1.4 Compressor Oil for R-134a Applications

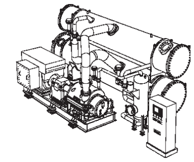
YORK OM refrigerant-134a Water Chilling System Multistage Compressors require an ester-based synthetic type oil. The compressor oil circuits will be field charged with YORK “J” oil, which is supplied by YORK as Part Number 011-00559-000 (55 gallon drums) or 011-00558-000 (5 gallon cans).

YORK OM refrigerant-134a Water Chilling System Multistage Compressors require an ester-based synthetic type oil. The compressor oil circuits will be field charged with YORK “H” oil, which is supplied by YORK as Part Number 011-00550-000 (55 gallon drums) or 011-00549-000 (5 gallon cans).

YORK OM refrigerant-134a Water Chilling System Multistage Compressors require an ester-based synthetic type oil. The compressor oil circuits will be field charged with YORK “” oil, which is supplied by YORK as Part Number 011--000 (55 gallon drums) or 011--000 (5 gallon cans).

Use only an ester-based synthetic type oil when servicing these units.

<u>Do not use any mineral or other type of oils in these units.</u>



1.5 Principles of Operation of the OM Chiller

Second Edition 1/12/2010

The OM Turbomaster Chiller operates under the following principles:

The fluid (to be cooled) flows through the tube side (inside the tubes) of the evaporator (cooler). Liquid refrigerant is located in the shell side of the evaporator, and is maintained at its saturation temperature (just about to boil). The liquid refrigerant is at a lower temperature than the fluid. Sensible heat flows from the fluid, through the evaporator tubes walls, to the refrigerant, thereby cooling the fluid, (which is the main purpose of the OM Turbomaster Chiller). The heat transferred to the refrigerant causes it to boil.

In order to sustain the continuation of this process, the refrigerant in the evaporator is held at the correct saturation temperature by drawing (sucking) refrigerant vapor from the shell side of the evaporator. This suction is achieved using the York 'M' series Turbomaster multistage centrifugal compressor. The vapor drawn from the evaporator, is compressed by the compressor, to a sufficiently high pressure such that the equivalent saturation temperature of the vapor is higher than that of a suitable heat sink fluid. The heat sink fluid is usually a supply of cooling water or, in the case of an air cooled system, the ambient air temperature. The high pressure refrigerant is thus contacted to the heat sink fluid (on the shell side of a shell and tube condenser or inside the tubes of an air cooled fin condenser) and refrigerant is condensed to a high pressure and temperature liquid. This liquid is flashed in two (or sometimes three) stages, cooling each time to return back to the evaporator to complete the cycle. Flashing is the process by which the high pressure and temperature liquid is exposed to a lower pressure. This drop in pressure causes the refrigerant to boil, causing some vapor to be formed, but in the same process causes the bulk refrigerant liquid to be cooled. The flash vapor must be drawn back into the compressor, but the colder refrigerant liquid is available to provide useful cooling. If this flashing process can be achieved in more than one step, the overall efficiency of the refrigeration cycle will be improved. With the OM Turbomaster Chiller more than one flashing step can be realized since there are two (or three) stages of compression within the 'M' compressor, corresponding to each impeller used.

The standard OM Turbomaster uses a two stage compressor with flash type Flash Economizer. The liquid is flashed off at an intermediate stage pressure, to lower the enthalpy of the liquid refrigerant as it enters the evaporator, thus providing a better overall refrigeration effect in the evaporator.

The standard OM Turbomaster will generally also utilize condenser subcooling in addition to the intercooling cycle for even better cycle efficiency. By passing liquid refrigerant over the tubes in a subcooler section of the condenser, the refrigerant temperature can be lowered from the basic saturation temperature, to a temperature closer to the entering water temperature. By lowering this refrigerant temperature ahead of the high stage expansion device, the amount of gas flashing in the Flash Economizer after expansion is reduced. The lower flash gas translates into less gas flow through the second stage impeller, and therefore lower overall horsepower.

Liquid leaving the condenser subcooler level control valve is expanded to the flash economizer pressure. It enters the flash economizer through an internal spray pipe, where flash gas is removed and channeled through a mesh eliminator material, out the top and on to the compressor second stage. Liquid feeds out of the flash economizer through a pneumatic operated ball valve to the evaporator.

The compressor operates on the centrifugal principle. The compressor consists of two (or three) impellers, which when spun rapidly on the shaft, will draw gas into the center and accelerates the vapor to high velocity (kinetic energy). As the vapor exits the impeller, the velocity of the gas reduces as it passes through the diffuser (located around the circumference of the impeller), and the kinetic energy is transformed into potential (pressure) energy. This process is repeated for each impeller (compression stage). The compressor shaft is rotated by means of either, an electric motor (via a speed increasing gearbox), a direct drive steam turbine, or sometimes a gas turbine (via a speed reducing gearbox) or a reciprocating gas engine (via a speed increasing gearbox).

For a more complete explanation of the OM Chiller system refer to Section 5 (Service Instructions). The following section(s) however explain the principles not covered in the Service Instructions and are recent enhancement(s) to the OM Chiller.

1.5.1 OM Subcooling and Vertical Flash Economizers

Second edition 1/12/2010

Description and Operation

The standard Titan OM Chiller uses a two-stage compressor with flash type flash economizer. The liquid is flashed off at an intermediate stage pressure, to lower the enthalpy of the liquid refrigerant as it enters the evaporator, thus providing a better overall refrigeration effect in the evaporator.

The standard Titan OM Chiller will utilize liquid subcooling in addition to the intercooling cycle for even better cycle efficiency. By running liquid refrigerant over the tubes in the subcooler section of the condenser, the refrigerant temperature can be lowered from the basic saturation temperature, to a temperature closer to the entering water temperature. By lowering this refrigerant temperature ahead of the high stage expansion device, the amount of gas flashing in the flash economizer after expansion is reduced, thus reducing the gas flow through the second stage impeller, and therefore lowering overall horsepower.

This chiller utilizes a subcooler bundle integral to the main condenser in the bottom section. As liquid refrigerant condenses in the main condenser area, it drains down to the bottom. At the bottom the refrigerant is channeled to the subcooler inlet area, which is at the return water box end of the condenser (opposite from the water inlet nozzle). Refrigerant liquid enters the subcooler section from the sides and bottom (there is a plate blocking the top). Dual subcoolers will be furnished in condensers with tube lengths 20 feet or longer.

The level of refrigerant is adjusted at full load to provide a liquid level an inch or two above the subcooler at the inlet area. This level needs to be sufficient at full load to prevent refrigerant gas from entering the subcooler. The refrigerant liquid then flows axially down the shell length over the subcooler tubes, and exits out the bottom at the cooling water Inlet end.

A Hansen Technologies “Techni-Level” capacitance level transmitter is mounted within a side chamber of the condenser with a sight port assembly at the subcooler inlet. This level transmitter has a 5.5 inch active length and provides a 4-20ma analog signal to the chiller PLC to indicate subcooler level. The center of the probe is at the approximate desired liquid level point for full load operation. The level control setpoint is adjustable using the chiller PLC panel operator interface or graphics screen.

A pneumatic ball valve is mounted in the piping leaving the subcooler. This valve responds to the subcooler inlet level transmitter signal, to maintain the refrigerant level above the subcooler. A ball valve was selected for its optimum rangeability, since not only chiller load, but also “head” or differential pressure across the valve changes dramatically with chiller operating conditions. The valve is selected to fail open and to open on chiller shutdown, primarily to drain liquid from the subcooler section. This is done as a precaution against tube freezing, by ensuring that liquid is not present in the subcooler when chiller pumpdown operations or major leaks might occur.

VERTICAL FLASH ECONOMIZERS

General

A liquid flash economizer is furnished with each Titan OM Chiller for field installation in the primary refrigerant circuit between the condenser and evaporator (see Figure 1).

The function of the flash economizer is to separate the flash gas from the liquid refrigerant at a pressure higher than that which exists in the evaporator and to return this flash gas to the intermediate stage of the compressor. By collecting the flash gas at the higher pressure, considerably less power is required to compress the gas to condensing pressure and a definite reduction in brake horsepower per ton of refrigeration is effected. As the flash gas forms, it absorbs its heat of vaporization from the remaining liquid refrigerant. This lowers the temperature of the remaining liquid and increases its refrigerating effect before it actually reaches the evaporator

Description

Flash Economizers used on Titan OM Chiller units are of the single stage type consisting of a vertical pressure vessel (see Figure 1) with internally mounted mesh eliminators and externally mounted (field installed) Hansen Technologies capacitance level transmitter mounted within a liquid level pipe assembly. This level transmitter has a 30 inch active length and provides a 4-20ma analog signal to the chiller PLC to indicate Flash Economizer level. The center of the probe is at the approximate desired liquid level point of 21 inches for full load operation. The level control setpoint is adjustable using the chiller PLC panel operator interface or graphics screen.

A pneumatic control ball valve is mounted in the piping leaving the flash economizer. This valve responds to the Flash Economizer liquid level transmitter signal, to maintain the required refrigerant level. A ball valve was selected for its optimum rangeability, since not only chiller load, but also “head” or differential pressure across the valve changes dramatically with chiller operating conditions. The valve is selected to fail open and to open on chiller shutdown, primarily to drain liquid from the condenser and flash economizer to the evaporator.

Eliminators are located in the top of the vessel to separate drops of liquid refrigerant from the flash gas as it flows to the intermediate compressor stage.

Sight glasses are provided above and below the eliminators. A thermometer well is furnished for checking liquid temperatures. Connections are provided for the York furnished, field installed pressure transmitter and relief valve assemblies.

Operation

Liquid leaving the condenser subcooler level control valve is expanded to the flash economizer pressure. It enters the flash economizer through an internal spray pipe, where flash gas is removed and channeled through a mesh eliminator, out the top and on to the compressor second stage. Liquid feeds out of the flash economizer through the pneumatic operated ball valve to the evaporator.

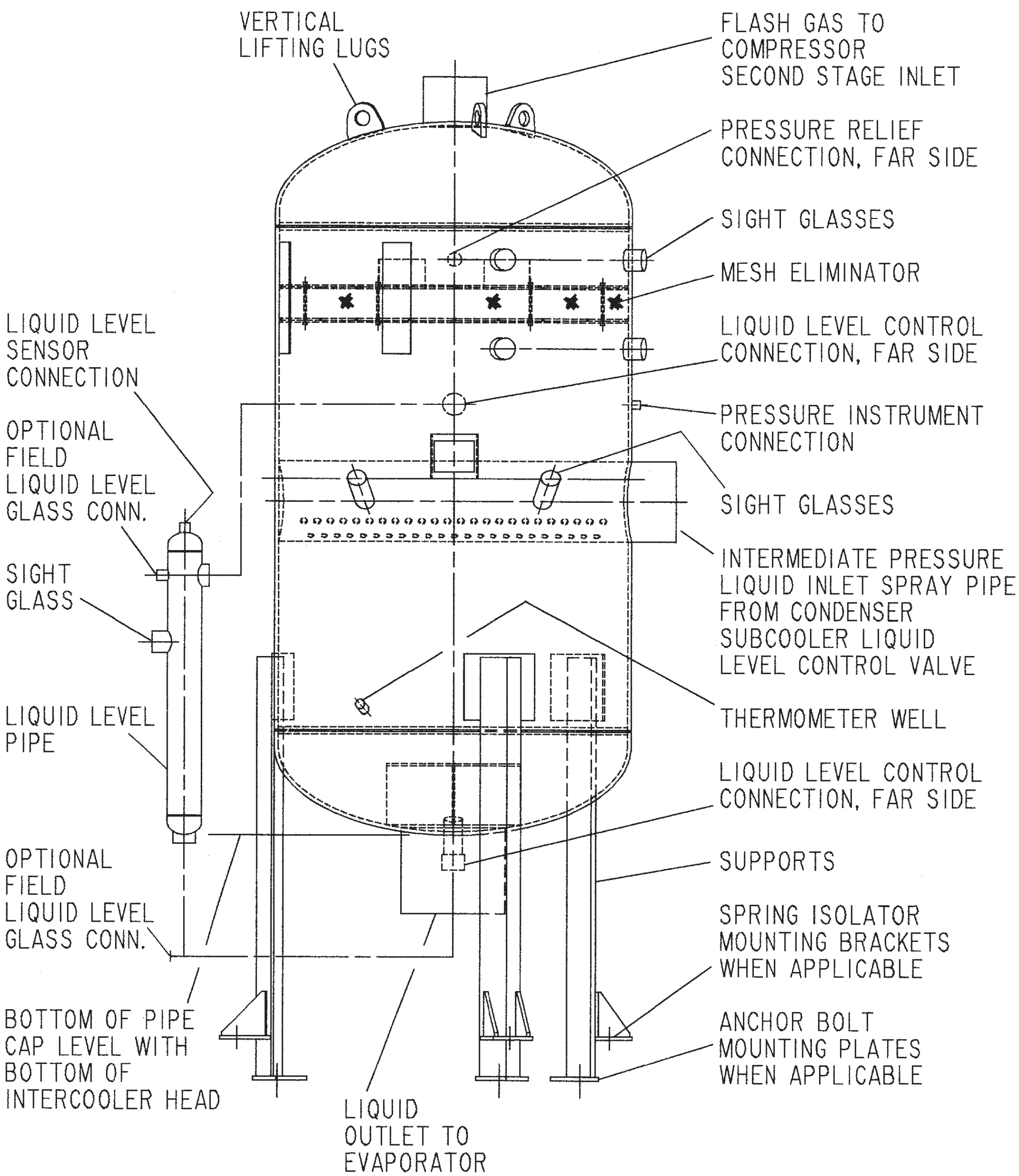
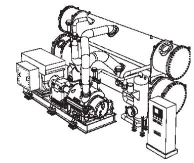


FIGURE 1 - VERTICAL INTERCOOLER CUTAWAY

1.6 Predicted Full and Part Load Performance curves

See next page

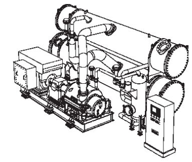


1.7 Predicted Water Flow vs. Pressure drop curve

See next page

2 Chiller Operation (Controls) MOTOR DRIVE

See Table of Contents under Tab 2



1 General

1.1 About this Manual

The following instructions outline the procedures to be followed for the installation, operation and maintenance of the York OM-5090 refrigerant 134a Turbomaster water chilling system for Al Salem Air Conditioning. York equipment furnished includes 8 motor drive chillers.

It is important that those responsible for the installation, operation and maintenance of this system to be provided with a copy of this manual so that they may thoroughly study its contents, along with the drawings. This will help ensure successful operation of the system.

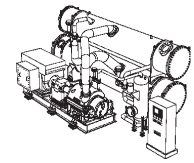
Standard York Service Instructions are included in this manual. Where the specific instruction is different than the standard service instructions, the specific instruction should be followed. On matters not covered by the specific instruction, the standard instruction may be used.

It is suggested that any major service or maintenance operation be supervised by a factory trained representative of the York International Corporation. This is especially recommended should it be necessary to open the compressor or shells for any reason.

To obtain a service representative contact:

Johnson Controls Saudi Arabia
P O Box 15019
Mezzanine Floor, Lotus Building
Madinah Road, Jeddah 21444 K.S. A

Phone : 966-2-690-0999
Fax: 966-2-690-0909



1.2 Safety

YORK designs, manufactures and tests its units to meet many National and International standards. However, proper performance, safe operation and continued satisfaction with these units is dependent upon:

Correct Installation
Proper Operation
Regular and Systematic Maintenance

The Safety Code for Mechanical Refrigeration ANSI/ASHRAE 15-1994 contains the recognized standards to assure the safe installation, operation and inspection of refrigeration systems. The purpose of this Code is to establish reasonable safeguards to life, limb, health, and property.

It is important that those responsible for the installation, operation and maintenance of this system be familiar with this Code. Copies may be purchased from the ASHRAE Circulation Sales Department, 1791 Tulle Circle NE, Atlanta, Georgia 30329.

Only experienced, qualified personnel should install, operate or maintain refrigeration equipment. They should be familiar with and adhere to local safety regulations and procedures.

These instructions are general in nature since it is impossible to foresee all potentially unsafe conditions. It is the responsibility of the operators and service personnel to anticipate and avoid any unsafe conditions. Because of space limitations, this manual must be supplemented by accepted and known industry safety practices and local code requirements.

Various component instruction forms throughout this manual contain **NOTES, CAUTIONS** and **WARNINGS**. In general, a **NOTE** provides additional information to make a step or procedure easier or clearer, a **CAUTION** emphasizes areas where equipment damage could result, and a **WARNING** emphasizes areas where personal injury could result from negligence. Be sure all **NOTES, CAUTIONS** and **WARNINGS** are read, understood and followed.

Inspection and maintenance should be carried out on a regular schedule during daily operations to prevent minor problems from escalating.

Maintain permanent daily logs of pressure, temperature and other pertinent data so that changes from the norm are immediately observed and corrective action is taken. A sample System Operating Log is included in this manual.

1.2.1 Safety - Refrigerants

All refrigerants are potentially hazardous and should be treated with care. Some are toxic, flammable or explosive in certain concentrations in air. Others can form toxic gases when exposed to high temperatures. They can cause suffocation by displacing oxygen when present in highly concentrated amounts. Information regarding specific refrigerants is available from refrigerant manufacturers.

Oil accompanying refrigerant escaping from a system can form a mist that could cause a fire or explosion.

Relief valve discharge must be piped to a safe location per ASHRAE Standard-15.

Refrigerant liquid or concentrated vapor in contact with skin or eyes can cause physical harm due to the low temperature of refrigerant at atmospheric pressure.

1.2.2 Safety - Refrigerant Cylinders

Follow refrigerant manufacturer's recommendations when handling or storing refrigerant cylinders.

Never heat a cylinder to a temperature higher than 125°F / 52°C.

Never apply direct flame or live steam directly to a cylinder or valve.

Do not remove or change the numbers or marks stamped into cylinders without written authority from the Bureau of Explosives, New York City.

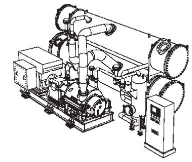
Never use cylinders for rollers, supports or for any purpose other than to carry refrigerants.

Protect containers from any object that will produce a cut or other abrasion in the surface of the metal.

Never tamper with the safety devices in valves or containers.

Never attempt to repair or alter containers or valves.

Never force connections that do not fit. Make sure that the threads on regulators or other auxiliary equipment are the same as those on container valves outlets.



Keep valves tightly closed and valve caps and hoods in place when containers are not in use. Storage of containers under a roof is recommended to protect containers against extremes of weather. Use a positive means to secure cylinders in place.

Never store containers near highly flammable substances such as oil, gasoline, waste, etc., or in buildings with a definite fire hazard. Keep sparks and flames away.

1.2.3 Safety - Maintenance

Dangerous voltages are present in the electrical components which can cause serious injury, electrocution and equipment damage. To avoid serious injury and/or equipment damage, all equipment must be de-energized, disconnected and isolated before any adjustments, servicing, wiring parts replacement, or any other acts requiring physical contact with the electrical or mechanical working components of the equipment. This must be done to prevent accidental contact with live or moving parts. It is recommended that positive lockout devices are used that will prevent unwitting reclosure.

Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified personnel, to prevent electrical shock and personal injury.

Safety guards must be in place after any service and before operating the equipment.

High temperature surfaces such as compressor discharge lines should be insulated for personnel protection. Precautions must be taken to avoid contact with any surfaces that could cause skin burns.

Each safety control and each relief valve should be tested once each year in accordance with the manufacturer's recommendations.

Never close valves on safety controls unless unit is shut down. Repair or replace defective controls immediately. Never circumvent electrical safety control circuits.

Avoid applying excessive torque to threaded parts. For example, do not use an oversized wrench or an extension of the handle.

Precautions must be taken to avoid damage due to expansion of liquid trapped in sections that can be isolated by positive shut-off valves. This can occur if the liquid is warmed to a temperature higher than that at which it was isolated. Extremely high pressures can result and possibly rupture a component in that system.

For the protection of personnel and property, all refrigerant possible must be removed from any section or component of the system before any refrigerant retaining part is loosened. Pump out as much refrigerant as possible from the section to be opened. Make sure control valves are opened where necessary to avoid trapping refrigerant. Do no depend on solenoid valves as isolation valves while making repairs.

When valves are equipped with seal caps, the caps must be removed with caution because refrigerant could accumulate under the cap.

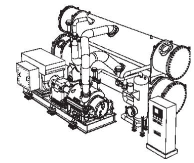
When opening any pressure containing component, care must be taken to relieve the pressure in a safe manner.

It is sometimes necessary to discharge small amounts of refrigerant from the section to be serviced. Be sure that the rate of discharge can be easily controlled and that it can be shut-off quickly if necessary. Discharge of refrigerant to the atmosphere should be avoided. Whenever possible, refrigerant should be transferred to a container approved for this purpose by applicable safety codes and standards. Follow refrigerant manufacturer's recommendations when transferring refrigerant.

Never discharge refrigerant into an area that does not have sufficient ventilation or where an open flame or electrical spark is present.

Do not use a halide torch or an electronic leak detector in areas where flammable or explosive gases may be present. Avoid breathing fumes from a halide torch since toxic gases can result from burning halocarbon refrigerants.

Always have an observer nearby when working on any part of a refrigeration system so that help is available in an emergency.



1.3 U.S. Environmental Protection Agency Regulations

The U.S. Environmental Protection Agency (EPA) has issued regulations on refrigerant handling under Section 608 of the Clean Air Act. Government regulations and interpretations on this subject are continuously changing. This page should not be considered accurate or up to date on refrigerant handling. However, any persons working on the equipment should be aware that many restrictions apply, not limited to the following.

- It is unlawful to intentionally vent refrigerant to the atmosphere.
- Only Certified Technicians may open an appliance for service, maintenance or repair. Such certified technician would be knowledgeable on the latest EPA regulations.
- Before opening the chiller, refrigerant must be recovered from the chiller using a recovery unit. CFC and HCFC recovery units must be certified if built after Nov 15, 1993 (the current York Models RTU-10DD and RP-4400 are ARI 740 certified for HCFC-22 and HFC-134a). HCFC-22 units currently must be pumped down to 10"Hg vacuum / 0.68 bara. HFC-134a units must be evacuated to 15"Hg vacuum / 0.5 bara before opening.
- Compressor Oil Change: It is a violation to change the oil at a pressure greater than 5 psig / 0.3 barg. In order to reduce the amount of refrigerant dissolved in the oil, the pressure of the oil must be reduced to 5 psig / 0.3 barg before being exposed to the atmosphere. This may be done by one of two acceptable methods:
    - ❖ Evacuate the chiller to a pressure no greater than 5 psig / 0.3 barg, and then remove the oil; or
    - ❖ Drain the oil into a system receiver or storage vessel, then lower the pressure (using a recovery or recycle unit) to a pressure no greater than 5 psig / 0.3 barg.

1.4 Compressor Oil for R-134a Applications

YORK OM refrigerant-134a Water Chilling System Multistage Compressors require an ester-based synthetic type oil. The compressor oil circuits will be field charged with YORK “J” oil, which is supplied by YORK as Part Number 011-00559-000 (55 gallon drums) or 011-00558-000 (5 gallon cans).

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Use only an ester-based synthetic type oil when servicing these units.

Do not use any mineral or other type of oils in these units.

1.5 Principles of Operation of the OM Chiller

Second Edition 1/12/2010

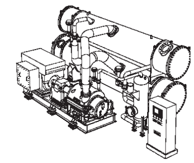
The OM Turbomaster Chiller operates under the following principles:

The fluid (to be cooled) flows through the tube side (inside the tubes) of the evaporator (cooler). Liquid refrigerant is located in the shell side of the evaporator, and is maintained at its saturation temperature (just about to boil). The liquid refrigerant is at a lower temperature than the fluid. Sensible heat flows from the fluid, through the evaporator tubes walls, to the refrigerant, thereby cooling the fluid, (which is the main purpose of the OM Turbomaster Chiller). The heat transferred to the refrigerant causes it to boil.

In order to sustain the continuation of this process, the refrigerant in the evaporator is held at the correct saturation temperature by drawing (sucking) refrigerant vapor from the shell side of the evaporator. This suction is achieved using the York 'M' series Turbomaster multistage centrifugal compressor. The vapor drawn from the evaporator, is compressed by the compressor, to a sufficiently high pressure such that the equivalent saturation temperature of the vapor is higher than that of a suitable heat sink fluid. The heat sink fluid is usually a supply of cooling water or, in the case of an air cooled system, the ambient air temperature. The high pressure refrigerant is thus contacted to the heat sink fluid (on the shell side of a shell and tube condenser or inside the tubes of an air cooled fin condenser) and refrigerant is condensed to a high pressure and temperature liquid. This liquid is flashed in two (or sometimes three) stages, cooling each time to return back to the evaporator to complete the cycle. Flashing is the process by which the high pressure and temperature liquid is exposed to a lower pressure. This drop in pressure causes the refrigerant to boil, causing some vapor to be formed, but in the same process causes the bulk refrigerant liquid to be cooled. The flash vapor must be drawn back into the compressor, but the colder refrigerant liquid is available to provide useful cooling. If this flashing process can be achieved in more than one step, the overall efficiency of the refrigeration cycle will be improved. With the OM Turbomaster Chiller more than one flashing step can be realized since there are two (or three) stages of compression within the 'M' compressor, corresponding to each impeller used.

The standard OM Turbomaster uses a two stage compressor with flash type Flash Economizer. The liquid is flashed off at an intermediate stage pressure, to lower the enthalpy of the liquid refrigerant as it enters the evaporator, thus providing a better overall refrigeration effect in the evaporator.

The standard OM Turbomaster will generally also utilize condenser subcooling in addition to the intercooling cycle for even better cycle efficiency. By passing liquid refrigerant over the tubes in a subcooler section of the condenser, the refrigerant temperature can be lowered from



the basic saturation temperature, to a temperature closer to the entering water temperature. By lowering this refrigerant temperature ahead of the high stage expansion device, the amount of gas flashing in the Flash Economizer after expansion is reduced. The lower flash gas translates into less gas flow through the second stage impeller, and therefore lower overall horsepower.

Liquid leaving the condenser subcooler level control valve is expanded to the flash economizer pressure. It enters the flash economizer through an internal spray pipe, where flash gas is removed and channeled through a mesh eliminator material, out the top and on to the compressor second stage. Liquid feeds out of the flash economizer through a pneumatic operated ball valve to the evaporator.

The compressor operates on the centrifugal principle. The compressor consists of two (or three) impellers, which when spun rapidly on the shaft, will draw gas into the center and accelerates the vapor to high velocity (kinetic energy). As the vapor exits the impeller, the velocity of the gas reduces as it passes through the diffuser (located around the circumference of the impeller), and the kinetic energy is transformed into potential (pressure) energy. This process is repeated for each impeller (compression stage). The compressor shaft is rotated by means of either, an electric motor (via a speed increasing gearbox), a direct drive steam turbine, or sometimes a gas turbine (via a speed reducing gearbox) or a reciprocating gas engine (via a speed increasing gearbox).

For a more complete explanation of the OM Chiller system refer to Section 5 (Service Instructions). The following section(s) however explain the principles not covered in the Service Instructions and are recent enhancement(s) to the OM Chiller.

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Second edition 1/12/2010

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This chiller utilizes a subcooler bundle integral to the main condenser in the bottom section. As liquid refrigerant condenses in the main condenser area, it drains down to the bottom. At the bottom the refrigerant is channeled to the subcooler inlet area, which is at the return water box end of the condenser (opposite from the water inlet nozzle). Refrigerant liquid enters the subcooler section from the sides and bottom (there is a plate blocking the top). Dual subcoolers will be furnished in condensers with tube lengths 20 feet or longer.

The level of refrigerant is adjusted at full load to provide a liquid level an inch or two above the subcooler at the inlet area. This level needs to be sufficient at full load to prevent refrigerant gas from entering the subcooler. The refrigerant liquid then flows axially down the shell length over the subcooler tubes, and exits out the bottom at the cooling water Inlet end.

A Hansen Technologies “Techni-Level” capacitance level transmitter is mounted within a side chamber of the condenser with a sight port assembly at the subcooler inlet. This level transmitter has a 5.5 inch active length and provides a 4-20ma analog signal to the chiller PLC to indicate subcooler level. The center of the probe is at the approximate desired liquid level point for full load operation. The level control setpoint is adjustable using the chiller PLC panel operator interface or graphics screen.

A pneumatic ball valve is mounted in the piping leaving the subcooler. This valve responds to the subcooler inlet level transmitter signal, to maintain the refrigerant level above the subcooler. A ball valve was selected for its optimum rangeability, since not only chiller load, but also “head” or differential pressure across the valve changes dramatically with chiller operating conditions. The valve is selected to fail open and to open on chiller shutdown, primarily to drain liquid from the subcooler section. This is done as a precaution against tube freezing, by ensuring that liquid is not present in the subcooler when chiller pumpdown operations or major leaks might occur.

VERTICAL FLASH ECONOMIZERS

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Description

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A pneumatic control ball valve is mounted in the piping leaving the flash economizer. This valve responds to the Flash Economizer liquid level transmitter signal, to maintain the required refrigerant level. A ball valve was selected for its optimum rangeability, since not only chiller load, but also “head” or differential pressure across the valve changes dramatically with chiller operating conditions. The valve is selected to fail open and to open on chiller shutdown, primarily to drain liquid from the condenser and flash economizer to the evaporator.

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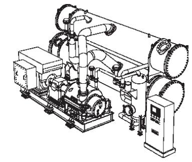
Sight glasses are provided above and below the eliminators. A thermometer well is furnished for checking liquid temperatures. Connections are provided for the York furnished, field installed pressure transmitter and relief valve assemblies.

<u>Operation</u>

Liquid leaving the condenser subcooler level control valve is expanded to the flash economizer pressure. It enters the flash economizer through an internal spray pipe, where flash gas is removed and channeled through a mesh eliminator, out the top and on to the compressor second stage. Liquid feeds out of the flash economizer through the pneumatic operated ball valve to the evaporator.



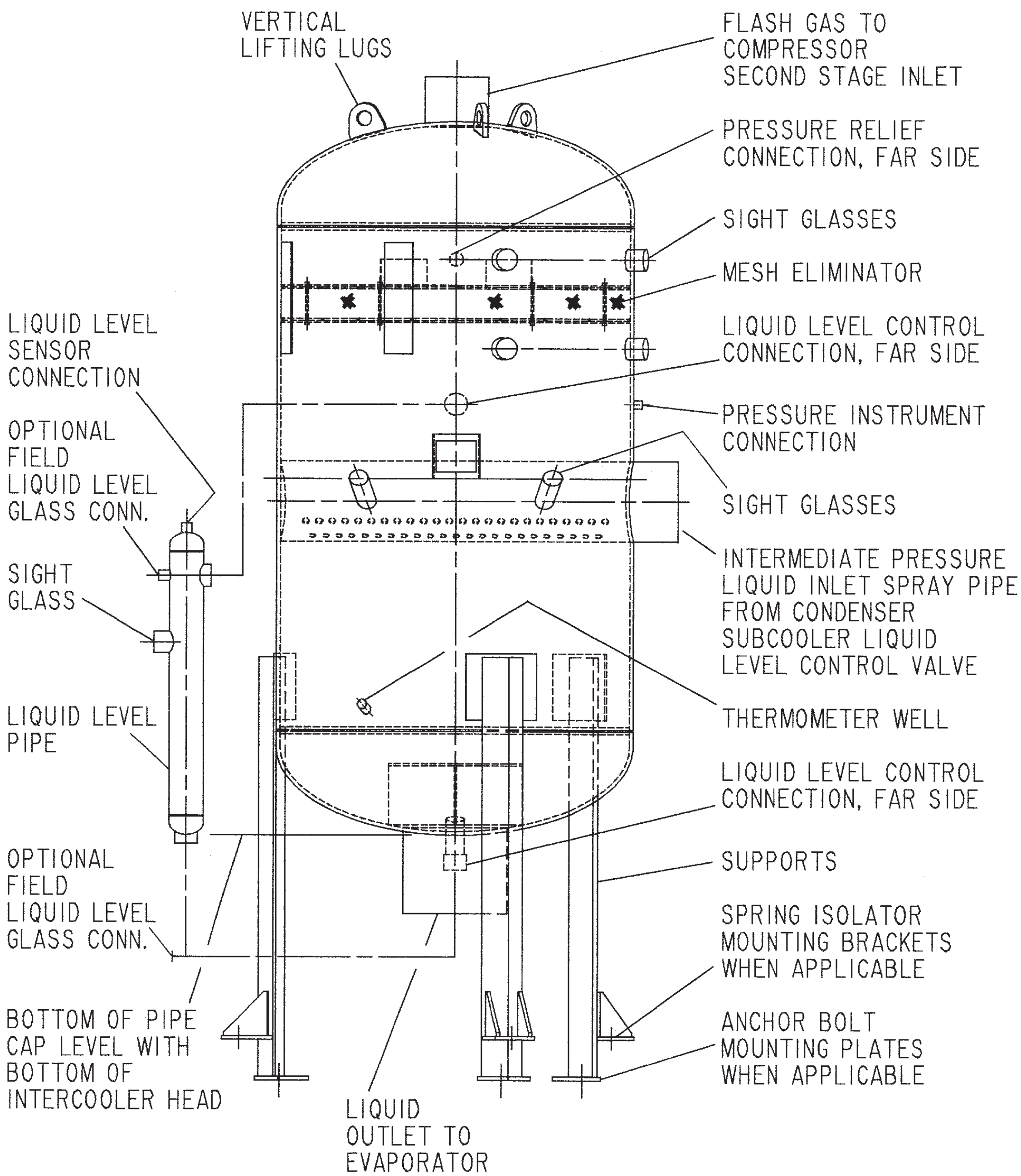
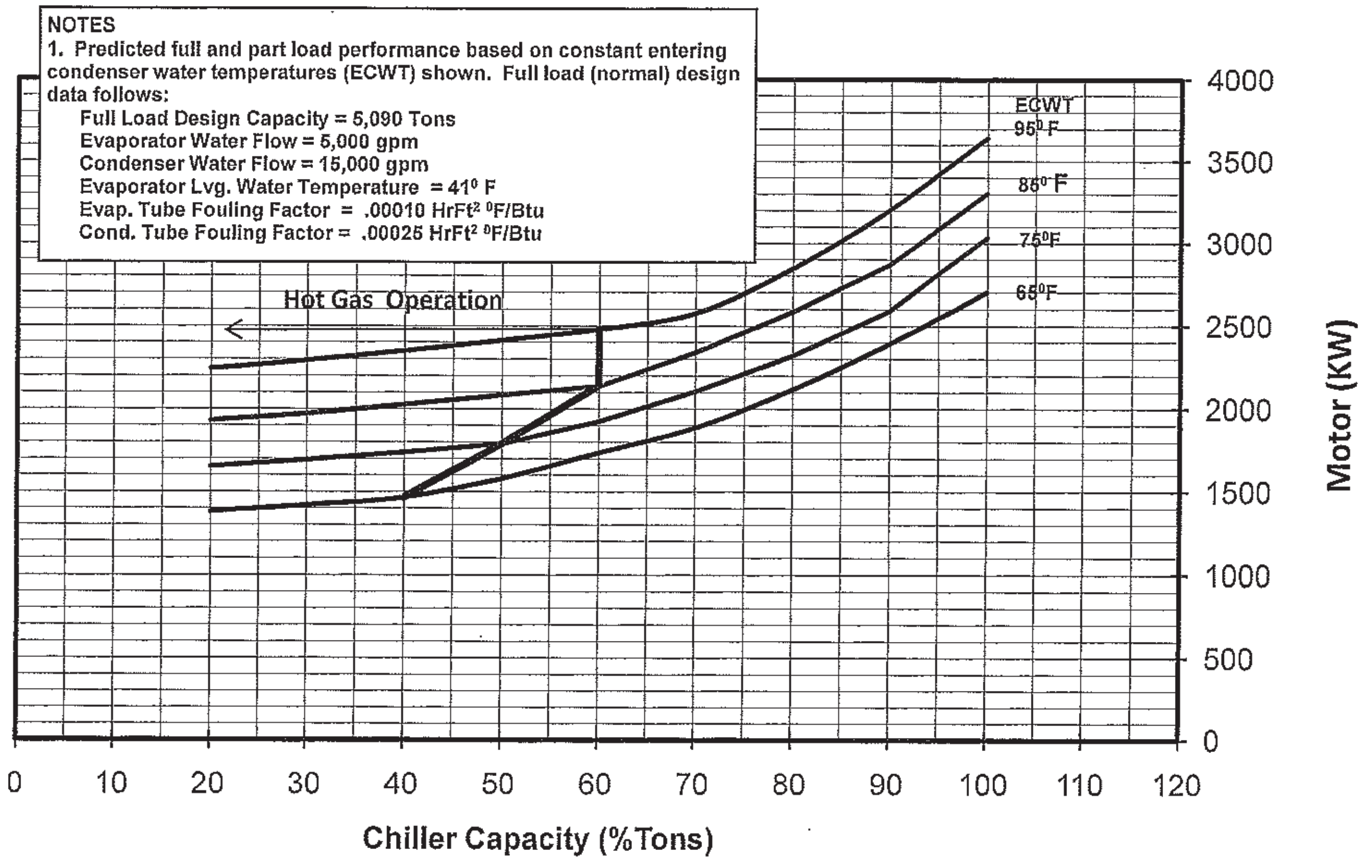


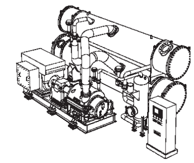
FIGURE 1 - VERTICAL INTERCOOLER CUTAWAY

1.6 Estimated part load performance curves

See next page

York OM 5090 R-134a Fixed-Speed Motor Drive Titan Chiller
Predicted Full & Part Load Performance
Motor KW vs Capacity (% Tons)





1.7 Estimated evaporator / condenser pressure drop curve

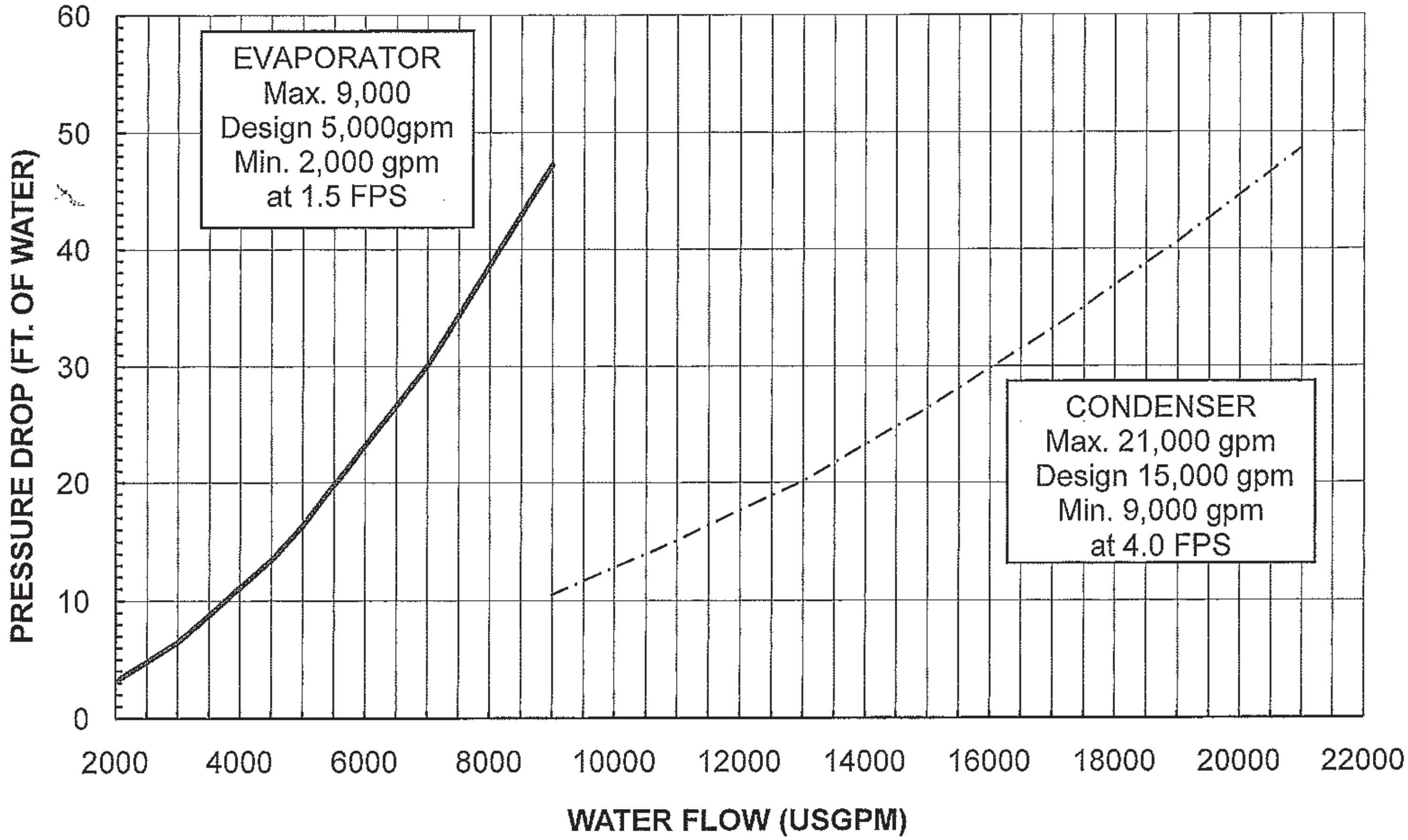
See next page

HOLY HARAM MAKKAH
DUBAI, UAE

YORK TITAN OM-5000
R134a MOTOR DRIVE CHILLER

YORK ORDERS 0J060251-03 THROUGH 18
1J060034-03 THROUGH 10

PREDICTED WATER FLOW VS. PRESSURE DROP
3-PASS EVAPORATOR & 2-PASS CONDENSER



FOR PUMP SIZING ESTIMATION PURPOSES ONLY. NOT TO BE USED FOR VALIDATION OF ARI 550 PERF. TESTING FLOWRATES

09/23/10
Rev.A, 07/13/12