API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction*

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Section	Edition	Inquiry #	Submitted Inquiry	SCAST Response
1.1	2nd - Dec. 1995	653-I-10/98		For riveted tanks, the rules in the original code of construction should be applied for issues not covered in API 653 (see Section 1.1.5). Otherwise, all of the applicable rules in API 653 apply. Note that the minimum thickness calculation for a riveted tank shell is covered in Section 4.3.4.
1.1.1	3rd - Dec. 2001	653-I-12/03	Is this procedure for both pressure and non-pressure vessels? I don't see a pressure component in the formula.	API 653 only applies to tanks that have been built and placed in service (see 1.1.1). Therefore, the tank will need to comply with all of the requirements of API 650.
1.5	2nd - Dec. 1995	653-I-04/99	Does API 653 require contractors performing repairs to have a API 653 certified inspector employed with them, and if so, where can this be found in the standard?	No. The API 653 certified inspector need not be an employee if the contractor meets the requirements of Section 1.5.4.
3.19.c	Ed 4, Ad 2	653-2013-F4	Is the removal and re-installation of existing shell plate beneath the liquid level defined as a major alteration/major repair when the re-installed plate is longer than 12 inches (such as a doorsheet) and all the weld spacing requirements of API 653 are satisfied?	Yes, but also refer to 12.3.2 and 12.3.2.3.8 for other provisions relevant to doorsheets.
4.2.4	2nd - Dec. 1995	653-I-10/00	Shall the design requirements of the latest edition of API 650 be considered for tanks that will have their operating temperature increased above 200°F.	Yes. See Sections 1.1.5 and 4.2.4.3.
4.2.4	2nd - Dec. 1995	653-I-03/01	1: An existing tank greater than 100 ft. in diameter with a lap-welded bottom is currently in heated service (>200ºF). This tank is removed from service for a routine internal inspection. Does this tank have to be retrofitted with an annular ring per API 650, Section M.4? 2: An existing tank greater than 100 ft. in diameter with a lap-welded bottom is being changed to heated service. Does API 653, 4.3.3.4 require this tank to be retrofitted with an annular ring per API 650, M.4.1? Or is it acceptable to evaluate the tank per M.4.2 to determine if stresses, minimum fill height, and fill/empty cycles will be acceptable with the existing lap welded bottom?	1: Yes. See Sections 1.1.5 and 4.2.4.3. 2: Yes. See Sections 1.1.5 and 4.2.4.3.

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4.3	2nd - Dec. 1995		Referring to API 653, if the corroded thickness in a bottom course is below the minimum thickness allowed per Section 4.3, must the corroded portion of the bottom course be removed and replaced by a new plate?	Yes, unless a patch plate repair is provided in accordance with Section 9.3. All requirements of Section 9.3 must be met, including obtaining the owner approval and complying with the 1/2 in. limit on shell plate thickness.
4.3	1st - Jan. 1991		What information is required to determine the fill height according to API 653?	Refer to API 653, Section 4.3.3.1 and 4.3.3.2.
4.3.2.1	2nd - Dec. 1995		How do you classify "corroded areas of considerable size" -- Section 4.3.2.1? Is there a size limit for this corroded area? If so, what are these limits? If not, why not?	It is not specifically defined, but an area larger than that defined in 4.3.2.2 would be considered a corroded area of considerable size.
4.3.3	1st - Jan. 1991		Will the evaluation of the calculations require a certified API 653 inspector?	No. Refer to the top of Section 4.3.1.2.
4.3.3	2nd - Dec. 1995		Does the criteria to settle the minimum thickness (t_{min} -- Section 4.3.3) calculation for welded tank shell apply only for a local corroded area? If so, what are the limits for this local area? Can that criteria be applied when there is a uniform corroded area along all the tank course? In this particular case, would t_1 be equal to t_2?	It is a general limit that applies either to a locally corroded area or to a uniformly corroded area.
4.3.3	2nd - Dec. 1995	653-I-09/00	1: When evaluating the retirement thickness in a corroded plate away from welds at a distance of at least the greater of one inch or twice the plate thickness, is the value of E=1.0 to be used? 2: If the value of E for an existing tank is less than 1.0, should this value for E be used in calculating the minimum required thickness of the tank?	1: Yes. 2: Yes.
4.3.3.1	2nd - Dec. 1995	653-I-22/98	Did API intend to reduce the operating height of tanks when the formula in 4.3.3.1 was changed to eliminate the term "H-1" and replace it with the term "H"?	No. The intent was to require the minimum required thickness of a locally corroded area of the tank shell be based on the actual height of liquid above the corroded area. The retirement thickness of a shell course was to be based on the one-foot method as described in API 650.

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4.3.4.1	2nd - Dec. 1995	653-I-01/07	SECTION 4. 4.3.4.1 Joint efficiencies for riveted tank shells; E = 1.0 for shell plate 6 in. or more away from rivets. QUESTION: How do I have to interpret this? Is the figure below correct?, if so, how many rivet rows do this joint to have for E = 1.	No. Six inches applies to outermost rivet away from the joint
4.4.1	1st - Jan. 1991		Does API 653 permit the use of leak detection procedures to justify extending inspection intervals beyond that determined by corrosion rates?	No. API 653, Section 4.4.1, does require periodic assessment of tank bottom integrity that could use leak detection data to shorten the inspection data.
4.4.5	2nd - Dec. 1995	653-I-07/97	Does the definition of RPB (see API 653, Section 4.4.5, or API 650, Appendix I, Section 1.1, Note 1) include a thin or reinforced thick film lining applied to the topside of a tank bottom in conformance to API RP 652?	No. The intent is that the RPB be positioned outside the tank for the purpose of preventing the escape of contaminated material and channeling released material for leak detection. An internal lining would not satisfy this purpose.
4.4.5.1	Ed 5	653-2015-F2	To determine the topside corrosion rate (StPr) discussed in 4.4.5.1, does API 653 require thickness change to be based on data pairs (i.e. start and end of a period of time) which are known to be at the same location?	No.
4.4.7.1	2nd - Dec. 1995	653-I-04/00	Does API 653 require that tank bottom expected service life calculations for a bottom, that has been repaired with patch plates fillet-welded over areas of underside pitting, be based on the corrosion rate (UP_r) of the repaired areas or the unrepaired areas?	Refer to API 653, Section 4.4.7.1. The last paragraph in the "Note" in this paragraph requires the use of the corrosion rate of the corroded area be used, unless the cause of the corrosion is removed in which case the corrosion rate of the unrepaired area can be used.

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4.4.8	3rd - Dec. 2001	653-I-09/03	Background: This inquiry addresses the technical correctness of the note to Table 4-4 of API 653. The effect of compaction just inside the ring-well does not produce stress levels of ignorance because the annular plate can bridge over a hollow band of settlement. Bending stresses at the edge of the ring-wall become significant when the fill inside the ring-wall permits a large width (too extensive to bridge) or the whole floor to dish and settle below the level of the ring-wall. Question: Does the committee consider the Note to Table 4-4 is misleading about what happens in this most critical area of a tanks structure and if not then why not?	No. Due to limited committee resources, API cannot respond to questions seeking the rationale for requirements in its standards. These requirements are based upon consideration of technical data and the judgment and skill of experienced engineering and technical personnel representing both users and manufacturers who serve on the standards-writing committees.
6	2nd - Dec. 1995		Does API 653 require that the authorized inspector be physically present at the inspection site and have 1st-hand knowledge of all aspects of the tank inspection?	Yes, refer to Section 6.3.2.1 and 6.4.1.2, concerning the periodic external and internal inspections. However, the authorized inspector is not required to be present for the routine in-service inspections required in Section 6.3.1.1.
6.2	2nd - Dec. 1995		Does API 653 specify the time frame for leak detection between internal inspections?	No.
6.3	3rd - Dec. 2001	653-I-02/03	Referring to Sections 6.3 and 6.4, can risk based inspection (RBI) be applied to determine the external inspection interval of a tank?	No. RBI can be applied to internal inspection intervals only.
6.3	3rd - Dec. 2001	653-I-09/03	Can risk based inspection (RBI) be applied to determine the external inspection interval of a tank?	No. RBI can be applied to internal inspection intervals only.
6.3.1.2	2nd - Dec. 1995	653-I-08/01	Does API 653 provide for extending the intervals for routine in-service inspections for tanks designed and constructed to API 650 when in services such as water or plastic pellet storage?	No. See 6.3.1.2.
6.3.2	2nd - Dec. 1995	653-I-24/98	Does API 653 require the insulation covering flanges to be removed for periodic inspections?	No, unless sings of leakage or damage are evident..
6.3.2	2nd - Dec. 1995	653-I-12/99	Does API 653, Section 6.3.2, indicate when the 5-year external inspection interval is to be measured from, e.g. the date last inspected, the date on the last inspection report, or the date put back in service?	The inspection interval is to be measured from the date of the last inspection. See API 653, Section 6.3.2.1.
6.3.3	1st - Jan. 1991		Does API 653, Section 6.3.3 require ultrasonic thickness readings on the tank shell?	No. UT examination is permitted but not required for the external inspection.

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6.3.3	2nd - Dec. 1995	653-I-08/97	Referring to API 653, Section 6.3, does this Section, including Section 6.3.3, ever require an internal ultrasonic examination of the tank bottom?	No. This section is addressing external inspection while the tank is in service, and therefore, would not require examination of the tank bottom. However, particular observations may suggest that the tank bottom be examined, such as for signs of internal shell corrosion near the tank bottom.
6.3.3.3	2nd - Dec. 1995		If the internal inspection is used as a substitute for the external ultrasonic thickness measurements (per 6.3.3.3), are ultrasonic thickness readings required during the internal inspection?	No.
6.4.2	3rd - Dec. 2001	653-I-03/02	Referring to API 653, Sections 6.4.2.2 (last sentence) and 6.4.3 (5th sentence), do they mean together that the inspection interval shall not exceed 20 years unless an RBI assessment is performed to support an extension?	Yes.
6.4.2.2	2nd - Dec. 1995	653-I-08/97	Referring to API 653, Section 6.4.2.2, when corrosion rates are not known, 1) must an inspection be performed within ten years after a tank has been put into service?, and 2) is it acceptable to perform the inspection in the ninth year of operation?	1: The inspection must be performed within 10 years of operation, with the starting date for the ten-year period determined by when the requirements of API 653 are 1st applied, either by jurisdiction or by user policy. 2: The inspection can be performed at any time within the ten-year period, with the next ten-year period beginning at that time.
7.3.1	2nd - Dec. 1995	653-I-14/98	Does API 653 permit the welding of electrical conduit supports (unistruts) to be welded onto the projection of bottom plates outside the shell of tanks built to API 650?	Section 5 of API 653 defers this issue to API 650, which requires that the material comply with Section 2. The welding and NDE should comply with API 650, Section 5.2.3.5
8.2	2nd - Dec. 1995		Referring to API 653, Section 8.2 and 8.3, when inserting a new shell course into an existing tank shell, is the weld joining the new course to the course above considered as a "new weld joint" or an "existing weld joint?"	The process of inserting a new course into an existing tank is an alteration, not a reconstruction, which makes Section 7 applicable, but not Section 8. Refer to Section 9.2.3.2, which indicates that the original code of construction may be followed for such work.

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8.4.2	2nd - Dec. 1995	653-I-06/99	There is a difference in the formulas (dropping the "1" from the API 653 formula in Section 4.3.3.1), is it the intent of API 653 that the API 650 formula with an "E", added for the joint efficiency, be used when a reconstructed tank is involved? $t_d = \frac{2.6\,D\,(H-1)\,G}{S_d\,E} + CA$	Yes
8.4.2	2nd - Dec. 1995	653-I-06/99	Is it the intent of API 653 that the following API 650 formula for the hydrostatic test height be used when a reconstructed tank is involved? $H_t = \frac{S_d\ E\ t_{\min}}{2.6\ D} + 1$	Yes.
9.1	2nd - Dec. 1995		Is there ever a condition when the new bottom would not extend beyond the shell plates?	No.
9.1	2nd - Dec. 1995		Does API 653 permit the installation of single-corrugation bell-shaped bottom plates that would serve as expansion joints? The corrugation size would be approximately 4 inches high by 14 inches wide.	No. API 653 is based on configurations specifically conforming to API 650 except where stated otherwise, or where existing details are not covered by API 650. Refer to Section 1.1.5 and 9.1.1 of API 653. The proposed detail may or may not provide a "level of integrity" equal to the current 650 rules. API 650 is based on bottoms that are flat, resting on foundations that provide adequate friction that keep the tensile stress due to shell expansion to an insignificantly low value.

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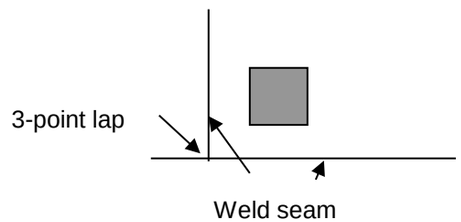
9.1	2nd - Dec. 1995	653-I-01/00	Referring to API 653, Figure 9-5 and Section 9.10, Can a patch be placed near a three-point seam as shown below? Illustration: A 12 in. square bottom patch plate located 2 in. min from weld seams -  	Yes, unless the patch plate covers the 3-point lap. See Note 5 in Fig. 9-5.
9.1	2nd - Dec. 1995	653-I-03/00	1: Does an authorized inspector have to be on site during reconstruction, repairs and alterations?	1: No, but the authorized inspector is required to be on the site for the external and internal inspections required by Section 4 of API 653.
9.1	3rd - Dec. 2001	653-I-08/04	Does API 653 specify inspection hold point(s) during tank repair and/or alteration when the authorized inspector is required to approve the work?	No. The standard does not specify required inspection hold points, but leaves this to the discretion of the authorized inspector. Refer to 9.1.3.
9.1.1, Fig. 9.13	Ed 4, Ad 2	653-2013-F2	Do all the spacing limitations of Figure 9.13 apply when the bottom seams are lap welded?	Yes, the limitations apply to all bottom lap welds per 9.10.3.1. Figure 9.13, Note 6 affirms that the limitations also apply to butt-welded bottoms.
9.2	2nd - Dec. 1995	653-I-02/98	Referring to API 653, Section 12.1.2.5, does the weld between the insert plate and the shell plate have to be fully or partially radiographed if a new nozzle has been installed in a new insert plate that complies with Section 9.2. and 12.2?	Yes.

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9.2	3rd - Dec. 2001	653-I-10/03	When cutting door sheets into butt welded tank shells, do the new vertical seams of the door sheet need to be offset if it goes from one course to another?	The new vertical weld joints in butt welded tanks must be offset as stated in 9.2.2.2 and API 650, Section 3.1.5.2b.
9.2.1	3rd - Dec. 2001	653-I-04/03	Can a shell course in an existing tank that is 2.4 m wide be replaced with two 1.2 m shell courses?	Yes. API 653 only requires that replacement shell plates be 300 mm (12 in.) wide; see 9.2.2.1.
9.2.2.1, Fig. 9.1	Ed 4, Ad 2	653-2013-F3	1. Does the minimum spacing between repair plates given as "H" in Figure 9.1 apply to repair plates that are square with rounded corners? 2. Do the minimum spacings for repair plates given in Figure 9.1 apply to all shapes listed in 9.2.2.1 and 9.3.1.4, even for shapes that are not depicted in Figure 9.1?	1. Yes. 2. Yes.
9.2.2	2nd - Dec. 1995	653-I-14/98	Do the welding requirements for the critical zone of Section 9.2.2 of API 653 apply to the welds made for attaching supports, such as unistrut supports welded to the projection of bottom plates?	No. The critical zone is inside the tank shell.
9.2.3	2nd - Dec. 1995		1: Does API 653 permit the above new weld joint to be a lap-welded design, assuming the existing tank welds are lap-welded? 2: If the above new weld must be butt-welded to the shell above, how can the joint be made where this weld joins the lap-welded vertical welds?	1: Yes, per Section 9.2.3.2 2: Butt-welding is not required, per 9.2.3.2.
9.2.3	2nd - Dec. 1995	653-I-20/98	Can a complete (360º) doubler plate be installed on the inside of the tank shell and fillet welded to the ID of the tanks shell and tank bottom for the purpose of reinforcing a corroded lower tank shell when the thickness of the tanks shell does not comply with the minimum thickness requirements of API 653 due to	No. This type of repair does not comply with the requirements of API 653.
9.2.4.3	Ed 4, Ad 3	653-2014-F1	If two new plates are used for a door sheet in a riveted tank, one in the bottom ring and a smaller one in the second ring, may the second ring plate cross a riveted (or lapped) vertical seam?	No. Per the second sentence of 9.2.4.3 it is "not permitted in any case" for the door sheet to cross a lapped or riveted vertical seam.

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9.3.1	2nd - Dec. 1995	653-I-06/97	1: Does API 653 permit installing a lap-welded patch plate on the inside of a shell plate, as well as the outside? 2: Is the 48 in. maximum patch plate vertical dimension, as permitted by API 653, in Section 9.3.1.7, dependent upon the horizontal width of patch plates? Note that there is a 6 in. minimum, however, for both the horizontal and vertical dimensions of the patch plate.	1: The use of inside patch plates is not prohibited by API 653, except as indicated in Section 9.3.1.6. 2: No.
9.3.1.1	2nd - Dec. 1995	653-I-13/99	1: Referring to API 653, Section 9.3.1.1, what is the alternative repair method if the shell course is greater than ½ in.? 2: Is API 653 retroactively applicable to a tank that had patches installed on a tank shell, with a thickness greater than ½ in., prior to the issue of API 653?	1: The rest of Section 7 specifies the applicable repair rules. 2: Yes, see Section 9.3.1.
9.3.1.6	2nd - Dec. 1995		Is it acceptable to repair an externally corroded shell plate at the shell-to-bottom joint using an internal patch plate extending to the corner weld?	No. Refer to Section 9.3.1.6 which requires a 6-inch clearance from the inside corner weld.
9.3.1.7	3rd	653-I-06/06	1: Do the restrictions for tank shell patch plates, maximum 48" X 72", outlined in API 653 Section 9.3.1.7 apply to tank bottoms? 2: Does API 653 require the removal of existing patch plates on the tank bottom that do not comply with the current requirements of API 653?	1: No; refer to API 653 Section 9.10. 2: API 653 does not cover this specific situation, refer to API 653 Sections 1.1.5 and 1.1.6.
9.3.2	2nd - Dec. 1995	653-I-06/97	Referring to API 653, Section 9.3.2, does this section mean that it is acceptable to repair a small corroded area by cutting a 2" diameter hole and then applying a patch plate?	Yes, assuming the corroded area lies in the area removed.
9.3.2.1	2nd - Dec. 1995	653-I-06/97	Referring to API 653, Section 9.3.2.1, does the "inner perimeter" refer to the perimeter of the hole in the shell plate?	Yes.
9.7	3rd - Dec. 2001	653-I-03/04	For a diamond-shaped reinforcing plate that is to be modified to have a tombstone shape, can the tombstone shape be obtained by welding two triangular shaped plates below the lower diagonal edges of the existing diamond shaped reinforcing plate?	No. Refer to Figure 9-3B for acceptable detail for addition of reinforcing plate to existing shell penetration.

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9.8	2nd - Dec. 1995	653-I-17/98	When adding a new nozzle to an existing shell plate > ½ inches that does not meet the current design metal temperature criteria, which of the [alleged] conflicting rules are to be satisfied: Section 9.8.2b of API 653, Section 3.7.3.1a of API 650, or Section 3.7.3.1b of API 650?	Refer to Section 9.8.1 of API 653, which requires that the rules of 653, Section 9.8.2 and 650 be met. Section 3.7.3.1a applies to the spacing from shell joints to insert plates, reinforcing plates, or nozzles. Section 3.7.3.1b applies to spacing between adjacent nozzles, reinforcing plates, insert plates, or any combination. Section 9.8.2b specifies the minimum size of the insert plate if a reinforcing plate is used. These rules, including 9.8.2d, need to be worked together. There is no conflict.
9.8	2nd - Dec. 1995	653-I-07/99	In the case of a new clean-out fitting being installed in an old tank, does API 653 or 650 allow the waiving of the requirement on API 650, Section 3.7.7.3 calling for stress-relieving after completely pre-assembling into a shell plate and prior to installation in the tank shell?	No. The entire clean-out fitting must be stress-relieved. See API 653, Section 9.8.
9.8	3rd - Dec. 2001	653-I-05/03	1: If a 20-inch manway is removed from an existing tank and a new 30-inch manway installed, is this work considered a replacement, repair, or alteration by the rules of API 653, Section 9? 2: Does API 653 allow the replacement of only the nozzle neck of a 6-inch nozzle in a tank with a shell thickness greater than 0.5 in., and not meeting current design metal temperature requirements? 3: Does API 653 allow the replacement of a nozzle neck without replacing the reinforcing pad, when the nozzle size is increased in a tank with a shell thickness greater than 0.5 in., and not meeting current design metal temperature requirements?	1: The replacement of a 20-inch manway with a new 30-inch manway is covered in Section 9.8 2: Section 9.8 requires that this nozzle and reinforcing pad be removed from the tank and an insert plate with the new nozzle be installed. 3: API 653 requires that this nozzle and reinforcing pad be removed, and an insert plate with the new nozzle installed as outlined in 9.8.

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9.8.2	Ed 4, Ad 2	INQ-653-D02	1: When calculating minimum required thickness of an insert or thickened insert in an existing tank is the allowable stress for the new material limited to the allowable stress of the existing material? 2: In API-653 9.8.2 does the reference to API-650 for design stress allow calculation of an insert plate or thickened insert plate so that the installed thickness could be less than the existing shell plate thickness?	1: No. When calculating the minimum required thickness for new material used for an insert or thickened insert the allowable stress of the new material shall be used. Additionally, the material thickness shall not be less that the greatest nominal thickness of an adjacent plate (ref. API-653 9.2.1). 2: No. The as-built standard stresses shall be used for calculation of new inserts or thickened inserts required thickness but installed material must be the same thickness as the adjacent existing shell plate as a minimum (ref. API-653 9.2.1). Paragraph 9.8.2 specifically addresses reinforcement area calculations.
9.9	1st - Jan. 1991		Are the requirements of Section 9.9.2 applicable only if the tank bottom has failed?	No. The requirements apply whenever a new tank bottom is being installed in a tank.
9.9	2nd - Dec. 1995	653-I-18/98	When making a "tombstone" modification to an existing penetration, extending the reinforcing down to the shell-to-bottom weld, does API 653 permit increasing the thickness of nozzle reinforcing plates and proportionally decreasing the vertical dimension from the nozzle centerline to the tank bottom?	Yes, provided the requirements for reinforcement and weld spacing comply with API 650. See Section 9.9.1.
9.9	2nd - Dec. 1995	653-I-11/01	Does API 653 allow nozzle-type clean out fittings that are half above floor level and half below floor level to be replaced in an old tank or installed in a new tank? If so, what section permits them to be replaced?	No.
9.9.1	2nd - Dec. 1995	653-I-06/00	Refer to Sections 9.9.1 and 9.9.2.2 of API 653. Given the following proposed tank modification: 1) A second bottom is to be installed by slotting the shell. 2) The existing diamond shape reinforcing plate is required to be replaced with a tombstone type reinforcing plate as shown in Fig. 9-3b to meet weld spacing. 3) The modification will satisfy the reinforcing area required. 4) This modification would violate the minimum elevation shown in Fig. 3-4A of API 650. Is the proposed modification in compliance of API 653?	This modification would not comply with the second edition of API 653, Addendum 4. However, a revision has been approved to Section 9.10.2.1.4, that when issued may allow modifications as described above, with some conditions that may be applicable. Please refer to the third edition of API 653 for this revision.
9.9.2.1.2	2nd - Dec. 1995		Is the requirement for a projection of a new bottom beyond the shell specified by the Section 9.9.2.1.2 dependent upon whether the bottom replacement is due to failure or due to some other reason?	No. This detail applies anytime that a bottom is installed in a tank.

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9.10	3rd - Dec. 2001	653-I-13/03	Does API Standard 653 allow a replacement bottom to be installed above an existing bottom with a flush-type cleanout fitting?	Yes. Refer to Section 9.9.2.3 and Figure 9-4.
9.10.1	3rd - Dec. 2001	653-I-15/03	1: Is removal of an existing bottom plate and replacement with a new plate allowed in Section 9.10.1? 2: When replacing an entire bottom plate, or portion thereof, not in the critical zone, does API Standard 653 specify a minimum plate width required?	1: The standard does not address replacement of a single bottom plate. 2: See Reply 1.
9.10.1	3rd - Dec. 2001	653-I-07/04	Is a patch plate an acceptable repair for a corroded tank bottom, and can the patch plate be placed over a weld seam?	Yes, provided the repair complies with the spacing and material requirements of API 653. Refer to 7.2, 9.10.1, and Figure 9-5
9.10.1.1	2nd - Dec. 1995		Regarding 653, Section 9.10.1.1, if a tank has an annular ring, is the critical zone limited to the region within 12 in. of the shell?	No, the critical zone is the entire annular ring and extends 12 in. beyond the annular ring.
9.10.1.2	2nd - Dec. 1995		If the tank does not have an annular ring, does it still have a critical zone, and is the critical zone defined as the region within 12 in. of the shell?	Yes.
9.10.2	2nd - Dec. 1995	653-I-05/98	Does the API allow variations in the installation of tank bottoms that do not comply with API 653, Section 9.10.2, such as the fillet welding of the new bottom to the inside of the tank shell instead of slotting the tank shell?	No.
9.10.2	2nd - Dec. 1995		Does API 653 permit repairing a tank bottom by welding a completely new floor directly on top of the old bottom plates, which would serve as a back-up for the new welds?	No. Refer to Section 9.10.2.1.1, which requires the use of a cushion material between the new and old bottoms.
9.10.2	2nd - Dec. 1995	653-I-01/99	1: In API 653, Section 9.10.2.1.2, is "cutting a slot" intended to mean a complete severing of the tank wall? 2: Is there a sketch or more definitive explanation of what is described regarding the slotted detail? 3: Is there any provision in API 653 for a shell-to-bottom weld (for a replacement bottom) that could be welded from the inside of the tank?	1: Yes. 2: No. 3: No. Two-sided welding is required. See 9.10.2.3 of API 653 which refers to API 650 (including Section 3.1.5.7 of API 650).
9.10.2	2nd - Dec. 1995	653-I-19/98	When a new raised bottom is installed in an existing tank, what criteria apply to the spacing between the existing shell nozzles and the new bottom-to-shell weld?	Refer to API 653, Section 9.10.2.1.4, which requires that the minimum spacing specified in API 650, Section 3.7.3, be met.

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9.10.2	3rd - Dec. 2001	653-I-16/03	1: Can nozzles that are required to be raised by 9.10.2.1.4 be modified in accordance with 9.9? 2: When shell nozzles that require stress relief are modified in accordance with 9.9.2.2 and/or 9.10.2.1.5, can the required stress relief be performed with the nozzle in the tank shell?	1: Yes. The nozzles would have to meet the requirements of 9.10.2.1.5 and API 650, Section 3.7.3. Refer to API 653, Section 9.9.2. 2: No. Refer to API 650, Sections 3.7.4.3, and 3.7.4.2.
9.10.2.1.1	3rd Ad. 2	653-I-01-06	1: May an entire replacement bottom be placed directly on top of the existing bottom? 2: May a single tank bottom plate be repaired by the use of a lap welded patch plate that covers the entire existing bottom plate?	1: No. Refer to API 653 Section 9.10.2.1.1 and Figure 9-5 Note 3. 2: Yes, provided the weld spacing requirements defined in API 653 Figure 9-5 are met.
9.10.3.1, Fig. 9.13	Ed 4, Ad 2	INQ-653-D05	If a tank is to be repaired to API 653 and it is required to bring the tank up to the latest API 650 Edition and fit wear plates beneath the roof support columns, do the wear plates have to be sized or positioned so that the weld attaching the wear plate to the bottom plate is separated by a minimum distance from welds between bottom plates as shown by Figure 9.13?	Yes, as stated in 9.10.3.1. Alternatively, additional NDE listed in 9.10.3.1 shall be applied to welds that do not meet Figure 9.13 spacing.
9.11	3rd - Dec. 2001	650-I-06/02	1: When installing girders and rafters in an existing tank, do they need to be installed in accordance with the latest edition of API Standard 650? 2: When not altering the roof rafters and framing of an existing tank, is it necessary to upgrade it to the current edition of API Standard 650?	1: Yes, refer to API Standard 653, Section 9.11.1.2. 2: Refer to API Standard 653 Section 4.2.2.
9.14.1	2nd - Dec. 1995	653-I-09/01	Does API 653 allow hot tapping NPS 2 connections in tank shells less than ¼ inch thick when the material is of unknown toughness?	Yes, if the thickness is not less than 3/16 inch. Refer to Table 9-1 and to Section 9.14.1 for further restrictions.
9.14.1	2nd - Dec. 1995	653-I-12/97	Referring to API 653, Sections 9.14.1.3 and 9.14.5.1, is the use of E-6010 electrode permitted for welding the 1st pass of the weld attaching the hot-tap nozzle to the shell? Subsequent passes would be the specified low-hydrogen electrode (E-7018).	No. E-6010 is not a low-hydrogen electrode, as required by Section 9.14.1.3.

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10.5	2nd - Dec. 1995	653-I-06/98	Would it be correct to assess planar tilt and calculate limits via use of the plumbness rules in API 653, Section 10.5.2?	API 653 has no rules on tilt of existing tank shells, per se. The only tolerances applicable to reconstructed tank shells are for plumbness, roundness, peaking, and banding, as defined in Section 10.5. However, Section 10.5.6 provides rules that in effect specify the permitted planar tilt of the foundation. Also, refer to Appendix B, Section B.2.2.2, which provides guidelines on rigid body tilting.
10.5.5	2nd - Dec. 1995	653-I-08/99	1: In API 653, Section 10.5.5, does the term "banding" apply to the fillet-welded joint between the bottom of the tank shell and the annular plates, i.e. the bottom corner weld? 2: Does API 653, permit the waiver of Section 10.5 if a suitably qualified engineer certifies that the tank is structurally fit for the intended purpose (Note that this allowable under API 650, Section 5.5.1; although the seller in this case is the manufacturer?	1: No. 2: No.
10.5.6	2nd - Dec. 1995	653-I-14/99	1: Are the foundation tolerances in API 653, Section 10.5.6, applicable only to reconstructed tanks or repairs on tank foundations originally constructed to the tolerances of API 650, Section 5.5.5, and Appendix B? 2: Are the foundation tolerances in API 653, Section 10.5.6, applicable to re-leveling tanks when the original tank foundation was constructed to the tolerances of API 650, Section 5.5.5, and Appendix B?	1: Yes. 2: No. The foundation tolerances in API 653, Section 10.5.6 apply only to reconstructed tanks and do not apply to re-leveling existing tanks. Sections 12.3.1.2 and 12.3.2.5 provide requirements on re-leveling work.
12	2nd - Dec. 1995	653-I-09/99	Consider a tank built in the 1950's to API 12C rules, but having vertical and horizontal welds that will not pass the API 12C radiography criteria. If only the vertical welds were repaired, can the tank be put back in service meeting the API 653 requirements?	The horizontal and vertical welds examined must be evaluated/repaired based on the rules in API 650, Section 9.6, and API 653, Section 10, before placing the tank back in service.
12	2nd - Dec. 1995	653-I-03/99	Referring to API 653, Section 10, is NDE required after roof repairs are made?	No
12.1.1	3rd - Dec. 2001	653-I-04/02	Does API 653 require radiographic tracer shots on repairs of new shell plate to new shell plate welds and new shell plate to old shell plate as is required in new construction repairs with API 650.	Yes. See Section 12.1.1.3.

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12.1.2.2	2nd - Dec. 1995	653-I-03/98	1: Referring to API 653, does Section 12.1.2.2 require that cavities created during the removal of attachment welds of existing reinforcement plates be examined? 2: If the answer is YES, does the examination have to be conducted before the cavities are repaired?	1: Yes, VT and either MT or PT are required. 2: Yes. See Section 12.1.2.2.
12.1.4.2	2nd - Dec. 1995	653-I-08/98	Does API 653, Section 12.1.4.2, in its entirety, apply only to attachments welded to Groups IV through VI material?	Yes.
12.2.1	2nd - Dec. 1995	653-I-05/00	With justifiable cause and at the request of the owner, is it allowable to substitute the RT in Section 12.2.1 of API 653 with UT?	No.
12.2.1.1	2nd - Dec. 1995		Regarding API 653, Section 12.2.1.1., if during a major tank repair new vertical welds are introduced which both intersect new horizontal welds and old horizontal welds, does the intersection of the new vertical weld with the old horizontal weld have to be radiographed?	Yes, see Sections 12.2.1.3 and 12.2.1.5.
12.2.1.1	2nd - Dec. 1995		Can the examination of the [above] vertical weld required by Section 12.2.1.1 of API 653 be done concurrently with either the examination of the intersection with the new horizontal weld or with the examination of the intersection with the old horizontal weld?	API 653 does not prohibit concurrent examinations, as long as the required weld lengths are examined in the vertical, horizontal, and intersection of vertical and horizontal joints.
12.2.1.1	2nd - Dec. 1995		When replacing several shell rings on an existing tank, is it acceptable, per API 653, to radiograph the joints between existing plates per Section 12.2.1.1, 12.2.1.2, and 12.2.1.3 of API 653 and joints between new plates per API 650? Or must all joints be radiographed per API 653?	When replacing shell rings on an existing tank, all joints must be radiographed per API 653.
12.3	2nd - Dec. 1995	653-I-05/98	Does the hydrostatic test in Section 12 of API 653 specify a water test or can any liquid be used?	The intent is only for water to be used for the hydrostatic test so the tank shell is stressed to a higher level than in operation to prove adequacy of repairs for product service and to minimize the risk of brittle fracture while in service.
12.3	2nd - Dec. 1995	653-I-09/98	A tank has been repaired and hydrotested according to the requirements of API 653. Following the hydrotest, a condition not complying with API 653 is discovered, e.g. a weld spacing being too small, that was not identified prior to testing. Is this tank acceptable for service?	At the time the tank repair and testing was completed the tank is acceptable for service per API 653, assuming there was no prior knowledge of the noncompliant condition. If the condition was identified after hydrotesting, that condition must be evaluated and handled as required by the tank owner/operator and the local jurisdiction.

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12.3	2nd - Dec. 1995	653-I-16/98	1: What is the maximum nozzle size that can be installed before a full hydrotest is required? 2: Can a tank be pressure tested with the product (#2 low sulfur diesel gasoline)?	1: If the tank is not exempt from hydrotesting per Section 12.3.2, the maximum nozzle size for nozzles installed below the design liquid level is 12 in. NPS. Any bottom penetration located within 12 in. of the tank shell requires a full hydrotest. 2: No. The intent is only for water to be used for the hydrostatic test so the tank shell is stressed to a higher level than in operation to prove adequacy of repairs for product service and to minimize the risk of brittle fracture while in service.
12.3.1	2nd - Dec. 1995		Referring to API 653, Section 12.3.1.2 (e) and Table 12-1 (3), do these apply to the cleaning of the weld necessary prior to making a restoration of a corroded or otherwise deficient weld?	No, but this issue is currently under review by the API committee responsible for maintaining API 653.
12.3.2	2nd - Dec. 1995	653-I-23/98	Does API recommend the hydrostatic testing of major repairs to tanks that store products with a specific gravity greater than 1.0?	All tanks should be subjected to a hydrostatic test following major repairs unless the tank and the repairs comply with the requirements for waiving a hydrostatic test in API 653, Section 12.3.2.
12.3.2.1	2nd - Dec. 1995	653-I-11/98	Referring to API 653, Second - Addendum 2, for the case of a tank with a new bottom installed in an existing tank that includes a new shell-to-bottom weld, is a hydrotest required?	Yes. A clarification to Section 12.3.2.1 and Table 12-1 was published in the December 1998 addenda clarifying that if the shell-to-bottom weld is completely removed, or if the new bottom is installed by slotting the shell, a hydrotest is required. If the bottom is replaced without removing the existing shell-to-bottom weld, and compliance with Table 12-1 is met, then a hydrotest in not required. It is not intended that this interpretation be applied retroactively to bottom replacements completed prior to this revision.
12.3.2.1	2nd - Dec. 1995	653-I-01/01	To meet the requirements of a hydrostatic test exemption per API 653, Section 12.3.2.1(a), must all repairs be reviewed, or just the items that are covered in the scope of the major repair?	Section 12.3.2.1a applies only to the items within the scope of the major repair.
12.5	3rd - Dec. 2001	653-I-11/02	Is a settlement survey required during hydrostatic testing as described in Section 12.5?	Yes, settlement shall be measured during and when water reaches 100 percent of the test level; see 12.5.2.
13	2nd - Dec. 1995	653-I-10/98	Referring to API 653, Section 11, if the only work to be done on a tank is floor repair, must the shell course, allowable stress, and material be entered on the nameplate?	No. A nameplate is required for reconstructed tanks, not for repaired tanks. Refer to Sections 13.1.1 and 13.2

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13	2nd - Dec. 1995	653-I-10/01	How long does API 653 require inspection records to be retained? Background: We are working with API 653-certified inspectors to perform API 653 inspection services for various clients. A question has arisen over whether monthly "routine in-service inspection" records are to be kept for the life of the tank, or whether some shorter retention interval, such as 10 years, might be considered adequate.	API 653 does not specify the retention period.
Figure 9-1	2nd - Dec. 1995		Do the rules of API 653, Figure 9-1 apply to weld spacing if bottom plates only are being replaced?	No.
General	3rd Dec 2001	653-I-03/06	We have a copy of an API standard no. 653, 3rd edition addendum 1 in September 2003. I was trying to follow the procedure for determining the t min for our tank. The material is SA-285C which I didn't see in the table for maximum allowable stresses. Also, this is a pressure vessel 100psi.	No. Refer to API 510
General	2nd - Dec. 1995		Does API 653 include requirements for abandonment of tanks?	No.
General	2nd - Dec. 1995		Do aboveground storage tanks with capacity of 10,000 barrels or less require an API 653 inspection?	No. API 653 applies to tanks built in accordance with API 650 and its predecessor 12C with no reduction in size. API 650 is designed for tanks in oil storage services. API 650 can be used for other applications as may be required by the tank owner/operator or jurisdictional requirements. API 653 can be used for inspection of tanks in other services. Jurisdictional requirements may specify instruction per API 653.
General	3rd	653-I-05/06	1: Does API 653 require evaluation of inspection results to be in accordance with the as-built standard? 2: Does API 653 require repairs to be performed in-accordance to the current applicable standard?	1: No, there are specific requirements for the evaluation of inspection results in many sections of API 653 and there is not a general rule for the evaluation of inspection results. 2: No, there are specific requirements for the repairs of tank components in the different sections of API 653 and there is not a general rule for the repairs performed on tank components.
General	3rd	653-I-07/06	When a portion of a shell plate is replaced adjacent to a vertical weld seam, may the replacement plate terminate at the vertical weld seam?	No, refer to API 653 Section 9.2.2.1 and Figure 9-1. Repair plate inserted in a tank shell plate may not have vertical weld seam in an existing vertical weld.

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General	2nd - Dec. 1995	653-I-04/01	Given that an inspection in accordance with API 653 is pending for selected tanks constructed in accordance with the 7th Edition of API 650, are these tanks required by API 653 to be upgraded to meet the requirements of current edition of API 650?	No. However, if there is a change in service involved, or there is a reconstruction, repair, or alteration required, then the requirements in 653 generally invoke the current edition of 650 for the evaluation/construction work required. Refer to the appropriate sections in 653.
General	3rd Dec 2001	653-I-01/06	1: Can an entire replacement bottom be placed directly on top of the existing bottom? 2: Can a single bottom plate be overlaid?	1: No. Refer to API Section 9.10.2.1.1 and Figure 9-5-Note 3. 2: Yes, provided the weld spacing requirements defined in Figure 9-5 are met.
General	3rd Dec 2001	653-I-04/06	Can a patch plate be welded to the bottom within 6 inches of the shell?	No unless it is a tomb stone design. Refer to Figure 9-5
Table 6-1	2nd - Dec. 1995		Referring to API 653, Table 6-1, what is the meaning of the term "tank bottom/foundation design?"	This expression is referring to the configuration of the tank and foundation as a whole. Another way to phrase the condition would be: "There is no mechanism in place that would detect a contain a bottom leak."
Table 6-1	2nd - Dec. 1995		Does the term "means to provide . . . containment of a bottom leak" imply undertank liner systems?	An undertank liner system is one method of containing bottom leaks. However, there are other methods, such as double bottoms, that also accomplish the containment.
Table 9-1	Ed 4, Ad 2	INQ-653-D04	In Table 9.1 for nozzle sizes intermediate to two rows, can minimum shell thickness interpolate to between the correlated shell thickness' given?	No, enter the table in the row that applies to the nozzle under consideration. Shell thickness must meet minimum requirements given in that row.