



# ENGINEERING STANDARDS

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- 760.0 EQUIPMENT - VESSELS, TANKS, BINS
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  - American Society of Mechanical Engineers (ASME)
    - Section II
    - Section VIII
  - American Welding Society (AWS)
  - American Petroleum Institute (API)
    - 6A - Wellhead Equipment
    - 620 - Low Pressure Storage Tanks
  - American Iron and Steel Institute
    - 304
  - American National Standards Institute
    - A58
    - B16.5
  - American Society of Testing and Materials
    - A53                    A204
    - A106                  A516
    - A193                  A285
    - A194                  A335
    - A515                  A387
    - A105

NOTE: Latest editions apply to all of the above.



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762.0 EQUIPMENT AND/OR MATERIAL SPECIFICATIONS

All materials to be used in the fabrication of vessels shall be new material free from defects other than those permissible under ASTM specifications (latest editions) for the type of material under consideration.

762.1 Plate material shall be pressure vessel quality selected for service, temperature and pressure conditions. For carbon steel and low alloy vessels in moderate and low temperature service ASTM A516 plate material is preferred and in intermediate and higher temperature service ASTM A515 plate material is preferred. Above 800°F (427°C) use A387 plate material unless otherwise specified.

762.2 Pipe for vessel shells or built-up nozzle necks under 20 inches (50.8 cm) in diameter shall be seamless. For carbon-steel sections, use ASTM A53 or A106 Gr. A or B for shells and Gr. B for nozzles. For carbon-moly sections, use ASTM A335, Gr. P1. For 1/2 Cr. 1/2 Mo. sections, use ASTM A335, Gr. P2.

Pipe with the following nominal diameters shall not be used unless specified on Design Data Sheets: 1-1/4 in. (3.175 cm), 2-1/2 in. (6.35 cm), 3-1/2 in. (8.89 cm) or 5 in. (12.7 cm).

762.3 All external bolting material shall be as follows: Stud bolts conforming to ASTM A193, Gr. B7, tempered at 1100°F (593°C) shall be used for design metal temperatures up to 900°F (482°C). Stud bolts conforming to ASTM A193, Gr. B16, tempered at 1200°F (649°C) shall be used for design metal temperatures between 900°F (482°C) and 1100°F (593°C). For the above temperatures, the nuts shall conform to ASTM A194, Gr. 2H.

Internal bolting for corrosive services shall conform to ASTM A193, Gr. B5 and B6. When high temperature strength is also required, bolting material conforming to ASTM A193, Gr. B8, 8C or 8T shall be used. The nut material shall be selected from ASTM A194 and shall be comparable material to the bolt stud.

762.4 Stud bolts shall have full continuous threads and be long enough to extend 1/4 in. (.635 cm) beyond each nut. All alloy steel bolting shall be threaded in accordance with ANSI B31.1. Lubricate threads with a mixture of graphite and oil or if high temperature service, a similar suitable lubricant before assembly.

Thread fits for stud bolts shall be Class 2 except when used in tapped openings, where Class 3 fit shall be used.

Hexagonal-head standard machine bolts with hexagonal nuts are permissible for fastening bolted manway covers, or other internal nonpressure-resisting parts.



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## 762.5 Gaskets

Gaskets for raised or flat-face pressure connections, handholes, manways, and end flanges shall be 1/16 in. (.159 cm) thick commercial compressed asbestos for pressures 225 psig and below, and/or temperatures 250°F and below. Above 250°F and/or 225 psig (15.8 kg/cm<sup>2</sup>) they shall be flexitallic type CG or equal. Spiral wound gaskets shall be used for all temperatures for propane and lighter service and for hydrogen service.

## 762.6 Ring Joint Gaskets

For ring joint flange connections on carbon steel vessels and sections, use octagonal shaped rings conforming to ANSI B16.2 or API 6B. Material shall be soft iron or low carbon steel with a maximum Brinell hardness of 110.

## 762.7 Gaskets for Non-Pressure Connections

762.7.1 Gaskets for internal non-pressure piping shall be 1/16 inch (.159 cm) thick commercial compressed asbestos for temperature 650°F and below. Above 650°F, they shall be flexitallic type CG or equal.

762.7.2 Bolts and gaskets shall be furnished by the manufacturer for manways, cover plates, and all other permanently bolted parts.

762.7.3 Flanges, bolts, nuts, and gaskets to be used in service shall not be used in testing any vessel.

762.7.4 Ten percent spare bolts and 100 percent spare gaskets shall be furnished by the vessel fabricator for manways, cover plates, and all permanently bolted parts.

## 762.8 Materials (Special)

### 762.8.1 Caustic Service

Vessels shall be stress relieved to resist caustic embrittlement as shown on the embrittlement curve below.

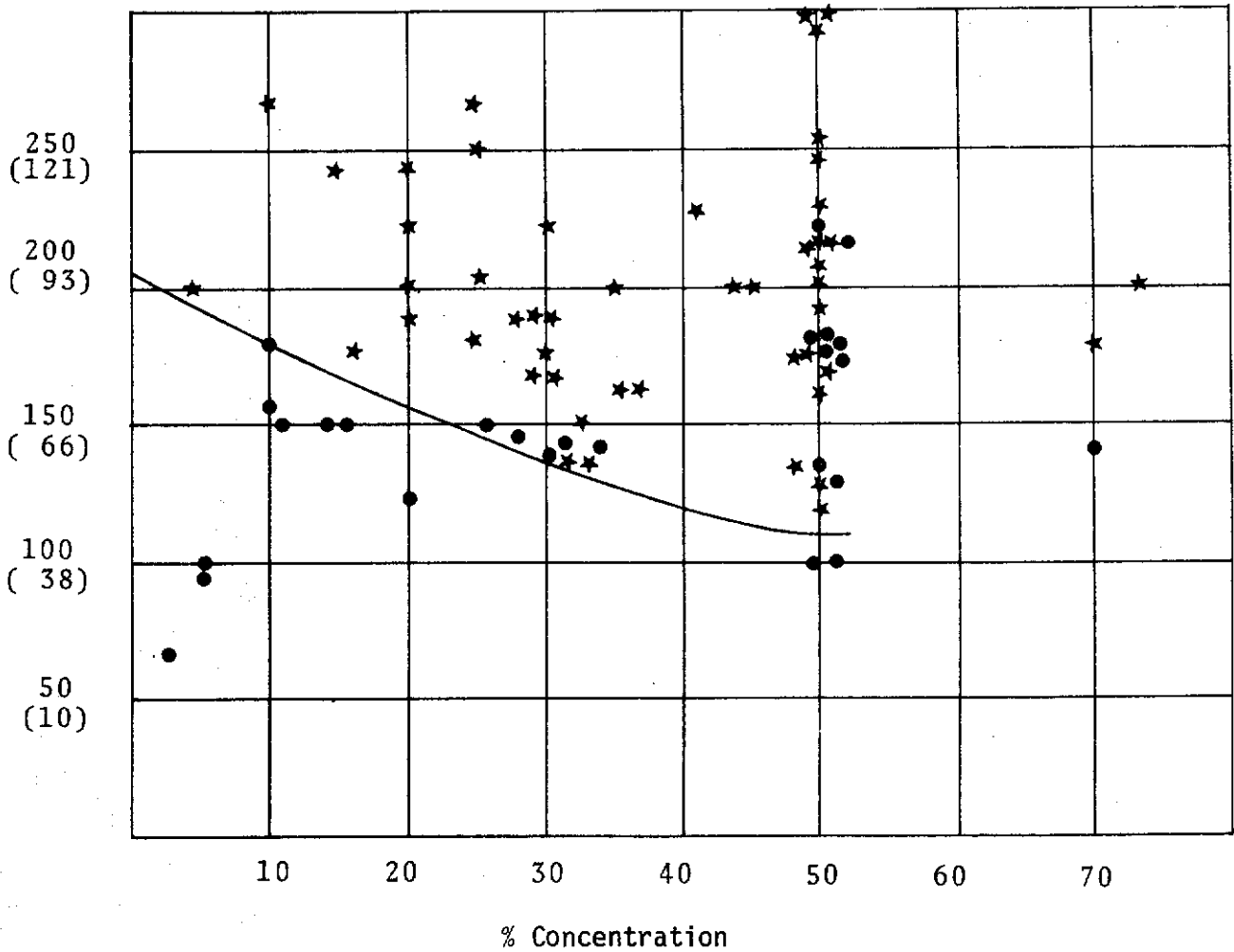


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● No Failure  
★ Failure

RELATION OF TEMPERATURE AND CONCENTRATION OF  $\text{NaOH}$  TO CAUSE CRACKING

Note: Stress relieve all vessels when the percentage of caustic concentration and temperature coverage is above curve.

Taken from Nace Publication 51-3  
(Modified)



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## 762.8.2 Alloy and Clad Steels

- a. The extent of the alloy protective lining shall be indicated on the vessel drawing.
- b. The lining for manhole and nozzle necks, manhole cover plates and similar components shall be the same as that used for the shell.
- c. The corrosion resistant cladding in integrally clad vessels may constitute the full corrosion allowance, but the thickness of such cladding shall not be used in strength calculations.
- d. Unless indicated otherwise on the Vessel Drawings, the thickness of applied liners shall be 5/64" (2 mm) and the thickness of alloy cladding on clad steels shall approximate 5/64" (2 mm) as closely as standard mill practices will permit. In special cases, greater thicknesses will be specified on Vessel Drawings.



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763.0 DESIGN CRITERIA

The design criteria is a general intent to permit the fabricator as much latitude in the selection of materials and standard procedures as much as possible to be consistent with safe economical construction. However, the requirements of the code shall govern the choice of materials and most fabricating procedures. In addition, the following specifications shall be complied with unless exceptions are made within code requirements.

763.1 Design Pressure

763.1.1 Vessels with relief valves shall be designed in accordance with the following tables:

VESSEL PRESSURE - psig (kg/sq. cm)

<u>Max. Operating Pressure</u>	<u>Design Pressure</u>
0 - 25 (0 - 1.76)	50 (3.51)
26 - 50 (1.83 - 3.51)	75 (5.27)
51 - 75 (3.59 - 5.27)	100 (7.03)
76 - 250 (5.34 - 17.6)	M.O.P. + 25 psi (1.76)
251 - 500 (17.6 - 35.2)	M.O.P. + 10 percent
501 - 1000 (35.2 - 70.3)	M.O.P. + 50 psi (3.51)

In no instance shall a vessel be designed for less than 50 psi (3.51 kg/sq. cm).

763.1.2 Vessels with internal trays with relief valves and/or blowdowns should be designed so the vapor velocity across the column trays does not exceed the design. This will eliminate the possibility of tray damage. If large system volumes lead to unacceptable blowdown times, multiple blowdowns should be used. In marginal cases, trays will generally withstand vapor velocities of 10% over design, but detailed review of the tray strength is necessary at higher rates.

763.1.3 The above design pressure shall also include any increased effects due to operating liquid, heads, etc. in sections so affected.

763.1.4 Vessels operating under external pressure only shall be designed for an external pressure of not less than 15 psi (1 kg/sq cm) vessels subject to operation under both internal and external pressure must be checked for the maximum external pressure conditions.

763.1.5 The fabricator shall calculate and supply Purchaser with maximum allowable vacuum that the vessel may be subjected to without danger of collapsing. This information shall also be stamped on the nameplate.



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### 763.2 Design Temperature

763.2.1 Vessels which will operate at temperature between 32°F (0°C) and 750°F (400°C) shall be designed for a temperature at least 25°F (15°C) above the maximum anticipated operating temperature.

763.2.2 Vessels which will operate at temperature above 750°F (400°C) shall be designed for a temperature equal to the maximum anticipated operating temperature.

763.2.3 Vessels which will operate at temperatures 32°F (0°C) and below shall normally be designed for the minimum anticipated operating temperature.

763.2.4 When different metal temperatures can definitely be predicted to occur for different zones of a vessel during operation, these different temperatures may be taken into account in the design of the zones affected. In this case the design temperatures and zones must be clearly defined on the nameplate as well as on drawings.

### 763.3 Corrosion Allowance

763.3.1 The corrosion allowance for all carbon steel vessels shall be 1/16 inch (.16 cm) unless otherwise noted on the Vessel Data Sheets. This corrosion allowance shall also be added to one side of all removable and non-removable carbon steel internal parts. Vessels containing corrosive products shall have the applicable corrosion allowance shown on the Vessel Data Sheets.

763.3.2 A corrosion allowance shall be added to the calculated thickness consistent with the design service conditions.

763.3.3 No corrosion allowance need be made for vessels in services where corrosion is negligible or will not occur, unless required by the specified Code.

763.3.4 For vessels in services for which severe corrosion can be predicted corrosion resistant alloy linings may be considered in the design. When alloy linings are employed, no corrosion allowance need be made in the thickness of the base metal.

763.3.5 The specified corrosion allowance shall be added to all pressure containing parts of the vessel coming in contact with the service fluid including shell, heads, nozzles, manholes and manhole covers.

763.3.6 For compartment type vessels, the specified corrosion allowance shall be added to each side of the internal head or partition.

763.3.7 Welded-in non-pressure internal components shall be designed to include the corrosion allowance on one side only.





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763.3.8 Stainless steel vessels shall be examined for corrosion allowance on a case by case basis.

763.4 Wind Loads

All vertical vessels and stacks shall be designed to be self supporting. The design wind load shall be based on a wind velocity of 100 mph (163 km/hr.) acting on the projected area measured over the insulation and subject to ANSI A58.1 height factors modified as follows:

<u>Height</u>	<u>Factor</u>
Below 50 ft. (15.2 m)	1.00
50 ft. to 99 ft. (15.2 m to 30.2 m)	1.20
100 ft. to 199 ft. (30.5 m to 60.7 m)	1.40
200 ft. to 299 ft. (61 m to 91.1 m)	1.50

Design wind loads shall include adequate allowances for ladders, platforms, and other appurtenances, overhead lines, supported by the vessel, plus any other loads effecting the ultimate stability of the vessel. Maximum deflection for a vertical vessel of any height shall not exceed good design practice.

763.5 Combined Loads

See the structural Section 200.

763.6 Shells

The minimum thickness for shells, excluding corrosion allowance shall be 1/4 inch (.635 cm).

763.7 Trays

763.7.1 The general design, number, type and spacing of internals will be established on the Vessel Drawings.

763.7.2 Generally, trays shall be of the removable plate type, each removable section being dimensioned to permit passage through vessel manholes.

763.7.3 Where no other means of access is provided, trays shall be provided with removable hatchways which form a component part of the trays. The removable plates shall be supported on all edges by a framed system of beams of the same material as the plates and by rings attached to the shell. These hatchways shall be in vertical alignment, if possible. Minimum size of hatchway shall be 20" x 24" (50.8 cm x 61 cm) nominal.



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- 763.7.4 Removable trays and removable tray sections shall be attached to support bars and beams by means of bolts or clamps. Tray joints shall be gasketed on the underside of the tray to prevent leakage, as specified on Vessel Drawing. Gaskets shall be furnished by tray fabricator.
- 763.7.5 All hatchways shall be designed to permit assembly or disassembly from the top or bottom side of the tray.
- 763.7.6 All tray and component parts shall be so designed that they may be installed in a vessel with a maximum out of roundness of 1% of the vessel diameter.
- 763.7.7 Maximum tray deflection shall not exceed 1/8 inch (.318 cm) when operating with a uniform load of 20 lbs. per square foot (97.6 kg/sq. m) of tray area. Trays shall also support a 200 lb. (90.7 kg) concentrated load in corroded state when not operating.
- 763.7.8 The minimum fabrication thickness of trays and internals shall be as follows unless otherwise specified:

	<u>Trays</u>	<u>Carbon Steel</u>	<u>Alloy</u>
Tray plates		#10 USS Gauge	#14 Gauge*
Welded in Downflows & D.O. Pans		#10 USS Gauge	#12 Gauge
Drawoff Pipes & Removable Downflow		#10 USS Gauge	#14 Gauge*
Weirs		#10 USS Gauge	#12 Gauge
Weir Supports & Closure Plates		#10 USS Gauge	#14 Gauge*
Bubble Caps		#10 USS Gauge	#16 Gauge
Risers (Fixed)		#12 USS Gauge	#14 Gauge
Risers (Removable)		#12 USS Gauge	#16 Gauge
Supports		To Suit Load	To Suit Load

\*Vessels 6'0" (1.83 m) diameter and less - #12 Gauge over 6'0" (1.83 m) diameter.

- 763.7.9 Bolting material for removable trays and internals shall be in accordance with vessel drawings.

763.8 Heads

Heads shall be either semi-elliptical or flanged and dished depending upon economy and availability. Semi-elliptical heads shall have approximately a 2:1 ratio of major to minor axis. Conical head or heads built up of several pieces shall not be used unless specifically approved by the Purchaser.

763.9 Supports

763.9.1 Skirts

Except where undue stresses occur, all vertical vessels supported by skirts shall have the skirts attached to the underside of the bottom



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head with the centerline of the skirt plate and the centerline of the shell plate coincident.

Skirts shall be designed to withstand the maximum combined stresses due to wind, and dead loads under operating and test conditions. The minimum skirt thickness shall be 1/4 inch (.635 cm) for vessels 48 inches (12.2 cm) or less in nominal diameter and 3/8 inch (9.5 cm) minimum for vessels above 48 inches nominal diameter unless otherwise noted on Vessel Drawings. Skirt materials shall be suitable for the design metal temperature.

All skirts shall be provided with access openings as follows:

<u>Nominal Diameter of Vessel</u>	<u>No. and Size of Access Opening</u>	<u>No. and Size of Vent Openings</u>
Under 20 inches (50.8 cm)	2- 6 in. (15.24 cm) reinforced	2-1 in. (2.54 cm)
20 - 30 inches (50.8 - 76.2 cm)	2- 8 in. (20.32 cm) reinforced	2-2 in. (5.08 cm)
31 in. and Over (78.7 cm)	1-18 in. (45.72 cm) reinforced	2-3 in. (7.62 cm)

All access openings shall be sealed with a 1/4 inch plate (0.6 cm) bolted to the opening with at least four bolts.

Unless otherwise specified on Vessel Data Sheets, all vertical vessel skirts shall be provided with continuous base rings. Where calculations indicate, towers may require conical skirts and/or double base rings. If fire protection of skirts is required, it shall be indicated on the Vessel Data Sheet.

763.9.2 Supports for Horizontal Vessels

Supports for horizontal vessels shall be as specified in the table on Standard 763.9.2 in the Typical and Drawings Section. For vessels exceeding the lengths and diameters covered by the table, special studies shall be made. The minimum anchor bolt shall be 3/4 in. (1.9 cm) in diameter.

763.9.3 Skirt and Base Design for Towers and Vertical Vessels

Skirt and base design for towers and vertical vessels shall be as specified in the table on Standard 763.9.3 in the Typical and Drawings Section.

763.10 External Attachments

763.10.1 External shell attachments such as platform clips, pipe supports, lifting lugs, guide clips, etc. as specified on the Vessel Data Sheets shall be welded to the vessel in the shop before the vessel is stress-relieved in such a manner as not to cover welded pressure joints.

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National  
Iranian Gas  
Company

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- 763.10.2 The Code stamp shall be on a nameplate of /ISI Type 304 stainless steel attached to a bracket welded to the shell or skirt on vertical vessels or to the shell or head on horizontal vessels. The bracket shall extend 1 in. outside shell or insulation. The fabricator's drawings shall show the location of the vessel stamping and the wording thereof.
- 763.10.3 Vendor shall be required to tag and identify each vessel. Specific instructions for identification of the vessel will be furnished by the purchaser to the vendor.
- 763.10.4 Where vessel drawings specifically waive stamping with the code symbol the omission of the stamp shall not be construed to permit any deviation from other Code requirements.
- 763.10.5 The nameplate shall contain the following information:
- Purchase order number.
  - Item number.
  - Shop order number.
  - ASME Code and Code stamp.
  - Design pressure.
  - Test pressure.
  - Design temperature.
  - Maximum allowable vacuum.
  - Date of fabrication.
  - Fabricator's name and place of fabrication.
  - Purchaser's name.
  - Corrosion allowance.
- 763.11 Davits
- If a davit is required, the following standards will be used as guidelines for design. These standards are in the Typical and Drawings Section.
- 763.11.1 Standard 500 lb. (227 kg) Tower Davit
- 763.11.2 Standard 1000 lb. (454 kg) Tower Davit
- 763.11.3 Standard 2000 lb. (907 kg) Tower Davit
- 763.11.4 Horizontal Davit Detail
- 763.11.5 Vertical Davit Detail
- 763.12 Ladders and Platforms
- 763.12.1 Ladders and platforms shall be as specified in Standard 763.12.1 in the Typical and Drawings Section.



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763.13 Internal Shell Attachments

- 763.13.1 Internal shell attachments such as deck support angles, lugs, clips and seats shall be designed to be welded to the vessel shell or head by continuous fillet welds.
- 763.13.2 Welded-in baffles or decks for vessels 4'0" (1.2 m) diameter or larger, shall have integrally flanged edges and shall be welded to the vessel by a continuous fillet weld at the flanged edge. In lieu of flanging the baffle may be bolted to a support bar.
- 763.13.3 Weir plates and reboiler drawoff boxes shall have bolted passageway covers as required for access without ladders.
- Weirs shall be fixed to normal height, unless otherwise specified. Adjustable weirs shall be adjustable for a distance of 1/4 in. (.635 cm) above and below normal weir height.

763.13.4 Vortex breakers shall be provided to meet Typical 763.13.

763.14 External Connections

- 763.14.1 No threaded connections shall be screwed directly into any part of the vessel. The only threaded connections allowed are couplings. Tell-tale holes and permissible stud holes in pad attachments and studded outlets are excepted. Minimum coupling projection outside the vessel shell or head shall be a length equal to the sum of the thread engagement plus the size of the fillet weld plus 1/4 in. (.635 cm).
- If standard dimension couplings are not long enough for this projection, special couplings shall be provided to match the vessel material. Couplings 1-1/2 in. (3.81 cm) nominal diameter and smaller shall be 6000 lb. (2722 kg). Two inch (5.1 cm) and larger connections will be flanged. Hillside connections shall have the minimum projection measured on the short side. Connections smaller than 1/2 in. (1.27 cm) nominal pipe size shall not be used.
- 763.14.2 Pressure and temperature ratings for pipe flanges and flanged fittings shall be in accordance with ANSI Specification B16.5. Nozzles and manways shall conform to the following types:
- Forged flanged welding neck. Taylor forge or equal.
  - Build-up nozzles made of seamless pipe with welding neck flange. (Welding neck bore to match specified pipe.)
  - Built up nozzles made of seamless pipe are permitted for 600 psig (42 kg/sq. cm) service and less. Slip-on flanges are not permitted.
  - Flanges and facings shall be in accordance with the ANSI Standards for the specified service ratings and shall be adequate for the design temperature and pressure stamped on the vessel.



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1. Raised face flanges shall be used for 300 lb. ANSI service rating and less.
2. Raised face flanges shall be used for 400 lb. and 600 lb. ANSI Service Ratings.\*
3. Octagonal ring facing shall be used for all service of 900 lb. ANSI Service Rating and over.

\*600 lb. ANSI flanges for services where the operating temperature exceeds 400°F (204°C) will be RTJ.

- e. Nozzles 10 inches (25.4 cm) in diameter and smaller shall have minimum wall equal to Schedule 80 pipe. Nozzles 12 inch (30.5 cm) and larger shall have a minimum wall of 3/8 inch (.953 cm).
- f. Nozzle necks 20 inches (50.8 cm) in diameter and larger may be of double butt welded rolled plate.
- g. Manholes are to be complete with blind flanges, bolts and gaskets. Davits shall be provided to handle all manhole covers. Manways shall be circular and of 16 inch (40.64 cm) minimum nominal pipe size, unless otherwise specified on Data Sheets or Vessel Drawings. Manhole flanges and blind flanges shall either be ANSI Standard or designed, in accordance with the latest edition, including addenda, of the applicable code. Calculations for special design flanges shall be submitted with the vessel approval drawings. The number of manholes required will be as shown on Vessel Data Sheets.
- h. Handholes shall be of 8 inch (20.3 cm) minimum nominal pipe size unless otherwise noted, and be complete with cover plates, studs and gaskets.
- i. All nozzles and manholes shall be flush with inside of vessel unless otherwise specified.  
  
Nozzles with internal piping shall be provided with internal flange connections, unless otherwise specified. Fabricator shall submit a design for support of internal pipe when such is needed.
- j. Nozzle projection outside the vessel shall be shown on Vessel Data Sheets and Drawings. All flanged connections shall be dimensioned from the centerline of the vessel to the extreme face of the flange on fabrication drawings.
- k. All bolt holes to straddle the vessel centerline unless otherwise specified.
- l. Inspection openings shall be provided as follows:



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## 764.0 INSTALLATION AND/OR CONSTRUCTION

Unfired pressure vessels shall be constructed in accordance with the requirements of the ASME Code for Unfired Pressure Vessels (Section VIII). It shall be understood that the latest edition of the Code is assumed, together with the latest subsequent addenda, applicable case interpretations of the Code and amendments or additions included in these specifications. All vessels in this class shall bear a name-plate properly stamped with the Code Symbol unless otherwise specified on Vessel Data Sheets. Where Vessel Drawings specifically waive stamping with the Code Symbol the omission of the stamp shall not be construed to permit any deviation from other Code requirements.

764.1 Shop Construction (Fabrication)

764.1.1 Welding on pressure vessels shall be in accordance with Subsection "B," Part UW of the ASME Pressure Vessel Code, Section VIII Division I.

764.1.2 Where vessels require more than one shell ring, longitudinal joints shall be staggered to allow at least 60° between longitudinal joints in adjacent sections. Where the orientation of shell connections will not permit this spacing to be maintained, fabricators drawings shall show proposed locations of longitudinal seams for the purchaser's consideration and approval. Openings shall not be placed in weld seams insofar as it is practical and economical.

Longitudinal and circular seams in horizontal vessels must be located so that they will not be covered by the support saddle assembly.

764.1.3 If base rings are made in segments, the segments shall be joined by full-penetration butt welds. Such welds shall be ground substantially flush on both top and bottom sides of the ring and the location of anchor bolt holes shall be such that the holes will not pass thru the welds.

764.1.4 Reinforcing pads shall preferably be made from the same material as that to which they are attached. The minimum width of a reinforcing pad must be 2-1/2 inches (6.35 cm). Pads for nozzles 8 inches (20.32 cm) nominal diameter and less shall have one tell-tale hole, pads for shell connections larger than 8 inches (20.32 cm) nominal diameter shall be provided with two tell-tale holes. Tell-tale holes shall be drilled and tapped for a 1/4 inch (.635 cm) connection. Tell-tale holes shall be located on a circle equal to the mean diameter of the pad. Where two holes are required they shall be spaced at 180°. Pad reinforcement size shall be calculated according to the Code requirement.

Reinforcing pads may also be made in segments joined by full penetration welds. Each segment shall be provided with one tell-tale hole and be tested independently. All tell-tale holes shall be provided



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with steel plugs after the vessel is tested. When the vessel is placed in service the plugs shall be removed, and tell-tale holes shall be filled with grease to prevent corrosion between pad and vessel wall.

764.2 Field Assembly

Vessels which cannot be shipped as a one piece unit are to be fabricated for field erection and tested in accordance with ASME pressure vessel code (latest edition). All components shall be marked and identified to correspond with the manufacturer's field erection drawings.





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## 765.0 TESTS AND/OR INSPECTION

765.1 Testing

765.1.1 All pressure vessels shall be given a hydrostatic test of 1-1/2 times the maximum allowable pressure as defined in latest edition of the ASME Code. All vessels whether shop or field fabricated shall be capable of being filled with water in their erected position. Consideration must be given to metal transition temperature in establishing water temperature for hydrostatic test. If special design makes a hydrostatic test impractical, an alternate test must be performed which is acceptable to the purchaser and in compliance with Code requirements.

765.2 Inspection

All materials and work are subject to inspection by a representative of the purchaser to assure compliance of applicable codes, regulations, and company policies. The representative may waive his right to make a preliminary or final inspection, or both, but such waiver shall not relieve the manufacturer of the responsibility for providing the same shop inspection that would be provided, if a representative of the purchaser was present, to assure that materials being used are as specified and the workmanship is in accordance with the requirements of these specifications and the code under which the vessel is designed.

765.2.1 All welded vessels, regardless of whether or not they are ASME Code stamped, shall be (as a minimum) spot examined by radiographing per the ASME Code for Unfired Pressure Vessels. Sectioning is not permitted. Spot reexamination to this Code shall be made, when required, at the fabricator's expense.

765.2.2 When vessel drawings or supplementary specifications call for magnetic particle or liquid penetrant inspection of welds, this procedure shall be applied to the back-chipped surface of root pass welds before proceeding to weld on the opposite side. The surface of finished welds shall be inspected accordingly after completion of all postweld heat treatment.

765.2.3 When magnetic particle inspection is specified, machining or grinding of the weld surface will not be required other than to remove excessive irregularities which would interfere with proper interpretation of results.

765.2.4 Low alloy vessels which are welded by the submerged arc welding process wherein the alloy is added in the flux, shall have a chemical analysis made of the deposited weld metal for every new batch of flux. Flux fused to the welding shall not be reused, and care shall be taken to assure that it will not become mixed with flux containing correct amounts of alloy.