Vertical Freight Door Protection

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The Peelle Company
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What We Have Achieved

Over the last 8 years, Peelle has shipped over 5,000+ Freight Elevator Door Sets with No “Hit by Door” Incidents Generating a Lawsuit
Study Of Alleged Incidents Initiating Liability Claim Against Peelle 1994 to 2017

JOBS SHIPPED BEFORE 2008

- Hit by Car Gate: 56%
- Closed on Hand: 20%
- Elevator Issue: 12%
- Other: 12%
History Rewind
Before ASME A17.1/CSA B44-2008a
Past ASME A17.1/CSA B44 Requirements on Reversal Devices

Up to A17.1/B44 2007 Edition

- Required Reversal Device
  - Automatic Closing
  - KE > 2.5 ft-lbs
- Device could be Contact or Non-Contact
- Coupled with Sequence Operation and Audible Warning
- Not Required if Constant Pressure Closing
Peelle Door Protection
A Walk Through Time

Our History
Constant Pressure

From “The Beginning” to 1969

- Constant Pressure Close
  - Dead-man’s operation
- No Automatic Closing
- No Cushioning Astragal
- **Physical Contact with no Re-opening**
- Simultaneous Operation
- Trained Authorized Users (Freight Handlers)
Reversing Edge

From 1969 to 1993

- **Automatic reversal**
- **Cushioned Mechanical Contact-Type Device**
  - Compression of Edge Initiated Reversal
- **Reversal Depended on Physical Contact**
  - Obstruction Experiences Full KE of Closing Car Gate
- **Sequence or Simultaneous Operation**
Sensor Beam

From 1994 to 2001

• Sensor Beam Reversal Device
  – Single Infra-Red Beam
  – Attached To, Riding With and Just Below the Car Gate
  – Directly Under Leading Edge

• Does Not Need Physical Contact to Initiate Reverse
  – Inertia of Moving Mass could cause Incidental Contact

• Sequence Operation Becomes Standard
Single Curtain

From 2001 to 2008

- Single Multi-Beam Light Curtain
  - Fixed to the Car Enclosure
  - Located Between Car Gate and Landing Door (i.e. Passenger Entrance)
  - Detection Zone: From 1 inch to 72 inches Above the Car Floor
  - Blockage of Any Beam Initiates Reversal

- Initiate Reversal Regardless of Location of Car Gate
  - Greatly Reduces Probability of Incidental Contact
Protector™

From 2006 to Today

- **Protector™ Light Curtain for Existing Freight Elevators**
  - Single Multi-beam Light Curtain with Cascading Design
  - Fits in Gate Rail and between Car Gate and Landing Door
  - Beams Directly Under Leading Edge
  - Specifically Designed to Retro-Fit to Existing
Before ASME A17.1/B44-2008a

ASME A17.1/CSA B44
• Mechanical Edges

Peelle Company
• Mechanical Edges
• Sensor Beam
• Single Light Curtain
• Protector Retro-Fit Light Curtain
Time to ACT
ASME A17/CSA B44 Actions

• Formed Ad Hoc Committee on Door Protection
  – Vertical Doors Started in 2002

• Performed Hazard Assessment of Vertical Doors
  – Assume No Relevant Safety Devices are Present
  – Define User – Type of Freight Handlers
  – Define Hazardous Scenarios
    • Unprotected System w/o Safety Devices
    • Entering, Exiting, Within, Adjacent, Moving Toward, Parallel or Perpendicular
    • Direct or Glancing Effects
    • Feet, Hands, Fingers, Arms, Legs, Head, Trunk
    • Upright, Bowed, Prone, Squatted, Walking, Running, Falling, Stationary
    • Limited Sight, Hearing or Mobility
    • Knowledge, Training, Expectations, Cognitive Abilities
  – Develop Mitigations
  – Uncover Residual Hazards and Mitigate Residual Hazards
Hazard Assessment

Hypothetical Person Moving Into, Through and Out of Opening

- Person located at gate outside edges subject to a sideswipe
- Person located directly under the path of the gate
- Person standing upright, downward bowed position, squatting, prone or seated in a vehicle

Assumptions

- Small adult user – hardest to detect
- Object sizes representation of body parts; (head, torso, arm, foot)
- Sizes from ISO 3411 and SAE J833
Object Detection Zones

- Person Adjacent to Car Gate
- Exposed to a Swipe of:
  - Head
  - Torso
Object Detection Zones

- Persons in Path of Car Gate
- Prevent Closing:
  - Whole body

![Diagram showing object detection zones and dimensions](image)
Object Detection Zones

- Person Standing Adjacent to Car Gate with Arm Extended
- Exposed to Hit of:
  - Arm or hand
Object Detection Zones

- Person with Foot in Path of Closing Car Gate
- Exposed to Hit of:
  - Leg or foot
Object Detection Zones

- Person with Foot Adjacent to Car Gate, Straddling Lower Bi-Parting Panel
- Exposed to Hit of:
  - Head, Leg or Torso
  - By Door Panels
Sequence Operation

• Car Gate Near Full Close Before Landing Door Close
  – Blocks Opening, Halts Entry or Egress, BEFORE Landing Door Close
  • Allows detection means to be limited to the car gate only
  • Rising Lower Panel of Bi-Parting Doors Moves User Away from Landing
  • Non-Crushing Leading Edge Required on Landing Doors
  • Reduced Closing Speed Just Prior to Full Landing Close
  • Door Open Buttons At Each Landing
  • Warning Safety Tape
Detection Device Function Test

2.13.3.4.9 After the door has reached its fully opened position and before door closing is initiated, the device(s) used to comply with 2.13.3.4.5(a), (b) or (c); 2.13.3.4.6(c), (d), or (e); or 2.13.3.4.7(d), (e), (f), or (g), where applicable, shall be checked to assure that it is capable of sensing the defined objects and sending the appropriate signal to the control that initiates the starting, stopping, and direction of motion of the door(s). If the device(s) is incapable of sensing the defined object or sending the appropriate signal, power closing of the door(s) or gate(s) shall be rendered inoperative.

- Occurs Prior to Closing
- Validates Wiring Between Detection Device and Elevator Control
- Ensures Receiving and Transmitting Elements work
- Ensures Relay or Output Signals are Not Welded, Broken or Bypassed
AN OPPORTUNITY

- General use of Freight Elevators
- Freight Elevators Permitted to Carry Passengers
  - Primary purpose to carry freight
  - Can carry operator or freight handler
  - Not accessible to the general public
- Freight Elevators not Meeting the Requirements
  - Special environments
  - Constant pressure closing
  - Reduced speed closing
A17.1/B44 2008a Edition and Beyond

- Reversal Devices
  - Required On All Freight Elevators with Power Doors *
  - Non-Contact Initiation of Reversal
  - Functionality Checking “The Test”
  - Detect Body Sized objects Wholly or Partially in Detection Zone
  - Door Re-Open Buttons at Landings and Inside the Car
  - Warnings and Cushioned Edges

* Special Requirements for Elevators in Unique Environments
Present Day
Compliance and Results
Peelle Response

• Since 2008
  – Bi-Parting Doors with Sequence Operation
  – Warning Buzzer as Standard
  – Two Light Curtains
    • One on Each Side of the Car Gate
  – Object detection vertically from 1 inch to 72 inches above the platform
  – Beams with Spacing 2 inches apart
  – Functionality Checking “The Test”
Body Protection

- Two light curtains
- “Sandwich” the car gate
- Head, torso, arms, legs, and feet all protected
- Devices contained on car
Foot and Straddle Protection

• Cushioned edge for compressed clearance compliance (2 inches)

• Lowermost beam for foot protection compliance (1 inch)
Dual Light Curtains

From 2008 to Present

• Dual Multi-Beam Light Curtain
  – Fixed to the Car Enclosure
  – Located on each side of the Car Gate
  – Detection Zone: From 1 inch to 72 inches Above the Car Floor
  – Blockage of Any Beam Initiates Reversal

• Detection Zone Coverage
• Test Functionality Checking
Warning Labels

CAUTION
TRIPPING HAZARD!
Open doors fully and ensure door sill is flush with floor.
USE PUSH PLATE TO OPEN DOORS

CAUTION
CLEAR OPENING BEFORE CLOSING DOORS
AUTOMATIC GATE!
Audible warning will sound when gate is closing.

WARNING
CRUSHING HAZARD!
Do not reach through opening while doors are closing.
USE PULL STRAP TO CLOSE DOORS
CLEAR OPENING BEFORE CLOSING DOORS

WARNING
Pinch point.
Keep hands clear during operation.
Operating Instructions

Power Freight Elevator Door Operation Instructions

**CAUTION**
- This is a freight elevator, not a passenger elevator, and not for general public use
- Do not attempt to operate this elevator unless you are authorized to do so
- Read and obey any posted usage, notice, caution or warning signs
- Stay back and keep hands and arms away from the leading edge of the doors
- Listen and look for audible door close warning signals
- Power doors can be stopped and reopened by pressing the door open button

**WARNING**
- Report any damaged or broken door components to the facility manager
- Do not attempt to open doors manually or with fork truck
- In case of mis-leveling do not use elevator and report to the facility manager
- Do not reach in gap between doors

Entering or Exiting a Freight Elevator

OPENING - POWER OPERATION
1. Press the car call pushbutton
2. Stand clear of the landing door and car gate until they are fully open
3. Push door open button or car call button to initiate opening
4. Stand clear of the landing door and car gate until they are fully open

CLOSING - POWER OPERATION
1. Stand clear of the car gate and landing door
2. Press and hold the door close button
3. Press and release the door close button
4. Press the door open button to reopen the doors while closing

** CAUTION **
- CLEAR OPENING BEFORE CLOSING DOORS
- AUTOMATIC DOORS
- AUDIBLE WARNING WILL SOUND WHEN DOOR IS CLOSING.

** WARNING **
- PINCH POINT
- KEEP HANDS CLEAR DURING OPERATION

Manual Freight Elevator Door Operation Instructions

**CAUTION**
- This is a freight elevator, not a passenger elevator, and not for general public use
- Do not attempt to operate this elevator unless you are authorized to do so
- Read and obey any posted usage, notice, caution or warning signs
- Stay back and keep hands and arms away from the leading edge of the doors
- Do not reach through the door to pull the outside pull strap
- Open and close doors carefully and do not slam the doors

Entering or Exiting a Freight Elevator

OPENING - MANUAL OPERATION
1. Look through vision panel or car gate to ensure car is stopped and level with the landing
2. Push door open using the lower panel recess plate or top of lower panel
3. Stand on the top of the lower panel to ensure door is fully open
4. Lift gate using lifting bar or recess plate
5. Push the bottom of the car gate to ensure it opens fully

CLOSING - MANUAL OPERATION
1. Stand clear of the landing door or car gate with both feet on the floor
2. Grasp the pull strap with both hands
3. Use pull strap closest to you
4. Do not reach through to the outside pull strap
5. Pull down and towards you to close the landing door until door is fully closed
6. Pull the car gate fully closed using the lifting bar or panel recess plate

**WARNING**
- CRUSHING HAZARD
- TRIPPING HAZARD
- DO NOT REACH THROUGH OPENING WHILE DOORS ARE CLOSING
- USE PULL STRAP TO CLOSE DOORS
- CLEAR OPENING BEFORE CLOSING DOORS

** WARNING **
- Report any missing, damaged or broken pull straps to the facility manager
- Do not tie knots or loops in the pull straps - use original equipment replacements
- Do not attempt to open doors with fork truck - only open doors by hand
- In case of mis-leveling do not use elevator and report to the facility manager
- Do not reach in gap between doors

A17 060341-EN
A17 060342-EN
User Manual

- North American and European instructions
- Translated to various languages, French, German, Spanish, Chinese
- Intended for use by building owners, consultants and advisers
Results

For Peelle After 2008:

– Light Curtains are Standard
– Light Curtain Upgrades to Existing Freights are Popular
– Warning Labels are Standard on New and Sold for Existing
– Robust Vertical Door Protection Added to Code
– Light Curtain Technology Matured and Stable