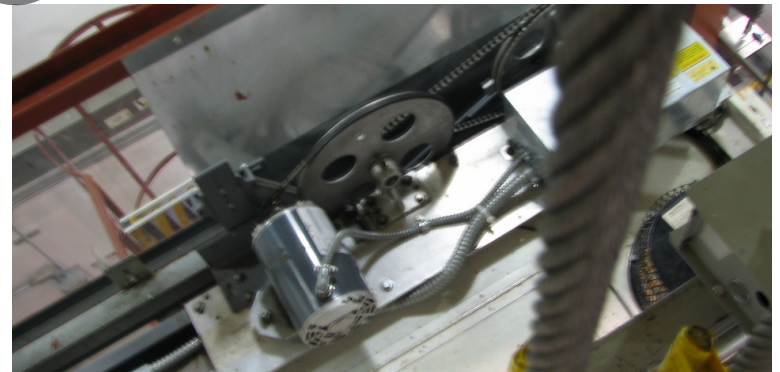
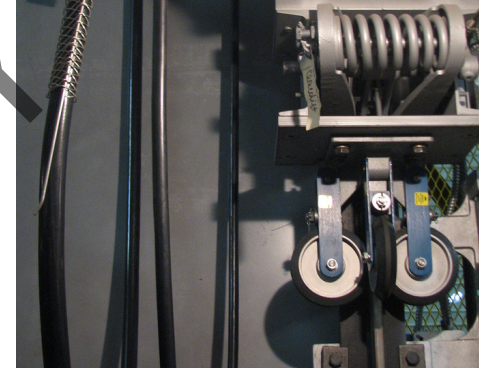


Instructor Guide



217: Elevator: Traction Elevator Module 5: Roping



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PREVIEW ONLY

Elevator – Electric Traction Roping

Instructor's Guide



Icons Used In This Guide



REVIEW slides



ASK



CLASSROOM ACTIVITY



SMALL GROUP ACTIVITY



INDIVIDUAL ACTIVITY



WRITE



Multimedia



REFER participants to

Agenda

Topic #	Topic Title	Duration
1	Overview	40 minutes
2	Roping Materials	40 minutes
3	Rope Handling	30 minutes
4	Rope Terminations	40 Minutes
5	Rope Maintenance	40 Minutes
6	Roped Hydraulic Systems	20 Minutes
7	Rope Installation	20 Minutes
8	Video	30 Minutes
9	Summary	50 Minutes
	Field Trips (Four Total)	200 Minutes
	Total Time:	420 Minutes

Elevator – Electric Traction Roping

Instructor's Guide



Overview

Purpose The purpose of this module is to:

- Provide the participant with a general knowledge and understanding of roping involved in Electric Traction and MRL 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:

- Describe roping materials, sizes and construction methods
- Discuss rope handling and safety procedures
- Discuss methods of terminating wire ropes
- Discuss proper techniques to maintain sheave ropes
- Discuss the construction methods for installation of roping
- Discuss roped hydraulic systems

Materials

Mandatory Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Pencils
- Paper
- Elevators 101, 2nd Edition
- Elevator Maintenance

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

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min

Time remaining: 480 min

This section: 40 min (19 slides)

Section start time: _____

Section End Time: _____

DO

SAY

Materials Needed



REVIEW introduction slides

In your own words:

Welcome to the module for electric traction and mrl elevators and roping.

Advance

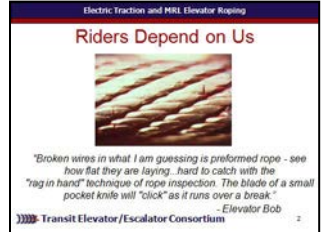
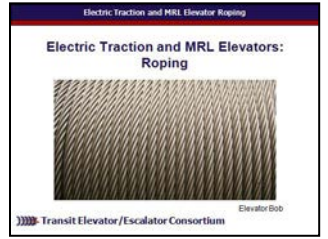
[Read quote.]

“Broken wires in what I am guessing is preformed rope - see how flat they are laying...hard to catch with the "rag in hand" technique of rope inspection. The blade of a small pocket knife will "click" as it runs over a break.”

Roping is a key part of an elevator system. The safety of this equipment plays a critical role in the safety of our riders

Advance

✓ PPT slides 1, 2



Instructor's Notes

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min

Time remaining: 480 min

This section: 40 min (19 slides)

Section start time: _____

Section End Time: _____

DO

SAY

Materials Needed



ASK participants what they remember about electric traction elevators



SMALL GROUP ACTIVITY



WRITE

Instructor's Notes

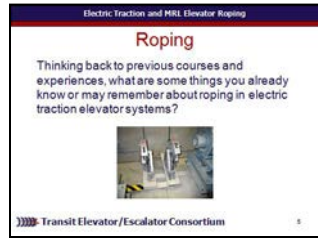
In your own words:

This course covers roping in more detail than was introduced in the earlier course on Elevator Principles of Operation (Course 213). While the focus will be on roping in electric traction elevator systems, roped hydraulic elevators will also be covered. Thinking back to previous courses and experiences, what are some things you already know or may remember about roping in electric traction elevator systems?

[Allow participants to think for a minute and perhaps discuss with a partner ideas as well as write down any ideas. Discuss participant responses and if possible list them on a chalk board or similar.]

Advance.

✓ PPT slide 5



Optional: Chalk board/chalk or white paper/marker

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min

Time remaining: 480 min

This section: 40 min (19 slides)

Section start time: _____

Section End Time: _____

DO

SAY

Materials Needed



REVIEW slide



REFER participants to Elevators 101 2nd Edition, Section 7.9 pages 66-68.

Instructor's Notes

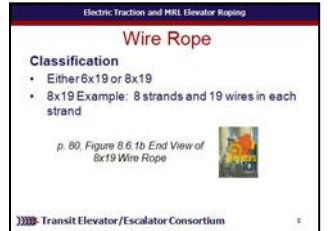
In your own words:

Elevator roping is either 6x19 or 8x19
For example, 8x19 means there are 8 strands and 19 wires in each strand.

[Direct participants to Elevators 101 2nd Edition Section 7.9 p. 80, Review Figure 8.6.1b End View of 8x19 Wire Rope] Advance.

The correct term for wire roping is **Wire Rope**.
For single strand wire rope on door operators, selectors, and applications other than suspension and governor service, the term typically used is **Aircraft Cable** or **Air Cord**
Advance.

✓ PPT slides 8, 9



✓ Elevators 101 2nd Edition

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 480 min This section: 40 min (19 slides) Section start time: _____ Section End Time: _____

DO



REVIEW slide



REFER participants to Elevators 101 2nd Edition, page 82.

Instructor's Notes

SAY

In your own words:
 Rose clips must be installed according to manufacturer instructions.
[Direct participants to Elevators 101 2nd Edition p. 82, Review Figure 8.7.6 Governor Rope Attached with Rope Clips.] Advance.

Materials Needed

✓ PPT slide 17



✓ Elevators 101 2nd Edition

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min

Time remaining: 440 min

This section: 40 min (18 slides)

Section start time: _____

Section End Time: _____

DO



REVIEW slides



REFER participants to Elevator Maintenance, page 66.

Instructor's Notes

SAY

In your own words:

With strand construction, different sizes are used to fill voids as much as possible.

Advance. 8x19 seale is very common in Elevators. **Advance.** And all ropes are 8x19 or 6x19 depending on number of strands, even if rope has more than 19 wires per strand.

Advance.

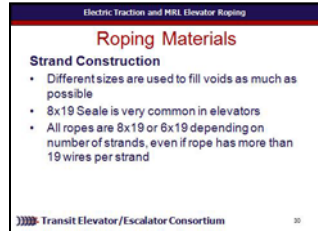
In terms of rope cross section, An eight-strand rope has larger fiber center. This increases Flexibility and puts more strands in contact with the sheave grooves and therefore improves traction.

[Direct participants to Elevator Maintenance, p. 65 Figure 2.3.9 Cross Section of Wire Rope.]

Advance.

Materials Needed

✓ PPT slides 30, 31



✓ Elevator Maintenance

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 350 min This section: 30 min (9 slides) Section start time: _____ Section End Time: _____

DO



REVIEW slides



REFER participants to Elevator Maintenance, page 75 - 77.

Instructor's Notes

SAY

In your own words:

Next we want to rope handling and safety procedures.

[Direct participants to Elevator Maintenance, p. 75 – 77 for this next section.]

Advance.

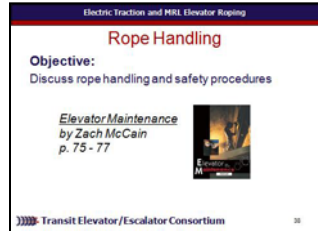
Advance. The storage life of elevator roping is limited. **Advance.** If stored too long, the lubricant dries out and the fiber core deteriorates. **Advance.** Wire rope must be protected from adverse conditions that will accelerate loss of lubricant and cause erosion

Advance. Wire rope for elevators should not be stored on floor, outside, etc.

Advance.

Materials Needed

✓ PPT slides 39, 40



✓ Elevator Maintenance

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 350 min This section: 30 min (9 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div> </div> <p>REVIEW slide</p> <div> </div> <p>REFER participants to <u>Elevator Maintenance</u>, page 77</p> <p>Instructor's Notes</p> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words:</p> <p>For cutting, Advance. Always with specific tool for that purpose. Advance. If that tool is not available, the only alternative is a sharp, cold chisel and a steel plate or anvil Advance. The cut should be square and if possible with only one hammer blow</p> <p><i>[Direct participants to Elevator Maintenance, p. 77 R Figure 2.3.17 Cutting Wire Rope with Chisel and Anvil.] Advance.</i></p>	<p>✓ PPT slide 45</p> <div> </div> <p>✓ <u>Elevator Maintenance</u></p>

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 350 min This section: 30 min (9 slides) Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed



ASK

In your own words:

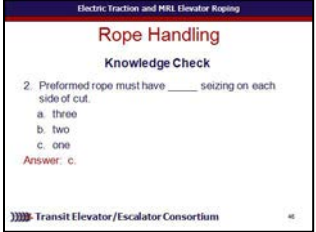
Preformed rope must have _____ seizing on each side of cut.

- a. three
- b. two
- c. one

**Call on participants for answer.
Advance for correct answer.**

**Answer: c.
Advance.**

✓PPT slide 47



Instructor's Notes

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 minutes Time remaining: 280 minutes This section: 50 minutes Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed



**CLASSROOM
ACTIVITY**

In your own words:
Okay, now it's time to see how this works in the real world. Please get your stuff together for a trip to the lab.

[At instructor's discretion, take time to visit the field and look for traction elevator roping termination examples and related information.]

Advance.

✓ PPT slide 55



Instructor's Notes

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 230 min This section: 40min (15 slides) Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed



REVIEW slide

In your own words:

Causes of unequal tension include:

- Broken equalizer springs
- Rope unwinding
- Unequal stretch in ropes
- Unequal seating depth in sheave grooves
- Damage to one or tow ropes by fretting corrosion or failure of fiber core
- Rope vibration
- Spring collar interference (rubbing)

Advance.

✓ PPT slide 58



Instructor's Notes

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 230 min This section: 40min (15 slides) Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed

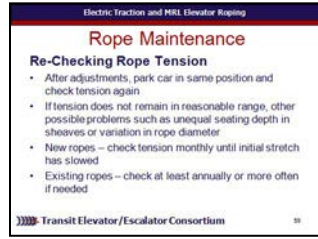


REVIEW slides

In your own words:

To re-check tension after adjustments, park car in same position and check tension again **Advance**. If tension does not remain in reasonable range, other possible problems such as unequal seating depth in sheaves or variation in rope diameter. **Advance**. New ropes should be check monthly until initial stretch has slowed **Advance**. And existing ropes should be checked at least annually or more often if needed **Advance**.

✓ PPT slides 61



Instructor's Notes

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 120 min This section: 20 min (6 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div> </div> <p>REVIEW slides</p> <div> </div> <p>REFER participants to <u>Elevator Maintenance</u>, page 83 - 86</p> <p>Instructor's Notes</p> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words:</p> <p>Next we want to discuss the installation methods for elevator roping.</p> <p>[Direct participants to Elevator Maintenance, p. 83 – 86 for the next set of slides.] Advance.</p> <p>Rope replacement is based on number of broken wires and other conditions . It is also part of the ASME A17.1 Code.</p> <p>[Direct participants to Elevator Maintenance, p. 83 Figure 2.3.22A Diameter Reduction Chart Measuring Rope Diameter.] Advance.</p>	<p>✓ PPT slides 75, 76</p> <div> </div> <div> </div> <p>✓ <u>Elevator Maintenance</u></p>

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 min Time remaining: 120 min This section: 20 min (6 slides) Section start time: _____ Section End Time: _____

DO	SAY	Materials Needed
<div> </div> <p>REVIEW slide</p> <div> </div> <p>REFER participants to <u>Elevator Maintenance</u>, page 84</p> <p>Instructor's Notes</p> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>In your own words:</p> <p>Unfavorable Conditions leading to broken wires include:</p> <ul style="list-style-type: none"> • Fretting corrosion (rouging) • Excessive wear of individual wires • Unequal tension • Poor sheave grooves • Other conditions that may increase rope wear <p>Advance.</p> <p><i>[Direct participants to Elevator Maintenance, p. 84 the number of broken wires allowed for Traction and Winding Drum .]</i> For these charts, upper limits may be used only if ropes are inspected monthly. If ropes are contaminated and wires not visible, they must be cleaned first</p> <p>Advance.</p>	<p>✓ PPT slides 78, 79</p> <div> </div> <div> </div> <p>✓ <u>Elevator Maintenance</u></p>

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 minutes Time remaining: 70 minutes This section: 50 minutes Section start time: _____ Section End Time: _____

DO

SAY

Materials Needed



**CLASSROOM
ACTIVITY**

In your own words:
Okay, now it's time to see how this works in the real world. Please get your stuff together for a trip to the lab.

[At instructor's discretion, take time to visit the field and look for traction elevator roping examples and related information.]

Advance.

✓ PPT slide 82



Instructor's Notes

Elevator – Electric Traction Roping

Instructor's Guide



Module Length: 480 minutes Time remaining: 20 minutes This section: 20 min (2 slides) Section start time: _____ Section End Time: _____

DO



REVIEW slides



ASK



**CLASSROOM
ACTIVITY**

Instructor's Notes

SAY

In your own words:

Administer quizzes.

Materials Needed

✓ PPT slides 84

