BAY CITY ELECTRIC WORKS

KOHLER®

LOFTIN
LOFTIN EQUIPMENT CO.

Information Sheet # 29

Key Reasons for Planned Maintenance

Your Reliable Guide for Generator Maintenance

1.0 Introduction:

Many customers can incur catastrophic losses should they lose utility electrical power, even for a short time. Standby generator systems provide a source of reliable and uninterruptible power during such outages. Hospitals, data centers, agricultural, etc. are highly dependent on standby power services.

This Information Sheet discusses planned maintenance programs which ensure a generator systems is in a state of readiness between extended periods of no interruption of power.

2.0 Planned Maintenance - The Key to Generator Reliability:

Whatever the industry, the key to having back-up power available and operating reliably during outages, is a planned maintenance program. While most standby generators incorporate an automatic set exerciser to start and run the generators for 30-minutes, such as once a week, only a planned maintenance program undertaken regularly will ensure reliability of the complete system.

3.0 Who Should Undertake Planned Maintenance:

Principal generator set manufacturers have established a nationwide network of distributors staffed with service and maintenance personnel trained on generator set systems. Service technicians, in addition to being trained on the equipment, follow the maintenance procedures as recommended for standby generator systems by bodies such as NFPA, NEMA, and GSA.

Untrained and inexperienced operators frequently fail to identify problems that can result in failure that an experienced service technician is trained to detect. In a planned maintenance (PM) program, trained service technicians make regular checks to minimize the likelihood of a failure during a power outage. A PM program ensures the generator system is maintained in a state of readiness. Trained service technicians carry out service as laid down by governing bodies and the manufacturer. *(Continued over)*

Key Points to Monitor/Maintain Standby Set Reliability

General Inspection
1 - Exhaust
2 - Fuel lines/filters/fittings
3 - DC electrical systems batteries

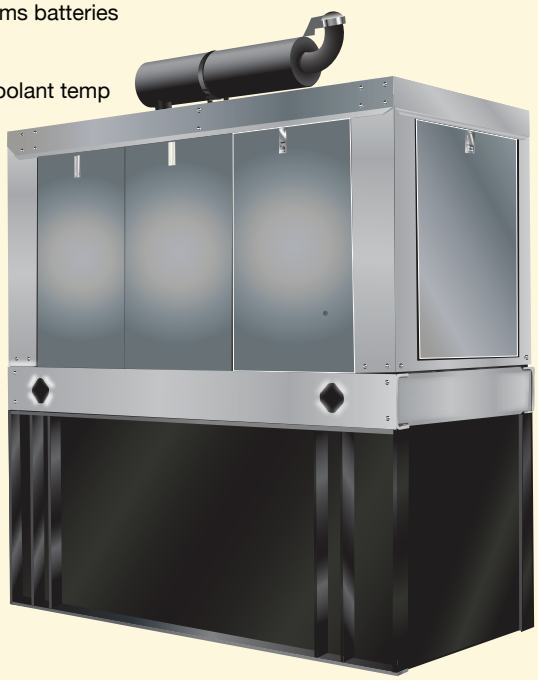
Engine
4 - Fluid levels
5 - Oil pressure and coolant temp
6 - Exhaust smoke

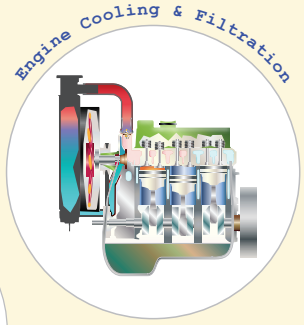
Cooling Systems
7 - Water pump
8 - Radiator fins
9 - Leakage
10 - Belts

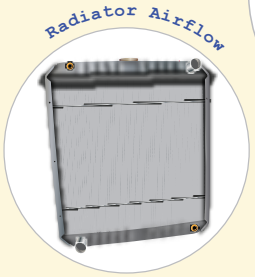
Fuel Storage
11 - Contamination
12 - Leaks

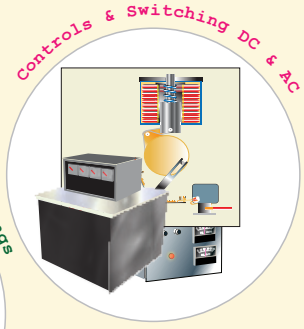
Filtration
13 - Fuel filter
14 - Oil filter
15 - Air cleaner

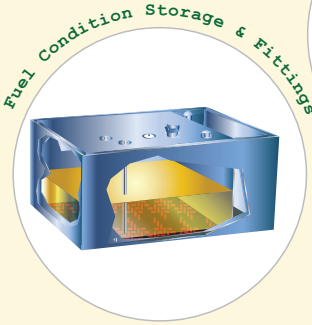
Switch Gear
16 - Battery charger
17 - ATS
18 - Control panel











To fulfill our commitment to be the leading supplier in the power generation industry, the Loftin Equipment and Bay City Electric Works teams ensures they are always up-to-date with the current power industry standards as well as industry trends. As a service, our **Information Sheets** are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power industry.

The installation information provided in this information sheet is informational in nature only and should not be considered the advice of a properly licensed and qualified electrician or used in place of a detailed review of the applicable National Electric Codes, NFPA 99/110 and local codes. Specific questions about how this information may affect any particular situation should be addressed to a licensed and qualified engineer and/or electrician.

4.0 Frequency of Maintenance:

The following factors influence the frequency of maintenance within a PM program:

Application - Critical applications are subject to codes such as NFPA110 that recommend a higher frequency of maintenance. Operators and users of systems should check the status of their application.

Location - Factors such as altitude, humidity, salt-laden atmosphere, extreme heat and cold, dust, etc. are all factors that can affect the life of a system. Manufacturer's recommendations for operating in different environments should be followed.

5.0 Systems Component Checks within a PM Program:

Most service providers will carry the necessary replacement parts, oil and fuel on their service truck. They also normally will have many other items that could be needed which will save time and transportation – hence cost.

A generator system includes many electrical and mechanical components, all of which have to be checked as follows:

Exhaust system - With set running, inspect the entire exhaust system including the exhaust manifold, muffler/silencer and exhaust piping. Check for leaks at all connections, welds, gaskets, and joints, making sure that exhaust pipes are not heating surrounding areas excessively. Any leaks should be repaired immediately.

Fuel system - With the unit running, inspect the fuel supply lines, return lines, filters and fittings for cracks or abrasions. Make sure the lines are not rubbing against anything that could cause eventual breakage or failure. Repair any leaks and reroute the lines to eliminate wear immediately.

Engine - Monitor all fluid levels, oil pressure, and coolant temperatures frequently. Most engine problems give an early warning so look and listen for changes in engine performance, sound, or appearance that may indicate that service or repair is needed. Be alert for misfires, vibration, excessive exhaust smoke, loss of power, or increases in oil or fuel consumption.

Lubrication system - In prime power applications where the engine runs continuously, the engine oil level with set shut down should be checked daily (For an accurate reading, the generator should be run and after sufficient time to warm through, shut down and allow the oil in engine's upper regions to drain back into the crankcase (about 10 minutes). The oil level on the dipstick should be at or near to the 'full' mark. If needed, top up with the same quality, brand, and viscosity of oil as recommended by the manufacturer for the ambient site conditions. Oil analysis is a good way to determine the state of the oil and can indicate certain potential problems.

The oil and oil filter should be changed every six months, regardless of hours operated. Used oil and filters must be disposed of properly to avoid any environmental damage or liability.

Coolant system - The coolant level should be checked regularly and maintained at the correct level. This solution should have a balanced mixture of water, antifreeze, and additives as recommended by the engine manufacturer. Also, the coolant heater (if fitted) should be checked to ensure it is working correctly. The cooling fins of the radiator must be kept free of obstructions and all dirt or foreign material removed with a soft brush or cloth, taking care to avoid damaging the fins.

It is important to check that the radiator fan belt is not frayed, cracking, or lacks the correct tension.

Fuel system - Diesel fuel is subject to contamination and deterioration over time. As diesel fuel in a sub-base of a standby generator tank is rarely consumed completely, tests should be conducted at regular intervals.

Water vapor accumulates and condenses in the fuel tank and must be drained along with any sediment periodically. The tank should be kept full and topped off at all times. Tests will indicate if fuel treatment is necessary using additives that fight micro-organism growth, prevent gelling, boost fuel Cetane levels, disperse contaminants, and give added lubrication. Contamination testing will indicate water presence and sediment in the bottom of the tank and will verify distillation and Cetane levels, thus meeting ASTM standards required to comply with NFPA 110 8.3.8. Also, test results will show the gel, flash, and cloud points of the fuel and so set performance will be as designed. Fuel "polishing" can remove any water, contaminants, and sediment from the tank. Fuel filters should be changed every six months or earlier if required.

Air Intake Components - All piping and hoses should be inspected weekly for leaks, holes, cracks, or loose connections. Filters must be cleaned regularly and their seals checked and replaced, as determined by the site conditions and manufacturers recommendations.

Starter Battery and Charger - Batteries are the most common cause of standby sets failing to start. Battery condition will be checked using a meter and taking a sample of the electrolyte. If the battery cannot hold charge it will be replaced. Battery terminals must be kept clean and dirt free. Charger operation will be verified.

Automatic Transfer Switch (ATS) - The ATS should be checked carefully on a regular basis to ensure it's proper operation. It must be maintained in a clean state and any dust, dirt, or other contaminants removed with a clean dry cloth, brush or vacuum. The contacts should be checked annually using an infrared ray gun or infrared camera to ensure there are no hot spots.

Load Banking - The only true way to check generator performance is to apply rated load for a minimum of two hours. As part of a PM program, if sufficient load is not available, a portable load bank can be connected to the generator. NFPA 110 Level 1 installations call for testing under load (minimum 30% nameplate rating) for four-hours every three-years.

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