

IMPLEMENTING  
NFPA 70E  
FOR  
ARC FLASH  
SAFETY

WWW.LEWELLYN.COM + 800.242.6673

# TODAY'S PRESENTER

**Lewellyn**  
TECHNOLOGY

**DARYN LEWELLYN**  
FOUNDER

IMPLEMENTING  
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SAFETY

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**“SOMETIMES THESE  
THINGS BLOW UP.”**

**BILL, 1984**

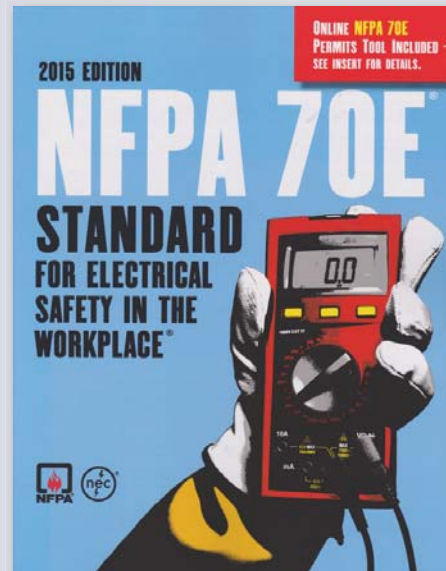


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# NFPA 70E

## STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE



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YOU **NEED** TO  
IMPLEMENT 70E.

**DON'T DO IT FOR  
COMPLIANCE.**

**DO IT TO**

**PREVENT INJURY.**

**IT'S **NOT** THE LAW...**

**AND THAT**

****DOESN'T** MATTER.**

# CULTURE CHANGE

**DO IT WHERE THE  
RUBBER MEETS  
THE ROAD.**

# CULTURE CHANGE

- **TIME-CONSUMING**
- **THROUGHOUT FACILITY**
- **CAN BE DIFFICULT**



# CULTURE CHANGE TIPS

• INVOLVEMENT OF KEY PEOPLE

• INSTRUCTOR'S "PASSION"

**ELECTRICALLY SAFE WORK CONDITION**

TURN  
IT OFF!





**ELECTRICALLY SAFE WORK CONDITION**

**DISCONNECTING AND  
VERIFYING ABSENCE OF VOLTAGE**

**HAZARDOUS  
WORK**

**QUALIFIED PERSON**

**•DOCUMENTED**

**•VERIFIABLE**

# TRAINING

LEWELLYN  
TECHNOLOGY  
HAS BEEN A  
TRAINING  
COMPANY FOR  
**20+** YEARS.



**TRAINING ALONE**  
**DOES NOT QUALIFY**  
**ANYONE TO DO**  
**ELECTRICAL WORK.**

**ONLY**

**THE EMPLOYER  
CAN DO THAT.**

# Hierarchy of Risk Control

• Elimination

• Substitution

• Engineering

• Awareness

• Administrative Controls

• PPE

Last Resort





# Arc Flash PPE?

**Task &  
Equipment  
Condition**

**IF**

Table 130.4(A) - Arc Flash Hazard Classification for Energizing Terminals and Switches (Normal CB Operation)

| Task  | Equipment Condition   | Arc Flash PPE Category |
|---|---|------------------------|
| Normal operation of a circuit breaker (CB), switch, contactor, or starter   | All of the following:<br>The equipment is properly installed<br>The equipment is properly maintained<br>All equipment doors are closed and secured<br>There is no evidence of impending failure | 1                      |
| One or more of the following:<br>The equipment is not properly installed<br>The equipment is not properly maintained<br>Equipment doors are open or not secured<br>There is evidence of impending failure | None of the following:<br>The equipment is properly installed<br>The equipment is properly maintained<br>Equipment doors are open or not secured<br>There is evidence of impending failure      | 2                      |
| Normal operation of a circuit breaker (CB), switch, contactor, or starter   | All of the following:<br>The equipment is properly installed<br>The equipment is properly maintained<br>All equipment doors are closed and secured<br>There is no evidence of impending failure | 1                      |
| One or more of the following:<br>The equipment is not properly installed<br>The equipment is not properly maintained<br>Equipment doors are open or not secured<br>There is evidence of impending failure | None of the following:<br>The equipment is properly installed<br>The equipment is properly maintained<br>Equipment doors are open or not secured<br>There is evidence of impending failure      | 2                      |

**WHAT**

Table 130.4(B) - Arc Flash PPE Categories for Energizing Terminals and Switches

| Arc Flash PPE Category | Arc Flash PPE Category |
|------------------------|------------------------|
| 1                      | 2                      |
| 3                      | 4                      |
| 5                      | 6                      |
| 7                      | 8                      |
| 9                      | 10                     |
| 11                     | 12                     |
| 13                     | 14                     |
| 15                     | 16                     |
| 17                     | 18                     |
| 19                     | 20                     |
| 21                     | 22                     |
| 23                     | 24                     |
| 25                     | 26                     |
| 27                     | 28                     |
| 29                     | 30                     |
| 31                     | 32                     |
| 33                     | 34                     |
| 35                     | 36                     |
| 37                     | 38                     |
| 39                     | 40                     |
| 41                     | 42                     |
| 43                     | 44                     |
| 45                     | 46                     |
| 47                     | 48                     |
| 49                     | 50                     |
| 51                     | 52                     |
| 53                     | 54                     |
| 55                     | 56                     |
| 57                     | 58                     |
| 59                     | 60                     |
| 61                     | 62                     |
| 63                     | 64                     |
| 65                     | 66                     |
| 67                     | 68                     |
| 69                     | 70                     |
| 71                     | 72                     |
| 73                     | 74                     |
| 75                     | 76                     |
| 77                     | 78                     |
| 79                     | 80                     |
| 81                     | 82                     |
| 83                     | 84                     |
| 85                     | 86                     |
| 87                     | 88                     |
| 89                     | 90                     |
| 91                     | 92                     |
| 93                     | 94                     |
| 95                     | 96                     |
| 97                     | 98                     |
| 99                     | 100                    |

**Equipment Type  
Voltage  
Current  
Clearing Time  
Working Distance**

**Task**

Normal operation of a circuit breaker (CB), switch, contactor, or starter

**Equipment Condition**

All of the following:  
**No**

- The equipment is properly installed*
- The equipment is properly maintained*
- All equipment doors are closed and secured*
- All equipment covers are in place and secured*
- There is no evidence of impending failure*

# Arc Flash PPE?

One or more of the following:  
**Yes**

- The equipment is not properly installed*
- The equipment is not properly maintained*
- Equipment doors are open or not secured*
- Equipment covers are off or not secured*
- There is evidence of impending failure*

Arc Flash PPE Category

Arc-Flash Boundary

**Equipment**

2

900 mm  
(3 ft)

Panelboards or other  
equipment rated >240  
V and up to 600 V

*Parameters: Maximum  
of 25 kA short-circuit  
current available;  
maximum of 0.03 sec  
(2 cycles) fault  
clearing time; working  
distance 455 mm (18  
in.)*

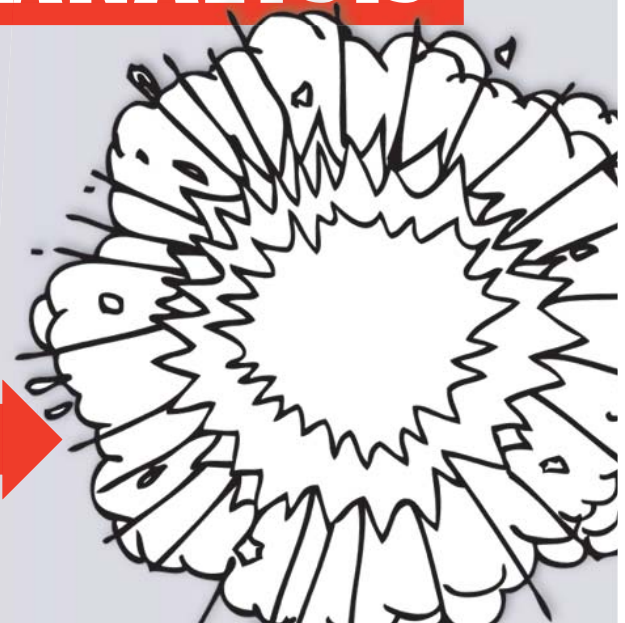
# PPE Category & Boundary?

## ARC FLASH ANALYSIS

- A HAZARD ANALYSIS
- NOT AN ELECTRICAL ENGINEERING STUDY



**SPARK** OR **EXPLOSION**



# ARC FLASH ANALYSIS

**THE PRIMARY GOAL OF AN ARC FLASH HAZARD ANALYSIS SHOULD BE TO IDENTIFY THE HAZARDS AND THEN ENGINEER THEM OUT OF YOUR SYSTEM.**



**ENGINEER**

**THE HAZARDS  
OUT OF YOUR SYSTEM**

# ARC FLASH ANALYSIS

- **DATA COLLECTION - BOOTS ON THE GROUND**
- **ENGINEERING - SOLUTIONS FOUND**
- **DELIVERY - REPORT PRESENTED, LABELS AFFIXED**

# DATA COLLECTION

- **TRANSFORMER DATA - KVA, VOLTAGES, IMPEDANCE**
- **CONDUCTOR SIZES AND LENGTHS**
- **FUSE AND CIRCUIT BREAKER DATA**
- **ELECTRIC UTILITY INFORMATION**
- **DEVELOP ACCURATE ONE-LINE DIAGRAMS**

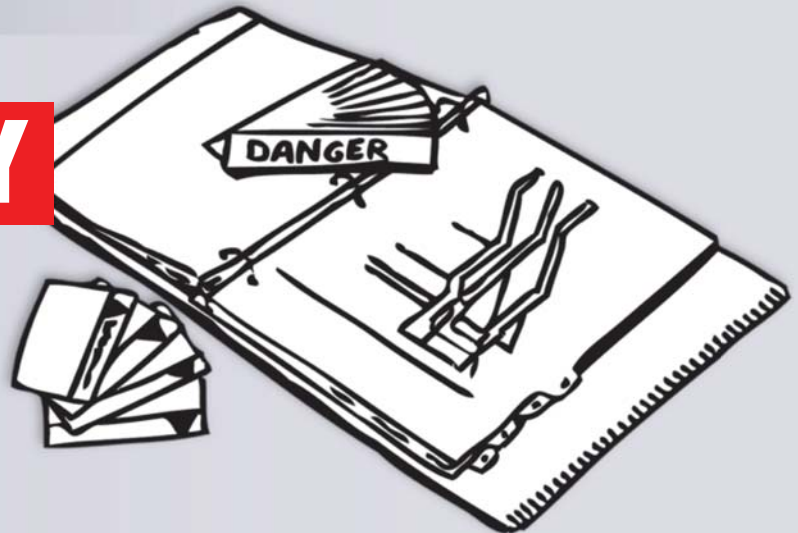
# ENGINEERING PHASE

- **SHORT-CIRCUIT ANALYSIS**
- **PROTECTIVE DEVICE COORDINATION ANALYSIS**
- **INTERRUPTING RATING ANALYSIS**
- **ARC FLASH HAZARD ANALYSIS**
- **MITIGATION RECOMMENDATIONS**

**SOLUTIONS**

# DELIVERY

- **REPORT EXPLAINED**
- **LABELS AFFIXED**
- **MITIGATION RECOMMENDATIONS CATEGORIZED**



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