

Changes shown by ↗

**THE FOLLOWING PARAGRAPH NUMBERS REFER TO API STANDARD 661,
4TH ED., NOVEMBER 1997, WHICH IS PART OF THIS PRACTICE**

SECTION 1 - SCOPE

- I 1.0 SCOPE
- (Exception) - This practice covers the design, materials, fabrication, inspection, testing, and preparation for shipment of air-cooled heat exchangers except those which are integral radiators for equipment - such as a packaged air compressor unit. All paragraphs in this practice amend those of API 661 unless specifically noted. For user convenience, the beginning of each paragraph in this IP is noted as follows:
- (Addition) - This means that the paragraph specifies additions to the corresponding API paragraph.
- (Exception) - This means that the paragraph completely replaces the corresponding API paragraph.
- (New) - This means that the paragraph is new and does not appear in API Standard 661.
- 1.1 GENERAL
- I 1.1.1 (Addition) When the tube bundles are constructed for use at a location where the ASME Code is not mandatory, it shall be noted, on the ASME Code forms, that the bundle does not carry an ASME code symbol.
- I ↗ 1.1.2 (New) An asterisk (*) indicates that a decision by the Purchaser is required or that additional information shall be furnished by the Purchaser. This additional information is transmitted in Appendix A of this practice. The Appendix supplements API 661, Appendix B.

SECTION 2 - REFERENCED PUBLICATIONS

- 2.0 REFERENCED PUBLICATIONS
- I 2.1 (Addition) **Table 1** lists the documents that shall be used with this IP in addition to those listed in API Standard 661.
- I * 2.1.1 (Addition) Table 2 lists the documents that shall be used with this IP if so specified by the Purchaser.

TABLE 1

PRACTICES			
IP 2-1-1	Plant Noise Design Criteria	IP 18-7-1	Welding Procedures
IP 4-1-3	Design Loads for Structures	IP 18-10-1	Additional Requirements for Materials
IP 5-1-1	Pressure Vessels	IP 18-12-1	Positive Material Identification
IP 5-3-1	Pressure Testing of Unfired Pressure Vessels	IP 19-1-1	Paint and Protective Coatings
IP 16-9-1	Low Voltage A-C Motors Up to 200 HP (150 kW)	IP 20-1-1	Inspection of Equipment and Materials
STANDARDS			
API Standard		ANSI Standards	
API 661	Air-Cooled Heat Exchangers for General Refinery Services	A12.1	Safety Requirements for Floor and Wall Openings, Railings and Toeboards
		A14.3	Safety Requirements for Fixed Ladders

TABLE 2

PRACTICES			
IP 3-16-1	Flanged Joints, Gaskets, and Bolting	IP 18-4-1	Postweld Heat Treatment of Equipment Handling Alkaline Solutions
IP 5-1-2	Additional Requirements for Heavy Wall Pressure Vessels, Thickness Over 2 Inches	IP 19-2-1	Weld Overlay and Integrally Bonded Cladding
IP 10-7-1	General Purpose Steam Turbines	IP 19-7-1	Protection of Stainless Steel During Fabrication, Shipping, Storage and Field Construction
IP 14-3-1	Fireproofing	IP 20-1-3	Quality Programs
IP 18-3-2	Statically Cast Steel and Alloy Pressure Containing Parts and Tube Supports for Fired Heaters		
CODES AND STANDARDS			
ASME Codes		ASME Standard	
Section V	Nondestructive Examination	B16.1	Cast Iron Pipe Flanges and Flanged Fittings
Section VIII	Pressure Vessels, Division 1	ASTM Standard	
		D 2000	Rubber Products in Automotive Applications

IP 6-4-1		Air-Cooled Heat Exchangers	
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(This practice is appropriate for attachment to Inquiry or Purchase Document)

SECTION 4 - PROPOSALS

4.2 VENDOR'S RESPONSIBILITIES

- I ♦ 4.2.8 (Exception) The proposal shall include noise level data per [IP 2-1-1](#).
- I ♦ 4.2.9 (Exception) The proposal shall include characteristic performance curves for fans and louvers.

SECTION 5 - DOCUMENTATION

5.1 APPROVAL INFORMATION

- I ♦ 5.1.1(b) (Addition) Minimum test temperature.
- R ♦ 5.1.5 (Exception) All proposed Welding procedures and qualifications shall be submitted for approval to the Purchaser prior to the start of fabrication. This shall include a single drawing for strength welded tube-to-tubesheet joints showing a complete procedure for welding, expansion, inspection, and weld testing.

5.2 FINAL RECORDS

- I ♦ 5.2.1 (Exception) Within ten (10) days after delivery, the Vendor shall furnish Purchaser the following documentation which shall be arranged in complete sets, with one set for each exchanger. These shall show any changes made after approval.
 - h. (Exception) Certified noise data sheet for the air-cooled heat exchanger.
 - j. (Exception) Louver characteristic performance curve.
 - k. (New) Certified outline and detail drawings stamped "AS BUILT." The drawings shall show the actual corrosion allowance of the header box plates and nozzles, the minimum nominal wall thickness of the nozzles, and the material impact requirements.
 - l. (New) All mechanical design calculations marked "AS BUILT."
 - m. (New) Manufacturer's nameplate rubbing.
 - o. (New) A certified record of any impact test performed.

SECTION 6 - DESIGN

6.1.1 GENERAL REQUIREMENTS

- R ♦ * 6.1.1.4 (Addition) Intermediate spacers, coinciding with the tube supports, shall be provided between all adjacent rows of tubes to prevent sagging and meshing or deformation of fins. If the Purchaser desires a particular type spacer, this preference can be indicated in Appendix A. Acceptable spacer types include the following:
 1. Aluminum or zinc rings, 2 in. (50 mm) wide with outside diameter equal to tube spacing with a positive method of retaining the spacers.
 2. Corrugated aluminum strips, 2 in. (50 mm) wide with corrugations and thickness as required. Corrugated strips shall be permanently secured in place by crushing part of the fin and by welding restraining channels to the sides of the frames.
- M * 6.1.1.12 (Addition) When the exchanger can operate below 120°F (49°C) including upsets and start-up conditions, the lowest possible tube metal temperature will be specified by the Owner.

6.1.3 TUBE BUNDLE DESIGN TEMPERATURE

- R ♦ 6.1.3.4 (Exception) The design temperature for pressure parts, as listed on the air cooled heat exchanger specification sheet is not intended to apply in determining exposure metal temperatures of mechanical and instrumentation components. The design temperatures shall be used to govern fin type selection as detailed in Section 6.1.11.

6.1.6 HEADERS

- R ♦ 6.1.6.2.3 (Exception) Bolted joints shall be designed with confined gaskets per **Figure 4** of API 661.
- M 6.1.6.2.7 (Exception) Through bolts shall be used unless otherwise approved by the Owner's Engineer.
- R ♦ 6.1.7.1 (Exception) Plugs shall be the shoulder type with straight threaded shanks and 1/8 in. (3 mm) minimum radius between the shoulder and shank.

6.1.9 NOZZLES AND OTHER CONNECTIONS

- R 6.1.9.8 (d) (Exception) A fabricated transition approved by the Owner's Engineer.
- R 6.1.9.12 (d) (Exception) Boss connections are not permitted.