

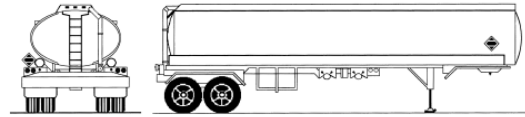
# Transportation Vessels



## 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



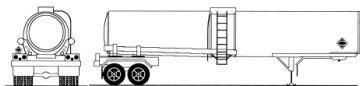
### Contents:

- 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 psi Exterior 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

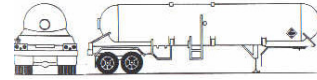
Contents:

- 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



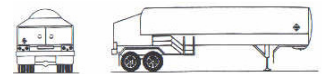
Contents:

- 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

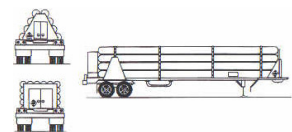


Contents:

- 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

VEHICLE MFG. - CUSTOM TRAILERS, INC. SPRINGFIELD			
VIN 1C9A1B2B1JSC01136			
DOT MC	306 AL	VEHICLE TYPE	SEMI TRAIL
DATE OF MFG.	8-25-88	ORIG. TEST DATE	8-24-88
CERTIFICATION DATE	8-25-88		
DESIGN PRESSURE	5 PSIG	TEST PRESSURE	5 PSIG
HEAD MAT'L.	5454 ALUM	SHELL MAT'L.	5454 ALUM
WELD MAT'L.	3554 ALUM	LINING MAT'L.	NONE
NOMINAL CAP'Y.	3500-2800-1100-2700		
BY COMP'T.	± 3 0/0 US GAL		
MAX. PRODUCT LOAD	57000 LBS		
LOADING LIMITS	DOME OPEN OR VAPOR RECOVERY OPERAT		
UNLOADING LIMITS	DOME OPEN OR VAPOR RECOVERY OPERAT		

*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

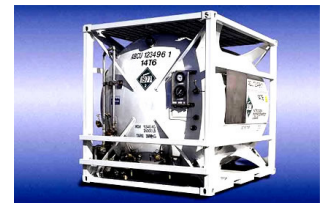


### Cryogenic Intermodal

- 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

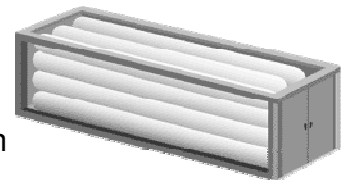


### High-Pressure Tube Intermodal

- 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

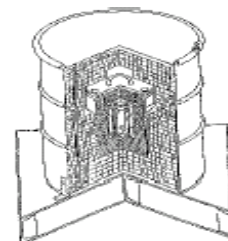
Contents:

- 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

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 in car construction
- Type of fittings – fitting material/tank lining
- SRV Safety Relief Valve Pressure Setting