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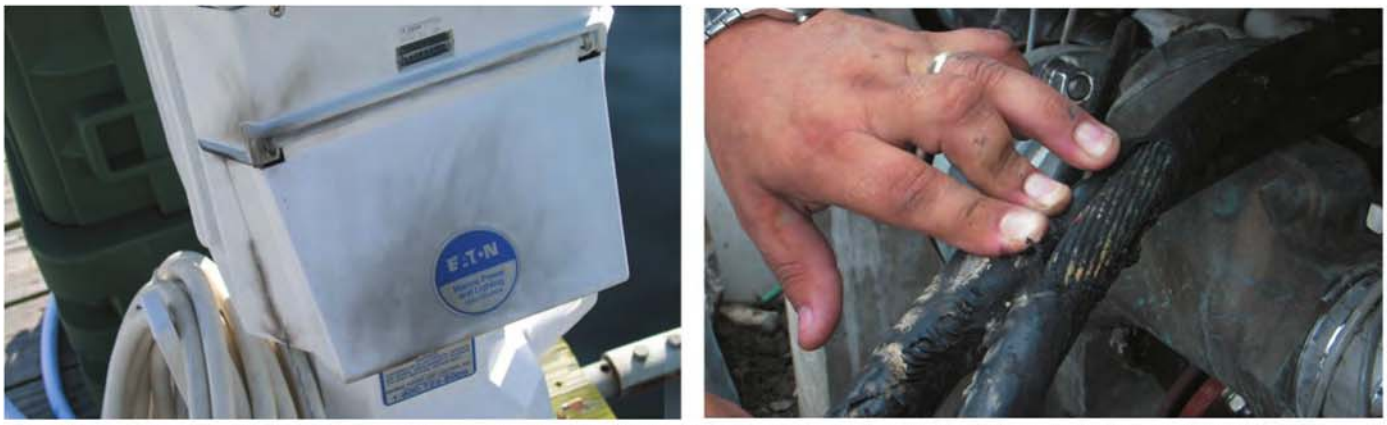
Does your marina have an electrical preventative maintenance program?

by **Cliff Norton**



Visual inspections of the dock electrical equipment can detect problems, such as a power pedestal with obvious smoke damage (pictured left) or insulation that is chaffed from the cable (right).

Everyday a marina's electrical system provides a vital service for its customers—one of the basic luxuries and necessities of docking at a marina. For the boater, electrical power is life support; it keeps batteries charged, bilge pumps operating, humidity low and alarm systems on alert. An electrical system may not always be highest on a marina operator's agenda, but when problems occur, they will never escape the boaters' attention.

Marinas should seriously consider and act appropriately on their responsibility to provide a well-maintained, safe electrical system. Boaters should understand this responsibility because maintaining a first-rate system requires their cooperation in inspections and daily operation, as well.

Risk management vs. risk avoidance

Maintenance of the marina's electrical system can follow two plans:

- Risk management is reactive and addresses problems when they come to the manager's attention. A risk manager buys an insurance policy, with faith that it will protect the marina financially and legally, if trouble occurs.
- Risk avoidance is proactive and actively seeks to avoid problems. A risk avoidance manager has insurance but knows it will not protect the marina from code violations and lax maintenance. It certainly does not prevent lawsuits.

Electrical preventive maintenance programs

Like any equipment, electrical systems must be inspected, tested and repaired. Marinas should formalize their preventive maintenance into a step-by-step regimen. An electrical preventive maintenance program (EPMP) should be simple so staff with no advanced training in electrical systems can easily learn the procedures. The discipline, organization and training needed to do it right may be challenging but well worth the effort. See the sidebar on page 24 for more specific details about how to put this plan together.

Identify a staff member, preferably with some formal electrical training, to be at the center of the program. If the marina doesn't have an experienced staff member, the marina should invite someone from its electrical contractor to provide staff training.

An EPMP is a Risk Avoidance program. A proactive preventive maintenance program ensures that operators are readily making inspections, which usually means minimal service interruptions. Most easily identifiable problems are just as easily corrected in a timely manner. This prevents more serious problems down the line and builds customer satisfaction. Preventive rather than reactive maintenance also reduces costs.

Regular inspections quickly identify boaters who may be misusing the electrical system. When the customers "buy in" to the EPMP they are much more likely to abide by the marina's safe operating rules and practice sound electrical maintenance on their boats. They will also monitor and report boaters who violate the rules.

Scheduled inspections for an effective EPMP should take place weekly, monthly, quarterly and annually.

Level one inspection

Weekly staff should conduct a visual inspection and take care of issues that can be seen with the eyes promptly. Look for the unsafe use of electrical cables and connections, equipment damage, corrosion or evidence of shorting. A simple weekly walk-around should find most problems.

Be on the lookout for unapproved devices. The National Fire Protection Agency (NFPA) 303, Section 5.2 standard requires that all electrical materials, devices, appliances, fittings and

other equipment be listed or labeled by a qualified testing agency. They must be installed and connected in accordance with listing requirements and/or manufacturer's instructions.

Inform boaters and actively discourage the purchase and use of unapproved devices, such as splitters.

Level two inspection

Level two includes the manual operation of devices and voltage verification. This inspection should be conducted monthly. At a seasonal marina, it should be done at the beginning and end of the season and monthly during the season.

NFPA 303, Section 5.20.1 requires an inspection of all electrical wiring, ground connections, conduit, hangers, supports, connections, outlets, appliances, devices and portable cable. All electrical equipment should be inspected at regular intervals to ensure a complete inspection at least annually.

Level two requires interrupting power to boats at the slips, and marinas should give customers plenty of advanced notice. Circuit breakers should be exercised and tested. Voltage should be verified at circuit breaker connections, terminal connections, power outlets (vessel connections) and other appropriate locations, as deemed necessary by a qualified electrician. An accurate (calibrated) RMS voltmeter is required for this task. There are several brands of high-quality voltmeters on the market. Choose one that can read up to 600V.

Level three inspection

Inspections at level three and four should be performed annually by a qualified InterNational Electrical Testing Association (NETA) contractor. Find a third party testing service with specially trained technicians to perform inspections. They provide testing documentation and make recommendations, so operators can properly direct an electrical contractor to perform any needed repairs. Find a list of NETA-qualified contractors in each state at *www.netaworld.org*.

Level three infrared (IR) testing is enormously effective for discovering a problem before it turns into an incident and for assessing the health of an electrical system. The power is left on so the inspection is non-intrusive. Improperly functioning electrical devices create resistance, which creates heat that is clearly evident in IR imaging. What appears to be a flawlessly functioning electrical device can look entirely different in IR.

EPMP level four inspection

This inspection identifies problems with ground resistance and ground fault circuits and is performed annually by a NETA testing service. NFPA 303, Section 5.20.2 requires a test of ground integrity and polarity.

Marina managers must coordinate with their boaters and the NETA contractor for a planned shutdown. The duration depends on the size of the marina, and the shutdown can last from one day for small marinas to as much as five working days for megayacht marinas.

Power is disconnected to supplying branch circuits, feeder circuits and service entrance conductors, as instructed by NFPA standards. A future article will discuss the technical aspects of this inspection, including information on ground resistance, polarity and ground fault testing.

The fire department and training

The fire department inspection is included in an EPMP for two reasons: fire in a marina with highly flammable fiberglass boats and fuel is an operator's worst nightmare. And fire is often caused by electrical problems. Remember, a good EPMP program can prevent, but not eliminate, the risk of fire in marinas.

NFPA 303, Section 4.4.1 requires an annual visit from the local fire department. They should become acquainted with every part of the facility and conduct employee training sessions. The fire department and all employees should know the locations of all landside electrical disconnects to the docks. Marina managers should be on good terms with the crew at the nearest firehouse. Invite them to run annual "dress rehearsals" at the marina.

Dress rehearsals by the San Diego Fire Department at the Marriott Hotel and Marina saved hundreds of boats in a 2006 fire; losses were limited to five boats destroyed and two boats damaged. A faulty electrical panel onboard one of the boats caused the fire.

EPMP documentation

Rigorous documentation is at the heart of the program. The system documents inspections, problems and the actions taken. A documented EPMP program ensures planned inspections or training occurs regularly.

The importance of documentation cannot be understated. It serves as a schedule of inspections, a checklist and a log of all observations, tests and actions taken. Real-time records are often decisive in the event of a lawsuit. A well-documented EPMP may also save on insurance costs.

Contractors

Staff can perform simple parts replacement with proper safety training,

EPMP Standard Operating Procedures and Best Practices

- Define a schedule of defined inspections
- Specify acceptable and unacceptable testing parameters
- Identify appropriate actions to take when problems occur, including a list of electrical contractors and electrical testing services on which to call
- Include references, all federal, state and local codes that apply
- Stay current and up-to-date when new codes go into effect (Read about the newest National Electrical Code (NEC) updates, in the following article on page 26.)

Regular inspections of the electrical system, even a simple dockwalk, will prevent dangerous situations like the one pictured here.

but when an EPMP program detects a problem that needs repair, marinas should have a qualified licensed "go-to" contractor that understands the marina's electrical system.

Contractors should be insured to work over water, under the United States Longshore and Harborworker's Compensation Act (USL&H), also known as the Merchant Marine Act of 1920 or referred to as the Jones Act. The federal worker's compensation law provides benefits for maritime employees in the event of injury or death.

This is not a small matter. Without this coverage, if an electrical worker gets hurt, the marina may be legally liable to pay for his injuries and lost wages. To be sure facilities are properly protected, seek the advice of an attorney and an insurance agent.

If marinas need assistance creating an EPMP for the first time, their local electrical contractor should help. A local NETA contractor can assist as well. Clearly, no matter how large or small the marina, planning an EPMP is well worth the time and investment, not to mention the peace of mind knowing that the marina's most maintenance-sensitive system is in good working order.

Boater education

All a marina's boaters should be involved or at least educated about electrical maintenance and safety. A boater with duct tape and access to a hardware store is capable of anything.

Marinas may think they have seen it all, but someone will always find a new way to abuse the electrical system. ⚓

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