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	Vehicle Tank Preventive Maintenance Procedures		

OEM or customer to determine preventive maintenance interval based on current customer operating conditions. Chart Industries engineering or field service department should be contacted for assistance in determining correct intervals if needed.

Overview

This LNG vehicle fuel system inspection should be performed as a supplement to the vehicles normally scheduled preventive maintenance inspection. All tank components should be allowed to defrost before performing the inspection. The tank and all components of the fuel system should be cleaned prior to the inspection. The tanks outer shell may be cleaned with normal vehicle washing equipment however the plumbing components should be cleaned using a mild non chlorinated soap. Do not use a high-pressure washer or steam cleaner on plumbing components as this can introduce moisture and contaminants into the threads of the fittings and damage sealants.

Safety: Always wear appropriate safety equipment, appropriate clothing and eye protection when performing any of the following steps.

All steps of this PM Procedure should be checked in sequence and recorded on the PM checklist. After all checks are completed a

follow up/repair items list can be created to ensure sufficient communication between inspecting and repairing technicians.

Vacuum Test

Check tank data plate for build date. If tanks age is greater than 36 months, perform vacuum integrity test per Chart Industries bulletin VT-0019. To minimize vehicle equipment downtime begin pressure rise test as soon as possible during PM procedure. Outcome of pressure rise test (8 hours total) to be determined after completion of the following PM inspection steps.

LNG Vehicle Tank Visual Inspection

- Inspect outer shell and both ends for dents or signs of damage, check underside of tank for deep scratches, flat spots or gouges.
- Inspect pump out port or cap for signs of damage or tampering, half round cap must be intact and secured to the tank using a plastic rivet.
- Inspect tank straps for damage and the presence of strap insulating rubber
- Inspect tank and straps for signs movement, loose straps, or tank rolling.

Decals

Check for presence and condition of the following decals on the vehicle or outside of the tank

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- Blue LNG triangle decal – Should be affixed to the right rear and left front of the vehicle
- Yellow LNG 230 psi MAX – Should be affixed in plain sight near the fill connector
- NexGen data plate - Should be permanently affixed to the tanks shroud (on shrouded tanks) or on the heading support (non shrouded tanks).
- Black UN1972 – Optional decal should be affixed on or near the fill connector.

The following decals should be visible and affixed to the tanks head on the plumbing end.

- Fill decal – Should be affixed to the tanks head near the fill tube
- Liquid decal – Should be affixed to the tanks head near the fuel supply tube
- Vent decal – Should be affixed to the tanks head near the vent tube
- Read Instruction Manual decal – Should be affixed to the tanks head approximately 3 inches directly below the tanks knuckle.

Shrouded Tanks Only

- Inspect shroud cover or door for signs of damage and operation
- Check for presence of shroud cover rubber securing straps and latches

- Check for presence and condition of cover retainer lanyard
- Check condition of rubber weather strip on inside of one-piece shroud end cover

Plumbing Components Inspection

- While shroud door removed, use Snoop leak tester to check for signs of plumbing or component leaks while performing the following visual inspections. Note leaks as you progress through the inspection and later determine what course of action will need to be taken as a follow-up procedure.
- Check economizer, U-tube and both elbows for signs of damage, frosting and leaks.
- Check vent service valve and use (liquid) service valve for leaks, signs of damage.
- Check service valves for ease of operation and leaks while operating.
- Inspect primary relief valve and threaded connections for signs of leaks, check relief valve pipe away tubing and elbows for signs of damage, kinks, chaffing, loose connectors, and correct routing.
- On shrouded type tanks check the orientation and cleanliness of the low point moisture drain hole in the pipe away tubing.
- Inspect the secondary relief valve, check for signs of leaks and correct orientation,

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if equipped with a weep hole in the wrench flats the weep hole must be oriented in downward position.

- Check for the presence of the red cap on secondary relief valve, if the cap is missing an inspection of the primary relief system will need to be performed in a follow up procedure.
- Inspect pressure gauge, check for cracks in the gauge sight glass and any other damage, check for presence of indicator needle and condition. Check face of gauge to ensure that it is legible and appears to be accurate, and secure.
- On vehicles equipped with remote mounted gauges check the entire length of tubing leading to the gauge, look for signs of kinked, crushed or damaged tubing, if the gauge is liquid filled check for signs of leaks around the face and rear body of the gauge.
- Check excess flow valve and tubing for signs of leaks, damage, correct orientation, and frosting while vehicle is parked.
- Check fill coupler for cleanliness, damage, leaks, secure mounting. Check for presence of and condition of cap and security cable.
- Inspect fill tubing for signs of damage, kinked, crushed tubing or chaffing.

- Inspect fill check valve for condition, leaks, and correct positioning.
- Follow entire length of vent tubing, look for signs of leaks, kinked, crushed, damaged, or chaffed tubing.
- Inspect Macro tech connector for leaks, security and signs of cracked or damaged fittings.

Fuel Gauge Components Inspection

- Check BNC connector and elbow for signs of leaks and damage, check for the presence of BNC heat shrink and look for cracking or signs of moisture intrusion or LNG leaks.
- Check sender cable and wiring for chafing, cracking or loose connections.
- Inspect sender box for damage and security; ensure retainer clips are installed on mounting ears. Inspect 3 pin weatherpack connection for loose damaged or chaffed wiring.
- Check for the presence of wire loam to protect the OEM harness. On shrouded type tanks inspect the wiring at the shroud for chafing and security, the shroud hole should be protected with a rubber grommet. Inspect gauge for security and signs of damage.
- Turn vehicle ignition switch to run position and check for gauge response. On instrument panel mounted gauges

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turn on instrument panel lamps to check for gauge lamp operation.

Relief Valve Pipe Away Inspection

- Inspect relief valve pipe away tubing; look for signs of cracked, kinked or pinched tubing. Follow the tubing from the shroud outlet through the frame rail, or to its destination as you inspect it.
- Look at the tubing outlet to ensure that it is not damaged, kinked or pinched off. Check to ensure that the tubing has a moisture drain and ensure that the drain is operable and free of debris or obstructions.

Heat Exchanger Inspection

- Follow liquid line tubing from tank to heat exchanger, check tubing for signs of damage, kinks in tubing and proper support. Inspect heat exchanger for mounting and condition, check clamps for security, check inlet and outlet connections for leaks. Check coolant hoses for proper size and routing.
- Check coolant hoses for signs of chafing, kinks, or leaks. Check coolant clamps for condition and proper positioning and torque.
- Check the heat exchanger mounting clamps and bolts for security and signs of looseness.

- If equipped, check the fuel shut off solenoid, look for signs of damage and leaks, wiring and electrical connections must not have any signs of chafing, cuts or exposed wiring. Check solenoid bracket for loose mounting.
- Follow and check tubing and supports from heat exchanger outlet to overpressure regulator inlet.

Overpressure Regulator Inspection

- Check the overpressure regulator and mounting, look for dents or damage to regulator.
- Check regulator and fittings for leaks using liquid leak checker, check mounting brackets and bolts for looseness.
- Check locking nut at adjustment handle to ensure it is tight.
- If the regulator is equipped with a pressure gauge check the gauge for damage or incorrect reading. Ensure gauge sight glass is clear and gauge pressure scale is not faded or damaged, gauge scale must be legible.
- If liquid filled gauge is used check for signs of liquid leaks around the gauge.

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LNG Vehicle Tank Preventive Maintenance Procedure Checklist

Fleet Name: _____

Vehicle Number: _____

Tank Serial Number: _____

Date: _____

Codes should be used in left side of box; technician initials should be used in right side box

Codes √ = Task performed OK; O = Follow-Up Needed; X = Follow-Up Completed; N/A= Not Applicable

Preparations

	Check tank and all components for cleanliness	
	If necessary clean tank and LNG system components	

Vacuum Check

	Check and record tank build date _____ If age is 36 months or older continue with steps in this section, if less than 36 months proceed to next section	
	Check for signs of frost spots or outer surface sweating	
	Ensure tank is ~ ½ to ¾ full of LNG	
	Ensure tank is at normal operating pressure (economizer set psi)	
	Record tank pressure _____	
	Record time tank pressure recorded _____	

Tank Visual Inspection

	Inspect entire tank for damage, dents, scratches etc	
	Inspect pump out port for damage or signs of tampering	
	Check straps for damage and condition of rubber isolator straps	
	Look for signs of loose straps or mounting hardware	

Shrouded Tanks

	Inspect shroud end cover or door for signs of damage	
	Check for presence and condition of rubber securing straps that secure shroud end cover	
	Check for security and condition of end cover retainer cable and cable retainers	
	Inspect end cover retainer cable and surrounding components for signs of damage and correct cable routing	
	Check condition of rubber weather strip on inside of end cover	

Plumbing Components Inspection

	Apply a snoop type leak tester solution to all components and plumbing located on or near the tanks plumbing end	
	Check economizer u tube and both elbows for damage, cracks, frosting or leaks.	
	Inspect vent and use valves for damage or leaks	
	Operate both service valves by hand and check for ease of operation and leaks	
	Inspect primary relief valve for leaks or damage	
	Shrouded Tanks Only: Check relief valve pipe away tubing and elbows for broken/loose parts	
	Shrouded Tanks Only: Check low point of nylon pipe away tubing for drain hole. Ensure hole is in downward position and surrounding area is clean and free of debris.	
	Inspect secondary relief valve for leaks and correct orientation.	
	Inspect for presence of red cap on secondary relief valve. If red cap is missing the tank is to be placed out of service until a follow up inspection of the primary relief system is performed, and necessary repairs made.	
	Check pressure gauge for leaks damage	
	If equipped: Check remote mounted pressure gauge for signs of damage, leaks, check tubing to remote mounted gauge for damage/chaffing.	
	Inspect excess flow valve and downstream tubing	
	Check fill coupler for damage, secure mounting and leaks. Check for presence and condition of dust cap	
	Inspect fill tubing for chaffing, kinks or chaffing	
	Inspect fill check valve for leaks, condition, and proper position	
	Follow entire length of vent tubing, check for crushed, kinked, leaks, or chaffing and security	
	Inspect macro tech fitting for leaks or damage	

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Fuel Gauge Components Inspection

	Inspect BNC Connector and elbow for leaks or damage	
	Check for presence and condition of heat shrink covering BNC Nipple to cable connector	
	Check sender cable and wiring for loose connections, cracking, exposed wiring or chaffing.	
	Inspect sender box for security or cracks/damage	
	Inspect 3 pin weather pack connector for loose connection, pushed back pins, chaffed or exposed wires	
	Inspect fuel gauge wiring and security into harness or to gauge	
	Turn on ignition or gauge power source and check for gauge operation and response	

Relief Valve Pipe Away Inspection

	Follow relief valve pipe away tubing from tank towards discharge port, check for cracked, kinked, crushed, damaged tubing.	
	Inspect pipe away tubing discharge port, ensure that port is unobstructed and functional.	
	Check to ensure the tubing has a low point moisture drain device (or hole). Insert a 1/8" allen wrench in to the hole to ensure it is free of obstructions and debris.	

Heat Exchanger Inspection

	Follow liquid line tubing from tank's excess flow valve to heat exchanger inlet. Check for kinks, sharp bends, damage, chaffing. Ensure tubing is supported sufficiently at least every 2 ft.	
	Check coolant hoses for proper size and routing, follow hoses to engine checking for chaffing, leaks, kinks, cracks.	
	Inspect coolant hose clamps for condition and proper torque	
	Check heat exchanger body clamps and support for security, or loose clamps and nuts.	
	Inspect fuel shut off solenoid for leaks, chaffed or exposed wiring and secure mounting.	
	Follow and check tubing and tubing supports between heat exchanger and overpressure regulator	

Overpressure Regulator Inspection

	Check overpressure regulator and mounting bracket	
	Regulator housing and fittings for leaks	
	Ensure adjustment handle and locking nut are tight	
	If equipped: Check condition of pressure gauge	
	If equipped: Check liquid filled gauge for liquid leaks	

Vacuum Test (conclusion)

	Ensure vehicle and tank has been idle for 8 hours (Refer to pressure rise start time in vacuum test on front page)	
	Perform tank shell temperature test with bare hand and record findings (example: Frost, Cold, cool, warm, hot) Shell _____ Shroud or ring _____	
	Was there a noticeable difference in temperature? _____ Yes _____ No	
	Record tank pressure (after sitting 8 hours) _____ psi	
	Subtract beginning pressure reading (on front page) from final pressure reading (above), the difference = total pressure rise for an 8 hour period. Record 8 hour pressure rise _____	
	Is vacuum maintenance necessary at this time? (Refer to VT-0019) _____ Yes _____ No	

Follow Up Items

Inspector Signature _____

Completion Date _____

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