

GUIDE TO MAINTENANCE FOR POWER GENERATION EQUIPMENT

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INTRODUCTION

Maintenance programs shouldn't be cut-and-paste. Real power generation equipment functions under real circumstances, which cause equipment real stress. While there are certain industry-standard preventative maintenance procedures, the real work of designing a comprehensive maintenance program lies in working with equipment owners to design a program that matches their needs.

Because environmental and use factors vary so widely across power generation applications, equipment everywhere is subject to different types and degrees of stress and wear. It's important that maintenance programs reflect those differences. A generator that's frequently light-loaded, for instance, should not be approached the same way as one that's rarely called to duty at all. Generator efficiency will determine a large portion of what maintenance is required in a given situation. Similarly, a prime-power generator keeping the lights on at a construction site and one in the belly of a push boat on the Mississippi face different stressors from their environments. Planned maintenance should reflect that.

And so, while all maintenance programs must take into account the unique circumstances of the equipment they're designed for, there are a few elements of any maintenance program that must be present for it to be called complete. A maintenance program isn't worthy of the name if it doesn't specify transfer switch maintenance, for instance.

Here are some of the elements that should always be present in maintenance programs for power generation equipment, while keeping in mind that, as conditions vary, so should the specifics of the program.

PLANNED SERVICE AGREEMENTS

Whether for a generator or another piece of power generation equipment, the purpose of a planned service agreement is to enhance the performance and reliability. By providing regular maintenance, these programs minimize the likelihood of an equipment malfunction. Planned service agreements must be executed as a combination of inspection and services by trained technicians to be effective. Following these inspections, the technician should be able to deliver a detailed status report to the asset owner.

Following is a list of services typically rendered as part of a planned service agreement:

- Change engine oil and filter(s)
- Record lube oil pressure
- Clean crankcase breather
- Record coolant level and mixture
- Record coolant temperature
- Check belt tension and condition
- Change water filter(s)
- Check ductwork for defects
- Check block heater operation
- Check coolant hoses and connections
- Check for oil/coolant leakage
- Belt and hose replacement
- Thermostat replacement
- Air filter replacement
- Air cleaners—check/oil for element
- Check for fuel leaks
- Change fuel filter
- Check exhaust system for leaks
- Check battery specific gravity, electrolyte level and clean connections
- Check battery charger operation
- Inspect ignition wiring, if equipped
- Check ignition timing, points and plugs, if equipped
- Battery replacement
- Coolant removal and replacement
- Radiator hose and fitting replacement

The above is a partial list of some of the services and inspections equipment owners may expect to be covered as part of a planned service agreement. Other services like antifreeze sampling, oil sampling, fuel sampling and load bank testing for generators are recommended on an annual basis. Things like battery and belt and hose replacements are generally scheduled at longer, but still regular, intervals.

Key Points to Monitor/Maintain Standby Set Reliability

General Inspection

- Exhaust
- Fuel lines/filters/fittings
- DC electrical systems batteries

Engine

- Fluid levels
- Oil pressure and coolant temp
- Exhaust smoke

Cooling Systems

- Water pump
- Radiator fins
- Leakage
- Belts

Fuel Storage

- Contamination
- Leaks

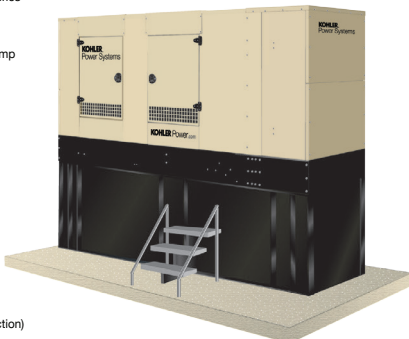
Filtration

- Fuel filter
- Oil filter
- Air cleaner

Switch Gear

- Structures (cleaning/inspection)
- Racking mechanisms
- Circuit breakers
- Trip units
- Protective relays/devices
- Thermal imaging
- Control power
- Battery charger

ATS



Radiator AirFlow



Engine Cooling & Filtration



Fuel Condition Storage & Fittings



Controls & Switching DC & AC



TRANSFER SWITCH PREVENTATIVE MAINTENANCE

In the case of emergency generators, transfer switch preventative maintenance is an essential element in verifying equipment health. Transfer switches are responsible for ensuring a continuous source of power to a facility by automatically transferring from a prime power source to an emergency one in the event the primary power source falls below a predetermined voltage. In other words, if a transfer switch is faulty, your emergency generator will fail to kick on when your primary power source fails. Hence, it's absolutely critical that preventative maintenance plans are in place for this crucial piece of equipment. In fact, the National Fire Protection Association (NFPA) code 110 mandates that transfer switches be maintained at least annually.

Here are the procedures a trained technician would generally follow for the cleaning and systems check for a transfer switch:

- De-energize the engine start signals
 - Check interior of transfer switch cabinet
 - Clean control board areas and relay cases, check for loose or missing relays
 - Check control wiring connections and wire bundle runs for abrasions
 - Lubricate necessary moving parts with manufacturer's recommended lubrication where applicable
 - Test all lights and note which are in need of replacement
 - Inspect mechanical and electrical interlocks where applicable
 - Inspect timing functions and record if possible
 - Inspect arc shields for proper installation and condition
 - With the customer's consent, inspect emergency and main contactors (contactors on nonbypass switches will necessitate operation of transfer switch in the bypass side of switch only)
 - Inspect control contacts
- Bypass switches will be placed in bypass to inspect main contacts by means of placing bypass to the preferred source (utility) and placing the auto part of the switch disconnect and removing from the ATS cabinet
 - Indicate deficiencies and recommend repairs
 - Re-energize the engine start signals
 - Initiate bypass switches in test mode
Nonbypass switches will not be actuated unless authorized
 - Thermal imaging of ATS only

FINDING YOUR MAINTENANCE PARTNER

A maintenance contractor who's not interested in the specific circumstances of your power generation equipment should set off some immediate red flags. It's imperative that a planned maintenance program is tailored to your needs, yet follows the manufacturer's published service requirements. Trained, certified and experienced technicians should be the next element customers insist upon. Without expertise, it's far too easy for potential issues to go unnoticed, for repairs to be botched or for the wrong procedures to be conducted.

ABOUT THE AUTHORS

CK Power is a proud distributor and authorized service provider of KOHLER® power since 1976. It has been a leading manufacturer of power units and power generation solutions for a variety of markets and customers. Its mission is to continually expand and improve its power solutions product offering no matter the application, fuel type or power rating. It also provides generator maintenance and planning to ensure your equipment is ready no matter what. For more information, visit CK Power at ckpower.com

ABOUT KOHLER

A global force in power solutions since 1920, Kohler is committed to reliable, intelligent products; purposeful engineering and responsive after-sale support. Kohler and SDMO are among the world's largest manufacturers of industrial generators. The companies have a combined 150 years experience in industrial power and benefit from global R&D, manufacturing, sales, service and distribution integration.