



## 1 GENERAL

Air cooled packaged unit shall include compressor(s), evaporator and condenser coils with fans, refrigeration piping, electrical components and enclosing cabinet in one piece. The units shall be factory assembled, internally wired, fully refrigerant charged with R410A and are suitable for outdoor installation on ground level with ducted system. The units shall be capable to operate up to 115°F [46°C] ambient temperature without failure.

## 2 CABINET

The unit cabinet shall be constructed from heavy gauge galvanized steel with epoxy painted for excellent finished, weatherability and corrosion resistance up to 1000 hours salt spray test according to ASTM B-117. Evaporator section shall be of 13mm [1/2 inch] (model VKORD Series 4Q to 145Q) and 25mm [1 inch] (model VKORD Series 160Q and above) thick single skin and lined with minimum 2lbs/ft<sup>3</sup> [32kg/m<sup>3</sup>] density having thermal conductivity of 0.0346W/m.K [0.24Btu.in/ft<sup>2</sup>.h.°F] acoustical fiberglass insulation. The insulation shall have fire resistant of Class O (BS 476 Part 6, 7). Access doors shall be provided for easy service and maintenance of unit internal parts.

## 3 COMPRESSOR & REFRIGERATION PIPING

Compressor(s) shall be scroll, refrigerant gas cooled and mounted on the base via vibration isolators. 1, 2, 3 or 4 refrigeration circuits shall be piped with copper tubing and include expansion valve with external equalizer, filter dryer, sight glass, pressure fittings of manual reset high pressure control and auto reset low pressure safety cutouts as well as charging/access ports in each circuit. The compressors comply with the internationally recognized standards CE and UL.

## 4 EVAPORATOR COIL

Evaporator coil shall be of draw through air design for uniform air distribution. The evaporator coil shall be quality construction of staggered row of 3/8"OD (model VKORD Series 40 to 570Q) and 1/2"OD (model VKORD640 and above) seamless copper tube, mechanically bonded to aluminium fins with galvanized coil plates. The coil shall be factory leak and pressure tested to 650psig [45 bar] under water. A galvanized and painted drain pan shall be provided to cover the entire coil area. The drain pan shall be designed to incorporate sloped gutter for complete condensate removal.

## 5 EVAPORATOR BLOWER AND MOTOR

Evaporator blower shall be direct-driven (model VKORD Series 40 to 145Q) and belt driven (model VKORD Series 160Q and above), double-inlet-double-width (DIDW) forward curved. All blowers are statically and dynamically balanced to ensure quiet operation and smooth performance. Heavy-duty V-belt fan drive with cast iron pulleys keyed and secured to the blower shaft shall be provided (model VKORD Series 160Q and above).

Motors shall be of totally enclosed fan cooled (TEFC) with IP55 enclosure rating, 4-poles with class F

insulation. Motors shall be mounted to an adjustable motor frame. Motor pulleys shall be cast iron, keyed and secured to the motor shaft (model VKORD Series 160Q and above).

## 6 CONDENSER COIL

Condenser coil shall be air cooled with integral sub-cooling circuit, constructed from staggered row of 3/8"OD inner grooved seamless copper tube, mechanically bonded to aluminium fins with galvanized coil plates. The coil shall be factory leak and pressure tested to 650psig [45 bar] under water.

## 7 CONDENSER FAN AND MOTOR

Condenser fan shall be direct driven propeller type discharging air vertically upward. Condenser fans shall be constructed of corrosion resistant blades and are statically and dynamically balanced. Condenser fan motors shall be of totally enclosed fan cooled (TEFC) with IP55 enclosure rating, 6-poles with class F insulation and wired to unit control panel (model VKORD68P and above). The condenser fan assembly shall be provided with heavy gauge and rust resistant steel wire fan guard.

## 8 FILTERS

Units shall be provided with 1" (model VKORD Series 40Q to 140Q) and 2" (model VKORD Series 160Q and above) thick washable pleated filters having average arrestance efficiency of 70% (model VKORD40Q Series to 145Q) and 75% (model VKORD Series 160Q and above) as per ASHRAE Standard 52.1 (or equivalent) with side loading.

## 9 CONTROL PANEL

The unit mounted control panel enclosure shall be constructed from heavy gauge galvanized steel with epoxy painted for excellent finished, weatherability and corrosion resistance. The enclosure shall conform to IP54. Hinged and lock type access door shall be provided for easy access and security. The control panel shall be wired without starter and control.

## 10 OPTIONS

### 10.1 Stainless Steel Drain Pan

A stainless steel condensate drain pan shall be provided for the evaporator section in lieu of standard galvanized and painted drain pan.

### 10.2 Hot Gas Bypass

The refrigerant circuit (applicable to 'first in last out' refrigeration system only) shall be provided with a hot gas bypass system for low load and low ambient condition (evaporator freeze protection).

### 10.3 Evaporator Coil Fin Materials

In lieu of standard aluminium fin, alternative fin material and/or protective coating include,

- Hydrophilic coated aluminium fin
- Copper Fin
- Aluminium fin with Airestec coating
- Copper fin with Airestec coating



## 10.4 Condenser Coil Fin Materials

In lieu of standard aluminium fin, alternative fin material and/or protective coating include,

- Hydrophilic coated aluminium fin
- Copper Fin
- Aluminium fin with Airestec coating
- Copper fin with Airestec coating

## 10.5 Condenser Coil Guard

Powder coated wire mesh guard shall be provided for better condenser coil protection.

## 10.6 High and Low Pressure Gauges

Each compressor is provided with unit mounted pressure gauges to monitor high and low side operating pressure.

## 10.7 Discharge / Suction / Liquid Line Service

Valves

Service valves shall be provided at each refrigerant lines for service convenience.

## 10.8 Closed Cell Elastomer Insulation

½" (model VKORD40Q to 145Q) and 1" (model VKORD160Q and above) thick closed cell elastomer insulation (Insufflex®) shall be provided in lieu of standard fiberglass insulation. Closed cell elastomer insulation shall comply Class 0 (BS476 Part 6) and Class 1 (BS476 Part 7) fire resistant standard.

## 10.9 1" Double Wall Fiberglass Casing

(Evaporator Section)

1" double wall fiberglass casing shall be provided in lieu of single skin fiberglass casing (model VKORD160Q Series and above).

## 10.10 1" Double Wall Polyurethane Casing

(Evaporator Section)

1" double wall polyurethane casing shall be provided in lieu of single skin fiberglass casing (model VKORD Series 640Q and above) for superior thermal insulation.

## 10.11 Liquid Line Solenoid Valve (LLSV)

Factory fitted liquid line solenoid valve shall be provided for each refrigeration circuit.

## 10.12 Hot Water Heating Coil

Hot water coil shall be provided for heating purpose (hot water shall be field supplied).

## 10.13 Evaporator Blower Isolator

Rubber or spring isolator shall be provided to dampen vibration caused by motor and blower (model VKORD160Q Series and above).

## 10.14 Replaceable Core Filter Drier

Replaceable filter core drier shall be provided in lieu of standard filter drier for the convenience of filter drier's core replacement.

## 10.15 Stainless Steel Fasteners

Stainless steel fasteners shall be provided in lieu of standard fasteners for corrosion resistance application.

## 10.16 Suction accumulator

Suction accumulator shall be provided to prevent liquid refrigerant migration to compressor.

## 10.17 C-Channel Structural Steel Base

C-channel structural steel base shall be provided in lieu of standard GI steel base for better structural support (model VKORD Series 160 to 570Q)

## 10.18 Belt Guard

Belt guard shall be provided for belt and pulley's non-contact exposure.

## 10.19 Electric Heater

Electric heater shall be provided for heating purpose.

## 10.20 Electronic Expansion Valve (EEV)

In lieu of standard thermal expansion valve, EEV shall be provided for precise superheat control (energy saving).

## 10.21 IEC DOL (Non UL)

The unit mounted control panel enclosure shall be constructed from heavy gauge galvanized steel with epoxy painted for excellent finished, weatherability and corrosion resistance. The enclosure shall conform to IP54. Hinged and lock type access door shall be provided for easy access and security. The control panel shall be factory wired and shall include compressor, evaporator fan motor and condenser fan motor circuit breaker and contactors, compressor and evaporator fan motor thermal overload relays, anti-recycling time delay relay, control circuit fuse, power and control circuit terminal blocks and features 230V controls with 380-415V/3PH/50HZ (+Neutral) power supply or 115V/230V/24V controls with 208V-230V/380/460V-3PH-60HZ power supply.

## 10.22 Carel Controller

Panel mounted thermostat is provided for the unit to control and maintain the room temperature at a constant level or set point.

## 10.23 Indicating Lights

Indication provided for high-pressure trip and compressor run.

## 10.24 UVR/Phase Failure Protect

Phase Failure Relay is provided for over voltage, under voltage and phase loss protection.



## 10.25 IP55 Control Panel

In lieu of standard control panel, IP55 Control Panel with double layer access door shall be design in according to IP55 standard is provided

## 10.26 Vision 2020i

The unit shall be provided with Vision 2020i control system with the following features,

- The control algorithm and parameters shall be stored in flash memory and EPROM of the controller and shall retain even in the event of power failures, without requiring a backup battery
- PGD Display
- Built in memory for data logging
- Temperature and humidity controlled
- Configurable by user
- Alarm status/ display
- Analog input/output display
- Digital input/output status
- Remote start/stop input
- Digital input for customer input alarm
- General alarm output (dry contact)
- Self-diagnostics
- Security password access with multiple access level for advanced settings
- Unit status display

## 10.27 MODBUS RS485

MODBUS card can be added for BMS communication. VISION 2020i controller must be selected for this features.

## 10.28 Lock Out Stop

Emergency stop switch provided for Blower Fan.

## 10.29 Differential Pressure Switch for Evaporator Blower

Differential pressure switch provided to interlock with the control circuit.

## 10.30 Voltmeter

Voltmeter and selector switch provided for voltage display

## 10.31 Ammeter

Ammeter and selector switch provided for current display.

## 10.32 Anti Recycle Timer

Additional timer is added to prevent the compressor from starting for a period of time after it stops last.

## 10.33 Electric Heater Starter

Contactors and circuit breaker provided for electric heater.

## 10.34 Low Ambient Kit

Fan cycling for better performance during low ambient.

## 10.35 Compressor Soft Start

Soft-Starter for compressors to reduce the starting current.

## 10.36 Door Interlock Main Incoming Isolator

Incoming Isolator is provided to isolate the main incoming power supply to the unit.

## 10.37 Hinged Access Door

Hinged type access door shall be provided for model VKORD Series 640Q and above.

## 10.38 Star Delta Starter Evaporator Motor

Star Delta starting method available for Evaporator motor.

## 10.39 Nominal Evaporator Motor Soft Starter

Soft-Starter available to reduce the starting current for Nominal Evaporator motor.

## 10.40 Max Evaporator Motor Soft Starter

Soft-Starter available to reduce the starting current for Maximum sized Evaporator motor.

## 10.42 VFD for Condenser Motor

Variable Frequency Drive (VFD) on condenser fan motors (base fans) with pressure transducer added for more accurate control.

## 10.43 VFD for Evaporator Motor Nominal HP

Variable Frequency Drive (VFD) on Nominal Evaporator motor with pressure transducer.

## 10.44 VFD for Evaporator Motor Max HP

Variable Frequency Drive (VFD) on Maximum Evaporator motor with pressure transducer.

## 10.45 VFD Box

Control panel to mount Variable Frequency Drive (VFD).

## 10.46 Crankcase Heater

Crankcase Heater shall be provided to prevent liquid refrigerant migration and condensation of refrigerant in the crankcase of the compressor when the unit is off.