Installation Manual

FlatPlate® - Series



GB - Series



WP - Series



GEA Heat Exchangers

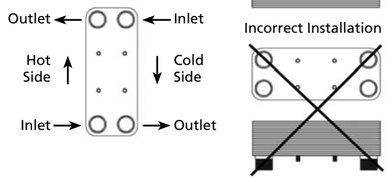
General Installation Notes

With extensive experience in hydronic and refrigeration heat exchanger design, GEA PHE Systems recommends a few key application tips when applying "Brazed Plate Heat Exchangers" to your systems.

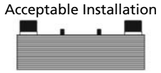
Installation:

Fluid applications – Heat exchanger may be installed in either a vertical or horizontal position.
If the application requires the heat exchanger to be mounted on its back, it is possible in this orientation for the heat exchanger to collect sediment and to be rendered useless in the system. Warranty claims due to sediment deposits will not be covered under warranty.

Fluid-to-Fluid



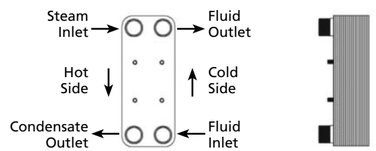
Acceptable Installation



Incorrect Installation

Steam applications - unit should be installed in a vertical position to ensure the condensate drains from the heat exchanger.

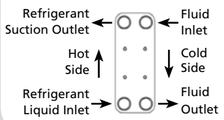
Steam-to-Fluid



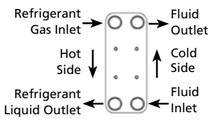
Refrigeration applications – Heat exchanger must be installed in a VERTICAL position.

Refrigerant-to-Fluid

Direct Expansion Evaporator / Subcooler



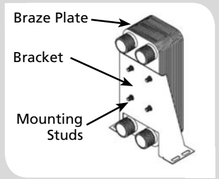
Condenser / De-Superheater



General Installation Notes

Mounting:

Small units may be mounted by the base of the unit or steel clamps. Larger units should use a mounting bracket (See illustration); if there is a risk of vibration, use an anti-vibration device.
Do not over tighten mounting nuts. Do not braze or weld mounting bracket to heat exchanger.



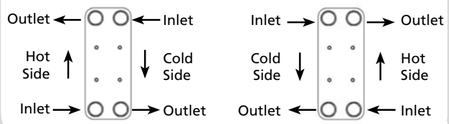
Safety:

Each side of the heat exchanger should be properly protected from over pressurization through the use of an appropriate safety relief device.

Piping Installation:

– Heat exchanger should be piped in counter-flow.

Counter-Flow



Thread Connections - Use Teflon tape or other sealant on male threaded part of connection to prevent leakage. Always use two wrenches when installing piping to heat exchanger connections to prevent over-torque stress and damage when tightening.

Solder / Sweat Connections – Use 45% silver solder (minimum), AWS grade BAg-24 or equivalent. Brazing flux should be AWS specification FB3C, AMS no. 3411 or equivalent. Use wet rag around base of connector, DO NOT OVERHEAT, purge unit with nitrogen. Do not braze unit in the horizontal, sitting flat, position; braze material may fall into the heat exchanger.

Welding – Should only be done to a supplied butt weld or socket weld connector. Prepare the edge of the piping with an appropriate bevel. DO NOT OVERHEAT, purge unit with nitrogen.

Water Strainer – A water strainer should be installed in the water inlet circuit to protect the heat exchanger from partial or complete blockage with a 16 – 20 mesh minimum, 20 – 40 mesh is a better choice.

General Installation Notes

Water Quality:

The water media pH value should be maintained at 7.4 (not less than 7.0 and no higher than 8.0) for proper heat exchanger life expectancy. For pH values outside this range, the GEA ***FlatPlate* MPN series** can tolerate a pH value as low as 2.0.

Highly chlorinated water (pools and spas), ground water with high sulfur content or sulfuric acid, and low pH, should use the GEA ***FlatPlate MPN series***. The standard series of heat exchangers, copper braze, will experience gradual copper erosion and premature failure of the heat exchanger.

Glycols:

Ethylene or Propylene based glycols - may be used with brazed plate heat exchangers. The glycol should be tested annually, or more often if required, to be sure the fluid still retains the desired properties and protection. No permanent connection should be made between a system containing ethylene glycol and a drinking water supply.

Automotive Glycols – Not recommended; usage may result in reduced thermal performance of the heat exchanger.

Freeze Protection:

It is not recommended to cool water below 33°F (0.6°C) due to the tolerances of the measuring equipment. For freeze protection it is recommended to use thermostats and / or temperature controls in the piping.

Low Pressure Cut-Out - In water chiller applications, in addition to the flow switch, the low pressure cut-out on the refrigerant side is the most important freeze protection control. To prevent freeze damage and to protect the heat exchanger and compressor, the low pressure cut-out should be set no lower than 28°F (-2°C), based on evaporator refrigerant pressure at this temperature. If part-load or transient loads cause the chiller to cycle off, use a resetting low pressure control with anti-cycling timer or install a hot gas bypass control to maintain the appropriate suction pressure at low loads.

NOTE: Use of a leaving chilled water sensor will not provide adequate freeze protection.

General Installation Notes

Swimming Pools & Spas

The use of chlorinating devices requires that all chemical feeds MUST be downstream from the heat exchanger, and a check valve should be installed to prevent back flow of chemicals into the heat exchanger whenever the pump is not in operation.

NOTE: Refer to the Installation Guidelines for Plate Heat Exchangers used in conjunction with Electronic Chlorinating devices.

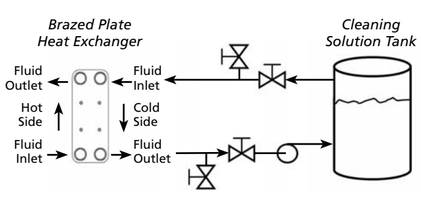
Cleaning:

In some applications the heat exchanger may be subjected to severe fluid conditions, including high temperature and / or hard water, causing accelerated scaling and corrosion rates and reducing the performance of the heat exchanger.

Because of these factors, it is important to establish regular cleaning schedules. Chemical cleaning is a very simple and effective process for removal of fatty and calcium deposits and other forms of scaling from brazed plate heat exchangers. Proper maintenance schedules will result in continued excellent performance and extended life.

Cleaning solutions, such as a commercially available de-scaler can be obtained from your local wholesaler. Make sure the cleaning solution is applicable for stainless steel and copper or nickel, depending on the model, and that the manufacturer's directions are followed. A 5% solution of Phosphoric Acid or Oxalic Acid may be considered.

Do not heat the cleaning solution when back flushing through the heat exchanger. Flush the heat exchanger with fresh water after cleaning.



Do not chemically clean the refrigerant circuit(s).

Refrigeration Installation

With extensive experience in halocarbon refrigeration heat exchanger systems, GEA PHE Systems recommends a few key application tips when applying “Brazed Plate Heat Exchangers” to your systems.

Direct Expansion Evaporators / Subcoolers:

GEA PHE Systems Brazed Plate Heat Exchangers are applicable for all types of halocarbon refrigerants.

Internal Distribution – The Direct Expansion distribution tube is designed to distribute the gas evenly to provide optimum performance and operating stability. The thermal expansion valve may need a slight adjustment to obtain proper operation, with 5°F (-15°C) to 10°F (-12°C) Superheat. For optimum performance, do not oversize the expansion valve and, where practical, do not install elbows between the expansion valve and the refrigerant inlet.

Performance Hints – Direct Expansion at various temperature ranges:

- -10°F (-23°C) to 50°F (10°C) suction – No oil return problems.
- < -10°F (-23°C) suction – Possible oil return problems depending upon gas velocities; install oil separator or other method of oil return.
- Piping – Refrigerant inlet piping should be sized to 100 fpm (0.50 m/s) or greater velocity, liquid refrigerant.

Condensers:

GEA PHE Systems Brazed Plate Heat Exchangers are applicable for all types of halocarbon refrigerants.

Ammonia:

GEA PHE Systems Brazed Plate Heat Exchangers are applicable for Ammonia applications with Nickel-Chrome Brazed Alloy. Please consult the factory, Applications Engineering, for correct model.

Insulation:

Recommend ½” to ¾” insulation for all evaporators and subcoolers to prevent sweating. For temperatures below -20°F (-29°C) consult the factory.

Technical modification reserved. Installation Manual 3/12 • Print 3/12 - Caskey

The specifications contained in this printing unit are intended only to serve the non-binding description of our products and services and are not subject to guarantee. Binding specifications, especially pertaining to performance data and suitability for specific operating purposes, are dependent upon the individual circumstances at the operation location and can, therefore, only be made in terms of precise requests.

GEA PHE Systems

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Terms and Conditions

Updates are made available at www.gea-phe.com/usa

1. GENERAL TERMS.

1.1 Binding Contract. Unless otherwise noted in the Seller’s Proposal, the Proposal shall lapse automatically upon the expiration of a thirty (30) day period after the date of its submission unless it has been previously accepted by Purchaser or revoked in writing by Seller. The Contract incorporating these Terms and Conditions does not become a binding contract until the Seller receives the Purchaser’s unqualified acceptance of the Proposal or the Seller confirms the Purchaser’s order in writing.

These Terms and Conditions are the only terms and conditions on which the Seller contracts for the supply of Equipment and they are incorporated in all contracts entered into by the Seller. Any other terms and conditions are hereby specifically rejected and are therefore excluded.

1.2 Plans, Drawing and Illustrations. Proposal pages, catalogue illustrations and preliminary drawings are submitted only to show the general style, arrangement, approximate dimensions and weight of equipment. The Seller reserves the right to make such changes of design, construction or arrangement as it deems necessary to achieve the specifications contained herein.

1.3 Proprietary and Confidential Information. This Proposal and all drawings, notebooks, operating data, specifications, and other information, data and material (whether orally disclosed, printed, handwritten, typed, numerically or computer generated, computer stored, or otherwise) furnished to Purchaser by either Seller or any of its subcontractors or sub-suppliers shall remain the proprietary and confidential property of Seller or the subcontractor or sub-supplier, respectively, and shall be used by Purchaser only with respect to the work covered by the Contract and shall not be used by Purchaser in connection with any other project. Such proprietary and confidential information and data shall not be shown or otherwise made available to any third party at any time without Seller’s prior written consent.

Neither Purchaser itself shall, nor shall Purchaser permit any third party to, reverse engineer, measure or otherwise technically examine or test Seller’s Equipment without Seller’s prior written consent. Any such proprietary and confidential information which Purchaser determines must be disclosed to its employees shall only be disclosed to them on a need-to-know basis for the operation, maintenance, and repair of the Equipment provided under the Contract. Intellectual property or patent rights which may be obtained on the basis of the information given or made available to Purchaser under the Contract or with respect to Seller’s Equipment shall remain the exclusive property of Seller or its subcontractor and/or sub-supplier, respectively.

2. SAFETY REQUIREMENTS OF PURCHASER.

Purchaser shall use, and shall train and require its employees to use and shall cause any end user to use, all safety devices, guards, and proper safe operating and maintenance procedures as prescribed by all applicable laws, rules, regulations, codes and standards and as set forth in operating and maintenance manuals and instruction sheets furnished by Seller. Purchaser shall not, and shall cause any end user not to, remove or modify any safety device, guard or warning sign.

If the Purchaser fails to strictly observe any of the obligations set forth in the preceding paragraph with regard to any of the Equipment, Purchaser agrees to defend Seller against, and indemnify and save Seller harmless from, any claim, liability or obligation (including the costs and attorneys’ fees of any suit or claims related thereto) incurred by Seller as a result of persons being injured or property being damaged directly or indirectly in connection with the operation of such Equipment as a result of such failure. Purchaser also agrees to indemnify and save Seller harmless from, any claim, liability or obligation incurred by Seller as a result of persons being injured or property being damaged due to Purchaser’s use of the Equipment for materials or products not specified in the Contract or use of non-original replacement parts not specifically authorized in writing by Seller or due to changes in the Seller equipment made by Purchaser without Seller’s specific written authorization.

3. COMPLIANCE WITH LAWS.

The Seller shall use reasonable endeavors to ensure that the Equipment complies in technical respect with the agreed standards and in all other respects with applicable laws, rules, regulations, codes and standards of all federal, state, local and municipal governmental agencies having applicable regulatory jurisdiction, as such laws, rules, regulations, codes and standards are in effect on the date of the contract, provided that: (i) the Purchaser will include in its specifications or will bring to the attention of Seller in writing any state, local or municipal laws, rules, regulations, codes or standards which are different from those imposed by the federal governmental agencies and authorities; (ii) if any such federal, state, local or municipal laws, rules, regulations, codes or standards are changed, or if new laws, regulations, codes or standards or interpretations thereof are enacted or adopted subsequent to the date of the contract, which require a change in Seller’s equipment or work, an equitable adjustment shall be made to the contract price, delivery schedule and payment terms; and (iii) Seller does not guarantee any compliance with, nor will Seller incur any liability for failure of the equipment or work to comply with, any federal, state or local pollution control, effluent or utility control laws, rules, regulations, codes or standards.

4. PRICE AND PAYMENT.

4.1 The purchase price shall be paid in accordance with the Proposal. Any right to retain due payments or to set-off counterclaims shall be excluded unless any such claim or counterclaim of the Purchaser is undisputed by Seller or has been determined by a final judgment of the competent court or arbitration panel.

Any tax or other governmental charge now or thereafter levied upon the production, sale, use or shipment of equipment ordered or sold will be charged to and paid for by the Purchaser. Such taxes are not covered in the Seller’s price(s) unless expressly so stated on the Seller’s Proposal.

4.2 Whatever the means of payment used, payment shall not be deemed to have been effected before the Supplier’s account has been fully and irrevocably credited.

4.3 If the Purchaser fails to pay by the stipulated date, the Seller shall be entitled to interest from the day on which payment was due. The rate of interest shall be one and one-half percent (1-½%) per month until the payment is made in full. Additionally, if Seller is required to expend costs and expenses in collecting any payments, Purchaser shall reimburse the Seller for such costs of collection (including reasonable attorneys’ fees).

In case of late payment the Seller may suspend his performance of the Contract until it receives payment. If the Purchaser has not paid the amount due within three months of the due date, Seller shall be entitled to terminate the Contract by notice in writing to the Purchaser and to claim compensation for the losses and damages it has incurred.

5. TRANSPORTATION; INSURANCE; RISK OF LOSS.

5.1 Transportation; Delivery.

5.1.1 Where transportation costs are prepaid, Equipment will be shipped to an unloading point designated by the Purchaser. Unloading, haulage from the designated unloading point and further necessary handling shall be at the Purchaser’s risk and expense, independent of any installation services that may be requested by the Purchaser.

5.1.2 Shipping instructions are to be supplied by the Purchaser at least 10 business days before the agreed on shipping date. In the event Purchaser fails to supply shipping instructions Seller at its option may place the Equipment in Seller’s or any public or private storage facilities at the Purchaser’s risk and expense. All such expenses shall be invoiced to Purchaser.

5.1.3 Equipment on which manufacture or delivery is delayed due to any cause within Purchaser’s control may be placed in storage by Seller, for the Purchaser’s account and risk, and regular charges and expenses in connection therewith shall be paid by Purchaser; but if, in Seller’s sole opinion, it is unable to obtain or continue such storage, Purchaser will, on request, provide or arrange for suitable storage facilities and assume all costs and risks in connection therewith. When such delay is due to causes beyond control of either party, the matter of storage and the payment of charges therefore shall be negotiated in good faith.

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5.2 Insurance. Purchaser accepts full responsibility for the safeguarding of all equipment delivered to the Purchaser until it is paid for in full. Until the contract price is paid in full, Purchaser shall provide and maintain insurance to the total value of the Equipment delivered hereunder against all risks of fire and explosion in the names of Purchaser and Seller and their respective interests may appear, and shall also provide and maintain such insurance to the above value against flood, earthquake, windstorm, cyclone, tornado, hurricanes, riot and strike and civil commotion.

5.3 Title; Right of Possession; Security for Payment. The parties mutually agree that the Equipment specified herein shall at all times remain personal property regardless of the degree of its annexation to the real property and that the Equipment shall not by reason of any annexation to real property become a part thereof or otherwise a fixture. Title and right of possession of such Equipment shall remain in Seller at all times. Title shall pass to Purchaser in accordance with the delivery terms for the Equipment. Without waiving any rights to elect to proceed under applicable lien laws, Seller reserves a security interest in the equipment and parts furnished by it. By accepting delivery of the Equipment or parts, Purchaser grants to Seller a security interest in such Equipment and parts to secure the full and prompt payment for such Equipment and parts until the agreed price (including any notes therefore) for such Equipment and parts has been fully paid in cash. In the event of default in payment, Seller shall have all rights of repossession and other rights available to a secured party under the laws applicable thereto. Any Equipment or parts may be separated from real estate for purpose of repossession by Seller or by its agent without liability for such removal if the Purchaser is in default in payment. Seller is authorized to execute, deliver and file with the appropriate filing office or offices all assignments, financing statements and other documents which Seller may require to evidence or perfect such security interest in accordance with applicable laws.

6. SELLER’S REMEDIES.

6.1 In the event of a material deterioration of Purchaser’s financial situation or in the event of the insolvency of the Purchaser, Seller reserves the right to cancel the contract as well as the right to stop delivery of the goods and to resell same. Such a right shall not restrict or otherwise impair Seller’s remedies for damages in the event of Purchaser’s breach.

6.2 Should Purchaser fail to comply with the terms and conditions set forth herein, or if any writ or execution be levied on any of Purchaser’s property, or a receiver be appointed, or if a petition in bankruptcy be filed by or against Purchaser, Seller may, upon election, demand the entire purchase price stated herein or may without notice or demand by process of law or otherwise, take possession of all or any of the equipment, wherever located, and retain all monies theretofore paid as compensation for the reasonable use of such equipment. If a contract arising from this Proposal is breached and is placed in the hands of an attorney for collection of any balance due or enforcement of any other of Seller’s remedies, Purchaser agrees to pay all reasonable attorneys’ fees and other expenses involved therein paid or incurred by Seller. Purchaser hereby waives any and all claims, damages and demands against Seller arising out of the repossession, retention and repair as aforesaid. All rights and remedies contained herein are cumulative and not alternative.

6.3 Seller reserves all other rights and remedies at law or equity available to it in the event of Purchaser’s breach.

7. ASSIGNMENT.

The Purchaser shall not have the right to assign the agreement without the written consent of Seller.

8. SELLER’S LIABILITY; FORCE MAJEURE.

8.1 Seller shall not be liable for delay or loss or damage of any kind resulting from: (i) Purchaser failing to supply any necessary technical data, as required; (ii) Purchaser failing to supply the apparatus, materials and services required; (iii) any changes in designs or specifications made subsequent to acceptance of this Proposal; (iv) failure of suppliers to furnish purchased material or auxiliary equipment within scheduled dates provided that the purchased material or auxiliary equipment was properly ordered and appropriately expedited; (v) by any other reason beyond Seller’s control; or (vi) any delay caused by late payments by Purchaser.

8.2 Seller shall attempt to overcome but shall not be liable for any loss or damage from delay in delivery of any Equipment or completion of any work as a result of causes of any kind beyond the reasonable control of Seller, including, but not limited to, strikes or other labor difficulties, war, riots, changes in laws and regulations and other acts of governmental authorities, inclement weather, fire, flood or unavoidable casualties, or any delays in transportation of materials, or inability to obtain timely delivery of materials from suppliers where such transportation or delivery has been properly procured and appropriately expedited. In the event of any such delay, Seller will notify the Purchaser within a reasonable time after Seller becomes aware of such cause of delay and it is agreed that the time for delivery or completion shall be extended for a period of time at least equal to the time lost by reason of the delay.

9. MATERIAL AND WORKMANSHIP WARRANTY.

Seller warrants to the Purchaser that the Equipment purchased from Seller is free from defects in material and workmanship. The warranty period shall be twelve (12) months from the date of Purchaser’s initial operation using the Equipment but not more than eighteen (18) months from the date of delivery of the Equipment. Any warranty given by the Seller shall be subject to the following: (i) the Equipment is installed in accordance with Seller’s specifications and instructions and is used and maintained normally and properly in accordance with Seller’s instructions as to maintenance and operation, as set forth in written operation and maintenance manuals and instruction sheets furnished by Seller; (ii) the Equipment has not been changed without the prior written approval of Seller; (iii) Purchaser gives prompt written notice to Seller before the end of the warranty period specifying all alleged defects in the Equipment purchased; and (iv) Purchaser preserves and turns over to Seller and permits reasonable inspection by Seller of all allegedly defective Equipment, parts or items and access to the Equipment to observe its startup, operation and maintenance.

This warranty shall not cover (i) any equipment furnished by Purchaser or any third party (other than a subcontractor of Seller), (ii) any defects arising from corrosion, abrasion, use of unsuitable lubricants, freezing or other operation outside of prescribed temperature ranges, or negligent attendance or faulty operation, (iii) ordinary wear and tear (e.g., gaskets), or (iv) any defects caused by errors on the part of the Purchaser in not providing a suitable place in which the Equipment is to be located, adequate foundation works, or adequate protection against influences within or outside the place where the Equipment is to be located which may affect the Equipment or its operation (improper storage), or (v) the performance of any equipment sold by Seller under conditions varying materially from those under which such equipment is usually tested under existing industry standards. Notwithstanding the warranty set forth above, Seller shall not warrant any equipment, where the vendor of such equipment (other than Seller) is specified by Purchaser, for a period longer than warranted by the vendor.

UNLESS OTHERWISE EXPRESSLY STATED IN ANY DOCUMENT ATTACHED TO THESE TERMS AND CONDITIONS, THIS WARRANTY OF MATERIAL AND WORKMANSHIP IS THE ONLY WARRANTY MADE BY SELLER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND SELLER DISCLAIMS ON BEHALF OF ITSELF, ITS SUBCONTRACTORS AND SUBSUPPLIERS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A SPECIFIC PURPOSE (OTHER THAN THE PURPOSE STATED IN THE PURCHASER’S SPECIFICATIONS SET FORTH IN THE CONTRACT), SUITABILITY OR PERFORMANCE. No other promise or affirmation of fact (including, but not limited to, statements regarding capacity or performance of the Equipment) shall constitute a warranty of Seller or give rise to any liability or obligation on the part of Seller.

Seller’s obligation under this warranty and any other warranty or guarantee which is part of the Contract is strictly and exclusively limited to furnishing repairs or replacements for Equipment or parts determined to be defective on inspection by an authorized representative of Seller. Notwithstanding

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this exclusive remedy, if it is ultimately determined that the remedy fails in its essential purpose, then any action which may be brought against Seller subject to the terms of the contract will be limited to 100% of the contract price for the purchased Equipment for which the exclusive remedy has so failed. Seller assumes no responsibility and shall have no liability for any repairs or replacements by Purchaser without Seller’s prior written authorization. If Seller did not originally install the Equipment, Seller shall have no liability for the costs of removing or segregating any defective Equipment so that the repairs or replacements can be made.

If tests are requested by the Purchaser to determine the performance of the Equipment covered in the Seller’s Proposal, the test procedure to be used must be acceptable to the Seller, and the Purchaser agrees to pay to the Seller the cost of any such test.

10. DAMAGES.

NOTWITHSTANDING ANY OTHER PROVISION OF THE CONTRACT TO THE CONTRARY:

(A) SELLER’S AND ITS SUBCONTRACTORS’ AND SUBSUPPLIERS’ AGGREGATE RESPONSIBILITY AND LIABILITY, WHETHER ARISING OUT OF CONTRACT OR TORT OR ANY OTHER LEGAL CONTEXT OR THEORY, INCLUDING NEGLIGENCE AND STRICT LIABILITY, UNDER THE CONTRACT, INCLUDING, BUT NOT LIMITED TO, ALL CLAIMS FOR BREACH OF ANY WARRANTY OR GUARANTEE, FAILURE OF PERFORMANCE OR DELAY IN PERFORMANCE BY SELLER OR PERFORMANCE OR NON-PERFORMANCE OF THE PURCHASED EQUIPMENT SHALL NOT EXCEED THE CONTRACT PRICE FOR THE PURCHASED EQUIPMENT; PROVIDED, HOWEVER, THAT THIS LIMITATION WILL NOT APPLY TO ANY LIABILITY OF SELLER FOR DIRECT DAMAGES CLAIMED BY PURCHASER FOR PHYSICAL DAMAGE TO PURCHASER’S PROPERTY (OTHER THAN EQUIPMENT PROVIDED BY SELLER) OR FOR DIRECT DAMAGES CLAIMED BY THIRD PARTIES FOR SUCH THIRD PARTIES’ PERSONAL INJURY OR PHYSICAL PROPERTY DAMAGE (FOR WHICH PURCHASER IS LIABLE) TO THE EXTENT CAUSED BY THE NEGLIGENT ACTS OR OMISSIONS OR WILLFUL MISCONDUCT OF THE SELLER, FOR ALL OF WHICH MATTERS SELLER SHALL BE LIABLE UP TO AN AMOUNT OF $1,000,000 IN THE AGGREGATE, AND

(B) IN NO EVENT SHALL SELLER, ITS SUBCONTRACTORS OR SUBSUPPLIERS BE LIABLE IN CONTRACT OR IN TORT OR UNDER ANY OTHER LEGAL CONTEXT OR THEORY, INCLUDING NEGLIGENCE AND STRICT LIABILITY, FOR ANY SPECIAL, PUNITIVE, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND OR CHARACTER, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE OF PRODUCTIVE FACILITIES OR EQUIPMENT, COSTS OF PRODUCT RECALL, PLANT DOWNTIME, DAMAGE TO OR LOSS OF PRODUCT, CHEMICALS, CATALYSTS, FEEDSTOCK OR OTHER RAW MATERIALS, LOSS OF REVENUES OR PROFITS OR LOSS UNDER PURCHASES OR CONTRACTS MADE IN RELIANCE ON THE PERFORMANCE OR NON-PERFORMANCE OF THE PURCHASED EQUIPMENT, WHETHER SUFFERED BY PURCHASER OR ANY THIRD PARTY, OR FOR ANY LOSS OR DAMAGE ARISING OUT OF THE SOLE OR CONTRIBUTORY NEGLIGENCE OF THE PURCHASER, ITS EMPLOYEES OR AGENTS OR ANY THIRD PARTY.

TO THE EXTENT THAT SELLER OR THE PURCHASER MAKES ANY CLAIM UNDER ANY FRAUD OR TORT THEORY FOR THE PURPOSE OF CIRCUMVENTING THE LIMITATIONS AND DISCLAIMERS SET FORTH ABOVE AND IS UNSUCCESSFUL IN PREVAILING ON THOSE CLAIMS, IT HEREBY AGREES TO REIMBURSE AND INDEMNIFY THE OTHER PARTY FOR ALL ATTORNEYS’ FEES AND EXPENSES AND COSTS INCURRED BY THE OTHER PARTY IN DEFENDING SUCH CLAIM.

11. ALTERATION – MODIFICATION.

No waiver, alteration or modification of these Terms and Conditions, except as noted in the text of the Proposal shall be valid unless made in writing and signed by an authorized representative of Seller.

12. PATENTS.

Seller shall hold Purchaser harmless against any claim that Seller’s Equipment infringes United States apparatus patents, but Seller makes no representation or warranty, and Seller shall have no responsibility for any infringement or unfair competition resulting from, the use of Seller’s Equipment with the Purchaser’s process, or in combination with other equipment not supplied by Seller.

13. PRODUCT SELECTION AND USE.

Notwithstanding Seller’s warranty obligations pursuant to these General Terms and Conditions of Sale, the Purchaser shall be responsible for accurate design and operating conditions used in the selection and use of the Seller’s products. The Purchaser’s selection and use of Seller’s products from published literature shall be at the Purchaser’s risk as to appropriate application, design conditions and performance criteria use.

14. STANDARDS AND TOLERANCES.

All product dimensions and published information is subject to change without notice. All of Seller’s products furnished to the Purchaser shall also be subject to tolerances and variations consistent with usages of the trade concerning dimensions, composition and mechanical properties and normal variations in performance characteristics and quality.

15. INTEGRATION CLAUSE.

Purchaser acknowledges (1) that the Contract may not be modified or terminated except in writing signed by a duly authorized representative of Seller making specific reference to the Contract, and (2) the Purchaser may not assign the Contract without the prior written consent of Seller.

16. DISPUTE RESOLUTION; GOVERNING LAW

Any determination, agreement or performance which is disputed or cannot be made, resolved or agreed within fourteen (14) days of the date requested by either Purchaser or Seller or such longer period for resolution as may be mutually agreed shall be submitted for resolution by the chief executive officers of the Purchaser and the Seller. It shall be a condition precedent to any subsequent proceeding that the dispute shall be submitted for resolution by such chief executive officers, but if those officers shall not reach a resolution within twenty-one (21) days of submittal to them, then the matter shall be finally settled by arbitration under the Rules of the American Arbitration Association by one or more arbitrators appointed in accordance with such Rules. The place of arbitration will be Philadelphia, Pennsylvania. The contract between the Seller and the Purchaser and their respective performances shall be construed under and governed by the laws of Pennsylvania.

17. DEFINITIONS

In these Terms and Conditions:

“Contract” means the contract between the Seller and the Purchaser for the supply of Equipment which will comprise these Terms and Conditions, the Seller’s Proposal, any documents referred to in the Proposal as forming part of the contract, the Purchaser’s order and the Seller’s confirmation of that order (or the Purchaser’s unqualified acceptance of the Proposal);

“Equipment” means the equipment, goods and materials to be supplied to the Purchaser under the Contract;

“Proposal” means the Seller’s written proposal to the Purchaser for the supply of the Equipment;

“Purchaser” means the person identified as the purchaser of the Equipment in the Proposal and the Contract;

“Seller” means GEA Heat Exchangers, Inc. PHE Division