



BODY OF KNOWLEDGE API TES TANK ENTRY SUPERVISOR CERTIFICATION EXAMINATION

March 2019 - July 2020
(Replaces May 2017)

This API Individual Certification Examination is designed to identify applicants possessing the required knowledge to serve as tank entry supervisors. API certified Tank Entry Supervisors must have knowledge of planning and preparation to address potential hazards and achieve safe work conditions during tank entry, ventilation, conducting work and completing the job. This includes some basic knowledge of storage tanks & their construction.

Questions may be taken from anywhere within each document in this BOK, unless specifically excluded herein.

If specific sections of a document are listed as excluded, all other sections within that document are still 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 “Project Planning” section of this BOK (Section 1), it states:

“Determining tank construction/configuration/type, including appurtenances and roof-type (API STANDARD 2015 Annex A.2; API RP 2026 Section 3).”

This means that tank construction/configuration/type will be found in API STANDARD 2015 Annex A.2 and API RP 2026 Section 3. It does not mean that other paragraphs in that section are excluded.

Emphasis is placed on entry into aboveground petroleum storage tanks and work associated with tank cleaning and other work on the tank that requires entry. Candidates are given three hours and fifteen minutes to complete the examination. Questions for the examination are multiple-choice and alternative questions type. Please see the website for more details. Reference materials are not permitted on the exam.

REFERENCE PUBLICATIONS:

The primary reference for the Tank Entry Supervisor Certification examination is API STANDARD 2015, which defines requirements for planning and implementing safe tank entry in order to perform work. These standards and recommended practices provide substantial experience-based practical information; they also incorporate by reference additional background material from API and other sources.

Note: Refer to the Publications Effectivity Sheet in the application package for a list of which editions, addenda, and supplements of the reference publications are effective for your exam.

API Publications

API STANDARD 2015	<i>Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks</i>
API RP 2026	<i>Safe Access/Egress Involving Floating Roofs of Storage Tanks in Petroleum Service</i>
API RP 2207	<i>Preparing Tank Bottoms for Hot Work</i>
API RP 2219	<i>Safe Operation of Vacuum Trucks in Petroleum Service</i>

**TES EXAMINATION KNOWLEDGE EXPECTATIONS:**

Similar knowledge items, which appear in the General Section or in subject sections of this BOK may Not be repeated in the same detail in subsequent sections but may still be tested in the examination.

GENERAL KNOWLEDGE:

This certification recognizes that while Tank Entry Supervisors direct work related to tanks, they also fulfill a primary Health & Safety role.

- a) Understanding the characteristics of a Permit Required Confined Space (PRCS) including reclassifying confined spaces into non-permit confined space and non-confined space. API STANDARD 2015 expands guidance to cover areas not specifically addressed by OSHA, including specific hazards and conditions found on petroleum tanks.
- b) Hazard recognition, identification, communication and control are key activities throughout the various project stages. Numerous safety aspects of this process are addressed throughout API STANDARD 2015.
- c) Requirements for tank cleaning and entry permits. (API STANDARD 2015 Sections 10.2 & 11.2)
- d) Training and personnel qualifications, significant for job performance and regulatory compliance which are required for most of the roles related to tank entry and cleaning. (API STANDARD 2015 Section 14)
- e) Definitions (API STANDARD 2015 Section 3) and from the other API RP reference documents.

The API TES certification exam does not include specific environmental regulations. Applicants should be aware that federal and state environmental regulations have permit or reporting requirements for emissions of hydrocarbons or chemicals to the air, or spills to the ground or water (API STANDARD 2015 Section 5.1).

CANDIDATES ARE EXPECTED TO DEMONSTRATE KNOWLEDGE IN THE PRECEDING GENERAL AREAS AND IN THE FOLLOWING SUBJECT AREAS:**1. PROJECT PLANNING**

(API STANDARD 2015 Sections 4, 5, 6 & 7)

Project planning includes identifying and understanding all work phases required to safely complete an aboveground storage tank entry, cleaning, inspection and repair project including the ability to identify requirements for properly trained and qualified workers for each activity as outlined in the standard.

PROJECT PLANNING QUESTIONS ARE BASED ON THE FOLLOWING TOPICS:

- a) Understanding and implementing the project-specific scope of work, including cleaning methods and knowing who will be responsible for each phase. Understand the qualifications and training requirements for all personnel and the contents of the written safe work plan.
- b) Understanding the impact of different tank designs and configurations, including type of roof, on the permit and work scope requirements (API STANDARD 2015 Section A.2; API RP 2026 Section 3).
- c) Performing pre-job hazard identification including tank physical conditions and safety hazards associated with the tank and surrounding area (API STANDARD 2015 Section 7, A.3 and F.2.8)
- d) Identifying materials that may be present in the tank to be entered (such as H₂S, benzene, lead, and/or pyrophorics), the materials to be used to clean or repair the tank, and their associated hazards.
- e) Understanding and implementing the requirements of the hazard communication plan (API STANDARD 2015, Section 5.1.2 and Annex A)



- f) Developing the written site plan, including identification of adjacent hazards and potential hazards that may impact on the work.
- g) Understanding the respective duties of Permit Required Confined Space (PRCS) entrants, attendants, and supervisors.
- h) Establishing correct confined space classification and implementing correct permit requirements (entry, hot and cold work) in accordance with confined space and permit programs (API STANDARD 2015 Sections 4.5.1 and 10)
- i) Understanding safe and proper methods for disposal/recycling products and residue (API STANDARD 2015 Sections 5.5.2 and 10.7)
- j) Ensuring appropriate emergency response requirements (including rescue) are met and identifying qualified rescue and responders as needed (API STANDARD 2015 Section 12)
- k) Understanding the requirements for project specific regulatory permits (API STANDARD 2015 Section 5.5.5 & Section 10)
- l) Ensuring safe work procedures are followed including lockout/tagout requirements for work to be done.
- m) Electrical equipment nearby and/or used during cleaning activities and other entry activities including related accepted safe work practices (API STANDARD 2015 Sections 4.4 & 5.4)

2. TANK PREPARATION

(API STANDARD 2015 Section 5 and Annexes A.3 and C; API RP 2219)

The goal of tank preparation is to make the area around a tank and the atmosphere inside a tank safe for human occupancy. Occupancy occurs during cleaning, while performing internal maintenance and inspection. Preparing the tank prior for decommissioning includes establishing basic permitting requirements; assigning specific responsibility for each phase of operation; removing and safe handling of product from the tank; and proper isolation of the tank space and the adjacent work site.

TANK PREPARATION QUESTIONS ARE BASED ON THE FOLLOWING TOPICS:

- a) Obtaining necessary owner's permits and work scope required for tank preparation.
- b) Recognizing the confined space permit classification and requirements if a descent onto a floating roof is required (API STANDARD 2015 Annex A.3 & C.6.2; API RP 2026).
- c) Setting floating roof legs or suspension cables after obtaining any necessary work permits (API STANDARD 2015 Section 5.2.1 & Annex C.6).
- d) Positioning ancillary equipment outside of tank
- e) Isolating tank using lock out/tag out and knowing the different energy isolation methods (blanking/blinding/other methods) (API STANDARD 2015 Section 5.3;) including safely isolating the cathodic protection system (if present) (API STANDARD 2015 Section 5.3.4)
- f) Removing recoverable product in the following sequence (API STANDARD 2015 Annex C.2; API RP 2219)
 - Drawing as much as possible through tank piping/fix connections
 - Removing additional recoverable material through water draws (and similar connections) without opening tank



- g) Removing as much remaining product and sludge as possible through the manway using pump and vacuum with bonding and grounding requirements. Understanding proper bonding of blowers and eductors to the tank to minimize the risk of static electricity as an ignition source (API STANDARD 2015 Section 5.4.5)
- h) Understanding proper placement of blowers and eductors to disperse vapors/control emissions prior to opening manways, the need to slowly start ventilation while opening manways and testing for toxics, as required

VENTILATION AND ATMOSPHERIC TESTING

Ventilation includes the proper placement and operation of degassing, ventilation and/or inerting equipment. Atmospheric testing is used to evaluate the effectiveness of the ventilation to ensure that safe working conditions are met and maintained during the entire work process

VENTILATION AND ATMOSPHERIC TESTING QUESTIONS ARE BASED ON THE FOLLOWING TOPICS:

VENTILATION (API STANDARD 2015 Annex B)

- a) Knowing the difference between degassing, ventilating and inerting (API STANDARD 2015 Sections 3.9, 3.27, 3.52 and 5.5).
- b) Determining degassing, ventilation or inerting requirements are being met and equipment is being properly used per the scope of work
- c) Knowing how to best locate ventilation equipment (API STANDARD 2015 Section 5.5 and Annex B).
- d) Knowing basic degassing equipment and placement (API STANDARD 2015 Annex B.8)
- e) Knowing inert gas purge requirements and equipment placement (API STANDARD 2015 Annex B.6).
- f) Understanding the hazards associated with inerting (API STANDARD 2015 Section 7.2).
- g) Understanding relationship between air changes and ventilation flow rates (API STANDARD 2015 Annex B.2.2.2)
- h) Understanding bonding and grounding requirements for ventilation and degassing equipment.

ATMOSPHERIC TESTING (API STANDARD 2015 Sections 6 & 7.1.2 and Annexes A, C and E:)

- a) Knowing training requirements and being able to identify qualified testers, entrants, attendants and rescuers (API STANDARD 2015 Section 9)
- b) Determining necessary testing instrumentation (API STANDARD 2015 Section 6 and Annex E).
- c) Understanding calibration and bump testing requirements including record keeping requirements
- d) Conducting initial atmospheric testing from outside the tank (without entry) to determine if condition inside tank meets entry requirements
- e) Understanding the difference between Permissible Exposure Limits (PELs) and Threshold Limit Value (TLVs®) (API STANDARD 2015 Sections 3.36 & 3.49 and Annex A.1.5)
- f) Recognizing that listed PEL or TLV® values in ppm are orders of magnitude lower than percent flammability values and that atmospheres with zero flammability may still have unacceptable chemical concentrations in the confined space greater than PEL or TLV® exposure levels (API STANDARD 2015 Annex E.3). Since one percent equals 10,000 parts per million the concentration of the flammable material would be:
$$\text{Percent (v) flammable material in air at LEL} \times \text{percent LEL meter reading (as decimal)} \times 10,000 = \text{ppm.}$$
- g) Recognizing the need for 10% minimum oxygen for catalytic flammability meters to work properly (API STANDARD 2015 Annex E.3.2).
- h) Knowing the correct sequence of testing atmospheric hazards for proper operation of equipment



- i) Knowing what constitutes oxygen deficient, oxygen enriched conditions and what constitutes IDLH conditions
- j) Knowing that 10% LEL is an important driver for decisions
- k) Understanding corrective actions, if necessary, and continuing ventilation (or degassing) and retesting if conditions become unsafe during entry
- l) Issuing correct permits for initial entry of testers into the tank to conduct internal atmospheric testing and inspection and knowing when permits may need to be changed based on changing conditions.

3. INITIAL ENTRY FOR VISUAL INSPECTION AND EVALUATION (API STANDARD 2015 Section 5, 6, 7, 8 and Annexes A and C)

Initial entry for visual inspection and evaluation includes tank entry under permit conditions, while monitoring the atmosphere, inspecting the tank, determining potential sources of vapor and evaluating the work plan for the required maintenance operation. Continuous ventilation requirements for entry to work are attained. Identifying and assigning entrants; attendants and rescuers. Establishing specific requirements for stopping work and exiting the tank.

INITIAL ENTRY TEST QUESTIONS ARE BASED ON THE FOLLOWING TOPICS:

- a) Identifying and addressing residual special hazards (such as H₂S, benzene or lead exposure, pyrophorics, physical hazards, poor condition of tank bottom or roof supports) (API STANDARD 2015 Section 7 & 8 and Annex A)
- b) Conducting hazard assessment and specifying PPE requirements for safe entry (API STANDARD 2015 Sections 4, 7 & 8 and Annexes A and C)
- c) Understanding that internal roofs and external floating roofs have additional hazards affecting confined space entry and that roofs must be properly stabilized prior to entry
- d) Knowing procedures to communicate with operators for safe entry including obtaining all necessary permit signatures.
- e) Implementing confined space entry program and emergency response plan including rescue team if required
- f) Conducting testing and ensuring correct entry permit issued for inspection activities
- g) Performing tank pre-cleaning safety inspection and visual inspection for work plan (API STANDARD 2015 Annex)
- h) Verifying and revising the scope of work (if required) after consultation with the owner.
- i) Verifying work to be done and verifying the tank is safe to enter

4. CLEANING A TANK (API STANDARD 2015 Section 9 and Annex C; API RP 2219)

Cleaning a tank includes: evaluating potential hazards and determining PPE requirements for those conducting the cleaning work; issuing entry and work permits; protecting against leakage into the tank; disposing of products and residue; providing for continued ventilation and testing of the atmosphere during maintenance activities. Additional duties include establishing requirements for canceling permits with work stoppage, exiting and closing the tank and retesting before reissuing permits to resume work. The tank shall be closed when unattended and retested and evaluated before reentry. Requirements shall be determined to enable reclassifying a tank into another entry category.



TANK CLEANING QUESTIONS ARE BASED ON THE FOLLOWING TOPICS:

Implementing the cleaning plan, including entry and cold work permits in conformance with the confined space entry plan

- a) Maintaining ventilation; continuously (or periodically) testing tank internal atmosphere for hazards per permit requirements
- b) Monitoring potential and actual external hazards
- c) Identifying and addressing special physical, toxic, and ignition hazards (for example, pyrophorics, H₂S, physical condition, and chemical cleaners)
- d) Using appropriately classified electrical equipment for the area. Understanding electrical classifications, Class 1, Div. 1, etc. (API STANDARD 2015 Section 5.4 and Annex C).
- e) Monitoring activities and qualifications of cleaning personnel
- f) Maintaining site security and securing access to avoid inadvertent entry into a confined space when the tank is unattended
- g) Ensuring continuity of supervision during operations
- h) Canceling permits, stopping work, and exiting the tank should conditions change and introduce hazards. Determining hazard cause, making tank safe, retesting and reissuing permits to restart work after permit cancellation
- i) Confirming disposal of sludge and residue in accordance with scope of work and tank cleaning plan
- j) Verifying completion of cleaning

5. VACUUM TRUCK SAFETY (API RP 2219)

Improper vacuum truck use can have catastrophic results. Know proper placement of vacuum truck including location of operator with respect to the work.

Know the hose requirements for conductive and non-conductive hose. Understand how to safely transition between pressure and vacuum. Know grounding and bonding requirements including what can be safely used for bonding and grounding and what equipment should not be used.

Understand the importance of wind direction during activities.

**6. TANK ENTRY FOR REPAIRS OR MODIFICATIONS AFTER CLEANING
(API STANDARD 2015 Sections 10 & 11 and Annex C; API RP 2207)**

Entry for repairs/modifications includes: considering the tank to be a permit required confined space until tested and determined otherwise; establishing atmospheric monitoring procedures to determine need and adequacy of ventilation; determining work to be performed and potential for declassify and reclassifying tank for various phases of work. Understand meaning and requirements for “alternate procedure” in confined space terminology. Conduct testing and issuing entry and work permits. Inspecting and testing to assure work has been performed as required and that all connections are in place. After work is completed, ensuring all equipment, tools, parts, debris, etc. is removed from inside and around the tank.

TANK ENTRY FOR REPAIR OR MODIFICATION QUESTIONS ARE BASED ON THE FOLLOWING TOPICS:

- a) Special precautions needed for entry onto an external floating roof or into internal floating roof confined spaces (API STANDARD 2015 Annex A.3 and C; API RP 2026 Section 4)
- b) Special or unique conditions (very large tanks or pontoon entry on floating roofs)
- c) Implementing work plan and confined space entry plan
- d) Understanding relationship between respirators and exposure limits (PEL, TWA) and ensuring proper PPE is implemented for entrants, testers, attendants, and rescuers



- e) Implementing emergency response plan (API STANDARD 2015 Section 12)
- f) Determining classification of tank (confined or non-confined space) (API STANDARD 2015 Section 3.8)
- g) Conducting appropriate tests to determine if entry conditions are acceptable and issuing entry permit (if needed) including hot work and cold work permits (API STANDARD 2015 Annex C; API RP 2207)
- h) Monitoring internal and external hazards, including identifying and addressing special hazards
- i) Monitoring activities to assure performance and qualifications of workers
- j) Maintaining site security and closing tank when unattended to avoid inadvertent or unauthorized entry (unless classified as a non-confined space)
- k) Ensuring continuity of supervision during operations
- l) Canceling permits to stop work, exit tank, and make tank safe should permit conditions change
- m) Reissuing permits to reenter (if needed) and continue work

7. RETURNING TANKS TO SERVICE (API STANDARD 2015 Section 13)

Return to service includes inspecting the tank prior to closing to assure work has been performed in accordance with the plan and tank is clean and ready to go back into service. Closing tank in accordance with procedures. De-isolating tank. Filling tank in accordance with procedures. Gauging and sampling as required.

- a) Inspecting tank prior to closing to assure
 - 1. Work has been performed according to plan
 - 2. Tank is clean
 - 3. Equipment and tools have been removed
 - 4. Tank is ready to go back into service.
- b) Verifying that recommissioning activities are complete in accordance with plan
- c) Understanding basic safe filling procedures and gauging activities including time requirements

U.S. OSHA STANDARDS AND OTHER PUBLICATIONS

*OSHA standards are **NOT** included as listed references for the TES test. The exam will not ask any specific questions from OSHA standards, however, a TES absolutely needs to be familiar with OSHA regulations as they pertain to confined space entry (both construction and general industry), personal protective equipment, emergency action plans, control of hazardous energy (LOTO, electrical safety, hazard communication (Hazcom/GHS), ground fault requirements, site specific chemical hazard safety requirements, welding burning and cutting, and any other standards related to safe tank entry for cleaning, inspection and repair activities.*

The OSHA website www.osha.gov offers free access to all the relevant standards, publications, compliance directives and guidance documents.