



**BODY OF KNOWLEDGE**  
**API 653 ABOVEGROUND STORAGE TANK INSPECTOR**  
**CERTIFICATION EXAM**

November 2022, March 2023, July 2023, and November 2023 (Replaces Nov 2021)

API Authorized Aboveground Storage Tank Inspectors must have a broad knowledge base relating to tank inspection and repair of aboveground storage tanks. The API Aboveground Storage Tank Inspector Certification Exam is designed to identify individuals who have satisfied the minimum qualifications specified in API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction*.

Questions may be taken from anywhere within each document in this Body of Knowledge (BOK), unless specifically excluded herein.

If specific sections of a document are listed as excluded— all other sections within that document are included.

In some cases, specific paragraphs, or sections, such as the example shown below, are included as an aid to the candidate. This is not intended to exclude other paragraphs.

For example: In the “Corrosion Rate and Inspection Intervals” section of this BOK (Section A, sub-section 1), it states:

The Inspector must be able to calculate:

- a) Metal Loss (including corrosion averaging - API 653, Section 4)

This means that the metal loss calculation will be found in Section 4. It does not mean that other sections in that document are excluded.

The exam consists of two parts. The closed-book part tests the candidate on knowledge and tasks requiring everyday working knowledge of API Standard 653 and the applicable reference documents. The open-book portion of the exam requires the use of more detailed information that the inspector is expected to be able to find in the documents but would not normally be committed to memory. During the exam, applicants will be expected to choose the best answer from the options provided.

**REFERENCE PUBLICATIONS:**

**A. API Publications**

API Recommended Practice 571, *Damage Mechanisms Affecting Equipment in Refining Industry*  
API Recommended Practice 575, *Inspection of Atmospheric and Low-Pressure Storage Tanks*  
API Recommended Practice 576, *Inspection of Pressure-Relieving Devices* (Sections 4.3.2 and 6.6 only)  
API Recommended Practice 577, *Welding Inspection and Metallurgy*  
API Standard 650, *Welded Steel Tanks for Oil Storage*  
API Recommended Practice 651, *Cathodic Protection of Aboveground Petroleum Storage Tanks*  
API Recommended Practice 652, *Lining of Aboveground Petroleum Storage Tank Bottoms*  
API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction*

**B. American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code:**

Section V, Nondestructive Examination  
Section IX, Qualification Standard for Welding, Brazing and Fusion Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators

**Note:** Refer to the Publications Effectivity Sheet on the ICP Website ([www.api.org/ICP](http://www.api.org/ICP)) for a list of specific editions, addenda, and supplements of the reference publications that are effective for your exam date.

**CALCULATIONS & TABULAR EVALUATIONS FOR EVALUATING THICKNESS MEASUREMENTS, WELD SIZES, AND TANK INTEGRITY**

(**Note:** Paragraph references for all formulas and calculations listed here should be checked for accuracy to the edition, addenda, or supplement for the exam you plan to take per the Publication Effectivity Sheet on the ICP website ([www.api.org/ICP](http://www.api.org/ICP).)

**Note:** Candidates are expected to understand the US customary units (inches, feet, PSI, etc.) and the SI units (metric system) and to use both system formulas.

In instances where the reference document is only in US customary or SI units, candidates should be prepared to respond in the units referenced.

**A. Calculation questions will be oriented toward existing tanks, not new tanks. API Authorized AST Inspectors should be able to check and perform calculations included in the following categories:**

1. CORROSION RATES AND INSPECTION INTERVALS (API 575, 7.1 & 7.2)

The Inspector should be able to take inspection data and determine the internal and external inspection intervals. These calculations could be in either the “open book” or “closed book” portion of the exam. The Inspector must be able to calculate:

- a) Metal Loss (including corrosion averaging – (API 653, Section 4)
- b) Corrosion Rates
- c) Remaining Life
- d) Remaining Corrosion Allowance
- e) Inspection Interval (API 653, Section 6)

$$\text{Remaining life (years)} = \frac{t_{\text{actual}} - t_{\text{minimum}}}{\text{corrosion rate}}$$

[inches (millimeters) per year]

Where:

$t_{\text{actual}}$  = the thickness, in inches (millimeters), recorded at the time of inspection for a given location or component.

$t_{\text{minimum}}$  = minimum allowable thickness, in inches (millimeters), for a given location or component.

$$\text{Corrosion rate} = \frac{t_{\text{previous}} - t_{\text{actual}}}{\text{years between } t_{\text{actual}} \text{ and } t_{\text{previous}}}$$

$t_{\text{previous}}$  = the thickness, in inches (millimeters), recorded at the same location as  $t_{\text{actual}}$  measured during a previous inspection.

The formulas for performing the above calculations and rules for setting the inspection intervals may be “closed-book” during the exam. The inspector should also be able to compensate for the corrosion allowance. (Add or subtract based on requirements from the exam problem.)

2. JOINT EFFICIENCIES

The inspector must be able to determine the joint efficiency, “E”, of a tank weld. Inspector should be able to determine:

- a) Joint Types (API 653 Section 4, Table 4.2)



- b) Type and extent of radiography performed (API 653, Table 4.2, Section 12; API 650, Section 8.1, Figure 8.1)
- c) Joint efficiency by reading API 653, Table 4.2

Determining joint efficiency may be part of a minimum thickness or maximum fill height problem since joint efficiency, "E", is used in the formulas for determining required thickness. (API 653, 4.3.3.1)

### 3. MAXIMUM FILL HEIGHT (HYDROSTATIC TESTING)

The inspector should be able to determine the maximum liquid height for a tank. To determine the height, the " $t_{min}$ " formula in API 653 is rearranged as follows. This formula will be provided in the exam. The inspector is NOT expected to derive this formula by using transposition.

- a) Calculate the minimum allowable thickness per Section 4 of API 653 or the maximum fill height in the localized corroded area per:

$$H = \left( \frac{S \times E \times t_{min}}{2.6 \times D \times G} \right)$$

- b) Calculate the minimum allowable thickness per Section 4 of API 653 or the maximum fill height for an entire shell course per:

$$H = \left( \frac{S \times E \times t_{min}}{2.6 \times D \times G} \right) + 1$$

### 4. WELD SIZES FOR SHELL & ROOF OPENINGS

The inspector should be familiar with determining the sizes and spacing of welds for shell openings to the extent of being able to use the information in the following Figures and Tables:

- a) API 650, Figures 5.7a, 5.7b, 5.8, 5.9, 5.12, 5.14, 5.16, 5.17, 5.19, 5.20, 5.21
- b) API 650, Tables 5.6a, 5.6b, 5.7a, 5.7b, 5.9a, 5.9b
- c) API 653, Figures 9.1, 9.2, 9.4, 9.5

### 5. HOT TAPPING

- a) The Inspector should be familiar with the Hot Tapping requirements. (API 653, 9.15)
- b) The inspector should be able to calculate the minimum spacing between an existing nozzle and a new hot tap nozzle. (API 653, 9.15.3)

### 6. SETTLEMENT EVALUATION

The Inspector should be able to calculate the maximum allowed settlement for the following:

- a) Edge Settlement (API 653 Annex B.2.3, Figure B.6)
- b) Bottom Settlement Near the Tank Shell (API 653, Annex B.2.4, Figures B.7, B.8, B.10, B.11, B.12, B.13)
- c) Localized Bottom Settlement Remote from the Tank Shell (API 653, Annex B.2.5, Figure B.9)

### 7. NUMBER OF SETTLEMENT POINTS

- a) The inspector should be able to calculate the number of survey points for determining tank settlement. (API 653, 12.5.2, Annex B, Figure B.1, Figure B.2)



## 8. IMPACT TESTING

The inspector should understand the importance of tank materials having adequate toughness. The inspector should be able to determine:

- a) Tank design metal temperature (API 650, 3.8, 4.2.10 & Figure 4.2)
- b) Material Group Number for a plate (API 650, Tables 4.4a and 4.4b)
- c) If impact testing is required (API 650, Figure 4.1a and 4.1b)
- d) If impact test values are acceptable (API 650, Table 4.5a and 4.5b)

## 9. EXISTING TANK SHELL - MINIMUM THICKNESS

- a) Calculate “ $S$ ”, allowable stress (API 653, 4.3.3.1 & 4.3.4.1)
- b) Determine “ $E$ ”, Joint efficiency (API 653, 4.3.3.1, 4.3.4.1 & Tables 4.2 & 4.3)
- c) Determine “ $H$ ”, liquid height (API 653, 4.3.3.1 & 4.3.4.1)
- d) Calculate minimum acceptable thickness (API 653, 4.3.3.1 & 4.3.4.1)
- e) Calculate the thickness required for continued service (API 653, 4.3.3.1 & 4.3.4.1)

## 10. RECONSTRUCTED TANK SHELL - MINIMUM THICKNESS

The inspector should be able to determine the minimum thickness of the shell of a reconstructed tank. The inspector should be able to:

- a) Determine “ $S_d$ ”, allowable stress for design condition (API 650, Tables 5.2a and 5.2b, and API 653, 8.4.2)
- b) Determine “ $S_t$ ”, allowable stress for hydrostatic test condition (API 650, Tables 5.2a and 5.2b, and API 653, 8.4.3)
- c) Calculate “ $t_d$ ”, design shell thickness (API 650, 5.6.3.2, for tanks of 200-ft. diameter and smaller)
- d) Calculate “ $t_t$ ”, hydrostatic test shell thickness (API 650, 5.6.3.2)

## 11. TANK SHELL - CORRODED AREA

The inspector should be able to determine if a tank shell corroded area is acceptable for continued service. The inspector should be able to:

- a) Select “ $t_2$ ”, minimum thickness exclusive of pits for a corroded area (API 653, 4.3.2.1.a & Figure 4.1)
- b) Calculate “ $L$ ”, critical length for a corroded area (API 653, 4.3.2.1.b & Figure 4.1)
- c) Determine “ $t_1$ ”, average thickness for a corroded area (API 653, 4.3.2.1.c, 4.3.2.1.d, Figure 4.1)
- d) Determine “ $t_{min}$ ” for the corroded area “ $H$ ”, height and “ $E$ ”, joint efficiency will be based on corroded area (API 653, 4.3.3.1)
- e) Determine if  $t_{min}$  is acceptable (API 653, 4.3.3.1.a & 4.3.3.1.b)

## 12. TANK SHELL - PITTING

The inspector should be able to evaluate a pitted area. The inspector should be able to:

- a) Calculate maximum acceptable pit depth (API 653, 4.3.2.2.a)
- b) Determine the maximum length of pits in any 8 in. vertical length (API 653, 4.3.2.2.b & Figure 4.2)

## 13. BOTTOM PLATE MINIMUM THICKNESS

The inspector should be able to determine if the bottom thickness is acceptable for continued service. The inspector should be able to:



Calculate “MRT”, minimum remaining thickness at the next inspection. (API 653, 4.4.5.1)  
Calculate “O”, maximum period of operation. These formulas will be provided in the exam.

14. REPLACEMENT PLATES

- a) The inspector should be able to determine the minimum dimensions for a replacement plate. (API 653, Figure 9.1)

15. LAP WELDED PATCH PLATES

Per API 653, 9.3 the inspector should be able to determine:

- a) The minimum thickness
- b) The minimum weld size
- c) The allowable size of the patch plate

**B. Typical code calculations and requirements that candidates will NOT be expected to know for purposes of the certification exam.**

1. Required thickness calculations for wind, earthquake, and small internal pressures;
2. Nozzle calculations for external loads;
3. Flange calculations;
4. Brazing requirements;
5. Calculating venting requirements;
6. Ladder, stairway, and other structural type calculations;
7. Calculations for bottoms supported by grillage;
8. Variable point method calculations



## II. WELDING ON ATMOSPHERIC ABOVEGROUND STORAGE TANKS

### ASME Section IX, Welding and Brazing Qualifications

(NOTE: Candidates should be familiar with the basic requirements for welding qualifications for procedures and welding personnel contained in ASME Section IX. Brazing is NOT covered on the exam. )

- A. The inspector should have the knowledge and skills required to review a Procedure Qualification Record, Welding Procedure Specification and Welder Performance Qualification.
- B.
- Determine if procedure and qualification records are in compliance with applicable ASME Boiler and Pressure Vessel Code and any additional requirements of API 653.  
The weld procedure review will include:
    - Weld Procedure Specification (WPS)
    - Procedure Qualification Record (PQR)
    - Welder Performance Qualification (WPQ)
  - Determine if all required essential and non-essential variables have been properly addressed. (Supplemental essential variables will not be a part of the WPS/PQR)
  - Determine that the number and type of mechanical tests that are listed on PQR are the proper tests, and whether the results are acceptable.
  - Determine that the welder is qualified to make a production weld according to the WPS

WELD PROCEDURE REVIEW WILL ONLY INCLUDE SMAW OR GMAW, WITH THE FOLLOWING LIMITATIONS:

- No more than one process will be included on a single WPS, PQR or WPQ and the WPS to be reviewed will be supported by a single PQR.
- Filler metals will be limited to one-per-process for SMAW or GMAW
- The PQR will be the supporting PQR for the WPS.
- The WPQ test coupon is to be welded in accordance with a qualified WPS.
- Base metals will be limited to P-No. 1.

The following are specifically excluded:

- Dissimilar base metal joints
- Supplemental powdered filler metals and consumable inserts
- Special weld processes such as corrosion-resistant weld metal overlay, hard-facing overlay, and dissimilar metal welds with buttering
- Charpy impact requirements and supplementary essential variables
- Any PQR and WPS included on the exam will not include heat treatment requirements.

- C. The inspector should know that the WPS must reference the applicable PQR and that the PQR must be signed and dated.

### API 650 and API 653: General welding requirements:

- API Standard 650, *Welded Steel Tanks for Oil Storage*:** The inspector should be familiar with and understand the general rules for welding in API 650, Section 9 and other rules for welding in API 650 such as those for:
  - typical joints and definitions
  - weld sizes
  - restrictions on joints
  - maximum allowable reinforcement
  - inspection requirements



2. **API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction:** The inspector should be familiar with and understand the general rules for welding in API 653, Section 11.

### III. NONDESTRUCTIVE EXAMINATION

#### ASME Section V, Nondestructive Examination

NOTE: The exam will cover only the main body of each referenced Article, except as noted:

#### A. Article 1, General Requirements:

The inspector should be familiar with and understand:

1. The Scope of Section V,
2. Rules for use of Section V as a referenced Code,
3. Responsibilities of the Owner / User, and of subcontractors,
4. Calibration,
5. Definitions of “inspection” and “examination”,
6. Record keeping requirements.

#### B. Article 2, Radiographic Examination:

The inspector should be familiar with and understand:

1. The Scope of Article 2 and general requirements,
2. The rules for radiography as typically applied on butt welded AST horizontal and vertical seams such as, but not limited to:
  - required marking
  - type, selection, number, and placement of IQIs,
  - allowable density
  - control of backscatter radiation
  - location markers
3. Records

#### C. Article 6, Liquid Penetrant Examination, Including Mandatory Appendix II:

The inspector should be familiar with and understand:

- 1) The Scope of Article 6,
- 2) The general rules for applying and using the liquid penetrant method such as but not limited to:
  - a) procedures
  - b) contaminants
  - c) techniques
  - d) examination
  - e) interpretation
  - f) documentation
  - g) record keeping

#### D. Article 7, Magnetic Particle Examination (Yoke and Prod techniques only, excluding paragraphs T-765 and T-766):

The inspector should be familiar with and understand the general rules for applying and using the magnetic particle method such as but not limited to:

1. The Scope of Article 7,



2. General requirements such as but not limited to requirements for:
    - a) procedures
    - b) techniques (Yoke and Prod only)
    - c) calibration
    - d) examination
    - e) interpretation
  3. Documentation and record keeping
- E. Article 23, Ultrasonic Standards, **Section SE-797 only** – Standard practice for measuring thickness by manual ultrasonic pulse-echo contact method:

The inspector should be familiar with and understand;

1. The Scope of Article 23, Section SE-797,
2. The general rules for applying and using the Ultrasonic method
3. The specific procedures for Ultrasonic thickness measurement as contained in paragraph 7.

F. **API 650 and API 653:** General nondestructive examination requirements:

1. **API Standard 650, *Welded Steel Tanks for Oil Storage*:** The inspector should be familiar with and understand the general rules for NDE in API 650, Section 8.
2. **API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction*:** The inspector should be familiar with and understand the general rules for NDE in API 653, Section 12

#### IV. PRACTICAL KNOWLEDGE - GENERAL

A. The following topics may be covered:

1. Organization and Certification Requirements.
2. Types and Definitions of Inspections.
3. Types Corrosion and Deterioration.
4. Materials and Fabrication Problems.
5. Welding.
6. Nondestructive Examination (NDE) Methods
7. Corrosion and Minimum Thickness Evaluation.
8. Estimated Remaining Life.
9. Inspection Interval Determination and Issues Affecting Intervals.
10. Inspecting Relief Devices. (API RP 576 4.3.2 & 6.6)
11. Inspection Safety Practices.
12. Inspection Records and Reports.
13. Repairs / Alterations.
14. Disassembly and Reconstruction.
15. Hydro Testing,
16. Pneumatic Testing

More information relevant to each of these categories is contained in section “V. PRACTICAL KNOWLEDGE - SPECIFIC” where each reference publication applicable for study for the exam has been listed with the relevant topics that may be covered on the exam.

B. Typical code requirements that candidates will **NOT** be expected to know for purposes of this certification exam.

1. Required thickness calculations for wind, earthquake, and small internal pressures
2. Nozzle calculations for external loads
3. Flange calculations





4. Brazing requirements
5. Calculating venting requirements (API 650 5.8.5)
6. Ladder, stairway, and other structural type calculations
7. Technical interpretations of API & ASME Codes and Standards
8. Welding process requirements other than shielded metal arc welding (SMAW) and gas metal arc welding (GMAW)
9. API 650, Annex D
10. API 650, Annex E
11. API 650, Annex F
12. API 650, Annex G, Except for G.1
13. API 650, Annex I, Except for I.1 and I.2
14. API 650, Annex J
15. API 650, Annex K
16. API 650, Annex L
17. API 650, Annex M, Except for M.1
18. API 650, Annex O, Except for O.1 & O.2
19. API 650, Annex P
20. API 650, Annex S, Except for S.1
21. API 650, Annex SC
22. API 650, Annex T
23. API 650, Annex V
24. API 650, Annex W
25. API 650, Annex X
26. API 650, Annex Y

## V. PRACTICAL KNOWLEDGE - SPECIFIC

- A. Each reference publication relative to study for the exam is listed below. A list of topics, which may be covered, is listed for each publication. Some topics may be listed under more than one publication. For example, ASME Section IX is the basic document for welding requirements as referenced by API 650 and API 653. The referencing API documents contain additional welding requirements and exceptions or additions to those contained in ASME Section IX. Therefore, welding requirements may be listed under all three documents and all three documents may be listed under the general heading of “Welding on Tanks”.

### API RP 571, Damage Mechanisms Affecting Fixed equipment in the Refining Industry

ATTN: Inspectors are not required to memorize the definitions of terms included in Section 3 (Definitions of Terms and Abbreviations) but are expected to be familiar with the common terms and abbreviations and be able to find definitions, if needed in the solution of a test question.

Test questions will be based on the following mechanisms only:

#### Section 2 Terms and Definitions

- |      |      |   |
|------|------|---|
| Par. | 3.8  | Atmospheric Corrosion                                     |
|      | 3.11 | Brittle Fracture  |
|      | 3.14 | Caustic Corrosion   |
|      | 3.15 | Caustic Stress Corrosion Cracking (Caustic Embrittlement) |
|      | 3.17 | Chloride Stress Corrosion Cracking                        |
|      | 3.22 | Corrosion Under insulation (CUI)                          |
|      | 3.43 | Mechanical Fatigue (Including Vibration-induced Fatigue)  |
|      | 3.45 | Microbiologically Influenced Corrosion (MIC)              |
|      | 3.57 | Soil Corrosion  |
|      | 3.58 | Sour Water Corrosion (Acidic)                             |
|      | 3.62 | Sulfuric Acid Corrosion                                   |

**API RP 575, Inspection of Atmospheric and Low-Pressure Storage Tanks**

NOTE: API RP 575 is a Recommended Practice and contains many general statements that are not strict requirements. Some questions on the exam related to API RP 575 may contain phrases such as “it is best to” or “an inspector would normally” when information or statements from API RP 575 are covered. In these cases, it is important to be familiar with the content of API RP 575 and to be able to pick the *best* answer of those given. All of API RP 575 is applicable to the exam unless specifically excluded.

- A. The inspector should have a practical understanding and be familiar with the information contained in API RP 575 as related to:
1. types of tanks covered
  2. procedures to perform internal and external inspection
  3. the types of external and internal inspections
  4. procedures to determine suitability for continued service
  5. evaluation change-of-service effects on suitability for continued service
  6. evaluation and general condition of:
    - a) distortions, flaws, windgirders, stiffeners, welds, and nozzles
    - b) tank bottoms
    - c) tank foundations
    - d) causes of corrosion, leaks, cracks, and mechanical deterioration
    - e) auxiliary equipment.
    - f) anchor bolts, pipe connections, ground connections
    - g) insulation.
    - h) shells and roofs

**API RP 576, Inspection of Pressure-relieving Devices**

1. Safety Relief Valve (API RP 576, 4.2.4)
2. Inspection, Testing, Maintenance, and Setting of Weight-loaded Pressure and/or Vacuum Vents on Tanks (API RP 576, 6.6)

**API RP 577, Welding Inspection and Metallurgy**

1. Definitions
2. Welding inspection
3. Welding processes
4. Welding procedure
5. Welding materials
6. Welder qualifications
7. Non-destructive examination
8. Metallurgy
9. Refinery and Petrochemical Plant Welding Issues
10. Terminology and symbols
11. Actions to address improperly made production welds
12. Welding procedure review
13. Guide to common filler metal selection
14. Example report of RT results



**API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction and the related portions of API Standard 650, Welded Steel Tanks for Oil Storage**

(NOTE: all of API 653 is applicable to the exam unless specifically excluded.)

A. Tank Inspection, NDE, and Testing

1. The inspector should have a practical understanding and be familiar with the information contained in API 653 related to general inspection practices such as:
  - a) types of tanks covered
  - b) applicable inspection tasks for internal and external inspection (e.g., API Standard 653, Annex C, Checklists for Tank Inspection).
  - c) safe working practices
  - d) thickness and dimensional measurements and tolerances
  - e) requirements of external and internal inspections
  - f) frequencies and intervals for external and internal inspection
  - g) alternatives to the required internal inspection intervals
  - h) NDE procedures and NDE personnel qualification requirements
  - i) types of roofs and seals and types of deterioration
  - j) reasons for inspection and causes of deterioration of storage tanks
  - k) procedures to check or test storage tanks for leaks
  - l) tools and equipment for tank inspection
  - m) failure assessment and deterioration of auxiliary equipment
  - n) suitability for continued service.
  - o) change-of-service effects on suitability for continued service
  - p) evaluation of tank bottom conditions
  - q) evaluate tank foundation conditions
  - r) risk of failure due to brittle fracture
  - s) evaluate the causes of corrosion, leaks, cracks, and mechanical deterioration.
  - t) evaluate the condition of anchor bolts, pipe connections, ground connections, and insulation
2. The inspector should have an understanding and be able to perform calculations related to: (See also previous section on “CALCULATIONS FOR EVALUATING THICKNESS MEASUREMENTS AND TANK INTEGRITY”)
  - a) actual and minimum required thickness for shell plates
  - b) maximum allowable fill height
  - c) required thickness for hydrotesting and for elevated temperatures
  - d) evaluation of corroded areas and pits on shell plates
  - e)  $t_{min}$ , corrosion rate, inspection interval and remaining corrosion allowance
  - f) distortions, flaws, welds, and nozzles.
  - g) minimum thickness for tank bottoms and annular plate rings and shell rings
  - h) evaluate the effects of tank bottom settlement and acceptable limits
  - i) evaluate the condition of tank shells and roofs.
  - j) weld size at roof-to-shell and bottom-to-shell junctions per design requirements
3. The inspector should understand the requirements for performing repairs and alterations such as:
  - a) definitions of repairs and alterations
  - b) repairs to foundations, shell plates, welds, tank bottoms, nozzles & penetrations, roofs, seals
  - c) knowledge of the repair/alteration material and toughness requirements
  - d) use of unidentified materials for repairs/alterations
  - e) hot tap requirements and procedures
  - f) inspection and NDE requirements for repairs and alterations



- g) hydrostatic and leak testing requirements
  - h) lap-welded patch plates (API 653, 9.3 and Figure 9.3)
  - i) new bottoms supported by grillage API 650, Annex I, excluding calculations)
4. The inspector should have an understanding of the requirements for recording the inspection data and records related to inspection, repairs, and alterations such as:
- a) nameplate requirements
  - b) record-keeping requirements
  - c) reports for inspection, repair and alterations

**API RP 651, *Cathodic Protection of Aboveground Petroleum Storage Tanks***

NOTE: Only Sections 1, 2, 3, 4, 5, 6, 8, and 11 will be covered on the exam.

- A. The inspector should have a practical understanding and be familiar with the information contained in API RP 651 related to:
- 1. Corrosion of Aboveground Steel Storage Tanks
  - 2. Determination of Need for Cathodic Protection
  - 3. Methods of Cathodic Protection for Corrosion Control
  - 4. Operation and Maintenance of Cathodic Protection Systems
- B. Information contained in API RP 651 which the inspector will not be examined on:
- 1. design of cathodic protection systems
  - 2. sources, detection, and control of interference currents

**API RP 652, *Lining of Aboveground Petroleum Storage Tank Bottoms***

- A. The inspector should have a practical understanding and be familiar with the information contained in API RP 652 related to:
- 1. types of tank bottom linings and advantage and disadvantages of each
  - 2. considerations for recommending tank bottom linings
  - 3. causes of tank bottom lining failures
  - 4. types of tank bottom lining materials
  - 5. surface preparation requirements for the installation of tank bottom linings
  - 6. issues affecting the application of a tank bottom lining