

FOREWORD

ELEVATOR WORLD, the National Elevator Industry, Inc. (NEII) and the members of the NEII Safety Committee assume no responsibility for either safety conditions or compliance with legal requirements at any particular jobsite. The safety practices and procedures spelled out within this *Elevator Industry Field Employees' Safety Handbook* are based upon experiences of field personnel and research conducted by many safety specialists. These practices and procedures are not only common-sense precautions to eliminate hazards, prevent incidents and avoid injuries; they are also the recommended methods by which to carry out and complete a job safely. This handbook should be carried and consulted in order for "safety" to become a "way of life" on every construction or maintenance job. Because elevator and escalator components vary from company to company, and because unique or unusual jobsite conditions may exist, it is not possible for a handbook on general safety methods and practices to deal with every possible hazard which may be present at every jobsite. For that reason, each user of this handbook must carefully observe the safety conditions at each jobsite to make certain there are no conditions which would require safety precautions beyond those described in this handbook. Although it does not purport to encompass or override the laws or regulations of any government body, this handbook is believed to be accurate at the time of publication; however, changes in law, regulations and/or interpretations may invalidate certain portions. It is the responsibility of the employer to be familiar with all appropriate State and Federal regulations. Written and edited by the NEII Safety Committee in cooperation with Elevator World, Inc. Published by and available from Elevator World, Inc., P.O. Box 6507, Mobile, Alabama 36660. This handbook is also available online at <http://safety.elevatorworld.com>. Revisions are kept current online. ©Copyright 2010. All rights reserved by Elevator World, Inc.

PREFACE

This Handbook is designed to provide a resource for safety information that the elevator industry field employees shall use to help prevent injuries and illnesses resulting from unsafe acts and/or conditions.

The intent of this Handbook is to promote jobsite safety through adherence to OSHA safety regulations affecting the elevator industry and other trades working with us. Directions to field personnel affecting the general public are incidental to the purpose of the Handbook and therefore should not be construed to be complete as to the proper way to safeguard the public. This Handbook is also not intended to be used as a guide, standard or code on the installation, repair or servicing of elevators.

This Handbook is intended to augment a company safety program. It is not intended to be used as the total company safety program (policy).

All elevator industry employees shall familiarize themselves with the contents of this Handbook. The safety procedures apply to all persons working on elevator, escalator, moving walk, material lift and dumbwaiter equipment directly employed by elevator companies, inspection companies and AHJ's who qualify with proper training.

NEII SAFETY COMMITTEE

January 2010

Louis DeLoreto, Chair NEII Safety Committee
Senior Manager Safety & Environment
Otis Elevator Company

Brian Black, Secretary NEII Safety Committee
BD Black Codes
Code and Safety Consultant to NEII

Timothy Walter, Vice President of EHS
KONE, Inc

Fred Wilt, Field Safety Manager
Schindler Elevator Corp.

John Faure, Manger Field & Quality Assurance
Mitsubishi Electric & Electronics USA, Inc

David Kobasic, Director of Safety
ThyssenKrupp Elevator Company

Kent Lloyd, Owner
Abell Elevator International, Inc

L.J. Fleetwood, National Safety Coordinator
Fujitec America, Inc.

Tim Daly
Liaison from the National Elevator Industry Education
Program (NEIEP)

Robert G. Merlo
Liaison from the National Association of Elevator Contractors
(NAEC)

Ricia Hendrick, Liaison from Elevator World, Inc.

TABLE OF CONTENTS

Section 1 – General Safety	8
1. Employee Responsibilities	8
2. Additional Safety Responsibilities of the Mechanic/Mechanic-in-Charge	13
3. Emergency Evacuation Procedures	13
Section 2 – Safety Inspections	17
1. Need for Routine Safety Inspections	17
2. Inspecting for Hazards	17
3. Pre-startup Safety Survey	19
Section 3 – Personal Protective Equipment (PPE)	22
1. Proper Clothing	22
2. Eye and Face Protection	23
3. Occupational Head Protection	25
4. Occupational Foot Protection	25
5. Hearing Protection	26
6. Personal Fall Arrest Equipment	26
7. Hand Protection (Gloves)	27
8. Respiratory Protection	27
Section 4 – Fall Protection	29
1. Personal Fall-Arrest System	29
2. Guardrail Systems	33
3. Escalator/Moving Walk Barricades	38
4. Elevator Maintenance Barricades	39
Section 5 – Electrical Safety	40
1. General Precautions	40
2. Meter Usage Safety Checklist	42
3. Energized Circuit Troubleshooting Checklist	43
Section 6 – Proper Use of Jumpers	45
1. Maintenance and Troubleshooting	46
2. Modernization and New Construction	47
3. Door Bypass Procedure	48
Section 7 – Lockout and Tagout	49
1. Procedures	49

2.	Supervisory/Emergency Removal of Lockout/Tagout	53
3.	Lockout/Tagout Procedures for Escalators and Moving Walks	54
4.	MRL Car Movement Locking Devices	54
Section 8 – Hoistways and Machine Rooms		56
1.	Hoistway Access Safety	56
2.	Pit Safety	61
3.	Hoistway Screening	67
4.	Overhead Protection	68
5.	Machine Room Safety	69
Section 9 – Tools		70
1.	Hand Tools	70
2.	Portable Electric Tools and Lights	71
3.	Powder Actuated Tools	73
Section 10 – Portable Ladders/Scaffolds/Stationary Work Platforms		74
1.	Scaffolds/Stationary Work Platforms	74
2.	Portable Ladders	75
Section 11 – Moving Work Platforms		78
1.	Running Platforms	78
2.	Temporary Cars	79
3.	False Cars and Other Devices Used in the Hoistway	79
Section 12 – Material Handling		85
1.	Manual Handling Lifting of Material	85
2.	Ramping and Blocking of Material	89
3.	Hoisting and Rigging	89
4.	Wire Rope Fastenings	95
5.	Chain Hoists	96
6.	Slings and Hitches	96
7.	Crosby Lifting Guide	97
8.	Synthetic Webbing Slings - Selection, Use and Maintenance	119

9.	Beam Clamps	124
10.	Manila Rope	127
11.	Synthetic Rope	127
12.	Knots are Weak	129
Section 13 – Welding, Cutting and Soldering		135
1.	General Precautions	135
2.	Acetylene, Oxygen and Other Pressurized Fuel Cylinders	137
3.	Soldering	138
Section 14 – Hazard Communications (HAZCOM)		139
1.	Working with Chemicals	139
2.	Oils and Grease	141
3.	Cleaners	142
4.	Babbiting	143
5.	Painting	144
6.	Welding	145
7.	Asbestos	145
8.	Flammable Liquids and Solvents	146
9.	Carbon Dust	147
10.	Sulfuric Acid Type Batteries	147
11.	Radio Frequency (RF) Awareness	150
Section 15 – Inclined Elevators		151
Section 16 – Escalators and Moving Walks		152
Section 17 – Dumbwaiters		155
Section 18 – Job Hazard Assessment		157
12.	Instructions	157
13.	Overview	157
14.	General	157
15.	Foot and Leg Protection	158
16.	Head Protection	158
17.	Hearing Protection	158
18.	Eye and Face Protection	159
19.	Respiratory Protection	159

9.	Personal Fall Arrest System	159
10.	Hand Protection	160
11.	OSHA Regulations	160
12.	Assessing Workplace Hazards	160
13.	Training	161
Section 19 – Driving and Vehicle Safety	.....	164
1.	Recognizing Hazards	164
2.	Alcohol/Drug Use	164
3.	Safety Belts are for Everyone	164
4.	Vehicle Maintenance	165
5.	Communication Devices	165
Section 20 – Substance Abuse	.....	166
Section 21 – Glossary of Terms	.....	167
Section 22 – Appendices	.....	173
1.	Metric Conversion	173
2.	Electrical	179
3.	Timber, Beams and Planks	181
Index	.....	185

Section 1

GENERAL SAFETY

1.1 Employee Responsibilities

You shall familiarize yourself with the safety procedures outlined throughout this safety handbook. The following safety rules shall receive special attention and are not necessarily all inclusive:

- (a) In all operations, when removing or moving any component or equipment, make sure that the effect of that activity on the entire elevator or escalator system is taken into consideration.
- (b) Employees shall not work when their ability or alertness is impaired by fatigue, intoxicating beverages, illegal or prescription or over-the-counter drugs, or any other physical or emotional cause that might expose the employee or others to injury. (See Section 20)
- (c) Practical jokes, horseplay, throwing of tools or fighting on the job are forbidden.
- (d) Weapons, explosives and illegal substances on the job are forbidden.
- (e) Mechanics arriving at a location to perform service or repairs shall alert the owner or building management and place Company-approved “Out of Service” signs on a single unit landing call buttons before any work begins. (Building management may require signature in log.)
- (f) Secure the equipment (elevators, escalators, dumbwaiters, moving walks, platform lifts and chair lifts) from the riding public when performing any adjustments or work. Ensure no one is in the car, close the doors and prevent the doors from operating while working on the elevator.
- (g) Before working on equipment, “tuck” loose-fitting clothing and confine long hair. Remove all jewelry.

- (h) When unexpected movement of the equipment presents a safety hazard while cleaning, oiling, or greasing any parts that move, the equipment shall be made inoperative by use of lockout and tagout. See Lockout and Tagout Procedure, Section 7.
- (i) The use of personal entertainment devices (radios, tape or CD players, etc.) are prohibited on all jobsites.
- (j) Communication devices should be used with caution around controllers.
- (k) If two-way radios are used, ensure your communication channels are clear so they are not interfered with by other trades. Be aware of potential delays in communications when using certain communication devices.
- (l) Do not wear tool belts or carry tools in pockets.
- (m) Keep the work area clean, discard trash in a waste container, not on the floor, etc. Notify the General Contractor or Building Manager of problems in common areas. Poor housekeeping exposes everyone to hazards.
- (n) Never use wiping cloths on or near moving and/or rotating equipment.
- (o) Oily or chemically-soaked rags shall be kept in company-approved containers, removed from the jobsite periodically and disposed of properly.
- (p) If you are required to clean the pit, car top, machine room floor or other apparatus, take precautions to avoid lacerations or punctures from sharp objects by wearing suitable work gloves and using a broom and shovel, or dust pan, to pick up debris.
- (q) Remove or bend all protruding nails.
- (r) Work areas, ramps, runways, corridors, stairwells, offices, shops and storage areas must be well-lit. Notify the responsible party and your Superintendent/Manager if lighting is inadequate.

- (s) Do not work without adequate light. If there is inadequate light, use a grounded portable light with a suitable, non-conductive or grounded lamp guard and reflector.
- (t) Do not walk up or down stairways with hands in pockets. Never run on stairs. Handrails must be provided and used. Filler boards shall be in place on unfinished stairs. Be alert for tripping hazards, especially if carrying tools or materials.
- (u) Do not run extension cords in stairwells if they will cause a tripping hazard.
- (v) Open-flame heaters shall not be used for space heating of shanties, machine rooms or pits unless proper and approved venting is provided and local codes are adhered to.
- (w) When uncoiling rope, cable or wire, do not stand within the coil.
- (x) Never slide, swing or climb on cables, ropes or guiderails.**
- (y) Never drop objects down the hoistway. A rope shall be used to safely lower objects.
- (z) Observe and obey all safety signs. Every sign serves a purpose. They are for your safety and the safety of others. If a sign is no longer necessary, it shall be removed.
- (aa) Administer first-aid only if you have been trained to do so, and never exceed your level of training.
- (ab) Do not cleanup spilled body fluids (blood, vomit, etc.) or material with body fluids unless you have received the appropriate training and vaccinations as required by OSHA (29 CFR 1910.1030), or any applicable local regulations. If you have received training and have been offered the applicable vaccinations and personal protective equipment, then assume contamination in handling any body fluids or material potentially contaminated with body fluids. All cleanup activities shall be conducted in accordance with your company Exposure Control Plan. If you have been accidentally exposed to body fluids that

- may contain bloodborne pathogens, contact your applicable company medical provider as soon as possible.
- (ac) Report every injury to your Supervisor immediately (no matter how trivial) in accordance with company policy and procedure.
 - (ad) The employee shall know the hazards and safe-use procedures associated with the materials and/or chemicals the employee is using. This information is available on the Material Safety Data Sheets (MSDS) provided by the Company. See Section 14 Hazard Communications for additional information. All materials and chemicals used shall be company-approved with MSDSs sheets. Improper use could result in injury or illness.
 - (ae) Some elevators may be located near operations with process hazards or work environments that may be potentially hazardous in an emergency, or as part of the customer's day-to-day operation. Such elevators may be located in petrochemical plants, oil refineries, paper mills, nuclear plants and similar facilities. In such facilities the elevator pit/hoistway may be classified and/or labeled as a permit-required confined space. Do not enter the pit/hoistway until you have consulted your Superintendent/Manager.
 - (af) On modernization, when removing old material from elevator platforms, make sure counter balance is properly adjusted before proceeding.
 - (ag) Rotating equipment can be dangerous. Be aware of your surroundings and be prepared for "sudden" start-up of the equipment. (See Section 7)
 - (ah) When working on hydraulic power units, keep your hands and clothing clear of the pump, motor, belts and sheaves to avoid being pulled into moving parts. Never check the belt tension unless the mainline disconnect switch is in the "off" position and locked and tagged out.

- (ai) Hydraulic oil may be hot and can cause severe burns.
- (aj) Elevator safety tests shall be performed in accordance with the procedures specified in the *ASME A17.2 Guide for Inspection of Elevators, Escalators and Moving Walks, (formerly Inspector Manual for Elevators)*.
- (ak) Before equipment is placed back in service, be sure all locks and tags have been removed and account for any jumpers used. All door and safety circuits shall be tested to ensure they are operating.
- (al) Before leaving the building, if the car is returned to service, remove all “Out of Service” signs. Checkout with building management.
- (am) Do not ride or permit anyone else to ride in or on top of the car during safety and buffer tests.
- (an) Do not allow other trades to work in the hoistway above and below you.
- (ao) Never look at an electric welding arc without proper eye protection. See Section 3.2.
- (ap) Never work in the hoistway below welding or cutting operations.
- (aq) Don't work in an area where a gasoline engine is running unless properly vented. A gasoline engine gives off deadly carbon monoxide gas.
- (ar) Don't work in an area where propane heaters are used unless properly vented.
- (as) Never leave an open hoistway door unguarded. Before working on an elevator with the hoistway door open place a barrier in front of the entrance. See Section 8.
- (at) If you have to get at something that is higher than you can reach, use a ladder. See Section 10. Do not stand on overturned buckets, crates, chairs, etc.
- (au) In machine rooms be careful of tripping and head bumping hazards.
- (av) Never clean or lubricate ropes with a hand held rag.
- (aw) Never work from a hoistway divider beam.

- (ax) **Where exposed to imminent danger, vacate the area immediately.**
- (ay) Whenever accessing the hoistway, cab or cartop, verify that the elevator is there prior to access.

1.2 Additional Safety Responsibilities of the Mechanic/Mechanic-in-Charge

Each Mechanic/Mechanic-In-Charge Must Always Coordinate Jobsite Safety With Company Management

The Mechanic/Mechanic-In-Charge is the Company's designated **Competent Person**. Although all employees are responsible for identifying existing and potential hazards in the surroundings, or work conditions which are unsanitary, hazardous, or dangerous to employees, and for taking prompt corrective measures to eliminate or avoid the hazard(s) the Mechanic/Mechanic-In-Charge must perform appropriate job hazard analysis to determine that work areas are safe. On the job, the Mechanic/ Mechanic-In-Charge is the principal interface with Company Management to ensure that the work is performed in accordance with the company safety policy. In fulfilling this responsibility, the Mechanic/Mechanic-In-Charge shall take all practical steps to be sure that the work is performed with due regard for safety. Unsafe acts, unsafe conditions, accidents or injuries should be reported to a Superintendent or other member of management immediately. To keep operations safe, the following are some examples of the principle job requirements of the Mechanic/ Mechanic-In-Charge:

- (a) Determine that their Apprentice(s)/Helper(s) fully understand the safety requirements and that they accept responsibility for the safety of themselves, their fellow workers, the jobsite, and equipment.

- (b) Ensure that all equipment, work areas, and access to work areas where Elevator Company work is performed are inspected for any unsafe conditions which could cause injuries or property damage before commencement of work.
- (c) Take steps to correct all unsafe conditions or practices that are under the control of the Company.
 - R - Recognize Hazards*
 - E - Evaluate Hazards*
 - C - Control Hazards*
- (d) When it is the responsibility of others to correct unsafe conditions, notify those responsible, (i.e., Building Owner, Project Manager, General Contractor) verbally and/or in writing per company policy. Also notify your Superintendent/Manager that such unsafe conditions exist. Avoid the area until hazard(s) is removed.
- (e) Whenever unsafe practices by workers of other trades are observed that could effect personal safety or property damage, immediately notify your supervisor and report such practices, verbally and in writing, maintaining a copy, to:
 - (1) the Responsible person at the jobsite and
 - (2) the Elevator Company Superintendent/Manager.
- (f) When work must be performed or materials stored in areas accessible to the public, install proper barricades, warning signs, lights, etc.
- (g) Keep unauthorized persons out of areas where work is being performed, or where Company material is stored.
- (h) Be sure all employees know the hazards of the type of work to be performed. A brief explanation before starting the work may prevent an incident.
- (i) Do not work or allow any employee to work when their ability or alertness is impaired by fatigue, intoxicating beverages, illegal or prescription drugs, or any other physical cause that might expose the employee or others to injury and notify your Superintendent/ Manager immediately.

- (j) Maintain the Company Hazard Communication (HAZCOM) program and Material Safety Data Sheets (MSDSs) as appropriate. (See Section 14.)
- (k) Before leaving the jobsite for meals, at quitting time, or for any other reason, determine the whereabouts of each person on the crew(s) present on the jobsite.
- (l) Never allow Company equipment to be loaned to, borrowed or used by anyone other than Company personnel unless authorized by your Superintendent/ Manager.
- (m) Never allow non-Company personnel or non-Company material to be carried on false cars or incomplete elevators, escalators, or moving walks unless your Superintendent/ Manager's approval has been obtained.
- (n) Make sure that all tools, ladders, hoists, personal protective equipment, etc. are inspected for defects. Tag defective equipment and remove from use and from jobsite. Return for repair or replacement. Maintain company log when required.
- (o) Conduct and document jobsite Safety Meetings (Toolbox Talks) in compliance with Company policy.
- (p) Ensure the following items are posted as required:**
 - (1) OSHA material i.e., Federal & State posters, including copies of any citations issued at that jobsite.
 - (2) Location of first aid station and telephone for medical treatment, ambulance, fire department and police in a conspicuous place.
 - (3) Evacuation, fire and other emergency procedures are posted and meeting areas outside buildings are designated when evacuation is required.
- (q) A company-approved first-aid kit shall be on every job (construction, modernization and major repair) and kits shall be periodically checked and refilled as required.
- (r) Although all employees are responsible for their own safety and the safety of co-workers, correct Company employees

who fail to adhere to the safety requirements contained in this Handbook and the Company's safety policies. Report violations of the Company's Safety policies to your Supervisor/Manager when future disciplinary action may be warranted.

- (s) **Notify your Superintendent/Manager or Safety Department before proceeding with any inspection by local, state or federal government agency.**

1.3 Emergency Evacuation Procedures

- (a) Upon entering any jobsite or building familiarize yourself with the emergency exit route and evacuation procedure established by management of the facility.
- (b) React immediately and do not assume any alarm is false or a test.
 - 1. Remain Calm;
 - 2. Secure equipment to protect the public if necessary;
 - 3. Do not retrieve tools or personal belongings; and
 - 4. Proceed to the designated assembly area.
- (c) Upon evacuation of the facility immediately contact your supervisor or branch office for further instruction or follow your company's defined safety program.

Section 2

SAFETY INSPECTIONS

2.1 Need for Routine Safety Inspections

Safety inspections are a must in the elevator industry and required by OSHA regulations. Such inspections shall be conducted periodically to identify unsafe work practices and conditions that could injure company employees and/or the employees of others. Reasons for normal inspections include, but are not limited to:

- (a) Normal wear and tear on such items as ropes, slings, scaffold planks, hand tools and PPE.
- (b) Defects, damage and weather conditions.
- (c) Changing conditions and other trades on site.

2.2 Inspecting for Hazards

The Competent Person on the jobsite must be aware of all potential hazards on the jobsite and take immediate corrective action. The following is a sample checklist:

- D Is Company-provided information posted at jobsite (OSHA, emergency phone numbers, warning signs, etc.)?
- D Is the site clean and free of debris? Are materials stored or stacked neatly and a safe distance away from your work area?
- D Are Company-approved first-aid kits on the job? Are they periodically checked and refilled as required?
- D Are emergency first-aid responders readily available or first-aid trained people on the job?
- D Is drinking water available and container plainly marked?
- D Are personnel properly wearing Company-approved personal protective equipment when exposed to possible danger (i.e., gloves, work boots/shoes, hard hats, safety harnesses, safety glasses, goggles, welding hoods, etc.)?

- D Are company fire extinguishers inspected monthly, readily accessible and annual maintenance certificates up-to-date?
- D Are ground fault circuit interrupters (GFCIs) available and in proper use?
- D Are copies of your Company's Hazard Communication (HAZCOM) Program and MSDSs on the site?
- D Are hazardous materials used (i.e., welding and cutting equipment, etc.) stored properly?
- D Are required locks and tags for locking out equipment available and used properly?
- D Are open decks, scaffolds, planking, etc., enclosed with approved guardrails and toeboards or are employees using approved personal fall-arrest systems?
- D Are all elevator hoistways, entrances and escalator wellways properly barricaded with removable guardrails?
- D Are floor openings covered or protected by OSHA compliant guardrails?
- D Are all hand and power tools in safe condition and grounded or double insulated?
- D Are defective tools and equipment tagged with company-approved tags and removed from use?
- D Is hoisting and rigging equipment in good condition and properly rated?
- D Is material handling equipment in good condition and properly rated?
- D Are ladders and scaffolding in good condition and being properly used?
- D Are company-approved warning signs posted where necessary?
- D Do work and common areas have adequate lighting?
- D Are there any site specific hazards i.e., chemical plants, refineries, etc.

- D Are disconnects and controllers properly labeled?
- D Does the pit have adequate guards (i.e., counterweight guards, etc.), covers, is dry, and is there safe access and egress?

3. Pre-startup Safety Survey

A safety survey should be conducted on all construction, modernization and major repair projects prior to starting work. The responsibility for conducting a pre-startup survey shall be determined by the company. The following is a sample of the items that should be included on a pre-startup checklist.

1. Asbestos

- D Customer has identified all areas containing asbestos
- D Sampling has been conducted to ensure safe atmosphere
- D Precautions have been taken to avoid asbestos containing material
- D Employees have been properly trained, according to level of exposure

2.3.2 Lead Paint

- D Customer has identified all areas containing lead paint
- D Sampling has been conducted to ensure safe atmosphere
- D Precautions have been taken to avoid lead paint
- D Employees have been properly trained, depending on level of exposure

2.3.3 Document Requirements

- D EEO, OSHA & State Posters
- D Emergency phone numbers identified (i.e. fire, hospital)
- D OSHA 300 log available (if required)

2.3.4 Electrical

- D Wiring labeled and grounded
- D Adequate power provided in areas where needed
- D High voltage adequately identified and covered
- D Ground Fault Circuit Interrupters (GFCI) available

2.3.5 Fall Protection

- D Type of fall protection to be used is identified
- D Anchor points identified
- D Barricades installed properly per handbook (removable)

2.3.6 Fire Prevention

- D Fire extinguishers available
- D Wood/paper products or rubbish not in pit or machine room
- D Smoking/No-smoking areas identified

2.3.7 First Aid

- D Location of first aid station (or kit) identified
- D Trained personnel identified

2.3.8 General

- D Evaluate the location of work by other trades and determine impact

2.3.9 Hazard Communication

- D Chemical inventory list
- D Containers properly labeled
- D MSDS's readily available

2.3.10 Hoisting & Rigging

- D Adequate equipment for job
- D Equipment inspected and certified per manufacturer recommendations
- D Capacities identified (equipment and load), ensure equipment will meet expected lifting requirements

2.3.11 Housekeeping

- D General condition of work area
- D Walkways clear
- D Regular waste disposal schedule
- D Adequate lighting

2.3.12 Ladders/Stairwells

- D Access stairwells have guardrails installed
- D Stairwells properly lit
- D Serviceable ladders of sufficient height are available
- D Extension ladders have safety feet and extend 3 ft (914 mm) above landings
- D Safe access to work areas provided

2.3.13 Material Handling

- D Employees are trained to operate forklifts safely and sufficient equipment is available to move material safely (forklifts, dollies, handcarts, etc.)
- D Equipment in good working condition
- D Staging area for material and equipment identified

2.3.14 Scaffolds

- D Proper erection is supervised and inspected by Competent Person
- D Locking pins installed
- D Equipped with baseplates
- D Tied to the structure when required
- D Proper planking

2.3.15 Welding

- D Adequate equipment provided (if needed)
- D Area identified for proper cylinder storage
- D Adequate shielding is available (if needed)
- D Well ventilated area identified for welding
- D Properly inspected extinguisher available

Section 3

PERSONAL PROTECTIVE EQUIPMENT (PPE)

General Requirements

Employers shall ensure that personal protective equipment (for eyes, face, head, and extremities), protective clothing, respiratory devices, protective shields and barricades, are provided, used and maintained in a sanitary and reliable condition. **All employees shall have necessary personal protective equipment with them at all times.**

Employees shall inspect PPE each time before use to ensure that it is in good working order and replace as necessary (if damaged or per manufacturers' recommendation).

To assist in evaluating required PPE for individual jobsites, the Job Hazard Assessment Form is to be used. See Section 18.

Employee-Owned Equipment

Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

3.1 Proper Clothing

- (a) Do not wear shorts, tank tops or trousers with cuffs. Long-sleeve shirts are recommended.
- (b) Hand tools and other objects shall not be placed in the pockets of trousers due to the possibility of snagging on moving objects or contacting energized equipment.
- (c) Finger rings, loose jewelry and torn clothing are hazardous and shall not be worn.
- (d) When working around energized equipment, finger rings, metal-framed glasses, large belt buckles and watches shall be removed or protected to prevent contacting live components.
- (e) Personal protective equipment shall not be traded or exchanged unless sanitized.

- (f) Oil free clothing shall be worn when performing welding or cutting operations.
- (g) Always wear appropriate clothing when welding, grinding or working around an open flame.

3.2 Eye and Face Protection

OSHA standards require employers to provide suitable eye and face protection.

- (a) Types of protection
 - (1) Safety glasses with side protection (used for most situations).
 - (2) Goggles (used when dust or chemical splash hazards exist).
 - (A) Welder's Goggles
Used for gas cutting and welding operations. (See filter lens chart for proper shade and number in Figure 3a.)
 - (B) Welder's Shield
Used for electric arc-welding work. Lens shade chosen as above and protected by a clear cover glass.
 - (C) Face Shields
Shall be worn when entire face needs protection, (i.e.: flying sparks; chemical splash; etc.)
- (b) Employees shall wear eye and face protection equipment when machines or operations present potential eye or face injury from physical, chemical, or radiant agents, (i.e.: grinding; drilling; chiseling; babbiting; welding; dusty and windy atmosphere; etc.)
- (c) Eye and face protection shall meet the requirements specified in American National Standards Institute, "ANSI Z87.1-1989 (R1998), Practice for Occupational and Educational Eye and Face Protection."

- (d) Eye and face protection equipment shall be kept clean and in good repair. The use of this type equipment with structural or optical defects shall be prohibited.
- (e) Protection shall meet the following minimum requirements:
 - (1) Be adequate for the hazard.
 - (2) Fit snugly.
 - (3) Not interfere with the wearer's movements.
 - (4) Be durable, easy to clean, and capable of being disinfected.
 - (5) Be kept in good repair.
- (f) The user shall be instructed regarding any limitations or precautions indicated by the manufacturer.
- (g) Non-metallic eye protection shall be worn while working on or near electrical circuits or electrical apparatus.

Figure 3a

Filter lens shade numbers for protection against Radiant Energy	
Welding Operation	Shade Number
Shielded metal-arc welding 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	10
Gas-shielded arc welding (nonferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	11
Gas-shielded arc welding (ferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	12
Shielded metal arc welding (ferrous) 3/16-, 7/32-, 1/4-inch diameter electrodes	12
5/16-, 3/8-inch diameter electrodes	14
Atomic hydrogen welding	10-14
Carbon-arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, over 6 inches	5 or 6
Gas welding (light), up to 1/8-inch	4 or 5
Gas welding (medium), 1/8-inch to 1/2-inch	5 or 6
Gas welding (heavy), over 1/2-inch	6 or 8

*General Note: 1 in. = 25.4 mm

(h) Tinted (except yellow) and shaded eye protection shall not be worn indoors except for welding and cutting operations.

(i) Contact lenses are not recommended at work.

3.3 Occupational Head Protection

OSHA standards require employers to provide suitable head protection.

(a) Employees working in areas where there is a possible danger of head injury from impact, falling or flying objects, or from electric shock and burns shall be protected by hard hats.

(b) Hard hats are to be worn at all times during all phases of construction. For modernization and repair tasks in the hoistway, hard hats are required (unless in a finished car).

(c) Hard hats shall be worn with the suspension properly fitted.

(d) Before using your hard hat, inspect it for cracks, etc.

(e) Don't store hard hat where it is exposed to direct sunlight.

(f) The application of decals, stickers, etc. is not recommended unless required by the jobsite General Contractor. Painting of hard hats is not permitted.

3.4 Occupational Foot Protection

Employers shall assess their employees' needs based on the type of work they perform to determine the proper work shoe for each employee. Work shoes purchased after June 1, 2006, shall meet ASTM F2412-05 and ASTM F2413-05. In addition Personal Protection-Protective Footwear shall conform to the following requirements:

(a) Leather uppers

(b) Oil resistant soles

- (c) Class 75 for impact and compression protection; where protective toe caps are required.
- (d) Employees working around live electrical equipment shall have electrically rated soles (EH rating).

3.5 Hearing Protection

OSHA standards require employers to provide suitable hearing protection. Hearing protection will be provided and used whenever it is not feasible to reduce the noise levels or duration of exposure below 85 dB on a time-weighted average.

- (a) There is no cure for noise-induced hearing loss.
- (b) Clean non-disposable earplugs after each use.
- (c) Earmuffs need to make a perfect seal around the ear to be effective.
- (d) For extremely noisy situations, wear earplugs and earmuffs.

As a rule of thumb if you must raise your voice to speak to others at a distance of 5 ft (1.5 m) or less - hearing protection should be worn.

3.6 Personal Fall Arrest Equipment

OSHA standards require employers to provide suitable fall arrest equipment.

- (a) Personal fall arrest equipment shall be worn and lanyards attached to lifelines at all times when working in or within 6 ft (1.8 m) of an open hoistway where there is the potential to fall more than 6 ft (1.8 m).
- (b) Personal fall arrest equipment shall be used only for employee safeguarding.
- (c) Any lifeline, harness, anchor, or lanyard actually subjected to shock loading, as distinguished from static loading, shall be immediately removed from service and shall not be used again for employee safeguarding.

- (d) Lifelines shall be secured above the point of operation to an anchorage or structural member capable of supporting a minimum dead weight of 5,000 lb (2268 kg).
- (e) Each employee is to be properly trained on the proper use, maintenance and inspection of personal fall arrest systems.
- (f) Lanyards shall be attached to lifeline or suitable anchorage such that an employee cannot free fall more than 6 ft (1.8 m), exceed calculated forces, nor contact any lower level.
- (g) See Section 4 on Fall Protection.

3.7 Hand Protection (Gloves)

- (a) Gloves shall be worn when potential hazards exist that could cause injuries to the hands, (i.e.: cuts; abrasions; burns; hazardous chemical exposure; etc.).
- (b) Gloves SHALL NOT be worn when working near moving machinery.

3.8 Respiratory Protection

In general, industry work environments do not pose a health risk from breathing contaminated air. However, respiratory protection may occasionally be required by job site conditions or building owner requirements. Contact your supervisor for more information if needed.

To control those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to eliminate the atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, appropriate respirators shall be used or completely avoid area depending on company policy.

If approved by the company, NIOSH approved dust respirators (non-sealing) can be used without the following requirements as long as the employee has no known medical condition which would put them at risk (i.e., heart condition, respiratory difficulties, etc.) and the mask is discarded when contaminated.

- (a) Only physically qualified employees will be trained and authorized to use respirators. A pre-authorization and annual certification by a physician will be required and maintained.
- (b) Any changes in an employees' health or physical characteristics which may affect their ability to wear a respirator (i.e., 20% weight gain or loss, heart condition, respiratory problems, etc.) shall be reported to their supervisor and will be evaluated by a physician.
- (c) Only authorized and trained employees shall use respirators. Those employees may use only the respirator that they have been trained on and properly fitted to use. The training is required initially and shall reoccur annually. This training shall include:
 - (1) How to select the proper type of respirator and/or cartridge.
 - (2) How to inspect and maintain the respirator.
 - (3) How and when to use the respirator.
 - (4) Limitations and capabilities of the respirator.
- (d) Before an employee is required to use any respirator, the employee shall be clean shaven where the respirator meets the face, fit tested with the same make, model, style, and size of respirator that will be used on the job. The fit testing is required initially and shall reoccur annually.

Section 4

FALL PROTECTION

General Requirements

Fall protection is required when a worker is exposed to a fall hazard (working more than 6 ft (1.8 m) above a lower level and an opening more than 12 in. (305 mm)).

There are three ways of controlling fall hazards. Elimination of the fall hazard should be the first consideration. The second consideration is a guard rail system, and the third is a personal fall arrest system.

4.1 Personal Fall-Arrest System

Figure 4a

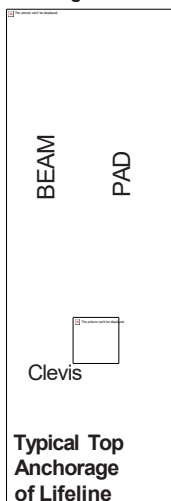
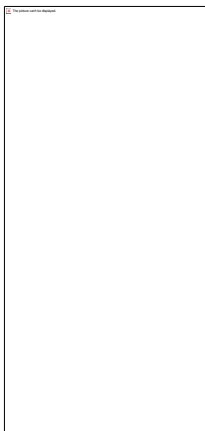
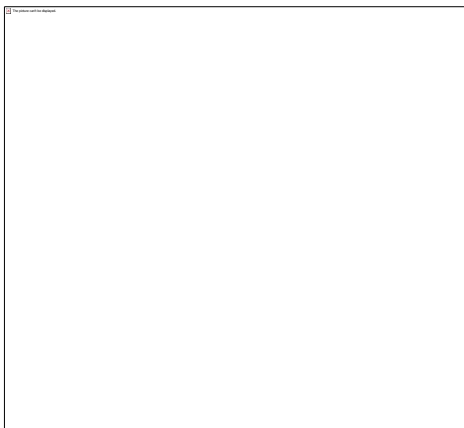


Figure 4b



Full-Body Harness



permit tying off before entering the hoistway/wellway. Prior to use the personal fall-arrest system shall be approved by a **Competent Person**.

- (e) Only one worker is permitted on a vertical lifeline, and that lifeline shall have a breaking strength greater than 5000 lbs (2268 kg) after it has been attached to the anchorage point.
- (f) Shock-absorbing lanyards shall be anchored to the lifeline and shall be above shoulder height so that any fall shall not exceed 6 ft (1.8 m). When determining fall heights be sure to use proper fall clearance distances (refer to figure 4b). Lanyards shall be connected to a vertical lifeline by means of a rope grab; the lanyard shall not be attached directly to the lifeline.
- (g) Lifelines, harnesses and shock-absorbing lanyards subjected to impact loading shall be immediately removed from service. They shall be eliminated and destroyed for employee safeguarding.
- (h) Tying to the hoist line is prohibited. Proper rope grab shall be used.
- (i) Fall protection shall be used on top of a completed elevator car where there is a fall hazard and the car is secured from movement.
- (j) On a completed car secured from movement, tie off when exposed to a fall hazard. Do not position yourself where there is fall hazard.
- (k) Replace personal fall protection equipment at intervals recommended by the manufacturer.
- (l) Before using a body harness, shock-absorbing lanyard and lifeline, inspect them carefully each time for signs of wear or damage.

1. *Inspection and Maintenance Checklist*

To maintain service life and high performance, personal fall arrest systems shall be inspected before each use. Replace the personal fall arrest system if any defective conditions are found.

- Webbing.* Grasp the webbing with your hands 6 in. (150 mm) to 8 in. (200 mm) apart. Bend the webbing in an inverted “U”. The resulting surface tension makes damaged fibers or cuts easier to see. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Watch for frayed edges, broken fibers, pulled stitches, cuts, burns and chemical damage.
- D-Rings/Back Pads.* Check D-rings for distortion, cracks, breaks, and rough or sharp edges. The D-ring should pivot freely. D-ring back pads should also be inspected for damage.
- Attachment of Buckles.* Attachments of buckles and D-rings should be given special attention. Note any unusual wear frayed or cut fibers or distortion the buckles or D-rings.
- Tongue/Grommets.* The tongue receives heavy wear from repeated buckling and unbuckling. Inspect for loose, distorted or broken grommets. Webbing shall not have additional punched holes.
- Tongue Buckle.* Buckle tongues shall be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. The roller shall turn freely on the frame. Check for distortion or sharp edges.
- Friction and Mating Buckles.* Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points of the center bar.

Visual Indications of Damage to Webbing and Rope. The following indications refer to nylon and polyester webbing:

- *Heat.* In excessive heat, webbing becomes brittle and has a shriveled brownish appearance. Fibers will break when flexed. Harnesses made of these materials should not be used at temperatures above 180 degrees Fahrenheit.
- *Chemical.* Changes in color usually appearing as a brownish smear or smudge. Transverse cracks appear when bent over a mandrel. Loss of elasticity.
- *Molten Metal or Flame.* Webbing strands fuse together. Hard shiny spots appear. Hard and brittle feel.
- *Paint and Solvents.* Paint that penetrates and dries restricts movement of fibers. Drying agents and solvents in some paints cause chemical damage.

4.2 Guardrail Systems

General

OSHA compliant guardrail systems for car tops, open hoistways or escalator wellways shall have a top rail 42 in. ± 3 in. (1067 mm ± 76 mm) high, with a mid-rail 21 in. (533 mm) high at centerline and toeboards. 3-1/2 in. (90 mm) high, with no greater than 8 ft (2.4 m) between uprights and shall be capable of sustaining a force equal to 200 lbf (890 N) at the top rail, 150 lbf (667 N) at the midrail, and 50 lbf (222 N) at the toeboard. When 200 lbf (890 N) is applied, the top rail shall not deflect lower than 39 in. (991 mm) (See Figures c, d and e)

- (a) OSHA compliant removable guardrail systems with toeboards shall be installed at elevator hoistways or escalator wellways typically by the General Contractor, after either rough or finished floors are in place.
- (b) Signs shall be installed warning against removal. It is also recommended that a sign indicate "Caution: Workers in Hoistway."

- (c) After hoistways are enclosed, and before permanent doors are installed, openings shall be protected by removable guard-rail systems (including toeboards).
- (d) If it is necessary to remove the guardrails, be sure to replace them before leaving the area.
- (e) Wire-rope guardrail systems are not recommended for guarding hoistways. Where used, post spacing shall not be greater than 8 ft (2.4 m) and they shall not deflect to a height less than 39 in. above the walking/ working level when a force of 200 lbf (890 N) is applied. Warning flags shall be attached every 6 ft (1.8 m), toeboards shall be provided and they must be easily removable for access to the hoistway at the terminal landings.
- (f) If guardrails are not properly maintained in place, notify your Superintendent/Manager and the General Contractor's Superintendent immediately.
- (g) On new installation, modernization, or major repair jobs where the general public is present, solid barricades at least 8 ft (2.4 m) high shall be used to fully enclose the work areas, open hoistways and escalator wellways. They shall be properly secured to avoid unauthorized access.
- (h) When a guardrail is removed to perform a job, a personal fall-arrest system must be utilized when a fall hazard is present.

NOTE: The methods shown in Figures 4d and 4e are recommended as a means of providing maximum protection and flexibility during construction. Do not use during modernization or major repair jobs where the general public is present – use only solid barricades.

Figure 4c
Osha compliant cartop guardrail system

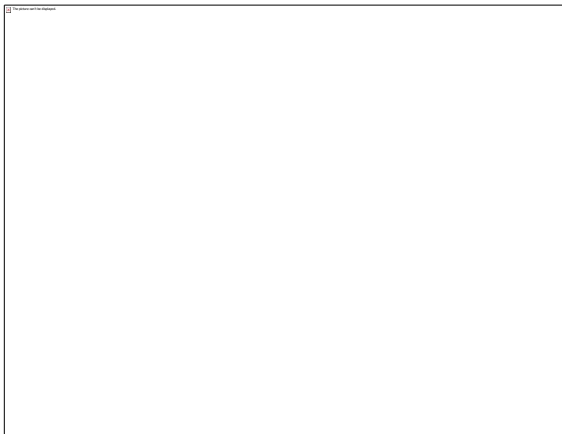


Figure 4d

SUGGESTED GUARDRAIL SYSTEMS

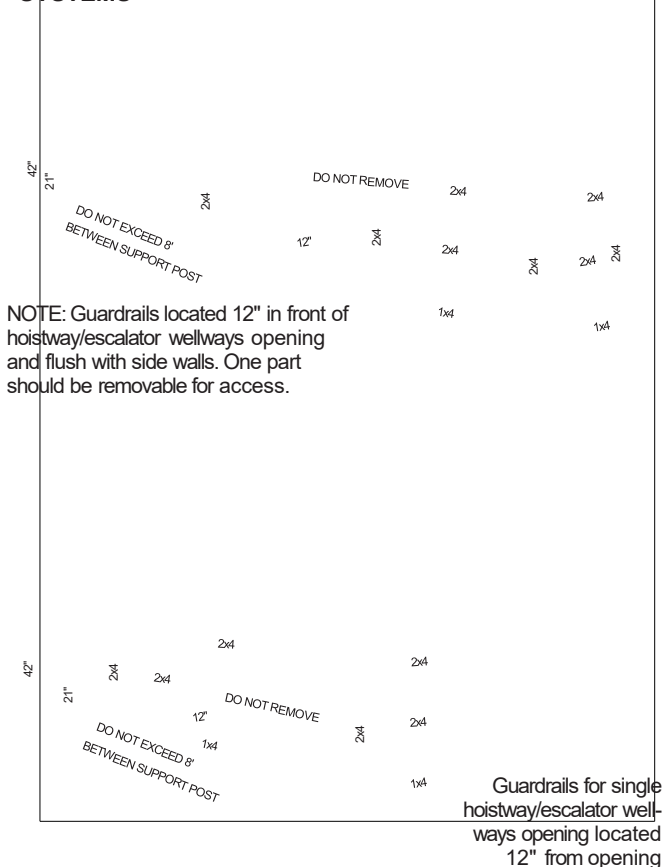
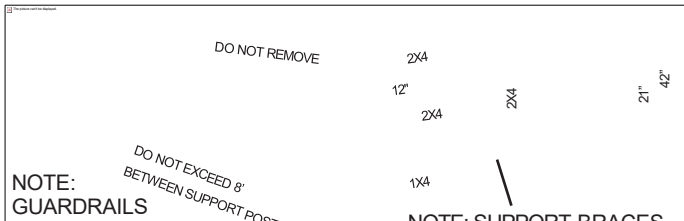


Figure 4e

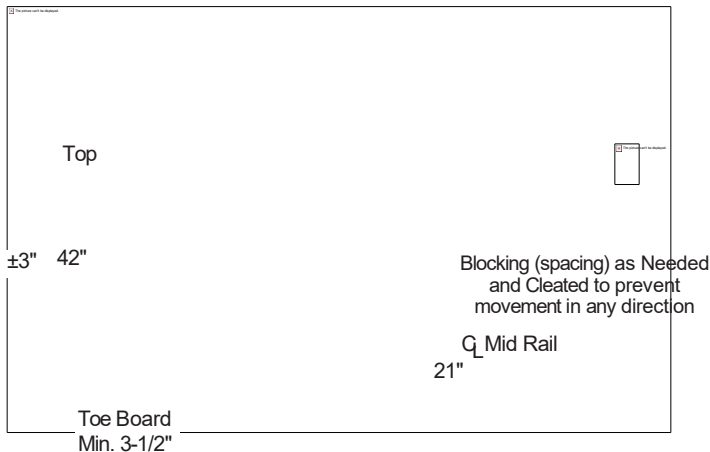
SUGGESTED GUARDRAIL SYSTEMS



NOTE:
GUARDRAILS
LOCATED 12" IN
FRONT OF HOISTWAY/
ESCALATOR WELLWAY
OPENING

NOTE: SUPPORT BRACES
TO BE MOUNTED AT EACH
SUPPORT POST

SHADED AREA ABOVE REPRESENTS CLEAR
HOISTWAY/ESCALATOR WELLWAY OPENING

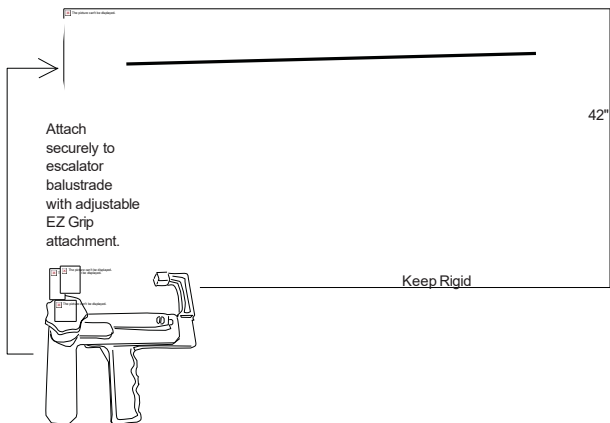


Removable Guardrails:
Space out from walls to permit Entrance Frame Installation.

4.3 Escalator/Moving Walk Barricades

- (a) Barricades shall be positioned to completely surround the escalator/moving walk from public access.
- (b) Barricades shall be positioned to surround, from public access, floor opening created when equipment access plate(s) are removed.
- (c) Barricades shall be a minimum of 42 in. (1067 mm) high.
- (d) Barricades shall be securely attached to the balustrades, handrails and/or floor.
- (e) All sections shall be connected.
- (f) A system shall be in place to keep the barricade rigid.
- (g) See figure 4f.

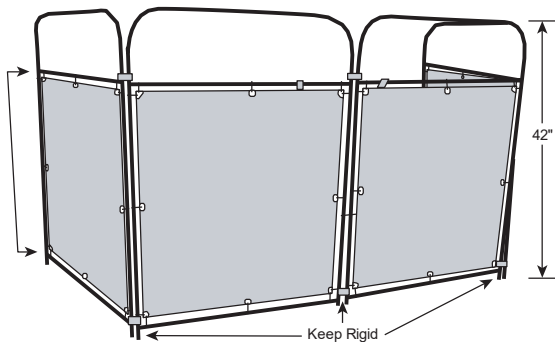
Figure 4f



4.4 Elevator Maintenance Barricades

- (a) Barricade shall be positioned to restrict public access to the hoistway where doors are open greater than 5 in. (125 mm).
- (b) Barricade shall be a minimum of 42 in. (1067 mm) high.
- (c) Barricade shall cover entire entrance area.
- (d) All sections shall be connected.
- (e) A system shall be in place to keep the barricade rigid.
- (f) See Figure 4g.

Figure 4g



Barricade

Section 5

ELECTRICAL SAFETY

5.1 General Precautions

- (a) When power is not required to perform the task, lockout/tagout procedures must be followed. Testing and troubleshooting may be done live, but repairs can only be done when system has been properly de-energized or circuits isolated.
- (b) THE FOLLOWING PERSONAL PROTECTIVE EQUIPMENT SHALL BE WORN WHEN TROUBLESHOOTING LIVE ELECTRICAL CIRCUITS:
 - For arc-flash protection long-sleeved natural-fiber or FR-rated shirts and pants, long-sleeved FR-rated coveralls or other company-approved arc-flash-hazard protection
 - For arc-flash protection clean leather gloves when working with 240 volts or more
 - Nonconductive safety glasses
 - EH-rated footwear or rubber mats
 - For electric shock protection, rubber insulated gloves with leather protectors rated for the voltage present. When the danger from electric shock extends to arms as well, rated rubber insulating sleeves in addition to the gloves
- (c) Always use a circuit tester on each circuit before troubleshooting on it because all voltages can be dangerous. Contact with even low voltages can result in serious injury.
- (d) All circuits shall always be treated as LIVE unless tests prove otherwise.
- (e) Before troubleshooting any electrical circuits or apparatus, remove all jewelry, keyrings, cell phones, radios, pagers and other metal objects, etc.

- (f) Never troubleshoot circuits when standing or kneeling on metal, wet surfaces or in water.
- (g) When troubleshooting live circuits, take care to be safely isolated (i.e., rubber mats, isolated tools, EH rated shoes, etc.).
- (h) To prevent shocks, take precautions to:
 - (1) Keep metal objects from touching or being exposed to any LIVE parts, moving machine parts or connections.
 - (2) Do not wear tool belts and do not carry tools in your pockets.
- (i) Use only double-insulated rated tools when troubleshooting on circuits that may not be de-energized.
- (j) While troubleshooting on MG Sets, elevator motors and solid-state motor drives, take extreme precaution, because the armature voltage present may be as high as 600 volts.
- (k) Exercise caution (Be cognizant and prepared to test other circuits that may be "LIVE") when troubleshooting on multi-car operations especially in group systems, which may have circuits that are LIVE. Even when the mainline disconnect switch is OFF, other circuits may be powered from other sources (group controls, cab lighting, etc.)
- (l) **Always** use fuse pullers to remove and install fuses. Fuses and fuse holders should be marked for proper size and type. Never use a higher amperage fuse, a fuse of a different type or bridge a fuse.
- (m) Use nonconductive flashlights.
- (n) Temporary wiring can be hazardous. All temporary wiring shall comply with the **NEC and OSHA 1910.305**. But when temporary wiring is used, locate wiring in such a manner that no one can trip over it. **Take precautions to protect temporary wiring** from sharp edges and mechanical damage and do not support it with nails or wires.

- (o) All 110-volt, 15- or 20-amp circuits shall be grounded, except temporary lighting circuits. Do not wire outlet receptacles into lighting circuits unless they are grounded.
- (p) Never troubleshoot on live circuits unless necessary to perform task. See Section 7 Lock-out/Tag-out.
- (q) Always replace covers on electrical equipment after troubleshooting is completed.
- (r) **DO NOT OPEN THE MAINLINE DISCONNECT SWITCH COVER.** If power is not being supplied to the elevator controller (e.g. open mainline fuses, etc.), advise the building owner to correct the condition. This is not the elevator company's responsibility.
- (s) Keep electric cabinet doors closed when system is energized, whenever possible.
- (t) A ground fault circuit interrupter (GFCI) is required when using portable power tools and drop lights. GFCIs should be tested prior to each use.

5.2 Meter Usage Safety Checklist

- Use Category III multimeters.
- Follow the manufacturer's safety procedures for the meter used.
- Be certain the meter is in good operating condition. Notify your supervisor immediately if the meter is damaged.
- The meter used must meet accepted safety standards for the environment it will be used in.
- Use a meter with fused current inputs and be sure to check the fuses before taking measurements.
- Inspect test leads for physical damage before making measurements. If damaged, replace them before proceeding.
- Use the meter to check continuity of the test leads.
- Use only test leads that have shrouded connectors and finger guards.
- Use only meters with recessed input jacks.
- Select the proper function and range for your measurement and double check before proceeding.

- Be aware of high-current and high-voltage situations and use the appropriate equipment, such as high-voltage probes and high-current clamps.
- Always disconnect the “hot” (red) test lead first.
- Use a meter that has overload protection on the ohm function.
- When measuring current without a current clamp, turn the power off before connecting into the circuit.

5.3 Energized Circuit Troubleshooting Checklist

Work on de-energized circuits and use lockout/tagout procedures whenever possible.

(a) On live circuits, use personal protective equipment (PPE).

- Use insulated tools.
- Wear nonconductive safety glasses or a face shield.
- Wear rubber insulated gloves with leather protectors rated for the voltage present. Where danger from electric shock extends to arms wear rated rubber sleeves in addition to gloves.
- Remove watches, jewelry or other metal objects.
- Stand on an insulated mat or use safety shoes with electrically rated soles.
- Wear long-sleeved natural-fiber or FR-rated shirts and pants, long-sleeved FR-rated coveralls or other company-approved arc-flash-hazard protection. (Check with your company procedures for specific uniform requirements.)

(b) When taking measurements on live circuits:

- Hook on the ground clip first, and then make contact with the hot lead. Remove the hot lead first and the ground lead last.
- Hang or rest the meter if possible. Try to avoid holding it in your hands to minimize personal exposure to the effects of transients.

- Use the three-point test method, especially when checking to see if a circuit is dead. First, test a known live circuit. Second, test the target circuit. Third, test the live circuit again. This verifies that your meter worked properly before and after the measurement.
- Use the old electrician's trick of keeping one hand in your pocket. This lessens the chance of a closed circuit across your chest and through your heart.

Section 6

PROPER USE OF JUMPERS

- (a) It is recognized that temporary circuit jumpers or clips (jumpers) may be required for conducting some service work on elevators, escalators or moving walks. All field personnel shall be trained in the proper use of jumpers for defeating safety circuits. When jumpers are used they shall have the following characteristics:
 - (1) Extra-long, tied in knots, and brightly colored wires or clips.
 - (2) Jumpers shall be numbered in sequence.
 - (3) The ends of jumper wires shall be affixed with insulated alligator clips.
 - (4) Each employee shall have his/her name or personnel number marked in indelible ink on a label permanently attached to each jumper.
- (b) Make sure you understand what effect using or removing a jumper will have on the entire elevator or escalator system prior to use.
- (c) Jumper wires shall never be placed or configured to resemble permanent wiring.
- (d) The number of jumpers carried shall be limited so that all jumpers can be accounted for at all times (numbering jumpers in sequence will help). Jumpers shall be removed and accounted for when returning equipment to service.
- (e) Equipment shall never be returned to service with jumpers left on. Equipment found in this condition shall be reported to your Superintendent/Manager immediately.

1. Maintenance and Troubleshooting

1. Rules

- (a) Jumpers shall not be used as a diagnostic tool. Always use a meter to troubleshoot circuits.
- (b) Temporary bridging (e.g., tomahawk) devices shall not be used to short out hall door contacts.
- (c) Do not jump out door and gate at the same time.
NOTE: You may deviate from this requirement only when a second qualified person is on site and in direct communication. **USE EXTREME CAUTION WHEN THESE CIRCUITS ARE JUMPED OUT.**
- (d) Ensure that elevator is on inspection before placing jumpers on door, gate, or safety circuits. Make a visual inspection that all hoistway doors are mechanically closed.
- (e) **Ensure all jumpers are removed before placing equipment back in service.**

6.1.2 Procedures for Jumper Use

- (a) Remove elevator from public use and ensure no passengers are in the elevator.
- (b) Place jumper kit on machine room door handle or other conspicuous place.
- (c) Verbally communicate to all other elevator personnel on the jobsite when jumper(s) are to be used. This communication provides needed information on circuits bypassed and equipment affected.
- (d) When work is complete, all jumpers shall be removed, counted and returned to the jumper kit.
- (e) Never leave jumpers on equipment or in the machine room.

6.2 Modernization and New Construction

On modernization and construction many jumpers are used to operate elevators.

- (a) Jumpers shall be brightly colored, easily identifiable and shall be long and conspicuous.
- (b) A Jumper Log shall be established to ensure that affected personnel are aware of the safety circuits which are not functioning. It is the responsibility of the mechanic/mechanic in charge to ensure that the Jumper Log is completed. The Jumper Log shall be kept with the controller and shall not be removed until all jumpers are removed.
- (c) Door, gate, or other safety circuits shall never be jumped out unless car is on inspection in the controller.
- (d) Jumpers shall be removed as soon as they are no longer needed, maintenance and troubleshooting procedures outlined above shall be followed.

In addition to the above, stickers shall be placed in the controller cabinet, in close proximity to the inspection/automatic switches, which read as follows:

DOOR, GATE OR SAFETY CIRCUITS SHALL NEVER
BE JUMPED OUT UNLESS CAR IS ON INSPECTION IN
THE CONTROLLER.

Before moving car with open doors, verify car is on inspection.

6.3 Door Bypass Procedure

- (a) Inspection operation with open door circuits (ASME A17.1, Requirement 2.26.1.5) shall only be utilized when it is necessary to move an elevator when the car gate and/or door lock circuit is electrically open. Before utilizing this, steps shall be taken to identify the problem circuit (car gate or door lock) and bypass only that circuit. Once a decision is made to utilize door bypass circuitry, the elevator shall be placed on inspection operation via the car top or the in-car inspection switches. Once on inspection operation, the pertinent switch(es) can be switched to “bypass” position. Then, whenever possible, the elevator shall always be operated from the top of the car.
- (b) Extreme caution shall be taken prior to and while moving the elevator to ensure the safety of the public and elevator personnel, i.e., unprotected openings, body parts clear of moving equipment, equipment unobstructed, etc.
- (c) Once the purpose for using the door bypass circuitry has been met, the switch(es) are to be switched to the “open” position. A thorough check of the car gate/door lock circuitry shall then be performed to ensure proper operation. Once this is confirmed, the elevator shall be placed back on automatic operation and returned to service.

Section 7

LOCKOUT AND TAGOUT

General Requirements

The procedures outlined below are intended to prevent injury or death to employees by requiring certain procedures be taken before working on equipment. Unless it is not feasible (i.e., inspecting, troubleshooting, observing, etc.), employees shall not perform any work on equipment where there is a potential to be exposed to energized mechanical or electrical hazards until all sources of energy have been de-energized, grounded or guarded.

Equipment variations require the mechanic to know what car controls are available and operating; the mechanic must know what safety methods will be employed to gain control of the car. Never access the hoistway unless you have control of the car.

All forms of potential energy including electrical, mechanical, hydraulic, pneumatic, kinetic, gravity, etc. shall be controlled to prevent inadvertent movement of a unit or piece of equipment being worked on.

7.1 Procedures

- (a) Understand the equipment; be aware of its potential hazards. If it is not understood, or if you have a question, contact your Superintendent/Manager immediately before proceeding.
- (b) Where the accidental starting of the equipment would create a hazard – deactivate mainline disconnect switch to shut off the power. **CAUTION:** Do not stand directly in front of the mainline disconnect when operating (**stand off to the side of the disconnect**). Each employee shall apply to the disconnect switch a personal lock and a “Do Not Start” tag with the employee’s name (Section 5.3).

- (c) Some components (capacitors, MG sets, etc.) often store residual energy, even though power is shut off. The stored energy can result in electrical shock or unintended movement of equipment. Before working on equipment with these components, discharge the stored energy to ground.
- (d) When it is impossible to lock the switch, assurances shall be made that the circuit is deactivated and tagged out.

Figure 7a



- (e) **CAUTION:** It is possible to have electrical energy on a controller that has had the mainline-disconnect switch deactivated. After initiating lockout and tagout, the lighting circuit may still be energized.
- (f) Once the system has been locked out, verify with the appropriate test equipment that the system has been de-energized. (see Section 5.3)
- (g) Before working on mechanical systems, make sure the system is understood. If there are any questions, get answers before proceeding. Such systems often store energy, even though the electrical power is shut off. The stored energy can result in violent movement of a machine part, such as a plunger or piston rod, when work is done on another portion of the equipment. If the portion of the system to be worked on can be isolated and the pressure in that portion of the system released by bleeding, it is not necessary to shut down the entire system. However, the valves and controls which could readmit pressure to the system being worked on shall be identified with "Do Not Start" tags and locked out. If a lockout is not possible, other positive action shall be taken to ensure that the equipment will not be energized. Check flanged connections, cylinder heads or plate-mounted components. The sticking of a gasket can hold the parts together, while bolts are removed, and then can come apart violently due to stored pressure.
- (h) When working under a hydraulic elevator, devices such as jacks, pipe stands, etc. shall be installed to prevent the elevator from injuring workers in the pit.
- (i) Each employee who performs duties described above will be provided with an individually keyed or combination lockout device and tags. If more than one employee is assigned to a task, each employee shall be responsible for placing their own lock and "Do Not Start" tag, so the controls cannot be operated.

- (j) If controls are so located that only one lock can be accommodated, a multiple lockout device shall be used.
- (k) Lockout devices shall be made available for locking out additional equipment.
- (l) Where special devices are required to lockout circuit breakers, they shall be available and used.
- (m) Lockout devices shall be returned to the Company when an employee transfers to other assignments or terminates.
- (n) When switches are deactivated for service, repairs or alterations, they shall be locked out and tagged out.
- (o) Before starting work on any equipment that is out of service, make a thorough check of all electrical control and starting devices. When any part of such equipment is remotely controlled, lockout and tagout the mainline disconnect and confirm that the system is de-energized [Section 7.1(f)].

7.1.1 Shift Changes

- (a) When employees are ending their shift and/or other employees will continue work on the machine or equipment, the employees shall attach the company locks and tags and then shall remove their personal locks and tags.
- (b) The new shift employees shall apply their personal locks and tags before beginning work on the machine or equipment. After the employees have placed their personal lockout mechanism and tag, and have verified that the system is de-energized the company locks and tags shall be removed.

7.1.2 Restoring Equipment and Machines to Normal Service

- (a) All tools shall be removed, all guards and covers shall be reinstalled and the area shall be checked to insure that no personnel are exposed to the equipment or machine.

- (b) The mechanic, after checking to make sure that no one is exposed to the equipment or machine, shall restore energy to it.
- (c) After each portion of the work is completed, the individual who places the lockout mechanism shall be responsible for its removal. If more than one operation is performed on a piece of equipment, machine or system, it will be necessary for each individual to remove their lockout mechanism immediately after their work task has ended. The last individual to remove their lockout mechanism shall notify the customer that all work has ended.
- (d) The unit shall be operated in the normal mode before returning it to service.
- (e) Remove out of service tags.
- (f) Notify the customer that the unit is back in service.

7.2 Supervisory/Emergency Removal of Lockout/Tagout

- (a) If it is necessary to operate a piece of equipment which is locked out, every effort shall be made to locate the employee whose lock is on the equipment. If the employee cannot be located, and after positive assurance is made that no one is working on the locked out equipment, your Superintendent/Manager may personally remove the lock. The Superintendent/ Manager must remember that there is danger of the employee involved returning, thinking the machine is still locked out, when actually it has been reactivated. The Superintendent/Manager shall ensure that the equipment is, once again, locked out before the employee resumes work.

- (b) If a machine is locked out and it becomes necessary to leave, recheck upon returning to make sure the machine is still locked out. While supervisors will make every effort to avoid removing locks, there may be situations when it must be done. The recheck is for your protection.

7.3 Lockout/Tagout Procedures for Escalators and Moving Walks

- (a) The applicable procedures in Sections 7.1 and 7.2 apply to all employees who work on escalators and moving walks. Anytime work is to be performed within the interior plane of the steps/ pallets, it shall be locked out and tagged out to prevent the unit from starting unexpectedly.
- (b) In addition to lockout/tagout, whenever working within the truss where 10% or more of the escalator steps are removed, a mechanical blocking device shall be activated to prevent the escalator from moving. If the unit is not equipped with a mechanical blocking device, the drive chain and/or step axles must be secured to the truss braces to prevent movement in either direction.
- (c) Whenever steps are removed and the unit is going to be left out-of-service, the steps/pallets should be moved to cover the openings (whenever possible).

7.4 MRL Car Movement Locking Devices

Some machine-room-less elevators are equipped with special car movement locking devices that provide an independent method of securing the car. The cartop can then safely be used for performing maintenance, inspection, adjustments, or repairs to overhead equipment.

- Elevator suspension must be in place
- The device is typically located on the crosshead

- It shall have a sign stating "WARNING!" Engage before maintaining on inspecting brake, emergency brake or controller.

Section 8

HOISTWAYS AND MACHINE ROOMS

1. Hoistway Access Safety

Prior to gaining access to the hoistway, determine whether power is needed to perform the required task. If not, the appropriate lockout/tagout procedure shall be used. (See Section 7.) Do not open the hoistway door more than 6 in. (152 mm) until you determine the car or car top is located in a safe position to access.

1. *Top-of-Car Access/Egress Procedure*

CAUTION: Besides examination, inspection, maintenance and adjustment work that must be done on the car top, there is a considerable amount of work in the hoistway which must be done from the top of the car and, at times with the car in motion. *Examples of safe access/egress procedures are outlined below.*

1. *Accessing Top-of-Car*

Prior to accessing the hoistway always verify that the elevator has arrived before stepping into or on the car.

(a) Hoistway Access Switch Provided:

- Capture the elevator, and take it to the top access landing.
- Activate the means to disable the operating devices, (in car inspection service) located in the COP. Verify that the elevator is not on automatic operation by attempting to register multiple car calls.
- Insert proper door wedge tool to mechanically hold the door(s) in the open position, stay clear from the entrance and lower the car to a safe height by using the hoistway access switch to run the car in the down direction. Note: Be aware of car door clearances.

- Remove key from hallway access switch.
- Reach into the hoistway and place the top-of-car stop switch in the “STOP” position and turn the car top work light “ON”.
- Insert key into the hall access switch and try to move elevator in both directions. It should not move. Remove key.
- Place the car top inspection switch in the “INSPECT” position and the car top STOP switch to “RUN”. Reinsert the access key switch and try to run the car in both directions. It should not move. Remove key.
- Before stepping onto the car top, activate STOP switch to “STOP”, locate a safe refuge area and access the car top.
- Remove door wedge tool and allow doors to close.
- Proceed with necessary tasks in hoistway ensuring car top station remains on INSPECT and stop switch is in the STOP position when work is being performed.

CAUTION: Be sure you have a surface to stand on that will support your weight. Don't stand on the car top emergency exit or the fan unit and use special care where the car tops are curved or domed.

(b) Without Hoistway Access Switch:

- Capture the elevator, and take it to the top access landing.
- Establish down demand by activating 2 in-car car calls.
- Using an approved door unlocking device, stop the elevator in flight to verify the door interlock by opening the hoistway no more than 6 inches. Be sure to stop the elevator in a safe position to safely reach the car top inspection run box.
- Insert proper door wedge tool and place the top-of-car stop switch in the “STOP” position, remove your door wedge tool and allow the doors to close

- Wait ten seconds and open the hoistway door no more than 6 inches to verify the top-of-car stop switch is working. Car should not move.
- Insert proper door wedge tool and place the car top inspection switch in the “INSPECT” position and the car top STOP switch to “RUN”. Remove your door wedge tool and allow the doors to close.
- Wait ten seconds and open the hoistway door no more than 6 inches to verify the top-of-car inspection switch is working. Car should not move.
- Insert proper door wedge tool and activate car top STOP switch to “STOP” position.
- Locate a safe refuge area and access the car top. Remove door wedge tool and allow doors to close.
- Proceed with necessary tasks in hoistway ensuring car top station remains on INSPECT and stop switch is in the STOP position when work is being performed.

CAUTION: Be sure you have a surface to stand on that will support your weight. Don't stand on the car top emergency exit or the fan unit and use special care where the car tops are curved or domed.

- (c) When in a multiple hoistway, **never place any part of your body in the runway of an adjacent operational elevator.**

NOTE: On elevators without top-of-car inspection stations, use the proper procedures in Section 8.1.2 (j).

8.1.1.2 Exiting Top-of-Car

- (a) Position top-of-car level with the egress landing. When a hoistway access switch is provided, position the top-of-car at the landing where the top access switch is located.
- (b) Place the top-of-car stop switch in the “STOP” position.
- (c) Check for tools, keys, rags or any other equipment.

- (d) Slowly open hoistway door and place door wedge tool into the sill.
- (e) Step off top-of-car onto landing.
- (f) Place the inspection switch in the “NORMAL” position.
- (g) Place the top-of-car stop switch in the “RUN” position and turn off the car top work light.
- (h) When a hoistway access switch is provided, with the hoistway door(s) in the open position, activate hoistway access switch to run the car up. Stay clear of moving car. Deactivate the means to disable operating devices.
- (i) Remove door wedge tool and close hoistway door to engage pickup rollers with door clutch.
- (j) Inside cab return “Access-Enable” to NORMAL or OFF position disabling access switch.
- (k) Verify elevator is operational by placing a hall call.

8.1.2 Safety precautions when working on car tops:

- (a) Familiarize yourself with the position of the car and counterweights of the car being accessed as well as any other cars/counterweights in the vicinity and take appropriate measures to keep yourself and others away from hazards.
- (b) If movement of the car is needed while on top of the car, be sure to have a firm hold on the crosshead, or other part of the car structure.
- (c) Never stand or sit on the crosshead when the car is moving.
- (d) Never hold onto the ropes, sheaves or sheave guard.
- (e) If the car top is not clean (i.e., oil, grease), clean it prior to performing any activities.
- (f) Verify proper operation of top-of-car inspection operating buttons.
- (g) Where outlets are provided, use a grounded portable light with a suitable, non-conductive or grounded lamp guard and reflector.

- (h) Electrical cords are not to be hung on car or counterweight ropes.
- (i) When a top-of-car operating device is available and operational, use it to operate the car instead of depending on an operator in the car.
- (j) If top-of-car operating device is not available and you must ride on top of the car ensure:
 - (1) The person on the car top shall identify and be positioned in a safe refuge space. Do not enter areas marked with Red and White strips.
 - (2) The operator in the car is briefed on the signals to be used.
 - (3) The operator in the car repeats instructions each time before moving the car.
 - (4) That hall buttons cannot control the car.
 - (5) The operator shall only run the car on the slowest possible speed and only in the specified direction.
 - (6) In the case of single and collective-operation elevators or any elevator whose reversal at the terminals is automatically controlled, instruct the operator to reverse the direction of the car before the terminals by means of the reversal switch in the car.
- (k) When a fall hazard exists, fall protection shall be used. (See Section 4.)
- (l) Wire ropes shall only be inspected or lubricated when the car is stopped. Avoid pinch points.
- (m) When opening hoistway doors from the car top, do so slowly so that no one steps in from the landing thinking a car has arrived.
- (n) Observe overhead clearances.
- (o) Use extra care when working on car tops that are curved, domed, or located in unenclosed hoistways.
- (p) Do not leave parts, lubricants, etc on the top of elevator cars. This is a violation of the ASME A17.1 Code.

- (q) The car top emergency exit shall remain in the closed position except when passing through same.
- (r) Before performing repairs from top-of-car, with the car at or above the top landing, place a ladder in car under top emergency exit to provide means of exiting from car top.

2. Pit Safety

1. General

- (a) Many serious injuries occur every year, entering and exiting pits. Every employee must be aware of the hazards before entering a pit. Some of the more common hazards are:
 - (1) Inadequate refuge space
 - (2) Inadequate lighting
 - (3) Improper access
 - (4) Tripping hazards
 - (5) Unsafe or lack of pit ladders
 - (6) Moisture/water/oil
 - (7) Moving equipment

Take appropriate steps to minimize these hazards and any others that are identified.

- (b) Before entering a pit, familiarize yourself with the position of the car and counterweights for the car being worked on as well as any other cars/counterweights in the vicinity.
- (c) Control of the car shall be obtained prior to entry into the pit.
- (d) If notified by the building owner or representative that the pit and/or hoistway has been classified as a permit required confined space (this notification could be verbal or the pit/hoistway may be labeled), immediately notify your Superintendent /Manager for further instructions. In either case, DO NOT enter the pit/hoistway until consulting your Superintendent/Manager and receiving authorization.

8.2.2 Elevator Pit Access/Egress Procedure

NOTE: These procedures do not apply to walk-in pits. See Section 8.2.3 for Walk-in Pit procedures.

8.2.2.1 Accessing Pits

- (a) When the movement of the elevator is required, the following procedure shall be followed in lieu of the Lockout/Tagout procedure in Section 7.
 - (b) Lockout/Tagout procedures are required if movement of the elevator is not needed to complete the work being performed. (See Section 7.)
 - (c) Before entering the pit, notify the building manager/owner that you will be servicing the elevator. Tag the elevator out of service by placing a sign on the controller stating "ELEVATOR IS UNDER THE CONTROL OF A SERVICE PERSON - DO NOT OPERATE."
 - (d) Install barricades if the hoistway door is going to be open more than 5 in. (125 mm) while performing your work. (See Section 4.4)
 - (e) When a hoistway access switch is provided capture the elevator at the lower access landing and activate the "Access-Enable" to disable operating devices located at the car-operating panel. Verify elevator is not on automatic by registering multiple car calls. With the hoistway door(s) held in the half-open position, activate hoistway access switch to run the car up until toe guard clears opening. Stay clear of moving car.
 - (f) When a hoistway access switch is not provided, capture the elevator and place two car calls to upper floors to establish an up demand. As the elevator moves away from the landing, open the hoistway door with a hoistway door unlocking device key to insure interlock stops the elevator.
- CAUTION:** When using hoistway door unlocking device keys be aware of pinch hazard when the hoistway door opens under power.
- (g) If hoistway access switches or hoistway door unlocking devices are not provided follow your company safety procedures for accessing the hoistway.

- (h) Before accessing the elevator pit, place a door wedge tool in the sill to ensure that the hoistway door(s) will not shut, turn the pit light on and place the pit stop switch in the "STOP" position.
- (i) Insert access key. Try to move elevator in both directions. It should not move. Remove key from switch.
- (j) Where an access ladder exposes a person to a fall hazard of 6 ft (1.8 m) or greater; and
 - (1) The ladder is further than 29.5 in. (750 mm) from the interior edge of the door frame; or
 - (2) The ladder or handhold extends less than 42 in. (1067 mm) above the access landing,
 - (3) The clearance between the ladder rungs and side wall is less than 4.5 in., a hazard assessment shall be conducted to identify the necessary safety precautions.
- (k) If the pit does not have a pit stop switch, the lockout/tagout procedure is to be implemented before entering the elevator pit. (See Section 7.)
- (l) Standing outside the hoistway, remove door wedge tool and close the hoistway door. Enter a hall call and wait 10 seconds to verify the elevator will not run and to verify that the pit stop switch is working. When working on a multiple bank of elevators wait for a minimum of 20 seconds to verify the elevator you are working on will not run.
- (m) Once verification of the pit stop switch operation is complete, open the hoistway door, place a door wedge tool back into the sill, do a mental job hazard assessment and locate a safe refuge space. Do not enter areas marked with Red and White strips. Carefully enter the pit. Close doors to about 6" and use door wedge to block.
- (n) In deep pits a second stop switch is typically installed 4 ft above the pit floor. After descending the pit ladder place the lower pit stop switch in the "STOP" position. The second

stop switch must be tested and verified by two independent means. Methods may vary across organizations.

- (o) If operation of the elevator is necessary:
 - (1) The car is only to be operated on inspection operation from either the car top with top-of-car inspection operation or inside the car with in-car inspection operation, if provided, by a qualified elevator person. The person operating the car and the person in the pit shall establish and maintain two-way communications.
 - (2) Install pipe stands.
 - (3) Remove the door wedge tool and allow the hoistway door to close.
 - (4) Place the upper pit stop switch in the "RUN" position.
 - (5) Stand on the pit floor and be prepared to stop the movement of the elevator with the pit stop switch.

CAUTION:

- (p) Never stand on the pit ladder when the pit stop switch at the access landing is in the "RUN" position, unless two pit stop switches are provided and the lower switch is in the "STOP" position.
- (q) When work is to be done on the hydraulic system, the car shall be landed on pipe stands, hydraulic pressure relieved and appropriate lockout/tagout procedures implemented. (See Section 7.)
- (r) When in multiple hoistways, **never place any part of your body in the runway of an adjacent operational elevator.**

8.2.2.2 Exiting Pits

- (a) Verify lower pit stop switch, where provided, is in the "STOP" position.
- (b) Verify pit stop switch at access door is in the "STOP" position.
- (c) Place lower pit stop switch in the "RUN" position.

- (d) Remove pipe stands.
- (e) Slowly open hoistway door and place a door wedge tool into the sill. Exit the pit.
- (f) Turn the pit light off.
- (g) Place the pit stop switch at access door in the "RUN" position.
- (h) When a hoistway access switch is provided, with the hoistway door(s) in the open position, activate hoistway access switch to run the car down. Stay clear of moving car. Deactivate the means to disable operating devices.
- (i) Remove door wedge tool and close hoistway door.
- (j) Place the car back into service.

3. *Walk-in Pits*

NOTE: See Section 8.2.2 for pit access procedure through lowest hoistway door

1. *General guidance*

- (a) Every walk-in pit is different. Therefore it is difficult to make one set of requirements that applies to all situations. For each situation that may be encountered, site specific requirements and procedures shall be established. Formulated requirements and procedures will depend on the height of the pit (7 ft. [2.1 m] or more of overhead clearance) and the guarding or location of related components such as; tapes, governors, counterweights, traveling cables, etc.
- (b) Always wear a hard hat in walk-in pits where cars are operating.

8.2.3.2 *General Rules that apply to the majority of walk-in pits.*

- (a) For walk-in pits where there is no risk of being stuck by the car or related equipment:

- (1) With elevators operating, it is generally safe to enter the pit to perform brief visual inspections, to walk from one pit to another to make observations, or to retrieve dropped items at the front side of the hoistway (e.g. keys, money, jewelry, small tools, etc.).
 - (2) For brief work activities such as minor adjustments or adding oil to buffers, the unit to be serviced must have two circuits tested and verified that the elevator will not run to ensure sufficient safe control.
 - (3) For repair work, the unit shall be locked and tagged out.
- (b) When working on elevated buffer stands (more than 6 ft. [1.8 m] off the pit floor) fall protection (guardrails or Personal Fall Protection) is required.

8.2.4 Safety precautions when working in pits:

- (a) Locate a safe refuge area and be prepared to enter same at a moment's notice.
- (b) Ensure that all portable lights and tools are connected through a Ground Fault (GFCI).
- (c) Take care to protect all lighting from damage.
- (d) Do not work in a pit with standing water.
- (e) Never "jump" into a pit – always use the access ladder or a portable ladder.
- (f) Always check your shoes for oil/grease prior to climbing.
- (g) Use both hands when using ladders entering or exiting the pit.
- (h) Be aware of moving equipment (i.e., counterweights, pumps, motors, belts, and sheaves) and ensure that clothing and hands can't get caught in them.

- (i) Avoid smoking or open flames while in the pit.
- (j) Use proper hand protection while cleaning pit.
- (k) Never place your body under the car and have the car lowered to or below the bottom landing. This does not apply to walk-in pits.
- (l) Never stand in counterweight runway, under compensating chains or straddle over the traveling cable(s) loop.
- (m) Never use wooden timbers to support car or counterweights.
- (n) Do not leave parts, lubricants, cleaning equipment, etc in the pit. This is a violation of the ASME A17.1 Code. Pipe stands may be stored in the pit.

8.2.5 Additional safety precautions to be taken when working under hydraulic units:

- (a) DO NOT stand on the hydraulic piping.
- (b) DO NOT work on the hydraulic system (i.e., repacking a jack, work on oil supply lines, pipe fittings or any portion of system that may be under pressure) unless the elevator is “landed” on pipe supports.
- (c) Avoid pinch points that a plunger or piston may present. The plunger or piston may not react normally, especially after repacking.

8.3 Hoistway Screening

Where an elevator is operating in a multiple hoistway, and construction or modernization work is to be performed in an adjacent portion of that multiple hoistway, that portion of the elevator’s hoistway where the work is to be performed shall be fully separated. The material used for this separation shall:

- (a) be equal to or stronger than 0.0437 in. (1.118 mm) dia. wire;
- (b) have openings not exceeding 1 in. (25 mm);

- (c) be so supported and braced so as to not deflect into the code required running clearance of the adjacent car; and
- (d) be in accordance with local code.

8.4 Overhead Protection

- (a) Overhead protection shall be provided in the hoistway and in any other work area where there is exposure to falling objects. This protection is to prevent all parts of the body from being struck by falling tools, debris, small parts, etc.
- (b) In general, overhead protection can be achieved by *one or a combination of the following examples*:
 - (1) False cars with roofs/netting designed and selected by the company.
 - (2) Installation of an overhead barrier directly above the work area which covers all areas where field personnel have to stand or reach to install hoistway components
 - (3) Protection of all hoistway openings above the work area (e.g.: installation of hoistway doors or protective screening)
 - (4) Sealing off corridors to prevent other trades from working near or passing by wall openings
 - (5) Walls are in place and all hoistway doors closed
 - (6) Guarding all holes in the machine room and secondary levels
 - (7) Prohibiting simultaneous work in hoistway and machine room with unguarded holes
 - (8) Prohibiting simultaneous work in common hoistways where no hoistway screening exists between hoistways
 - (9) Prohibiting storage of materials within 6ft. (1.8m) of hoistway openings.
- (c) All cases where objects have fallen down the hoistway must be immediately investigated and reported by the mechanic

in charge. Once the cause for this occurrence has been identified, it will be mitigated by the company or the MIC.

5. Machine Room Safety

Access to machine rooms, as well as working in the machine room itself, can be hazardous if proper precautions are not taken. It is very important that you have the ability to recognize potential hazards and are aware of the proper precautions to take when they exist. Machine rooms shall be secured from unauthorized access.

1. Access to the machine room

Just getting to a machine room can be hazardous, so recognizing potential hazards and taking steps to correct or avoid them is very important. Some of the more common hazards are:

(a) Lighting

- (1) If the stairwell or hallway area is not well lit, use a flashlight or other temporary lighting until the situation can be corrected – Don't just "feel your way" in the dark.

(b) Unsafe ladders

- (1) Many machine rooms can only be accessed through the use of fixed ladders. Always check the condition of the ladder before climbing.
- (2) Never climb a ladder with tools in your hands. Use a rope to pull tools up.

- (c) Machine room doors are typically self-closing and/or self-locking. The ASME A17.1 requires the door to be operable from inside the machine room without the need to use a key.

Section 9

TOOLS

9.1 Hand Tools

- (a) Employees shall maintain hand tools in good condition at all times.
- (b) Do not use tool belts and never carry tools in your pockets.
- (c) Never use tools that are worn, cracked or broken.
- (d) Pliers and pipe wrenches shall not be used on nuts and bolts.
- (e) Crescent wrenches shall never be used in place of the proper-type wrench.
- (f) Do not use makeshift tools such as pipe, iron bars or extensions for leverage (cheaters).
- (g) Use the correct size crowbar for each job. Place a block of wood under the head of the crowbar for leverage.
- (h) Never strike hardened steel surfaces with a steel hammer. Use a soft metal hammer or one with a plastic, wooden or rawhide head.
- (i) Cold-chisels, center-punches, etc., shall be dressed to eliminate mushrooming.
- (j) Keep a knife sharp and in a sheath or holder when carrying it on a job. Do not use it for stripping traveling cable; use cable strippers instead. When using a knife, always cut away from your body.
- (k) Avoid placing a tool box where another person may trip over it.
- (l) Split or loose handles in hammers or sledges shall be replaced with new and properly fitted handles before being used. Handles shall never be wired or taped.
- (m) Always keep screwdrivers properly dressed and their handles in good condition.

- (n) Never use a screwdriver as a punch, wedge, pinch bar, pry or chisel.
- (o) Files shall never be used unless they have a proper handle, and never as a pry.
- (p) Always use the proper tool for the job it was intended.



9.2 Portable Electric Tools and Lights

- (a) Electrically powered tools cause the same types of incidents as hand tools, but the injuries are usually more severe.
- (b) Power tools, portable lights or cord sets shall be protected by GFCIs.
- (c) If the insulation on an electric tool or cord is broken, cracked, missing or damaged, destroy and discard the tool or cord.

- (d) Never tamper with or remove three-prong grounding plugs or pins. This eliminates the grounding protection. When grounded outlets are not available — as may be found in older buildings — adapter plugs shall be used with the grounding wire secured to a positive ground. (Note: The cover plate screw may not give a positive ground, use your meter or GFCI tester to test for positive ground.)
- (e) Always use a GFCI when plugged in even when using double insulated tools.
- (f) Double-insulated tools may be used if they are distinctively marked with the words “Double Insulated,” or the symbol shown in Figure 9b.
- (g) When using extension cords, make sure the cord is plugged into a grounded outlet of correct voltage and the cord is capable of carrying the expected load. Extension cords shall conform to OSHA Standards and be Company-approved. 110-volt extension cords shall be durably marked with the size (12-3 or 14-3 AWG) and type as noted in the chart below:

Figure 9b



Figure 9c Approved Markings for Extension Cords

Hard Service				Junior Hard Service		
S	SO	ST	SE	SJ	SJE	SJT
	SOO	STO	SEO	SJO	SJEO	SJTO
		STOO	SEOO	SJOO	SJEOO	SJTOO

- (h) Flexible cords shall be used in continuous lengths without splice or tape. Hard service flexible cords No. 14 or larger may be repaired or spliced. The splice and insulation characteristics shall be equal or greater than the original cord.
- (i) Electric cords shall not be run through holes in walls, ceilings or floors. If run through doorways, windows, or similar openings, they shall be protected from damage.

- (j) Metal or plastic electrical boxes, commonly referred to as “handy” boxes, shall not be used to make extension cords and multipliers. Do not “field engineer” electrical components. Such components and assemblies are not approved for that use.
- (k) Portable lights shall be equipped with guards to prevent accidental contact with the bulb. Unless guards and handles are properly grounded, they shall be made from non-conductive materials.
- (l) Portable lights shall not be suspended by their electric cords, unless cords and lights are designed for this means of suspension.
- (m) Work areas, walkways and similar locations shall be kept clear of all cords so as not to create a hazard to employees or subject cords to damage.
- (n) Do not lift or lower portable electric tools by the power cord; use a handline. Never throw tools, equipment or material from one work level to another.
- (o) Keep all cords coiled when not in use. To prevent cord damage do not wrap cords tightly around tools.
- (p) Hand-held power tools shall not be equipped with a “dead man” control. It may have a lock-on control provided turn off can be accomplished by a single motion of the same finger or fingers that turn it on.
- (q) Power operated cutting tools shall have a functional brake.
- (r) Avoid forcing tools; let the tool do the work.
- (s) Unplug power when adjusting or cleaning the tool.
- (t) Never use electrical tools for purposes other than intended.
- (u) Keep guards in place and properly adjusted.
- (v) Have a firm footing and be properly braced when using power tools.

9.3 Powder Actuated Tools

Powder actuated tools are prohibited on all worksites.

Section 10

PORTABLE LADDERS / SCAFFOLDS / STATIONARY WORK PLATFORMS

10.1 Scaffolds and Stationary Work Platforms

- (a) Scaffolds and stationary work platforms shall be erected in accordance with approved safety standards under the supervision of a **Competent Person** (see Section 21).
- (b) When used, wooden or synthetic planks shall be scaffold-grade or approved by a **Qualified Person** for scaffold and stationary work platforms use capable of withstanding 4 times the working load.
- (c) The assembly and disassembly of scaffolds and stationary work platforms shall be done using a safety harness and lifeline anytime there is more than a 6 ft (1.8 m) fall exposure.
- (d) Ladders are required to reach working surfaces more than 2 ft (610 mm) above or below the point of access.
- (e) In hoistways, at least two 2 in. (51 mm) by 10 in. (254 mm) planks must be used with a minimum of 6 in. (152 mm) of bearing and a maximum of 12 in. (305 mm) of overhang beyond the bearing surface. The span shall not exceed 10 ft (3.05 m) for a single plank. The planks shall be cleated to prevent movement.
- (f) No planks shall be of such length as to extend into passageways where there is a possibility of planking being bumped by the movement of people, materials or equipment through the area.
- (g) Under no circumstances shall others be permitted to use the Elevator Company's scaffolds, scaffolding materials or stationary work platforms unless approved by your Supervisor/Manager. Under no circumstances shall the

elevator company use other trade scaffolds or stationary work platforms unless approved by your Supervisor/Manager.

- (h) If it is necessary to have workers below the work area, make sure cover protection is provided. A minimum of 3/4 in. (19 mm) plywood on 2 in. (51 mm) planking shall be used.
- (i) Never erect scaffolding or stationary work platforms in an active hoistway, unless the car has been completely shut down and the mainline disconnect switch locked out and tagged. (See Section 7.)
- (j) Do not climb cross braces on scaffolds.
- (k) When using tubular welded frame scaffold, the sections shall be joined together using the lock pins provided for that purpose.
- (l) Spacing between ladder rungs shall meet OSHA standards.
- (m) Scaffolds shall be equipped with baseplates.
- (n) Scaffolds and stationary work platforms shall be tied into the building with rigid connectors spaced 4 times the minimum width at intervals not exceeding 26 ft (7.9 m).
- (o) Unless the scaffold is fully planked and equipped with proper guardrails and toeboards, the employee shall be tied off using a personal fall-arrest system.

10.2 Portable Ladders

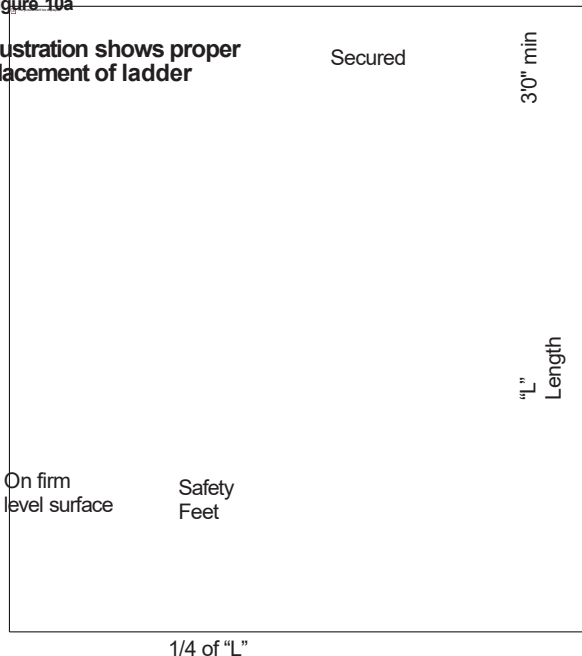
- (a) Only OSHA-compliant ladders shall be used.
- (b) Use type 1-A ladders (300-lb rating) as a minimum.
- (c) Because metal ladders are conductors of electricity, they shall not be used.
- (d) Extension ladders shall be equipped with safety feet.
- (e) Ladders shall be examined for defects before every use. Those found to be defective shall be tagged "Defective – Do Not Use" and removed from the jobsite.

- (f) Ladders shall never be painted.
- (g) No more than one person is allowed on a ladder.
- (h) Avoid reaching more than an arm's length while working on a ladder.
- (i) Do not work from the top 3 rungs of any straight or extension ladder or top 2 steps of an A-frame ladder.
- (j) Only ladders of sufficient length shall be used. Adding makeshift extensions is dangerous and prohibited.
- (k) When ladders are used for ascending or descending from one level to another, extend the ladder top at least 3 ft (914 mm) above the landing served and tie it off, with feet secured against slippage.
- (l) Extension ladders shall be placed so that the space between the bottom of the ladder and the supporting structure is 1/4 the supported length of the ladder (see Figure 10a).
- (m) When placing and using extension ladders, care shall be taken to avoid overhead obstructions and hazards (electrical, low ceilings, pipes, etc.).
- (n) When a ladder is being used in a location where it may be struck by others in the area, there shall be a second person at the bottom of the ladder at all times. Ladders shall never be left in such locations when not in use. Whenever it is necessary to place a ladder in front of a door opening, the door shall be blocked, locked or guarded by a second person. When ladders are placed in an aisle or corridor, the area shall be barricaded or roped off.
- (o) Be aware of the potential hazard of other trades working on ladders in your immediate area.
- (p) Lift and lower large articles with a handline.
- (q) When climbing up and down, always face the ladder and maintain 3-point contact at all times.
- (r) Extension ladders shall not be taken apart to make two ladders.

- (s) Step ladders shall only be used in their fully open position with spreader or locking device engaged to prevent accidental fold-up of the ladder.
- (t) Remove tools, tool bucket and equipment from ladder before moving.
- (u) When working on a ladder, maintain three points of contact, with center of body within the rails at all times or fall protection shall be used when 6 ft. (1.8 m) or greater above the ground.

Figure 10a

Illustration shows proper placement of ladder



Section 11

MOVING WORK PLATFORMS

11.1 Running Platforms

- (a) The running platform is not an elevator and shall not be used to haul other personnel or material. Any other use of a running platform shall be approved by your Superintendent/Manager. In the event that work done by another trade must be done on a running platform, it shall be done only with the permission of your Superintendent/Manager. Any movement of a running platform shall be done by Elevator Company Personnel only.
- (b) Before hoisting or roping of a platform, the governor shall be installed and roped to the safety releasing arm and tested to ensure that the safety is operational.
- (c) Fall protection should always be utilized - However, if a personal fall protection system is not utilized, the running platform shall be equipped with guardrails and toe-boards. The front of the platform shall be equipped with removable guardrails until the front of the hoistway is completely enclosed.
- (d) When required the running platform shall be counter-weighted for the weight of the car platform assembly and its expected load. Do not put all the counterweights in the frame and be sure they are secured.
- (e) Temporary run controls and cords shall be inspected daily. Damaged cord shall be destroyed and discarded.
- (f) Temporary run controls shall be three button control ("UP," "DOWN," "SAFETY") so that it takes activation of two buttons to run any direction, plus an emergency stop switch on a stand-alone circuit. Cords shall be fitted with strain relief and insulation shall be intact. All buttons shall function as intended.

- (g) The temporary operating station shall be mounted on the side of the car sling, away from the entrance and the counterweights. The operating station shall have a means for locking it out of service or disconnecting it to prevent unauthorized use.
- (h) Buffers shall be in place before using a running platform.
- (i) Running platform for hydraulic elevators shall never be hoisted with a chain fall or winch.

11.2 Temporary Cars

- (a) When an elevator is to be turned over to the building owner or general contractor for temporary use during construction, it shall meet all the requirements of Section 5.10 of the *ASME A17.1 Safety Code for Elevators and Escalators* and/or applicable local code. Post proper signs showing capacity in pounds (kilograms) and number of people.
- (b) The signed Temporary Acceptance Form shall show allowable capacity in pounds (kilograms) and number of passengers. If counterweight, setting of governor, or area of car platform have been altered, coordinate with your office to provide proper documentation for operation of the temporary elevator.

11.3 False Cars And Other Devices Used In The Hoistway

- (a) There are a variety of false cars and similar devices used in the hoistway to stack rails, set brackets, set hoistway entrances, run hoistway wiring, etc. Remember the following very important points at all times:
 - (1) In the event that work done by another trade must be done from a false car, it shall be done only with the permission of your Superintendent/Manager.
 - (2) Any movement of a false car shall be by Elevator Company Personnel only.

