Federal Railroad Administration

NAR Reduction Through The Proper Qualification of Tank Cars

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FRA Hazardous Materials Seminar
Reno, Nevada – June 25-27, 2013

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Overview

Qualification of Tank Cars

- How did we get here?
- What is it and how it's done.
  - Qualification
  - Owners requirements
  - Facility requirements
  - Inspection requirements
- Questions

How did we get here?

Once upon a time….

Hydrostatic Testing…

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How did we get here?

It did not always work…

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How did we get here?

Something different had to be done.

September 1995
U.S. DOT Final Rule
HM-201
Crashworthiness Protection Requirements for Tank Cars;
Detection and Repair of Cracks, Pits, Corrosion, Lining Flaws,
Thermal Protection Flaws and Other Defects of Tank Car Tanks.

“Tank Qualification” was Born.

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What is it and how it's done.

Qualification

Means the car and its components conforms to the specification to which it was designed, manufactured or modified to the requirements of DOT, AAR and the car owners acceptance criteria.

Qualification is accomplished by careful and critical examination that verifies conformance using inspections and test based on a written program approved by the tank car owner followed by a written representation of that conformance.
A tank car passes the appropriate tests for its specification, has a signed test report is marked to denote this passage and is considered qualified for hazmat transportation.

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What is it and how it's done.

Owners Requirements

Federal regulations, 49 CFR 180.501-519, require that tank car owners must develop and implement a qualification program for tank cars and their components.

This program must include written procedures that **outline where to inspect, how to inspect and the acceptance criteria.**

This program must be developed in such a way that it will ensure that a component will not fail prior to the next scheduled inspection or test.

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What is it and how it's done.

Owners Requirements

Inspection and test intervals must be selected base on damage tolerance analysis or service reliability assessments.

Car owners must ensure through continued surveillance that the tank car facility performing these inspections and test;

1. Inspect and test each component in accord with the program requirements.
2. Evaluates each component according to the acceptance criteria.
3. Marks the tank car as qualified.
4. Prepares and provides car owner with required documentation.

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What is it and how it's done.

Owners Requirements

Without regard to the qualification compliance date requirements, a tank car owner must ensure that an appropriate inspection or test is conducted according to the type of defect or maintenance/repair function performed if;

1. Tank car shows evidence of abrasions, corrosion, cracks, dents, distortions defects in welds or other conditions that make it unsafe for transportation.
2. Was in an accident and shows evidence of damage that adversely affects it's ability to retain it's contents.
3. Tank bears evidence of damage caused by fire.
4. FRA requires it based on the existence of objectively reasonable and articulable belief that car(s) may be in an unsafe operating condition.

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What is it and how it's done.

Owners Requirements

Car owners must retain required documentation that supports the initial and continual qualification of the tank car including the following;

1. Certificate of construction and related papers that certify the manufacturing of the tank car.
   These documents must be retained throughout the ownership of the car and one year after.
2. Copies of the inspection and test results of qualification inspections and test.
   These documents must be retained until the next successful qualification event.

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What is it and how it's done.

Owners Requirements

Car owner must maintain all documents used to determine that tank shell butt welds will perform to the designed level of safety and service reliability throughout their operational life or will not fail prior to the next required inspection.

Car owners must maintain documentation describing the allowable thickness reductions for sumps, protective housings and nozzles and nozzle reinforcements.

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What is it and how it's done.

Owners Requirements

Car/equipment owner must analyze the service equipment inspection and test results for any given product and based on the analysis, adjust the inspection frequency accordingly.

Car/equipment owner must maintain all documents used to determine that the service equipment will perform to the designed level of safety and service reliability throughout it's operational life or will not fail prior to the next inspection.

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What is it and how it's done.

Owners Requirements

Coating/lining owner must establish and maintain records for the service life of coating/lining and commodity combination.

Coating/lining owner must use a written procedure for collecting and documenting the performance history for the coating/lining for it's service life.

After an analysis of this performance history, the owner must establish an inspection frequency accordingly.

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What is it and how it's done.

Owners Requirements

Coating/lining owner must provide the inspection and test method Including acceptance criteria to the tank car owner. (If different)

This information must also be provided to the person responsible for the qualification of the coating/lining.

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What is it and how it's done.

Tank Car Facility Requirements

A tank car facility must have a quality assurance program approved by the AAR. This program must be in accordance with the requirements of 49 CFR 179.7.

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What is it and how it's done.

Tank Car Facility Requirements

The facility must incorporate the tank car/equipment owners qualification program into their quality assurance program.

The facility must obtain the permission of the car/equipment owner before performing any repairs maintenance or qualification of the owners car(s).

The facility must use the written instructions provided by the car owner or have written confirmation from the owner allowing the use of written instructions provided by another.

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What is it and how it's done.

Tank Car Facility Requirements

The facility must report all observed damage, deterioration, failed components or noncompliant parts to the car owner.

The facility must prepare and provide owner with the written report of all the inspection and test results including defects found and repair methods.

The facility must mark the tank car with the date of inspection and inspection due date.

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What is it and how it's done.

Inspection Requirements

- Visual Inspection
- Structural Integrity Inspection & Test
- Thickness Test
- Safety System Inspection
- Interior Coating or Lining Inspection & Test
- Leakage Pressure Test
- Service Equipment Inspection & Test

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What is it and how it's done.

Inspection Requirements

Visual Inspection

- Internal inspection of the tank for abrasion, corrosion, cracks, dents and weld defects.
- Inspection of exposed areas when the removal of linings, head protection, insulation or thermal protection in whole or part.
- Inspection of service equipment including gaskets.
- Inspect for loose or missing fasteners.
- An inspection of all closures including protective housings.
- Threaded seats on excess flow valves.
- Inspection of the required markings.

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What is it and how it's done.

Inspection Requirements

Visual Inspection

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What is it and how it's done.

Inspection Requirements

Structural Integrity Inspection

- All transverse fillet welds greater than ¼" on the bottom 8' of tank, except body bolster repad welds.
- The termination of longitudinal fillet welds greater than ¼" on the bottom 8' of tank.
- Tank shell butt welds on the bottom 4' of tank, unless owner can determine that structure will not develop defects reducing the design level of safety, fail during it's operational life or prior to the next inspection. (only at time of lining removal for lined tanks)

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What is it and how it's done.

Inspection Requirements

Structural Integrity Inspection

- All these inspections must be performed using one or more NDT methods.
  PT, MT, UT, RT or VT including direct, remote or enhanced visual.

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What is it and how it's done.

Inspection Requirements

Structural Integrity Inspection

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What is it and how it's done.

Inspection Requirements

Thickness Test

- A test to determine the thickness of the shell, heads, sumps, protective housings and nozzles.

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What is it and how it's done.

Inspection Requirements

Thickness Test Intervals

- At time of interior coating or lining removal of the tank.
- Once every 10 years for an uncoated or unlined tank.
- Once every 5 years for an uncoated or unlined tank when,
  - Used to transport a product that is corrosive or reactive.
  - When shell is found to be below frequency adjustment threshold.
- After repairs, modifications or blasting that results in a reduction of thickness.

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What is it and how it's done.

Inspection Requirements

Safety Systems Inspection

- Inspection of the thermal protection system.
- Inspection of the insulation system, excluding foam and cork.
- Inspection of tank head puncture resistance system.
- Inspection of coupler vertical restraint system.
- Discontinuity protection. e.g., skids and protective housings.

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What is it and how it's done.

Inspection Requirements

Safety Systems Inspection

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What is it and how it's done.

Inspection Requirements

Interior Coating and Lining Inspection and Test

- Inspection of coatings or linings that are used for protection against corrosive or materials reactive to the tank.

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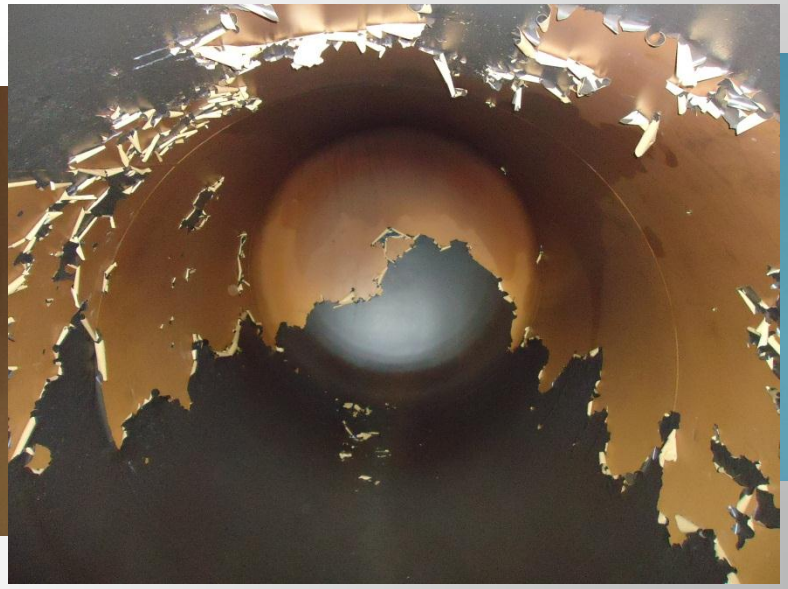
What is it and how it's done.

Inspection Requirements

Interior Coating and Lining Inspection and Test



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What is it and how it's done.

Inspection Requirements

Leakage Pressure Test

- A pressure test of the tank, service equipment and all closures installed on the tank, unless the configuration prohibits it.

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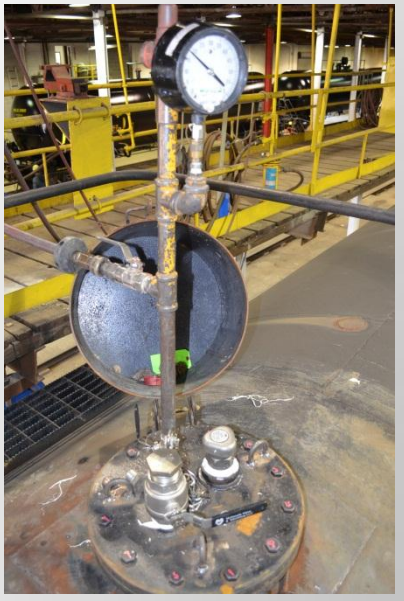
What is it and how it's done.

Inspection Requirements

Leakage Pressure Test



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What is it and how it's done.

Inspection Requirements

Service Equipment Inspection and Test

- A detailed inspection and test of service equipment components to ensure they continue to meet the design specifications and level of safety and reliability.
  - Fasteners, plugs, flanges, pressure plates, fittings plates, manway covers non-reclosing PRD's, valve adaptors, gasket sealing surfaces, etc.
  - Inspection, rebuild and test of all process valves, PRDs, vacuum valves sample valves, etc.
  - Hydrostatic test of interior heater systems.

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What is it and how it's done.

Inspection Requirements

Service Equipment Inspection and Test


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What is it and how it's done.

Inspection Requirements

Qualification After Repair or Maintenance

After performing any repairs or maintenance activities to any part of the tank or it's components, these items must be qualified to ensure continued qualification of the package.

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What is it and how it's done.

Inspection Requirements

Inspection Reporting

Each tank car that is inspected and tested must have a written report generated in English.

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What is it and how it's done.

Inspection Requirements

Inspection Reporting

The inspection and test report must contain the following information;

1. Tank car reporting mark and number.
2. Tank car specification.
3. Date of inspection and test.
4. Type of inspection and test.
5. Results for each inspection and test.
6. Location and description of defect found and method of repair.
7. Unique code identifying the facility. (Station Stencil)
8. Name and address of tank car facility including name and signature of inspector.

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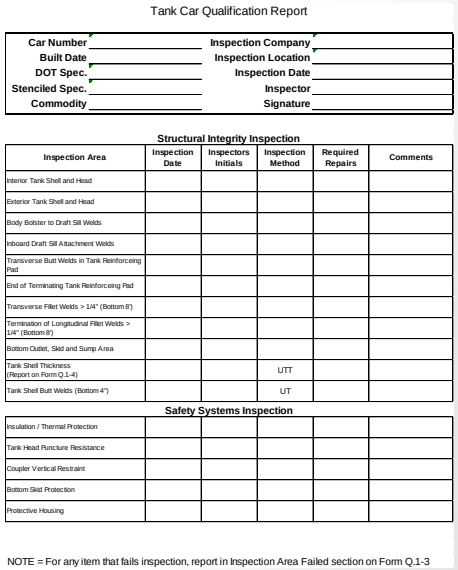
What is it and how it's done.

Inspection Requirements

Inspection Reporting



Tank Car Qualification Report

Car Number		Inspection Company	
Built Date		Inspection Location	
DOT Spec.		Inspection Date	
Stenciled Spec.		Inspector	
Commodity		Signature	

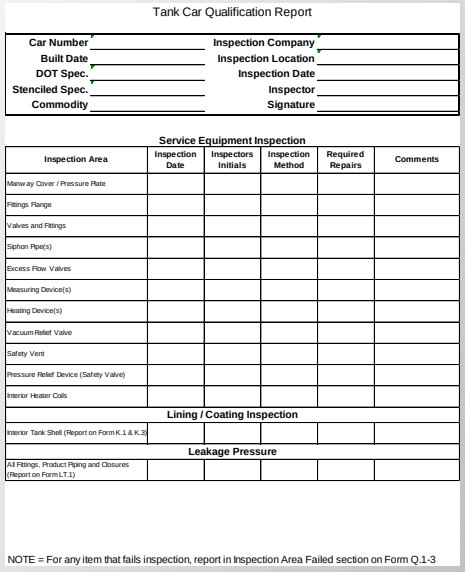
Structural Integrity Inspection

Inspection Area	Inspection Date	Inspectors Initials	Inspection Method	Required Repairs	Comments
Interior Tank Shell and Head					
Exterior Tank Shell and Head					
Body Bolster to Draft Sill Welds					
Inboard Draft Sill Attachment Welds					
Transverse Butt Welds in Tank Reinforceing Pad					
End of Terminating Tank Reinforceing Pad					
Transverse Fillet Welds > 1/4" (Bottom 8')					
Termination of Longitudinal Fillet Welds > 1/4" (Bottom 8')					
Bottom Outlet, Skid and Sump Area					
Tank Shell Thickness (Report on Form Q.1-4)			UTT		
Tank Shell Butt Welds (Bottom 4")			UT		

Safety Systems Inspection

Insulation / Thermal Protection					
Tank Head Puncture Resistance					
Coupler Vertical Restraint					
Bottom Skid Protection					
Protective Housing					

NOTE = For any item that fails inspection, report in Inspection Area Failed section on Form Q.1-3



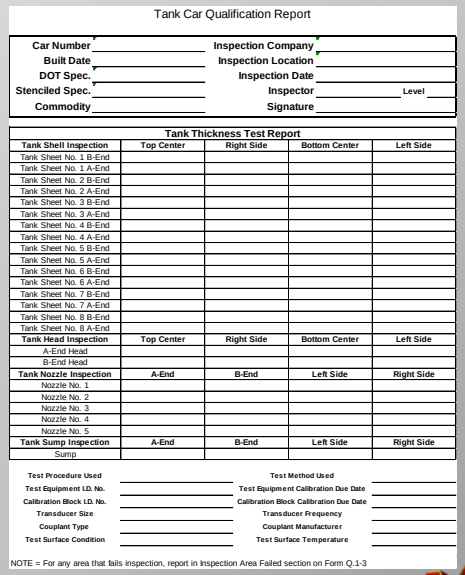
Tank Car Qualification Report

Car Number		Inspection Company	
Built Date		Inspection Location	
DOT Spec.		Inspection Date	
Stenciled Spec.		Inspector	
Commodity		Signature	

Service Equipment Inspection

Inspection Area	Inspection Date	Inspectors Initials	Inspection Method	Required Repairs	Comments
Manway Cover / Pressure Rate					
Fittings Flange					
Valves and Fittings					
Siphon Pipe(s)					
Excess Flow Valves					
Measuring Device(s)					
Heating Device(s)					
Vacuum Relief Valve					
Safety Vent					
Pressure Relief Device (Safety Valve)					
Interior Heater Coils					
Lining / Coating Inspection					
Interior Tank Shell (Report on Form K.1 & K.3)					
Leakage Pressure					
All Fittings, Product Piping and Closures (Report on Form LT.1)					

NOTE = For any item that fails inspection, report in Inspection Area Failed section on Form Q.1-3



Tank Car Qualification Report

Car Number		Inspection Company	
Built Date		Inspection Location	
DOT Spec.		Inspection Date	
Stenciled Spec.		Inspector	Level
Commodity		Signature	

Tank Thickness Test Report

Tank Shell Inspection	Top Center	Right Side	Bottom Center	Left Side
Tank Sheet No. 1 B-End				
Tank Sheet No. 1 A-End				
Tank Sheet No. 2 B-End				
Tank Sheet No. 2 A-End				
Tank Sheet No. 3 B-End				
Tank Sheet No. 3 A-End				
Tank Sheet No. 4 B-End				
Tank Sheet No. 4 A-End				
Tank Sheet No. 5 B-End				
Tank Sheet No. 5 A-End				
Tank Sheet No. 6 B-End				
Tank Sheet No. 6 A-End				
Tank Sheet No. 7 B-End				
Tank Sheet No. 7 A-End				
Tank Sheet No. 8 B-End				
Tank Sheet No. 8 A-End				
Tank Head Inspection	**Top Center**	**Right Side**	**Bottom Center**	**Left Side**
A-End Head				
B-End Head				
Tank Nozzle Inspection	**A-End**	**B-End**	**Left Side**	**Right Side**
Nozzle No. 1				
Nozzle No. 2				
Nozzle No. 3				
Nozzle No. 4				
Nozzle No. 5				
Tank Sump Inspection	**A-End**	**B-End**	**Left Side**	**Right Side**
Sump				

Test Procedure Used		Test Method Used	
Test Equipment I.D. No.		Test Equipment Calibration Due Date	
Calibration Block I.D. No.		Calibration Block Calibration Due Date	
Transducer Size		Transducer Frequency	
Couplant Type		Couplant Manufacturer	
Test Surface Condition		Test Surface Temperature	

NOTE = For any area that fails inspection, report in Inspection Area Failed section on Form Q.1-3

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What is it and how it's done.

Inspection Requirements

Inspection Reporting

After the successful completion of all inspection and test, the tank car must be marked with the date of inspection and the next inspection due date.

Marking or retaining the specification on the tank car is the representation that all inspection and test were performed and the results meet the tank car owners acceptance criteria to qualify the car for continued use.

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What is it and how it's done.

Inspection Requirements

Inspection Reporting

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What is it and how it's done.

Inspection Requirements

Alternative Inspection and Test Program

A car owner may request for the use of an alternative inspection program. (e.g. Extended inspection interval, relief form inspection, etc.)

This request must be submitted and approved by the DOT and include a supporting damage tolerance analysis or service reliability assessment.

Summary

Key Points

Program must be developed and implemented by car/equipment owner.

Car/equipment owner must ensure that facility operates in accordance with the program.

Facility must follow the program without deviation.

Inspection frequency must be driven by supporting data.

All maintenance and repair functions must be qualified.

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Questions?????

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