Transportation Vessels

**MC-306 (DOT-406)**

Non (low) pressure bulk liquid cargo tank

- MC 306--Maximum operating pressure of up to 3 psi
- DOT 406--Maximum operating pressure of up to 4 psi
- Oval or “egg” shaped cross section
- Flat or nearly flat ends
- Aluminum—primary material of construction
- Usually multi-compartmented
- Separate manhole for each compartment
- Emergency shutoff—drivers side front
- Rollover protection to prevent manholes from opening up on rollover
- Average maximum capacity--9, 000 gallons

Contents:

- NORMALLY—petroleum products, however, may be water or milk

**MC-307 (DOT-407)**

Low-pressure bulk liquid cargo tank

- Pressure—up to 40 psi @ 70°F
- Horse shaped" shaped cross section
- Flat or slightly rounded ends
- Stainless steel is primary material of construction
- May be insulated. Insulation may hide tank shape—may not appear to be horseshoe shaped.
- Manway usually center (top) of tank
- Discharge valves usually center (bottom) of tank
- If multi-compartmented, will have a separate manhole for each compartment
- Emergency shutoff—drivers side front
- Rollover protection to prevent manholes from opening up on rollover, normally center of tank top
- Average maximum capacity--6, 000 gallons

Contents:

- NORMALLY—mild acids, however, may be water, milk, or combustible liquids

**MC-312 (DOT-412)**

Corrosives Cargo Tank

- Pressure—5 to 25 psiExterior strengthening (stiffener) rings often visible
- Lined tank—usually lined with rubber or plastic
- Round cross section
- Stainless steel is primary material of construction
- May be insulated, insulation may hide tank shape
- Manway usually rear (top) of tank
- Discharge valves usually rear (bottom) of tank
- If multi-compartmented, will have a separate manhole for each compartment
- Emergency shutoff—drivers side front
• Cigar shaped tank—long, small diameter
• Average maximum capacity—4,000 to 6,000 gallons

Contents:
• Corrosives
• High weight (specific gravity) liquids

**MC-331**

**Gasses that are liquefied by pressure application only**

• Circular cross section
• Rounded ends
• Single shell carbon steel construction
• All valves, gauges, piping protected against damage from rollovers
• Painted white for reflecting suns UV light rays
• Pressure—100 to 500 psi
• Gases that are liquefied by pressure application
• Capacity—from 2,500 gallons for bobtail to 11,500 gallons for highway transport truck

Contents:
• Propane (LPG)
• Butane
• Chlorine
• Anhydrous ammonia

**MC-338**

**Cryogenic Cargo Tank**

• Cryogenic liquids (DOT definition of cryogenic states that substance must be at least
  -130°F
• Cylindrical shape with “box cabinet” on rear of tank, door for loading/unloading operations are usually within these doors
• Thermos bottle design; 2 cylinders, cylinder-within-a-cylinder
• Area between 2 cylinders evacuated of air (vacuum)
• It is normal to see vapors escaping from the vent “stack” on rear cabinet area of container
• Pressures from 23.5 to 500 psi—normally low pressure

Contents:
• Substances which cannot be liquefied by pressure application alone, these substances must be “super cooled” to become a liquid
• Liquid oxygen, hydrogen, carbon dioxide

**High-Pressure Tube - Gasses that cannot be liquefied with pressure application**

• Each tube is a separate container
• Each tube is thermally protected with a thermal plug that is designed to melt out under fire conditions to relieve internal pressure
• Tubes are individually controlled in rear compartment
• Off-loaded by “cascade style” (same method as used to fill SCBA bottles)
• Pressures of 4,000 to 6,000 psi per tube
• Usually 9 to 12 tubes per trailer
• High-pressure tube rail cars are of the same design as these style of highway cargo tanks

Contents:
• Gases that cannot be liquefied by only pressure application
• Helium, nitrogen, argon

Emergency Shut-Offs
May be one of three types -
• Pneumatic—Flip lever to shut-off
• Hydraulic—shear nut to shut-off
• Cable—pull handle, paddle, or shear-nut (break-off) to shut-off

Dry Bulk
• Also known as pneumatically off-loaded hopper trailer
• Capacity up to 1,500 cubic feet of dry product
• Uses air pressure to off-load—product is “blown” out of the bottom discharges
• Need to ground and bond when transferring product. Movement of product through hoses causes a buildup of static electricity

Contents:
• Ammonium nitrate fertilizer
• Cement
• Plastic pellets
• Caustic soda in powdered form

Specification (Spec) Plate
• Located left side of cargo tank on frame rail
• Type of cargo tank
• Material of construction
• Capacity
• Compartmented
• Test date
• Design pressure
• Lining material
• Test pressure
• Other information

The “spec” plate is the only way to tell exactly “what type of cargo tank you have”

Fixed Dry Bulk
• Found at facilities that use dry goods.

Contents:
• Plastic pellets
• Soda ash
• Grain
• Flour
Pressure Intermodal
- IMO Type 5
- Pressures 100 to 500 psi
Contents:
- Liquefied gases—liquefied by pressure application alone.
- LPG, anhydrous ammonia

Non-Pressure Intermodal
- IM 101 (IMO Type 1)
  Pressure usually 25.4 to 100 psi
- IM 102 (IMO Type 2)
  Pressure usually 14.5 to 25.4 psi
- Safety Relief Valves are a combination valve—
  pressure/vacuum
Contents:
- Solvents, corrosives, fertilizers

Cryogenic Intermodal
- IMO Type 7
- Tank-within-a-tank design, area between tanks under a
  vacuum for best insulation
- Pressures normally 23.5 psi and up
- Cryogenic—DOT definition, at least –130 degrees F
Contents:
- Gases that cannot be liquefied by pressure application alone—they must be super-
  cooled
- Liquid argon, liquid nitrogen, liquid oxygen

High-Pressure Tube Intermodal
- Usually made up of 9 – 12 individual tubes
- Pressures of 5,000 to 6,000 psi
- Each tube is thermal protected against over pressurization
Contents:
- Gases that cannot be liquefied by pressure application
- Helium, nitrogen, oxygen

Intermodal Markings
There are a number of markings on intermodal containers that can
be used to assist the first responder in identifying the type of
container and the product within the container. These markings
are:
- Reporting Marks and Number. These markings indicate
tank ownership, and the tank number identifies the specific
tank. These markings are normally found on the right side
and both ends of the tank.
• **Specification Marking.** The specification marking indicates the standards to which the tank was built. (i.e. IM-101, IM 102, Spec 51) These markings are normally found on the sides of the container.

• **DOT Exemption Marking.** If any exemptions have been authorized by the DOT, they must be clearly displayed on the outside of the container in two-inch letters and must be marked “DOT-E.”

• **AAR-600 Marking.** Tanks meeting the requirements of the Association of American Railroads (AAR) will display the “AAR-600” marking in two-inch letters on both sides of the tank. The “AAR-600” marking indicates the tank may be used for regulated (hazmat) materials.

• **Country, Size, and Type Markings.** This is the bottom line of the tank markings information section. The country code is a two or three letter code that indicates the country of origin.

**Cryogenic Liquid Tank Car**
- Refrigerated to -155°F and below, as per railroad, **this is not the same as the DOT which is -130°F**
- Loading/unloading valves are normally located in compartments on diagonally opposite corners of car
- Well insulated “thermos bottle” construction

**Contents:**
- Liquid oxygen, liquid nitrogen, liquid hydrogen

**Radioactive Cask**
- May be either Type A or Type B packaging
  - Type A packaging is designed to prevent loss of contents under normal transport conditions. Type A containers small lightly shielded containers usually shipped in cardboard boxes.

- Type B packaging meets the same requirements as Type A, but must also protect against loss of contents under hypothetical conditions. Type B containers are heavily shielded, large bulky containers.

**Contents:**
- Radioactive materials and radioactive wastes

**Non-Pressure Tank Car**
- Also called “General Service” or “Low Pressure”
- Even though the railroad considers these cars “low pressure” they may have up to 100-psi pressure in them.
- All valves and fittings are visible
- No protective “dome” on top of car
• Older car may have an expansion dome on top. This expansion dome is “humped” in shape and not as tall or circular as a pressurized cars dome.
• May be jacketed
• Capacities of 4,000 to 45,000 gallons

Older cars may have expansion domes

Contents:
• Almost anything liquid that does not require pressurization

Pressure Tank Car
• 100 to 500 psi
• “Dome” protects valves and fittings
• No valves and/or fittings anywhere on tank except in dome

Contents:
• LPG
• Anhydrous ammonia
• Chlorine

Locomotive
• 4,000 to 5,000 gallons of diesel fuel
• Anti-freeze
• High electrical voltage/amperage

Dry Bulk
• Also known as pneumatically off-loaded hopper car
• May use air pressure to off-load—product is “blown” out of the bottom discharges
• Need to ground and bond when transferring product. Movement of product through hoses causes a buildup of static electricity

Contents:
• Ammonium nitrate fertilizer
• Cement
• Plastic pellets
• Caustic soda in powdered form
• Grain

Specification Panel: Information Provided—
• Approving Authority
• Type of car – Pressure/Non-pressure
• Separator/Delimiter (important in certain cars)
• Tank test pressure
• Type of weld used I car construction
• Type of fittings – fitting material/tank lining
• SRV Safety Relief Valve Pressure Setting