



Guidelines for Internal and External Inspections of Field-Erected Tanks

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Minnesota Pollution Control Agency (MPCA) rules and permits require that most field-erected steel above-ground storage tanks (ASTs) in Minnesota be internally and externally inspected on a routine basis and repaired if necessary to ensure tank integrity and to prevent leaks, spills, and ruptures. An inspector certified by the American Petroleum Institute (API) must perform each inspection in accordance with API Standard 653, “Tank Inspection, Repair, Alteration, and Reconstruction.”

The inspection process provides important information directly to tank owners about the condition of a major business asset. Tank owners use inspection data to make short- and long-term investment decisions, avoid loss of valuable product inventory, and protect the environment from accidental releases.

The following guidelines describe the MPCA’s general level of expectation for inspector qualifications, written reports, and other aspects of API 653 tank inspections. Please note that individual permits for major facilities (those with one million gallons or greater liquid storage capacity, total all tanks) may occasionally indicate additional, fewer or different types of testing, record keeping and reporting than are described here. API 653 procedures will normally govern all aspects of a tank inspection. However, in certain permits a magnetic flux leakage (MFL) floor scan is required for a particular tank, whereas API 653 would allow other floor inspection techniques to be used in the discretion of the company and the inspector. **Always consult the applicable**

permit for exact requirements.

Inspections at non-major facilities (those with less than one million gallons liquid storage capacity) should follow API 653 as is.

Applicability

A field-erected steel tank is one that is constructed of steel plates by final assembly on site at a facility, and is generally larger than 50,000 gallons design capacity. Some field-erected steel tanks may be exempt or partially exempt from inspection by the applicable permit or rules. For example, tanks that do not contain either petroleum products or hazardous materials (see 49 CFR 172.101) and are not located at a major facility need not be inspected. Most asphalt and roofing flux tanks need only receive external inspections under Minnesota rules and permits, although industry standards may also indicate internal inspections.

Frequency of inspection

Field-erected tanks at major facilities are initially inspected according to the schedule contained in the facility permit. Thereafter, the inspection interval is normally based on the tank’s corrosion rates as calculated according to API 653 criteria from floor and shell thickness measurements. API 653 requires a maximum allowable interval of five years for external inspection and twenty years for internal inspection in most circumstances. New tanks must generally receive an initial out-of-service inspection

within ten years of initiation of service. It is common for an internal inspection to include an external inspection when the scheduled inspection timings coincide. This provides some efficiency for inspection scheduling and generally some cost savings.

Petroleum and hazardous material field-erected tanks located at non-major facilities must receive an initial external inspection by November 1, 2003, and an initial internal inspection by November 1, 2008, under Minnesota rules. Non-major facilities choosing to use API 653 inspections to meet corrosion protection requirements for a tank must complete both an initial internal and external inspection for the tank by November 1, 2003.

API 653 refers to alternative methods of establishing an inspection interval for a tank using either (1) an analysis of corrosion data and other factors from another tank in similar service, or (2) a so-called risk-based inspection analysis. Specific criteria for these methods have not yet been approved either by the API or by the MPCA. Tank owners wishing to use either technique should consult with the MPCA beforehand.

Qualifications and responsibilities of persons involved in inspections

1. Internal and external tank inspections must be performed by a Certified Tank Inspector. Unless the MPCA has previously approved an alternative inspection protocol and inspector qualifications for a particular tank, a Certified Tank Inspector means an API 653 Authorized Inspector (AI), who must be qualified pursuant to Section 4.10 and certified pursuant to Appendix D of API 653.
2. The AI must possess a current API certification at the time of the inspection.
3. At a minimum, the AI must conduct a visual inspection of the tank and is responsible for assuring the quality and completeness of all inspection results.
4. When an engineering evaluation is indicated by API 653, it must be performed by an engineer who is experienced in the specific area of design, construction, or operation of field-erected above-ground storage tanks.
5. Persons who are not AI's may be employed to assist during an inspection. Such persons must be adequately trained and experienced to perform the specific tasks to which they are assigned, and must

be closely instructed and supervised by the AI, as required by API 653.

6. Any person who performs a non-destructive examinations (NDE) using any data-gathering equipment, such as a MFL or ultrasonic thickness (UT) scanning device, must be trained and experienced in the operation of the specific equipment pursuant to Section 10 of API 653.

Repairs

Most facility permits require that all repairs recommended by the AI be made by the tank owner prior to returning the tank to service. In some cases, a recommended repair may not be necessary, or may be made at a later time, if it does not directly affect tank integrity or risk of failure (e.g. paint failure on the shell of the tank). Tank owners and AI's should discuss these situations with the MPCA prior to returning the tank to service.

Reports and summaries

The MPCA routinely evaluates inspection reports and summaries for tanks located at major facilities, and will review inspection reports for tanks at non-major facilities during inspections. The MPCA reviews reports to determine whether qualified personnel have properly inspected tanks and made necessary repairs in accordance with API 653 and in compliance with MPCA major facility permits. Clear and complete reports are an important part of this regulatory oversight.

Facility owners should request and receive written API 653 reports from tank inspectors, and must retain these records on file for the life of the tank in the case of internal inspections or for five years in the case of external inspections. At major facilities, tank owners are usually required to submit either the full report or a report summary to the MPCA following the inspection or with the annual report. At non-major facilities, API 653 reports are not required to be submitted on a routine basis, but may be requested by the MPCA.

Internal (out-of-service) inspection reports

Out-of-service internal inspection reports must contain, at a minimum, the following:

1. The date(s) the inspection occurred, the name of the inspector(s), and a summary of methods used.
2. A full description of the tank, including tank number, design capacity, most recent service, known service history, next intended service, dimensions, materials, roof design, floor design, etc. Any applicable design standards, such as API Standard 650, must be identified. A drawing of the tank (blueprint) should be provided if available.
3. All instrument readings, checklists, and notes, including observations and photographs if taken.
4. A description of the tank floor integrity examination, including:
 - inspection methods used (visual, vacuum box, magnetic particle, A scan, B scan, C scan, MFL, UT, helium, robotics, etc)
 - extent of floor coverage (including floor plates, chime plate, lap welds, bottom-to-shell corner welds, roof and piping supports, floor penetrations, and sumps)
 - sampling frequency and locations (with drawing)
 - identification of any areas that could not be inspected, with reasons given
 - results of all testing, with special attention to:
 - any holes found
 - areas of thinning, pitting, cracks, weld failure, etc.
 - condition of the “critical zone”
5. A description of conditions found, as required in Section 4.9 of API 653. The general checklist provided in Appendix C or an equivalent document identifying the inspection scope-of-work must be completed and included. All calculations shall be shown. If conditions are found which fall outside the parameters of API 653 and a separate engineering evaluation is performed, this must be indicated.
6. A summary and recommendations write-up based on a determination of suitability of the tank for the intended service. All repairs and alterations to the tank recommended by the AI must be itemized, including whether hydrostatic testing is required following any major repairs and alterations.
7. A specific response to each repair or alteration recommended by the AI, indicating which of them

were performed prior to return to service, which will be performed later and by what date, and which will not be performed with reasons given. **Note:** Repairs and alterations may be performed variously by the AI, the AI’s employer or subcontractor, the tank owner, or the tank owner’s contractor. **In all cases, it is the responsibility of the tank owner to ensure that the disposition of all recommended repairs and alterations is documented in writing, whether in the inspection report itself or in a separate document such as a submittal cover letter.**

8. The tank floor and shell corrosion rates calculated according to API 653 from the inspection data.
9. The recommended date for the next internal and external inspections, based on the corrosion rates calculated.
10. A statement that the inspection was performed in accordance with the latest edition of American Petroleum Institute Standard 653 (identify edition number).
11. Signature, name, address, telephone, employer, title and API certification number of the Authorized Inspector(s) responsible for the inspection and report.

External (in-service) inspection reports

In-service external inspection reports not otherwise included as part of an out-of-service internal inspection report must contain, at a minimum, the following:

1. The date(s) the inspection occurred, the name of the inspector(s), and a summary of methods used.
2. A full description of the tank, including tank number, design capacity, contents, dimensions, materials, roof design, floor design, etc. Any applicable design standards, such as API Standard 650, must be identified. A drawing of the tank (blueprint) should be provided if available.
3. All instrument readings, checklists, and notes, including observations and photographs if taken.
4. Tank shell ultrasonic thickness data showing reading locations and results, if completed as part of the inspection. Tank shell thickness is generally measured as part of an external inspection, but is not always required since the interval for shell measurements is based on corrosion rates and can be extended to fifteen years if corrosion rates are low. The shell of an insulated tank must be evaluated to

the same extent as an uninsulated tank, unless otherwise approved by the MPCA.

5. A summary and recommendations write-up based on a determination of suitability of the tank for the intended service. All repairs and alterations to the tank recommended by the AI must be itemized.
6. A specific response to each repair or alteration recommended by the AI, indicating which of them were performed, which will be performed later and by what date, and which will not be performed with reasons given. **Note:** Repairs and alterations may be performed variously by the AI, the AI's employer or subcontractor, the tank owner, or the tank owner's contractor. **In all cases, it is the responsibility of the tank owner to ensure that the ultimate disposition of all recommended repairs and alterations is documented in writing, whether in the inspection report itself or in a separate document such as a submittal cover letter.**
7. The tank shell corrosion rate calculated according to API 653 from the UT data generated.
8. The recommended date for the next external inspection, based on the corrosion rate calculated.
9. A statement that the inspection was performed in accordance with the latest edition of American Petroleum Institute Standard 653.
10. Signature, name, address, telephone, employer, title, and API certification number of the AI.

Report summaries

If the facility permit requires a report summary to be submitted to the MPCA, rather than the full internal or external inspection report, the following information must be included:

1. Brief tank description.
2. Summary of inspection results, in particular tank floor and tank shell condition.
3. List of repairs, alterations, and other recommendations of the authorized inspector.
4. Description of repairs and alterations made, and reasons if any inspector recommendation was not followed.
5. Calculated date of next inspection.

The full report must be kept on file for the life of the tank (five years in the case of external inspection

reports) and may be reviewed by the MPCA upon request.

Contacting the American Petroleum Institute (Washington DC)

To get a copy of the technical standards for tank construction and inspection, contact the API at 202-682-8375 or go to the Web sites provided below:

- API Standard 653; Tank Inspection, Repair, Alteration, and Reconstruction (\$125.00)
www.cssinfo.com/cgi-bin/detail?product_id=2794
- Other API publications or standards
<http://api.ep.api.org/publications/>
- To verify certification of API 653 Authorized Inspectors, go to
www.api.org/programs_services/inspect/listofinspectors/listpg1.htm

Need more information

Visit the AST Program at www.pca.state.mn.us/cleanup/ast.html. The site has forms, fact sheets, and other information about ASTs and AST requirements.

You can also call the MPCA at 651-296-6300 or 1-800-657-3864.
