Shell-and-Tube Heat Exchangers

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Introduction

It is necessary that users of this standard be aware that further or differing requirements can 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 innovative or developing technology. Where an alternative is offered, the vendor should 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 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.

Shell-and-Tube Heat Exchangers

1 Scope

This standard specifies requirements and gives recommendations for the mechanical design, material selection, fabrication, inspection, testing, and preparation for shipment of shell-and-tube heat exchangers for the petroleum, petrochemical, and natural gas industries.

This standard is applicable to the following types of shell-and-tube heat exchangers: heaters, condensers, coolers, and reboilers.

This standard is not applicable to vacuum-operated steam surface condensers and feed-water heaters.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ASME B16.5 [1], *Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard*

ASME PCC-1-2013, *Guidelines for Pressure Boundary Bolted Flange Joint Assembly*

EJMA [2], *Standards of the Expansion Joint Manufacturers Association*

NACE MR0103 [3], *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 [4], Ninth Edition, *Standards of the Tubular Exchanger Manufacturers Association*

3 Terms and Definitions

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

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

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1 ASME International, 2 Park Avenue, New York, New York 10016-5990, www.asme.org.
2 Expansion Joint Manufacturers Association, 25 North Broadway, Tarrytown, New York 10591, www.ejma.org.
3 NACE International (formerly the National Association of Corrosion Engineers), 1440 South Creek Drive, Houston, Texas 77084-4906, www.nace.org.
4 Tubular Exchanger Manufacturers Association, 25 North Broadway, Tarrytown, New York 10591, www.tema.org.