



ELEVATORS ARE CRUCIAL FOR PEOPLE WITH DISABILITIES WHEREAS ESCALATORS ARE FOR MASS TRANSIT

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ABSTRACT

Escalator and elevator themes in design, media, or stories often revolve around vertical movement, connection/separation, modernity, efficiency, urban life, and the human journey (up/down, success/failure, hope/fear), using these transport systems as metaphors for progress, confinement, or the contrasts between accessibility and isolation, perfect for themes in construction websites, sci-fi, or psychological thrillers.

Common Themes & Concepts

- Modernity & Urban Life: Sleek designs, glass, steel, futuristic feel, busy public spaces (airports, malls, subways).
- Efficiency & Progress: Fast, continuous movement (escalator) vs. purposeful (elevator), industrial design, urban infrastructure.
- Journey & Transition: Moving between levels represents life stages, success (up), or decline (down).
- Connection & Separation: Linking floors/people vs. isolating individuals in a box (elevator).
- Fear & Claustrophobia (Elevator): A confined space to confront inner demons, secrets, or the unknown.
- Accessibility & Inclusion: Elevators are crucial for people with disabilities; escalators for mass transit.

Applications:

- Web Design: Themes for construction, real estate, or architecture companies focusing on vertical solutions.
- Storytelling: Symbolism for social mobility, psychological tension, or futuristic settings.
- Art & Iconography: Vector icons, posters, and futuristic concepts for way finding or abstract art.

KEYWORDS: elevators, escalators.

Preamble: An elevator (or lift) is a vertical transport machine moving people/goods between building floors using electric motors, cables, and counterweights, or hydraulic power, making tall buildings practical; it's a key modern technology with historical roots in Roman times, also referring to aircraft wings or agricultural grain conveyors. Modern elevators feature safety brakes, smart controls, and efficiency through counterbalancing, though the concept dates back centuries.

How it works (Traction Elevator)

- Motor & Cables: An electric motor turns a pulley (sheave) with steel cables attached to the car and a counterweight.
- Counterweight: Balances the car's weight (plus half its load) for energy efficiency, reducing motor power needed.
- Safety Brakes: Spring-loaded brakes clamp onto guide rails if power fails or the car overspeeds, triggered by a governor.

- Mechanism: A worm-wheel gear system converts high-speed motor power to the high torque needed for lifting.

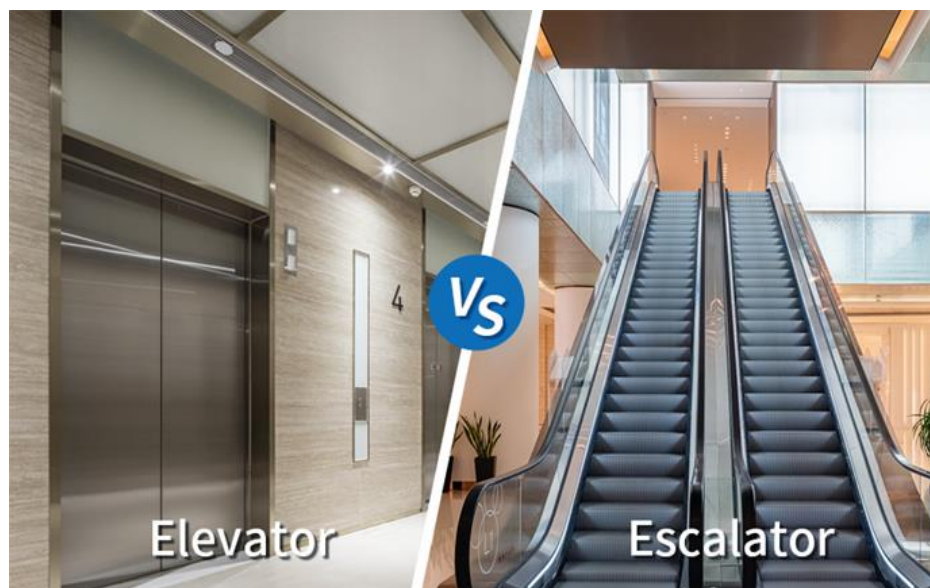


Figure-1: Elevator vs Escalator.

Other Meanings

- Grain Elevator: A structure for storing, handling, and moving grain.
- Aircraft Elevator: A movable wing surface on an aircraft's tail for pitch control (up/down movement).
- Medical: A surgical tool to lift depressed bones or a dental instrument for tooth extraction.
- Elevator Pitch: A brief, persuasive speech about a project or idea, short enough to deliver during an elevator ride.

Key takeaway: Elevators are essential for urban development, allowing access to higher floors and improving accessibility, especially with wheelchair law. The main difference is that **elevators** are enclosed cabins that move vertically between floors, while **escalators** are continuous moving staircases for open, continuous pedestrian traffic. **Elevators** are used for a wide range of purposes, from moving goods to passengers with mobility issues, and are often found in tall buildings. **Escalators** are best for moving large numbers of people quickly over short vertical distances in public spaces like malls and subway stations.

Feature	Elevator	Escalator
Function	Transports individuals or goods vertically in an enclosed cabin.	Transports people continuously on a set of moving stairs.
Design	A closed cabin that moves along a vertical shaft.	A set of stairs that move up or down along a diagonal track.
Capacity	Can carry specific loads, including heavy freight or wheelchairs.	Designed for continuous flow of many people simultaneously.
Usage	Best for tall buildings, hospitals, and offices, especially where accessibility is needed.	Best for public spaces like malls, airports, and metro stations with high pedestrian traffic.
Energy	Only consumes power when in operation.	Consumes more power as it must operate continuously.
Accessibility	Can transport people with mobility issues, luggage, and patients.	Not suitable for wheelchairs, large luggage, or people with mobility issues.

An **elevator** (or lift) is an enclosed cabin that moves vertically in a shaft for transporting people/goods between floors, ideal for high-rise buildings and accessibility. An **escalator** is a continuous, moving staircase with steps that transports many people between floors on an incline, common in malls and stations for high traffic. The key difference: elevators are batch

transport in a closed box (shaft), while escalators offer continuous, open flow transport (moving stairs).

Elevator (Lift)

- Function: A box-like car that moves up and down inside a shaft.
- Mechanism: Uses cables and counterweights, powered by a motor, to lift the car.

- Usage: High-rise buildings (apartments, offices, hospitals) for privacy, specific loads, heavy items, or wheelchair users.
- Capacity: Carries fewer people at a time (e.g., 10-15).

Escalator

- Function: A continuous, inclined stairway with steps that move.
- Mechanism: Motor-driven chain moves steps on tracks in a loop, forming stairs at the bottom and disappearing at the top.
- Usage: Public spaces with high foot traffic (malls, airports, stations) for constant, effortless movement.
- Capacity: Moves large numbers of people simultaneously in a continuous stream.

An elevator (or lift in British English) is a machine that vertically transports people or goods between floors in a building, using a platform or cage in a shaft, powered by motors and cables or hydraulics. The term also refers to a large building for storing grain (grain elevator) or a movable control surface on an aircraft's tail for ascent/descent, but its primary meaning is the building transport system, especially in North America. There are two different types of elevators that are commonly used: hydraulic lifts and traction lifts. A hydraulic elevator uses a fluid-powered piston in a cylinder, driven by an electric pump, to lift the car, making it ideal for low-rise buildings due to its heavy load capacity, lower installation cost, and simpler mechanism (no overhead machine room needed). It's reliable, offers smooth rides, and is cost-effective for residential and small commercial uses, with types including in-ground, hole less (above-ground cylinders), and roped systems. Choosing the better fitting type for your building impacts energy efficiency, space requirements, installation procedures and cost. A traction elevator uses an electric motor, ropes (or belts) wrapped around a grooved pulley (sheave), and a counterweight to move the car, relying on friction for lifting, making it energy-efficient and ideal for mid to high-rise buildings, offering smooth, fast travel by

balancing the car's weight, reducing motor strain, and is the most common type of modern elevator.

Key Meanings & Uses

- Vertical Transport: The most common meaning; a cabin or platform moving up and down in a shaft.
- Grain Elevator: A tall structure for storing grain.
- Aeronautics: The horizontal stabilizer on an aircraft's tail, controlling pitch (up/down movement).
- Surgical Tool: A handheld instrument for lifting tissue (periosteal elevator).

Key Features

- Mechanism: Typically uses electric motors, cables, and counterweights, or hydraulic systems.
- Synonym: Lift (UK).
- Function: Provides convenient, accessible transport, especially in tall buildings.

Inventions: While ancient Greeks used basic lifts, **Elisha Graves Otis** invented the modern, safe elevator in 1852 with his crucial safety brake, preventing falls and making skyscrapers possible; his first public demo at the World's Fair and first passenger elevator installation in 1857 revolutionized urban design. Elisha Graves Otis (August 3, 1811 – April 8, 1861) was an American industrialist and founder of the Otis Elevator Company.

Key Milestones

Ancient Times: Archimedes (c. 236 BC) used ropes and pulleys for primitive lifts.

1852 (Otis's Breakthrough): Elisha Otis invents the safety brake, allowing the elevator car to lock in place if the cable snaps, making passenger travel viable.

1857 (First Passenger Elevator): The first commercial passenger safety elevator is installed in a New York department store.

1880s & Beyond: Electric elevators emerge, quickly replacing steam-powered ones and enabling the construction of modern skyscrapers.

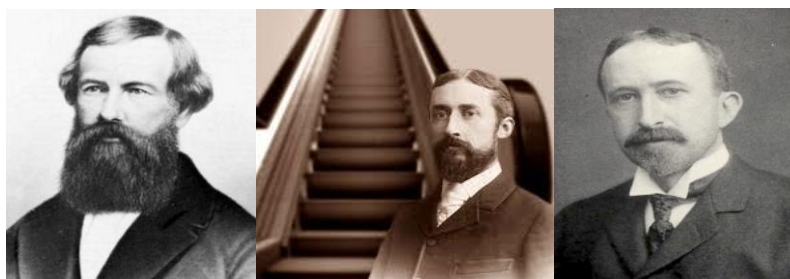


Figure-2: Inventors of Elevator [Elisha Graves Otis] & Escalator [Jesse W. Reno & Charles D. Seeberger].

The escalator was invented by two people: **Jesse W. Reno** invented the first inclined conveyor-style escalator in 1891, and **Charles D. Seeberger** developed the first modern, step-based escalator with the help of the Otis Elevator Company. Reno's version, first used as an amusement ride at Coney Island in 1892, featured cleats

on a moving belt. Seeberger's design, which included horizontal steps and a moving handrail, was first shown at the Paris Exposition of 1900 and commercialized by Otis.

Jesse W. Reno: Patented an "Endless Conveyor or Elevator" in 1891, which was an inclined belt with cleats

for passengers. Jesse Wilford Reno (August 4, 1861 – June 2, 1947) was an American inventor and engineer. He invented the first working escalator in 1891 (patented March 15, 1892) used at the Old Iron Pier, Coney Island, New York City. His invention was referred to as the "inclined elevator." An earlier escalator machine, termed

"revolving stairs" by its inventor Nathan Ames, was patented March 9, 1859, but was never built.

First commercial use: An amusement ride based on Reno's design was installed at Coney Island in 1892.

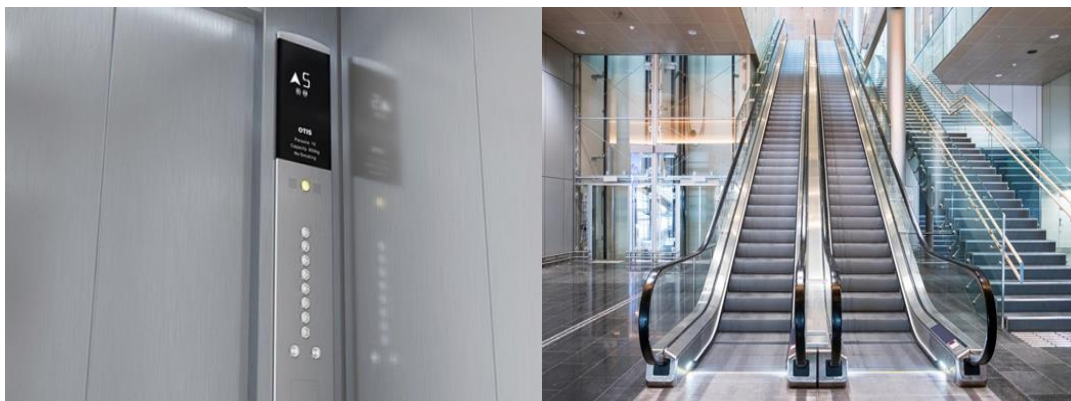


Figure-3: Elevator & Escalator structure.

Charles D. Seeberger: Redesigned the concept in the late 1890s, adding horizontal steps and a moving handrail, which is the basis for the modern escalator. Charles D. Seeberger (May 14, 1857 – September 13, 1931) was an American inventor. In 1899, he joined the Otis Elevator Company.

First commercial installation: Seeberger's design, built by the Otis Elevator Company, was first showcased at the 1900 Paris Exposition. The name "escalator" was first applied to this moving stairway.

Otis's innovation transformed vertical transport, making cities taller and changing real estate by valuing upper floors.

The Difference between Escalator and Elevator Working principle

- An elevator is an enclosed cabin that runs vertically, like a room that moves up and down, to quickly transport passengers or goods to any floor of a building. It uses motors, cables and counterweights to accomplish this.
- An escalator is an auto-moving staircase that runs at an **incline (usually 30° or 35°)**. It can only take passengers from one floor to the adjacent floors. It is

driven by an electric motor, which drives a chain that moves the steps in a circular motion.

2. Structure and Design

- Elevators take up less floor space but require a vertical shaft running through the building, and usually require a machine room on the top.
- Escalators take up more space and need a long, diagonal path between floors.

3. Speed

- Elevators move faster, from 1.0m/s to 2.0m/s in standard buildings, and even higher in skyscrapers, where they can exceed 10.0m/s.
- Escalators move at slower speeds, typically 0.5m/s to 0.75m/s.

4. Capacity

- Elevators can carry 6-21 passengers (450-1600 kg) per trip.
- Escalators can carry 20 and more passengers at a time, transporting up to 8,000 people per hour.

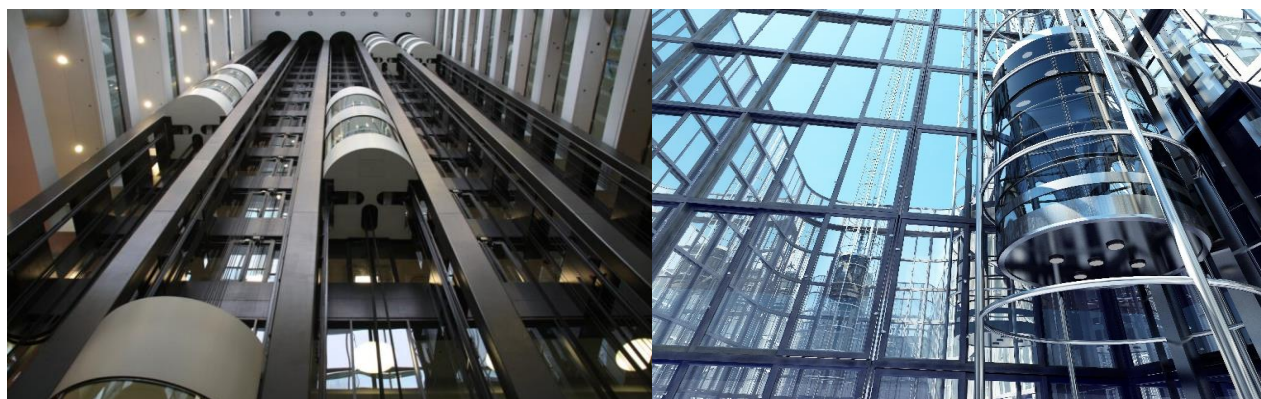


Figure-4: Glass covered Elevator.

5. Passenger Transport Efficiency

- Elevators are quicker if you need to get to many floors, but you will have to wait in line for one to appear, especially if it is busy. Delays can occur in buildings with high foot traffic due to this.
- Escalators are always moving. No waiting! You can stand still or walk to go faster, depending on how much you want to hustle.

6. Traveling Height

- Elevators is particularly good for tall structures such as high-rise buildings and even skyscrapers. They can go up so many floors.
- Escalators are more suitable for short movements, specifically covering the distance of a single or at most two floors.

7. Application

- Elevators are mainly used in multi-story buildings to transport passengers, patients, equipment and goods, commonly found in office buildings, apartments, hospitals, hotels, warehouses.
- Escalators are usually installed in high-traffic areas to transport passengers efficiently, commonly found in subways, shopping centres, and airports.

8. Energy Efficiency

- Elevators use energy while starting and stopping, and not when idle. Regenerative drives used in modern elevators absorb and return energy to the building.
- Escalators run all the time, even when no people are using them, therefore, they consume more energy. However, the newer systems are equipped with sensors that slow the escalator or make it cease to operate if it is not in use.

9. Maintenance: While both escalators and elevators transport people between floors, elevators require more safety and maintenance measures due to their vertical movement and enclosed space. In contrast, escalators have a more open design and generally require less maintenance.

Which Is Safer, To Ride in an Elevator or on an Escalator? Both of these are safe. Accidents are uncommon and typically result from improper usage. You have to follow safety rules like holding the handrail on escalators and not overload that elevator.

Which One Should I Choose? Choosing between an elevator and an escalator will depend heavily on the building's purpose. Office buildings, hotels, and residential buildings often rely on elevators because they efficiently move people between floors. Their enclosed design also provides privacy and accessibility for all users.

Shopping malls, airports, and transit stations often use both elevators and escalators. Escalators are excellent at moving large numbers of people between adjacent floors, especially during peak hours. They're also great for

buildings with high foot traffic where many people need to move between just two or three floors.

In general, a combination of both is usually best.

Which Costs More—Elevators or Escalators? For the same building, escalators tend to be more expensive. For instance, a 3-story building typically requires at least four escalators (two for ascending and two for descending), whereas only one or two elevators are usually sufficient.

Are Elevators and Escalators Manufactured to the Same Standards? No. Elevators and escalators are manufactured to different standards due to their distinct mechanical requirements. For example, in Europe, elevators must comply with the EN 81-20 standard, while escalators and moving walks are governed by the EN 115 series of standards (e.g., EN 115-1 for safety requirements).

What Happens to Elevators and Escalators During Power Outages? Elevators automatically switch to backup power systems that safely bring the cabin to the nearest floor and open doors. For escalators, they gradually slow to a stop, engaging automatic brakes to prevent backward movement. Some premium models have backup power to complete their cycle.

What Is the Difference Between Elevator and Escalator Troubleshooting? When an elevator breaks down, it usually stops automatically at the nearest floor and passengers can call for help via the emergency call button. In the case of an escalator failure, passengers can press the emergency stop button and then quickly exit the escalator.

What Is the Service Life of Elevators and Escalators? The lifespan of an elevator is 15-20 years and an escalator is 10-15 years. However, the exact lifespan depends on the frequency of use and maintenance.

Elevator lift capacity varies widely, from small home lifts (4-6 people/320-450kg) to large commercial/hospital lifts (17-26+ people/1275-2000+kg), measured in both weight (kg/lbs) and number of persons, based on floor space, building height, and usage, with common standards around 75kg per person, accommodating needs from prams and wheelchairs (630kg+) to stretchers (1000kg+).

Common Capacity Ranges

- Residential (Small Homes/Blocks): 320–450 kg (4–6 people).
- Medium Buildings (Offices/Hotels): 630–1000 kg (8–13 people).
- High-Traffic (Malls/Hospitals): 1275–2000 kg (17–26 people) or more.

Key Factors Determining Capacity

- Load Rating (kg): The official weight limit (e.g., 320kg, 630kg, 1000kg, 1275kg, 2000kg).
- Person Count: Based on an average weight (around 75kg/person for safety standards).
- Building Use: Hospitals need stretcher capacity (630kg+); car elevators handle vehicles (6,600-11,000 lbs).
- Cab Size & Hoisting: Larger cabs and different hoisting mechanisms affect total capacity.

Standard Load Levels

- 320 kg: Basic passenger transport.
- 630 kg: Suitable for prams, wheelchairs, and barrier-free access.
- 1000 kg: Accommodates stretchers and furniture.
- 1275 kg+: For larger bed lifts and high-capacity needs.

An escalator's capacity, measured in persons per hour (PPH), varies greatly but typically ranges from 2,500 to over 13,000 PPH, depending on step width (e.g., 600mm vs. 1000mm) and speed (usually 0.5-0.75 m/s), with standards suggesting two people per step for high capacity, though real-world usage often yields lower numbers due to passenger behaviour and spacing.

Step Width: Wider steps (like 1000mm) accommodate more people than narrower steps (like 600mm), significantly boosting PPH.

Speed: Standard speeds are around 0.5 to 0.75 meters per second (m/s), with faster speeds increasing throughput.

Passenger Spacing: The theoretical standard often assumes two people per step, but in practice, people often spread out, reducing actual capacity.

Usage Environment: High-traffic transport hubs (like metro stations) have higher demand than shopping malls, influencing observed flow rates.

Typical Capacity Examples (at 0.5-0.75 m/s).

- 600mm Step Width: Around 2,500 - 6,000 PPH.
- 1000mm Step Width: Can reach 9,000 to 13,500+ PPH (theoretical maximum).

Understanding the different types of elevators is crucial for safety, efficiency, maintenance, and accessibility. Elevators vary in safety features, speed, capacity, energy efficiency, maintenance requirements, and accessibility. Knowing these differences helps building owners and managers choose the right type of elevator for their needs. It also helps them improve efficiency, prevent costly breakdowns and repairs, and ensure accessibility for people with disabilities.

High-Rise Elevator: High Rise Elevators are vertical transportation systems specifically designed for buildings with multiple floors, particularly high-rise buildings. They are responsible for moving people and goods quickly and efficiently between floors, saving valuable

time and reducing physical exertion. Buildings with more than 12 floors.

Mid-Rise Elevator: Mid-rise elevators are vertical transportation systems designed to move people or goods between floors in buildings that are typically 5 to 12 stories tall. These elevators are generally smaller and slower than high-rise ones, designed for taller buildings.

Low-Rise Elevator: Low-rise elevators are small-scale vertical transportation systems designed for buildings with few floors, typically 2 to 4. These elevators are ideal for low-rise residential, commercial, and institutional buildings where space and budget constraints are a concern. An elevator lift/escalator company provides vertical transportation solutions, with major global players like Otis, KONE, Schindler, and TK Elevator (ThyssenKrupp), alongside numerous local and specialized providers in India, such as IEC Lifts, Nibav, Vintec, and J.K. Elevators, offering services from home lifts to large commercial elevators, focusing on safety, customization, and modern tech like MRL systems for homes, businesses, and industries. Escalator specifications define key parameters like speed (e.g., 0.5 m/s), inclination (typically 30° or 35°), step width (600mm, 800mm, 1000mm), and vertical rise (up to 13m or more). They also cover capacity, safety features (like comb plate sensors, emergency stops, VVVF control), materials, and ** environmental suitability** (indoor/outdoor), adhering to international standards like EN 115.



Figure-5: Logo of Elevator & Escalator.

List of 10 Best Escalator Manufacturers in the World:

- **Schindler**
- **Otis Elevator Company**
- **KONE Corporation**
- **ThyssenKrupp AG**
- **Hitachi Ltd.**
- **Toshiba Elevator and Building Systems Corporation**
- **Hyundai Elevator Co., Ltd.**
- **Shanghai Mitsubishi Electric Corporation (SMEC)**
- **Fujitec (Japan)**
- **Dazen Elevator (China)**

Capsule elevators offer advantages like panoramic views, aesthetic appeal, space efficiency, and enhanced

property value, making them ideal for modern buildings, while also providing accessibility, quiet operation, and luxury features for a better user experience in homes, malls, and offices. They are often energy-efficient and easier to maintain due to simpler designs, combining style with practical functionality.

Advantages

- **Aesthetic & Design:** Glass walls provide stunning panoramic views, boosting architectural appeal and creating a mood-lifting, luxurious feel for occupants and visitors.
- **Space-Saving:** Their compact design allows them to fit into tighter spaces, making them great for homes and buildings where traditional elevator shafts are challenging.

- **User Experience:** Panoramic views reduce claustrophobia, while features like music and voice assistance enhance comfort, ideal for malls, hotels, and offices.
- **Accessibility:** They improve mobility for the elderly or differently-abled, making buildings more inclusive.
- **Value & Appeal:** They're seen as premium features that increase property value and attract clients/guests.
- **Efficiency & Maintenance:** Often energy-efficient and simpler to operate with single speeds, they can be easier to maintain than complex lifts.
- **Modern Features:** Many come with customizable lighting and quiet technology, fitting seamlessly into contemporary designs.

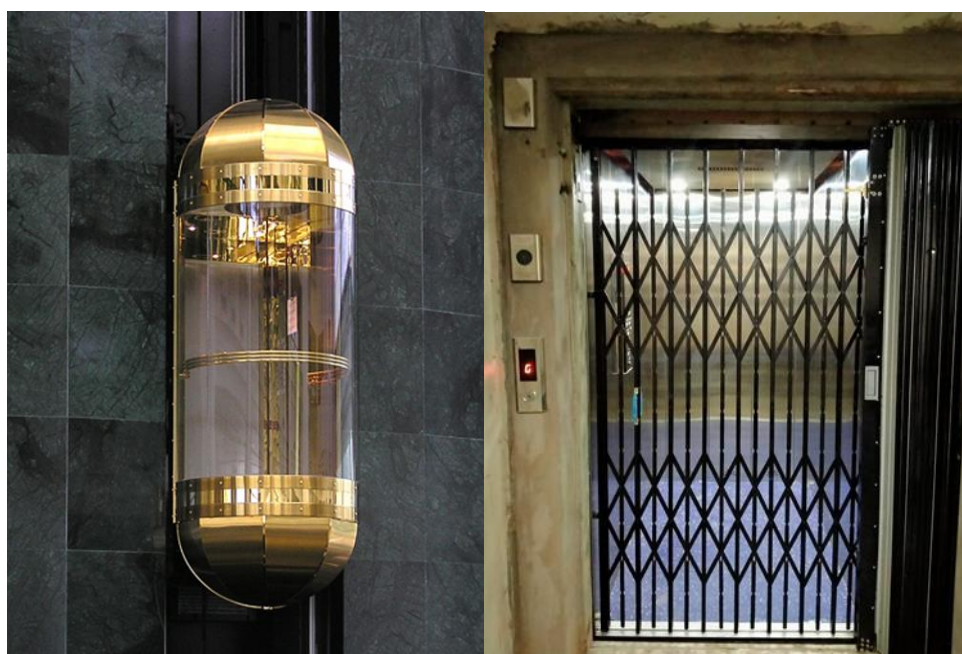


Figure-6: Capsule and Collapsible elevators.

Disadvantages

- Include high cost (materials, installation)
- Limited capacity (fewer people/lower loads)
- Slower speeds for taller buildings, complex and costly maintenance/servicing (especially for retrofits), and suitability mostly for low-rise homes/lobbies where aesthetics outweigh function.
- Their custom designs, using glass, also mean lengthier installation and potential difficulties modernizing, making them less practical for high-traffic, tall structures compared to traditional lifts.
- **Higher Price:** Premium materials (glass, custom finishes) and advanced tech increase upfront costs.
- **Complex Installation:** Glass requirements and custom designs can prolong installation and make retrofitting harder.
- **Low Capacity:** Not ideal for high passenger volume due to smaller sizes (often 2-6 people) and load limits.

- **Slower Speeds:** Generally slower than high-speed traditional lifts, limiting use in tall buildings.
- **Height Limitations:** Performance suffers in very tall buildings due to increased power/pressure demands.
- **Costly Servicing:** Can be more difficult and expensive to maintain.
- **Difficult to Modernize:** Custom nature makes upgrading complex and costly.

Emergency alarms: The emergency alarm in an elevator is usually connected to a bell. The bell rings when the button is pushed to alert people that someone is stuck in the elevator and needs assistance. **Telephones:** Usually marked with an image of a phone, this button is used to contact a technician for help.

Ideal Use Cases: Best for low-rise residences, hotels, or lobbies where aesthetics (panoramic views) are prioritized over high capacity and speed.



Figure-7: Emergency switch, alarm and lift switches.

Switches: There are 4 general types of limit switches: **whisker, roller, lever, and plunger**. Limit switches are electromechanical devices operated by a physical force applied to it by an object. A limit switch is an electromechanical device consisting of an actuator mechanically linked to an electrical switch.

Collapsible elevators, often hydraulic or limited-use types, are slower, less energy-efficient (especially going up without a counterweight), have limited travel distances, and are harder/costlier to service due to specialized parts and space constraints, leading to higher maintenance and potential downtime, while also being less green and tough to modernize. Their low capacity and complex installation (glass, custom fit) make them unsuitable for high-traffic buildings, and hydraulic versions pose oil leak/odour risks.

Advantages

- **Space Saving:** Their ability to retract or fold when not in use maximizes usable floor space, crucial for tight urban or small commercial areas. Space efficiency, as they fold away, freeing up room; cost-effectiveness, being cheaper than traditional lifts; versatility for homes, shops, and factories; and easy, quick installation with less disruption, making them ideal for small spaces, budget projects, and enhancing accessibility without major construction. They provide good vertical transport with compact designs and lower running costs.
- **Cost-Effective:** They are generally more affordable to buy and install, offering a budget-friendly way to add accessibility.
- **Easy Installation:** Installation is often quicker and less invasive to existing structures compared to conventional elevators.
- **Versatility:** Suitable for diverse needs, from moving goods in warehouses to providing access in homes, hospitals, and retail settings.
- **Enhanced Accessibility:** Improve mobility for elderly or disabled individuals in multi-story buildings, helping people age in place.
- **Low Maintenance:** Designed for rugged use, they often feature designs that minimize downtime and maintenance needs.

- **Energy Efficient:** Smart designs can lead to lower energy consumption during operation, reducing utility costs.

Ideal For:

- Small residential buildings and multi-story homes.
- Retail stores and shopping complexes for moving products.
- Factories, warehouses, and industrial facilities.
- Buildings where structural modifications for traditional lifts are difficult or costly.

Disadvantages

- **Speed & Efficiency:** Slower than traction lifts; hydraulic models use more energy going up because they lack a counterweight.
- **Capacity:** Limited passenger capacity, making them poor for busy buildings.
- **Maintenance & Cost:** Harder, dangerous, and expensive to service; higher downtime; shorter lifespan; costly to modernize.
- **Environmental Impact:** Less green due to complex parts and shorter life; hydraulic oil can leak, contaminating soil/water.
- **Installation & Space:** Complex, lengthy installation (especially glass), needs specific space.
- **Travel Distance:** Ideally for short trips (under 18m); while hydraulic can reach 40m, piston length limits it.
- **Noise & Smoothness:** Hydraulic models can be noisier and offer a less smooth ride.
- **Safety Concerns (Hydraulic):** Risk of hydraulic oil overheating, leaks, and associated environmental issues.

CONCLUSION

In short, elevators and escalators do different things and are used in different ways. Both have good points. We understand that every building has special requirements. If you're planning to install an elevator or escalator in your building and need help finding the right one.

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