TANK CAR
Guide

THE GREENBRIER COMPANIES

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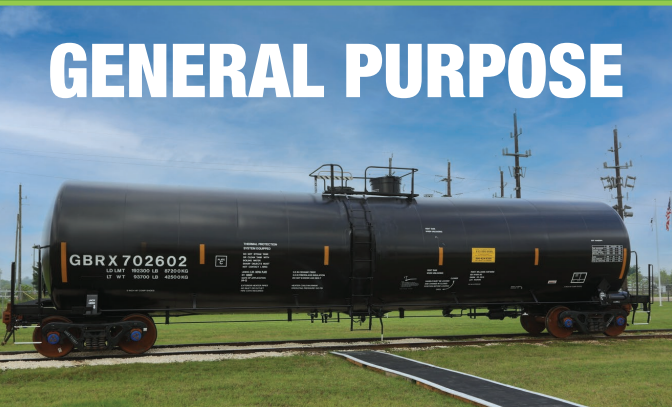
GENERAL PURPOSE



GENERAL PURPOSE TANK CARS

- Non-hazardous products
- Hazardous products with low to medium risks
- 13,600–34,500 gallons
- 100 to 165 PSI test pressure
- May have top and bottom valves with exposed fittings
- Reclosing or non-reclosing pressure relief device
- Sometimes called low pressure or general service

Major Commodities

- Alcohol N.O.S.
- Corn oil
- Diesel fuel
- Ethanol
- Gasoline
- Hydrochloric acid
- Sodium hydroxide solution
- Sulfuric acid

PRESSURE

PRESSURE TANK CARS

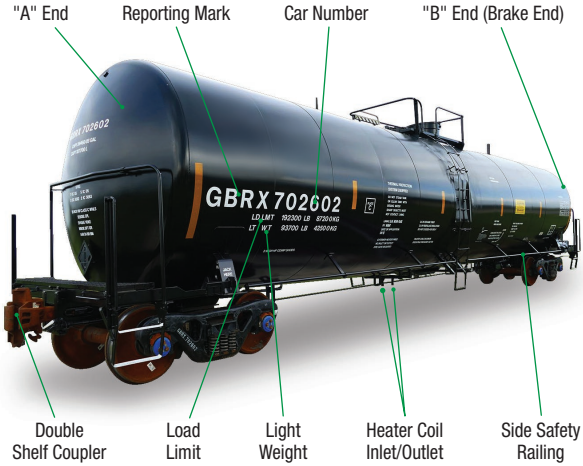
- Compressed gases and materials poisonous by inhalation
- 18,000–34,500 gallons
- 100–600 PSI test pressure
- Variety of top valves and typically no bottom valves
- Reclosing pressure relief device

Major Commodities

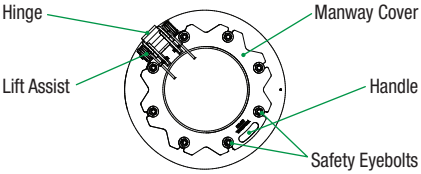
- Anhydrous ammonia
- Butane
- Carbon dioxide
- Chlorine
- Ethylene oxide
- Liquefied petroleum gas (LPG)
- Propane
- Vinyl chloride, stabilized

GENERAL PURPOSE

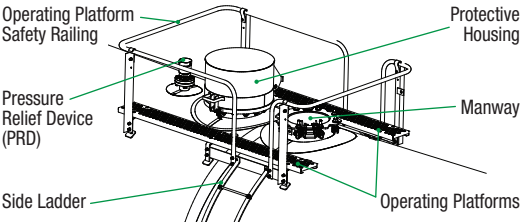
(sometimes called low pressure or non-pressure)



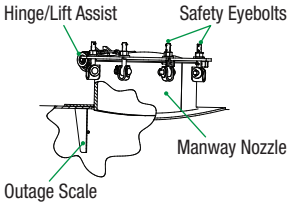
Hinged and Bolted Manway

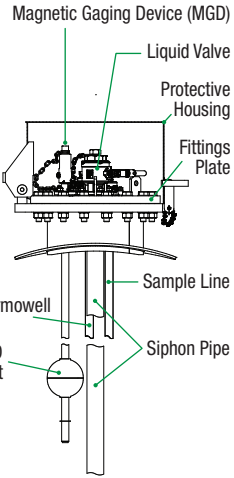


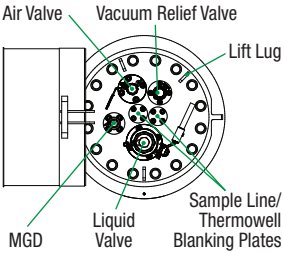
Operating Platform



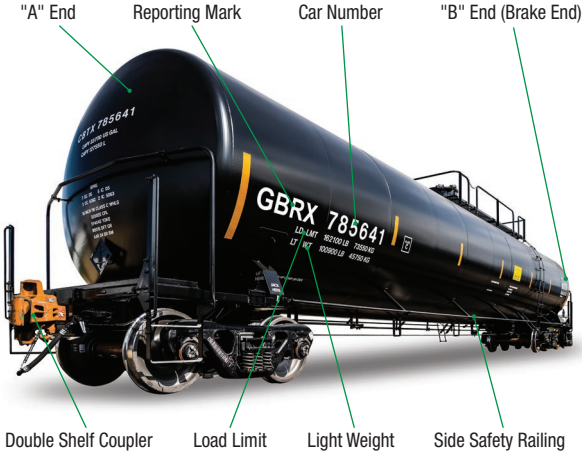
Valves and Fittings (not all cars equipped)







PRESSURE



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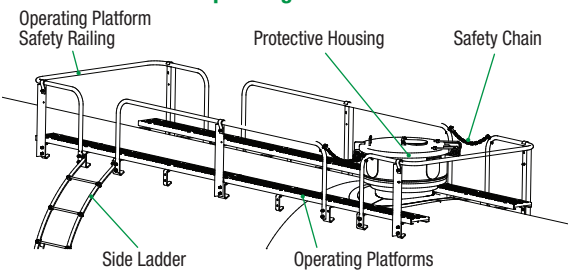
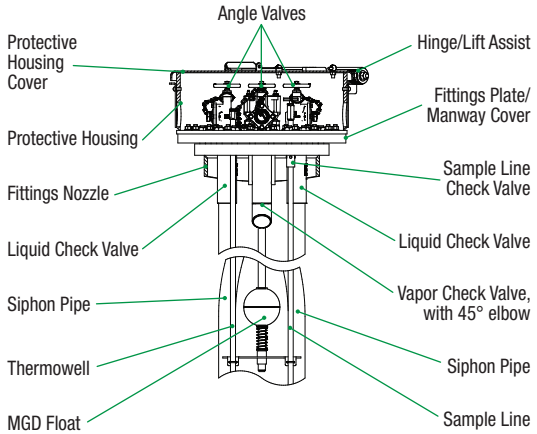
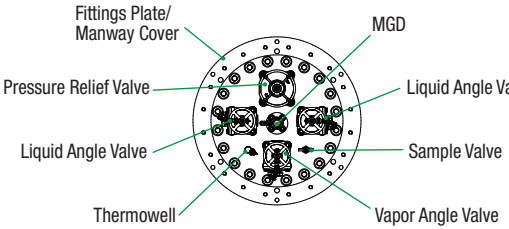
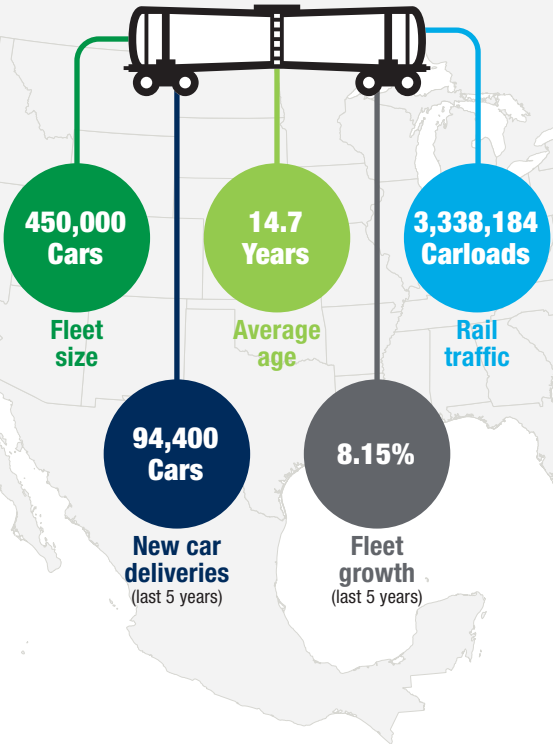


Valves and Fittings

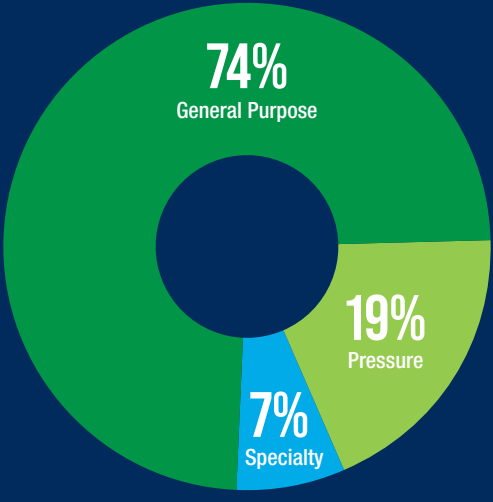




ALL TANK CARS BY THE NUMBERS



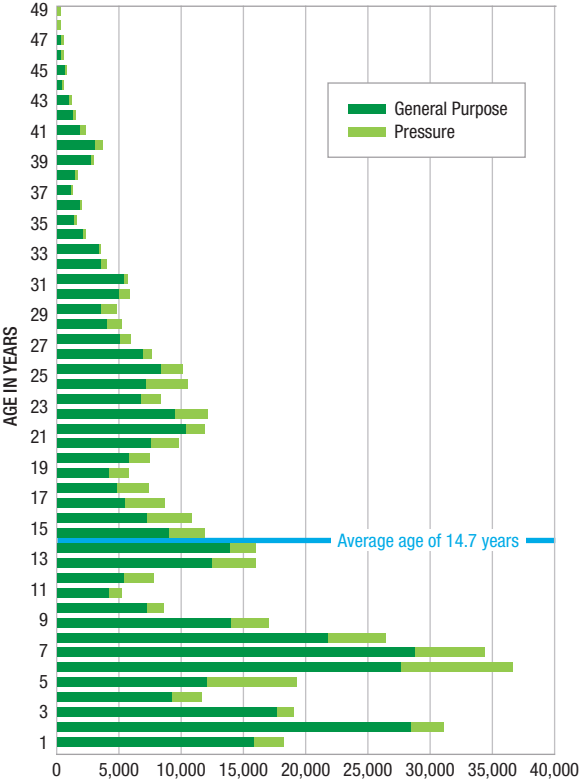
NORTH AMERICAN FLEET MIX BY GENERAL TANK CAR TYPE



100% = 450,000

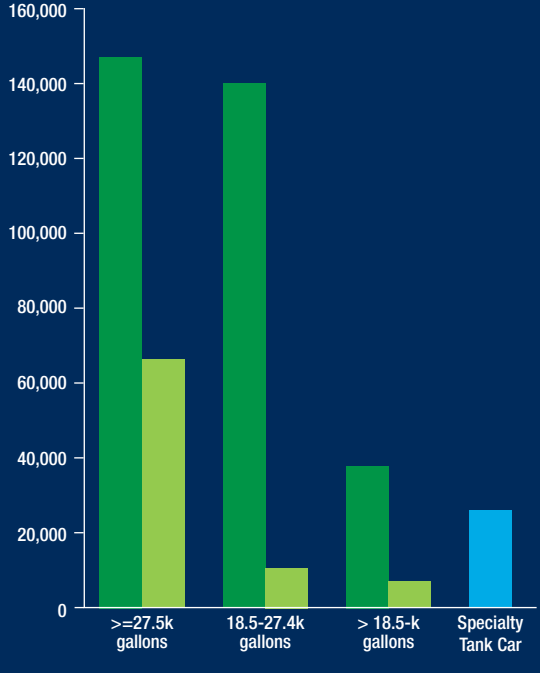
Source: UMLER

AVERAGE FLEET AGE AND NUMBER OF CARS BY TANK CAR TYPE



Source: AAR

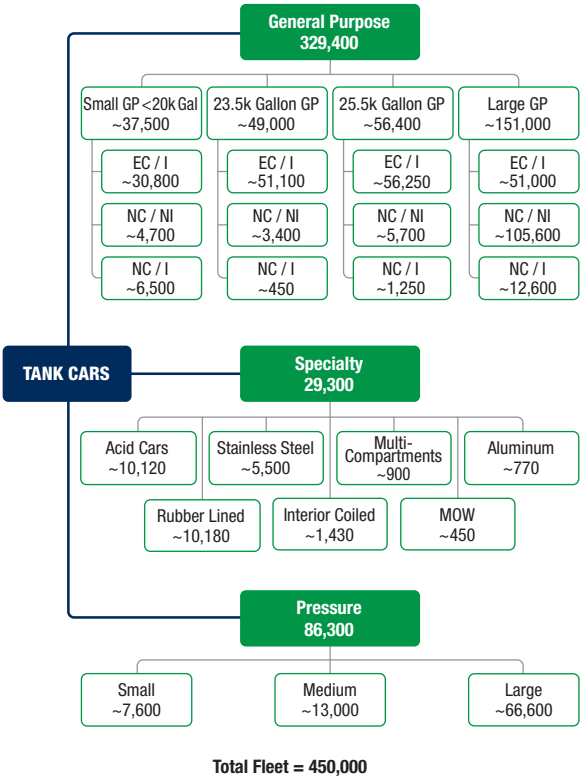
NORTH AMERICAN TANK CAR FLEET BY CAPACITY



Total Fleet = 450,000

Source: AAR

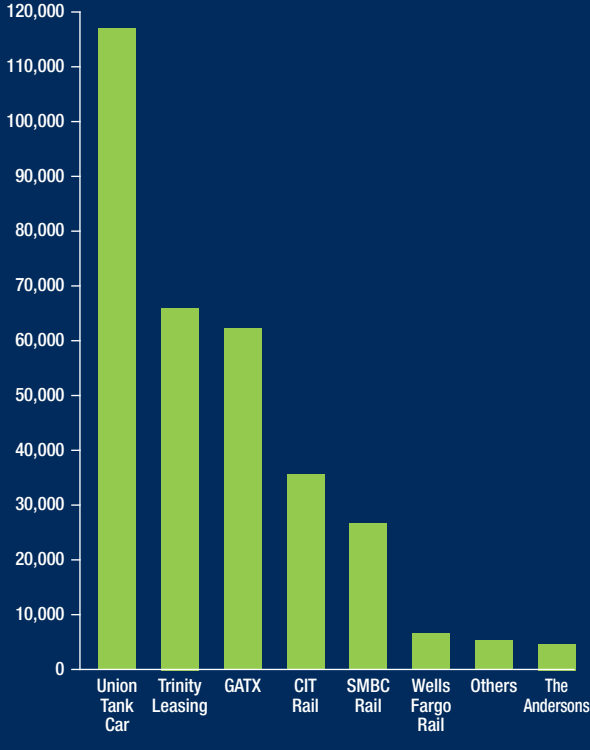
NORTH AMERICAN FLEET SEGMENTATION



Total Fleet = 450,000

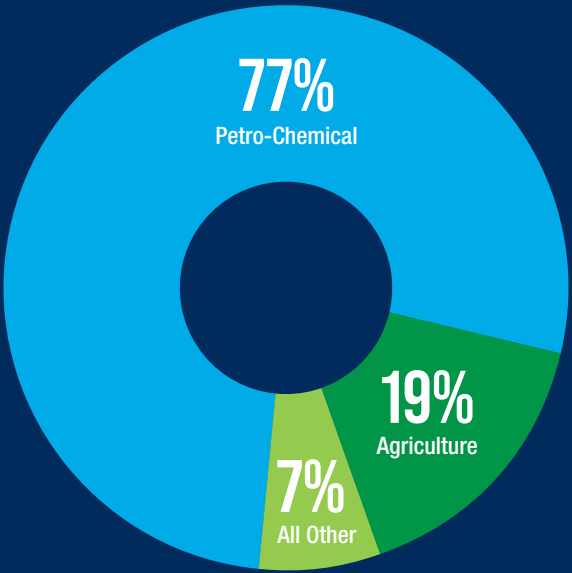
Source: FTR

NORTH AMERICAN LEASE FLEET



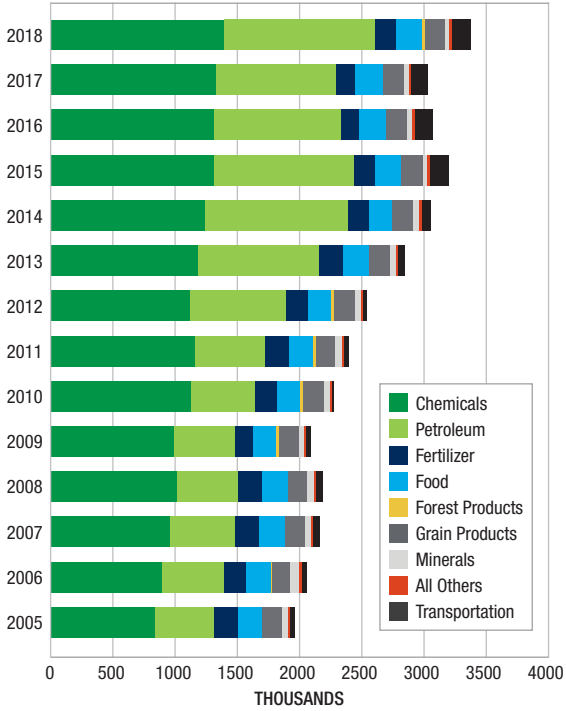
Source: UMLER

2018 TOTAL NORTH AMERICAN TANK CAR TRAFFIC BY INDUSTRY

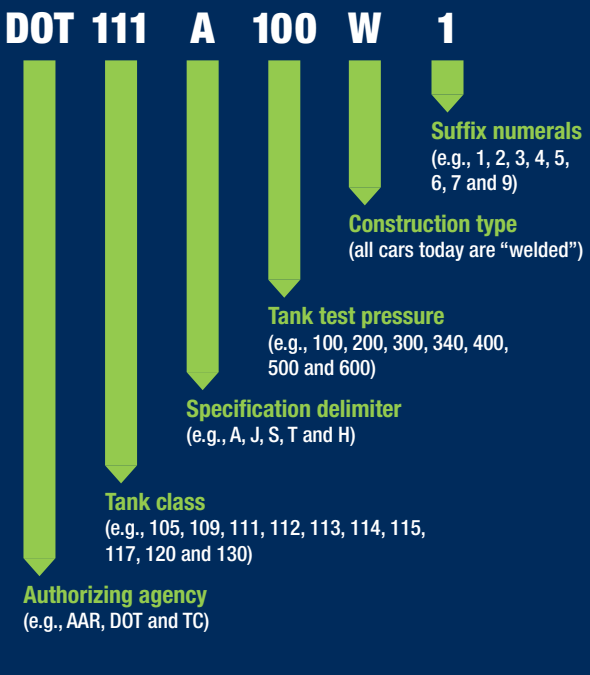


Source: FTR

TOTAL NORTH AMERICAN TANK CAR TRAFFIC BY INDUSTRY



Source: FTR



AUTHORIZING AGENCIES

AAR Association of American Railroads

DOT Department of Transportation

TC Transport Canada

AAR

CLASS	DESCRIPTION
204	Class 204 tank cars are vacuum-insulated cars having an inner container and carbon steel outer shell. They are designed for loading of liquid argon, nitrogen or oxygen. Specification AAR 204W tank cars are similar in concept to Class 113.
206	Specification AAR 206W tank cars are insulated non-pressure cars having an inner container and carbon steel outer shell. These cars conform, with certain exceptions, to Class 115.
207	Class 207 pressure-differential covered hoppers are designed for 15 psig (103 kPa) minimum internal pressure and are used for the transportation of granular commodities that are off-loaded pneumatically.
211	Class 211 tank cars are insulated or non-insulated non-pressure cars without an expansion dome. The numeral after "W" designates specific outlet and bottom connection options. These cars conform, with certain exceptions, to Class 111.
CPC-1232	CPC-1232 tank cars conform to Class 111, but have enhanced safety features such as thicker tank shell and heads, the use of normalized steel, head protection, top fittings protection and re-closing pressure relief devices.

DOT / TC

CLASS	DESCRIPTION
105	Class 105 tank cars are insulated carbon or alloy steel pressure cars, with a manway nozzle, designed for top loading and off-loading; bottom outlet or washout prohibited.
111	Class 111 tank cars are insulated or non-insulated non-pressure cars without an expansion dome. The expansion capacity in the tank is 2%. Class 111 tank cars built for specific services or requiring special fittings or materials of construction are designated by suffix letters or numerals.
112	Class 112 tank cars are insulated or non-insulated carbon or alloy steel pressure cars with a manway nozzle and without bottom connections, designed for top loading and off-loading.
113	Class 113 tank cars are vacuum-insulated cars with an inner container and carbon steel outer shell. The insulation system is designed for a holding time. Class 113 cars are designed for specific loading and shipping temperatures and have certain materials and fittings requirements as designated by the intermediate letter.
114	Class 114 tank cars are insulated or non-insulated carbon or alloy steel pressure cars with a manway nozzle and optional noncircular cross-section. An additional group of valves and fittings may be provided in another location.
115	Class 115 tank cars are insulated non-pressure cars having an inner container and carbon steel outer shell with optional bottom connections.
117	Class 117 tank cars are insulated or non-insulated carbon steel non-pressure cars with a manway nozzle designed for top loading and top or bottom off-loading, generally used for the transportation of flammable liquids. These cars conform, with certain exceptions, to Class 120.
120	Class 120 tank cars are insulated pressure cars with a manway nozzle. An additional group of valves and fittings may be provided in another location.

Safety System Delimiter Summary by Tank Class

CLASS	112A/ 114A	112S /114S	112T/ 114T	112J/ 114J	117J/ 117P*	117R	105A	105S	105J	105H/ 112H
Head Protection		●	●	●	●	●		●	●	●
Insulation					Optional	Optional	●	●	●	●
Non-Jacketed Thermal Protection			●							
Thermal Protection				●	●	●			●	●
Tank Jacket				●	●	●	●	●	●	●
PRD Sized Using AFFTAC			●	●	●	●			●	●
9-MPH Top Roll Over Protection										●

*117P tank cars conform to Class 117, but the tanks are not manufactured from AAR TC-128, Grade B, normalized, carbon steel plate. Alternate steels may be used, such as stainless steel, provided, the car can withstand a 12-mph side impact and a 18-mph head impact. These cars require FRA approval.

UNITED STATES

SPECIFICATION	Class 111 Non-jacketed	Class 111 Jacketed	CPC 1232 Non-jacketed	CPC 1232 Jacketed
Crude Oil, unrefined petroleum product	1/1/2018	3/1/2018	4/1/2020	5/1/2025
Ethanol	5/1/2023	5/1/2023	7/1/2023	5/1/2025
Other Flammable Liquids PG I	5/1/2025	5/1/2025	5/1/2025	5/1/2025
Other Flammable Liquids PG II and III	5/1/2029	5/1/2029	5/1/2029	5/1/2029
Condensates	No Requirement	No Requirement	No Requirement	

CANADA

SPECIFICATION	Class 111 Non-jacketed	Class 111 Jacketed	CPC 1232 Non-jacketed	CPC 1232 Jacketed
Crude Oil, unrefined petroleum product (UN1267, 1268, 3494)	11/1/2016	11/1/2016	11/1/2018	5/1/2025
Ethanol (UN1170, 1987, 1993, 3476)	5/1/2023	5/1/2023	7/1/2023	5/1/2025
Other Flammable Liquids PG I	5/1/2025	5/1/2025	5/1/2025	5/1/2025
Other Flammable Liquids PG II and III	5/1/2025	5/1/2025	5/1/2025	5/1/2025
Condensates	1/1/2019	1/1/2019	1/1/2019	


GBRX 310060
LD LMT 195700 LB 88800 KG
WT 67300 LB 30500 KG

A end of the car—a term used to identify locations on a railcar, being the end opposite the "B" end. Commonly seen with "L" or "R" to designate left or right side (e.g., "AL" or "AR.") *See "B" end of railcar.*

A level protection—the highest level of accident protection for bottom outlet valves, sumps and washouts. All new railcars are built to "A" level requirements.

AAR Specifications for Tank Cars—the manual that sets standards, in addition to DOT specifications, for the design, construction, repair, inspection and testing, and certification of tank car facilities and personnel.

AAR tank car class—tank cars built to the requirements contained in the Association of American Railroads, Manual of Standards and Recommended Practices, Section C, Part III, M-1002, Specifications for Tank Cars.

AAR—an acronym for the "Association of American Railroads."

ACC—an acronym for the “American Chemistry Council.”

AE—an acronym for “Acoustic Emission Testing.” A non-destructive testing technique that detects and monitors the release of ultrasonic stress waves from localized sources when a material deforms under stress.

Air valve—a valve mounted on top of a tank car through which air pressure, or other gas pressure, is introduced to facilitate off-loading.

Alloy steel—a steel with differing amounts of various elements added to enhance corrosion proprieties. Stainless steel falls under this classification.

Alteration—a change in tank or fittings that does not change the specification or class, but which does change the certificate of construction.

Alyko—a paint whose major component is alkyd resin.

API—an acronym for the "American Petroleum Institute."

ASLRRA—an acronym for the "American Short line and Regional Railroad Association."

Assemble—to construct a tank car without welding on the tank car tank. The tank would, in this situation, have been fabricated by another shop authorized to construct tanks.

B-612 (Midland MFG. Co.)—a gauging device manufactured by Midland Manufacturing Company. This device may be used on both non-pressure and pressure tank cars and permits gauging without releasing any commodity to the atmosphere.

Bathtub ring—a corrosion phenomenon that decreases the tank's thickness when commodity remains in the tank when water is loaded. Mainly found after tank testing.

Bee screen—a screen covering an opening into a tank (commonly the air inlet of a corn syrup railcar) to prevent bees and other insects attracted by the commodity, from entering the tank.

B-end—the end of the railcar on which the hand brake is located.

Black natural rubber—a type of rubber commonly used to line the interior of a tank car to protect the interior of the tank from corrosion attack.

BOE-6000 series—a tariff that incorporates the Hazardous Material Regulations issued by the U.S. Department of Transportation. The tariff also includes additional information useful for railroads and shippers of hazardous materials.

BOE—an acronym for the "Bureau of Explosives." BOE is a department within AAR responsible for hazardous material transportation safety.

Bottom outlet protection—a protective structure around bottom outlets and washouts to protect these devices against damage that could result in the release of contents in the tank during a derailment.

Bottom outlet valve (BOV)—a valve located at the bottom of the tank through which the tank contents may be off-loaded.

Bottom washout—an outlet on the bottom of the tank used only during tank cleaning/washing/rinsing operations. NOT used to off-load the tank.

Bureau of Explosives (or BOE)—a department of the AAR that conducts railroad, shipper, manufacturing and repair facility audits against the Hazardous Material Regulations issued by the U.S. Department of Transportation.

Burst pressure—the theoretical internal pressure necessary to rupture a tank. The term is also used to mean the start-to-discharge pressure of a frangible (rupture) disc or breaking pin device used in a combination pressure relief device.

Butterfly valve—a quarter-turn shutoff valve where the closure member consists of a generally circular disc that blocks fluid flow when perpendicular to the flow path and permits flow when rotated 90-degrees or parallel to the flow path.

Car seal—a security device consisting of a thin metal strip or metal cable usually attached to tank or hopper car closures. A broken seal indicates possible tampering or unauthorized tank entry.

Center band—a chemically resistant vertical paint band, often thicker than the exterior paint, around the center of the tank to protect against possible commodity spills.

Ceramic fiber—a high-temperature ceramic fiber material that manages the flow of heat into the tank when exposed to fire. The ceramic fiber is necessary in order to meet the DOT requirements for “H” and “J” railcars.

Check valve—a valve that automatically closes to stop the flow of liquid or vapor in one direction. Also known as an excess flow valve.

CHEMTREC—an acronym for the “Chemical Transportation Emergency Center” managed by the American Chemistry Council.

Chlorobutyl—a type of rubber commonly used to line the interior of a tank car to protect the interior of the tank from corrosion attack.

CI—an acronym for the “Chlorine Institute.”

Closing pressure—the pressure measured at a pressure relief valve inlet, at which the valve closes.

Coiled or Coils—a tank interior or exterior coil piping system used to heat vicious products to allow for easier off-loading.

Compartment tank car—a tank car in which the tank is divided into several sections for the purpose of carrying different commodities or smaller shipments.

Conical jacket heads—the general shape of a tank head jacket fabricated by means other than pressing.

Conversion—a change in tank or fittings that changes the tank class or specification.

Corrosion, crevice—a localized type of corrosion occurring within an adjacent to narrow gaps or openings formed by metal-to-metal-to-non-metal contact. Aluminum and stainless steel that depend on their surface oxide film for corrosion resistance are particularly prone to crevice corrosion.

Corrosion, galvanic or dissimilar metal corrosion—the loss of metal resulting from the electrical potential of two dissimilar metals.

Corrosion, intergranular—an attack on the grain boundaries or zones immediately adjacent to the grains. Typically, there is no attack on the grain body.

Corrosion, pitting—a highly-localized loss of metal. In extreme cases it appears as deep tiny hole in an otherwise unaffected area.

Corrosion, uniform or general corrosion—an even rate of metal loss over an exposed surface. It is generally the result of metal loss from chemical attack or dissolution of the metallic component into metallic ions.

Crown—the highest point on the top curved surface of a tank car.

Cryogenic liquid tank car—a tank car design to transport extremely cold materials, such as liquid ethylene, hydrogen and methane.

Cutout—an inspection port opening in a tank jacket that will later be either permanently closed (e.g., welding) or with a removable closure.

Depth gauge—a device used for measuring the amount of liquid in a tank car.

Dome or Expansion Dome—a vertical cylinder with dome head designed for pressure on the concave side installed on older DOT 103 and DOT 104 tank cars to allow for product expansion. The minimum expansion capacity was generally 1% or 2% depending on tank design. The dome head typically included valves, fittings, a pressure relief device and a manway. Today, this term is sometimes used to refer to the top fitting arrangement or manway area.

DOT tank car class—tank cars built to the requirements contained in the Department of Transportation's Hazardous Materials Regulations. *See 49 C.F.R. §§100-185.*

DOT—an acronym for the "Department of Transportation."

Draft sill—the primary structure member of the underframe that extends from the striker casting to the body bolster. The draft sill is subjected to buff and draft forces during train operations and contains the cushioning unit behind the coupler to absorb train load forces.

Excess flow valve—a device, typically installed below a liquid or vapor valve, that closes automatically against the outward flow of the contents of the tank in case the external closure valve is broken off or removed during transit. Excess flow valves may be designed with a by-pass to allow the equalization of pressures.

Exterior coils—the half pipe system welded to the exterior of the tank that uses a fluid medium to heat the lading from outside the tank for the purpose of off-loading.

Extreme height—the distances from the top of the rail to the highest point on the railcar.

Fill hole—a relatively small opening (with bolted and hinged cover), located on the manway cover plate, used to load the tank. Fill holes are commonly installed on tank cars in acid service.

Fixed tube gauge—a tube, mounted on the manway cover plate, extending into the tank a fixed distance. Commodity flowing out of the valve at the top of the tube indicates that the liquid level is at or above the bottom of the tube.

Flashing—the relatively small pieces of jacket material used to achieve a weather-tight fit around nozzles and other appurtenances that protrude through the jacket of an insulated tank car.

Flourotape—a video magnetic tape recording of the output of a fluoroscope.

Flow capacity—the capacity in cubic feet per minute (cubic meters per second, metric) of air at standard conditions discharged through a pressure relief device when tested at the required flow rating pressure.

Fluoroscope—an instrument with a fluorescent screen used for viewing X-ray images without taking and developing X-ray photographs.

Foam—polyurethane foam insulation, a high-efficiency insulation material used on tank cars transporting highly-temperature sensitive products. Not generally used on railcars equipped with heater coils.

Food-grade—a level of interior preparation suitable for use with materials intended for human consumption. Also, a term used to describe gaskets suitable for use with the above type of materials.

FRA—an acronym for the "Federal Railroad Administration." FRA is a department within the Department of Transportation responsible for railroad transportation safety.

Frangible disc—the operating part of a non-reclosing pressure relief device (safety vent) designated to burst at a pre-determined tank pressure.

Fusion welding—a group of processes in which metals are welded together by bringing them to the molten state at the surfaces to be joined.

Gauging device—a device that measures the liquid level within the tank; typically used in a closed system of loading.

Hazardous material—a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety and property when transported in commerce and has designated as hazardous under section 5103 of Federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table *(see 49 CFR 172.101)* and materials that meet the defining criteria for hazard classes and divisions in 49 C.F.R. §173.

HD—an acronym for "Hot Dog" which refers to a stub-sill design tank car (without a continuous center sill).

Head brace—the reinforcement structure between the draft sill and tank head at each end of a tank car.

Head plate—the flat plate of steel plate that will subsequently be formed into a tank head.

Head shield—a puncture resistant system often manufactured from ½-inch steel plate, shaped to the contour of the tank head and installed concentric with the tank heads, to help prevent tank head puncture in train accidents.

Header system—a tank car heater arrangement generally consisting of four (4) or more parallel longitudinal heater coil runs.

Header—a lateral or circumferential heater coil that connects two (2) or more parallel longitudinal heater coil runs.

Heater coils—the tubular pipe sections of an interior heating system, or the half-oval heat chamber sections welded to the exterior of the tank.

Heater runs—a straight continuous longitudinal section of an interior or exterior heater coil.

Hydrostatic pressure test—an NDT method as defined in the current standard that requires filling the tank with a liquid, usually water and pressurizing the tank to the specified test pressure. By shutting off the supply line, a technician can verify pressure tightness by observing whether there is a pressure loss or if there is a visible leak.

Innage—a measurement of the number of gallons of commodity contained in a tank. Usually determined indirectly by measuring to the liquid level in the tank and then consulting a pre-calculated table.

Insulated—the tank is covered with an interposing material, such as fiberglass, to prevent the loss or gain of heat.

Insulation (railcar construction)—any material that decreases the flow of heat through a structural wall from one space to another. Common insulating materials in railcar applications include polyurethane foam, ceramic fiber and fiberglass. Dead air space between wall panels also serves as an effective insulation.

Interior heater system—a piping system located within the tank that uses a medium to heat the material within the tank for the purposes of off-loading.

Interior preparation or interior prep—blasting and/or grinding the interior surface of a tank usually in anticipation of lining or coating application.

Interior protective coating—a layer of material applied to the surface of another material with the intent of inhibiting or preventing corrosion. Protective coatings are generally sprayed onto the interior surfaces of a tank and sometimes require heat curing.

Interior protective lining—a layer of material applied to the surface of another material with the intent of inhibiting or preventing corrosion. Protective linings are generally applied in sheets onto the interior surfaces of a tank and require heat and pressure to vulcanize the material to the tank.

IXC—an acronym for an "Insulated and Exterior Coiled" tank car.

Jacket head—the portions of the tank jacket that covers each end of an insulated tank car.

Jacket spacer—the steel, foam, or wood stand-offs on the outer tank shell that provide support and separation of the metal jacket from the tank; thus, defining a uniform space for the insulation.

Jacket—an 11-gauge metal covering applied over insulation or thermal protection material to prevent weathering of the material.

Jacking pad—the steel plates usually attached to the underside of body bolsters, near the sides of railcar, designated to support the weight of the railcar on rail car jacks.

Jumbo pressure tank car—a tank car having an internal capacity greater than 30,000 gallons.

Left side (L)—the left side of a railcar when facing the "B" end of a railcar.

Liquid tight—a valve, tank, or mechanical joint judged to have passed a specific hydrostatic leak test using specific acceptance criteria.

Liquid valve—a valve mounted at the top of a siphon pipe for loading or off-loading a fluid product.

Low profile ball valve—a bottom outlet valve designed to protrude a minimum distance below the tank shell.

LPG—an acronym for "Liquefied Petroleum Gas."

LT—an acronym for "Leak Testing." A common method is the "Bubble Leak Technique."

Manway cover—the bolted closure at the top of each tank designed for removal to permit workers to enter the interior of the tank for cleaning, inspection and maintenance purposes. The manway cover also contains the fittings arrangement. On a pressure tank car, this is sometimes referred to as the "silver dollar."

Manway nozzle—the cylindrical tube or other structure welded to the top of the tank defining the manway opening and upon which the manway cover is mounted.

Manway—an opening located at the top of each tank that permits workers to enter the interior of the tank for cleaning, inspection and maintenance purposes. Manways are also referred to access ports and hatches.

Marked capacity—the volumetric (gallons or liters) shell full capacity stenciled on each end of a tank car.

Microwave gauging device—a closed-system gauging device using microwave technology rather than mechanical floats, direct visual, ultrasonic, or other means to detect tank liquid level.

Mileage equalization—to balance revenue and non-revenue miles in the movement of private railcars. There are two mileage equalization programs in place, each calculated separately: one that applies to private railcars in Canada and a second that applies to private tank cars in the United States. In the case of tank cars, railroads charge for that portion of empty miles that are in excess of 6 percent of loaded miles.

MT—an acronym for "Magnetic Particle Testing."

Mud guards—the relatively light weight fender-type structures mounted above the wheels of some tank cars to prevent foreign matter from being thrown against and thereby dirtying the railcar body.

Multiple housing—the top fittings arrangement on a tank car.

Multi-unit tank car—tank car tanks built to a DOT 106A or DOT 110A specification. Tanks built under these two specifications are cylindrical, circular in cross section and have heads of approved design. All openings are in the heads. Each tank has a water capacity of at least 1,500 pounds and not more than 2,600 pounds.

Needle valve—a type of valve with a small port and a threaded, needle-shaped plunger. It allows precise regulation of flow, although it is generally only capable of relatively low flow rates. This type of valve is commonly used on a sample line.

NINC—an acronym for a "Non-Insulated and Non-Coiled" tank car.

Nitrogen purge—a standard technique of displacing any undesirable or hazardous atmosphere within a tank with an inert nitrogen atmosphere. Nitrogen is dry and non-combustible. Nitrogen displacement of combustible or atmospheric gases within the tank reduces the risk of fire or explosion and reduces moisture content that may lead to tank shell corrosion.

Non-coiled—the tank does not have interior or exterior heater coils.

Non-destructive testing—a testing and analysis technique used by industry to evaluate the properties of a material, component, structure or system for characteristic differences or welding defects and discontinuities without causing damage to the original part. Examples of nondestructive testing include leak testing, visual testing and ultrasonic testing.

Non-insulated—the tank is not covered with an interposing material to prevent the loss or gain of heat. Non-insulated tanks are often referred to a "slick tank."

Non-pressure tank cars—a tank car tank designed to withstand a test pressure of 60 or 100 psig. Typical products loaded into non-pressure tank cars have relatively low vapor pressures and are often loaded through an open manway. Sometimes called low pressure or general service.

Nozzle—the cylindrical tube or other structure welded to the top of the tank defining the manway opening and upon which the manway cover or other fittings are mounted.

Outage tables—a table developed by the equipment manufacturers that represent the loaded gallon capacity within a tank based on the measurement of the height of the liquid from the bottom of the tank. Tables are used as a guide for loading and off-loading tanks and may prevent overloading (filling) of the tank.

Outage—the volumetric capacity between the liquid level in the tank and the inside surface at the top of the tank. Outage is necessary to allow for product expansion in transit.

Packing—the sealing material around a valve stem.

Passivation—a nitric acid treatment commonly applied to the interior of stainless-steel tanks to enhance corrosion resistance, generally preceded by a cleaning treatment.

Payload capacity—the maximum number of gallons that can be legally loaded into a tank car.

Phenolic coating (high bake)—a thermosetting resin primarily used for interior coating of tank cars that offer consistent, high-grade protection against corrosion, scratches and cracks. Baked phenolic coatings have excellent chemical resistance to acids, even at high temperatures.

PHMSA—an acronym for the "Pipeline and Hazardous Materials Safety Administration." PHMSA is a department within the Department of Transportation responsible for pipeline and hazardous material transportation safety.

PIH—an acronym for a "Material Poisonous by Inhalation." The terms PIH and TIH may be used interchangeably.

Placard holder—a steel frame designed to hold and display cards describing the nature of a hazardous materials transported within or on a railcar.

Plug valve—a multi-turn valve that derives its name from a rotating cylindrical or truncated plug the forms a closing element.

Pressure head—the pressure plate and valve arrangement on the top of a tank car.

Pressure regulator—a device that controls the pressure of liquids or gases (medium) by reducing a high input pressure to a controlled lower output pressure.

Pressure regulator valve—a valve that controls the pressure of a fluid or gas to a desired value. Regulators are used for gases and liquids and can be an integral device with a pressure setting, a restrictor and a sensor all in the one body, or consist of a separate pressure sensor, controller and flow valve. Common uses of a regulator valve are to control pressure in tank cars transporting carbon dioxide.

Pressure tank car—a tank built to withstand a tank test pressure of 100 psig to 600 psig. Pressure tank cars typically have only one top nozzle which serves as a manway and upon which the fittings are mounted.

Pressure—the force, generally measured in pounds per square inch (or kilopascals, KPa), created by the action of a compressed gas or fluid in a confined space such as a tank car tank.

Protective housing—the heavy steel housing surrounding the top fittings arrangement to prevent damage to the valves resulting from a roll-over accident.

PT—an acronym for "Penetrant Testing." Commonly called "dye penetrant testing."

Qualification—providing documented verification that the design of new or existing equipment will result in a system that is suitable for the intended purpose. With respect to tank cars, means documented verification that the tank and its components conform to the specification to which it was designed, manufactured, or modified, to the applicable requirements of the AAR Specifications for Tank Cars and to the owner's acceptance criteria.

Radiograph—the film transparency or paper image obtained by development of a sensitized film, after passage of x-rays or gamma rays through an object (e.g., tank welds) to expose the film.

Radioscopy—a nondestructive test method of observing the internal characteristics of objects with x-rays or gamma rays, specifically by using radiographic or fluoroscopic techniques.

Radius of curvature—the minimum radius of a curve in a track that a railcar can negotiate without interference of any car body or truck parts. AAR standards prescribe required minimum radii.

Reinforcing pad—a plate contoured and welded directly to the tank surface upon which another structural member is attached whose function is to enhance the ability of the tank to resist a load at the point (e.g., bottom tank reinforcing pad located between the draft sill and the tank).

Retest—to repeat a pressure test on the tank, service, equipment, or heater coils to determine fitness for service.

Return bend—a 180-degree "U" shaped heater coil section that connects adjacent runs of a serpentine heater system.

Right side (R)—the right side of a railcar when facing the "B" end of a railcar.

Ring—the rolled tank section prior to being attached to a tank head or another tank section.

Rivet—a short cylindrical steel fastener with semi-spherical heads used to connect the parts of a steel structure.

Rollers (shop)—a device used to roll tanks to a position that facilities the building or repair operation.

RSI—an acronym for the "Railway Supply Institute."

RT—an acronym for "Radiographic Testing." Commonly called X-ray testing.

Rubber spider—an all rubber siphon pipe guide used in rubber lined tank cars (commonly cars hauling hydrochloric acid).

Saddle—the mounting flange welded to the tank bottom, to which the bottom outlet valve is attached.

Safety attendant—an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's confined space permit program.

Safety valve or re-closing pressure relief device—a re-closing device used to provide a means of venting excess pressure which could rupture a tank. Safety valves are required on tank cars transporting Class 2, 3, 4 and 6.1 PG I and II materials.

Safety valve, external spring—a safety valve where the spring(s) is located above the valve seat, thereby isolating the spring from the commodity. This valve is typically used to protect the operable parts of the valve from corrosive effects of the product.

Safety vent or non-reclosing pressure relief device—a non-reclosing device, incorporating a frangible disc, used to provide a means of venting excess pressure which could rupture a tank. Safety vents may be installed on tank cars transporting Class 5, 6.1 PG III, 8 and 9 materials. *See also "Frangible Disc."*

Sample line—a device permitting the sampling of the product in a loaded tank car. This line is also known as a "test tube."

SAV nozzle—the fittings arrangement on the nozzle of a non-pressure tank car that includes the liquid valve (siphon) and air valve (vent).

Serpentine systems—a tank car heater coil system with only one possible passage or route from inlet to outlet. May be used with either steam or liquid heating medium.

Service equipment—equipment used for filling, sampling device, emptying, venting, vacuum relief, pressure relief, heating if internal to the tank, lading temperature measurement or measuring the amount of lading within the tank car.

Set pressure—the pressure, measured at the valve inlet, at which a safety relief valve is set for start-to-discharge.

Shell full capacity—the maximum volumetric capacity of a tank, not including any required outage.

Shell plate—the steel or aluminum plate used to fabricate tank car tanks.

Side ladder—one of two ladders, generally located near the center of each side of a tank car, for the purpose of providing access from the ground to the top operating platform.

Side safety railing—a safety appliance railing running the length of each side of a tank car at ground level to prevent workers from entering the area between the tank car body bolsters.

Sill pad—the bottom-reinforcing pad to which the center sill or stub sill is attached and which, in turn, is attached to the tank.

Siphon pipe guide—a fabrication mounted within the tank bottom of which purpose is to stabilize the siphon pipe.

Siphon pipe—a pipe that extends from the top of a tank to the bottom, often extending into a bottom sump, thereby enabling the tank contents to be off-loaded from the top.

Skid or bottom discontinuity protection—the cast or fabricated structure mounted to the bottom exterior of a tank to provide shear-off protection for bottom outlet valves, sumps and washouts.

Sloped Bottom Tank—a tank design where the two halves are tilted downward toward the center, thereby facilitating drainage.

Spark test—a test to determine the presence of pinholes, punctures, cuts and other small defects that create passages to the base metal.

Specific gravity—the ratio of the density of a substance (tank car commodity) to the density of water at 60°F.

Start to discharge pressure—the pressure, measured at the valve inlet, at which there is a measurable lift of the closure device on a safety relief valve or at which discharge becomes continuous.

Start to leak pressure—the pressure measured at a safety valve inlet, at which fluid is first detected at the valve outlet.

Steam jacketed—a casing fitted around a pipe, valve, or nozzle to enable steam to be injected and circulated around the equipment to facilitate flow of the product within the system.

Straight flange—the straight potion of the head measured from the tangent line to the edge of the head that is butted against and then welded to a tank ring section. The industry standard is 2-1/2" to 3-1/2" straight portion.

Straight shell—a tank without a sloping bottom.

Stripping—a chemical, thermal and mechanical technique for removing existing coatings and linings from a tank.

Stub sill—the primary structure member of the underframe that extends from the striker casting to the body bolster and in the case of tank cars extends partially inboard of the body bolster. The tank acts as a structural member between the stub sills. “Underframe tank cars” have center sills rather than stub sills.

Submerged arc welding—an automatic arc welding process capable of depositing relatively large amounts of weld metal in a single pass and the process used to assemble tank car tanks.

Sump—a small depression in the bottom of the tank located directly under the siphon pipe(s) to facilitate complete tank off-loading.

Surface area—the surface area of a tank expressed in square feet.

Tank anchor—the structural arrangement at the bottom center of the tank that provides a means for attaching the tank to the center sill.

Tank band—the steel straps that pass over the tank at each cradle (bolster) to help hold the tank on the underframe cradles.

Tank cradle—the subtended underframe structure, at the center of each truck, on which the tank sits.

Tank head—a circular, curved, or elliptical pressed end sheet of a cylindrical tank.

Tank—means tank car tank and consists of a shell, heads, nozzles, sumps, flanges, outlet saddles, any other attachments containing the lading and all welds joining them.

TC tank car class—tank cars built to the requirements contained in Transport Canada's Transport of Dangerous Goods Regulations.

TFI—an acronym for "The Fertilizer Institute."

Thermometer well—a specially designed enclosure which is connected into a piping system or tank and into which a thermometer may be inserted to measure fluid temperature. Various temperature sensing devices may be inserted into this pipe to determine the temperature of the tank contents.

TIH—an acronym for a "Material Toxic by Inhalation." The terms TIH and PIH may be used interchangeably.

Top fittings or top fittings arrangement—the loading and off-loading valves and other fittings mounted on the top of tank cars.

Top off-load—an assembly of valves used to off-load a tank car from the top.

Top operated bottom outlet plug valve—a bottom outlet plug valve where the operating shaft extends to the top of the tank, thereby removing the attendant from a position under the tank.

Top operating platform—The platform that provides a working area and access to the manway and fittings arrangement located on the top of a tank.

TSI—an acronym for "The Sulphur Institute."

TT—an acronym of "Tank Test."

Tub—the assembly of a tank ring and a tank head.

Turnbuckle—a mechanical device with a threaded eye bolt at each end, used to tighten tank bands.

U-factor—the measure of thermal transmittance, through conduction, convection and radiation. It is a measure of insulating efficiency and varies with the type and thickness of insulation used. U-Factor is the reciprocal of R-Value U = 1/R (R-3 is the same as U = 0.33).

Ultrasonic inspection—a nondestructive test method that transmits ultrasonic energy through the test material to detect internal and surface flaws. Used also for shell plate thickness measurements.

Unacceptable welding defect—a weld defect that exceeds the standards contained in Appendix W of the AAR Specifications for Tank Cars.

UT—an acronym for "Ultrasonic Testing."

UTT—an acronym for "Ultrasonic Thickness Testing."

Vacuum relief valve—a spring-loaded valve, mounted at the top of some tanks, designed to open and allow air into the tank if an excessive internal vacuum occurs.

Valve stem—a movable shaft that transmits the operating force to the valve closure member.

Vapor tight pressure—the pressure measured at the inlet of a safety valve after it has closed, at which no further fluid flow is detected.

Visual gauge bar—a bar mounted to the inside of the tank and which is visible through the manway when open. Markings on the bar indicate various liquid levels.

VT—an acronym for "Visual Testing."

Wafer sphere valve—a butterfly style bottom outlet valve.

Water capacity—the number of gallons or liters of water a tank will hold.

Wheel burn—damage to the tank shell due to frictional contact with a rotating wheel, resulting in metal flow and/or discoloration due to frictional heat.

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