

Instructor/Participant Guide



212: Escalator-Inspection & Basic Maintenance

Module 8: Brakes



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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	Braking Distance <ul style="list-style-type: none"> • Safety Switches and Emergency Stops • Conditions of Braking System 	20 minutes
3	Drive Machine Brakes <ul style="list-style-type: none"> • Brake Coils and Plungers • Levers, Sleeves, Bushings and Pins • Brake Pads and Lining • Spring • Discs and Drums • Brake Switch • Control Boards and Contacts 	40 minutes
4	Main Drive Shaft Brakes <ul style="list-style-type: none"> • Mechanically Activated Brakes • Machine Safety Brake • Maintenance 	20 minutes
5	Summary	5 minutes
Total Time:		1.5 hours



Overview

Purpose

The purpose of this module is to:

- Introduce the participant to inspection and basic maintenance procedures involved in braking systems

Objectives

At the end of this chapter, the learner will be able to:

- Identify the areas of the braking system which require inspection
- List typical problems which would require repair or replacement
- Identify proper clearances and adjustments
- Perform visual inspection
- Perform needed adjustments and/or repairs

Materials

Make sure you have the following:

- Laptop (one for leader)
- Participant Guides
- PowerPoint slide deck
- LCD projector
- A17.1 Safety Code for Elevators and Escalators
- A17.2 Guide for Inspection of Elevators, Escalators and Moving Sidewalks
- A17.3 Safety Code for Existing Elevators and Escalators

- Heavy Duty Transportation System Escalator Design Guidelines (APTA RT-RP-FS 007-02)

- Field Employees' Safety Handbook
- Transit Agency Handbook

Preparation

PREPARE flip charts with the following titles:

- Class Expectations



Instructor's Notes

Escalator Specific: Brakes

Introduction

- Escalator brakes prevent unintended movement of the escalator.
- Transit escalators utilize a fail-safe system using mechanical or magnetic power to set the brake.
- This type of brake is called an escalator drive machine brake.
- Drive machine brakes are either drum or disc which is mechanically or magnetically applied to stop and hold the escalator drive machine.

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Slide 3



REVIEW a few details on the brake system.



ASK the participants to describe the purpose of brakes.

Brakes Introduction

What is the overarching purpose of the brakes?



Instructor's Notes

<p>Escalator Specific: Brakes</p> <h3>Drive Machine Brake</h3> <p>Introduction</p> <ul style="list-style-type: none">• Drive machine brakes use friction to stop the escalator.• When the brake coil or hydraulic thruster is energized, the pads are lifted from the brake drum/disc.• This allows the drive machine to operate freely.• When a safety switch is activated, power is removed from the coil/thruster the brake pads then grip the disc/drum providing a controlled stop.• The brake is designed and required by code to hold the machine and escalator with sufficient force to prevent unintended movement. <p>Transit Elevator/Escalator Consortium 9</p>	<p>Escalator Specific: Brakes</p> <h3>Drive Machine Brake</h3> <p>The following seven areas should be maintained to ensure proper operation:</p> <ul style="list-style-type: none">• Brake coils and plungers• Levers, sleeves, bushings and pins• Brake pads and lining• Springs• Discs and drums• Brake switch• Control boards and contacts <p>Note that other areas may need maintenance also!</p> <p>Transit Elevator/Escalator Consortium 11</p>
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Slide 9

Slide 11



REVIEW slides 9 through 11 to describe briefly the functions of the brake system.



ASK: what areas should be maintained to ensure proper operation?

Drive Machine Brake

What areas should be maintained to ensure proper operation?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____



Instructor's Notes

Escalator Specific: Brakes

Inspection and Maintenance

Levers, Sleeves, Bushings and Pins

- Levers, also known as arms, are attached to the plungers through the eyebolts and pivot pin.
- The lever mechanically lifts the brake shoes from the brake drum, allowing the machine to run unrestricted.
- During inspection, make sure the pins are installed correctly and/or the set screws are tight and lubricate the pins at the pivot points.
- Clean pins where the lever connects to the plunger and lubricate making sure the lever moves freely.
- Make sure sleeves and bushings are lubricated.

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Slide 14



REVIEW slide 14 and discuss how to correctly complete proper inspection of levers, sleeves, bushings and pins.



ASK where are the pins located?

Levers, Sleeves, Bushings, and Pins

Where are the pins located?

PREVIEW ONLY



Instructor's Notes

Escalator Specific: Brakes

Inspection and Maintenance

Springs

There are two types of springs in drive machine brakes:

- The **lever spring** is present in both disc and drum brakes.
- The **pressure plate spring** is only present in a disc brake.
- Visually inspect these springs looking for damage such as cracks and corrosion.
- Also check that the locking nut is securely locked to the set nut.

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Slide 16



REVIEW slide 16 and discuss the differences between lever springs and pressure plate springs. Also discuss the proper inspection of each.



ASK *What are the differences between the two springs listed?*

Springs

What are the differences between the two springs below?

Lever Spring

Pressure Plate Spring



Instructor's Notes

Escalator Specific: Brakes

Inspection and Maintenance

Control Boards and Contacts

Check that all control board connectors are seated properly and all connections are secure.



Warning: Safety Precautions

When working with electrical equipment such as control boards, make sure that power is de-energized. Also wear a static ground strap.

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Slide 19



REVIEW slides 19 and review how to check all control boards and contacts.

CONTENT: Direct participants to describe in their own words how to properly inspect the main drive machine brake components.

APPLICATION FEEDBACK: now that we have discussed a little about drive machine brakes, have the participants answer the following question.



ASK *how participants can ensure that all power has been disconnected from electrical equipment prior to starting their work?*

Control Boards and Contacts

How do you ensure that all power has been disconnected prior to starting your work?



Instructor's Notes

Escalator Specific: Brakes

Main Drive Shaft Brakes

Machine Safety Brake

- A spring applied and lifted hydraulically to allow the escalator to operate.
- In the event of main drive failure, the handrail tension lever pivots and activates the broken main drive chain safety switch.



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Slide 23



REVIEW slide 23 and discuss the purpose and functions of the machine safety brake.



ASK *what is the function of the machine safety brake?*

Machine Safety Brake

What is the function of the machine safety brake?

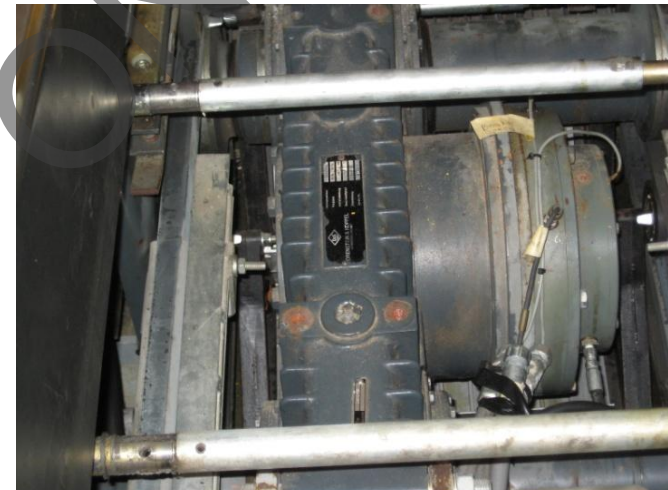


Figure 1 Kone Safety Brake



Instructor's Notes

Summary

Escalator Specific: Brakes

Summary

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Slide 26



REVIEW slide 26 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 on what was presented.

PREVIEW ONLY