

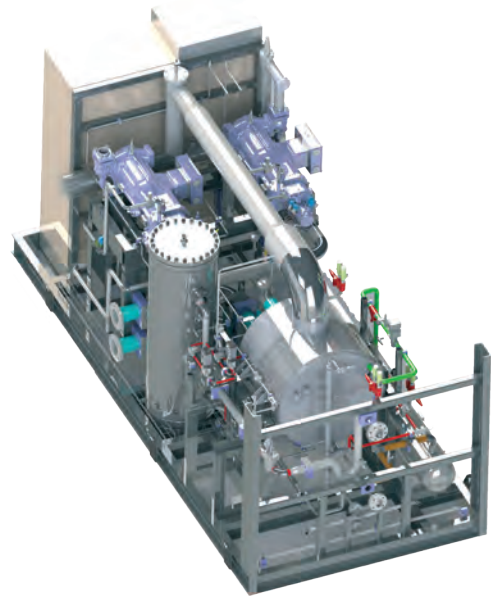
Standard NH₃ Chiller



The new era of natural refrigerants

SCM Semi-hermetic NH₃ Chiller line

Starting from 60 kW to 1400 kW



Standardized ammonia chiller line

Innovative technology and high efficiency performance

Industrial grade design and build quality

Designed by SCM Ref



Content:

| | |
|---|-----------|
| 1. Beijer Ref Group introduction | 4 |
| 2. Key benefits of ammonia | 6 |
| 3. Chiller categorization | 8 |
| 4. Outdoor chiller | 9 |
| 5. Indoor chiller | 13 |
| 6. Features and advantages | 16 |
| 7. Application | 18 |
| 8. Capacity range | 20 |
| 9. Dimensions | 24 |
| 10. Engineering and Workshop | 26 |

1 Beijer Ref Group introduction

The company's expansion strategy is twofold: to enlarge the geographical landscape and to harmonise the product portfolio and the production. The company intends to produce, as an OEM in several locations around the world, and to sell the portfolio worldwide. The company is convinced and optimistic that the demand of natural refrigerants will grow. Beijer Ref is therefore keen to enlarge its natural refrigerant portfolio. It is this desire to be at the forefront of new technology development that drives the company's expansion. Beijer Ref is committed, engaged straightforward and united. The company is trendsetter on green solutions. It is in its culture and DNA to care about protecting the environment. As a Swedish company Beijer Ref defend these values within the industry.

Beijer Ref Support Center

Beijer Ref Support Center is a Beijer Ref company with its head office in Oirschot, the Netherlands.

As we can learn from the name it is a support center for Beijer Ref companies. The Beijer Ref Support Center is completely built from scratch with a total space of 12500 square meters.

It is a state of the art building that is equipped with the latest innovations and a fully automated Autostore warehouse cube. This robotized spare parts warehouse makes the logistic chain super-efficient and fast.

Beijer Ref Support BV

Is the head office in the Netherlands and centralises the back office and the general warehouse in the support center. It will support the Beijer Ref companies.

SCM Ref BV

Is located in the Beijer Ref Support and is a independent assembly facility for the Beijer Ref companies and is located in Oirschot the Netherlands. SCM Ref specializes in standard

Ammonia units with a low refrigerant content and custom-made Ammonia installations. SCM Ref contains two "low-charge" products; a cooling installation and a cooling unit for small industrial projects, with glycol as secondary refrigerant liquid, to deliver (ancillary) cooling to a room. The standard air cooled AC line starts at 190 kW to 960 kW. The water cooled AC line from 300 kW to 1385 kW. The units are plug and play and easy to install. In addition, SCM Ref can produce any other customized unit up to three, four or five Megawatts.

All units are assembled in the SCM Ref assembly hall in Oirschot, which is furnished in accordance with ISO and PED guidelines. It goes without saying that SCM Ref has F-gas certification. Our independent sales companies are therefore assured of quality and can have all their units assembled with confidence in this modern production hall. Contact the independent sales companies for the possibilities.

Why Ammonia?

Natural refrigerants CO₂, ammonia and hydrocarbons have been used in different HVAC & R applications for

many years. With the exception of a few sectors, their market penetration has remained relatively low.

Today this is changing fast, as an evolving legislative landscape for fluorinated refrigerants, the proactivity of influential end users and falling technology costs drive wider natural refrigerant uptake worldwide.

Recognising the need to reduce ammonia charges and create simpler systems for installers, SCM Ref BV has start manufacturing low-charge ammonia packaged units.

The new packaged and custom ammonia units can be installed on the roof, eliminating the need for an engine room.

When you have a chiller or a rack in capacities of up to 500-680 kW, it's possible to have an air-cooled condenser without a machine room. In capacities above 700-750 kW, one nearly always have a machine room.

Reference project

We have installed a 800 kW heat pump system. It is charged with 180kg of ammonia with two twin



Beijer Ref Support Center



SCM Ref BV is located near Eindhoven



Our Beijer Ref truck

screw compressors. The system is composed of two unique chillers with semi-hermetic twin screw compressors running on ammonia, where you normally would expect open-type compressors.

An ammonia compressor is typically open-type with shaft seal, which a semi-hermetic compressor does not contain.

The advantage of the new compressor is that it is smaller and uses a permanent magnetic motors. The packaged units can help open up ammonia to new areas of application, including HVAC and supermarkets.

The fact that ammonia smells, helps to mitigate the safety risk of a leak. Unlike with other refrigerants, people are likely to vacate the area before the ammonia reaches a dangerous concentration.

People do not have to be afraid of ammonia. Once it's in a well-designed packaged unit with safety valves, there are no issues.

By using a water curtain, once a leak has been detected, ammonia can also be dissolved before it becomes toxic.

NH₃ is the only refrigerant with zero

ozone-depleting potential and zero global warming potential.



2 Key benefits of Ammonia

Many industrial refrigeration systems use ammonia as refrigerant. Ammonia (NH₃) for refrigeration is nothing new, and its history dates back to the mid-19th century. However, it still remains an important tool in large commercial and industrial applications. Here are four benefits of this time-tested refrigerant.

1. Efficiency

The properties of ammonia make it perfect for refrigeration use. For example, ammonia's cooling capacity is greater than many other refrigerants. In other words, it takes less ammonia than halocarbon refrigerants to get the job done. In large applications, it is one of the most efficient refrigerants you can use.

2. Cost-Effective

Because ammonia is very efficient, companies with industrial cooling or chilling equipment can save a lot of energy with NH₃ systems. Savings are sometimes fifteen percent or more. This represents substantial savings in a large operation. Ammonia refrigerant is readily available and inexpensive, which adds to its cost effectiveness.

You can buy anhydrous ammonia from industrial refrigeration services at affordable prices..

3. Good for the Environment

Even though NH₃ emits toxic fumes, these fumes are not hazardous to the environment. When ammonia is released to the atmosphere it rapidly rises because it's lighter than air. It only takes a few days for ammonia to decompose. Unlike some refrigerants, ammonia does no harm to the ozone layer, and is not a hazard after it gets into the atmosphere.

4. Fumes

Ammonia fumes are toxic, but easy to detect. When there is a leak in a system, you will know about it quickly, and be able to take action. Ammonia is relatively safe from explosion hazards, except under certain conditions. However, handling ammonia does require training, and safety precautions, and you should always use trusted industrial refrigeration services.

Economic Advantages of Ammonia Refrigeration

What are the overall advantages of using ammonia as a refrigerant? As a refrigerant, ammonia offers three distinct advantages over other commonly used industrial refrigerants.

- 1) Ammonia is environmentally compatible. It does not deplete the ozone layer and does not contribute to global warming.
- 2) Ammonia has superior thermodynamic qualities. As a result ammonia refrigeration systems use less electricity.
- 3) Ammonia's recognizable odor is it's greatest safety asset. Unlike most other industrial refrigerants that have no odor, ammonia refrigeration has a proven safety record in part because leaks are not likely to escape detection.

Thermodynamically, ammonia is 3-10% more efficient than competitive refrigerants; as a result, ammonia systems use less electricity than competitive refrigerants.

The cost of ammonia itself is significantly less than competitive industrial refrigerants and less ammonia is also generally required to do the job than other industrial refrigerants.

All of that adds up to lower operating costs for food processors and cold storage facility operators.

Do lower energy demands benefit the environment?

Proper environmental impact assessment of refrigerants and their systems requires consideration of both their direct and indirect contribution to global warming.

Refrigeration systems directly contribute to global warming through the greenhouse gas effect of their fugitive refrigerant emissions. They indirectly add to global waging through carbon dioxide emissions resulting from conversion of fossil fuels to energy required to operate the systems.

The "total equivalent warming impact," TEWI, is defined as the sum of these direct and indirect contributions.

Ammonia's TEWI score is very low because ammonia itself does not contribute to global warming. In addition, due to highly favourable thermodynamic properties, ammonia refrigeration systems require less primary energy compared to other commonly used refrigerants.

As a result, there is an indirect global warming benefit of lower CO₂ emissions from electric power plants; among the lowest of all refrigerants.

Why is Ammonia growing in popularity ?

As fewer and fewer CFCs and HCFCs are available for use as refrigerants, companies are looking to ammonia as a more effective replacement.

According to ASHRAE and the International Institute of Ammonia Refrigeration (IIAR), ammonia is a cost-effective, efficient alternative to CFCs and HCFCs that is also safe for the environment.

Ammonia (chemical formula NH₃) is a gas comprised of two other gases – nitrogen and hydrogen. Whether found in nature or made by man, ammonia is colourless but has a sharp, pungent odour.

Ammonia, frequently used commercially in large freezing and refrigeration plants is also called "anhydrous ammonia" because it contains almost no water (it is 99.98% pure). Household ammonia, by comparison, is only about 10% ammonia by weight mixed with water.

As a refrigerant, ammonia has several major advantages over CFCs and HCFCs:

Ammonia is a 3-10% more efficient refrigerant than CFCs, so an ammonia-based system requires less electricity, resulting in lower operating costs.

Ammonia is safe for the environment, with an Ozone Depletion Potential (ODP) rating of 0 and a Global Warming Potential (GWP) rating of 0. Ammonia is substantially less expensive than CFCs or HCFCs

There are two key disadvantages to using ammonia as a refrigerant:

It is not compatible with copper, so it cannot be used in any system with copper pipes.

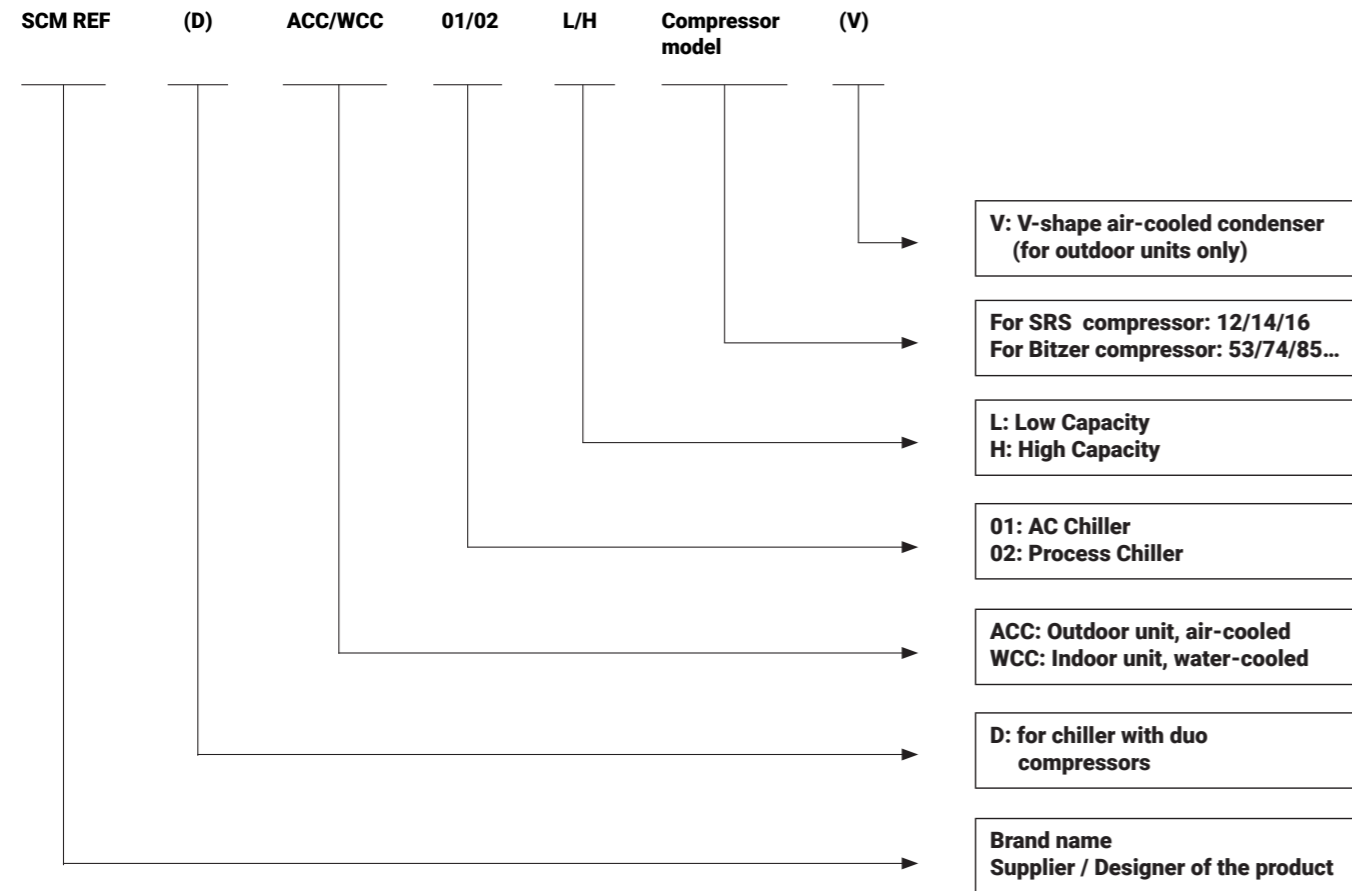
Ammonia is poisonous in high concentrations. Two factors, however, mitigate this risk:

- 1. Ammonia's distinctive smell is detectable at concentrations well below those considered to be dangerous,
- 2. Ammonia is lighter than air, so if any does leak, it will rise and dissipate in the atmosphere.



3. Chiller categorization:

Naming System:



Application: AC comfort chiller and medium temperature process cooling.

Option 1: Winter package for extreme low ambient temperature.

Option 2: Weather casing with mechanical ventilation. ATEX fans.

Option 3: Closed casing with sound-proof panel, mechanical cooling and NH₃ leakage ventilation. ATEX fans.

Option 4: General exhaust pipe connecting all relief valves to the outside of casing.

Option 5: Liquid injection for oil temperature protection.

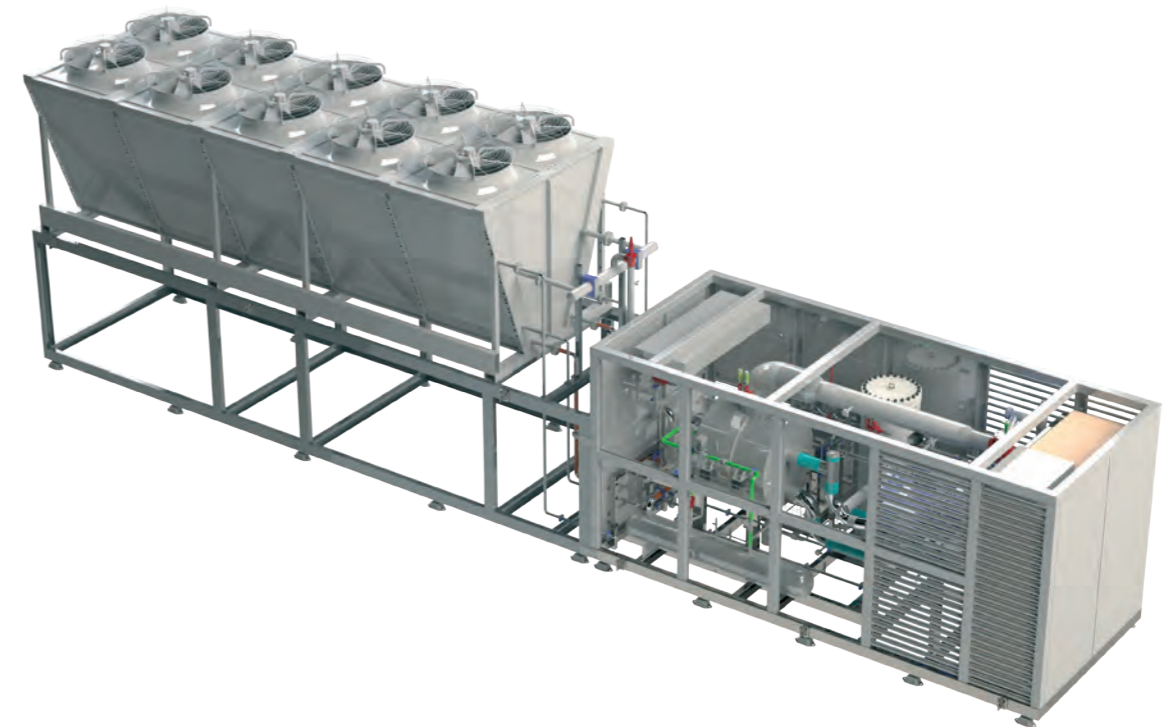
Option 6: 3-way regulating valve at water inlet connection for head pressure control of water-cooled condenser.

Option 7: Hybrid air-cooled condenser/dry cooler are available for air-cooled/water-cooled chillers. Please contact SCM Ref for details.

Option 8: Adaption to NH₃ CO₂ application on request.

4. Outdoor Chiller

4a. 3D modelling:



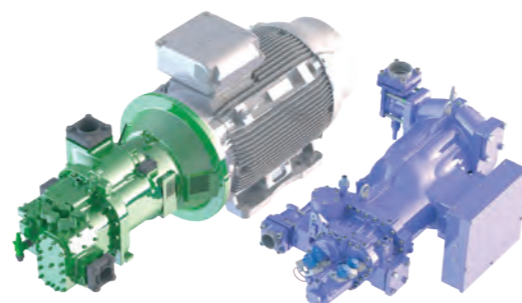
*Air-cooled condenser is connected and mounted with prefab piping and framework.

*Air-cooled condenser can be delivered separately without framework. Prefabbed Inlet/outlet headers, service valves, double safety valves will be delivered. X-ray is not needed.

4b. Major components outdoor Chillers

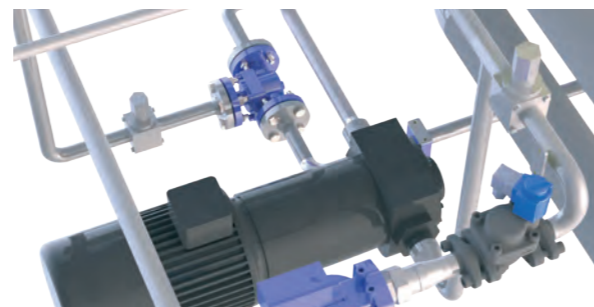
Compressor:

- Semi-hermetic or open-drive screw compressor
- Semi-hermetic compressors built with PM motor and coated aluminum motor windings
- Capacity control with inverter and slider
- VI adjustment
- Motor overheating protection
- Discharge temperature protection and motor phase protection
- Internal pressure relief valve
- Built-in discharge check valve
- Built-in oil flow switch, sight glass



Oil circuit:

- Three stage oil separator
- Three-way valve
- Oil pump
- Oil fine filters
- Oil flow switch
- Automatic oil bleeding
- Additional manual oil drainage valve at the bottom of evaporator



Condenser:

- Air-cooled condenser with stainless steel tubes / Pre painted coated aluminum fins
- EC axial fans, FeZn casing with epoxy powdered coating
- Electrical box equipped with automatic fan fuses, general main switch, general alarm relays and votage transformer to run without neutral
- Integrated oil cooling loop
- Horizontal and V-shaped layout are both available
- Sound level approx. 60 dbA in 10 m
- Service switch on each fan
- Condenser pressure regulation system coming from PLC
- Pressure regulating system includes floating condenser pressure control
- Water-cooled condenser is also available for outdoor chiller application



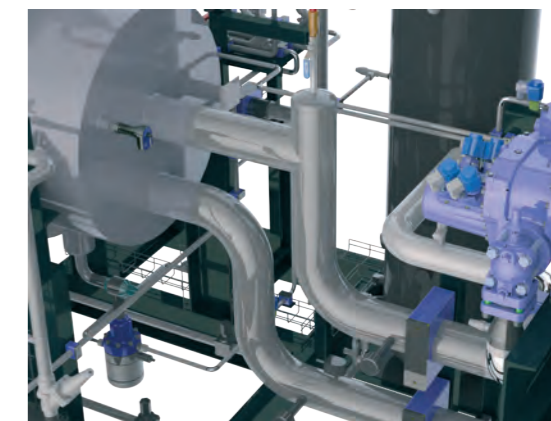
Evaporator:

- Compact plate-in-shell heat exchanger. Carbon steel shell with SS316L plates.
- Optimized design for chiller application. Stable thermal performance under different load conditions. Possibility to work with constant and variable speed pumps.
- Built-in demister package
- Electronic liquid level control in combination with liquid-gas fraction compensation.
- Liquid level control column equipped with service valves and gauges
- Externally insulated and optional AL/stainless steel cladding
- Oil bleeding
- Two liquid level sight glass



Refrigerant circuits:

- Motorized expansion valve that is in control of the liquid level and the liquid vapour fraction that is measured.
- Motorized hot gas bypass, PI controlled
- High pressure liquid receiver with sight glass
- HP, LP and oil manometers
- HP, LP and oil 4-20mA pressure sensors
- Temperatures sensors at discharge, suction and oil line
- Pipelines made in stainless steel 304L
- Combined winter regulation by means of mechanical head pressure control and dedicated fan control. Severe low ambient package as option.



Water / Brine connections:

- Inlet / outlet temperature sensors
- Flow switch at line outlet
- Water / brine inlet / outlet connections can be switched from one side to the other side of the chiller
- Air vent installed as standard
- Externally insulated and optional AL/stainless steel cladding



Safety:

- Dual pressure relief valves on each isolated pressure vessel
- Mechanical HP and LP switches
- Internal pressure relief valve on compressor
- Motor overheating protection and phase protection
- Temperature and pressure protection on critical points in refrigerant and oil circuit
- NH₃ leakage detector with adjustable detection level for high and low gas alarm
- Fully welded pipelines bring higher durability and lower risk of leakage
- Independent power supply for NH₃ detector, alarm and siren
- Externally mounted alarm cabinet in addition to the main alarm unit
- Power line phase protection
- Controlled temperature and humidity inside electrical cabinet. Designed for industrial environment -5°C / +40°C, 85% humidity.
- HP, LP and oil pressure sensors and gauges
- Service valves and shutoff valves for maintenance
- Condenser main power circuit protection without neutral

Electrical Control and Inverter:

- Siemens PLC installed with SCM REF chiller control software
- 7" LCD touchscreen
- Main power switch
- Main electrical cabinet with IP54 rating
- Power switch on cabinet
- Danfoss inverter box integrated
- Codified terminal board and halogen free cables
- Emergency push buttons mounted interiorly and exteriorly to allow quick response
- Condenser electrical cabinet with IP54 rating
- Thermostat, hygostat and ventilation for controlling environment inside cabinet
- Electrical cabinet without neutral (transformer equipped)
- Separate delivered alarm cabinet in case of machine room application



First option casing:

- Weather casing with mechanical NH₃ extract-ventilation fan's casing is epoxy coated with multi layer industrial painting system.

Second option casing:

- Weather resistant closed casing equipped with sound-proof absorption panels. Internal mechanical cooling and NH₃ extract fan.

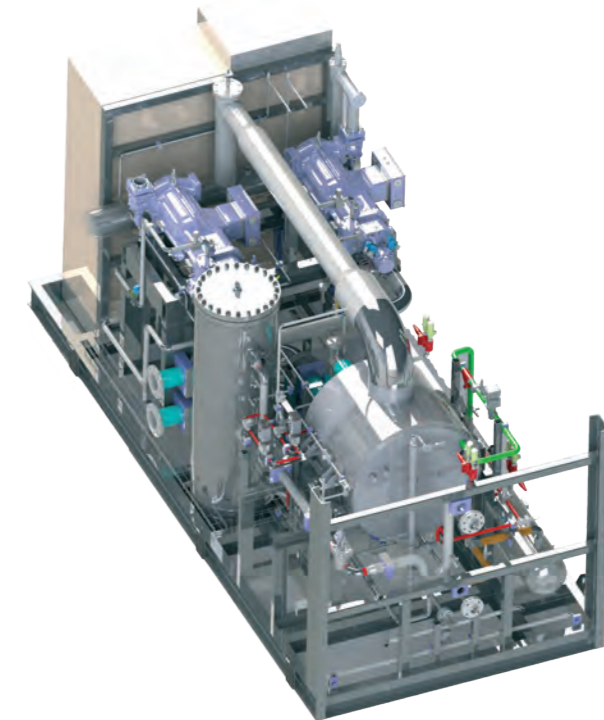
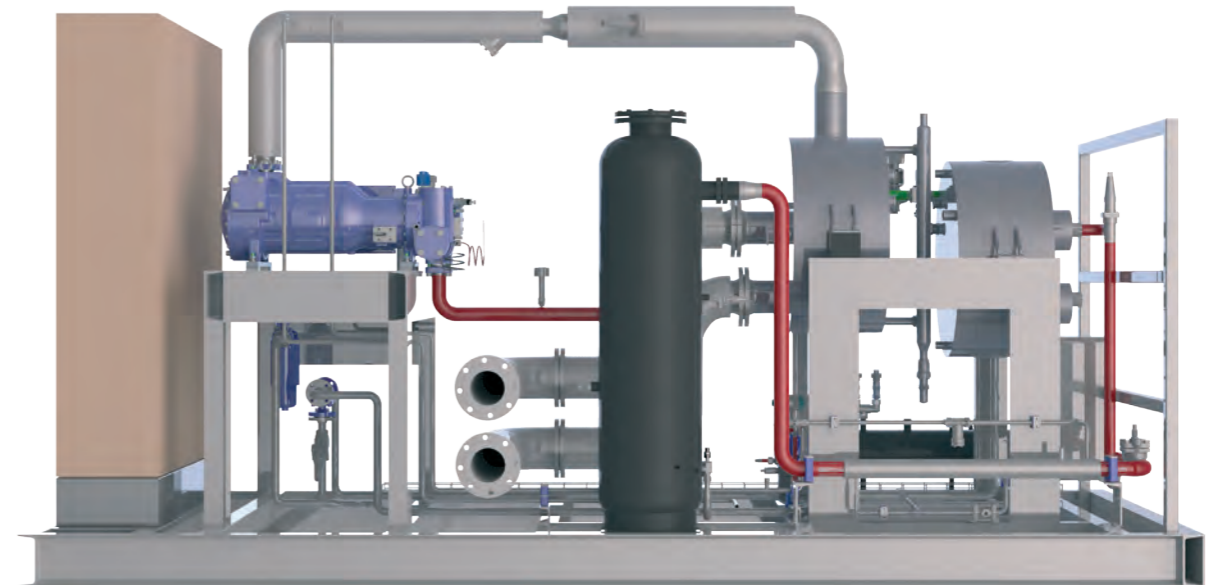
NH₃



GREEN COOLING
OUR CHALLENGE

5. Indoor Chiller

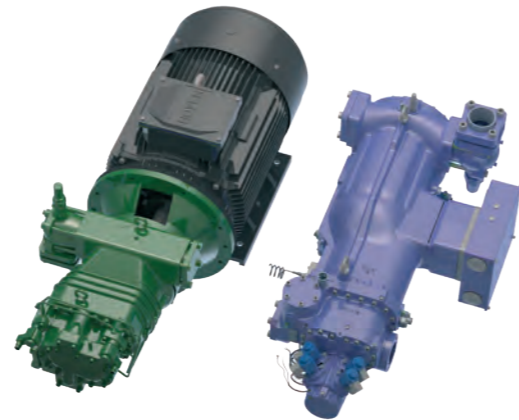
5a. 3D modelling



5b. Major components indoor Chillers

Compressor:

- Semi-hermetic or open-drive screw compressor
- Semi-hermetic compressors built with PM motor and coated aluminum motor windings
- Capacity control with inverter and slider
- VI adjustment
- Motor overheating protection
- Discharge temperature protection and motor phase protection
- Internal pressure relief valve
- Built-in discharge check valve
- Built-in oil flow switch, sight glass



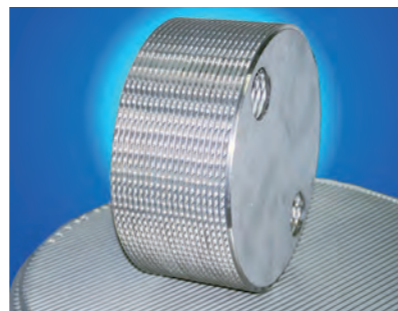
Oil circuit:

- Three stage oil separator
- Three-way valve
- Oil pump
- Oil fine filters
- Oil flow switch
- Automatic oil bleeding
- Additional manual oil drainage valve at the bottom of evaporator



Condenser:

- Semi-welded plate heat exchanger with 316SS plates
- Durable and high efficiency
- Condenser pressure regulation system
- Air-cooled condenser with integrated oil cooler is also available for indoor chiller application. They are placed outside separately.



Evaporator:

- Compact plate-in-shell heat exchanger. Carbon steel shell with SS316L plates.
- Optimized design for chiller application. Stable thermal performance under different load conditions. Possibility to work with constant and variable speed pumps.
- Built-in demister package
- Electronic liquid level control in combination with liquid-gas fraction compensation.
- Liquid level control column equipped with service valves and gauges
- Externally insulated and optional AL/stainless steel cladding
- Oil bleeding
- Two liquid level sight glass



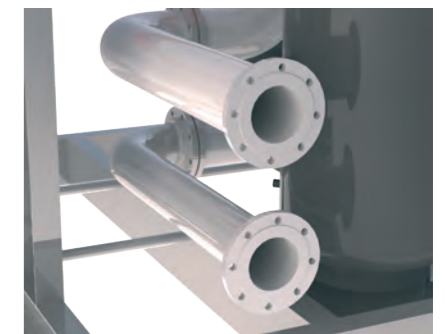
Refrigerant circuits:

- Motorized expansion valve that is in control of the liquid level and the liquid vapour fraction that is measured
- Motorized hot gas bypass, PI controlled
- High pressure liquid receiver with sight glass
- HP, LP and oil manometers
- HP, LP and oil 4-20mA pressure sensors
- Temperatures sensors at discharge, suction and oil line
- Pipelines made in stainless steel 304L
- Optional high pressure regulation by means of 3-way valve



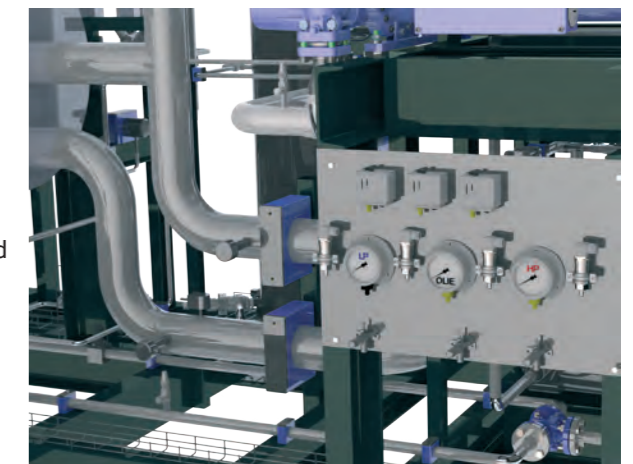
Water / Brine connections:

- Inlet / outlet temperature sensors
- Flow switch at line outlet
- Water / brine inlet / outlet connections can be switched from one side to the other side of the chiller
- Air vent installed as standard
- Externally insulated and optional Aluminium or stainless steel cladding



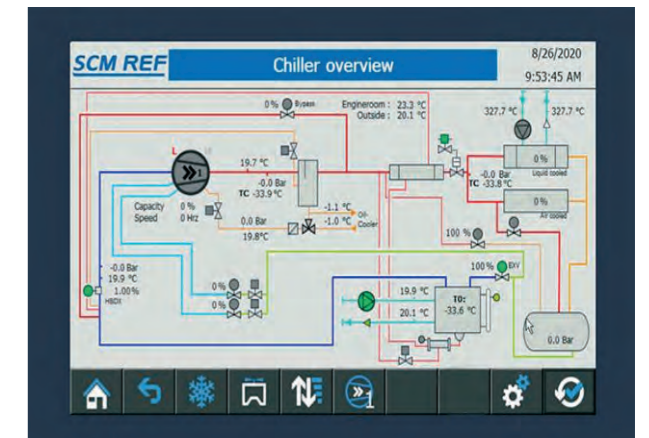
Safety:

- Dual pressure relief valves on each isolated pressure vessel
- Mechanical HP and LP switches
- Internal pressure relief valve on compressor
- Motor overheating protection and phase protection
- Temperature and pressure protection on critical points in refrigerant and oil circuit
- NH₃ leakage detector with adjustable detection level for high and low gas alarm
- Fully welded pipelines bring higher durability and lower risk of leakage
- Independent power supply for NH₃ detector, alarm and siren
- Externally mounted alarm cabinet in addition to the main alarm unit
- Power line phase protection
- Controlled temperature and humidity inside electrical cabinet. Designed for industrial environment -5°C / +40°C, 85% humidity.
- HP, LP and oil pressure sensors and gauges
- Service valves and shutoff valves for maintenance
- Condenser main power circuit protection without neutral



Electrical Control and Inverter:

- Siemens PLC installed with SCM REF chiller control software
- 7" LCD touchscreen
- Main power switch
- Main electrical cabinet with IP54 rating
- Power switch on cabinet
- Danfoss inverter box integrated
- Codified terminal board and halogen free cables
- Emergency push buttons mounted interiorly and exteriorly to allow quick response
- Condenser electrical cabinet with IP54 rating
- Thermostat, hygrostat and ventilation for controlling environment inside cabinet
- Electrical cabinet without neutral (transformer equipped)



6 Features and advantages

6a. Features of components

Embrace natural refrigerant:

NH₃ has been an ideal refrigerant for our industry because of its efficiency, cost-effectiveness and safety. Even better, it contributes to slowing down global warming effect because it has zero negative impact to environment unlike many others. SCM REF NH₃ chiller line -with its high efficiency and built-in safety features- makes it unprecedentedly easy and safe to adopt NH₃ chillers and protect our common home, Earth.

Semi-hermetic NH₃ compressor:

Cutting-edge semi-hermetic NH₃ screw compressors with internal high efficiency PM motor are installed on SCM REF NH₃ chillers. They help reduce downtime significantly and improve efficiency along with many other control mechanisms. The choice of open-drive NH₃ compressor is also available.

Compact and robust shell & plate heat exchangers:

Plate-in-shell heat exchangers on SCM REF NH₃ chillers are designed to be compact and with industrial leading efficiency. Fully welded stainless steel plates are strong and reliable even against extreme condition. Patented plate profiles have been proved for high thermal performance. Dual safety relief valves are welded on heat exchangers.



Highly automated control system:

SCM REF NH₃ chiller has a ray of safety mechanism embedded, which work in harmony with an own developed chiller control software. The sophisticated control scheme is invented by engineers with rich field experience to prevent many possible issues. We make these industrial chillers safe and easy to use almost like plug & play home appliance. In most scenarios, users only need to define the cold water/brine temperature and leave the rest to the chiller. Router is integrated in the electrical panel. Easy internet access is available by means of TCP/IP.

Indoor and outdoor units are both available for all models:

Designed for wide spectrum of environment and application, SCM REF NH₃ chillers come with indoor and outdoor versions. The whole indoor chiller is installed on one compact rack. Outdoor

chiller includes two racks, which can be placed together outside or separately, chiller rack indoor and air-cooled condenser outdoor. Well thought design and robust quality ensures smooth operation in extreme weather conditions and environment.

Outdoor weather proof casings:

Outdoor chillers are protected by strong industrial grade casings. They are designed to be weather-proof suitable for industrial and marine environment with built-in ammonia detector and alarm. Optional soundproof panel and explosion-proof ventilation fans are also available.

6b. Maintenance features

SCM REF NH₃ chillers are designed to be service friendly. The components are arranged in a well-thought-out way to make sure their accessibility. All major components can be isolated by ball valves easily. Each oil filter can be easily isolated and maintained by ball valves, service valves and purging valve. The connecting pipes where oil filters are installed on are designed to be short as possible to minimize ammonia loss. As part of service package, bypass line is installed at oil filter to allow continuous operation during maintenance. A hand drain valve is installed at the bottom of evaporator for checking or draining oil. For outdoor chillers, each fan is equipped with a service switch

6c. Safety features

SCM REF NH₃ chillers has low NH₃ charge per kilowatt, which makes it safer and more economical compared to conventional NH₃ chillers. The leakage from shaft seal is eliminated completely by using semi-hermetic compressor.

SCM REF chillers control software can regulate by itself without human intervene during normal situation. Enough safety prevention mechanism is already tested and built in to sustain operation in difficult situation and prevent damage in emergency.

Innovative vapor quality control feature ensures dry suction gas, which is very important for the smooth operation and lifespan of NH₃ compressors.

All pipelines use 304SS alloy for better strength and resistance against corrosion. The connections are fully welded without rotalock. This will again improve strength and reduce the risk of NH₃ leakage.

HP and LP pressure switches are installed by default. Dual safety relief valves are welded on each isolated pressure vessel. All safety relief valves are connected to one common relief pipe to make installation easier for our customers.

Ammonia detector and alarm are built into all chiller models and powered by independent power supply. To help our customers comply with different local legislation, the detection level can be adjusted on the detector.

Standard weatherproof casings with ATEX fans for outdoor chillers is designed to allow in enough airflow to dilute NH₃ concentration. Soundproof panels and ATEX NH₃ extraction fans are available optionally for outdoor chillers to further reduce sound level.

The temperature and humidity inside electrical cabinet is monitored and controlled to minimize the environmental influence especially in warm areas. The cabinets also come with IP54 rating and work in wide temperature range.

The design of chillers and casings fully comply with CE-PED standard.

R717

7. Application

7a. Working condition and fluids

Refrigerant: R717

Air Conditioning Comfort Chiller:
Cold water temperature: $T_{inlet} / T_{outlet} : +12^{\circ}\text{C} / +7^{\circ}\text{C}$
Coolant: water (MEG 10% is advised)

Medium Temperature Process Chiller
Brine temperature: $T_{inlet} / T_{outlet} : -3^{\circ}\text{C} / -8^{\circ}\text{C}$
Coolant: MEG 35%

Please consult SCM REF for using other kind of brine, different concentrations or temperature applications

| Air-cooled Chiller | | |
|--|--|---|
| Application | AC | Process |
| T_e / T_c | $+4^{\circ}\text{C} / +45^{\circ}\text{C}$ | $-11^{\circ}\text{C} / +45^{\circ}\text{C}$ |
| $T_{coolant\ inlet} / T_{coolant\ outlet}$ | $+12^{\circ}\text{C} / +7^{\circ}\text{C}$ | $-3^{\circ}\text{C} / -8^{\circ}\text{C}$ |
| Coolant Type | Water (MEG 10% is advised) | MEG 35% |
| Ambient Dry Bulb (T_{DB}) | $+35^{\circ}\text{C}$ | |

| Water-cooled Chiller | | |
|--|---|---|
| Application | AC | Process |
| T_e / T_c | $+4^{\circ}\text{C} / +38^{\circ}\text{C}$ | $-11^{\circ}\text{C} / +38^{\circ}\text{C}$ |
| $T_{coolant\ inlet} / T_{coolant\ outlet}$ | $+12^{\circ}\text{C} / +7^{\circ}\text{C}$ | $-3^{\circ}\text{C} / -8^{\circ}\text{C}$ |
| Coolant Type | Water (MEG 10% is advised) | MEG 35% |
| $T_{coolant\ inlet} / T_{coolant\ outlet}$ | $+30^{\circ}\text{C} / +35^{\circ}\text{C}$ | |
| Cooling media | MEG 35% | |

Digital and analog setpoint shift available to comply with wide application range.
AC chiller set point shift allows water/brine outlet temperature set between $+4^{\circ}\text{C}$ and $+10^{\circ}\text{C}$.
Process chiller set point shift allows brine outlet temperature set between -2°C and -11°C .



COOLING SOLUTIONS
OUR SUSTAINABLE WAY

8. Capacity range

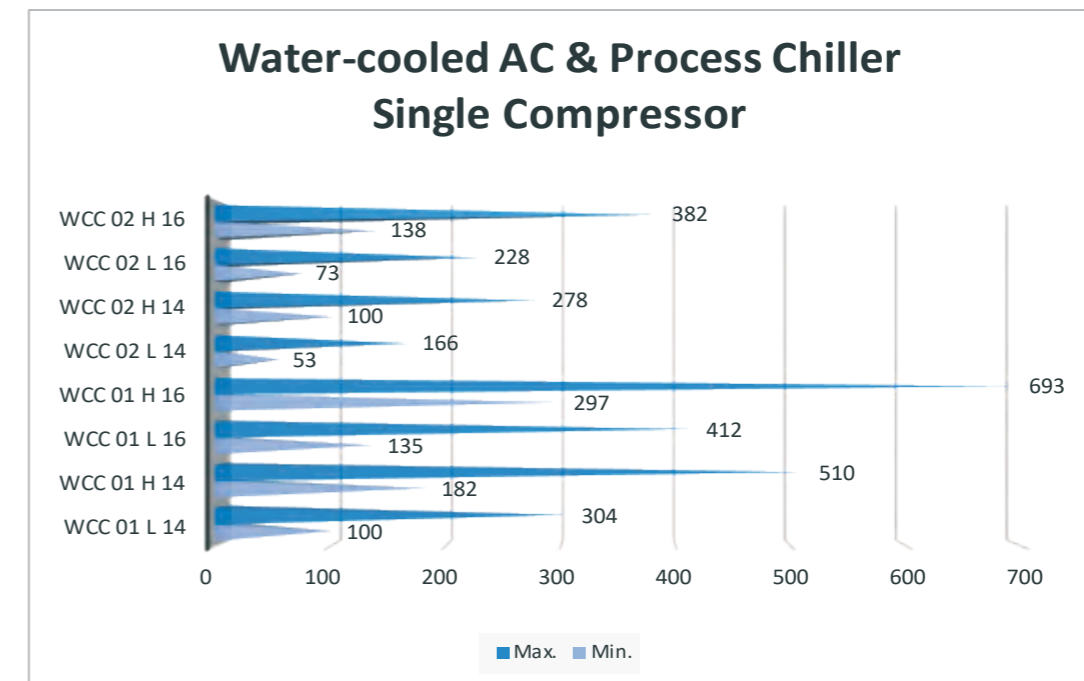
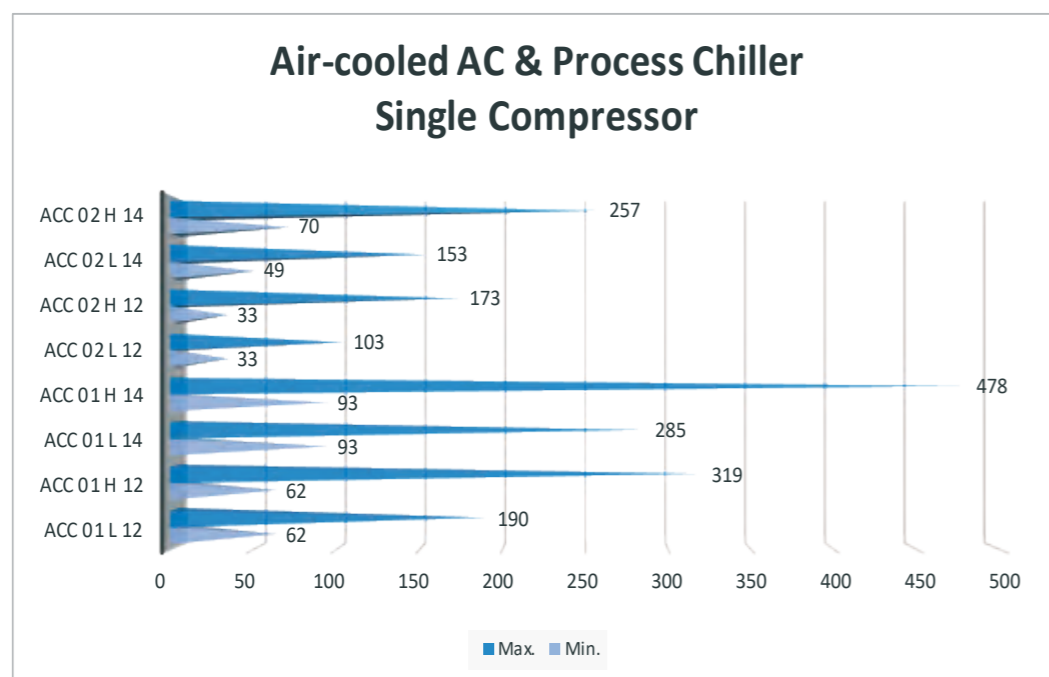
8a. Chiller with single SRS compressor (capacity in kW)

| Air-cooled AC Chiller: Te/Tc: 4/45°C; Cold water inlet/outlet: 12/7°C; Ambient DB: 35°C. | | | | |
|---|-------------|-------------|-------------|-------------|
| Model | ACC 01 L 12 | ACC 01 H 12 | ACC 01 L 14 | ACC 01 H 14 |
| Cooling cap. Min. | 62 | 62 | 93 | 93 |
| Cooling cap. Max. | 190 | 319 | 285 | 478 |
| Condensing cap. Min. | 66 | 66 | 100 | 100 |
| Condensing cap. Max. | 207 | 358 | 313 | 541 |
| Oil heat rejection Min. | 17 | 17 | 27 | 27 |
| Oil heat rejection Max. | 33 | 45 | 46 | 62 |

| Air-cooled Process Chiller: Te/Tc: -11/45°C; Brine inlet/outlet: -3/-8°C; Ambient DB: 35°C. | | | | |
|--|-------------|-------------|-------------|-------------|
| Model | ACC 02 L 12 | ACC 02 H 12 | ACC 02 L 14 | ACC 02 H 14 |
| Cooling cap. Min. | 33 | 33 | 49 | 70 |
| Cooling cap. Max. | 103 | 173 | 153 | 257 |
| Condensing cap. Min. | 30 | 30 | 53 | 76 |
| Condensing cap. Max. | 113 | 195 | 170 | 298 |
| Oil heat rejection Min. | 21 | 21 | 24 | 28 |
| Oil heat rejection Max. | 34 | 51 | 50 | 71 |

| Water-cooled AC chiller: Te/Tc: 4/38°C; Cold water inlet/outlet: 12/7°C; Cooling water inlet/outlet: 30/35°C | | | | |
|---|-------------|-------------|-------------|-------------|
| Model | WCC 01 L 14 | WCC 01 H 14 | WCC 01 L 16 | WCC 01 H 16 |
| Cooling cap. Min. | 100 | 182 | 135 | 297 |
| Cooling cap. Max. | 304 | 510 | 412 | 693 |
| Condensing cap. Min. | 107 | 198 | 146 | 325 |
| Condensing cap. Max. | 334 | 561 | 456 | 776 |
| Oil heat rejection Min. | 18 | 22 | 23 | 31 |
| Oil heat rejection Max. | 32 | 53 | 39 | 55 |

| Water-cooled Process chiller: Te/Tc: -11/38°C; Brine inlet/outlet: -3/-8°C; Cooling water inlet/outlet: 30/35°C. | | | | |
|---|-------------|-------------|-------------|-------------|
| Model | WCC 02 L 14 | WCC 02 H 14 | WCC 02 L 16 | WCC 02 H 16 |
| Cooling cap. Min. | 53 | 100 | 73 | 138 |
| Cooling cap. Max. | 166 | 278 | 228 | 382 |
| Condensing cap. Min. | 57 | 111 | 79 | 153 |
| Condensing cap. Max. | 185 | 317 | 256 | 436 |
| Oil heat rejection Min. | 21 | 26 | 25 | 32 |
| Oil heat rejection Max. | 41 | 62 | 48 | 75 |



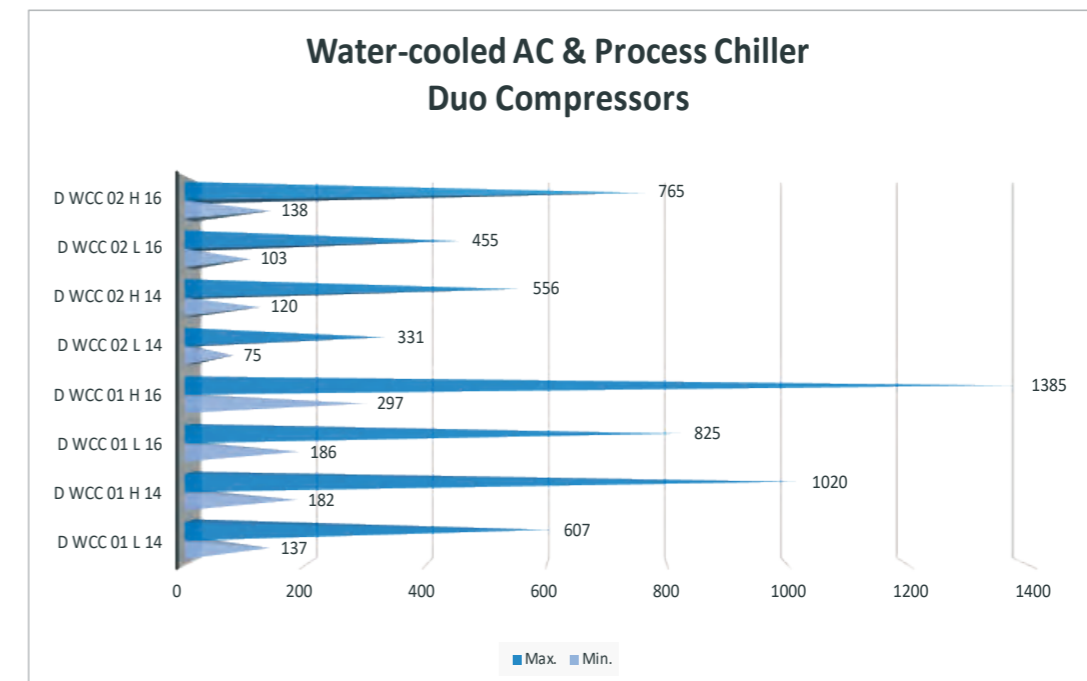
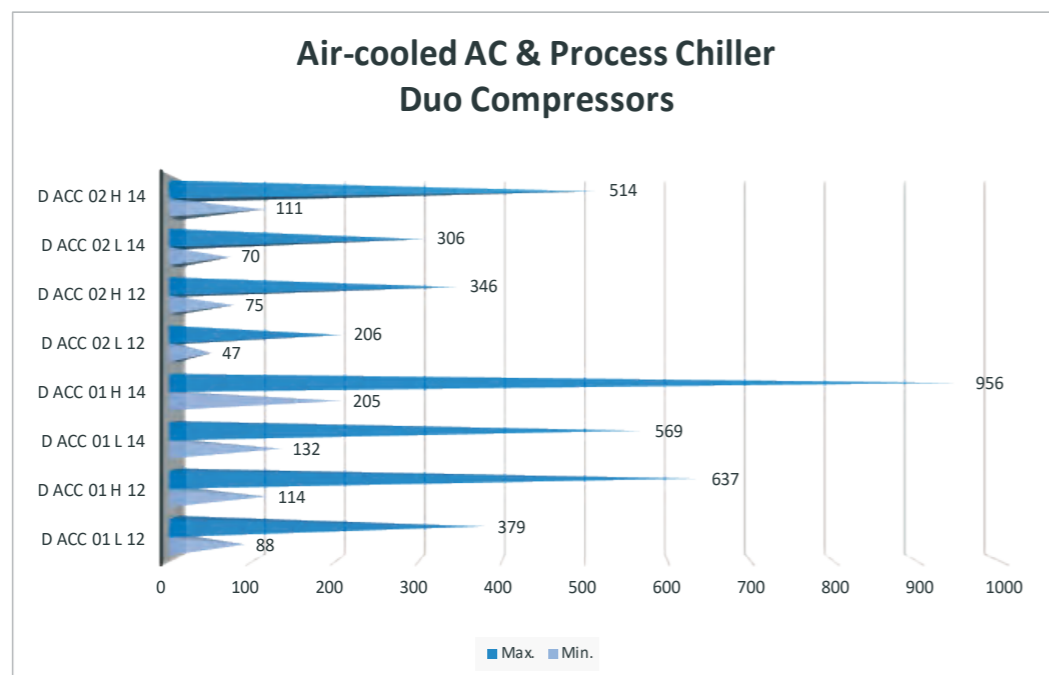
8b. Chiller With Duo SRS Compressors (capacity in kW)

| Air-cooled AC Chiller: Te/Tc: 4/45°C; Cold water inlet/outlet: 12/7°C; Ambient DB: 35°C. | | | | |
|---|---------------|---------------|---------------|---------------|
| Model | D ACC 01 L 12 | D ACC 01 H 12 | D ACC 01 L 14 | D ACC 01 H 14 |
| Cooling cap. Min. | 88 | 114 | 132 | 205 |
| Cooling cap. Max. | 379 | 637 | 569 | 956 |
| Condensing cap. Min. | 94 | 94 | 142 | 223 |
| Condensing cap. Max. | 414 | 716 | 626 | 1082 |
| Oil heat rejection Min. | 19 | 19 | 27 | 37 |
| Oil heat rejection Max. | 67 | 90 | 92 | 125 |

| Air-cooled Process Chiller: Te/Tc: -11/45°C; Brine inlet/outlet: -3/-8°C; Ambient DB: 35°C. | | | | |
|--|---------------|---------------|---------------|---------------|
| Model | D ACC 02 L 12 | D ACC 02 H 12 | D ACC 02 L 14 | D ACC 02 H 14 |
| Cooling cap. Min. | 47 | 75 | 70 | 111 |
| Cooling cap. Max. | 206 | 346 | 306 | 514 |
| Condensing cap. Min. | 51 | 82 | 76 | 122 |
| Condensing cap. Max. | 225 | 391 | 340 | 596 |
| Oil heat rejection Min. | 18 | 25 | 27 | 38 |
| Oil heat rejection Max. | 68 | 103 | 100 | 142 |

| Water-cooled AC chiller: Te/Tc: 4/38°C; Cold water inlet/outlet: 12/7°C; Cooling water inlet/outlet: 30/35°C | | | | |
|---|---------------|---------------|---------------|---------------|
| Model | D WCC 01 L 14 | D WCC 01 H 14 | D WCC 01 L 16 | D WCC 01 H 16 |
| Cooling cap. Min. | 137 | 182 | 186 | 297 |
| Cooling cap. Max. | 607 | 1020 | 825 | 1385 |
| Condensing cap. Min. | 148 | 198 | 202 | 325 |
| Condensing cap. Max. | 667 | 1122 | 911 | 1551 |
| Oil heat rejection Min. | 17 | 22 | 21 | 31 |
| Oil heat rejection Max. | 64 | 106 | 78 | 111 |

| Water-cooled Process chiller: Te/Tc: -11/38°C; Brine inlet/outlet: -3/-8°C; Cooling water inlet/outlet: 30/35°C. | | | | |
|---|---------------|---------------|---------------|---------------|
| Model | D WCC 02 L 14 | D WCC 02 H 14 | D WCC 02 L 16 | D WCC 02 H 16 |
| Cooling cap. Min. | 75 | 120 | 103 | 138 |
| Cooling cap. Max. | 331 | 556 | 455 | 765 |
| Condensing cap. Min. | 83 | 133 | 115 | 153 |
| Condensing cap. Max. | 370 | 634 | 512 | 872 |
| Oil heat rejection Min. | 20 | 31 | 24 | 32 |
| Oil heat rejection Max. | 82 | 124 | 96 | 150 |



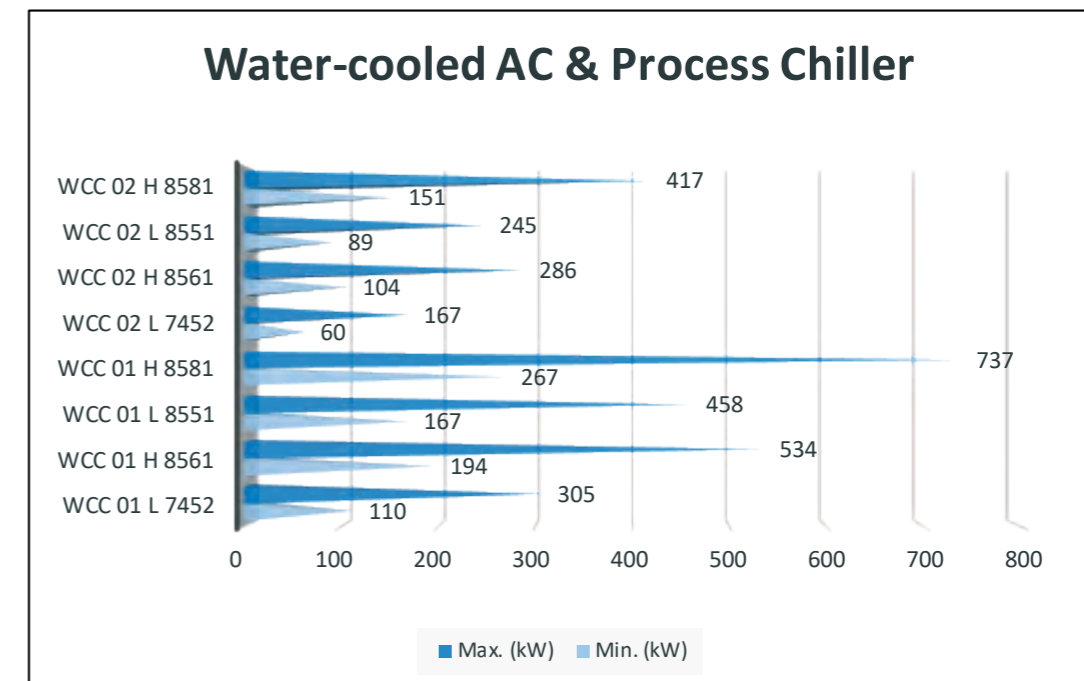
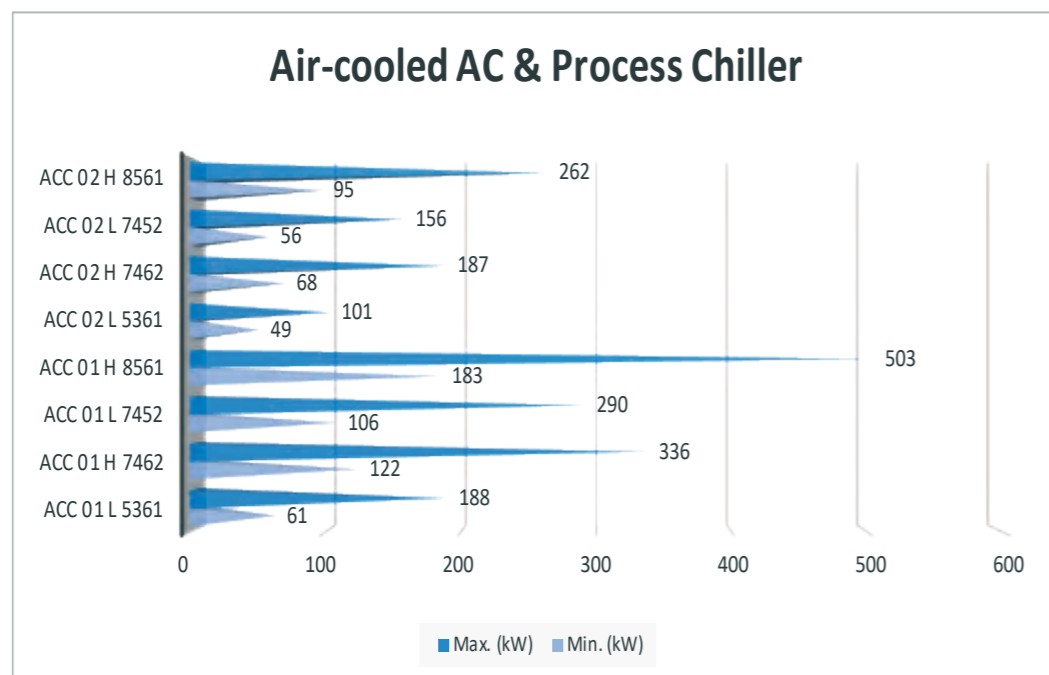
8c. Chiller With Single Bitzer Compressor (capacity in kW)

| Air-cooled AC Chiller: Te/Tc: 4/45°C; Cold water inlet/outlet: 12/7°C; Ambient DB: 35°C. | | | | |
|---|---------------|---------------|---------------|---------------|
| Model | ACC 01 L 5361 | ACC 01 H 7462 | ACC 01 L 7452 | ACC 01 H 8561 |
| Cooling cap. Min. | 61 | 122 | 106 | 183 |
| Cooling cap. Max. | 188 | 336 | 290 | 503 |
| Condensing cap. Min. | 68 | 137 | 118 | 204 |
| Condensing cap. Max. | 210 | 377 | 326 | 563 |
| Oil heat rejection Min. | 8 | 16 | 14 | 23 |
| Oil heat rejection Max. | 26 | 44 | 39 | 63 |

| Air-cooled Process Chiller: Te/Tc: -11/45°C; Brine inlet/outlet: -3/-8°C; Ambient DB: 35°C. | | | | |
|--|---------------|---------------|---------------|---------------|
| Model | ACC 02 L 5361 | ACC 02 H 7462 | ACC 02 L 7452 | ACC 02 H 8561 |
| Cooling cap. Min. | 49 | 68 | 56 | 95 |
| Cooling cap. Max. | 101 | 187 | 156 | 262 |
| Condensing cap. Min. | 37 | 77 | 64 | 109 |
| Condensing cap. Max. | 115 | 213 | 177 | 299 |
| Oil heat rejection Min. | 8 | 19 | 17 | 28 |
| Oil heat rejection Max. | 26 | 51 | 48 | 76 |

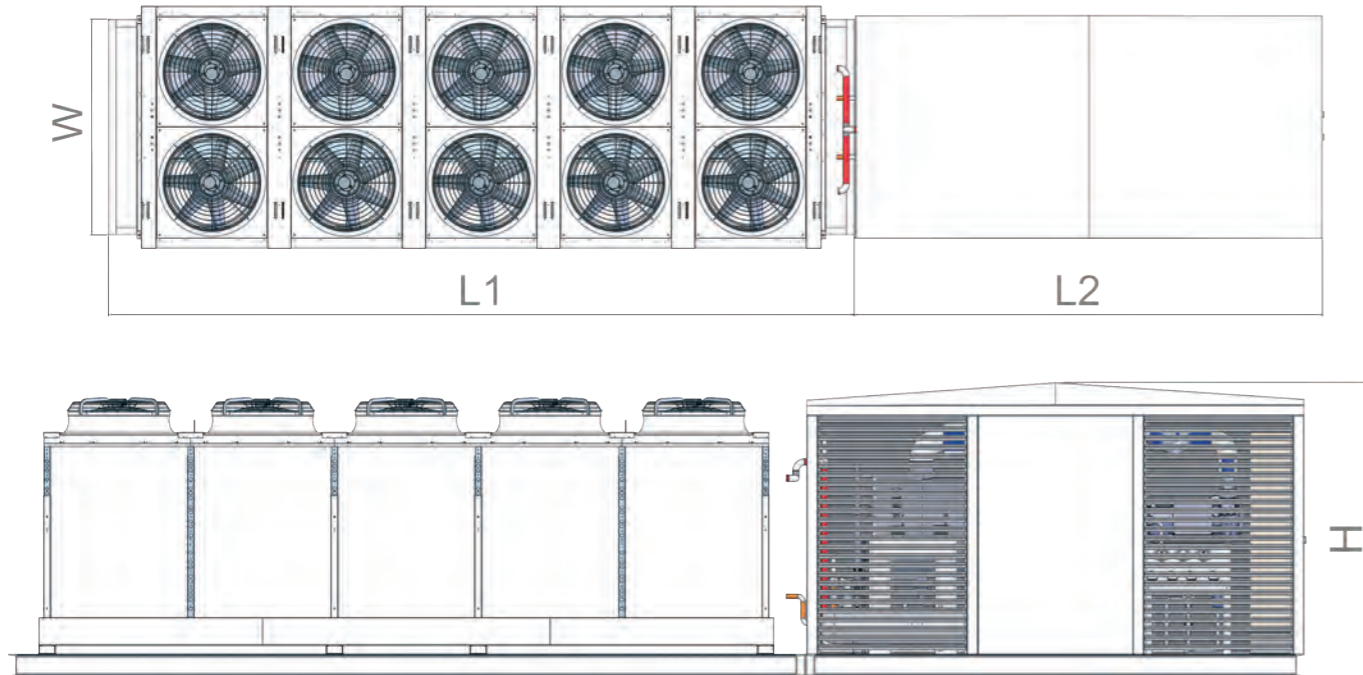
| Water-cooled AC chiller: Te/Tc: 4/38°C; Cold water inlet/outlet: 12/7°C; Cooling water inlet/outlet: 30/35°C | | | | |
|---|---------------|---------------|---------------|---------------|
| Model | WCC 01 L 7452 | WCC 01 H 8561 | WCC 01 L 8551 | WCC 01 H 8581 |
| Cooling cap. Min. | 110 | 194 | 167 | 267 |
| Cooling cap. Max. | 305 | 534 | 458 | 737 |
| Condensing cap. Min. | 125 | 218 | 188 | 301 |
| Condensing cap. Max. | 344 | 601 | 518 | 831 |
| Oil heat rejection Min. | 9 | 14 | 13 | 15 |
| Oil heat rejection Max. | 25 | 40 | 36 | 41 |

| Water-cooled Process chiller: Te/Tc: -11/38°C; Brine inlet/outlet: -3/-8°C; Cooling water inlet/outlet: 30/35°C. | | | | |
|---|---------------|---------------|---------------|---------------|
| Model | WCC 02 L 7452 | WCC 02 H 8561 | WCC 02 L 8551 | WCC 02 H 8581 |
| Cooling cap. Min. | 60 | 104 | 89 | 151 |
| Cooling cap. Max. | 167 | 286 | 245 | 417 |
| Condensing cap. Min. | 69 | 119 | 102 | 173 |
| Condensing cap. Max. | 191 | 329 | 280 | 478 |
| Oil heat rejection Min. | 12 | 20 | 18 | 23 |
| Oil heat rejection Max. | 33 | 56 | 50 | 62 |

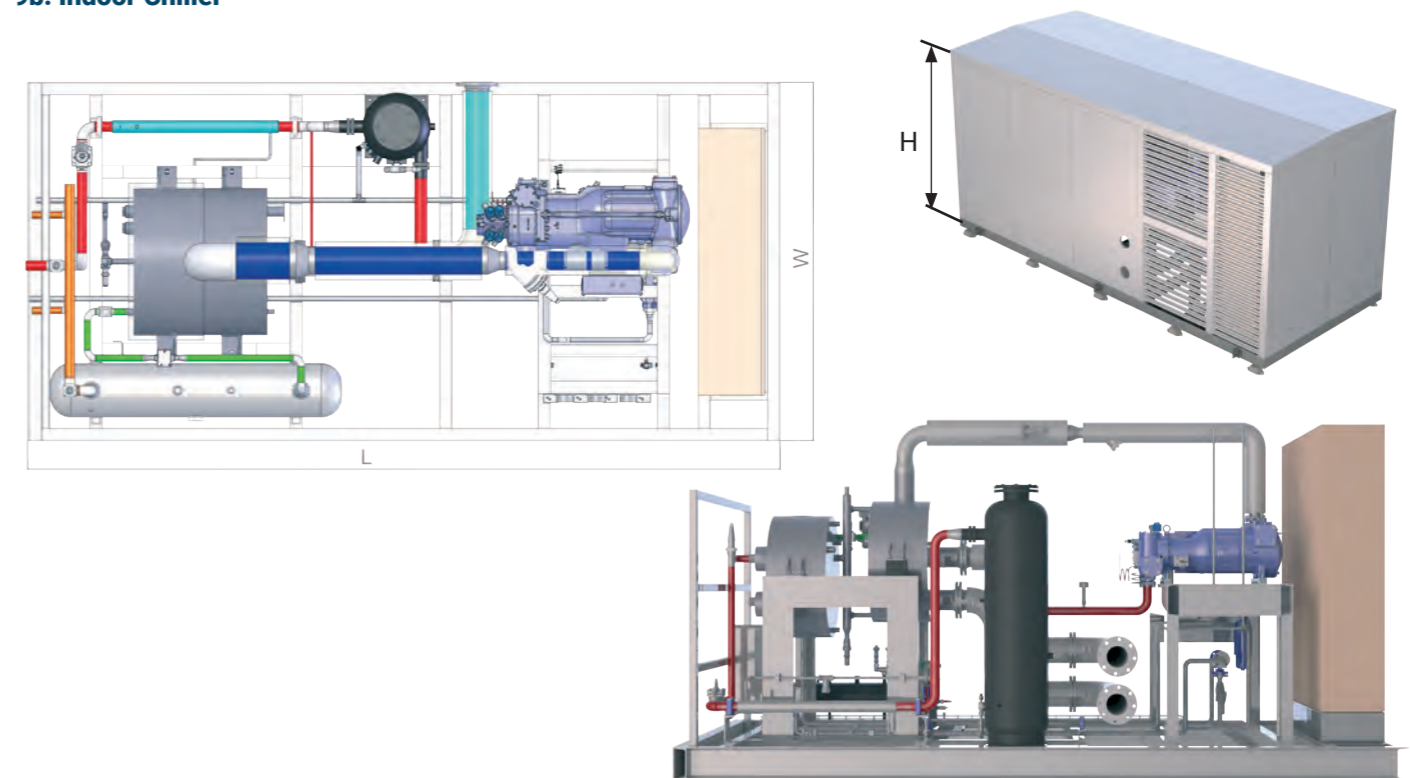


9. Dimensions

9a. Outdoor Chiller



9b. Indoor Chiller



| Chiller / Condenser unit dimensions single and duo compressor | | | | | | | | |
|---|------------------------------|-------|--------|-------------------|---------------------------|-------|--------|---------------------|
| Model | Chiller unit dimensions (mm) | | | Chiller mass (kg) | Condenser dimensions (mm) | | | Condenser mass (kg) |
| | Length | Width | Height | | Length | Width | Height | |
| Single compressor | | | | | | | | |
| ACC 01 L 12 | 5300 | 2250 | 2615 | 4347 | 3976 | 2056 | 1527 | 930 |
| ACC 01 H 12 | 5300 | 2250 | 2615 | 4378 | 7478 | 2056 | 1527 | 1790 |
| ACC 01 L 14 | 5300 | 2250 | 2615 | 4551 | 5726 | 2056 | 1527 | 1370 |
| ACC 01 H 14 V | 5300 | 2250 | 2615 | 4707 | 6550 | 2340 | 2307 | 3200 |
| ACC 02 L 12 | 5300 | 2250 | 2615 | 4264 | 3976 | 2056 | 1527 | 930 |
| ACC 02 H 12 | 5300 | 2250 | 2615 | 4357 | 5726 | 2056 | 1527 | 1370 |
| ACC 02 L 14 | 5300 | 2250 | 2615 | 4506 | 5726 | 2056 | 1527 | 1370 |
| ACC 02 H 14 | 5300 | 2250 | 2615 | 4551 | 7478 | 2056 | 1527 | 1790 |
| Duo compressor | | | | | | | | |
| D ACC 01 L 12 V | 5300 | 2250 | 2615 | 5442 | 6650 | 2340 | 2307 | 3400 |
| D ACC 01 H 12 V | 5300 | 2250 | 2615 | 5690 | 9250 | 2340 | 2307 | 4480 |
| D ACC 01 L 14 V | 5300 | 2250 | 2615 | 5943 | 7950 | 2340 | 2307 | 3840 |
| D ACC 01 H 14 V | 5300 | 2250 | 2615 | 6070 | 10550 | 2340 | 2307 | 5120 |
| D ACC 02 L 12 | 5300 | 2250 | 2615 | 5411 | 7476 | 2056 | 1527 | 1790 |
| D ACC 02 H 12 | 5300 | 2250 | 2615 | 5580 | 9226 | 2056 | 1527 | 2210 |
| D ACC 02 L 14 | 5300 | 2250 | 2615 | 5925 | 9226 | 2056 | 1527 | 2210 |
| D ACC 02 H 14 V | 5300 | 2250 | 2615 | 6001 | 7950 | 2340 | 2307 | 3840 |

* Dimensions in the table above and the next page are with casing included. The top cover is demountable to fit into a container.
 * Orders with casings will be delivered with absorption dampers dismounted.
 * For dimension without casing please consult with SCM Ref BV.

| Chiller unit dimensions single and duo compressor | | | | |
|---|------------------------------|-------|--------|-------------------|
| Model | Chiller unit dimensions (mm) | | | Chiller mass (kg) |
| | Length | Width | Height | |
| Single compressor | | | | |
| WCC 01 L 14 | 7150 | 2250 | 2615 | 5515 |
| WCC 01 H 14 | 7150 | 2250 | 2615 | 5778 |
| WCC 01 L 16 | 7150 | 2250 | 2615 | 5818 |
| WCC 01 H 16 | 7150 | 2250 | 2615 | 6127 |
| WCC 02 L 14 | 7150 | 2250 | 2615 | 5467 |
| WCC 02 H 14 | 7150 | 2250 | 2615 | 5581 |
| WCC 02 L 16 | 7150 | 2250 | 2615 | 5757 |
| WCC 02 H 16 | 7150 | 2250 | 2615 | 6016 |
| Duo compressor | | | | |
| D WCC 01 L 14 | 7150 | 2250 | 2615 | 7064 |
| D WCC 01 H 14 | 7150 | 2250 | 2615 | 8409 |
| D WCC 01 L 16 | 7150 | 2250 | 2615 | 8693 |
| D WCC 01 H 16 | 7150 | 2250 | 2615 | 9198 |
| D WCC 02 L 14 | 7150 | 2250 | 2615 | 7013 |
| D WCC 02 H 14 | 7150 | 2250 | 2615 | 7235 |
| D WCC 02 L 16 | 7150 | 2250 | 2615 | 7573 |
| D WCC 02 H 16 | 7150 | 2250 | 2615 | 7802 |

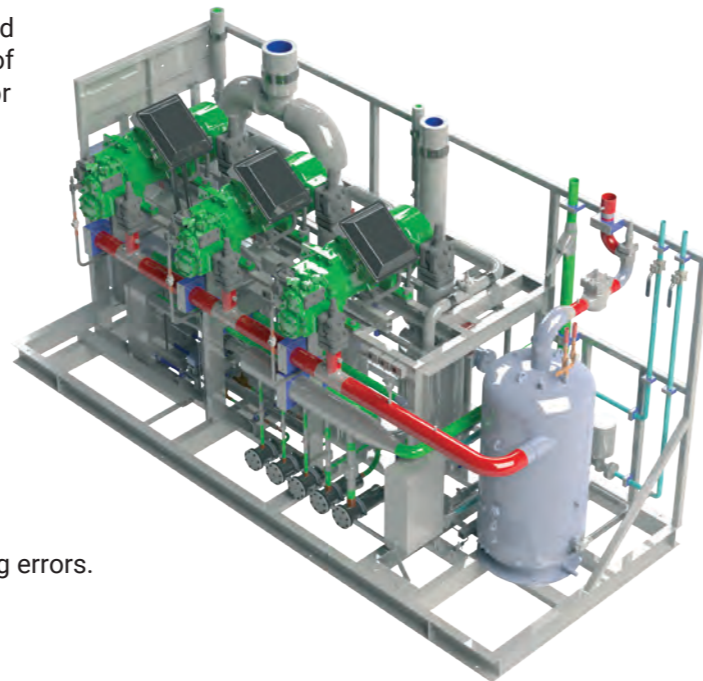
10. Engineering and workshop

3D custom made design

Our units are produced custom made in collaboration with our customers. When the P&ID (Piping and Instrumentation Diagram) is ready we will design the units with SOLIDWORKS 3D. This will give a clear look for the customer how the unit will be assembled and where all the important connections are situated.

We can even deliver to the customer a movie or exploded view of the 3D model, so that it can be viewed on all sides.

The 3D model is always equipped with the full and detailed product/parts list and unit specifications. With our team of specialised engineers we can produce nearly every unit for commercial and industrial refrigeration.



Your advantages:

- Short production time.
- Fast and professional design.
- Professional communication.
- Always up to date.
- Experienced professionals who think along with you.
- Clear professional drawings for our workshop, preventing errors.
- Also the possibility to submit your own drawings.



Our Engineering team has the highest level of experience and talent. We have the ability to do high quality assembling and a component stock for shorter delivery time. Our Ammonia academy will be based in Oirschot, for training and lecture.

SCM Ref production facility

All units are assembled in the SCM Ref assembly hall in Oirschot, which is furnished in accordance with ISO and PED guidelines. It goes without saying that SCM Ref has F-gas certification.

The maximum construction height is 10 meters. In this way high cascade units can be produced in one go.

With own test facilities units can be safely tested. We have a pressure test room of 10 x 10 meters. The operation of that room is controlled from a safe separate secondary room. All pressure equipment can be controlled and operated from here. Very safe!

In the clear assembly hall we have 2 overhead cranes with a total capacity of 5 tons and 2 overhead cranes with a capacity of 10 tons.

SCM Ref is equipped with modern tools to produce very high quality and custom made units.

The room is conditioned by means of an air handling unit for cooling and heating. Also with separated floor heating.

The modern assembly facility has a central exhaust system for extracting smoke and toxic gases. This is equipped with a high-efficiency flue gas filter. The warm air is not discharged outside, but is purified and delivered to the interior again. This saves heating power. In the summer, the cooled air is purified and returned to the interior in the same way, again saving energy.

Every workplace has its own welding / soldering point and is obtained via a central gas and oxygen cycle system. The gas supply (built up outside) is brought from outside to inside, creating an extra safe workplace.

We use liquid nitrogen to extort and to flow.

There are two separate welding areas specially for stainless steel and one welding area specially for steel. The workplaces are equipped with mobile PC towers, so that the installers can immediately consult 3D drawings for easy assembly without leaving their stations.

Our team is always at your disposal.

Contact SCM Ref and discover what we can do for you!





*Information in this brochure is subject to change without notice. Please ask us directly for further information.

SCM REF

SCM Ref BV

Beijer Ref Support Center
Westfields 1210, 5688 HA Oirschot
P.o. box: 100, 5688 ZJ Oirschot
Tel: +31 088 122 09 00
info@scmref.nl