

Xylem Inc. Plate & Frame Specification with AHRI Standard 400

I. Design

- A. Preference should be given to single pass designs with all connections located on the frame plate (fixed head) to allow for removal of plates and inspection without dismantling the process piping.
- B. For single pass units, all connections should be located on the frame plate (fixed head), allowing the pressure plate (movable head) to slide back and have plates added, removed, or replaced from the plate pack without disturbing the connections or associated piping.
- C. The design should allow for the removal of any plate in the plate pack without requiring the removal of any other plates.
- D. The unit shall be provided with an aluminum splash shield covering the sides and top of the plate pack. The bottom should be left open for leak detection.
- E. The unit shall be designed, tested, and U stamped in accordance with ASME Section VIII Division 1 and registered with the National Board. A U-1 data report to be furnished upon request.
- F. Manufacturer must be certified and registered with ISO 9001:2008. A certificate of registration shall be supplied upon request.
- G. Unit must be factory pressure tested with ASME U stamp applied on nameplate prior to leaving the factory.

II. Frame

- A. The frame and pressure plates shall be carbon steel SA 516 grade 70.
- B. The frame and pressure plates shall be of sufficient thickness to meet the ASME design pressure without the use of stiffeners or other type of reinforcement.
- C. Carbon steel frame components, except hardware, shall be painted with gray macro epoxy paint to a minimum of 4 mils dry film thickness.
- D. Carbon steel frame and pressure plates shall be steel grit blasted to SSPC-SP6/NACE 3 (Commercial Blast Cleaning) with surface profile of 2 mils on either face. All surfaces and openings must have a recoatable epoxy primer applied within 8 hours of blast or before flash rusting occurs.
- E. Frame plates shall have integral lifting eyes in the upper corners. Bolted or welded on lifting lugs not allowed.
- F. Units with studded port connections shall have unlined or alloy lined studded ports to mate with a raised face or flat faced ANSI flange where 150# ANSI flanges are acceptable. Rubber liners are not allowed.
- G. Units with NPT connections, except 1" port sizes, shall have the frame plate tapped with carbon steel female NPT connections or, if alloy material is required, extended male NPT nozzles.

- H. Units with 1" ports shall have carbon steel or 316 stainless steel female tapped NPT or alloy material male NPT connections.
- I. For units with studded port type connections, the studs around the ports must be provided by the manufacturer.
- J. Units with connections greater than 3" require that the thermal plates be supported by the top carry bar. The bottom guide bar shall only assist in properly aligning the plates.
- K. The design for units with 2.5" connections or smaller shall allow the plates to be supported by the bottom guide bar and the top carry bar shall help properly align the plates.
- L. The carry and guide bar for 2" port models shall be stainless steel. For models with 2.5" ports and greater, the thermal plate contact surfaces of the carry and guide bar shall be stainless steel. For units with 1" connections, the carry and guide bars shall be zinc plated carbon steel.
- M. For ease of movement during assembly and maintenance, the movable pressure plate shall be supported by a roller assembly over the carry bar for 4" ported models greater than 90" in height and for all 6" and larger ported models. For 4" ported models less than 90" in height, a glide clip made of ultra high molecular weight polyethylene shall be used on the movable pressure plate.
- N. Units shall have a minimum of two mounting feet at the frame plate and one at the support column, if a support column is used in the design.
- O. For units with 300 psig design pressure or less, excluding "wide gap" designs, frames must be designed to withstand full test pressure in one circuit with zero pressure in the opposite circuit.
- P. The nominal connection size shall match the nominal thermal plate port hole diameter.

III. Hardware

- A. All bolting, including tightening bolts, shall be carbon steel SA193 grade B7 and galvanized via electroplating of zinc coating.
- B. All nuts shall be carbon steel SA194 grade 2H and galvanized via electroplating of zinc coating.
- C. Mounting feet shall be zinc plated carbon steel.
- D. The tightening bolt assemblies on units with 3" and greater connections shall include lock washers at the movable pressure plate such that the unit can be opened and closed with one wrench from the front of the unit.
- E. All the tightening bolt assemblies on units with 3" and greater connections shall include bearing washers at the fixed frame plate to reduce friction. Bearing assemblies only on some of the bolts is not allowed.
- F. The nuts on the tightening bolt assemblies on units with 3" and greater connections shall be peened on, not welded, at the frame plate.

IV. Plates

- A. Plates shall be pressed in a one-step stamping process, except for plates 132" and greater in length, where multi step pressing is allowed.
- B. Plates shall use an integral rolled edge hanging system to provide a rigid hanger device between the plate and carry bar and guide bar. Welded on hanging brackets or stiffeners are not acceptable.
- C. The plate pack shall use a positive plate to plate alignment system to ensure proper plate to gasket seals throughout the plate pack. The positive alignment system shall either be a gasket lug which fits within a plate recess on the proceeding plate (tongue in groove) to align successive plates or an extended rolled edge hanger which nests successive plates through direct contact around the entire plate hanger. Plate designs which only offer alignment through contact with the carry and guide bar are unacceptable.
- D. Plates shall have an enclosing groove for the entire gasket designed to contain the gasket while allowing for thermal expansion.
- E. Plates shall be permanently marked to indicate plate material and thickness.
- F. Double wall plates shall have an air gap with a leak detection path.
- G. Stainless steel double wall plates shall be pressed at the same time to ensure a close fit with minimal loss of heat transfer.
- H. For units with 300 psig design pressure or less, excluding "wide gap" designs, thermal plates must be designed to withstand full test pressure in one circuit with zero pressure in the opposite circuit.

V. Gaskets

- A. All gaskets for single pass designs, except the gasket on the first plate, shall be identical.
- B. The gaskets shall be a one-piece construction with a double gasket barrier at the port region. The area isolated by the double gasket shall be vented to the atmosphere, so that a gasket failure is detected by leakage to the exterior prior to any possible cross contamination.
- C. Gaskets shall have tapered sides to assure positive seating of the compressed gasket and assist in aligning the thermal plates during compression.
- D. When available, glue-free gaskets are preferred to glued-on gaskets. Glue-free gasket attachment methods which break during gasket removal or plate maintenance, thus destroying the gasket, are not allowed.
- E. Care should be taken in the selection of gasket materials to insure compatibility with the fluids and operating temperatures.

VI. Thermal/Hydraulic Design and Certification

- A. The manufacturer shall provide written guarantee to the accuracy of the heat exchanger thermal design.
- B. The manufacturer shall be certified with the Air-Conditioning, Heating and Refrigeration Institute's Liquid to Liquid Heat Exchanger Certification program, AHRI Standard 400, for the Model being supplied.
 - 1. For units within the scope of the program: "This heat exchanger is certified by the AHRI Liquid to Liquid heat exchanger certification program based on AHRI Standard 400. AHRI certified units are subject to rigorous testing, have performance ratings independently measured and are third party verified. Certified units may be found in the AHRI Directory at www.ahrirectory.org".
 - 2. For units at operating conditions outside the scope of the program: "The operating conditions are outside of the scope of AHRI Standard 400 Liquid to Liquid certification program of 2000 gpm and/or 24,000,000 btu/hr. Model is an AHRI Standard 400 certified model"
- C. In accordance with AHRI Standard 400, the manufacturers output/specification sheet shall have the following information:
 - 1. Model Number;
 - 2. Volumetric Flow Rate;
 - 3. Inlet Temperatures on Both Circuits;
 - 4. Outlet Temperatures on Both Circuits;
 - 5. Pressure Drops on Both Circuits;
 - 6. Surface Margin (also known as Excess Surface Area);
 - 7. Heat Duty (also known as Heat Load);
 - 8. Overall Heat Transfer Coefficient;
 - 9. Heat Transfer Area;
 - 10. Number of Plates;
 - 11. Channel Arrangements on Both Circuits;
 - 12. Number of Passes;
 - 13. Plate Material and Thickness;
- D. Should the Heat Exchanger not perform to the specified conditions as defined in AHRI Standard 400, the manufacturer is responsible to replace or repair the exchanger to achieve the stated performance.
- E. If the manufacturer is not certified with the Air-Conditioning, Heating and Refrigeration Institute's Liquid to Liquid Heat Exchanger certification program, AHRI Standard 400, a witnessed factory performance test must be completed per the testing specification of AHRI Standard 400.