STARK SAFETY
CONSULTANTS

ARC FLASH & ELECTRICAL SAFETY SERVICES

Are You In Compliance?

Electrical Safety Checklist

1) All persons who operate/maintain energized electrical equipment have been trained on both shock and arc flash hazards.

YES or NO

2) All persons who operate/maintain energized electrical equipment have access to proper personal protective equipment (PPE) to protect from both shock and arc flash hazards.

YES or NO

3) All persons who operate the power system have easy access to a current one-line diagram.

YES or NO

4) Written safety procedures and energized work permitting processes exist and are followed.

YES or NO

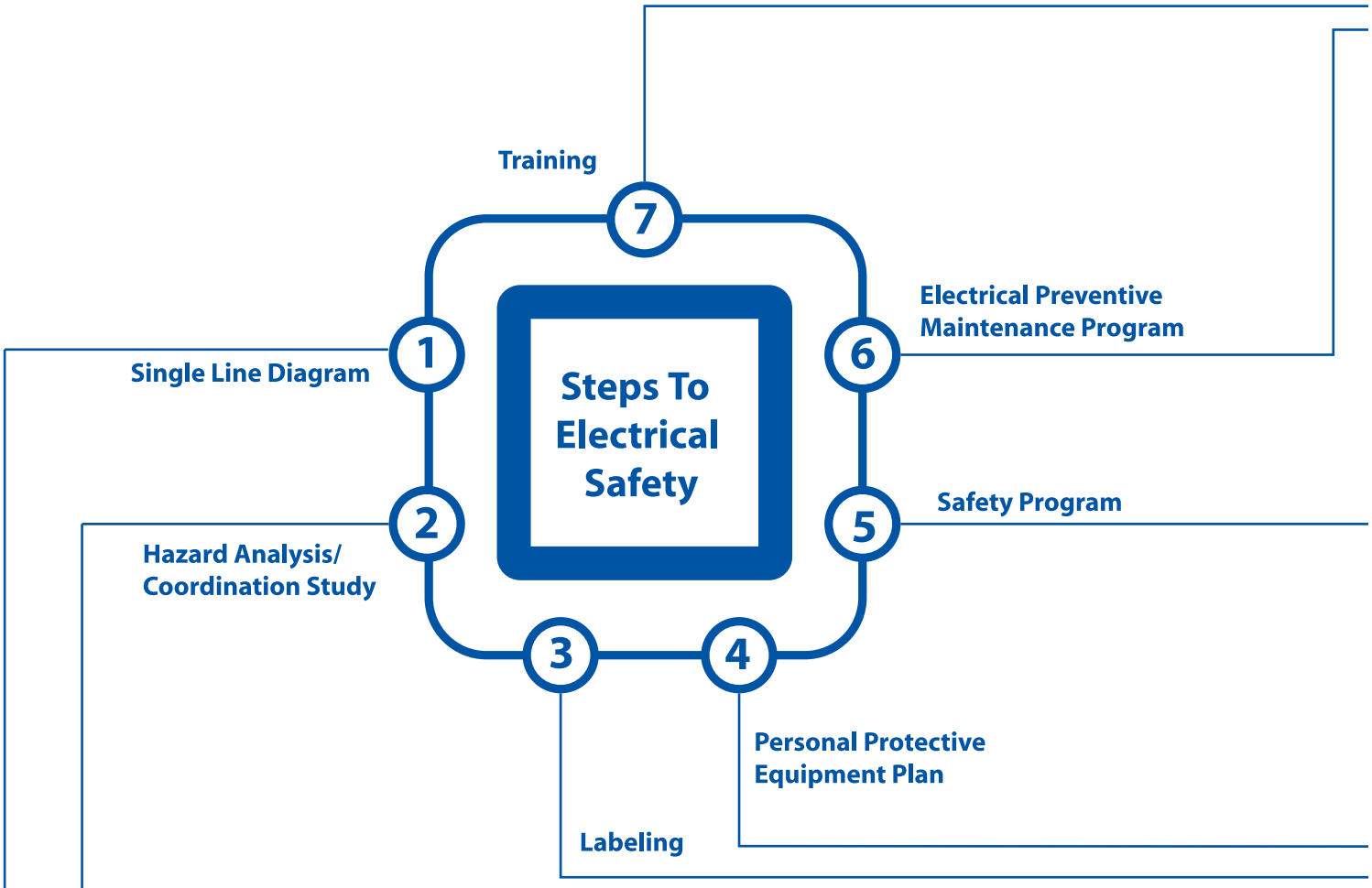
5) An arc flash analysis and coordination study has been completed for the electrical system, and reports and/or labels are available where needed.

YES or NO

If you answered no to any of these questions then your facility may not be in compliance with the current O.S.H.A. and N.F.P.A. 70E Regulations

Here's what Stark Safety Consultants can do to help...

STARK SAFETY
CONSULTANTS



There are many factors that can create an Arc Flash.

- Dropped tools
- Accidental contact with electrical systems
- Build up of conductive dust
- Corrosion
- Improper work procedures
- Equipment Failure

1 Single Line Diagram

NFPA 70 Article 205.2, 120.2(F)(1)(a) Updated and verified one-line diagram — An updated and accurate electrical one-line diagram is an essential ingredient for electrical safety. If workers do not have an accurate map of the system, they can be exposed to potential back feeds from alternate sources, energized capacitors, undocumented switching problem of not being able to accurately perform lock-out/tag-out procedures.

2 Hazard Analysis / Coordination Study

110.8(B)(1) Electrical Hazard Analysis

- If the live parts operating at 50 volts or more are not placed in an electrically safe work condition, other safety-related work practices shall be used to protect employees who might be exposed to the electrical hazards involved.
- Appropriate safety-related work practices shall be determined before any person approaches exposed live parts within the Limited Approach Boundary by using both shock hazard analysis and flash hazard analysis.

STARK SAFETY
CONSULTANTS

The Arc Flash Hazard Study will involve four phases:
1) Data gathering
2) Engineering analysis of the data
3) Report and one-line diagram presentation, PPE plan and labeling
4) Training

Of these four phases, only the engineering analysis is done offsite; the remainder of the process occurs within your plant.

Benefits of Performing an Arc Flash Hazard Analysis

- Ensures workers have the best possible PPE protection
- Reduces insurance premiums
- Provides up-to-date electrical system documentation through the creation of an accurate one-line diagram
- Identification of over-dutied equipment through an accurate system-wide short-circuit analysis
- Most importantly, reduces workplace injuries when recommended procedures are followed

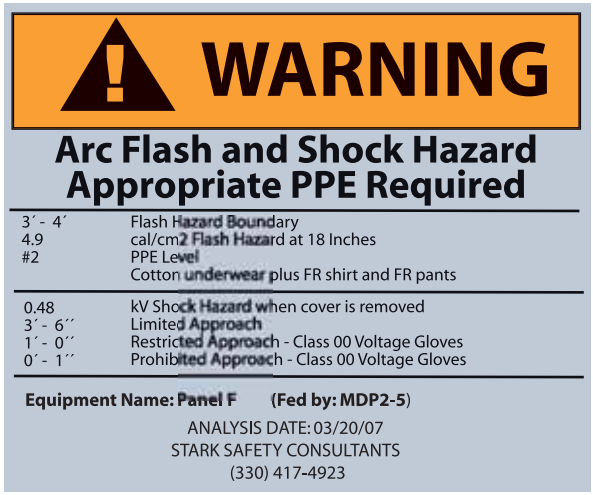
Cost of not performing an Arc Flash Hazard Analysis

- Non-compliance fines
- Lost productivity
- Damaged equipment and related repair expenses
- Medical claims from injured workers
- Legal costs
- Loss of life, there is no price for this.

3 Labeling

110.16 Flash Protection.
Switchboards, panel boards, industrial control panels, motor control centers and disconnect switches in other than dwelling occupancies, that are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before

What Data is required to be on the new arc flash warning labels?
Art. 110.16 (NEC) only requires that the label state the existence of an arch flash hazard.



NFPA 70E requires that hazards associated with live electrical parts be accessed by doing an arc flash analysis. Our labels provide the following information:
1) Flash Protection Boundary
2) Incident energy at 18" expressed in cal/cm²
3) PPE required
4) Voltage shock hazard
5) Limited shock approach boundary
6) Restricted shock approach boundary
7) Prohibited shock approach boundary
8) Equipment name and feeding device
9) Company contact information

4 Personal Protective Equipment Plan (PPE)

Anytime any part of your body crosses either the Restricted Approach Boundary or the Flash Protection Boundary, you must wear equipment to protect yourself from arc flash and shock. Protection must be head to toe.

STARK SAFETY
CONSULTANTS

Determining PPE Hazard Risk Category		
Category	Cal/cm²	Clothing
0	1.2	Untreated cotton
1	4	Flame retardant (FR) shirt and FR pants
2	8	Cotton underwear, FR shirt and FR pants
3	25	Cotton underwear, FR shirt, FR pants and FR coverall
4	40	Cotton underwear, FR shirt, FR pants and Double-layer switching coat and pants

5 Safety Program

Electrically Safe Work Practices Program

- Develops and documents electrically safe work practices
- Determines policies on electrically safe work conditions
- Produces electrically energized work permits
- Establishes PPE requirements inside shock boundaries
- Determines PPE clothing policy

Article 130.1-3 Electrical Safety Program & Energized Work Permits

This is the heart of NFPA 70E and worker safety. Without safety program principles, procedures, hazard/risk evaluations, work permits, and job briefings safety is relegated to a mere label with a PPE number. Workers are then left to fend for themselves "to get the job done" as many have done for years. Workers need to have a complete process/procedure to follow and have it regularly audited to address changing conditions. Only with the continued support and motivation from management will a real "culture" be established for electrical safety.

6 Electrical Preventive Maintenance Program

NFPA 70B - Recommended practice for Electrical Maintenance indicates that testing and maintenance of molded case circuit breakers be done every 6 months to 3 years.

- All arc flash calculations require the arc clearing time
- The clearing time is derived form the engineering coordination study based on what the protective devices are supposed to do.
- If maintenance and testing is not performed it could result in extended clearing times, unintentional time delays, open and shunted current transformers, open coils or dirty contacts.
- All of these factors could potentially cause the results of flash hazard analysis and the protection boundary to be inaccurate.

7 Training

Remember, your facility's safety is determined by your workforce's knowledge, training and attitudes about arc flash hazards.

The training should at least contain the following concepts:

- What electrical hazards are present in the workplace.
- How each electrical hazard affects body tissues.
- How to determine the degree of each hazard.
- How to avoid exposure to each hazard.
- How to minimize risk by body position.
- What PPE is needed for the employee to execute their work assignment.
- How to select and inspect PPE.
- What employer-provided procedures, including specific work practices, must be implemented by the employee.
- How to determine the Flash Protection Boundary and its relationship to the quantity of available energy.

For additional information and a complete list of services, visit us online.

www.StarkSafetyConsultants.com

STARK SAFETY
CONSULTANTS

Stark Safety Consultants
1935 Allen Ave. SE,
Canton, Ohio 44707
Phone: 1-866-923-7922
Fax: 1-330-452-2895
info@starksafetyconsultants.com

Member of:

NFPA MEMBER

NECA