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# HIGH SPEED ELEVATORS TIME & SPACE





High-Tech New Concept Elevator

# Time & Space



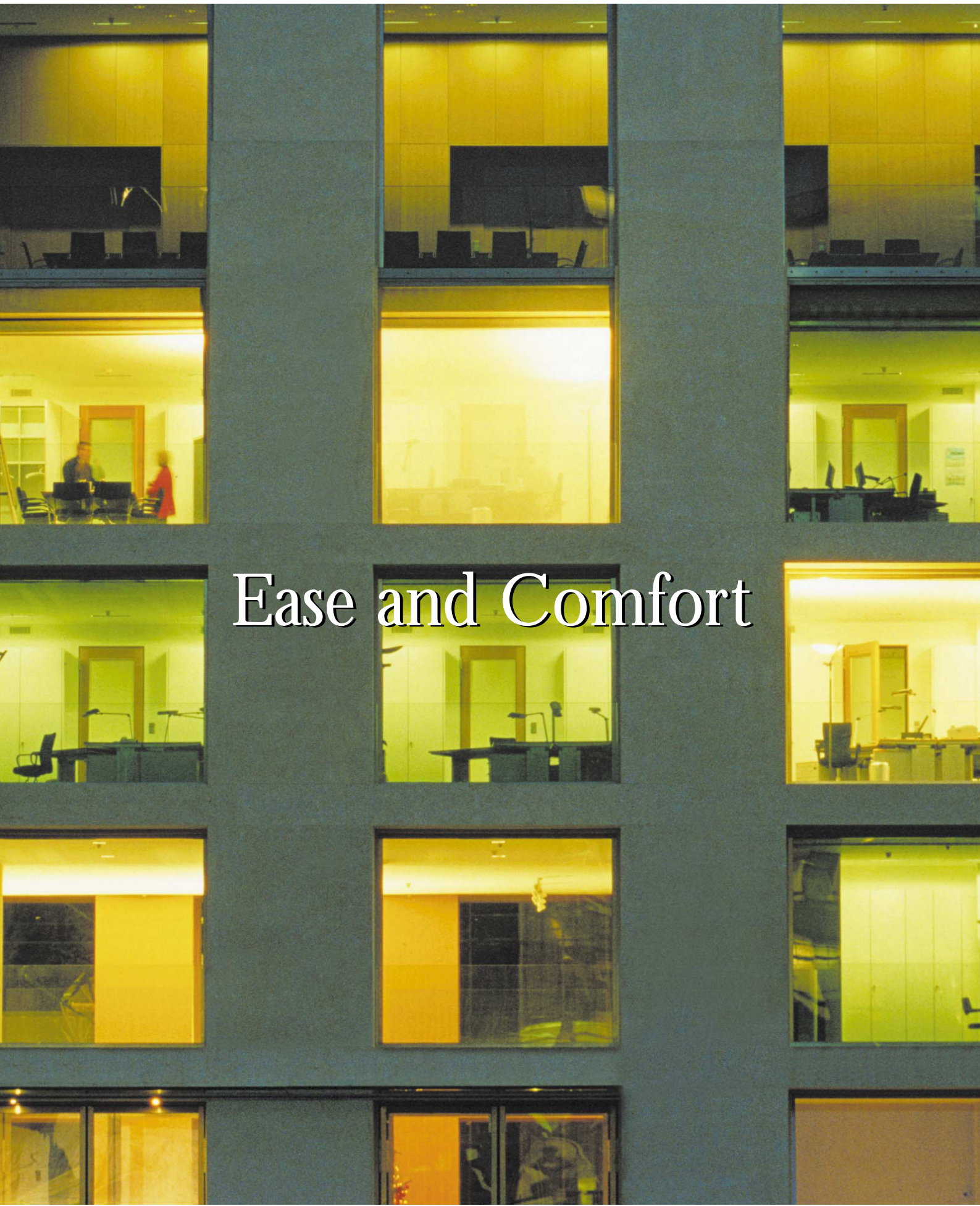
Time & Space, Hyundai's high-speed elevator for passengers, is a high-tech, new concept elevator that realizes a high level of riding comfort and reliability. Time & Space employs a high efficient Gearless Traction Machine with a Permanent Magnet Synchronous Motor, a high precision inverter drive system, advanced Microprocessor, and data Network Systems.

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# Ease and Comfort

Time & Space   


Easy and comfortable space movement begins with Time & Space technology. You will ride in comfort and quietness surrounds you. You will experience a smooth, fast but undistributed ride through space and get to your destination swiftly and comfortably.





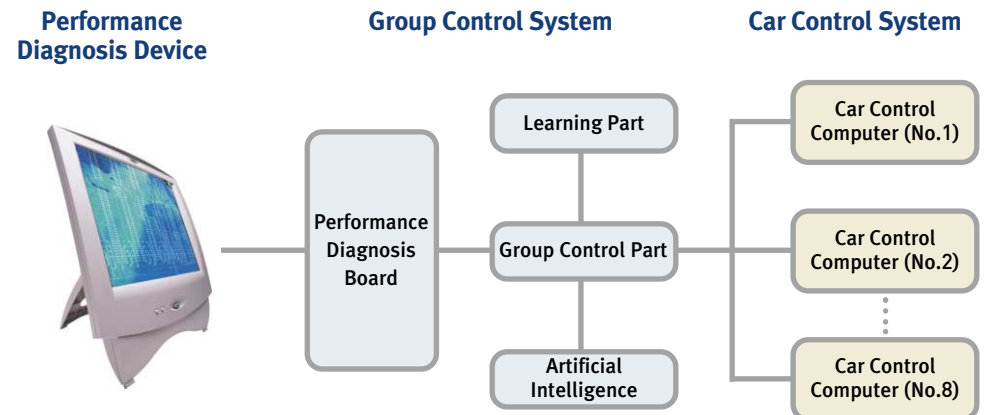


# Comfort and Safety



## We are pursuing reliability and safety

In Time & Space, microprocessors are distributed throughout the elevator system in the car operating panel, hall fixtures, and control system in the machine room, monitoring the elevator operation and maintaining the reliability of the system to ensure passenger safety. The Elevator Data Network collects system operation data from the moment the hall or car call is registered until the passenger arrive at their destination floor.



### Self-checking System

Time & Space technology enhances the reliability of the entire system with the use of microprocessors to control speed and movement and has a self-checking system that monitors the safety functions of the operation system.



### Data Network and Fiber Optic Transmission Device

Fiber Optic is used for the communication between the microcomputers that controls dispatching, car speed and door operations. This provides a fast, accurate signal delivering network. In addition, there are enough optional specifications to meet various passenger needs.





# The essence of core technology, the Permanent Magnet Synchronous Motor, is hidden

Gearless Traction Machine with a Permanent Magnet Synchronous Motor, developed for the first time in Korea, is the core technology of Hyundai Elevator, a company striving for passenger's safety and elevator technology for two decades. Discover Korea's high technology in Korea's first core technology, Time & Space.







# Core Technology



## We guarantee a pleasant and comfortable ride

You will experience new riding pleasure in Time & Space with its adoption of a high efficient Gearless Traction Machine with a Permanent Magnet Synchronous Motor and energy saving inverter (VVVF).

### ▪ Quiet Ride

Quiet and smooth riding was realized since the optimal control of harmony noise successfully reduced the noise and vibration due to the application of high responding synchronous motor.

### ▪ Leaner and Lighter

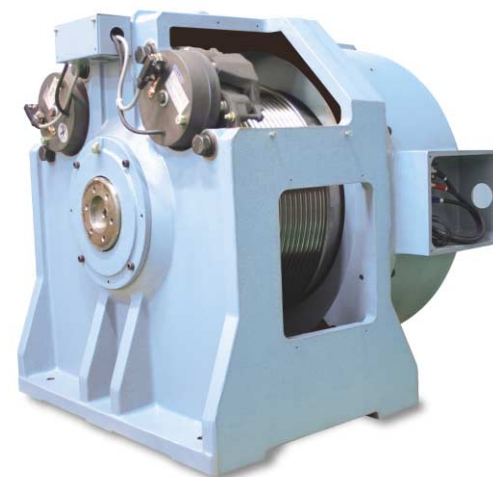
Since Multiple Arrangement is available, the size of the traction machine has become 50% smaller and lighter compared with existing Induction Motor type.

### ▪ Safe Braking

Double brakes in which one brake takes over if the other does not work were adopted to enhance the level of safety. This product fulfills EN81 of the European elevator standards.

### ▪ VVVF Inverter Control

The VVVF inverter controls the motor speed at the optimal level by changing the voltage and frequency continuously to provide a super and quiet ride. In addition, a converter for restoring electric power (PWM Converter) is adopted to improve control efficiency.



### ▪ Korea's First Synchronous Motor, Gearless Traction Machine

Unlike the existing AC-Geared Machine, the Gearless Traction Machine using Permanent Magnet is installed for the first time in Korea to improve safety as well as a smooth ride.





# Thinking Elevator, Advanced, Satisfying System

Time & Space   


High technology in elevator is here now. Meet the future-oriented service that Hyundai provides with optional features like EDS(Electronic Display System)- a full- color screen that provides internet-based news, weather, local traffic, and financial market information to elevator passengers. New elevator life style, Time & Space, will be with you in the future.



## Time & Space

Dignified style delivers placidity. Refined delicacy attracts our attention. A beautiful and special elevator added with high performance increases the value of the building. Increase the value of your building with Time & Space, a deep and special taste.



## Group Control Operating System

The group control operating system is designed to optimize elevator operational efficiency by operating, distributing, and controlling such operation information as location, speed, number of passengers, and registered call numbers for each of the elevators when a hall call occurs. This serves to enhance the overall efficiency of elevator operation.

Basic Functions of Group Control				
	Description	Applicable Item by Building Type		
		Office	Hotel	Multiplex Skyscraper
<b>Artificial Intelligence</b>	Artificial intelligence applying fuzzy logic automatically controls ambiguous changes in complex traffic and always provides the best service.	○	○	○
<b>Learning Function</b>	This function learns elevator usage by day and time and sets various operational parameters automatically to enhance group control operational performance.	○	○	○
<b>Forecast Allocation Method</b>	Optimal car usage is determined by forecasting traffic and evaluating elevator suitability for the calls.	○	○	○
<b>Minimize Average Waiting Time</b>	Calls are allocated to minimize the average waiting time of passengers.	○	○	○
<b>Minimize Long Waiting Passengers</b>	When traffic demand is at a high level, the number of passengers waiting for more than 60 seconds is minimized with this controlling function.	○	○	○
<b>Overall Evaluation</b>	The performance of the overall system is improved by evaluating all of the previously registered hall calls as well as the newly registered calls in terms of call allocation.	○	○	○
<b>Multi-purpose Control</b>	Optimal group control is available all the time since items such as waiting time of the basic control target, ratio of waiting passengers, and importance of energy consumption are determined automatically depending on traffic status providing a flexible response to the traffic stream.	○	○	○

Operation Functions				
	Description	Applicable Item by Building Type		
		Office	Hotel	Multiplex Skyscraper
<b>Rush Hour Service (Up)</b>	During rush hour, elevators under group control will return to the base floor during intensive service.	○	★	★
<b>Rush Hour Service (Down)</b>	To minimize the waiting time of passengers going downward during rush hour, the down calls are allocated to the nearest elevators.	○	★	★
<b>Peak Traffic Control</b>	Considering other floor services, elevators are allocated to the floors with peak traffic as a priority.	★	★	★
<b>Distributed Waiting Function</b>	Idle elevators are distributed to other floors with higher demand.	○	○	○
<b>Allocation in Priority</b>	Elevators with calls for a certain floor are allocated to that floor as a priority.	○	○	○
<b>Automatic by pass</b>	A full-loaded car will bypass hall calls in order to maintain maximum operating efficiency.	○	○	○
<b>Automatic Separation of an out-of-order Elevator</b>	An out-of-order elevator is separated from group control automatically to isolate its effect.	○	○	○
<b>No Service for Certain Floors</b>	Certain service floors are separated and elevators do not stop at such floors.	○	○	○
<b>Group Control including Elevators for the Handicapped</b>	Elevators for the handicapped are not operated separately but are included in group control.	○	○	○
<b>Cut Service</b>	Certain elevators are cut out from group control and converted to independent operation by the cut service hall button.	★	★	★
<b>Service Reservation Indication</b>	When you press the hall button, the hall lantern Reserved for Service turns on to display that the service is reserved.	★	★	★
<b>Car Arrival Lantern</b>	Lantern begins flashing 4 or 5 seconds prior to car arrival to alert passengers to the arriving elevator.	○	○	○

Standard feature ○ Optional Feature ★





# Smart System

Services		Applicable Item by Building Type		
Description		Office	Hotel	Multiplex Skyscraper
		<b>Independent Operation</b>	Cars can be separated from group control and converted into independent operation by car calls.	○
<b>Programmable Door Timer</b>	Timing can be set to automatic control of opening/closing of doors according to the call registered.	○	○	○
<b>Repetitive Door Operation</b>	If the door cannot fully close, it will repeatedly open and close for a specified number of times.	○	○	○
<b>Door Reopen by Hall Button</b>	If the hall button in the same moving direction of the car is pressed when the door is closing, the door will reopen.	○	○	○
<b>Parking</b>	The car can be parked at a specified floor at night or on holidays.	○	○	○
<b>Each Floor Stop</b>	The car can stop at each floor up to its arrival on the specified floor for the purpose of crime prevention during the night or on holidays.	○	○	○
<b>Safety Shoe</b>	If the door cannot fully close because of an object in the door track, it will repeatedly open and close until the object has been removed.	○	○	○
<b>Cancel Reverse Direction Call</b>	Car call registration in the reverse direction can be cancelled.	○	○	○
<b>Anti-Nuisance</b>	Evaluates the number of people in the car and compares that value to the number of car calls registered. If the number of calls exceeds the number of people in the car, the car call exceeding the number of passengers is not registered.	○	○	○
<b>Car Call Cancel</b>	When the registered car call button is pressed, it is cancelled.	○	○	○
<b>Light, Fan Shut-Off</b>	Light and fan in the car are automatically shut off if there is no call registered for a predetermined period of time.	○	○	○
<b>Auxiliary Car Operating Panel</b>	Even when the car is crowded, calls can be registered easily.	★	★	★
<b>Multi-Beam Door Protection</b>	Multi-beam sensor installed in the door senses any obstruction caught in the door, causing the door to reopen, or stay open before the door touches such obstruction.	★	★	★
<b>Photo Eye Door Protection</b>	If the safety ray from the beam sensor in the door is interrupted, the door reopens or stays open.	★	★	★
<b>Voice Guidance System</b>	A synthesized voice instructs passengers on current status, including floor numbers, etc.	★	★	★
<b>Touch Button</b>	Calls can be registered only by touching.	★	★	★
<b>Information Display System</b>	Information display installed on each floor and/or inside the car shows traffic information and other necessary information.	★	★	★
<b>EDS (Electronic Display System)</b>	Inside or outside of the elevator or in the building lobby, an TFT-LCD (Thin Film Transistor-Liquid Crystal Display) or PDP (Plasma Display Panel) provides various information such as news, weather, transportation, financial news, music video, commercials, etc.	★	★	★

Supervisory Operation		Applicable Item by Building Type		
Description		Office	Hotel	Multiplex Skyscraper
		<b>Performance Monitoring Function</b>	The operation and performance of the elevator can be monitored in the machine room.	★
<b>Earthquake Service - S wave</b>	When the seismic sensor detects an earthquake, all cars proceed to stop at the nearest floor to prevent damage.	★	★	★
<b>Earthquake Service - P wave</b>	When the seismic sensor detects a delicate tremor (P wave) before an earthquake (S wave) arrives, all cars in operation are forced to stop at the nearest floor to prevent damage.	★	★	★
<b>Fire Emergency Service</b>	When a fire breaks out, all cars are immediately called to the specified rescue floor for service.	★	★	★
<b>Firefighting Operation</b>	Elevators can be used for firefighting activities with key switches. (Emergency Elevator)	★	★	★
<b>Emergency Power</b>	Service continues by automatically or manually selecting the number of cars covered by the building's emergency power source.	★	★	★
<b>Computer Monitoring System (HELMON)</b>	Monitors operation of all elevators in the building and within the apartment complex. (Floors where the cars do not stop can be set.)	★	★	★
<b>Remote Monitoring System (RMS)</b>	Monitors operation of elevators with RMS remotely by telephone line and computer.	★	★	★

Standard feature ○ Optional Feature ★





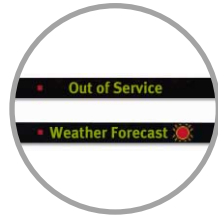
## A broad range of information is provided by the elevator

You receive the latest information and various conveniences in Time & Space with the advanced information system of our high-speed elevator.



### ▪ EDS (Electronic Display System)

Inside or outside of the elevator or at the lobby of the building, an TFT-LCD (Thin Film Transistor-Liquid Crystal Display) or PDP (Plasma Display Panel) provides internet-based information such as car operation, weather, stock price, index trends, and real-time headline news .



### ▪ Hall Information Display System (IDS-02)

This is an information system to provide simple information such as elevator operation status, weather, stock price, index trends, floor guides, and headline news using LEDs of various colors.



### ▪ CRT Monitoring

A Monitor in the machine room is provided with each Time & Space to show operational status, and history, error history, and other data that will help trouble shooting and preventive maintenance.



### ▪ RMS (Remote Monitoring System)

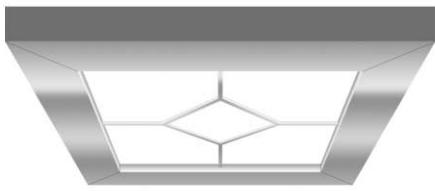
The Time & Space system comes with a RMS(Remote Monitoring System). This system responds ever so quickly to emergency situation, for example, when the elevator will not function due to various reasons including blackout. The emergency is reported to the RMS center through phone line and the maintenance staff receives the trouble call and is on their way for fast recovery.





# Ceilings & Signal Fixtures

## ••• Ceiling



**CD291C** · Lumasite  
· Stainless Mirror 3S Vibration



**CD519D** · Aluminium Silver  
· Indirect Lighting  
· Convective Air Sterilization System



**CD516B** · Aluminium & Sheet  
· Indirect Lighting  
· Convective Air Sterilization System



**CD517A** · Stainless Mirror 3S Vibration  
· Lumasite  
· Painted Steel(White)

## ••• Car Operating Panel



Selected as 2002 Good Design Product



**OPP-N250**  
(Swing Panel)



**OPP-D250B**  
(Swing Panel)



**OPP-N250B**  
(Swing Panel)



**OPP-D240B**



**OPP-N240B**



**OPP-N240**



**50 TYPE**  
(Swing Panel Only)



**40 TYPE**



**41 TYPE**



## ••• Hall Lantern



**HLS-640**



**HLS-720**



**HLS-750**



**HLS-760**



**HLS-770**



**HLS-780**  
Boxless Type



**IDS-01**



**IDS-02**

## ••• Information Display System

## ••• Hall Button



**HPB-340**



**HPB-342**



**HPB-252**



**HPB-242**  
Arrival Announcement  
Lamp



**HPB-254**  
Arrival Announcement  
Lamp



**HPB-640**  
Boxless Type



**HIP-D640**  
Boxless Type



**HIP-D240**

## ••• Indicator



**PI-D600**



**PI-D110**



**PI-S100**





**E200Tge**

Landing Doors	· Titanium Gold Mirror Etching(EE009)
Jambs	· Titanium Gold Mirror
Position Indicator	· PI-D110
Hall Button	· HPB-252



**E016Gag**

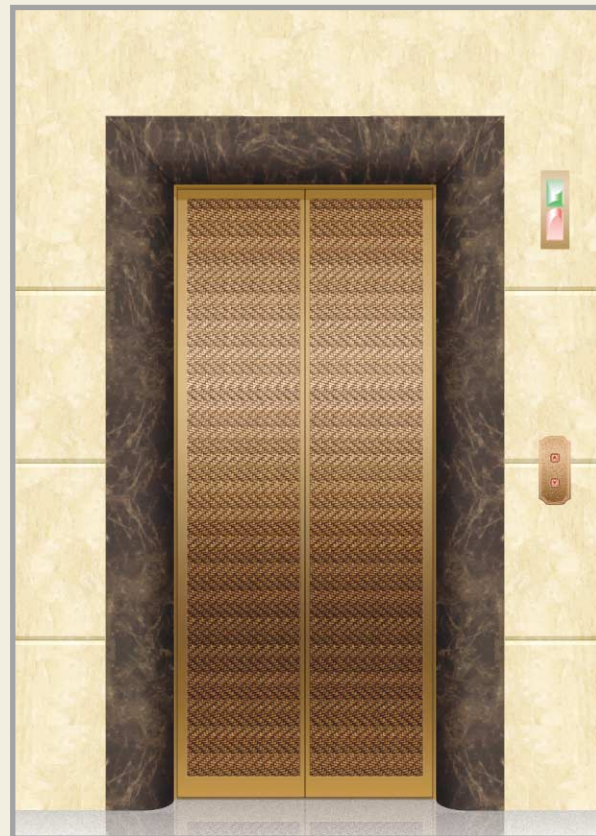
Landing Doors	· Galaxy Art/Graphic
Jambs	· Marble(By others)
Position Indicator	· PI-D300
Hall Button	· HPB-250
Hall Lantern	· HLS-720

Note : In this style, consumers can produce their own design suitable for the building using actual objects, art, and graphics.



**E200Bet**

Landing Doors	· Bronze Etching (EE008)
Jambs	· Bronze
Position Indicator	· IDS-02 (Hall Information Display System, Optional Spec.)
Hall Button	· HPB-254
Hall Lantern	· HLS-750



**E017Bmt**

Landing Doors	· Bonded Metal (Mazatran/Bronze)
Jambs	· Marble(By others)
Hall Button	· HPB-530
Hall Lantern	· HLS-740



## Car Design



### SD32

Ceiling	· CD341A · Acryl · Stainless (Dull Finished Stainless Steel)
Lighting	· Indirect Light and Downlight
Car Door and Car Wall	· Bonded Metal(Taos/Nickel Silver) · Stainless(Dull Finished Stainless Steel)
Operating Panel	· OPP-N250 · Return Panel
Position Indicator	· PI-D100(Dot Type)
Handrail	· Stainless · Wood
Entrance Column	· Stainless (Dull Finished Stainless Steel)
Transom Panel	· Stainless (Dull Finished Stainless Steel)
Floor	· Granite · Stainless Molding (By others)

Note : The colors in this catalogue may vary slightly from actual colors.



### SD37

Ceiling	· CD491C · Acryl · Painted Steel · Stainless Mirror Pattern Blast
Lighting	· Indirecting Light · Down Light
Car Door	· Stainless Mirror Pattern Blast
Car Wall	· Stainless Mirror Pattern Blast
Operating Panel	· OPP-N250B(Swing Panel)
Position Indicator	· PI-D110(Dot Type)
Handrail	· Stainless 1Pipe
Transom Panel	· Stainless BA Pattern Blast
Floor	· Marble(By Others)

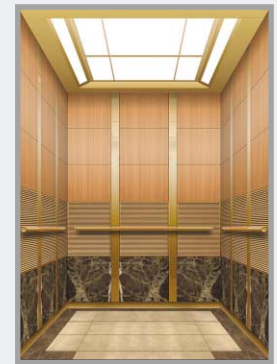
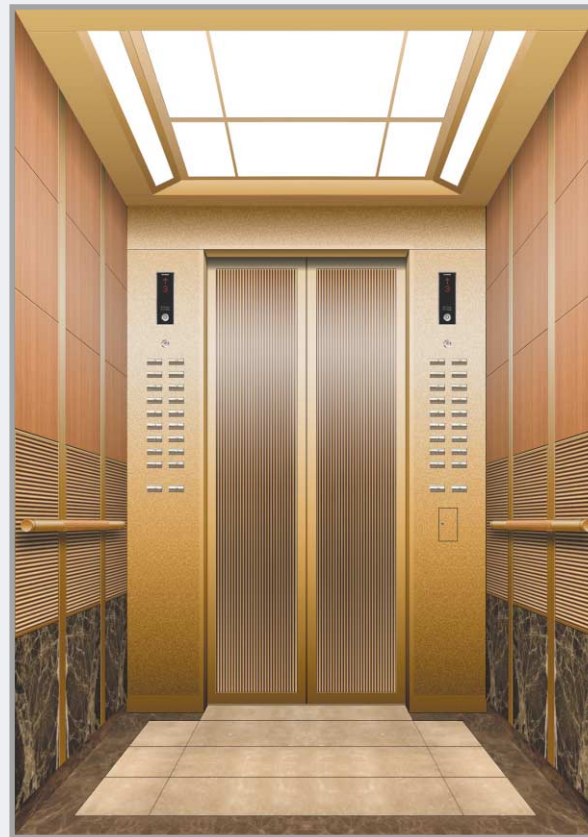
Note : The colors in this catalogue may vary slightly from actual colors.



### SD38

Ceiling	· CD431B · Acryl · Stainless (Dull Finished Stainless Steel)
Lighting	· Indirecting Light
Car Door	· Stainless (Dull Finished Stainless Steel) · Bonded Metal (Delta/Nickel Silver)
Car Wall	· Bonded Metal (Delta/Nickel Silver) · Wood Sheet · Stainless Mirror
Operating Panel	· OPP-D250B (Swing Panel)
Handrail	· Stainless 1Pipe
Transom Panel	· Stainless (Dull Finished Stainless Steel)
Floor	· Marble (By Others)

Note : The colors in this catalogue may vary slightly from actual colors.



### SD39

Ceiling	· CD421C · Acryl · Titanium Bronze
Lighting	· Indirecting Light
Car Door	· Bonded Metal (Delta/Bronze) · Titanium Bronze
Car Wall	· Aluminum Panel · Wood Sheet · Titanium Bronze Mirror · Bonded Metal (Delta/Bronze) · Stone Panel
Operating Panel	· Titanium Bronze Etching · OPP-D250B (Swing Panel)
Handrail	· Titanium Bronze · Wood
Transom Panel	· Titanium Bronze Etching
Floor	· Marble (By Others)

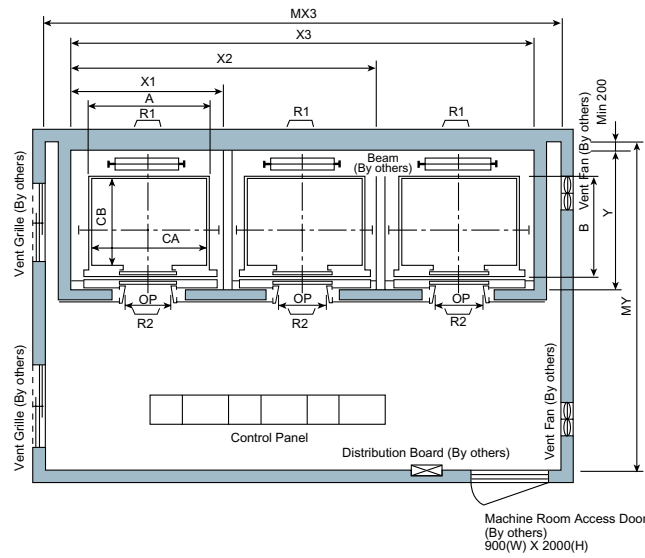
Notes :  
1. This ceiling should be applied to cars with a capacity of more than 17 persons.  
2. When this ceiling is applied, the overhead should be raised 300mm higher than standard.  
3. The colors in this catalogue may vary slightly from actual colors.





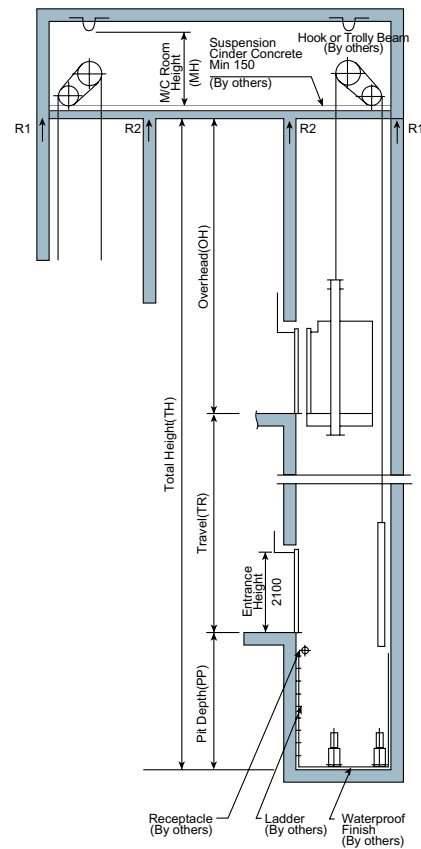
# Installation Layout Plan & Standard Dimensions

**Plan of Hoistway & Machine Room (In-Line Arrangement of 3 Units)**

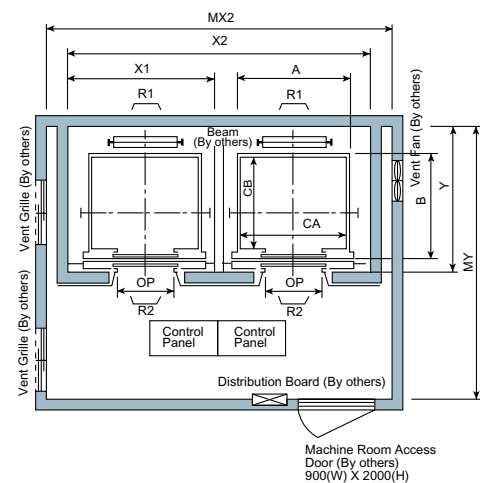
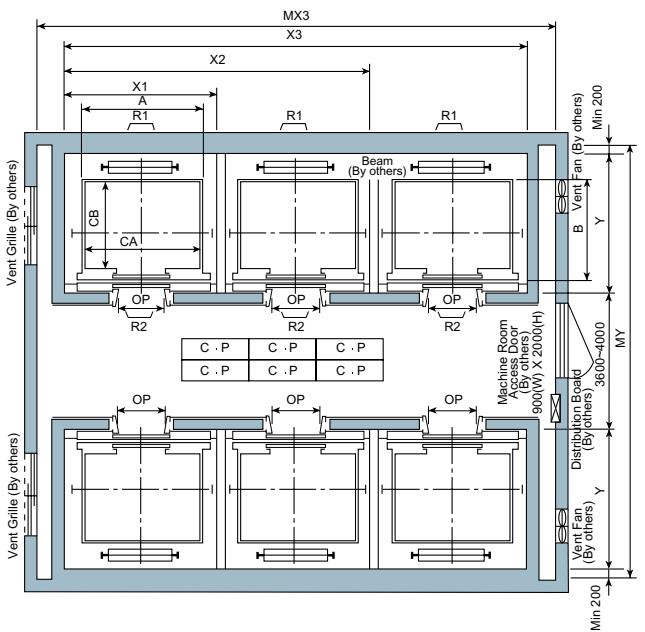


**Note :** Temperature should be maintained below 40 °C and humidity below 90%, with installation of a ventilating fan, ventilating grille, and air conditioner (if necessary). Toxic gas or dust should not be generated.

**Section of Hoistway**



**Face-to-Face Arrangement**



**Standard Dimensions & Reactions**

(Unit: mm)

Speed(M/Min)	Capacity	Clear Opening	Car		Hoistway				M/C Room				M/C Room Reaction(Kg)		
			Internal	External	1Car	2Cars	3Cars	Depth	1Car	2Cars	3Cars	Depth	R1	R2	
Persons	(Kg)	OP	CA X CB	A X B	X 1	X 2	X 3	Y	MX 1	MX 2	MX 3	MY	R1	R2	
1.20	13	900	1600 x 1350	1700 x 1570	2300	4550	6900	2200	2800	5500	7900	4500	12030	6630	
			1600 x 1400	1700 x 1620	2300	4550	6900	2250	2800	5500	7900	4700	12810	6950	
	15	1000	1600 x 1500	1700 x 1720	2300	4550	6900	2400	2800	5500	7900	4700	12810	6950	
			1600 x 1550	1700 x 1770	2300	4550	6900	2400	2800	5500	7900	4700	12810	6950	
	17	1150	1000	1800 x 1500	1900 x 1720	2500	4950	7500	2400	3000	6100	8800	4700	13080	7130
				2000 x 1350	2100 x 1570	2700	5350	8100	2250	3200	6250	9100	4500	13080	7130
1.50	20	1350	1800 x 1700	1900 x 1920	2500	4950	7500	2600	3000	6100	8900	5000	14360	7650	
			1800 x 1730	1900 x 1950	2500	4950	7500	2630	3000	6100	8900	5000	14360	7650	
	24	1600	1100	2000 x 1500	2100 x 1720	2700	5350	8100	2400	3200	6250	9100	4700	15090	8080
				2000 x 1550	2100 x 1770	2700	5350	8100	2450	3200	6250	9100	4700	15090	8080
	24	1600	1100	2000 x 1750	2100 x 1970	2700	5350	8100	2650	3200	6250	9100	5000	15090	8080
				2150 x 1600	2250 x 1820	2850	5650	8550	2500	3400	6500	9400	4900	15090	8080
2.10	15	1000	1600 x 1500	1700 x 1720	4600	6950	2400	5600	8200	4900	12810	7800	12810	7800	
			1600 x 1550	1700 x 1770	4600	6950	2450	5600	8200	4900	12810	7800	12810	7800	
	17	1150	1000	1800 x 1300	1900 x 1520	5000	7550	2200	5800	8400	4900	14100	8000	14100	8000
				1800 x 1370	1900 x 1590	5000	7550	2300	5800	8400	4900	14100	8000	14100	8000
	20	1350	1100	1800 x 1700	1900 x 1920	5000	7550	2600	6100	8800	5000	15100	8050	15100	8050
				1800 x 1730	1900 x 1950	5000	7550	2650	6100	8800	5000	15100	8050	15100	8050
24	1600	1100	2000 x 1500	2100 x 1720	5400	8150	2400	6200	9000	5000	15700	8100	15700	8100	
			2000 x 1550	2100 x 1770	5400	8150	2450	6200	9000	5000	15700	8100	15700	8100	
3.00	20	1350	2000 x 1800	2100 x 2020	5000	8150	2700	6400	9000	5000	17800	13200	17800	13200	
			2150 x 1600	2250 x 1820	5700	8650	2500	6500	9400	5000	17800	13200	17800	13200	
	24	1600	1100	2150 x 1670	2250 x 1890	5700	8650	2600	6500	9400	5000	18100	13500	18100	13500
				2000 x 1700	1900 x 1920	5100	7700	2650	6200	9100	6000	17800	13200	17800	13200
	20	1350	1100	1800 x 1730	1900 x 1950	5100	7700	2700	6200	9100	6300	17800	13200	17800	13200
				2000 x 1500	2100 x 1720	5500	8300	2450	6200	9100	5900	17800	13200	17800	13200
3.60	24	1600	1100	2000 x 1550	2100 x 1770	5500	8300	2500	6200	9100	6300	18100	13500	18100	13500
				2000 x 1750	2100 x 1970	5500	8300	2650	6500	9100	6300	18100	13500	18100	13500
24	1600	1100	2000 x 1800	2100 x 2020	5500	8300	2700	6500	9100	6300	18100	13500	18100	13500	
			2150 x 1600	2250 x 1820	5800	8750	2500	6500	9400	6200	18100	13500	18100	13500	
24	1600	1100	2150 x 1670	2250 x 1890	5800	8750	2600	6500	9400	6200	18100	13500	18100	13500	
			2150 x 1670	2250 x 1890	5800	8750	2600	6500	9400	6200	18100	13500	18100	13500	

- Notes : 1. White colored dimensions shall be applied for Malaysia & Singapore market.
- 2. The minimum hoistway dimensions are shown on the above table. Therefore, some allowances should be made considering the sloping of the hoistways.
- 3. Above dimensions are based on center opening doors. For applicable dimensions with side opening doors, consult Hyundai.
- 4. For elevators with more than 28 persons capacity, consult Hyundai.
- 5. When non-standard capacities and dimensions are required to meet the local code, consult Hyundai.
- 6. The capacity in persons is calculated at 68kg/person. (EN81 75kg/person)

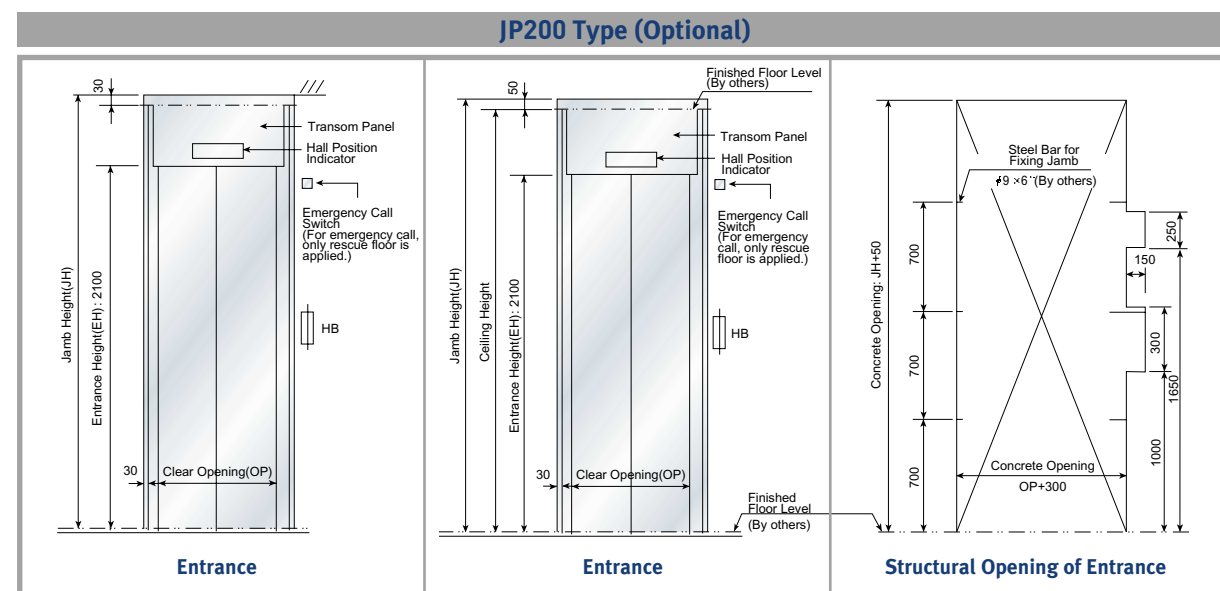
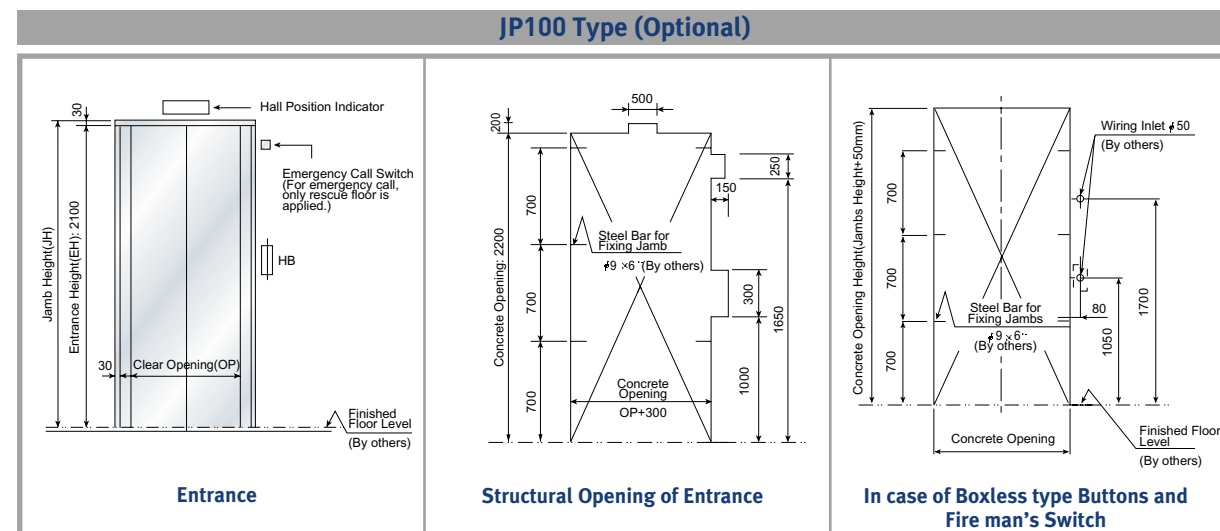
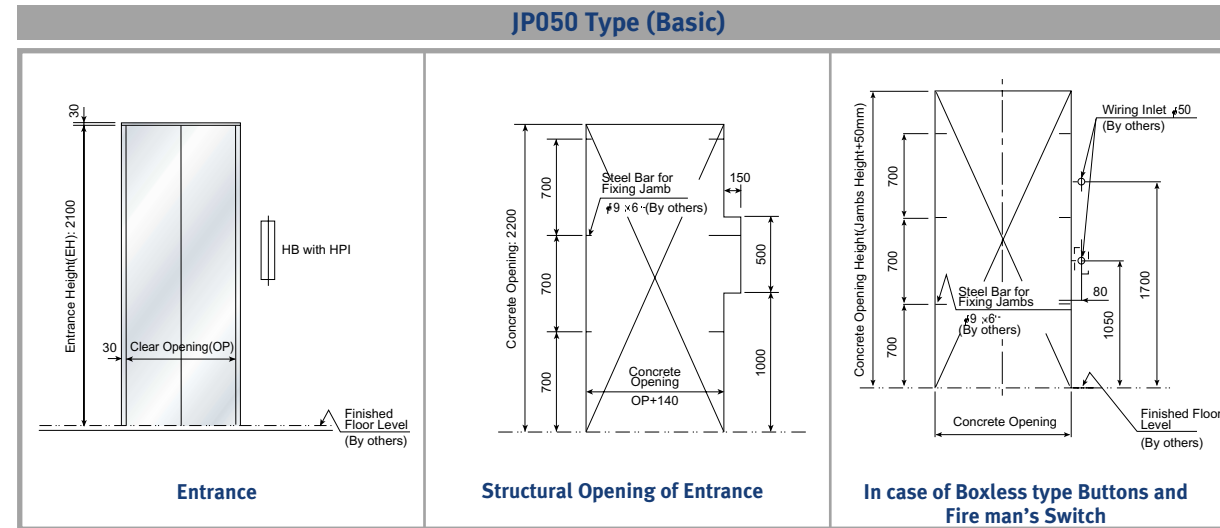
(Unit: mm)

Speed(m/min)	Overhead(OH)	Top Clearance(TC)	Pit(PP)	M/C Room Height(MH)
1.20	5500	1800	2100	2400
1.50	5700	2000	2400	2400
1.80	6000	2300	2700	2500
2.10	6400	2700	3200	2800
2.40	7100	3350	3850	2800
3.00	7700	4000	4050	3000
3.60	7700	4000	4050	3000

**Note :** The above table shows minimum figures. Therefore, some allowances should be made considering errors that may occur during construction.



# Typical Entrance Layouts



# Work to be Done by Other Contractors (Conditions for Estimate)

The following works are not included in the elevator contract, and shall be done by other contractors in accordance with the Hyundai Elevator's drawings and the applicable codes and regulations. The reference rules shown are from ANSI A17.1 Code.

## Building Work

### Hoistway

- Clear, plumb hoistway with fire resistant hatch walls as required by the governing code. (Rule 100.1a)
  - 75° bevel guards on all projections, recesses or setbacks over 50mm except on side used for loading or unloading. (Rule 100.6)
  - Venting of the hoistway as required by the governing code or authority. (Rule 100.4)
  - Supports for rail brackets at each floor, roof, and machine room. (Rule 200.9) Maximum allowable vertical spacing of rail supports without backing. (Rule 200.4 and 301.1) Divider beams 100mm between hoistway at each floor and roof, for guide rail bracket supports. (Rule 200.4, 200.9 and 301.1)
  - Recesses supports and patching as required to accommodate hall button boxes, signal fixtures, etc.
  - All barricades either outside elevator hoistways or between inside hoistways as required.
  - Dry pit reinforced to sustain normal vertical forces from rails and buffers. (Rule 106.1b and 109) Consult Hyundai Elevator Company for rail forces and buffer impacts. Where there is space below the pit floor which can be occupied, consult Hyundai Elevator Company for special requirements. (Rule 300.4) Cylinder hole, casings under the pit as required and backfilling around the cylinder casings when direct plunger type is to be installed.
  - Where access to the pit is by means of the lowest hoistway entrance, vertical iron ladder extending 1060mm minimum above sill of access door. (Rule 106.1d)
  - Entrance walls and finished floor are not to be constructed until after door frames and sills are in place. Door frames are to be anchored to walls and properly grouted in place to maintain legal fire rating.
  - Sill supports 64mm minimum floor recesses full hoistway width for entrance sills, with grouting after sills are set in place.
  - For application as indoor or outdoor observation elevator, a minimum 3.6m high glass enclosure above bottom landing is recommended for safety. For application as outdoor observation elevator, full height glass enclosure is required.
- ### Machine Room
- Enclosed and protected machine room. (Rule 101.1)
  - Access to the machine room and machinery space as required by the governing code or authority. (Rule 101.3)
  - Reinforced concrete machine room floor slab or grating, as specified, which must not be placed over the hoistway until elevator machinery is set in position. (Rule 100.3 for Traced over Hoistway)
  - Clear access above ceiling or trench in floor, for oil line and wiring duct from machine room, if machine room is remote from elevator hoistway. (For Hydraulic Elevator) Cutout through machine room wall, for oil line and wiring duct as required by the Hyundai Elevator's shop drawings. (For Hydraulic Elevator)
  - Hoisting beams, trap doors and other means of access to machine room for maintenance and equipment removal purposes. (Rule 101.3d)
  - Cable guards in the machine room or secondary level. (Rule 104.1)
  - Supports for machine and sheave beams and reactions including wall pockets and patching after beams are set in place. (Rule 105.1 to 105.5)

## Electrical Work

### Hoistway

- Light outlet for each elevator, in center of hoistway (or in machine room) as indicated by Hyundai Elevator Company.
  - Convenience outlet and light fixture in pit with switch located adjacent to the access door. (Rule 106.1e)
  - Wiring and piping work of emergency bell, interphone, etc. Outside the hoistway and the machine room.
- ### Machine Room
- Lighting, convenience outlets, ventilation, heating of machine room, and machinery space. (Rule 101.5)
  - Temperature should be maintained below 40°C with ventilating fan and/or air conditioner, if necessary, and humidity below 90%.
  - A fused disconnect switch or circuit breaker for each elevator and light switch located per the governing code and where practicable located adjacent to the door of the machine room. (Rule 210.5 and 306.7)
  - Feeder and branch wiring to the controller, including main-line switch and convenience outlets.
  - Suitable power feeder and branch wiring circuits as required for elevators with power operated doors, including disconnect switch or circuit breaker.
- ### Emergency Provisions
- Elevator fireman's and other emergency services wiring and interconnections to automatic sprinkler systems or heat and smoke sensing devices furnished by others and installed to terminal points on the elevator controllers.
  - When emergency power operation of elevators is required, the electrical contractor should coordinate with Hyundai Elevator Company or local distributor for operation requirements.
  - Elevator fireman's and other emergency service requirements may differ from each country. Consult Hyundai Elevator Company or local distributor for other local requirements.
  - When provisions for earthquake protection are required, consult Hyundai Elevator Company for special requirements.

### HEAT EMISSION OF MACHINE ROOM

$$Q(\text{kcal/H}) = W \times V \times F \times N$$

- W: Capacity(kg)
- V: Speed
- F: Factor
- N: Number of cars
- F: 1/40-VVVF

## Electric Power Requirements / 1 car (By others)

Persons (kg)	Speed (m/min)	Motor (kW)	C.B. Rated Current (A)	Transformer Capacity (kVA)	Power Feeder (mm <sup>2</sup> )	Earth Wire (mm <sup>2</sup> )	50/60Hz, 380V						
							Persons (kg)	Speed (m/min)	Motor (kW)	C.B. Rated Current (A)	Transformer Capacity (kVA)	Power Feeder (mm <sup>2</sup> )	Earth Wire (mm <sup>2</sup> )
13 (900)	120	11.1	50	19	16	5.5	20 (1350)	120	16.6	75	27	16	5.5
	150	13.8	75	23	16	5.5		150	20.7	100	32	16	5.5
	180	16.6	75	26	16	5.5		180	27	100	37	25	5.5
15 (1000)	120	12.3	75	21	16	5.5		210	31	125	42	25	5.5
	150	15.4	75	25	16	5.5		240	35	125	46	25	5.5
	180	18.4	75	28	16	5.5		300	48	150	62	35	14
17 (1150)	210	23	100	32	25	5.5	360	56	175	80	35	14	
	240	26	100	35	25	5.5	120	19.6	75	31	16	5.5	
	120	14.1	75	23	16	5.5	150	24.5	100	38	25	5.5	
	150	17.7	75	28	16	5.5	180	30	125	43	25	5.5	
	180	21.2	100	32	25	5.5	210	36	150	50	25	14	
	240	30	125	40	25	5.5	240	40	150	53	25	14	
24 (1600)	300	56	175	70	35	14	300	56	175	70	35	14	
	360	68	200	93	35	14							

Notes : 1. The above power sizes are for lengths of electric wire up to 50 meters from the elevator machine room to the transformer.

For lengths of 50 meters or more, the following formula should be applied : Power feeder size (mm<sup>2</sup>) =  $\frac{\text{Power feeder length (m)}}{50} \times \text{size in the above (mm}^2\text{)}$

- Above power feeder sizes are for copper wires inside electro-metallic tubing.
- It is recommended a larger diameter earth wire be used.
- For installing several elevators, apply the following formula.  
Transformer Capacity (kVA) = Number of elevator X Diversity factor
- For AC-Geared elevators, consult Hyundai Elevator.

Number of elevator(N)	1	2	3	4	5
Diversity factor	1.00	0.91	0.85	0.80	0.76