

Scheduled Maintenance

Scheduled Maintenance Service for EMD Engine Driven Stationary Power Units for Standby or Base Load Operation

INTRODUCTION

This Maintenance Guide outlines the minimal services, labor and materials necessary to provide the standard maintenance required to meet OEM (PowerTeam) recommendations for standby and base load power plant operations of our EMD Engine Driven Generator Sets to ensure satisfactory engine operation and economical maintenance costs where average stated load factors and average stated climate conditions (as listed standard performance specifications of each model unit) are encountered.

General Description

This guide provides all normal maintenance required on all EMD equipment. Operator to utilize recommended engine parts, consumables (oil, air and fuel filters) and spare parts.

Standard Assumptions:

- Fuel oil used will meet original specifications provided.
- Lubricating oil used will meet the specifications of original specifications provided and will be changed at the intervals specified.
- Engine coolant used will meet the original specifications provided.
- Lubricating oil, fuel and air filters and replacement parts will be of a quality equal to original equipment and will be changed at the intervals specified.
- All warranty work is performed by PowerTeam or its authorized representative or it's assigns.
- Operating load limitations will be adhered to.
- Units are installed in accordance with OEM (PowerTeam) minimum recommendations

NOTE

- ✓ The following recommendations are applicable to stationary power units used for standby or base load power operations.
- ✓ In the case that the units are being operated in a standby mode, each unit should be operated at least once a week. Each unit should be operated at idle for a sufficient period of time to allow coolant temperature to stabilize at 49°C (120°F) or higher. Once a month each unit should be operated at full speed, full load for a minimum of one half hour.
- ✓ The operator is required to contact PowerTeam in the case that each unit is not to be operated below a minimal output requirements for maximum efficiency. (Reference appropriate maintenance manual with model number for associated output clarifications)

SECTION 1

Equipment Operating Task be Provided by Plant Operating Personnel on a Daily Basis

IMMEDIATELY AFTER EACH START
(Automatic or Manual Start Units)

Unit Start Up Procedures

BEFORE EACH START

Check the following:

Cooling System

Check coolant level and add coolant if required

Fuel System

Check main fuel supply to each unit

Air System

Drain condensate.

Check system pressure

Check oil supply in air line lubricator

Governor

Check lube oil level

Lube Oil System

Pre-lube engine if unit has been shutdown for over 48 hours.

Fuel System

Prime system.

Air System

Drain condensate.

Check system pressure.

Check oil supply in airline lubricator.

Engine

Open cylinder test valves and manually bar over engine one complete revolution, check for liquid ejected from valves, and close test valves. If fluid discharge is observed from any cylinder, find the cause and make necessary repairs prior to starting the engine.

FOLLOWING START UP

While Engine is Running

Inspect For Leaks

Cooling system

Fuel system

Lube system

Exhaust system

Lube Oil System

Check lube oil level in pan with engine at idle

Check lube oil pressure at engine

Engine

Check cylinder test valves for leakage. Tighten if required.

Check hand-hole covers for leakage. Tighten if required.

Check air box drains for proper operation and clean.

* If drains are kept closed, drain every 4 hours.

SECTION 2

Description Maintenance Task to be performed by Plant Operators
On a “Running Time” basis.

BASIC INSPECTION RESPONSIBILITIES

EVERY MONTH

Lube Oil System

Take sample for analysis*

*The services of a competent laboratory should be used to monitor the suitability of the oil for continued use.

Lube Oil Circulating Pump and Motor

Check for proper operation

Immersion Heater

Check for proper operation

EVERY TWO MONTH

Auxiliary Turbocharger Filter (As necessary)

Check for proper operation / pressure and leaks inspections

In-Line “Y” Oil Strainer (Inspect and clean as necessary)

Clean strainer screen

EVERY YEAR

Lube Oil Circulating Pump and Motor

Inspect and clean with dry air.

Remove and clean check valve.

EVERY THREE YEARS

Cooling System Thermostatic Valve

Replace “O” rings and thermostatic elements.

EVERY FOUR YEARS

Cooling System Pressure Cap

Replace.*

*Unless 16,000 hour replacement has occurred first.

EVERY SIX YEARS

Engine

Replace top deck cover seals and check latches.*

*Unless 8000 hour replacement has occurred first.

Replace cylinder head grommets, inlet and outlet seals, and lower liner seals.

*Unless cylinder assembly replacement has occurred first.

Main Generator

Remove bearing cover and inspect for grease contamination, excessive wear and overheating. Apply new grease.*

*Unless 48,000 hour lubrication has occurred first. If generator is other than EMD, refer to manufacturer’s manual.

PERFORM THE FOLLOWING ITEMS PER ACCUMILATING RUN TIME HOURS

AFTER THE FIRST 350 HOURS OF OPERATION

Engine Nut and Bolt Tightness Check

Torque to values specified the following:

Cylinder head crab nuts.

Exhaust manifold flange bolts.

Cylinder liner water inlet line nuts and bolts.

Head frame to crankcase bolts.

Turbocharger to air duct bolts, after-cooler to air duct bolts and air duct to crankcase bolt

Inspect injectors

EVERY 350 HOURS THEREAFTER

Fuel Filter

Check pressure gauge with engine at rated RPM.*

*On units where gauge is connected to filter input side, change filter elements if pressure is greater than 50 psi.

Lube Oil Filter

Check lube oil pressure at filter cover with engine running at rated RPM.*

*Change filter elements if input pressure is greater than 25 psi.

EVERY 700 HOURS

Engine Protector

Check operation.

Soak Back Pump And Motor

Check operation*

*With the engine shut down and soak back pump motor running, remove left rear hand-hole cover and check oil flow through gear train.

*Observe camshaft bearings. If lube oil flows from camshaft bearings with soak back pump running and engine shut down, inspect turbo filter outlet check valve for proper operation.

Engine Air Filter Fiberglass Type

Check indicator. * The interval of change for turbocharger air intake filter elements is influenced by load factor, kind of lubricating oil, type of operation, climatic conditions and maintenance of main lube oil filters.

Heat Exchanger

Inspect corrosion zincs.

Lube Oil Filters

Check indicators and replaces filter elements as necessary

Clean lube oil strainer.*

*Fill strainer housing with oil before starting engine.

Turbocharger Oil Filter

Replace filter elements.*

*The interval of change for turbocharger and soak back filter elements is influenced by load factor, kind of lubricating oil, type of operation, climatic conditions and maintenance of main lube oil filters.

Soak Back Oil Filter

Replace filter elements.*

*Filter elements must be of a quality equal to original equipment. The interval of change for turbocharger and soak back filter elements is influenced by load factor, kind of lubricating oil, type of operation, climatic conditions and maintenance of main lube oil filters.

EVERY 1400 HOURS

Lube Oil Filters

Change filter elements

Clean lube oil strainer.*

*Fill strainer housing with oil before starting engine.

Turbocharger Oil Filter

Replace filter elements.*

*Filter elements must be of a quality equal to original equipment. The interval of change for turbocharger and soak back filter elements is influenced by load factor, kind of lubricating oil, type of operation, climatic conditions and maintenance of main lube oil filters.

Soak Back Oil Filter

Replace filter elements.*

*Filter elements must be of a quality equal to original equipment. The interval of change for turbocharger and soak back filter elements is influenced by load factor, kind of lubricating oil, type of operation, climatic conditions and maintenance of main lube oil filters.

Protective Devices and alarms controls system

Check operation and functionality and repair or replace defective components as necessary.

Fuel Filters

Inspect, clean or replace suction strainer element.

Change engine mounted filter elements.*

Oil System

Change engine oil.* Depending upon fuel sulfur content and quality of lubricating oil, it may be necessary to change lube oil even more frequently.

Clean oil pan.

Clean filter housing.

Clean oil suction screens.

Clean scavenging oil screens.*

*Fill strainer housing with oil before starting engine.

EVERY 2000 HOURS

Fuel Filters

Clean or replace suction strainer element.

Change engine mounted filter elements.*

*Use only elements equal to original equipment.

Cooling System

Check inhibitor concentration.

Engine Air Filter-Fiberglass Type

Replace elements.

Engine

Inspect air box.
Inspect crankcase.
Inspect crankshaft and connecting rods.
Inspect pistons and piston rings.
Inspect cylinder liners.
Inspect cylinder head mechanism with engine idling and at operating temperature.
Inspect engine fuel lines and connections for leaks.
Inspect engine water system for leaks.

EVERY 4000 HOURS

Exhaust System

Remove manifold screen and trap. Check for cracks and clean.

Eductor Tube (Exhaust Stack Mounted)

Inspect for carbon deposits and clean, if necessary.

Oil System

Change engine oil.*

*Evaluation of engine and oil condition should indicate the frequency of this item. Type of service, type of oil, quality of filter elements and condition of engine will influence the frequency of oil change.

Clean oil pan.

Clean filter housing.

Clean oil suction screens.

Clean scavenging oil screens.*

*Fill strainer housing with oil before starting engine.

Engine

Check pressure drop across after-coolers*

*Clean air passages if necessary.

Check exhaust manifold base flange bolts for proper tightness.

Main Generator

Inspect collector rings and brushes and replace brushes if required.*

*If generator is other than EMD, refer to manufacturer's manual.

Reverse polarity of collector rings.

Governor

Change oil.

Lubricate linkage moving parts.

Lubricate governor synchronizing motor, motor bearings.

EVERY 8000 HOURS

Engine Nut And Bolt Re-torque

Cylinder head crab nuts.* Loosen and then torque to values as specified in PowerTeam Specifications.

Head frame to crankcase bolts.

Turbocharger to air duct bolts, after-cooler to air duct bolts and air duct to crankcase bolts.

Engine

Replace top deck cover seals and check latches

Qualify injectors.

Check injector timing and injector rack length.

Check engine speed.

Remove and clean oil separator element.

Check pressure drop across aftercooler.*

*Clean air passages if necessary.
Inspect vibration gear dampener
Remove, clean, and inspect: replace if necessary.
 Soak back check valve in the turbo filter inlet.
 Soak back oil pressure relief valve in the soak back filter head.
 Soak back filter bypass valve in the soak back filter head.
 Turbo oil filter check valve in the turbo filter head.

Exhaust System

Inspect manifold connectors for liner cracks and replace if necessary.

Main Generator

Visually inspect and clean.
Replace collector ring brushes.

Exciter

Clean and visually inspect.
Inspect and replace brushes when required. Replace brushes in sets only.

Starting Motors

Clean Strainer and lines of any water or sludge

Soak Back Pump Motor

Inspect and clean with dry air.
Replace brushes.

Cooling System

Inspect and perform pressure test.
Replace pressure cap if defective.

Lube Oil Filter

Remove oil filter bypass valve; clean, inspect and test.

EVERY 16,000 HOURS

Starting Motors (Air)

Disassemble, clean and lubricate.
Renew parts if necessary.

Fuel Pump

Replace coupling spider.

Soak Back Pump

Replace coupling spider.

EVERY 24,000 HOURS

Engine

Install new thrust collars.
Install new lower main bearings.
Replace water pump seals and all worn parts.

Cooling System

Replace flexible coupling seals.

Lube Oil Cooler

Inspect, clean and test.

Heat Exchanger

Inspect, clean and test.

Main Generator

Remove bearing cover and inspect for grease contaminations, excessive wear and overheating. Apply new grease.*

*If generator is other than EMD, refer to manufacturer's manual.

EVERY 35,000 – 40,000 HOURS

Engine

Replace oil pumps

Replace water Pumps

Inspect and Qualify Turbocharger for replacement

Remove oil pressure relief valve; clean, inspect, test and reset

Replace Injector Fuel Control Rods

Replace Power Assemblies

Replace Fuel Injectors

Replace Connecting Rods & Bearings

Inspect and Qualify Main Bearings for replacement

Inspect and qualify piston cooling tubes

Replace Rocker Arms Assemblies

Replace Valve Bridge Assemblies

Reset Exhaust and Injector Timing.

Cooling System

Replace pressure cap.

Inspect filler neck for damage. Replace if damaged.

Take cooling water sample for lab analysis and corrosion test.

Turbocharger-To Filter Air Duct and clamps

Replace.

Governor

Recondition.

Fuel Pump

Replace Fuel Pump.

Soak Back Pump and Motor

Recondition.

Generator

Inspect and qualify generator bearing for replacement and replace as necessary.

Check RTD's and repair as necessary

Inspect Terminations and repair as necessary

Check all Generator Connection Box and repair as necessary

Check engine/generator alignment and re-torque mounting bolts

Section 3

Description of Maintenance Task performed by Plant Operators on a
“Calendar Period ” basis.

Assuming a limited amount of accumulated RUN TIME on units.

EVERY TWO YEARS

Lube Oil Filters

Change filter elements.*

*Unless filter change, on a running time basis, has occurred first.

Clean lube oil strainer.*

*Fill strainer housing with oil before starting engine.

Turbocharger Oil Filter

Replace filter elements.*

*Unless filter change, on a running time basis, has occurred first.

Soak Back Oil Filter

Replace filter elements.*

*Unless filter change, on a running time basis, has occurred first.

Fuel Filters

Change engine mounted filter elements.*

*Unless filter change, on a running time basis, has occurred first.

Clean or replace suction strainer element*

*Unless filter change, on a running time basis, has occurred first.

Engine Protector

Recondition.*

*Qualify on test stand after renewing springs, “O” rings, and diaphragms.

Lube Oil Circulating Pump and Motor

Recondition.

EVERY TWO WEEKS

Lube Oil System

Take sample for analysis*

*The services of a competent laboratory should be used to monitor the suitability of the oil for continued use.

Inspections with Engine Running

Bi-Weekly

With Engine Running

Inspect For Leaks

Cooling system

Fuel system

Lube oil system

Exhaust system
Air system

Lube Oil System

Check lube oil level in pan with engine at idle
Check lube oil pressure at engine

Engine

Check cylinder test valves for leakage. Tighten if required.
Check hand-hole covers for leakage. Tighten if required.
Check air box drains for proper operation and clean. If necessary.*
*If drains are kept closed, drain every 4 hours.

Bi Monthly

With Engine Not Running

Inspect For Leaks

Cooling system
Fuel system
Lube oil system
Exhaust system
Air system

Lube Oil System

Check lube oil level in pan

Cooling System

Check coolant level

Fuel System

Check fuel supply

Air System

Drain condensate from lines and tanks.

Governor

Check oil level and add oil if required