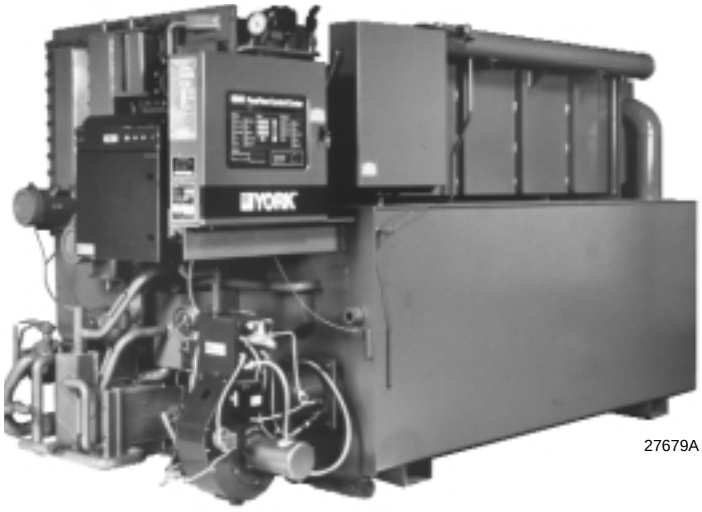
YORK®	*Millennium*® ParaFlow™ ABSORPTION CHILLERS STEAM AND DIRECT-FIRED	
INSTALLATION	Supersedes: 155.17-N1 (1293)	Form 155.17-N1 (900)

MODELS

DIRECT-FIRED
YPC-FA-12SC THROUGH YPC-FZ-19S
YPC-FD-19G THROUGH YPC-FD-20G

STEAM-FIRED
YPC-ST-19S
YPC-ST-19G THROUGH YPC-ST-22GL



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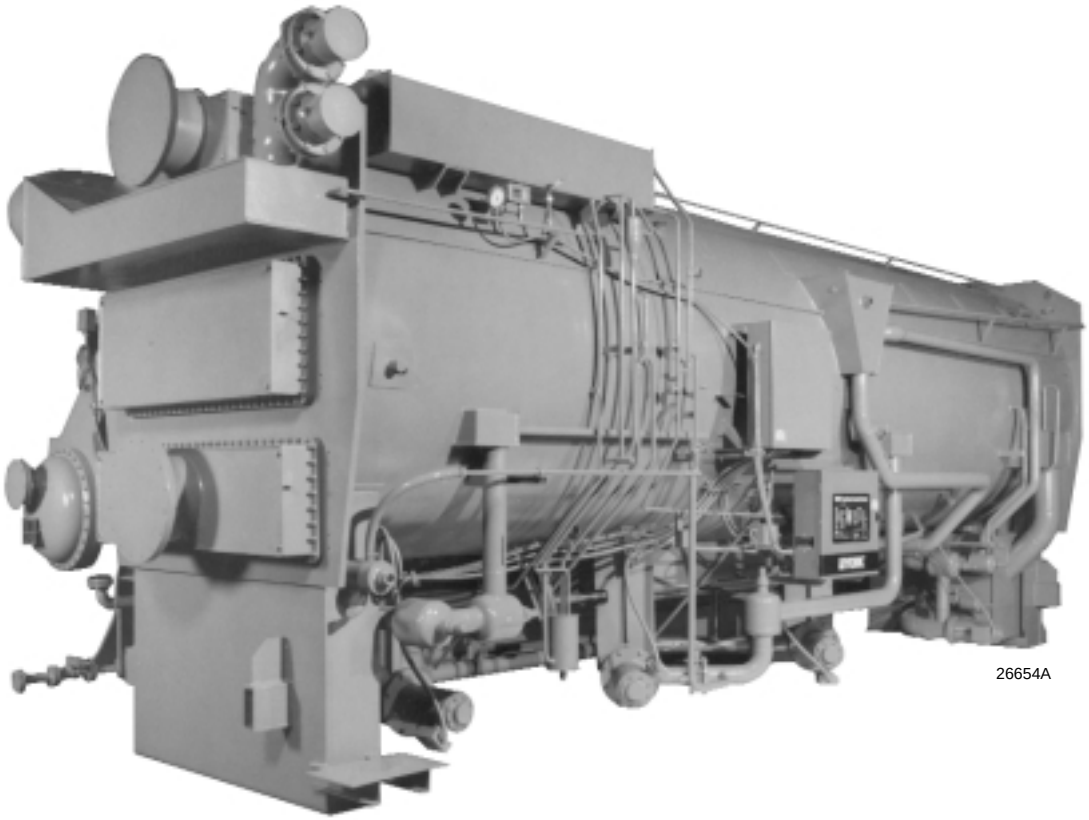

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UNITS SHOWN:
DIRECT-FIRED “S” MODEL
STEAM-FIRED “G” MODEL

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating / service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating / service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

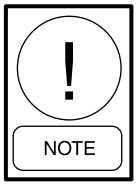
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



NOTE is used to highlight additional information which may be helpful to you.

CHANGEABILITY OF THIS DOCUMENT

In complying with YORK's policy for continuous product improvement, the information contained in this document is subject to change without notice. While YORK makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest YORK Applied Systems Service office.

It is the responsibility of operating / service personnel as to the applicability of these documents to the equipment in question. If there is any question in the mind of operating / service personnel as to the applicability of these documents, then, prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.

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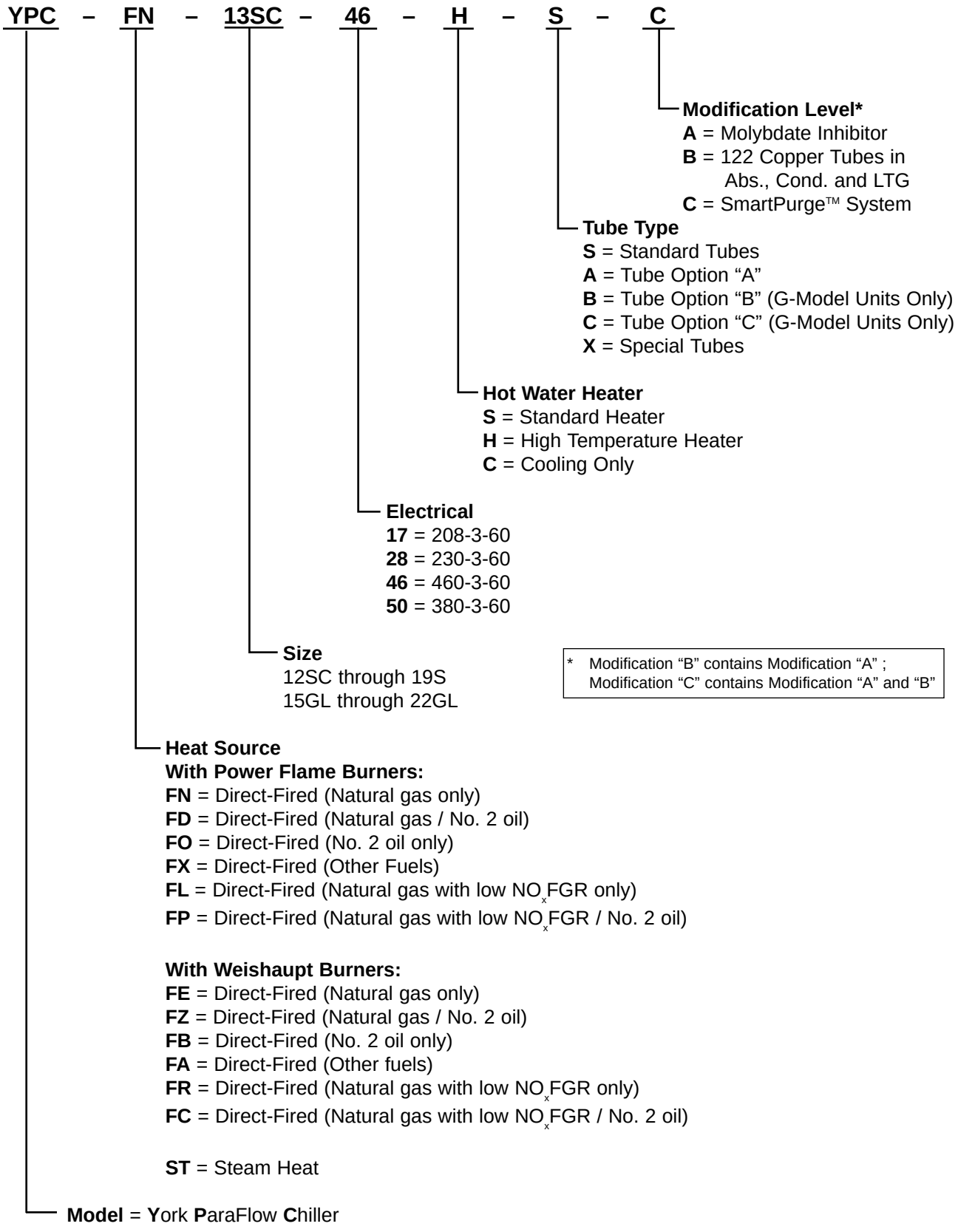
UNIT NOMENCLATURE

The model number denotes the following characteristics of the unit:



SECTION 1 – INTRODUCTION

This manual provides the installing contractor with all the necessary information to do the following:

1. Define the scope of his work.
2. Accurately estimate the cost of his work.
3. Assure proper, timely and trouble-free unit installation.
4. Assure satisfactory unit performance after installation.
5. Assure overall customer satisfaction by eliminating installation delays and unexpected costs.

For answers to any questions regarding unit installation, design, specifications, literature or operation on the particular unit you are installing, please contact your local YORK office.

This installation guide may be used in conjunction with the following other related YORK publications:

155.17-PA1 - Field control modifications diagram for Millennium YPC control center.

155.17-PA2 - YPC wiring diagram, field connections for Millennium control center.

155.17-PA3 - Dimensions and physical data for direct-fired “G” style units.

155.17-PA4 - Dimensions and physical data for direct-fired “S” style units.

155.19-PA2 - Dimensions and physical data for steam-fired “S” style units.

155.19-PA1 - Dimensions and physical data for steam-fired “G” style units.

155.17-W1 - Elementary wiring diagrams for all direct-fired YORK ParaFlow™ absorption units.

155.19-W1 - Elementary wiring diagrams for all steam-fired YORK ParaFlow™ absorption units.

155.17-M3 - Major Cutting and Welding Guidelines.

When using this manual, the installer must pay particular attention to the words; DANGER, WARNING, CAUTION and NOTE. These words are accompanied by symbols to alert the reader of areas of potential hazard. For further explanation see the Safety Symbols section at the front of this document.

The installing contractor is advised to become thoroughly familiar with the installation, operation, maintenance and service requirements of the YORK ParaFlow™ chiller. Careful study of the factory submittal drawings and this document is highly recommended. YORK representatives are available to answer any and all questions and to coordinate delivery of the unit and its accessories.

The local YORK office must be advised by the contractor of the scheduled start-up time so that qualified personnel can be made available for that date. YORK requires a minimum of four weeks advance notice to schedule a unit start-up and to have the lithium bromide solution delivered to the jobsite. To help facilitate this action, at the end of this document is an **Installation Check List and Request for Authorized Start-up Engineer**. Please take the time to properly fill it out at the completion of the installation and send (or give) it to the local YORK office so that a unit start-up can be scheduled.

SITE SELECTION

The ParaFlow™ Chiller/Heater operating weight should be considered when choosing the unit location.

In selecting a site, consider structural support, access for service and tube pull area on either end of the main shell. *Tube pull space is approximately equal to the length of the main shell.*

If the chiller is a direct-fired unit, consideration should be given to the stack in comparison to building intake and exhaust vents, cooling towers, etc. The effect of wind patterns around a building can create surface pressures and eddy currents that could lead to draft problems or contamination of other systems.

Follow standard engineering practice in designing the piping systems and other services.

Adequate support must be provided for system piping so that no weight is placed on the unit's water boxes and connecting nozzles.

The ParaFlow™ unit makes very little noise or vibration (See Typical Noise and Vibration Levels section); therefore, vibration eliminating mounts are generally not required. However, when the unit is installed in an area where even mild noise would be a problem, such as on a floor near a conference room, sleeping area or roof, where there are very strict noise and sound requirements, seek the advice of an acoustical consult ant.

Check the type of fuel to be used when selecting the installation site. Gas allows more flexibility in site selection than does oil. Standard oil units require gas supply for burner pilot ignition. Also, a means of metering gas flow must be provided.

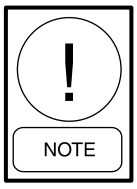
A minimum of 42 inches of service space is recommended along each side of the unit. Tube pull space equivalent to one unit length must be provided on at least one end of the main unit shell. The end opposite the tube pull end should be allowed 60 inches of service clearance. Refer to Appendix A, Unit Weights and Dimensions for specific Unit Clearance Data.

If there are flammable materials near the unit, leave at least 20 inches of space above the unit and at least 40 inches above the first-stage generator.

ParaFlow™ chillers are not suitable for outdoor installation. They must NOT be stored in temperatures below 35°F. The machine room must be enclosed, well-lighted and properly ventilated to keep its temperature no higher than 104°F and no lower than 35°F. Relative humidity in the machine room must never reach the saturation point. Condensation of moisture may cause corrosion and damage to electrical components.

All local utility codes vary with location. Be sure to check and comply with them when installing the unit.

SECTION 2 – PRE AND INITIAL INSPECTION OF UNIT



When the chiller shipment arrives, notify the local YORK Service office immediately. A complete inspection must be done in the presence of a YORK representative to verify any damage to the unit, and to make sure all components and ship loose parts have arrived.

To ensure a smooth chiller installation, please check all factory submittals and drawings that accompany the chiller shipment. If these are not available, refer to the introduction section of this document and order the appropriate YORK form. Verify all unit clearances, overall dimensions and weight. Verify electrical requirements, fuel gas or steam pressure and chiller footprint for foundation dimensions.

The chiller shipment MUST also be checked on arrival to see that all major pieces, boxes and crates are received. The unit should be checked on the trailer or rail car when received, before unloading, for any visible signs of damage. **This inspection must be done in the presence of a YORK service representative.** Any damage or signs of possible damage should be reported to the transportation company immediately for their inspection. **YORK will not be responsible for any damage in shipment or at the job site or loss of parts.**

When received at the jobsite, all containers should be opened and contents checked against the packing list or shipping orders. Any material shortage must be reported to YORK immediately! (Refer to Shipping Damage Claims, Form 50.15-NM).

VERIFICATION OF UNIT HOLDING CHARGE

If the customer wants his absorption unit charged with lithium bromide at the factory, he may do so. This will be indicated on the unit shipping papers, and a level

will be seen when looking in some of the unit's sight glasses. When a unit is charged with lithium bromide, a nitrogen blanket is applied to the unit up to 2-1/2 to 3 PSIG, which is indicated on the unit's pressure gauge by a black mark. This pressure gauge must be inspected when the unit arrives at the jobsite to ensure that no leakage has occurred during shipment. If the needle on the pressure gauge is significantly lower than the factory mark, notify YORK immediately! **YORK will not be liable for any damage done to any parts of the unit as a result of the loss of the solution side nitrogen charge after time of inspection.**

VERIFICATION OF UNIT VACUUM

An absorption unit is customarily shipped without any lithium bromide charged to the unit. A unit without a lithium bromide charge is indicated by the unit pressure gauge in a deep vacuum. The gauge needle will also be marked in black where the unit vacuum was before the unit left the factory. If for any reason the pressure gauge needle is not at the factory mark on the gauge notify YORK immediately! A unit leak check may be necessary before any unit start-up can commence. **All unit leak checking must be done by YORK Service!**

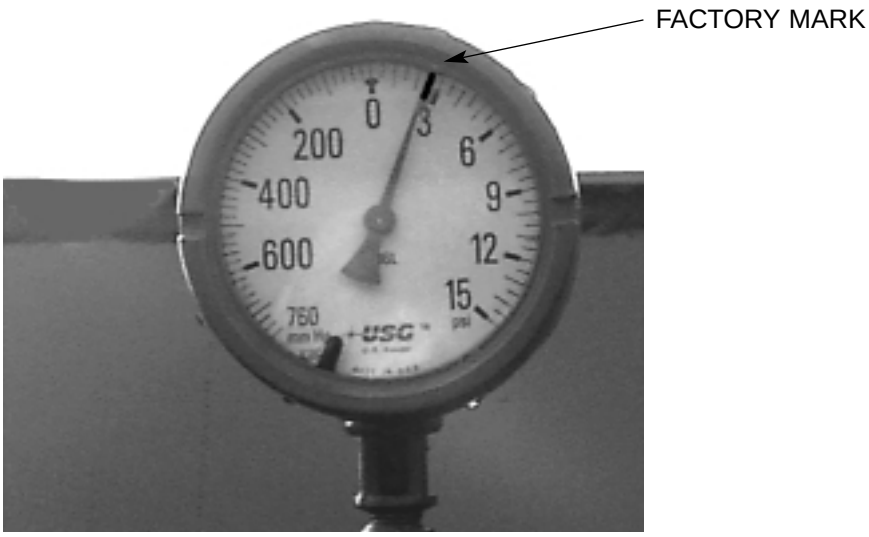


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FIG. 1 – EXAMPLE OF PRESSURE GAUGE ON UNIT WITH NITROGEN CHARGE

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FIG. 2 – LOCATION OF PRESSURE GAUGE ON S-MODEL UNIT

SECTION 3 – UNIT RIGGING

Only qualified rigging personnel should handle the rigging operation. Failure to observe this may result in equipment damage, serious injury or death!

For unit weights and dimensions, see table on page A1 in Appendix A at the back of this document.

Rigging diagrams for specific ParaFlow™ unit models are located in Appendix B.

The following guidelines must be followed when rigging the unit:

1. When using single point lifting, do not place the slings at more than a 60° angle. See diagrams in Appendix B for illustration.
2. If slings will be at more than a 60° angle, use spreader bar.
3. Only rig the unit horizontally! Do not slant the unit while moving it. If the unit is to be installed in a sublevel basement or where it can only be rigged slanted, contact YORK for special instructions prior to rigging. This should be done prior to ordering, to check feasibility.
4. Lifting eyes are mounted at the top of the "S"-type series units for rigging. Choose a chain according to the minimum length requirement in column "C" under the "S" Unit Rigging table. Place the hooks in the eyes and lift unit to the appropriate location.
5. Do not sling on or against any projecting brackets, pumps, valves, pipes, fittings, etc.
6. Do not lift the unit using the holes at the corners of the endsheets. These holes are manufacturing lifting holes and are not designed for lifting the combined weight of a completely assembled unit.

FOUNDATION

Unit foundations are usually made from concrete with a compressive strength rating of not less than 4000 psi and are able to support the full operating weight of the unit (see Appendix A tables – Unit Weights and Dimensions, for the particular unit model). When laying a concrete foundation, use steel to reinforce the concrete and finish the surface smoothly. **The concrete foundation pad must be level within 1/4 inch at all the mounting locations of the unit.**

If the ceiling height in the equipment room permits, it is advantageous to have a portion of the foundation elevated just where the chiller legs will set upon the concrete. This allows for greater clearance beneath the chiller for service work such as taking solution samples, pulling pumps, etc. For details on where the chiller feet will rest (chiller footprint), see the appropriate YORK "Dimensions and Physical Data" forms as listed in the Introduction Section of this document. See the appropriate table in Appendix A at the back of this document for unit dimensions, and weights.

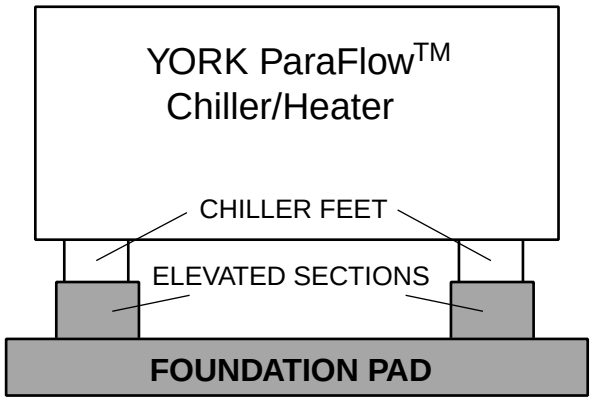

FIG. 3 – FOUNDATION PAD

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HIGH-TEMPERATURE GENERATOR SHIPPING BOLT

NOTE

Most steam fired units have a hold-down bolt that is used to secure the high-temperature generator during shipment. This bolt needs to be loosened prior to unit operation.

The bolt is located at the opposite end of the steam inlet. Since there is appreciable thermal growth in the high-temperature generator toward the end where the bolt is located during operation, failure to loosen the bolt could result in distortion or damage to the high-temperature generator.

Keep the bolt tight during the rigging operation but loosen bolt prior to unit start-up. The loosened bolt/nut combination may be left in the hole but should be tagged so that it is not re-tightened accidentally in the future.

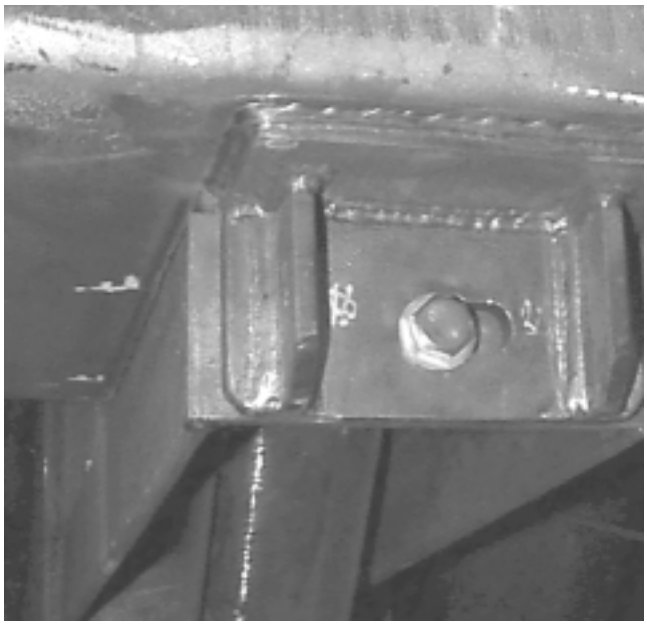

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FIG. 4 – SHIPPING BOLT

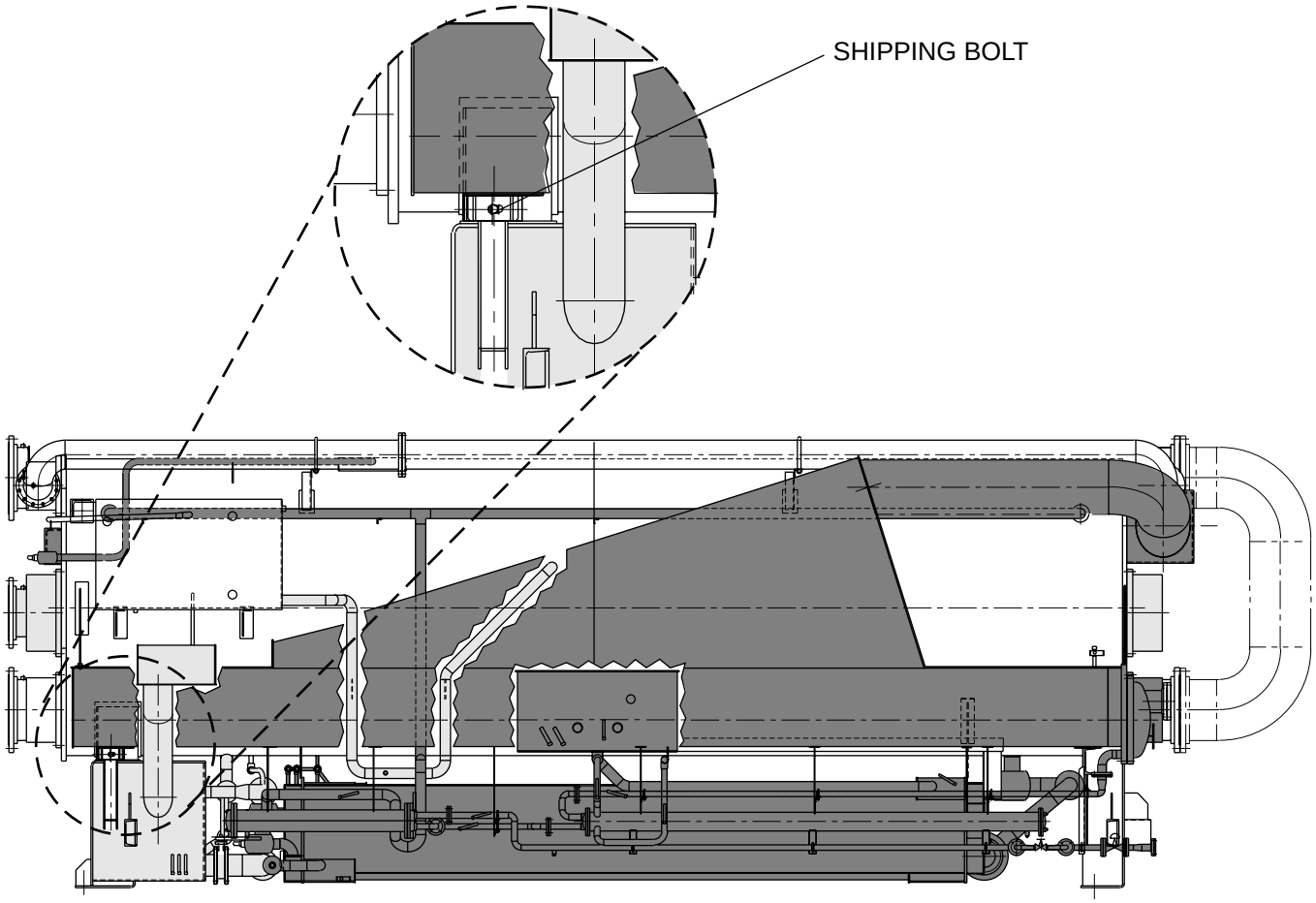

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FIG. 5 – LOCATION OF SHIPPING BOLT ON 22G STEAM UNIT

SECTION 4 – KNOCKDOWN SHIPMENT UNITS

As an extra option (specially quoted jobs only), YORK can ship ParaFlow™ absorption units in a two or three major component arrangement to accommodate limited access into the jobsite building. Usually, the major components consist of the main shell, first-stage generator, and the burner - if the unit is a direct-fired unit. On steam-fired units, the shipment is usually in two pieces, consisting of the main shell and the first-stage generator.

YORK does not recommend knockdown shipments due to the fact that a complete factory unit leak check cannot be accomplished properly to ensure a tight and leak free unit.

Because of the many various ways to ship a knockdown unit, this document will only highlight the most important steps to assemble the unit. If the unit to be installed is a knockdown shipment, a special drawing will be included with the unit shipment. Use it to re-assemble the your particular unit along with the following YORK forms:

155.17-M3	ParaFlow™ Welding Procedure	
155.17-W1	Direct Fired Wiring Diagram	*or*
155.19-W1	Steam Chiller Wiring Diagram	
155.17-PA1	ParaFlow™ Wiring Options	
155.17-PA2	Wiring Diagram Field Connections	

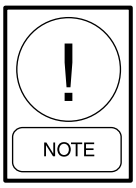
IMPORTANT STEPS TO FOLLOW DURING REASSEMBLY

All cutting and welding of units under warranty must be 100% YORK supervised. Under no circumstances should non-YORK personnel be given the sole responsibility to cut or to weld a ParaFlow™ unit. Absorption units require specialized handling when cutting or welding. Only trained YORK personnel are considered qualified to supervise or perform this work.

ASSEMBLY GUIDELINES

1. Never allow the introduction of dirt or foreign particles into the unit during the reassembly process.
2. Never weld on any pressure vessel, or when the pressure vessel is in a vacuum.
3. Always open valves when welding.
4. Always use a nitrogen bleed when welding.
5. All weld root passes and hot passes must be made using Gas Tungsten-Arc welding (commonly called TIG). The purpose of using TIG for the first two passes is primarily to provide a smooth, crevice-free surface on the inside of the pipe or shell.
6. If unit was charged with lithium bromide, NEVER allow air to enter the unit.
7. If unit assembly work cannot be finished within the workday – do not leave the chiller open to the atmosphere overnight. Always tape or cover openings up with cardboard or other suitable material and leave nitrogen bleed on.

LEAK CHECKING



Only YORK trained Service Technicians are authorized to leak-check ParaFlow™ absorption units.

Welds that cannot be pressure tested must be dye penetrant tested prior to closing. Solution pipes within pipes, such as between the solution heat exchanger and the first-stage generator, are examples of these welds.

Welds that can be pressure tested must be done so with soap first. **Do not exceed 8.0 PSIG unit pressure when leak testing.**

The second step after soap testing is to charge the unit with a mixture of nitrogen and R-22 refrigerant. **Again, do not exceed 8.0 PSIG unit pressure when charging the unit.** Slowly go over each unit joint with a R-22 leak detector to determine if any joints are leaking.

SECTION 5 – LEVELING THE UNIT

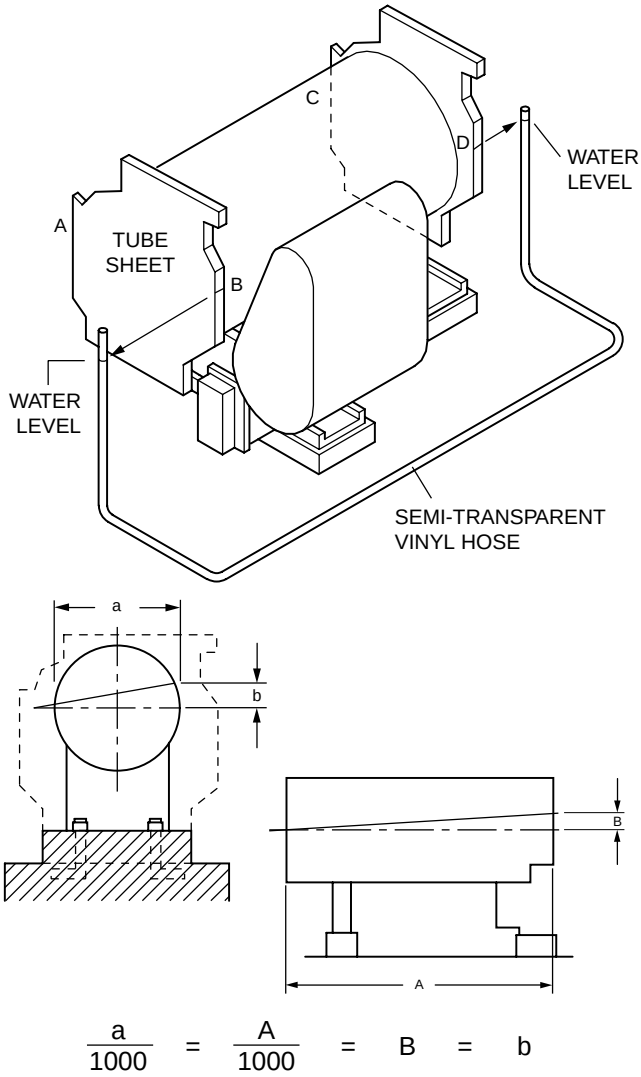
The YORK ParaFlow™ Chiller/Heater will operate properly and produce maximum output only if it is installed level. Therefore, it is important that the unit be leveled when installed in place, and checked again (and adjusted if necessary) after the piping, solution, refrigerant and system water have been installed.

G-style units are provided with punch-marked leveling lines and an indicating sticker at each level line on the tube sheets. See photo in Fig. 6. **Use these lines as reference points when leveling the unit. Do not use the bottom of the tube sheet or any part of the indicating sticker.**

S-style units are built on a skid and require that the unit be level within 1 inch in 1000. S-style units also have punch-marked and scribed level lines on the tube sheet, which are identified by a leveling sticker at each line on the chiller tube sheets.

LEVELNESS CHECK

Use a transparent or semitransparent flexible hose. As shown in Fig. 6, check the levels of points A-B, A-C, and A-D. Secure one end of the hose to corner A with tape. Move the other end of the hose to the opposite corner and fasten with tape. Fill the hose with water until the water level in the hose corresponds to the unit level mark on the tubesheet at corner A. The distance between the unit level mark on the unit tubesheet and the water level in the hose at the opposite end of the unit is how far the unit is out-of-level. The unit should be leveled to within 1 inch in 1000, both lengthwise and sidewise (see Fig. 6 below). Use jacks at jacking points on unit legs to raise and lower unit during leveling.



$$\frac{a}{1000} = \frac{A}{1000} = B = b$$

MAXIMUM ALLOWABLE OUT-OF-LEVEL TOLERANCE BETWEEN ANY TWO CORNERS

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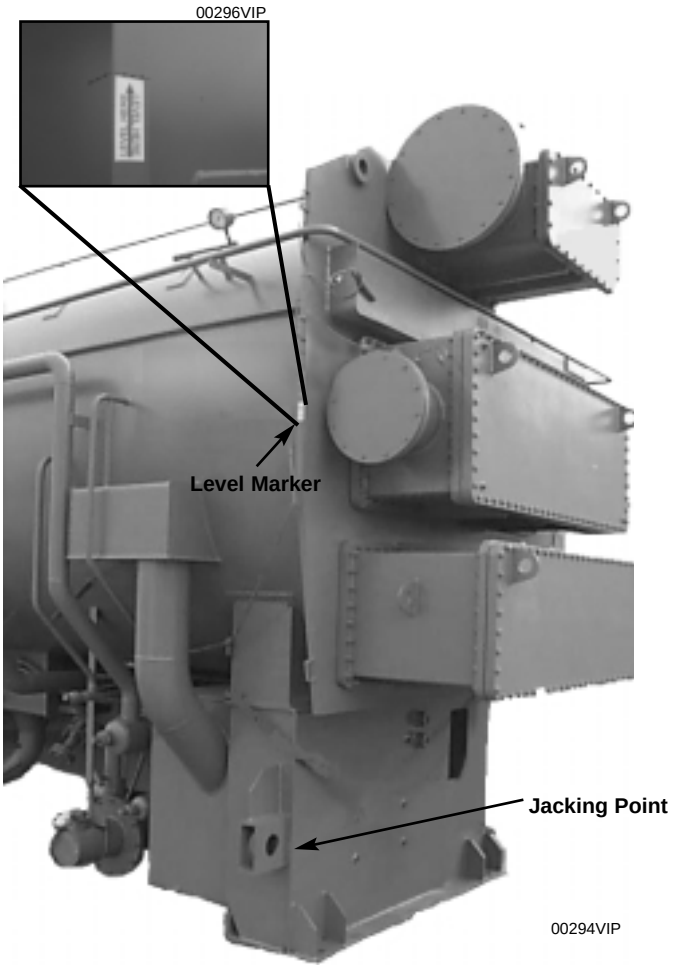
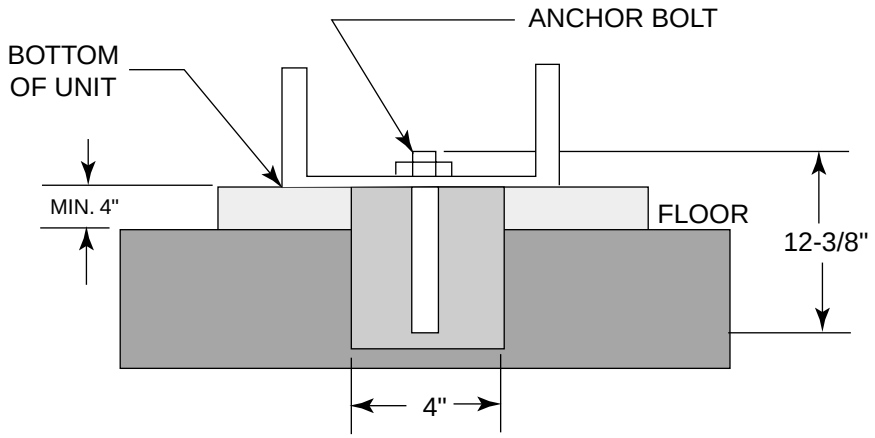


FIG. 6 – LEVELING AND ANCHORING THE UNIT

ANCHORING

Since there is little vibration, anchor bolts are not necessary in most locations. However, in areas known to experience tremors, bolting down the unit is recommended. Fasten the legs to the foundation with anchor bolts after leveling the unit. See Fig. 6.



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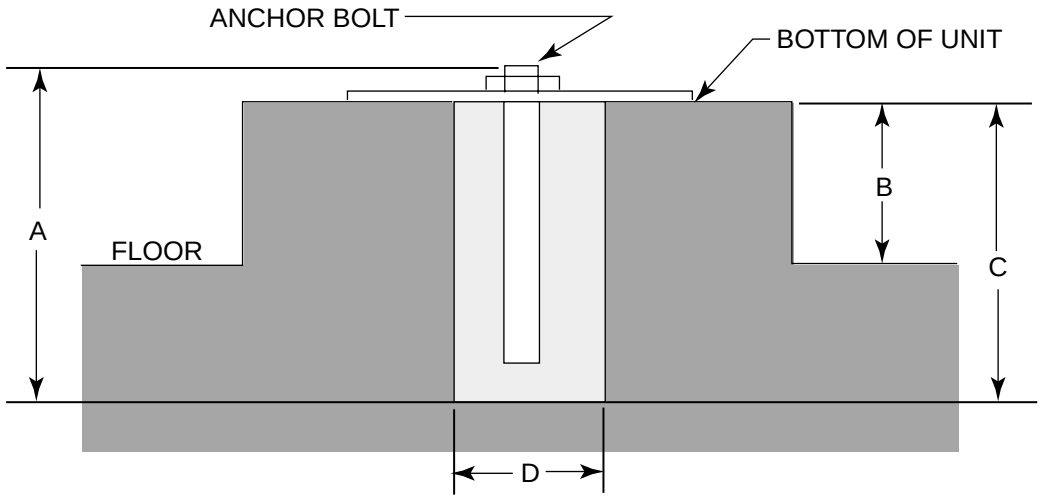
S-MODEL UNITS



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G-MODEL UNITS

DIMENSIONS				
UNIT	**A**	**B**	**C**	**D**
18G	19-1/2"	5" (minimum)	19-1/2"	4"
19G	19-1/2"	5" (minimum)	19-1/2"	4"
19GL	19-1/2"	5" (minimum)	19-1/2"	6"
20G	19-1/2"	5" (minimum)	19-1/2"	6"
21G	19-1/2"	5" (minimum)	19-1/2"	4"
22G	19"	5" (minimum)	19"	6"
22GL	19"	5" (minimum)	19"	6"

FIG. 7 – ANCHORING DIAGRAMS

SECTION 6 – UNIT WATER PIPING AND HOOK-UP

When the assembly of the unit is complete, and unit is level, the absorber/condenser, chilled, and hot water (if applicable) piping connections may be made.

As standard, the unit nozzles will be provided with victaulic connections suitable for 150 PSIG design water pressure (DWP). Flanged connections for 150 or 300 PSIG DWP are provided only as an option at time of order.

All unit piping must be installed in accordance with accepted piping practice and any applicable local piping codes. Provide adequate temperature and pressure wells or taps on all supply and return piping.

CAUTION

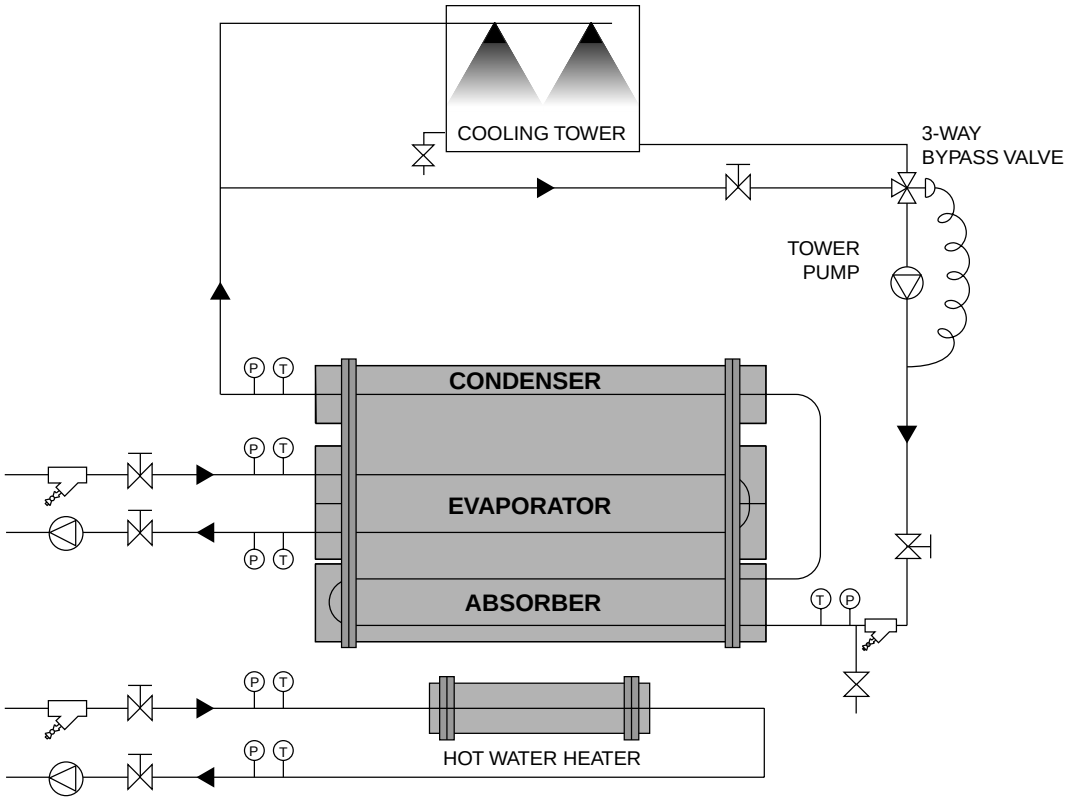
All water piping must be adequately supported and braced independent of the chiller. No strain whatsoever is to be placed on the unit water boxes, nozzles, and/or connection flanges. Piping should not spring when connections are broken at unit.

The piping should be arranged with offsets for flexibility, and adequately supported and braced independently of the unit to avoid strain on the unit and vibration transmission. Hangers must allow for alignment of pipe. Isolators (by others) in the piping are not necessary but may be desirable, and may be required by customer specifications.

Upon completion of the unit piping, a connection in each line as close to the unit as possible should be opened by removing the flange bolts or coupling and check for piping alignment. If any of the bolts are bound in their holes, or if the connection between the pipes spring out of alignment, the pipe has excess strain on it which could cause damage to the unit. The piping misalignment must be corrected by properly supporting the piping or by applying heat to anneal the pipe.

NOTE

If the piping is annealed to relieve stress, the inside of the pipe must be cleaned of scale before it is finally bolted in place.



LD05302

FIG. 8 – TYPICAL WATER PIPING SCHEMATIC, ALL UNITS - MODELS 12SC THROUGH 22G

FLOW SWITCHES

The unit inlet and outlet nozzle connections are identified by yellow labels placed adjacent to each nozzle. An evaporator water flow switch is supplied by YORK as a ship loose item. This water flow switch must be installed in either the evaporator supply or return water circuit, as close to the unit as possible. (See Fig. 9.) YORK highly recommends mounting the flow switches in a horizontal length of pipe, with the switch in a vertical position at the top of the pipe. It is not recommended to mount the flow switch in a vertical pipe with an upward flow, due to the fact that minimum water flow may not be substantial enough to lift the switch's paddle.

A condenser and/or a hot water switch is shipped only as an extra order option. However, these switches must be used in each installation. See unit shipping papers if these switches are supplied. **Foreign objects which could lodge in or block flow through the cooler, hot water heat exchanger, and absorber tubes must be cleaned or flushed before being connected to the chiller pumps or other equipment.**

PRESSURE DIFFERENTIAL SWITCHES

YORK factory can supply differential switches in lieu of flow switches as a special order option. Differential switches serve the same function as flow switches – to ensure that flow is established for chiller operation. This is accomplished by determining a difference in pressure between two sample points in the chiller piping, usually at the inlet and outlet of a heat exchanger bundle. It is very important that the pressure differential switch be installed as close to the heat exchanger bundle as possible so that only the pressure difference across the bundle is sensed. Do not put the pressure differential switch across the suction and discharge of a heat exchanger pump. Doing so may not absolutely ensure flow across the chiller bundle due to valves that could be closed.

Another important aspect to remember when using a pressure differential switch is to ensure both the sample points are on the same elevation with other. If one connection is higher than the other, then static pressure becomes a factor into the total differential across the switch. The switch could be reading a differential under this condition even when there is no flow.

STRAINERS

Permanent strainers (supplied by others) are required in all the absorption unit's water circuits to protect the tubes, coils, and controls. The strainer should be a #10 mesh and be installed in the entering water line, directly upstream of the chiller. Water piping circuits should be arranged so that the pumps discharge to maintain essentially constant chilled, tower and hot (if applicable) water flows through the unit at all load conditions. If pumps discharge through the chiller, the strainer may be located upstream from the pumps to protect both pump and chiller (piping between strainer, pump and chiller must be very carefully cleaned before start-up). If pumps are remotely installed from chiller, strainers should be located directly upstream of the chiller.

ABSORBER AND CONDENSER WATER PIPING

The absorber and condenser water piping should be in accordance with the drawings for the specific system. The tower water must be piped into the inlet absorber nozzle and out of the condenser nozzle. A factory installed well is located in the absorber inlet nozzle on the absorber inlet water box. This nozzle should also have a yellow inlet sticker attached at the top or side of the nozzle to help the installer identify which nozzle is the inlet.

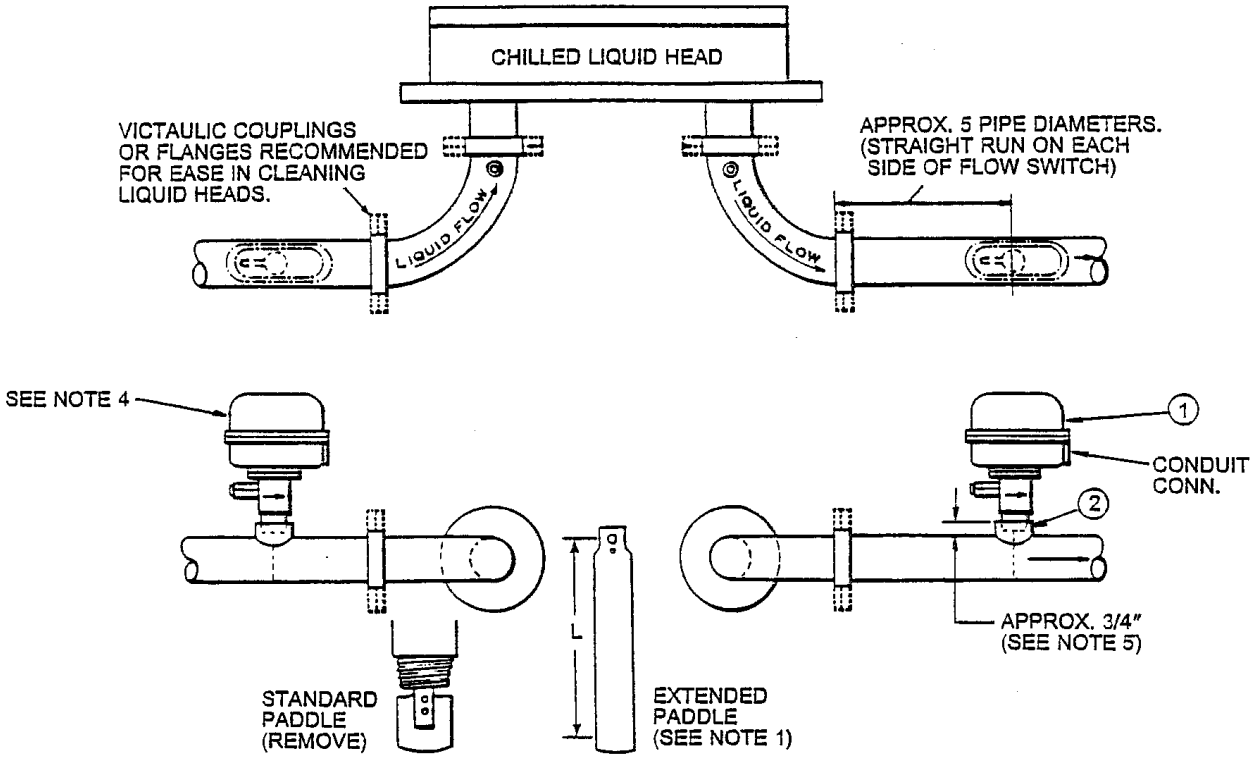
TOWER WATER CROSS-OVER LINE

On some units it is necessary to field fabricate the tower water cross-over line from the absorber outlet nozzle to the condenser inlet nozzle. **All material must be field supplied for fabrication of this line. The cross-over line must be fabricated so that the pressure drop is kept to a minimum! This should only be 1 or 2 psi at the extreme!**

Tips to help accomplish this when fabricating the cross-over line:

1. Use only butt-welded connections. Do not use victaulic connections other than those at the unit nozzles.
2. If the absorber and condenser nozzles are not the same size, use a gradual reducer. Do not go from one size to another abruptly!
3. Use long radius elbows if possible.
4. Make the cross-over line as short as possible.
5. Use the couplings on the absorber outlet box and condenser inlet box to check the pressure drop across the line.

The design working pressure rating on the cross-over line must be the same pressure rating as the rest of the tower water system piping. Arrange the cross-over line so that cleaning of the tubes in the absorber, evaporator, and condenser can be easily accomplished.



LD05303

ITEM	DESCRIPTION
1	Switch, Flow Control (Supplied by YORK)
2	Coupling, Pipe, 1" x 1" Lg. (Not Supplied)

NOTES:

1. Adjust the Flow Switch Paddle to the size of the pipe in which it is to be used. Trim extended paddle to the "L" dimension as follows:

DIAMETER OF PIPE (INCHES)	"L" DIMENSION (INCHES)
5	4-5/8"
6	5-5/8"
8 and Larger	Full Paddle

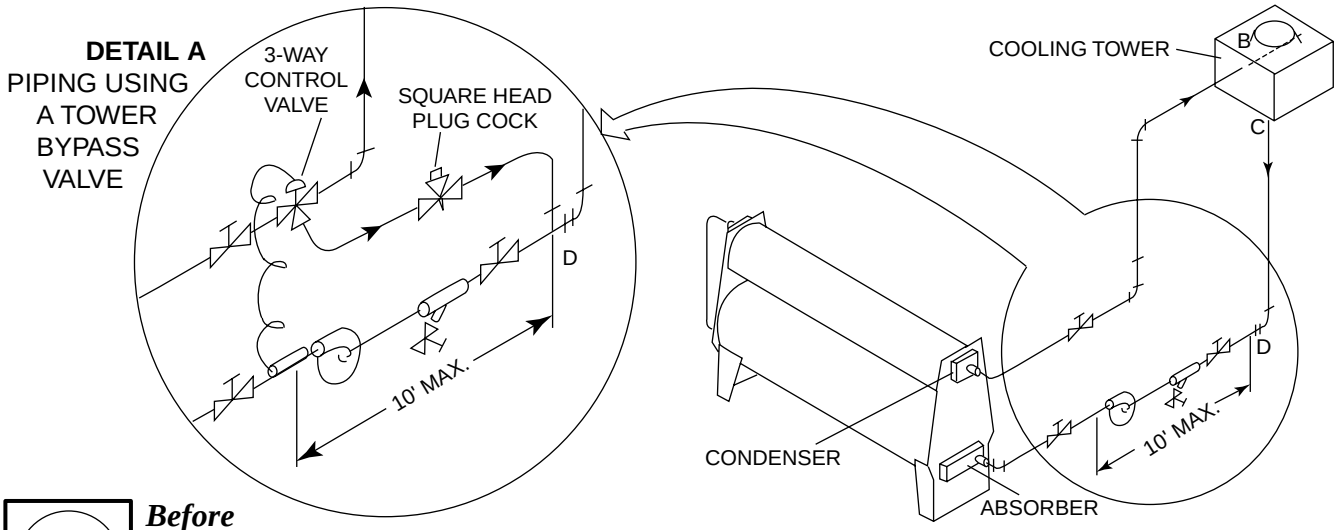
2. The Flow Switch is to be installed vertically and upright on a horizontal run of pipe, as shown.
3. Screw the Flow Switch in position so that the paddle is at a right angle to the liquid flow. (Arrow mark on side of casting must point in same direction as liquid flow.)
4. The Flow Switch can be installed in either the inlet flow or outlet flow connections.
5. Before installing Item 2, make sure it is 1 inch long, maximum.

FIG. 9 – INSTALLATION OF FLOW SWITCH

THREE-WAY MIXING VALVE

The temperature of the tower water to the absorber shell of the unit must be maintained at all times between 68°F, (20°C) and the design temperature of the unit [typically 85°F, (29.4°C)]. However, at unit start-up, the tower water may be as low as 59°F, (15°C) providing the water temperature reaches 68°F, (20°C) in a 30 minute period. **The tower water must not change in temperature more than 0.5°F (0.28°C) per minute.**

A three-way mixing valve (or tower bypass valve) with accompanying temperature controller, as indicated in the Unit Water Piping and Hook-Up section of this document, is recommended to control tower water temperature. This valve could be installed at either the inlet side (diverting flow) or outlet side (mixing flow) of the cooling tower. The sizing of this valve is critical and should be left up to the building piping engineer to properly size the valve so that design chiller flow can be maintained under all operating conditions. Detail of a 3-way mixing valve is shown in Fig. 10.



NOTE

Before commissioning the ParaFlowTM Chiller/Heater, all unit system water piping must be leak checked and flushed. All water strainers must be cleaned after flushing and trapped air vented.

FIG. 10 – PIPING FOR TOWER WATER - THREE-WAY MIXING VALVE

LD05846

SECTION 7 – TOWER WATER TREATMENT

Absorber / Condenser and Evaporator water must be free of corrosive species or inhibited to prevent attack of the waterside tubing. Impurities and dissolved solids can cause scaling that reduces heat exchanger efficiency and causes corrosion of tubes. Corrosion, in turn, can result in more serious problems, such as metal wastage and contamination of the solution and refrigerant if through-wall pitting occurs.

YORK ParaFlow™ Absorption can only deliver design output and efficiency if they are properly operated and maintained. One of the most important elements of proper maintenance is the cleanliness of the tubes to prevent fouling, scaling and corrosion during daily operations and shutdowns.

It is the responsibility of the owner (operator) of this equipment to engage the services of an experienced and reputable water treatment specialist for both the initial charging of the system and its continuous monitoring and treatment. Improperly treated or maintained water will result in decreased efficiency, high operating costs and premature failure due to waterside corrosion.

For water treatment programs to be acceptable, they must protect all exposed metal (i.e., carbon steel, copper and brass) from corrosive attack. The use of corrosion inhibitors must be effective at low concentrations, must not cause deposits on the metal surfaces, and must remain effective under a broad range of pH, temperature, water quality and heat flux. Furthermore, the inhibitor package must prevent scale formation and disperse deposits while having a minimal environmental impact when discharged.

Water samples should be collected and analyzed on at least a monthly basis by the water treatment specialist. A quarterly review with the treatment supplier should address the conditions of the water systems and develop action plans based on these analyses. A third party water consulting company can help oversee the water treatment programs in order to properly protect the physical plant and avoid costly downtime.

It is equally important that the owner (operator) of the equipment performs tube cleaning and inspection of the absorber, condenser and evaporator waterside tubes at the frequencies recommended in the Tube Maintenance Section of the "Preventative Maintenance Schedule" located in manual 155.17-OM1. In addition to periodic cleaning with tube brushes, tubes must be inspected for wear and corrosion. Tube failures usually occur due to corrosion, erosion, and fatigue due to thermal stress. Eddy current analysis and visual inspection by boroscope of all tubes are invaluable preventative maintenance methods. These provide a quick method of determining waterside tube condition at a reasonable cost.

Your local YORK Service Representative will be more than happy to supply any or all of these services.

SECTION 8 – RUPTURE DISK PIPING INSTALLATION

The ParaFlow™ Chiller/Heater will arrive at the jobsite with a factory installed metallic rupture disk. The rupture disk is stainless steel and has a burst rating of 12.0 PSIG +/- 2.0 PSI. This will protect the unit should there ever be a tube rupture, or in the very unlikely event that the unit's refrigerant vapor pressure gets too high. Unlike vapor compression cooling machines that will relieve refrigerant vapor, if the rupture disk bursts, absorption machines could expel a liquid.

Liquid coming out of the rupture disk could be in excess of 300°F. Always run vent piping to a floor drain away from high traffic areas.

The disk is mounted between two special flanges which have been painstakingly checked at the factory for leaks. **Do not loosen the bolts around the flange nor remove the rupture disk for any reason!** The outer flange of the disk has a schedule 80 CPVC pipe stub supplied at the factory for the installer to connect to. (See rupture disk photo in Fig. 11.)

YORK recommends using CPCV or Fiberglass materials for the rupture disk vent piping, unless this is prohibited by local codes. The rupture disk vent piping must be at least the same diameter as the rupture disk itself. **Never** run the rupture disk vent piping at a higher elevation than the rupture disk – doing so will impose an undesirable static head back-pressure, which the unit must first overcome before relieving the internal pressure within the unit. Run the rupture disk vent piping over to a floor drain and terminate about 10 - 12 inches above the drain, as shown in Fig. 11.

Adequate piping supports must be used on the rupture disk vent piping to eliminate all forces and stresses to the disk and flange. These forces could cause premature disk failure or cause the absorption unit to leak in this area.

Due to the high temperatures of an absorption unit during operation, and the expansion and contraction associated with this, the rupture disk vent piping must have a flexible connection coming off the factory supplied CPVC stub, as shown in Fig. 11. The flexible connection must be field supplied by others.

If the installation is for two or more units, **DO NOT** merge the rupture disk piping from the units into a common line. Each absorption unit must have its own individual rupture disk line. However, a common floor drain could be used for more than one absorption unit.

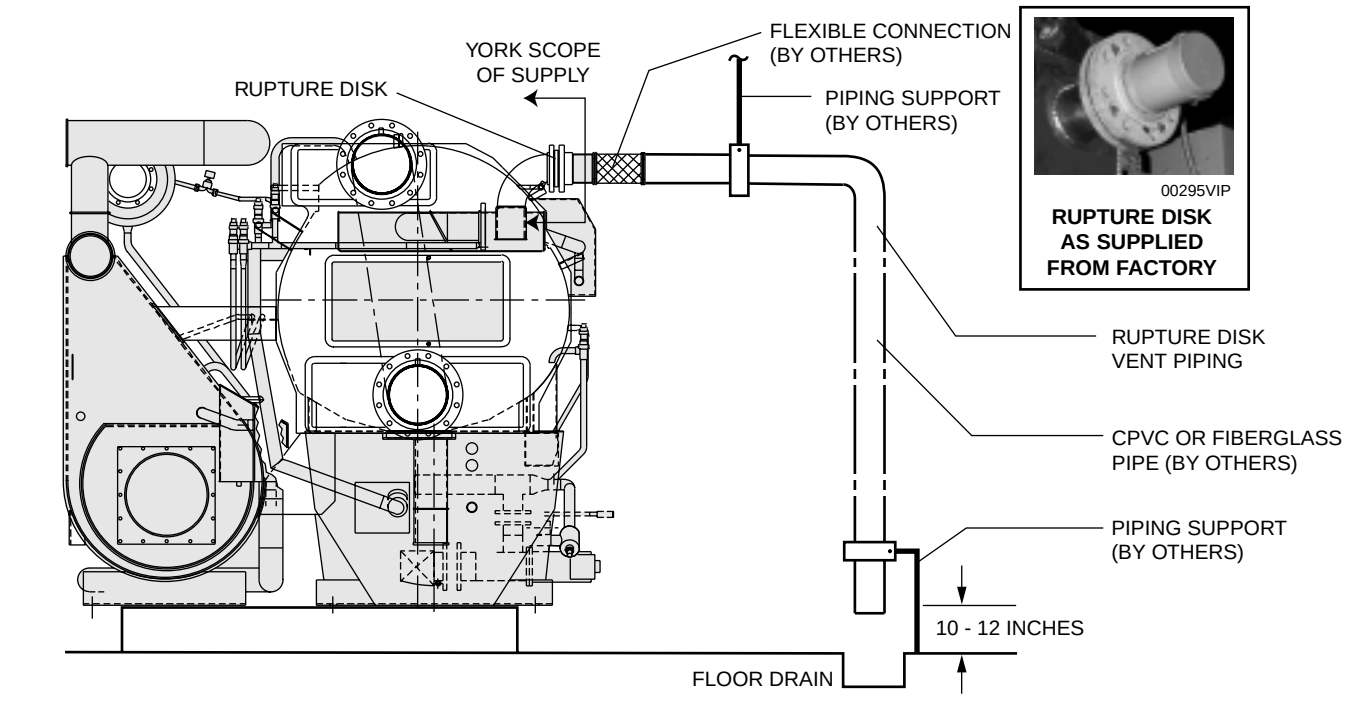


FIG. 11 – TYPICAL RUPTURE DISK VENT PIPING

SECTION 9 – HIGH-TEMPERATURE GENERATOR INLET STEAM PIPING

The YORK ParaFlow™ absorption chiller is nominally rated for dry steam with minimal superheat, and a pressure of 115 PSIG (7.93 bar) at the steam valve. The inlet steam must not have a temperature higher than 363°F (183.9°C) and can not have a saturation pressure higher than 128 PSIG (8.83 bar). The condensate leaves the drain cooler at approximately 15.0 PSIG (2.0 bar) at 180°F (82.2°C).

PRESSURE

Since a lower steam saturation pressure corresponds to a lower temperature in the generator, a ParaFlow™ chiller's available capacity varies with the steam pressure at the steam valve. Therefore, it is important when designing and fabricating the steam inlet piping to keep the pressure drop to a minimum. This is especially important between the steam control valve and the generator inlet head.

FLOW

Steam flow is equally important as steam pressure. Flow is usually measured in pounds per hour (Lbs/Hr.) and refers to the amount of steam being consumed by the unit. To control the steam flow through the chiller, YORK factory supplies a flow setting needle valve on the steam condensate return line.

PIPING

All steam field piping should be installed in accordance with any local, state or federal codes that may apply. Piping should be adequately supported and braced independent of the chiller. The support system must account for the expansion and contraction of the steam piping, avoiding the imposition of strain on chiller components. Steam piping should be designed in accordance with good engineering practice.

A typical steam piping schematic is shown on the next page. **Both steam supply and condensate pipes must be properly sized and pitched to prevent liquid hammering.** Steam mains should be sized in accordance with the required steam flow and acceptable pressure drop. Wherever possible, the steam supply line to the absorption unit should be taken off the main steam supply line from the top side to minimize the possibility of condensate carry-over. Additional consideration should be given to steam flow velocity, especially in those applications where noise is a factor. Generally speaking, steam velocities up to 6,000 fpm (30 m/s) will not produce an objectionable noise level. Always pitch the steam supply line to prevent steam or water hammering.

The factory supplied steam control valve must be installed as close as possible to the high-temperature generator steam inlet flange in order to minimize the pressure drop from the valve exit to the generator inlet.

INLET STEAM PIPING COMPONENTS

The following is a description of each major component on the steam entering side of the steam piping. Refer to the steam piping schematic (Fig. 12) for the actual recommended component location.

Manual Block Valve

This valve is installed to manually shut off the steam supply to the unit, thus allowing ease of service if required.

Automatic Shut-Off Valve

This failsafe valve must be supplied by others. The valve must spring closed to shut 100% of the steam flow off, and be bubble tight. It's purpose is to protect the absorption unit from crystallization in the case of a cycling/safety shutdown or a power failure. The YORK supplied steam control valve will remain in whatever position it happened to be in at the time of a power failure, letting steam flow into the unit. Therefore, a valve that will completely shut-off steam flow to the unit during such a failure is required to keep the unit from crystallization.

The automatic shut-off valve should not be a butterfly-type valve or any other quick opening type valve. Furthermore, it must be installed as close as possible to the YORK-supplied Steam Control valve without eliminating any of the required components between the two valves. If these requirements are not adhered to, during long unit shutdowns the steam caught between the two valves would condensate. Upon unit start-up, a surge of steam coming from the automatic shut-off valve could pick up the condensate and slam it up against the control valve, (water hammer) caus-

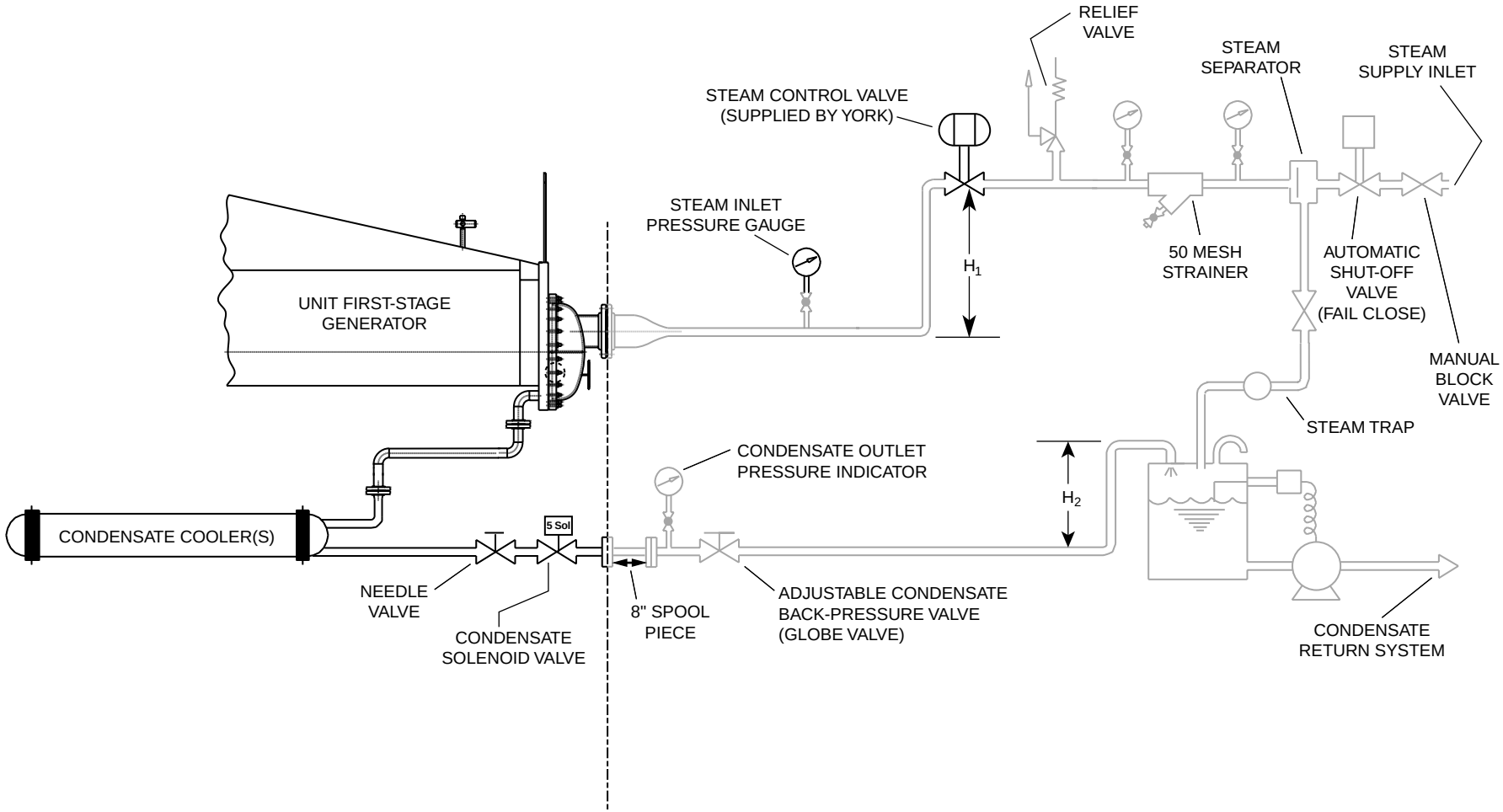


FIG. 12 – STEAM PIPING SCHEMATIC

LD05561

ing damage. In some situations, due to piping arrangements, it may not be possible to locate the automatic shut-off valve close enough to the control valve as specified. In these situations, it is permissible to locate the automatic shut-off valve downstream of the control valve.

Steam Separator

A steam separator should be installed after the automatic shut-off valve. It is used to separate any liquid (condensate) present in the supply steam. This steam condensate should normally be piped through a steam trap, then to the condensate tank. The steam trap (mounted below the steam separator) will prevent any steam from blowing through the separator and into the condensate return system. The use of a steam separator and trap will allow only dry steam to enter the unit at all times.

Steam Strainer

A fine mesh steam strainer (#50 mesh) is used to capture any impurities in the steam supply line. These impurities may manifest themselves in the form of dirt, rust, or precipitates. This strainer will prevent the chiller system components from getting plugged. Plugged components will reduce system capacity and increase maintenance costs. A pressure gauge must be installed just before and after the steam strainer. If the pressure drop as read from these two gauges increases to an unacceptable level, the steam strainer should be removed and cleaned.

Pressure Regulator (Not Shown in Fig. 12)

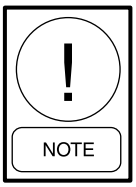
A pressure regulator is not needed in all cases. It is only necessary if the steam supply pressure to the unit will exceed 128 PSIG (8.83 bar). If the steam supply pressure is known to fluctuate, it is recommended that a steam pressure regulator be used.

Pressure Relief Valve

A pressure relief valve set to open at 150 PSIG (8.83 bar) must be installed to protect the high-temperature steam generator shell.

Steam Control Valve

This valve is supplied by the YORK factory and can be found among the unit's shipped loose parts (it is usually packed in a large wooden crate). This valve should be connected to the appropriate wiring harness (also supplied by YORK) and is used to control the amount of steam flow that enters the unit. It should be installed horizontally within 200 inches (5.0 meters) of the first stage generator inlet flange to minimize steam pressure drop between the exit of the valve and the inlet of the generator. (See Fig. 12)



Dimension H_1 is a minimum of 40 inches (101.6 cm) to prevent condensate back-flow from the first stage generator into the steam piping.

SECTION 10 – STEAM CONDENSATE RETURN SYSTEM

Steam condensate return systems should be designed in accordance with good engineering practice for the general purpose of removing condensate from the absorption unit's generator and returning it to the boiler. Always pitch the condensate piping to prevent liquid hammering.

The typical condensate leaving temperature when the absorption unit is running at full load is 180°F (82.2°C) at approximately 15.0 PSIG (204.77 kPa) as measured immediately downstream of the drain solenoid valve.

Refer to the Typical Piping Schematic (Figs. 21 - 25) for a brief description of each component, starting at the unit's condensate drain cooler.

STEAM CONDENSATE DRAIN COOLER

The condensate drain cooler(s) are installed on the unit by the factory. It effectively eliminates the need for an additional condensate cooler or a steam trap.

CONDENSATE FLOW SETTING VALVE

This is a needle valve that is supplied, installed, and set by the factory. It is set to allow the correct amount of steam condensate flow through the valve at full load conditions. Only a skilled and certified YORK Service Technician should adjust this valve during unit start-up.

STEAM CONDENSATE DRAIN SOLENOID VALVE

This NC valve is also supplied and installed by the factory. It is used to insure zero steam flow through the generator shell when the unit is shut down. This valve works in conjunction with the Automatic Shut-Off Valve at the steam inlet.

FLANGE ADAPTER (SPOOL PIECE)

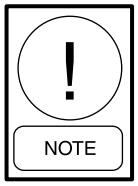
This customer-supplied adapter must be installed at the outlet condensate flange of the unit. A flow meter will be temporarily installed at this location during start-up to fine-tune the condensate flow setting valve.

CONDENSATE OUTLET PRESSURE INDICATOR

(Customer supplied) The pressure immediately before the Condensate Back-Pressure Valve must be read at this location.

ADJUSTABLE CONDENSATE BACK-PRESSURE VALVE

This must be a customer-supplied globe or similar type valve. It is installed downstream of the pressure indicator and used to adjust the condensate back-pressure during start-up. YORK designs all the steam-fired absorption units around a 15 PSIG (204.77 kPa) back-pressure rating for conformity. Therefore, when the unit is running full load, the condensate back-pressure must be set at 15 PSIG (204.77 kPa) to insure the steam flow through the first stage generator is correct to design conditions.



Dimension H_2 on the Steam Piping Schematic (Fig. 12) is a maximum of 33 feet (10 meters). This is the maximum height of piping to prevent excessive back-pressure to the condensate drain cooler.

When designing and installing the steam condensate piping, the condensate system pressure drop downstream of the condensate back-pressure valve must be equal to or lower than 15 PSIG (204.77 kPa). If not, this required setting will not be achievable and not enough steam will flow through the high-temperature generator for unit full load capacity.

The following formula must be used when designing the steam condensate piping:

$$\Delta P\ H_2 + \Delta P\ \text{Piping} + \Delta P\ \text{Valve} = 15.0\ \text{PSIG}$$

Where:

$\Delta P\ H_2$	=	Pressure drop due to height, H_2.
ΔP Piping	=	Pressure drop due to condensate piping, elbows, bends, etc...
ΔP Valve	=	Pressure drop due to condensate system backpressure valve.

SECTION 11 – STEAM / CONDENSATE PURITY

As with the water side of the system, it is the responsibility of the owner (operator) of this equipment to engage the services of an experienced and reputable steam / condensate treatment specialist for both the initial charging of the system and its continuous monitoring and treatment. Improperly treated or maintained steam / condensate will result in decreased efficiency, high operating costs and premature failure due to steam / condensate side corrosion.

Steam / Condensate samples should be collected and analyzed on at least a monthly basis by the treatment specialist. A quarterly review with the treatment supplier should address the conditions of the steam systems and develop action plans based on these analyses. A third party consulting company can help oversee the treatment programs in order to properly protect the physical plant and avoid costly downtime.

It is equally important that the owner (operator) of the equipment performs an inspection of the generator tubes at the frequencies recommended in the Tube Maintenance Section the "Preventive Maintenance Schedule" located in manual 155.17-OM1. In addition to periodic cleaning with tube brushes, tubes must be inspected for wear and corrosion. Tube failures usually occur due to corrosion, erosion, and fatigue due to thermal stress. Eddy current analysis and visual inspection by boroscope of all tubes are invaluable preventative maintenance methods. These provide a quick method of determining waterside / steam generator tube condition at a reasonable cost.

Your local YORK Service Representative will be more than happy to supply any or all of these services.

SECTION 12 – BURNER INSTALLATION (Power Flame Burners)

YORK generally uses the Power Flame Type "C" modulation burner on the ParaFlow™ absorption chiller line. These burners use the principles of pressure atomization for oil and multiple orifice, venturi operation for gas. The total package utilizes the forced draft, flame retention concept. The Type "C" burner is listed and labeled by Underwriters Laboratories, Inc.

The burners range in inputs from 2553 MBH for the smaller S-series models to 10,418 MBH for the larger sizes. They can be fired using either gas (natural or propane) or #2 fuel oil. A gas pilot burner is used for both gas and oil operation. Some burners, even though they may be strictly oil-fired, may require a gas flame ignitor pilot be used instead of electrode flame ignition. Usually any Power Flame burner larger than a CR4-(G)O-25, or a burner that has an oil usage capacity of greater than 60 gpm, requires that a gas pilot be used.

Refer to Appendix A for standard burner information for all model units.

The Power Flame Type "C" burner is a totally packaged and factory tested combustion system offering single unit responsibility. The package incorporates accurate control of the fuel-air ratio throughout the firing range with the resultant controlled flame patterns and clean combustion for maximum efficiency. Combustion air flow is controlled by a double louvered damper assembly. The combustion air is supplied by an integral motor-driven blower, which discharges into the burner blast tube assembly. The air / fuel ratio is established at the time of start-up and proven with combustion test equipment to provide the highest practical carbon dioxide with a clean flame.

All ParaFlow™ standard shipment absorption units have the burner preinstalled at the YORK factory. The units are shipped with the burner pre-wired to the appropriate control panel. A remote fuel oil pump is shipped separately on gas / oil units. Gas train components will always be shipped separately and will require field mounting. A pedestal accompanies the burners ship loose items for field installation under the burner.

MODEL IDENTIFICATION

The numerical suffix after the letter C denotes the burner frame size. The letter R inserted immediately after the letter C denotes an inverted blower configuration.

The alphabetical designation immediately following the frame size indicates the fuels to be used: G is gas only; O, oil only; and GO, is for combination gas/oil.

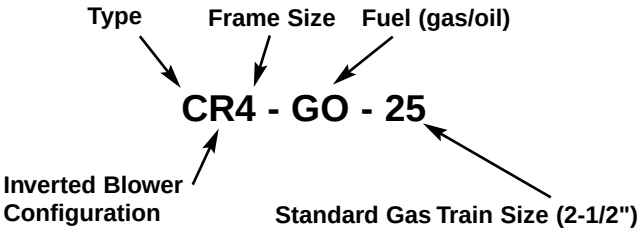
The two numbers following the fuel designation denotes the standard gas train size. (Selected components may be different pipe sizes than the nominal train size coded).

20 - 2" Gas Train

25 - 2-1/2" Gas Train

30 - 3" Gas Train

Example:



The model number listed in the example is depicted throughout this section of the manual. This burner is used on the ParaFlow™ YPC-DF-16G unit. Other burners will vary in physical size but will have the same configuration.

UNPACKING AND HANDLING

ParaFlow™ absorption chillers are shipped with the burner(s) mounted and pre-wired to the appropriate control panel. The gas train and fuel oil pump (if oil burner) are shipped separately and will require field mounting.

Remove the shrink wrap from the burner carefully and check all parts received against the Burner As Built Specification Sheet supplied by the burner manufacturer. This step should have been done at the initial unit inspection. If it has, disregard this step and continue. Components that were not mounted on the burner (ship loose) are designated with an “L” on the sheets. Claims of damage to the burner or shortage must be immediately filed with the carrier. Support the burner with the Power Flame supplied pedestal. Cut the shipping tie-wraps from the U-bolt after the burner is well supported by the pedestal.

The following pages show the typical arrangements and components of the burner and gas trains. Gas units will have similar components, however, all oil components shown will not be present. For specifics on your system, refer to the technical information supplied with the burner.

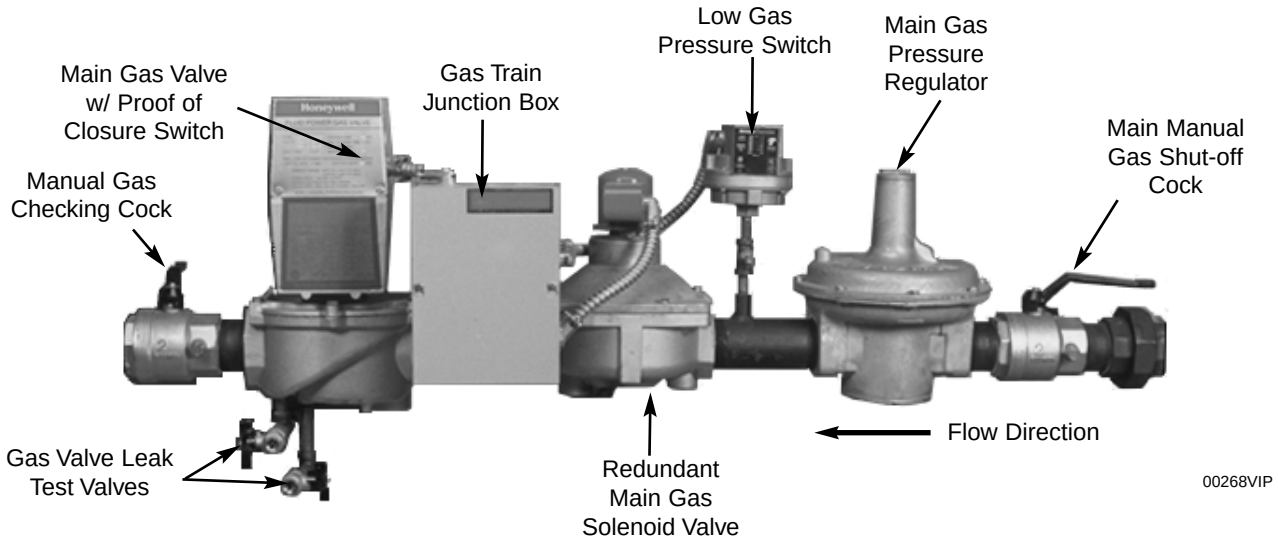
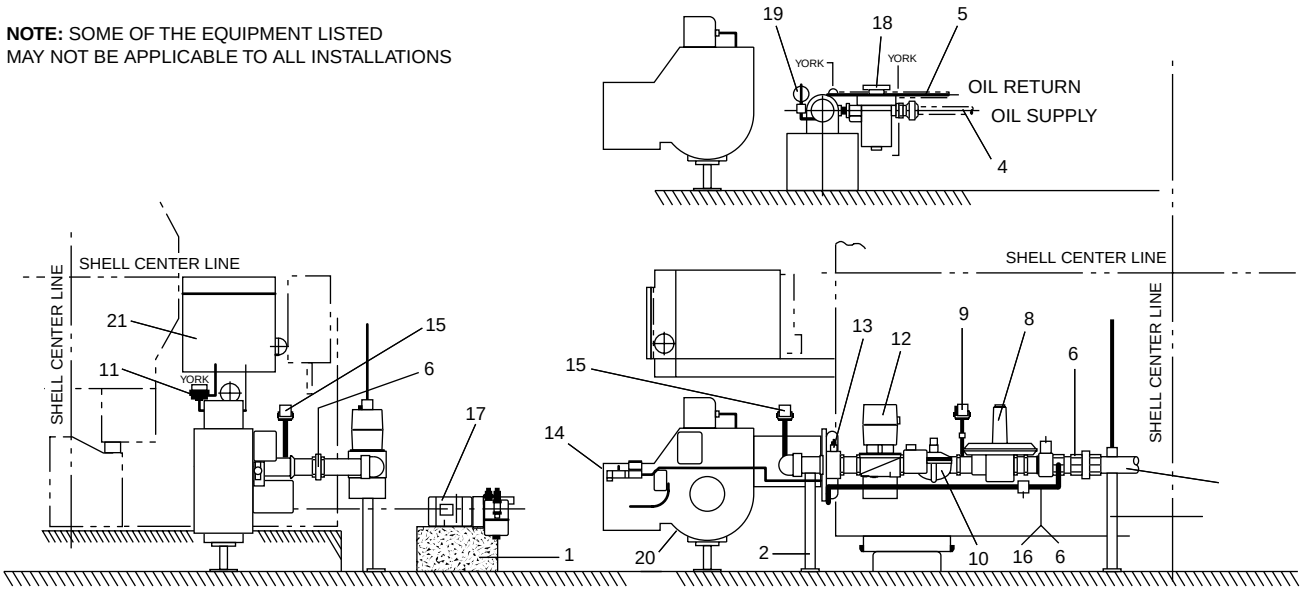


FIG. 13 – TYPICAL GAS TRAIN COMPONENTS

NOTE: SOME OF THE EQUIPMENT LISTED
MAY NOT BE APPLICABLE TO ALL INSTALLATIONS



ITEM	NAME
01	Base (For Oil Pump Unit)
02	Support (For Oil Pump)
03	Gas Supply Piping
04	Oil Supply Piping
05	Oil Return Piping
06	Union
07	Main Gas Shut-Off Cock
08	Main Gas Pressure Regulator
09	Low Gas Pressure Switch
10	Auxiliary Gas Valve
11	Pilot Regulator
12	Main Gas Shut-Off Valve
13	Manual Leak Test Shut-Off Valve
14	Gas Pressure Gauge
15	High Gas Pressure Switch
16	Manual Gas Shut-Off Valve
17	Oil Pump Unit
18	Oil Filter
19	Oil Compound Gauge
20	Burner Unit
21	Burner Control Panel

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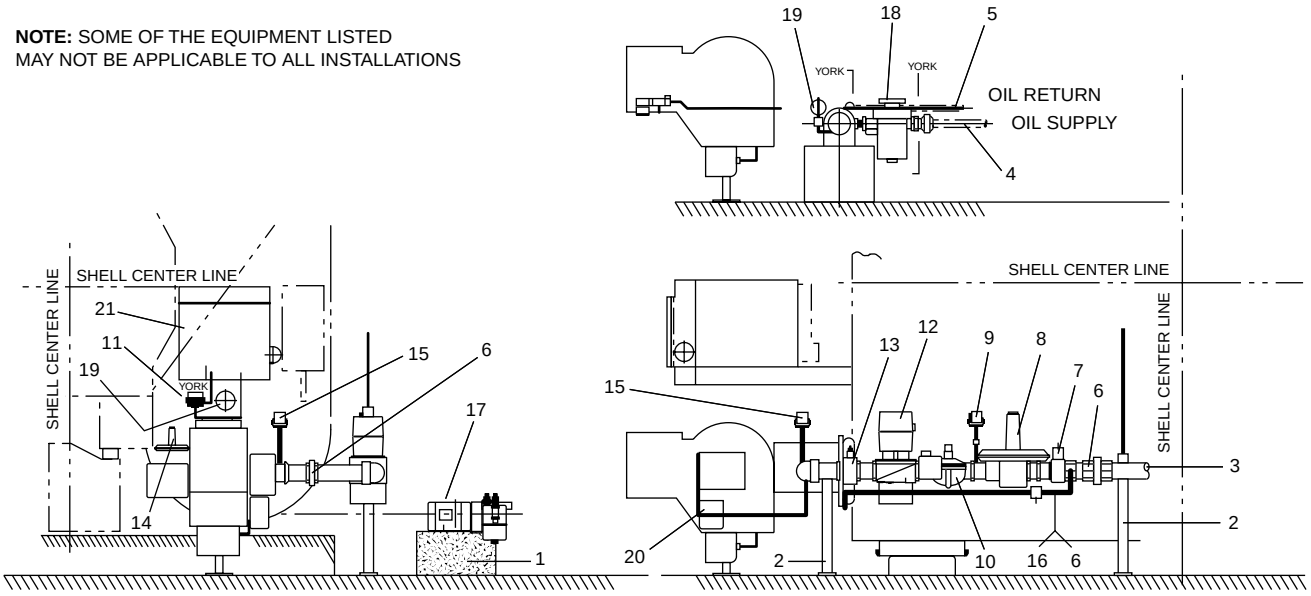
FIG. 14 – TYPICAL BURNER ASSEMBLY FOR DIRECT-FIRED, S-MODEL UNITS

NOTE: SOME OF THE EQUIPMENT LISTED
MAY NOT BE APPLICABLE TO ALL INSTALLATIONS



ITEM	NAME	ITEM	NAME	ITEM	NAME
01	Base (For Oil Pump Unit)	08	Main Gas Pressure Regulator	15	High Gas Pressure Switch
02	Support (For Oil Pump)	09	Low Gas Pressure Switch	16	Manual Pilot Gas Shut-Off Valve
03	Gas Supply Piping	10	Auxiliary Gas Valve	17	Oil Pump Unit
04	Oil Supply Piping	11	Pilot Regulator	18	Oil Filter
05	Oil Return Piping	12	Main Gas Shut-Off Valve	19	Oil Compound Gauge
06	Union	13	Manual Leak Test Shut-Off Valve	20	Burner Unit
07	Main Gas Shut-Off Cock	14	Gas Pressure Gauge	21	Burner Control Panel

LD05308

FIG. 15 – TYPICAL BURNER ASSEMBLY FOR DIRECT-FIRED, G-MODEL UNITS

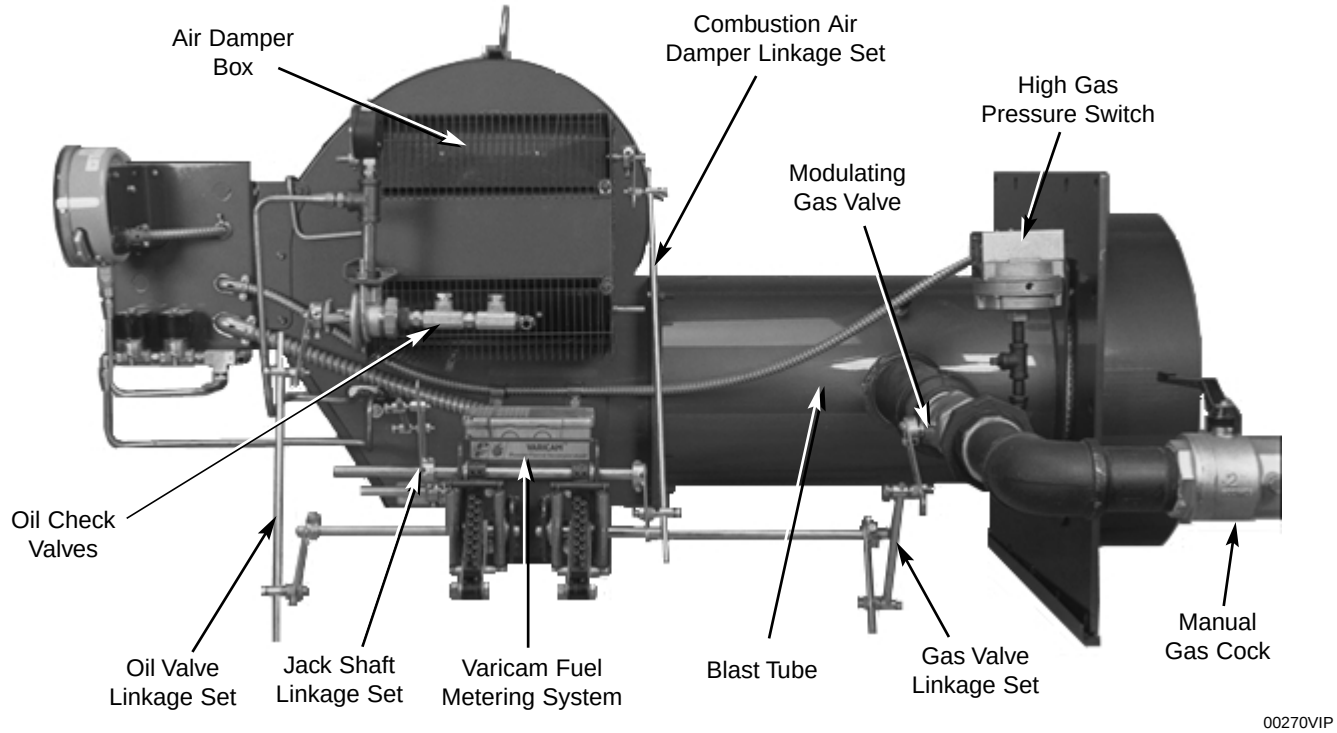


FIG. 16 – TYPICAL BURNER COMPONENTS (RIGHT-SIDE VIEW)

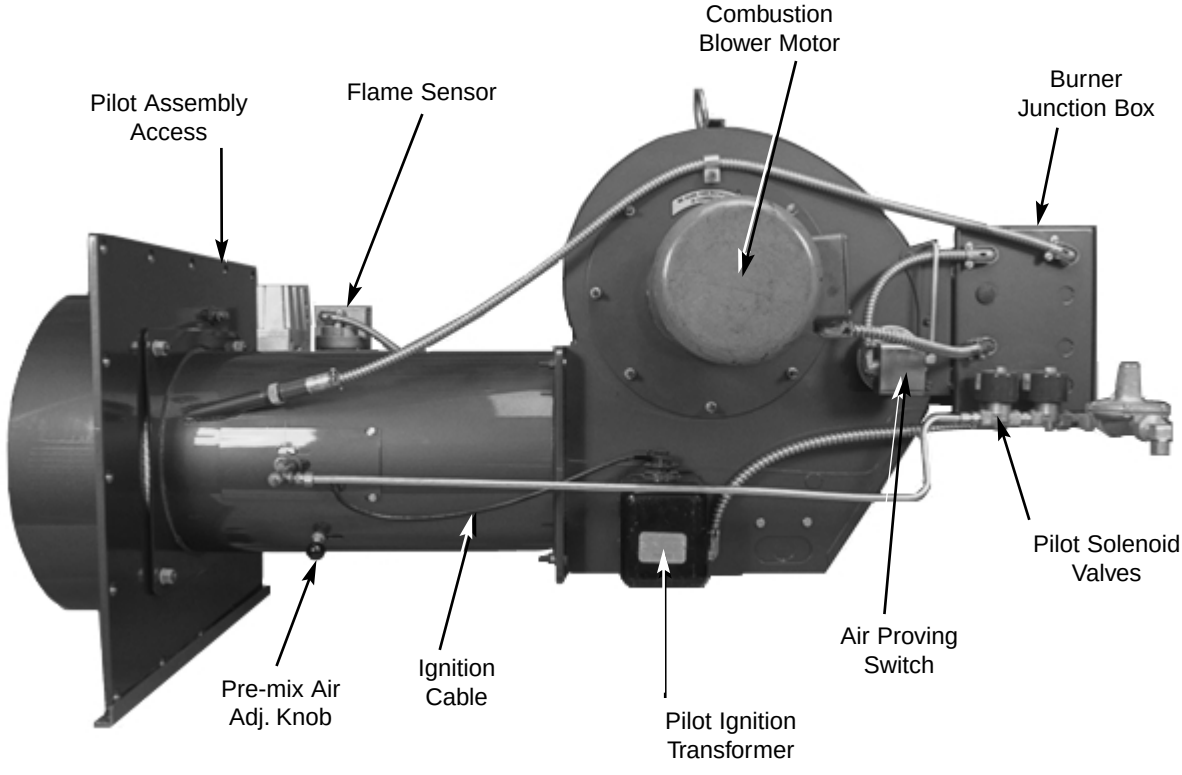


FIG. 17 – TYPICAL BURNER COMPONENTS (LEFT-SIDE VIEW)

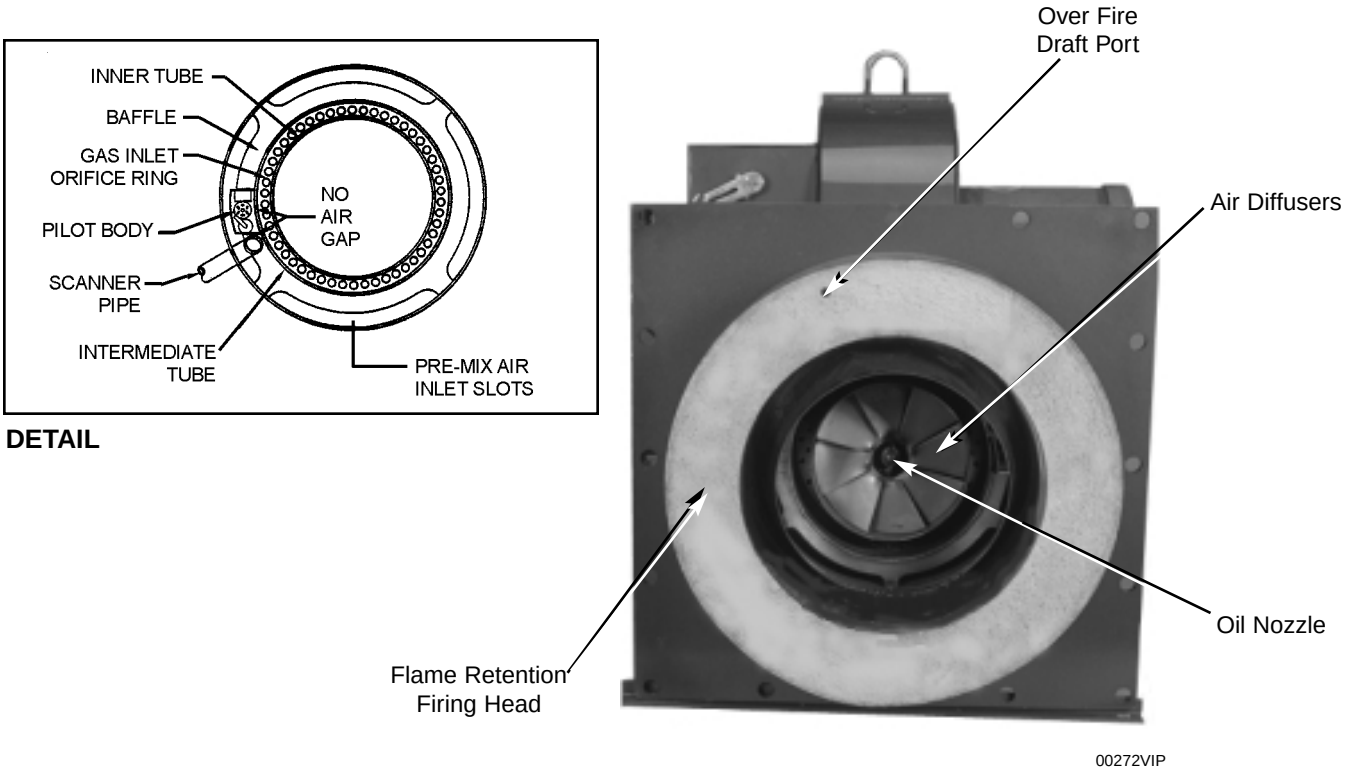


FIG. 18 – TYPICAL BURNER COMPONENTS (FRONT END)

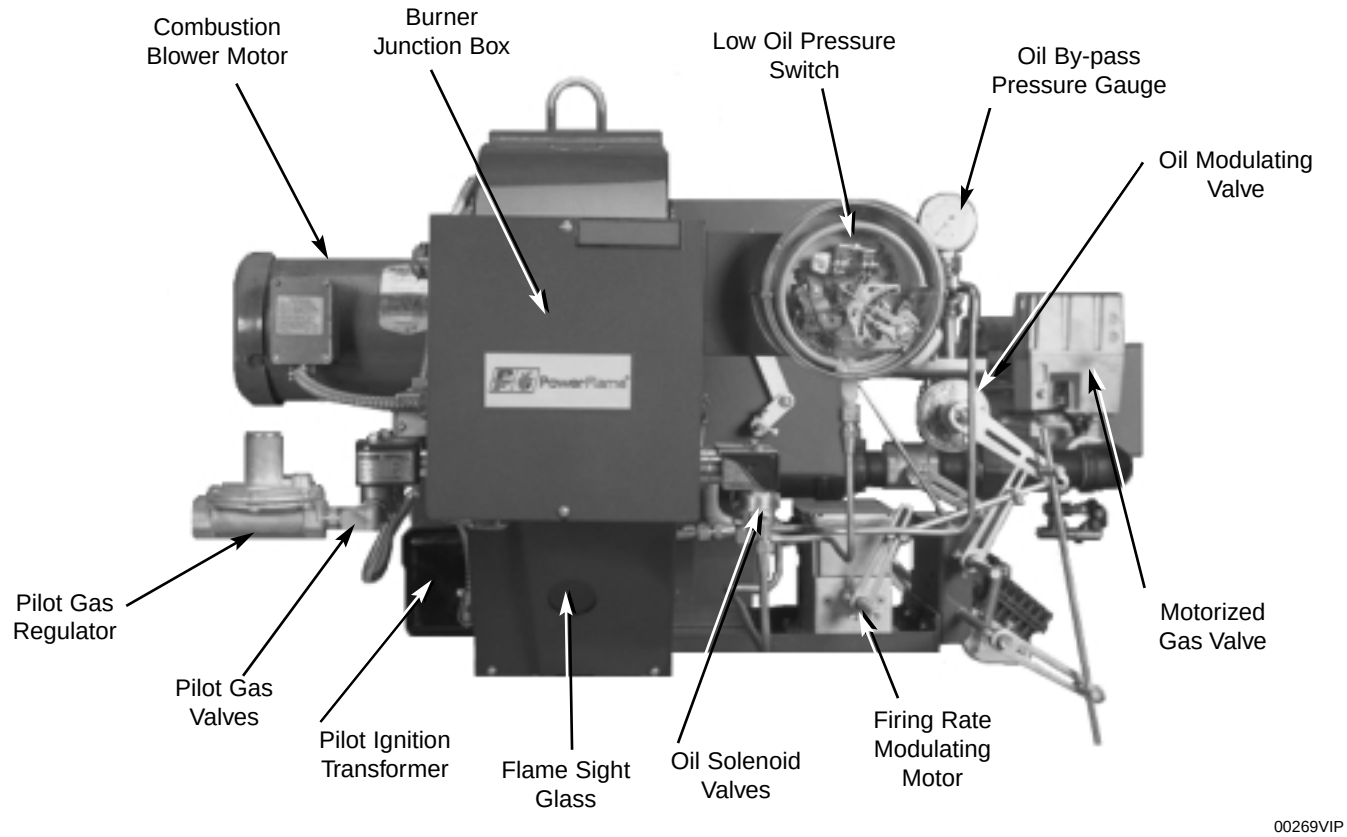
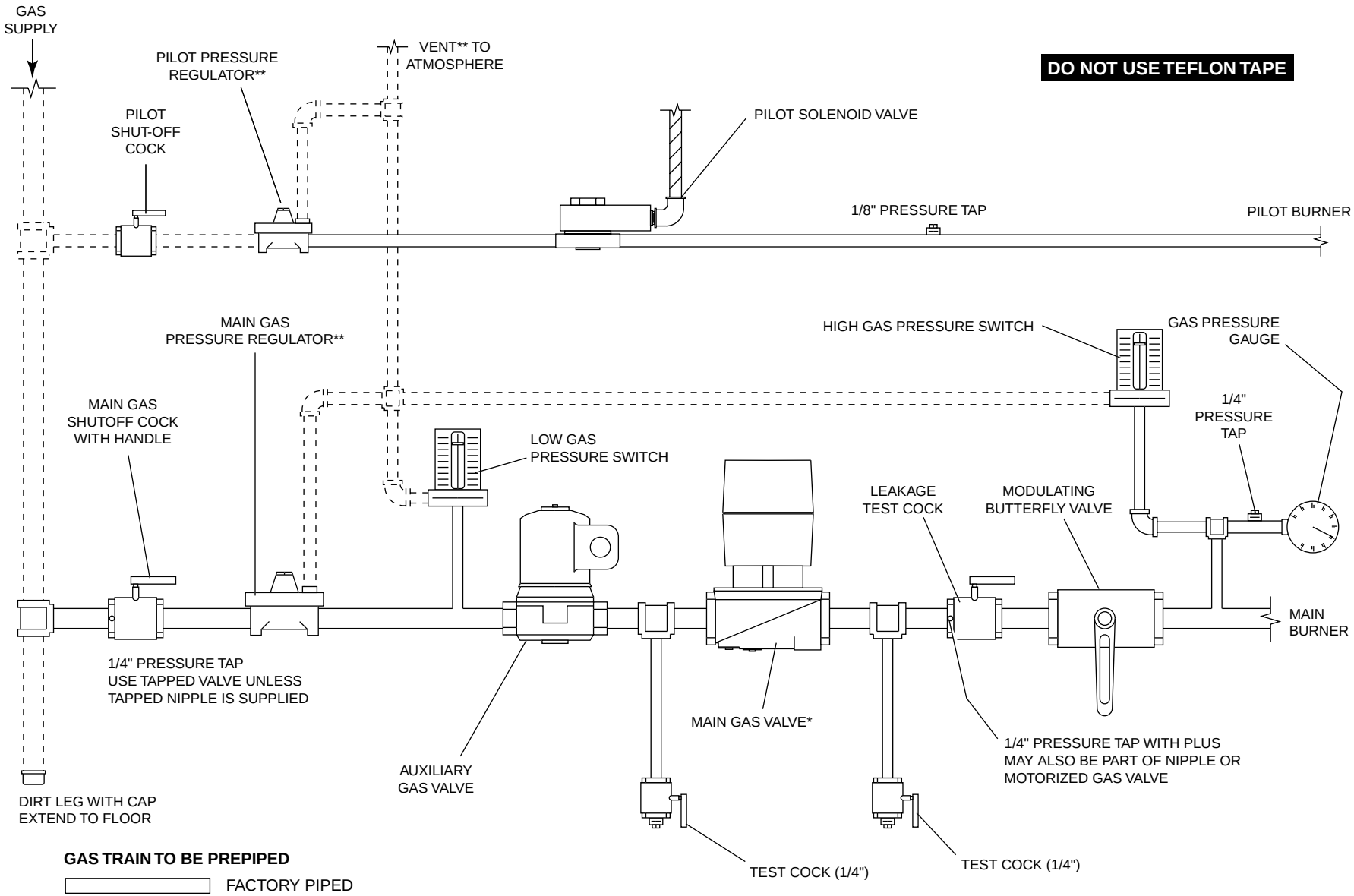


FIG. 19 – TYPICAL BURNER COMPONENTS (BACK END)

FIG. 20 – STANDARD U.L. GAS TRAIN



GAS TRAIN TO BE PREPIPED

FACTORY PIPED

FIELD PIPED

CAUTION: ALL FIELD PIPING MUST BE MOUNTED IN THE PROPER LOCATION AND IN PROPER DIRECTION OF GAS FLOW.

* PROOF OF CLOSURE REQUIRED ABOVE 5,000,000 BTU's

**

COMMON VENT LINE SIZE	REGULATORS
3/4"	RV-53 thru RV-91
1"	RV100, 2100
1-1/4"	RV131, 210 E-J

NOTE: THIS DRAWING DEPICTS YORK INTERNATIONAL "S" STANDARD SCOPE OF SUPPLY. PROJECT SPECIFIC BURNER SUBMITTAL WILL BE SUPPLIED UNDER SEPARATE COVER.

LD05309

SECTION 13 – GAS PIPING DESIGN

DANGER

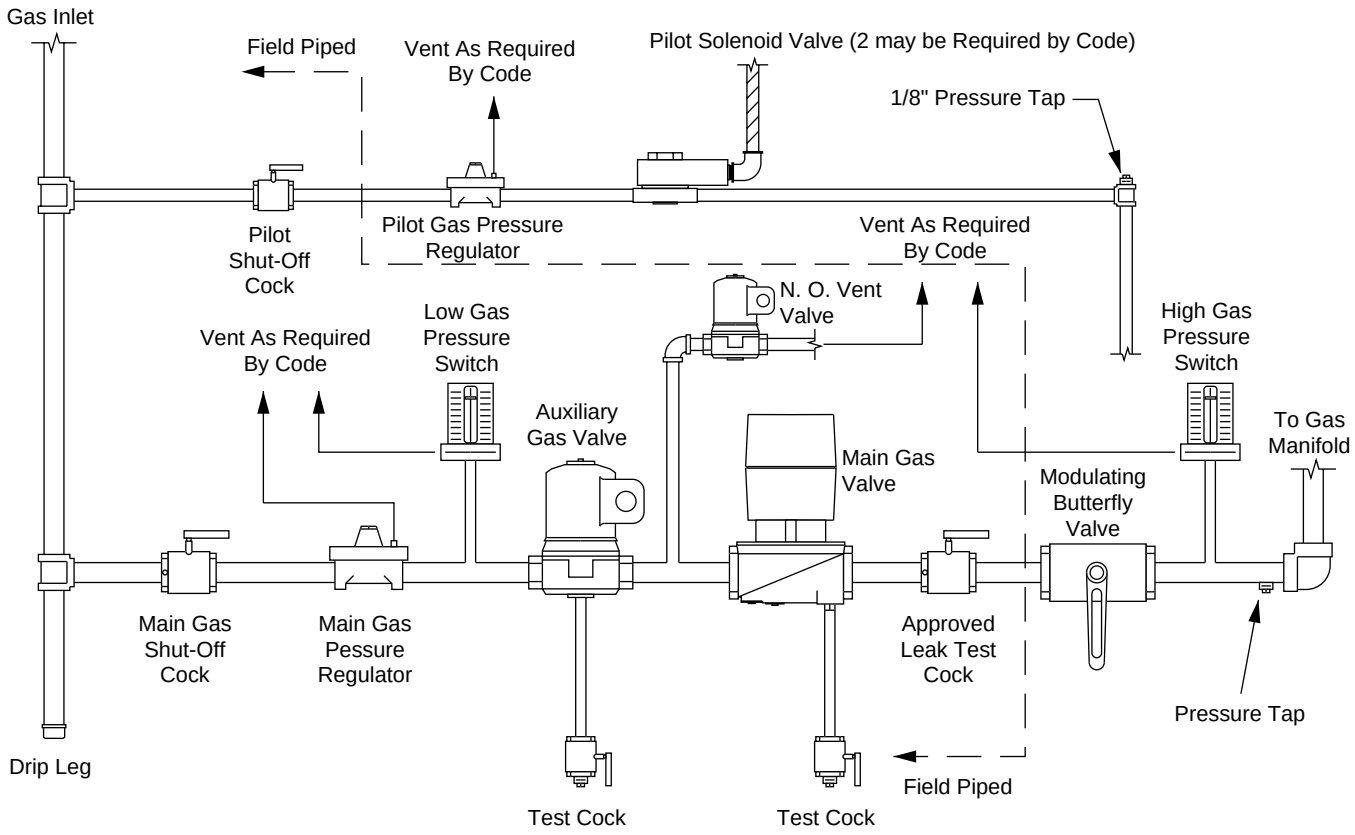
Prior to designing/installing gas piping systems, all national, local, and other applicable codes, restrictions and regulations should be reviewed to ensure total compliance.

Gas piping should be sized to provide required pressure at the burner train inlet manual shut-off cock, when operating at the maximum desired fuel input.

All gas piping should be appropriately pressure tested to ensure leak-free operation. It is mandatory that a drip leg be installed in the gas supply system just ahead of the burner gas train inlet manual shut-off cock. See Fig. 21 below.

When testing with pressures higher than the maximum pressure ratings of the gas train components, be sure to isolate these components and test their piping for gas leaks with correct pressures only. On some burners, the maximum main gas train and/or pilot gas train components pressure is 1/2 PSIG. (14" W.C.).

Refer to the tables in Appendix A at the back of this document for information relating to the sizing of gas supply piping. These tables are based on the general flow characteristics of commercially produced black wrought iron pipe. If in doubt regarding the flow capabilities of a chosen line size, the next largest size is recommended.



CAUTION: All field mount components must be mounted in the proper location and in the proper direction of gas flow.

LD05310

FIG. 21 – TYPICAL SCHEMATIC GAS PIPING

SECTION 14 – OIL PIPING DESIGN

Prior to designing/installing oil piping systems, all national, local and other applicable codes, restrictions, and regulations should reviewed to ensure total compliance.

ParaFlow™ Units are designed for use with #2 fuel oil. A two-pipe system (separate suction and return line) must always be used. The oil pumps are preset at the Power Flame factory with a two pipe system. **The pump warranty will be voided if a one pipe system is installed.**

Do not install manual valves in the return line between the pump and the oil tank unless required by a specific code. If a manual valve is required, an automatic relief valve must be installed across the manual valve to ensure that oil will bypass directly back to the tank in the event the manual valve is inadvertently left in the closed position. It is always best to keep the oil return line at the same level or lower than the oil pump. Excess backpressure may damage the oil pump.

Do not use Teflon tape on any oil piping connections. Rigid pipe connected to the pump may cause excessive vibration. It is recommended that the connection to the pump be of copper tubing, complete with a vibration dampening loop, on both the suction and return lines. Copper tubing with flare fittings or iron pipe is to be used on all installations. All units must utilize the proper size and type of suction line oil filters. **See table of oil filters in Appendix A at the back of this document for proper oil filter usage.**

Some burners, even though they are strictly oil burners, require a gas flame ignitor pilot be used instead of electrode flame ignition. Usually any Power Flame burner larger than a CR4-(G)O-25, or a burner that has an oil usage capacity of greater than 60 gpm, requires that a gas pilot be used.

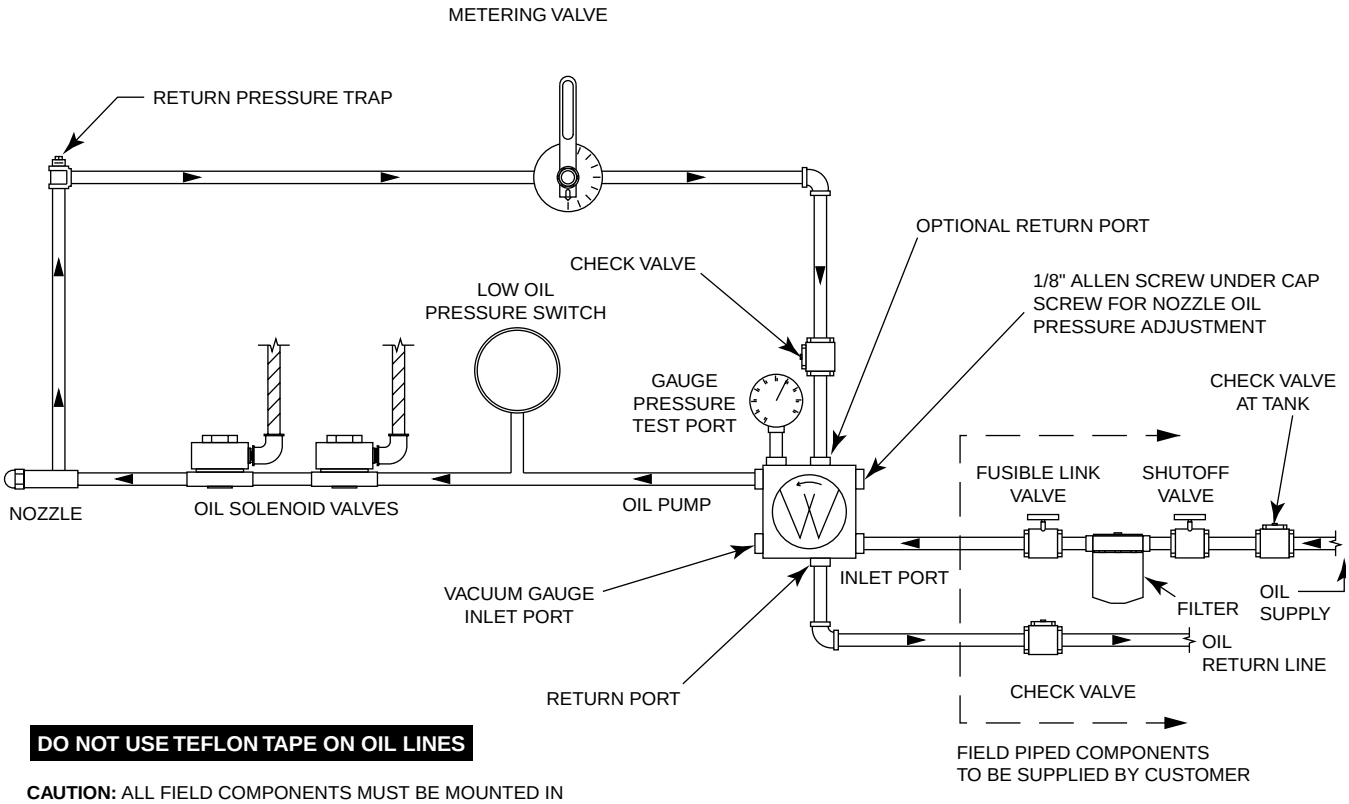
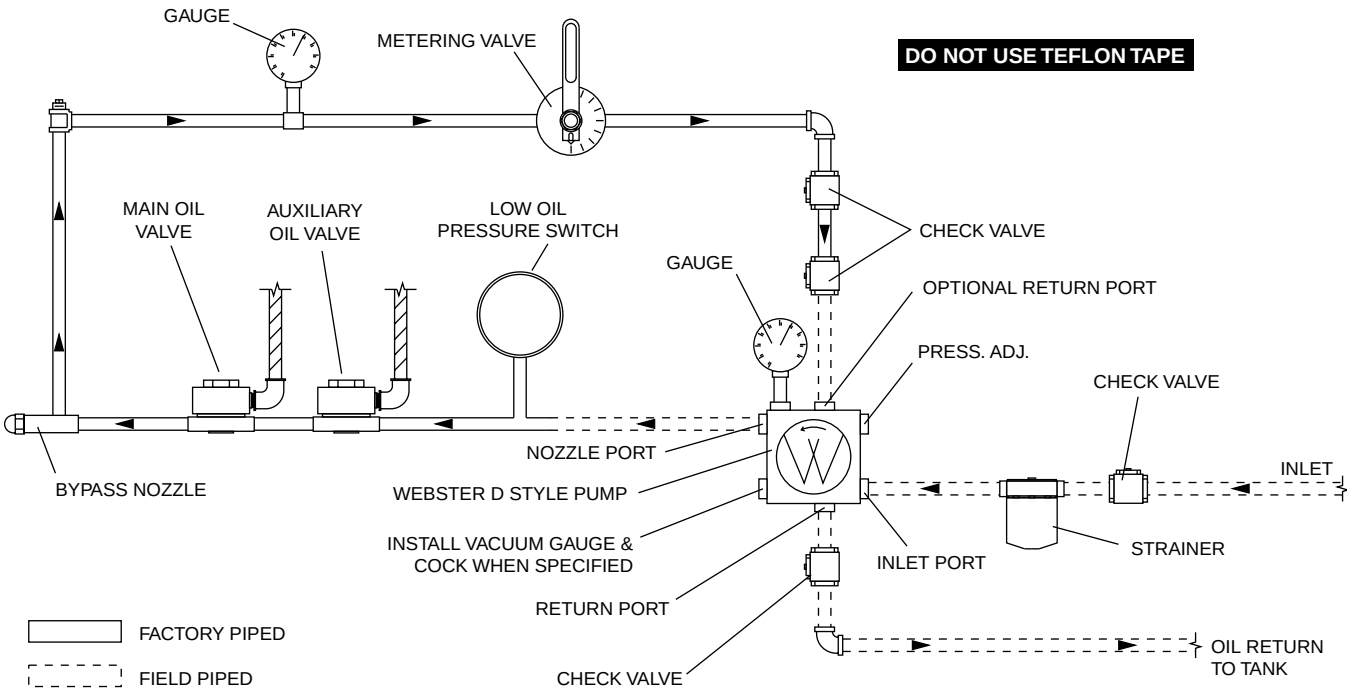


FIG. 22 – TYPICAL SCHEMATIC OIL PIPING



CAUTION: ALL FIELD PIPING MUST BE MOUNTED IN THE PROPER LOCATION AND IN PROPER DIRECTION OF GAS FLOW.

NOTE: THIS DRAWING DEPICTS YORK INTERNATIONAL "S" STANDARD SCOPE OF SUPPLY. PROJECT SPECIFIC BURNER SUBMITTAL WILL BE SUPPLIED UNDER SEPARATE COVER.

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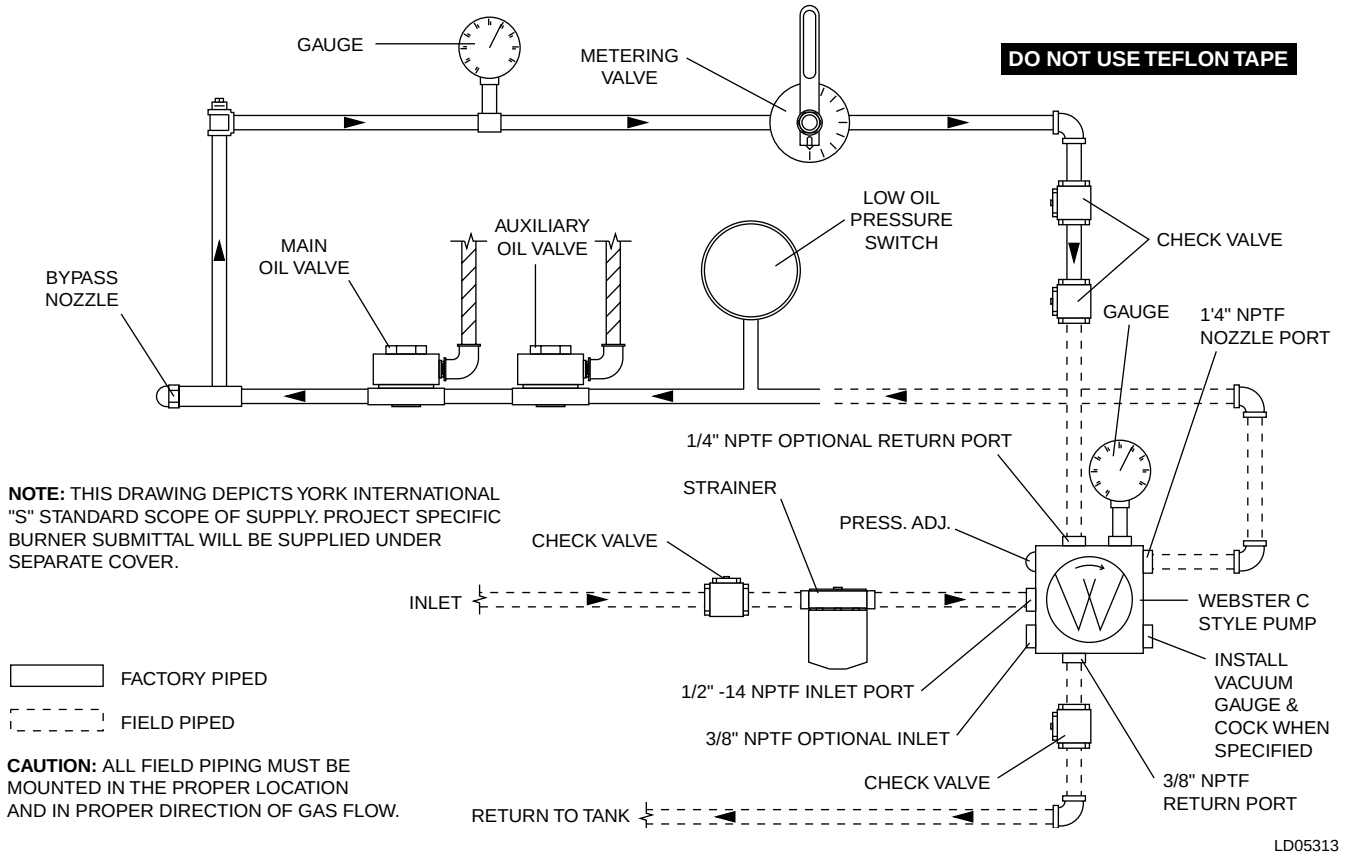
FIG. 23 – OIL PIPING SCHEMATIC FOR WEBSTER “D” STYLE PUMP



NOTE: THIS DRAWING DEPICTS YORK INTERNATIONAL "S" STANDARD SCOPE OF SUPPLY. PROJECT SPECIFIC BURNER SUBMITTAL WILL BE SUPPLIED UNDER SEPARATE COVER.

CAUTION: ALL FIELD PIPING MUST BE MOUNTED IN THE PROPER LOCATION AND IN PROPER DIRECTION OF GAS FLOW.

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FIG. 24 – OIL PIPING SCHEMATIC FOR WEBSTER “C” STYLE PUMP

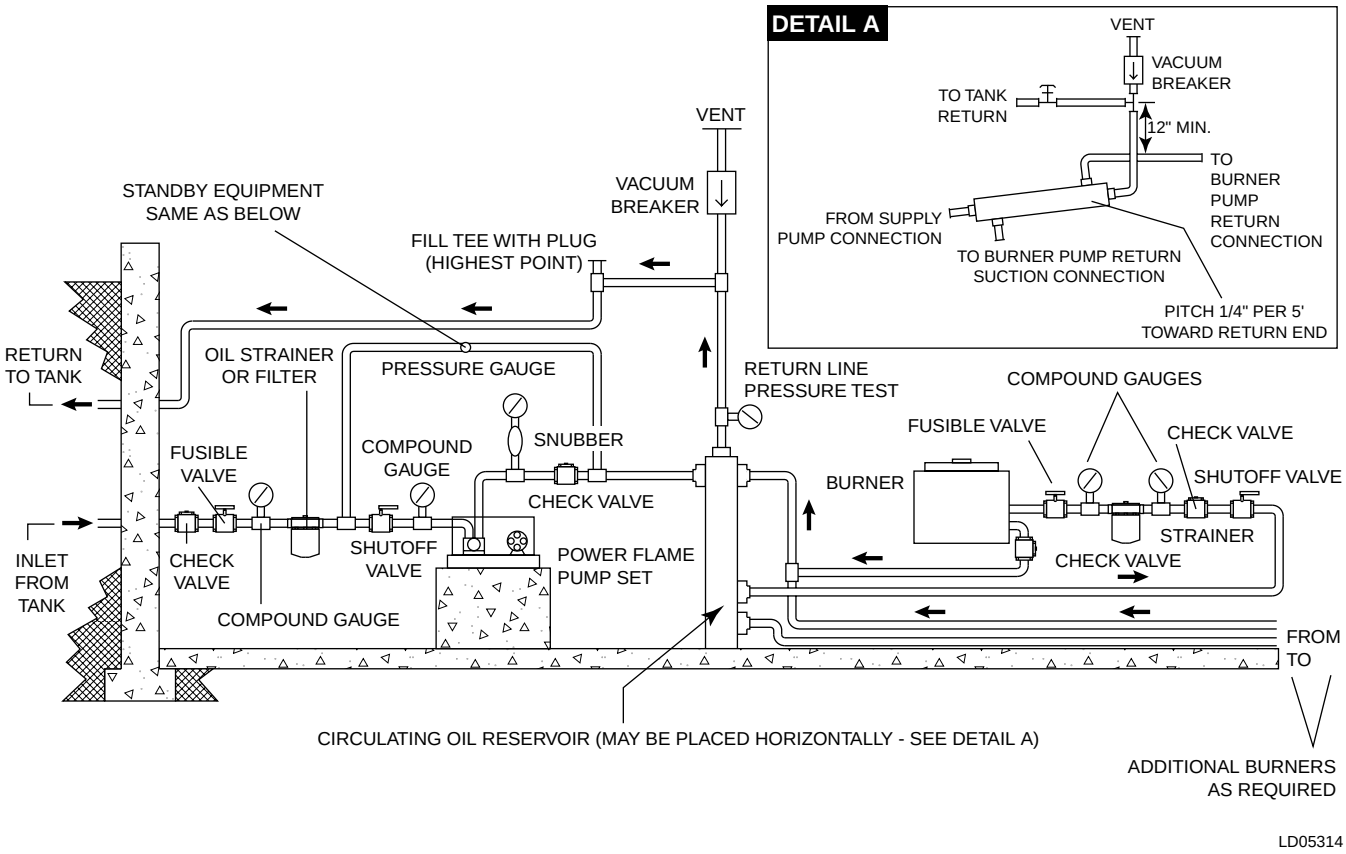

FIG. 25 – TYPICAL OIL PIPING SCHEMATIC FOR MULTIPLE BURNERS

SECTION 15 – OIL LINE SIZING

It is very important to properly size the oil suction line and oil filter, to provide fuel flow to the burner without exceeding 10" suction pressure (vacuum) at the oil pump suction port.

The method to properly size copper tubing is outlined below. Consult the burner manufacturers service department for sizing assistance regarding iron pipe.

Instructions For Using Oil Line Sizing Graphs:

1. Check oil pump “GPH Suction Capacity” from “Absorption Burner Sizes” table or the “Oil Pump Suction Capacity and Filter Selection Chart” in Appendix A at back of this document.
2. Measure total tube length (horizontal and vertical) from the end of the line in the tank to the connection at the oil pump.
3. Choose the appropriate graph based on the tubing size. Read up from the horizontal axis “Total Feet of Copper tubing” to “Suction Capacity in G.P.H.
4. Read to the left until the vertical axis is reached. This is the vacuum required to draw oil through the length of tube selected.
5. If the installation has lift (vertical distance the fuel unit is above the top of the tank), add 1" of vacuum for every 1 foot of lift.
6. Add the two values obtained in steps 4 and 5.
7. If the total obtained in step 6 is over 10" vacuum, move to the next graph to the right (increase tubing size) and re-calculate the total inches of vacuum.
8. These instructions do not allow for any added restrictions, such as the line filter, elbows, sharp corners, check valves, etc. Suction line vacuum values will vary from one manufacturer to another. A good rule of thumb to determine total vacuum for suction line sizing is to add 10% to the vacuum obtained in step 6.

CAUTION

It is always safe to size the return line from the pump to the tank at the same size as the selected suction line.

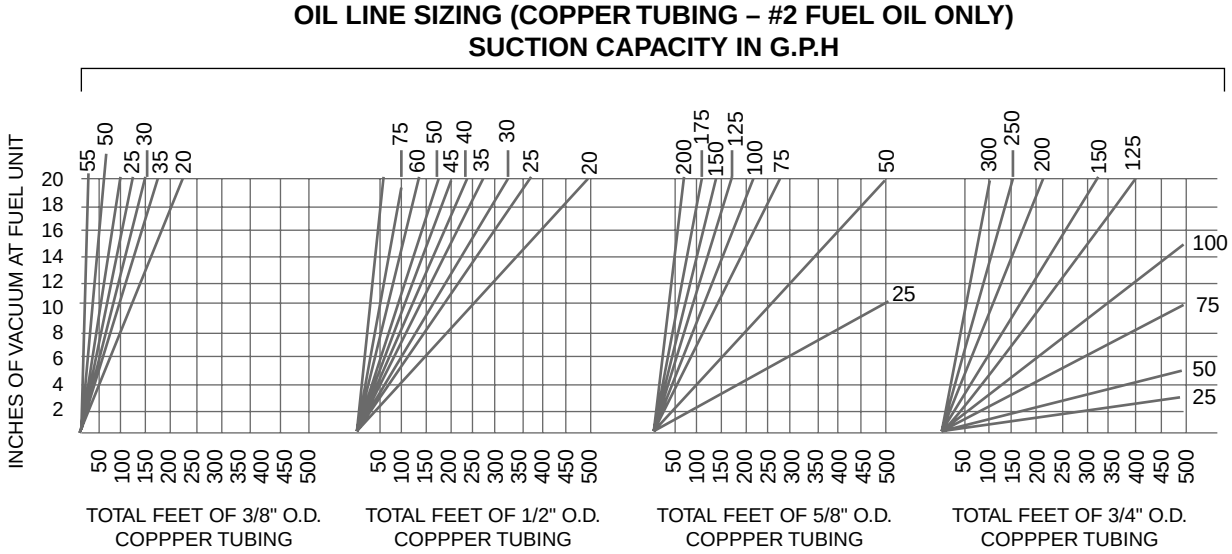

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FIG. 26 – OIL LINE SIZING GRAPHS

SECTION 16 – OIL TANKS

It is recommended that prior to installation, NFPA-31 and all other national, state, local and other applicable codes be reviewed to ensure total compliance with their requirements including, but not necessarily limited to, the use of anti-siphon valve(s), oil safety valve(s) (OSV), or other acceptable means to prevent siphoning of the oil when tank is above burner level. Even if such devices are not required by code, they should be considered good installation practice, and are mandatory when the tank is above the burner level.

If the oil storage tank has been used with fuel heavier than #2 fuel oil, the entire system should be thoroughly cleaned and flushed before filling the tank with the new #2 fuel oil for the first time.

If iron pipe oil lines are used on underground tanks, swing joints utilizing nipples and elbows must be used and joined together, making certain the piping connections are tightened as the tank settles. Keep swing joints in the suction and return lines as close to the tank as possible.

Underground tanks should be pitched away from the suction end of the tank to prevent sediment from accumulating at the suction line entrance. Install the suction line a minimum of 3" from the bottom of the tank.

Before starting up the system, all appropriate air and oil leak tests should be performed. Make certain that the tank atmospheric vent line is unobstructed.

SECTION 17 – COMBUSTION AIR REQUIREMENTS

Fresh air to support combustion, as well as to provide adequate location ventilation, is of great importance. All types of fuel require approximately 10 cubic feet of standard air (sea level at 60°F) per 1000 BTUs firing rate, for theoretical perfect combustion. In actual practice, a certain amount of excess air (usually 20% excess) is required to ensure complete combustion.

As a general rule, 12 standard cubic feet (SCF) of air are required for every 1000 BTU of fuel burned, but this can vary substantially with specific job conditions. In addition, air is lost from the equipment room through barometric dampers, draft diverters, and similar venting devices. Outside air must be brought into the room to make up for these losses.

Ventilation air should be brought in directly from the outside whenever possible. Air supply openings of adequate size must be provided to the equipment room in accordance with local codes and standards. The specific location and size should be sufficient to allow an unobstructed flow of fresh air to the burner.

It is generally accepted that 1/2 square inch of free air opening (for each gas or oil burner in the room) per 1000 BTU/hr firing rate will be adequate. **Under no circumstances should the static pressure in the equipment room become negative (below atmospheric pressure).** Jurisdictional authority relating to combustion air and equipment room ventilation requirements vary widely. In order to make certain of compliance, the controlling authorities should be consulted.

The following is standard field practice and should be used as a minimum. *All confined mechanical rooms and spaces shall be provided with two permanent openings: one commencing within 12 inches (30cm) of the ceiling, and one commencing 12 inches (30cm) from the floor.*

Refer to Fig. 27 for different options.

1. If openings communicate with the outdoors through vertical ducts, each opening must have a minimum free area of 1 square inch per 4,000 BTU/hr (5.5 cm^2 per kW) of the total input rating of all equipment in the mechanical room.
2. If openings communicate with the outdoors through horizontal ducts, each opening must have a minimum free area of 1 square inch per 2,000 BTU/hr (11cm^2 per kW) of the total input rating of all equipment in the mechanical room.
3. If these openings directly communicate with the outdoors (on an outside wall), each opening must have a minimum free area of 1 square inch per 4,000 BTU/hr. (5.5 cm^2 per kW) of the total input rating of all equipment in the enclosure.

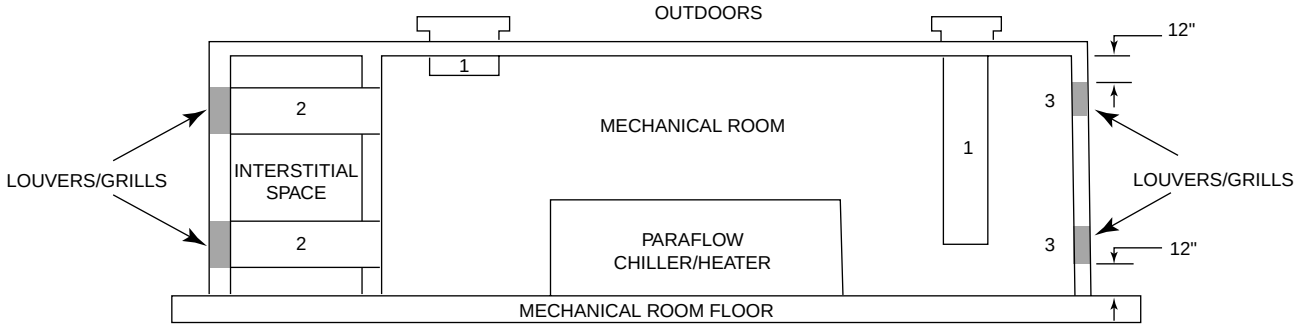

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FIG. 27 – COMBUSTION AND VENTILATION AIR IN MECHANICAL ROOMS

NOTE

If ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect.

LOUVERS AND GRILLS

In calculating free area, consideration is to be given to the blocking effect of louvers, grills and screens protecting the openings. Do not use screens which have a mesh size smaller than 1/4" (6.3 mm).

If the free area through the design of louver or grill is known, use it to calculate the size opening required to provide the free area specified. If this value is not known, the following rules of thumb may be used. *Wood louvers and grills will have 20 - 25% free area and metal louvers and grills will have 60 - 75% free area.*

AIR PROVING SWITCH (optional accessory supplied by others)

On some installations, an additional auxiliary safety interlock switch may be installed and wired into the Power Flame controls circuitry. This safety switch, along with its subordinate controls (motor contactor, pressure regulator, ventilation unit and/or dampers), can be used to ensure ample make-up fresh air is brought into the equipment room from the outdoors at all times when the burner is running.

When the Start signal is sent from the YORK Micro panel to the burner control center, a 180-second timer is started. All circuitry must complete its function within this 180 second time frame so that the burner panel's "Main Flame On" contacts can close. Otherwise, a "Warning – Burner Panel Malfunction" will appear on the YORK panel display and the burner will need to be manually restarted.

Consult the Power Flame "As Built" wiring schematic for location of where the air proving connection terminals are located.

NOTE

It is preferred to interlock all automatic opening louvers, grills, room dampers, or ventilation fans so that they open during unit operation. The temperature of the mechanical room must not drop to a point which may facilitate crystallization in the event of a power failure. All mechanical room openings should be allowed to close during a power failure.

SECTION 18 – SEALED COMBUSTION (Burner Fresh Air Intake Duct Sizing)

Many codes and regulations stipulate a fresh air intake ductwork system for burners. It is the ultimate responsibility of the customer to make sure all national, local and other applicable codes, restrictions and regulations are satisfied in regards to the burner's fresh air intake ductwork.

Due to the many various job-site conditions, materials of construction, and final ductwork design/installation, this section will not address the actual design and details of the ductwork.

If a fresh air intake duct is required for the chiller installation, a burner intake adapter flange kit can be purchased through a Power Flame representative.

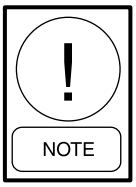
The data found in the "Combustion Air Requirements" table (see Appendix A of this document), will offer the field engineer the air intake requirements for his burner at the proper operating conditions.

For combustion air design temperatures other than what's listed in the "Combustion Air Requirements" table, use the adjustment procedure in the following formula:

$$ACFM = SCFM \times \left[\frac{460 + T_{AIR}\,°F}{537} \right]$$

where:

ACFM – Actual Cubic Feet/Minute (corrected for pressure and temperature)
SCFM – Standard Cubic Feet/Minute (based at 77°F)



An undersized fresh air intake duct will significantly reduce the capacity of the burner and the chiller. If in doubt regarding the air flow capabilities of a chosen duct size, the next largest size duct is recommended.

SECTION 19 – CHIMNEY DESIGN AND DRAFT THEORY

The ParaFlow™ Direct-Fired Chiller-Heater is equipped with a forced draft burner capable of firing on a variety of fuels, including natural gas and/or No. 2 oil and/or propane. As such, the unit will require a properly designed chimney system to control draft and discharge flue gases from the unit to the atmosphere.

DRAFT

The term draft is simply an indicator of how quickly gases (products of combustion) leave the generator's firebox as compared to how quickly combustion air and fuel are put in.

If flue gases are removed faster than fuel and air are put in, the pressure within the firebox will be lower than atmospheric pressure. In this case, there exists a NEGATIVE DRAFT in the firebox.

In contrast, if the rate of fuel and air input is greater than the rate of combustion product removal, there will be a higher pressure in the firebox as compare to atmospheric pressure. In this case, there exists a POSITIVE DRAFT in the firebox.

Draft control serves two important functions for the ParaFlow™ Direct Fired units:

1. It removes the combustion products for the living or work space.
2. Minimizes excess draft, which pulls useful heat out of the unit and lowers its efficiency.

Draft depends on two important factors*:*

1. The temperature difference between the flue gas and the outside air.
2. The height of the chimney.

TEMPERATURE DIFFERENCE

Chimney draft is the force created by the difference in temperature between the flue gases and the outside

ambient air. The magnitude of this temperature difference is directly proportional to the draft created. Temperature differences cause drafts because gases such as air occupy different volumes at different temperatures.

For example:
One cubic foot of air weights 0.0834 lbs. at 0°F (17.8°C). This same cubic foot of air at 450°F (232.2°C) weighs only 0.0422 lbs. The amount of mass per specific volume is referred to as density. Density decreases as temperature increases and lighter (lower density) air rises while heavier (more dense) air sinks.

Heated combustion gases, being less dense than the cooler outside air, rise and flow out the top of the chimney and create a partial vacuum. This causes a negative pressure at the chimney inlet that pulls in more gas for venting. This pulling force is referred to as **chimney draft.**

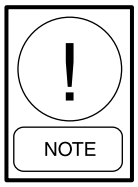
Because ParaFlow™ units are capable of operating in both the heating and cooling modes, the outdoor air temperatures will change significantly from the summer to the winter. These wide temperature swings must be accounted for during burner start-up. The larger the temperature difference, the greater the draft. Therefore, when the unit is operating during the colder months, more draft will be produced. **It is essential that the chimney system be designed using summer ambient conditions so as to avoid undersizing the draft system·**

CHIMNEY HEIGHT

Chimney height is another major factor influencing the intensity of the draft. Generally, the higher the chimney, the higher the draft. Fig. 28 shows the relationship between stack height, temperature, and draft.

The combustion system for the ParaFlow™ Chiller-Heater is engineered to produce a positive gauge pressure at the outlet of the high-temperature generator (the unit is a positive forced draft appliance). The exhaust temperature at the outlet of the high-temperature generator at full load condition will be around 400°F gross temperature(204.4°C) +/- 50°F (23.6°C).

CHIMNEY DESIGN THEORY



It is not the intent of this section to address the fine details of proper chimney design - this must be addressed on an application-specific basis by an experienced designer knowledgeable in chimney systems, draft control and local code requirements. This section is prepared only to identify certain considerations which may bear upon final chimney system configuration, and to provide a brief description of two commonly employed methods of draft control.

For the sake of discussion, it is necessary to define the following terms:

Available Draft (Da)

The draft required at the outlet exhaust flange of the ParaFlow™ high-temperature generator.

Theoretical Draft (Dt)

The natural draft or “chimney effect” produced by the difference in densities of hot exhaust gas relative to cooler ambient air.

Pressure Drop (dP)

Frictional losses in the chimney which act against theoretical draft.

The theoretical draft needed to overcome chimney frictional losses is described as follows:

$$Dt = dP + Da \quad \text{equation 1}$$

In the case of a ParaFlow™ Chiller-Heater, (Da) is negative, resulting in Equation 1 becoming:

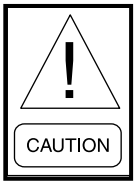
$$Dt = dP - Da \quad \text{equation 2}$$

Proper chimney design balances the theoretical draft (Dt) against the pressure drop (dP) of the chimney system in order to provide the required available draft (Da) at the outlet of the unit under all operating con-

ditions. Because the difference between summer and winter ambient conditions can result in (Dt) variations of 50% or greater, some method of draft control is usually required in order to maintain a steady draft.

Theoretical draft is a function of mean or net chimney gas temperature (always a temperature lower than unit outlet temperature), ambient temperature, ambient barometric pressure and chimney height. It should be noted that this value can vary significantly from summer ambient conditions (when Dt is smallest) to winter ambient conditions (when Dt is greatest). Because ParaFlow™ chiller-heaters are typically required to operate at "high fire" throughout the summer months, **it is important to design the chimney system for summer ambient design conditions to avoid undersizing.**

When designing the chimney, it is recommended to design it for a (Da) of 0 (zero) inches of water column. This will prevent the chimney from becoming pressurized at any point along the flue gas path.



If the stack-chimney pressure is ever above zero (0) inches of water column, there is a chance that flue gases could leak into the equipment room.

WIND AND WEATHER

Windy conditions will tend to increase the draft in the chimney as the wind helps to remove the combustion products leaving the chimney at a much faster rate. However, down draft may occur, causing a temporary positive pressure in the chimney system. The stack may be designed to prevent not only wind, but rain and snow from entering the stack. A flue cap should be installed.

INADEQUATE SYSTEM INSTALLATION

If the diameters of the chimney system are too restrictive, the combustion products and flue gases may not be allowed to leave the system. On the other hand, if the flue passages are too large, the chimney is never given a chance to completely warm due to the large surface area of the flue. This situation may cause poor draft and flue gas condensation.

If the flue gases are allowed to condensate, sulfur dioxide and nitric oxide, along with other nitrogen compounds, will combine with water vapor in the air causing corrosion within the flue pipe and/or chiller firebox. To allow the chimney system to heat up faster, insulation should be installed on all exposed flue piping. Insulation is also a good safety measure (often required by code) as the breeching and flue pipes will heat to temperatures in excess of 400°F.

Chimney design and draft control are topics best handled by experienced engineers. YORK strongly recommends that the installer engage the services of a competent engineer to design the chimney and provide the type of draft control best suited for each application.

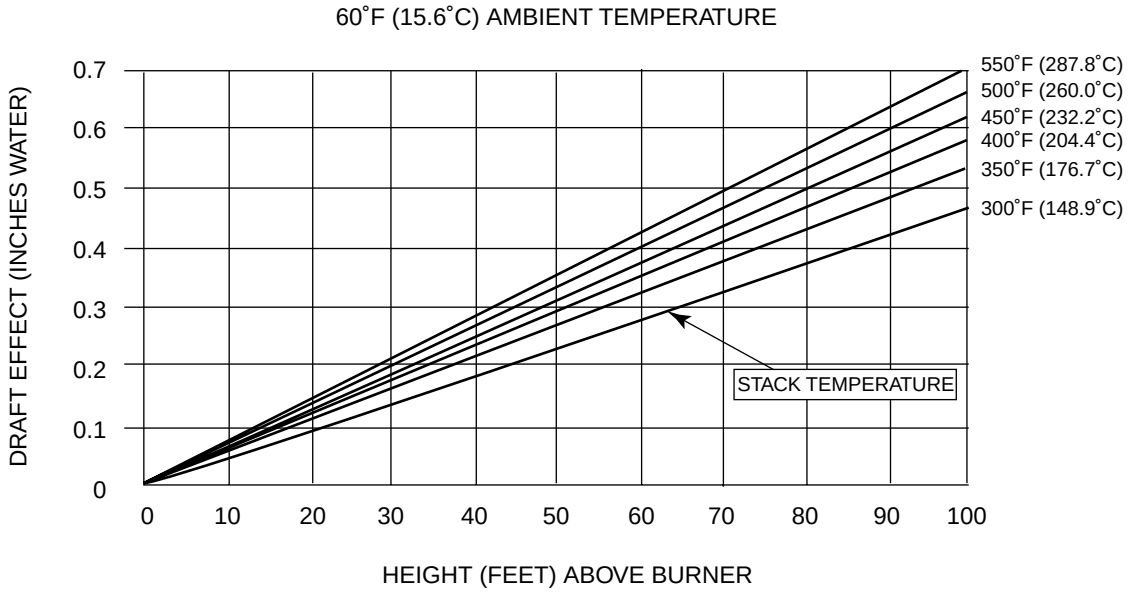


FIG. 28 – THEORETICAL STACK EFFECT

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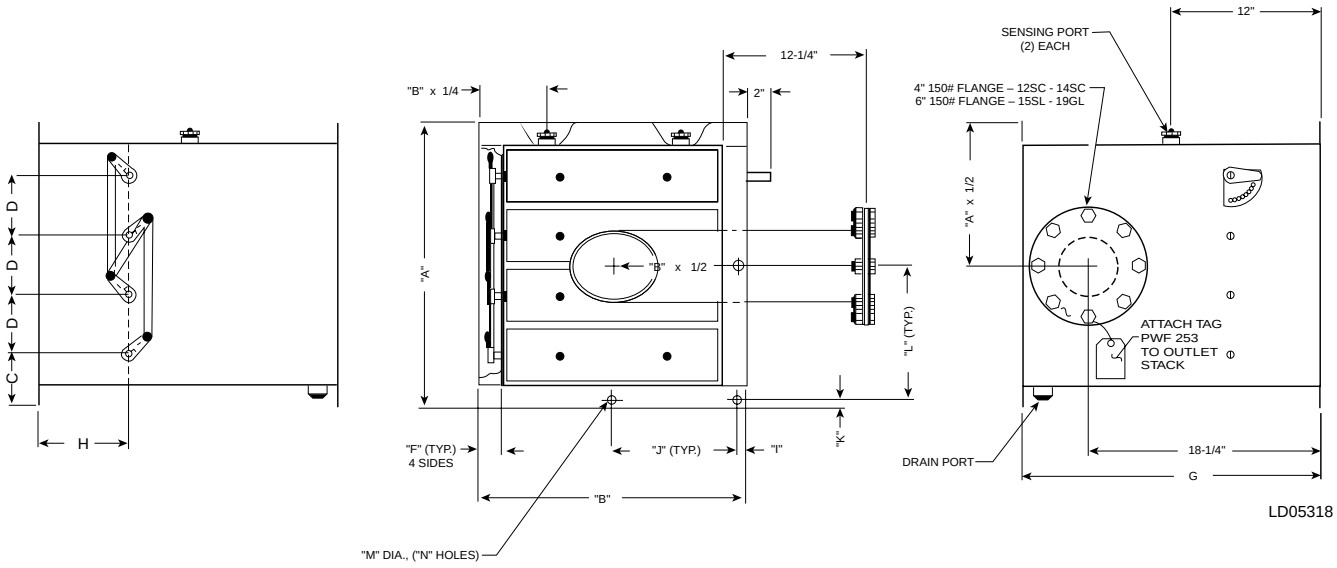
SECTION 20 – DRAFT CONTROL

There are two commonly used ways to maintain the pressure at the outlet of the high-temperature generator. Either manual or automatic/motorized draft control can be used.

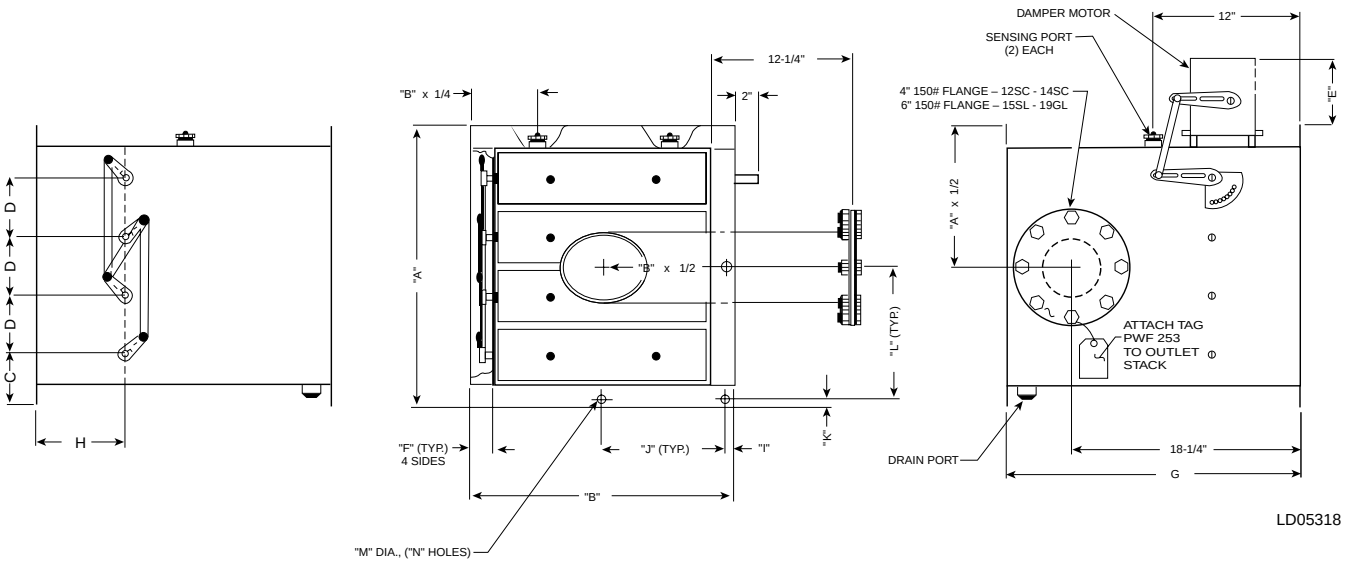
All YORK direct-fired ParaFlow™ chiller/heaters with a Power Flame burner will come standard with a manual backdraft damper. This backdraft damper ships loose for field mounting on the back side of the high-temperature generator (outlet). The damper can be modified for motorized operation either at the YORK factory (if specially ordered that way) or in the field if site conditions require.

Figures 29 and 30 illustrate two different types of manual backdraft dampers. One of these dampers will be supplied by Power Flame and shipped loose with each chiller shipment.



MODEL PF P/N	"A"	"B"	"C"	"D"	"F"	"G"	"H"	"I"	"J"	"K"	"L"	"M"	"N"
12SC/13SC P/N I30000	24-1/2	22-1/2	4-9/16	5-1/8	2	24	5-7/8	3/4	10-1/2	3/4	11-1/2	1/2	8
14SC P/N I30010	24-3/4	22-3/4	4-19/32	5-3/16	2	24	5-7/8	13/16	10-9/16	13/16	11-9/16	1/2	8
15SL/16S P/N I30020	27-1/4	27-1/4	4-23/32	5-15/16	2	24	5-7/8	13/16	12-13/16	13/16	12-13/16	1/2	8
16SL/17S P/N I30030	33-1/8	33-1/8	5-41/64	7-9/32	2	24	5-7/8	13/16	15-3/4	13/16	15-3/4	5/8	8
18S/19S P/N I30040	34-1/2	34-1/2	5-13/16	7-5/8	2	24	5-7/8	13/16	16-7/16	13/16	16-7/16	5/8	8
16G - 18G P/N I30060	26-5/8	26-5/8	4-29/64	5-29/32	1-1/2	24	5-7/8	11/16	6-5/16	11/16	6-5/16	5/8	16
19G/19GL P/N I30060	33-3/8	34-5/8	5-19/64	7-19/32	1-1/2	24	5-7/8	3/4	6-5/8	3/4	6-3/8	5/8	20

FIG. 29 – MANUAL BACKDRAFT DAMPER WITH FGR CONNECTION



MODEL PF P/N	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"	"M"	"N"
12SC/13SC P/N I30000	24-1/2	22-1/2	4-9/16	5-1/8	6-11/16	2	24	5-7/8	3/4	10-1/2	3/4	11-1/2	1/2	8
14SC P/N I30010	24-3/4	22-3/4	4-19/32	5-3/16	6-11/16	2	24	5-7/8	13/16	10-9/16	13/16	11-9/16	1/2	8
15SL/16S P/N I30020	27-1/4	27-1/4	4-23/32	5-15/16	6-11/16	2	24	5-7/8	13/16	12-13/16	13/16	12-13/16	1/2	8
16SL/17S P/N I30030	33-1/8	33-1/8	5-41/64	7-9/32	6-11/16	2	24	5-7/8	13/16	15-3/4	13/16	15-3/4	5/8	8
18S/19S P/N I30040	34-1/2	34-1/2	5-13/16	7-5/8	6-11/16	2	24	5-7/8	13/16	16-7/16	13/16	16-7/16	5/8	8
16G - 18G P/N I30060	26-5/8	26-5/8	4-29/64	5-29/32	6-11/16	1-1/2	24	5-7/8	11/16	6-5/16	11/16	6-5/16	5/8	16
19G/19GL P/N I30060	33-3/8	34-5/8	5-19/64	7-19/32	6-11/16	1-1/2	24	5-7/8	3/4	6-5/8	3/4	6-3/8	5/8	20

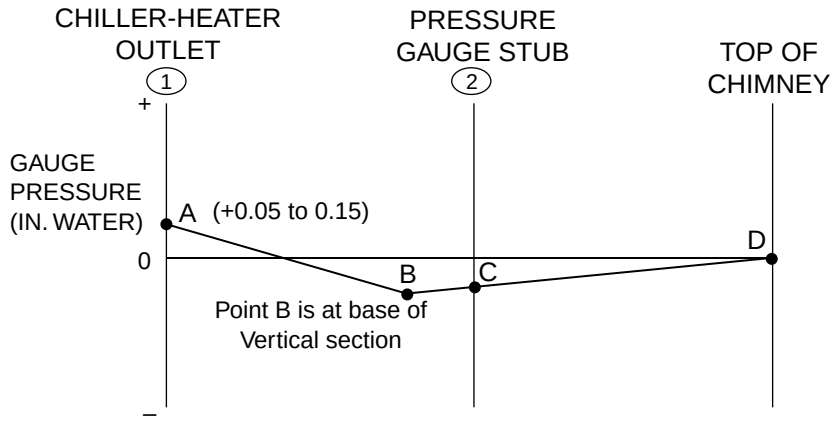
FIG. 30 – MOTORIZED (FOR SEQUENTIAL DRAFT CONTROL) BACKDRAFT DAMPER WITH FGR CONNECTION

SECTION 21 – BAROMETRIC DAMPERS

The Barometric Control Figure and Graph depict a simple yet effective means of controlling draft with maximum economy employed in the chimney design. With this system, a barometric draft regulator (field supplied) is used in series with a manual backdraft damper (factory supplied – see previous pages). A barometric damper is suitable for applications where each gas-fired appliance will have its own dedicated chimney.

YORK will not be responsible for costs associated with retrofitting dampers to improperly designed chimneys. With maximum economy employed in the chimney design, **Dt** would exactly equal **dP - Da** (eq. 2) during summer design ambient conditions with the barometric regulator closed. In reality, some degree of conservatism should exist in the design, causing the barometric draft regulator to be open slightly even during summer design conditions. As ambient temperatures drop, (Dt) would increase. If not for the barometric draft regulator in place, mechanical room air is introduced into the chimney as in response to the increased draft, thus stabilizing the gauge pressure just upstream of the barometric regulator. Most barometric regulators can maintain -0.06 inches water gauge pressure when properly sized for a particular application.

With the gauge pressure thus stabilized just upstream of the barometric regulator, the manual backdraft damper can be adjusted to a fixed position which will provide the proper resistance or pressure drop to yield a sufficient steady burner flame.



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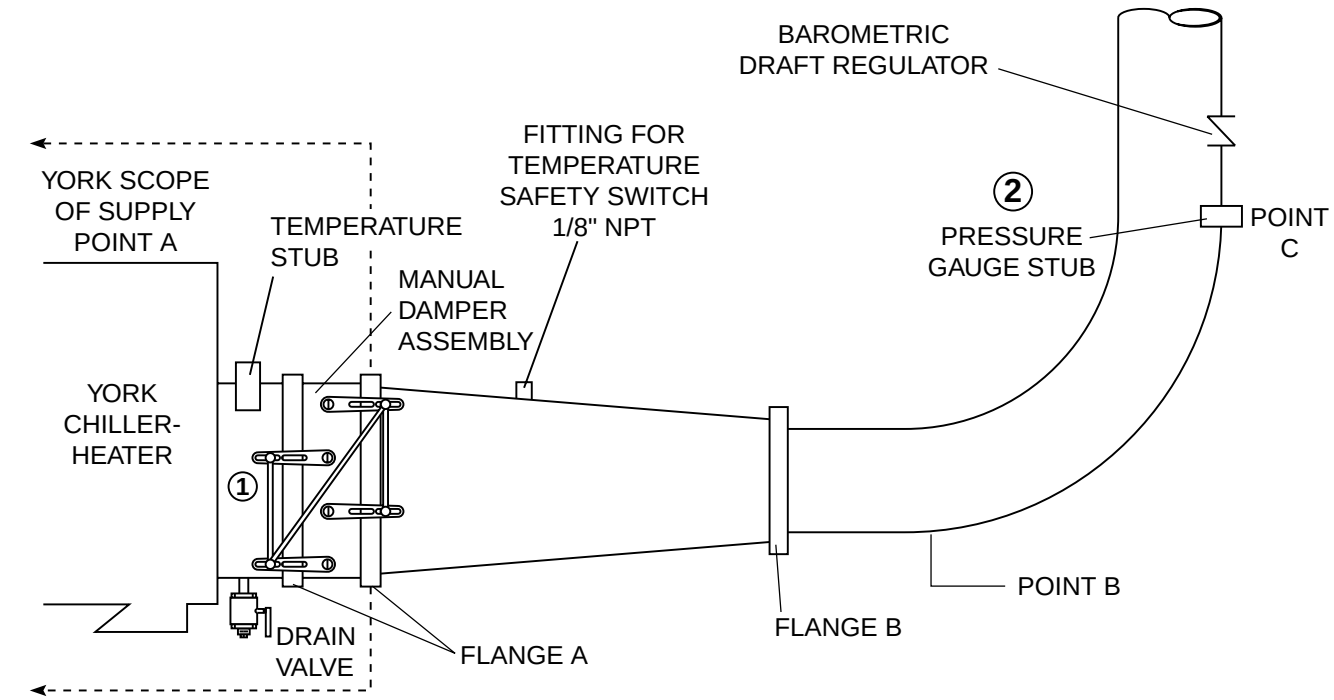
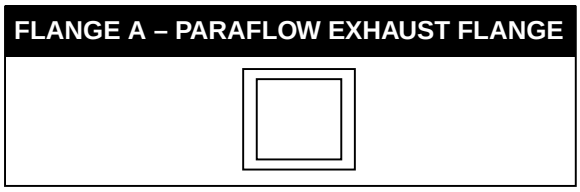
NOTES:

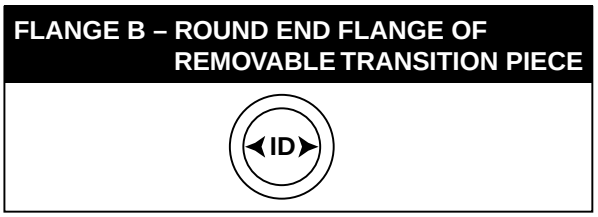
1. dP between A and B due to transition piece and properly positioned manual backdraft damper. Damper adjusted to maintain +0.05 to 0.15 in. water at A.
2. Maximum draft (minimum gauge pressure) occurs at base of vertical section of chimney (B). Barometric regulator will maintain steady gauge pressure at (C). Maximum gauge pressure attainable with a barometric draft regulator is typically -0.06 in. water.

FIG. 31 – GAUGE PRESSURE PROFILE / CHIMNEY SYSTEM WITH BAROMETRIC CONTROL





(DIMENSIONS PER SUBMITTAL INFORMATION,
OR SEE APPROPRIATE YORK FORM)



(ID DETERMINED BY CHIMNEY SYSTEM DESIGNER)

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FIG. 32 – BAROMETRIC CONTROL

SECTION 22 – SEQUENTIAL DRAFT CONTROL (Motorized Draft Control)

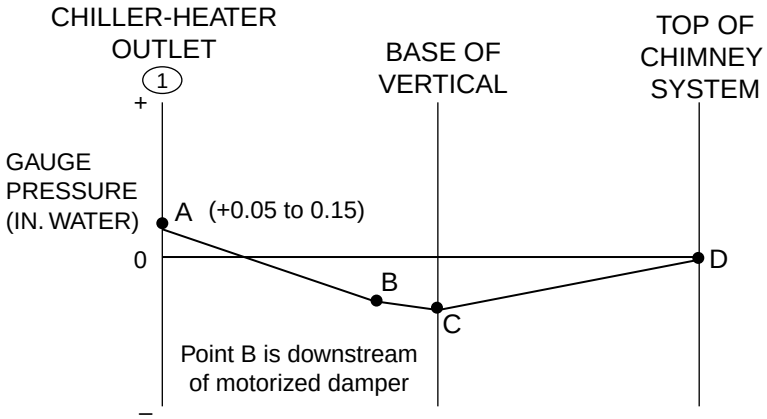
Figures 33 and 34 depict a sequential draft control system. This type of system incorporates an actuator motor mounted on top of the damper assembly. The actuator arm is connected to the damper blades through a linkage system to automatically open or close the damper blades. The actuator receives a signal from a separately mounted "Overfire Draft Control Panel" that constantly monitors the present draft at the outlet of the first stage generator. The signal to the actuator motor constantly adjusts the damper blades to provide the available draft required per burner loading.

Motorized draft control is suitable for applications where multiple gas-fired appliances will be ducted into one common chimney system. In this case, each unit will require its own draft control system. (Motorized draft control may be used for one unit/one chimney applications, if desired, over the standard barometric damper control).

When multiple ParaFlow™ Chiller-Heaters are to be ducted into a common breeching or chimney system, it is recommended that separate draft control system be provided for each unit.

BACKDRAFT DAMPER

The YORK supplied manual backdraft damper can be modified (in the factory if ordered, or in the field) to mount the motor driver. The motor is controlled from a draft control panel which senses the pressure at the outlet of the high-temperature generator. The draft control panel is available from YORK to ship with the chiller (see Fig. 30 for drawing of the motorized damper). The panel is wired to the burner panel and damper motor in the field, and the pressure is sensed through a small line field-connected to the outlet of the chiller-heater.



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NOTES:

1. dP between A and B due to transition piece and motorized damper. Damper automatically controls to maintain +0.05 to 0.15 in. of water at A. The actual dP is variable and depends on the momentary gauge pressure C.
2. Maximum draft (minimum gauge pressure) occurs at base of vertical section of chimney (C). With sequential draft control, this valve is allowed to drift with prevailing ambient conditions. Motorized damper controls to maintain steady gauge pressure at A.

FIG. 33 – GAUGE PRESSURE PROFILE / CHIMNEY SYSTEM WITH SEQUENTIAL DRAFT CONTROL

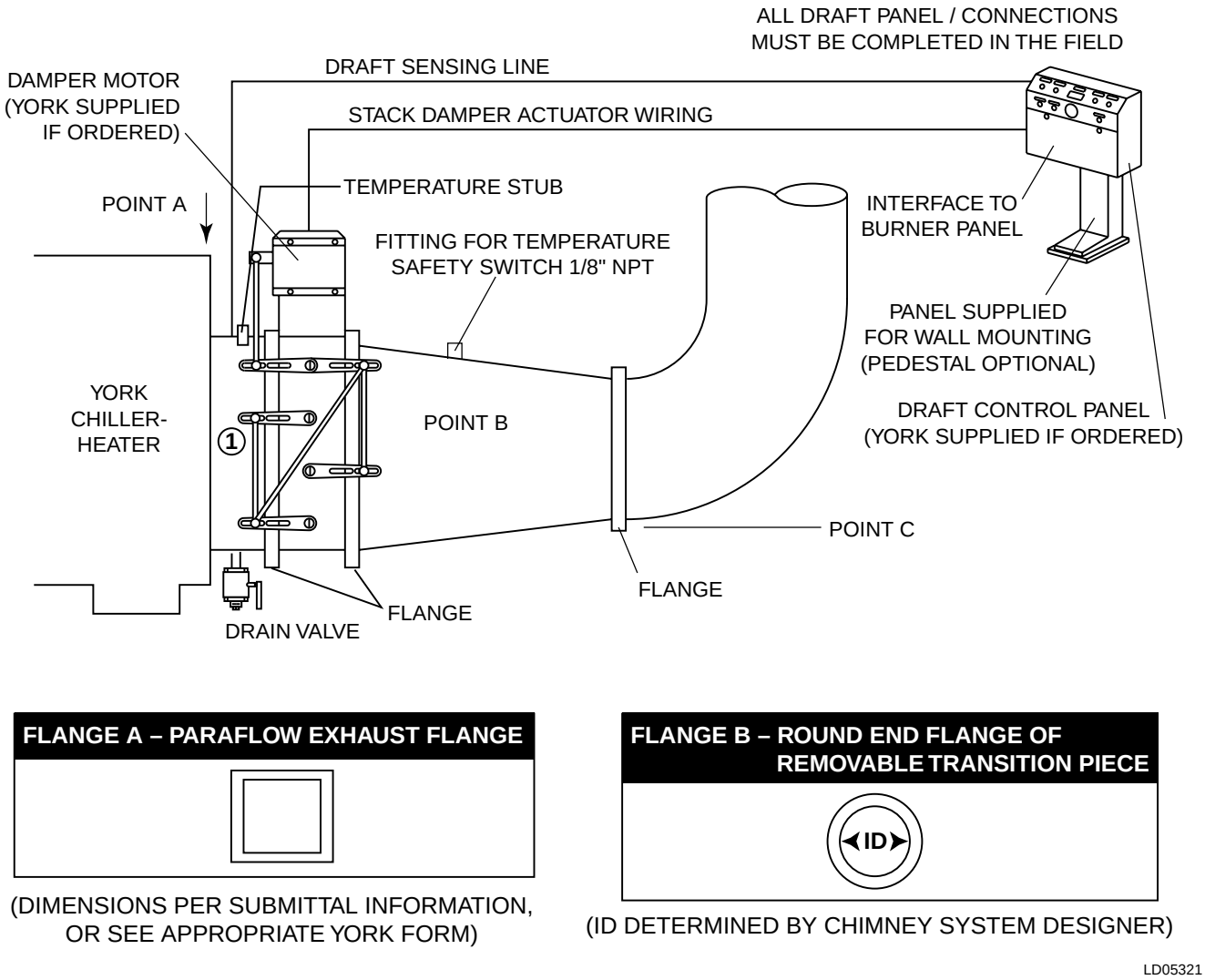


FIG. 34 – SEQUENTIAL DRAFT CONTROL

SECTION 23 – HIGH STACK TEMPERATURE PROBE

Along with the burner's ship loose parts is a Power Flame-supplied thermocouple probe assembly and a 50' roll of "J" thermocouple wire. This probe must be field installed into the chimney breeching before the manual backdraft damper, if possible. If this is not possible, the probe should be as close as possible downstream of the manual backdraft damper. The probes wires must be connected to the temperature controller in the burner panel. The probe will require a 1/8" NPTI coupling, which must be supplied by the field installer.

SECTION 24 – BURNER INSTALLATION (Weishaupt Burners)

For all European direct-fired unit shipments requiring 50 Hz CE code wiring, YORK supplies a Weishaupt burner in lieu of a Power Flame burner. YORK can also supply a Weishaupt burner as a special order for any USA unit shipment.

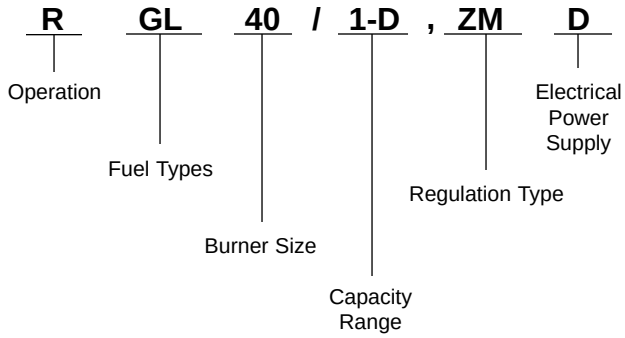
Weishaupt burners are easily distinguished by their bright red color. Basically, the Weishaupt burners operate in the same manner as the Power Flame burners. Some of the main differences are:

1. A backdraft damper is not required for operation and is not part of the absorption unit's ship loose parts. Weishaupt burners are able to operate in a back-pressure between -1.0 inch of water column through 6 inches of water column and even higher pressures with some burner models.
2. The modulating gas butterfly valve (normally found on the gas train for Power Flame burners) is an integral part of the Weishaupt burner, mounted directly on the burner housing. The butterfly valve is spring loaded to fully close the valve, if the drive linkage is disconnected.
3. Capacity regulation is controlled by a single servomotor, equipped with individual adjustable micro switches. This servomotor is integrally linked to the gas butterfly valve and combustion air control louvers via a single cam arrangement. Therefore, the Varicam, jackshafts, and linkage sets normally found on the Power Flame burners are not present on the Weishaupt burners.
4. All Weishaupt burners have a cast aluminum burner housing that is hinged for ease of service. Because of this design, no pedestal support is needed for the Weishaupt burner.
5. Weishaupt includes a burner-mounted oil pump for burners sizes 30, 40, and 50 that use #2 fuel oil. Therefore, there is no oil pump or motor in the unit's ship loose parts.

As with the Power Flame burners, the Weishaupt burners are mounted at the YORK factory and the burner is pre-wired into a unit mounted burner panel - if the unit is not a knockdown shipment. The gas train components will be shipped separately and will require field mounting.

MODEL IDENTIFICATION

The following is an example of a Weishaupt burner designation:



Operation – The "R" indicates a modulating burner. The burner will "modulate" infinite amounts between its low-fire position and its high-fire position. YORK always uses a modulating burner for the ParaFlow™ chiller/heaters.

Fuel Types – "G" indicates a gas burner – natural gas, propane, or manufactured gas. The "L" indicates a #2 fuel oil burner. YORK ParaFlow™ chiller/heaters that use oil, use only #2 fuel oil.

Burner Size – YORK ParaFlow™ chiller/heaters use the following sizes:

3 = 300 - 2150 MBH
5 = 600 - 3200 MBH
7 = 1025 - 6000 MBH
8 = 1350 - 7650 MBH
9 = 1700 - 12000 MBH
10 = 3400 - 13500 MBH
11 = 4200 - 17400 MBH

30 = 1000 - 7300 MBH
40 = 1500 - 8700 MBH
50 = 2000 - 12600 MBH
60 = 2700 - 20000 MBH
70 = 2900 - 29000 MBH

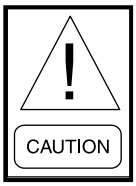
MBH values are approximate. If burner system has Flue Gas Recirculation (FGR), reduce MBH by 10%. If system has Oxygen trim, deduct 15%. If system has FGR and Oxygen trim, deduct 25% from the rated burner capacity.

Capacity Range – There are one or more for each burner size. The number will be 0, 1, or 2 in increasing size. The letter will be A, D, or E and indicates the mixing case size. This will, of course, affect the firing range of the burner.

Regulation Type – YORK uses the following regulation type on the ParaFlow™ chiller/heaters:

ZM	=	Gas, modulating or oil modulating
ZMA	=	Gas, modulating, high turn-down
ZMI	=	Gas, modulating, very high turn-down

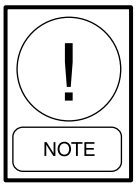
Electrical Power Supply = "D" indicates three-phase



The installation, start-up, or servicing of any Weishaupt burner or any equipment supplied by Weishaupt must only be carried out by fully qualified and licensed person(s). The person(s) performing the work must be familiar with, and operate within, the applicable local and national codes.

FIELD WIRING

Due to the fact that the burner swings open for service (either right or left), flexible conduit must be used for the last 5 to 6 feet before the burner. **Do not use rigid conduit right up to the burner!** A wiring diagram is provided with all burners. A separate page titled "Connection Diagram" is included, which recommends and illustrates the number of conduits for the field wiring, including the number of wires for each conduit.



It is recommended that the flame scanner wires are run in a separate conduit and not in multi-wire cables. Maximum line length for UV monitoring is 97 feet (30 meters). For details refer to the flame safeguard manual.

Swinging Open The Burner

If it becomes necessary to open the burner, please follow the below instructions:

1. Disconnect the linkage from the servomotor to the gas butterfly valve.
2. Remove the burner top cover.
3. Disconnect the ignition and flame sensor plugs (if applicable).
4. Remove the lock nut and washer, which secures the burner closed.
5. Swing the burner open carefully.

Closing The Burner:

1. Swing the burner closed. Take care not to trap the ignition and flame sensor plugs or wires (if applicable) when closing the burner.
2. Secure the burner closed with the locking nut and washer.
3. Remove the burner top cover to connect the ignition and flame sensor plugs (if applicable).
4. On combination gas/oil burners, re-connect the internal oil lines if they have been disconnected.
5. Replace the top cover and secure.
6. Connect the linkage from the servomotor to the gas butterfly valve.

SECTION 25 – GAS PIPING DESIGN

Gas piping should be sized to provide the required pressure at the burner train inlet manual shut-off valve, when operating at the maximum desired fuel input.

The assembled shipped loose gas trains supplied with the burner are not pressure tested at Weishaupt, therefore, this responsibility is up to the installing contractor. See Gas Train Leak Check procedure section in this manual.

GAS TRAIN SIZING

BURNER SIZE	DN - SIZE
G3	DN40 – 1.5"
G5, 30/2, 40/1	DN50 – 2.0"
G7, 8, 40/2, 50/1	DN65 – 2.5"
G9, 10, 50/2	DN80 – 3.0"
G11, 60, 70	DN100 – 4.0"

Installing the Gas Train

A drip leg must be installed in the gas supply system just ahead of the burner gas train inlet. (See Fig. 35.)

To ensure a consistent and reliable operation of the burner, the gas safety shut-off valves (pilot and main gas) must be mounted as close to the burner as possible.

The gas valve train can be attached to the burner either from the left or right side (on the ParaFlow™ chiller/heater units, it is usually on the outboard side of unit). Before installing the gas valve train, ensure that the burner can be swung open for service.

Ensure that all gas train components are installed in the correct order and that the flow direction is correct for each component. Gas valves, actuators and gas regulators must only be installed in the vertical (upright) position. The gas train should be supported in several places.

For YORK ParaFlow™ chiller/heater orders, Weishaupt supplies the correct gas train size and components with each shipment. However, for general information and a better understanding of the burner's gas train, Fig. 35 shows the general location of various components in a typical gas train. The gas train in Fig. 35 will vary accordingly due to local codes, firing rates of the burner, or gas supply pressure.

DO NOT USE TEFLON TAPE

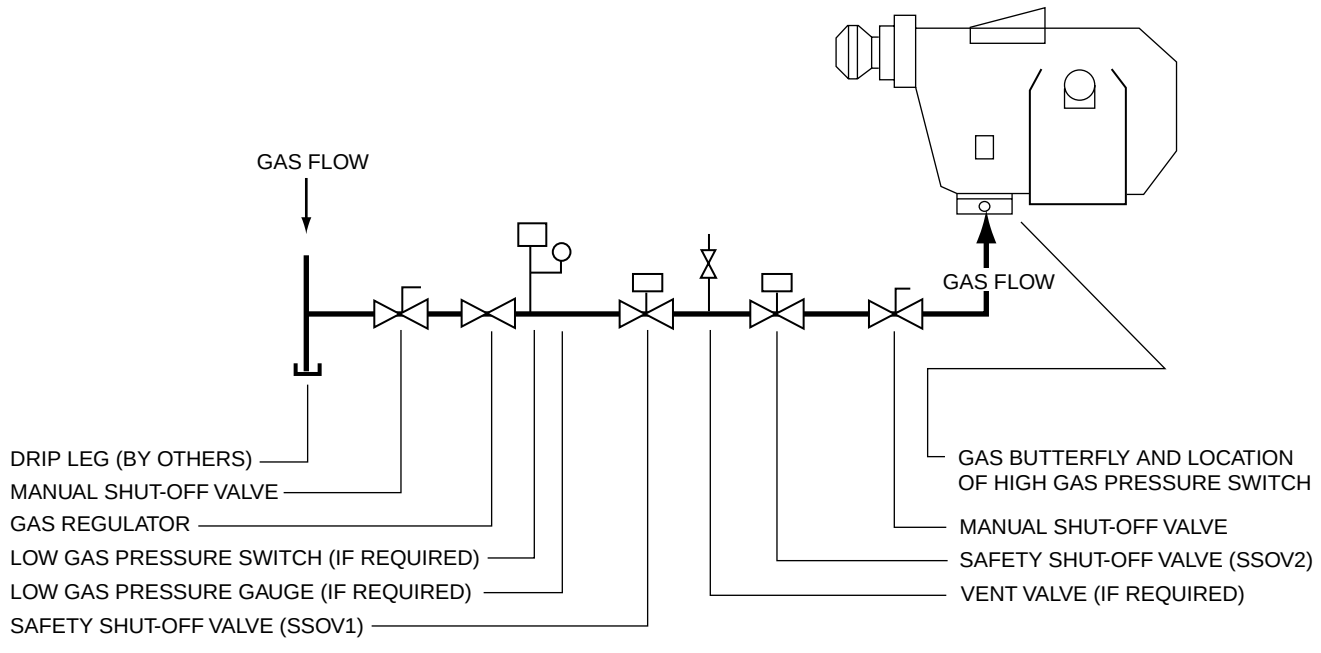
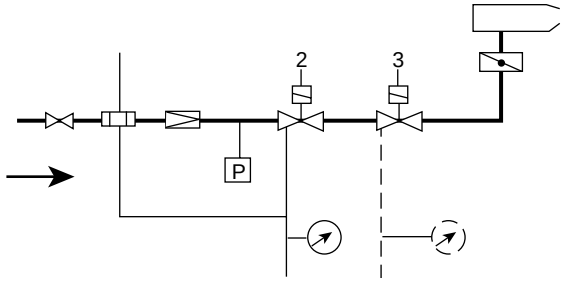


FIG. 35 – GAS PIPING DESIGN

GAS TRAIN LEAK CHECK PROCEDURE

All manual shut-off and solenoid valves must be closed for the test.

A test manometer is connected with a rubber hose and hand pump using a tee piece in the hose, at the solenoid valve and at the pressure regulator or gas filter. If this is not done, the neutral connection in the pressure regulator causes faulty measurements.



NOTES:

1. Filter with 1/4" test port connection.
2. Valve with 1/4" test port connection.
3. Valve with 1/4" test port connection.

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FIG. 36 – GAS TRAIN VALVE TESTING

The test pressure in the gas train should be twice the operating pressure – at least 100 mbar (1.45 psi) with natural gas and 150 mbar (2.18 psi) with liquid gas.

Before commencement of the test period, 5 minutes must elapse so that false measurements are not caused by temperature variations. It can then be assumed that there will not be significant pressure variations due to temperature equalization.

The gas train is leak-free if the pressure drop after the test period of 5 minutes is not more than 1 mbar (0.4" W.C.).

If a leak is found, then the leak must be located by brushing with Nekal solution and sealed. The test procedure would then be repeated. This test is necessary and is required for the Weishaupt burner commissioning report, which must be submitted to Weishaupt for warranty.

SECTION 26 – OIL PIPING DESIGN

All applicable local and national codes must be observed when installing the burner, oil tank, and oil lines. Correct installation and pipe connections are the responsibility of the installer.

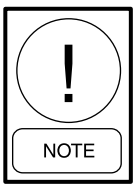
OIL PIPING DESIGN

It is important that a consistent source of oil is supplied to the burner oil pump in order to ensure a reliable burner operation.

Steel and copper can be used as oil lines. Copper lines are preferred for #2 fuel oil. A two-line system is also preferred for single or multiple #2 oil type burner systems. With this type of system any air bubbles in the oil are returned to the oil tank along the return line. However, on two-line systems the following must be met:

1. Suction pressure must not exceed -15" W.C. (-0.4 bar).
2. The lift of the oil must not exceed 13 ft. (4.0 m).

If these criteria cannot be met, then it is necessary to use a "ring line oil system" for the burner. See burner installation and operation manual for this type of oil piping system.



If an oil meter is installed in the oil return line, there must be protection provided for safety in the form of a relief valve. A blocked oil meter could lead to a burst oil hose or damage to the oil pump. It is recommended that any shut-off device in the oil supply and oil return lines be protected from unintended individual closure. Non-return valves must not be installed in the oil return line.

The pressure drop of the oil line, oil filters, 90° elbows, etc. must be considered when sizing the oil supply (suction) lines to the burner. The suction lift and supply pressure can be measured at the burner pump with appropriate gauges. The selection of the oil line size must be based on the maximum capacity of

the burner oil pump(s) (not the actual oil consumption rate of the burner), viscosity of the oil, and the length of piping. See Appendix A of this document for the Weishaupt burner oil pump capacities.

For single burner installations, it is recommended that the oil supply and return lines are the same size. For multiple burner installations, it is recommended that individual supply lines are run to each burner. However, a common return line can be used.

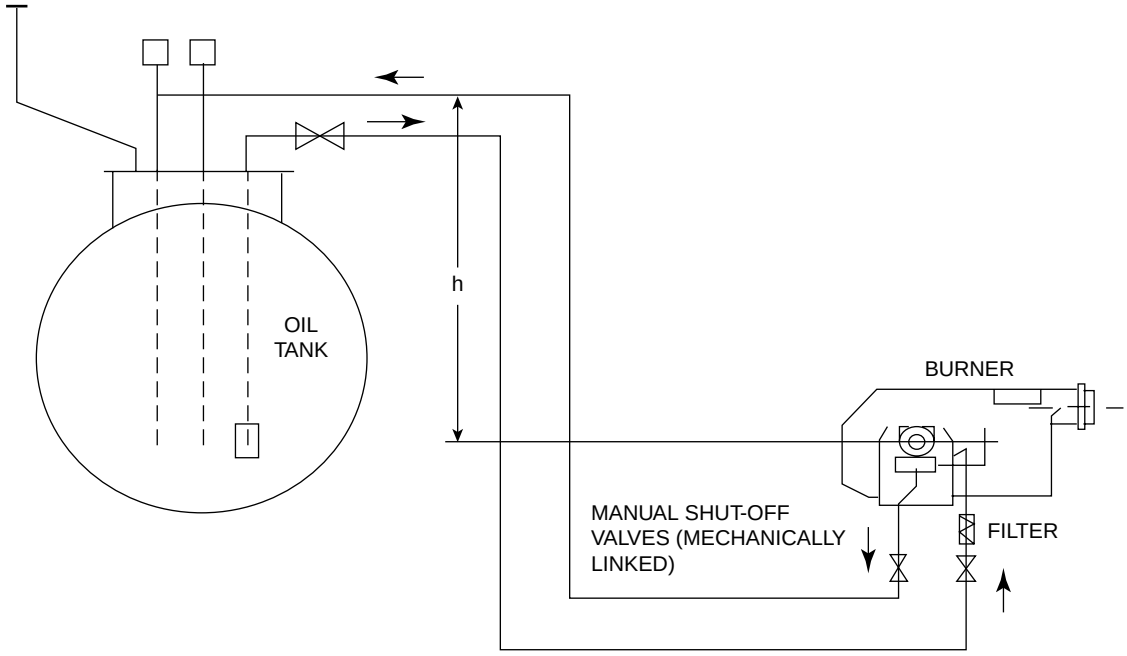


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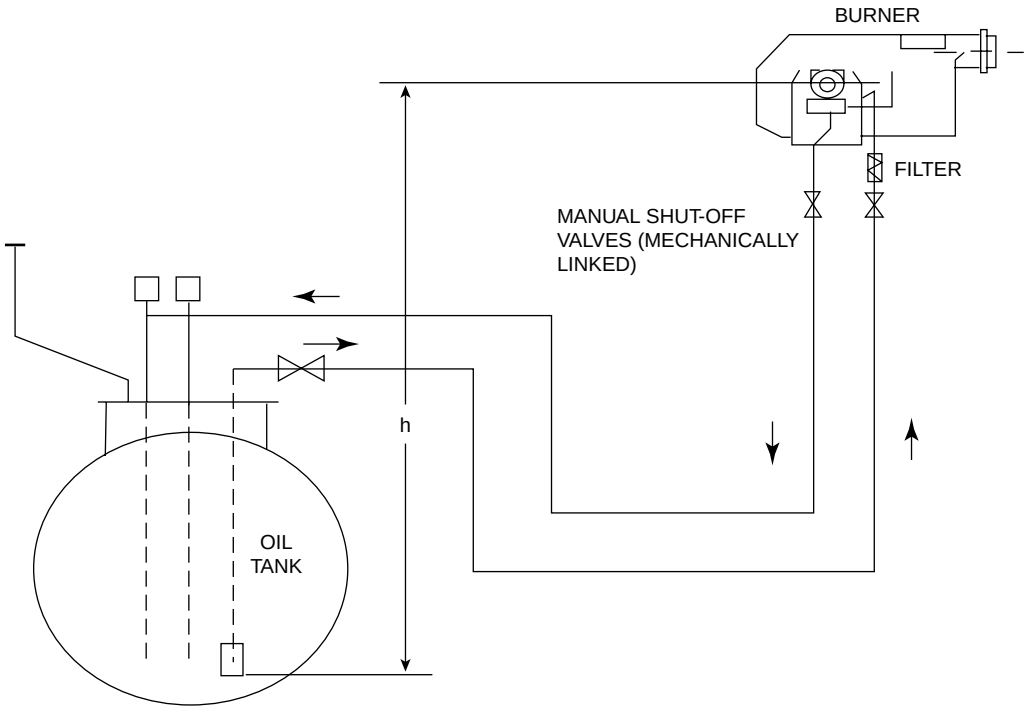
FIG. 37 – OIL PIPING SCHEMATIC - OIL TANK LOCATED HIGHER THAN BURNER



LD05325

FIG. 38 – OIL PIPING SCHEMATIC - OIL TANK LOCATED LOWER THAN BURNER

SECTION 27 – SIMULTANEOUS OPERATION (where applicable)

Direct-Fired

Direct-Fired YORK ParaFlow™ Chiller/Heaters equipped with an auxiliary, high-temp, hot water heat exchanger, can provide both chilled water and hot water simultaneously. Steam-Fired units do not have this capability. An understanding of the simultaneous operation feature and its limitations is required to assure proper application.

Simultaneous operation can take place only if there is a basic demand for chilled water. **The operation of the unit during simultaneous operation is initiated and controlled by the chilling load, and it is essentially the same as the normal chilling operation.** The only difference is that during simultaneous operation some of the vapor generated in the high-temperature generator is utilized to make hot water.

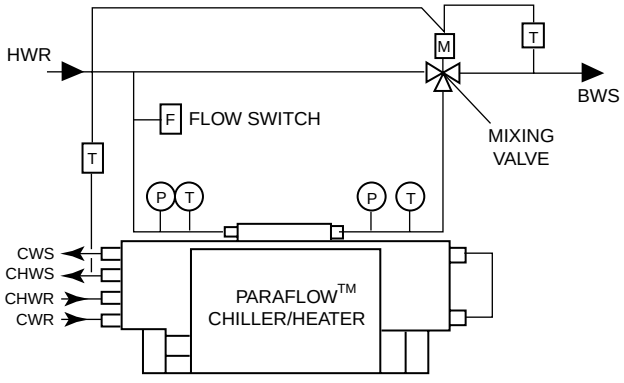
To control the hot water temperature, a motorized mixing valve and two temperature controllers must be supplied and installed in the hot water circuit by the installer as shown in Fig. 39. One controller senses the leaving hot water and positions the mixing valve to maintain that temperature. The other controller acts as a limit switch and will abort simultaneous operation by placing the mixing valve in the full bypass position and stopping the hot water circulating pump if the leaving chilled water temperature rises to a preset level (usually 50°F), indicating that too much energy is being used to make hot water and the chiller cannot meet the chilling demand.

Since the unit operation is controlled by the chilling load, the amount of available heating capacity as well as the hot water temperature will vary as the chilling load varies. The below graph shows the relationship between chilling capacity and heating capacity at varying energy input rates.

For example, at 100% energy input rate (top curve), the unit will produce 100% chilling and no heating or, 80% chilling and 10% heating or, 50% chilling and 32% heating. etc. At 80% energy input (second from top curve) the unit will produce 77% chilling and no heating or, 60% chilling and 10% heating or, 30% chilling and 31% heating, etc. All the values are approximate.

WARNING

When the YORK ParaFlow™ chiller/heater is in the heating mode, the mixing valve must be in the open position to allow full flow through the hot water heat exchanger. The hot water controller will then modulate the burner to meet load variations and the unit will operate in the normal manner.



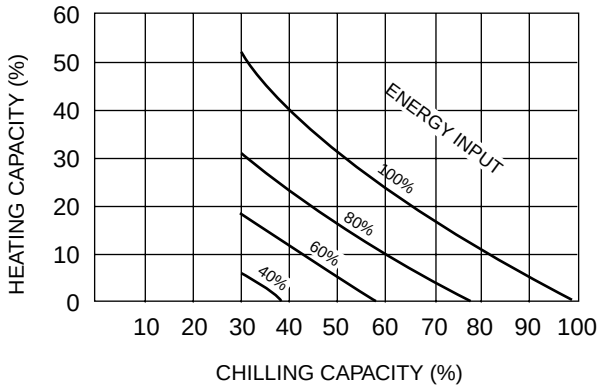
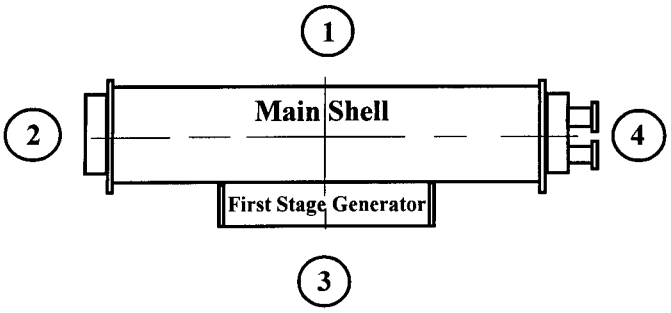


FIG. 39 – SUGGESTED PIPING SCHEMATIC FOR SIMULTANEOUS OPERATION
(All Piping & Controls by Others)

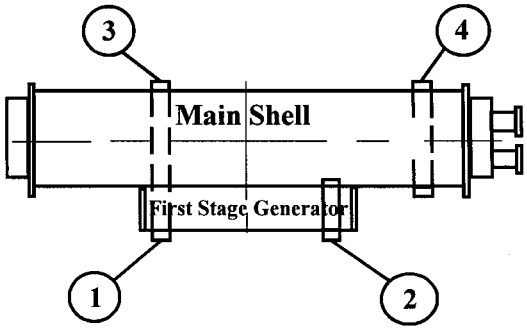
LD05326

SECTION 28 – TYPICAL NOISE AND VIBRATION LEVELS

NOISE LEVEL



VIBRATION LEVEL



NOISE	LOCATION NUMBER			
	1	2	3	4
A SCALE	84	89	85	82.5
B SCALE	86.5	92	88.7	84.5
C SCALE	88	93	89.6	87.5

UNITS: dB at 1 meter distance from the chiller

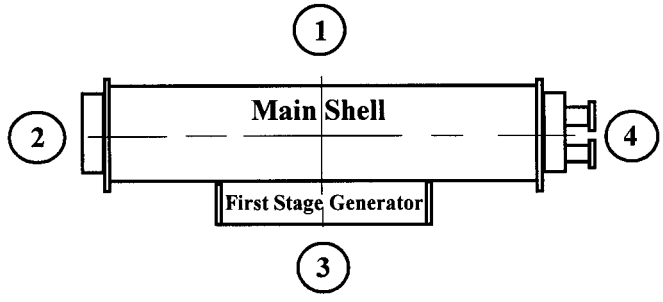
NOISE	LOCATION NUMBER			
	1	2	3	4
HORIZONTAL	4	3	3	3.5
VERTICAL	3	3	2.5	3
AXIAL	2.5	3	2	4

UNITS: Microns

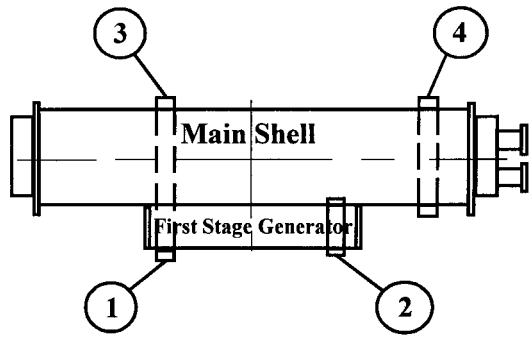
LD05327

FIG. 40 – TYPICAL NOISE AND VIBRATION LEVELS - DIRECT-FIRED UNITS, ALL MODELS

NOISE LEVEL



VIBRATION LEVEL



NOISE	LOCATION NUMBER			
	1	2	3	4
A SCALE	84	83	82	82.5
B SCALE	86.5	85	84	84.5
C SCALE	88	87	87	87.5

UNITS: dB at 1 meter distance from the chiller

NOISE	LOCATION NUMBER			
	1	2	3	4
HORIZONTAL	3	2	3	3
VERTICAL	2	2	2	3
AXIAL	2	2	2	4

UNITS: Microns

LD05328

FIG. 41 – TYPICAL NOISE AND VIBRATION LEVELS - STEAM-FIRED UNITS, ALL MODELS

SECTION 29 – ELECTRICAL CONNECTIONS

All field wiring to be in accordance with the National Electrical Code (N.E.C.) as well as all other applicable State and local codes and specifications. The installer(s) must be a fully qualified and licensed individual(s) that is familiar with and operates within these codes.

ELECTRICAL CONNECTIONS

Included with the unit shipment is a Unit Wiring Diagram (located in the micro panel enclosure), a Power Panel Wiring Diagram (located in the power panel enclosure), and a Burner Wiring Diagram (located in the burner control panel of Direct-Fired units only). For more information and details of unit wiring, refer to the appropriate YORK forms as listed at the front of this document under the Introduction Section. All the forms listed can be obtained through the local YORK Service office.

The incoming three-phase power supply to the unit must be routed through a CUSTOMER SUPPLIED remote, fused disconnect switch. For determining the size of the fuses, refer to the Max-Dual Element Fuse size as listed under the Electrical Data table within Appendix A of this document.

Located in the Power Panel of all ParaFlow™ Chiller/Heater absorption units is a non-fused, service disconnect switch. For most models it is rated at 100 amps. For the larger low voltage, direct-fired models, it is rated at 250 amps. The incoming power lines from the customer supplied fused disconnect switch must be connected to L1, L2, and L3 terminals within the power panel. This is the only power connection needed to the chiller. The micro panel control power (115V, 50/60 Hz, 10 amps - 1.0 KVA) is supplied through a factory mounted control power transformer located inside the power panel. If multiple conduits are used for the incoming three phase power, they should contain an equal number of wires from each phase in each conduit to prevent overheating. **Use copper conductors only; Do not use aluminum conductors.** Flexible conduit for final connection to the power panel should used in the extreme case of unit vibration.

The unit must be grounded in accordance with applicable codes. Use only copper conductors for all grounding. The power panel is furnished with grounding lugs suitable for wire sizes between #14 to 1/0 AWG.

WIRING THE PURGE PUMP

One Welsh purge pump is supplied and shipped loose with every ParaFlow™ Absorption chiller/heater. A factory supplied harness is connected to the appropriate terminals within the unit panel. However, the

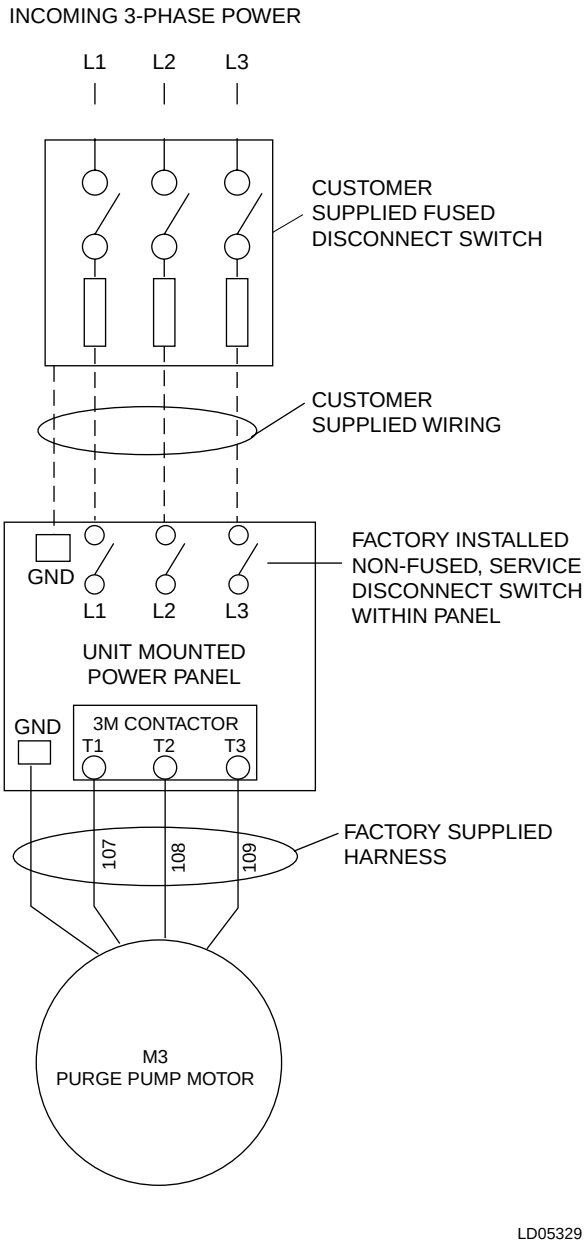


FIG. 42 – WIRING THE PURGE PUMP

purge pump end of this harness must be connected to the correct purge pump terminals inside the purge pump motor connection box in the field. The mounting and electrical connection of the purge pump could be done by either the installing contractor or YORK service (this should be determined at the time the contract is awarded to the installer). See Figure 42 for wiring connections.

NOTE

Make sure the purge pump motor is turning in the correct direction.

FIELD CONTROL MODIFICATIONS AND SAFETY DEVICES

There are many connections which need to be made during installation so that the YORK ParaFlow™ chiller/heater functions properly and can communicate with other customer remote devices and systems if desired.

When any auxiliary safety device is used, the factory installed jumper between terminals 4 and 53 on terminal block 5 must be removed.

To aid the installer with these connections, it is imperative that the following YORK forms be on hand:

- **155.17-W1 (297):**
  Wiring diagram for Direct-Fired units
- **155.19-W1 (197):**
  Wiring diagram for Steam-Fired units.
- **155.17-PA1 (1296):**
  Field Control Modifications Diagram for both Direct-Fired and Steam machines.

FLOW SWITCHES

The ParaFlow™ chiller/heater must monitor the flow of water through the various heat exchanger bundles in order to operate correctly. Therefore, flow switches or differential pressure control switches are required on the chilled water, tower water and hot water (if applicable) flow circuits to determine if flow is established. The chilled water flow switch is a safety control. It must be connected to prevent operation of the unit whenever chilled water flow is stopped. One Chilled Water flow switch for each unit is always supplied by YORK and included with the unit's ship loose parts. A differential pressure control switch, tower water flow switch, or a hot water flow switch (if applicable) can be purchased through YORK as an extra order option. Otherwise, the tower water and hot water flow switches must be supplied by others.

For installation of these switches, refer to the Unit Water Piping and Hook-up section of this document. For wiring, connect the chilled water flow switch to terminals 1 and 12 on TB2 of the Digital Input Board. This board is located inside the unit micro panel.

For the tower water flow switch, connect the wires to terminals 1 and 20 on TB2 of the Digital Input Board. The hot water flow switch (if applicable) would be connected to terminals 1 and 82 on TB4 of the Relay Board. See Fig. 43.

NOTE

All Flow devices contact ratings are to be 5 milliamperes at 115 volts A.C.

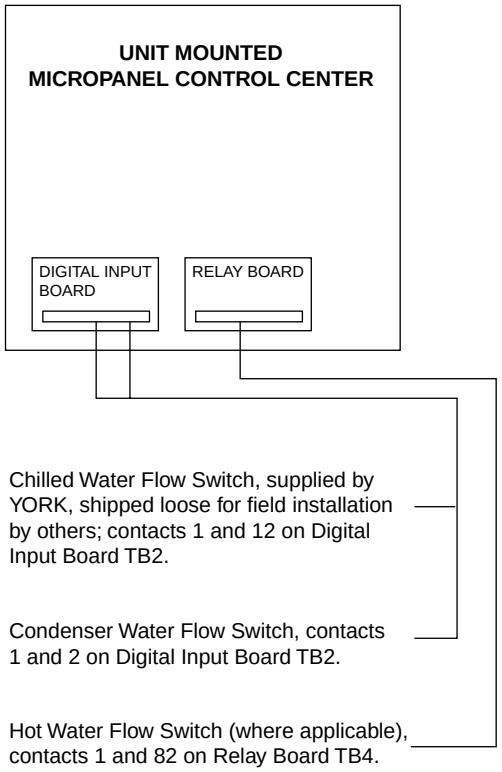


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FIG. 43 – FLOW SWITCH CONNECTIONS

CONTROL OF CUSTOMER SYSTEM PUMPS

Since absorption chillers require a dilution cycle of an unpredictable length of time, **it is mandatory that the ParaFlow™ micro panel control the operation of the following system pumps:**

- Condenser Water (Tower water)
- Chilled Water
- Hot Water (when applicable)

YORK's prescribed method to employ this pump control is to hard wire the pump starter control circuit through the appropriate contacts on the relay board. See Fig. 44 below:

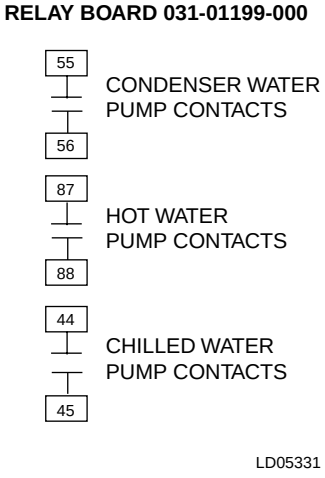
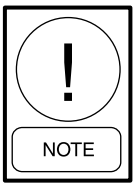


FIG. 44 – RELAY BOARD CONTACTS

Should a customer insist on using another device, such as an Energy Management System, to control the pumps, that device must turn the pumps on and off as a result of its direct interface with the contacts on the relay board.

If there is a desire to interface the pumps with some device other than the ParaFlow™ micro panel, that device must receive its instructions from the micro panel and not from the Energy Management System.

Each contact rating is 5 amps resistive at +/- 250 volts A.C. and 30 volts D.C., 2 amp inductive (0.4 PF) +/- 250 volts A.C. and 30 volts D.C. Each 115 volt field-connected inductive load (i.e. relay coil, motor starter, etc.) shall have a transient suppressor wired in parallel with its coil, physically located at the coil. Spare transient suppressors and control circuit fuses are supplied in a bag in the control center.



Failure to adhere to the above instructions could result in evaporator tube freeze-up and unit crystallization. YORK will not be responsible for damages to the unit, nor cover any charges under the unit warranty.

ENERGY MANAGEMENT SYSTEMS WIRING

The ParaFlow™ micro panel control center is designed to function as an integral component of the YORK ParaFlow™ absorption chiller/heater. All of the data contained in the micro panel control center is shared with the YORK direct digital controllers via the single twisted-pair YorkTalk Bus. All temperatures, pressures, safety alarms and cycling conditions are available to the direct digital controllers for integrated plant control, data logging, and local and remote display of operator information. The YorkTalk Bus communication interface allows the direct digital controllers to issue commands to the micro panel control center to set temperature setpoints and start or stop the unit.

The micro panel control center also provides a limited interface to other Energy Management Systems (EMS). The micro panel control center includes unit status contacts, provisions for remote temperature setpoint reset and starting and stopping of the unit.

All field control wiring modifications are to be furnished and installed by others. To learn more about what safety devices and chiller controls can be wired remotely, refer to the micro panel wiring diagram, YORK Form 155.17-PA1, YORK Form 155.17-W1 (for gas/oil-fired units), or YORK Form 155.19-W1 (for steam-fired units).

SECTION 30 – INSULATION

YORK recommends that all ParaFlow™ chiller/heater absorption units be insulated properly for the following reasons**:**

1. Optimize operating performance
2. Ensure the safety of operating and plant personnel
3. Prevent unit sweating
4. Prevent crystallization for up to eight hours during a power failure.

YORK performance ratings are based on a properly insulated chiller. Proper insulation limits the heat loss from the chiller to its surroundings. Insulation also protects personnel from the hot surfaces, such as the generator shell and steam piping, and is often required for safety codes. Lastly, insulation, when applied properly, will prevent crystallization during a power failure for up to eight hours with a minimum room temperature of 70°F.

Insulating an absorber chiller requires special consideration to three separate sections of the chiller: Hot, Cold, and Intermediate temperature surfaces. By insulating the hot surfaces, heat loss to the equipment room is minimized, thereby maximizing efficiency and preventing hazardous working conditions. Cold insulation is applied to a chiller to prevent sweating. When a chiller is operating, moisture in the surrounding air may condense on the cold surfaces of the evaporator and refrigerant side and collect on the equipment room floor causing unsafe conditions. The last critical area for insulation are areas that contain weak lithium bromide solution. These areas are more susceptible to crystallization when their temperature lowers. A properly insulated chiller will provide safe, reliable and efficient operation throughout the life of the equipment.

For hot surfaces, YORK recommends using 2 inch thick, 3 pound density fiberglass insulation. Hot surfaces that need insulation are the generator and connecting piping. These areas are filled in with a charcoal gray in the insulation drawings located in Appendix C of this document.

For cold surfaces, YORK recommends using 3/4 inch, closed-cell foam insulation. Cold surfaces that need foam insulation are the evaporator shell, refrigerant piping, refrigerant pumps, and the refrigerant tank. Cold surfaces are indicated on the insulation drawings with a light gray color.

For intermediate temperature surfaces, YORK recommends using 1 inch thick, 2 pound density fiberglass insulation. These surfaces include the absorber pumps and piping. The intermediate surfaces are marked with a medium gray color on the insulation diagrams.

INSULATION TIPS

Before insulating an absorption chiller, see the “Other Insulation Guidelines” section below for some helpful hints and warnings about applying insulation.

Insulation must NOT be applied to the chiller until the start-up has been successfully completed by a qualified YORK service technician. Apply removable insulation to the chiller surfaces that must be removed for servicing. The surfaces of the chiller that must have removable insulation include the refrigerant and solution pump motors, valves, sight glasses, thermowells, isolation valves, flanges and other piping connections. For detailed insulation drawings, see Appendix C of this document.

Acceptable means of mounting insulation to the chiller surfaces include bonding agents, wires, and bands. Insulation pins are also acceptable provided they **are not** welded to the chiller surface. An acceptable high temperature epoxy for installing insulation can be found in the notes of the Chemicals and Compounds section of YORK Renewal Parts Form 155.17-RP3. The surface of the insulation should be sealed vapor-tight to prevent sweating and mildew underneath the insulation. All seams should be filled in using insulation tape or thermal mastique compound. Aluminum facing provides an additional layer of protection in high-temperature areas and provides a quality finish to the job.

Welding anything to the shell may penetrate the shell and could jeopardize the integrity of the chiller. Any welding to the chiller shell without written consent of YORK Factory Service will result in voiding the unit warranty.

OTHER INSULATION GUIDELINES

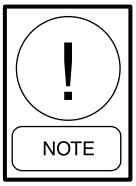
Only use removable insulation on movable parts, valves thermowells, sight glass view areas, flanges and pipe connections, and water boxes covers and

bolts. These areas must be accessible for service and occasionally by operating personnel. **NEVER** cover sight glass areas. Refer to the insulation drawings located in appendix C of this document. **NEVER** cover pump motors with insulation. Pumps must be allowed to radiate some of the heat generated to the surrounding air. **NEVER** use weld pins for attaching insulation to the chiller - **doing so will void the factory warranty. NEVER** insulate over electrical wiring, the heat generated within the unit will melt the insulation on the wiring. Water boxes or cover plates must be removed or opened from time-to-time for tube cleaning. Valves, pumps and nozzles must be accessible for servicing and operation. Insulate auxiliary and instrument piping by wrapping glass wool around it.

ADDITIONAL COMMENTS

Before installing insulation, the unit should be placed in its permanent position, leveled, checked to make sure it is air tight, and commissioned. **Insulation should be scheduled last. YORK will not be responsible for costs incurred to remove insulation to leak check unit if insulation was installed before commissioning.**

The insulation drawings in Appendix C of this document are meant to serve as a guide for the insulation contractor before the chiller arrives on the jobsite for cost estimation and for actual installation.



Never use weld pins to attach insulation to the chiller. Doing so will void the factory warranty!

SECTION 31 – INSTALLATION CHECKLIST

On the next page of this document is an Installation Check List, which is to be used to ensure that all installation items have been taken care of.

The local YORK office must be contacted at time of chiller arrival at jobsite. With the presence of a YORK representative, the chiller and its shipped loose parts must be inspected to ensure all items arrived and no damage occurred during shipment.

The inspection of the unit should be performed by an individual who is thoroughly familiar with all aspects of the chiller and burner (if applicable) and how it interfaces with overall plant operation. When satisfied that the unit installation is complete, call for the services of a YORK representative by filling out the form and submitting to the local YORK service office.

INSTALLATION CHECK LIST AND REQUEST FOR AUTHORIZED START-UP ENGINEER

To: _____
District Service and Maintenance Manager
_____
_____
_____
YORK Telephone No: _____
Unit Model No: _____

Job Name: _____
Location: _____
Customer Order No: _____
YORK Order No: _____
Unit Serial No: _____

This work (as checked below) is in process and will be completed by: _____
Month Day Year

The following work **must** be completed in accordance with YORK Installation Instructions of the above Model and Absorption Unit.

A. UNIT SHIPMENT, INITIAL INSPECTION:

- ☐ **Local YORK Service has been notified of unit arrival.**
- ☐ All major pieces, boxes and crates are received.
- ☐ No visible signs of damage.
- ☐ With a local **YORK Service Representative** present, open all containers and check for contents against the packing list.
- ☐ Unit holding charge or vacuum has been verified.
- ☐ All damage or signs of possible damage have been reported to the transportation company.

B. FOUNDATION:

- ☐ Unit is mounted on a foundation level to 1/4".
- ☐ Unit located in accordance with the minimum clearance dimensions as recommended.
- ☐ Unit installed in an area protected from weather and maintained at a temperature above freezing.
- ☐ If the unit is a knockdown shipment, unit assembled under YORK supervision.
- ☐ Unit is level per YORK's allowable tolerance.

C. PIPING:

- ☐ All tower water piping installed between chiller and tower, including cross-over line.
- ☐ Chilled water piping installed between evaporator, pumps and cooling coils.
- ☐ Steam piping (if applicable) installed between unit and source of supply.
- ☐ If steam unit, all condensate and removal systems installed.
- ☐ Make-up and fill lines installed to cooling tower and chilled water system.
- ☐ All thermometer wells, flow switches and gauge connections installed in chilled and condenser water lines.
- ☐ All water piping checked for strain (piping should not spring when connections are broken at unit).
- ☐ System water piping leak tested and flushed, and water strainers cleaned after flushing. Piping system filled with water, and trapped air vented.
- ☐ Chilled and condenser water, hot water, or steam flow available to meet unit design requirements.
- ☐ All pressure relief devices (including unit rupture disk) are vented to a safe area.

D. BURNER:

- ☐ Free of damage; all fasteners, fittings, and plugs are tight
- ☐ All mechanisms, control arms and ball-swivels are tight and are in working order.
- ☐ Burner support has been installed.
- ☐ All gas train components supplied, properly installed and leak-checked.
- ☐ Breeching connections have been installed to the chimney and are open and unobstructed.
- ☐ Draft control equipment installed properly.
- ☐ High stack temperature probe installed properly and wired.
- ☐ Have properly sized vent lines been installed on all gas train components which require venting? This includes pressure regulators, normally open vent valves, diaphragm valves, low and high gas pressure switches, etc.
- ☐ Have gas train piping and components been tested and proven gas tight?
- ☐ Purge both main and pilot gas lines.
- ☐ Is the proper gas pressure available at the inlet to the controls? (Pressure must meet the requirements shown on the burner "as built specification sheet" as provided by the burner manufacturer.)

OIL FIRED BURNERS:

- ☐ Is the oil tank installed and filled with #2 fuel oil?
- ☐ Have oil supply and return lines been sized to meet the maximum pumping capacity of the pump?
- ☐ Has the oil piping system been leak tested and purged of air?
- ☐ Is the proper oil pressure available at the inlet to the controls?

E. ELECTRIC WIRING:

- ☐ Wiring completed from customers' main power supply fused disconnect switch to power panel on unit.
- ☐ External control wiring completed from control panel to flow switches, vacuum pump motor, etc., in accordance with YORK Wiring Diagram.
- ☐ Power available and wiring completed to the following starters and motors:
  - a. Chilled water pump contacts.
  - b. Tower water pump contacts.
  - c. Hot Water pump contacts (if applicable).
- ☐ Vacuum pump motor and blower fan motor (direct-fired units only) rotating in correct direction
- ☐ All electrical terminal connections are tight.

F. UNIT CHARGING AND COMMISSIONING:

- ☐ Lithium bromide, refrigerant and alcohol is available at jobsite for YORK Service to charge into the unit?
- ☐ Is vacuum pump oil available for charging into the vacuum pump?
- ☐ Is there a full capacity cooling load available for unit start-up?

With reference to the terms of the above contract, we are requesting the presence of a YORK Authorized Representative at the job site on _____ to start the system and instruct operating personnel. Please contact _____.
Month Day Year Names

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APPENDIX A – TABLES

UNIT WEIGHTS AND DIMENSIONS

MODEL UNIT	OVERALL DIMENSIONS (FEET-INCHES)			MAINT. CLEARANCE (feet-inches) (either end)	APPROX. SHIPPING WEIGHT (lbs.)		APPROX. OPER. WEIGHT
	LENGTH	WIDTH	HEIGHT		w/o CHARGE	w/ CHARGE	
DIRECT-FIRED UNITS							
12SC	14 - 1/4	6 - 10	7 - 5-9/16	10 - 7	17,400	19,800	20,900
13SC	14 - 1/4	6 - 11-1/8	7 - 5-9/16	10 - 7	19,300	22,000	23,400
14SC	16 - 7-7/8	6 - 8-1/8	7 - 7-7/16	13 - 2-1/2	22,000	25,200	26,700
15SL & 16S	17 - 4-15/16	8 - 3-3/4	9 - 1-5/16	13 - 2-1/2	32,600	36,325	38,705
16SL & 17S	20 - 8-5/16	8 - 9-9/16	9 - 2-13/16	16 - 5-7/8	39,900	44,440	47,535
18S	23 - 11-11/16	9 - 3/8	9 - 10	19 - 9-1/4	46,300	51,750	55,475
19S	27 - 3-1/16	9 - 3/8	9 - 10	24 - 5/8	54,800	61,145	65,455
16G	17 - 1-1/2	8 - 9-1/8	8 - 11-1/16	13 - 1-1/2	29,150	40,799	42,790
17G	20 - 5-5/16	8 - 9-1/8	8 - 11-1/16	16 - 5	34,500	45,050	47,900
18G	23 - 8-9/16	9 - 1/16	9 - 1-5/16	19 - 8-1/4	39,750	53,500	56,635
19G	26 - 8-1/16	11 - 1-11/16	9 - 3-15/16	22 - 7-3/4	51,370	N/A	77,660
19GL	30 - 3-5/16	11 - 3-7/16	9 - 3-15/16	26 - 3	59,840	N/A	92,180
20G	36 - 11/16	11 - 6-1/16	10 - 4-1/4	26 - 3	75,130	N/A	112,420
STEAM-FIRED UNITS							
14SC	16 - 8-1/16	6 - 1-13/16	7 - 7-9/16	13 - 2-1/2	20,900	22,500	24,300
16SL	20 - 8-5/16	7 - 7-3/4	9 - 6-7/8	16 - 5-7/8	30,200	34,150	37,800
17S	20 - 8-5/16	7 - 7-3/4	9 - 6-7/8	16 - 5-7/8	31,000	34,950	38,600
18S	23 - 11-11/16	7 - 8	10 - 3-13/16	19 - 9-1/4	36,900	41,600	45,800
19S	27 - 3-1/16	7 - 8	10 - 4-11/16	23 - 5/8	44,500	49,600	54,900
18G	22 - 3-5/8	7 - 8-1/8	8 - 8-3/8	19 - 8-1/4	34,210	46,365	49,500
19G	25 - 3-1/8	7 -10-5/16	8 - 11-13/16	22 - 7-3/4	41,250	53,812	57,420
19GL	28 - 10-3/8	8 - 3-5/8	9 - 1-5/16	26 - 3	48,510	68,629	73,700
20G	30 - 7-3/8	9 - 1/8	9 - 5-11/16	26 - 3	59,400	N/A	87,340
21G	30 - 11-1/2	9 - 10-3/8	11 - 2-11/16	26 - 3	73,920	N/A	106,040
22G	31 - 4-15/16	11 - 8-13/16	11 - 9/16	26 - 3	99,330	N/A	143,000

NOTES:

1. Overall dimensions are for units with compact water boxes and victaulic couplings on the water nozzles.
2. If chiller has flanges on the water nozzles, add 1/2" to each end for overall length.
3. Marine water boxes with flanges will add height, length, and width to the unit dimensions. For details, see the appropriate YORK publication as listed at the beginning of this document.

PARAFLOW™ TYPICAL CHARGES

UNIT MODEL	REFRIGERANT						SOLUTION						BZT* STEAM ONLY	ALCOHOL
	STEAM			DIRECT-FIRED			STEAM			DIRECT-FIRED				
	DRUMS	LBS.	GALS.	DRUMS	LBS.	GALS.	DRUMS	LBS.	GALS.	DRUMS	LBS.	GALS.	LBS.	GALS.
12SC	N/A	N/A	N/A	3	1100	132	N/A	N/A	N/A	8	2975	221	N/A	14.3
13SC	N/A	N/A	N/A	3	992	119	N/A	N/A	N/A	10	3718	276	N/A	14.3
14SC	4	1475	177	3	1300	156	9	3352	249	12	4483	333	.14	14.3
15SL	N/A	N/A	N/A	5	2200	264	N/A	N/A	N/A	13	5226	388	N/A	9.5
16S	N/A	N/A	N/A	5	2200	264	N/A	N/A	N/A	13	5226	388	N/A	9.5
16SL	7	2792	335	6	2459	295	13	5072	377	17	6593	490	.22	14.3
17S	7	2792	335	6	2459	295	13	5072	377	17	6593	490	.22	14.3
18S	7	3034	364	7	2967	356	16	6174	458	20	7916	588	.26	14.3
19S	9	3959	475	8	3451	414	18	6924	514	23	9217	684	.29	19.0
16G	4	1609	193	4	1509	181	12	4781	355	21	8499	631	.20	9.5
16GL	5	1967	236	4	1450	174	14	5440	404	24	9349	694	.23	9.5
17G	5	1909	229	3	1375	165	14	5652	420	24	9562	710	.24	9.5
18G	5	2184	262	5	2125	255	21	8181	607	31	12536	930	.35	14.3
19G	5	2217	266	4	1675	201	23	9030	670	47	18698	1388	.38	14.3
19GL	11	5059	607	8	3467	416	31	12536	930	51	20611	1530	.53	14.3
20G	10	4176	501	9	3926	471	36	14236	1057	57	22948	1703	.61	14.3
21G	10	4576	549	N/A	N/A	N/A	41	16212	1203	N/A	N/A	N/A	.69	14.3
22G	9	4084	490	N/A	N/A	N/A	55	22000	1632	N/A	N/A	N/A	.94	14.3
22GL	9	4084	490	N/A	N/A	N/A	59	23500	1744	N/A	N/A	N/A	1.0	37.0

NOTES:

* BZT (Benzotriazole) is supplied with the chiller from the factory as part of the chiller's ship loose parts. It is for a one time only installation by a qualified YORK Service Technician in the first stage generator of steam fired units at chiller start-up.

One gallon of water at 60°F = 8.334 lbs.

One gallon of solution at 55% concentration = 13.48 lbs.

One drum holds 30 US gallons. Drum quantities are full drums, in some cases overage may occur.

CHILLER TUBE VOLUMES

UNIT MODEL	TUBE SIDE														
	# OF TUBES	EVAPORATOR				# OF TUBES	ABSORBER				# OF TUBES	CONDENSER			
		W/O WATER BOXES		W/WATER BOXES			W/O WATER BOXES		W/WATER BOXES			W/O WATER BOXES		W/ WATER BOXES	
		GAL	LTR	GAL	LTR		GAL	LTR	GAL	LTR		GAL	LTR	GAL	LTR
12SC	502	43.6	165.1	47.9	181.4	405	57.4	217.3	63.2	239.3	140	19.8	75.0	21.8	82.5
13SC	502	43.6	165.1	47.9	181.4	405	35.2	133.3	38.7	146.5	140	19.8	75.0	21.8	82.5
14SC	502	54.5	206.3	59.9	226.8	405	43.9	166.2	48.3	182.9	140	24.8	93.9	27.3	103.4
15SL	366	70.8	268.1	77.9	294.9	525	135.5	513.0	149.0	564.1	160	41.3	156.4	45.4	171.9
16S	408	79	299.1	86.9	329.0	525	135.5	513.0	149.0	564.1	160	41.3	156.4	45.4	171.9
16SL	366	88.5	335.1	97.4	368.8	525	169.4	641.4	186.3	705.4	160	51.6	195.4	56.8	215.1
17S	408	98.7	373.7	108.6	411.2	525	169.4	641.4	186.3	705.4	160	51.6	195.4	56.8	215.1
18S	408	118.4	448.3	130.3	493.3	525	203.2	769.4	223.6	846.6	160	61.9	234.4	68.1	257.8
19S	408	138.2	532.3	152.0	575.5	525	237.1	897.7	260.8	987.5	160	72.3	273.7	79.5	301.0
15GL	718	88.4	334.7	97.3	368.4	602	109.4	414.2	120.4	455.9	190	34.5	130.6	38.0	143.9
16G	720	86.3	326.8	94.9	359.3	602	72.1	273.0	79.3	300.2	190	33.6	127.2	37.0	140.1
16GL	718	110.5	418.4	121.6	460.4	602	136.8	518.0	150.5	569.8	190	43.2	163.6	47.5	179.8
17G	720	107.8	408.2	118.6	449.0	602	90.2	341.5	99.2	375.6	190	42.0	159	46.3	175.3
18G	720	129.4	489.9	142.3	538.8	602	108.2	409.7	119.0	450.6	152	58.8	222.6	64.7	245.0
19G	720	148.8	563.4	163.7	619.8	602	124.4	471.0	136.9	518.3	152	67.6	255.9	74.4	281.7
19GL	790	194.6	736.8	214.0	810.3	602	218.9	828.8	240.8	911.7	152	89.2	337.7	98.1	371.4
20G	1007	241.4	914.0	265.5	1005.2	823	291.5	1103.7	320.7	1214.2	215	111.0	420.3	122.0	461.9
21G	1234	295.8	1120.0	325.4	1232.0	946	335.1	1268.8	368.6	1395.6	252	130.0	492.2	143.1	541.8
22G	1404	336.6	1274.4	370.2	1401.7	1194	423.0	1601.6	465.3	1761.7	404	208.5	789.4	229.3	868.2

NOTE:

Water boxes are compact design.

POWER FLAME ABSORPTION BURNER SIZES

UNIT MODEL	NOM. TONS	BURNER SIZE	MAX FIRING RATE (MBH)	MIN FIRING RATE (MBH)	MAX OIL FLOW (GPH)	GAS PRESS. REQUIRED (W.C.) min/max	SEPARATE DRIVEN OIL PRESSURE PUMP	
							MOTOR HP HP	SUCTION CAPACITY (GPH)
"S" UNITS								
12SC / 13S	200	CR2-G(O)-20B	2,553	750	22	4.8 / 14	1/3	40
13SC / 14S	230	CR3-G(O)-20	2,891	900	26	5.9 / 14	1/2	105
14SC / 15S	300	CR3-G(O)-25	3,613	900	33.7	7.0 / 14	1/2	105
15SL	350	CR4-G(O)-25	4,508	1300	45	8.0 / 14	3/4	135
16S	400	CR4-G(O)-25	5,010	1300	45	8.0 / 14	3/4	135
16SL	440	CR4-G(O)-25	5,634	1300	45	8.0 / 14	3/4	135
17S	485	CR4-G(O)-25	6,261	1300	45	8.0 / 14	3/4	135
18S	580	CR4-G(O)-30	7,230	2459	56	12.1 / 14	3/4	135
19S	675	CR5-G(O)-30	8,765	3000	75	19.9 / 28	1	250
"G" UNITS								
16G	400	CR4-G(O)-25	5,950	1300	45	8.0 / 14	3/4	135
16GL	450	CR4-G(O)-25	6300	1300	45	8.0 / 14	3/4	135
17G	500	CR4-G(O)-30	7,258	2459	56	12.1 / 14	3/4	135
18G	600	CR5-G(O)-30	8,936	3000	75	19.9 / 28	1	250
19G	700	CR5-G(O)-30	10,418	3000	75	19.9 / 28	1	250
19GL	800	CR5-G(O)-30	10,418	3000	75	19.9 / 28	1	250
20G*	1000	CR4-G(O)-30	7,258	2459	56	12.1 / 14	3/4	135
21G*	1250	CR5-G(O)-30	8,936	3000	75	19.9 / 28	1	250
22G*	1500	CR5-G(O)-30	10,418	3000	75	19.9 / 28	1	250

NOTES:

* Units equipped with two burners

This information is of a general nature only. Please refer to "Burner As Built Data" (supplied with burner) for specific job details.

CAPACITY OF PIPE – NATURAL GAS (CFH)

With Pressure Drop of 0.3" W.C and Specific Gravity of 0.60

PIPE LENGTH (feet)	PIPE SIZE (inches) (IPS)						
	1	1-1/4	1-1/2	2	2-1/2	3	4
10	520	1050	1600	3050	4800	8500	17500
20	350	730	1100	2100	3300	5900	12000
30	285	590	890	1650	2700	4700	9700
40	245	500	760	1450	2300	4100	8300
50	215	440	670	1270	2000	3600	7400
60	195	400	610	1150	1850	3250	6800
70	180	370	560	1050	1700	3000	6200
80	170	350	530	990	1600	2800	5800
90	160	320	490	930	1500	2600	5400
100	150	305	460	870	1400	2500	5100
125	130	275	410	780	1250	2200	4500
150	120	250	380	710	1130	2000	4100
175	110	225	350	650	1050	1850	3800
200	100	210	320	610	980	1700	3500

Use Correction Factor Table for other specific gravities and pressure drops.

CORRECTION FACTORS *

SPECIFIC GRAVITY	MULTIPLIER	PRESSURE DROP	MULTIPLIER
0.50	1.10	0.1	0.577
0.60	1.00	0.2	0.815
0.70	0.926	0.3	1.00
0.80	0.867	0.4	1.16
0.90	0.817	0.6	1.42
1.00	0.775	0.8	1.64
Propane - Air		1.0	1.83
1.10	0.740	2.0	2.58
Propane		3.0	3.16
1.55	0.622	4.0	3.65
Butane		6.0	4.47
2.00	0.547	8.0	5.15

* To be used for specific gravities or pressure drops.

EQUIVALENT LENGTH OF FITTINGS (ft.) *

Pipe Size (IPS)	1	1.25	1.5	2.0	2.5	3.0	4.0
Std. Tee through Side	5.5	7.5	9.0	12.0	14.0	17.0	22.0
Std. E11	2.7	3.7	4.3	5.5	6.5	8.0	12.0
45° E11	1.2	1.6	2.0	2.5	3.0	3.7	5.0
Plug Cock	3.0	4.0	5.5	7.5	9.0	12.0	16.0

* Based on Schedule 40 iron pipe.

OIL PUMP SUCTION CAPACITY AND FILTER SELECTION CHART FOR POWER FLAME BURNERS

YORK MODEL UNIT	BURNER MODEL	SUCTION CAPACITY (GPH)	POWER FLAME OIL FILTER MODEL	ALTERNATE OIL FILTER
12SC / 13S	CR2-G(O)-20	40	70101-100	73410 (FULFLO FB-6)
13SC / 14S	CR3-G(O)-20	105	70101-100	73410 (FULFLO FB-6)
14SC / 15S	CR3-G(O)-25	105	70101-100	73420 (FULFLO FB-10)
15SL	CR4-G(O)-25	135	70101-100	73420 (FULFLO FB-10)
16S	CR4-G(O)-25	135	70101-100	73420 (FULFLO FB-10)
16SL	CR4-G(O)-25	135	70101-100	73420 (FULFLO FB-10)
17S	CR4-G(O)-25	135	70101-100	73420 (FULFLO FB-10)
18S	CR4-G(O)-30	135	70101-100	73420 (FULFLO FB-10)
19S	CR5-G(O)-30	250	70101-100	“73290 (#72 1" HAYWARD W/100 MESH BASKET)”
16G	CR4-G(O)-25	135	70101-100	73420 (FULFLO FB-10)
16GL	CR4-G(O)-25	135	70101-100	73420 (FULFLO FB-10)
17G	CR4-G(O)-30	135	70101-100	73420 (FULFLO FB-10)
18G	CR5-G(O)-30	250	70101-100	“73290 (#72 1" HAYWARD W/100 MESH BASKET)”
19G	CR5-G(O)-30	250	70101-100	“73290 (#72 1" HAYWARD W/100 MESH BASKET)”
19GL	CR5-G(O)-30	250	70101-100	“73290 (#72 1" HAYWARD W/100 MESH BASKET)”
20G*	CR4-G(O)-30	2@135	70101-100	73420 (FULFLO FB-100
21G	CR5-G(O)-30	250	70101-100	“73290 (#72 1" HAYWARD W/100 MESH BASKET)”
22G	CR5-G(O)-30	250	70101-100	“73290 (#72 1" HAYWARD W/100 MESH BASKET)”

COMBUSTION AIR REQUIREMENTS FOR POWER FLAME BURNERS

Burner Model	Rated MBH	Combustion Air Required*		Approximate Flue Gas Flow Rates At Varying Stack Temperature (ACFM)						
		LB/HR	SCFM	77°F	250°F	300°F	350°F	400°F	450°F	500°F
CR2-G(O)-20B	3,080	2,653	590	621	821	879	937	994	1,052	1,110
CR3-G(O)-20	3,650	3,144	699	736	973	1,041	1,110	1,178	1,247	1,315
CR3-G(O)-25	4,718	4,064	903	951	1,258	1,346	1,435	1,523	1,612	1,700
CR4-G(O)-25	6,300	5,427	1,206	1,270	1,679	1,797	1,916	2,034	2,152	2,270
CR4-G(O)-30	7,840	6,753	1,501	1,580	2,090	2,237	2,384	2,531	2,678	2,825
CR5-G(O)-30	10,500	9,044	2,010	2,117	2,799	2,996	3,193	3,390	3,587	3,784

Based on 20% excess air (dry) at 77°F.

WEISHAUPT BURNER OIL PUMP CAPACITIES

BURNER TYPE	BURNER CAPACITY ON NO. 2 OIL	TYPE OF OIL PUMP	PUMP CAPACITY	MAXIMUM SUPPLY PRESSURE	MAXIMUM OPERATING TEMPERATURE
GL3	up to 16.5 GPH	UNI 2.10 L7	44 GPH (140 kg/h)	30 psi (2.0 bar)	160°F (70°C)
RGL3	up to 16.5 GPH	UNI 2.10 L8	66 GPH (210 kg/h)	30 psi (2.0 bar)	160°F (70°C)
GL5	up to 24.5 GPH	J6	72 GPH (230 kg/h)	30 psi (2.0 bar)	160°F (70°C)
RGL5	up to 24.5 GPH	E7	97 GPH (310 kg/h)	70 psi (5.0 bar)	190°F (90°C)
GL7	up to 40.0 GPH	J6	72 GPH (230 kg/h)	30 psi (2.0 bar)	160°F (70°C)
GL7	up to 46.0 GPH	J7	116 GPH (370 kg/h)	30 psi (2.0 bar)	160°F (70°C)
RGL7	up to 46.0 GPH	TA2	165 GPH (525 kg/h)	70 psi (5.0 bar)	190°F (90°C)
GL8	up to 60.0 GPH	J7	116 GPH (370 kg/h)	30 psi (2.0 bar)	160°F (70°C)
RGL8	up to 60.0 GPH	TA3	247 GPH (785 kg/h)	70 psi (5.0 bar)	190°F (90°C)
GL9	up to 68.0 GPH	J7	116 GPH (370 kg/h)	30 psi (2.0 bar)	160°F (70°C)
GL9	up to 91.0 GPH	TA2	165 GPH (525 kg/h)	70 psi (5.0 bar)	190°F (90°C)
RGL9	up to 91.0 GPH	TA3	247 GPH (785 kg/h)	70 psi (5.0 bar)	190°F (90°C)
RGL10	up to 103.0 GPH	TA3	247 GPH (785 kg/h)	70 psi (5.0 bar)	190°F (90°C)
RGL11	up to 133.0 GPH	TA4	330 GPH (1050 kg/h)	70 psi (5.0 bar)	190°F (90°C)

ELECTRICAL DATA – DIRECT-FIRED UNITS

CHILLER MODEL	VOLTAGE	MAX. DUAL ELEMENT FUSE (CUSTOMER SUPPLIED) BURNER TYPE				TOTAL UNIT AMPACITY				MINIMUM CIRCUIT AMPACITY			
		DUAL FUEL	DUAL FUEL LOW NOX	GAS ONLY	GAS ONLY LOW NOX	DUAL FUEL	DUAL FUEL LOW NOX	GAS ONLY	GAS ONLY LOW NOX	DUAL FUEL	DUAL FUEL LOW NOX	GAS ONLY	GAS ONLY LOW NOX
12SC	200/208-3-60	70	70	60	70	43.3	47.3	41.3	45.3	48.8	52.8	46.8	50.8
	230-3-60	60	60	60	60	39.0	42.6	37.2	40.8	44.0	47.6	42.2	45.8
	380-3-50	35	35	30	35	21.2	22.9	20.4	22.0	24.0	25.7	23.2	24.8
	460-3-60	30	30	30	30	19.6	21.4	18.7	20.5	22.1	23.9	21.2	23.0
13SC & 14SC	200/208-3-60	70	70	70	70	45.7	49.7	43.1	47.1	51.2	55.2	48.6	52.6
	230-3-60	60	60	60	60	41.2	44.8	38.8	42.4	46.2	49.8	43.8	47.4
	380-3-50	35	35	35	35	22.2	23.8	21.1	22.8	25.0	26.6	23.9	25.6
	460-3-60	30	30	30	30	20.7	22.5	19.5	21.3	23.2	25.0	22.0	23.8
15SL & 16S	200/208-3-60	90	100	90	90	63.5	67.5	60.2	64.2	70.4	74.4	67.1	71.1
	230-3-60	80	90	80	80	56.8	60.4	53.7	57.3	63.1	66.7	60.0	63.6
	380-3-50	50	50	45	50	31.8	33.4	30.4	32.0	35.6	37.2	34.2	35.8
	460-3-60	40	45	40	40	28.5	30.3	27.0	28.8	31.6	33.4	30.1	31.9
16SL, 17S & 18S	200/208-3-60	125	125	125	125	89.7	93.8	86.4	90.4	99.9	103.9	96.6	100.6
	230-3-60	125	125	110	125	80.6	84.2	77.5	81.1	89.8	93.4	86.7	90.3
	380-3-50	60	60	60	60	42.8	44.4	41.4	43.0	47.5	49.2	46.2	47.8
	460-3-60	60	60	60	60	40.3	42.2	38.9	40.7	44.9	46.8	43.5	45.3
19S	200/208-3-60	125	125	125	125	126.2	126.1	126.2	126.2	136.3	136.3	136.3	136.3
	230-3-60	125	125	125	125	113.5	113.5	113.5	113.5	122.7	122.7	122.7	122.7
	380-3-50	80	80	80	80	59.5	59.5	59.5	59.5	64.3	64.3	64.3	64.3
	460-3-60	70	70	70	70	56.8	56.8	56.8	56.8	61.4	61.4	61.4	61.4
19G	200/208-3-60	125	125	125	125	89.1	93.0	85.4	89.4	99.3	103.2	95.6	99.6
	230-3-60	125	125	110	125	80.6	84.2	77.2	80.9	89.8	93.4	86.4	90.1
	380-3-50	60	60	60	60	41.2	42.8	39.7	41.3	46.0	47.6	44.5	46.1
	460-3-60	60	60	60	60	40.3	42.1	38.7	40.5	44.9	46.7	43.3	45.1
19GL	200/208-3-60	125	150	125	125	108.0	111.9	104.3	108.3	116.3	120.2	112.6	116.6
	230-3-60	125	125	125	125	97.8	101.4	94.4	98.1	105.3	108.9	101.9	105.6
	380-3-50	70	70	70	70	53.2	54.8	51.7	53.3	57.5	59.1	56.0	57.6
	460-3-60	60	60	60	60	48.9	50.7	47.3	49.1	52.7	54.5	51.1	52.9
20G	200/208-3-60	200	200	175	200	152.4	160.4	145.6	153.6	162.6	170.6	155.8	163.8
	230-3-60	175	175	175	175	137.9	145.3	131.9	139.1	147.1	154.5	141.1	148.3
	380-3-50	90	100	90	90	75.4	78.6	72.6	75.8	80.2	83.4	77.4	80.6
	460-3-60	90	90	80	90	69.1	72.7	65.9	69.7	73.7	77.3	70.5	74.3

NOTES:

1. Electrical system must be securely grounded.
2. Direct-Fired table is based on a Power Flame burner.
3. Field wiring must conform to N.E.C. and all other applicable local codes.
4. Incoming wire to chiller must be copper only. Aluminum wiring is not permitted.
5. Connection lugs in power panel will accept incoming wire range of #14 AWG through #1/0 AWG for 380 volt and 460 volt chillers. For 200, 208 and 230 volt chillers, lugs will accept #4 to 350 MCM wire.

SOLUTION PUMP	REFRIGERANT PUMP	PURGE PUMP	SOLUTION SPRAY PUMP #1	SOLUTION SPRAY PUMP #2	MICRO & POWER PANELS
FLA	FLA	FLA	FLA	FLA	FLA
22.0	6.2	1.7	N/A	N/A	5.0
20.0	5.6	1.5	N/A	N/A	4.3
11.2	3.1	0.9	N/A	N/A	2.6
10.0	2.8	0.8	N/A	N/A	2.2
22.0	6.2	1.7	N/A	N/A	5.0
20.0	5.6	1.5	N/A	N/A	4.3
11.2	3.1	0.9	N/A	N/A	2.6
10.0	2.8	0.8	N/A	N/A	2.2
27.6	13.8	1.7	N/A	N/A	5.0
25.0	12.0	1.5	N/A	N/A	4.3
15.0	7.0	0.9	N/A	N/A	2.6
12.5	6.0	0.8	N/A	N/A	2.2
40.6	13.8	1.7	13.2	N/A	5.0
36.8	12.0	1.5	12.0	N/A	4.3
19.0	7.0	0.9	7.0	N/A	2.6
18.4	6.0	0.8	6.0	N/A	2.2
40.6	13.8	1.7	33.1	N/A	5.0
36.8	12.0	1.5	30.0	N/A	4.3
19.0	7.0	0.9	17.0	N/A	2.6
18.4	6.0	0.8	15.0	N/A	2.2
40.6	13.2	2.3	N/A	N/A	5.0
36.8	12.0	2.2	N/A	N/A	4.3
19.0	7.0	1.2	N/A	N/A	2.6
18.4	6.0	1.1	N/A	N/A	2.2
33.1	13.2	2.3	13.2	13.2	5.0
30.0	12.0	2.2	12.0	12.0	4.3
17.0	7.0	1.2	7.0	7.0	2.6
15.0	6.0	1.1	6.0	6.0	2.2
40.6	15.4	2.3	15.4	33.1	5.0
36.8	14.0	2.2	14.0	30.0	4.3
19.0	9.5	1.2	9.5	17.0	2.6
18.4	7.0	1.1	7.0	15.0	2.2

ELECTRICAL DATA – STEAM-FIRED UNITS

CHILLER MODEL	VOLTAGE	MAX DUAL ELEMENT FUSE (CUSTOMER SUPPLIED)	TOTAL UNIT AMPACITY	MINIMUM CIRCUIT AMPACITY
14SC	200/208-3-60	60	34.9	40.4
	230-3-60	50	31.4	36.4
	380-3-50	30	17.2	19.9
	460-3-60	25	16.2	18.7
16SL, 17S & 18S	200/208-3-60	125	74.3	84.5
	230-3-60	110	66.6	75.8
	380-3-50	60	36.5	41.3
	460-3-60	50	33.4	38.0
19S	200/208-3-60	125	94.2	104.4
	230-3-60	125	84.6	93.8
	380-3-50	70	46.5	51.3
	460-3-60	60	42.4	47.0
19G	200/208-3-60	110	61.1	71.3
	230-3-60	100	55.3	64.5
	380-3-50	50	29.8	34.6
	460-3-60	50	27.7	32.3
19GL	200/208-3-60	110	80.0	88.3
	230-3-60	110	72.5	80.0
	380-3-50	60	41.8	46.1
	460-3-60	50	36.3	40.1
20G	200/208-3-60	150	111.8	122.0
	230-3-60	125	101.3	110.5
	380-3-50	80	58.8	63.6
	460-3-60	70	50.7	55.3
21G	200/208-3-60	125	91.9	102.1
	230-3-60	125	83.3	92.5
	380-3-50	70	48.8	53.6
	460-3-60	60	41.7	46.3
22G & 22GL	200/208-3-60	125	94.1	104.3
	230-3-60	125	85.3	94.5
	380-3-50	70	51.3	56.1
	460-3-60	60	42.7	47.3

NOTES:

1. Electrical system must be securely grounded.
2. Direct-Fired table is based on a Power Flame burner.
3. Field wiring must conform to N.E.C. and all other applicable local codes.
4. Incoming wire to chiller must be copper only. Aluminum wiring is not permitted.
5. Connection lugs in power panel will accept incoming wire range of #14 AWG through #1/0 AWG for 380 volt and 460 volt chillers. For 200, 208 and 230 volt chillers, lugs will accept #4 to 350 MCM wire.

SOLUTION PUMP FLA	REFRIGERANT PUMP FLA	PURGE PUMP FLA	SOLUTION SPRAY PUMP #1 FLA	SOLUTION SPRAY PUMP #2 FLA	MICRO & POWER PANELS FLA
22.0	6.2	1.7	N/A	N/A	5.0
20.0	5.6	1.5	N/A	N/A	4.3
11.0	3.1	0.9	N/A	N/A	2.6
10.0	2.8	0.8	N/A	N/A	2.2
40.6	13.8	1.7	13.2	N/A	5.0
36.8	12.0	1.5	12.0	N/A	4.3
19.0	7.0	0.9	7.0	N/A	2.6
18.4	6.0	0.8	6.0	N/A	2.2
40.6	13.8	1.7	33.1	N/A	5.0
36.8	12.0	1.5	30.0	N/A	4.3
19.0	7.0	0.9	17.0	N/A	2.6
18.4	6.0	0.8	15.0	N/A	2.2
40.6	13.2	2.3	N/A	N/A	5.0
36.8	12.0	2.2	N/A	N/A	4.3
19.0	7.0	1.2	N/A	N/A	2.6
18.4	6.0	1.1	N/A	N/A	2.2
33.1	13.2	2.3	13.2	13.2	5.0
30.0	12.0	2.2	12.0	12.0	4.3
17.0	7.0	1.2	7.0	7.0	2.6
15.0	6.0	1.1	6.0	6.0	2.2
40.6	15.4	2.3	15.4	33.1	5.0
36.8	14.0	2.2	14.0	30.0	4.3
19.0	9.5	1.2	9.5	17.0	2.6
18.4	7.0	1.1	7.0	15.0	2.2
40.6	13.2	2.3	15.4	15.4	5.0
36.8	12.0	2.2	14.0	14.0	4.3
19.0	7.0	1.2	9.5	9.5	2.6
18.4	6.0	1.1	7.0	7.0	2.2
40.6	15.4	2.3	15.4	15.4	5.0
36.8	14.0	2.2	14.0	14.0	4.3
19.0	9.5	1.2	9.5	9.5	2.6
18.4	7.0	1.1	7.0	7.0	2.2

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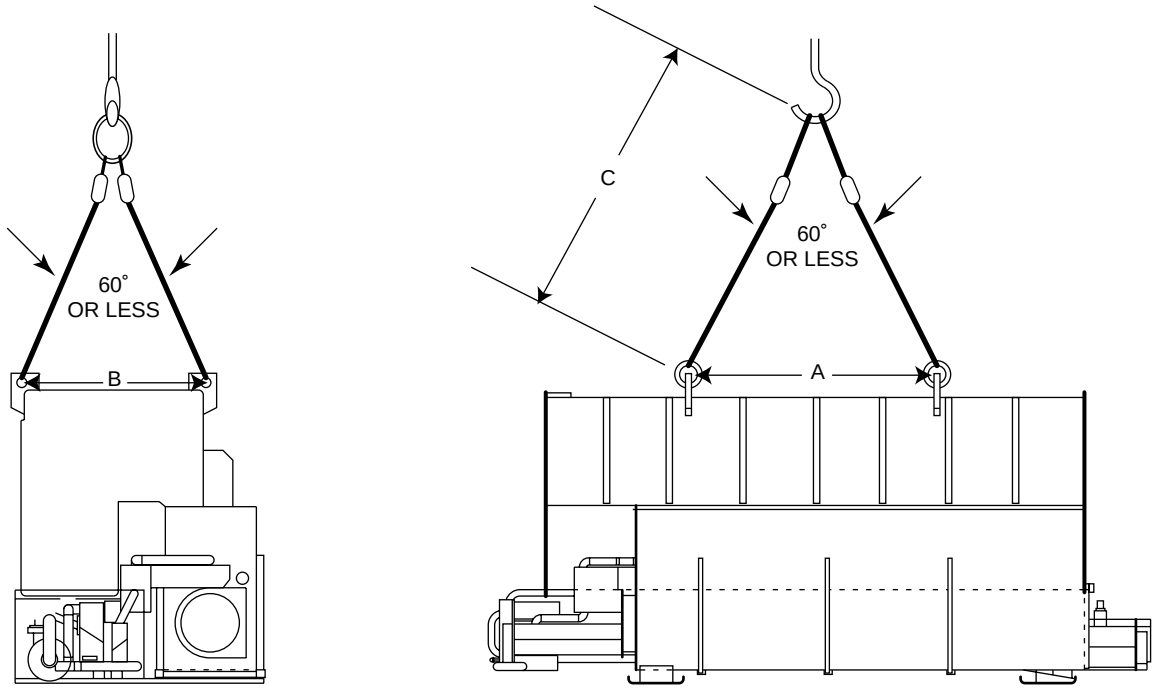
APPENDIX B – RIGGING ILLUSTRATIONS



LD05332

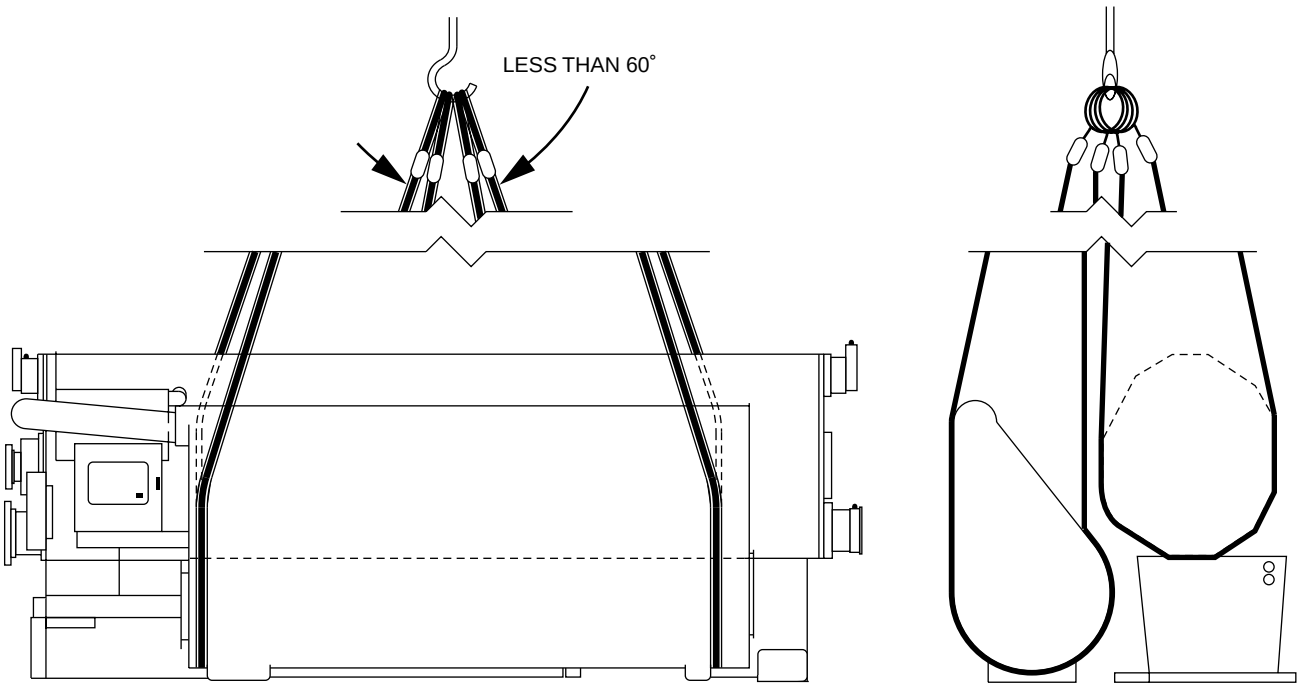
FIG. 45 – RIGGING FOR 12SC THROUGH 19S DIRECT-FIRED AND STEAM UNITS

For lifting units, sling vertically. Use extreme care so as not to sling against, or on any projecting brackets, pipes, fittings, etc. Four slings are to be used on these machines; one on each generator and one on each end of the main shell. When viewed from the exhaust end of the machine, the slings on the left side will be in the same plane while the slings on the right side will be staggered.

S-UNIT RIGGING

UNIT MODEL	DIMENSION "A" (INCHES)	DIMENSION "B" (INCHES)	DIMENSION "C" (MINIMUM) (INCHES)
12SC & 13S	55	53-1/2	55
13SC & 14S	55	53-1/2	55
14SC & 15S	71-3/4	53-1/2	71-3/4
15SL	94-1/2	72-1/2	94-1/2
16S	94-1/2	72-1/2	94-1/2
16SL	103-3/4	72-1/2	103-3/4
17S	103-3/4	72-1/2	103-3/4
18S	138-3/4	72-1/2	138-3/4
19S	138-3/4	72-1/2	138-3/4

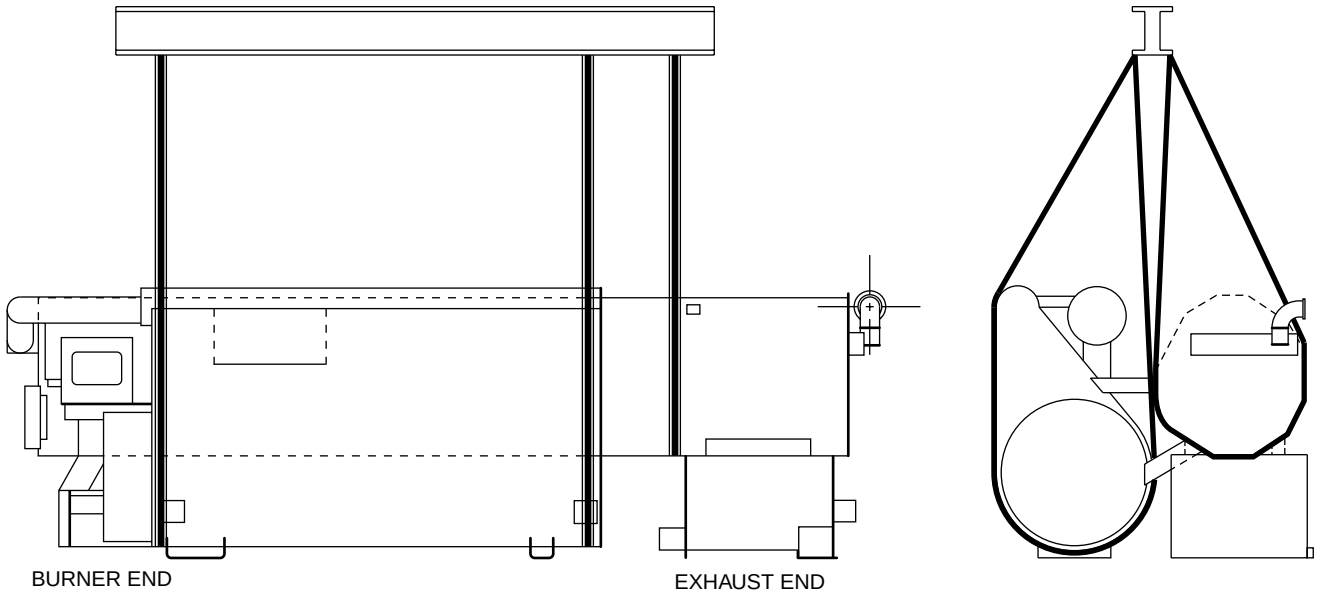
NOTE: Dimension "C" value will give an angle less than 60°.



LD05333

For lifting units, sling vertically. Use extreme care so as not to sling against, or on any projecting brackets, pipes, fittings, etc. Use four slings, one on each end of the high-temperature generator and one at each end of the main shell. When lifting, keep unit level.

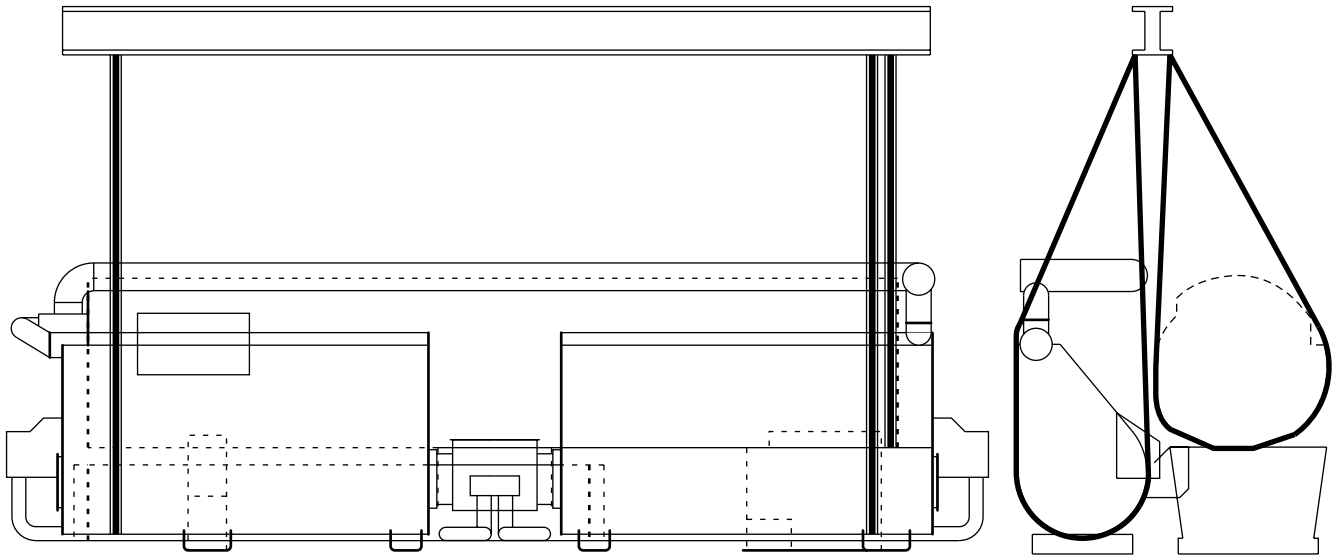
FIG. 46 – RIGGING FOR 16G THROUGH 18G DIRECT-FIRED UNITS



LD05334

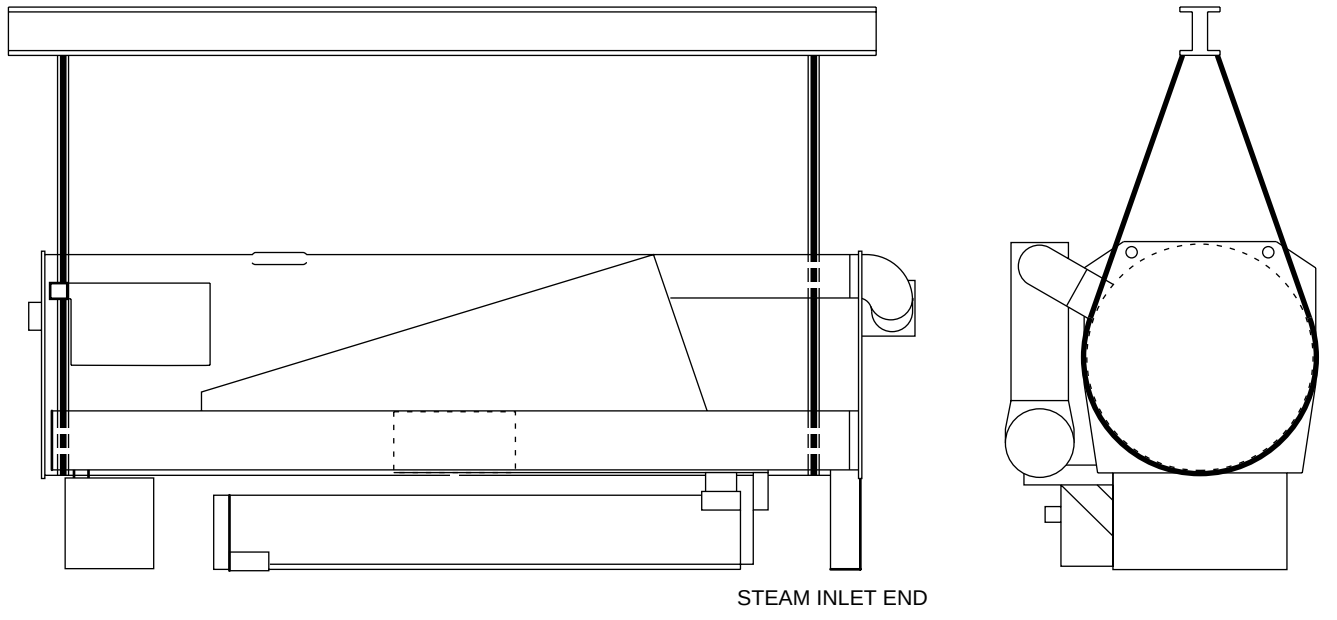
For lifting units, sling vertically. Use extreme care so as not to sling against, or on any projecting brackets, pipes, fittings, etc. Use four slings and spreader bar as shown, one sling on each end of the first-stage generator and one on each end of the main shell.

FIG. 47 – RIGGING FOR 19G THROUGH 19GL DIRECT-FIRED UNITS



For lifting units, sling vertically. Use extreme care so as not to sling against, or on any projecting brackets, pipes, fittings, etc. Use four slings and spreader bar as shown, one sling on each end of the high-temperature generator and one on each end of the main shell.

FIG. 48 – RIGGING FOR 20G DIRECT-FIRED UNITS



For lifting units, sling vertically. Use extreme care as not to sling against, or on any projecting brackets, pipes, fittings, etc. Use spreader bar as shown and two slings. Sling around belly bands on the main shell - when lifting, make certain unit is level.

FIG. 49 – RIGGING FOR 19G THROUGH 22GL STEAM-FIRED UNITS

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APPENDIX C – INSULATION ILLUSTRATIONS

ABSORPTION INSULATION LEGEND

	HOT INSULATION	INTERMEDIATE INSULATION	COLD INSULATION
MATERIAL	3 LB. DENSITY FIBERGLASS	2 LB. DENSITY FIBERGLASS	CLOSED-CELL FOAM
THICKNESS	2 INCHES	1 INCH	3/4 INCH
COLOR CODE ON INSULATION DIAGRAMS			

YORK ParaFlow™ ABSORPTION CHILLER INSULATION AREA (sq. feet)

UNIT MODEL	DIRECT-FIRED HOT	DIRECT-FIRED COLD	STEAM-FIRED HOT	STEAM-FIRED COLD
12SC	172	86		
13SC	194	86		
14SC	258	118		
15SL	355	140		
16S	355	140		
16SL	398	172	398	172
17S	398	172	398	172
18S	474	205	474	205
19S	506	237	506	237
16G	350	75		
17G	390	75		
18G	430	90		
19G	585	90		
19GL	625	150	530	150
20G	840	165	545	155
21G			635	125
22G			730	165

YORK ParaFlow™ ABSORPTION CHILLER INSULATION AREA (sq. meters)

UNIT MODEL	DIRECT-FIRED HOT	DIRECT-FIRED COLD	STEAM-FIRED HOT	STEAM-FIRED COLD
12SC	16.0	18.0		
13SC	18.0	8.0		
14SC	24.0	11.0		
15SL	33.0	13.0		
16S	33.0	13.0		
16SL	37.0	16.0	37.0	16.0
17S	37.0	16.0	37.0	16.0
18S	44.0	19.1	44.0	19.1
19S	47.0	22.0	47.0	22.0
16G	32.5	7.0		
17G	36.2	7.0		
18G	40.0	8.4		
19G	54.4	8.8		
19GL	58.1	13.9	49.2	13.9
20G	78.0	15.3	50.6	14.4
21G			59.0	11.6
22G			67.8	15.3

INSULATION METHODS TO AVOID:

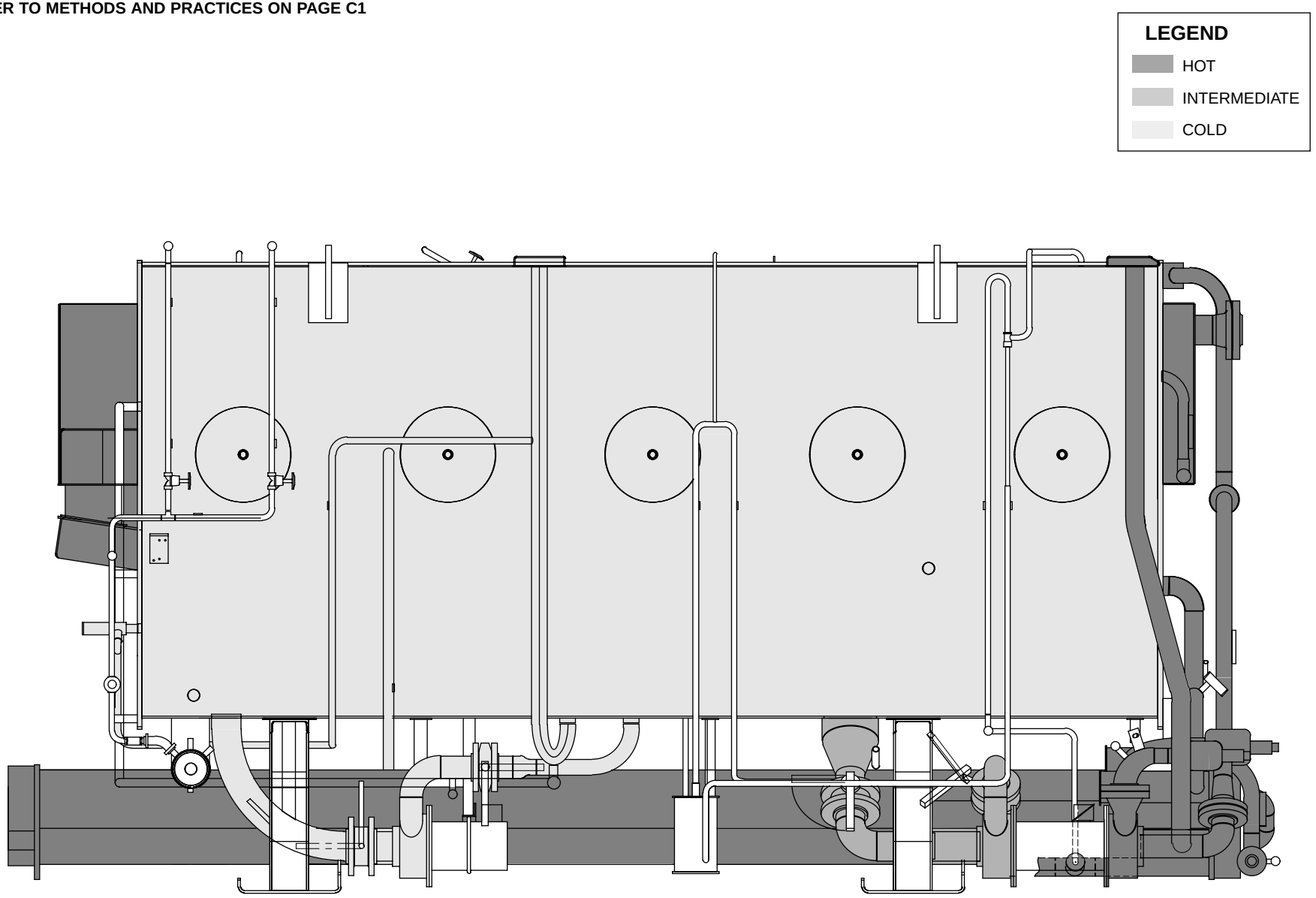
1. Do not insulate moving parts, such as valve handles.
2. Do not insulate thermowells.
3. Do not cover sight glasses with insulation.
4. Do not cover pipe connections, since they must be accessible for pressure and vacuum tests.
5. Do not cover pump motors with insulation.
6. Do not use weld pins to attach insulation.

PROPER INSULATION PRACTICES:

1. Insulation on pumps, valves, sight glasses equipment and flange sections should be mounted so that it can be removed easily.
2. Water boxes or cover plates must be removed/opened from time to time for tube cleaning. Valves, pumps and nozzles must be accessible for servicing and operation.
3. Insulate auxiliary and instrument piping by wrapping glass wool around it.

To mount insulation materials, use bonding agents, wires or bands. These methods do not penetrate the chiller system and jeopardize the integrity of the vacuum pressure in the chiller. WELD PINS ARE NOT ACCEPTABLE.

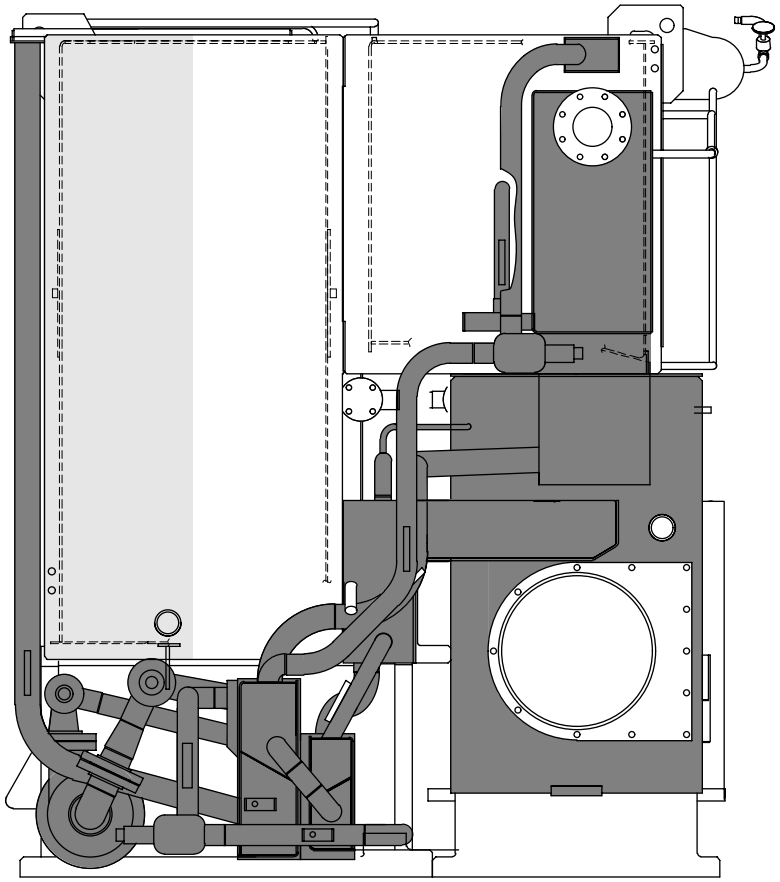
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05337

FIG. 50 – INSULATION DIAGRAM, MODEL YPC-DF-12SC-15S

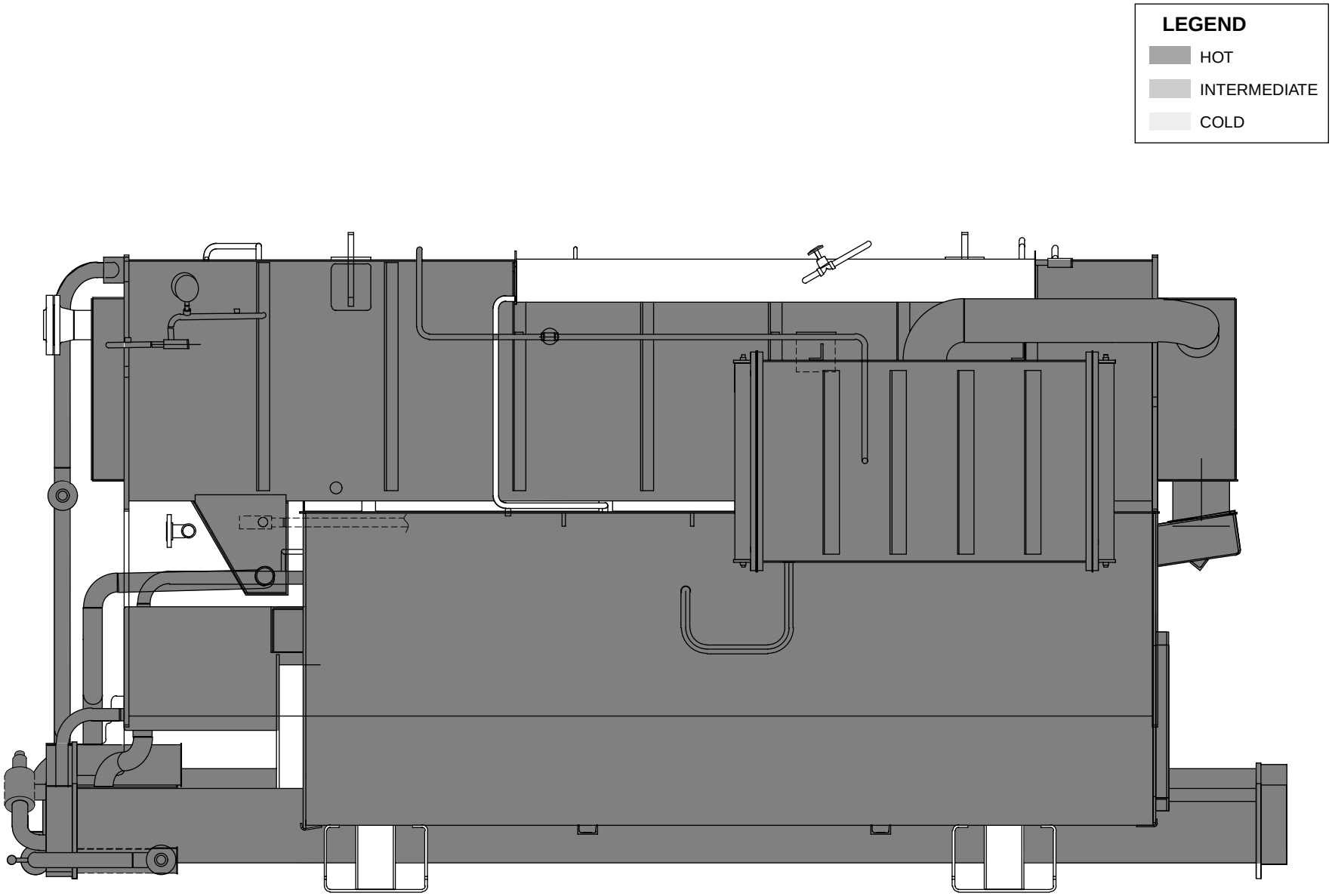
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05337A

FIG. 50 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-12SC-15S

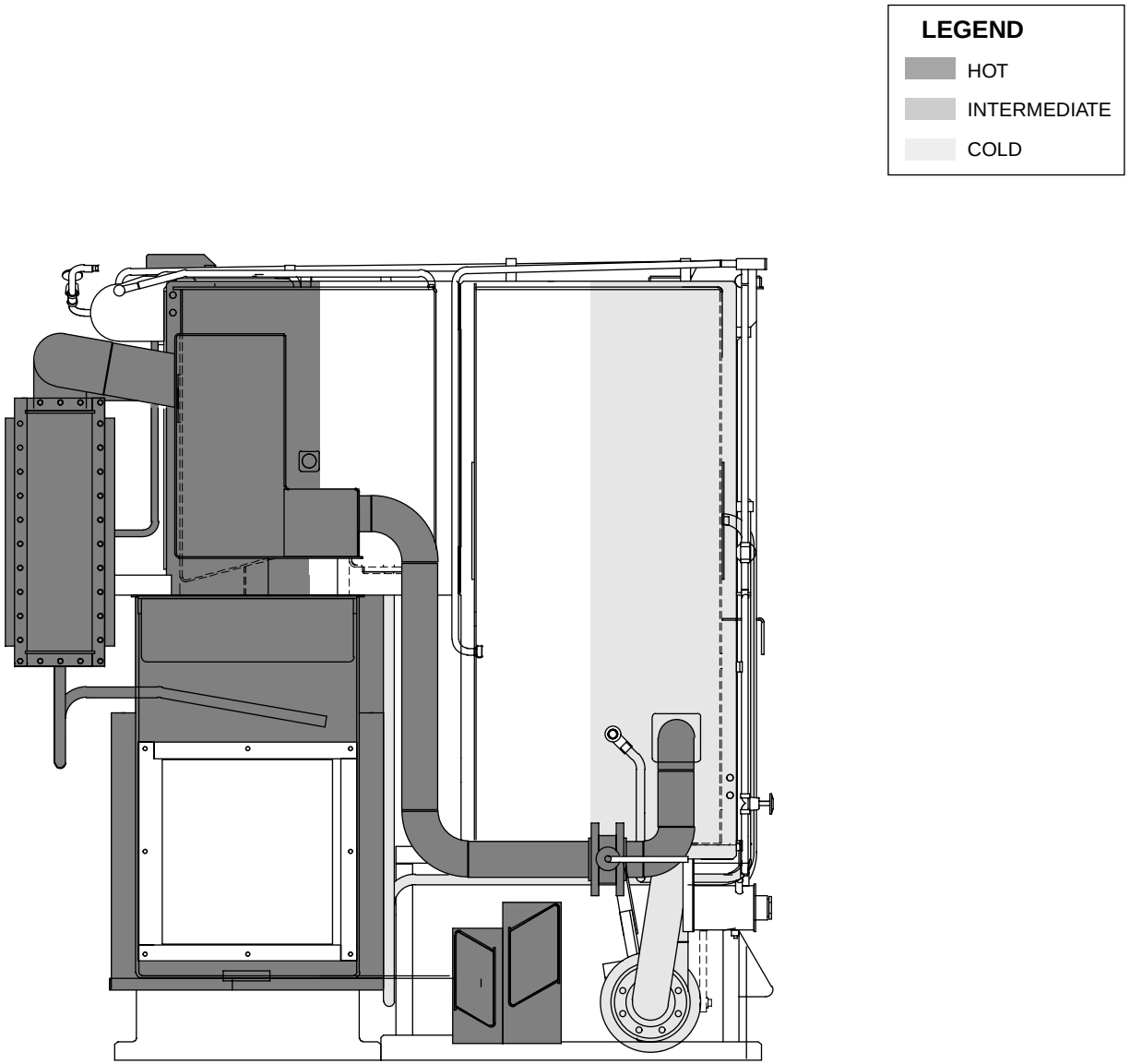
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05338

FIG. 51 – INSULATION DIAGRAM, MODEL YPC-DF-12SC-13S-15S

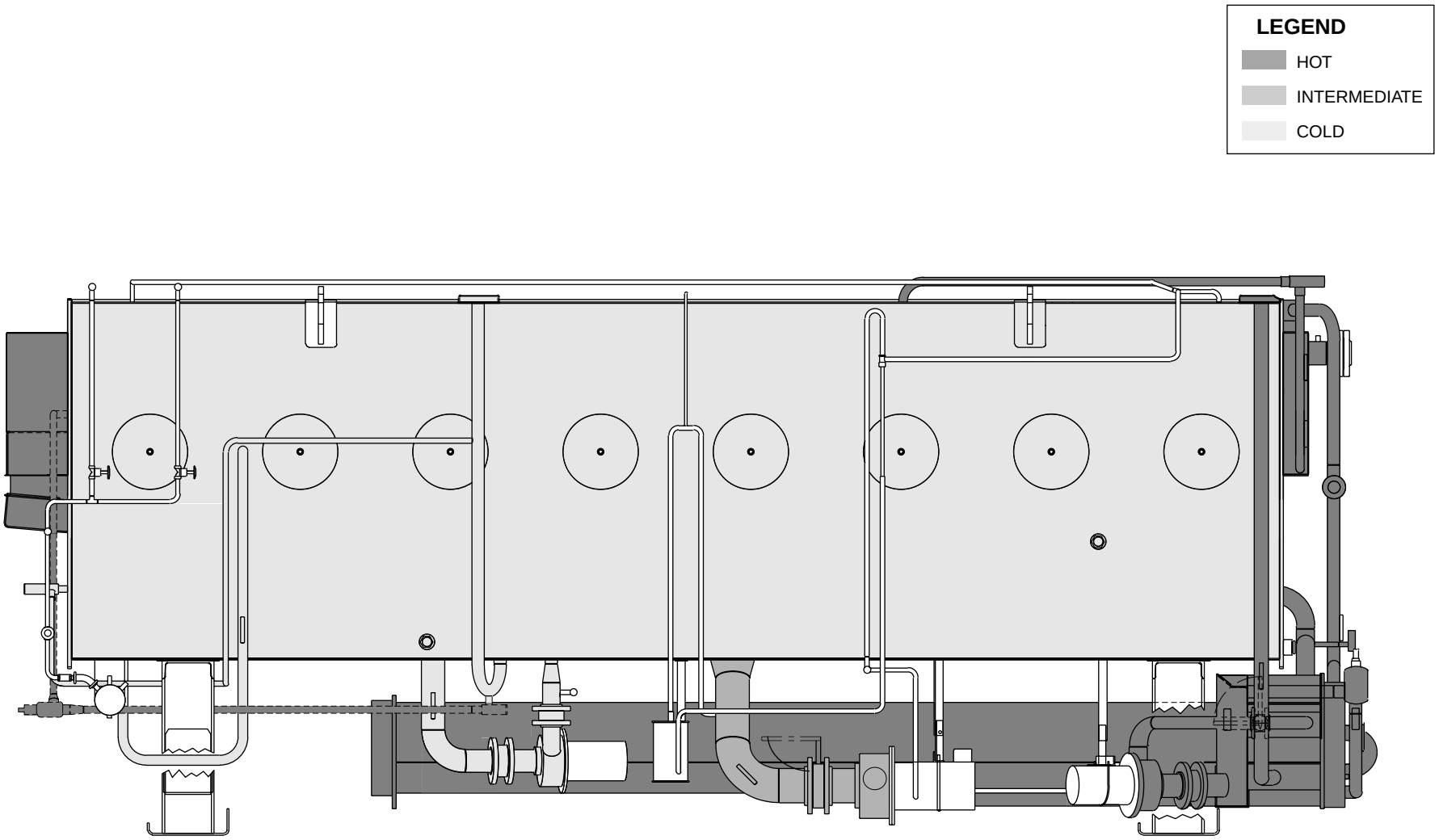
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05338A

FIG. 51 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-12SC-13S-15S

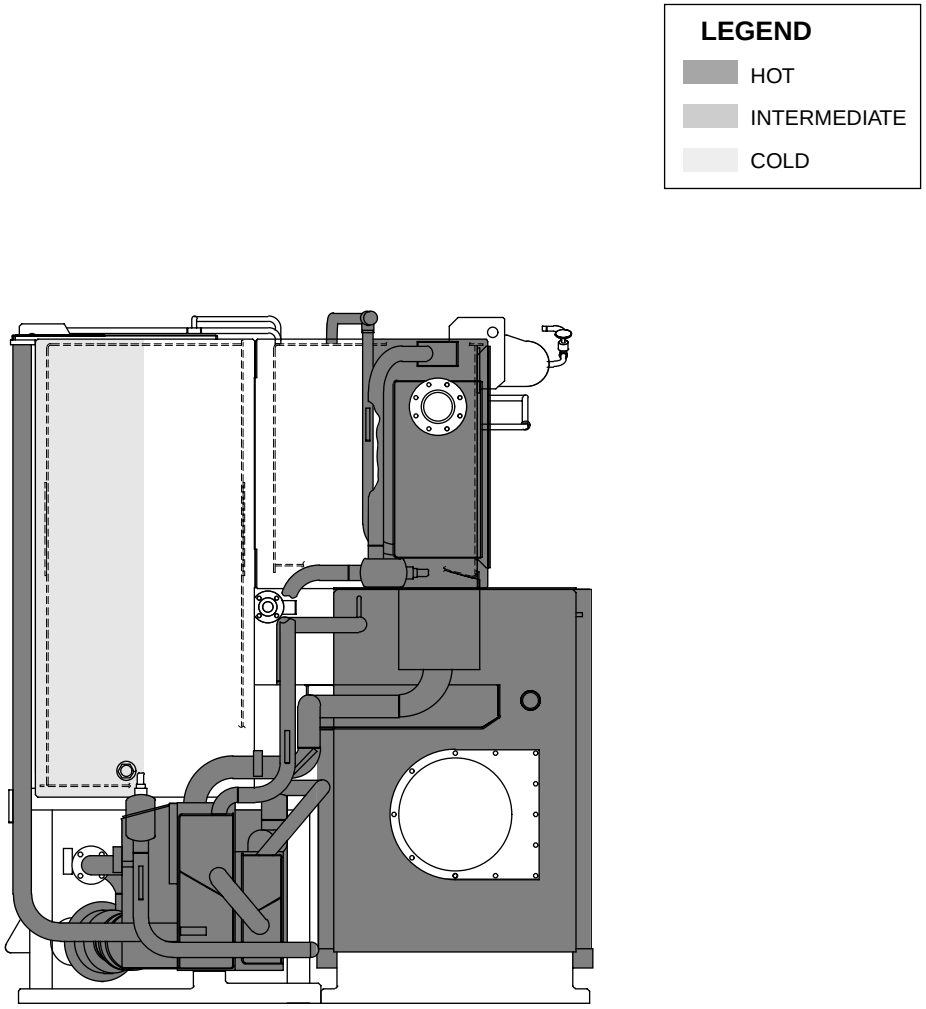
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05339

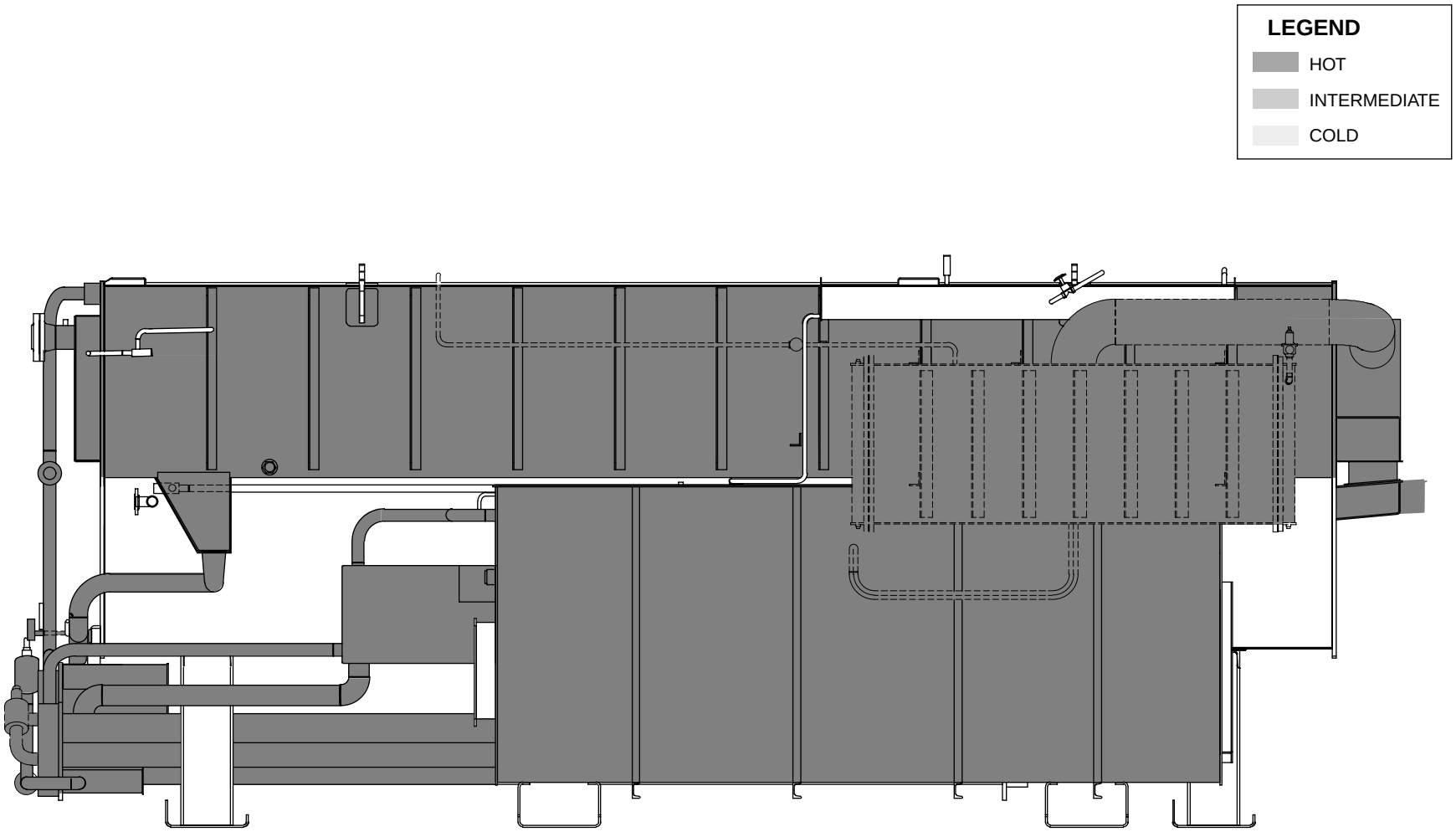
FIG. 52 – INSULATION DIAGRAM, MODEL YPC-DF-15SL-16S

REFER TO METHODS AND PRACTICES ON PAGE C1



LD05339A

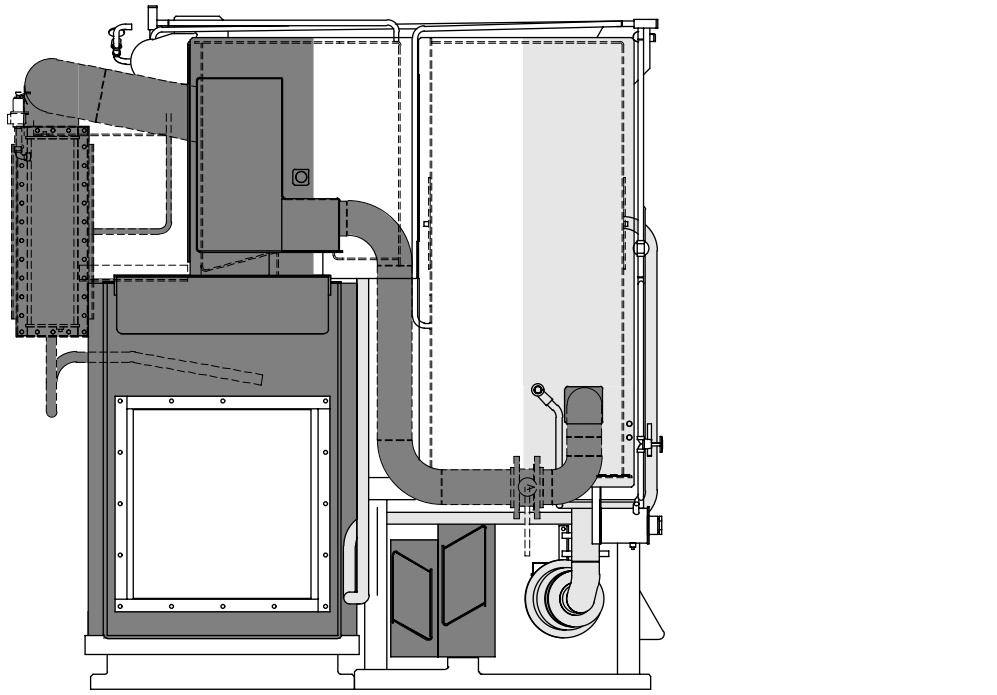
FIG. 52 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-15SL-16S



LD05340

FIG. 53 – INSULATION DIAGRAM, MODEL YPC-DF-15SL-13S-16S

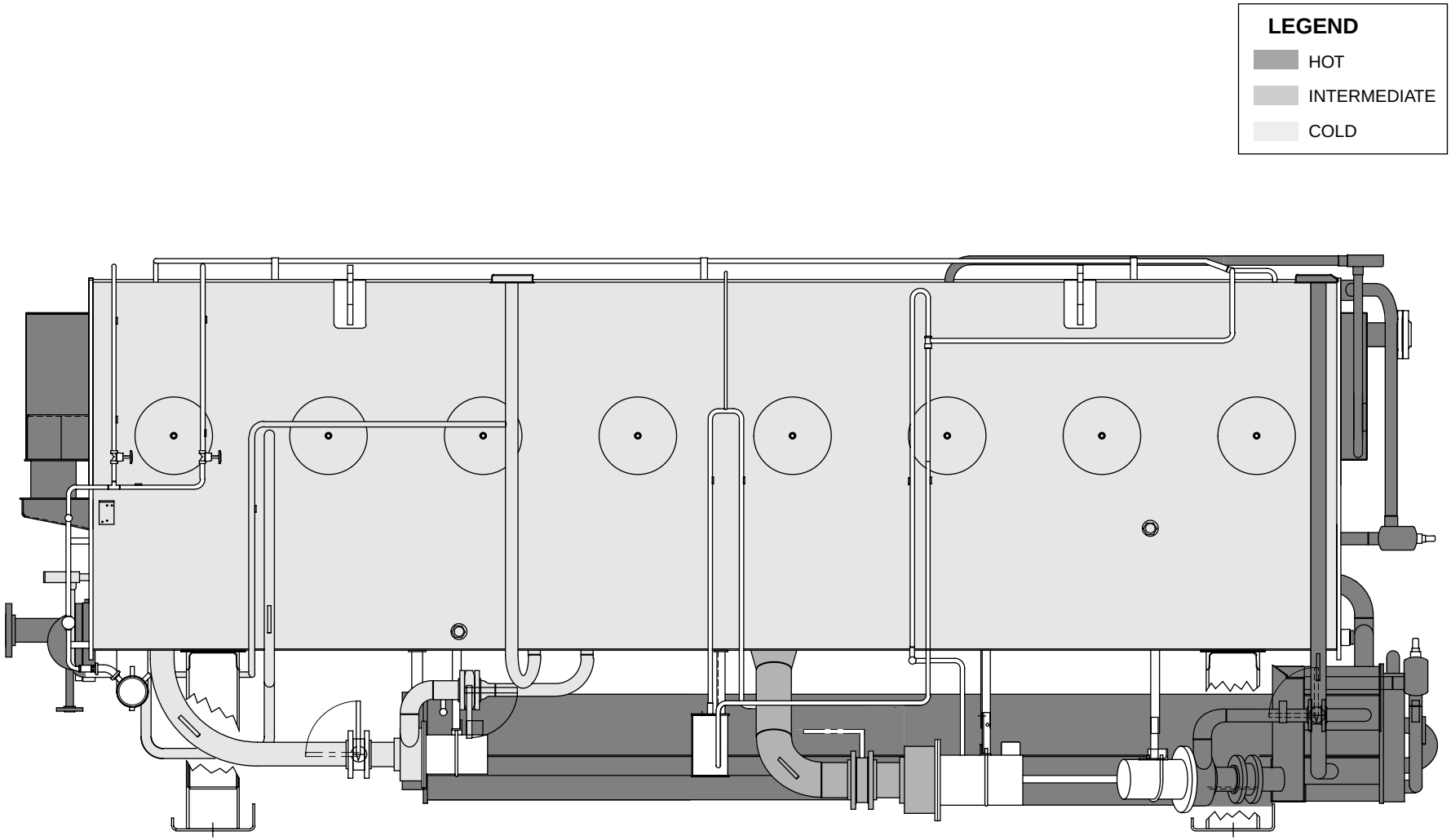
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05340A

FIG. 53 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-15SL-13S-16S

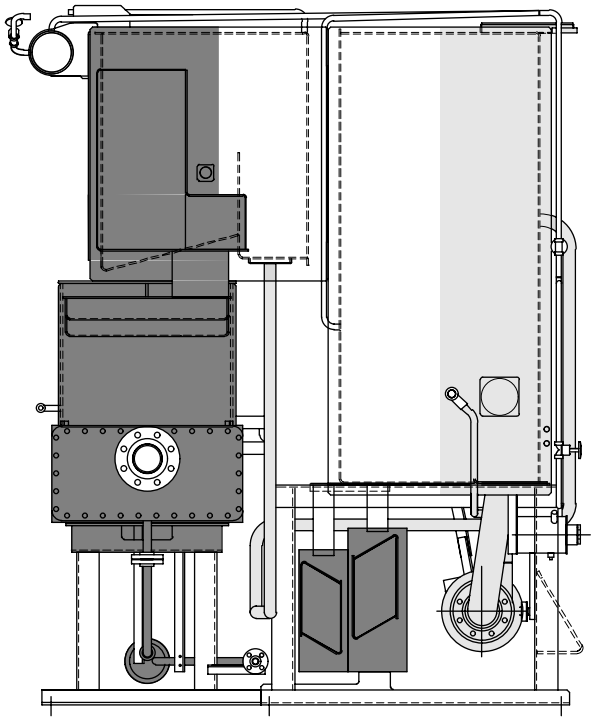
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05341

FIG. 54 – INSULATION DIAGRAM, MODEL YPC-ST-16SL-19S

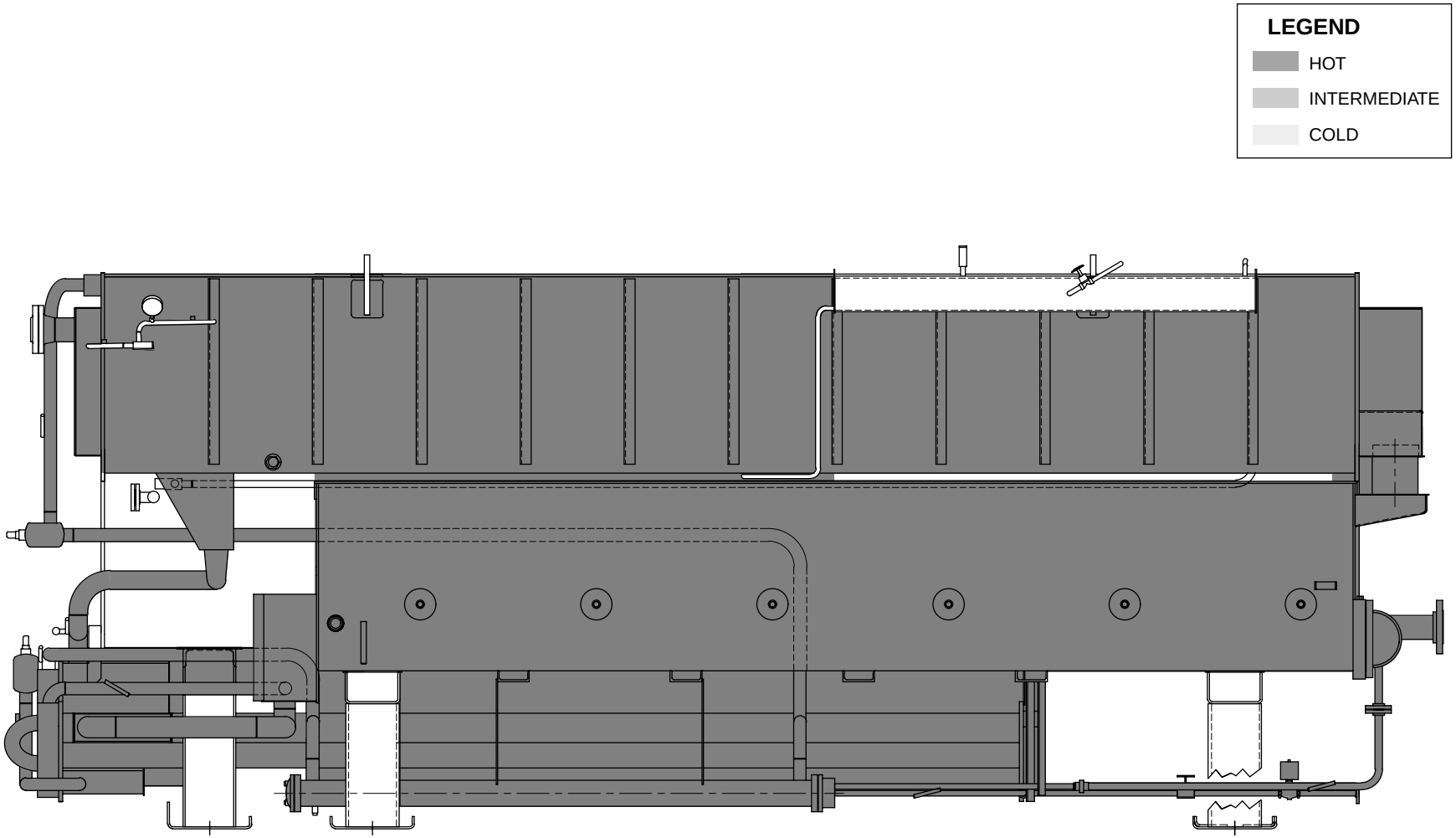
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05341A

FIG. 54 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-16SL-19S

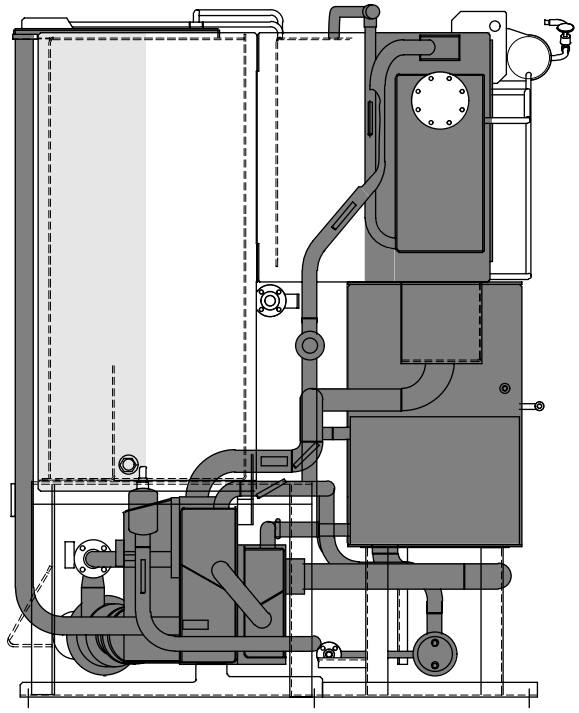
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05342

FIG. 55 – INSULATION DIAGRAM, MODEL YPC-ST-16SL-19S

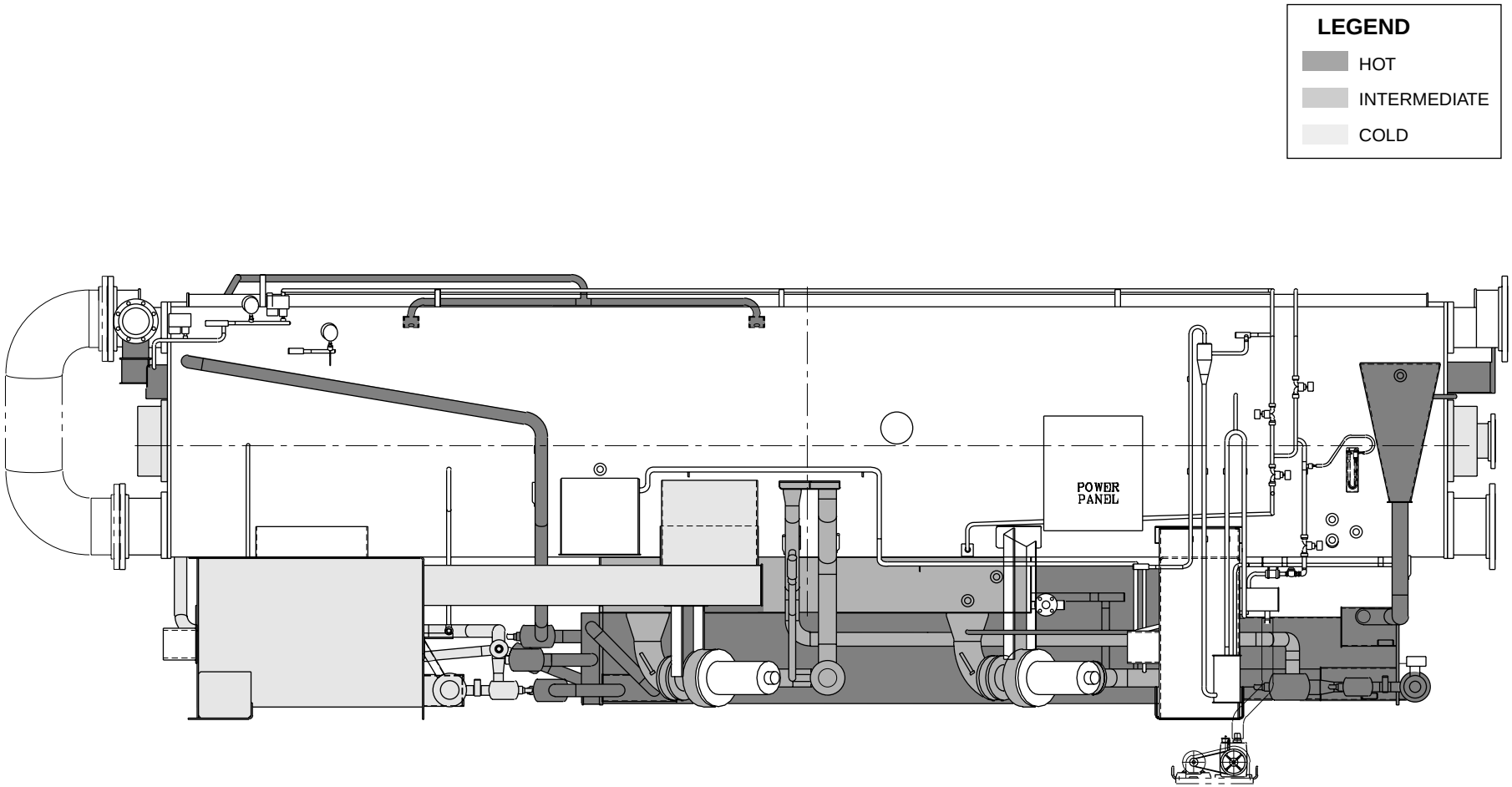
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05342A

FIG. 55 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-16SL-19S

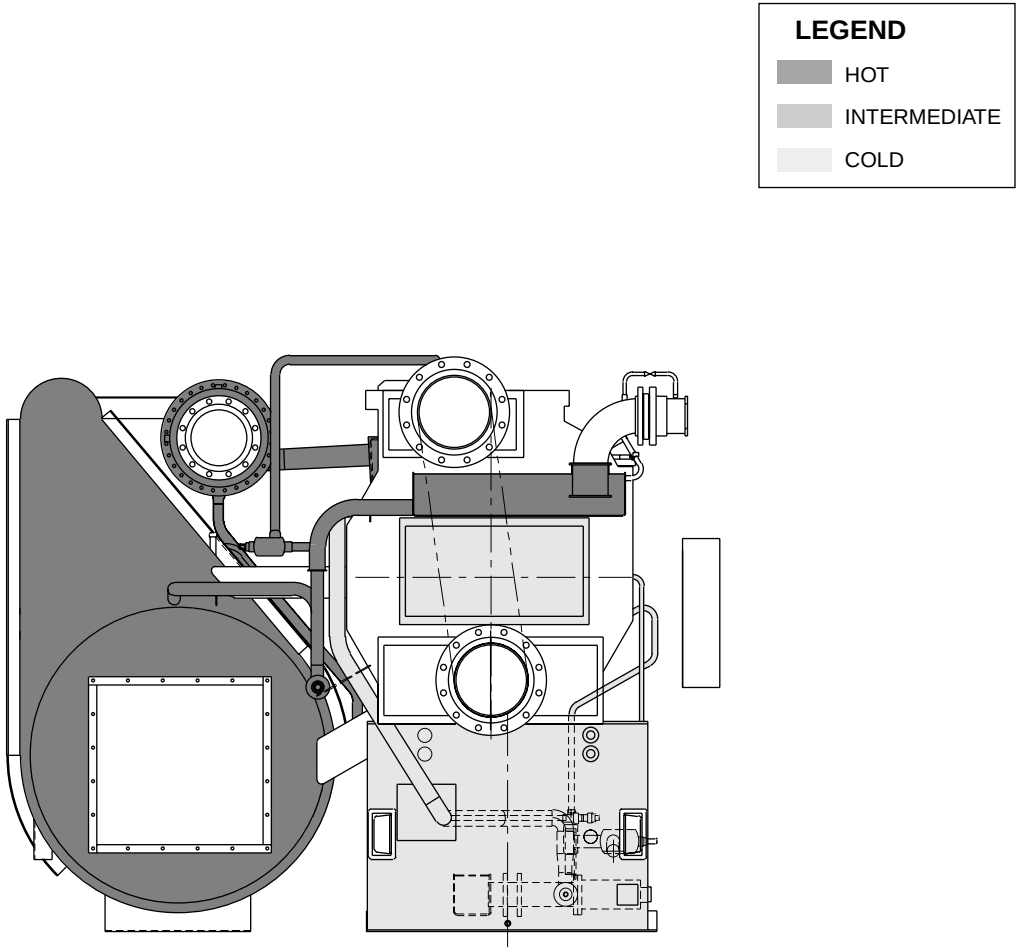
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05343

FIG. 56 – INSULATION DIAGRAM, MODEL YPC-DF-19GL

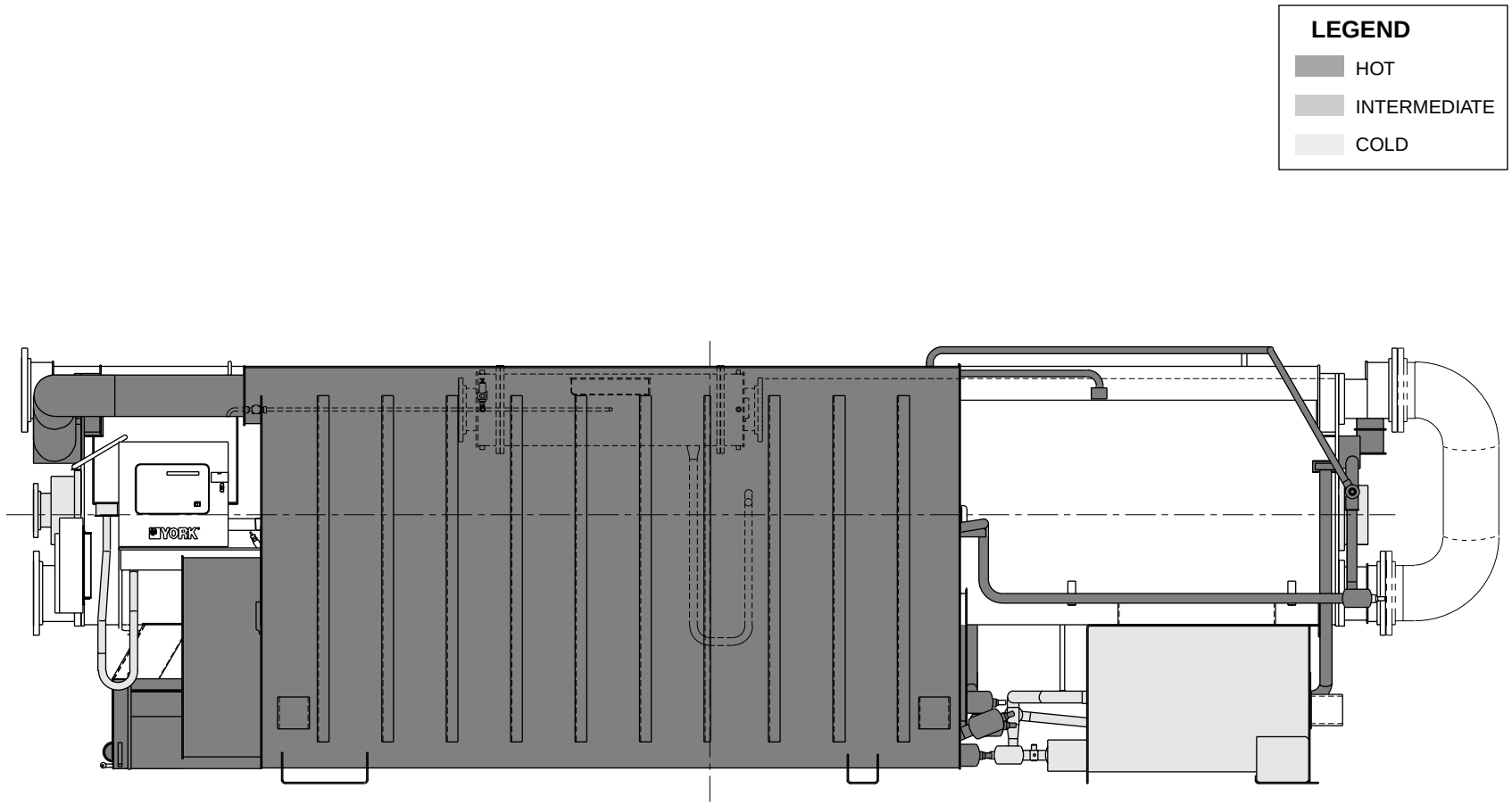
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05343A

FIG. 56 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-19GL

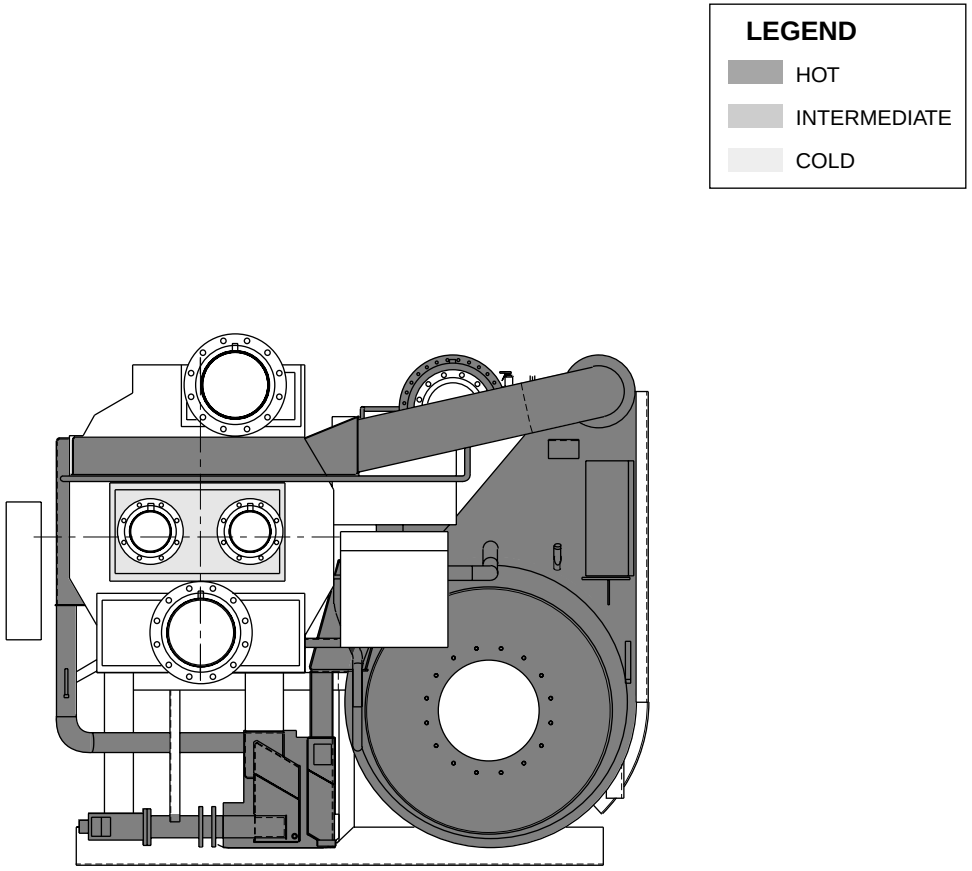
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05344

FIG. 57 – INSULATION DIAGRAM, MODEL YPC-DF-19GL

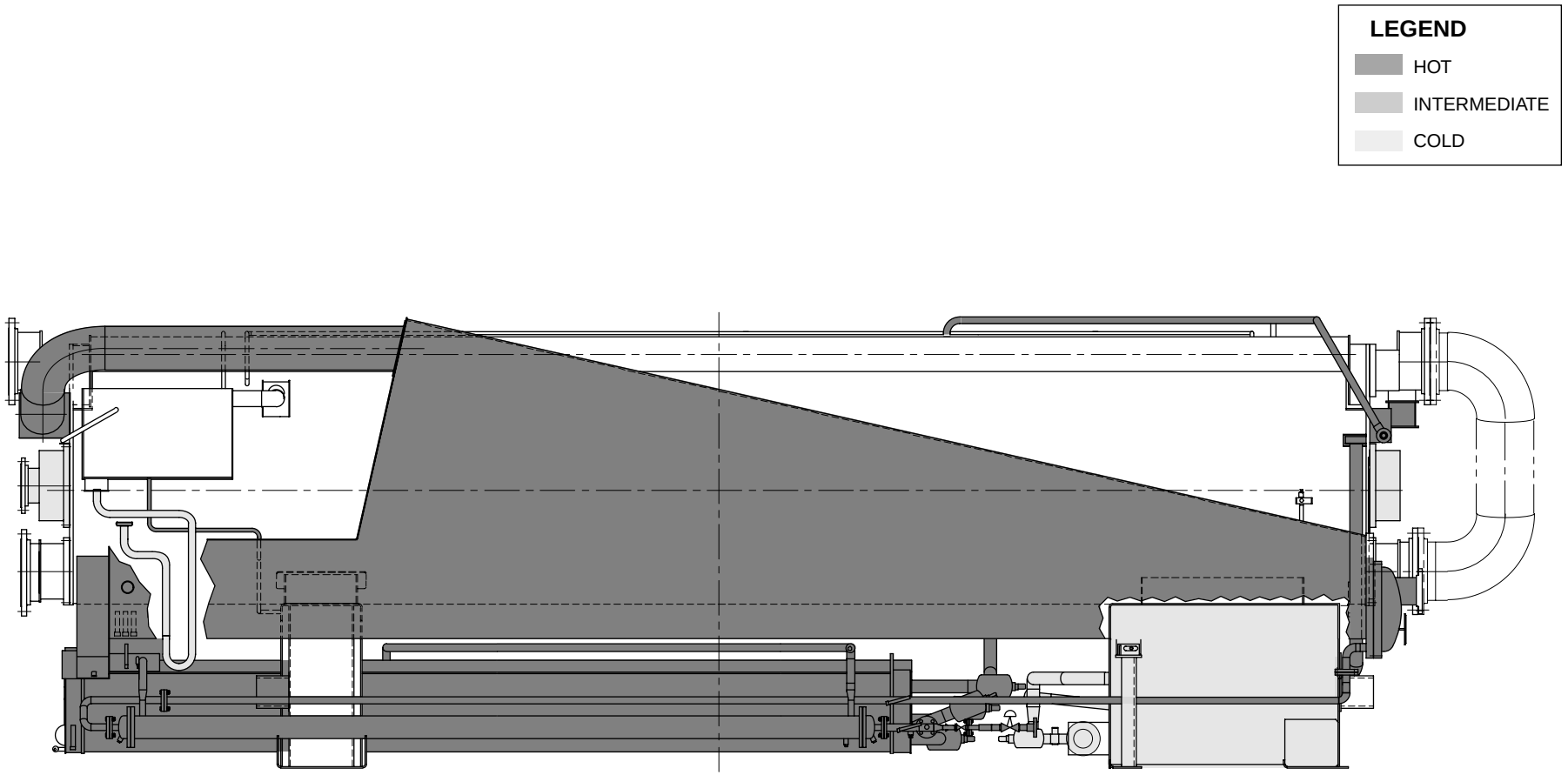
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05344A

FIG. 57 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-19GL

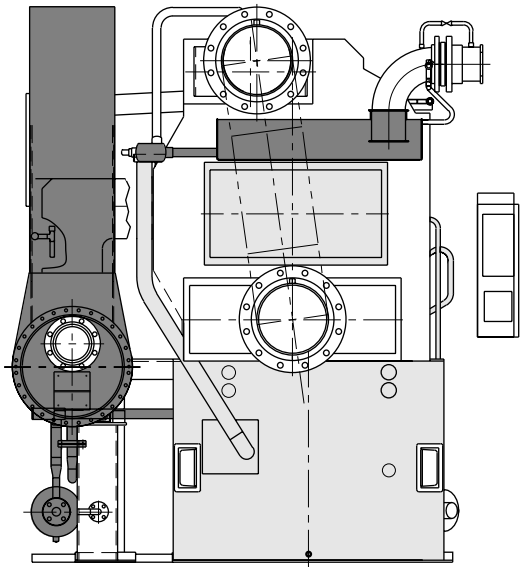
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05345

FIG. 58 – INSULATION DIAGRAM, MODEL YPC-DF-19GL

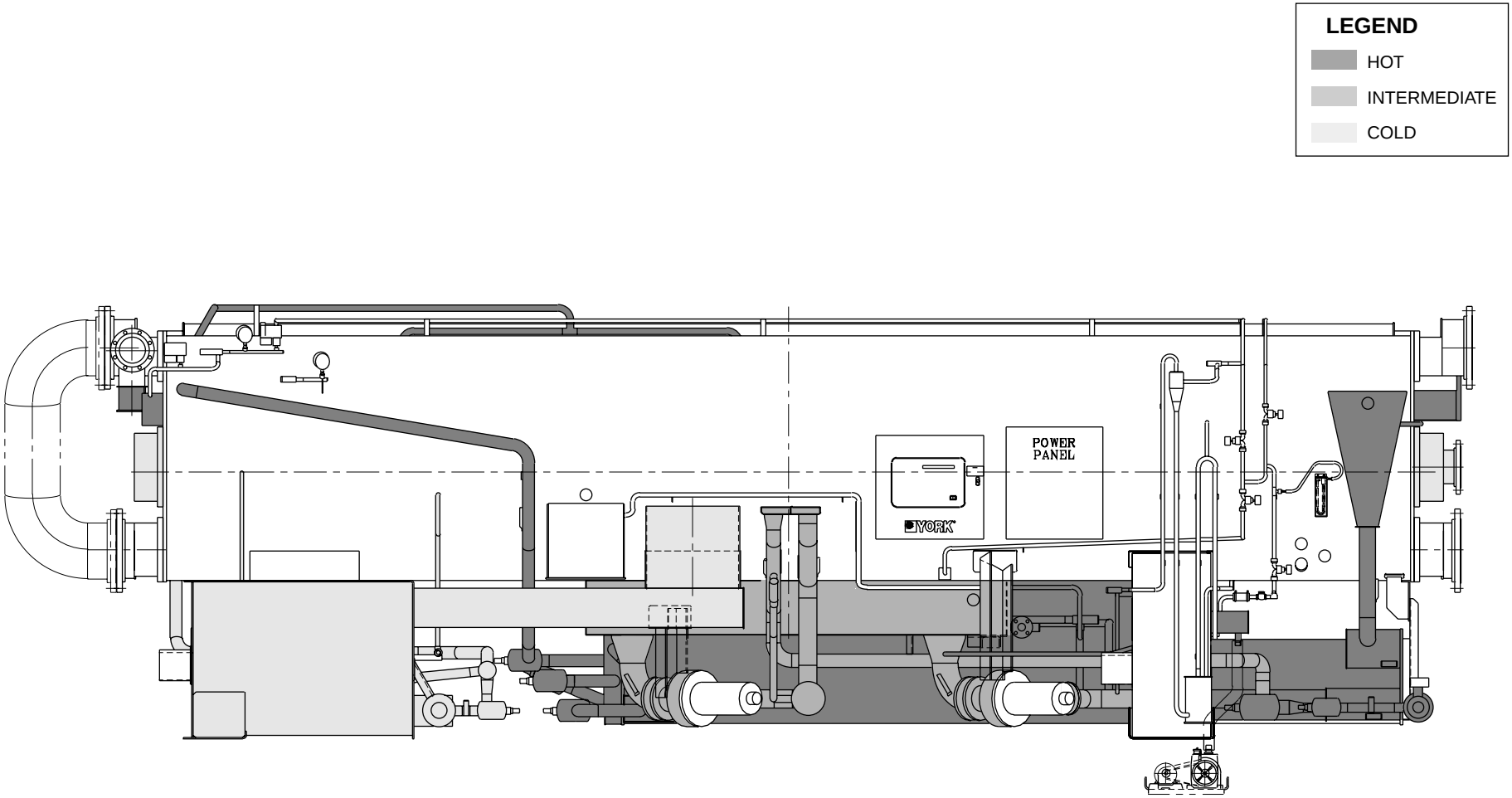
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05345A

FIG. 58 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-19GL

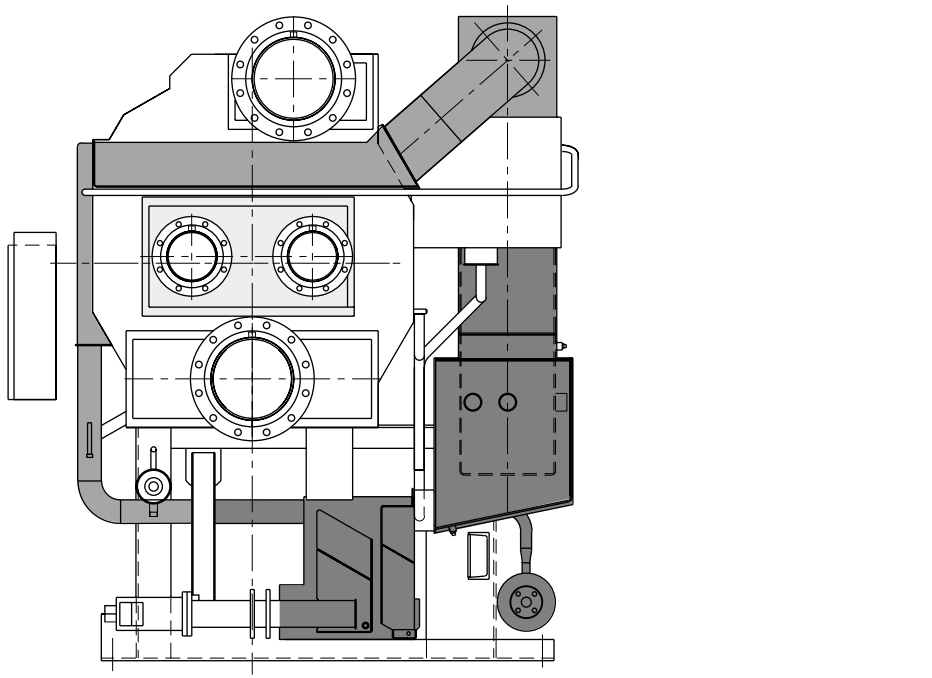
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05346

FIG. 59 – INSULATION DIAGRAM, MODEL YPC-DF-19GL

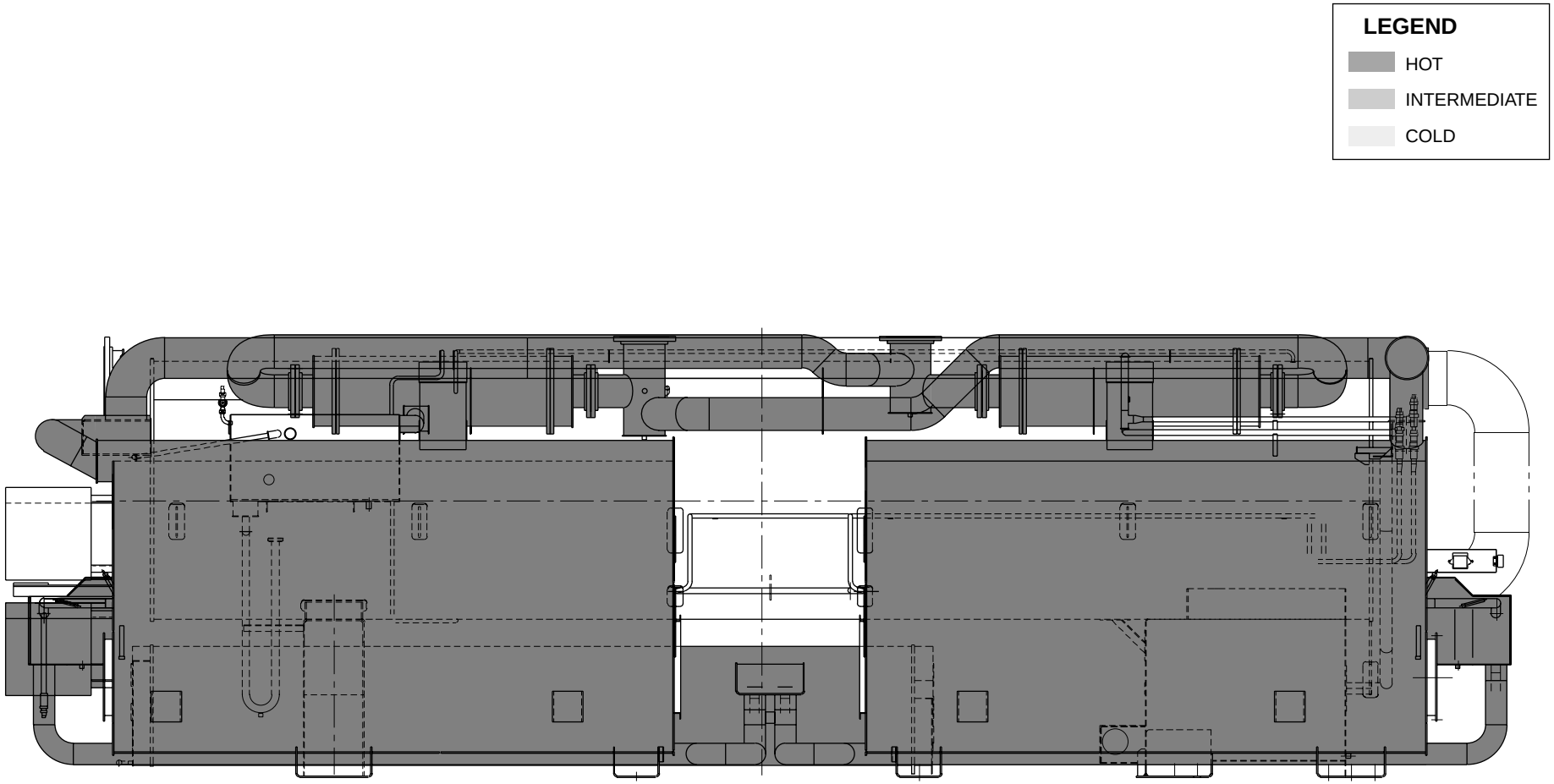
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05346A

FIG. 59 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-19GL

REFER TO METHODS AND PRACTICES ON PAGE C1



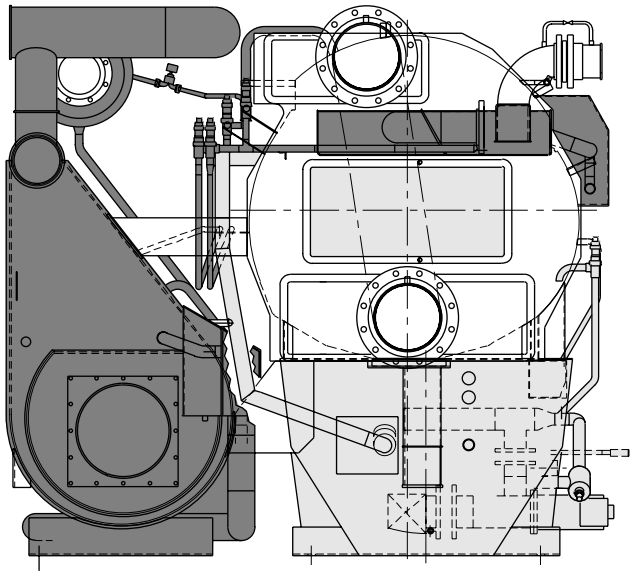
LD05347

FIG. 60 – INSULATION DIAGRAM, MODEL YPC-DF-20G

REFER TO METHODS AND PRACTICES ON PAGE C1

LEGEND

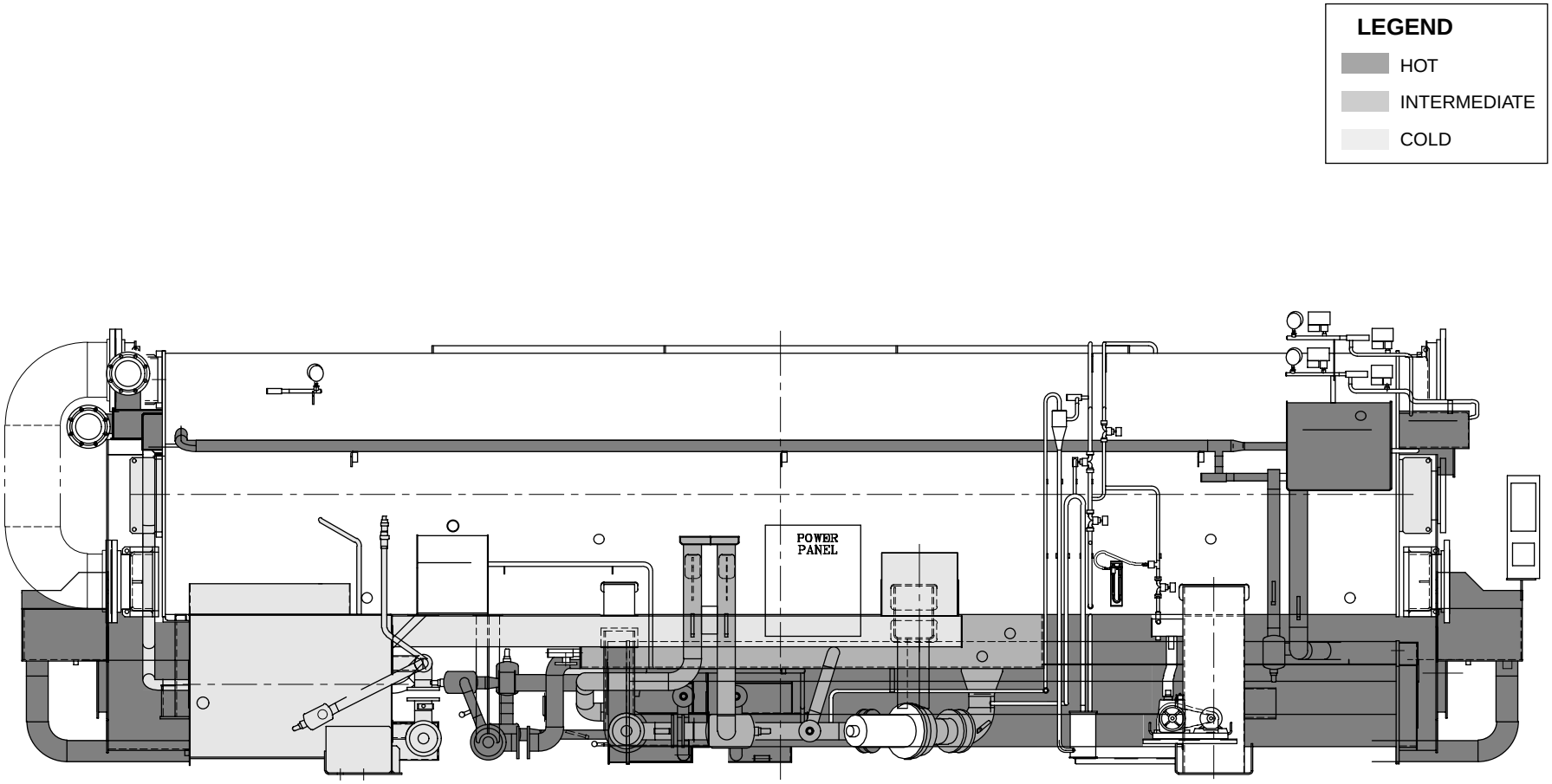
- HOT
- INTERMEDIATE
- COLD



LD05347A

FIG. 60 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-20G

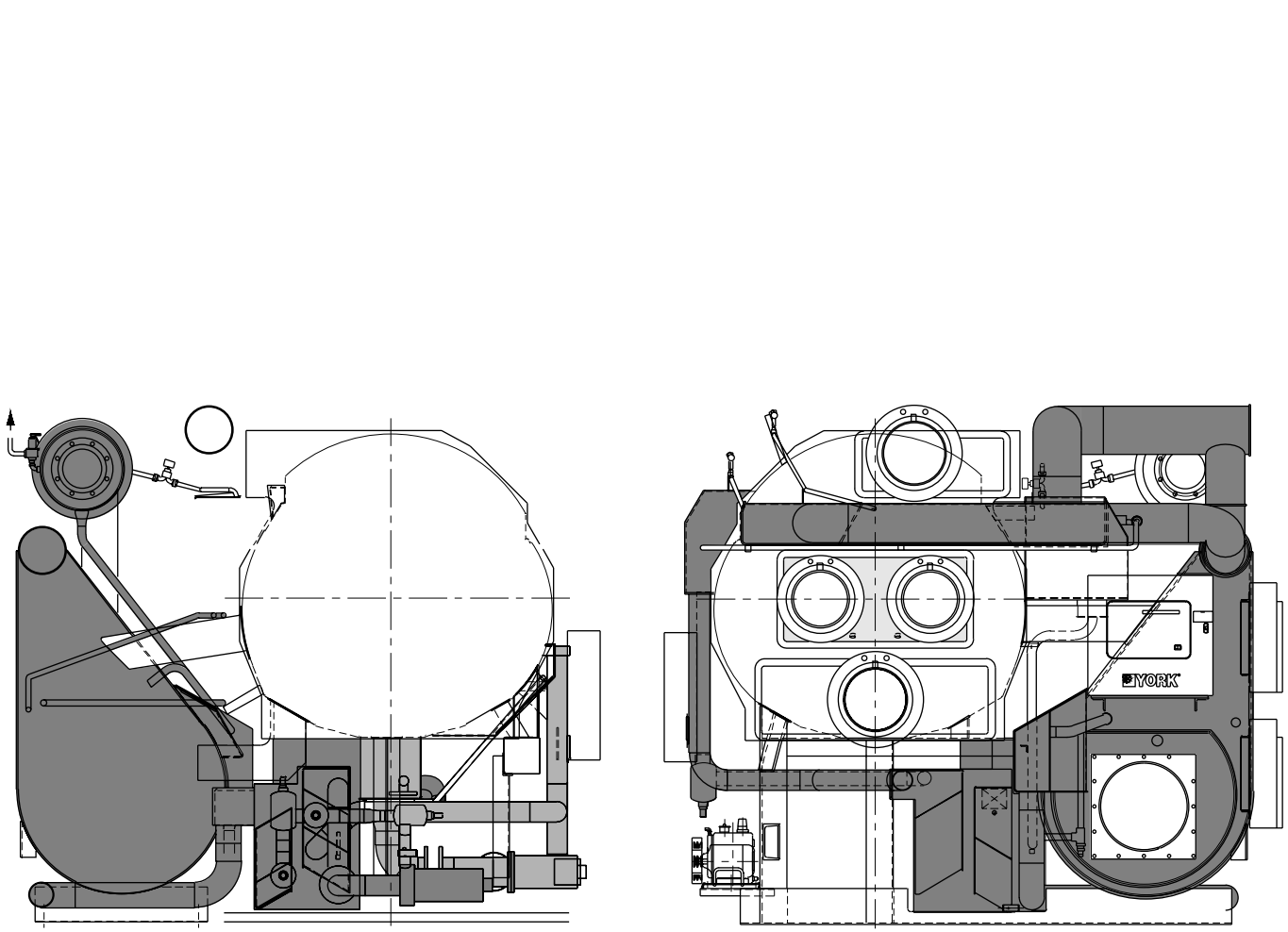
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05348

FIG. 61 – INSULATION DIAGRAM, MODEL YPC-DF-20G

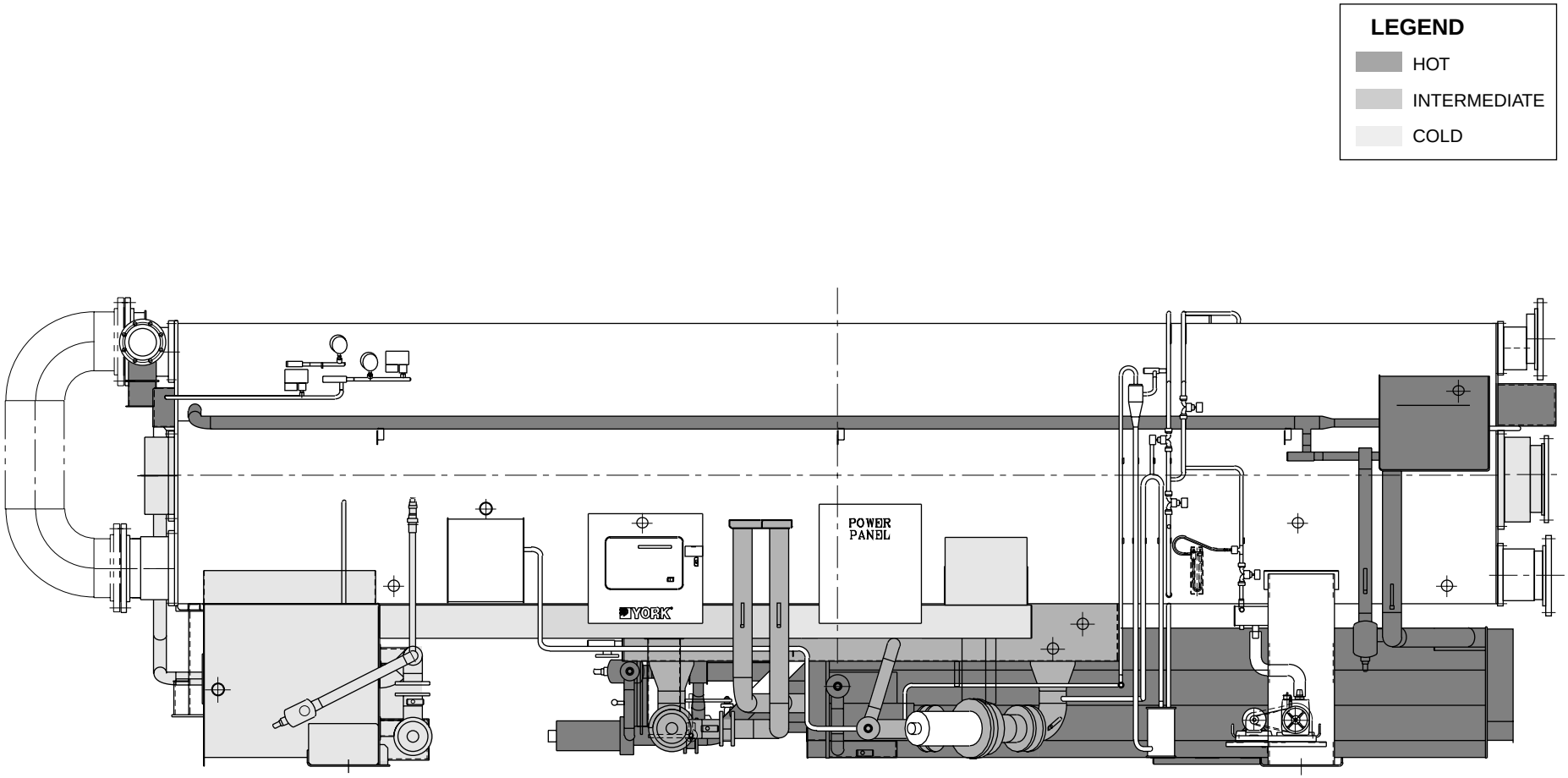
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05348A

FIG. 61 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-DF-20G

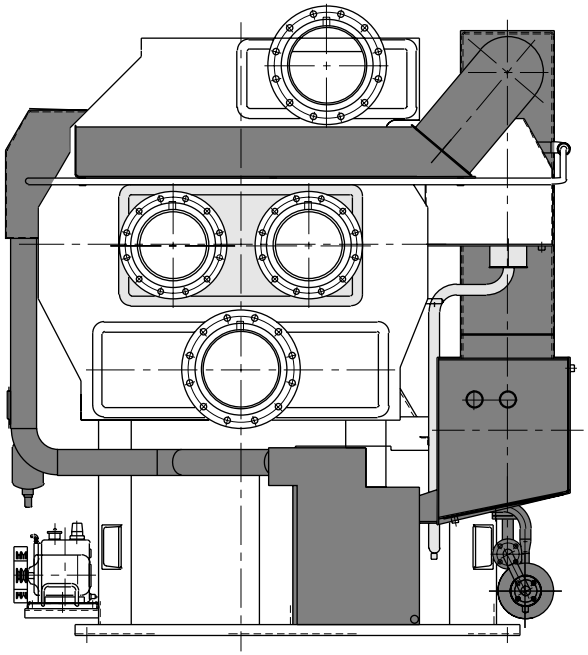
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05349

FIG. 62 – INSULATION DIAGRAM, MODEL YPC-ST-20G

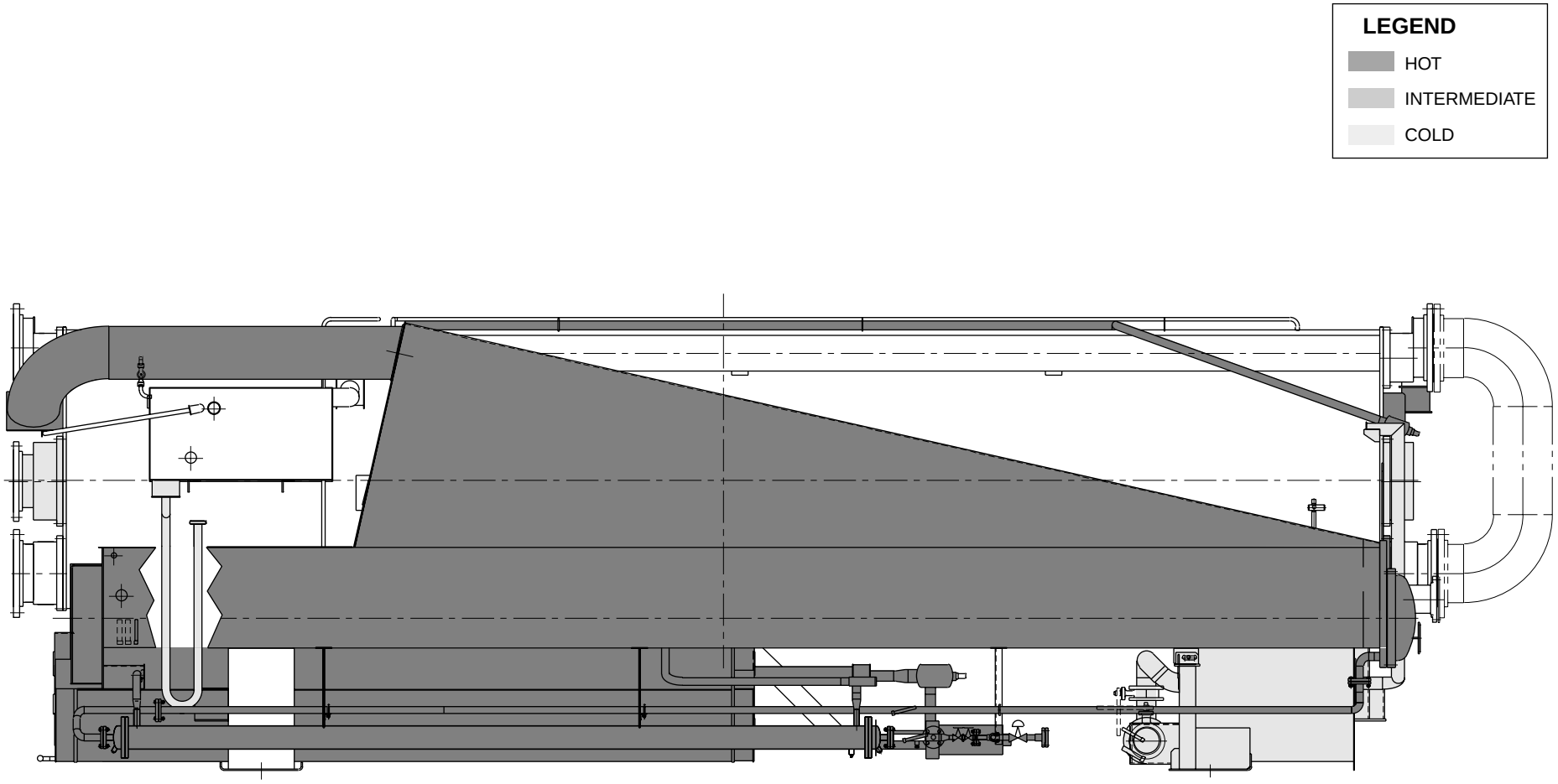
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05349A

FIG. 62 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-20G

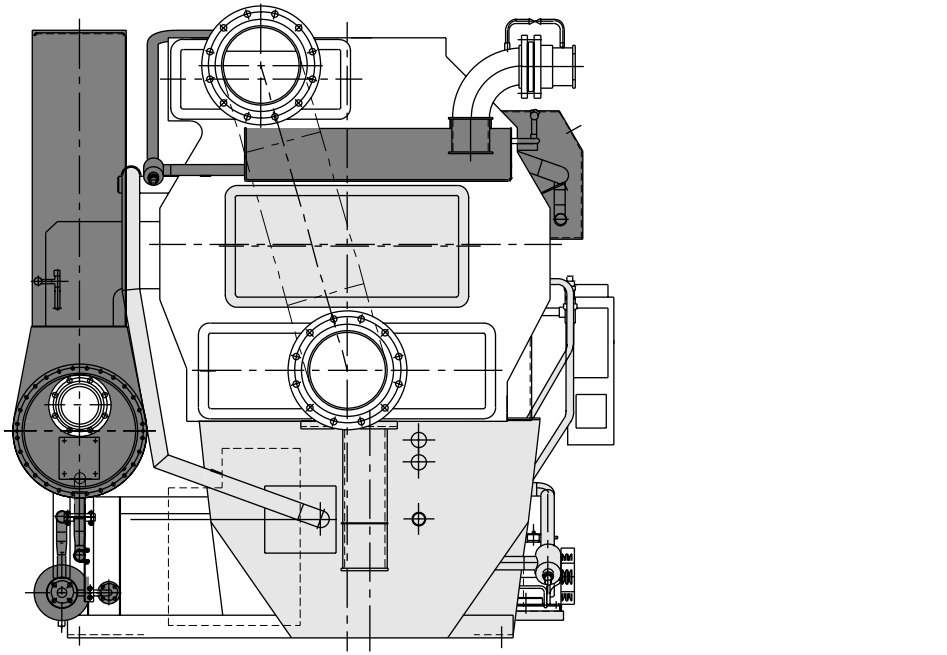
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05350

FIG. 63 – INSULATION DIAGRAM, MODEL YPC-ST-20G

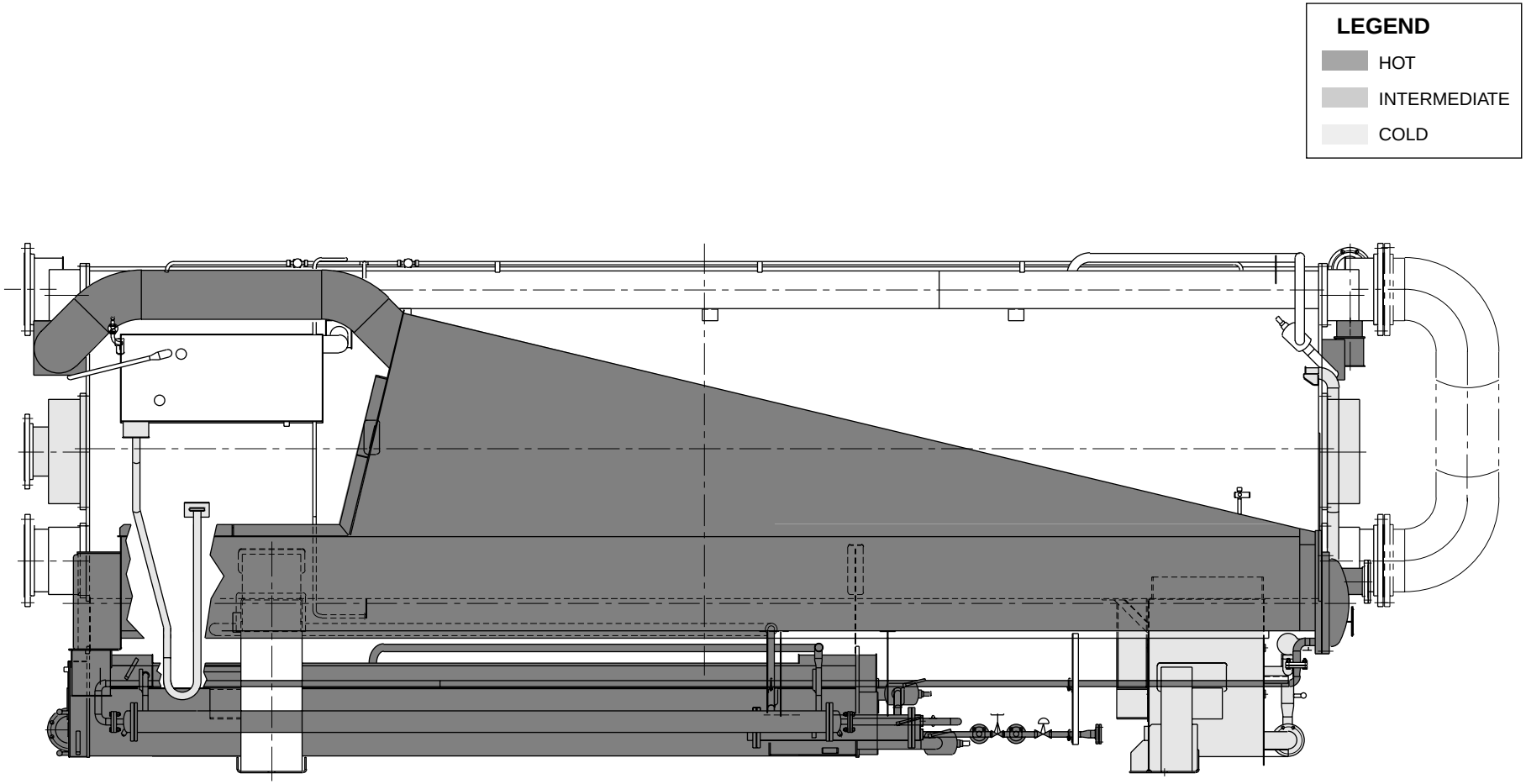
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05350A

FIG. 63 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-20G

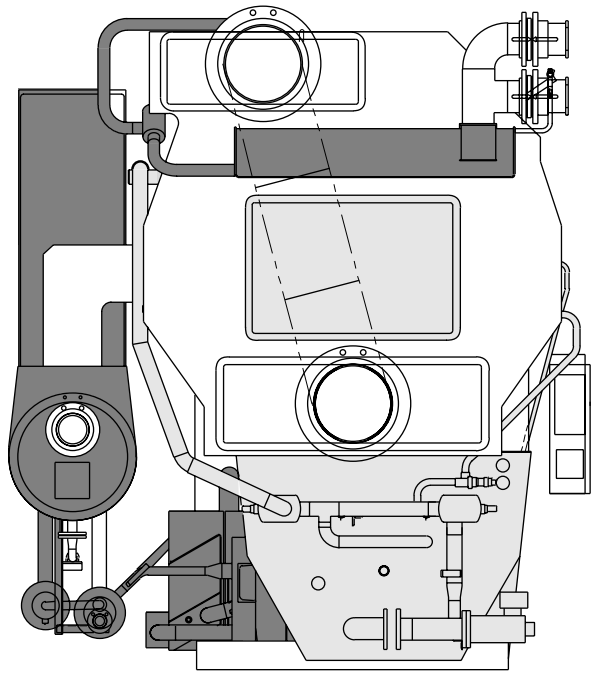
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05351

FIG. 64 – INSULATION DIAGRAM, MODEL YPC-ST-21G

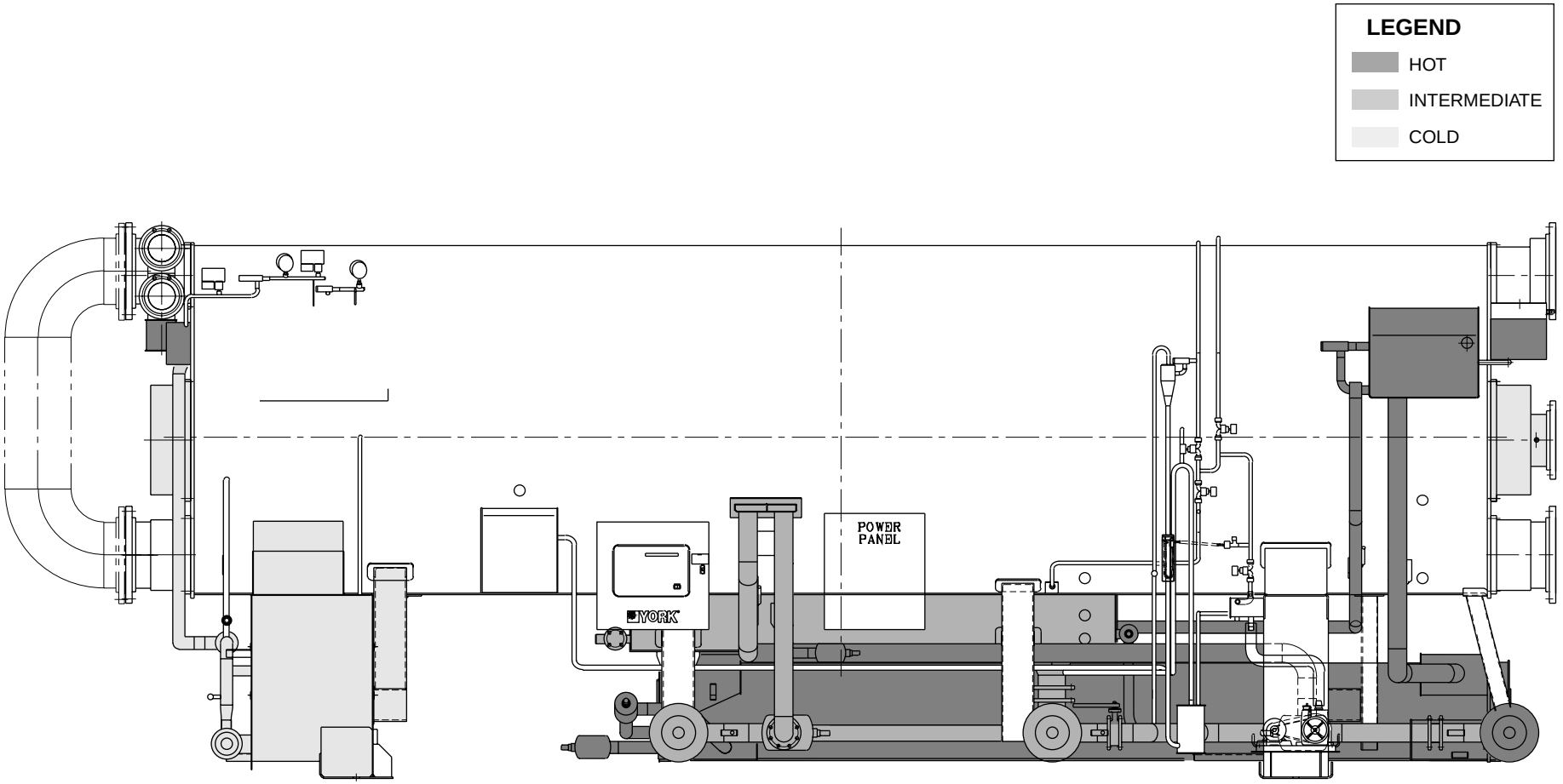
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05351A

FIG. 64 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-21G

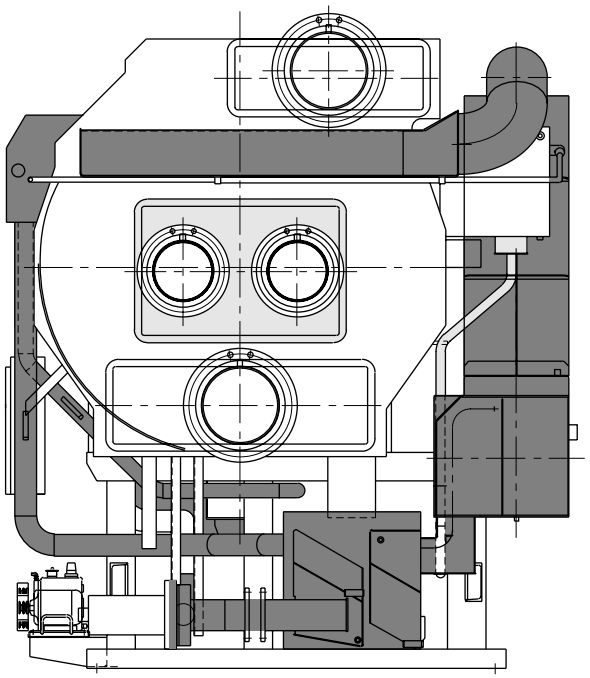
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05352

FIG. 65 – INSULATION DIAGRAM, MODEL YPC-ST-21G

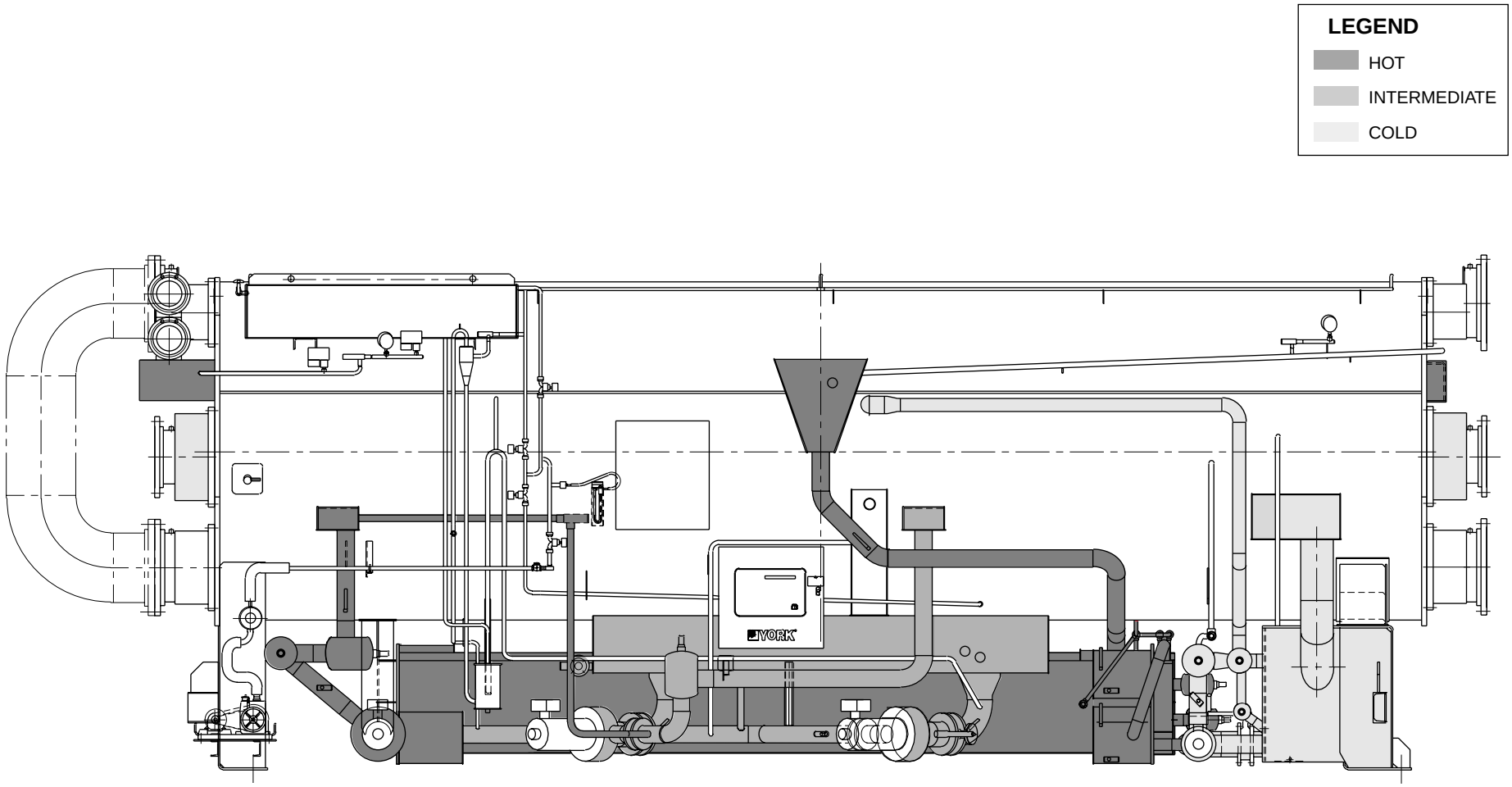
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05352A

FIG. 65 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-21G

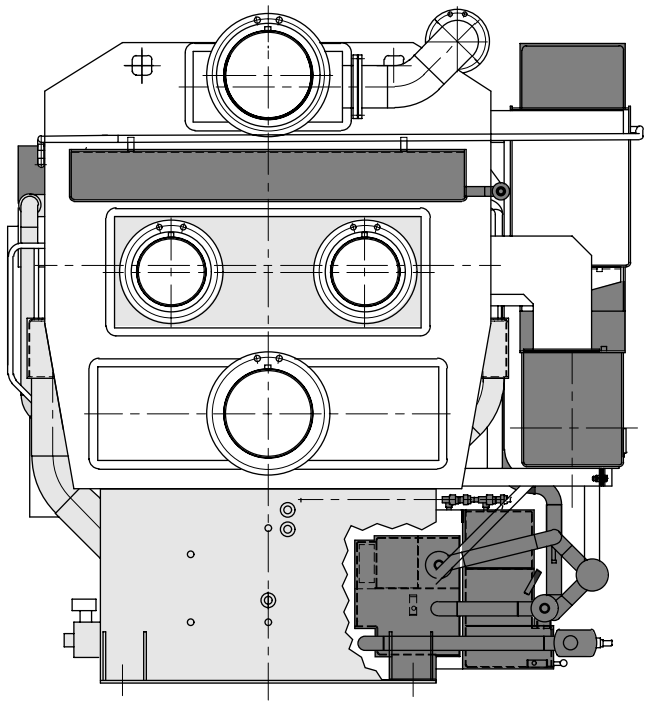
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05353

FIG. 66 – INSULATION DIAGRAM, MODEL YPC-ST-22G

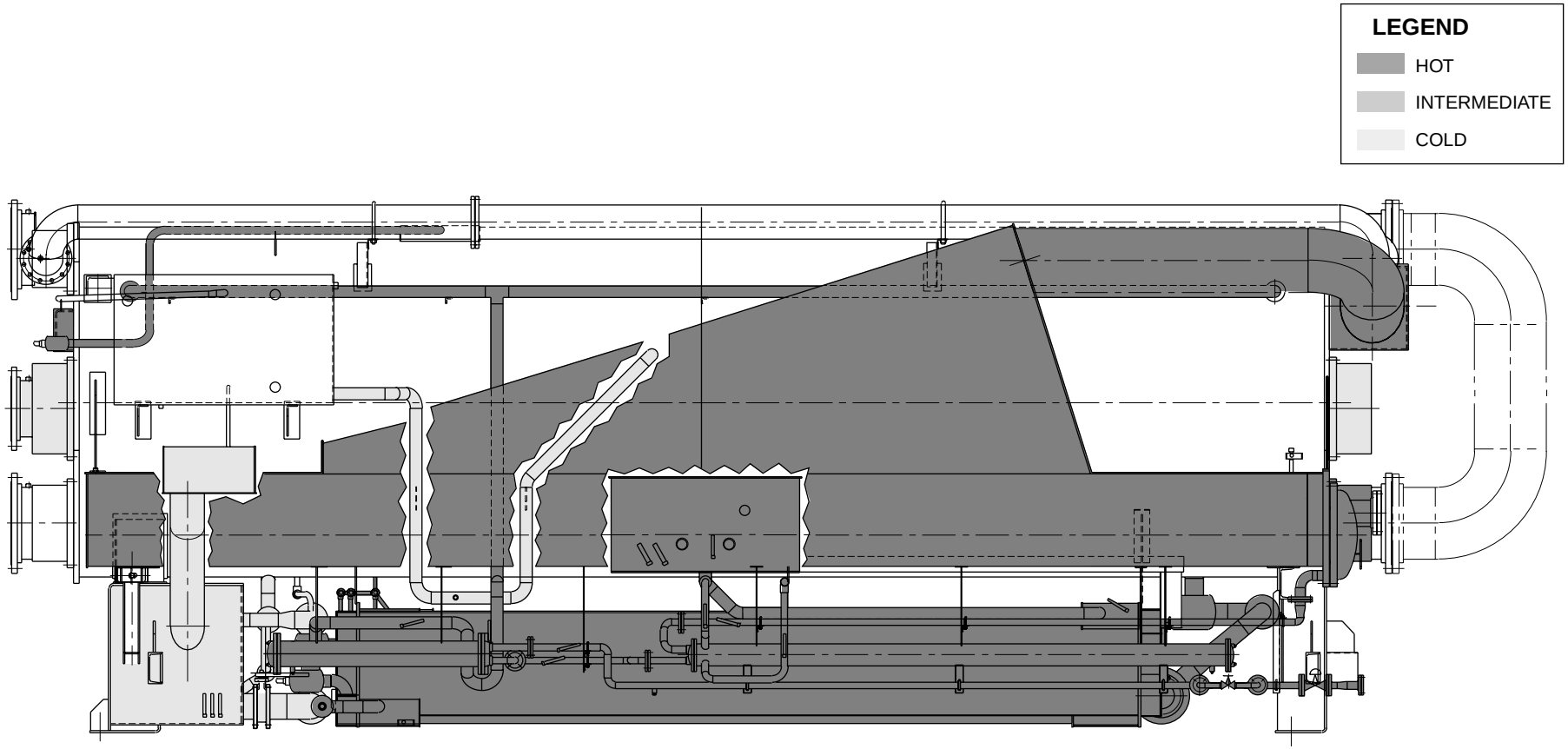
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05353A

FIG. 66 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-22G

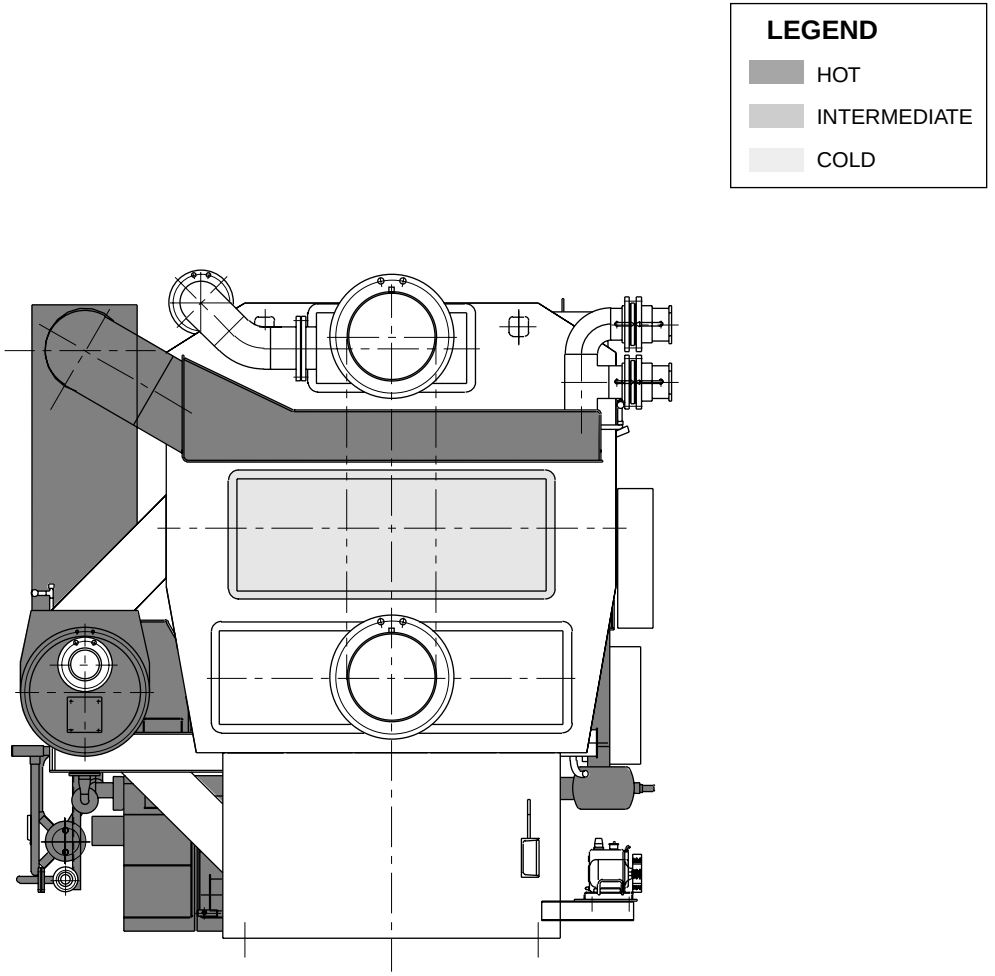
REFER TO METHODS AND PRACTICES ON PAGE C1



LD05354

FIG. 67 – INSULATION DIAGRAM, MODEL YPC-ST-22G

REFER TO METHODS AND PRACTICES ON PAGE C1



LD05354A

FIG. 67 (CONTINUED) – INSULATION DIAGRAM, MODEL YPC-ST-22G

REFER TO METHODS AND PRACTICES ON PAGE C1

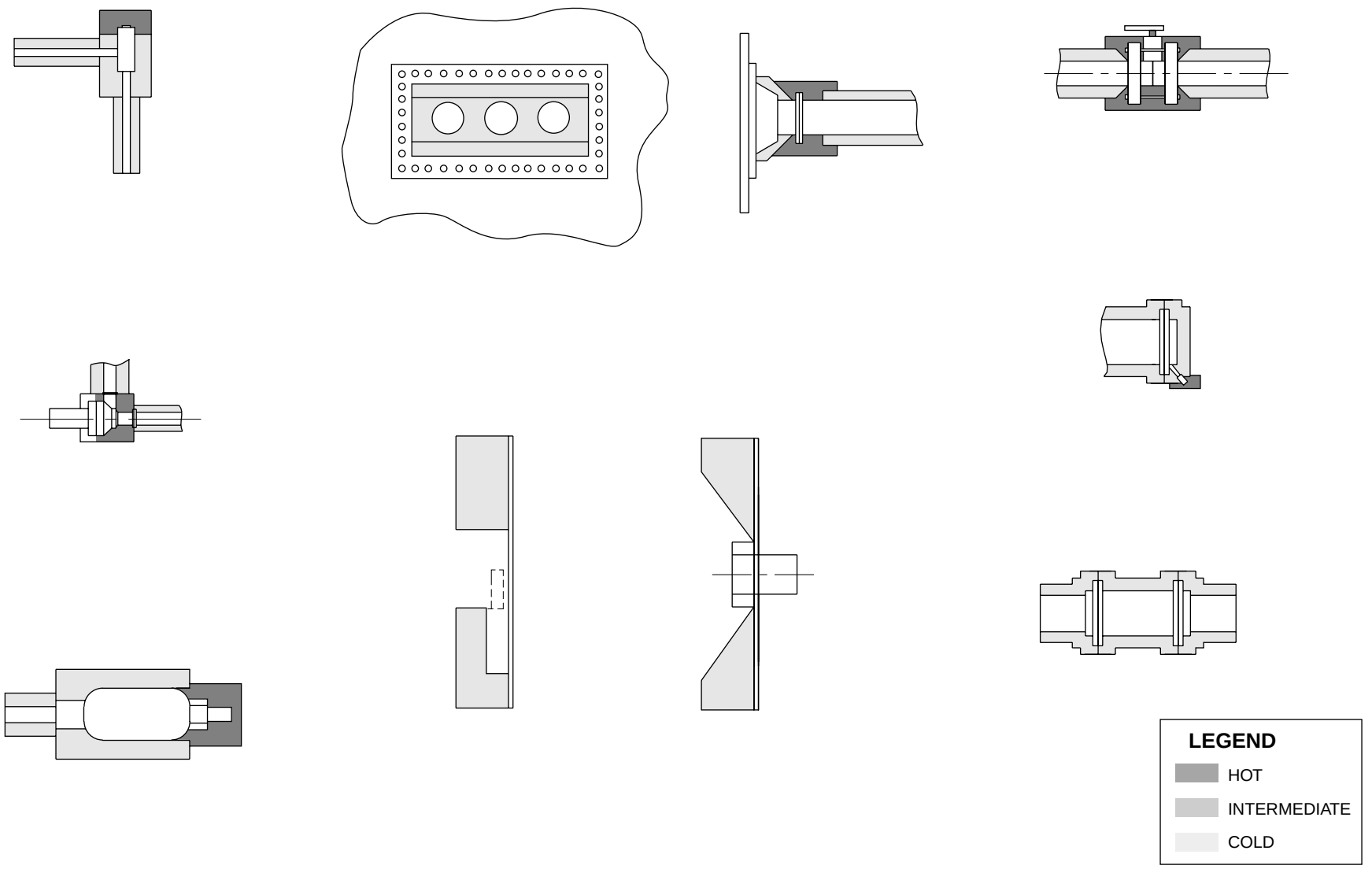


FIG. 68 – INSULATION DIAGRAM, AUXILLARY VIEWS

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