



# **American Institute of Architects Continuing Education System**

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



## **Course Description**

Discuss 2014 NYC elevator and hoist code revisions and address safety concerns faced by the elevator industry.

This course will also discuss how these code updates affect property owners and building maintenance personnel.



## **Learning Objectives**

Review major 2014 code updates related to the elevator industry.

Discuss new emergency and standby power requirements.

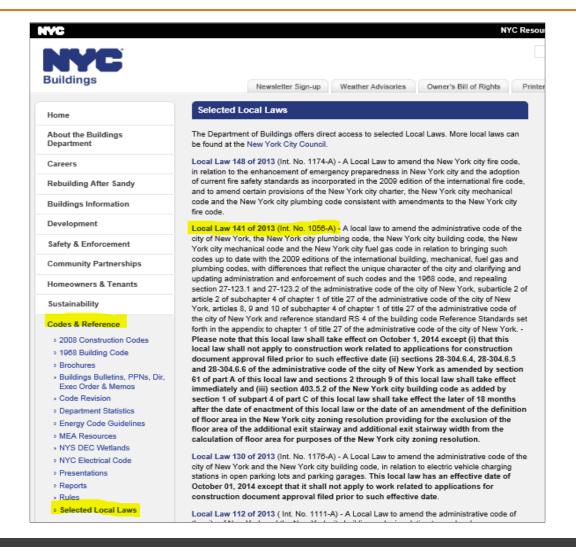
Participants will learn about Personnel Hoist installation and safety issues to maintain code compliance with manufacturer and NYC Building Code requirements.

Discuss access door requirements for Machine Roomless elevators.

Discuss safety and maintenance issues faced by the elevator industry.



## **Navigating to Local Laws**





#### Chapter 30.

NYC-specific Building Code requirements

#### Appendix K.

Modifications to ASME A17.1-2000 with supplements A17.1a-2002 and A17.1b-2003

#### Chapter K2.

Modifications to ASME B20.1-2006 for Conveyors and related equipment



#### Chapter K3.

Modifications to ASME A17.3-2002 Safety code for existing elevators and escalators

#### Chapter K4.

Modifications to ASME A17.1S-2005 Safety code for MRL elevators



**Chapter 30 – Major Code Changes** 



## Stringent accessibility and conformance to ICC A117.1 code. The following must conform:

- Passenger elevators required to be accessible by chapter 11 of the NYC Building Code
- Limited Use Limited Application (LULA) installed on accessible route
- Platform lift on an accessible route
- Private Residence Elevator in Group R2 and R3 occupancies on an accessible route



ICC A117.1 – International Code Council (ICC) standard for **Accessible and Usable Buildings and Facilities** 

**ACCESSIBLE ROUTE.** A continuous, unobstructed path that complies with Section 1104 of the NYC Building Code.



## **Occupancy Groups**

Occupancy Group R1. Occupied for a <u>period less than one month</u> (i.e. Hotels, Motels, College dormitories, homeless shelters)

Occupancy Group R2. Occupied for a <u>month or more at a time</u> (i.e. Apartment houses, Apartment hotels)

Occupancy Group R3. 1- and 2-family dwellings

Occupancy Group B. Business group

Occupancy Group E. Educational group



## FDNY Requirements – Sign on All Floors

#### Language:

IN FIRE EMERGENCY, DO NOT USE ELEVATOR USE THE EXIT STAIRS





## **FDNY Requirements-Identification**

#### Each stair and each elevator bank must be identified by:

- An alphabetical letter
- Elevator bank alphabetic
- Elevators alphanumeric (NYC Fire Code-Chapter 4, § 404.3.1.)

Exception: Occupant Evacuation Elevators



## **Buildings Five Stories or More – Stretchers**

#### Must have at least one elevator accessible to all floors

#### Must have an elevator that can accommodate a stretcher:

- 24-inch x 84-inch with not less than 5-inch radius corners
- Standby power required
- Exception: Private-residence elevators
   LULA

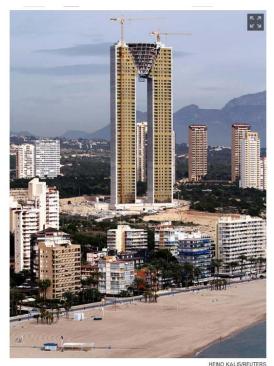




## **Non-compliant Building**

#### **Daily News**

Spanish skyscraper missing elevators in monster goof: 'Standard for the Future' or sign of current decline?





## **Standby Power Requirements for Elevators**

High-rise buildings other than R2 occupancy, per § 403.1

High-rise buildings with R2 occupancy and more than 125 feet high

Underground buildings

Elevators in Group B, E and R1 occupancies

Elevators serving as accessible means of egress

Exceptions: LULA, elevator serving not more than one dwelling unit



## **Emergency Power**

Occupancy group other than R2

Car lighting

Emergency voice/alarm communications system



## Standby Power vs. Emergency Power

#### **Emergency Power Requirements:**

NEC Article 700 Kicks in within 10 seconds

#### **Standby Power Requirements:**

Legally Required Standby Power NEC Article 701 Kicks in within 60 seconds

Both capable of serving full-demand load for six hours Natural gas allowed in R-2 occupancies as sole fuel source



## **Hoistway Venting**

#### Required vent area need not be permanently open when:

- Vent opens automatically upon detection of smoke in the elevator lobbies or hoist way
- Upon power failure (except when standby power provided)
- Upon activation of manual override control



#### Fire Service Access Elevator

In buildings with an occupied floor more than 120 feet above the lowest level of Fire Department vehicle access, a minimum of one fire service access elevator shall be required, which shall serve every floor of the building.

This access elevator shall comply with sections 3007.1 through 3007.8.



#### Fire Service Access Elevator

### **Comply with sections 3007.1-3007.8:**

- Serve every floor;
- Automatic sprinkler systems;
- Water protection;
- Fire rating of shaft;
- Hoistway lighting;
- Lobby requirements (120 square feet);
- Signage; and
- Power requirements.



## **Occupant Evacuation Elevators**

In buildings higher than 420 feet, designated elevators permitted to be used in case of fire.

These special occupant self-evacuation elevators must comply with sections 3008.1 through 3008.11.



## **Occupant Evacuation Elevators**

| Section 3008.1 - 3008.11                |                                                 |                                                   |                                      |  |  |  |  |  |  |  |
|-----------------------------------------|-------------------------------------------------|---------------------------------------------------|--------------------------------------|--|--|--|--|--|--|--|
| Additional exit stairways: not required | Approved fire-safety and emergency-action plans | Emergency voice/<br>alarm communication<br>system | Structural integrity of the hoistway |  |  |  |  |  |  |  |
| Operation                               | Sprinklers                                      | Water protection                                  | Lobby<br>Requirements                |  |  |  |  |  |  |  |
| Vision panel                            | Signage                                         | Two-way communication                             | Power<br>Requirements                |  |  |  |  |  |  |  |
| Notification appliance                  | Hazardous material areas                        |                                                   |                                      |  |  |  |  |  |  |  |



## **Elevator – Repair, Inspection, Test**

Must use caution tape when elevator is being serviced, repaired or tested *or* use OSHA-approved elevator barricades.





## **Major Code Changes**

## **Chapter K**



#### **New + Revised Definitions**

#### **New Definitions**

Elevator Classification – Passenger or Freight

Patient Elevator

Sky Lobby

**Smoke Hole** 

Zero Clearance Vestibule

#### **Revised Definitions**

**Designated Level** 

Hospital Emergency Service



## **Elevator Landing**

Elevator landing on floors other than designated level provided with a vestibule:

Red telephone installed in the vestibule near elevator doors

"In case of fire or other emergency, use this phone to contact lobby or building manager or central service station"

The locking devices on the vestibule door leading to exit are released upon activation of signal device or power failure

At least one exit stair is located within the vestibule



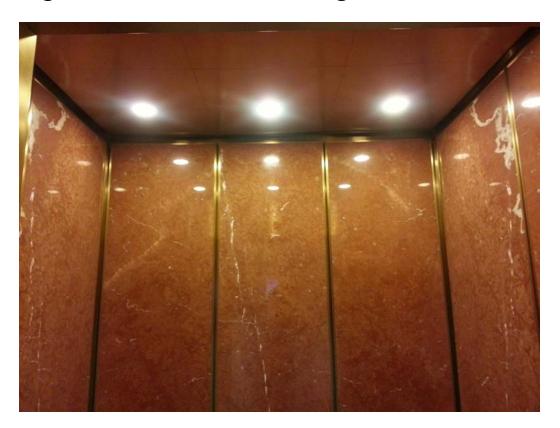
## **Parking Devices**

Elevators that are operated from within the car only and have manual operated doors that can be opened with a common tool shall have elevator parking devices installed at that landing.



## **Interior Car Lighting**

Car interior light shall not be extinguished.





## **Escalators Safety Issues**

Service ports used for diagnostic purposes or for resetting faults shall be placed in a location accessible only to elevator personnel.

Escalators with AC power supply shall be provided with means to remove power from the drive motor and brakes if there is a phase reversal or power failure.



## **Escalator Signs and Graphics**

Step-riser signs or graphics, and handrail signs or graphics are not permitted.





#### Identification

City ID to be applied on the right-hand side facing the newel at the top and bottom of the escalator and:

- The driving machine;
- Controller; and
- Main line disconnect switch.

Each escalator shall be assigned a unique alphabetical or numerical identification which shall be applied on the exterior, clearly visible at the top and bottom of the escalator.



## **Updated Table N1**

| TABLE N1  REQUIRED INSPECTION AND TEST INTERVALS IN "MONTHS" |                                             |                       |                               |                                       |                                 |                                                 |                                                                                                     |                              |                                       |                            |                          |                   |                            |
|--------------------------------------------------------------|---------------------------------------------|-----------------------|-------------------------------|---------------------------------------|---------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------|----------------------------|--------------------------|-------------------|----------------------------|
|                                                              |                                             |                       | Inspection<br>epartment       | Periodic Test on Behalf of Owner  (4) |                                 |                                                 |                                                                                                     |                              |                                       |                            |                          |                   |                            |
|                                                              |                                             |                       |                               | (2)                                   |                                 | (Unexpos<br>Pistons of<br>Water Hy<br>elevators | Category 3 (Unexposed Pistons of Roped Water Hydraulic elevators and Pressure Vessels)  Categor (5) |                              | (5) Noti-<br>fica-<br>tions<br>(1)(3) |                            | Filin<br>g<br>(1)(3<br>) | Performing (1)(3) | Witness -ing Agency (1)(3) |
| Referenc<br>e Code<br>ASME<br>A17.1                          | Equipmen<br>t Type<br>Electric<br>Elevators | Require -ment 8.11.2. | <u>Interval</u> 1-1 to 12- 31 | Require<br>-ment<br>8.11.2<br>2       | Interv<br>al<br>1-1 to<br>12-31 | Require<br>-ment<br>N/A                         | Interv<br>al<br>N/A                                                                                 | Require-<br>ment<br>8.11.2.3 | Inter-<br>val<br>60                   | Yes<br>(Cat.               | <u>Yes</u>               | Yes               | Yes                        |
| ASME<br>A17.1                                                | Hydraulic<br>Elevators                      | 8.11.3.<br>1          | 1-1 to 12-<br>31              | 8.11.3.2                              | 1-1 to<br>12-31                 | 8.11.3.3                                        | <u>36</u>                                                                                           | Roped<br>8.11.3.4            | <u>60</u>                             | 5)<br>Yes<br>(Cat.<br>3,5) | Yes                      | Yes               | Yes                        |



## **Major Code Changes**

**Chapter K2 – Major Changes** 



## **Vertical Reciprocating Conveyors**

The conveyor housing shall be equipped with doors or equivalent means at each manual landing and unloading section equipped with interlocks so the door does not open when carrier is not present at that landing.



## Periodic Inspection Requirements – Table N1

|               | TABLE N1  REQUIRED INSPECTION AND TEST INTERVALS IN "MONTHS" |                                   |     |                                       |                 |                                                                                        |            |                                     |           |                                  |               |                   |                            |
|---------------|--------------------------------------------------------------|-----------------------------------|-----|---------------------------------------|-----------------|----------------------------------------------------------------------------------------|------------|-------------------------------------|-----------|----------------------------------|---------------|-------------------|----------------------------|
|               |                                                              | Periodic Inspection By Department |     | Periodic Test on Behalf of Owner  (4) |                 |                                                                                        |            |                                     |           |                                  |               |                   |                            |
|               |                                                              |                                   |     | Category 1 (2)                        |                 | Category 3 (Unexposed Pistons of Roped Water Hydraulic elevators and Pressure Vessels) |            | Category 5<br>(5)                   |           | Noti-<br>fica-<br>tions<br>(1)(3 | Filin g (1)(3 | Performing (1)(3) | Witness -ing Agency (1)(3) |
| ASME<br>B20.1 | Vertical and Inclined Reciproca -ting                        | N/A                               | N/A | Appendi<br>x K2, §<br>6.21.3<br>(b)   | 1-1 to<br>12-31 | N/A                                                                                    | <u>N/A</u> | Appendi<br>x K2,<br>§ 6.21.3<br>(b) | <u>60</u> | <u>No</u>                        | <u>No</u>     | <u>No</u>         | No                         |



## **Major Code Changes**

**Chapter K3 – Major Code Changes** 



#### **Elevator Parking Device**

Elevators that are operated from within the car and only have manual operated doors that can be opened with a common tool shall have elevator parking device installed at every landing with unlocking device.



## Single-Plunger Brake

All existing traction elevators with single-plunger brakes must comply with either of the following by January 1, 2027:

- Alteration of single plunger assemblies with dual plunger
   or
- 2. Compliance with unintended car movement as per ASME A17.1 section 2.19.2

Permit from the Department required to do this work.



#### **Door Contact Circuits**

All automatic passenger and freight elevators shall provide systems to monitor and prevent automatic operation of elevators with faulty door contact circuits by January 1, 2020.



## **Major Code Changes**

**Chapter K4 – Major Code Changes** 



#### **Controller Location**

Machinery space in hoistways may not contain a motion controller, a motor controller or an operation controller.



#### **Control of Hot Gases**

Hoistways must be provided with means to prevent the accumulation of smoke and hot gases when required by the New York City Building Code.



## **Sump Pump in the Pit**

Elevators with sprinklers in the shaftway must be provided with a drain or sump pump.



#### Pit Door

Access must be by means of the lowest hoist way door or by means of a separate pit access door, located at the level of the pit floor.

Pit doors must be labeled "DANGER: ELEVATOR PIT" with letters not less than 51mm (2 in) high.





#### **Working Clearances**

Control space must be located where working clearances will not impede up on the path of travel in unrestricted areas.



## **Working Clearances**

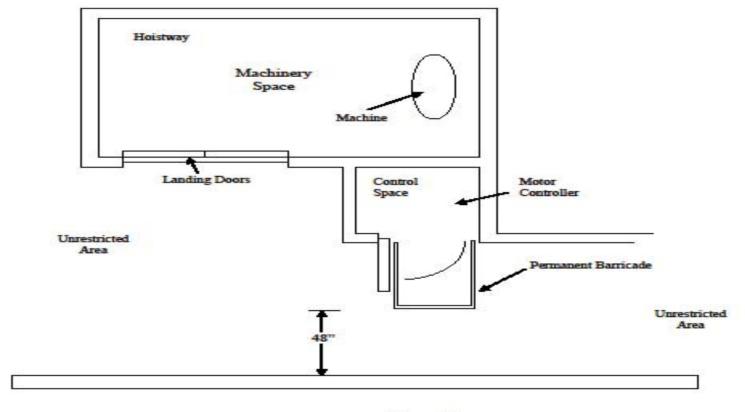


Figure Q-2



#### **Access Door**

Access doors to machine rooms, control rooms and control spaces must be provided.

An access door is required when the governor is installed at the top of the hoistway for access to reset switches by elevator personnel.



#### **Bottom Guides**

The bottom of each panel must be guided by two or more bottom guides (door gibbs).





## **Operational Safety Issues**

**Elevator Safety** 

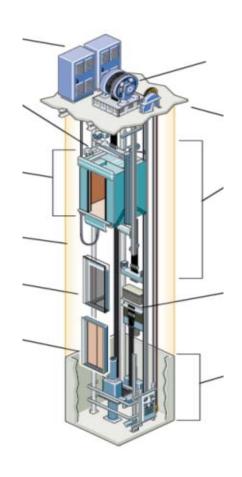
**Escalator Safety** 

**Hoist Safety** 

**Training** 



# Overview of NYC Elevator Safety Inspections: Maintenance and Repairs





## **Elevators in New York City**

| Dumbwaiter (D)                                                                  | 941   |
|---------------------------------------------------------------------------------|-------|
| Escalator (E)                                                                   | 2407  |
| Freight (F)                                                                     | 3633  |
| Handicap Lift (H)                                                               | 209   |
| Manlift (M)                                                                     | 52    |
| Passenger Elevator (P)                                                          | 58036 |
| Permanent Amusement Ride (A)                                                    | 135   |
| Private Elevator (T)                                                            | 7     |
| Public Elevator (L)                                                             | 23    |
| Sidewalk (S)                                                                    | 480   |
| Various (V) - Conveyer, hoist, material lift, inclined wheelchair, Floor Casket | 769   |
| Wheelchair (W)                                                                  | 2503  |
| Grand Total                                                                     | 69195 |



## One Elevator Day in NYC

64,076 Passenger elevators, escalators, moving walks and freight elevators

500 Trips an average elevator makes per day

30 Million Trips made citywide everyday

11% Percent of all elevators and 4.6% escalators in the United States are in New York City



## **Elevator Safety**

The Public

**Elevator Personnel** 

**Authorized Personnel** 

**Emergency Responders** 



#### **Codes and Standards**

ASME A 17.1/2003 and ANSI/ASSE A10.4 (Personnel Hoist)

ASME A 17.3/2002 (Existing Elevators and Escalators as modified by Chapter K3)

NYC Building Code 2008 (Appendix K, Chapter 30)



## **Device Types**

**Elevators** 

**Escalators** 

Man lifts

Conveyors

Personnel hoists

Wheelchair lifts



#### The Elevator Unit's Mission

The Elevator Unit promotes the operational safety, reliable service and lawful use of elevators, escalators, amusement rides and other related devices throughout New York City by performing inspections and testing.

The unit enhances compliant development and safety awareness through the Department's various outreach programs and supports development by permitting new technologies under pilot programs.



#### **Elevator Applications**

New installations

Alterations (speed, capacity, rise, structural, location)

Replacement and modification (replacement/modification of controller, machine, governor, safety etc.)

Elevator use for construction use (new or amendment on existing application)

Removal + dismantle

Electrical permit must be filed for electrical work performed on device

Note: An acceptance test is required for items # 1-5 type

Note: An acceptance test is required for items # 1-5 types of applications, and NYC Buildings inspectors shall perform the necessary test and inspection.



## **Types of Inspection**

Acceptance Tests - Permitted Application (new and modernized devices)

Complaint Inspections (received through 311)

Incidents/Accidents and Emergency Response (24/7)

**Survey Inspections** 

Periodic Inspections

Violation Re-Inspections

**Amusement Ride Inspections** 

Personnel Hoist Inspections (Construction Sites)

**Quality Assurance Inspection** 



#### **Hoist Permit Process**

#### **Construction, Electrical Applications and Permits:**

Issued by respective borough

Material Handling Plan: Submitted to BEST for approval on highrise jobs. For low rise buildings, EOR to maintain plan at site for review

#### **Elevators Unit application process:**

Four Elev-1 Forms; 1 original, 1 duplicate and 2 copies Affidavits signed sealed by PE/RA

Two sets of drawing showing the following:

- Type of hoist: (dual hoist)
- Total rise
- Ties to building
- Cab and mass structure
- Run by clearance
- Reaction of all ties and pit



#### **Enforcement**

**ECB** Violations

**PVT/DOB Violations** 

Aggravated I and II

Criminal Court summons (under major offenders program)

Work-Without Permit Violation



## **Elevator Maintenance + Repair**

Maintenance Control Program

Maintenance Log

Repair



## **Maintenance and Repair – Contract**

#### NYC Administrative Code 28-304.7 – Required Contract

Owner of New and existing passenger elevators shall have contract with an approved agency to perform elevator repair work and maintenance as defined by ASME A 17.1 – Section 8.6.

The name, address and telephone number of approved agency under contract shall be maintained at each premises, on the elevator mainline disconnect switch and in a location readily accessible to employees of the department, building maintenance and custodian staff at the premises.



## Maintenance, Repairs + Replacement

#### Shall confirm following code requirements:

Code at the time of the installation

Code requirements at the time of any alteration/modernization

ASME A 17.3-2002 as modified by NYC Building Code Appendix K

ASME A 17.1b-2003, Section 8.6



## **Maintenance Control Program**

## MCP shall be in compliance with ASME A 17.1b-2003 section 8.6.1.2:

Examination, maintenance and tests at schedule interval;

Equipment age, condition, and accumulated wear;

Design and inherent quality of the equipment;

Usage, Environmental condition;



#### Maintenance Control Program (Continued)

Improved technology;

Cleaning, lubricating and adjusting applicable components at regular intervals;

Repair or replace all worn or defective component where necessary to maintain installation as per codes and manufacturer requirements;

Available at site to elevator personnel; and

As required by manufacturer manual.



#### **Maintenance Records**

## Maintenance records shall be in compliance with ASME A 17.1b-2003 Section 8.6.1.4:

Description of maintenance task performed and dates;

Description and dates of examinations, tests, adjustments, repairs and replacements;

Description and dates of call backs (trouble calls), including corrective action taken;

Written record of the findings on the firefighter service; and

Available at the site for elevator personal.



#### Advantages of Maintenance – Per MCP

Enhance safety

Improve service reliability

Increase life span of equipment

Enhance efficiency of vertical system transportation

Avoid costly repairs

Avoid violations and penalties



## **Elevator Safety**

Worker Safety – OSHA safety regulation

**Fall Protection** – Personal fall-arrest system, guardrail system, barricades

**Electrical Safety** – Personal protective equipment, safety checklist

**Proper Use of Jumpers** – Use extreme caution; only use on inspection and ensure jumpers removed before placing equipment back in service

**Lockout and Tag out** 

Use of Caution Tape When Elevators are Serviced – NYC Building Code Section BC-3009



## **Elevator Safety – General Public**

#### **Caution Tape**

3" yellow caution safety tape installed at 18" and 54" on the inside car door threshold when working on the elevator

Use tape when elevator is removed from normal service and a mechanic is not working in front of the entrance of the device

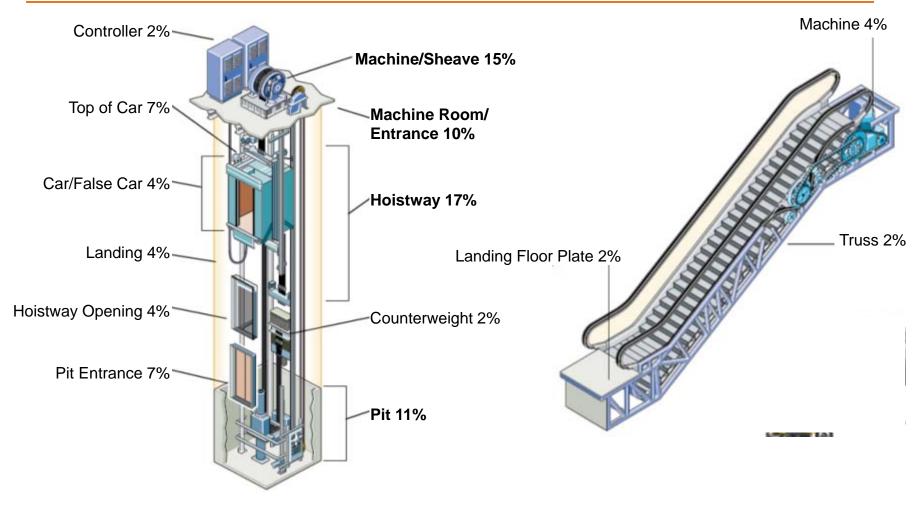
Prevents unintended public entrance

Lights out/doors open communicates that the car is out of service

## CAUTION CAUTION CAUTION



# Elevator Safety – Elevator Mechanic Serious Injury Risk Areas

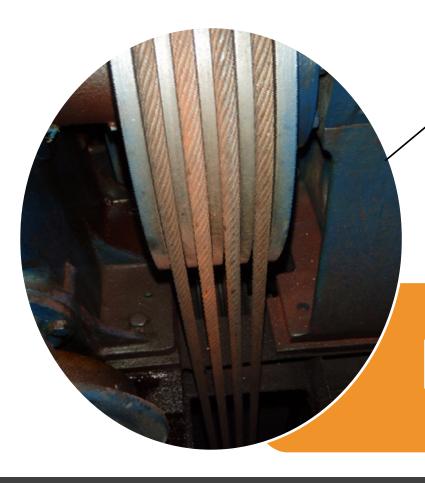




# Elevator Safety – Elevator Mechanic Serious Injury Risk Areas (Continued)



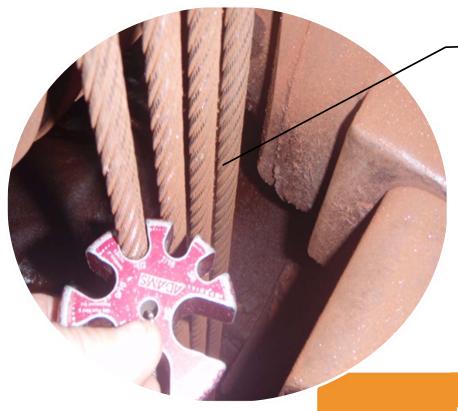




Rouge on ropes: lack of maintenance

Hoist cables





Undersized ropes

Hoist cables

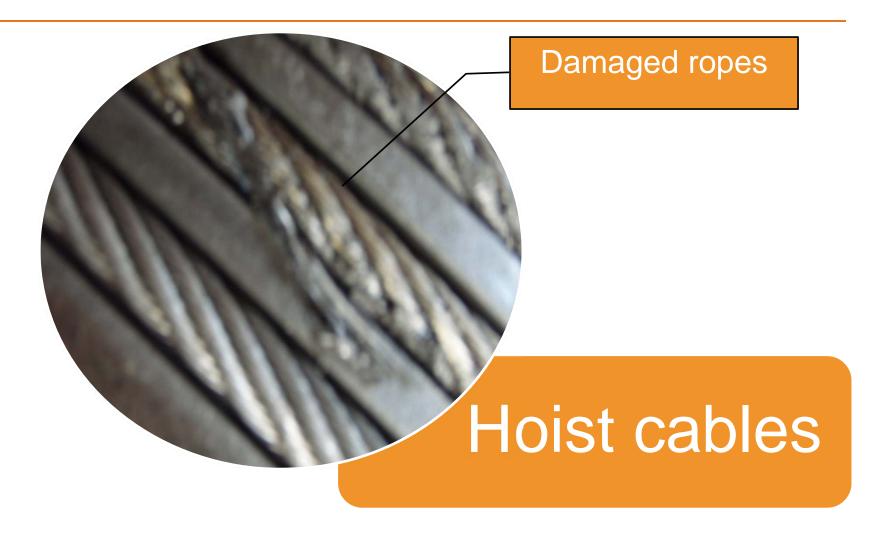




Severe rust on safety cable drum

Safety rope







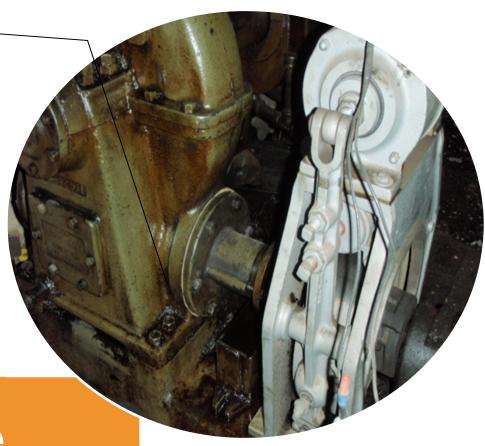
Lack of oil change



Hoist machine



Oil leak on machine



Hoist machine





Electrical

Jumped Fuses





# Electrical

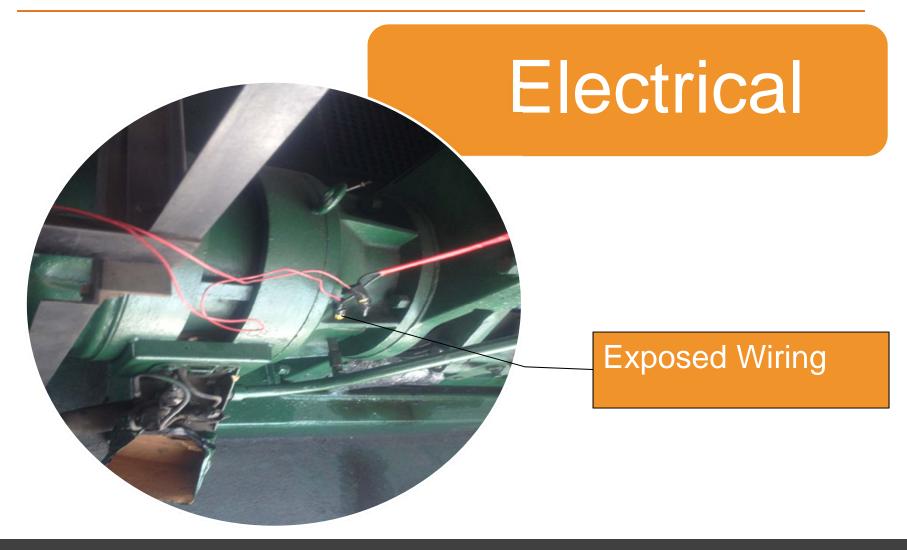
**Exposed wiring** 



Safety

Governor switch blocked







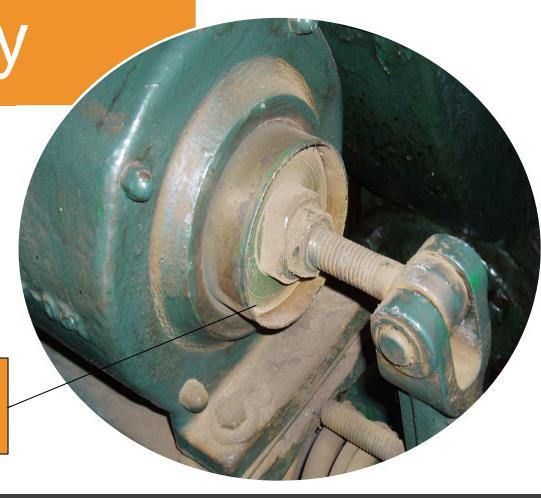
Housekeeping

Dirty pit: fire hazard



Safety

Brake sleeve defective



# **Hoist Applications**

#### **New Installations**

Electrical permit must be filed for electrical work

As per the 2008 NYC Building Code (section 3318.4), upon completion of the installation of the personnel hoist and/or its runback structure, an inspection report verifying that the hoist has been installed in accordance with the design drawings, construction documents and specifications shall be prepared by the designer, installer or third party designated by both the designer and installer and acceptable to the commissioner. This inspection report must be submitted by professional engineer to the department of buildings.

Construction application must be filed at the borough office for ties to the building structure and for back structure installation

Note: All hoists must be tested by the department after installation and inspection upon removal of the hoist.



#### **Hoist Plan Review**

#### **Foundation**

Attachment of slabs to mast

Mast and tie reaction forces calculation

#### Types of tie:

- Type I, II a, II, 1V, V, etc.
- All ties are positive (no epoxy)

Ties in schedule shall not exceed 30 feet

Hoist cab structure and safety devices



# **Hoist Inspection Requirements**

#### **Acceptance Inspection and Test – Department:**

Cathead/Tower Raise – approved agency inspectors (Requires 3-day notification)

90 Day Inspection – approved agency inspectors (requires full load test)

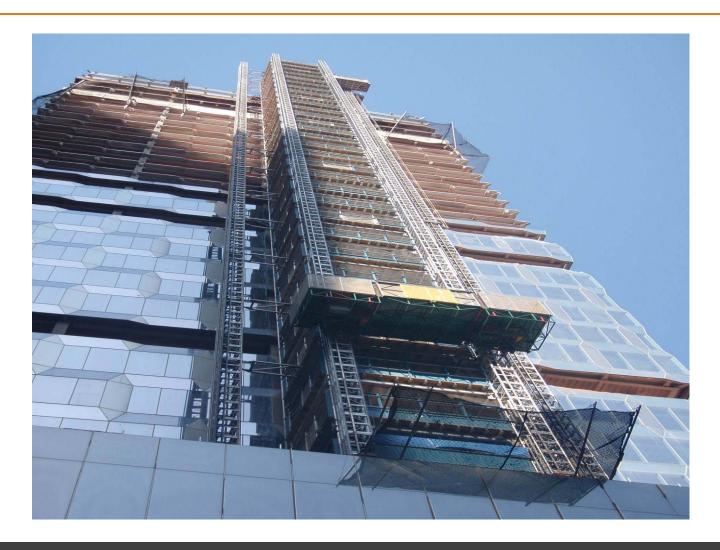
Inspections required as per manufacturer's manual

Audit inspection – Department

Hoist removal – Department

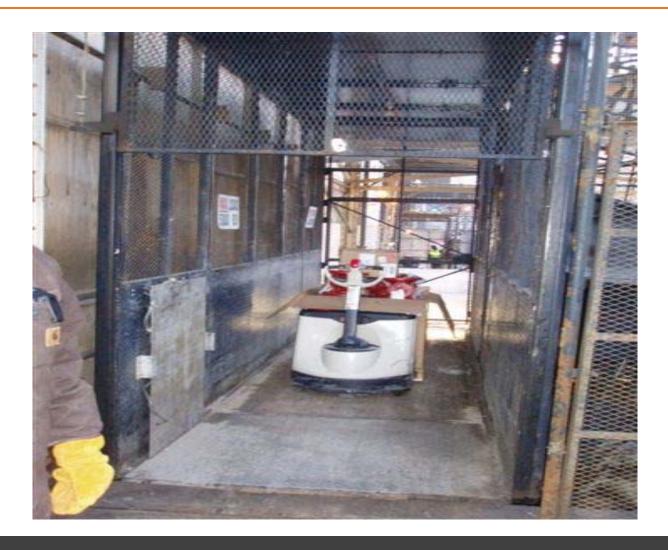


# **New Technology**





# **Power-operated Equipment Restriction**





# **Close Proximity of Equipment**





# **Material Handling Plan Needed**





# **Maintenance Failure**





# **Good Practice: Isolation Bracket for Noise + Vibration**



# **Hoist Maintenance Issue**





# **Hoist Maintenance Issue**





#### **Questions?**

This concludes the American Institute of Architects Continuing Education Systems Course.

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