



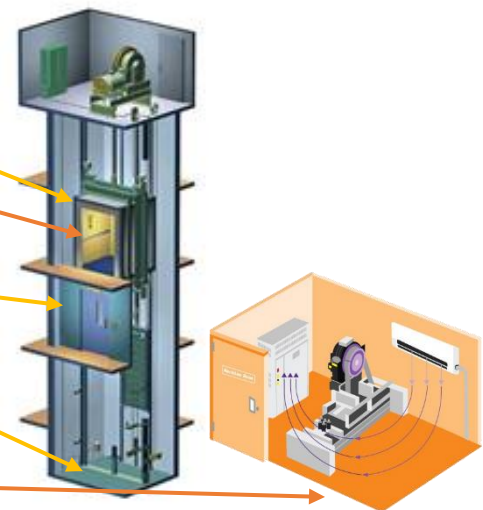
# The Basics of Elevator Hostways

Any time you're dealing with elevators, whether for new construction, a remodel, or replacement, pre- and post-inspections, or surveys by a qualified elevator inspector called a Vertical Transportation Engineering Specialist (VTES) is critical. One reason is to ensure an elevator is within building codes from the International Code Council (ICC) called International Building Codes (IBC) and American Society of Mechanical Engineers (ASME). These codes are specifically for elevators and in place to ensure safe operation for passengers and building owners. Another is the survey identifies problems that can lead to costly delays, rework, and failed government inspections.

In pre-construction, a VTES looks over the plans and area where the elevator will be built. In post-construction every part of an elevator is evaluated like it's hoistway, counterweights, platforms, clearance, etc. to ensure all codes are met. It is also recommended in ASME A17.1 that periodic inspections are performed at 6-month intervals by a VTES. Once again, it can save time and money as well as ensure continued safe and efficient operation.

The ASME A17.2.1 (electric elevators) and ASME A17.2.2 (hydraulic elevators) building codes outline specific areas of inspection include:

- **Top of the Car** – cabin's exterior roof
- **Inside of the Car** – cabin's interior
- **Outside the Hostway** – shaft that houses the elevator, as it travels
- **Pit** – elevator shaft from the lowest landing door threshold to the floor at the shaft's bottom
- **Machine Room** – elevator equipment room



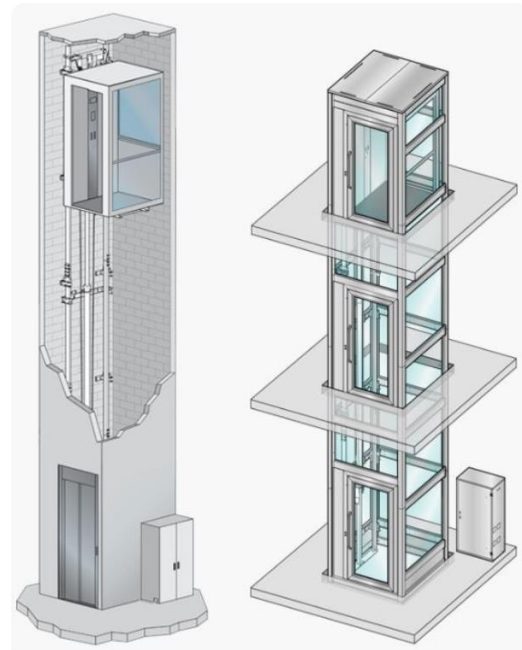
We will be focusing on the hoistway in this article — What needs to be inspected, and how does that relate to the IBC Chapter 30 and ASME codes.



## What Must Be Inspected

For each of the areas outlined above, there are more specific requirements that a VTES needs to examine for compliance. They include:

1. **Hoistway Measurements** – it must be clear and plumb within tolerances per manufacturer
2. **Hoistway Ventilation** – all hoistway ventilation must meet manufacturer specifications
3. **Counterweight Guards** – must be installed per ASME guidelines
4. **Working Platforms** – need to meet OSHA and ASME codes, and the manufacturer specifications
5. **Guardrail Bracket Support** - be as specified by the manufacturer
6. **Top of Car Clearance** – the amount of clearance complies with code requirements
7. **Hoistway Wiring** – complete and complies with code requirements
8. **Projections, Recesses & Setbacks** - of more than 4 inches are beveled
9. **Hoistway Protrusions** - are within limits
10. **Concrete Anchored** – attached to concrete per manufacturer specification, if required
11. **Floor Marks** – finished floor marks are visible from the hoistway opening and all landings
12. **Fastening Support** - all fastening points are adequate for each entrance
13. **Emergency Doors** - if an emergency door is required in a bling hoistway, it meets the manufacturer's requirements
14. **Fire Service Access** - all hoistways must meet Fire Service Access IBC and NFPA codes.





## Elevator Codes

Every elevator must comply with ASME's building codes for the entire life cycle. They are in place to ensure safe operation. The main building codes are listed below:

- **ASME A17.1 — "Safety Code for Elevators and Escalators"**

The code covers installation requirements for new elevators, as well as maintenance and test requirements for existing equipment.

- **IBC Chapter 30 — "Elevators and Conveying Systems"**

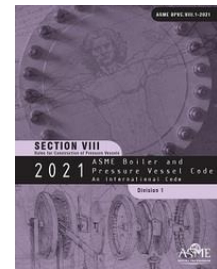
Chapter 30 contains the provisions that regulate vertical and horizontal transportation and material-handling systems installed in buildings.

### ASME Code: A17.1

This code requires that maintenance, repair, and replacements only need to conform at the time of the original installation. If an elevator does not meet the requirements, alterations are required. Every part must comply with codes to pass inspection before an elevator is certified for operation.

Alterations and new additions are issued approximately every three years, along with intermediate supplements published as needed. Standard terms used in building codes are defined by ASME as follows:

- **Alteration** - any change to equipment, including its parts, components, and/or subsystems, other than maintenance, repair, or replacement.
- **Maintenance** - routine examination, lubrication, cleaning, and adjustment of parts, components, and/or subsystems to ensure performance per the applicable code requirements.
- **Repair** - reconditioning or renewal of parts, components, and/or subsystems necessary to keep equipment in accordance with applicable code requirements.
- **Replacement** - the substitution of a device or component and/or subsystems in its entirety. The unit must be the same as the original to ensure performance per applicable code requirements.



### IBC Code: Section 3002 Hoistway Enclosures

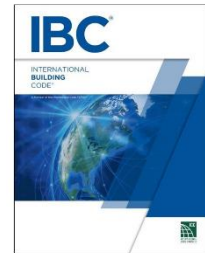
This section covers hoistway enclosure protection. All openings in the hoistway must be protected as per Chapter 7 of the IBC.



## IBC Code: Section 3006 Elevator Lobbies & Hoistway Opening Protection

For elevator hoistway openings and enclosed elevator lobbies, they need to be in accordance with the following:

- Where hoistway opening protection is required by Section 3006.2, for example, protection shall be in accordance with Section 3006.3.
- Where enclosed elevator lobbies are required for underground buildings, such lobbies shall comply with Section 405.4.3.
- Where an area of refuge is required with an enclosed elevator lobby, the enclosed area shall comply with Section 1009.6.
- Where fire service access elevators are provided, enclosed elevator lobbies shall comply with Section 3007.6.
- Where occupant evacuation elevators are provided, enclosed elevator lobbies shall comply with Section 3008.6.

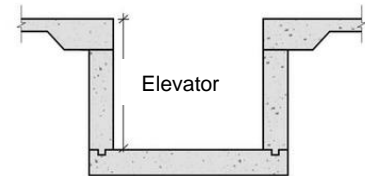


## Elevator Shaft Wall Construction Requirements

The elevator shaft has four basic parts: the Pit, Overhead, Rail Wall, and Hoisting Beam.

### Pit

The elevator pit is the depression below the surface of the lowest landing. It allows the elevator bottom to be level with the floor at the lowest landing. The carriage or sling, which holds the elevator car, consumes space below the car's floor. It means that the material below the car floor must be recessed into the floor to provide proper leveling.



The pit depth may need to be increased to provide a safe space under the car. Its purpose is to protect a technician while working under the car. The pit floor is a critical design element because most of the force imposed by the elevator will be transferred to the pit floor.

### Overhead

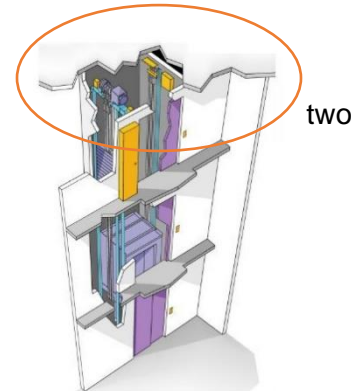
The area from the top of the upper finished floor to the nearest overhead obstruction within a shaft is called the 'overhead'. This space must provide a place for the elevator and its operational machinery when the car's floor is level with the upper finished floor. Additional overhead may be required to protect a technician while working on top of the car.



### Rail Wall

When the elevator is installed, guide rails must be anchored into backing within the wall called a 'rail wall'. The guide rails perform primary functions:

1. To guide the elevator in a plane that is parallel to the entrances of the hoistway.
2. Provide a surface on which the car safeties can deploy. Adequate backing ensures stability in the function and wear of the elevator.



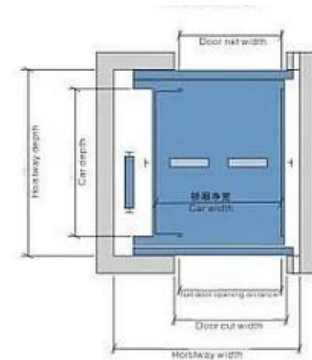
### Hoisting Beam

Some jurisdictions will require the installation of a hoisting beam at the top of the shaft. The hoisting beam can be used during installation to support, raise, and lower components of the elevator. It can also be utilized as a connection point for fall suppression devices used by elevator technicians.

Because the requirements for each of these applications vary so greatly, the structural characteristics and installation of the hoisting beam should be discussed with the authority having jurisdiction and the elevator installation company.

The elevator shaft wall is typically constructed out of materials such as cast-in-place concrete, masonry, gypsum plaster, steel stud drywall, or specially designed gypsum panel shaft wall systems. These systems can also be used as fire-rated, interior partitions where access is restricted to one side and as fire-rated, horizontal membranes.

Low Overhead Clearance Example



Hoistway Plan Example



***Do you remember what is important?  
Test yourself with the questions that follow this article.***

### Pay Now or Pay Later

The bottom line is numerous codes cannot be forgotten, missed, or ignored when it comes to elevators. Staying up-to-date is a full-time job and one that a VTES is already doing. It behooves a company to leverage the expertise and eyes of an expert at multiple stages in the process. Failing to do so can lead to failed inspections that delay elevator operation and increase the time and money required for project completion.



## 6 Important Review Questions

Question	Answer	Additional Note
Where do you find building codes?	International Building Codes (IBC) comes from the International Code Council (ICC).  ASME design codes come from the American Society of Mechanical Engineers (ASME).	For IBC go to: <a href="http://www.shop.iccsafe.org/international-codes/ibc-references.html">http://www.shop.iccsafe.org/international-codes/ibc-references.html</a> For ASME go to: <a href="http://www.webstore.ansi.org/Standards/ASME/ASMEA17CSAB442019-2400977?source=blog">http://www.webstore.ansi.org/Standards/ASME/ASMEA17CSAB442019-2400977?source=blog</a>
Which ASME codes apply to elevators?	If it is an electric elevator, ASME A17.2.1.  For hydraulic elevators, use ASME A17.2.2.	Don't forget also to follow IBC code sections 3002 & 3006
What are three standard terms used in ASME building codes like A17.1?	Alterations, repair, replacement, and maintenance	Revisions are issued about every three years.
What does ASME consider to be an alteration?	Any change to equipment, including its parts, components, and/or subsystems, other than maintenance, repair, or replacement.	Before making any alterations, check and make sure you are using the most recent ASME standards.
What is the pit depth of an elevator?	It is a recess in the lowest landing floor designed to give the elevator car frame room to park while keeping the cab entrance and threshold level with the landing.	The elevator pit area will be the same width and length as the hoistway but can range in depth from 6" to 12", depending on the elevator type
Does an elevator need a hoistway beam?	It depends upon the requirements of the city, county, and state. Some jurisdictions will require the installation of a hoisting beam at the top of the shaft.	Hoist beams provide an attachment point for lifting motors, an elevator car, rails, or other components during initial installation and later, if required, for equipment repairs.