

LED PREVENTATIVE MAINTENANCE PLAN

The purpose of an LED preventative maintenance plan is to ensure optimal performance and longevity of LED lighting systems through regular inspections and upkeep.

2023



PREVENTATIVE MAINTENANCE PLAN FOR LED LIGHTING

I. Introduction: LED lighting is a highly energy-efficient and long-lasting alternative to traditional lighting sources. To ensure that LED lights continue to operate at peak performance, it is important to implement a regular preventative maintenance plan. This plan will outline the steps to be taken to keep LED lighting systems in good working condition, prevent malfunctions, and extend their lifespan.

II. Maintenance Schedule: The frequency of maintenance tasks will depend on the specific lighting system, its environment, and usage. As a general rule, LED lights should be inspected and cleaned at least once every six months. Tasks should be performed more frequently in high-traffic areas or in environments with excessive dust and debris.



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Maintenance Tasks:

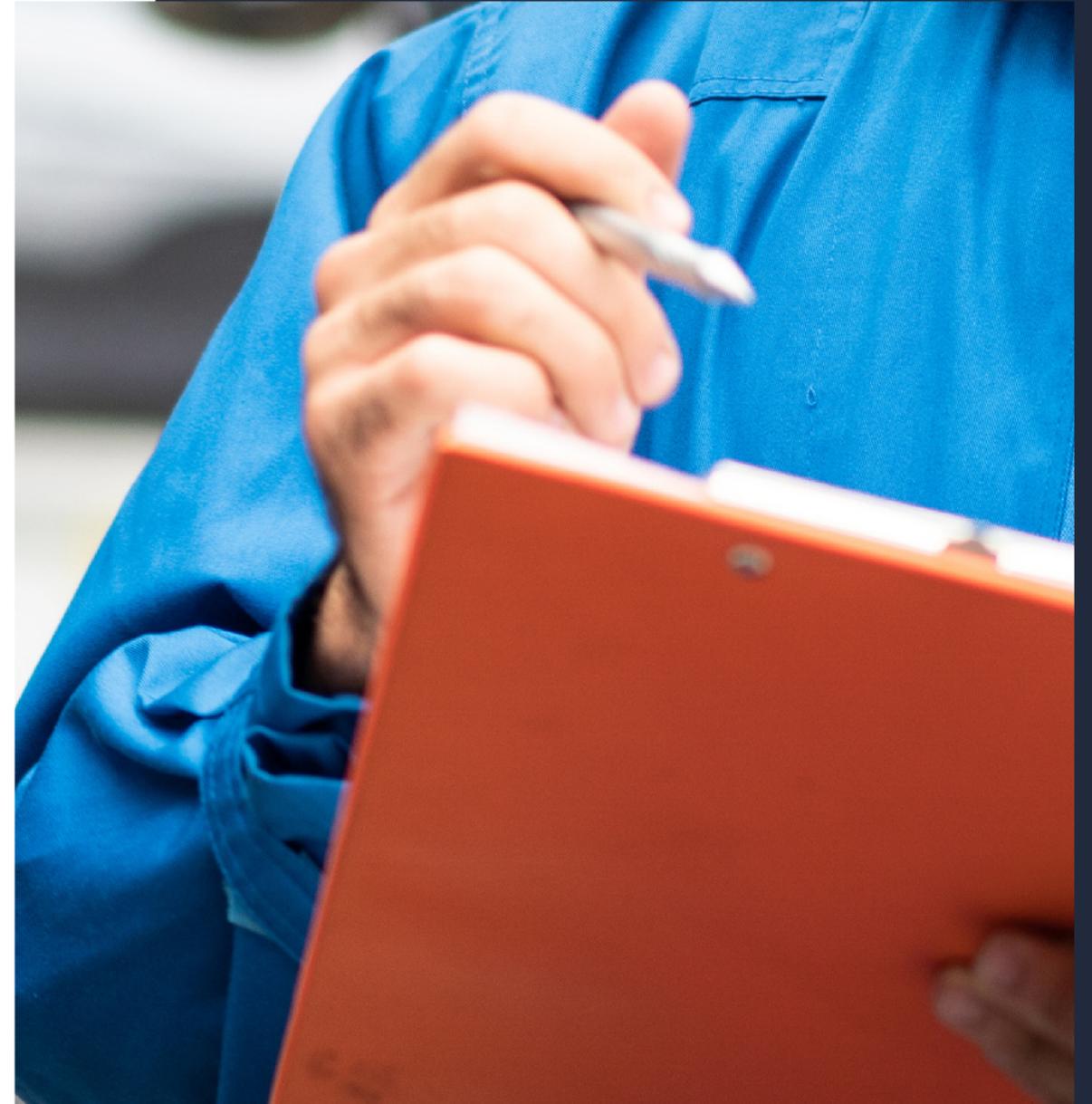
1. **Inspection:** A visual inspection should be performed to check for any physical damage, such as cracks, broken lenses, or loose connections.
2. **Cleaning:** LED lights should be cleaned regularly to remove dust and debris that can reduce their efficiency and cause overheating. Use a soft cloth or microfiber cloth to gently clean the lights, being careful not to scratch the lens.
3. **Testing:** Test the lighting system to ensure that all lights are functioning properly. Check for any flickering, dimming, or dead lights, and replace any faulty components as needed.
4. **Tightening Connections:** Check all connections to ensure that they are tight. Loose connections can cause arcing and other electrical problems.
5. **Replacing Components:** Replace any components that are worn or damaged, such as ballasts, drivers, or lenses.
6. **Surge Protection Devices:** Ensure that surge protection devices are installed and functioning properly. These devices protect the lighting system from power surges and voltage spikes that can cause damage or malfunctions.



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IV. Record Keeping: It is important to keep accurate records of all maintenance tasks performed on the lighting system. This information can be used to track the performance of the system, identify any trends or patterns, and schedule future maintenance tasks.

V. A preventative maintenance plan for LED lighting is an important part of ensuring that these systems continue to perform at their best. Regular inspection, cleaning, testing, and maintenance tasks can help prevent malfunctions, extend the lifespan of the lighting system, and keep it operating at peak performance.



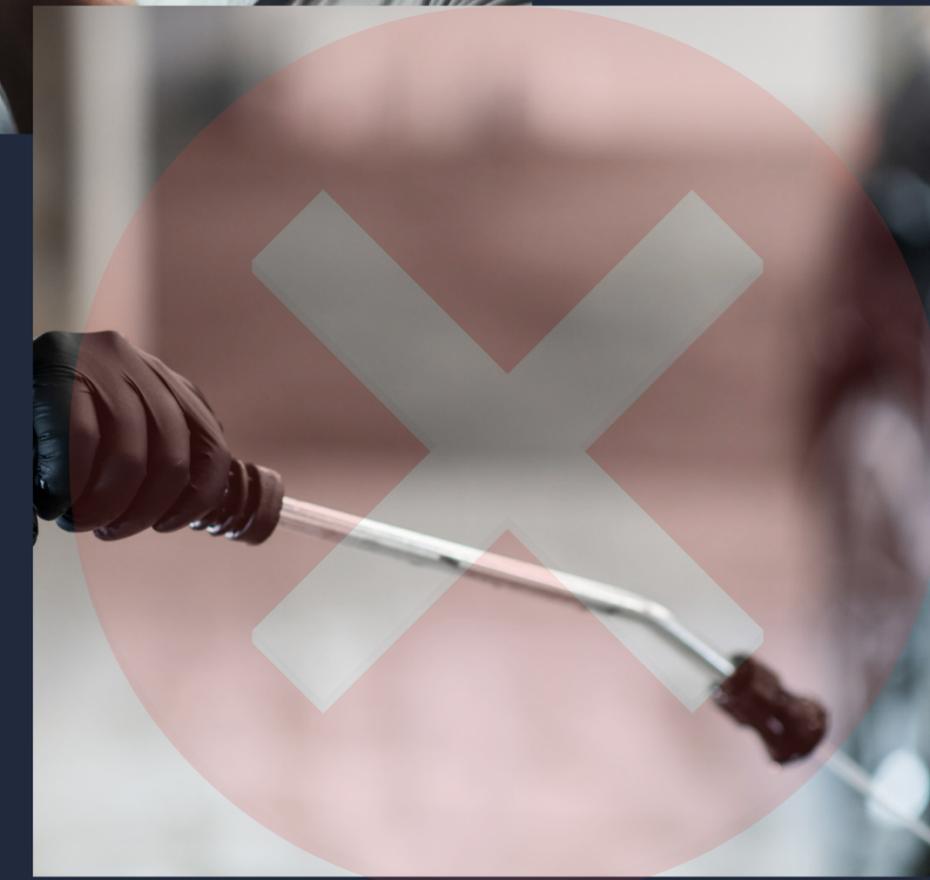
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Cleaning solutions

When cleaning LED lights, it's important to use a cleaning solution that is safe for the LED lights and the fixtures. Here are some recommended cleaning solutions for LED lights: Prior to using any solution ensure the IP rating of the LED fixtures is IP54 or above. LED fixtures with a lower IP than 54 should not be washed.

1. **Water:** A simple solution of water can be used to clean LED lights. For best results, use a soft cloth or microfiber cloth to avoid scratching the surface of the LED lights or fixtures.
2. **Mild detergent:** A mild soap or detergent solution can be used to clean LED lights. Avoid using abrasive or corrosive cleaning agents, as they can damage the LED lights or fixtures.
3. **Isopropyl Alcohol:** Isopropyl alcohol (IPA) is a common cleaning solution that is safe for use on LED lights. It is effective in removing grease and grime and is quick-drying.
4. **Glass cleaner:** A glass cleaner specifically designed for use on LED lights can be used. These cleaners often contain ingredients that are safe for LED lights, such as isopropyl alcohol or a mild detergent solution.

It is important to avoid using harsh chemicals or abrasive cleaning agents, such as bleach or ammonia, as these can damage the LED lights or fixtures. Also, it is recommended to avoid using a high-pressure washer or water with high pressure when cleaning LED lights, as this can cause damage to the LED lights or fixtures.



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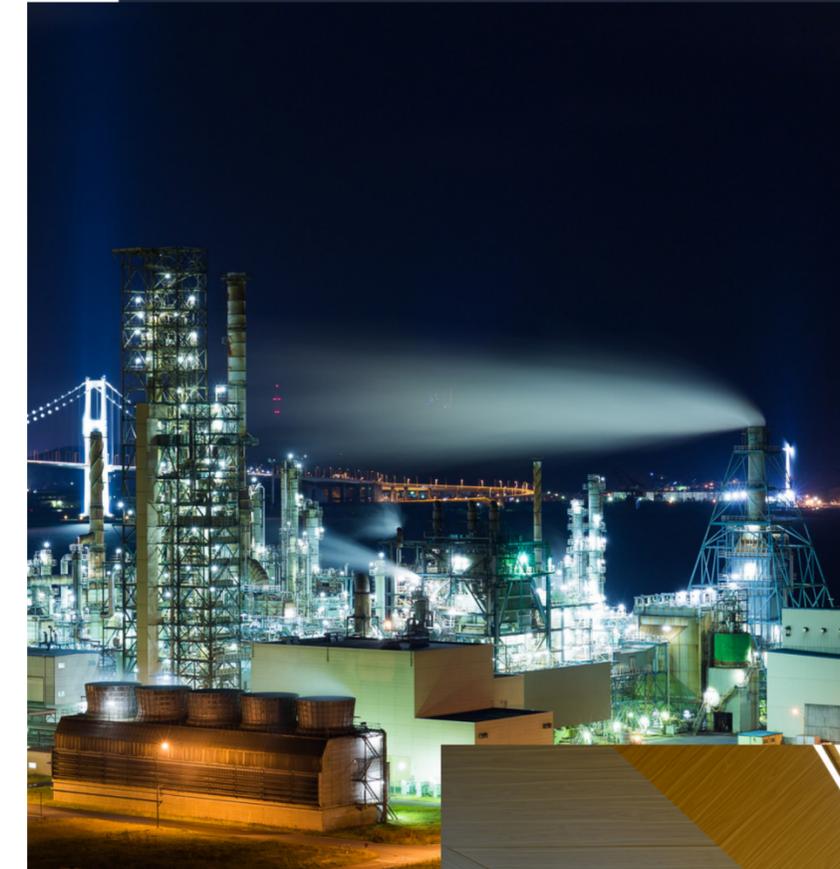
A high IP rating does not guarantee that the fixture is 'gas-tight', meaning that corrosive gas molecules may still enter the fixture over time depending on the concentration. If the facility HVAC system is mixing adequate make-up air from outside this measure will sometimes suffice. Some manufacturing facilities may have solvents, machining mists or other volatiles continuously in the air. Indoor pools and spas having strongly chlorinated water will form chloramine gasses when perspiration from pool users mixes with the pool water. In environments such as these, frequent inspection is called for, and enhanced cleaning cycles may be necessary to preserve the life of the fixtures.

Sample Schedule

Here is a sample bi-annual preventative maintenance chart for LED lighting at a commercial facility:

Month 1 (Every Even Year):

- Inspect electrical panels and wiring for signs of damage or wear.
- Check surge protection devices to ensure they are functioning properly.
- Clean LED lights and fixtures to remove any dirt or debris.
- Test all emergency lighting to ensure they are functioning properly.
- Replace any damaged or worn electrical components, such as wiring or surge protection devices.



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Month 6 (Every Even Year):

- Inspect electrical panels and wiring for signs of damage or wear.
- Check surge protection devices to ensure they are functioning properly.
- Clean LED lights and fixtures to remove any dirt or debris.
- Test all emergency lighting to ensure they are functioning properly.
- Replace any damaged or worn electrical components, such as wiring or surge protection devices.

Month 12 (Every Odd Year):

- Conduct a comprehensive inspection of the electrical system, including panels, wiring, and surge protection devices.
- Clean LED lights and fixtures thoroughly to remove any accumulated dirt or debris.
- Test all emergency lighting to ensure they are functioning properly.
- Replace any damaged or worn electrical components, such as wiring or surge protection devices.
- Perform any necessary upgrades to the electrical system, such as replacing outdated electrical panels or upgrading surge protection devices.

By following this schedule, LED lights can be kept in good working condition, reducing the risk of malfunctions, and prolonging their lifespan. Regular inspections, cleaning, and maintenance of the electrical system and LED lights can help ensure safe and efficient operation, reducing the risk of electrical hazards and lost productivity.

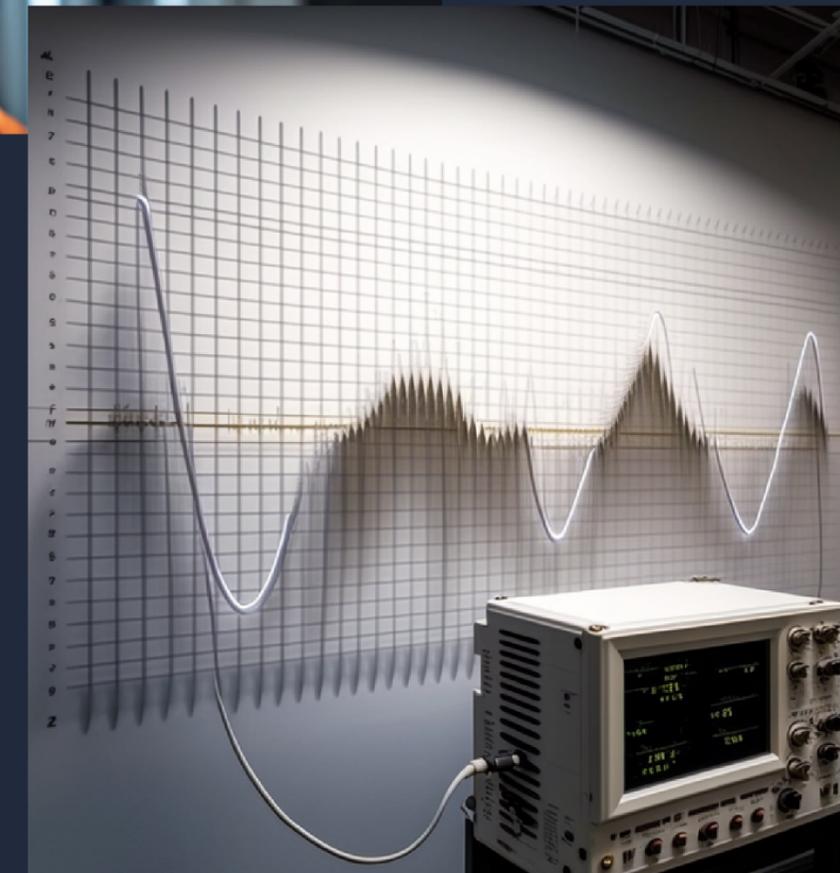
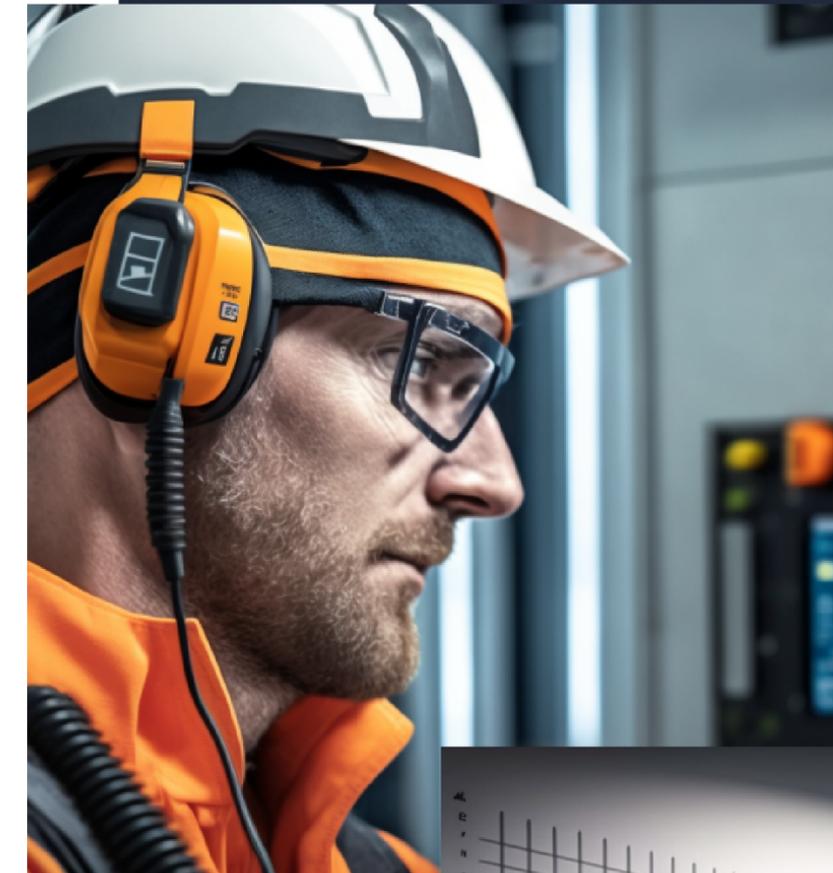
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Electrical System Inspections

Every facility has some level of power quality disturbance. The AC electrical power in our buildings should look like a perfect sine wave if we view the voltage waveform with a special high-speed meter or oscilloscope. Typical electricians' voltmeters only display an average of the RMS voltage one time or a few times per second. To visually detect power quality problems, we need to sample the power many thousands of times per second. When we do so we may spot problems such as harmonic distortion, ring transients and impulse transients.

The frequency of electrical system inspections for a commercial facility depends on several factors, including the size and complexity of the electrical system, the type of equipment and usage, and local regulations and codes. As a general guideline, a commercial facility's electrical system should be inspected at least once a year by a licensed electrician.

However, more frequent inspections may be necessary in certain circumstances, such as after major equipment upgrades or modifications, or in facilities with heavy usage or demanding environments.



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In addition to annual inspections, regular monitoring and maintenance of the electrical system can help identify and prevent problems before they become serious issues. This can include tasks such as checking for loose connections, replacing worn or damaged components, and testing the operation of surge protection devices. It is important for commercial facilities to have a proactive approach to their electrical system maintenance to ensure that their electrical equipment is functioning safely and efficiently.

Maintenance needs related to power quality include an annual testing of the resistance to earth ground. The resistance to earth ground, from fixture/equipment to the building grounding electrode, can increase with age, corrosion, system modifications or damage. Some types of grounding electrodes have a life of only 15 years or less depending on soil conditions, and deep freeze or drought conditions drastically increase the resistance. The National Electrical Code specifies a maximum year-round ground resistance of 25 Ohms (a standard developed in the 1930's, before today's electronics), and both the NFPA and IEEE recommend less than 5 Ohms for modern computer and electronic equipment, including solid-state LED lighting. Even the best combination of Type 1, 2 and $\frac{3}{4}$ surge protection is rendered ineffective if the building grounding fails. The great benefit of maintenance checks of our building earth grounding is that we are also ensuring a key system needed for life safety and fire safety. After any additions or modifications to the facility electrical system, a trained electrical inspector should verify that neutral and ground are connected where they should be, and are not connected where they never should be. We have observed a shockingly high number of commercial, sports and industrial buildings with improper neutral-to-ground connections, which is a code violation and a serious safety hazard.

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Poor electrical equipment can have a significant impact on LED lights, reducing their performance and potentially causing malfunctions or premature failure. Some of the ways that poor electrical equipment can affect LED lights include:

1. **Power Surges and Voltage Spikes:** Power surges and voltage spikes can damage LED lights and shorten their lifespan. Poor electrical equipment, such as faulty surge protectors or improperly installed wiring, can increase the risk of power surges and voltage spikes.
2. **Inadequate Voltage and Current:** LED lights require a specific voltage and current to operate at peak performance. Poor electrical equipment, such as worn or damaged transformers or wiring, can result in inadequate voltage and current being supplied to the LED lights, causing flickering, dimming, or reduced output.
3. **Overloading:** Overloading the electrical system can cause damage to the LED lights, as well as other components of the electrical system. Poor electrical equipment, such as outdated electrical panels or improperly sized circuit breakers, can increase the risk of overloading.
4. **Poor Grounding:** LED lights require a proper ground connection to function safely and efficiently. Poor electrical equipment, such as outdated or inadequate grounding systems, can result in improper grounding and potentially cause damage to the LED lights or other components of the electrical system.

Proper electrical equipment is critical for the reliable operation of LED lights. Poor electrical equipment can result in malfunctions, reduced performance, and shortened lifespan, leading to increased maintenance costs and lost productivity. Regular inspections and maintenance of electrical equipment can help ensure that LED lights are functioning safely and efficiently.

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Recalled Electrical Panels

If an electrical panel has been recalled by the manufacturer, it means that the panel has been found to have a safety defect or malfunction that poses a risk to people or property. Using a recalled electrical panel is not only illegal, but it also poses a serious safety risk.

It is the responsibility of the owner or operator of the electrical panel to have it repaired or replaced as soon as possible. The manufacturer of the recalled panel may provide instructions or a free repair or replacement, or the panel may need to be professionally repaired or replaced.

Using a recalled electrical panel can also result in liability issues, as well as insurance or regulatory violations. If a fire or other electrical hazard occurs as a result of using a recalled electrical panel, the owner or operator could be held responsible for damages or losses.

If an electrical panel has been recalled, it should not be used. The owner or operator should take immediate action to repair or replace the panel to ensure the safety of people and property.

OSHA

The Occupational Safety and Health Administration (OSHA) sets safety standards for the workplace, including standards related to electrical panels. Some common OSHA violations related to electrical panels include:

1. Lack of proper labeling: Electrical panels must be clearly labeled to indicate the purpose and operation of each circuit. Lack of proper labeling can result in confusion and potentially dangerous electrical incidents.
2. Improper grounding: Electrical panels must be properly grounded to prevent electrical shock and fire hazards. Improper grounding can result in electrical hazards, such as electrical shocks or fires.
3. Improper wiring: Electrical panels must be wired according to OSHA standards, including the use of proper conduit and proper wire sizing. Improper wiring can result in electrical hazards, such as electrical fires or electrical shocks.
4. Overloading: Electrical panels must be designed to handle the maximum load that they are expected to carry. Overloading electrical panels can result in electrical fires or other electrical hazards.

