A TATA Product

VOLTAS LIMITED
Domestic Projects Group

Energy Efficient
Air-Cooled Screw Chillers

R134a

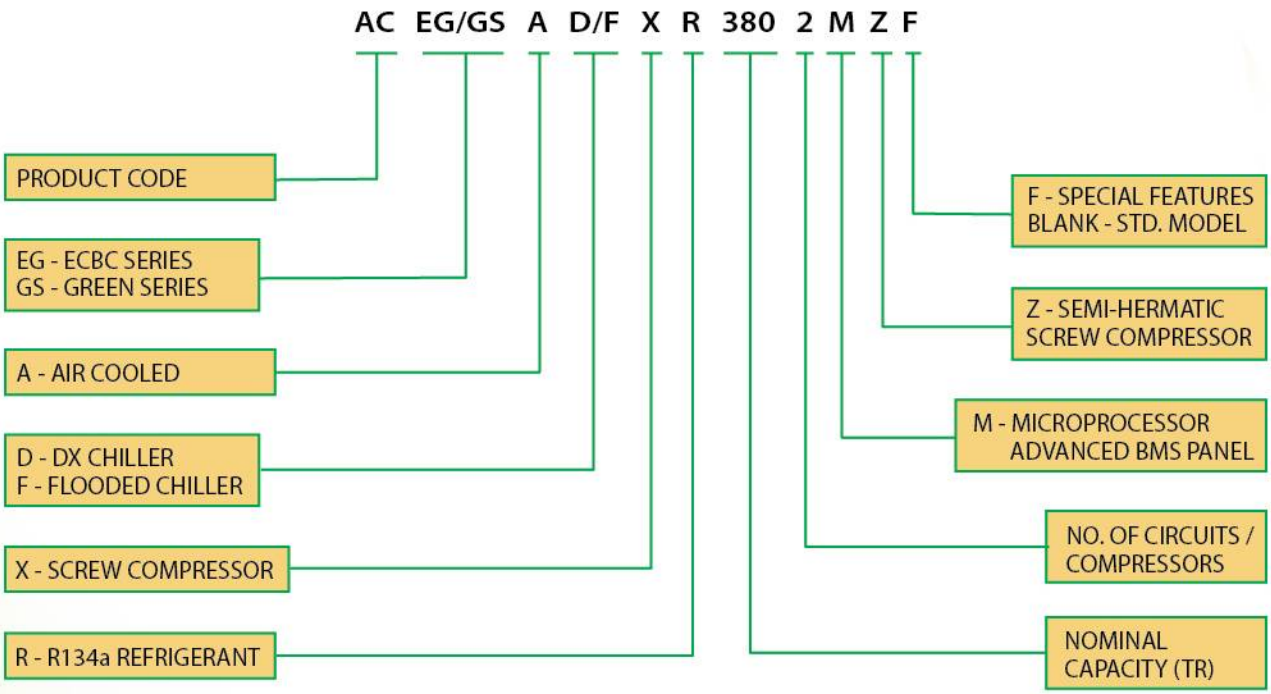
GREEN
EFFICIENT
SUSTAINABLE

ENERGY-EFFICIENT AIR-COOLED SCREW CHILLERS

Voltas Electro-mechanical and Refrigeration Business Group, an ISO:9001 company is the pioneer and leader in the field of electro-mechanical and refrigeration. Because of its commitment to provide customers with the latest green technology and 'best value for money', Voltas has introduced a new series of energy-efficient Chillers, using the environment friendly refrigerant R-134a.

The chillers have become an ideal choice for **Green Building Projects** and other air-conditioning applications. Available in a wide range of capacities, each unit is tested in a state-of-the-art facility, matching international standards, prior to their delivery - thus ensuring reliability and optimum performance.

MODEL NOMENCLATURE



WIDEST RANGE

ECBC Series - 100 TR to 380 TR

Green Series - 90 TR to 360 TR

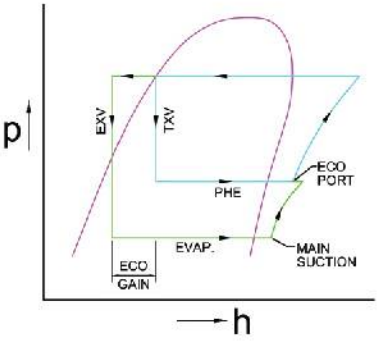
(For models of higher & lower capacities than those mentioned here, please contact us)

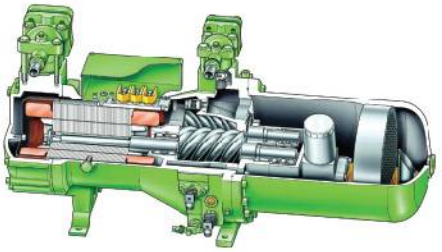
EIGHT POWERFUL FEATURES:

Exceptional Energy Efficiency by Design

- **Basic equipments** are designed to operate compressors on a comparatively better suction pressure and an optimum discharge pressure, to maximize efficiency benefit.
- **Compressor** with step-less ca pacity control mechanism, operates in response to the chilled water outlet temperature, and precisely matches the part-load requirements without hunting.
- **Electronic expansion** with controller and sensors, respond quickly to the variable operating conditions and enhances efficiency.
- **Fan cycling** programmed on discharge pressure, saves the energy consumption during low ambient temperature, or at partial load operation.
- **Compressor** staging has been programmed to save energy, by running adequate numbers of compressors at maximum efficiencies, even at different loads.
- **Economizer** greatly improves efficiency of the unit and full-load cooling capacity. Additional sub cooling is created by expanding one part of liquid refrigerant from condenser, to sub cool remaining part of total refrigerant, in a compact plate-type heat exchanger (PHE).

  The Economizer's working process is depicted in the diagram. Screw compressor is provided with an additional suction port called ECO port, which makes it possible to suck the refrigerant vapour from PHE, to accomplish economizer heat transfer.





Screw Compressor Means Efficiency and Reliability

Screw Compressors are sourced from industry's best manufacturers, and are tested in accordance with ARI / Eurovent standards. The Compressors are known for efficiency, ruggedness, reliability and consistent part-load operations.

Salient features of these compressors are:

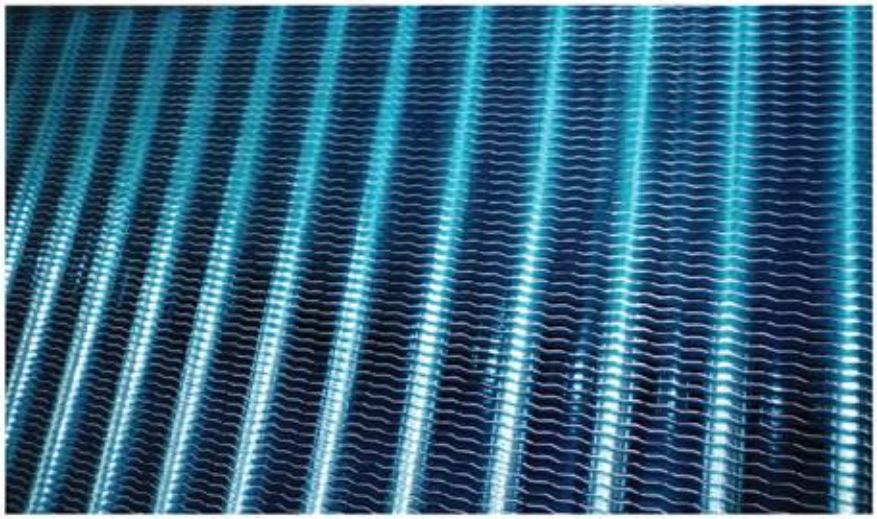
- High-efficiency due to scientific profile design of screws, high-speed operation and precision controls.
- Step-less capacity control from 100% to 25% for each compressor.
- These are semi-hermetic type compressors and hence, easily serviceable.
- Robust and proven construction with double-walled, single-housing and new slider technology.
- Each compressor is provided with a self-motor protection module, PTC motor winding protection, oil temperature protection, oil level switch and oil heaters - all these guaranty reliability and long life.
- Multistage and ultrafine, inbuilt oil-separator results in less oil carryover rate.
- Lower sound level due to double-walled casting.

Electronic Expansion Valve (EXV) – Precise and Efficient Control

EXVs are used to maintain a precise flow of refrigerant to the evaporator, under both full-load and part-load operation of the compressor. It can precisely control superheat at the outlet of the evaporator with faster response, irrespective of the wide variation in capacity. EXVs are an improvement over conventional thermostatic expansion valves and enable reduction of energy loss and hence, improve overall efficiency of chillers.

The EXV operation is controlled by an electronic controller module, which is user-friendly and provides multiple application options. It is provided with battery back-up so that in case of a power failure, EXV can close positively and stop any liquid flood-back to compressor.

Air-cooled Condenser - Designed for efficiency and modular construction



Sophisticated software used in the designing of the condenser coil helps optimize operating discharge pressure and maximize chiller design efficiency. These are subsequently validated by actual tests. Standard coils are manufactured using super-slit, louvered aluminum fins and 99.9% pure copper tubes, mechanically expanded and tested at 400psig pressure. Tubes used are inner groove type with enhanced heat transfer efficiency. Coils made of pre-coated fins are offered as an optional feature. This increases resistance to corrosion. Modular construction of condensers provides compactness and allows easier approachability for service and handling.

Flooded / Direct Expansion Chiller – Maximising efficiency

The evaporators are manufactured using imported and highly efficient, compact ridged inner-finned copper tubes, which are mechanically expanded for better fitment.

Chillers are fabricated and pressure-tested, as per relevant standards for pressure vessels. Each chiller model design is validated by special design software and optimized for efficiency, refrigerant / water velocities and pressure drops.

Liquid Injection

During part-load operation of the compressor, discharge gas temperature is likely to go beyond tolerable limits. To control it within a safe limit, liquid injection is provided in compressor after certain level of discharge gas temperature is reached, to enhance operation range and life of the compressor.

Micro-computer Control Panel

Advanced micro-computer control is a standard feature on all Voltas Screw Chillers. This maintains all analog and digital inputs to achieve precise control of the operational and protective functions of the unit. **Direct Digital Control (DDC)** allows fingertip user interaction. The easy-to-use, push-button key board and menu-driven software provides access to operating conditions, control set points and alarm history, displayed on a prominent 32 character alpha-numeric LCD.

User-friendly Operation Modes

- Programmed Auto Mode: Auto-start and stop are programmable for an entire year. This minimizes operator interface and facilitates auto-restart on power restoration after load shedding or grid supply failure.
- Auto Mode: Start-and-Stop of the unit is controlled manually by a single button. Subsequent operation of the unit is fully automatic through microcomputer control.
- Test-service Mode: Facilitates testing of the unit under supervision.
- Remote mode (for Hardware BMS): Facilitates switching-on of the unit from a remote location through Hardware BMS. Panels are provided with three additional digital outputs and one digital input (start key) hardware BMS, as a standard scope of supply.

Display Information

Easily accessible measurements include the following parameters:

- Leaving chilled water temperature
- Number of compressor starts
- Suction pressure
- Remote / Local operation option
- Discharge pressure.
- Oil level fault indication.
- System voltage
- Compressor ON / OFF status
- Compressor current for each compressor.
- Compressor load percentage for each compressor
- Compressor elapsed run time for each compressor.
- Discharge gas temperature.

System Protections

The following system protection controls will automatically act for protecting the chiller under abnormal conditions, and ensure system reliability and safety.

- Low suction pressure
- Compressor over current, for each compressor.
- High discharge pressure.
- High winding temperature.
- High oil temperature.
- High discharge gas temperature.
- Freeze protection
- Sensor error
- Chilled water flow
- Single phase and phase reversal.
- Low oil level
- Over / under current and current imbalance
- Anti recycle
- Preventive maintenance due trip
- Self protection (SE – E1)
- Over / under voltage and voltage imbalance.

Diagnostic Displays

The diagnose mode provides for easy trouble – shooting.

- Unit trips 50 hours prior to completion of 8000 hours, as a precautionary measure, for preventive maintenance.
- Alarm history of last 10 trips with date, time and causes of failures.
- Protection trips for various vital parameters.

Adaptive Control

- Discharge / suction pressure limiting is done by unloading. This offers the advantages of chiller running unloaded, instead of tripping.
- In case the compressor current increases above set valve, the microcomputer senses the increase and signals the computer to unload, thus maintaining current within set value.

Voltas countrywide after – sales service

- A nationwide service network backs every unit.
- After the initial warranty period, Voltas offers annual maintenance service schemes. More than 90% of the customers have opted for these schemes. You cannot get better insurance.

Our service offerings are

- Service level agreement (SLA) to O & M / key customers in all sectors, with guaranteed uptime of > 95%.
- 24 x 7 services to O & M / key customers in all sectors.
- Conversion of chillers with R22 refrigerant to those with R 134a refrigerant.
- Accredited ESCO grade I certification – energy optimization through assessment of HVAC systems, including managing / conserving utilities to optimize Capex and Opex.
- Life cycle solutions provided, as compared to product warranties offered by other manufacturers.

Optional Features offered:

- Air – cooled condenser coils with pre – coated aluminum fins (for corrosive atmospheric conditions).
- Dual – mode chillers for thermal storage system.
- Communication port for remote connectivity, status and fault indication.
- BMS compatibility with MODBUS / BACnet can be linked to Integrated Building Management Systems (IBMS).

TECHNICAL DATA SHEET - ECBC A/C SCREW CHILLER PKG.

Chiller Pkg.Model	ACEGADXR 100 1MZ	ACEGADXR 130 1MZ	ACEGADXR 160 1MZ	ACEGADXR 180 1MZ	ACEGADXR 200 2MZ	ACEGADXR 230 2MZ	ACEGADXR 260 2MZ	ACEGADXR 300 2MZ	ACEGAFXR 340 2MZ	ACEGAFXR 380 2MZ
** Nominal Capacity (TR)	100	127	160	172	198	224	253	288	340	380
COMPRESSOR										
Compressor Type	Semihermetic Screw									
Qty/unit	1	1	1	1	2	2	2	2	2	2
RPM	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900
Min % Unit Capacity Reduction	25%	25%	25%	25%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
Refrigerant	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a
EVAPORATOR										
Evaporator Type	DX Shell & Tube								Flooded	
Qty/unit	1	1	1	1	1	1	1	1	2	2
Water Flow - (US gpm)	266	338	426	458	527	596	673	691	904	1011
Water Side Pr. Drop PSI	4.75	6.00	6.82	8.60	5.89	6.79	5.76	10.02	5.50	7.30
**Water Nozzle Sizes (MM)	150	200	200	200	200	250	250	250	250	250
CONDENSER										
Air Cooled Condenser Type	AL Fins & CU. Tube									
Fan Type	Propeller									
Condenser Module Qty	4	5	6	7	7	8	9	10	10	12
Fan Dia (Inch)	36"	36"	36"	36"	36"	36"	36"	36"	36"	36"
No. of Fans	8	10	12	14	14	16	18	20	20	24
Total Air Flow (CFM)	96000	120000	144000	168000	168000	192000	216000	240000	240000	288000
CHILLER PACKAGE PHYSICAL DATA										
Unit Length (MM)	4760	5828	6900	7970	7970	9030	10200	11270	11270	13406
Unit Width (MM)	2236	2236	2236	2236	2236	2236	2236	2236	2236	2236
Unit Height (MM)	2615	2640	2665	2665	2765	2765	2790	2790	2790	2790
Shipping Weight (KG)	4561	5365	6156	6920	8511	9337	10108	11008	12526	14000
Refrigerant Charge (KG)	100	130	160	180	200	230	260	300	465	520

Note1: *Capacity rated for evaporator leaving water temparature 7°C, Evap. water side fouling factor of 0.000018 m^2k/W and at design ambient of 35°C.
Power & control supply voltage ranges are 360 - 440 V & 210-240 V respectively and frequency 50Hz.
Note 2: ** Sizing of water piping to be done at site based on operating tonnage & available pump head.
Note3 : Extended capacity product range available on request.

(Product development is a continuous process in Voltas, hence specifications and technical data subject to alterations without notice.)

TECHNICAL DATA SHEET - GREEN SERIES A/C SCREW CHILLER PKG.

Chiller Pkg.Model	ACGSACDXR 090-1	ACGSACDXR 105-1	ACGSACDXR 120-1	ACGSACDXR 150-1	ACGSACDXR 175-2	ACGSACDXR 210-2	ACGSACDXR 240-2	ACGSACDXR 300-2	ACGSACDXR 360-2
* Nominal Capacity (TR)	89	105	120	150	175	210	240	300	356
COMPRESSOR									
Compressor Type	Semi Hermetic Screw								
Qty/unit	1	1	1	1	2	2	2	2	2
RPM	2900	2900	2900	2900	2900	2900	2900	2900	2900
Min % Unit Capacity Reduction	25%	25%	25%	25%	12.50%	12.50%	12.50%	12.50%	12.50%
Refrigerant	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a
EVAPORATOR									
Evaporator Type	DX - Shell & Tube								
Qty/unit	1	1	1	1	1	1	1	1	1
Water Flow - (US gpm)	237	280	320	400	465	560	640	800	960
Water Side Pr.Drop PSI	6.17	8.52	6.25	8.44	7.41	9.2	10	8	9.8
** Water Nozzle Sizes (mm)	150	150	150	200	200	200	200	250	250
CONDENSER									
Air Cooled Condenser Type	AL Fins & CU. Tube								
Fan Type	Propellor								
Condenser Module Qty	3	3	3	4	5	6	7	8	9
Fan Dia (mm)	914	914	914	914	914	914	914	914	914
CHILLER PACKAGE PHYSICAL DATA									
Unit Length (mm)	3900	3900	3900	4760	5830	6900	7965	9030	10200
Unit Width (mm)	2236	2236	2236	2236	2236	2236	2236	2236	2236
Unit Height (mm)	2570	2570	2570	2595	2595	2645	2645	2645	2660
Shipping Weight (kg)	4140	4747	4747	5624	6666	8311	9377	10876	12487
Refrigerant Charge (kg)	107	126	144	180	210	252	288	360	432

Note1: *Capacity rated for evaporator leaving water temparature 7°C, Evap. water side fouling factor of 0.000018 m^2k/W and at design ambient of 35°C.
Power & control supply voltage ranges are 360 - 440 V & 210-240 V respectively and frequency 50Hz.
Note 2: ** Sizing of water piping to be done at site based on operating tonnage & available pump head.
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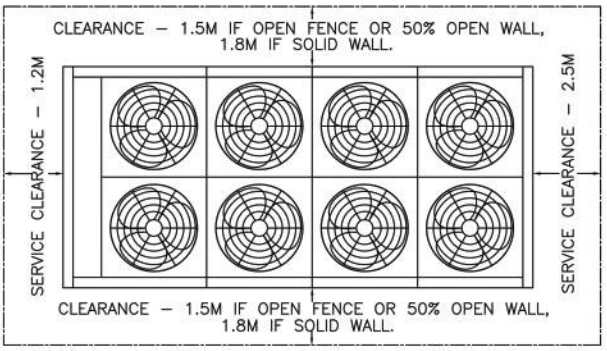
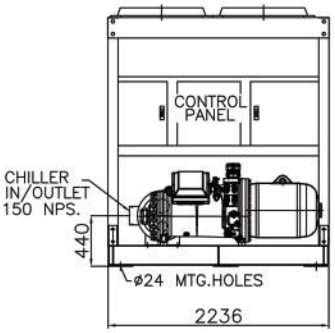
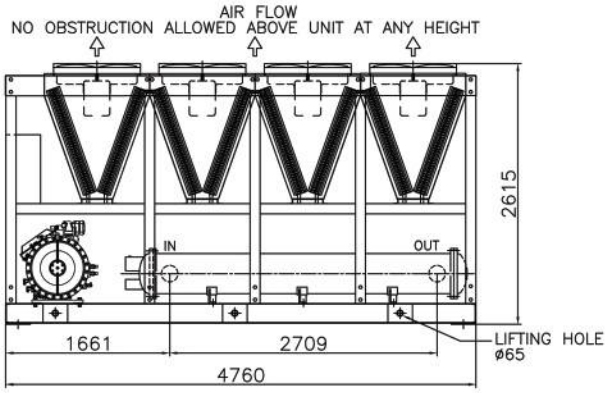
G. A DRAWING
MODEL ACEGADXR100 1MZ

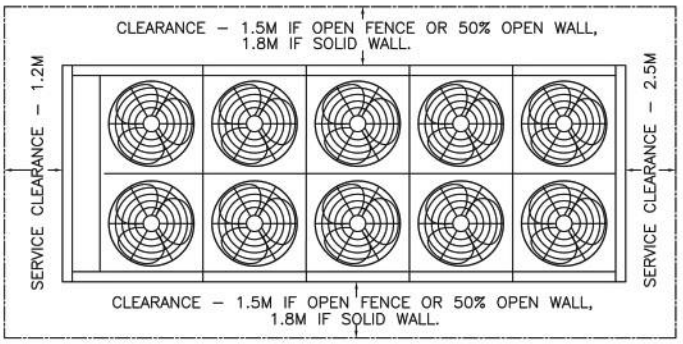


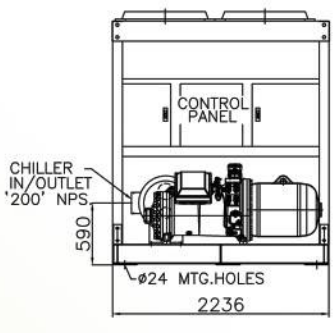


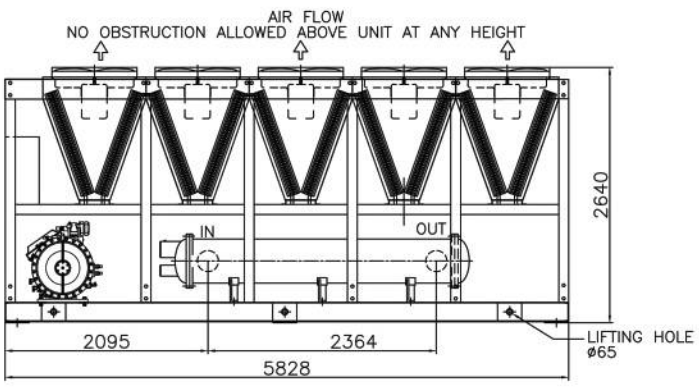


NOTE :
1.DIMENSIONS ARE GIVEN IN MM.
2.WATER NOZZLES FOR CHILLER TO BE PROVIDED WITH END CAP.

G. A DRAWING
MODEL ACEGADXR130 1MZ







NOTE :
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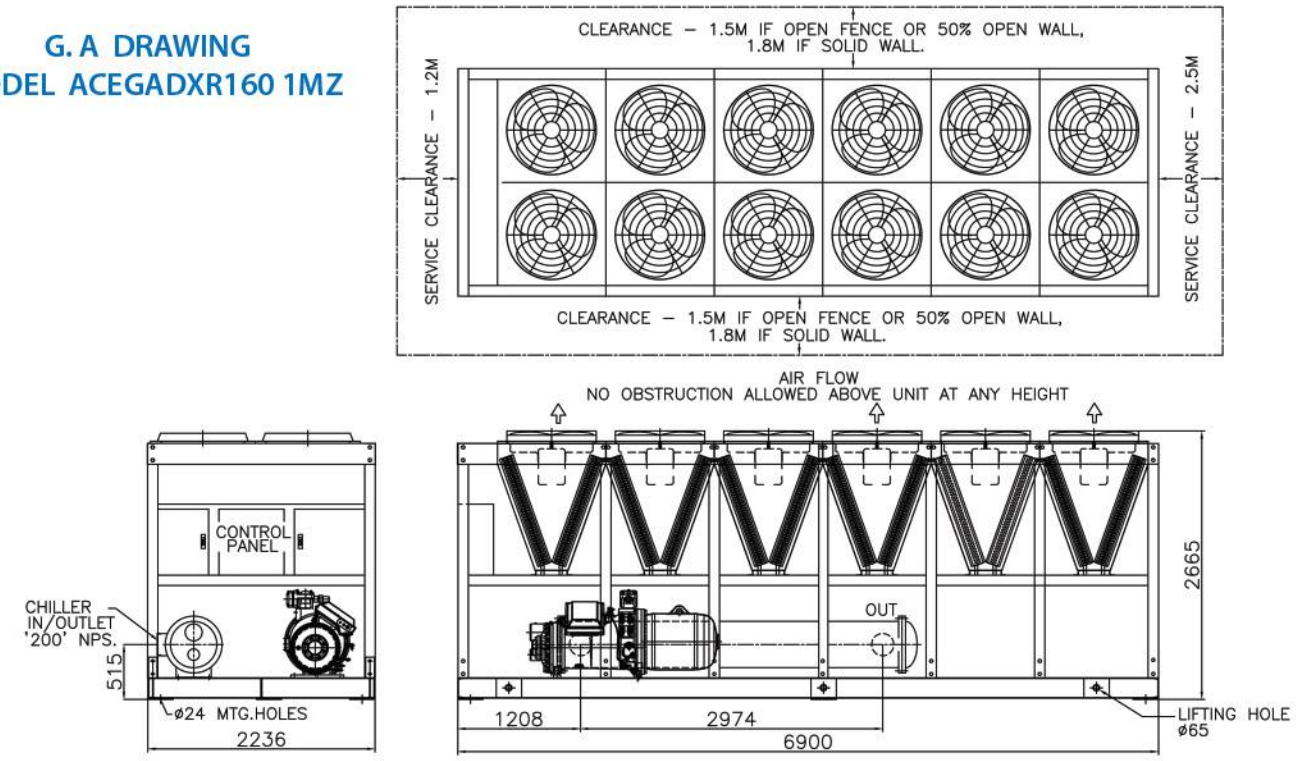
2.WATER NOZZLES FOR CHILLER TO BE PROVIDED WITH END CAP.

G. A DRAWING
MODEL ACEGADXR160 1MZ



NOTE :
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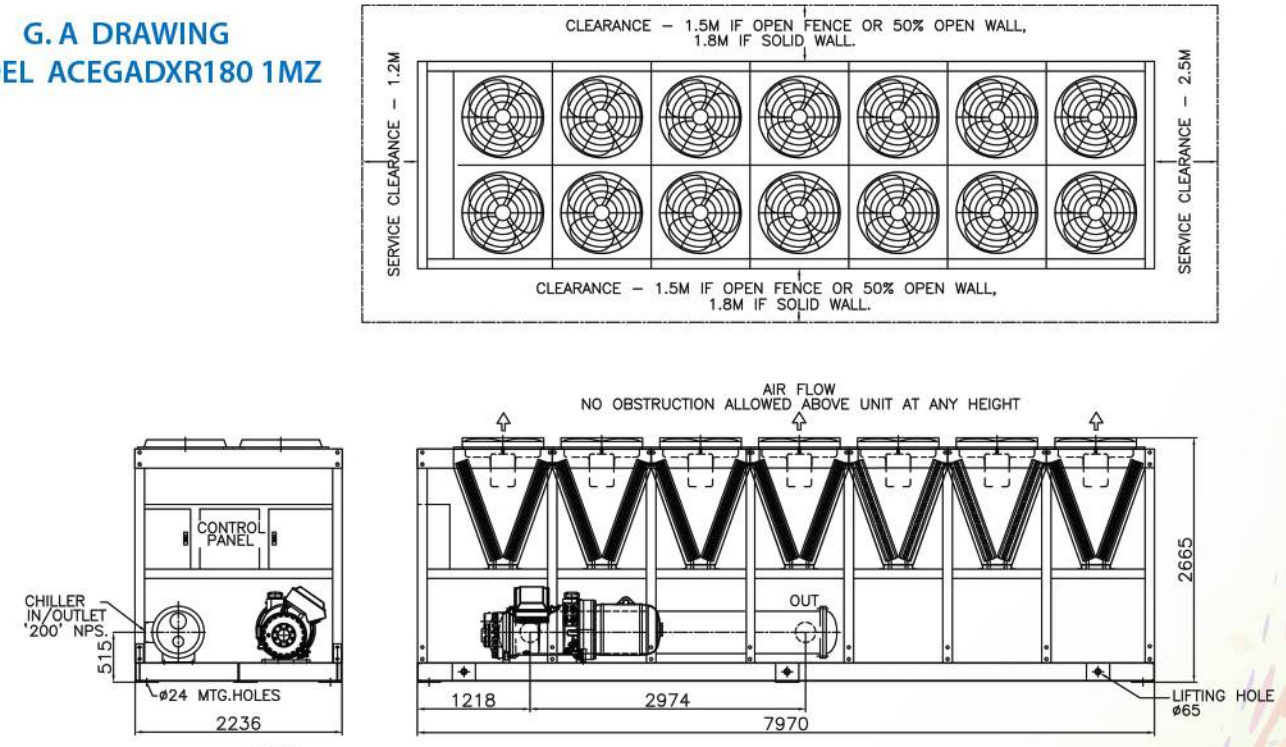
2.WATER NOZZLES FOR CHILLER TO BE PROVIDED WITH END CAP.

G. A DRAWING
MODEL ACEGADXR180 1MZ



NOTE :
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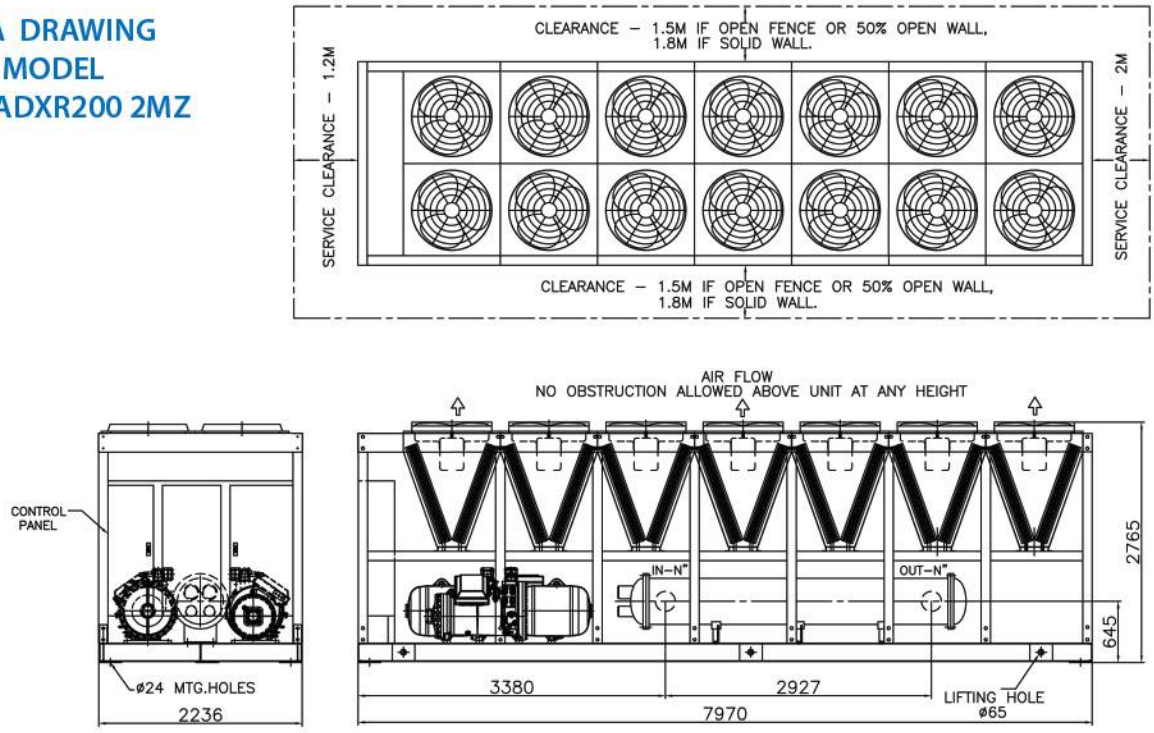
2.WATER NOZZLES FOR CHILLER TO BE PROVIDED WITH END CAP.

G. A DRAWING MODEL ACEGADXR200 2MZ



NOTE :
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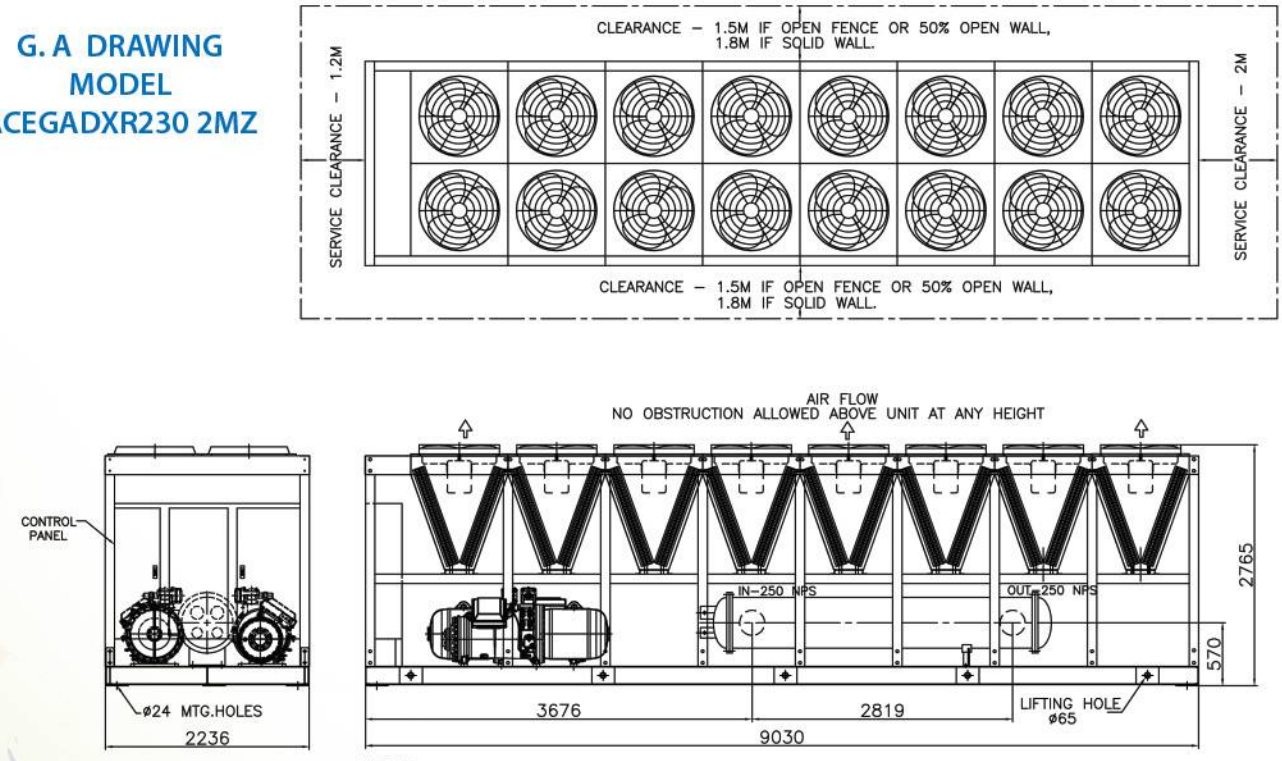
2.WATER NOZZLES FOR CHILLER TO BE PROVIDED WITH END CAP.

G. A DRAWING MODEL ACEGADXR230 2MZ



NOTE :
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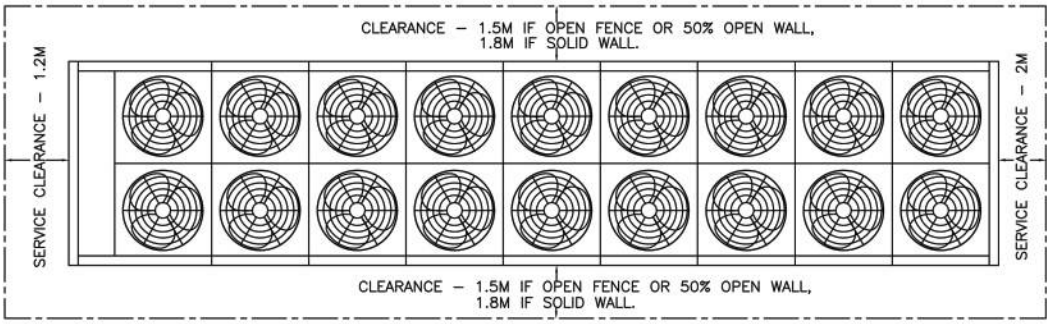
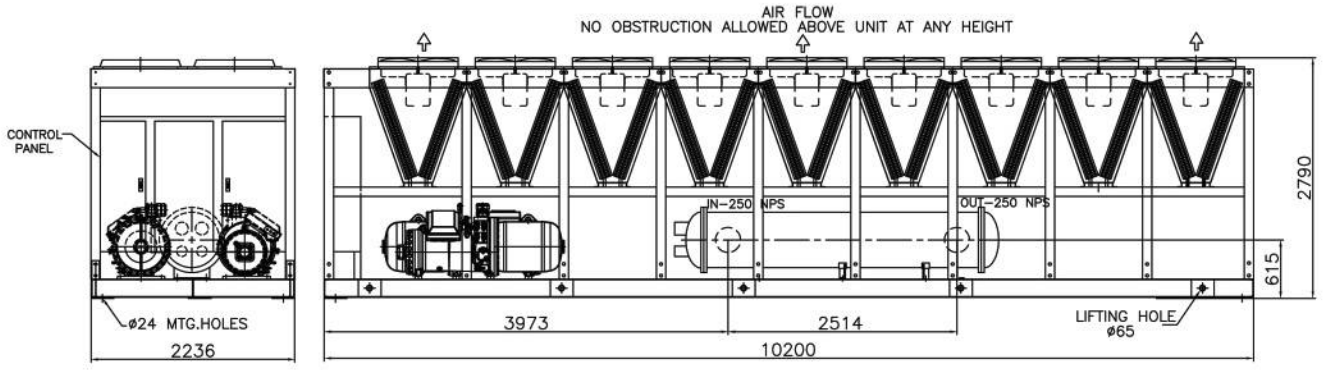
G. A DRAWING MODEL ACEGADXR260 2MZ





NOTE :
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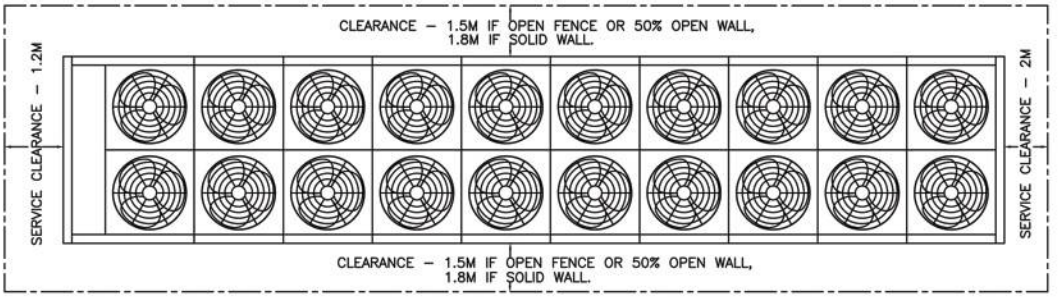
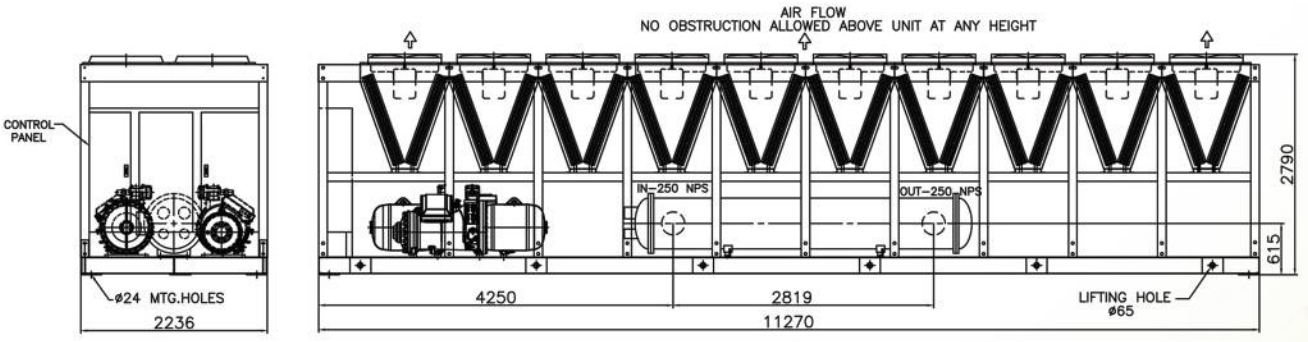
G. A DRAWING MODEL ACEGADXR300 2MZ





NOTE :
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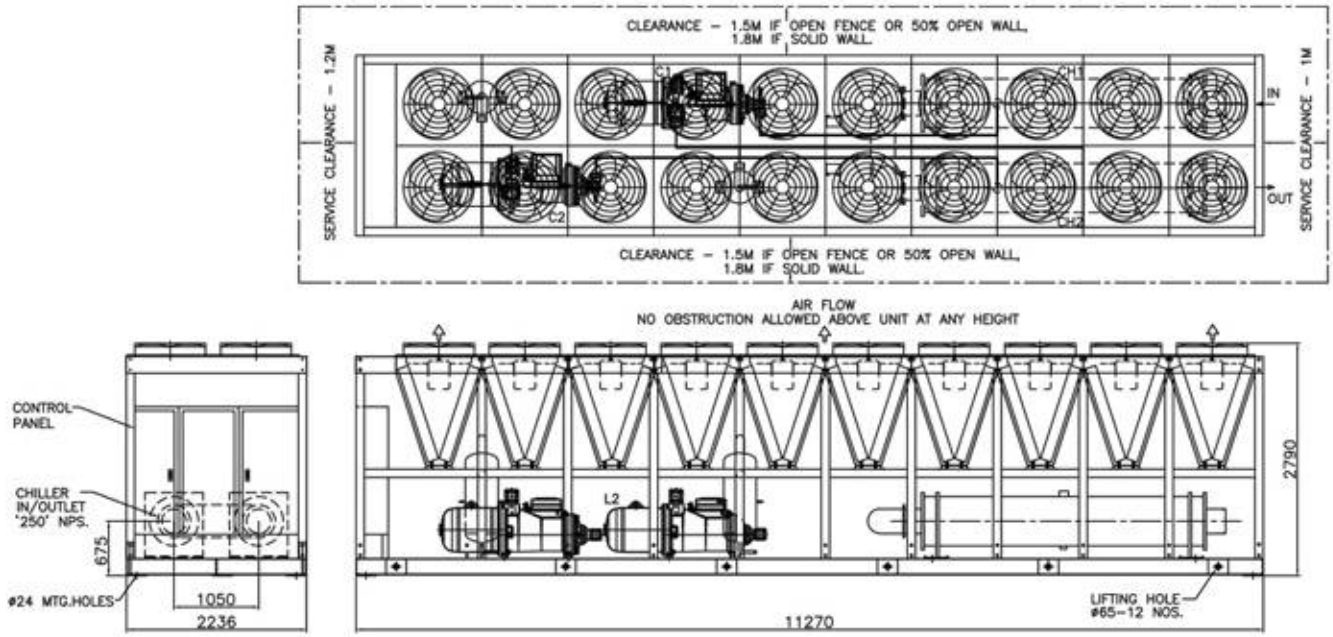
G. A DRAWING - MODEL ACEGAFXR340 2MZ



NOTE :
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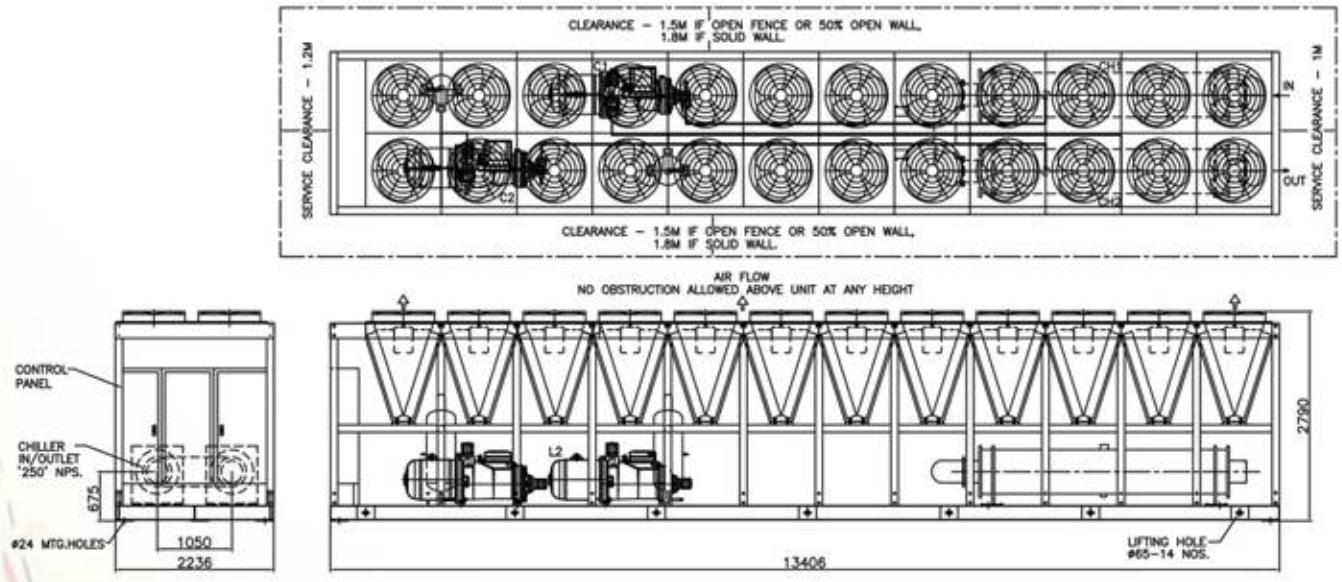
2.WATER NOZZLES FOR CHILLER TO BE PROVIDED WITH END CAP.

G. A DRAWING - MODEL ACEGAFXR380 2MZ



NOTE :
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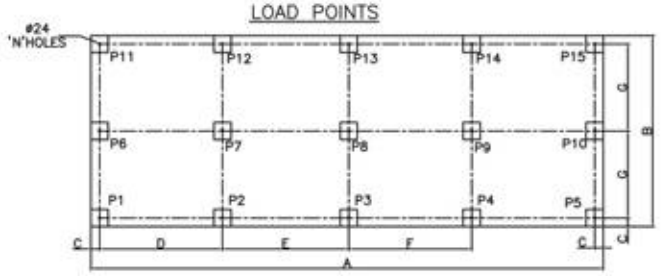
POINT LOAD DIAGRAM - ECBC AIR-COOLED SCREW CHILLER PACKAGE

LOAD POINTS



LOAD POINT LOCATION (MM)

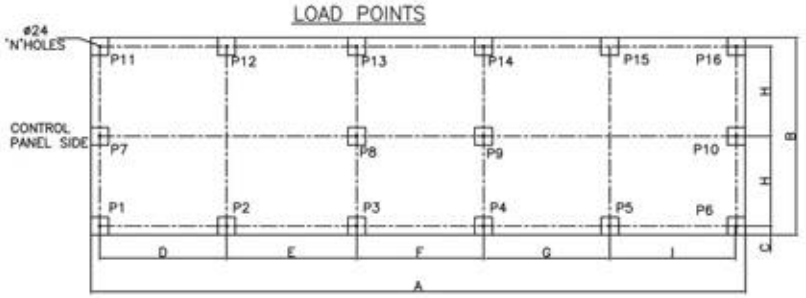
MODEL	A	B	C	D	E	F	G	N
ACEGADXR1001MZ	4760	2236	100	2280	–	–	1018	9
ACEGADXR1301MZ	5828	2236	100	1876	1876	–	1018	12
ACEGADXR1601MZ	6900	2236	125	2217	2217	–	993	12
ACEGADXR1801MZ	7965	2236	125	1930	1928	1928	993	15
ACEGADXR2002MZ	7965	2236	125	1930	1928	1928	993	15
ACEGADXR2302MZ	9030	2236	125	2250	2140	2140	993	15
ACEGADXR2602MZ	10200	2236	125	2780	2195	2195	993	15
ACEGADXR3002MZ	11270	2236	125	2780	2730	2730	993	15
ACEGAFXR3402MZ	11270	2236	125	2678	2780	2780	993	15

LOADING DETAIL

MODEL	KGS PER POINT															TOTAL LOAD KG
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	
ACEGADXR1001MZ	591	459	315	–	–	626	689	420	–	–	659	459	343	–	–	4561
ACEGADXR1301MZ	558	409	343	–	297	591	552	503	–	391	622	425	350	–	324	5365
ACEGADXR1601MZ	640	469	393	–	340	678	633	578	–	449	715	487	402	–	372	6156
ACEGADXR1801MZ	576	476	376	346	285	610	643	545	453	377	647	495	414	355	322	6920
ACEGADXR2002MZ	634	525	416	362	298	978	940	860	689	530	631	534	406	372	338	8511
ACEGADXR2302MZ	695	576	456	397	327	1072	1032	944	756	582	692	586	445	407	370	9337
ACEGADXR2602MZ	753	624	494	430	353	1162	1117	1022	819	628	750	634	482	440	400	10108
ACEGADXR3002MZ	820	679	538	468	385	1266	1216	1113	891	685	816	691	525	480	435	11008
ACEGAFXR3402MZ	588	612	1187	635	634	1052	1089	2067	1038	951	499	464	867	440	403	12526

POINT LOAD DIAGRAM - ECBC AIR-COOLED SCREW CHILLER PACKAGE

LOAD POINTS



LOAD POINT LOCATION (MM)

MODEL	A	B	C	D	E	F	G	H	I	N
ACEGAFXR3802MZ	13406	2236	125	2678	2780	2186	2780	993	2678	16

LOADING DETAIL

MODEL	KGS PER POINT																TOTAL LOAD KG
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	
ACEGAFXR3802MZ	560	900	1000	900	700	650	1100	1800	1500	960	530	600	900	700	700	500	14000

SPECTRUM OF HVAC PRODUCTS & SYSTEMS

PACKAGED & DUCTABLE SPLIT UNIT

VARIABLE REFRIGERANT FLOW SYSTEM (VRF)

ENERGY EFFECIENT
AIR COOLED SCREW CHILLER

ENERGY EFFECIENT
WATER COOLED SCREW CHILLER

AIR COOLED SCROLL CHILLER

WATER COOLED SCROLL CHILLER

AIR COOLED RECIPROCATING CHILLER

WATER COOLED RECIPROCATING CHILLER

DOUBLE EFFECT VAM

CO-GEN VAPOUR ABSORPTION MACHINE (VAM)

PROCESS REFRIGERATION PACKAGE

IAQ & ENERGY REDUCTION SYSTEM

COILOTRON (UV FOR AHU COILS)

STP EA ODOUR / H_2S REMOVAL SYSTEM

AIR HANDLING UNIT

Supersede : Prev. Cat.

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VL/CHP/ACSCW/01/03/14/1k