National Elevator Industry, Inc.

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A "Step By Step" Guide

Answers to Your Building Transportation Questions

Building transportation includes elevators, escalators and moving walks used for the movement of passengers or goods within a building.

ELEVATORS:

What is an elevator?

An elevator is a hoisting or lowering mechanism, designed to carry passengers or goods (freight), and is equipped with a car and platform that typically moves in fixed guides and serves two or more landings.

What's the difference between a traction elevator and a hydraulic elevator?

Traction elevators have an elevator car and counterweight attached to opposite ends of hoist ropes. The hoist ropes pass over a driving machine that raises and lowers the car. Traction elevators run on load-bearing rails in the elevator hoistway. Traction elevators are most often used in mid-rise and high-rise buildings with five or more floors.

Hydraulic elevators, on the other hand, are raised by forcing pressurized oil through a valve into a steel cylinder located above ground or underground. The pressure forces a piston to rise, lifting the elevator platform and car enclosure mounted on it. The car is lowered by opening the valve and allowing the weight of the car to force oil from the cylinder in a controlled manner. When the valve is closed the car is stopped. Since the weight of hydraulic elevator cars is borne by the piston, there is no need for a structural framework or load-bearing rails. Hydraulic elevators are commonly found in low-rise buildings with two to five floors.

A roped hydraulic elevator is a hydraulic elevator where the cylinder is connected to the car by wire ropes or indirectly coupled to the car by means of wire ropes and sheaves.

What is a Machine Room-Less (MRL) elevator?

Machine Room-Less elevators are those that do not require a machine room. They do not run on hydraulics and the only space they require is the hoistway. Because of these features, MRL can help buildings save space and reduce energy requirements.

What is a Destination Dispatch Elevator?

Destination dispatch is an optimization technique used for multi-elevator installations, which groups passengers requesting similar destinations into the same elevators, thereby reducing waiting and travel times when compared to a traditional approach of multiple floor requests per cab.

Typically, passengers request travel to a particular floor using a keypad, touch screen or key-card in the lobby and are directed to the appropriate elevator.

How long have elevators been in use?

Since the 19th century, power elevators, often steam-operated, were used for conveying materials in factories, mines, and warehouses. In 1853, American inventor Elisha Otis demonstrated a freight elevator equipped with a safety device to prevent falling in case a supporting rope should break. This increased public confidence in such devices. In 1846, Sir William Armstrong introduced the hydraulic crane, and in the early 1870s, hydraulic machines (water) began to replace the steam-powered elevator. German inventor Werner von Siemens built the first electric model in 1880.

ESCALATORS:

What is an escalator? How does an escalator work?

An escalator is a power-driven, continuously moving, inclined stairway. Varying by design and planned usage, an escalator can rise from 4 feet to over 100 feet and may go floor-to-floor or skip floors. Escalators transport more than 105 billion passengers per year in the United States.

Escalators are an endless chain of moving steps driven by a motor. This motor turns the main drive shaft, which powers the step

chain to move the steps. Balustrades, or the sides of the escalator, are mounted on either side of the steps and a continuously moving belt at the top of each balustrade forms the handrail. The escalator's steps are actually wedge-shaped units that move along a continuous conveyer

How long have escalators been in use?

The first patent for a "revolving" stair, the escalator's predecessor, was issued in 1859. Charles Seeberger and Jesse Reno invented the first escalators as we know them today. Seeberger trademarked the term escalator and exhibited his product at the Paris Exhibition in 1890. Jesse Reno installed his "inclined elevator" at the Third Avenue and 59th Street elevated station in New York City about that same time.

MOVING WALKS

What is a moving walk?

Moving walks are designed for use where the elimination of long walks is desired and in areas where traffic patterns are constant and heavy, such as airports, exhibition halls and subways. They are similar to escalators except that the passenger-carrying surface remains parallel to its direction of motion and is uninterrupted. Moving walks are sometimes used to move passengers from one floor to another along a gradual incline.

What is NEII?

The National Elevator Industry, Inc., *NEII*, is the premier national trade association of the building transportation industry, was established to promote safe building transportation for new and existing products and technologies, the adoption of current codes by local government agencies, and to encourage responsible legislation and regulatory measures at all levels of government. Regular membership is available to those corporations, firms or companies that, as part of their normal business operations, provide or perform any of the following: manufacturing (including parts or components used by others in the manufacture, repair or maintenance), installation, or the repair and maintenance of elevators, escalators, moving walks and related equipment. Trust membership is available to those corporations, firms, or companies that, as part of their regular business, employ members of the International Union of Elevator Constructors (IUEC) and contribute to the benefit trusts (Trusts) established by agreements between the IUEC and *NEII*. Individual memberships are available to persons who are not employees of *NEII* member companies or organizations. *NEII* promotes safe building transportation and works with various organizations on the formation, adoption and enforcement of the latest building transportation codes and standards.

NEII is a leader in promoting safe building transportation for new and existing products and technologies, as well as working with local government agencies to encourage the enforcement of the latest codes and standards.

What steps has NEII taken to improve building transportation safety?

NEII improves elevator and escalator safety by driving the formulation of codes and standards that provide for the safety of the riding public and encourage the introduction of safer technology. The organization also promotes communication and coordination with governmental agencies regarding adoption and enforcement of the latest ASME A17 codes and standards.

Although escalator accidents are rare compared to the millions of passengers who ride them each day, the escalator industry continuously works to improve safety. *NEII* has focused on reducing the potential of step/skirt entrapments. It partnered with Arthur D. Little, Inc., to develop a Step/Skirt Performance Index that offers a reliable standard from which all escalators, new and old, can be measured. This Index was adopted and is now part of the ASME A17.1/CSA B 44, the basis for all state and local escalator codes throughout the United States.

The Index measures the potential for possible entrapments between the moving stair and the stationary sidewall. Mounting deflector devices on the skirt significantly reduce the chance of contact between a child's calf and the escalator skirt.

Recently, *NEII* members helped develop the Performance Based Safety Code (PBC) for Elevators and Escalators, or ASME A17.7/CSA B44.7. The PBC is a companion to the 2007 version of the Safety Code for Elevators and Escalators, ASME A17.1/CSA B44, and provides Authorities Having Jurisdiction (AHJs) with an objective and structured method for approving new technology while ensuring continued elevator safety. *NEII*® was also instrumental in the development of the recently published Standard for Elevator Suspension, Compensation and Governor Systems, ASME A17.6.

How many elevators and escalators are there in North America?

There are approximately one million elevators and almost 44,000 escalators in North America alone. Escalators are found everywhere from airports and train stations to shopping malls, hotels, office buildings and theme/amusement parks.

How many people use building transportation each day?

There are approximately 325 million elevator passengers and 500 million escalators passengers daily in North America. Excluding automobiles, that is more than the total riders of all other forms of transportation combined. The average elevator rider takes four trips per day, 250 days per year.

How many people use building transportation each day?

Yes. Elevators and escalators are made of millions of moving parts. Like an automobile, which requires tune-ups, oil changes and periodic replacement of worn out parts, elevators and escalators must also be tested and inspected for sound working order. Equipment component life is directly related to the amount of building transportation use and maintenance, and worn out parts must be replaced.

Who is responsible for maintaining elevators and escalators?

Building transportation safety is the responsibility of building owners/operators with the help of elevator and escalator manufacturers, maintenance companies, and passengers. Building owners and managers must ensure that their elevators and escalators are maintained, meet all code requirements and are inspected and tested as required by local codes. Many elevator and escalator companies have tools that can help building managers asses their maintenance needs.

Is the building transportation industry regulated?

The American Society of Mechanical Engineers (ASME) sets stringent standards that form the basis for all elevator, escalator and moving walk codes in North America, which must be followed by building transportation manufacturers, building owners and managers, and maintenance companies. The ASME A17.1/CSA B44 Safety Code for Elevators and Escalators recommends that all forms of building transportation be inspected and tested annually, and in some instances every six months, for compliance with the code. The local jurisdiction is required by the ASME A17.1/CSA B44 Code to establish the inspection and testing frequency for that jurisdiction. The ASME A17.1/CSA B44 Code is the code used by every jurisdiction in the U.S. and Canada that regulates elevators, escalators and moving walks.

What are the most common types of building transportation accidents?

Slips, trips and falls by the elderly are the most common types of accidents that occur on escalators, and most are due to unsafe riding practices. The neglect of safety rules among children is another significant cause of accidents. Trips, falls and being struck by closing doors when entering and exiting elevators are the most prevalent accidents that occur on elevators. Most of these incidents are due to being inattentive to one's surroundings. All riders need to be careful when using building transportation and follow certain rules to ensure safety. Building owners and managers can help educate passengers about how to safely ride elevators, escalators and moving walks by posting simple safety tips.

For more information on vertical transportation safety, please go to the *NEII* Safety pages for elevators and escalators.

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