

# Instructor/Participant Guide



209: Escalator: Electrical Systems

*Module 1: General Electrical Safety Procedures*

# General Electrical Safety Procedures



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PREVIEW ONLY



## Icons Used in This Guide

Throughout the Instructor's Guide, the following icons indicate the type of content being presented.



**Refer To**



**PowerPoint**



**Multimedia**



**Web based  
Training**



**Write**



**Ask**



**Individual Activity**



**Small Group  
Activity**



**Classroom  
Activity**



**Duration**

## Agenda

Topic No.	Topic Title	Duration
1	Introduction	5 minutes
2	Safety Oversight Resources	15 minutes
3	Electrical Safety	20 minutes
4	Physiological Effects of Electrical Energy <ul style="list-style-type: none"> <li>• Electrocutation</li> <li>• Electric Shock</li> <li>• Burns</li> <li>• Effects of 50HZ AC Currents</li> </ul>	20 minutes
5	Reducing Occupational Hazards <ul style="list-style-type: none"> <li>• Determining Boundary Levels</li> </ul>	20 minutes
6	Safe Practices <ul style="list-style-type: none"> <li>• Lockout/Tagout</li> <li>• Electrical Cords and Equipment</li> </ul>	20 minutes
7	Emergency Response	15 minutes
8	Summary	5 minutes
<b>Total Time:</b>		<b>2 hours</b>



### Overview

<b>Purpose</b>	The purpose of this module is to:	<b>Preparation</b>	<b>PREPARE</b> flip charts with the following titles:
	<ul style="list-style-type: none"><li>• Introduce participants to general electrical safety procedures.</li></ul>		<ul style="list-style-type: none"><li>• Class Expectations</li></ul>
<b>Objectives</b>	At the end of this chapter, the learner will be able to:		
	<ul style="list-style-type: none"><li>• Identify General Safety Procedures</li><li>• Relate Safe Work Practices to Escalator Maintenance</li></ul>		
<b>Materials</b>	Make sure you have the following:		
	<ul style="list-style-type: none"><li>• Laptop (one for leader)</li><li>• Participant Guides</li><li>• PowerPoint slide deck</li><li>• LCD projector</li><li>• A17.1 Safety Code for Elevators and Escalators</li><li>• A17.2 Guide for Inspection of Elevators, Escalators and Moving Sidewalks</li><li>• A17.3 Safety Code for Existing Elevators and Escalators</li><li>• Heavy Duty Transportation System Elevator Design Guidelines (APTA RT-RP-FS 008-03)</li><li>• Heavy Duty Transportation System Escalator Design Guidelines (APTA RT-RP-FS 007-02)</li><li>• Field Employees' Safety Handbook</li><li>• Transit Agency Handbook</li></ul>		




## Instructor's Notes

General Electrical Safety Procedures

### Safety Oversight Resources

- National Fire Protection Association
- Occupational Safety and Health Administration
- American Society of Mechanical Engineers




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General Electrical Safety Procedures


### Publications

- National Electrical Code
- Elevator Industry Field Employee's Safety Handbook




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**Slide 3**



**REVIEW** the safety oversight resources and publications.

**Slide 4**



**ASK** the participants to list the purpose of each of the organizations described on the page.

## Safety Oversight Resources

List the purpose of each organization below.

### National Fire Protection Association

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### Occupational Safety and Health Administration

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### American Society of Mechanical Engineers

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### Instructor's Notes

#### General Electrical Safety Procedures

##### Electrocution

- Electrocution is a fatality resulting from an individual being exposed to a lethal amount of electrical energy.
- The human body becomes part of an active electrical circuit having a current capable of over stimulating the nervous system and/or causing damage to internal organs.

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#### General Electrical Safety Procedures

##### Electrical Shock

###### Occurs from:

- Direct contact with electrical energy.
- Flame burns from ignition of clothing.
- Injuries from Arc Flash
  - May result in an explosion known as an Arc Blast.



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#### Slide 7

#### Slide 8



**REVIEW** slides 7 and 8 and review electrocution and electrical shock.

An Electrical Foreman with over 20 years' experience was working on a high-voltage circuit that he thought was de-energized. Unfortunately, he had de-energized the wrong circuit. He was thrown back by an arc flash/blast and received burns to his arm, neck, and face.



**ASK** participants to define Arc Flash and Arc Blast.

### Electrocution

Define the following:

#### Arc Flash

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#### Arc Blast

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## Instructor's Notes


General Electrical Safety Procedures

### Effects of 60 HZ AC Currents


- 1mA – Sensation Threshold
- 16mA – Cannot Let Go
- 20mA – Muscular Paralysis
- 50-60mA – Death
- 100mA – Ventricular Fibrillation Threshold
- 2Amps – Cardiac Standstill and Internal Organ Damage

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**Slide 12**

 **REVIEW** slide 12 and review the types of burns and how they are caused.

**APPLICATION FEEDBACK:** now that we have discussed a little about the preventive maintenance procedures, have the participants answer the following question.

 **ASK:** What can occur with electrocution over 50mA?

## Effects of 60 HZ AC Current

*At what current do the following effects occur?*

**Sensation Threshold**

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**Cannot Let Go**

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**Muscular Paralysis**

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**Possible Death**

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**Ventricular Fibrillation Threshold**

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**Cardiac Standstill**

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## Instructor's Notes

**Determining Boundary Level**

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**Safe Practices**

Removing Power:

- Securing a circuit, device, or system in this condition is commonly known as placing it in a de-energized or **zero energy state**.

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Slide 15

Slide 16



**REVIEW** slides 15 and 16 and describe how to determine an appropriate boundary level. Describe some safe practices to display during electrical work.

**CONTENT:** Direct participants to describe in their own words how to properly determine boundary levels.

**APPLICATION FEEDBACK:** Now that we have discussed a little about reducing occupational hazards, have the participants respond to the following topic.



**ASK** the participants to define the boundary levels.

## Determining Boundary Level

Define the following boundary levels.

### Limited Approach Boundary

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### Restricted Approach Boundary

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### Flash Protection Boundary

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### Prohibited (Shock) Boundary

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## Electrical Cords and Equipment

## General Electrical Safety Procedures

## Electrical Cords and Equipment

### Basic Rules:

- Should be free of loops and kinks when in use and shall be properly stored after use.
- Should be covered or elevated to protect them from physical damage when passing through work areas, walkways, or passageways
- Worn, frayed or defective electrical cords should not be used and must be recycled
- Employees should disconnect receptacle plugs by grasping the plug and not pulling the cord

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## Slide 19



**REVIEW** slide 19 and review the basic rules of using electrical cords and equipment.

**APPLICATION FEEDBACK:** now that we have discussed a little about safe practices, have the participants answer the following question.



**ASK** the participants to describe how to properly disconnect receptacle plugs.

*How do you properly disconnect receptacle plugs?*

ONLY



### Instructor's Notes

### Summary

General Electrical Safety Procedures

#### Summary

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#### Slide 22



**REVIEW** and summarize the module.

**EVALUATION and CLOSURE:** Recap the main points of the module before moving on to the next topic within this course.



**ASK** the participants if they have any outstanding questions regarding what was presented.