Optimization of Passenger Elevator Design for Apartment Building

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Abstract: An elevator is one of the circulation systems in a building that is classified as a vertical circulation system in the building. Transportation planning in buildings must be in accordance with laws, ministerial regulations, regional regulations and standards, which become a reference in planning procedures. The xxx apartment building located in East Jakarta is an apartment building consisting of 2 towers (Tower A and B), each of which consists of a total of 25 floors (24 floors + 1 basement), 1 floor roof, each 87.3 meters high. , the number of occupants of building A is 727 people and building B is 748 people. Traffic analysis is needed to determine the type of lift suitable for the building. The method used in this research is to use the Indonesian National Standard, SNI 03-6573-2001. From the results of traffic analysis calculations for buildings A and B obtained, the selected elevator for apartment building A is an elevator with a capacity of 15 people (1000 kg) with a speed of 90 mpm, a total of 3 units. And apartment building B is an elevator with a capacity of 15 people (1000 kg) with a speed of 90 mpm, a total of 3 units.

Keywords: elevator, apartment, TDG, SNI

1. Introduction

An elevator is one of the circulation systems in a building that is classified as a vertical circulation system in the building. In accordance with government regulations, that planning for interior transportation (TDG) must refer to the Indonesian National Standard, SNI 03-6573-2001, 2001 regarding the Design Procedure for a vertical transportation system in buildings (elevators). The xxx apartment building located in East Jakarta is an apartment building consisting of 2 towers (Tower A and B), each of which consists of a total of 25 floors (24 floors + 1 basement), and 1 roof floor.

Basement floors are used for parking areas and are also used as M / E Utility Rooms (Transformer Rooms, Panel Rooms, Genset Rooms, Pump Rooms, etc.). Floors 1 to 5 are used as the Lobby, Parking and Public Facilities, while floors 6 to 24 are used as residences. The roof floor is used as a placement for mechanical supporting equipment such as a top water tank, distribution pump, exhaust fan, gondola and so on. It is necessary to design the type of lift in accordance with the provisions, SNI 03-6573-2001, so that the elevator service is more optimal in normal conditions or in emergencies..

Rules used as a reference in elevator planning

- PERDA (Regional Regulation) of the Special Capital Region of Jakarta Number 7 of 2010 concerning Buildings within the Special Capital Region of Jakarta or the latest edition.
- PERDA (Regional Regulation) of the Special Capital Region of Jakarta Number 8 of 2008 concerning Fire Hazard Management in the Special Capital Region of Jakarta or its latest edition.
- DKI Regional Regulation No. 3 of 1975 concerning Fire Lift Operations and Fire Rating.
- Guidelines for the Installation of Elevators Electricity No.3 1987
- Saftey Code for the Elevator
- Indonesian National Standard (SNI) 05-2189-1999 regarding the definition of elebator and escalator terms
- Indonesian National Standard (SNI) 03-2190-1999 concerning General Conditions for Passenger Elevator Construction which is run by Traction Motor.
- Indonesian National Standard (SNI) 03-6573-2001 concerning Design Procedures for Vertical Transportation Systems in Buildings (Elevators).

2. Elevator

An elevator is a vertical transportation tool in a vertical building, which is used to carry people or goods. Lifts are usually used in high-rise buildings above 3 floors. One of those who introduced the lift was Elisa Graves Otis in 1853, where in 1857 the first passenger lift was installed in a building in New York. So that in 1873 more than

200 elevators were used in various office buildings and hotels in America. The elevator has developed, where in 1903 the gearless traction elevator was introduced.

The lift mechanism (geared or gearless) is a lift carriage depending on the sliding space by steel hoist ropes, pulley pulleys, and counterweights. The carriage weight and counterweight provide traction between the pulley and hoist ropes, so that it moves and holds the carriage without slipping, and the carriage and counterweight move along the rails

1) Normal Condition Elevator System

The lift works in a joint work (Operation group). Elevators are controlled by supervisory. Elevator responsive to Floor Calls (PL) and Train Calls (PK). The driving machine is a type of traction (geared machine) with an AC induction motor with VVVF (Variying Voltage Variying Frequency) control.

2) Emergency Condition Elevator

a) Fire

If a fire alarm is detected, a signal from the fire alarm system will inform passengers that the elevator will descend into the lobby for use by the fire team. If at that time the elevator is moving upwards will stop at the next closest floor, without opening the door and immediately going down non-stop to the lobby floor or a floor planned. If at that time the elevator is moving down, the elevator continues its journey directly to the lobby. The elevator, which is parked on a floor, immediately closes the door and leaves for the Lobby floor. The door that closes is regulated not to reopen, even if the safety shoe (edge) is offended by someone or the DC button is pressed. All the above operations without heeding floor calls and train calls. When all the elevators reach the lobby, the doors open. One of the lifts is ready for use by the pemdam team by using the ignition key. If the fire switch returns to normal, the FIREMAN's SERVICE signal goes out and the elevator works normally. The fire fighting elevator is powered by an emergency generator. The power line must be fire resistant for 1 hour and installed in fire protection.

b) Earthquake.

the elevator is equipped with seismic sensors, the lift will land on the nearest floor under load in the event of an earthquake. Another goal is to prevent the rails from being damaged by shocks (pendulum effect).

c) Jamming

Jamming in the elevator by a PLN power source that has been cut off, must be resolved with an Automatic Rescue Device (ARD). After the PLN power is off, the emergency light will turn on. A few seconds later the elevator will go to the nearest floor under weights and the elevator door will open. Elevator congestion due to the safety function works, for example overspeed and due to technical errors (maintenance and worn components) can be overcome by remote elevator monitoring (REM), which is by installing a modem via the telephone line automatically recorded jams on the maintenance contractor's computer or as soon as possible repaired.

d) Emergency Electric Power

The emergency power generator must be able to replace the loss of the PLN power source in a short time automatically, because the emergency power source is not fully powered, then automatically one by one the elevator descends to the lobby. Upon arriving at the lobby the doors opened to let everyone out. Then there are several selected lifts that automatically get energy rations to operate again.

3. Metodology

The methodology used in this research is to refer to the Indonesian National Standard, SNI 03-6573-2001, starting from:

1) Building Data
2) Traffic Zoning
3) Rush-Peak Hour
4) Average waiting time

4. Design and calculation

The design of the transportation system in the xxx apartment building in East Jakarta refers to the regulations, laws of the Republic of Indonesia, Indonesian National standards and existing literature.

1) Building Data :

The building consists of 2 buildings, Apartment A and Apartment B.

a) Apartement A

Type of building : Apartement A

Total Floor : 25 (24 floors + Basement)

Building height : 87,3 meter
Occupants : 727 person
Floor area : 63,871 m2 (average)

b) Apartemen B
Type of building : Apartement B
Total Floor : 25 (24 floors + Basement)
Building height : 87,3 meter
Occupants : 748 person
Floor area : 63,871 m2 (average)

2) Traffic Analysis

Traffic analysis for lift building A and building B is based on the Indonesian National Standard, referring to the reference SNI 03-6573-2001 Table 5.2.2, is the Average Waiting Time (AWT) at Main Lobby and Circulation Flow Demand.

No	Building	AWT (second)	Circulation Flow Demand (%)	Circulation Busy time
1	Luxurious Office	25 - 35	10 - 12	Morning, Up
2	Commercial Office	25 - 35	11 - 13	Morning, Up
3	Agency Office	30 - 40	14 - 17	Morning, Up
4	Star Hotel	40 - 60	8 - 10	Midday, balanced
5	Hotel Resort	60 - 90	6 - 8	Morning, Down
6	Hospital	40 - 60	10	Midday, balanced
7	Apartement	60 - 90	6 - 8	Morning, Down
8	Lecture Building	40 - 90	12.5 - 25	Morning, Up Midday

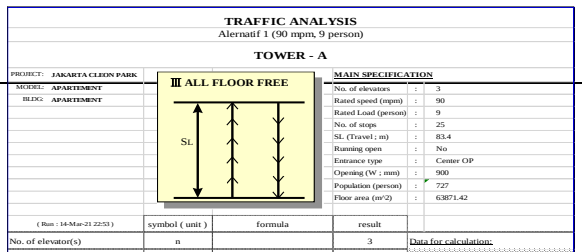
According to apartment SNI standards are:

– Average Waiting Time: 60–90 seconds
– Circulating Current Demand: 6 - 8%

Traffic analysis calculations with 4 alternative simulations (alt-1, alt-2, alt-3, alt-4) for several variables of elevator capacity and speed.

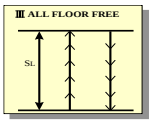
a) Traffic Analysis, building A

Simulation	Speed	Capacity
Alt-1	90 mpm	9 person
Alt-2		11 person
Alt-3		15 person
Alt-4		17 person
Alt-1	105 mpm	9 person
Alt-2		11 person
Alt-3		15 person
Alt-4		17 person
Alt-1	120 mpm	9 person
Alt-2		11 person
Alt-3		15 person
Alt-4		17 person


TRAFFIC ANALYSIS
Alernatif 1 (90 mpm, 9 person)
TOWER - A
PROJECT: JAKARTA CLEON PARK
MODEL: APARTEMENT
BLDG: APARTEMENT
ALL FLOOR FREE
MAIN SPECIFICATION
No. of elevators : 3
Rated speed (mpm) : 90
Rated Load (person) : 9
No. of stops : 25
SL (Travel ; m) : 83.4
Running open : No
Entrance type : Center OP
Opening (W ; mm) : 900
Population (person) : 727
Floor area (m^2) : 63871.42
(Run : 14-Mar-21 22:53)
symbol (unit)
formula
result
No. of elevator(s) n 3
Data for calculation:

TRAFFIC ANALYSIS
Alernatif 3 (90 mpm, 15 person)
TOWER - A

PROJECT: **JAKARTA CLEON PARK**
MODEL: **APARTEMENT**
BLDG: **APARTEMENT**



MAIN SPECIFICATION

No. of elevators	:	3
Rated speed (mpm)	:	90
Rated Load (person)	:	15
No. of stops	:	25
SL (Travel ; m)	:	83.4
Running open	:	No
Entrance type	:	Center OP
Opening (W ; mm)	:	900
Population (person)	:	727
Floor area (m^2)	:	NA

(Run : 15-Mar-21 9:12)

	symbol (unit)	formula	result	
No. of elevator(s)	n		3	Data for calculation:
Elevator speed	V (m/sec)	Rated speed / 60	1.5	
No. of passengers	ru (person)		6	
	rd (person)		4.5	
No. of expected stops in local	fLu	N (1 - ((N - 1) / N) ^ ru)	5.384	N: 23
service section	fLd	N (1 - ((N - 1) / N) ^ rd)	4.169	
No. of stop(s) in express service section	fE	0	0	
No. of expected stops in the entire section	F	fLu + fLd	9.553	
Average running distance in	Su (m)	SL / fLu	15.49	
local service section	Sd (m)	SL / fLd	20.004	
Minimum running distance	2Sa (m)		3	Sa: 1.5
Running Time — Local — Su < 2Sa	Tr (sec)	tru x fLu	0	tru: 8.602
Sd < 2Sa		trd x fLd	0	trd: 9.672
Su >= 2Sa		SL / V + ta x fLu	66.368	ta: 2
Sd >= 2Sa		SL / V + ta x fLd	63.938	
express		0	0	tpd: 3.25
Door-opening & closing time	Td (sec)	td x F	21.971	td: 2.3
Passenger entrance & exit time	Tp (sec)	ru x tpu + rd x tpd	35.625	pu: 3.5
Time loss	Tl (sec)	tl x (Td + Tp)	5.759	tl: 0.1
One round trip time	RTT (sec)	Tr + Tp + Td + Tl	193.661	
Average waiting interval	Tav (sec)	RTT / n	**64.55**	
5-minute capacity of each elevator's	P' (person)	5 x 60 x (ru+rd) / RTT	16.265	Legend:
5-minute capacity of all elevators'	P (person)	P' x n	**48.795**	N: no. of floors in local section
Floor area	Fa (M^2)		NA	Sa: accelerated (decelerated) dist.
Rental ratio	Rr		NA	tl: time loss
Effective floor area of each floor	Ef (M^2)		NA	ta: accelerated (decelerated) time
Area occupied by one person	Ao (M^2)		NA	td: door -opening & closing time per one stop
Floor population	Fp (person)		NA	tpu: tpd: average entrance & exit time per passenger
Total building population	Q (person)		727	tru: up running time
5-minute handling capacity	CC (%)	P / Q x 100	**6.71**	trd: down running time

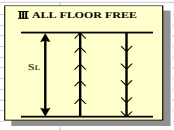
b) Traffic Analysis, building B

Simulation	Speed	Capacity
Alt-1	90 mpm	9 person
Alt-2		11 person
Alt-3		15 person
Alt-4		17 person
Alt-1	105 mpm	9 person
Alt-2		11 person
Alt-3		15 person
Alt-4		17 person
Alt-1	120 mpm	9 person
Alt-2		11 person
Alt-3		15 person

Alt-4		17 person

TRAFFIC ANALYSIS
Alernatif 1 (90 mpm, 9 person)
TOWER - B

PROJECT: JAKARTA CLEON PARK
MODEL: APARTEMENT
BLDG: APARTEMENT



MAIN SPECIFICATION

No. of elevators	:	3
Rated speed (mpm)	:	90
Rated Load (person)	:	9
No. of stops	:	25
SL (Travel ; m)	:	83.4
Running open	:	No
Entrance type	:	Center OP
Opening (W ; mm)	:	900
Population (person)	:	748
Floor area (m^2)	:	63871.42

(Run : 14-Mar-21 22:53)	symbol (unit)	formula	result	
No. of elevator(s)	n		3	Data for calculation:
Elevator speed	V (m/sec)	Rated speed / 60	1.5	
No. of passengers	ru (person)		3.6	
	rd (person)		2.7	
No. of expected stops in local	fLu	N (1 - ((N - 1) / N) ^ ru)	3.401	N: 23
service section	fLd	N (1 - ((N - 1) / N) ^ rd)	2.601	
No. of stop(s) in express service section	fE	0	0	
No. of expected stops in the entire section	F	fLu + fLd	6.002	
Average running distance in	Su (m)	SL / fLu	24.522	
local service section	Sd (m)	SL / fLd	32.064	
Minimum running distance	2Sa (m)		3	Sa: 1.5
Running Time – Local: Su < 2Sa		tru x fLu	0	tru: 10.628
Sd < 2Sa		trd x fLd	0	trd: 12.046
Su >= 2Sa	Tr (sec)	SL / V + ta x fLu	62.402	ta: 2
Sd >= 2Sa		SL / V + ta x fLd	60.802	
express		0	0	tpd: 3.25
Door-opening & closing time	Td (sec)	td x F	13.804	td: 2.3
Passenger entrance & exit time	Tp (sec)	ru x tpu + rd x tpd	21.375	tpu: 3.5
Time loss	Tl (sec)	tl x (Td + Tp)	3.517	tl: 0.1
One round trip time	RTT (sec)	Tr + Tp + Td + Tl	161.9	
Average waiting interval	Tav (sec)	RTT / n	**53.96**	
5-minute capacity of each elevator's	P' (person)	5 x 60 x (ru+rd) / RTT	11.673	Legend:
5-minute capacity of all elevators'	P (person)	P' x n	**35.019**	N: no. of floors in local section
Floor area	Fa (M^2)		NA	Sa: accelerated (decelerated) dist.
Rental ratio	Rr		NA	tl: time loss
Effective floor area of each floor	Ef (M^2)		NA	ta: accelerated (decelerated) time
Area occupied by one person	Ao (M^2)		NA	td: door -opening & closing time per one stop
Floor population	Fp (person)		NA	tpu: tpd: average entrance & exit time per passenger
Total building population	Q (person)		748	tru: up running time
5-minute handling capacity	CC (%)	P / Q x 100	**4.68**	trd: down running time

TRAFFIC ANALYSIS
Alernatif 3 (90 mpm, 15 person)
TOWER - B

PROJECT: JAKARTA CLEON PARK
MODEL: APARTEMENT
BLDG: APARTEMENT

MAIN SPECIFICATION

No. of elevators	:	3
Rated speed (mpm)	:	90
Rated Load (person)	:	15
No. of stops	:	25
SL (Travel ; m)	:	83.4
Running open	:	No
Entrance type	:	Center OP
Opening (W ; mm)	:	900
Population (person)	:	748
Floor area (m^2)	:	NA

(Run : 15-Mar-21 9:12)	symbol (unit)	formula	result	
No. of elevator(s)	n		3	Data for calculation:
Elevator speed	V (m/sec)	Rated speed / 60	1.5	
No. of passengers	ru (person)		6	
	rd (person)		4.5	
No. of expected stops in local	fLu	N (1 - ((N - 1) / N) ^ ru)	5.384	N: 23
service section	fLd	N (1 - ((N - 1) / N) ^ rd)	4.169	
No. of stop(s) in express service section	fE	0	0	
No. of expected stops in the entire section	F	fLu + fLd	9.553	
Average running distance in	Su (m)	SL / fLu	15.49	
local service section	Sd (m)	SL / fLd	20.004	
Minimum running distance	2Sa (m)		3	Sa: 1.5
Running Time – Local: Su < 2Sa		tru x fLu	0	tru: 8.602
Sd < 2Sa		trd x fLd	0	trd: 9.672
Su >= 2Sa	Tr (sec)	SL / V + ta x fLu	66.368	ta: 2

Sd >= 2Sa		SL / V + ta x fLd	63.938	
express		0	0	tpd: 3.25
Door-opening & closing time	Td (sec)	td x F	21.971	td: 2.3
Passenger entrance & exit time	Tp (sec)	ru x tpu + rd x tpd	35.625	tpu: 3.5
Time loss	Tl (sec)	tl x (Td + Tp)	5.759	tl: 0.1
One round trip time	RTT (sec)	Tr + Tp + Td + Tl	193.661	
Average waiting interval	Tav (sec)	RTT / n	**64.55**	
5-minute capacity of each elevator's	P' (person)	5 x 60 x (ru+rd) / RTT	16.265	Legend:
5-minute capacity of all elevators'	P (person)	P' x n	**48.795**	N: no. of floors in local section
Floor area	Fa (M^2)		NA	Sa: accelerated (decelerated) dist.
Rental ratio	Rr		NA	tl: time loss
Effective floor area of each floor	Ef (M^2)		NA	ta: accelerated (decelerated) time
Area occupied by one person	Ao (M^2)		NA	td: door -opening & closing time per one stop
Floor population	Fp (person)		NA	tpu: tpd: average entrance & exit time per passenger
Total building population	Q (person)		748	tru: up running time

5. Result and evaluation

1) Traffic Analysis Results

Apartement Building A

Resume Traffic Analysis (Passenger elevator)							
Alternatif	Total elevator	Capacity (person)	Speed (mpm)	Floor service	SNI 03-673-2001 (Apartement)		Note
					Circulation Flow (6% - 8%)	AWT (60 - 90 sec)	
ALT -1	3	9	90	25	4.81	53.96	
ALT -2	3	11	90	25	5.52	57.55	
ALT -3	3	15	90	25	**6.71**	**64.55**	**ok**
ALT -4	3	17	90	25	**7.22**	**67.97**	**ok**
ALT -1	3	9	105	25	5.25	49.47	
ALT -2	3	11	105	25	5.97	53.21	
ALT -3	3	15	105	25	**7.15**	**60.53**	**ok**
ALT -4	3	17	105	25	**7.66**	**64.09**	**ok**
ALT -1	3	9	120	25	5.63	46.10	
ALT -2	3	11	120	25	6.35	49.97	
ALT -3	3	15	120	25	7.53	57.51	
ALT -4	3	17	120	25	8.02	61.19	

Gedung Apartemen B

Resume Traffic Analysis (Passenger elevator)							
Alternatif	Total elevator	Capacity (person)	Speed (mpm)	Floor service	SNI 03-673-2001 (Apartement)		Note
					Circulation Flow (6% - 8%)	AWT (60 - 90 sec)	
ALT -1	3	9	90	25	4.68	53.96	
ALT -2	3	11	90	25	5.36	57.55	
ALT -3	3	15	90	25	**6.52**	**64.55**	**ok**
ALT -4	3	17	90	25	**7.02**	**67.97**	**ok**
ALT -1	3	9	105	25	5.10	49.47	
ALT -2	3	11	105	25	5.80	53.21	
ALT -3	3	15	105	25	**6.95**	**60.53**	**ok**
ALT -4	3	17	105	25	**7.44**	**64.09**	**ok**
ALT -1	3	9	120	25	5.48	46.10	
ALT -2	3	11	120	25	6.18	49.97	
ALT -3	3	15	120	25	7.32	57.51	
ALT -4	3	17	120	25	7.79	61.19	**ok**

2) Analisys

The results of the traffic analysis for building A, obtained 4 alternative lift options that match the criteria, as follows:

Alternatif	Total elevator	Capacity (person)	Speed (mpm)	Floor service	SNI 03-673-2001 (Apartement)		Note
					Circulation Flow (6% - 8%)	AWT (60 - 90 sec)	
ALT -3	3	15	90	25	**6.71**	**64.55**	**ok**
ALT -4	3	17	90	25	**7.22**	**67.97**	**ok**
ALT -3	3	15	105	25	**7.15**	**60.53**	**ok**
ALT -4	3	17	105	25	**7.66**	**64.09**	**ok**

The results of the traffic analysis for building B, obtained 5 alternative lift options that match the criteria, as follows:

Alternatif	Total elevator	Capacity (person)	Speed (mpm)	Floor service	SNI 03-673-2001 (Apartement)		Note
					Circulation Flow (6% - 8%)	AWT (60 - 90 sec)	
ALT -3	3	15	90	25	**6.52**	**64.55**	**ok**
ALT -4	3	17	90	25	**7.02**	**67.97**	**ok**
ALT -3	3	15	105	25	**6.95**	**60.53**	**ok**
ALT -4	3	17	105	25	**7.44**	**64.09**	**ok**
ALT -4	3	17	120	25	7.79	61.19	**ok**

Selected elevator for building A and B :

Elevator capacity 15 person and speed 90 mpm. This elevator was chosen because the price is the cheapest compared to others

3) Analisys Result

Building A

Description	Passenger Lift	Service/Fire Lift
Code	PL.1, PL.2, PL.3	SV.1
Quantity	3 unit	1 unit
Fungsion	Passenger	Service / Fire
Capacity	15 orang (1000 kg)	22 orang (1500 kg)
Speed	90 mpm	90 mpm
Floor Serve	Basement ~ Lt.24	Basement ~ Atap
Travel	83,4 m	87,3 m
Car size internal	1600 x 1500 mm	2000 x 1650 mm
Hoistwal Dimention	2100 x 2300 mm	2800 x 2450 mm
Door Width/Type	900 x 2100 mm / CO	1100 x 2100 / CO
Over Head	4850 mm	4850 mm
Pit Depth	1850 mm	1850 mm
Machine Room Location	Roof	Roof
Machine Room Dimention	min. 2200 mm	min. 2200 mm
Control System	Duplex	Simplex
Power	18 KW	18 KW

Building B

Description	Passenger Lift	Service/Fire Lift
Code	PL.1, PL.2, PL.3	SV.1
Quantity	3 unit	1 unit
Fungsion	Passenger	Service / Fire
Capacity	15 orang (1000 kg)	22 orang (1500 kg)
Speed	90 mpm	90 mpm
Floor Serve	Basement ~ Lt.24	Basement ~ Atap
Travel	83,4 m	87,3 m
Car size internal	1600 x 1500 mm	2000 x 1650 mm
Hoistwal Dimention	2100 x 2300 mm	2800 x 2450 mm
Door Width/Type	900 x 2100 mm / CO	1100 x 2100 / CO
Over Head	4850 mm	4850 mm
Pit Depth	1850 mm	1850 mm
Machine Room Location	Roof	Roof
Machine Room Dimention	min. 2200 mm	min. 2200 mm
Control System	Duplex	Simplex
Power	18 KW	18 KW

4) Elevator control

All passenger lifts and service lifts are of type AC-Variable Voltage / Variable Frequency (AC-VVVF) with micro-processor (Computerized) control, both for Single Lift (Selective Collective) and as a group (Supervisory-Group Control)

5) Elevator Operational System

– Passenger Elevator operation using dupex supervisory group control
– The task of each elevator is controlled by a supervisory group control panel using a micro-processor.
– One of the elevators will stop on a specific floor call by a train call, if the direction of the elevator matches the call.
– A button press can be received by the elevator control management for 5 seconds before the lift stops at the floor specified.

– A person entering an elevator is given the opportunity to press a button (priority as long as the destination is the same as the direction of the lift) before the elevator door closes. If that time interval, the button is not pressed then the train is free to go to the direction where there is a call.
– All calls to the floor upward will be served by an upward elevator, on the other hand, a downward floor call is served by an elevator that moves downward.
– The lift will reverse direction if the last call / request has been served and will then serve floor calls and train requests in the opposite direction.
– If the elevator is on duty, one of the lifts will be waiting at the Lobby, the other elevator will stop where it was last served. If this elevator serves the lobby floor the last time, the standby elevator in the lobby will move to "Home Landing" where the home landing is placed 2/3 of the building floor.
– The elevator waiting in the lobby will leave, if the other elevator is busy serving floor calls.
– Passenger elevator serves Ground to 24 floors
– Lift service serves all floors. This lift also functions as a fire lift in an emergency

6) There was a fire in the elevator operating system

When a fire occurs or the General Alarm is active, through the Master Control Fire Alarm (MCFA) all elevators are ordered to descend to the 1st floor and all calls from other floors will not be served. In this condition, only the Service Lift can be operated manually via the Fireman Switch on the 1st floor near the elevator. The lift service is operated by the Fire Brigade Team for the purposes of both extinguishing operations and evacuating residents when a fire occurs.

– The power source comes from an emergency generator
– The cable must be fire resistance cable for 1 (one) hour and installed in fire protection.
– Minimum train area of 2.0 m2
– The tempo of running the fire lift to the top should not take more than 60 seconds.
– If the Switch (Toggle Switch) in the glass case has been activated, the “Firmans Service” signal will light up to inform passengers that the elevator will descend into the lobby for use by the fire team and will not serve all calls and requests.
– If at that time the elevator moving upwards will stop at the next closest floor, without opening the door and immediately departing non-stop to the lobby level (or other floor planned)
– If at that time the elevator is moving down, the elevator continues the trip directly to the lobhy.
– The elevator is parked on a floor, it will immediately close the door and go to the lobby floor.
– The door that closes is set not to reopen, even if the safety edge is offended by someone or the door open button is pressed and all orders / calls will not be served.
– When all passenger lifts have reached the lobby, the elevator doors will open.
– Service Lift which also functions as a fire lift is ready to be used by firefighters by using the ignition key.
– If the fire switch returns to normal, then the “FIREMANS SERVICE” signal will go out and all of its passenger lifts will immediately work normally.

The need for blood for the fire lift is supplied by PLN and the generator using FRC cables so that there is no loss of electrical power during the evacuation.

In addition, the lift cannot be considered as part of the procedure for rescue or evacuation from fire hazards, but can still be used as an escape when the initial fire siren sounds.

6. conclusion

The analysis traffic for apartment building xxx located in East Jakarta is obtained for apartment building A is a type of passenger elevator with a capacity of 15 person (1000 kg) with a speed of 90 mpm, total 3 units. And apartment building B is an elevator with a capacity of 15 people (1000 kg) with a speed of 90 mpm, a total of 3 units.

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