OTIS Worldwide

- The world's largest company in the manufacture and service of elevators, escalators, moving walkways and other horizontal transportation systems.
- Wholly owned subsidiary of United Technologies Corporation.
- Approximately 122,000 Otis elevators and escalators sold annually.
- Over 60,000 employees, with 53,000 employees working outside the United States.
- US $11.6 billion in 2010 of which 80 percent was generated outside the United States.
- More than 2.4 million Otis elevators and escalators are in operation worldwide.
- More than 1.8 million elevators and escalators serviced by Otis worldwide.
- Product offered in more than 200 countries and territories.
- Companies two tallest elevator test towers located at Shibayama; Japan (505 feet / 154 meters above ground 89 feet / 27-meters, below ground) and Bristol United States (384 feet / 117 meter above ground).
- The GeN2™ elevator system combines 21st Century technology and material with modern objectives including energy efficiency, environmental responsibility, passenger safety and comfort, increased usable space, streamlined architectural profiles and time saving installation. GeN2 incorporates the latest breakthrough in elevating technology - flexible polyurethane coated steel belts replaces the conventional steel ropes.
- Over 200,000 GeN2™ elevators sold worldwide.
- Regen™, drives along with GeN2™ reduces elevator energy usage by up to 75 percent compared to non-regenerative.
- Skyway™, gearless elevator system that incorporates high speed, large load carrying capacity and the Double Deck and Super Double.
- Deck high-speed models, Compass™, destination entry provides passengers personalized elevator service while improving system performance.
OTIS India

- Incorporated in 1953.
- India’s No. 1 elevator company engaged in the manufacture and service of elevators and escalators.
- First elevator company in India to receive the ISO 9001: 2000 certification covering design, manufacture, marketing, installation, service and modernisation of elevators and escalators.
- First elevator company in India to receive the ISO 14001: 1996 certification for environment norms, for its Bangalore Works.
- World class manufacturing facility at Bengaluru.
- Over 2,400 employees.
- More than 70,000 elevators and escalators throughout India.
- Over 50,000 units under contractual maintenance.
- Largest network of over 80 service centres with the widest geographical spread, covering more than 300 towns and cities.
- Introduced OTISLine™ in five metro’s. A system that enables customer service staff to receive a customer complaint, quickly track all information on the elevator through a dedicated computer system and instantly inform the route mechanic to attend and set things right.
- Dedicated National Service Centre, near Mumbai for quick supply of spare parts.
- Passenger, Panoramic, Freight and Automobile elevators.
- Home elevators.
- Commercial and Public escalators.
- Trav-O-Lators®.
- Otis Essentia - Elevators for low-rise housing / commercial complexes.
- Gen2 Comfort - Marketing a milestone in gearless machine-roomless elevator technology, with high efficiency, space saving, environment protection and riding comfort.
- OTIS Skyrise - The OTIS Skyrise is Otis’ high performance gearless solution elevator for prestigious high rise buildings. It combines the latest VVVF drive control, intelligent modular system design, advanced door operating technology and modern aesthetics.
- Modernisation packages for improved performance and reliability through refurbishment of existing cars, fixtures, door operators and installing modern elevator control systems.
It is continuing Otis policy to provide products and services of superior quality, and information plays an crucial role in that policy. It is thus the purpose of the Planning Guide to equip customers with an independent ability to make initial elevator system design decisions of quality, during the “concept” stages of a project. The guidance offered is not of a depth to permit detailed design, but it will enable initial decisions to be made for subsequent development. Such development is the province of the specialist and at this stage Otis should be consulted directly.

The planning tools and experience available to customers through Otis are unsurpassed and Otis is always ready to provide more information and assistance. It is hoped that this guide gives a clear sign of that intent and, for those new to the subject, it will be the first step in a wider and mutual co-operation. For existing Otis customers it is hoped that this guide gives yet more valuable help in planning matters and that it reaffirms Otis’ commitment to the pursuit of excellence.

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Elevator System Design

Good elevator system design is critical to a multi-storey building. Planning of elevator systems must therefore feature very early in overall building design programmes, within both new construction and refurbishment schemes. The quality of vertical transportation is vital to building circulation and therefore has a profound effect on human response to a building itself. If it is correct, acceptability, reputation and a sound investment are assured. If it is incorrect, it causes disadvantages from which escape is difficult and usually expensive.

Typical Arrival Pattern - Commercial Office Building elevator systems must be configured to match the expected traffic requirements, both present and future. This means that accuracy in predicting expected building population and how and when it will move is critical, for it is on this principle that fundamental elevator system design decisions must be based. Key decisions, such as the number of elevator shafts, cannot be easily modified in the later stages of building development.

Predicting population flow and patterns is often a difficult and uncertain task, needing a unique expertise. Using data predictions in the process of producing an optimum elevator system design, or the art of elevating as it is known, is also a specialist’s task. Knowledge and experience are essential to get things right the first time.

Otis is dedicated to getting things right and is always ready to assist, by providing information and advice to existing or prospective customers on how to plan and achieve the best elevator system design. Whether it is for a new building, with all the design alternatives available, or for an existing building, where ingenuity and use of up-to-date technology can solve many design problems, Otis can help the designer get exciting and innovative results.

Key Design Considerations

There are many variables which affect elevator system design. However, the key ones to be specified are:
- Number of floors to be served.
- Floor to floor distance.
- Population of each floor.
- Location of building.
- Specialist services within building.
- Type of building occupancy.
- Maximum peak demand in passengers per five minute period.

To meet the elevator system specification, there are many design features which an elevator manufacturer can vary. Of these, the principal ones are:
- Elevator speed.
- Elevator car dimensions.
- Load.
- Number of elevators.
- Elevator design characteristics (e.g. entrances and control systems).

Although design estimates can be made manually, with many variables to be included in the overall process, on larger projects it requires the use of computer techniques to obtain optimum solutions. This applies particularly to complex designs.

OTISPLAN PLUS™ is a sophisticated suite of computer programmes which has been developed by Otis to solve such problems for larger buildings. Building and traffic data is input to the programmes which then process it, with access to additional data accumulated from many years of Otis experience.
Basic Design Parameters

There are numerous parameters which can be used to judge elevator system performance. The principal one is based on quality of service. Quality of service is related fundamentally to the time interval a passenger has to wait for an elevator car and how quickly the system transports that passenger to a desired destination. To quantify the concept a standard definition is used.

Quality of service (or interval) is the expected average interval (in seconds) between the arrival of elevators at the main floor.

In basic terms, this is the round trip time of one elevator divided by the number of elevators in a group.

The required handling capacity or quantity of service of a system, is expressed in elevator industry design terms, as a function of the expected building population.

It is stated in units of the percentage of a building’s population to be transported within a five minute period.

Building Types

The guidelines below indicate the key design features for particular building types. Although some qualitative and quantitative advice is given, it should always be remembered that there is no substitute for accurate estimation of traffic patterns. Average values are quoted for guidance. However, true estimates for a particular building, including local influences, such as the location of transport terminals or stations, can alter these significantly.

Offices

Maximum traffic usually occurs just before the start of working hours and is known as “up morning peak” in elevator industry jargon. Office buildings with single (unified) tenancy usually provide heavier peak flows than those with multiple (diversified) tenancy.

If more detailed estimates cannot be made, the following handling capacity requirements should be used as a basis for design to meet up morning peak.

- Unified tenancy - 15 to 25 per cent of the total building population entering in a five minute period.
- Diversified tenancy - 10 to 15 per cent of the total building population entering in a five minute period.

There will be other peaks in elevator system usage, such as at lunchtime and in the evening when people leave. Peaks can also be caused by the location of basement garages, conference rooms, restaurants and similar mass use facilities. The effect of these must be taken into account individually.

Designing for a quality of service is very much dependent on the preferences and needs of the owner or occupant of a building. A general guide to the acceptability of service intervals can be summarised as follows.

- Average interval 20–25 seconds - excellent.
- Average interval 35–40 seconds - fair.
- Average interval 45 seconds - poor.

A large prestigious office building must often meet exceptional inter-floor traffic demands which have to be considered in planning. These demands can often be very complex and correct design decisions will be more accurate if computer aided optimisation and simulation is used as a planning technique. It will usually be beneficial to involve Otis directly in such work. Use of such techniques is essential when the final elevator system itself will be computer controlled to achieve optimum operational performance, as will be the case for most large building complexes.
Hotels

The traffic flow in hotels is dependent on the type of hotel and its layout. Traffic peaks normally occur in the early morning and in the evenings, as guests leave and enter, or access the common facilities, such as restaurants and bars. At these peak times, traffic flow can be approximately 10 per cent (5 per cent in each direction) of the hotel guest population requiring elevator service in a five minute period. In the absence of other estimates, this value is used for planning.

Hotels where large scale events are held, such as conferences and banquets, may often have periods where traffic flows substantially exceed the recommended planning figure. If a hotel’s owner or developers require it, planning criteria should be amended to a higher value, to ensure the elevator system can cope with such demands. Ideally large suites should be located on lower levels.

What is an acceptable service interval in a hotel can vary greatly according to its type and location. In smaller, older or provincial establishments longer intervals up to 60 seconds can be acceptable. In modern, international hotels not more than 30 seconds will be acceptable.

In addition to guest elevator systems, most hotels will require provision of separate elevator systems for staff movement, catering supplies, linen and other purposes.

Residential Buildings

Traffic patterns in residential buildings, either private or publicly owned, usually resemble those of hotels. Peak traffic density usually occurs in the early morning, but peaks will vary both in time span and in intensity. The peak traffic value for use in planning, is suggested as 6 per cent of total building population.

The acceptable service interval for residential buildings is a highly variable quantity and must be assessed on criteria relevant to each application. Thus it is difficult to give general guidance. However, it should not be overlooked that extended waiting due to low quality of service can antagonise and frustrate elevator users. This in turn can lead to unpleasant reaction and social problems.

If there is a requirement for a residential elevator system to access public areas, service levels must be given special consideration. Elevator equipment must also be designed to suitable standards for such application. Often the planning criteria will be set by the principal, such as a housing association or local authority. Further, modern residential buildings also need multiple use elevators like stretcher, service cum goods elevator.

Hospitals

Generally vertical transportation requirements are laid down by the operating authorities of hospitals, consultants etc., whether public or private.

Very careful research is necessary to plan each individual hospital elevator project correctly. There will usually be a requirement to provide several elevator systems. Apart from those for specific patient and medical use in a hospital’s day-to-day work, elevators will be required for patients’ visitors, catering, linen transport, waste disposal and similar purposes.

Specialised Buildings

Leisure centres, shopping malls, retail developments, air terminals and entertainment complexes are typical of the kind of specialised buildings which require careful individual study of traffic flow and density. Often the vertical transport facilities for passengers will be a combination of elevators and escalators and there will be separate elevators for goods transport.

Panoramic elevators are often selected for use in specialised buildings for aesthetic reasons and to provide viewing platforms. Their use has added design implications which do not apply to standard passenger elevator designs. Such elevators should rarely be used as the prime means of vertical transportation in a building scheme.
Modernisation Of Existing Elevators

In refurbishment projects, the problems will usually be to upgrade within the physical constraints of an old system or add an elevator system where none existed. The design of a system should still be based on projected traffic flow, but the realities of each situation may have greater influence on design.

There will be greater need to use more innovative arrangements, such as adoption of the latest microprocessor based VF control system for improved operation and traffic handling.

Modularity, as offered by Otis designs, enables elevators to be dimensioned to match existing wells or to optimise

Benefits Of Otis Modernisation

- Greater reliability due to incorporation of latest technology.
- Savings in energy costs.
- Smoother and more comfortable ride.
- Reduced waiting time, noise and vibration.
- Accurate floor levelling.
- Optimum system efficiency.
- More pleasing aesthetics, face-lifted car interiors resulting in enhanced prestige to your building.
- Comfort from the latest in elevator safety technology.
- Most importantly, satisfied building occupants.

OTIS MODERNISATION upgrades existing elevators to your desired expectations by retaining as much of the existing equipment as practicable by utilising specially developed pre-engineered packages. Modernisation projects are executed in the most scientific manner. Our proven techniques minimise downtime and inconvenience to the building’s occupants and visitors.

AC1 X’Press

Otis Modernisation has recently launched unique and innovative AC1 X’press package to upgrade old manual door elevators suitable up to 14 stops and includes Microprocessor based VF controller, luminous buttons, wiring, locks, Retiring cam, Multiple options of buttons and faceplates for fixtures.

This package can be installed in a very short time thereby minimizing the shut down time and has been designed to deliver exceptional value to customers. Key benefits of this package are better leveling, ride comfort, appreciable power saving and reduced waiting time.

PM Gearless with VVVF

The new gearless Mod package is launched for upgrading the old DC gearless elevators with running speed of 2.5 meters per second. The package consists of Permanant Magnet gearless machine with microprocessor based ACD Controller, Fixtures, Wiring and Roller guides for Car.
Normally, the most efficient method of locating elevators to serve an individual building is to group them together. A group has a lower average interval between car arrivals than a single elevator.

Groups should be located for easy access to and from a main building entrance and should normally be located centrally for general ease of passenger transit throughout the building.

If a building is of a design with areas which give long distances to the central elevator group, it may be efficient to install an additional elevator for local area inter-floor traffic.

For complex buildings, the principles for location of elevators can be different from those indicated. Otis are

**Location Of Elevators**

**Grouping Of Elevators**

A group of elevators should be designed in a manner so that they are located closely to minimise the walking distance between entrances. Waiting passengers can then react quickly and access cars swiftly without detrimental effect to the quality of overall service.

Lobby areas, especially the main ones, should not be in the path of passageways. Any potential for confusion between waiting passengers and passers-by should be avoided by having separate lobby areas.

There are two options for grouping 2 or 3 elevators (as per fig 1 & 2 below). For 4 elevators, option as shown below is preferable, as 4 elevators in line cause sufficient increases in passenger walking distances to diminish operational efficiency.

The lobby width, of twice the car depth, when elevators are placed opposite each other in a group, determines the size of the elevator machine room. If the lobby width is decreased below that specified, it can provide difficulties in machine room layout.
ELEVATOR LAYOUT

Elevator arrangement is a term used to describe the configurations used for hoisting an elevator car. The main criteria which determine the layout to be used are:

- Design of the building, particularly the physical constraints imposed by dimensional or loading limitations.
- Performance of the elevator system in speed and capacity.
- Optimum utilisation of available floor space.

1. Electric traction machine above

1:1 roped (the rope linear speed and car travel speed are the same). An economical and efficient roping system applicable to many medium and high speed elevators systems. Often a diverter sheave will be fitted.

2. Electric traction machine above

2:1 roped (the rope linear speed is twice the car travel speed). This layout permits a machine to carry twice the elevator car load it can in layout 1.

3. Electric traction machine below

1:1 roped. Single wrap. Generally restricted to 30 meters. The headroom required above the elevator well is reduced in this layout by having the machine mounted at or below the lowest floor level served. The increased length of rope can limit travel and the method doubles the load on the building structure or elevator shaft compared with layout 1.

4. Machine room less Elevator

For building owners, the Machine Room less Elevator system results in lower construction costs – firstly because there is no machine room and secondly because the machine itself is located on the top of the guiderails. It also gives flexibilities to architects in terms of designing the roof tops. This means that all the force is transmitted via the rails onto the pit floor. Again, pit depth and space provision for overhead area is significantly lesser. The result is savings again in construction cost.
Modern elevator systems are driven by electric motion. The main criteria which decide the method to be used for a specific design are:

- Elevator speed.
- Intensity of elevator usage.
- Headroom constraints.
- Passenger comfort.
- Energy consumption.

- Site constraints.
- Capital and operating costs.

Machines used to provide electric traction drive are designed.

- Variable Voltage Variable Frequency geared machines for speeds up to 2.5 metres per second.

Geared Machine by virtue of its design offers higher performance. Greater flexibility & enhanced reliability. High specification of materials used in the gear coupled with one of low friction bearing results in highly efficient gear box. Both these factors contribute to reduced energy consumption. Complies with ISO 9000 Standards.

Variable Voltage Variable Frequency Geared Machines

Variable Voltage Variable Frequency Gearless Machines

A ‘Green’ Machine:
The low inertia gearless machine is equipped with a highly efficient PM synchronous motor of radial construction.
A gearless machine with a closed-loop VP drive increases passenger comfort.
The gearless machine combined with a sophisticated load weighing device and a closed loop variable frequency drive with vector control contribute to a smooth and quiet ride.

Gearless Machine for 2.5 mps & above:
Recommended for 2.5 mps & above speeds because of very low noise levels, less friction and no mechanical losses resulting in a very high operating efficiency.
Option of Permanent Magnet Machines with gearless system is also available which provides additional benefits in terms of:

- Increased hoisting capacity with compact design resulting in space saving & enhanced flexibility in layout.
- Improved motor efficiency.
- Improved rotational control resulting in better ride quality & precise stopping accuracy.
- Cooling through natural convention resulting in elimination of fan noise.
The Otis Variable Voltage Variable Frequency system used on geared elevators provides the ultimate in performance at reduced operating costs.

Incoming mains AC power is first rectified to DC and then inverted to provide controlled AC current to the elevator drive. Precision monitoring of motor speed and car direction, position and load enable the pulse width of the AC power supplied to the motor to be adjusted to ensure that elevator speed is maintained very accurately to an ideal profile.

Pulse width modulation control of AC motors has tremendous advantages compared with the older Servo control techniques, namely:

- Total control at all stages of the motion cycle
- A consistent fully adjustable smooth ride
- Excellent levelling accuracy under all conditions
- A higher power factor
- Lower starting currents
- Energy saving through reduced power consumption
- Quieter, cooler running.
The most efficient door configuration is two panel, center opening- Figure (a). A usable clear opening becomes available, and passengers begin transfer, before the doors are fully opened.

Passengers are protected from the closing doors by Electronic Door detector.

The principal elements affecting entrance efficiency are:
- Opening width
- Door configuration
- Door drive system
- Passenger protective systems

Power Operated Entrances

Two speed, two panel entrances - Figure (b) are used more at hospitals and similar buildings. They are more space effective, but lack the operational efficiency of type (a).

Protective System

The screen of infrared beams acting as a safety curtain across the door entrance detects an obstacle when the doors are closing, the doors then revert to an open position.
General

There are three key elements to the operational control of an elevator system:

- Passengers requiring an elevator inform the system by a ‘landing call’.
- Passengers in an elevator car inform the system of their destination by a ‘car call’.
- The elevator’s operational control system responds to passengers’ demands by issuing appropriate commands to the elevator’s motion controller.

Most Otis control systems use microprocessors to handle system commands. They are of modular design, ranging from the simplest form of control to the most up-to-date and sophisticated.

Down Collective Operation - One Car (Simplex)

1. The car normally rests at the main floor. Main floor has an ‘UP’ call button. Floors above have ‘DOWN’ call button. The controller memorises landing and car calls. This system is ideal for residential buildings.

When more than one landing calls are received, the car will travel to the highest call, stopping at other landing calls during the descent.

2. During an ‘UP’ journey from the main floor, the car ignores all landing calls, stopping at car calls in floor sequence. After the highest car call floor, the car will descend, stopping at landing and car calls in floor sequence back to the main floor.

3. The system is suitable only for light traffic. Interfloor traffic is poorly served by this system and it should be used only when traffic is mainly up from, and down to, the main floor eg. residential buildings.
Down Collective Operation - Two Cars (Duplex)

1. Operates as the Simplex but...

With no calls in the system, one car rests at the main floor, the other normally at the last floor served, unless that was the main floor, when the car will park at a midway point.

When a landing call is received, the microprocessor calculates which car is nearest to the call.

If a series of landing calls is received, a car will be despatched to the highest call, and then work down in floor sequence.

The microprocessor constantly monitors the system and re-assigns calls when necessary.

Full Collective Operation - One Car (Simplex)

1. 'UP' and 'DOWN' landing call buttons are provided on all floors except the lowest floor which has an 'UP' button, and the highest floor which has a 'DOWN' button. Landing call buttons illuminate when pressed to indicate that the call is registered.

2. Landing calls and car calls are memorised and handled in logical sequence according to the direction of travel of the car and independent of the order in which the calls were registered.

3. The Full Collective system handles inter-floor traffic well and is suited to most applications within its handling capacity.
Duplex operates as the Simplex but....

With no calls in the system, one car rests at the main floor, the other normally at the last floor served (unless it was the main floor, when the car will park at a midway point).

When a landing call is received, the microprocessor calculates which car is nearest to the call, travelling in the required direction. Each car responds to its own car calls in logical sequence, depending upon direction of travel, and takes landing calls as assigned by the microprocessor.

The microprocessor constantly monitors the system and re-assigns calls when necessary.

When the Full collective (upto 8 elevators) Duplex principle is extended to cover more than two lifts to operate them as a co-ordinated system it becomes a Full collective Group.

With no calls in the system one car rests at the main floor, the others are distributed evenly throughout the other floors.

Each elevator has its own microprocessor controller and each controller has the ability to perform the group supervisory role, so that, in the event of an elevator failure, the remaining elevators continue to operate as a co-ordinated system.
Otis Relative System Response Plus (RSR Plus) dispatching system is the third generation of Elevonic Relative System Response (RSR) software. RSR Plus is the dispatching software for medium and high speed elevator.

An important function of group control is the identification of the most suitable of several eligible cars to respond to a hall call. For a given hall call, the RSR Plus patented dispatcher determines the “best” car to answer the call using a figure of merit called Relative System Response (RSR). The foundation of the dispatcher is a set of 21 bonuses and penalties, which are used to compute the RSR score.

RSR Plus has two major enhancements:

- The addition of five new parameters.
- When system demand is heavy, RSR Plus has the ability to vary some of the bonuses and penalties based on what the system has "learned" during recent actual traffic patterns in order to optimize hall call registration time.

The benefits:

RSR Plus can increase heavy two-way dispatching efficiency by up to 10 percent. By varying the bonuses and penalties, the number of long-wait calls are reduced further and average wait time is improved.

**Coincident call feature**

As elevator ‘B’ is going to stop on floor No. 6 for car call, the same hall call can be attended and car ‘A’ can travel direct to lobby.

**Contiguous call feature**

In heavy down traffic, if elevator ‘A’ attends to all consecutive floor calls it is going to take longer. Hence the allocation of consecutive floor calls is divided.
Dimensional Details For Gearless Elevator System: (Machine Room) Speed = 1.0 MPS

Refer Otis Detailed Drawing For Additional Information

All Dimensions Are In mm
Dimensional Details For Gearless Elevator System: (Machine Room Less) Speed = 1.0 MPS

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REFER OTIS DETAILED DRAWING FOR ADDITIONAL INFORMATION

ALL DIMENSIONS ARE IN mm
Panoramic Elevator (Glass Panel On Rear Side)

DIMENSIONS

OWNER'S WORK
1. ALL WALLS MINIMUM 150 RCC OR 230 BRICK (FRONT WALL 230 BK. PREFERRED)
2. ALL CIVIL WORK, HOLES, GRouting etc.
3. REINFORCED CONCRETE MACHINE-ROOM STRUCTURAL FLOOR SLAB 150 THICK DESIGNED TO SUSTAIN MIN. 1000 Kg/m² U.D.L.
4. ROLLED STEEL SECTION FOR HOISTING BEAMS, MACHINE BEAMS, BEARING PLATES PIT-LADDER, ETC.
5. POWER SUPPLY: 400 VOLTS, 3 PHASE, WIRING WITH NEUTRAL, 50 Hz & 230 VOLTS 1 PHASE
6. SUITABLE RAIN PROTECTED ENCLOSURE FOR FULL HEIGHT OF HOISTWAY AS ELEVATOR EQUIPMENT IS NOT SUITABLE FOR EXPOSED ENVIRONMENT.

MACHINE - ROOM PLAN

ELEVATION

PERSONS LOAD 6 8 10 13 16 20

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REFER OTIS DETAILED DRAWING FOR ADDITIONAL INFORMATION

ALL DIMENSIONS ARE IN mm
Panoramic Elevator (Three Glass Panel On Rear Side)

DIMENSIONS

OWNER’S WORK
1. ALL WALLS MINIMUM 150 RCC OR 230 BRICK (V/Y. FRONT WALL 230 BK. PREFERRED)
2. ALL CIVIL WORK, HOLES, GROUTING ETC.
3. REINFORCED CONCRETE MACHINE-ROOM STRUCTURAL FLOOR SLAB 150 THICK DESIGNED TO SUSTAIN MIN. 1000 Kg./M² U.G.L.
4. ROLLED STEEL SECTION HOSTING BEAMS, MACHINE BEAMS, BEARING PLATES SUPPORT BEAMS AND PIT-LADDER, ETC.
5. POWER SUPPLY: 400 VOLTS, 3 PHASES
6. SUITABLE RAIN PROTECTED ENCLOSURE FOR FULL HEIGHT OF HOISTWAY AS ELEVATOR EQUIPMENT IS NOT SUITABLE FOR EXPOSED ENVIRONMENT.

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<th>PERSONS</th>
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<td>1380 Kg.</td>
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</table>

REFER OTIS DETAILED DRAWING FOR ADDITIONAL INFORMATION

ALL DIMENSIONS ARE IN mm
Panoramic Elevator (Five Glass Panel On Rear Side)

**DIMENSIONS**

**MACHINE - ROOM PLAN**

**HOISTWAY PLAN**

**OWNER'S WORK**
1. All walls minimum 150 RCC or 230 brick (1½½ front wall 230 brick preferred)
2. All civil work, holes, grouting etc.
3. Reinforced concrete machine-room structural floor slab 150 thick designed to sustain min. 1000 Kg/m² U.D.L.
4. Rolled steel section hosting beams, machine beams, bearing plates support beams, insert plate & pit-ladder etc.
5. Power supply: 400 volts, 3 phase, 4 wires with neutral, 50 Hz & 230 volts 1 phase.
6. Suitable rain protected enclosure for full height of hoistway as elevator equipment is not suitable for exposed environment.

**LOAD**

<table>
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<tr>
<th>CLASS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<td>1250</td>
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<td>3000</td>
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</table>

Refer OTIS detailed drawing for additional information. All dimensions are in mm.
Automobile Elevator 2500 Kg.

Owner's Work
1. All walls minimum 150 ROC or 230 BRC (HY. FRONT WALL 230 BK. PREFERRED)
2. All Civil work, Holes, Grooving etc.
3. Reinforced concrete MACHINE-ROOM STRUCTURAL FLOOR SLAB 150 THICK DESIGNED TO SUSTAIN MIN. 1000 Kgs./m² U.S.L.
4. Rolled Steel Section HOSTING BEAMS, MACHINE BEAMS, HITCH BEAMS, SUPPORT BEAMS, GOV. SUPPORTS, BEARING PLATE, STANCHIONS AND PIT LADDER ETC.
5. Power supply: -- 400 Volts, 3 Phase, 4 wires with neutral, 50 Hz & 230 Volts 1 Phase
6. Steel stanchions --BY OWNER

Refer Otis Detailed Drawing for Additional Information
All Dimensions are in mm
Home Elevator (Residential Elevator for Private Homes)

- Home Elevator is a small elevator meant for 3 persons for Private Residential House / Bungalows.
- Otis innovative design takes care of limited residential space and uses the available space very effectively.
- It has low running cost and extends facilities of comfortable living.
- It is very ideal for elderly and handicapped members of the family.
- It is certainly adds to the quality of living.

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Usage</th>
<th>Private home use (Usable for wheelchair users)</th>
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<tbody>
<tr>
<td>Drive Machine</td>
<td>Drum type machine installed inside hoistway</td>
</tr>
<tr>
<td>Load Capacity</td>
<td>204 Kg.</td>
</tr>
<tr>
<td>Passenger Capacity</td>
<td>3 persons</td>
</tr>
<tr>
<td>Control System</td>
<td>Simplex automatic operation</td>
</tr>
<tr>
<td>Max. no of stops</td>
<td>4</td>
</tr>
<tr>
<td>Max. rise</td>
<td>12 meter</td>
</tr>
<tr>
<td>Car speed</td>
<td>0.33 m/sec.</td>
</tr>
<tr>
<td>Power supply</td>
<td>1 phase, 200 Volts, for elevator operation and 100 Volts for lights.</td>
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<tr>
<td>Entrance</td>
<td>Front only (standard) or front and rear (optional)</td>
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<tr>
<td>Door</td>
<td>4 - panel center opening doors with light beam door protection system.</td>
</tr>
<tr>
<td>Car inside (mm)</td>
<td>1000 wide X 1150 deep X 2000 high</td>
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<tr>
<td>Clear opening (mm)</td>
<td>800 wide X 1900 high</td>
</tr>
<tr>
<td>Hoistway size (mm) (Min)</td>
<td>Front opening only : 1350 wide X 1450 deep</td>
</tr>
<tr>
<td></td>
<td>Front and rear opening : 1350 wide X 1610 deep</td>
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<tr>
<td>PIT (mm)</td>
<td>Min : 500</td>
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<td></td>
<td>Max : 900</td>
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</table>
Home Elevator (Residential Elevator for Private Homes)

DIMENSIONS

REFER OTIS DETAILED DRAWING FOR ADDITIONAL INFORMATION

ALL DIMENSIONS ARE IN mm
For a well-engineered installation, the choice of freight elevators requires a close consideration of such factors as size, weight of the materials to be transported, the method of handling, etc. to provide freight elevator installations suited to any operating condition, we manufacture several basic types. A wide range of capacities and control systems are also on offer.

Directly and indirectly, modern freight elevators make for efficient operations throughout a building. The results of properly planned freight elevator installation show up in increased material handled volume and greater earning power.

<table>
<thead>
<tr>
<th>LOAD (Kg)</th>
<th>SPEED (M.P.S)</th>
<th>CAR INSIDE</th>
<th>LIFT WELL</th>
<th>ENTRANCE 2 SPEED DOOR</th>
<th>MACHINE-ROOM</th>
<th>PIT DEPTH</th>
<th>OVERHEAD</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>K</td>
</tr>
<tr>
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<td>1100</td>
<td>1200</td>
<td>1900</td>
<td>1750</td>
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<td>3050</td>
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<td>2900</td>
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</tbody>
</table>

Note: Vertical uplifting car door & vertical biparting landing doors are available as option subject to availability of minimum floor to floor height as (1.5 H + 400 mm). (H = Opening height)

ALL DIMENSIONS ARE IN mm
Freight Elevator

MACHINE - ROOM PLAN

OWNER’S WORK
1. ALL WALLS MINIMUM 150 RCC OR 230 BRICK + VY. FRONT WALL 230 BK. PREFERRED
2. ALL CIVIL WORK, HOLES, GROUTING ETC.
3. REINFORCED CONCRETE MACHINE-ROOM STRUCTURAL FLOOR SLAB 150 THICK DESIGNED TO SUSTAIN MIN. 1000 Kg/m² U.D.L.
4. ROLLED STEEL SECTION HOISTING BEAMS, MACHINE BEAMS, H Peach BEAMS, SUPPORT BEAM, BEARING PLATES, PIT-LADDER, ETC.
5. POWER SUPPLY :- 400 VOLTS, 3 PHASE, 4 WIRES WITH NEUTRAL, 50 Hz & 230 VOLTS 1 PHASE.

ELEVATION

HOISTWAY PLAN

REFER OTIS DETAILED DRAWING FOR ADDITIONAL INFORMATION

ALL DIMENSIONS ARE IN MM
“OTIS” Hospital Elevators are designed to meet present-day Hospital needs. It is designed to carry bulky hospital equipment. Versatile Automatic Control System permit economical self-service or attendant operation.

For a relatively small hospital, a minimum of two elevators are recommended so that at least one will always be available for use.

Important:
A car with an internal size 1600 mm x 2400 mm is recommended because it is necessary to have ample room for easy movement of beds and other equipment. The speeds range from 0.40 mps. for small 2-storey hospital to 2.5 mps. for Multi-storey building. Sound-isolated cars and rubber tyred car door hangers contribute to quite to operation. High-speed elevators with micro self-levelling expedite safe transfer of beds, stretchers, X-ray apparatus and other heavy equipment.

“The car size indicated herein are based on the prevailing Indian Standards. Owners / Architects / Consultants are requested to assure themselves that the planned car size is sufficient to accommodate trolley / stretcher / bed which are planned to be carried in the elevator”.

### MINIMUM CIVIL DIMENSIONS FOR HOSPITAL ELEVATORS

<table>
<thead>
<tr>
<th>Load</th>
<th>Speed (M.P.S.)</th>
<th>Car Inside</th>
<th>Lift Well</th>
<th>Entrance Two Speed</th>
<th>Machine - Room</th>
<th>Pit Depth</th>
<th>Overhead</th>
</tr>
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<tbody>
<tr>
<td><strong>Persons</strong></td>
<td>Kg.</td>
<td><strong>A</strong></td>
<td><strong>B</strong></td>
<td><strong>C</strong></td>
<td><strong>D</strong></td>
<td><strong>E</strong></td>
<td><strong>K</strong></td>
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All dimensions are in mm.
## Dimensional Details for Gearless (With Machine-Room) Elevators

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<thead>
<tr>
<th>Load Kg. [Persons]</th>
<th>Speed</th>
<th>Car Size W x D x H</th>
<th>Lift Shaft Size W x D</th>
<th>Entrance Size W x H</th>
<th>Opening Type</th>
<th>Max. Stops</th>
<th>Max. Travel (Mts.)</th>
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<td>2200</td>
<td>5200</td>
<td>2500</td>
<td>5500</td>
</tr>
</tbody>
</table>

**ALL DIMENSIONS ARE IN mm**
Gearless System (With Machine Room) Elevators

**Dimensions**

- **Machine-Room Width**: 1500 mm
- **Hostway Below**: 1500 mm
- **Rise**:
  - **Top Landing**: 2900 mm
  - **Overhead**: 2500 mm
- **Car Depth**:
  - **Railway Depth**: 2500 mm
- **Hostway Width**:
  - **Floor Height**:
    - **Bottom Landing**: 2000 mm
    - **Top Landing**: 2900 mm
  - **Rise**:
    - **Floor Height**:
      - **Top Landing**: 2900 mm
      - **Bottom Landing**: 2000 mm

**Owner's Work**

1. All walls minimum 200/250 RCC (HY. FRONT WALL 230 BK. PREFERRED)
2. All civil work, holes, grouting etc.
3. Reinforced concrete machine-room structural floor slab 150 thick designed to sustain w/h 1000 Kg/m² U.D.L.
4. Rolled steel section hoisting beams,
5. Power supply: 400 Volts, 3 phase, 4 wires with neutral, 50 Hz & 230 Volts 1 phase.

Refer Otis detailed drawing for additional information. All dimensions are in mm.
### Dimensional Details For Gearless Elevator System: (Machine Room Less) Speed > 1.0 MPS

<table>
<thead>
<tr>
<th>Load Kg./Persons</th>
<th>Speed</th>
<th>Car Size Width x Depth x Height</th>
<th>Lift shaft Size Width x Depth</th>
<th>Entrance Width x Height</th>
<th>Overhead</th>
<th>Pit</th>
<th>Max. Stop/Travel</th>
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<td>952 (14)</td>
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<td>3020 x 1950</td>
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Note: Overhead dimensions are based on car Height of 2300 mm & 2100 mm entrance height

All dimensions are in mm.
Machine Room less elevator system eliminates requirement of a Machine Room. This is a gearless elevator system with speeds ranging from 1.6 MPS & 1.75 MPS. The sophisticated & revolutionary design provides major benefits such as:

- Space Saving
- Very smooth & quiet operation
- Energy efficient
- Passenger safety
- Environment Friendly
- Quick Installation
- Flat Roofing

The system’s core is coated steel belt the first major breakthrough in lifting technology has a Permanent Magnet Gearless Machine which is highly efficient & compact in design.

REFER OTIS DETAIL DRAWING FOR ADDITIONAL INFORMATION
## High Speed Gearless System

<table>
<thead>
<tr>
<th>Load Kg. (Person)</th>
<th>Speed</th>
<th>Car Size W x D x H</th>
<th>Lift Shaft Size W x D</th>
<th>Entrance W x H</th>
<th>Opening Type</th>
<th>Max. Stops</th>
<th>Max Travel (Mts.)</th>
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</table>

All dimensions are in mm.
High Speed Gearless System

High performance gearless solution elevator for prestigious high-rise buildings. The system contains latest VVVF drive control technologies with sophisticated microprocessor control, intelligent modular system design, advance VVVF door operating technology, modern aesthetics & unmatched quality with safety.

This Product Incorporates:

a) State-of-the-art compact permanent magnet machine technology into an elecronic clans system benefiting in improved power efficiencies, increased hoisting capacities, space saving & higher flexibility.

b) Microprocessor based modular control system using new generation micro processor controllers to provide optimum passenger response.

c) Control system uses a state-of-the-art digital VVVF drive control having accurate & consistent operation for speeds upto 4.0 MPS.

d) An efficient dispatching system which is the most efficient dispatching system in the industry known as RSR system. With its algorithm of bonuses & penalties, it consistently delivers the shortest waiting time with minimum number of elevators.

e) Ultra modern guide shoes are used.

f) Variable frequency door operating system with close loop control.
Escalators provide quick, continuous, safe and reliable movement of people between floors.

Airports, rail transit systems, hotels, shopping and commercial complexes - all benefit from escalators. Escalators have come to be an important feature of many such projects. They become a center of attraction lending added prestige to the buildings and increased comfort and convenience to users.

Escalators encourage movement. They keep large crowds moving and prevent congestion. They have an inviting, ready-to-serve-you appearance that induces people to travel freely.

Unlike elevators, escalators offer what is called ‘Zero Interval Service’. Escalators offer smooth ride, quiet operation, durability, style and most of all complete safety.
Escalator (Light Duty, Indoor) Inclination 30°

**APPLICATION:** COMMERCIAL COMPLEXES, AIRPORTS, DEPARTMENTAL STORES ETC.

**BEAM TO BEAM**

\[ D = 40 = (1.732H + E + F) \]

**HAND RAIL-BY-OWNER**

**DIMENSION TO BE DETERMINED ON SITE**

**HOLE FOR CONNECTION OF ESCALATOR TO LOCAL DRAINAGE SYSTEM**

(AS ACCORDING TO WATER QUANTITY)

**CLEAR FLOOR ACCESS AREA**

2500 x (L) OR 2000 x (2xL)

**ELEVATION**

**PLAN**

**ESCALATOR**

**ANGLE:** 30° — **SPEED:** 0.5m/s.

<table>
<thead>
<tr>
<th>STEP WIDTH</th>
<th>FLAT STEPS</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
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<tr>
<td>800</td>
<td>2</td>
<td>2212</td>
<td>2440</td>
<td>4350</td>
<td>MIN. 2542</td>
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<td>1000</td>
<td>3</td>
<td>2612</td>
<td>2840</td>
<td>4750</td>
<td>MAX. 8000</td>
<td>1430</td>
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**REACTON TO SUPPORT IN KN (D in m) (1KN=100kg)**

<table>
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<tr>
<th>FLAT STEPS</th>
<th>WITHOUT INTERMEDIATE SUPPORT</th>
<th>WITH INTERMEDIATE SUPPORT</th>
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<tr>
<td>2</td>
<td>2542 &gt; H &lt; 6000</td>
<td>6000 &gt; H &lt; 8000</td>
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<tr>
<td>3</td>
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**NOTE:**
1. In case of escalators with side by side arrangement, the minimum clearance required between two escalators should be 210 mm.
2. If escalators are exactly one above the other, min. floor to floor height required is 3600mm.
3. For rise above 6m, it is essential to have 3 flat steps at both landings.
4. If H > 6 meters, add mid support at the middle of beam to beam distance.

Refer Otis detailed drawing for additional information.

All dimensions are in mm.
Note:-
1) In case of Escalators with side by side arrangement, the minimum clearance required between two Escalators should be 210 mm.
2) If Escalators are exactly one above the other, min. floor to floor height required is 3600mm.
3) If D > 13.368 meter, add mid support middle of beam to beam distance.
Escalator (Heavy Duty, Indoor) Inclination 30°

Application: Railways Stations, Subways, Large Bus Terminals etc.

Dimensions

Beam to Beam: \( \frac{E}{F} = (1.732 + \frac{E}{F}) \)

Other Dimensions:
- Working Point
- Edge of Support
- Working Line
- Flat Hose Line
- Hole for Connection of Escalator to Local Drainage System
- Drainage Quantity

Elevation

Plan

Clear Floor Access Area: 2500 x (2) or 2000 x (2)

Elevator Dimensions Parameter

<table>
<thead>
<tr>
<th>Step Width</th>
<th>Flat Steps</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
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<td>3516</td>
<td>5170</td>
<td>1460</td>
<td>1660</td>
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</table>

Reactions to Support

- Without Intermediate Support
- With Intermediate Support

<table>
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<th>A</th>
<th>B</th>
<th>C</th>
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</thead>
<tbody>
<tr>
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<td>4.4 x D + 9</td>
<td>1.832 x D</td>
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<tr>
<td>1000</td>
<td>5 x D</td>
<td>5 x D + 9</td>
<td>2.075 x D</td>
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</table>

Note:
1) In case of escalators with side by side arrangement, the minimum clearance required between two escalators should be 210 mm.
2) If escalators are exactly one above the other, min. floor to floor height required is 3600 mm.
3) For rise above 6m, it is essential to have 3 flat steps at both landings.
4) If "EC-W1" machine, add 200 to "F".
5) If H > 4.90 meters, add mid support at the middle of beam to beam distance.

Refer Otis Detailed Drawing for Additional Information

All dimensions are in mm
Note: 1) In case of Escalators with side by side arrangement, the minimum clearance required between two Escalators should be 210 mm.
2) If Escalators are exactly one above the other, min. floor to floor height required is 3600mm.
3) If ‘EC – W1’ machine, add 200 to ‘F’

Refer Otis detailed drawing for additional information

All dimensions are in mm
Trav-O-Lator (Light Duty) Inclination 10° & 12°

DIMENSIONS

APPLICATION: SHOPPING MALL, EMPORIUM, AIRPORT ETC.

PLAN

DIMENSIONS PARAMETER IN mm

<table>
<thead>
<tr>
<th>ANGLE</th>
<th>REACTION TO SUPPORT IN KN (D IN m)</th>
<th>PALLET WIDTH</th>
<th>PALLET DEPT</th>
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<tr>
<td>10°</td>
<td>800</td>
<td>1900</td>
<td>1800</td>
<td>3</td>
</tr>
<tr>
<td>12°</td>
<td>1000</td>
<td>2000</td>
<td>1900</td>
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ANGLE: 10° & 12° — SPEED: 0.5 m/s

(D(kN)=100kg)

REFER OTIS DETAILED DRAWING FOR ADDITIONAL INFORMATION

ALL DIMENSIONS ARE IN mm
The initial plans and designs for an elevator system are merely the start of a long equipment life cycle. Elevator systems will remain in operational use often long after those responsible for their initial planning and installation have left the scene for new projects. However, the long term success of an elevator system is substantially affected by the decisions for its operation and maintenance which are made during the planning and creative stages.

There are several key points to be considered:

- **Preventive maintenance** - to ensure continuity of safe and efficient operation.
- **System monitoring** - to enable impending faults to be detected and corrected and overall system performance to be assessed.
- **Corrective maintenance** - to effect rapid restoration of service when a fault occurs.
- **Inspection and audit** - to determine that an installation is being maintained in a safe and effective manner.
- **Passenger assurance** - to make sure that the disturbance and distress to passengers is minimised should a fault occur.

Otis addresses all the above requirements through a comprehensive package called ‘Otis Maintenance’. It is a modular range of services, built on years of experience, which can be applied according to customer needs.

The main components of Otis Maintenance are:

- **Programmed maintenance**
- **Otisline**
- **Call out services**
- **Annual Surveys, Quality Surveys and Special Inspections**

**Programmed maintenance** is the corner-stone of Otis Maintenance. An efficient technique, refined by years of site experience, it ensures regular preventive maintenance to check, adjust and lubricate the key components of an elevator equipment.

**Otisline** is a service at main centres that provides a computerised point of contact to help with difficulties or if failures occur. Customers can be sure that there is always someone from Otis to help when needed.

**Surveys and inspections** are necessary for several reasons. Safety surveys must be carried out to ensure compliance with statutory standards and certification. Quality surveys should enable regular review of maintenance and its effectiveness, and annual surveys should be implemented to keep a close eye on the overall condition of a system and to ascertain if improvements and enhancements are necessary. Otis can provide the expertise to carry out such work, entirely to suit each individual customer’s preferences and working arrangements.

The Otis range of services are provided through an established network of local Otis offices in every region. Individual agreements, can be formulated to suit customers’ precise requirements.
Otis Gives Safety High Priority

You are a significant partner of Otis in ensuring risk-free installation and modernisation work of its elevators. Safety should be our mutual concern.

Otis invests heavily in training and equipping its technicians to adopt safety procedures as a way of life. The heights, narrow shafts and generally tough construction-site conditions in which our engineers and technicians need to work put them at high risk. At Otis, our aim has been to foresee all those elements of risk and provide them with total body protection gear and all other required safeguards at the site.

Entrance Barricades

Otis has designed and developed entrance barricades that are so crucial both during elevator construction and modernisation work. Special, full height metal barricades provided by Otis, have openable doors if technicians need to access the hoistway at that level.

Top Of Car Inspection (TOCI)

The TOCI box is provided so that the elevator is totally under the control of the Otis mechanic during maintenance and inspection, and the elevator therefore, cannot be used or accessed by the public. Thus, the safety of both, the mechanic as well as the public, is ensured during maintenance operations.

Lock-Out Tag Arrangements

During checking and repair work of elevators, it is important that the main switch in the machine room is in the OFF position. No other person, should be able to put the switch ON, even by mistake. To prevent this situation, a LOCKOUT arrangement has been devised by Otis on the main switch of the machine room, ensuring safe working time for technicians undertaking repair work in the hoistway area on or on the elevator equipment.

Scaffolding

In keeping with the latest developments, Otis has already began implementing the scaffoldless technique of erection wherein the need for scaffolding is totally eliminated. Freedom from obstruction, added working space and convenience, all help in cutting down installation time to a considerable extent.

Full Body Harness & Personal Protection Equipment

Otis technicians are provided with full body harness to ensure proper support to their body and the facility to work freely with both hands. All other personal protection equipment such as rigid but lightweight PVC helmet, rubber-soled shoes for protection against electrical shock and gloves for handling of heavy equipment are also provided by Otis both on humanitarian grounds and with the objective of avoiding delays due to injury.

Safety Nets

Heavy duty nets are provided in the hoistway at intermittent levels to hold tools that may slip and otherwise fall on to the technicians working at the lower level in the hoistway. Also, these nets protect technicians from falling debris that may be inadvertently kicked into the hoistway while the building is under construction.

Fall Protection On Car Top

Technicians at work on the car top are prone to slipping and falling into the gap between the elevator and the walls of the hoistway. Otis provides a high metal net guard on three sides of the elevator top. Besides eliminating the danger of a fall, the metal barricade provides a good support to the technician during testing procedures.
Otis Gives Safety High Priority

of electrical shock not only to the elevator technician during erection and subsequent servicing but also for elevator car passengers even during regular use.

General

Lighting/Ventilation

The machine room of the elevator should be provided with adequate lighting and cross ventilation. This is the heart chamber of the elevator and proper visibility during installation and servicing procedures is important. As in any other electro mechanical unit, faults are more easily detected with proper visibility of connections and moving parts. Ventilation is equally important if technicians need to spend long hours in the machine room. Also, cool machines run more efficiently with lower failure rate. It is therefore desirable to maintain the machine room temperature below 35°C.

Hoisting Beams

Beams provided in the machine room for hoisting of heavy elevator drives and controller cabinets should be of adequate load bearing capacity — ‘I’ section structural steel. It is important to have the load bearing capacity specified at the site to avoid over-loading and consequent fall and damage to elevator units while hoisting and lifting them to the machine room. Such eventualities lead to delays and unnecessary expensive replacements.

Trapdoor

Once the required elevator units relating to the machine room have all been hoisted and positioned, the trap entry opening to the machine room needs to be covered by a proper trapdoor. It is important to remember that technicians are bound to walk over the trapdoor carrying heavy objects. Or, it is likely that two or three technicians may stand over it during their normal course of construction or maintenance work. The trapdoor should therefore be strong enough to support the weight of such personnel. A poorly designed trapdoor will endanger the lives of technicians working in the machine room.

Hoistway Lighting

During both construction and repair work of the elevator, lighting arrangements (with proper earthing) in the hoistway is of utmost importance. What is recommended is 230 V-1 OOW bulk lead fittings at each floor level with switching facility in the machine room. The line to the midway junction box that provides supply to the elevator car lights, should be controlled by a switch also fitted in the machine room. Light provided in the pit should be independent and with a separate switch facility at the entrance of the ground floor. When landing doors are of the panel type, visibility in the hoistway becomes very poor. Emergency repairs take much longer with inadequate lighting.
Working Platform
To ensure safety speed and convenience of work for elevator erectors, platforms are assembled on the topmost landing for the purpose of loading counter weights. The system consists of a collapsible angle sections fixed rigidly on to the hall floor and to the far end of the hoistway wall. The assembled system looks similar to brackets but extra large in size to hold 3" thick wooden platform. The planks provide a safe platform for two people to stand and work conveniently. The system prevents accidental fall of the erectors in the hoistway.

Machine Guard
Otis provides a strong metal net guard all along the open face of the pulley and the motor. This ensures physical protection to visitors who may enter the machine room, without taking adequate care.

Your Co-operation Can Make A Big Difference!
You will appreciate that the Otis team deployed for elevator installation, spends long hours of continuous work for several days at the site only to ensure that the schedule is met with and the job executed to your entire satisfaction. No doubt, space allocation and proper amenities at construction sites are not easy, but a dedicated effort would make possible reasonable conveniences that would boost the morale of those engineers and technicians involved in the installation and commissioning of your elevators. Featured below are those areas at your site where your co-operation could significantly help in stopping pilferage and deterioration of elevator material besides providing certain basic conveniences that would prevent delay in the job.

Elevator Installation (Machine Room) Safe Access Way
The machine room of the elevator is an important junction of electrical controls, heavy motor and rotating pulley that need to be accessed from time to time, not only during emergencies of lift failure and fires but also during regular servicing of the elevator. It is therefore important that the passage way to the machine room is well-lit and clear of encumbrances. It should have a proper stairway (preferably in concrete) with handrails for support. The door of the machine room should preferably always open outwards unless the swing of the door is less than the swing of the door + 600 mm. All this will help in speedy remedial measures during an emergency.

Stable Power Supply With ELCB
Especially at the time of erection of the elevator, it is important to provide technicians with a stable power supply of 230 V mains with a proper junction box and Earth Leakage Circuit Breaker in the machine room. This will ensure uninterrupted power for not only lights in the hoistway, pit and car of the elevator but more importantly for installation of sensitive controls and their checking. The ELCB is vital since it minimises chances...
**Ladder**

The pit houses elevator components that need to be checked and serviced from time to time even after the elevator construction is completed. A strong steel ladder will allow safe and easy access to the pit for technicians.

It is recommended that the top step of the ladder be high enough to extend by at least a foot above the lowest landing. This along with the handrail of the ladder will enable technicians to have a proper hand hold while climbing in and out of the pit.

**Water-Proofing**

The elevator pit well should be totally safe and free from any entry of water from any source. Flooding of the elevator pit well can have serious consequences. It can render the cables unsafe and cause other elevator components in the pit to rust. If water enters the cables, it can lead to serious malfunctioning of the elevator. Repair work as a result of this, can be heavy and expensive.

**General**

**Secure Storage Facility**

The elevator construction or even modernisation procedure is in stages and components, both light and heavy duty, arrive at the site according to the progress of the job. A separate storage room with locking facility needs to be made available since otherwise, expensive electrical parts may be stolen if they are left in the open.

Heavy duty parts and structural left in the open could corrode should they be exposed to rain. They could also be hazardous, if particularly children trip over them while playing. If the building is still under construction, these elevator parts need to be protected from dust and other falling objects.

**Surroundings**

Construction sites are invariably crowded with building material leaving little place for free access. During the erection stages of the elevator, it is necessary to have easy and safe access to the elevator and its surrounding areas since technicians would need to transport heavy material from time to time. Tripping hazards, loose hanging electrical wires or falling objects could prove to be fatal to technicians at work and could lead to legal issues. Even injury to the technicians could result in delays and erection schedules being disrupted.

**Amenities**

Some basic minimum amenities need to be provided for technicians especially during erection work — such as safe drinking water and toilet facilities. Also, if deadlines need to be met, late working hours could mean the menace of mosquitoes and adequate measures such as disinfecting of stagnant water and fumigation need to be taken. Infected and indisposed technicians would mean delays in erection time. Lack of toilet facilities could also lead to unhygienic conditions eventually leading to various infections.
1. **Scaffolding**

A firm, stable, and sturdy scaffolding erected in the hoistway.

Technicians become more confident when they step onto a strong scaffolding. Their fear of falling is greatly reduced and they can concentrate better on giving you a quality job faster.

2. **Barriers**

Barriers should be provided across all open entrances in the form of 3 strips at 42", 18" and a toe board 6" in height.

An adequate barrier will save any curious passerby or technicians from accidentally walking into and falling down an unguarded hoistway – Avoid chance of fatal accident.

3. **Separator Screen**

In case there is more than one elevator in a common lift well, a separator screen should be provided between the two elevator hoistways. This could be either of masonry construction or a wiremesh stretched between the separator beams.

Note: In case of a “Fire Lift”, the separator must be a masonry wall.

This minimises the risk of any elevator component accidently protruding into the adjacent hoistway where the other elevator is running.

4. **Lighting**

Properly earthed lighting arrangements to be provided in the hoistway in the form of 230V-100W bulkhead fittings at each floor level with its switch in the machine-room. The pit light should be controlled individually by a switch accessible from ground floor entrance. The line to the midway junction box which feeds the car light should also be controlled by a switch provided in the machine-room.

Visibility in the hoistway is very poor especially when landing doors are of the panel type. Emergency repairs take much longer where lighting is inadequate.

5. **Ladder**

A Steel Ladder should be provided in the pit for convenient access. The ladder must extend to at least 1' above the lowest landing as indicated in the illustration. Pit-Light Switch & Pit-Stop must be accessible from entrance.

A strong ladder is required to provide safe access to the pit to work on the elevator and to carry out routine maintenance of elevator components located in the pit.

6. **Water Proofing**

The elevator pit well must be thoroughly water proofed.

If water enters the pit well it could render the travelling cables unsafe and also cause the other equipment to rust. Water in the electrical cables can cause serious malfunctioning of the elevator and result in heavy repair bills.

7. **Surroundings**

In the construction stage, access to the elevator and its adjacent working areas must be safe at all times. There should be no tripping hazards, loose hanging electrical wires or danger from any falling objects.

Accidents to technicians could prove to be fatal and lead to legal complications. Serious injuries to technicians at the erection stage could disrupt installation and job completion schedules of the elevator. Such delays are better avoided for obvious reasons.

8. **Amenities**

Basic Amenities like safe drinking water and reasonable toilet facilities for technicians working at site must be provided. Adequate measures to control the menace of mosquitoes must also be taken.

In the absence of safe drinking water, technicians are prone to fall ill. Contaminated water could lead to dangerous diseases.

Presence of mosquitoes may cause malaria. If adequate toilet facilities are not provided technicians may have no alternative but to use corners and niches – rendering the site highly unhygienic.
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<td>Installation &amp; Maintenance of Lifts for Handicapped persons</td>
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