10 - MAJOR SYSTEM COMPONENTS AND OPERATION DATA

10.1 - Geared twin screw compressor

- 30HXC units use 06N geared twin screw compressors.
- Nominal capacities range from 137 to 281 kW (39 to 80 tons). Economized or non economized models are used depending on the 30HXC unit size.

10.1.1 - Oil filter

The 06N screw compressor has an oil filter integral in the compressor housing. This filter is field replaceable.

10.1.2. - Refrigerant

The 06N screw compressor is specially designed to be used in R-134 a system only.

10.1.3 - Lubricant

The 06N screw compressor is approved for use with the following lubricant: Carrier material spec PP 47-32.

10.1.4 - Oil supply solenoid valve

An oil supply solenoid valve is standard on the compressor to isolate the compressor from oil flow when the compressor is not operating.

The oil solenoid is field replaceable.

10.1.5 - Suction and economizer screens

To increase the reliability of the compressor, a screen has been incorporated as a standard feature into suction and economizer inlets of the compressor.

10.1.6 - Unloading system

The 06NW screw compressor has an unloading system that is standard on all compressors. This unloading system consists of two steps of unloading that decrease the compressor capacity by rerouting partially compressed gas back to suction.

10.2 - Pressure vessels

10.2.1 - Evaporator

30HXC chillers use a flooded evaporator. The water circulates in the tubes and the refrigerant is on the outside in the shell. One vessel is used to serve both refrigerant circuits. There is a center tube sheet which separates the two refrigerant circuits. The tubes are 3/4” diameter copper with an enhanced surface inside and out. There is just one water circuit, and depending on the size of the chiller, there may be two or three water passes.

At the top of the cooler are the two suction pipes, one in each circuit. Each has a flange welded to it, and the compressor mounts on the flange.

The evaporator shell has a thermal insulation of 19 mm thick polyurethane foam and a water drain and purge. With the very low temperature option this insulation is 38 mm thick.

10.2.2 - Condenser and oil separator

30HXC chiller use a vessel that is a combination condenser and oil separator. It is mounted below the cooler. Discharge gas leaves the compressor and flows through an external muffler to the oil separator, which is the upper portion of the vessel. It enters the top of the separator where oil is removed, and then flows to the bottom portion of the vessel, where gas is condensed and subcooled. One vessel is used to serve both refrigerant circuits. There is a center tube sheet which separates the two refrigerant circuits. The tubes are 3/4” or 1” diameter copper with enhanced surface inside and out. There is just one water circuit with two water passes.

The condenser shell can have a thermal insulation of 19 mm thick polyurethane foam and a water drain and purge.

10.3 - Electronic expansion device (EXV)

The microprocessor controls the EXV through the EXV control module. Inside this EXV is a linear actuator stepper motor. High-pressure liquid refrigerant enters the valve through the bottom. A series of calibrated slots are located inside the orifice assembly. As refrigerant passes through the orifice, the pressure drops and the refrigerant changes to a 2-phase condition (liquid and vapour). To control refrigerant flow for different operating conditions, the sleeve moves up and down over the orifice, thereby changing effective flow area of expansion device. The sleeve is moved by a linear stepper motor. The stepper motor moves in increments and is controlled directly by the processor module. As the stepper motor rotates, motion is transferred into linear movement by the lead screw. Through the stepper motor and lead screws, 1500 discrete steps of motion are obtained. The large number of steps and long stroke result in very accurate control of refrigerant flow.

At initial start-up, the EXV position is at zero. After that, the microprocessor keeps accurate track of the valve position in order to use this information as input for the other control functions. It does this by initializing the EXV's at startup. The processor sends out enough closing pulses to the valve to move it from fully open to fully closed, then resets the position counter to zero. From this point on, until the initialization, the processor counts the total number of open and closed steps it has sent to each valve.

10.4 - Economizer

Economizers are installed on 30HXC 190, 285 and 375.

The economizer improves both the chiller capacity and efficiency as well as providing motor cooling. The economizers used are direct-expansion plate heat exchangers.

The flow of the direct-expansion plate heat exchanger circuit is adjusted by the thermostatic cooling valves.

10.5 - Oil pumps

The 30HXC screw chillers use one externally mounted pre-lubricating oil pump per circuit. This pump is operated as part ot the start-up sequence.

ATTENTION: The operating temperature of the coil may reach 80°C. In certain temporary conditions (especially during start-up at low outside temperature or low condenser loop temperature) the oil pump can be reactivated.

10.6 - Motor cooling valves

Compressor motor winding temperatures are controlled to the optimum setpoint. The control accomplishes this by cycling the motor cooling solenoid valve to allow liquid refrigerant to flow across the motor windings as needed.

On units equipped with economizers with plate heat exchangers, a thermostatic valve controls the necessary refrigerant flow entering this heat exchanger and continuously flowing over the motor windings. All refrigerant used for motor cooling returns to the rotors and is compressed to the discharge pressure.

10.7 - Sensors

The units use thermistors to measure the temperature, and pressure transducers to control and regulate system operation (see 30GX/HXC - Pro-Dialog Plus Control IOM for a more detailed explanation).