Specification Series:
Elevators - First Things First

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The first step in specifying elevators is to determine the right system for your project. Four basic variables govern a system: elevator type, speed, size, and quantity. Once you establish these starting points, you can specify your system with standard specification formats, such as Masterspec. If you are going to use outside professionals to prepare the specifications, they need to know these four factors to help them get started. They will need other information later, such as finishes of car interiors and corridor entrances.

Type

There are three types of elevator equipment in general use today. With modern equipment from a reputable manufacturer, the quality of ride should be about the same.

1. Hydraulic elevators. These are moved by a hydraulic piston device, and are generally used in low-rise, low speed applications, including commercial buildings of four floors or less and residential buildings of six floors or less.

2. Geared-traction elevators. These are moved by hoist cables driven by a geared reduction unit, and are generally used in midrise, mid-speed applications, such as commercial buildings of nine floors or less and residential buildings of 18 floors or less.

3. Gearless-traction elevators. These are moved by hoist cables driven directly by a large-frame motor, and are generally used for high-rise, high-speed applications, such as commercial buildings over nine floors and residential buildings over 18 floors.

To specify elevators, you need to know the appropriate types to serve the varied needs of different buildings.

Speed

The required speed will affect the type of equipment selected. The taller the building, the higher the speed needed and also the higher the cost. Suggested speed ranges are:

Hydraulic

- *Three floors or less: 100 feet per minute*
- *Six floors or less: 150 feet per minute*

Geared-traction

- Five floors or less: 200 feet per minute
- Nine floors or less: 350 feet per minute
- Eighteen floors or less: 450 feet per minute

Gearless-traction

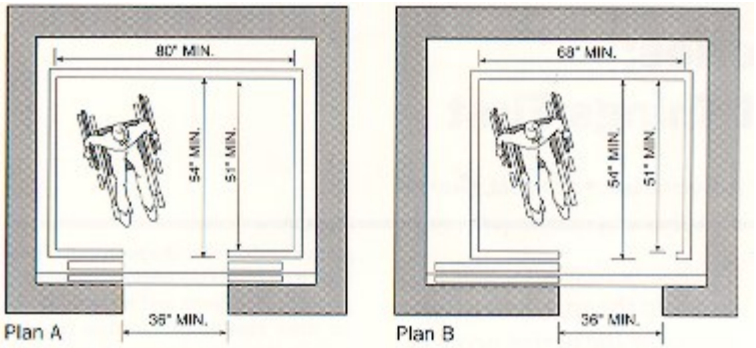
- Fifteen floors or less: 500 feet per minute
- Fifteen to 25 floors: 700 feet per minute
- Above 25 floors: 1,000 plus feet per minute

Size

The size of an elevator depends upon its rated carrying capacity, which is determined by the net inside area according to the requirements of the national elevator code, ANSI A17.1. The industry over the years has established certain standard elevator car sizes. While it is not obligatory to use these standard measurements, they offer cost advantages.

Consider the use of the elevator when selecting a size. Office and residential elevators are designed to carry peopleand have a shape that is wider than it is deep. This helps keep passengers near the doors and reduces transfer time. Healthcare facilities usually require this same passenger shape for moving pedestrian traffic, but also need larger cars for moving patients and equipment. In larger commercial or residential buildings, elevators may also need to accommodate frequent moving of materials, such as furniture, building materials, etc. In this case, at least one elevator should be larger, similar to a hospital elevator in shape and size.

The recent Americans with Disabilities Act has set minimum elevator car sizes for those buildings covered. The plan (see illustration) shows the minimum door size and minimum in side-car sizes. Minimum car depth is 5! inches and minimum car width is either 68 or 80 inches depending on door type. In plan A, the car has a rated capacity of 2,500 pounds and, in plan B, the car has a rated capacity of 2,000 pounds.



Minimum elevator sizes to comply with the Americans with Disabilities Act.

Trends over the past 20 years have been towards larger car sizes. Office buildings commonly now have eleva tors with capacities of 3,500 pounds to allow for more passenger room and comfort. Residential buildings typically have a minimum capacity of 2,500 pounds (plan A) and may have larger cars in buildings with more expensive units. Healthcare facilities now require elevators with a capacity of 6,000 pounds in order to accommodate a patient with accompanying staff and monitoring equipment.

The following are suggested inside dimensions and rated capacities:

- **Office buildings:** 6 feet 8 inches wide by 5 feet 5 inches deep; 3,500 pounds.
- **Apartment buildings:** 6 feet 8 inches wide by 4 feet 3 inches deep; 2,500 pounds
- **Hotels/motels:** 6 feet 8 inches wide by 5 feet 5 inches deep; 3,500 pounds.
- **Service elevators:** 5 feet 4 inches wide by 8 feet 5 inches deep; 4,500 pounds.
- **Hospital passenger elevators:** 6 feet 8 inches wide by 5 feet 5 inches deep; 3,500 pounds.
- **Hospital vehicle elevators:** 5 feet 9 inches wide by 10 feet deep; 6,000 pounds.

Quantity

There are rules of thumb to determine the number of elevators required:

Office buildings:

1. One elevator is required for every 45,000 net usable square feet. The ratio of the number of floors to the number of elevators should be two to one or two and a half to one, depending on the occupancy of the building. The more dense the population, the more elevators needed.
2. The number of elevators in a single group should not exceed eight and no single group should serve more than 16 levels.
3. In buildings of four to eight floors, a separate service elevator should be considered. Over nine floors, a service elevator is virtually required.
4. Upper-floor, special-use areas, such as cafeterias, mail rooms, transfer bridges, etc., can increase the required number of elevators.

Hotels/motels:

1. Provide one elevator for every 75 rooms with a minimum of one elevator up to three floors. Do not exceed 150 feet from farthest room to elevator.
2. When room service is provided, allow for one separate service elevator for every two passenger elevators.
3. Special-functions, meeting rooms, or lobby areas above entry level can increase the number of elevators.

Apartment / Condominium/Dormitory

1. One elevator for every 90 units with a maximum distance of 150 feet from elevators to the most distant unit.
2. Urban locations or high-price units might require one elevator for every 60 units.
3. Make one elevator oversize (at least 3,500 pounds) to accommodate furniture. In buildings 10 floors or more, consider a separate service elevator.

Healthcare facilities

1. This type of building requires specific evaluation due to the many types of facilities and specialized uses.
2. In buildings with consistent staff and visitor traffic, consider separate passenger elevators.
3. Provide one passenger and one service/patient elevator for every 100 beds and bassinets in a general hospital. In all healthcare facilities, at least two elevators must be provided.
4. Additional elevators may be required if the building is located in an urban area and/or two or more visitors per bed are expected.
5. Additional elevators may be required if operating areas, cafeterias, laundry, central supplies, etc. are on upper levels.

For more information

In addition to this information on the four basic variables in selecting an elevator system, major elevator manufacturers have available supplementary free planning guides. One of the most definitive reference sources in planning elevator systems is George R. Strakosch's Vertical Transportation, Elevators and Escalators, 2nd Edition, published by John Wiley & Sons.

Further assistance with planning can be obtained from an experienced representative of one of the major elevator manufacturers. For more significant projects with varying vertical transportation requirements, a consultant specializing in designing elevator systems should be considered.

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