Hairpin Type Heat Exchangers

API STANDARD 663
SECOND EDITION, AUGUST 2022

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Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001, standards@api.org.

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Users of this standard should be aware that further or differing requirements may be needed for individual applications. This standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is an innovative or developing technology. Where an alternative is offered, it is the responsibility of the vendor to identify any variations from this standard and provide details.

This standard requires the purchaser to specify certain details and features.

A bullet [•] at the beginning of a section or subsection indicates a requirement for the purchaser to make a decision or provide information (for information, a checklist is provided in Annex B).

In this standard, where practical, U.S. customary (USC) or other units are included in parentheses for information.

Hairpin Type Heat Exchangers

1 Scope

This standard specifies requirements and gives recommendations for the mechanical design, materials selection, fabrication, inspection, testing, and preparation for shipment of hairpin heat exchangers for use in the petroleum, petrochemical, and natural gas industries. Hairpin heat exchangers include double-pipe and multi-tube heat exchangers.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Recommended Practice 941, *Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants*

API Standard 521, *Pressure-relieving and Depressuring Systems*

API Technical Report 938-C, *Use of Duplex Stainless Steels in the Oil Refining Industry*

ASME B16.25,[1] *Buttwelding Ends*

ASME PCC-1, *Guidelines for Pressure Boundary Bolted Flange Joint Assembly*

NACE MR0103,[2] *Petroleum, Petrochemical and Natural Gas Industries—Metallic Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments*

NACE MR0175, *Petroleum and Natural Gas Industries—Materials for Use in H_2S-containing Environments in Oil and Gas Production—Parts 1, 2 and 3*

NACE SP0472, *Methods and Controls to Prevent In-Service Environmental Cracking of Carbon Steel Weldments in Corrosive Petroleum Refining Environments*

TEMA,[3] *Standards of the Tubular Exchanger Manufacturers Association*, Tenth Edition

3 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1
annular distributor
An additional chamber incorporated at a shell side nozzle to evenly distribute shell side fluids entering or exiting the tube bundle.

3.2
cyclic service
Process operation with periodic variation in temperature, pressure, and/or flowrate.

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1 ASME International, Two Park Avenue, New York, New York 10016-5990, USA, www.asme.org.

2 NACE International (formerly the National Association of Corrosion Engineers), 15835 Park Ten Place, Houston, Texas 77084, U.S.A., www.nace.org.

3 Tubular Exchanger Manufacturers Association, 25 North Broadway, Tarrytown, New York 10591, U.S.A, www.tema.org.