

CLARKE

Driving Fire Protection Since 1964

**Cincinnati, Ohio USA –
Glasgow, Scotland UK**

Diesel Engine Maintenance

Based on NFPA 25 2014 Edition &
Clarke Operation Manual

www.clarkefire.com

Weekly	
<i>Static Checks</i>	
<input type="checkbox"/>	Air Cleaner
<input type="checkbox"/>	Battery
<input type="checkbox"/>	Coolant Hoses
<input type="checkbox"/>	Coolant Levels
<input type="checkbox"/>	Cooling Water Solenoid Valve
<input type="checkbox"/>	Clean Y Strainer
<input type="checkbox"/>	Manual Cooling Loop Valves
<input type="checkbox"/>	Heat Exchanger Discharge Line
<input type="checkbox"/>	Exhaust System
<input type="checkbox"/>	Fuel Tank
<input type="checkbox"/>	General Inspection
<input type="checkbox"/>	Governor Run-Stop Control
<input type="checkbox"/>	Jacket Water Heater
<input type="checkbox"/>	Lubrication Oil Level
<input type="checkbox"/>	Radiator Core Debris
<i>Running Checks</i>	
<input type="checkbox"/>	Operation Gauges
<input type="checkbox"/>	Remove Water from Fuel Filter
<input type="checkbox"/>	Cooling Water
<input type="checkbox"/>	Excessive Noise & Vibration
<input type="checkbox"/>	No Fuel, Oil or Exhaust Leaks

Every 6 Months	
♣	Batteries
<input type="checkbox"/>	Belts
<input type="checkbox"/>	Couplings

Every 1 Year	
♣	Air Cleaner
<input type="checkbox"/>	Crankcase Vent System
○	Driveshaft U-Joints
<input type="checkbox"/>	Heat Exchanger Electrode
▶	Fuel & Oil Filters
▶	Lubricating Oil
<input type="checkbox"/>	Wiring System
<input type="checkbox"/>	Fuel Supply testing

Every 2 Years	
▶	Air Cleaner
▶	Batteries
▶	Belts
▶	Coolant Hoses
▶	Coolant

Legend	
<input type="checkbox"/>	Check
♣	Clean
▶	Replace
○	Lubricate

Weekly Checks – Static Inspection

- The first group of slides reviews the maintenance requirements while the engine is **NOT** running or static.

Weekly Checks – Static Inspection

- **Air Cleaner** – Visual Inspection. No rips, not crushed, and no extreme dirt.



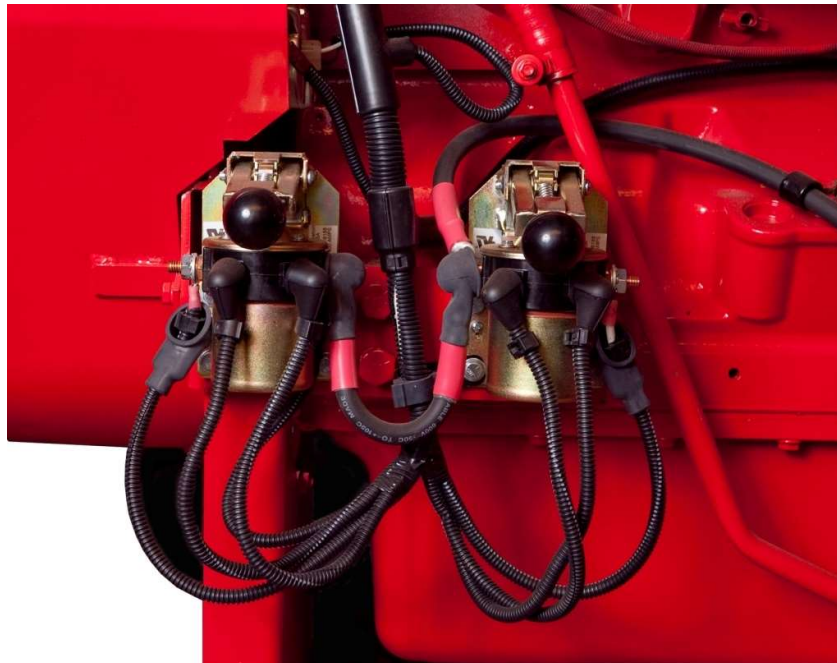
Weekly Checks – Static Inspection

- **Battery** -
 - Electrolyte level - Unscrew cap and check water level.



Weekly Checks – Static Inspection

- **Battery** -
 - Connections – tight and not corroded. Cable insulation not worn or broken.



Weekly Checks – Static Inspection

- **Battery** -

- Voltmeter – On a 12 volt system make sure position is between 13 to 14 volt range. On a 24 volt system make sure position is between 26 to 28 volts.



Weekly Checks – Static Inspection

- **Battery** -
 - Voltmeter – On a 12 volt system make sure position is between 13 to 14 volt range. On a 24 volt system make sure position is between 26 to 28 volts.



Weekly Checks – Static Inspection

- **Battery** -

- Alarms – No battery failure or charger alarms.



Weekly Checks – Static Inspection

- **Coolant** –

- Hoses – Check for rips, splitting, loose clamps, collapses or bulges.
- Level – Engines with Expansion tank make sure level is between minimum and maximum when the engine is not running. Engine without expansion tanks make sure coolant is to the bottom of the fill neck.
 - If coolant needs to be added, use only ASTM D6210.



Weekly Checks – Static Inspection

- **Coolant** –

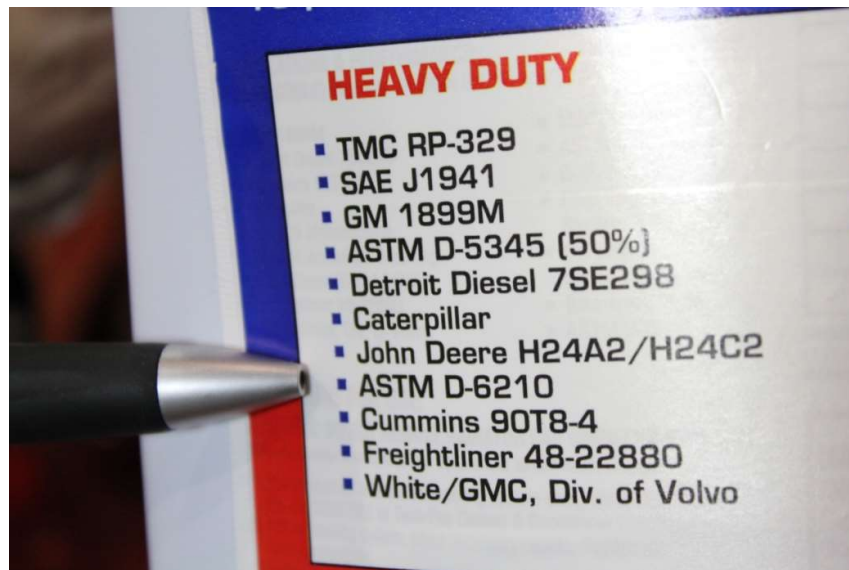
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Weekly Checks – Static Inspection

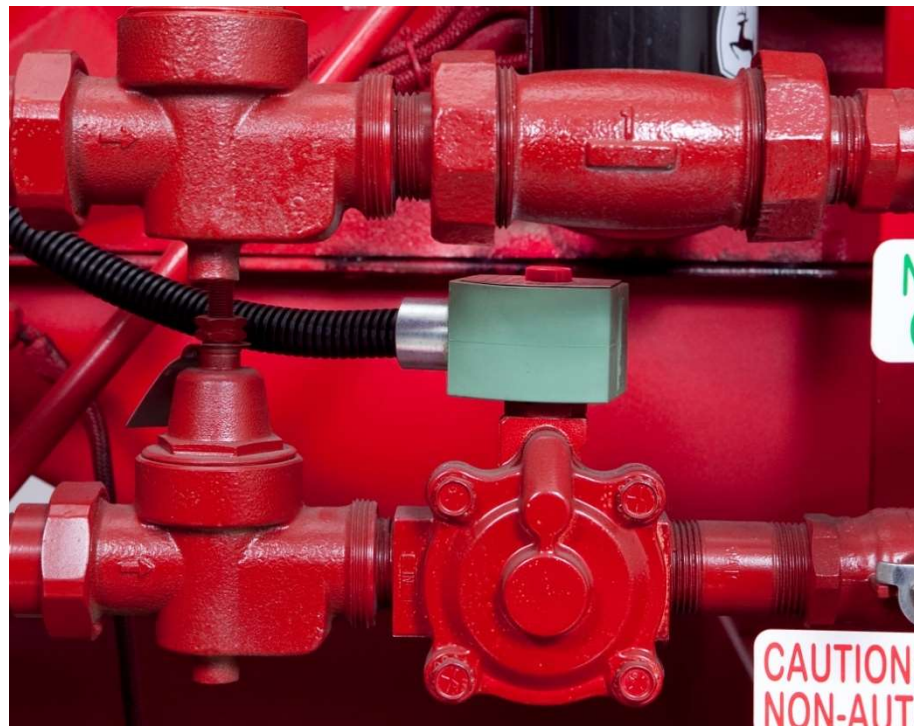
- **Coolant** –

- Color – Make sure coolant is not dark (a sign the coolant is breaking down).
- Condition – Use test strips to determine the condition.



Weekly Checks – Static Inspection

- **Cooling Water Solenoid** –
 - Opens on any run signal. N/A vertical turbine pumps.



Weekly Checks – Static Inspection

- **Y Strainer** –
 - Flush filter by removing the end plug or remove strainer to clean.



Weekly Checks – Static Inspection

- **Manual Cooling Loop Valves** –
 - Confirm valves are in the correct positions.



Weekly Checks – Static Inspection

- **Heat Exchanger Discharge Line** –
 - Open and clear for free flow operation or return back to suction reservoir.



Weekly Checks – Static Inspection

- **Exhaust System** –
 - All connected and supported from ceiling and open to a safe area.
- **Fuel Tank** –
 - Minimum 2/3rd full and there are no leaks in tanks or lines.
- **General Inspection** –
 - No leaks, missing items, or anything broken.

Weekly Checks – Static Inspection

- **Governor Run Stop Control** –
 - On mechanical engines make sure speed adjustment jam nuts are tight. Manual Stop is in the Automatic Run position, if equipped.



Weekly Checks – Static Inspection

- **Jacket Water Heater** –

- Engine is warm to the touch; don't touch the heater.
- Make sure wired and AC power supply is energized.
- Make sure the outer shell is not discolored.



Weekly Checks – Static Inspection

- **Lubrication Oil Level** –
 - Make sure Oil level is within range.

Weekly Checks – Static Inspection

- **Drain Water Separator at Fuel Filter –**
 - Open valve under filter and let water and sediment flow until fuel comes out.



Weekly Checks – Static Inspection

- **Radiator Core Debris (where applicable)** –
 - Remove debris from back side of the radiator.



Weekly Checks – Running Inspection

- **Starting Method –**

- From Fire Pump Controller using test feature or actual pressure drop. Activates shut down in Test mode for oil and coolant and verifies automatic starter disconnect.



Weekly Checks – Running Inspection

• Operation Gauges –

- Make sure gauges are operational and in the correct ranges.

- **Engine rpm matches pump**
(mechanical engines rpm is slightly higher then listed speed)

- **Coolant temp**
160 – 200F (71 – 93C)

- **Oil pressure**
40 – 60 PSI (276 – 414 kPa) - Deere,
60 – 80 PSI (414 – 552 kPa) - Doosan

- **Voltage**
13 to 14 Volts (12 Volt)
26 to 28 Volts (24 Volts)



Weekly Checks – Running Inspection

- **General Inspection** –

- Cooling water – Make sure there is flow and the operating pressure does not exceed 60 psi (414 kPa) - Use pressure gauge on cooling loop to verify the pressure.



Weekly Checks – Running Inspection

- **General Inspection –**
 - Check for excessive noise and vibration
 - Room ventilation equipment is operational
 - No fuel, coolant, oil, or exhaust leaks.



Every 6 Months – Additional Items

- The next group of slides reviews the maintenance requirements for the engine's 6 month inspection.

Every 6 Months – Additional Items

- **Batteries** –

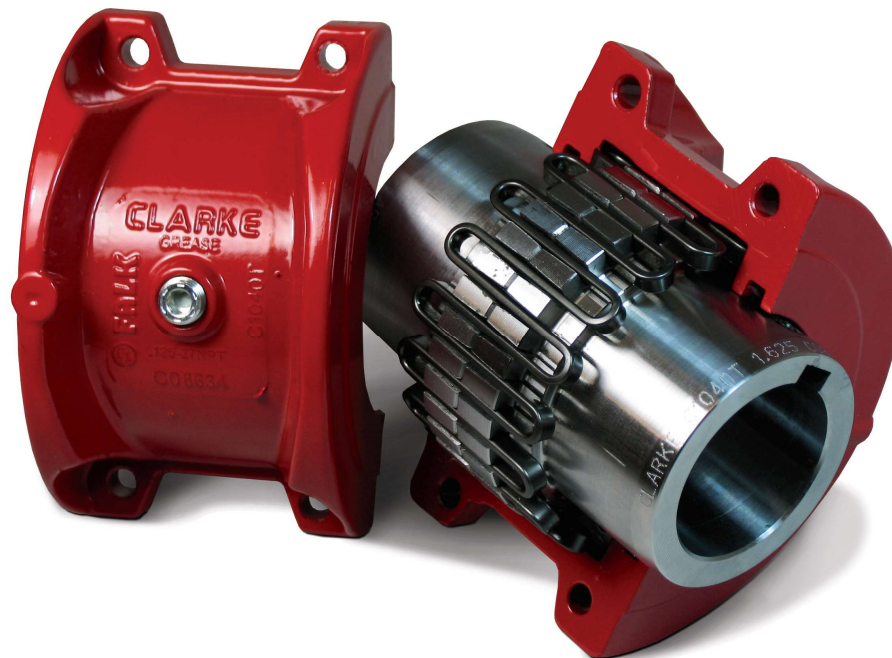
- Check specific gravity using a battery hydrometer. Look for 1.25 or greater.
- Clean the connections

- **Belts** –

- No wear, no fraying, no cracks and is aligned.
- Correct Tension – Refer to operation manual for the correct tension and adjusting procedure.

Every 6 Months – Additional Items

- **Coupling** –
 - Visual, not loose, check set screws



Every 6 Months – Additional Items

- **Coupling** –
 - Visual, not loose, check set screws



Every 12 Months – Additional Items

- The next group of slides reviews the maintenance requirements for the engine's 12 month inspection.

Every 12 Months – Additional Items

- **Air Cleaner** –
 - *Replace*
- **Crankcase Vent System** –
 - *Open and not kinked.*

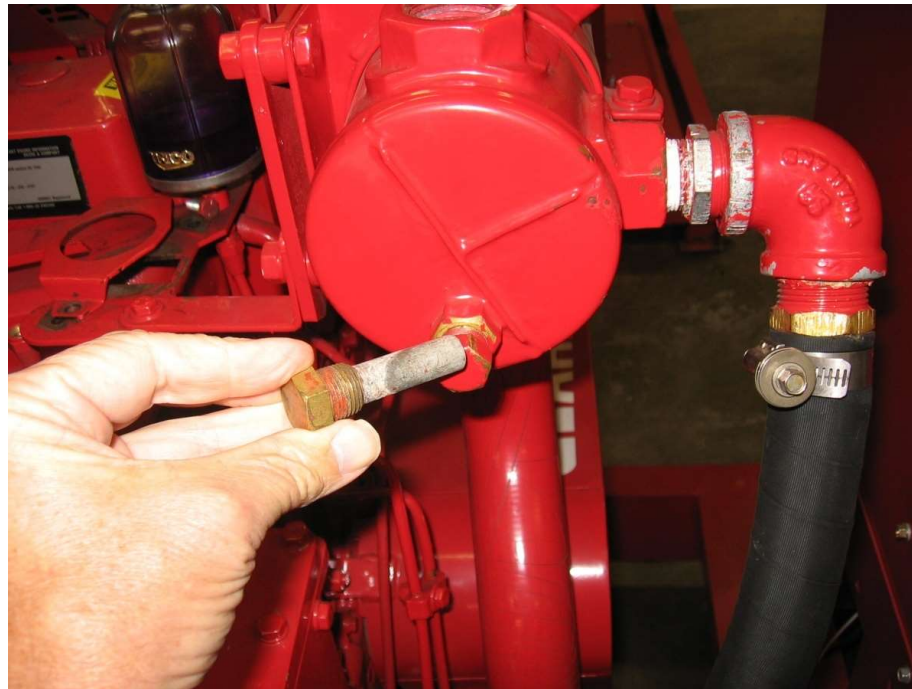
Every 12 Months – Additional Items

- **Driveshaft U Joint** –
 - Check alignment, correct if necessary and lubricate.
 - (Turn controller off and battery chargers off and disconnect the batteries when performing this procedure.)



Every 12 Months – Additional Items

- **Heat Exchanger Electrode** –
 - *Inspect to determine if need replacing.* If it less then 1 inch (2.5 cm) then replace it.



Every 12 Months – Additional Items

- **Lubricating Oil** –

- *Change oil.*
 - *John Deere break-in oil p/n TY22041*
 - *All engines 15w-40*
 - *DDFP 2 cycle SAE 40 only*

- **Oil and Fuel Filters** –

- *Replace oil and fuel filter(s)*
 - *OEM filters only*

- **Wiring System** –

- *Inspect all wiring and connections, tighten if necessary.*

- **Fuel Testing**

- *Test fuel supply to ASTM D-975-11b standard*

Every 24 Months – Additional Items

- The next group of slides reviews the maintenance requirements for the engine's 24 month inspection.

Every 24 Months – Additional Items

- **Air Cleaner** –
 - *Replace*
- **Batteries** –
 - *Replace*
- **Belts** –
 - *Replace*
- **Coolant Hoses & Thermostat** –
 - *Replace*

Every 24 Months – Additional Items

- **Coolant** –
 - *Replace*
 - *Remove water pump to inspect impeller and seal*



Maintenance Kits – 1 and 2 year

