Instructor Guide

218: Elevator: Hydraulic Elevator
Module 4: Hoistway
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## Agenda

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<th>Duration</th>
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<tr>
<td>1</td>
<td>Overview</td>
<td>20 minutes</td>
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<tr>
<td>2</td>
<td>Hoistway</td>
<td>20 minutes</td>
</tr>
<tr>
<td>3</td>
<td>Hoistway Overhead Components</td>
<td>40 minutes</td>
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<tr>
<td>4</td>
<td>Length of Hoistway Components</td>
<td>50 minutes</td>
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<td>5</td>
<td>Pit Area Components</td>
<td>45 minutes</td>
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<td>6</td>
<td>Car Components</td>
<td>15 Minutes</td>
</tr>
<tr>
<td>7</td>
<td>Common Issues</td>
<td>60 minutes</td>
</tr>
<tr>
<td>8</td>
<td>Summary</td>
<td>30 Minutes</td>
</tr>
<tr>
<td>9</td>
<td>Field Trips (Four)</td>
<td>200 Minutes</td>
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<tr>
<td></td>
<td><strong>Total Time:</strong></td>
<td><strong>480 Minutes</strong></td>
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Overview

Purpose
The purpose of this module is to:
• The purpose of this unit is to explain and discuss the principles Hydraulic Elevator Operations. The key concepts discussed will aid the trainee in their future applications of elevator concepts and terminology.

Objectives
At the end of this lesson, the transit elevator/escalator trainee will be able to:
• Identify areas and associated components of the hoistway
• List common areas in the hoistway which would require repair or replacement

Materials
Mandatory
Make sure you have the following
• PowerPoint Presentation
• Course book
• Quizzes
• Pencils
• Paper
• Elevator's 101
• “Common Issues Worksheet” in Course book for authority specific notes

Optional
You may also want the following for optional activities:
• Chalk board with chalk, large paper with marker, etc.
• Internet connection
• Lab, simulator or out of service elevator
• ASME A17.1 Code Book
• Elevator Industry Field Employees’ Safety Handbook
## Elevator – Hydraulic Hoistways

### Instructor’s Guide

Module Length: 480 min       Time remaining: 480 min       This section: 20 min (7 slides)       Section start time:       Section End Time: 

<table>
<thead>
<tr>
<th>DO</th>
<th>SAY</th>
<th>Materials Needed</th>
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<tbody>
<tr>
<td>REVIEW module objectives</td>
<td><strong>In your own words:</strong> Today we will look at the principles of operation for hydraulic elevators. In doing so, we will… -Identify areas and associated components of the hoistway and -List common areas in the hoistway which would require repair or replacement <strong>Advance.</strong></td>
<td>✓ PPT slide 3</td>
</tr>
</tbody>
</table>
Instructor’s Notes

In your own words:
We have looked at some of the major components in a hydraulic elevator system in course 213, and some of the major components associated with the operation of the hydraulic elevator system.

*Advance.*

Lets start this module by looking at the components in the hoistway you will need to know.

*Advance.*
In your own words:
The construction of a hydraulic hoistway will typically include ventilation, sliding hoistway doors, pit access ladder, pit stop switch, pit drain or sump pump, pit and/or hoistway lighting, buffers, guide rails, sensors mounted in the shaft to relay information to the controller concerning the position of the car within the hoistway, and a fire detection system which include sprinkler heads and smoke and heat detectors. *Advance. Advance.*

In a roped hydraulic system, there are *Advance.* counterweights and hoisting ropes which are components also found in traction elevators (more on roped hydraulics in the traction elevator course). *Advance.*
## Elevator – Hydraulic Hoistways

### Instructor’s Guide

<table>
<thead>
<tr>
<th>DO</th>
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<tbody>
<tr>
<td>REVIEW slides</td>
<td>In your own words: Components found in the hoistway overhead of hydraulic transit elevators include: Hoistway Vents, Limit Switches, Sprinkler Head, Smoke Detector, Heat Detector, Refuge Space, and the Runby Area. Advance.</td>
<td>✓ PPT slides 15, 16</td>
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### Instructor’s Notes

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### Elevator – Hydraulic Hoistways

**Instructor’s Guide**

**Module Length:** 480 min  
**Time remaining:** 440 min  
**This section:** 40 min (15 slides)  
**Section start time:**  
**Section End Time:**

<table>
<thead>
<tr>
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</table>
| REVIEW slide | **In your own words:**  
Typically in a hydraulic elevator system there are three limit switches located in the hoistway overhead and pit area: terminal slow down, normal, and final.  

**Advance.** The terminal slow down limit switch signals the controller that the car is reaching the end of the hoistway.  
**Advance.** If the elevator overshoots the landing in the up direction, the normal limit is engaged and removes power to the elevator.  
**Advance.** If the elevator overshoots the last floor level in either the upward or downward direction, the final limit switch is engaged. The final limit removes power to the controller board.  
**Advance.** | ✓ PPT slide 18 |

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**Instructor’s Notes**

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### DO

- REVIEW slides

### SAY

**In your own words:**

Also required by ASME code *Advance.* are minimal distances for the runby areas (top and bottom) of the hoistway. *Advance.* The bottom runby is that area that is between the car buffer striker plate and the striking surface of the car buffer when the car floor is level with the bottom terminal landing. *Advance.* The top runby in a direct-plunger hydraulic elevator is that area the elevator car can run above its top terminal landing before the plunger strikes its mechanical stop. *Advance.*

Here is a diagram showing the refuge and runby space areas. Other components we have looked at are also shown here and highlighted. *Point out other components to participants.* *Advance.*

### Materials Needed

- PPT slides 24, 25
### Elevator – Hydraulic Hoistways

**Instructor’s Guide**

Module Length: 480 min  Time remaining: 440 min  This section: 40 min (15 slides)  

<table>
<thead>
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</table>
| ASK | In your own words:  
   Code required space on top of car enclosure allowing for technicians to work on top of car is known as a refuge area and must be ___ inches from top of car to closest obstruction in hoistway when elevator is at upper extreme of travel.  
   a. 30  
   b. 43  
   c. 50  
   Call on participants for answer.  
   Advance for correct answer.  
   Answer: b.  
   Advance. | ✓ PPT slide 28 |

**Instructor’s Notes**

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In your own words:

Guide rails and rail brackets *Advance* also run the length of the hoistway. *Advance*. Guide rails function as vertical tracks to direct the course of travel of an elevator up and down the hoistway. *Advance*. They are constructed of long lengths of steel, which are T-shaped with the running surface machined on three sides. *Advance*. Their size and design are directly related to the speed and weight capacity of the elevator. *Advance*.

Here is a selector tape, guide rails and rail brackets at the top of the hoistway as well as a Guide rail and brackets by Hollister Whitney. *Advance*. 

<table>
<thead>
<tr>
<th><strong>DO</strong></th>
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<th><strong>Materials Needed</strong></th>
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</thead>
<tbody>
<tr>
<td>REVIEW slides</td>
<td>In your own words: Guide rails and rail brackets <em>Advance</em>. also run the length of the hoistway. <em>Advance</em>. Guide rails function as vertical tracks to direct the course of travel of an elevator up and down the hoistway. <em>Advance</em>. They are constructed of long lengths of steel, which are T-shaped with the running surface machined on three sides. <em>Advance</em>. Their size and design are directly related to the speed and weight capacity of the elevator. <em>Advance</em>. Here is a selector tape, guide rails and rail brackets at the top of the hoistway as well as a Guide rail and brackets by Hollister Whitney. <em>Advance</em>.</td>
<td>✓ PPT slides 33, 34</td>
</tr>
</tbody>
</table>
### DO
- REVIEW slide

### SAY
**In your own words:**

In some places two sections of guide rail may be joined together. The rails are milled with a tongue and groove that accepts the sections of rail and provides a stable seamless surface for the roller to ride over. This is known as a connecting plate also known as a "fish plate."

**Advance.**

### Materials Needed
- ✓ PPT slide 35

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**Instructor’s Notes**

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### Instructor’s Notes

- Located in the length of the hoistway is the hoistway fascia plate. These are normally provided to maintain clearances at the lower and upper ends of the hoistway. ASME A17.1 provides that these clearance measurements should be taken at the following hoistway locations:
  - **Advance.** At the lower end of the hoistway, the specified clearance must be maintained to the location of the car sill when the car is resting on its fully compressed buffer.
  - **Advance.** At the upper end of the hoistway, the clearance must be maintained to the location of the car sill when it has reached its maximum upward travel.

### Materials Needed

- **DO**
  - REVIEW slide

- **SAY**
  - In your own words:
    Located in the length of the hoistway is the hoistway fascia plate. These are normally provided to maintain clearances at the lower and upper ends of the hoistway. ASME A17.1 provides that these clearance measurements should be taken at the following hoistway locations:
    - **Advance.** At the lower end of the hoistway, the specified clearance must be maintained to the location of the car sill when the car is resting on its fully compressed buffer.
    - **Advance.** At the upper end of the hoistway, the clearance must be maintained to the location of the car sill when it has reached its maximum upward travel.

- **SAY**
  - **PPT slide 40**

### Length of Hoistway Components

- **Hoistway Fascia Plate**
  - Lower end – clearance at location of car sill when car is resting on fully compressed buffer.
  - Upper end – clearance at location of car sill when it has reached maximum upward travel.
### Elevator – Hydraulic Hoistways

#### Instructor’s Guide

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<thead>
<tr>
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<tbody>
<tr>
<td>REVIEW slides</td>
<td><strong>In your own words:</strong> The most obvious component in the pit is the jack – <strong>Advance.</strong> made up of a cylinder and piston. <strong>Advance.</strong> It is the jack that pushes the car up as hydraulic pressure increases and lowers the car as hydraulic pressure decreases. Because transit elevators are often exposed to weather elements, water can collect in the elevator pit <strong>Advance.</strong> and a sump pump is necessary to remove this excess water. <strong>Advance.</strong> A sump pump is an automatic water pump powered by an electric motor for the removal of drainage, <strong>Advance.</strong> except raw sewage, from the pit area. <strong>Advance.</strong> Here is a photo showing the jack and sump pump in a WMATA system. <strong>Advance.</strong></td>
<td>✓ PPT slides 53, 54</td>
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</table>

**Instructor’s Notes**

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**Pit Area Components**

- **JACK**
  - Made up of cylinder and piston
  - Pushes the car up as hydraulic pressure increases; lowers car as hydraulic pressure decreases

- **SUMP PUMP**
  - Automatic water pump for the removal of drainage
  - Programmable to operate during pump or drainage events

**Transit Elevator/Escalator Consortium**
**Elevator – Hydraulic Hoistways**

Instructor’s Guide

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</table>
| REVIEW slide | **In your own words:**

Here are the components and their locations in the pit area of a hydraulic elevator system.

[Point out the components to participants.]

Advance. | **PPT slide 62**

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**Instructor’s Notes**

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In your own words:

Lets move on to our last objective. You will need to use the handout for notes for your specific authority information. For our last objective, we want to look at common areas in the hoistway which require maintenance or replacement. Advance.

Before we discuss any specific information, the one rule to always follow first when performing maintenance on transit elevators, remember to properly land the car. Advance.
**Elevator – Hydraulic Hoistways**

**Instructor’s Guide**

Module Length: 480 min  
Time remaining: 30 min  
This section: 30 minutes (4 slides)  
Section start time:  
Section End Time:  

<table>
<thead>
<tr>
<th>DO</th>
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</table>
| REVIEW slides | In your own words: *Read slide.*  
*For each objective, briefly review what was learned in this module or ask participants to share what they have learned for each learning objective and briefly discuss as a class.*  
Advocate.  
[Read slide. *Discuss definitions as a group.*]  
Advocate.  
[Read slide. *Discuss definitions as a group.*]  
Advocate.  
Read slide.  
Advocate. | ✓ PPT slides 81, 82 |

**Instructor’s Notes**

- In your own words: *Read slide.*  
*For each objective, briefly review what was learned in this module or ask participants to share what they have learned for each learning objective and briefly discuss as a class.*  
Advocate.  
[Read slide. *Discuss definitions as a group.*]  
Advocate.  
[Read slide. *Discuss definitions as a group.*]  
Advocate.  
Read slide.  
Advocate.
### Elevator – Hydraulic Hoistways

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<tbody>
<tr>
<td>In your own words:</td>
<td><strong>Administer quiz.</strong></td>
<td>✓ PPT slide 84</td>
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#### CLASSROOM ACTIVITY

**Instructor’s Notes**

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