



Kenics® Static Mixers

Kenics Heat Exchanger Installation, Operation and Maintenance Manual

Model No.:

KENICS HEAT EXCHANGER

Unit Serial No.:

Equipment No.:

Manual No.:

809

For service and information contact:

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A Unit of Robbins & Myers, Inc.

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Manufacturer of the Kenics Static Mixer
North Andover, Ma. 01845

INSTALLATION, OPERATION AND
MAINTENANCE MANUAL

HEAT EXCHANGER
MANUAL 809 REV. 9/16/86

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FACTORY: Chemineer Kenics
North Andover, MA 01845
Refer to the front cover of this manual for the
name and address of your local Chemineer-Kenics
representative.



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INSPECTION AND/OR SHIPPING DAMAGE: Your Kenics Heat Exchanger was carefully packaged, crated, or protected for shipment. However, upon receipt it should be carefully inspected for any shipping damage. Any damage should be reported immediately and a claim filed with the responsible carrier. Your local Chemineer Kenics representative or the factory Customer Order Service Department can assist with claims.

Shipping package contents should be inspected for conformity with your order and for proper unit quantities. Any discrepancies should be reported to the factory Customer Order Service Department within one week of receipt.

STORAGE AND HANDLING: All Kenics Heat Exchangers should be stored indoors in clean, well ventilated storage areas. Care should be taken to see that excessive loads are not applied to the heat exchanger during storage. Sealing surfaces (thread & flanges) should be protected. The original shipping container is adequate protection for most storage conditions. A rust-preventative paint is normally applied to carbon steel external surfaces prior to shipment. For extended storage in harsh environments additional coating or protection may be required.

Heat Exchangers must be handled with appropriate care. Careless handling may result in permanent damage.

FIELD MODIFICATION TO KENICS HEAT EXCHANGERS: No field modifications (addition of fittings, etc.) to Kenics Heat Exchangers should be made without prior consultation with your local representative or the factory. Integrity of the unit or mixing elements can be seriously altered without proper instructions.



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GENERAL:

Your Kenics Heat Exchanger is a rugged piece of process equipment manufactured to demanding design and quality standards. This manual has been provided to assist you in the storage, handling, installation and operation of your heat exchanger and should be reviewed carefully before installation. Adherence to a few precautions will assure a highly satisfactory installation and years of trouble-free service.

The few difficulties encountered with Kenics Heat Exchangers most often result from improper handling, installation and operating procedures. The following quick checklist should assist you in avoiding any difficulties:

1. Extreme care should be exercised in handling and lifting in order to avoid damage and personal injury. Avoid using chains, cables and fork lifts in direct contact with surfaces not designed specifically for handling.
2. Flanged ports should not be bolted into systems where misalignment or gaps exist between the mating flanges. Follow flange tightening instructions later in the manual.
3. Heat exchangers should be operated within process and pressure/temperature limits specified. Consult your local representative or the factory prior to changing operating conditions.

For dimensional and construction information refer to the equipment order drawing supplied with your heat exchanger.



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INSTALLATION GENERAL:

Before installation purge process lines to remove foreign material and debris. In most new construction or modifications to process lines there is a high probability of foreign material within the system which if not removed could damage the internal mixing elements

HANDLING & SUPPORT: Extreme care should be used in handling and lifting so as to avoid damage or personal injury. Never use chains, cables, or fork-lifts in direct contact with the unit. For units which are horizontally mounted, a web sling or two cloth straps are normally used for moving. Vertical units are normally supplied with lifting lugs.

CAUTION: Lugs that are attached to removable heads may not be capable of lifting the entire unit, consult the equipment order drawing or the factory for additional details.

Support structures and foundations shall be designed not to settle and impose excessive strains on the exchanger. Foundation bolts should allow for leveling as required to square port connections. Support brackets which are slotted should have the bolts kept loose to allow free expansion of the shell.

Because of the diversity of mounting and lifting arrangements, sound engineering practice must be observed when moving and supporting equipment.

FLANGED PORTS: Ports can be provided with raised face slip-on, raised face weld neck or lap joint flanges in all standard pressure ratings or drillings. Refer to your equipment order drawing for the type and rating of flange supplied.

Unless specified otherwise on the equipment order drawing, flange facing finish is either a serrated-concentric or a serrated-spiral with a surface finish of approximately 500 micro-inch.

A wide variety of gasketing materials can be used depending upon plant standards, materials being handled, or gasket supplier recommendations. Local gasket distributors should be contacted for specific recommendations.

Sound engineering practice and plant standards should be followed in flange bolt tightening, especially in high pressure service or those employing special gasketing.

THREADED PORTS: Ports with threaded ends are provided with either male or female NPT threads. Little difficulty should be encountered in achieving sound, leak free joints if good pipe fitting practice is followed and mating threads are of equal quality. A high quality thread sealing compound will help to assure leak free joints.

WELD PREPPED PORTS: Weld prepped ports are supplied with standard 37-1/2 degree weld prepped ends for field installation of flanges or direct installation in the piping system.

All field welding should be performed by welders qualified for the class of service and material specified.

REMOVABLE HEADS: Bolted Joints - Heat exchangers are pressure tested before leaving the factory in accordance with ASME Code requirements. However, normal yielding of gaskets may occur in the interval between testing and installation at the jobsite. Therefore, all external bolted joints may require retightening after installation and, if necessary, after the exchanger has reached operating temperature.

RECOMMENDED BOLT TIGHTENING PROCEDURE: It is important that all bolted joints be tightened uniformly and in a diametrically staggered pattern as illustrated in Figure 1.

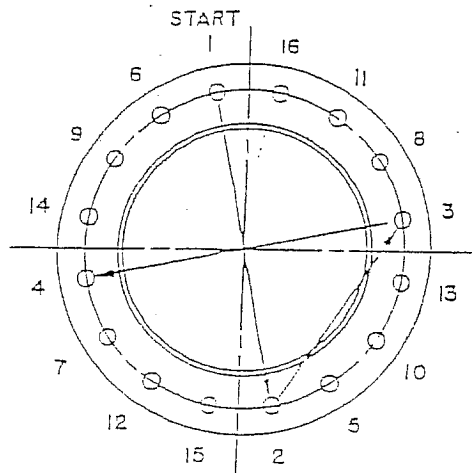


FIGURE 1
(TYPICAL)



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OPERATION:

There are a few special operation instructions required with Kenics Heat Exchangers. Your heat exchanger was designed based upon the flow rate and heat duty specified, and most efficient performance will occur at that rate. The heat exchanger, however, will accommodate wide flow variations in most processes. Consult your local representative or the factory for specific recommendations.

OPERATING LIMITATIONS: The nameplate on your heat exchanger, along with the equipment order drawing and the heat exchanger specification sheet contain pressure/temperature information. Equipment must not be operated at conditions which exceed those specified. Particular attention shall be given to the inlet/outlet temperatures as specified on the heat exchanger specification sheet. Because of the fixed tubesheet design, high thermal stresses may develop if the temperature differential between the shell and tubes is exceeded. For service conditions other than the specified ratings, consult your local representative or the factory.

1. START-UP OPERATION: Open vent valves and/or draw a vacuum so as to purge all cavities and passages of air while filling with fluid. Fluid must be introduced in a manner to minimize differential expansion between the shell and tubes.

Thermal shocks and/or abrupt thermal cycling should be avoided. Hot fluid must not be suddenly introduced when unit is cold, or vice-versa.

2. SHUT-DOWN OPERATION: The unit must be shut down in a manner to minimize differential expansion between the shell and tubes. Drain thoroughly when the possibility of corrosion damage exists.

MAINTENANCE:

Kenics Heat Exchanger requires no additional maintenance other than joint care and inspection typical to the rest of the piping system.

SPARE PARTS - GASKETS: Normally ports which mate with the customers piping are supplied with "standard" ANSI flanges. Replacement gaskets can be selected as required for these joints (Ref. Installation section).

Removable Head flanges are normally designed for use with a particular type of gasket as specified on the equipment order drawing. Substitution of a gasket with differing properties or geometry may result in leakage and/or damage to the gasket seating surfaces.

PERIODIC INSPECTION: At regular intervals and as frequently as experience indicates, an examination should be made of the interior and exterior condition of the unit. Neglect in keeping all tubes clean may result in complete stoppage of flow through some tubes which could cause severe thermal strains and/or leaking tube joints.

Exchangers subject to fouling or scaling should be cleaned periodically. A light sludge or scale coating on the tube greatly reduces its efficiency. A marked increase in pressure drop and/or reduction in performance usually indicates cleaning is necessary. The unit should first be checked for air or vapor binding to confirm that this is not the cause for the reduction in performance. Since the difficulty of cleaning increases rapidly as the scale thickness or deposit increases, the intervals between cleanings should not be excessive. The following cleaning precautions should be observed:

1. Tubes should not be cleaned by blowing steam through individual tubes since this heats the tube and may result in severe expansion strain, deformation of the tube, or loosening of the tube-to-tube sheet joint.
2. Cleaning compounds must be compatible with the metallurgy of the exchanger.
3. For oven "burn-out", in addition to sound heat treatment procedure, the shell and tubes must be allowed to freely expand at the same rate.

Gasket seating surfaces should be inspected and thoroughly cleaned. They should be free of scratches and other defects. It is recommended that new gaskets be used when re-assembling flanged joints.