

## **API – 661 (6<sup>th</sup>) ISO 13706 (Second) – Summary of Changes**

API 4.1 Deleted the use of the triangular bullet to indicate that the detail is included on the data sheet.

API 5.4 Deleted the requirement to provide tube to tube sheet procedures in the proposal.

ISO 5.8 Added that the design point is to be marked on the fan curve.

API 5.11 Deleted the requirement to notify purchaser of conflicts with purpose and operation.

ISO 6.1.1 q) Added requirement that Plug torque values with recommended thread lubrication to be added to approvals.

ISO 6.1.4 Added requirement that Tube to tubesheet welding procedures and qualifications be approved.

ISO 6.2.1 Changed the length that documents are to be held to 10 years.

ISO 6.2.2 Added non-destructive testing records to final records.

API 7.1.3.1 Deleted note that the maximum design temperature is to be at least 50 deg F greater than process fluid inlet. (Purchaser to specify maximum design temperature).

API 7.1.3.1 Deleted note that the maximum design pressure is to be the greater of the inlet pressure plus 10% or inlet pressure plus 25 psi. (Purchaser to specify maximum design pressure).

ISO 7.1.6.1.3 Added that some of the stresses are additive and tube joint efficiency shall be considered.

API 7.1.6.1.3 b) and c) Deleted stresses caused by lateral header movement and deleted note about set-in versus set-on nozzles.

API 7.1.6.3.1 Deleted minimum requirement of 2" thread depth. (Full depth of plug sheet required).

ISO 7.1.6.3.2 Increased the requirement of the nominal thread diameter of the plug holes to the outside diameter of the tube plus at least 1/32" to at least 1/8".

API 7.1.9.2 Deleted requirement that 1/2 NPS pipe size not be used and added less than 3/4 NPS will not be used.

API 7.1.11.13 Changed wording to indicate that elliptical tubes shall not be used without purchasers approval.

API 7.2.1.2 Deleted all but first sentence, ie information relating to methods of control.

ISO 7.2.3.3 Added definition of bundle face as nominal width multiplied by nominal tube length. Added 3 ft minimum fan diameter.

API 7.2.3.15 Deleted the limits on the temperature for the fans. Deleted note on variable pitch.

API 7.2.3.16 Deleted this paragraph and Table 8 on maximum exposure.

ISO 7.2.3.16 Added new paragraph discussing additional pressure drop associated with insect screens and lint screen and hail screens.

API 7.2.7.4 Deleted the paragraph on steam turbine drives.

API 7.2.8.3.3 Deleted the paragraph on steam turbine drives.

ISO 7.2.10.1 Added requirement that 7.2.10 applies to both parallel and opposed action louvers.

ISO 7.2.11 Added paragraph 7.2.11.2 Insect/lint screens ( mesh size number 8 ) and paragraph 7.2.11.2 Hail screens ( mesh size number 8 ).

API 7.3.2.4 Deleted this paragraph. This deleted the requirement that the effective vibration velocity measured on the bearings perpendicular to the fan shaft centerline, shall not exceed 1/4 in/s up to 1/8 in/s.

ISO 7.3.3.8 Changed the design basis from Uniform Building Code to ICC International Building Code.

ISO 7.3.4.6 Changed (0.08) to (0.075) but 14 guage USS remained the same.

API 7.3.5.2 Deleted the requirement that maintenance platforms extend 2 ft on all side of drive and drive system. Deleted the limit that the platform can not extend beyond the bay.

API 7.3.6.6 This paragraph was included as part of ISO 7.3.6.4.

ISO 8.1.5 Added requirment that alternative coatings and/or materials shall be used. ( reference the use of galvanized materials or zinc-containing paints in contact with or above austenitic stainless steel.

API 8.2.2 Deleted the use of suitable alloy for carbon steel stiffeners or partitions.

ISO 8.4.6 Changed from Brinell hardness no greater than 120 HB for carbon steel and 160 HB for austenitic to Rockwell hardness no greater than HRB 68 and HRB 82. Deleted the reference to austenitic/ferritic (duplex) stainless steel.

ISO 9.1.1.2 Paragraph was revised to read: All pressure containing header welds shall have full penetration and full fusion. These welds shall also be double-side welds except end plate and nozzle welds.

ISO 9.1.2.1 Paragraph was revised to read: Partition plates shall be seal-welded to abutting tubesheet and plugsheet plates and shall be welded from both sides; a full penetration weld joint preparation shall be used. Seal welds on the ends of internal pass partitions plates are excluded from this requirement.

ISO 9.1.2.2 Paragraph was revised to read: If partition plates are also used as stiffeners, a full-penetration configuration shall be used and weld joint efficiencies shall be in accordance with the pressure design code.

ISO 9.3.1.2 Paragraph was revised to read and the bullet indicating that it is a purchaser decision was removed: If austenitic stainless steel, duplex stainless steel, titanium, copper-nickel or nickel alloy tubes are specified, the tube holes shall be machined in accordance with Table 11, "Special close fit".

ISO 9.4.3 Roughness for the gasket surfaces was revised to be between 0.8um and 1.6um (32 uin and 64 uin). Reference to 125 micro-inches and 250 micro-inches was deleted. Note that Table A.4 on page 47 was not revised.

API 10.1 General was deleted.

ISO 10.1.7 b) Hardness testing is by Rockwell only, the use of Vickers was deleted. Added requirement that the test machine shall be capable of measuring the hardest point in the heat-affected zone.

ISO 10.1.7 d) Revised such that hardness is not to exceed 20 HRC rather than 225 HB and 22HRC rather than 240 HB.

ISO 10.2.3 Revised the parts per million by mass to parts per million by weight. Also added: Upon completion of the hydrostatic test, the equipment shall be promptly drained.

ISO 10.2.6 Added that additional requirements for equipment drying or preservation shall be performed if specified by the purchaser.

ISO 10.4 Equipment performance testing was added. If a performance test is specified, e.g. to check the guaranteed performance of the exchanger unit, it shall be in accordance with ASME PTC 30 or other standard if agreed by the purchaser.

API 12.2.1 The paragraph on alternative plug header construction was deleted.

API 12.2.4 The paragraph on recessed type tube to tubesheet welds was deleted.

API 12.3.3 and 12.3.4 Paragraphs were deleted and ISO 12.3.3 was added; All welds shall be either ultrasonically or radiographically examined.

ISO A.1.1 Added definition of fin selection temperature as the interface temperature between the liner tube and the fin at maximum operating conditions and that the maximum process temperature is a good approximation.

ISO Table A.1 Added in the Note that the manufacture shall be consulted.

ISO A.6 Added the requirement for grease displacement, that it should be achieved either by the bearing design or by fitting an external relief device.

API B.1 Checklist. Deleted clauses 9.3.1.2, 9.4.4 and 10.1.1 and ISO added clause 9.3.4.1 concerning seal weld and strength weld.

ISO B.1 Checklist. Clause 10.2.6 added: or additional requirements for drying.

Please note, these are observations and interpretations only by members of our engineering department and are presented only as a courtesy service to our readers. If there are questions arising from any of these points, please contact API directly at [www.api.org](http://www.api.org).