

# Tender Specification

*VLS / VLH / VLC 604-1204*

## Tender Specification



**SERIES:** VLS / VLH / VLC 604-1204

**TYPE:** Air cooled water chiller, heat pump and condensing unit

**TECHNOLOGY:** multi-scroll compressors, R410A refrigerant

**CAPACITY RANGE:**

Cooling → 153-307 [kW]

Heating → 170-337 [kW]

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## 1 General description

VLS / VLH / VLC units have been designed and optimized to operate with R410A refrigerant and scroll compressors

Thanks to multi-scroll technology and asymmetric design in tandem combination, it is possible to reach very high level of seasonal performances (ESEER up to 4,1), in line with Ecodesign requirements

VLS units are available in 7 sizes, with a nominal capacity range from 153 to 307 [kW]

VLH units are available in 7 sizes, with a nominal capacity range from 149 to 300 [kW] in cooling mode and from 170 to 337 [kW] in heating mode

All units are equipped with two separated refrigerant circuits, each one equipped with 2 compressors

VL units can be supplied with 3 acoustic options:

- Basic Low Noise (-): the units are equipped with delta connected fans. The chillers are supplied with compressors box to reduce the noise emissions
- Low Noise (LN): the units are equipped with star connected fans, which allows the units to operate with a low rotation speed. Besides very low

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fan deck sound emission, the chillers are supplied with compressors box to reduce the noise emissions

- Extra Low Noise (ELN): the units are equipped with star connected fans, fitted with a speed controller which allows the units to operate with a very low rotation speed. Besides very low fan deck sound emission, the chillers are supplied with compressors box and soundproof jackets on compressors

To increase its application field, VL range is available in two additional versions:

- HT (High Temperature) version: same equipment as the basic version, but also fitted with brushless EC fan motors to ensure low energy consumption and to operate on a wider envelope
- HPF (High Pressure Fans) version: same equipment as the basic version, but also fitted with brushless EC fan motors so as to provide external static pressure up to 120 [Pa]

Two heat recovery options are available:

- Desuperheater: plate type heat exchangers fitted on the compressor discharge line, to recover about 20 % of the total heat rejected to the condensers
- Total Heat Recovery (VLR version): double circuit plate type heat exchanger to recover the total heat rejected to the condensers. 4-way valves and field installed control sensor are also provided to ensure the cooling/heat recovery mode changeover

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Several hydraulic options are available in order to cover a wide range of requirements in terms of pump available static pressure, redundancy and inertia water side

The general operation status of the unit is steadily managed by a microprocessor implementing a dedicated developed software, ensuring a total protection of compressor inside its operating envelope and including parameter customization according application field

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## 2 Key points

- High seasonal performances → ESEER up to 4.1
- Common configuration for the different versions → Easy upgrade of the units in stock or on field
- Electronic expansion device → Excellent control of superheating for the best performance at full and partial load and for a safe operation
- Microchannel coils for VLS version → Significant reduction on refrigerant charge and operating weight
- Compressors box → Remarkable sound reduction even for the basic noise version
- Control platform → Modular architecture, compressor envelope integration, corrective actions in border line areas, easy-friendly user interface
  
- Several options / accessories provided with standard delivery:
  - Sequence phase control → safe electric installation
  - Electronic expansion valve → precision in SH control
  - Control circuit transformer → power supply without neutral
  - Control data logger → thermodynamic parameters recording
  - Water differential pressure switch → protection against low water flow
  - Antifreeze electrical heater → protection against BPHE freezing

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## 3 Cabinet

The cabinet is made of heavy gauge galvanized steel.

All galvanized steel components are individually painted by a special painting process before the assembly of the unit. This painting system performs a homogeneous protection to the corrosion.

The painting is a polyester powder based type, colored in RAL 7040. The units are suitable for outdoor installation, directly on the building roof or at the ground level

## 4 Compressors

Compressors are of hermetic scroll type and fitted with an electronic control system ensuring protection against high temperature and excessive load.

All compressors have direct-on-line starting and are mounted on rubber vibration isolators in order to minimize noise and vibration transmission

## 5 Evaporator

Indoor heat exchangers are brazed stainless steel plate type. They are insulated with a 19 [mm] thick closed cell polyethylene foam material and provided with Victaulic connections.

They are protected by a 130 [W] antifreeze electric heater to ensure a good

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protection against freezing at low ambient temperature when the unit is switched off.

Maximum working pressure is 10 [bar] water side and 45 [bar] refrigerant side

## 6 Condenser

In Heat pump version (VLH), Condensing unit (VLC) and Total heat recovery unit (VLR), condenser coils are made of seamless copper tubes, arranged in staggered rows, mechanically expanded into corrugated aluminum fins.

In Cooling only version (VLS) condenser coils are microchannel type, made of 100% aluminum (fins, tubes and headers) with the exception of copper pipe couplings. Additional surface coating is provided for the standard delivery in order to further improve resistance to corrosion.

## 7 Condenser fans

Basic units (in all different sound versions) are equipped with axial fans, direct drive with asynchronous three-phase motors.

Special fan with electronic brushless type motors are used in HT and HPF versions.

Fans are equipped with externally mounted nozzle profile housing generating low sound levels

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## 8 Refrigerant circuit

All the units are equipped with two independent and separate refrigerant circuits.

Each refrigerant circuit is equipped with liquid line and discharge line shut-off valves, filter-drier with solid core, sight glass and electronic expansion valve.

Heat pump units (VLH) are additionally provided with 4-way reversing valves, suction accumulators and liquid receivers.

Total heat recovery units (VLR) are additionally provided with 4-way reversing valves and liquid receivers.

## 9 Control panel

A new optimized control with an easy-friendly interface, manages unit operation under different load and temperature condition and can provide:

- Compressor management
  - Power on/off
  - Anti-cycle
  - Tandem / trio unloading for high pressure, high temperature and/or high compressor pressure ratio
- Chilled and hot water temperature regulation (return water temperature RWT - P+I type or leaving water temperature LWT - neutral band type)
- Automatic control of suction superheating through electronic expansion valve with optimized functions (cooling, heating, start-up and defrost)



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- Evaporator antifreeze protection
- Defrost management
- High and low pressure operating conditions management
- External interlocks management
- Remote control management
  - Unit power on / off
  - Unit cool / heat operation
  - Summary alarm signal
- Remote signaling, by dry contacts:
  - Voltage presence
  - Compressors in operation
  - General alarm
- Hydro-kit management: start-up of pump, antifreeze heater of external tank, pump anti-sticking function
- Heat recovery management by means of RWT sensor at the heat recovery condenser

Unit controller can display all operating parameters such as:

- Return water temperature
- Leaving water temperature
- Outdoor ambient temperature
- Refrigerant discharge pressure
- Refrigerant suction pressure
- Refrigerant suction temperature
- Refrigerant discharge temperature

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- Refrigerant coil temperature
- Heat recovery temperature

Unit controller can display various alarms and operation status:

- Low / High pressure
- Evaporator antifreeze
- Lack of water flow
- Compressor operation / operating hours and start-up numbers
- Pump operation / operating hours
- Compressor thermal protection
- Fan thermal protection
- Faulty sensors

## 10 Safety and control devices

Each unit is complete with the following safety and control devices

### Safety

- Power disconnect switch with an emergency stop function
- Phase sequence control
- High pressure switches
- Low pressure switches
- Evaporator antifreeze electric heater

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- Crankcase oil electric heater
- Water differential pressure switch
- Safety valve on discharge lines

## Control

- High pressure transducers
- Low pressure transducers
- Discharge gas temperature probes
- Return water temperature sensor
- Leaving water temperature sensor (with an antifreeze function)
- Suction temperature sensor (for EEV control)
- Outdoor ambient temperature sensor
- Coil temperature sensors (VLH only)
- Heat recovery temperature sensor (VLR only)

## **11 Optional hydro kits**

On board mounted and remote hydro-kits are available as option.

On board hydro kits can be supplied with or without buffer tank while remote hydro kits (supplied loose for field installation) are always provided with internal tank.

On board hydro kit without buffer tank are provided with following

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components:

- Single or double pump with low available static pressure (100 [kPa]) or high available static pressure (200 [kPa])
- Expansion tank (25 [l] for all models)
- Check valves (in case of 2 pumps)
- Safety valve
- Automatic air vent valve
- Thermal insulation for pipes and water pump(s)

On board hydro kit with buffer tank are provided with following components:

- Single or double pump with low available static pressure (100 [kPa]) or high available static pressure (200 [kPa])
- Buffer tank (500 [l] for all sizes)
- Expansion tank (25 [l] for all models)
- Check valves (in case of 2 pumps)
- Safety valve
- Automatic air vent valve
- Thermal insulation for pipes and water pump(s)
- Antifreeze electric heater inside buffer tank

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## 12 Factory installed options

- ModBus protocol kit for BMS
- Lonwork protocol kit for BMS
- Bacnet protocol kit for BMS
- Compressors soft-starter
- Fan speed control for low ambient operation in cooling mode
- Double set point
- Power factor correction capacitors
- Compressor overload protection
- Automatic circuit breaker
- HP & LP gauges
- E-coating for Al/Cu coils
- Condenser coils with copper fins
- Chiller grilles
- Compressor jackets
- Desuperheater
- Total heat recovery (VLR)
- On board hydro kits 1P/2P with/without tank

## 13 Field installed accessories

- Remote ON/OFF control

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- Remote keyboard panel
- Sequencer, up to max four units
- Master and slave control, up to max four units
- Anti-vibration spring
- Water flow switch
- Water pressure switch
- Water filter
- Remote hydro kits with buffer tank, 1 or 2 low or high pressure pump(s), relevant accessories, with or without antifreeze heater

## 14 Conformity with standards

The units are in conformity with the following standards:

- Machine Directive: 2006/42/EC
- Electromagnetic Compatibility Directive: 2014/30/EU
- Pressure Equipment Directive: 2014/68/EU