HUDSON
Products Corporation

API Standard 661

5th Edition / ISO 13706

API Standard 661 - 5th Edition / ISO 13706 is now available from API. The following are some comments concerning the information provided in the 5th Edition versus the 4th Edition. These comments are intended as a courtesy to our website visitors and we do not make any claims on the accuracy of our interpretation. We recommend you contact API directly for ordering and detailed clarifications

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General Comments

1. Most of the specific Codes have been eliminated and comments such as “in accordance with the pressure design code” is substituted. This was done to make it an international standard.

2. The nozzle loads remained the same.

3. Pressures, temperatures and dimensions are in metric (US).

4. Nominal pipe sizes refer to DN numbers (NPS numbers).

5. Many of the paragraphs have been shortened with explanations and requirements eliminated.

6. Annex A (informative), Recommended practices has been added.

7. Appendix F - Measurement of Noise from Air-Cooled Heat Exchangers was deleted from the previous edition.

Specific Comments on paragraphs in the 5th Edition

5.10 The proposal shall include details of the method used to secure the fin ends (7.1.11.7)

6.1.1.o) Approvals required “nameplate and its position” and p) tube-to-tubesheet joint and details of joint preparation.

7.1.2 Added “If steam is used as heating fluid,” heating coils shall be single pass...

7.1.3.1 “the maximum design temperature shall be at least the specified process fluid inlet temperature plus 25 deg C (50 deg F).”

7.1.6.3 “Calculations shall consider the following stress combinations: a) For tube stress and/or tube joint stress: ... b) For header and nozzle stress: ...c) For header attachments and supports (including coil side frames and cooler structure: ...”

7.1.6.1.6 Minimum nominal thickness of header components, Table 1 added “Pass partition plates and stay plates 12 mm (1/2 inch) Carbon Steel and 6 mm (1/4 inch) High alloy steel or other materials”

7.1.6.1.7 The requirement “a joint efficiency of 0.6 shall be used for the full penetration attachment weld which cannot be inspected” has been eliminated. The design is per the pressure vessel code.

7.1.6.2.9 Added “The maximum spacing between bolt centres shall be in accordance with the pressure design code.”

7.1.7.8 Paragraph 6.1.7.8 of 4th Edition now reads: “Threads of plugs having nominal diameters 30 mm (1 1/inch) and smaller shall be fine series threads.”
Paragraph 6.1.7.9 was eliminated.

7.1.8.9 Added “Annex A.8 may be consulted for further guidance on gaskets” This annex is new.

7.1.9.6 Paragraph changed to: “The minimum nozzle neck thickness, including corrosion allowance, of carbon steel and low-alloy steel flanged connections shall be as specified in Table 3.” Also Table 3 is added.

7.1.11.7 Paragraph a) Added: “The fin end at each end of the tube shall be secured to prevent loosening or unraveling of the fins; the vendor shall indicate the method used.”

Paragraph c) Added: “The fin end at each end of the tube shall be secured to prevent loosening or unraveling of the fins; the vendor shall indicate the method used.” Note: the requirement for zinc rings was eliminated from the paragraph.

Paragraph f) Added: Knurled footed - L-shaped aluminum fin wrapped under tension over the outside surface off a tube, while the foot of the fins is simultaneously pressed into the ribbed outer surface of the tube. The fin end at each end of the tube shall be secured to prevent loosening or unraveling of the fins; the vendor shall indicate the method used.”

7.1.11.13 Added: “Elliptical tubes may be used if agreed by the purchaser. A.1.4 may be consulted for further guidance on elliptical tubes.”

7.2.1.3 Paragraph has been revised to read: “Fan selection at design conditions shall ensure that at **rated** speed the fan can provide, by an increase in blade angle, a 10% increase in air flow with a corresponding pressure increase...”. Previously it was at constant speed.

7.2.1.4 Substituted: “Alternatively, these temperatures may be estimated by the following methods: a) The design exposure temperature ... located above the bundle ... b) The design exposure temperature ... located below the bundle....”

7.2.2.3 Substituted: “The procedure for determining noise level shall be in accordance with ISO 3744, using the hemispherical method for determining sound power levels.” The reference to Appendix F is deleted.

7.2.3.8 Deleted the requirement that the hubs for automatically controlled pitch fans be dynamically balanced.

7.2.3.9 Substituted: “The fan assembly shall be designed to minimize reverse air flow at the hub.” Previously it had read prevent air flow.

7.2.3.14 Note that the units used in the calculation of blade pass are changed. Revolutions per second are used.

7.2.4.1 For calculating the rating life, reference is made to ISO 281 and/or ISO 76 in lieu of ABBMA.

7.2.4.5 Substituted: “Fan shafts shall have key seats and fits in accordance with ISO 2491 and ISO 286 (tolerance N8) and ISO/R775.

7.2.6.2 Added: “The materials of fan blades and fan guards shall be a non-sparking combination.”

7.2.7.2.1 Substituted: "...The purchaser shall specify the voltage and frequency, the applicable **motor** specification, the hazardous area classification, the temperature classification and the insulation class."

7.2.7.9 Added: "If specified by the purchaser, a self-actuating braking device shall be installed to prevent reverse rotation of an idle fan and the connected driver caused by down-draughts."

7.2.7.3 Added: "Requirements for variable-speed drive system (VSDS) shall be agreed between the purchase and the vendor."

7.2.7.4 Substituted: "Steam turbine drivers shall be in accordance with ISO 10436."

7.2.8.2.2 Substituted: "Belt drives in a heated air stream (such as top-mounted drives)... (see also 7.2.7.2.8 and 7.2.8..13)."

7.2.8.2.5 Substituted: " V-belt drives shall be in accordance with ISO 1081, ISO 4183, ISO 4184, ISO 5287, ISO 5290 and/or ISO 9563 as applicable."

7.2.8.2.10 Substituted: "V-belt drive assemblies suspended from the structure may be used with motor drivers rated no higher than 30 kW (40 HP)."

7.2.8.2.11 Substituted: "High-torque type positive-belt drive assemblies suspended from the structure may be used with motor drivers rated no higher than 45 kW (60 HP)."

7.2.8.3.1 Substituted: "Electric motors rated higher than 45kW (60HP) shall use gear drives; motors rated not higher than 45 kW (60 HP) may use gear drives." Note that the requirement to use gears went from 50 HP to 60 HP, and allows gears at lower HP.

7.2.8.3.2 Substituted: "Gear drives for electric motors rated not higher than 45k (60HP) may be suspended from the structure."

7.2.10.1 Added: "...The thickness of extruded hollow-shaped aluminum blades shall be at least 1,5 mm (0.06 inch)."

7.2.10.5 a) Substituted: "the maximum process inlet temperature less 30 deg C (50 deg F)." Note was 100 deg F.

7.2.10.11 Added: "...The handling force to operate the louvres shall not exceed 250 N (56 lb)."

7.2.10.24 Added: "Pin-type retainers shall be used to hold manual control levers of louvres in a set position; butterfly-type locking nuts shall not be used."

7.2.10.25 Added: "All linkage joints shall be through-bolted or pinned; friction -type joints shall not be used. The bolting or pinning shall be done after final linkage adjustment."

7.3.1.1 Substituted: "The structural code shall be specified or agreed by the purchaser. Structural steel design, fabrication and erection shall be in accordance wit the structural code."

7.3.1.2 & 7.3.1.3 Refer to "the structural code" in lieu of specific codes.

7.3.2.4 Added: "The effective vibration velocity (r.m.s.), measured on the bearings perpendicular to the fan shaft center line, shall not exceed 6,3 mm/s (1.4 in/s) up to 10 r/s and 3,0 mm/s (1/8 in /s) above 10 r/s."

7.3.5.4 Added: "...raised pattern solid plate with drain holes,...at least 6 mm (1/4 inch). Glass-reinforced plastic (GRP) may be used if specified or agreed by the purchaser."

7.3.5.5 Deleted the reference to OSHA when talking about ladders, railing etc.

7.3.5.8 Added: "The purchaser shall specify requirements, if any, for personnel protection against high air-out temperatures and hot surfaces."

7.3.6.4 Substituted: "Sufficient lifting eyes shall be provided on each driver and gear ..." One was previously required.

8.1 Deleted the following:
The comment that all materials shall be new.
Bolting and nut material requirements for pressure retaining parts.
Structural steel shall conform to ASTM.
Specification for bolts for galvanized structural steel.

8.1.1 Refers to "the pressure design code" in lieu of the ASME Code.

8.1.4 Substituted: "Galvanizing of structural steel shall be in accordance with ISO 1459 and ISO 1461."

8.1.5 Added: "Galvanized materials or zinc-containing paints etc , should not be used on or directly above exposed austenitic stainless steel or high nickel alloy pressure components."

8.2.1 & 8.2.4 Refer to "the pressure design code" in lieu of ASME

8.2.5 Added: "If the header material is solid stainless steel, precautions should be taken to avoid galling between the plugs and the plug sheet."

8.3.1 Substituted: "Louver blade pivot pins shall be austenitic stainless steel..."

8.4.6 Substituted: "...160 HB for austenitic stainless steel and austenitic/ferritic (duplex) stainless steel."

9.1.1.1 Refers to "the pressure design code"

9.1.1.4 Added: "enclosed spaces between any welded attachment and the headers shall be vented by a 3 mm (1/8 inch) diameter drilled hole.

9.1.3 Deleted: Paragraph 8.1.3.1 of previous edition dealing with temperature limit and allowance.

9.1.3.1 Substituted: "Removable cover plate flanges and removable bonnet header flanges shall be installed with full penetration welds." Previously had a 500 deg F limitation.

9.4.3 Substituted: "Plug gasket contact surfaces shall be machined to a finish of average roughness between 3,2 um and 6,3 um (125 micro-inches and 250 micro-inches)."

10.2 Individual review of this paragraph should be done because of the numerous changes in the contents. References to ASME were deleted and references to P numbers was deleted from the previous edition. The requirement for testing tubes with eddy current or hydrotest was deleted.

10.2.8 Substituted: "Weld hardness testing shall be as follows: ..."

10.3 Requirements for the temperature of the hydrotest water were deleted from the previous edition.

10.5.1 Substituted: "An austenitic stainless steel nameplate shall be affixed to the inlet header of each tube bundle indicating the item number, marks required by the pressure design code and any other information specified by the purchaser."

11.2 References to SSPC Volume 2, Chapter 10 were deleted from the previous edition.

12.2.5 Substituted: "Nozzle connection to headers shall be made with full-penetration welds." All references to ASME were deleted.

12.3 References to ASME were deleted.

12.3.7 Substituted: "Ultrasonic examination shall be performed on all weld repairs after postweld heat treatment." The explanation in the previous edition was deleted.

12.3.13 Added: "Nondestructive examinations and acceptance criteria shall comply with the pressure design code."