc (kW)	937	917	895	872	849	825		
	Qwe (l/s)	39.38	37.83	36.23	34.58	32.87	31.09		
	Pdwe (kPa)	73	68	63	57	52	47		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		750							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	705	673	641	607	573	538	503	451
	Pi (kW)	116	128	140	154	171	190	212	247
	Hc (kW)	821	801	781	762	744	729	715	698
	Qwe (l/s)	33.66	32.15	30.61	29.02	27.40	25.73	24.02	21.55
	Pdwe (kPa)	43	40	36	33	30	27	23	19
5	Cc (kW)	730	698	664	630	596	560	523	471
	Pi (kW)	118	129	142	156	172	191	213	247
	Hc (kW)	848	827	806	786	768	751	736	718
	Qwe (l/s)	34.87	33.33	31.74	30.12	28.46	26.75	24.99	22.49
	Pdwe (kPa)	46	42	39	35	32	28	25	21
6	Cc (kW)	756	723	689	654	618	582	544	492
	Pi (kW)	119	131	143	157	173	191	213	248
	Hc (kW)	875	854	832	811	791	773	757	739
	Qwe (l/s)	36.10	34.53	32.91	31.26	29.55	27.80	26.00	23.50
	Pdwe (kPa)	49	45	41	38	34	31	27	23
7	Cc (kW)	782	748	714	678	642	604	566	513
	Pi (kW)	121	133	145	159	174	192	213	248
	Hc (kW)	903	881	859	837	816	797	779	761
	Qwe (l/s)	37.37	35.76	34.11	32.41	30.66	28.87	27.02	24.51
	Pdwe (kPa)	52	48	44	40	36	33	29	24
8	Cc (kW)	809	775	739	703	666	627	587	535
	Pi (kW)	122	134	147	160	176	193	214	249
	Hc (kW)	931	909	886	863	841	821	802	784
	Qwe (l/s)	38.66	37.01	35.33	33.59	31.81	29.97	28.07	25.59
	Pdwe (kPa)	55	51	47	43	39	35	31	26
9	Cc (kW)	837	802	766	728	690	651	610	558
	Pi (kW)	124	136	148	162	177	195	215	249
	Hc (kW)	960	938	914	890	867	845	825	807
	Qwe (l/s)	39.97	38.30	36.57	34.80	32.97	31.08	29.14	26.66
	Pdwe (kPa)	59	54	50	46	42	37	33	28
10	Cc (kW)	865	829	792	754	715	674	633	582
	Pi (kW)	125	138	150	163	179	196	216	251
	Hc (kW)	990	967	942	918	893	870	848	833
	Qwe (l/s)	41.32	39.61	37.85	36.03	34.16	32.22	30.23	27.81
	Pdwe (kPa)	62	58	53	49	44	40	36	31
11	Cc (kW)	894	857	819	780	740	699	656	
	Pi (kW)	127	139	152	165	180	197	217	
	Hc (kW)	1020	996	971	946	920	896	873	
	Qwe (l/s)	42.70	40.95	39.15	37.29	35.37	33.39	31.34	
	Pdwe (kPa)	66	61	57	52	47	42	38	
12	Cc (kW)	923	886	847	807	766	724	680	
	Pi (kW)	128	141	154	167	182	199	218	
	Hc (kW)	1051	1027	1001	974	948	922	898	
	Qwe (l/s)	44.10	42.32	40.48	38.57	36.61	34.58	32.48	
	Pdwe (kPa)	70	65	60	55	50	45	40	
13	Cc (kW)	953	915	875	835	793	749		
	Pi (kW)	129	142	155	169	184	200		
	Hc (kW)	1082	1057	1031	1004	976	949		
	Qwe (l/s)	45.53	43.71	41.82	39.88	37.87	35.79		
	Pdwe (kPa)	74	69	64	58	53	48		
14	Cc (kW)	984	945	904	863	819	775		
	Pi (kW)	130	144	157	171	186	202		
	Hc (kW)	1114	1089	1062	1034	1005	977		
	Qwe (l/s)	46.99	45.13	43.20	41.21	39.15	37.02		
	Pdwe (kPa)	79	73	68	62	57	51		
15	Cc (kW)	1015	975	934	891	847	801		
	Pi (kW)	131	146	159	173	188	204		
	Hc (kW)	1146	1120	1093	1064	1034	1005		
	Qwe (l/s)	48.47	46.57	44.60	42.57	40.46	38.27		
	Pdwe (kPa)	83	77	72	66	60	54		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		830							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	778	743	708	671	633	595	555	499
	Pi (kW)	129	141	155	171	189	210	235	268
	Hc (kW)	907	884	862	841	822	805	790	767
	Qwe (l/s)	37.18	35.51	33.80	32.05	30.26	28.42	26.53	23.84
	Pdwe (kPa)	36	33	30	27	25	22	20	16
5	Cc (kW)	806	770	734	696	658	618	578	521
	Pi (kW)	130	143	157	172	190	211	235	269
	Hc (kW)	936	913	890	868	848	829	813	789
	Qwe (l/s)	38.51	36.81	35.06	33.27	31.43	29.55	27.61	24.88
	Pdwe (kPa)	38	35	32	29	27	24	21	17
6	Cc (kW)	835	798	761	723	683	643	601	544
	Pi (kW)	132	145	158	174	191	212	235	269
	Hc (kW)	967	943	919	896	874	854	836	813
	Qwe (l/s)	39.88	38.14	36.35	34.52	32.64	30.70	28.71	26.00
	Pdwe (kPa)	41	38	34	31	28	25	23	19
7	Cc (kW)	864	827	788	749	709	667	625	568
	Pi (kW)	133	146	160	175	192	213	236	269
	Hc (kW)	997	973	948	924	901	880	860	837
	Qwe (l/s)	41.27	39.50	37.67	35.80	33.87	31.88	29.84	27.12
	Pdwe (kPa)	43	40	37	33	30	27	24	20
8	Cc (kW)	894	856	817	777	735	693	649	593
	Pi (kW)	135	148	162	177	194	214	237	270
	Hc (kW)	1029	1004	979	953	929	906	885	863
	Qwe (l/s)	42.70	40.88	39.02	37.10	35.13	33.10	31.00	28.31
	Pdwe (kPa)	46	43	39	36	32	29	26	22
9	Cc (kW)	924	885	845	804	762	719	674	617
	Pi (kW)	137	150	164	179	196	215	237	271
	Hc (kW)	1061	1036	1009	983	958	934	911	888
	Qwe (l/s)	44.15	42.30	40.40	38.44	36.41	34.33	32.18	29.50
	Pdwe (kPa)	49	45	42	38	35	31	28	24
10	Cc (kW)	955	916	875	833	790	745	699	644
	Pi (kW)	138	152	166	181	197	216	238	272
	Hc (kW)	1094	1068	1041	1014	987	961	937	916
	Qwe (l/s)	45.64	43.75	41.81	39.80	37.73	35.59	33.39	30.77
	Pdwe (kPa)	52	48	44	41	37	33	30	26
11	Cc (kW)	987	947	905	862	818	772	725	
	Pi (kW)	140	154	168	183	199	218	240	
	Hc (kW)	1127	1100	1073	1045	1017	990	964	
	Qwe (l/s)	47.16	45.23	43.24	41.19	39.07	36.88	34.62	
	Pdwe (kPa)	55	51	47	43	39	35	32	
12	Cc (kW)	1020	978	936	892	846	799	751	
	Pi (kW)	141	156	170	185	201	220	241	
	Hc (kW)	1161	1134	1105	1076	1047	1019	992	
	Qwe (l/s)	48.71	46.74	44.71	42.60	40.43	38.19	35.87	
	Pdwe (kPa)	58	54	50	46	42	38	34	
13	Cc (kW)	1053	1010	967	922	875	827		
	Pi (kW)	143	157	172	187	203	221		
	Hc (kW)	1195	1168	1139	1109	1078	1049		
	Qwe (l/s)	50.29	48.28	46.20	44.05	41.83	39.53		
	Pdwe (kPa)	62	57	53	49	44	40		
14	Cc (kW)	1086	1043	999	953	905	856		
	Pi (kW)	144	159	174	189	205	223		
	Hc (kW)	1230	1202	1173	1142	1110	1079		
	Qwe (l/s)	51.90	49.84	47.72	45.52	43.24	40.89		
	Pdwe (kPa)	65	61	56	52	47	43		
15	Cc (kW)	1121	1077	1031	984	935	885		
	Pi (kW)	145	161	176	191	207	225		
	Hc (kW)	1266	1238	1207	1175	1143	1110		
	Qwe (l/s)	53.54	51.44	49.27	47.02	44.69	42.27		
	Pdwe (kPa)	69	64	60	55	50	45		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		930							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	877	838	797	756	714	670	626	547
	Pi (kW)	141	154	170	187	207	230	257	290
	Hc (kW)	1018	992	967	943	920	900	882	837
	Qwe (l/s)	41.90	40.02	38.09	36.12	34.10	32.02	29.89	26.14
	Pdwe (kPa)	34	31	29	26	24	21	19	15
5	Cc (kW)	908	868	827	785	741	697	651	571
	Pi (kW)	143	156	171	188	208	231	257	290
	Hc (kW)	1051	1025	998	973	949	928	908	861
	Qwe (l/s)	43.40	41.48	39.51	37.50	35.42	33.30	31.11	27.28
	Pdwe (kPa)	36	33	31	28	25	23	20	16
6	Cc (kW)	941	900	857	814	770	724	677	597
	Pi (kW)	144	158	173	190	209	231	257	290
	Hc (kW)	1085	1058	1031	1004	979	956	935	887
	Qwe (l/s)	44.94	42.98	40.97	38.90	36.78	34.60	32.36	28.50
	Pdwe (kPa)	39	36	33	30	27	24	21	17
7	Cc (kW)	973	932	889	844	799	752	704	622
	Pi (kW)	146	160	175	192	211	233	258	291
	Hc (kW)	1119	1092	1064	1036	1009	985	962	913
	Qwe (l/s)	46.51	44.51	42.45	40.34	38.17	35.93	33.63	29.73
	Pdwe (kPa)	41	38	35	32	29	26	23	18
8	Cc (kW)	1007	964	920	875	829	781	731	650
	Pi (kW)	148	162	177	194	212	234	259	292
	Hc (kW)	1155	1127	1098	1069	1041	1014	990	941
	Qwe (l/s)	48.12	46.07	43.97	41.81	39.59	37.30	34.93	31.04
	Pdwe (kPa)	44	40	37	34	31	28	25	20
9	Cc (kW)	1041	998	953	907	859	810	759	677
	Pi (kW)	150	164	179	196	214	235	260	292
	Hc (kW)	1191	1162	1132	1102	1073	1045	1019	969
	Qwe (l/s)	49.76	47.67	45.52	43.32	41.04	38.69	36.27	32.34
	Pdwe (kPa)	46	43	40	36	33	30	26	21
10	Cc (kW)	1077	1032	986	939	890	839	787	706
	Pi (kW)	151	166	181	198	216	237	261	294
	Hc (kW)	1228	1198	1167	1136	1106	1076	1048	1000
	Qwe (l/s)	51.43	49.31	47.11	44.85	42.52	40.11	37.62	33.73
	Pdwe (kPa)	49	46	42	38	35	31	28	23
11	Cc (kW)	1112	1067	1020	971	921	870	817	
	Pi (kW)	153	168	184	200	218	238	262	
	Hc (kW)	1265	1235	1203	1171	1139	1108	1079	
	Qwe (l/s)	53.15	50.97	48.73	46.42	44.03	41.56	39.01	
	Pdwe (kPa)	52	48	45	41	37	34	30	
12	Cc (kW)	1149	1102	1054	1005	954	901	846	
	Pi (kW)	155	170	186	202	220	240	264	
	Hc (kW)	1303	1273	1240	1207	1174	1141	1110	
	Qwe (l/s)	54.89	52.67	50.38	48.01	45.57	43.04	40.42	
	Pdwe (kPa)	55	51	47	44	40	36	32	
13	Cc (kW)	1186	1139	1090	1039	987	932		
	Pi (kW)	156	172	188	204	222	242		
	Hc (kW)	1342	1311	1278	1243	1209	1175		
	Qwe (l/s)	56.68	54.41	52.06	49.64	47.13	44.54		
	Pdwe (kPa)	59	54	50	46	42	38		
14	Cc (kW)	1224	1176	1125	1074	1020	964		
	Pi (kW)	157	174	190	207	224	244		
	Hc (kW)	1382	1350	1316	1280	1244	1209		
	Qwe (l/s)	58.49	56.17	53.77	51.30	48.73	46.08		
	Pdwe (kPa)	62	58	53	49	45	40		
15	Cc (kW)	1263	1213	1162	1109	1054	997		
	Pi (kW)	159	176	192	209	227	247		
	Hc (kW)	1422	1389	1354	1318	1281	1244		
	Qwe (l/s)	60.34	57.97	55.52	52.98	50.36	47.64		
	Pdwe (kPa)	66	61	57	52	47	43		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		980							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	921	879	837	794	749	704	657	594
	Pi (kW)	151	166	182	201	222	247	276	315
	Hc (kW)	1072	1046	1020	995	972	951	933	909
	Qwe (l/s)	43.99	42.02	40.00	37.92	35.80	33.62	31.39	28.36
	Pdwe (kPa)	31	29	26	24	22	19	17	14
5	Cc (kW)	954	912	868	824	778	732	684	619
	Pi (kW)	153	168	184	203	224	248	277	316
	Hc (kW)	1107	1080	1053	1027	1002	980	960	935
	Qwe (l/s)	45.57	43.55	41.49	39.37	37.19	34.96	32.66	29.60
	Pdwe (kPa)	33	31	28	26	23	21	18	15
6	Cc (kW)	988	944	900	855	808	760	711	647
	Pi (kW)	155	170	186	204	225	249	277	316
	Hc (kW)	1143	1115	1087	1059	1033	1009	988	963
	Qwe (l/s)	47.18	45.12	43.01	40.85	38.62	36.33	33.97	30.93
	Pdwe (kPa)	36	33	30	27	25	22	20	17
7	Cc (kW)	1022	978	933	887	839	790	739	675
	Pi (kW)	157	172	188	206	227	250	278	317
	Hc (kW)	1179	1151	1121	1093	1065	1040	1017	992
	Qwe (l/s)	48.83	46.73	44.57	42.36	40.07	37.73	35.31	32.26
	Pdwe (kPa)	38	35	32	29	27	24	21	18
8	Cc (kW)	1057	1012	966	919	870	820	768	705
	Pi (kW)	159	175	191	208	228	252	279	317
	Hc (kW)	1217	1187	1157	1127	1098	1071	1046	1022
	Qwe (l/s)	50.52	48.37	46.17	43.90	41.57	39.16	36.68	33.67
	Pdwe (kPa)	40	37	34	31	28	25	23	19
9	Cc (kW)	1093	1048	1000	952	902	850	797	734
	Pi (kW)	161	177	193	210	230	253	280	318
	Hc (kW)	1254	1224	1193	1162	1132	1103	1077	1053
	Qwe (l/s)	52.24	50.06	47.80	45.48	43.09	40.62	38.08	35.09
	Pdwe (kPa)	43	40	36	33	30	27	24	21
10	Cc (kW)	1130	1084	1035	986	934	881	827	766
	Pi (kW)	163	179	195	213	232	255	281	320
	Hc (kW)	1293	1262	1230	1198	1167	1136	1108	1086
	Qwe (l/s)	54.00	51.77	49.47	47.09	44.64	42.11	39.50	36.60
	Pdwe (kPa)	45	42	39	35	32	29	26	23
11	Cc (kW)	1168	1120	1071	1020	967	913	857	
	Pi (kW)	165	181	198	215	234	257	282	
	Hc (kW)	1333	1301	1268	1235	1202	1170	1139	
	Qwe (l/s)	55.80	53.52	51.16	48.73	46.22	43.64	40.96	
	Pdwe (kPa)	48	45	41	38	34	31	28	
12	Cc (kW)	1206	1157	1107	1055	1001	946	888	
	Pi (kW)	166	183	200	217	237	259	284	
	Hc (kW)	1373	1341	1307	1272	1238	1204	1172	
	Qwe (l/s)	57.64	55.30	52.90	50.41	47.84	45.19	42.44	
	Pdwe (kPa)	51	47	44	40	37	33	29	
13	Cc (kW)	1245	1196	1144	1091	1036	979		
	Pi (kW)	168	185	202	220	239	261		
	Hc (kW)	1413	1381	1346	1311	1275	1240		
	Qwe (l/s)	59.51	57.12	54.66	52.12	49.49	46.77		
	Pdwe (kPa)	54	50	46	43	39	35		
14	Cc (kW)	1285	1234	1182	1127	1071	1013		
	Pi (kW)	169	188	205	222	242	263		
	Hc (kW)	1455	1422	1386	1350	1312	1275		
	Qwe (l/s)	61.41	58.98	56.46	53.86	51.17	48.38		
	Pdwe (kPa)	57	53	49	45	41	37		
15	Cc (kW)	1326	1274	1220	1164	1107	1047		
	Pi (kW)	171	190	207	225	244	265		
	Hc (kW)	1497	1463	1427	1389	1351	1312		
	Qwe (l/s)	63.35	60.86	58.29	55.63	52.87	50.02		
	Pdwe (kPa)	61	56	52	48	44	40		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		C10							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	989	944	899	852	805	756	705	640
	Pi (kW)	162	178	195	215	238	265	296	341
	Hc (kW)	1151	1122	1094	1067	1043	1020	1001	981
	Qwe (l/s)	47.25	45.13	42.95	40.73	38.45	36.11	33.71	30.58
	Pdwe (kPa)	31	29	26	24	22	19	17	14
5	Cc (kW)	1024	979	932	885	836	786	734	668
	Pi (kW)	164	180	197	217	239	266	296	341
	Hc (kW)	1188	1159	1130	1102	1075	1051	1030	1009
	Qwe (l/s)	48.94	46.77	44.55	42.28	39.94	37.55	35.08	31.92
	Pdwe (kPa)	33	31	28	26	23	21	18	16
6	Cc (kW)	1060	1014	967	918	868	817	764	698
	Pi (kW)	166	182	199	219	241	267	296	342
	Hc (kW)	1227	1196	1166	1137	1109	1083	1060	1040
	Qwe (l/s)	50.67	48.46	46.19	43.87	41.47	39.01	36.48	33.35
	Pdwe (kPa)	36	33	30	27	25	22	20	17
7	Cc (kW)	1098	1050	1002	952	901	848	794	728
	Pi (kW)	168	184	202	221	243	268	297	342
	Hc (kW)	1266	1235	1203	1173	1143	1116	1091	1070
	Qwe (l/s)	52.44	50.19	47.87	45.49	43.04	40.51	37.92	34.78
	Pdwe (kPa)	38	35	32	29	27	24	21	18
8	Cc (kW)	1135	1087	1038	987	934	880	824	760
	Pi (kW)	170	187	204	223	244	269	298	343
	Hc (kW)	1306	1274	1242	1210	1179	1149	1122	1103
	Qwe (l/s)	54.25	51.95	49.58	47.14	44.64	42.05	39.39	36.31
	Pdwe (kPa)	40	37	34	31	28	25	23	20
9	Cc (kW)	1174	1125	1074	1022	968	913	856	792
	Pi (kW)	172	189	206	225	246	271	299	344
	Hc (kW)	1346	1314	1281	1247	1215	1184	1155	1136
	Qwe (l/s)	56.10	53.75	51.33	48.84	46.27	43.62	40.89	37.84
	Pdwe (kPa)	43	40	36	33	30	27	24	21
10	Cc (kW)	1214	1164	1112	1058	1003	947	888	826
	Pi (kW)	174	191	209	228	248	273	300	346
	Hc (kW)	1388	1355	1321	1286	1252	1219	1188	1172
	Qwe (l/s)	57.99	55.59	53.12	50.57	47.94	45.22	42.42	39.46
	Pdwe (kPa)	45	42	39	36	32	29	26	23
11	Cc (kW)	1254	1203	1150	1095	1039	981	921	
	Pi (kW)	176	194	211	230	251	275	302	
	Hc (kW)	1430	1397	1361	1325	1290	1255	1223	
	Qwe (l/s)	59.92	57.47	54.94	52.33	49.64	46.86	43.99	
	Pdwe (kPa)	48	45	41	38	34	31	28	
12	Cc (kW)	1295	1243	1189	1133	1075	1016	954	
	Pi (kW)	178	196	214	233	253	277	304	
	Hc (kW)	1473	1439	1403	1366	1329	1292	1258	
	Qwe (l/s)	61.89	59.39	56.81	54.14	51.38	48.52	45.58	
	Pdwe (kPa)	51	47	44	40	37	33	29	
13	Cc (kW)	1337	1284	1229	1171	1112	1051		
	Pi (kW)	180	198	216	235	256	279		
	Hc (kW)	1517	1482	1445	1407	1368	1330		
	Qwe (l/s)	63.90	61.34	58.70	55.97	53.15	50.22		
	Pdwe (kPa)	54	50	46	43	39	35		
14	Cc (kW)	1380	1326	1269	1211	1150	1087		
	Pi (kW)	181	201	219	238	258	281		
	Hc (kW)	1562	1526	1488	1449	1408	1369		
	Qwe (l/s)	65.95	63.33	60.63	57.84	54.95	51.95		
	Pdwe (kPa)	57	53	49	45	41	37		
15	Cc (kW)	1424	1368	1310	1250	1188	1124		
	Pi (kW)	183	203	222	241	261	284		
	Hc (kW)	1607	1571	1532	1491	1450	1408		
	Qwe (l/s)	68.03	65.36	62.60	59.74	56.78	53.72		
	Pdwe (kPa)	61	56	52	48	44	40		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		C11							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	1066	1018	969	919	868	815	761	690
	Pi (kW)	175	192	211	232	256	285	319	368
	Hc (kW)	1241	1210	1180	1151	1124	1100	1079	1058
	Qwe (l/s)	50.94	48.66	46.31	43.91	41.46	38.93	36.34	32.97
	Pdwe (kPa)	33	31	28	25	23	20	18	15
5	Cc (kW)	1104	1056	1005	954	901	847	792	720
	Pi (kW)	177	194	213	234	258	286	319	368
	Hc (kW)	1281	1250	1218	1188	1159	1134	1111	1088
	Qwe (l/s)	52.76	50.43	48.04	45.58	43.06	40.48	37.82	34.41
	Pdwe (kPa)	35	33	30	27	25	22	19	16
6	Cc (kW)	1143	1094	1042	990	936	880	823	753
	Pi (kW)	179	196	215	236	260	287	320	368
	Hc (kW)	1323	1290	1257	1226	1196	1168	1143	1121
	Qwe (l/s)	54.63	52.25	49.81	47.30	44.71	42.06	39.34	35.95
	Pdwe (kPa)	38	35	32	29	26	24	21	18
7	Cc (kW)	1183	1133	1080	1027	971	914	856	785
	Pi (kW)	181	199	217	238	261	289	320	369
	Hc (kW)	1365	1331	1298	1265	1233	1203	1176	1154
	Qwe (l/s)	56.54	54.11	51.61	49.05	46.40	43.68	40.89	37.50
	Pdwe (kPa)	40	37	34	31	28	25	22	19
8	Cc (kW)	1224	1172	1119	1064	1007	949	889	819
	Pi (kW)	184	201	220	240	263	290	321	370
	Hc (kW)	1408	1374	1339	1304	1271	1239	1210	1189
	Qwe (l/s)	58.50	56.01	53.46	50.83	48.13	45.34	42.47	39.15
	Pdwe (kPa)	43	39	36	33	30	27	24	21
9	Cc (kW)	1266	1213	1158	1102	1044	984	923	854
	Pi (kW)	186	204	222	243	266	292	323	371
	Hc (kW)	1452	1417	1381	1345	1310	1276	1245	1225
	Qwe (l/s)	60.49	57.96	55.35	52.66	49.89	47.04	44.09	40.80
	Pdwe (kPa)	45	42	39	35	32	29	26	22
10	Cc (kW)	1309	1255	1199	1141	1082	1021	957	891
	Pi (kW)	188	206	225	245	268	294	324	373
	Hc (kW)	1497	1461	1424	1387	1350	1314	1281	1264
	Qwe (l/s)	62.53	59.94	57.28	54.53	51.69	48.76	45.74	42.55
	Pdwe (kPa)	48	44	41	37	34	31	27	24
11	Cc (kW)	1352	1297	1240	1181	1120	1057	993	
	Pi (kW)	190	209	228	248	270	296	326	
	Hc (kW)	1542	1506	1468	1429	1391	1354	1318	
	Qwe (l/s)	64.61	61.97	59.24	56.43	53.52	50.52	47.43	
	Pdwe (kPa)	51	47	44	40	36	33	29	
12	Cc (kW)	1397	1340	1282	1222	1159	1095	1029	
	Pi (kW)	192	211	231	251	273	298	327	
	Hc (kW)	1589	1552	1513	1472	1433	1393	1356	
	Qwe (l/s)	66.74	64.03	61.25	58.37	55.40	52.32	49.15	
	Pdwe (kPa)	54	50	46	42	39	35	31	
13	Cc (kW)	1442	1384	1325	1263	1199	1133		
	Pi (kW)	194	214	233	254	276	301		
	Hc (kW)	1636	1598	1558	1517	1475	1434		
	Qwe (l/s)	68.90	66.14	63.29	60.35	57.30	54.15		
	Pdwe (kPa)	57	53	49	45	41	37		
14	Cc (kW)	1488	1429	1368	1305	1240	1172		
	Pi (kW)	196	216	236	257	279	303		
	Hc (kW)	1684	1646	1604	1562	1519	1476		
	Qwe (l/s)	71.11	68.29	65.37	62.36	59.24	56.02		
	Pdwe (kPa)	60	56	52	48	44	39		
15	Cc (kW)	1535	1475	1413	1348	1281	1212		
	Pi (kW)	197	219	239	260	282	306		
	Hc (kW)	1732	1694	1652	1608	1563	1518		
	Qwe (l/s)	73.35	70.47	67.50	64.41	61.22	57.92		
	Pdwe (kPa)	64	59	55	51	46	42		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

		C12							
		Entering Condenser Water Temperature (°C)							
ELWT (°C)		25	30	35	40	45	50	55	60
4	Cc (kW)	1144	1092	1040	986	931	874	816	740
	Pi (kW)	187	206	226	249	275	306	342	394
	Hc (kW)	1331	1298	1265	1234	1206	1180	1158	1134
	Qwe (l/s)	54.64	52.19	49.67	47.10	44.46	41.76	38.98	35.35
	Pdwe (kPa)	36	33	30	27	25	22	20	16
5	Cc (kW)	1184	1132	1078	1023	967	909	849	772
	Pi (kW)	190	208	228	251	277	307	342	394
	Hc (kW)	1374	1340	1307	1274	1243	1216	1191	1167
	Qwe (l/s)	56.59	54.09	51.52	48.89	46.19	43.42	40.57	36.90
	Pdwe (kPa)	38	35	32	29	27	24	21	18
6	Cc (kW)	1226	1173	1118	1062	1004	944	883	807
	Pi (kW)	192	211	231	253	278	308	343	395
	Hc (kW)	1419	1384	1349	1315	1282	1253	1226	1202
	Qwe (l/s)	58.60	56.04	53.42	50.73	47.96	45.12	42.19	38.55
	Pdwe (kPa)	41	38	34	31	28	25	23	19
7	Cc (kW)	1269	1215	1159	1101	1042	981	918	842
	Pi (kW)	194	213	233	255	280	310	343	396
	Hc (kW)	1464	1428	1392	1356	1322	1290	1261	1237
	Qwe (l/s)	60.65	58.04	55.36	52.60	49.77	46.85	43.85	40.21
	Pdwe (kPa)	43	40	37	34	30	27	24	21
8	Cc (kW)	1313	1257	1200	1141	1080	1018	953	879
	Pi (kW)	197	216	236	258	283	311	345	397
	Hc (kW)	1510	1473	1436	1399	1363	1329	1298	1275
	Qwe (l/s)	62.74	60.08	57.34	54.52	51.62	48.63	45.55	41.98
	Pdwe (kPa)	46	43	39	36	32	29	26	22
9	Cc (kW)	1358	1301	1242	1182	1120	1056	990	916
	Pi (kW)	199	219	239	260	285	313	346	398
	Hc (kW)	1557	1520	1481	1443	1405	1369	1336	1314
	Qwe (l/s)	64.88	62.16	59.36	56.48	53.51	50.45	47.29	43.75
	Pdwe (kPa)	49	45	42	38	35	31	28	24
10	Cc (kW)	1404	1346	1286	1224	1160	1095	1027	955
	Pi (kW)	201	221	241	263	287	315	347	400
	Hc (kW)	1605	1567	1527	1487	1448	1410	1374	1355
	Qwe (l/s)	67.07	64.29	61.43	58.48	55.44	52.30	49.06	45.62
	Pdwe (kPa)	52	48	44	41	37	33	30	26
11	Cc (kW)	1450	1391	1330	1267	1202	1134	1065	
	Pi (kW)	204	224	244	266	290	318	349	
	Hc (kW)	1654	1615	1574	1533	1492	1452	1414	
	Qwe (l/s)	69.30	66.46	63.54	60.52	57.41	54.19	50.87	
	Pdwe (kPa)	55	51	47	43	39	35	32	
12	Cc (kW)	1498	1437	1375	1310	1244	1175	1103	
	Pi (kW)	206	227	247	269	293	320	351	
	Hc (kW)	1704	1664	1622	1579	1536	1494	1454	
	Qwe (l/s)	71.58	68.68	65.69	62.61	59.42	56.12	52.71	
	Pdwe (kPa)	58	54	50	46	42	38	34	
13	Cc (kW)	1547	1485	1421	1355	1286	1216		
	Pi (kW)	208	229	250	272	296	323		
	Hc (kW)	1754	1714	1671	1627	1582	1538		
	Qwe (l/s)	73.90	70.94	67.88	64.73	61.46	58.08		
	Pdwe (kPa)	62	57	53	49	44	40		
14	Cc (kW)	1596	1533	1468	1400	1330	1258		
	Pi (kW)	210	232	253	275	299	325		
	Hc (kW)	1806	1765	1721	1675	1629	1583		
	Qwe (l/s)	76.27	73.24	70.12	66.89	63.54	60.08		
	Pdwe (kPa)	65	61	56	52	47	43		
15	Cc (kW)	1647	1582	1515	1446	1374	1300		
	Pi (kW)	211	235	256	278	302	328		
	Hc (kW)	1858	1817	1771	1724	1676	1628		
	Qwe (l/s)	78.68	75.59	72.39	69.09	65.67	62.12		
	Pdwe (kPa)	69	64	60	55	50	45		

Notes:

Cc (cooling capacity) - Pi (unit power input)

Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)

ELWT (evaporator leaving water temperature – Δt 5°C)

Data refers to 0,0176 m² °C/kW evaporator fouling factor

Evaporator and condenser pressure drops

EWWD-H-XS

	370	450	530	610	750	830	930	980
Cooling Capacity (kW)	369	445	521	608	748	827	932	978
Water Flow (l/s) - Evaporator	17.63	21.26	24.89	29.05	35.74	39.51	44.53	46.73
Evaporator Pressure Drops (kPa)	48	40	38	42	48	40	38	35
Water Flow (l/s) - Condenser	20.63	24.86	29.05	33.87	41.71	46.11	51.74	54.52
Condenser Pressure Drops (kPa)	35	30	32	28	34	30	37	35

Water flow and pressure drop referred to nominal condition: evaporator water in/out: 12/7°C – condenser water in/out: 30/35°C

	C10	C11	C12
Cooling Capacity (kW)	1050	1133	1215
Water Flow (l/s) - Evaporator	50.17	54.13	58.05
Evaporator Pressure Drops (kPa)	35	37	40
Water Flow (l/s) - Condenser	58.48	63.12	67.65
Condenser Pressure Drops (kPa)	33	33	35

Water flow and pressure drop referred to nominal condition: evaporator water in/out: 12/7°C – condenser water in/out: 30/35°C

Pressure drops at different working conditions

Evaporator and/or condenser pressure drops for different versions or different working condition can be calculated with the following formula:

$$PD2 \text{ (kPa)} = PD1 \text{ (kPa)} \times \left(\frac{Q_2 \text{ (l/s)}}{Q_1 \text{ (l/s)}} \right)^{1.8}$$

where:

- PD2 Pressure drop to be determinate (kPa)
- PD1 Pressure drop at nominal condition (kPa)
- Q2 water flow at new working condition (l/s)
- Q1 water flow at nominal condition (l/s)

How to use the formula: Example (evaporator)

The unit EWWD370H-XS has been selected for working at the following conditions:

- evaporator water in/out: 11/6°C
- condenser water in/out: 30/35°C

The cooling capacity at these working conditions is: 356kW

The water flow at these working conditions is: 17.02 l/s

The unit EWWD370H-XS at nominal working conditions has the following data:

- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C

The cooling capacity at these working conditions is: 369kW

The water flow at these working conditions is: 17.63 l/s

The pressure drop at these working conditions is: 48 kPa

The pressure drop at the selected working condition will be:

$$PD2 \text{ (kPa)} = 48 \text{ (kPa)} \times \left(\frac{17.02 \text{ (l/s)}}{17.63 \text{ (l/s)}} \right)^{1.8}$$

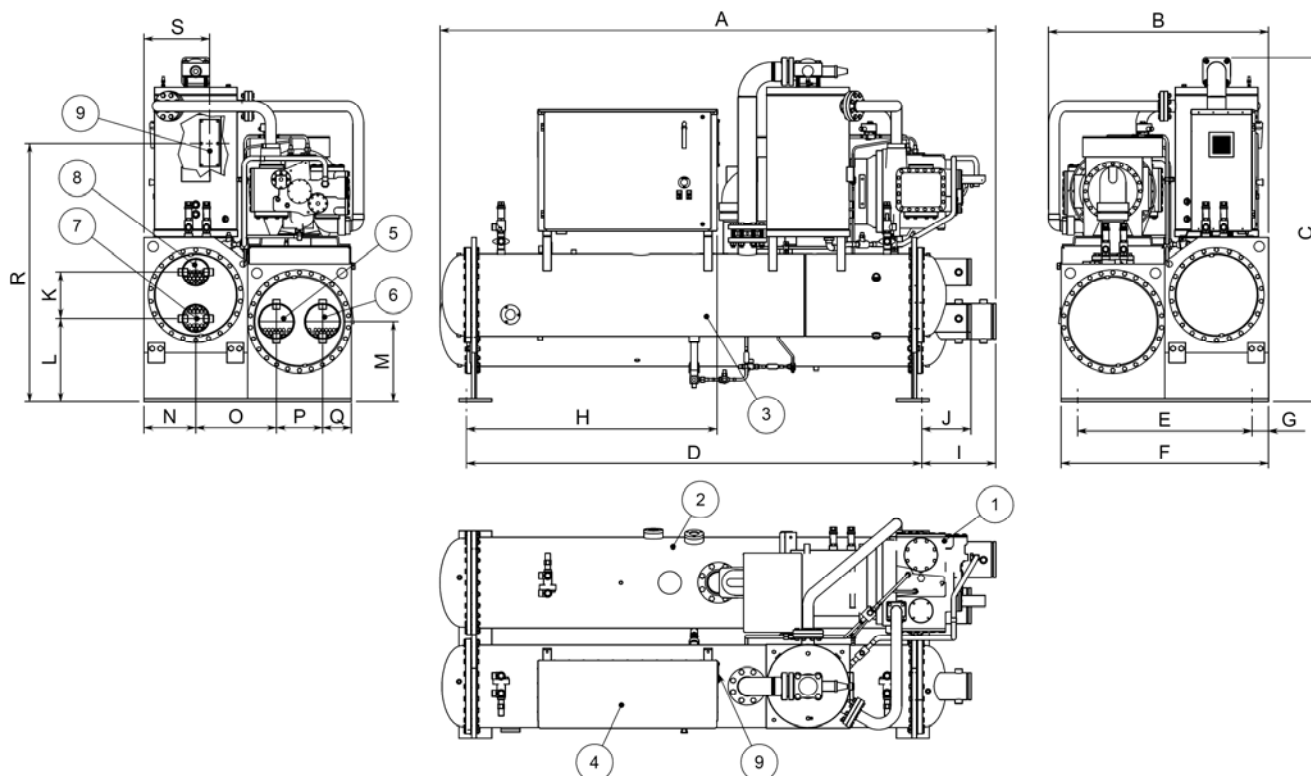
$$PD2 \text{ (kPa)} = 45 \text{ (kPa)}$$

NOTE - Important

If the calculated evaporator water pressure drop is below 10 kPa or above 100 kPa please contact the factory for dedicated evaporator.

Dimensions

EWWD370~530H-XS – 1 circuit



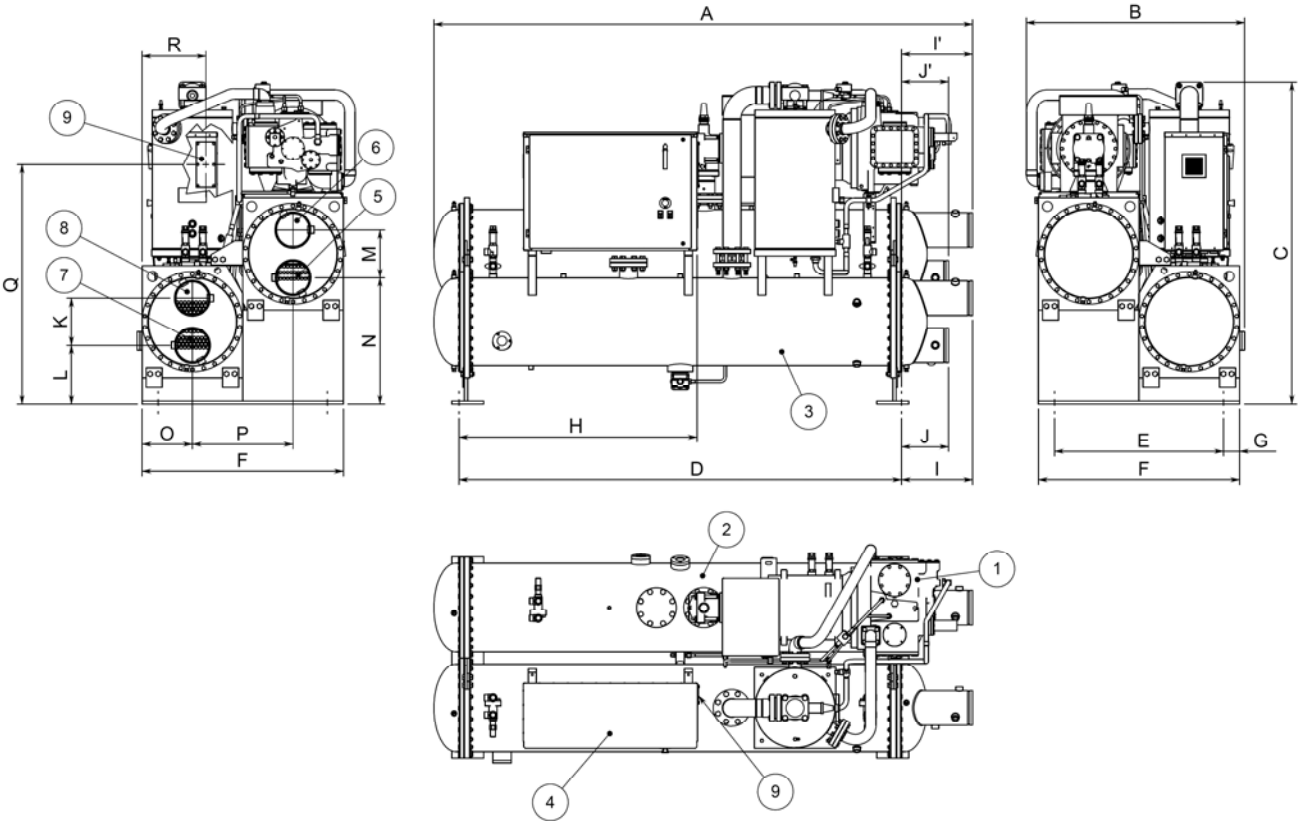
Models	Dimensions (mm)									
EWWD~H-XS	A	B	C	D	E	F	G	H	I	J
370	3341	1353	2121	2800	1072	1276	102	1541	303	303
450	3341	1353	2121	2800	1072	1276	102	1541	303	303
530	3419	1353	2121	2800	1072	1276	102	1541	456	303

EWWD~H-XS	K	L	M	N	O	P	Q	R	S
370	286	515	496	319	495	286	176	1595	384
450	286	515	496	319	495	286	176	1595	384
530	286	515	496	319	496	284	177	1595	384

LEGEND

1. Compressor
2. Evaporator
3. Condenser
4. Electrical panel
5. Evaporator water inlet
6. Evaporator water outlet
7. Condenser water inlet
8. Condenser water outlet
9. Power connections slot

EWWD610H-XS – 1 circuit

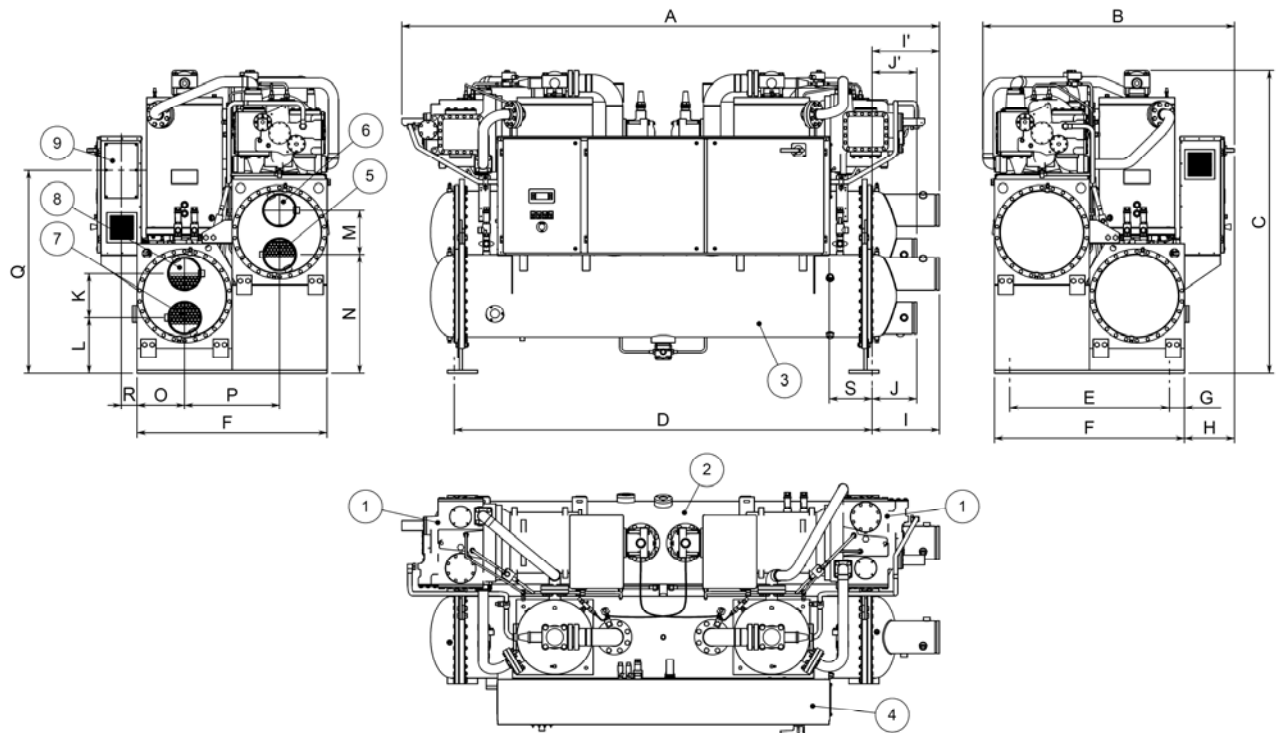


Models	Dimensions (mm)									
EWWD~H-XS	A	B	C	D	E	F	G	H	I	I'
610	3417	1384	2048	2805	1072	1276	102	1510	452	452
EWWD~H-XS	J	J'	K	L	M	N	O	P	Q	R
610	300	300	300	376	300	806	319	638	1521	384

LEGEND

- 1. Compressor
- 2. Evaporator
- 3. Condenser
- 4. Electrical panel
- 5. Evaporator water inlet
- 6. Evaporator water outlet
- 7. Condenser water inlet
- 8. Condenser water outlet
- 9. Power connections slot

EWWD750~C12H-XS – 2 circuits



Models	Dimensions (mm)										
EWWD~H-XS	A	B	C	D	E	F	G	H	I	I'	J
750	3609	1689	2048	2805	1072	1276	102	336	452	452	300
830	3609	1689	2048	2805	1072	1276	102	336	452	452	300
930	3609	1711	2048	2805	1157	1361	102	336	452	300	300
980	3609	1711	2048	2805	1157	1361	102	336	452	300	300
C10	3509	1711	2161	2805	1221	1425	102	272	300	300	300
C11	3509	1711	2161	2805	1221	1425	102	272	300	300	300
C12	3509	1711	2161	2805	1221	1425	102	272	300	300	300

EWWD~H-XS	J'	K	L	M	N	O	P	Q	R	S
750	300	300	376	300	806	319	638	1373	106	288
830	300	300	376	300	806	319	638	1373	106	288
930	300	300	376	360	725	319	660	1337	106	288
980	300	300	376	360	725	319	660	1337	106	288
C10	300	360	409	360	839	383	660	1487	42	288
C11	300	360	409	360	839	383	660	1487	42	288
C12	300	360	409	360	839	383	660	1487	42	288

LEGEND

1. Compressor
2. Evaporator
3. Condenser
4. Electrical panel
5. Evaporator water inlet
6. Evaporator water outlet
7. Condenser water inlet
8. Condenser water outlet
9. Power connections slot

Installation notes

Warning

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and who are experienced with this type of equipment. Must be avoided the unit installation in places that could be considered dangerous for all the maintenance operations.

Handling

The chiller is mounted on heavy wooden skids to protect the unit from accidental damage and to permit easy handling and moving. It is recommended that all moving and handling be performed with the skids under the unit when possible and that the skids not be removed until the unit is in the final location.

If the unit must be hoisted, it is necessary to lift the unit by attaching cables or chains at the lifting holes in the evaporator tube sheets. Spreader bars must be used to protect the control cabinet and the other areas of the chiller.

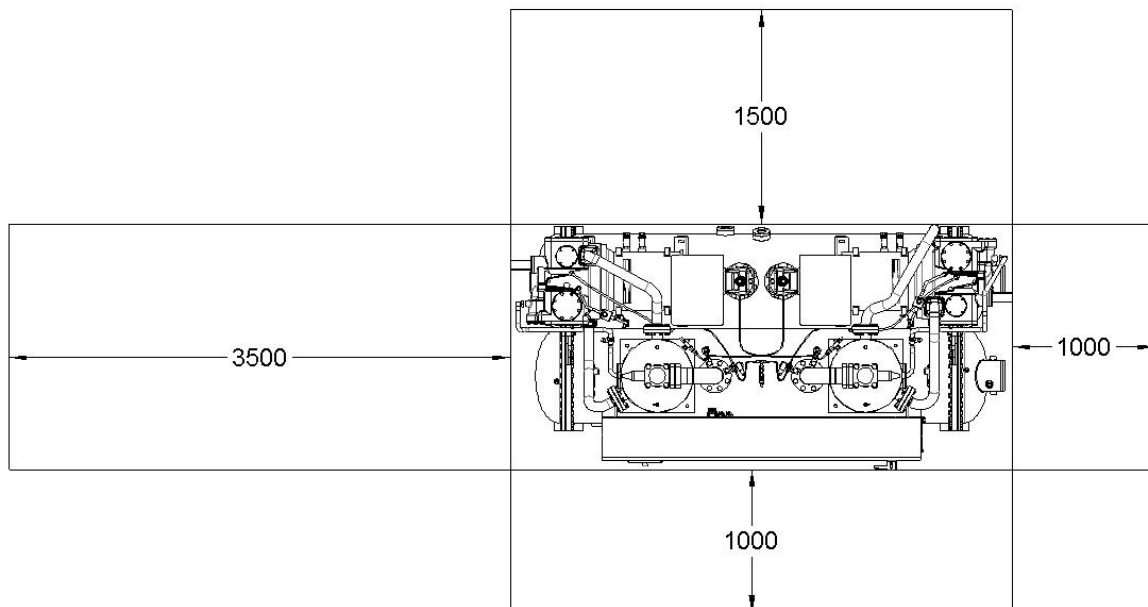
Location

A leveled and sufficiently strong floor is required. If necessary, additional structural members should be provided to transfer the weight of the unit to the nearest beams.

Rubber-in-shear isolators can be furnished and field placed under each corner of the package. A rubber anti-skid pad should be used under isolators if hold-down bolts are not used. Vibration isolator in all water piping connected to the chiller is recommended to avoid straining the piping and transmitting vibration and noise.

Minimum space requirements

Every side of the machine must be accessible for all post-installation maintenance activities. The minimum space required is shown on the following drawing:



Minimum clearance requirements for machine maintenance

Technical Specification for water cooled screw chiller

General

The water cooled screw chiller will be designed and manufactured in accordance with following European directives:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204-1 / EN 60335-2-40
Manufacturing Quality Stds	UNI – EN ISO 9001:2004

The unit will be tested at full load in the factory at the nominal working conditions and water temperatures. Before shipment a full test will be held to avoid any losses.

Chiller will be delivered to the job site completely assembled and charged with right refrigerant and oil quantity.

Comply with the manufacturer instructions for rigging and handling equipment.

The unit will be able to start up and operate as standard at full load and condenser entering fluid temperature from °C to °C with an evaporator leaving fluid temperature between ... °C and ... °C.

All units published performances have to be certified by **Eurovent**.

Refrigerant

Only HFC 134a will be accepted.

Performance

- ✓ Number of water cooled screw chiller:
- ✓ Cooling capacity for single water cooled screw chiller: kW
- ✓ Power input for single water cooled screw chiller in cooling mode: kW
- ✓ Flooded shell & tube evaporator entering water temperature in cooling mode: °C
- ✓ Flooded shell & tube evaporator leaving water temperature in cooling mode: °C
- ✓ Flooded shell & tube evaporator water flow: l/s
- ✓ Flooded shell & tube condenser entering water temperature in cooling mode: °C
- ✓ Flooded shell & tube condenser leaving water temperature in cooling mode: °C
- ✓ Flooded shell & tube condenser water flow: l/s
- ✓ The unit should work with electricity in range 400V ±10%, 3ph, 50Hz without neutral and shall only have one power connection point.

Unit description

Chiller shall include as standard: single refrigerant circuit, semi-hermetic single screw compressors, electronic expansion device (EEXV), flooded shell & tube heat exchangers, R134a refrigerant, lubrication system, motor starting components, control system and all components necessary for safe and stable unit operation.

Chiller will be factory assembled on a robust base-frame made of zinc coated steel, protected by an epoxy paint.

Noise level and vibrations

Sound pressure level at 1 meter distance in free field, semispheric conditions, shall not exceed dB(A). The sound pressure levels must be rated in accordance to ISO 3744.

Other types of rating unacceptable. Vibration level should not exceed 2 mm/s.

Dimensions

Unit dimensions shall not exceed following indications:

- ✓ unit length mm,
- ✓ unit width mm,
- ✓ unit height mm.

Chiller components

Compressors

- ✓ Semi-hermetic, single-screw type with one main helical rotor meshing with gaterotor. The gaterotor will be constructed of a carbon impregnated engineered composite material. The gaterotor supports will be constructed of cast iron.
- ✓ The oil injection shall be used in order to get high EER (Energy Efficiency Ratio) also at high condensing pressure and low sound pressure levels in each load condition.
- ✓ Refrigerant system differential pressure shall provide oil flow through service replaceable, 0.5 micron, full flow, cartridge type oil filter internal to compressor.
- ✓ Refrigerant system differential pressure shall provide oil injection on all moving compressor parts to correctly lubricate them. Electrical oil pump lubricating system is not acceptable.
- ✓ The compressor's oil cooling must be realized, when necessary, by refrigerant liquid injection. External dedicated heat exchanger and additional piping to carry the oil from the compressor to heat exchanger and viceversa will be not accepted.
- ✓ The compressor shall be provided with an external high efficiency oil separator and with built-in oil filter, cartridge type.
- ✓ The compressor shall be direct electrical driven, without gear transmission between the screw and the electrical motor.
- ✓ Shall be present two thermal protection realized by a thermistor for high temperature protection: one temperature sensor to protect electrical motor and another sensor to protect unit and lubricating oil from high discharge gas temperature.
- ✓ The compressor shall be equipped with an electric oil-crankcase heater.
- ✓ Compressor shall be fully field serviceable. Compressor that must be removed and returned to the factory for service shall be unacceptable.

Cooling capacity control system

- ✓ Each unit will have a microprocessor for the control of compressor slide valve's position and the instantaneous RPM value of the motor.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 25% for each circuit (from 100% down to 12,5% of full load for unit with 2 compressors). The chiller shall be capable of stable operation to a minimum of 12,5% of full load without hot gas bypass.
- ✓ Step unloading unacceptable because of evaporator leaving water temperature fluctuation and low unit efficiency at partial load.
- ✓ The system shall stage the unit based on the leaving evaporator water temperature that shall be controlled by a PID (Proportional Integral Derivative) loop.
- ✓ Unit control logic shall to manage frequency level of the compressor electric motor to exactly match plant load request in order to keep constant the set point for delivered chilled water temperature. In this operating condition unit control logic shall modulate electrical frequency level in a range lower and upper the nominal electrical network value fixed at 50 Hz.
- ✓ The microprocessor unit control shall detect conditions that approach protective limits and take self-corrective action prior to an alarm occurring. The system shall automatically reduce chiller capacity when any of the following parameters are outside their normal operating range:
 - o High condenser pressure
 - o Low evaporation refrigerant temperature
 - o High compressor motor amps

Evaporator

- ✓ The units shall be equipped with flooded shell & tube type evaporator with water flowing inside the tube and refrigerant boiling outside. The tubes shall be enhanced for maximum heat transfer and rolled into steel tube sheet and sealed. The tubes shall be individually replaceable.
- ✓ The water side shall be designed for 10 bar of maximum operating pressure; vents and drain shall be provided.
- ✓ The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.

Condensers

- ✓ The units shall be equipped with shell & tube condenser with water flowing inside the tube and refrigerant condensing outside. The bottom of the condenser shall be provided with subcooler section for better refrigerant capacity. The tubes shall be enhanced for maximum heat transfer and rolled into steel tube sheet and sealed. The tubes shall be individually replaceable
- ✓ The condensers are designed in according to 97/23/EC directive (PED).
- ✓ The water side shall be designed for 10 bar of maximum operating pressure; vents and drain shall be provided.
- ✓ The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.

Refrigerant circuit

The refrigerant circuit shall include as standard: one or two single screw compressor with external oil separator, evaporator, condenser, oil pressure transducer, high pressure switches, high pressure transducer, low pressure transducer, moisture liquid indicator, electronic expansion valve

Control panel

- ✓ Field power connection, control interlock terminals, and unit control system should be centrally located in an electric panel (IP 54). Power and starting controls should be separate from safety and operating controls in different compartments of the same panel.
- ✓ Starting shall be Wye-Delta type as standard.
- ✓ Operating and safety controls should include energy saving control; emergency stop switch; overload protection for compressor motor; high and low pressure cut-out switch (for each refrigerant circuit); anti-freeze thermostat; cut-out switch for each compressor.
- ✓ All of the information regarding the unit will be reported on a display and with the internal built-in calendar and clock that will switch the unit ON/OFF during day time all year long.
- ✓ The following features and functions shall be included:
 - resetting chilled water temperature by controlling the return water temperature or by a remote 4-20 mA DC signal or by controlling the external ambient temperature;
 - soft load function to prevent the system from operating at full load during the chilled fluid pulldown period;
 - password protection of critical parameters of control;
 - start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection;
 - communication capability with a PC or remote monitoring;
 - discharge pressure control through intelligent cycling of condenser fans;
 - lead-lag selection by manual or automatically by circuit run hours;
 - double set point for brine unit version;
 - scheduling via internal time clock to allow programming of a yearly start-stop schedule accommodating weekends and holidays.

Optional High Level Communications Interface

The controller as a minimum shall be capable of providing the data shown in the above list, using the following options:

- RS485 Serial card
- RS232 Serial card
- LonWorks interface to FTT10A Transceiver.
- Bacnet Compatible
- Use of Compass Points (manufactured by North Communications) to allow communications with such as Honeywell, Satchwell, Johnson Controls, Trend etc.



Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For seventy years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco-design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.



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Daikin Europe N.V. participates in the European Certification Programme for Air Conditioners (AC), Liquid Chilling Packages (LCP) and Fan Coil Units (FCU); the certified data of certified models are listed in the European Directory. Multi units are European certified for combinations up to 2 indoor units.

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