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Building Operators Association of Canada

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What's Inside?

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Important Phone Numbers

Emergency	911
Alberta Boiler Association	403 291 7070
Alberta Labour (Emergency)	403 297 2222
Buried Utility Locations	1 800 242 3447
City Of Calgary (All Departments)	311
Dangerous Goods Incidents	1 800 272 9600
Environmental Emergency	1 800 222 6514
Poison Centre	403 670 1414
Weather Information (24hr)	403 299 7878

President's Message

I hope this message finds you & yours well and in good health

This is a banner year for the Building Operators Association. It was sixty years ago the group of Building Operators got together forming a framework set of meetings that we follow today. We still hold fast to the ideals of the founding members. We are there to educate the operators, to inform them of safe work practices on the job, to have new ideas brought to the members in such areas as operational changes, code changes and relevant legislation.

Our commitment both to you and to Alberta Human Resources and Employment is to present a form that will assist the Operators in identifying the tasks that operators perform in a year, and let each Operator rate the tasks as to level of hazard. This form has being created and will is issued for comments and corrections.

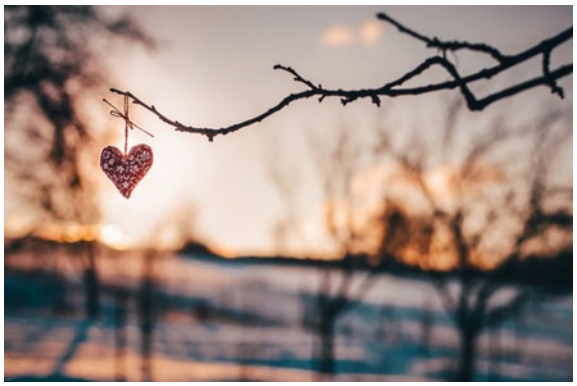
The worst of the weather is over and what a winter it was. The mechanical contractors as well as sprinkler people ran off their feet in calling to emergencies. I can only hope the month of February is better.

Smiles))

With kind regards,

Les Anderson PE, RPA

BOA
Building Operators Association of Canada



TEST YOUR OPERATOR IQ!

Are you equally adept at troubleshooting problems in the boardroom and the boiler room? As the resident facility guru, there's a lot riding on whether or not you know the difference between sounds control and a sound investment.

Try our monthly Operator IQ challenge...*answers on page 25*

1. A hot water boiler of the same output is:

a. larger than a steam boiler
b. smaller than a steam boiler
c. the same size as a steam boiler
d. taller than a steam boiler
e. shorter than a steam boiler

2. A hot water system which circulates water through the pipes with a pump is known as a:

a. circulating system
b. forced system
c. pumped system
d. gravity system
e. return system

3. Advantages of the forced circulation hot water heating systems are:

a. reduction in pipe size and greater heat storage capacity
b. high pressure piping and controls
c. high vacuum in the return lines and pumps
d. higher make-up and better chemical control
e. low water make-up and better temperature control

4. In a hot water heating system compared to a steam heating system, if there is a leak, damage will:

a. be greater in the steam system
b. be greater in the hot water system
c. be about the same in either system
d. depend on where the boiler is located in the system
e. be minimal due to the automatic drain system

5. In a one pipe hot water system, the fitting that directs the water to each converter is called the:

a. diverter
b. trap
c. vent valve
d. separator
e. difficult to make

Evaluating Generator Maintenance RFQ's: Lowest Cost vs. Overall Value

Bill Henderson

When procuring generator maintenance services, organizations may opt for different evaluation methods for the bidding process. Issuing a request for quotes (RFQ) and evaluating based solely on the lowest bid is a common method that prioritizes cost above all other factors. On the other hand, a more comprehensive evaluation approach considers not only the cost but also the skill of technicians and relevant experience. This multifaceted method aims to ensure that the quality of services is not compromised for the sake of lower expenses.

Each evaluation method comes with its own set of implications for businesses. Relying on the lowest bid may result in significant upfront cost savings, which is particularly attractive for businesses with stringent budget constraints. However, it might overlook the long-term value that skilled and experienced technicians bring to the maintenance of generators, which could be crucial for the longevity and reliability of the equipment. Conversely, a multifactor evaluation acknowledges the complexities of generator maintenance and the importance of quality workmanship, potentially leading to lower overall costs in the form of fewer repairs and extended generator lifespans.

The Bottom Line

- Evaluating RFQs by lowest bid can minimize initial costs but may overlook long-term value.
- Considering technician skill and experience in RFQs can ensure higher quality maintenance.

A multifactor evaluation can lead to better overall cost efficiency and equipment reliability.

Evaluating by Lowest Bid Only

Pros:

Cost Effectiveness

Organizations often favor the **lowest bid criteria** because it tends to *lower costs* for services rendered. The competitive nature of bidding can drive prices down, allowing for the selection of services that provide the necessary functionality at the minimal expense. This cost-saving strategy may lead to significant budgetary reductions over time, especially in long-term contracts for generator maintenance.

Simplified Selection Process

Choosing a provider based on the lowest bid simplifies the **evaluation process**. Decision-makers can *easily compare* bids based solely on price, enabling a swift and straightforward decision. This method can reduce the time and resources spent on evaluating complex aspects of each proposal, making it an efficient approach for services where the lowest cost is the priority.

Budget Control

Using a lowest bid evaluation assists in maintaining strict budget control. It sets a clear expectation for costs, thereby minimizing the likelihood of budget overruns. When coupled with clearly defined maintenance service requirements, it ensures that spending aligns with the financial planning of the organization, leading to predictable financial management without unexpected expenditures.

Cons:

Risk of Poor Quality

Evaluating quotes based solely on the **lowest bid** could result in the procurement of substandard services. Companies often reduce costs by cutting corners, which can compromise the quality of maintenance work performed on generators. Lower quality may lead to frequent

breakdowns or a shorter lifespan for the equipment.

Overlooking Technician Expertise

A focus on the least expensive option does not consider the **skill level** of technicians. Maintenance of complex machinery like generators requires skilled technicians who can diagnose and rectify issues efficiently. High-skilled technicians often command higher wages, which might not be reflected in the lowest bids.

Ignoring Relevant Experience

Relevant experience is another critical factor that a lowest bid evaluation process often excludes. Providers with a proven track record in generator maintenance may provide more reliable and effective service solutions but might be disregarded if their quotes are not the lowest.

Potential Long-Term Costs

An initially low bid can translate into **higher long-term costs**. This can occur through the need for more frequent repairs or replacements if the quality of the maintenance is compromised. Additionally, inadequate servicing can lead to operational downtime, affecting the buyer's productivity and profitability.

Evaluating by a Combination of Lowest Bid, Skill of Technicians, and Relevant Experience

Pros:

Enhanced Quality of Service By evaluating multiple factors beyond just price, organizations are likely to obtain higher quality service. Technicians' skills and experience play crucial roles in both the efficiency and effectiveness of generator maintenance. A non-monetary evaluation can identify contractors who are more likely to provide long-lasting maintenance solutions.

Balancing Cost with Expertise

It is not only cost-effective to consider the lowest bid, but also the expertise that comes with the price. A multifactor approach allows decision-makers to consider a balance between cost savings and the skill level of the service provider, ensuring they are not sacrificing quality for a reduced price.

Consideration of Vendor Track Record

Past performance and experience can be indicative of future results. A multifactor evaluation gives weight to the track record of vendors, looking at their history of reliability, adherence to safety standards, and overall customer satisfaction. Factoring in these elements can lead to a more informed and strategic selection.

Cons:

Higher Initial Costs

The combination of factors may lead to a higher bid price due to the premium placed on quality and expertise.

More Complex Evaluation Process

The process of evaluating bids based on multiple criteria can be more time-consuming and may require more expertise to assess the technical qualifications and experience of each bidder properly.

In conclusion, while the lowest bid approach may be more cost-effective and simpler, it carries risks related to quality and expertise. Conversely, evaluating bids on diverse criteria promotes adherence to industry standards, as vendors are more likely to employ certified and experienced technicians, use correct tools and parts, and follow protocols that align with regulatory requirements, resulting in compliant and dependable maintenance services.

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What factors contribute to the recommended practice of conducting load bank testing for UPS systems and their accompanying batteries?

Performing load bank tests on UPS (Uninterruptible Power Supply) systems and their associated batteries periodically offers several benefits:

1. Ensuring System Reliability: Load bank testing allows you to assess the reliability and performance of your UPS system and batteries under realistic operating conditions. By subjecting the equipment to a simulated load, you can verify that it can handle the expected power demands during an actual power outage. This helps identify any potential weaknesses or malfunctions in the system, allowing you to address them proactively before they cause critical failures.

2- Capacity Verification: Load bank tests help you determine if your UPS system and batteries can deliver their rated power capacity. Over time, batteries may degrade or develop internal resistance, leading to reduced performance. Load bank testing helps identify any capacity issues, such as reduced runtime or insufficient power delivery, allowing you to take corrective measures like battery replacement or maintenance.

3- Battery Health Assessment: Batteries are a vital component of UPS systems, and load bank testing provides valuable insights into their health and condition. By conducting load tests, you can identify weak or failing batteries that may not be able to sustain the required power load during an outage. This

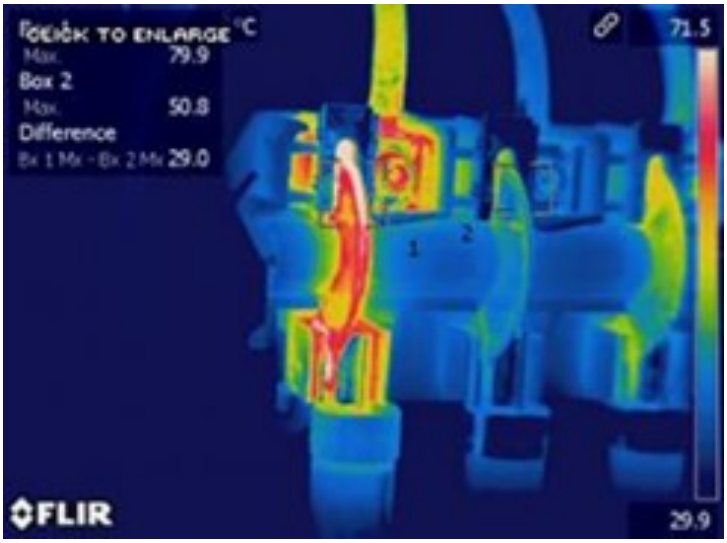
information allows you to replace or repair problematic batteries promptly, minimizing the risk of unexpected downtime.

4- System Optimization: Load bank tests provide an opportunity to optimize your UPS system's configuration, settings and calibration verification. By analyzing the performance data gathered during the test, you can fine-tune various parameters like voltage and frequency regulation, response time, and system behavior under different load conditions. This optimization ensures that your UPS system operates at its best efficiency and reliability, enhancing its overall performance.

5- Compliance and Certification: Certain industries and regulatory standards may require load bank testing for UPS systems and batteries as part of their compliance protocols. By conducting these tests periodically, you can ensure that your organization meets the necessary regulatory requirements and maintains the appropriate certifications or accreditations. as example IEEE 1188 for valve-regulated lead-acid batteries (VRLA) and IEEE 450-2002 for wet lead acid cells.

6- Thermal Scanning: Thermal scanning on UPS and batteries during load bank testing, also known as infrared thermography, involves using thermal imaging cameras to detect and visualize heat patterns in electrical equipment, including UPS systems and batteries. By examining the temperature distribution across the equipment, thermal scanning can identify areas of excessive heat, which may indicate potential issues such as loose connections, overloaded components, or faulty components. Elevated temperatures can also be an early sign of battery or UPS system problems.

7- Preventive Maintenance: The combination of load bank testing and thermal scanning allows you to proactively address potential problems before they lead to critical failures or



downtime. By identifying and rectifying issues during scheduled maintenance, you can enhance the overall reliability and longevity of the UPS system.

Overall, load bank testing on UPS systems and batteries helps verify their reliability, capacity, and overall health. It enables proactive maintenance, reduces the risk of unexpected failures, and ensures continuous operation of critical infrastructure.

Mohsen Abedi P.Eng, PSM.
Technical Consultant | Senior UPS Systems Specialist | Electrical engineering design | Power electronic systems design | Power quality systems & Harmonic filters | BESS RenewablesTechnical Consultant | Senior UPS Systems Specialist | Electrical engineering design | Power electronic systems design | Power quality systems & Harmonic filters | BESS Renewables

Importance of Boiler Room Safety

Rob Brennan

Boilers are essential to many industries, providing heat and energy for a wide range of applications. However, boilers can also pose significant risks if not properly maintained and operated. Boiler room safety is crucial to protect workers and the facility from the dangers of boiler explosions, fires, and other hazards. In this article, we'll explore the importance of boiler room safety and provide ten tips for maintaining a safe boiler room.

Boiler room safety is critical for several reasons. First, boilers operate under high pressure and temperature, making them potentially dangerous if not adequately maintained and operated. Second, the energy sources used to fuel boilers, such as natural gas, oil, or coal, can be highly combustible and explosive if not handled properly. Third, a boiler malfunction or failure can result in downtime, lost productivity, and costly repairs. Fourth, boiler accidents can cause severe injuries, fatalities, and property damage.

To prevent boiler accidents and ensure safe boiler room operations, it's essential to follow a set of guidelines and best practices. Here are ten tips for maintaining a safe boiler room:

Follow proper installation and maintenance procedures

Boilers must be installed and maintained according to the manufacturer's instructions and applicable safety codes and regulations. Regular maintenance and inspections can help identify potential problems and prevent them from escalating.

2.Train employees on safe boiler operations

All boiler operators and maintenance personnel should receive proper training on safe boiler operations, including startup and shutdown procedures, emergency protocols, and hazard recognition and mitigation.

3. Establish and enforce safety procedures

A comprehensive safety program should be established and enforced, covering all aspects of boiler room operations, including equipment operation, maintenance, and emergency response.

4. Use appropriate personal protective equipment (PPE)

All personnel entering the boiler room should wear appropriate PPE, including eye protection, hearing protection, and safety shoes. Boiler operators may also need additional PPE, such as gloves, respirators, or

face shields, depending on the type of boiler and the hazards present.

5. Install and maintain safety devices

Boilers should be equipped with safety devices, such as pressure relief valves, temperature controls, and low-water cutoffs. These devices should be installed and maintained according to the manufacturer's instructions and safety codes and regulations.

6. Monitor boiler performance regularly

Boiler performance should be monitored regularly, including water levels, pressure, temperature, and emissions. Any deviations from normal operating conditions should be investigated and corrected promptly.

7. Keep the boiler room clean and organized

A clean and organized boiler room can help prevent accidents and make maintenance tasks easier and safer. Keep the boiler room free of clutter and debris, and ensure that all equipment and tools are properly stored.

8. Follow proper fuel handling and storage procedures

Fuel handling and storage procedures must be followed to prevent spills, leaks, and fires. Fuel tanks and lines should be regularly inspected and maintained, and any leaks or damage should be repaired promptly.

9. Develop an emergency response plan

An emergency response plan should be developed and communicated to all personnel in the boiler room. The plan should include procedures for handling boiler malfunctions, fires, and other emergencies, as well as evacuation procedures and emergency contact information.

10. Conduct regular safety audits

Regular safety audits can help identify potential hazards and areas for improvement. Audits should be conducted by trained personnel and should cover all aspects of boiler room operations.

In conclusion, boiler room safety is critical to prevent accidents, injuries, and property damage. By following proper installation and maintenance procedures, training employees on safe boiler operations, establishing and enforcing safety procedures, using appropriate PPE, installing and maintaining safety devices, monitoring boiler performance regularly, keeping the boiler room clean and organized, following proper fuel handling and storage procedures, developing an emergency response plan, and conducting regular safety audits, you can maintain a safe boiler room and reduce the risk of accidents and hazards. It's important to remember that boiler safety is not a one-time effort but a continuous process that requires ongoing vigilance and attention to detail. By prioritizing boiler room safety, you can protect your workers, your facility, and your bottom line.

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KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 25)

- Fill in the numbers from 1 –6
- Do not repeat the number in any row or column
- The numbers in each heavily outlined set of squares, called cages, must combine (in any order) to produce the target number in the top corner using the mathematical operation indicated
- Cages with just one square should be filled in with the target number in the top corner
- A number can be repeated within a cage as long as it in the same or column

7		1	8		2	6		5
								2
2	5		9	1			3	
	3			9				4
1	2	5	3		7		6	9
4		9			6	2		
	6	3	4	8	1			
		2		7	3	9		6
	7					3	8	

Fun facts about Leap Year that you may not have known!

Leap years were added as a part of our calendar to keep it in alignment with the **Earth** as it **revolves around the sun.**

It actually takes **365 days** and just about **6 hours** for the Earth to travel around the sun. Therefore, every **4 years** an additional day is added to the calendar.

People **born** on **Leap Day** are called **Leaplings** or **Leapers**. Most celebrate their birthday on February 28th or March 1st.

Celebrities born on Leap Year: actor **Antonio Sabato, Jr.**, rapper/actor **Ja Rule** and motivational speaker **Tony Robbins.**

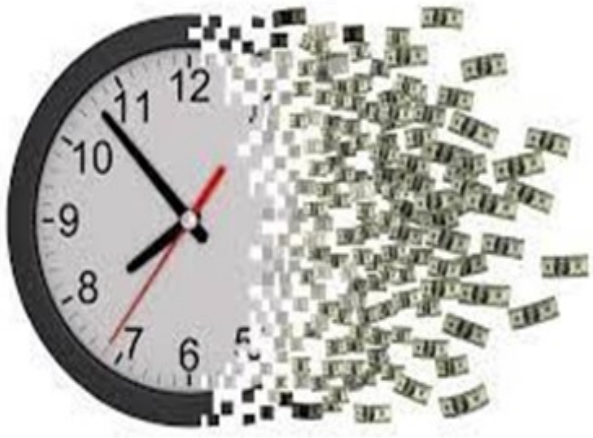
There are approximately 4 million leap year babies or leaplings out there.

Let's Talk Building Ops: Energy Efficiency

Paolo Cordovado

Fun Fact!

Did you know a minute of run time saved a day for 365 days equals 6 hours of run time saved annually, increase it to 30 minutes a day and at the end of the year you have eliminated 7.6 days of run time!!



One minute a day x a month x a year x the life of the building!

Not every change needs to be a Grand Slam, a single is still as critical! Little changes can have a big impact overtime. Example: instead of cutting your air handler schedule by hours at first start with 5,10- or 15-minute increments, monitor consumption and tenant comfort. You want to be cautious of the changes you're making and ensure they don't affect tenant comfort. Once you've tried 5,10 or 15 mins push it back another 5,10 or 15 mins and monitor again. You will come to a point where you have your air handler is running less before and after occupancy and you have not impacted tenant comfort. You can apply this example to any equipment in the building by adjusting the on/off time and/or set points by .5 degree. These small changes could have a big impact on your consumption and not effect tenant comfort either.

Don't make it too complex!

It's easy to look at all the systems and start making small changes to everything but each change will require monitoring. On top of your current daily tasks you will have to monitor all those changes which you probably don't have time for. I'm not saying you can only make one change at a time but be very cautious of the changes you're making and ensure you document all the changes and what the values were before so you can quickly flip back if you get complaints. If I was making the change to a heating setpoint I may look into the heating pumps or the on/off times of the boilers as the equipment is all connected to the same heating system but I would also like to see the impact of each change. One day I make the heating setpoint change and then monitor, a few days later I adjust on/off times and then monitor, a few days later I'll adjust the pumps. During the monitoring periods, we're hoping for very similar days to see how long the boiler ran, at what modulation, and what was consumed that day across utilities to start. Comparing to previous data how did we do?

Fine tuning your building systems in my opinion is always ongoing. In older buildings systems may be set to set points "they've always been set to" which I understand but with the world changing their views on energy simply staying status quo doesn't cut it. Older systems is where tiny changes are perfect, the last thing you want to do is put too much pressure on a

system that is barely holding on but doesn't have the budget for a full replacement yet. In newer buildings items may have been removed in the construction phase or design specs that may have been more than the current tenant needs.

Deep dive to get in tune

Maybe it was the way I was taught but using your senses to get in tune with your building is the first thing an operator should do at their property. Go into your mechanical room and listen, go put your hand on the pump, put your ear on the ahu door. (I say this but if you don't know how to do it safely ask someone that does)

I know operators that can diagnose a problem from outside the mechanical room. When you get to the point where you are in tune with how your building currently operates, use your tracked data and start small. Some companies may have the ability to get a 3rd party involved for audits, the investigation is taken off of your plate but this is where your input can help the team and you can start implementing some of the changes recommended.

In conclusion, don't be afraid of energy efficiency, Net Zero or Decarbonization. Look at it like this, you want to drive through a tunnel but there is a boulder in the way. Yes you can completely remove the boulder and make your way through the tunnel but at what cost? Can you even afford it? How long will it take until you can afford it? Instead start chipping little pieces off the boulder with No and low-cost measures, they're the best way to reduce your energy usage. With the savings from your no/low-cost measures you may be able to afford pulling that boulder out sooner than expected or find out after the changes your "boulder" isn't as bad as you thought.

Also keep in mind each building will require its own unique strategy, you may be able to implement most items across a portfolio, but you will still need to tailor each item to the specific building. Each system was designed to work a certain way, as operators we don't necessarily always need to reinvent the wheel, but a fresh set of eyes might look at the system differently than the designer or engineer did.

I fought the system design at an a previous property and with the help of my controls technician was able to save 1.1milkion kWh in consumption in 14 months with no retrofit projects just operational changes to schedules, set points and automation. The 1.1 million kWh worked out to a savings over $80,000. Slowly making small changes worked best for me and being small changes didn't impact the tenants at all. After learning and understanding how my systems were able to cool/heat and how long it would take to get to set point we're critical for making the changes. Ongoing commissioning is something that should be on an operator's mind, in a new building and an old building.

As always, these are my opinions on the subject. Always refer to your direct manager and company before starting. You still have a job to do and don't forget that because that's the reason you get a pay check!

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Facility Managers Guide to Life Safety Emergency Power Standards – Part IV The Quin

Bill Henderson

Every day, in our business we encounter new generator services, and a recurring pattern emerges in the records of these new accounts: the critical quinquennial (5-year) generator service is often overlooked. Frequent staff turnover, poor record keeping and a disruption to the continuity of service are the chief reasons. Numerous maintenance and property managers fail to consider their emergency standby generators until there's a power outage and ...nothing happens.

A proactive manager who regularly services their standby generator can rest assured, knowing a brief wait is all it takes for power restoration. Conversely, managers new to their roles, those frequently switching portfolios, or those dependent on staff or service providers for maintenance reminders must educate themselves on the importance of regular generator servicing.

The quinquennial generator inspection is crucial for identifying and fixing issues that are not apparent during routine annual checks, thereby guaranteeing extended generator operation. The Canadian Standards Association 282-19 stipulates five essential steps for the Quinquennial service:

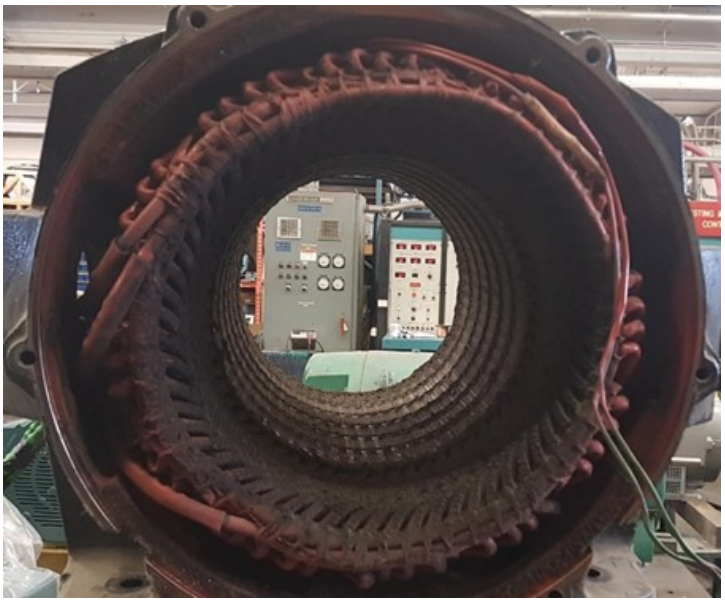
1) Complete all items specified in weekly, monthly, semi-annual, and annual testing requirements. This is a very thorough and meticulous examination and testing of the backup generator where a methodical scope of work needs to be employed, that is, the CSA282 Emergency electrical power supply for buildings. The generator service company will have a report that covers all of the tests and inspections from Table 2 (weekly) to Table 6 (Quin) of the Scope of Work per CSA282-19. (an abbreviated copy is included at the end of this newsletter for your convenience.)

Most service companies will conduct the annual service and load test together with the quinquennial service . An experienced generator technician can complete the Annual Service and Load Test for a gen-set up to a 250kW rating in about 4 hours and the Quinquennial Service in another 4 hours for 8 hours in total. As the gen-sets get larger, likely two or more technicians will be required to get the job done in one shift.

2) Removing the alternator's vented plate to inspect the windings visually and with a meggar meter, ensuring the insulation is intact to prevent catastrophic failures due to arcing. Gen-sets work in just about every environment imaginable. Health care facilities, schools, universities, condominiums and government buildings are among the cleanest. While agricultural dryers, machine shops and marine engine rooms are among the dirtiest.

With lots of fly and dust from feed or oil and exhaust contamination hanging in the air. If the gen-set resides in a particularly dirty environment, the alternator should be inspected more frequently than every five years. In a room with high humidity and abundant particulate

matter, the amount of soot that sticks to the alternator windings may eventually arc to ground, causing a catastrophic failure resulting in repair costs in the tens of thousands of dollars.



The dirty alternator below needs to be thoroughly cleaned by a technician who knows what they are doing, properly dried for an adequate amount of time and then megger tested to ensure the winding insulation remains intact. When done properly, this alternator will provide power for years to come.

3) Draining the cooling jacket, installing new thermostats, refilling with fresh coolant, cleaning the radiator fins for enhanced cooling efficiency, and adjusting the engine valve clearance to the manufacturer's specifications.

Engine valve clearance on a standby generator with low hours should not take much movement but valve cover gaskets will need to be ordered prior to the quinquennial service. Make sure you order the gaskets even if you think you might be able to get by without them. If some tear, rip or leak after service or soon thereafter, it will be expensive to return to replace as most generator service companies offer one year warranty on parts and labour for service jobs.

Prior to attending the quinquennial service make sure you order the proper thermostats, gaskets and manufacturer recommended coolant. It is not uncommon for larger CAT, Cummins or Mitsubishi engines to require four or more thermostats. Gotta love that Cummins "Blue".

I don't know how the radiator in the photo below kept the gen-set cool for so long before overheating with the sludge in the cooling jacket. We picked up this account several years ago, when the generator alarmed out. Obviously, no monthly checks were done on this standby unit. Simple maintenance can save you thousands in repairs.

4) Addressing all minor issues and potential non-start deficiencies during the inspection, and providing quotations for any future work.

5) Documenting all inspections, tests, and corrective actions in a logbook kept near the generator, enabling quick review of the generator's maintenance history by any technician.

Be Prepared, Stay Powered: As we wrap up this guide, remember that the key to uninterrupted power and peace of mind lies in the planning and meticulous care of your generators. Regular quinquennial inspections are not just a recommendation; they are your safeguard against the unexpected.

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Scope of Work – CSA282-19

Weekly inspection, test, and maintenance requirements

1. Consumables:
    a. Inspect auxiliary supply tank fuel level (gas pressure) and main tank level (gas pressure)(if applicable). There shall be a minimum supply of 2 h.
    b. Inspect lubricating oil level.
    c. Inspect engine coolant level.
    d. Inspect engine, generator, fuel tank(s), and cooling systems for leakage.
    e. Inspect for proper operation of fuel transfer pump (if applicable).
    f. Inspect fuel filter for contamination if filter is equipped with a transparent bowl.
2. Starter system:
    a. Inspect electric starter for cleanliness, mounting, and terminal security.
    b. Air starter:
        i. Inspect air tanks for pressure.
        ii. Inspect valves for leakage.
        iii. Test auxiliary engine and compressor for proper operation.
        iv. Bleed off any condensation
3. Batteries and charging equipment:
    a. Inspect electrical connections for tightness and evidence of corrosion.
    b. Inspect battery for cleanliness and dryness between terminals.
    c. Inspect charger electrical connections for cleanliness and tightness.
4. Engine:
    a. Test lubricant and/or coolant heaters for proper operation.
    b. Inspect governor control linkages and oil level (if applicable).
    c. Inspect fuel pump oil sump (if applicable).
    d. Inspect fan belts for correct tension and wear.
5. Control panel:
    a. Inspect control panel covers for security.
    b. Test annunciator lamps to confirm that they are operational.
    c. Inspect control panel settings (ensure that the unit is ready for automatic start-up).
    d. Test remote visual and audible trouble signals at the building fire alarm panel.
6. Inspect air control louvre settings to ensure proper operation.
7. Test emergency lighting unit(s).
   Verify whether room temperature is above 10 °C.
8. Inspect generator and transfer switch room(s) for cleanliness and accessibility to all components of the emergency system.
9. Correct all defects found during inspections and tests.
10. Record all inspections, tests, and corrective actions in the log.

2/12/2020

T&T POWER GROUP

Monthly inspection, test, and maintenance requirements

1. Complete all items specified in weekly testing requirements above.
2. Test and verify the entire system as follows:
    a. Simulate a failure of the normal electrical supply to the building.
    b. Verify that the battery charger current output increases while cranking.
    c. Operate the system under at least 40% of the rated load for 60 min.
    d. Operate all automatic transfer switches under load.
    e. Inspect brush operation for sparking, if applicable.
    f. Inspect for bearing seal leakage.
    g. Inspect for correct operation of all auxiliary equipment, e.g., radiator shutter control, coolant pumps, fuel transfer pumps, oil coolers, and engine room ventilation system(s).
    h. Record the readings for all instruments in the log and verify that they are normal.
    i. Drain the exhaust system condensate trap.
3. Inspect block heater hoses and wires.
4. Batteries and charging equipment:
    a) Inspect all battery cells for correct electrolyte fill level (applicable to vented or flooded lead-acid batteries only). As a safer alternative, perform a battery conductance test using a conductance tester. Record test results in the log book for trending purposes.
    b) Test all battery cells for correct electrolyte-specific gravity (applicable to vented or flooded lead-acid batteries only). This inspection may be omitted if the conductance test in Item a) is performed.
5. Correct all defects found during inspections and tests.
6. Record all inspections, tests, and corrective actions in the log.
7. Inspect all electrical components to ensure proper function.

Semi-annual inspection, test, and maintenance requirements

1. Complete all items specified in monthly and weekly testing requirements.
2. Inspect and clean engine crankcase breathers.
3. Inspect and clean all engine linkages.
4. Lubricate the engine governor and ventilation system.
5. Test protective devices for proper operation.
6. Before start-up, perform two full cranking cycles. Near the end of each cycle (and while still cranking), measure and record the lowest indicated battery voltage. If the measured voltage is less than 80% of the battery's rated voltage, replace the battery. Alternatively, perform a battery load test using a suitable load tester.
7. Inspect ventilation system belt(s).
8. Correct all defects found during inspections and tests.
9. Record all inspections, tests, and corrective actions in the log.

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Annual inspection, test, and maintenance requirements

1. Complete all items specified in weekly, monthly and semi-annual testing requirements.
2. Control panel:
    a. Open all inspection covers and inspect all electrical connections.
    b. Test breakers for proper operation.
    c. Clean insulators and bushings.
    d. Test voltage regulator for proper operation.
    e. Operate all moving parts to ensure that they move freely.
    f. Clean and dress contacts as necessary.
    g. Remove all dust.
    h. Check gauge calibration.
    i. For off-site fueled generators, turn position-indicating gas valve to off-position to ensure valve rotates properly and that the audible alarm on generator control panel is activated.
3. Engine:
    a. Change engine lubrication oil and filters.
    b. Test strength of coolant and chemical protection level of coolant inhibitors.
    c. Change fuel filters, clean strainer(s), and verify that the fuel supply valve is open.
    d. Inspect the exhaust system. Check and record the back pressure of the exhaust system to ensure that it complies with the engine manufacturer's requirements, and compare with previous readings.
    e. Clean and lubricate linkages.
    f. Inspect air filters
    g. Inspect all mechanical connections.
    h. Inspect all electrical connections.
    i. Inspect all external surfaces of heat exchanger(s) and clean as necessary.
    j. Inspect all belts and hoses and replace if necessary.
    k. Test and inspect ignition system(s). Replace any defective components.
    l. Inspect coolant pump(s) for leaks and external wear [if belt driven, remove the belt(s) first].
4. Diesel fuel storage tank(s) - The fuel oil in any storage tank (and auxiliary supply tank, if used) shall be tested (clear & bright test and water paste to detect water in bottom of tank), and if the fuel oil fails the test, it shall be:
    a. drained and refilled with fresh fuel in accordance with Article 6.5.1.5 of the National Fire Code of Canada; or
    b. full filtered to remove water, scale, bacteria, and oxidized gums/resins in order to minimize filter clogging and ensure diesel start-up.

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5. Generator:
    a. Test surge suppressor and rotating rectifier on brushless machines.
    b. Grease bearings (replace old grease with new) (if applicable).
    c. Clean commutator and slip rings (if applicable).
    d. Clean rotor and stator windings using clean compressed air.
    e. Inspect coupling bolts and alignment.
    f. Inspect conduits for tightness.
    g. Inspect windings at rotor and stator slots.
    h. Inspect all electrical connections.
6. Overcurrent protective devices:
    a. Electrically isolate all overcurrent protective devices.
    b. Remove all dust.
    c. Test devices for proper operation.
7. Transfer switches:
    a. Isolate transfer switch, open all inspection covers, and inspect all electrical connections.
    b. Operate all moving parts to ensure that they move freely.
    c. Clean and dress contacts as required.
    d. Remove all dust.
    e. Clean and lubricate linkages.
8. Infrared thermal imaging:

    a) Perform infrared thermal imaging of the normal power supply (preferred) side of each transfer switch. Ensure that the normal power supply side of each transfer switch has been loaded to at least 40% of the circuit rating of the normal power supply feeder for at least 60 min and that the load does not drop below 40% during the imaging. Scan all electrical connections, contacts, and energized components.

    b) At the end of the 60 min load test, with the emergency power supply system (all components) still operating under at least 40% load, perform infrared thermal imaging of all components from the point where the load bank cables will be connected (for the 2 h full load test), through to and including the load side of each transfer switch. Scan all electrical connections, contacts, circuit breakers, and energized components.

    c) After at least 60 min of the emergency generator full load test, with the emergency generator still operating under full load, conduct infrared thermal imaging of all components from the load terminals of each alternator through to the connection point for the load bank cables. Scan all electrical connections, contacts, circuit breakers, and energized components.

    d) Correct any components or connections that displayed unacceptably high temperatures or unacceptable differences in temperature between phases, during the tests in Items a), b), and c) above.

    e) Repeat the infrared thermal imaging for any components and connections that were serviced, repaired, or replaced following the scans performed in Items a), b), or c) above.
9. Lubricate door locks and hinges (if necessary), especially those of outdoor enclosures.
10. Conduct a 2 h full-load test
11. As needed, review and provide instruction on the technical requirements for weekly, monthly and semi-annual inspections with the person(s) responsible for carrying out the work.
12. Correct all defects found during inspections and tests.
13. Record all inspections, tests, and corrective actions in the log.

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Quinquennial (every 5 years) inspection, test, and maintenance requirements

1. Complete all items specified in weekly, monthly, semi-annual and annual testing requirements.

2. Generator:

   Inspect insulation of generator windings. Use an insulation tester (megger). The resistance in megohms should be not less than

   $$\left[\frac{\text{Rated voltage} + 1000}{1000}\right]$$

   If the resistance is less, dry out the insulation using the auxiliary heat process.

2. Engine:
   a. Drain and flush the cooling system. Refill the system with new coolant.
   b. Clean radiator tubes and cooling fins.
   c. Replace thermostats.
   d. Inspect valve clearances and adjust as appropriate.
3. Correct all defects found during inspections and tests.
4. Record all inspections, tests, and corrective actions in the log.

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Kenken Puzzle Answer

7	4	1	8	3	2	6	9	5
3	9	8	7	6	5	4	1	2
2	5	6	9	1	4	7	3	8
6	3	7	2	9	8	1	5	4
1	2	5	3	4	7	8	6	9
4	8	9	1	5	6	2	7	3
9	6	3	4	8	1	5	2	7
8	1	2	5	7	3	9	4	6
5	7	4	6	2	9	3	8	1

TEST YOUR OPERATOR IQ ANSWERS

Answers: 1)b 2)b 3)a 4)b 5)a

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TUESDAY FEBRUARY 13, 2024 AT 5PM FOR OUR IN-PERSON MONTHLY MEETING

Title: **Providing an overview of the various Services James Electric Motor Services provides to the HVAC community and customer base.**

Presenter: **Darcy Lemieux with James Electric.**

Location: **Danish Canadian Club, 727 11 Ave SW, Calgary, AB T2R 0E3**

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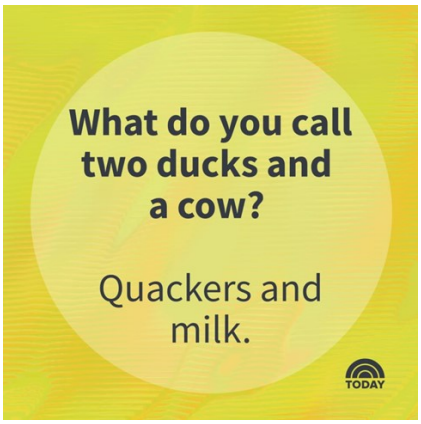

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We look forward to seeing you in-person for our meeting at the Danish Canadian Club (727 11 Ave SW) on Tuesday February 13, 2024 @ 5pm

Please visit the Building Operators Association of Canada YouTube Channel to watch the Speakers.

BOA Building Operators Association of Canada