

The AHRI Standard 400 Story

The development of the Standard 400 program for Liquid to Liquid Heat Exchangers, originally as part of ARI and now AHRI, began in 2003 with Bell & Gossett playing a critical role in its development. In 2004, Bell & Gossett was among the first in the HVAC industry to receive the Air-Conditioning and Refrigeration Institute's (ARI) new certification for liquid-to-liquid heat exchangers. Since the early years, the program has continued to develop and Bell & Gossett is pleased to provide: "The AHRI Standard 400 Story".

1. What is AHRI?

AHRI stands for **Air-Conditioning, Heating, and Refrigeration Institute** and is a trade association with 300+ member companies that produce more than 90% of the air conditioning, heating, water heating and commercial refrigeration equipment made in North America. AHRI strives to promote energy savings, improve productivity, and ensure a better environment. AHRI certifications programs establish definitions, minimum data requirements for published ratings, marking/nameplate data, test requirements, and conformance conditions.

2. What is a Standard 400 for Liquid to Liquid Heat Exchangers?

The AHRI Liquid to Liquid Heat Exchanger (LLHE) program, now formally ANSI/AHRI Standard 400 (formerly ARI Standard 400), is a third party certification program that certifies the performance of gasketed plate heat exchangers designed to transfer heat from one single phase fluid to another in an **HVAC** system using actual third party witnessed laboratory testing.

3. What tolerances does AHRI require the manufacturer meet during its performance testing?

AHRI developed testing requirements more stringent than those traditionally used in the HVAC industry to recognize the use in high energy efficient solutions with close temperature approaches and high efficiency pumps. During testing intervals specified by AHRI, the manufacturers stated performance for a given test must meet the following requirements.

Total Heat Transfer Rate \geq 95% of published value
Tested Pressure Drop \leq 115% of published value (1)

- (1) Prior to August 2015, requirement was $\leq 110\%$ of published value but was changed to better reflect actual industry flow and pressure loss measurement capabilities.

4. How is an HVAC system defined?

HVAC is defined in the ANSI/AHRI Standard 400 LLHE Operations Manual as: “Applications encompassing equipment located in a residential or commercial building exclusively used for conditioning spaces for the occupants of the building.”

5. What is the scope of the ANSI/AHRI Standard 400 program?

The scope of the ANSI/AHRI Standard 400 program(1) is defined as:

- For gasketed plate type heat exchangers.
- Utilizing water or sea water. (Glycols are not yet included.)
- With a capacity less than or equal to 240,000,000 btu/hr
- And flow rate less than or equal to 20,000 gpm.⁽¹⁾

6. What is the intended market?

AHRI defines the intended market of the ANSI/AHRI Standard 400 program as U.S., U.S. Territories and Canada.

7. Why is AHRI Standard 400 important?

AHRI certification ensures a manufacturer’s stated product performance will be met and operate as designed thus enhancing buyer confidence.

- Ensures all manufacturers are designing to the same tolerances providing buyers a reliable comparison of equipment.
- Promotes energy savings. For example, in a “free cooling/water side economizer” application, this could mean the chiller will run less resulting in energy savings.
- Other pieces of equipment in a system, such as the chiller, may have AHRI or other certifications (CTI for cooling towers for example).
- AHRI certification can facilitate compliance to various state and federal efficiency regulations.
- ASHRAE Standard 90.1 requires waterside economizers to comply with AHRI Standard 400 starting in 2010 version.
- U.S. Green Building Council’s LEED references ASHRAE Standard 90.1.

- International Energy Conservation Code registers compliance with ASHRAE Standard 90.1.
- Most AHRI certification programs, including AHRI Standard 400 for liquid to liquid plate and frame heat exchangers, require members to quote an AHRI certified model/design when the application is within the scope of the program.
- Most of the major plate & frame heat exchanger manufacturers have worked to developed to this standard.

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8. What are “Certify All” requirements of AHRI?

Almost **all** AHRI certification programs, including the Liquid to Liquid Heat Exchanger AHRI Standard 400, have a “certify-all” requirement.

- Certify-all requires any manufacturer that has their AHRI certification for the product, to quote and provide an AHRI certified design when the application falls within the AHRI program scope, application definition, and intended market.
- The scope, application definition, and market are defined above.
- **The certify-all requirement is regardless if the specification, user, buyer, etc. requires an AHRI certified design or not** and applies to all participating manufacturers of the AHRI certification program.

9. How to specify GPHE’s based on the above information?

If writing a specification, it is recommended to add clarification to avoid any interpretations or opinion. This will help ensure “apples to apples” comparisons.

- Specify that acceptable manufacturers are:
 - **“Certified** participating members of the AHRI Liquid to Liquid Heat Exchanger Certification Program based on ANSI/AHRI Standard 400”.
 - Manufacturer **must** have AHRI LLHE certification to offer an AHRI certified model
 - A manufacturer can be a member of AHRI but not participate in nor have AHRI LLHE certification, hence **should not** be considered equivalent to members with AHRI LLHE certification.
 - Statements such as “in accordance with”, or similar, are **not** the same as AHRI certified.
- If the application is within the AHRI scope, meets the AHRI definition for HVAC equipment and is being sold into the intended market:
 - Require an AHRI certified model to be listed in the schedule
- If the fluids or heat load or flow rates are outside the scope of the AHRI LLHE certification program, add clarification to the specification that:

- Accepted manufacturer must have AHRI LLHE certification, even though model offered cannot be AHRI certified due to being out of scope.
- Manufacturer must design to the tolerances required in AHRI Standard 400 for heat transfer and pressure drop.

AHRI LLHE certified members can be found at:

- <https://www.ahridirectory.org/ahridirectory/pages/llhe/defaultSearch.aspx>

10. How can I tell if a unit is AHRI Certified?

The certified manufacturers are required to attach the label shown below for all certified units.



Bell & Gossett continues to be an active certified member of the ANSI/AHRI Standard 400 for Liquid to Liquid Heat exchangers. Working with AHRI, development continues to expand and improve the program to support energy savings, improve productivity and ensure a better environment.

Should any additional information be required, please contact your local Bell & Gossett representative, which can be located at <http://bellgossett.com/sales-service/> , or the writer directly.