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KINGSVILLE TEXAS

TRAILER OPERATION AND SAFETY MANUAL

PROCO INCORPORATED

VACUUM TANK OPERATION

"NON- HAZARDOUS - NON-COMBUSTIBLE"

Vacuum Tank Operation

This vacuum tank has been built for Non-Dot work only. Extreme care must be exercised regarding product handling. The unit is equipped with a 2" pressure relief valve located on the inside scrubber dome or portal shutoff, and should always remain in good operating condition. When the trailer is parked and dolleyed down on the landing gear it should be on solid ground to support the load on the landing gear pads and rear axles. If loaded, the unit should have a support under the kingpin plate.

OPERATION

1. Place 3" fourway valve on vacuum pump in proper position for vacuum or pressure (**NOTE WARNING ON FLAMMABLE / COMBUSTIBLE MATERIALS**). Make sure both scrubber blow-down valves are closed (outside scrubber valve located on front fender beneath scrubber, inside scrubber or secondary blow-down valve located on rear, handle near center).
2. Check Oil level in vacuum pump. On Gardner Denver, check oil for any foreign material such as water, other liquid, thin oil or solids. Oil should be drained flushed and refilled if foreign material is found. Inspect pump for any physical damage.
3. Start vacuum pump by engaging PTO on truck and set at proper RPM. Pump will start either pulling a vacuum or pressuring the tank. Upon reaching the desired pressure or vacuum, open one of the rear 4" valves thus allowing fluid to flow. Continue until operation is complete. NOTE: Rotary vane pumps have a minimum and maximum RPM. Too slow results in wash boarding the pump, too fast will cause overheating.

SCRUBBER OPERATION

4. The trailer is equipped with an inside shutoff and an outside scrubber to prevent liquid from entering the vacuum pump. The scrubber & shutoff have a 6" stainless steel float ball, and a 3" rubber seat. Both must be in good condition to protect the vacuum pump. Any liquid entering the scrubber will be caught in the liquid sump, and drained out the blow down valve. A sizable amount drained (quart or more) indicates a problem with the float ball or seat and should be corrected. The liquid drained from the scrubber is tank product and must be handled accordingly. Remember the vacuum pump is an air compressor & not a liquid pump. Liquid can do major damage.

TROUBLE SHOOTING

1. UNIT WILL NOT PULL VACUUM - Check 4 way valve for proper position. Check liquid level in tank, float balls will shutoff airflow on high level. Check vacuum pump valves (Gardner Denver vacuum pump only). Check manway lids and gaskets for a tight fit.

2. PRODUCT WILL NOT DISCHARGE FROM TANK - Check position of rear 4" valve. Check for obstructions down stream of vacuum tank and in 4" valve. Follow company procedures for clearing solids from valves.

DON'TS

1. Your unit is equipped with a relief valve set at the working pressure of the tank. This valve is never to be removed, plugged or reset unless performed by a qualified shop.
2. DO NOT release suction or discharge until all personnel are in a safe position i.e. not directly behind outlets or near hoses.
3. DO NOT exceed maximum rpm, or go lower than the minimum rpm on the vacuum pump.
4. DO NOT load unit in excess of maximum carrying capacity of truck and trailer.
5. Suction / discharge valve(s) to remain closed at all times except while loading or unloading.
6. Whenever entering tank be aware of most recent commodity hauled, check for toxic fumes and always have adequate ventilation. Never enter a tank without proper protective clothing and breathing air. If vapors inside tank are combustible, do not enter tank for ignition source will cause an explosion.
7. Never place hand in proximity of suction or discharge line on pump or vacuum tank.
8. Do not release hatch bolts until pressure has been removed, i.e. open blow down lines. Loosen all four or six bolts without moving bolts to clear lid. Should lid stick to gasket and tank be pressurized, this should prevent lid from blowing open. With all bolts loose, slightly move lid to ensure it is free and there is no pressure in the tank. Move bolts and raise lid. Always keep your body (face and limbs) free from lid while opening lid to prevent injury in case of lid blowing open.
9. Your vacuum pump is equipped with a cam fitting allowing you to pipe the exhaust gases into a low-pressure recovery system or down wind & away from the equipment and personnel. Remember the gases could be combustible or harmful if breathed.

OPERATING SEQUENCE OF PROCO VACUUM TANK

1. Close and secure all manways.
2. Connect hose(s) to rear tank connections, make sure that valve(s) in rear of vacuum tank are in closed position.
3. Check blow-down valves to insure they are in closed position.
4. Start compressor / vacuum pump. NOTE: if vapors inside the tank are hazardous or combustible the exhaust from the vacuum pump should be hoses to a safe location.
5. Build desired pressure or vacuum.
6. Open desired valve, product should start flowing. Make sure hose is secure, hose may start whipping if air under pressure enters hose.
7. Watch pressure gauge when off loading. Pressure should not exceed the tank rated pressure. Relief valve should open at the set pressure and close once the pressure has dropped down. Should pressure build too high, disengage compressor.
8. Upon completion of operation, close rear valve.
9. Disengage compressor.
10. Disconnect hose and connect dust cover to outlet. Load hose before moving truck to insure it is disconnect and not run over thus ruining hose.
11. Bleed pressure or vacuum from tank by opening 2" ball valve on outside scrubber line. Open valve slowly and stop should valve blow liquid, dust or particles from road into air. Any liquid should be handled properly based upon its hazardous content.
12. Tank should be inspected and retested as specified by current DOT regulations.
13. Running gear, frame, wheels, lug nuts, and all supports should be inspected weekly for any damage.
14. Compressor (vacuum pump) oil level should be checked after each vacuum operation. Should the scrubber fail or the product loading foam, product may enter the compressor. (Gardner Denver only) A small amount of diesel injected into the air intake with the unit running will wash the inside of the compressor and clean valves. Feed liquid slowly too much will cause severe damage.

15. NOTE Vane type pumps consume oil from their reservoir. The reservoir level should be checked before each operation and filled with the manufacturers recommended oil.

DOT 407

DOT 407 designed and fabricated vacuum transports allow you to haul combustible liquids with special precautions. You must always remember if the material you are handling is combustible that with the right mixture of air (oxygen) and any ignition source (static electricity, spark caused by two metal objects striking or rubbing each other) or heat and an explosion or fire will occur.

DON'TS

1. DO NOT load or unload until proper ground, (one ohm) has been properly attached to tank. (NOTE paint is an insulator make sure proper connection has been made).
2. DO NOT use compressor to build up pressure inside of tank. You are supplying the necessary oxygen for an explosion.
3. DO NOT pull vacuum on the tank with flammable vapors inside the tank. They will be exhausted through the 3" hose to the outside and could cause a fire outside the tank.
4. DO NOT remove relief valve.
5. DO NOT move trailer if product is leaking.

DO'S

1. Blanket the inside of the tank with an inert gas (nitrogen) when loading, hauling and unloading flammable liquids. If you must pressure off use an inert gas.
2. Unload tank with an approved pump not the vacuum pump.
3. Ground tank before unloading.
4. Inspect relief valve regularly for cleanliness and proper operation. Relief valve should be pressure tested regularly (minimum of monthly).
5. In case of emergency, push the emergency kill button on the front of the unit.

TTMA RECOMMENDED PRACTICE AND TECHNICAL BULLETINS

Recommended practices or technical bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of publication. They are not exhaustive, TTMA can not possibly know, evaluate, or advise the service trade of all conceivable ways which a practice or bulletin might be used or possible consequences of each way. TTMA has not undertaken any such broad evaluation.

The following bulletins may be included:

1. Cargo Tank venting
2. Cleaning voids in insulated tanks.
3. Preheating of chemical tanks.
4. Work in confined space.
5. Corrosion in stainless steel tanks.
6. MC-307 tank vehicles
7. Liquid vapor controls
8. MC-312 tank vehicles
9. Reinforcing member inspection on lined MC-312
10. Spring parking and emergency brakes
11. Disposition of spring brake chambers

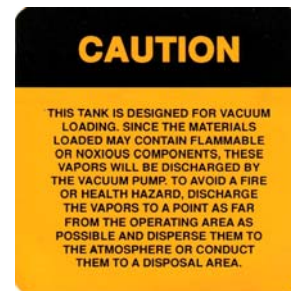
Everyone who uses Practices and Bulletins, either recommended or not recommended by Proco Inc. or TTMA, must first satisfy himself thoroughly that neither his safety nor the safety of his product will be jeopardized by any method he selects.

MAINTENANCE SUGGESTIONS

1. Before the end of the first 1000 miles of use, the U-Bolts on the springs should be retorqued to the manufacturer specifications. Loose U-bolts will cause broken springs and or a severe accident. The U-bolts should be tightened at least every four months while the trailer is in use.
2. Be sure axles are properly aligned and checked every 5,000 miles. Failure to do so will result in excessive tire wear.
3. New trailers must be equipped with automatic slack adjusters, which should keep your brakes properly adjusted. The adjustment should be regularly checked to make sure they are working properly. Faulty adjusters must be replaced. Older trailer without automatic slack adjusters must be manually adjusted as required to make sure your trailer is in DOT compliance. The brake shoes & drums must be inspected regularly to make sure they are in DOT compliance.
4. Trailers manufactured after February 28, 1998 must be equipped with ABS (Anti-skid) brakes. All trailers manufactured after February 28, 1998 will have an amber indicator light mounted above the rear driver's side wheel. The power is supplied to the ABS system through the center pin connection on the 7-way plug. When power is sent to the trailer on start up, the amber indicator light will turn on for 2 1/2 seconds while the system performs a self-diagnostic test. If the system is working properly the indicator light will go off and remain off. If the light remains on, or if it lights up during operation there is a problem with the ABS brakes. The air brakes will continue to function in the same manner as regular air brakes, however the anti-skid function does not work. The trailer should be taken in to be fixed immediately.
5. The oil level on the wheel bearings should be checked before each trip. Look at the exterior part of the wheels for evidence of a leaking oil seal. Oil will show up first on the inside part of the brake drum.
6. Inspect the tires before each trip for uneven wear. Uneven wear would indicate misalignment of the suspension, or tires out of balance.
7. Inspect the lights before each trip for broken lenses and burned out bulbs. Examine tractor cord for chafing or bare wires.
8. Inspect air brake hoses and drain air tanks of moisture before each trip.
9. Inspect all gasketed joints the first time the system is brought up to pressure after loading. Listen for air leaking or soap joints to detect leaks. Do not tighten lids or fitting with any part of your body on or near the lid or fitting. Should it fail, it could strike the body.
10. Check valves for leakage. Repair as needed.

Proco Inc.
Warning and caution decals

Decals have been placed in the proper location on your new tank and should be explicitly followed. Naturally, we cannot foresee all the possible hazards which you may encounter while operating the tank, so good common sense should always be exercised. If for any reason the decals become lost or illegible, contact Proco Inc. and new ones will be sent at no charge.



TTMA

Recommended Practice

RP No. 54-90

June 29, 1990

TRUCK TRAILER
MANUFACTURERS ASSOCIATION

1020 Princess Street
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RICHARD P. BOWLING
PRESIDENT

**SUBJECT: EXTERNAL WORK ON CARGO TANK MOTOR VEHICLES
WHICH MAY HAVE BEEN IN SERVICE**

(Originally Issued June 1980 - Revised December 1985 - Revised June 1990)

1.0 PREFACE:

- 1.1 Recommended Practices or Technical Bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a Practice or Bulletin may be used or possible consequence of each way. TTMA has not undertaken any such broad evaluation.
- 1.2 Everyone who uses Practices or Bulletins, either recommended or not recommended by TTMA, must first satisfy himself thoroughly that neither his safety nor the safety of his product will be jeopardized by any method he selects. These publications are reviewed at least every five years and the date so indicated.
- 1.3 Definitions of specialized terms used in TTMA Recommended Practices or Technical Bulletins may be found in TTMA RP No. 36 - "Tank Trailer and Tank Container Nomenclature" or TTMA RP No. 66 - "Trailer Nomenclature."
- 1.4 The use of shall or should has no bearing on the voluntary nature of TTMA publications. Inclusion of a TTMA publication in a document, standard, or contract by a company or agency is a voluntary act. When a TTMA publication is so cited, the publication becomes a requirement within the limitations set forth by the document, standard, or contract. The following shall apply to use of these words:

SHALL is to be used wherever the criterion for conformance with the specific recommendation requires that there be no deviation. Its use shall not be avoided on the grounds that compliance with the report is considered voluntary.

SHOULD is to be used wherever noncompliance with the specific recommendation is permissible. Should, shall not be substituted for shall on the grounds that compliance with the report is considered voluntary.

2.0 PURPOSE AND SCOPE:

- 2.1 To establish recommended safety precautions applicable to work on cargo tank motor vehicles which have handled flammable materials.

3.0 DEFINITIONS:

- 3.1 "Cargo tank" means a tank (including the appurtenances, reinforcements, fittings and closures) that is permanently attached to or forms a part of a motor vehicle or is not permanently attached to a motor vehicle but which by reason of its size, construction or attachment to a motor vehicle is loaded or unloaded without being removed from the motor vehicle.
- 3.2 "Cargo tank motor vehicle" means a motor vehicle with one or more cargo tanks permanently attached to or forming an integral part of the motor vehicle.

4.0 PRECAUTIONS:

- 4.1 Cargo tanks shall be properly steamed or degassed - including all compartments, void areas, piping (both discharge and vapor collection), pumps, hose tubes, cabinets, etc. as appropriate, before doing any work on the cargo tank motor vehicle or bringing the cargo tank motor vehicle inside a building for any reason.
- 4.2 Even "cold" work on a cargo tank motor vehicle for which the cargo tank does not test safe with an explosimeter is not recommended as mechanical or electrical sparks can be just as dangerous as a source of ignition as welding.
- 4.3 Special attention shall be paid to vapor return lines, being certain that they are vented or piped to a safe area even while steaming the tank as they can discharge a concentrated stream of hazardous vapor.
- 4.4 For internal work, refer to TTMA RP No. 74, "Work in. Confined Spaces - New Tanks" or RP No. 75, "Work in the Confined Spaces of Tanks which may have been in Service."

DWV/em

TTMA

Recommended Practice

RP No. 75-85

December 12, 1985

TRUCK TRAILER
MANUFACTURERS ASSOCIATION

1020 Princess Street
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(703) 549-3010

SUBJECT: WORK IN THE CONFINED SPACES OF TANKS WHICH
MAY HAVE BEEN IN SERVICE
(Originally issued -- December 1985)

CHARLES J. CALVIN
PRESIDENT

1.0 PREFACE:

- 1.1 Recommended Practices or Technical Bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a Practice or Bulletin may be used or possible consequences of each way. TTMA has not undertaken any such broad evaluation.
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SHOULD is to be used wherever noncompliance with the specific recommendation is permissible. Should, shall not be substituted for shall on the grounds that compliance with the report is considered voluntary.

2.0 SCOPE:

- 2.1 This Recommended Practice applies to tank and dry bulk vessels (truck tanks, trailer tanks, and containers) which may or may not have been in service.
- 2.2 See RP No. 74 - "Work in Confined Spaces - New Tanks" for recommendations for working in vessels which are being manufactured.

3.0 PURPOSE:

- 3.1 The purpose of this Recommended Practice is to establish safety precautions for personnel working in confined spaces.

4.0 DEFINITIONS:

- 4.1 A confined space is a space with limited access which does not lend itself to the free circulation of air.

5.0 IDENTIFICATION OF TANK CONDITION:

- 5.1 Inspect the vessel to be sure it has been cleaned and/or purged.

6.0 TEST OF VESSEL ATMOSPHERE:

- 6.1 Assure that the tank is not under pressure before opening manhole.
- 6.2 Do not go inside the vessel to perform the atmosphere tests.
- 6.3 Check for proper level of oxygen.
- 6.4 Perform instrument tests for contaminants if applicable.
- 6.5 Perform a visual and nasal check following the instrument check for contaminants.
- 6.6 Test atmosphere before first entry of the day and any time the ventilation is interrupted.
- 6.7 GAS POCKETS:

The following areas and equipment which may entrap product should be checked:

Void compartments	Valves
Insulation	Interior heat coils
Pads	Other areas of possible product entrapment
Rings	Hose tubes
Heat Panels	Vapor Return Systems
Overtum Rails	Void Between Double Bulkheads
Meters	(See TTMA Technical Bulletins
Reels	Nos. 90 and 96)
Piping	
Sumps	

7.0 VENTILATION:

- 7.1 Confined spaces should be ventilated before and during operations performed in the confined space.
- 7.2 Ventilation should provide for internal air circulation throughout the work area and should remove fumes generated and avoid recirculating contaminated air.

- 7.3 Oxygen (sometimes improperly called "air") should not be used to ventilate confined spaces since excess oxygen extends the flammable range of gases and vapors. Excess oxygen also makes combustible materials, of which clothing is an example, ignite easily and burn furiously.

8.0 ENTRY PROCEDURES:

- 8.1 Notice of entry into a confined space should be given to the supervisor or a responsible employee.

9.0 SAFETY PRECAUTIONS:

9.1 Torches and Other Gas Sources:

- 9.1.1 Cylinders containing oxygen or acetylene or other fuel gas should not be taken into confined spaces.
- 9.1.2 For the elimination of possible fire in enclosed spaces as a result of gas escaping through leaking or improperly closed torch valves, all torches and other sources of gas other than air should be removed when the employee leaves the confined space for any reason.
- 9.1.3 In order to eliminate the possibility of the buildup of inert gases in enclosed spaces which could result in insufficient oxygen for sustaining life as a result of gas escaping through leaks and/or improperly closed welding torch valves, all torches and other sources of inert gas should be removed when the employee leaves the confined space for any reason.
- 9.1.4 In the case that any hoses, torches, or other sources of gas other than air have been left in a confined space, the space should be thoroughly ventilated before entering.

9.2 Power Tools:

- 9.2.1 Portable power tools which are held in the hand should be equipped with switches of a type which must be manually held in the activated (on) position.
- 9.2.2 The frames of portable electric tools and appliances, except double insulated tools approved by Underwriters' Laboratories, should be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current.

9.3 Lighting:

- 9.3.1 Temporary lights should be equipped with guards to prevent accidental contact with the bulb, except that guards are not required when the construction of the reflector is such that the bulb is deeply recessed.

- 9.3.2 Temporary lights should be equipped with heavy duty electric cords with connections and insulation maintained in safe condition. Temporary lights should not be suspended by their electric cords unless cords and lights are designed for this means of suspension.

9.4 Electrical:

- 9.4.1 Worn or frayed electric cables should not be used.

- 9.4.2 Splices should be equal to or better than that of the original cable.

9.5 Coatings:

- 9.5.1 In such cases where coatings or linings are applied after the manufacture of the tank, precautions should be taken to proceed according to the supplier's or manufacturer's recommendations.

10.0 RESCUE PROCEDURES:

- 10.1 Rescue procedures should be established and published.

- 10.2 While employees are inside a confined space, emergency assistance should be readily available if required.

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Alexandria, Virginia 22314

CHARLES J. CALVIN
President

*Utilizing TTMA Services may give you an Education;
not using them will give you experience.*

(703) 549-3010

BULLETIN NO. 81

June 16, 1980

SUBJECT: MC 307 TANK VEHICLES

1.0 PREFACE:

- 1.1 Recommended practices or technical bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a practice or bulletin might be used or possible consequence of each way. TTMA has not undertaken any such broad evaluation.
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2.0 INTRODUCTION:

- 2.1 This bulletin is intended to suggest accepted operating procedures in the proper usage of MC 307 Tank Vehicles.
- 2.2 These suggested directions are not exhaustive since tank vehicles are of varying design to meet the requirements of the first purchaser, therefore, the user must satisfy himself that his safety, the safety of the public, the integrity of the transport and the load are not jeopardized: An MC 307 tank is the most versatile of bulk hauling equipment and so the most vulnerable to being abused.
- 2.3 Before operating, become familiar with the message indicated on all information and caution plates on the vehicle. If a plate or label has become illegible or lost, request replacement from the vehicle manufacturer.
- 2.4 Before loading and/or unloading the product, the user must familiarize himself with its operational characteristics, including manholes, vents, gravity discharge valves, pump-off valves, heating procedures, etc.
- 2.5 **KNOW WHAT PRODUCT YOU ARE LOADING AND KNOW WHAT PRODUCT WAS LAST CARRIED IN THE VEHICLE.**

3.0 CAPABILITIES:

- 3.1 An MC 307 tank is a pressure vessel used for the hauling of flammable liquids with vapor pressures in excess of that permitted by MC 306 tanks, but in no case higher than 40 psia. The MC 307 specification is also used for Class B poisons and flammable liquids which are also corrosive or oxidizing materials.
- 3.2 If a product is authorized for transportation by an MC 307 specification tank, this does not mean that a particular MC 307 is automatically suitable for this product. The following questions must be answered first:
 - 3.2.1 Does the product attack or pit the shell or any of the tank components such as valves, piping, gasket material, etc.?
 - 3.2.2 Does the product density exceed that for which the tank is rated?
 - 3.2.3 Does the product temperature exceed that for which the tank is rated?
 - 3.2.4 Is the product so viscous as to require special venting and valving?
 - 3.2.5 Do regulations require special equipment, extra venting or special valving?
 - 3.2.6 Does product require insulation and/or heating equipment?
 - 3.2.7 Does tank have a proper pressure rating and safety relief devices for the product?

4.0 PRE-TRIP INSPECTION:

- 4.1 Before each trip, for your safety, and the safety of the motoring public, your vehicle should be inspected for deficiencies and proper corrective action taken in the following areas:
 - 4.1.1 *TIRES* - for cuts, bruises, bulges, tread wear, improper air pressure.
 - 4.1.2 *RIMS* - cracks, deformation.
 - 4.1.3 *WHEELS* - cracks in spokes, discs, rim clamps or hubs, leaking of bearing lubricant at seals or hub caps.
 - 4.1.4 *BRAKE SYSTEM* - air leakage with and without service brakes applied. Air reservoirs should be completely drained of moisture daily in order to maintain air supply volume provided and to minimize cold weather freeze-up. Antifreeze solutions if used should only be introduced in the system through the tractor mounted evaporator and be of an approved type.
 - 4.1.5 *SUPPORTS* - proper operation and braces intact in the event they are needed due to breakdown en route.

CAUTION: Never set a loaded trailer down on supports that are not intended for this purpose, or if a multiple compartment tank do not set on supports if front compartment only is loaded.

- 4.1.6 *EQUIPMENT SECURITY* - spare tire, hoses, tools, fittings and emergency equipment properly secured in respective carriers with chains, latches, etc. in good restraining condition.
- 4.1.7 *LIGHTING SYSTEM* - all lights must perform their proper function when activated and clearly visible.
- 4.1.8 *KINGPIN AREA* - wear plate must be free of measurable thinning, lubrication, gouges, and unusual distortion. The bolts used in fastening the plate assemble to its frame must be tight.
- 4.1.9 *TRUCK MOUNTED TANKS* - check tie-down fastener assemblies to be sure they are intact and secured.
- 4.1.10 *PULL TRAILER TANKS* - check draw bar, hinges, hitch, safety chains/cables, towing eye (or corresponding device) for abnormal wear, fastener tightness, weld cracks or cracks in components. Check electrical connector for good electrical cable and air hoses should be free of cuts and abrasions.
- 4.1.11 **DO NOT LOAD A DAMAGED TANK.**

5.0 PRE-LOADING INSTRUCTIONS: GROUND LEVEL:

- 5.1 See that all product discharge valves and emergency valves are in operating order and are closed. Emergency trip at front of tank should be functional and the fusible link in emergency valve system should be in place. The correct commodity placards should be in place.

6.0 PRE-LOADING INSTRUCTIONS: TOP SIDE:

- 6.1 Before opening manhole, be sure tank is de-pressurized by opening blow down valve on pressurizing unit.
- 6.2 See that manhole cover gasket is intact and that closing mechanism functions properly to secure lid tightly.
- 6.3 See that all vents are clean and functioning.
- 6.4 Be sure that the unit is equipped with fusible or frangible emergency venting. Fusible cleanout caps shall not be replaced with solid caps.
- 6.5 Check to see that tank is clean as many chemicals can react violently when mixed. Also, any product over 200°F should only be loaded in tanks free of moisture. Loading of hot products (over 180°F) in non-insulated tanks is not recommended as personnel may be burned by hot shell.
- 6.6 Know the maximum capacity of tank to avoid overfilling.

- 6.7 Regulations require that there be enough vapor space to allow for expansion due to any possible rise in product temperature during transit. In no case is this to be less than 1% for flammable liquids and 2% for corrosive liquids.
- 6.8 Be sure ladder and walkways are well maintained. If abrasive on walkway surfaces are worn or missing, replace.

7.0 *LOADING PRECAUTIONS:*

- 7.1 Always set parking brake before loading. If product is flammable, ground tank to loading rack to avoid static electrical sparks. If loading a specialized product, follow product manufacturers' recommendations for the control of static electricity. For further information on the control of static electricity see API RP 2003 "Recommended Practice for Protection Against Ignitions Arising out of Static, Lightning and Stray Currents" . . .

ALL LOADING AND UNLOADING OPERATIONS SHOULD BE PROPERLY SUPERVISED AT ALL TIMES.

- 7.2 Do not load tank with hot product which exceeds tank manufacturers' maximum temperature rating, or with a product that will have a corrosive effect on the tank. To do so endangers the structural capability of tank to continue trouble-free performance. Aluminum and stainless steel tanks require close attention to this caution.

DO NOT MIX PRODUCT IN TANK . . .

Example: Many acids react violently upon addition of water to the tank.

- 7.3 Do not load the vehicle beyond the maximum product load specified on the metal certification plate or on the vehicle certification label which specifies the Gross Vehicle Weight Rating (GVWR). The GVWR is the maximum allowable total weight of vehicle, payload and equipment on the vehicle.
- 7.4 The loading pipe should be adequately secured, braced, or restrained to prevent accidental spill during loading.
- 7.5 Stay away from vicinity of manhole to avoid being splashed and burned or exposed to product fumes during loading.
- 7.6 Be sure manhole cover is closed, seated, and securely latched before moving tank. Excessive tightening of manhole covers may damage gaskets.
- 7.7 When bottom loading, be sure manhole is open, or if equipped with vapor return line, that it is free of internal obstructions and valve is open. Be sure that all hoses are attached securely.

7.8 **DO NOT PRESSURIZE TANK WHILE IN TRANSIT:**

EXCEPTION: Certain hot products tanks or tanks carrying products which decompose or are damaged by moisture in normal atmosphere are sometimes kept under slight pressure (2 to 5 psi) of nitrogen or inert gas. This should be specifically called for by the shipper or carrier, however.

8.0 HEATING PRECAUTIONS:

- 8.1 Do not heat empty tank with on board heating equipment unless manufacturer expressly states that unit is capable of this type of preheating. Otherwise follow TTMA Technical Bulletin No. 61 for preheating.
- 8.2 Do not exceed working pressure of steam panel. Be sure correct pressure relief valve is on unit and that it is functioning. Outlets should be directed away from personnel. Pressure gauges should be installed on steam supply to monitor equipment. Be sure coupling of steam hose is secure before applying steam.
- 8.3 Handle steam hoses with gloved hands. Connect inlet hose to trailer heat system inlet, return hose to trailer heat system return or outlet connections if provided. After both ends of hose are secured, open valve(s) slowly to check for leakage before leaving valve.
- 8.4 If it is necessary to introduce steam into the trailer heat system during the entire product unloading operation, the heating transfer system should be turned off **AT THE HEAT SOURCE** as promptly as possible after the product unloading operation is completed. When cold weather conditions may cause freezing of steam condensate in the vehicle heating system, leave connections uncovered to allow condensate to drain.

9.0 OVER-THE-ROAD SAFE HANDLING FOR OPERATING TANK SEMITRAILERS:

9.1 INTRODUCTION

This section is to provide you with information about the stability of tank semitrailers, as an aid in developing safe handling practices and knowing what situations to avoid that make the tank unstable.

9.2 WARNING

Like any other vehicle, tank semitrailers can tip or slide out of control if turns are negotiated at too high a speed or when making violent maneuvers such as abrupt lane changes or other evasive actions to avoid obstacles.

9.3 FACTORS WHICH PROMOTE OPERATIONAL SAFETY

- 9.3.1 Secure mounting of lower fifth wheel to tractor frame.
- 9.3.2 Driver familiarity with the characteristics of the particular tank trailer and the load being transported.
- 9.3.3 Driver familiarity with the nature of the roads and traffic which may be encountered during the trip.
- 9.3.4 The ultimate objective of care in these areas is to assure that the vehicle will be operated in a safe and, therefore, stable manner. Major factors which can adversely affect stability are:
 - 9.3.4.1 Excessive speed;
 - 9.3.4.2 Violent swerving or turning;
 - 9.3.4.3 Application of brakes or tractor power while turning.

9.3.5 Within the relatively narrow confines of road laws limiting vehicle size and weight, together with the characteristics of available tires, suspensions, and other components, there is little that a tank manufacturer can do to affect the inherent stability of a trailer other than keeping the bottom of the tank as low as practicable considering the requirements of mounting structures and other appurtenances. This means that the major factor affecting operational stability is the knowledge and skill of the driver. Based upon accident reports with which we are familiar, the predominant causes of the rollover accidents (which happen infrequently considering the volume of traffic involved) are:

9.3.5.1 Entering curves at too high a speed which is probably caused by one of the following factors:

9.3.5.1.1 Travelling at freeway speeds for long periods of time and failing to recognize the high speed of travel and reducing it before entering freeway interchanges or other curves requiring a reduced and controlled speed.

9.3.5.1.2 Lack of familiarity with the vehicle characteristics to recognize its safe speed with relation to posted speed limits on curves which are usually determined with automobile traffic in mind.

9.3.5.2 Failure to reduce speed sufficiently when approaching congested traffic such as might be found at traffic signals on highways. With the advent of today's more powerful and higher torque engines, the original practice of maintaining momentum to avoid acceleration in traffic is outmoded.

9.4 *TIRE CHARACTERISTICS:*

High pressure truck tires have different characteristics under high speed cornering conditions than do passenger car tires. As an extreme example, it is fairly common knowledge that a skilled race car driver can consistently "drift" his racer around tight turns where very high lateral "g" forces are encountered. However, truck tires which are designed for carrying high loads over long distances have substantially different characteristics. In technical terms, their lateral stability becomes unpredictable when lateral forces approach 0.4g. This means that trailer tanks, truck tanks, or other commercial vehicles must be operated in a conservative manner when cornering.

9.5 *BRAKING AND ACCELERATION:*

Either braking or accelerating while cornering can significantly reduce the stability of the vehicle and should be avoided. The best driving practice is to decelerate to a safe conservative speed before entering a corner or approaching congested traffic, and then to apply only very moderate power until an essentially straight path has been re-established.

9.6 *HANDLING PARTIALLY LOADED TANKS*

It is an accepted fact that liquid tanks filled to their normal capacity (with 5% outage or less) handle essentially the same as a similar vehicle with a solid load. However, as the tanks are partially loaded due to product density or legal requirements in the case of compressed gases, the mobility of the load or "sloshing" can be detected and must be taken into account in establishing safe driving practices. In general, a downloaded tank will be less stable under cornering and braking conditions than an ordinary liquid tank loaded to its normal capacity. This factor must be given full consideration when determining the handling characteristics of the unit and establishing knowledge required for safe driving of the unit. A specific suggestion is that the driver of a downloaded tank should learn the characteristics of the load and handle his braking efforts accordingly for smoothest stopping. It is also a good practice to keep the brakes on full for a few moments after coming to a stop to avoid vehicle movement in the event that the braking sequence has developed a wave action in the tank.

9.7 *YOUR AND OUR SAFETY*

Frequently tanks are used to carry products that are hazardous, flammable, poisonous, or corrosive. When operating a tank trailer loaded with a hazardous material, you have a double obligation to yourself and the public to drive safely.

Traffic accidents that cause a spill can turn into disasters. **YOU - THE OPERATOR --** have control over the most important factors that affect vehicle stability. Tank vehicles are important tools in our transportation industry -- and, like any tool, is safe in the hands of a properly qualified operator.

10.0 UNLOADING PROCEDURES

10.1 Always set parking brakes before unloading.

10.2 See that discharge lines, valves, and transfer hose are empty and clean. Be sure hoses are compatible with product.

ALL LOADING AND UNLOADING OPERATIONS SHOULD BE PROPERLY SUPERVISED AT ALL TIMES.

10.3 Valves, seats, grooved couplings and other mating surfaces should be periodically checked for excessive wear, scratches or gouges.

10.4 If vapor is to be recovered connect vapor hose from trailer to vapor connection on receiving tank. Make sure any valves that may be in this line are open. Also, make sure vent valves in the top of the tank are operating. If vapor is not to be recovered open valve or remove caps on trailer vapor line. If trailer is not equipped with vapor recovery or vent valve, open manhole cover. Failure to provide vacuum relief by one of the above methods may result in tank collapse.

10.5 If unloading by gravity or pumping off, open blow down valve on tank vent. Open manhole cover before discharge of load by either pump or gravity. When opening manhole with multiple clamps, release clamps nearest hinge first. Stop here if escaping air or vapor under pressure is detected. Avoid product fumes when this is done.

- 10.6 Connect product hose from trailer to receiving tank.
- 10.7 After both ends of discharge hose are secured, open emergency valve. Open product discharge valve slowly to check for leakage before leaving valve.

CAUTION:

**WHEN UNLOADING HOT PRODUCT, VALVES AND
HOSES WILL BE HOT.**

- 10.8 Remain clear of rotating drives to prevent entanglement in machinery, if product is being pumped off.
- 10.9 When pumping off, start pump after hoses are connected and valves open. Run pump for several minutes after suction breaks air. Then close valve and open small air intake valve, if provided, to purge hose. Ground the tank to receiving line.
- 10.10 If unloading with air pressure, be sure air source is limited in both pressure and flow rate as stamped on tank's metal certification plate, if applicable. See TTMA Recommended Practice No. 34.
- 10.11 **REMEMBER:**
In case of emergency, product flow can be stopped by remote emergency valve control.
KNOW ITS LOCATION!
- 10.12 When shutting down product transfer operation while there is the possibility of some pressure in the transfer line, always close the valve nearest the source of pressure first. If the valve at the receiving end of the transfer line is closed first, there is the possibility of a weak line or loose connection allowing bystanders to become sprayed with dangerous material.
- 10.13 After load is discharged, close all emergency valves, product discharge valves, manhole covers and return hoses to their place.

CAUTION NOTES:

**MOST SUBSTANCES HAULED IN MC 307 TANKS ARE
DANGEROUS. KNOW WHAT YOU ARE HAULING AND
THE REQUIRED FIRST AID IN CASE OF EMERGENCY.**

**DO NOT ENTER TANK BEFORE IT IS PURGED; THEN
HAVE A BUDDY NEARBY AND USE FORCED VENTILATION
IN ALL SECTIONS BEING ENTERED.**

11.0 SAFE OPERATING PROCEDURES & INSTRUCTIONS:

11.1 At Terminals, Loading, & Unloading Sites:

The shipper and/or carrier should establish safe operating procedures and instructions for each application for loading and unloading of MC 307 Tanks. Since each of these involve not only the MC 307 tank being used but also varied types of valving, storage and safety equipment at each location, it is not possible to establish a single procedure for all applications. As a minimum, the instructions should include but not be limited to the following items:

- 11.1.1 Description of the product and its hazardous characteristics.
- 11.1.2 Check for proper shipping papers marking and placarding.
- 11.1.3 Protective clothing and equipment to be used by the operator.
- 11.1.4 Knowledge of the location and use of safety equipment in the area including safety showers and eye wash fountains.
- 11.1.5 Knowledge of location and use of First Aid equipment and location of dispensary or medical facility at each location.
- 11.1.6 Instructions to check all equipment on tank for proper operation before loading (i. e. - vents, valves, gaskets, pressure gauges, connections, etc.)
- 11.1.7 Detailed loading procedure.
- 11.1.8 Detailed unloading procedure.
- 11.1.9 Detailed procedure for removing pressure from tank (if pressure unloaded) after unloading and securing empty tank for return trip.
- 11.1.10 Washing or cleaning instructions if required (many acids react violently upon the addition of water to the acid).
- 11.1.11 Procedure to be used in case of spills or leaks.
- 11.1.12 Understanding of what happens if tank is over pressurized and a relief valve or rupture disc blows; especially the sudden noise that occurs and the discharge of air, or vapor or liquid and vapor which ensues.
- 11.1.13 Understanding of how easily a tank can be collapsed (vacuumed) if it is pumped off without an operable vacuum vent or top valve or fill cover or manhole cover being open to replace the material being pumped out.

11.2 *Over The Road Precautions*

- 11.2.1 See Nos. 11.1.1, 11.1.2, 11.1.6.
- 11.2.2 In case of accident: how to instruct local fire and police department personnel on type of hazardous material in tank.
- 11.2.3 Who or what organization to call for information in case of leaks, spills, fires, etc. involving environmental protection and safety in populated areas.

12.0 *INSPECTION AND MAINTENANCE, TANK PROPER:*

- 12.1 DOT regulations require that tanks be inspected visually every two years and hydrostatically tested if: (1) it has been out of service one year or more, (2) involved in an accident and repaired; (3) altered, (4) is operating under special permit. The inner tank barrel itself is a very important piece of equipment. The barrel serves the dual purpose of product retention and must carry the weight of the product in addition to the weight of the barrel itself. The barrel is strongest when it is in its originally manufactured condition. A substantial amount of its load bearing capability is lost if buckling or distortion occurs in the tank shell due to an accident, overloading or any of the following:
 - 12.1.1 Fast filling of hot product in a cold tank that has not been prewarmed in a building or prewarmed by other means that are not detrimental to the tank, loading and/or safety of the loader or operator. Slow initial filling should be considered.
 - 12.1.2 Loading with product that is hotter than the maximum temperature rating of the trailer.
 - 12.1.3 Vacuum created by the unloading process (or by tank cooling after unloading) with manhole closed and vents plugged with solidified materials or otherwise rendered inoperative.
 - 12.1.4 Repeated travel over rough roadways at speeds that are not reasonable for longevity of any type of vehicle.
 - 12.1.5 Dropping the loaded trailer on the landing gear in lieu of setting it down, which creates unusual shock.
 - 12.1.6 Operating the trailer at a continuous speed at which the resonant frequency (vibration) is at its peak. Every trailer has such a frequency and a change in speed of two or three miles per hour either faster or slower reduces the vibration out of the peak range.
- 12.2 The structural integrity must be maintained. It is recommended that the barrel and all internal members be checked regularly at intervals of every three (3) months or 15,000 miles whichever occurs first. Corrective repairs should be made as soon as possible.

1020 Princess Street

----- Alexandria, Virginia 22314

CHARLES J. CALVIN
President*Utilizing TTMA Services may give you an Education;
not using them will give you experience.*

(703) 549-3010

BULLETIN NO. 82

June 16, 1980

SUBJECT: MC 312 TANK VEHICLES

1.0 PREFACE:

- 1.1 Recommended practices or technical bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a practice or bulletin might be used or possible consequence of each way. TTMA has not undertaken any such broad evaluation.
- 1.2 Everyone who uses practices or bulletins, either recommended or not recommended by TTMA, must first satisfy himself thoroughly that neither his safety nor the safety of his product will be jeopardized by any method he selects. These publications are reviewed at least every five years and the date so indicated.

2.0 INTRODUCTION:

- 2.1 This bulletin is intended to suggest accepted operating procedures in the proper usage of MC 312 Tank Vehicles.
- 2.2 These suggested directions are not exhaustive since tank vehicles are of varying design to meet the requirements of the first purchaser, therefore, the user must satisfy himself that his safety, the safety of the public, the integrity of the transport and the load are not jeopardized.
- 2.3 Before operating, become familiar with the message indicated on all information and caution plates on the vehicle. If a plate or label has become illegible or lost, request replacement from the vehicle manufacturer.
- 2.4 Before loading and/or unloading the product, the user must familiarize himself with its operational characteristics, including manholes, vents, gravity discharge valves, pump-off valves, heating procedures, etc.
- 2.5 **KNOW WHAT PRODUCT YOU ARE LOADING AND KNOW WHAT PRODUCT WAS LAST CARRIED IN THE VEHICLE.**

3.0 CAPABILITIES:

- 3.1 MC 312 tanks are used primarily for the transportation of corrosive liquids such as caustic soda, phosphoric acid, sulphuric acid and hydrochloric acid, etc.
- 3.2 In addition, certain oxidizers, organic peroxides, flammable solids and Class B poisons can be shipped in MC 312 tanks. Examples are Cumene Hydroperoxide (organic peroxide) and Mercuric Iodide Solutions (Class B poisons).
- 3.3 It is important to know that the material of construction of the tank and accessories are compatible with the liquid being carried in the tank. In addition, if other products have been carried in the tank previously, it is important to know if a contamination problem or dangerous condition has been created. The best source of this information is the shipper. The fact that a product is authorized for transportation by an MC 312 specification tank does not mean that a particular MC 312 is automatically suitable for this product. The following questions must be answered first:
 - 3.3.1 Does the product attack or pit the shell or any of the tank components such as valves, piping, gasket material, etc.?
 - 3.3.2 Does the product density exceed that for which the tank is rated?
 - 3.3.3 Does the product temperature exceed that for which the tank is rated?
 - 3.3.4 Is the product so viscous as to require special venting and valving?
 - 3.3.5 Do regulations require special equipment, extra venting or special valving?
 - 3.3.6 Does the product require insulation and/or heating equipment?
 - 3.3.7 Does the tank have proper pressure rating and safety relief devices for the product?

4.0 PRE-TRIP INSPECTION:

- 4.1 Before each trip, for safety, and the safety of the motoring public, your vehicle should be inspected for deficiencies and proper corrective action taken in the following areas:
 - 4.1.1 *TIRES* - for cuts, bruises, bulges, tread wear, improper air pressure.
 - 4.1.2 *RIMS* - cracks, deformation.
 - 4.1.3 *WHEELS* - cracks in spokes, discs, rim clamps or hubs, leaking of bearing lubricant at seals or hub caps.
 - 4.1.4 *BRAKE SYSTEM* - air leakage with and without service brakes applied. Air reservoirs should be completely drained of moisture daily in order to maintain air supply volume provided and minimize cold weather freeze-up. Antifreeze solutions if used should only be introduced in the system through the tractor mounted evaporator and be of an approved type.

- 4.1.5 *SUPPORTS* - proper operation and braces intact in the event they are needed due to breakdown en route.

CAUTION: Never set a loaded trailer down on supports that are not intended for this purpose, or if a multiple compartment tank do not set on supports if front compartment only is loaded.

- 4.1.6 *EQUIPMENT SECURITY* - spare tire, hoses, tools, fittings and emergency equipment properly secured in respective carriers with chains, latches, etc., in good restraining condition.
- 4.1.7 *LIGHTING SYSTEM* - all lights must perform their proper function when activated and clearly visible.
- 4.1.8 *KINGPIN AREA* - wear plate must be free of measurable thinning, gouges and unusual distortion. The bolts used in fastening the plate assembly to its frame must be tight.
- 4.1.9 *TRUCK MOUNTED TANKS* - check tie-down fastener assemblies to be sure they are intact and secured.
- 4.1.10 *PULL TRAILER TANKS* - check draw bar, hinges, hitch, safety chains/cables, towing eye (or corresponding device) for abnormal wear, fastener tightness, weld cracks or cracks in components. Check electrical connector for good electrical cable and air hoses should be free of cuts and abrasions.
- 4.1.11 **DO NOT LOAD A DAMAGED TANK.**

5.0 PRE-LOADING INSTRUCTIONS: GROUND LEVEL:

- 5.1 If tank is equipped with bottom outlet unloading valves, check for proper operation. Also check that bolts in flange connections are tight and gaskets are in good condition. Check for proper operation of emergency release (if outlet valve is self-closing type).
- 5.2 If tank has no bottom valves, check bottom sump for proper gasketing and blind flange bolt tightness.
- 5.3 If tank is equipped with a "down line" from the top of the tank, check that the end of the down line is equipped with a properly operating valve and/or a blind flange properly gasketed and bolted.
- 5.4 If tank is equipped with air unloading piping to the front or rear, check valves and pressure gauges for proper operation and gladhands or connectors for condition and gasketing.
- 5.5 Check for proper commodity placards.

June 16, 1980

6.0 PRE-LOADING INSTRUCTION: TOP SIDE:

- 6.1 If tank is equipped with a blow down valve (usually part of the "vent" or "pressurizing" or "christmas tree" assembly), crack open blow down valve to make certain there is no pressure in the tank. Make sure discharge of blow down valve is not directed toward yourself or other personnel. If there is no blow down valve, find out from your supervisor how to make certain of pressure condition of tank before proceeding any further.
- 6.2 Check manhole assembly for condition of gaskets and proper functioning of closing mechanism to secure lids tightly.
- 6.3 All MC 312 Tanks must be equipped with a spring loaded relief valve (set to open at the design pressure of the tank; see metal certification plate) or a rupture disc (set to rupture at not more than 150% of design pressure). These should be checked for proper rating, condition, and cleanliness. Sometimes a relief valve is installed on top of a rupture disc. In this case, there should be a pressure gauge or test valve or plug between the two devices so the condition of the rupture disc can be determined.
- 6.4 Check any other valves, gaskets, vacuum vents, pressure gauges and fittings on top of tank for proper operation and condition. Unlike MC 306 and MC 307 tanks, no fusible caps should be used on MC 312 tanks. If tank is equipped with dip pipe and top discharge valve, check operation, gasket condition, flange bolt tightness. If there is no down line from top discharge, make certain blind flange is installed on valve discharge. NOTE: Cam type quick couplers should not be used on MC 312 tanks. Only flanged or threaded (preferably Acme thread) fittings should be used.
- 6.5 Since MC 312 tanks can be equipped with valves and fittings for many different uses, the shipper or tank owner should furnish a detailed description for the operator's understanding.
- 6.6 Check to see that tank is clean as many chemicals can react violently when mixed. Also, any product over 200°F should only be loaded in tanks free of moisture. Loading of hot products (over 180°F) in non-insulated tanks is not recommended as personnel may be burned by hot shell.
- 6.7 Know the maximum capacity of tank to avoid overfilling.
- 6.8 Regulations require that there be enough vapor space to allow for expansion due to any possible rise in product temperature during transit. In no cases is this to be less than 2% for corrosive liquids.
- 6.9 Be sure ladder and walkways are well maintained. If abrasive on walkway surface is worn or missing, replace.

7.0 LOADING PRECAUTIONS:

- 7.1 Always set parking brake before loading, then ground tank to loading rack to avoid static electrical sparks. If loading a specialized product, follow product manufacturers' recommendations for the control of static electricity. For further information on the control of static electricity see API RP 2003 "Recommended Practice for Protection Against Ignitions Arising out of Static, Lightning and Stray Currents".

**ALL LOADING AND UNLOADING OPERATIONS SHOULD BE
PROPERLY SUPERVISED AT ALL TIMES**

- 7.2 Do not load tank with hot product which exceeds tank manufacturers' maximum temperature rating, or with a product that will have a corrosive effect on the tank. To do so endangers the structural capability of tank to continue trouble-free performance. Aluminum and stainless steel tanks require close attention to this caution.

DO NOT MIX PRODUCT IN TANK . . .

Example: Many acids react violently upon addition of water to the tank.

- 7.3 Do not load the vehicle beyond the maximum product load specified on the metal certification plate or on the vehicle certification label which specifies the Gross Vehicle Weight Rating (GVWR). The GVWR is the maximum allowable total weight of vehicle, payload and equipment on the vehicle.

7.4 *TOP LOADING:*

- 7.4.1 The loading pipe should be adequately secured, braced, or restrained to prevent accidental spill during loading.
- 7.4.2 Stay away from vicinity of manhole to avoid being exposed to product fumes during loading.
- 7.4.3 Be sure manhole cover is closed, seated, and securely latched before moving tank. Excessive tightening of manhole covers may damage gaskets.

7.5 *CLOSED SYSTEM LOADING:*

- 7.5.1 If tank is to be loaded through discharge valve (or special top loading valve) and manhole kept closed so dangerous vapors will not escape, a separate venting line must be connected to the pressure fitting or special vent valve on top of the tank to keep from over pressurizing the tank. The shipper should give specific instructions for this procedure; including type and size of hoses, what fittings and valves on the tank vehicle and storage tank are to be used.
- 7.5.2 After loading tank, make certain all hoses are disconnected before moving trailer tank. If loading procedure was done under pressure, a means must be provided to depressurize hoses before they are disconnected.
- 7.5.3 Do not pressurize tank while in transit. **EXCEPTION:** - Certain hot products tanks or tanks carrying products which decompose or are damaged by moisture in normal atmosphere are sometimes kept under slight pressure (2 to 5 psi) of nitrogen or inert gas. This should be specifically called for by the shipper or carrier, however.

8.0 HEATING PRECAUTIONS:

CAUTION:

THE MAJORITY OF PRODUCTS REQUIRING AN MC 312 TANK MAY BECOME CORROSIVE TO THE TANK AND/OR HEATING SYSTEM AT ELEVATED TEMPERATURES AND SHOULD THEREFORE NOT BE HEATED OR LOADED WARM.

- 8.1 Do not heat empty tank with on board heating equipment unless manufacturer expressly states that unit is capable of this type of preheating. Otherwise follow TTMA Technical Bulletin No. 61 for preheating.
- 8.2 Do not exceed working pressure of steam panel. Be sure correct pressure relief valve is on unit and that it is functioning. Outlets should be directed away from personnel. Pressure gauges should be installed on steam supply to monitor equipment. Be sure coupling of steam hose is secure before applying steam.
- 8.3 Handle steam hoses with gloved hands. Connect inlet hose to trailer heat system inlet, return hose to trailer heat system return or outlet connections if provided. After both ends of hose are secured, open valve (s) slowly to check for leakage before leaving valve.
- 8.4 If it is necessary to introduce steam into the trailer heat system during the entire product unloading operation, the heating transfer system should be turned off **AT THE HEAT SOURCE** as promptly as possible after the product unloading operation is completed. When cold weather conditions may cause freezing of steam condensate in the vehicle heating system, leave connections uncovered to allow condensate to drain.

9.0 OVER-THE-ROAD SAFE HANDLING FOR OPERATING TANK SEMITRAILERS:

9.1 INTRODUCTION

This section is to provide you with information about the stability of tank semitrailers, as an aid in developing safe handling practices and knowing what situations to avoid that make the tank unstable.

9.2 WARNING

Like any other vehicle, tank semitrailers can tip or slide out of control if turns are negotiated at too high a speed or when making violent maneuvers such as abrupt lane changes or other evasive actions to avoid obstacles.

9.3 *FACTORS WHICH PROMOTE OPERATIONAL SAFETY:*

- 9.3.1 Secure mounting of lower fifth wheel to tractor frame.
- 9.3.2 Driver familiarity with the characteristics of the particular tank trailer and the load being transported.
- 9.3.3 Driver familiarity with the nature of the roads and traffic which may be encountered during the trip.
- 9.3.4 The ultimate objective of care in these areas is to assure that the vehicle will be operated in a safe and, therefore, stable manner. Major factors which can adversely affect stability are:
 - 9.3.4.1 Excessive speed;
 - 9.3.4.2 Violent swerving or turning;
 - 9.3.4.3 Application of brakes or tractor power while turning.
- 9.3.5 Within the relatively narrow confines of road laws limiting vehicle size and weight, together with the characteristics of available tires, suspensions, and other components, there is little that a tank manufacturer can do to affect the inherent stability of a trailer other than keeping the bottom of the tank as low as practicable considering the requirements of mounting structures and other appurtenances. This means that the major factor affecting operational stability is the knowledge and skill of the driver. Based upon accident reports with which we are familiar, the predominant causes of the rollover accidents (which happen infrequently considering the volume of traffic involved) are:
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 - 9.3.5.1.1 Travelling at freeway speeds for long periods of time and failing to recognize the high speed of travel and reducing it before entering freeway interchanges or other curves requiring a reduced and controlled speed.
 - 9.3.5.1.2 Lack of familiarity with the vehicle characteristics to recognize its safe speed with relation to posted speed limits on curves which are usually determined with automobile traffic in mind.
 - 9.3.5.2 Failure to reduce speed sufficiently when approaching congested traffic such as might be found at traffic signals on highways. With the advent of today's more powerful and higher torque engines, the original practice of maintaining momentum to avoid acceleration in traffic is outmoded.

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High pressure truck tires have different characteristics under high speed cornering conditions than do passenger car tires. As an extreme example, it is fairly common knowledge that a skilled race car driver can consistently "drift" his racer around tight turns where very high lateral "g" forces are encountered. However, truck tires which are designed for carrying high loads over long distances have substantially different characteristics. In technical terms, their lateral stability becomes unpredictable when lateral forces approach 0.4g. This means that trailer tanks, truck tanks, or other commercial vehicles must be operated in a conservative manner when cornering.

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It is an accepted fact that liquid tanks filled to their normal capacity (with 5% outage or less) handle essentially the same as a similar vehicle with a solid load. However, as the tanks are partially loaded due to product density or legal requirements in the case of compressed gases, the mobility of the load or "sloshing" can be detected and must be taken into account in establishing safe driving practices. In general, a downloaded tank will be less stable under cornering and braking conditions than an ordinary liquid tank loaded to its normal capacity. This factor must be given full consideration when determining the handling characteristics of the unit and establishing knowledge required for safe driving of the unit. A specific suggestion is that the driver of a downloaded tank should learn the characteristics of the load and handle his braking efforts accordingly for smoothest stopping. It is also a good practice to keep the brakes on full for a few moments after coming to a stop to avoid vehicle movement in the event that the braking sequence has developed a wave action in the tank.

9.7 *YOUR AND OUR SAFETY*

Frequently tanks are used to carry products that are hazardous, flammable, poisonous, or corrosive. When operating a tank trailer loaded with a hazardous material, you have a double obligation to yourself and the public to drive safely.

Traffic accidents that cause a spill can turn into disasters. **YOU -- THE OPERATOR --** have control over the most important factors that affect vehicle stability. Tank vehicles are important tools in our transportation industry - and, like any tool, is safe in the hands of a properly qualified operator.

10.0 *UNLOADING PROCEDURES:*

10.1 Always set parking brakes before unloading.

10.2 See that discharge lines, valves and transfer hoses are empty and clean. Be sure hoses are compatible with product.

**ALL LOADING AND UNLOADING OPERATIONS SHOULD BE
PROPERLY SUPERVISED AT ALL TIMES.**

- 10.3 Valves, seats, flanged fittings and other mating surfaces should be periodically checked for excessive wear, scratches, or gouges.
- 10.4 If unloading by gravity or pumping off, open blow down valve on tank vent. Open manhole cover before discharge of load by either pump or gravity. When opening manhole with multiple clamps, release clamps nearest hinge first. Stop here if escaping air or vapor under pressure is detected. Avoid product fumes when this is done.
- 10.5 Connect product hose from trailer to receiving tank.
- 10.6 Remain clear of rotating drives to prevent entanglement in machinery, if product is being pumped off.
- 10.7 When pumping off, start pump after hoses are connected and valves open. Run pump for several minutes after suction breaks air. Then close valve and open small air intake valve, if provided, to purge hose. Ground the tank to receiving line.
- 10.8 If unloading with air pressure, be sure air source is limited in both pressure and flow rate as stamped on tank's metal certification plate, if applicable. See TTMA Recommended Practice No. 34.
- 10.9 After both ends of discharge hose have been properly secured from tank truck to receiving tank, proceed as follows:
 - 10.9.1 For tanks having bottom unloading, open emergency valve or manually controlled sump valve. Then open product discharge valve slowly to check for leakage before leaving valve.

CAUTION:

WHEN UNLOADING HOT PRODUCT, VALVES AND HOSES WILL BE HOT.

REMEMBER: In case of emergency, product flow can be stopped by remote emergency trip in the case of self closing emergency valves, or by a remote manual closing feature (minimum of 10 ft. from valve) in the case of a manual sump valve without self closing feature.

KNOW BOTH LOCATION & TYPE OF CLOSING FEATURE.

- 10.9.2 For tanks having top unloading, open valve on top of dip pipe slowly to check for leakage before leaving valve.

REMEMBER: Unless specially equipped with air, hydraulic, or mechanical operator, there is no remote operator for closing this type of valve so in case of emergency, the top valve itself must be closed manually. **KNOW LOCATION & TYPE.**

- 10.9.3 For tanks having top unloading with a down line and valve at bottom of down line, open top dip pipe valve, then slowly open down line valve to check for leakage before leaving valve.

REMEMBER: For emergency flow stoppage, top dip pipe valve is the preferable one to close.

KNOW LOCATION & TYPE.

- 10.10 When shutting down after pressure unloading product from transport tank, shut off air supply at its source and allow air pressure in transport tank to blow down through product discharge hose into consignee's tank. If this procedure is not allowed by consignee, shut off air supply at its source and allow air pressure in transport tank to blow down using the blowdown valve in the pressure discharge manifold described in TTMA RP No. 34, if plant so equipped.

CAUTION:

BLOW DOWN AIR MAY CONTAIN ACID OR OTHER DANGEROUS VAPORS. DIRECT DISCHARGE VAPORS AWAY FROM PERSONNEL.

If neither of above blow down procedures is permissible, check with consignee for proper procedure to be used.

- 10.11 When shutting down product transfer operation while there is the possibility of some pressure in the transfer line, always close the valve nearest the source of pressure first. If the valve at the receiving end of the transfer line is closed first, there is the possibility of a weak line or loose connection allowing bystanders to become sprayed with dangerous material.

CAUTION:

MOST SUBSTANCES HAULED IN MC 312 TANKS ARE DANGEROUS. KNOW WHAT YOU ARE HAULING AND THE REQUIRED FIRST AID IN CASE OF EMERGENCY.

DO NOT ENTER TANK BEFORE IT IS PURGED: THEN HAVE A BUDDY NEARBY AND USE FORCED VENTILATION IN ALL SECTIONS BEING ENTERED.

11.0 SAFE OPERATING PROCEDURES & INSTRUCTIONS:

11.1 At Terminals, Loading, & Unloading Sites:

The shipper and/or carrier should establish safe operating procedures and instructions for each application for loading and unloading of MC 312 Tanks. Since each of these involve not only the MC 312 tank being used but also varied types of valving, storage and safety equipment at each location, it is not possible to establish a single procedure for all applications. As a minimum, the instructions should include but not be limited to the following items:

- 11.1.1 Description of the product and its hazardous characteristics.
 - 11.1.2 Check for proper shipping papers marking and placarding.
 - 11.1.3 Protective clothing and equipment to be used by the operator.
 - 11.1.4 Knowledge of the location and use of safety equipment in the area including safety showers and eye wash fountains.
 - 11.1.5 Knowledge of location and use of First Aid equipment and location of dispensary or medical facility at each location.
 - 11.1.6 Instructions to check all equipment on tank for proper operation before loading (i. e. - vents, valves, gaskets, pressure gauges, connections, etc.)
 - 11.1.7 Detailed loading procedure.
 - 11.1.8 Detailed unloading procedure.
 - 11.1.9 Detailed procedure for removing pressure from tank (if pressure unloaded) after unloading and securing empty tank for return trip.
 - 11.1.10 Washing or cleaning instructions if required (many acids react violently upon the addition of water to the acid).
 - 11.1.11 Procedure to be used in case of spills or leaks.
 - 11.1.12 Understanding of what happens if tank is over pressurized and a relief valve or rupture disc blows; especially the sudden noise that occurs and the discharge of air, or vapor or liquid and vapor which ensues.
 - 11.1.13 Understanding of how easily a tank can be collapsed (vacuumed) if it is pumped off without an operable vacuum vent or top valve or fill cover or manhole cover being open to replace the material being pumped out.
- 11.2 *Over The Road Precautions:*
- 11.2.1 See Nos. 11.1.1, 11.1.2, 11.1.6.
 - 11.2.2 In case of accident: how to instruct local fire and police department personnel on type of hazardous material in tank.
 - 11.2.3 Who or what organization to call for information in case of leaks, spills, fires, etc., involving environmental protection and safety in populated areas.

12.0 INSPECTION AND MAINTENANCE: TANK PROPER:

- 12.1 DOT regulations require that tanks be inspected visually every two years and hydrostatically tested if: (1) it has been out of service one year or more, (2) involved in an accident and repaired; (3) altered, (4) is operating under special permit. Since all MC 312 tanks rated over 15 psi working pressure are ASME vessels, any repair or alteration to the vessel shall be done by a shop having material control, welding procedures, quality assurance manual, and personnel qualified per the ASME Code. The inner tank barrel itself is a very important piece of equipment. The barrel serves the dual purpose of product retention and must carry the weight of the product in addition to the weight of the barrel itself. The barrel is strongest when it is in its originally manufactured condition. A substantial amount of its load bearing capability is lost if buckling or distortion occurs in the tank shell due to an accident, overloading or any of the following:
- 12.1.1 Fast filling of hot product in a cold tank that has not been prewarmed in a building or prewarmed by other means that are not detrimental to the tank, loading and/or safety of the loader or operator. Slow initial filling should be considered.
 - 12.1.2 Loading with product that is hotter than the maximum temperature rating of the trailer.
 - 12.1.3 Vacuum created by the unloading process (or by tank cooling after unloading) with manhole closed and vents plugged with solidified materials or otherwise rendered inoperative.
 - 12.1.4 Repeated travel over rough roadways at speeds that are not reasonable for longevity of any type of vehicle.
 - 12.1.5 Dropping the loaded trailer on the landing gear in lieu of setting it down, which creates unusual shock.
 - 12.1.6 Operating the trailer at a continuous speed at which the resonant frequency (vibration) is at its peak. Every trailer has such a frequency and a change in speed of two or three miles per hour either faster or slower reduces the vibration out of the peak range.
- 12.2 The structural integrity must be maintained. It is recommended that the barrel and all internal members be checked regularly at intervals of every three (3) months or 15,000 miles whichever occurs first. Corrective repairs should be made as soon as possible.

1020 Princess Street

----- Alexandria, Virginia 22314

RICHARD P. BOWLING
PRESIDENT(703) 549-3010
FAX: 1-703-549-3014

BULLETIN NO. 99

May 3, 1991

SUBJECT: DISPOSITION OF SPRING BRAKE CHAMBERS
(Original Issue - June 1985 - Reissued May 1991)*1.0 PREFACE:*

- 1.1 Recommended Practices or Technical Bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a Practice or Bulletin may be used or possible consequences of each way. TTMA has not undertaken any such broad evaluation.
- 1.2 Everyone who uses Practices or Bulletins, either recommended or not recommended by TTMA, must first satisfy himself thoroughly that neither his safety nor the safety of his product will be jeopardized by any method he selects. These publications are reviewed at least every five years and the date so indicated.
- 1.3 Definitions of specialized terms used in TTMA Recommended Practices or Technical Bulletins may be found in TTMA RP No. 36 - "Tank Trailer and Tank Container Nomenclature or TTMA RP No. 66 - "Trailer Nomenclature."
- 1.4 The use of shall or should has no bearing on the voluntary nature of TTMA publications. Inclusion of a TTMA publication in a document, standard, or contract by a company or agency is a voluntary act. When a TTMA publication is so cited, the publication becomes a requirement within the limitations set forth by the document, standard, or contract. The following shall apply to use of these words:

SHALL is to be used wherever the criterion for conformance with the specific recommendation requires that there be no deviation. Its use shall not be avoided on the grounds that compliance with the report is considered voluntary.

SHOULD is to be used wherever noncompliance with the specific recommendation is permissible. Should, shall not be substituted for shall on the grounds that compliance with the report is considered voluntary.

2.0 OBJECTIVE:

- 2.1 Provide a warning of potential danger in disposing of used or damaged spring brake chambers.

- 2.2 Recommend permanent disarming of all spring brake chambers before they are discarded.

3.0 *DISPOSITION:*

3.1 Warning:

Spring brake chambers contain high strength springs which are compressed even at the extended position in the chamber. This spring, if suddenly released, can propel itself or other parts of the brake chamber with enough force to seriously injure personnel.

Recommendations of the spring brake chamber manufacturer should be followed carefully when inspecting, removing, repairing, servicing, disposing, or otherwise handling spring brake chambers.

3.2 Disposition:

Spring brake chambers that are to be discarded should be safety disarmed before storage. The disarming should be accomplished in a disablement cage or other suitable safety device using the method recommended by the manufacturer of the spring brake chamber.

1020 Princess Street ----- Alexandria, Virginia 22314

CHARLES J. CALVIN
President*Utilizing TTMA Services may give you an Education;
not using them will give you experience.***(703) 549-3010****BULLETIN NO. 100****December 5, 1985****SUBJECT: INSPECTION OF REINFORCING MEMBERS ON LINED MC 312 VESSELS**
(Original issue date December 1985)**1.0 PREFACE:**

- 1.1 Recommended Practices or Technical Bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a Practice or Bulletin may be used or possible consequence of each way. TTMA has not undertaken any such broad evaluation.
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Should is to be used wherever noncompliance with the specific recommendation is permissible. *Should*, shall not be substituted for *shall* on the grounds that compliance with the report is considered voluntary.

2.0 PURPOSE AND SCOPE:

- 2.1 This Technical Bulletin is intended to emphasize the need for regular inspection of reinforcing members on lined MC 312 cargo tanks used for the transportation of corrosive materials.
- 2.2 This Technical Bulletin is primarily intended for cargo tanks fabricated from mild and high tensile steels.

3.0 PROBLEM:

- 3.1 The Department of Transportation has issued an ON GUARD bulletin warning of structural shell failures involving cargo tanks transporting corrosive materials. To date, all the cargo tanks involved in accidental spills have had some type of carbon steel shell material (either mild or high tensile steel). The problem has been identified as excessive shell corrosion (rust) under supporting rings.

4.0 RECOMMENDATIONS:

- 4.1 Inspect all cargo tanks at least annually for signs of corrosion. Pay particular attention to rust spots around supporting rings and other enclosed areas.
- 4.2 Keep all drain holes in pads and supporting rings open. Clogged drain holes may indicate corrosion is taking place and steps should be taken to identify the problem.
- 4.3 Inspect lining for tears, cracks, and raised seams. Corrosion sites on the tank exterior opposite the lining may indicate lining failure.
- 4.4 All void spaces should be inspected as part of regularly scheduled maintenance. Void spaces should be inspected at least annually, or more often if warranted by service, both visually and with an ultrasonic (or equivalent) testing device.
- 4.5 Where possible, the cargo tank should be inspected with an ultrasonic (or equivalent) testing device to determine if the shell thickness meets minimum applicable DOT requirements.

TTMA/em

Encl.

CHARLES J. CALVIN
President

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not using them will give you experience.*

(703) 549-3010

BULLETIN NO. 103

October 24, 1986

SUBJECT: LIQUID AND VAPOR CONTROL DURING LOADING/UNLOADING
 MC 307 TANKS

1.0 PREFACE:

- 1.1 Recommended Practices or Technical Bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate or advise the service trade of all conceivable ways which a Practice or Bulletin may be used or the possible consequences of each way. TTMA has not undertaken any such broad evaluation.
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2.0 PURPOSE:

- 2.1 The purpose of this Technical Bulletin is to advise operators of the potential fire hazard from spills and health hazard from vapors associated with loading and unloading MC 307 tanks, and recommendations on ways to alleviate these potential problems.

3.0 FIRE HAZARDS:

- 3.1 Overfill protection systems are available to prevent overfilling tank trailers and storage tanks. Overfill spills may present fire, health, and/or pollution hazards.
- 3.2 When storage tanks are equipped with a vapor recovery system, the vapor recovery system shall be used. All connections to the storage tank and the tank trailer shall be made vapor tight.
- 3.3 When storage tanks are not equipped with vapor recovery systems, the vapors shall always be piped to a safe disposal area.

4.0 HEALTH HAZARDS:

- 4.1 Be aware of the dangers of each location as some products have toxic vapors. *HYDROGEN SULFIDE GAS*, for example, is extremely toxic and gas masks or self-contained breathing air shall be used when this gas is known to be present.
- 4.2 Other products have vapors that can cause dizziness and disorientation. Precaution should be taken to avoid breathing any vapors from these products.
- 4.3 Engulfment by some products can cause a variety of illnesses and precautions should be taken to avoid contact with bare skin.

TTMA/em

February 1984

DANGER—CARGO TANK RUST!!!

If your cargo tank
breaks open and spills
its cargo—you could be
responsible:

For ENVIRONMENTAL CLEAN UP,
which is usually very expensive.

2. For DEATH or
INJURIES to persons
exposed to the
spilled hazardous
materials.

On Guard



U.S. Department of Transportation
Federal Highway Administration

**WARNING! INSPECT YOUR CARGO TANKS FOR CORROSION
ON THE OUTSIDE OF THE TANK!**

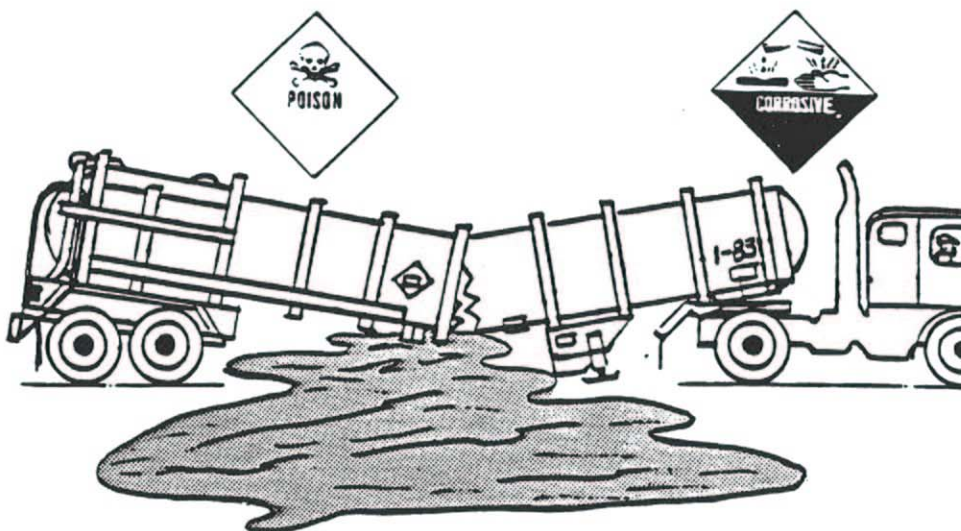
Several recent accidents revealed that rust can weaken the metal cargo tank shell—until it splits open and dumps its dangerous cargo.

FACT: A cargo tank ruptured while transporting 5,000 gallons of Hydrochloric Acid. The entire load spilled, closing the highway. In a similar accident on a busy turnpike—32 people were injured by the toxic fumes—and environmental "clean up" cost a small fortune.

FINDINGS: Rust under the tank ring stiffeners had weakened the cargo tank until it suddenly gave way while under the stress of a load.

RECOMMENDATIONS: If your cargo tank has been in service for awhile, in addition to the visual inspection required by Federal Regulations under 49 CFR 177.824, consider:

1. Visually inspecting cargo tanks at *least once each year* for signs of rust or corrosion of the tank shell—instead of every 2 years and perform ultrasonic inspection (or equivalent) to determine if shell thickness meets minimum specification requirements.
2. Giving special attention to external rust spots next to any tank attachments and any ring stiffeners which could trap moisture—especially—if drain holes are plugged.



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BULLETIN NO. 58

December 5, 1985

SUBJECT: CARGO TANK VENTING

(Originally issued August 1975,
Revised April 1979 and
December 1985)

1.0 PREFACE:

- 1.1 Recommended Practices or Technical Bulletins furnished by TTMA are a guide to general practice and the state of the art that exists at the time of their inception. They are not exhaustive. TTMA cannot possibly know, evaluate, or advise the service trade of all conceivable ways which a Practice or Bulletin may be used or possible consequence of each way. TTMA has not undertaken any such broad evaluation.
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2.0 PURPOSE:

- 2.1 The purpose of this Technical Bulletin is to emphasize the importance of proper venting to operators and to describe equipment problems that may result from inadequate venting.

3.0 REASONS FOR VENTING:

3.1 Venting is provided on tanks for three reasons:

- 3.1.1 To prevent explosion of tanks involved in fires.
- 3.1.2 To prevent damage of tanks as a result of over-pressurization.
- 3.1.3 To prevent collapse of tanks as a result of internal vacuum.

4.0 TYPES OF VENTING DEVICES:

- 4.1 Cargo tank venting is provided by spring loaded pressure relief valves, vacuum breaker vents, fusible vents, rupture discs, positive actuated valves, open vents, and combination pressure/vacuum relief valves (normal vents).

All tanks are not required to be equipped with each of the venting devices described and, indeed, some tanks are prohibited from being equipped with certain types of venting devices.

5.0 DOT SPECIFICATION VENTING:

5.1 DOT VENTING REQUIREMENTS:

The Department of Transportation specifications require specific minimum venting for cargo tanks built and operated as MC 306, MC 307, MC 312, MC 331, IM 101 and IM 102 tanks. These venting devices will be marked with their venting capacity in standard cubic feet of air per hour at a specified pressure.

5.2 VENTING & VAPOR RECOVERY

When an MC 306 gasoline tank is equipped to recover vapors at filling stations and to transfer vapors at loading terminals, special venting problems can occur. Most pressure/vacuum relief valves used from 1967 through 1978 to comply with the MC 306 Specification will open and allow both inbreathing and outbreathing of vapors at pressures below those generated when collecting vapors. In other words, they allow small amounts of vapors to escape to atmosphere.

Most MC 306 gasoline cargo tanks now being manufactured are equipped with pressure/vacuum relief valves that are set to open at slightly under one (1) psi (27.7 inches water column). This pressure is not harmful to the cargo tank or cover, but will cause a out-rush of vapors when the cover is opened.

6.0 NON-SPECIFICATION VENTING:

- 6.1 Venting devices for tanks not meeting any Department of Transportation specifications must meet loading, unloading, and other operational requirements of the equipment so that the pressure and vacuum strength of the vessel design is not exceeded. There are no industry standards on venting devices for this type of equipment because of the wide range of products transported and the wide range of handling conditions.

7.0 PROBLEMS:

7.1 EXPLOSION:

If proper spring loaded pressure relief valves, fusible vents or rupture discs are not provided, or not properly maintained, the cargo tank may explode if exposed to a fire.

7.2 DAMAGE:

If spring loaded pressure relief valves and/or rupture discs are clogged, of insufficient size, improperly adjusted, or not properly maintained, the cargo tank may become distorted or may rupture from over pressurization during pressure unloading.

7.3 COLLAPSE:

If vacuum breaker vents are clogged, of insufficient size, improperly adjusted, or not properly maintained, the cargo tank may develop buckles or collapse from vacuum forces during gravity unloading or pumping off.

NOTE: Vessel may also collapse after steam or hot solution cleaning if tank is allowed to cool with manhole closed and vent openings inoperative.

8.0 PRECAUTIONS AND RECOMMENDATIONS FOR MANUFACTURERS AND OPERATORS:

8.1 Manufacturers must make certain that proper venting is provided to meet DOT requirements and other operating conditions described by operator.

8.2 Operators must have proper venting devices in place at all times. Check MC Specification requirements and make certain conversion information indicated on Certification plate is complied with when tank is used in multi spec service.

8.3 Operators must keep venting devices in a clean operating condition and set properly. Venting devices clogged with viscous materials will not operate at design pressure.

8.4 Recent innovations have greatly improved the performance of MC 306 pressure/vacuum relief valves.

These latest "state of the art" pressure/vacuum relief valves provide total product containment under any condition of tank upset. In addition, these new pressure/vacuum vents are so constructed to be disassembled, inspected, cleaned and repaired.

8.5 When pressure unloading is used, equip pressure line with separate regulator or pressure relief valve set to relieve at a pressure slightly below tank valve pressure to protect tank and relieve air pressure before tank valve pops, which would discharge vapors. (See TTMA RP No. 34).

8.6 During gravity unloading or pumping off on tanks not equipped with a vapor recovery system, prop manhole open as a safety factor to prevent vacuum collapse or buckling.

8.7 After steam cleaning or hot solution cleaning, prop manholes open to prevent vacuum collapse of tank during cooling.

TTMA/em

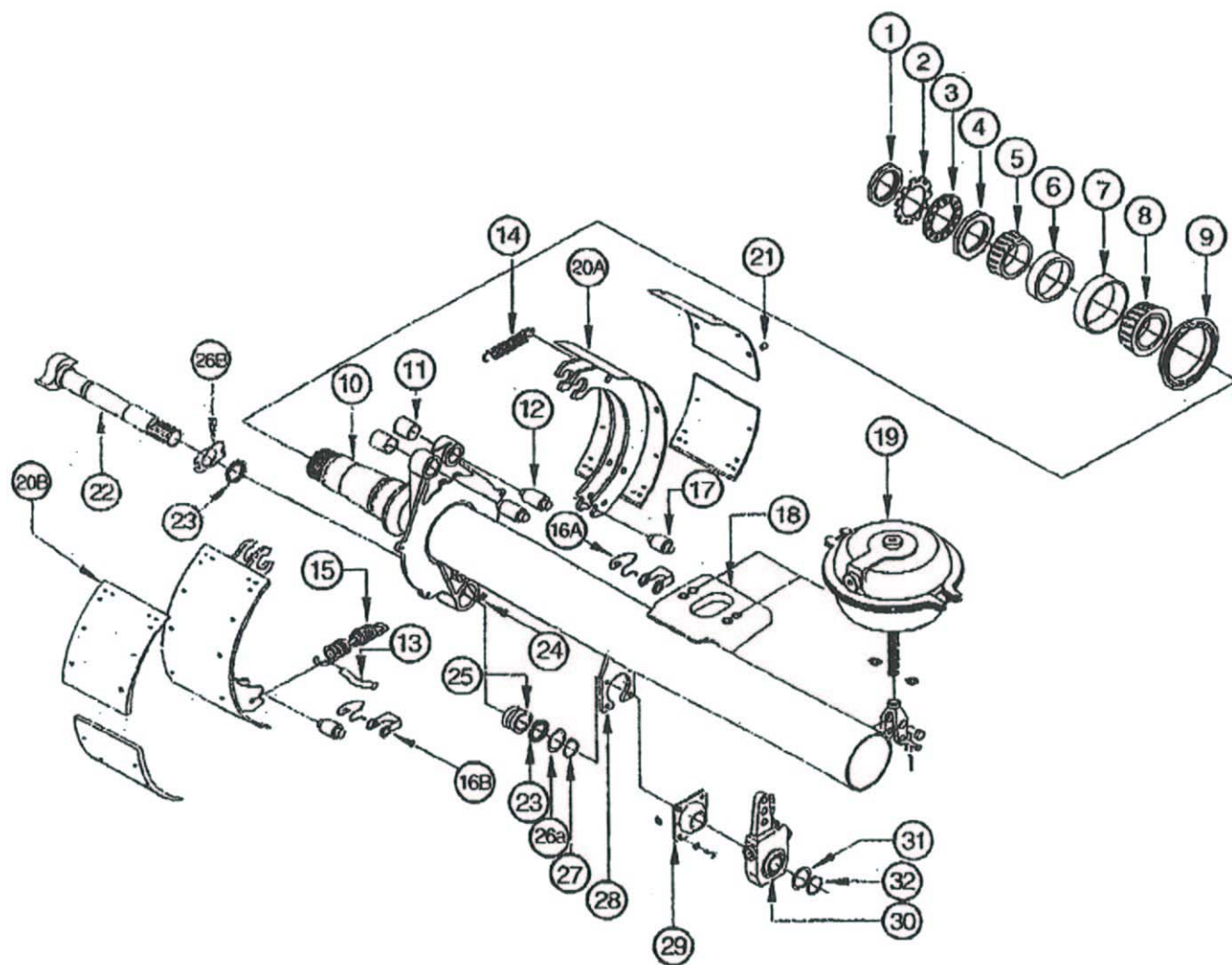
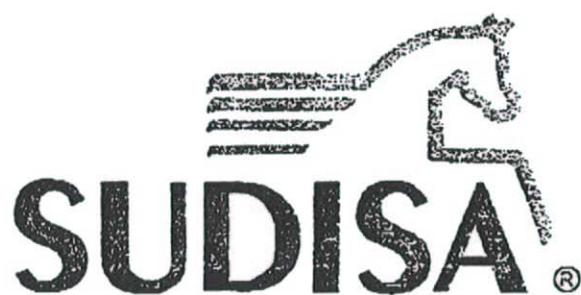


Trailer Axle Parts Cross Reference Chart

FIG	DESCRIPTION	SUDISA	EUCLID	MERITOR/ROCKWELL	DANA/SPICER
1	WHEEL BEARING ADJUSTMENT NUT	9490	E-572	1227-B-756	M10HN102
2	WHEEL BEARING LOCKING THRUST WASHER	9294	E-2237	1229-J-4638	M10HN151
3	LOCK WASHER	9658	E-573	1229-V-1660	M10HN100
4	INNER NUT	9489	E-540	1227-C-549	M10HN101
5	OUTER BEARING CONE HM218248			Specify Brand	
6	OUTER BEARING CUP HM218210			Specify Brand	
7	INNER BEARING CUP HM212011			Specify Brand	
8	INNER BEARING CONE HM212049			Specify Brand	
9	HUB SEAL GREASE	9191	E-1295	1205-D-940	M10HH123
9	HUB SEAL OIL (TWO PIECE)			STEMCO GRIT-GUARD 372-7097	
9	HUB SEAL OIL	9551 V		STEMCO VOYAGER 373-0143	
10	TRAILER AXEL BEAM	EA9M/11M			
11	ANCHOR PIN BUSHING	9300	E-1893	1225-B-496	M16HD101
12	BRAKE SHOE ANCHOR PIN	9652	E-2766	1259-N-274	M16WJ105
13	SPRING RETAINER	9175	E-747	1218-G-85	M16WJ102
14	RETAINER SPRING	9191	E-2767	2258-Q-615	M16WJ101
15	RETURN SPRING	9485	E-545 A	2258-P-354	H10WJ135
16A	ROLLER RETAINER - STEEL WIRE	9174	E-539	1718-Y-103	M16WJ103
16B	ROLLER RETAINER - STEEL-	9135	E-3227		34-1530
17	BRAKE SHOE ROLLER	9610	E-523	1779-R-18	M16WJ104
18	AIR CHAMBER BRACKET	9680	E-2518 A	3299-A-5981	M10WJ144
19	AIR CHAMBER T-30 *	9075	E-BC30S	V38-3276-D-30	16219-1
20A	BRAKE XHOE 16.5" X 7" Q TYPE	9882	E-2778	3222-S-1293	
20B	BRAKE LINING STANDARD FMVSS 4515-G				
21	RIVET 10-8	9199	E-10-8S	RV-3109	24-1049
22	S CAMSHAFT 24 1/8"-28 L 1 5/8" X 1 1/2" **	9363 L	E-6081LH	2210-W-6575	
22	S CAMSHAFT 24 1/8" - 28 R 1 5/8" X 1 1/2" **	9363 R	E-6082 RH	2210-W-6576	
22	S CAMSHAFT 20 7/16" -28 L 1 5/8" X 1 1/2" **	9366 L	E-5508 LH	2210-G-6871	
22	S CAMSHAFT 20 7/16" -28 R 1 5/8" X 1 1/2" **	9366 R	E-5508 RH	2210-G-6870	
23	CAMSHAFT SEAL	9208	E-2405	1205-U 1451	29-1274
24	GREASE FITTING 1/8"	9121	E-1308		34-1542
25	CAM SPIDER BUSHING 1 5/8" I.D.	9088	E-2690 A	1225-N-1158	
26A	CAM WASHER 1 5/8" I.D.	9288-C	E-9074	1229-B-4136	
26B	CAM WASHER 1 5/8" I.D. "D" TYPE	9344	E-9073	1229-A-4135	
27	LOCK RING 1 5/8"	9240	E-1569	1229-A-1119	
28	CAMSHAFT SUPPORT BRACKET	9587	E-2477 B	3299-T-5844	
29	CAMSHAFT SUPPORT ASSY	1008-06S	E-1318 A	3105-V-282	
30	SLACK ADJUSTER 10 SPLINE AUTO/MANUAL			Specify Brand	
30	SLACK ADJUSTER 28 SPLINE AUTO/MANUAL			Specify Brand	
30	SLACK ADJUSTER 37 SPLINE AUTO/MANUAL			Specify Brand	
31	CAM WASHER 1 1/4" I.D.	9134	E-5095	1229-J-3130	
32	LOCK RING 1 1/4"	9219	E-5093	1229-D-2942	16070

* Type 30/30 also available

** Other camshaft lengths also available



MODEL 9M - 22,500 Lbs. Capacity
MODEL 11M - 25,000 Lbs. Capacity



CAMSHAFTS FOR 16 1/2" & 12 1/4" BRAKES

Oct. 04/2001

Splines	Length		Type	Sudisa Part Number		Sudisa Product Matrix Ref	Dirona PN	EUCLID PN	MERITOR PN	BRUNNER PN	Notes
	CHRG	TOTAL		OLD	NEW						
10	20-7/16"	22-3/16"	16 1/2	9362 L/R	F2609/10		X22102294/65	1424/25 L/R			
	24-1/8"	25-7/8"		9364 L/R	F2619/20		X22102266/67	2461/52 L/R			
	20-7/16"	22-3/16"		9366 L/R	F2611/12	A	X22102556/57	5509/09 L/R	2210G6670/71		
	24-1/8"	25-7/8"		9363 L/R	F2621/22	B	2210W6575/76	6081/82 L/R	2210W6575/76		
28	22-3/8"	24-1/8"	12 1/4	9368 L/R	F2615/16	C	X22102588/89			B6 2002 L/R	
	21-1/8"	22-7/8"		9369 L/R	F2613/14			3861/52 L/R		B6 2052 L/R	
	23-7/8"	25-5/8"		9394 L/R	F2617/18	D				B8 1160 L/R	
	25-1/4"	27"		9393 L/R	F2606/07	E				B8 1164 L/R	
10	20-7/16"	22-3/16"	12 1/4	9870 L/R	F2607/08					B4 1158 L/R	FAST RISE
	20-7/16"	22-3/16"		9886 L/R	F2627/28						

BRAKE SHOES & LININGS	Sudisa Part Number		dirona / brunner pn	Type	diam drum	width	lining FMSI	notes
	OLD	NEW						
	9380	F 4902	B 4591 S	P	12- 1/4"	7-1/2"	4591	
	9385	F 4901	B 4692 G2	Q	12- 1/4"	7-1/2"	4692	fast rise
	9890		3222 E 1383	Q	15"	7"	4705	
	9881	F 4903	A 3722 N 66	P	16-1/2"	7"	4515	
	9882	F 4904	32222 Y 2001	Q	16-1/2"	7"	4515	
	9882 RP	F 4909		Q	16-1/2"	7"	4515	B-lock
	9675	F 4905	A 3222 B 1510 D	Q	16-1/2"	8"	4644	
	9880	F 4908	A 3222 K 1831	Q	16-1/2"	8"	4644 TD	

60 DAY INSPECTION

TRAILER NO. _____ SHOP _____ DATE _____ HUBOMETER _____ (MILES)

	<u>MECHANIC'S</u> <u>OK</u>	<u>INITIALS</u> <u>REPAIRED</u>
1. Check all lights & reflectors: - Operating & clean, wiring OK, connection OK	_____	_____
2. Brakes – operation: - Hoses & cylinders – no leaks, chafing - Slack adjuster (1/2" free travel, clearance OK) - Linings - Air reservoirs – drain, secure attachment - Bent bushing mounting brackets	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
3. Wheels: - Oil leakage from damaged seal - Oil level - Check lugs tight with wrench	_____ _____ _____	_____ _____ _____
4. Tires and rims: - Missing or loose - Cracked or bent rims - Tires – damaged, tread below limit - Inflation pressure _____ psi (check w/guage) - Uneven wear - Mismatched	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____
5. Grease Job	_____	_____
6. Suspension: - Check for cracks or signs of damage - Cracked or missing leaves - U-bolts in place - Shifted axles - Worn bushings, torque arms, hangers - Check torque firm clamps with wrench	_____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____
7. Upper coupler: - King pin secure, no apparent wear - Cracks in wear plate - Attachment bolts loose or missing - Use GO-NO-GO gauge on king pin	_____ _____ _____ _____	_____ _____ _____ _____

8. Support Legs:

- Operate properly
- No evidence of damage – bent braces, cracked mountings
- Attachment bolts not loose or missing

_____	_____
_____	_____
_____	_____

9. Product-related features:

- Internal valve operated properly, mechanical emergency release operates (or hydraulic system leak-free, emergency relief device in place)
- No evidence of leakage from any tank fittings

_____	_____
_____	_____

10. Note inspection, permit & license renewal dates

_____	_____
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6 MONTH INSPECTION

TRAILER NO. _____ SHOP _____ DATE _____ HUBOMETER _____ (MILES)

	<u>MECHANIC'S</u> <u>OK</u>	<u>INITIALS</u> <u>REPAIRED</u>
1. Perform 60 day inspection.	_____	_____
2. Pull wheels, thoroughly inspect drums, seals, bearings and brakes.	_____	_____
3. Check wheel alignment.	_____	_____
4. Steam clean upper coupler wear plate. Inspect for cracks.	_____	_____
5. Appearance: Touch up paint; straighten dents and dings, repair miscellaneous brackets and appurtenances as specified by DuPont.	_____	_____

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