ANSI/AHRI Standard 400 with Addenda
(Formerly ARI Standard 400)

2001 Standard for

Liquid To Liquid Heat Exchangers

Approved American National Standard
ANSI

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Full document details: AHRI Standard 400-2001 - Liquid To Liquid Heat Exchangers - Addendum 2

ANSI/AHRI STANDARD 400-2001 WITH ADDENDUM 2, *Liquid to Liquid Heat Exchangers*

April 2005

AHRI Standard 400-2001 with Addendum 2, *Liquid to Liquid Heat Exchangers,* is comprised of only the shaded portions shown. The September 2005 Addendum 2 has been incorporated into the already published 2001 version of AHRI Standard 400 to avoid confusion.

Particular additions (shown shaded in the standard), deletions ~~(shown with a strikethrough and shaded in the standard)~~, and corrections (shown shaded in the standard) are as follows:

1 In **5.3**, the requirement for pressure drop not to exceed more than 110% of the published pressure drop was removed.
2 In **5.3**, a requirement for tested pressure drop not to exceed the published pressure drop by more than 10%, or 1.0 ft of fluid [0.3 m of fluid], whichever is greater, was added.

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ANSI/AHRI STANDARD 400-2001 WITH ADDENDUM 1,

Liquid to Liquid Heat Exchangers

June 2003

AHRI Standard 400-2001 with Addendum 1, *Liquid to Liquid Heat Exchangers,* is comprised of only the shaded portions shown. The June 2003 Addendum 1 has been incorporated into the already published 2001 version of AHRI Standard 400 to avoid confusion.

Particular additions (shown shaded in the standard), deletions ~~(shown with a strikethrough and shaded in the standard)~~, and corrections (shown shaded in the standard) are as follows:

1. In **Table 1**, units of measurement for minimum and maximum pressure drop were corrected.
2 In **Table 1**, the SI equivalents for minimum and maximum pressure drop were corrected.
3 In **Appendix A**, the current edition of ANSI/ASHRAE Standard 41.1 is ANSI/ASHRAE Standard 41.1-1986 (RA 2001).
4 In **Appendix A**, references to ASME MFC-5M, ASME MFC-6M, ASME MFC-16M, and ASME PTC 19.2 were deleted.
5 **C4. *Instruments and Test Apparatus*** (and associated subsections) was deleted.
6 **C4**. ***Test Measuring Instruments*** (and associated subsections) was added.

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IMPORTANT

SAFETY DISCLAIMER

AHRI does not set safety standards and does not certify or guarantee the safety of any products, components or systems designed, tested, rated, installed or operated in accordance with this standard/guideline. It is strongly recommended that products be designed, constructed, assembled, installed and operated in accordance with nationally recognized safety standards and code requirements appropriate for products covered by this standard/guideline.

AHRI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices.
AHRI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

Note: This standard supersedes ARI Standard 400 with Addendum 1.

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Section 1. Purpose

1.1 *Purpose*. The purpose of this standard is to establish for Liquid to Liquid Heat Exchangers: definitions; test requirements; rating requirements; minimum data requirements for Published Ratings; marking and nameplate data; and conformance conditions.

1.1.1 *Intent*. This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

1.1.2 *Review and Amendment.* This standard is subject to review and amendment as technology advances.

Section 2. Scope

2.1 *Scope*. This standard applies to Liquid to Liquid Heat Exchangers as defined in Section 3, which includes the following types of heat exchangers:

a. Plate Heat Exchangers
b. Shell-and-Tube Heat Exchangers, Shell-and-U-Tube Heat Exchangers, and Shell-and-Coil Heat Exchangers
c. Counter flow Shell-and-Tube Heat Exchangers

2.2 *Exclusions*. This standard does not apply to heat exchangers used for change of phase or non-liquid heat transfer applications.

Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration*, unless otherwise defined in this section.

3.1 *Clean Capacity.* The total heat transfer rate of the heat exchanger with clean heat exchanger surfaces.

3.2 *Cold Stream*. The liquid stream with the lower inlet temperature.

3.3 *Counter Flow Shell-and-Tube Heat Exchanger.* A baffled shell and tube heat exchanger, circuited such that the shellside and tubeside liquids flow countercurrent to one another.

3.4 *Field Fouling Allowance*. Provision for anticipated fouling during use.

3.4.1 *Fouling Factor*. The thermal resistance due to fouling accumulated on the heat transfer surface.

3.5 *Hot Stream*. The liquid stream with the higher inlet temperature.

3.6 *Liquid to Liquid Heat Exchanger*. A heat transfer device used to exchange heat between two liquid streams that are single phase fluids.

3.7 *Number of Transfer Units (NTU).* A dimensionless coefficient representing the magnitude of thermal demand. The equation for NTU is given in Appendix C.

3.8 *Plate Heat Exchanger.* Heat transfer device that typically utilizes corrugated metal plates in a bolted frame. An alternate technique is for the plates to have elastomer gaskets that seal the unit and direct the heat transfer stream in countercurrent flow. The corrugated plates can also be brazed together using a sacrificial alloy thus avoiding the need for a bolted frame.

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