

Hands-on Learning Exercise Templates

The following packet holds the templates and instructions for the BEB Familiarization Course Hands-On learning exercises 2D and 2E.

At the end of the packet there is also a template for Hands-on assessments form that can be used as needed to assess a participant's progress through the exercises.

With the group, demonstrate the function/use and proper method for using the appropriate items of personal protective equipment [PPE].

Below you will find a packet of several hands-on activities and exercises you can run with the class should you have the time and equipment for them.

The images below are examples of the PPE you will need to perform inspection, maintenance and troubleshooting as a battery electric bus technician. There will also be a table breakdown of the NFPA category ratings for arc-rated PPE that will be needed to perform any work on a BEB.



Hands-on Learning Exercise Templates

Topic:	2D - PPE Application and Inspection Demonstration		
Hands on Learning Objective(s):			
Courseware Reference:			
Preparation: A set of at least 2 PPE is required, with one set having an item (preferably gloves) with a known defect			
Tools, Equipment and Materials Required (including PPEs): Rubber gloves, Leather gloves/overlays, hard hat, safety glasses, electrical hazard [EH] rated shoes or boots, arc-flash suit, balaclava			
Instructional Method			
<input type="checkbox"/>	Role Play	<input checked="" type="checkbox"/>	Demonstration
<input type="checkbox"/>	Drills	<input type="checkbox"/>	Simulations
<input type="checkbox"/>		<input type="checkbox"/>	Critical Incident
<input type="checkbox"/>		<input type="checkbox"/>	Case Study
Application Feedback Level			
<input checked="" type="checkbox"/>	Full Class	<input type="checkbox"/>	Small Group
<input type="checkbox"/>		<input type="checkbox"/>	Individual
<p>The Instructor will perform the following task lists and then ask participants to perform the tasks. Task Steps:</p> <ol style="list-style-type: none"> 1. Display the PPE to participants 2. Identify each individual piece as you point to it or highlight that item 3. For the gloves, demonstrate the following examination procedures: <ol style="list-style-type: none"> a. "Blow and fold" technique b. Glove inflator use [if possible] 4. Once you have reviewed the inspection methods for glove safety testing and covered the full PPE set, begin demonstration of putting on each item individually <ol style="list-style-type: none"> a. Rubber Gloves/Leather glove overlays b. Safety Glasses c. EH rated safety shoes d. Hard Hat with arc-rated shield e. Arc-flash suit f. Balaclava 			

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5. Once you have introduced and demonstrated the ways to put on and inspect the PPE, have a participant come up and practice the same exercise they just observed.
 - a. Preferably each participant will get to practice with each item
 - b. During the participant portion, have them perform an inspection test on the PPE item with a known defect and relay the information back to the full group.
6. After participants have had the opportunity to practice the PPE application and inspection, return PPE to storage and move on to section 2-4 in Participant Guide.

Maximum Time Allowed:

Up to 2 minutes per person

Other Notes: It may benefit to have the other PPE set item should have a known defect. As you show how to put on the PPE and the safety testing, recall or clarify that known defect check when demonstrating. Then when participants are performing the PPE inspection(s) they can identify and call out the known defect

You may add the optional activity below to supplement when going over glove inspection:

Learning Application- Video Review

Use the link provided for additional context on glove inspection:

<https://www.youtube.com/watch?v=AnfTcccmFS4>

After watching the video, answer the following questions and check in with your instructor.

1. What happened when an energized source was placed near the glove?
2. What was the process(es) by which the man visually inspected the insulated gloves?
3. What are two ways to perform the inflation test?

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	Category 1: Minimum Arc Rating of 4 cal/cm2	Category 2: Minimum Arc Rating of 8 cal/cm2	Category 3: Minimum Arc Rating of 25 cal/cm2	Category 4: Minimum Arc Rating of 40 cal/cm2
Arc Rated Required Clothing; includes shock hazard PPE	AR Long Sleeve Shirt and Pants or AR Coverall	AR Long Sleeve Shirt and Pants or AR Coverall	AR Flash Suit Jacket and Pants or AR Coverall	AR Flash Suit Jacket and Pants or AR Coverall
Required AR Face and Head Protection; includes shock hazard PPE	Face Shield or Arc Flash Suit Hood	AR Flash Suit Hood or AR Face Shield and Balaclava with minimum arc rating of 8 cal/cm2	AR Flash Suit Hood	AR Flash Suit Hood
Required AR Hand Protection; includes shock hazard PPE	Leather glove/overlay	Leather glove/overlay	Rubber insulating gloves and leather protectors or AR gloves	Rubber insulating gloves and leather protectors or AR gloves
As Needed	AR Jacket, Rainwear, Parka, Hard Hat Liner	AR Jacket, Rainwear, Parka, Hard Hat Liner	AR Jacket, Rainwear, Parka, Hard Hat Liner	AR Jacket, Rainwear, Parka, Hard Hat Liner

Hands-on Learning Exercise Templates

Topic:	2E - Voltage Meter Test Demonstration	
Hands on Learning Objective(s):	Identify typical PPE involved with BEB maintenance under NFPA70E category ratings; Recall the primary functions of each PPE introduced Recall the procedures for testing and inspecting HV gloves	
Courseware Reference:	Pages 74-78	
Preparation: Obtain a working multimeter that turns on and has the appropriate measurement categories, making sure test leads are working and batteries are working. Find and utilize an accessible low voltage AC and DC circuits within the training area.		
Tools, Equipment and Materials Required (including PPEs): A working and known functional meter/multimeter tested on a known, good voltage source; a low voltage [LV] circuit which to test with		
Instructional Method		
<input type="checkbox"/> Role Play	<input checked="" type="checkbox"/> Demonstration	<input type="checkbox"/> Critical Incident
<input type="checkbox"/> Drills	<input type="checkbox"/> Simulations	<input type="checkbox"/> Case Study
Application Feedback Level		
<input checked="" type="checkbox"/> Full Class	<input type="checkbox"/> Small Group	<input type="checkbox"/> Individual
The Instructor will perform the following task lists and then ask participants to perform the tasks. Task Steps:		
<ol style="list-style-type: none"> 1. Turn the multimeter on and move the dial to the correct measurement settings (AC for AC circuits, DC reading for DC circuits, etc.) 2. Test a known good DC voltage circuit 3. Next set the meter to AC setting on the meter 4. Take a measurement of a known good AC voltage circuit (e.g. 120-volt AC outlet) 5. Remove the test leads and turn the meter off 		
Maximum Time Allowed:	<u><i>Up to 2 minutes per person</i></u>	
Other Notes: Variances of voltage range and tolerance measurements are expected		

Hands-on Learning Exercise Templates

Hands-on Learning Assessment Form Template

Participant Name			
Date of Assessment			
Topic:			
Hands on Learning Objective(s):			
Courseware Reference:			
Task Steps		S	U
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Comments:			

