

D2E
International

Introduction

There are no 'hard and fast' rules to be adhered to when designing lift systems within buildings. There are, however, best practices and rules of thumb that, when applied correctly, can and will produce resilient solutions.

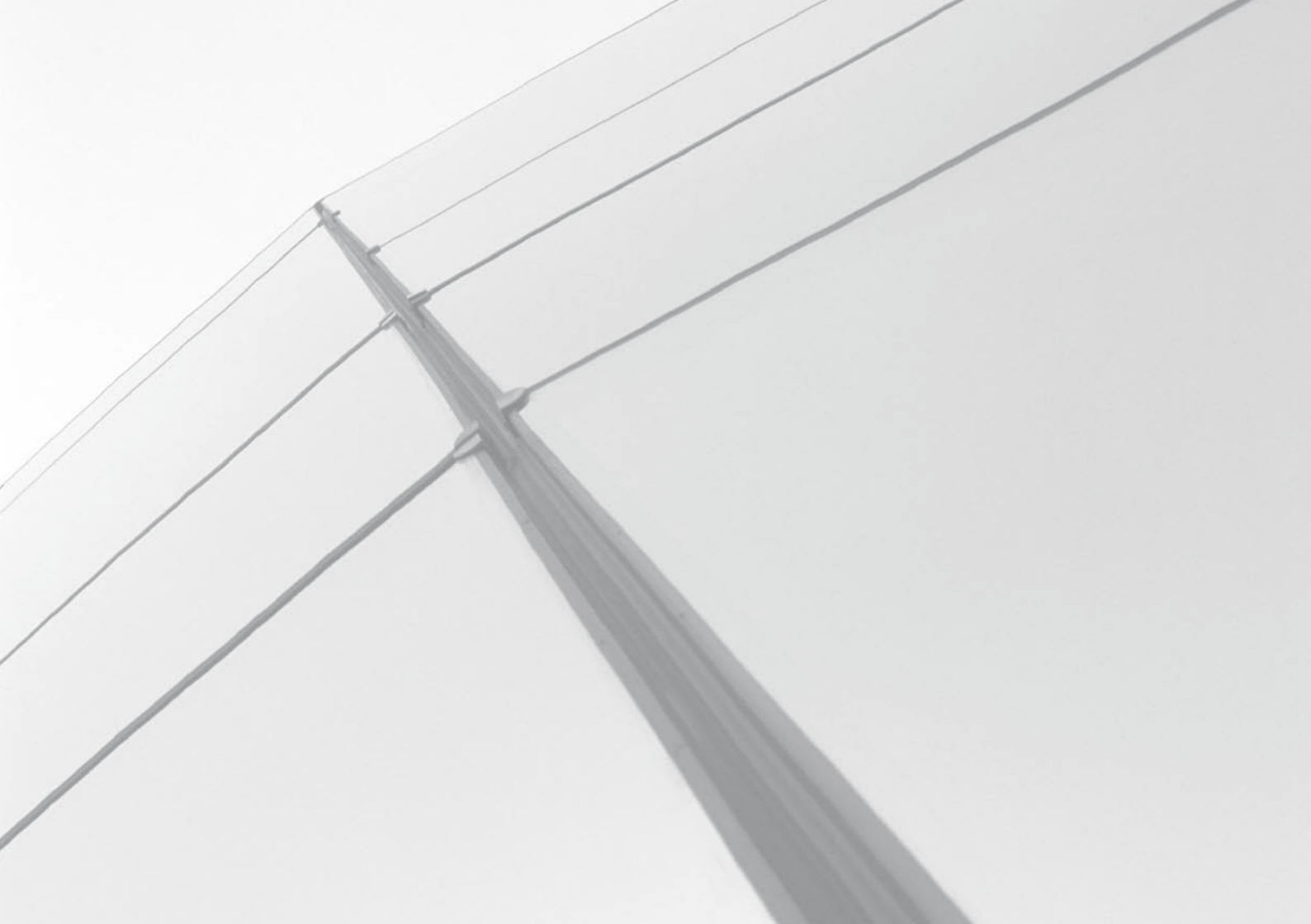
This guide endeavours to direct the user to a base design solution. It does not replace expert analysis by a trained vertical transportation advisor and it is recommended that base designs are checked by an advisor prior to implementation.

All lift references within this document are based on lifts without machine rooms.

The first and most important criteria to be determined is the building use.

This guide will look at the following:

- Commercial Offices
- Residential
- Hotels
- Educational Establishments
- Healthcare Facilities



Commercial Offices

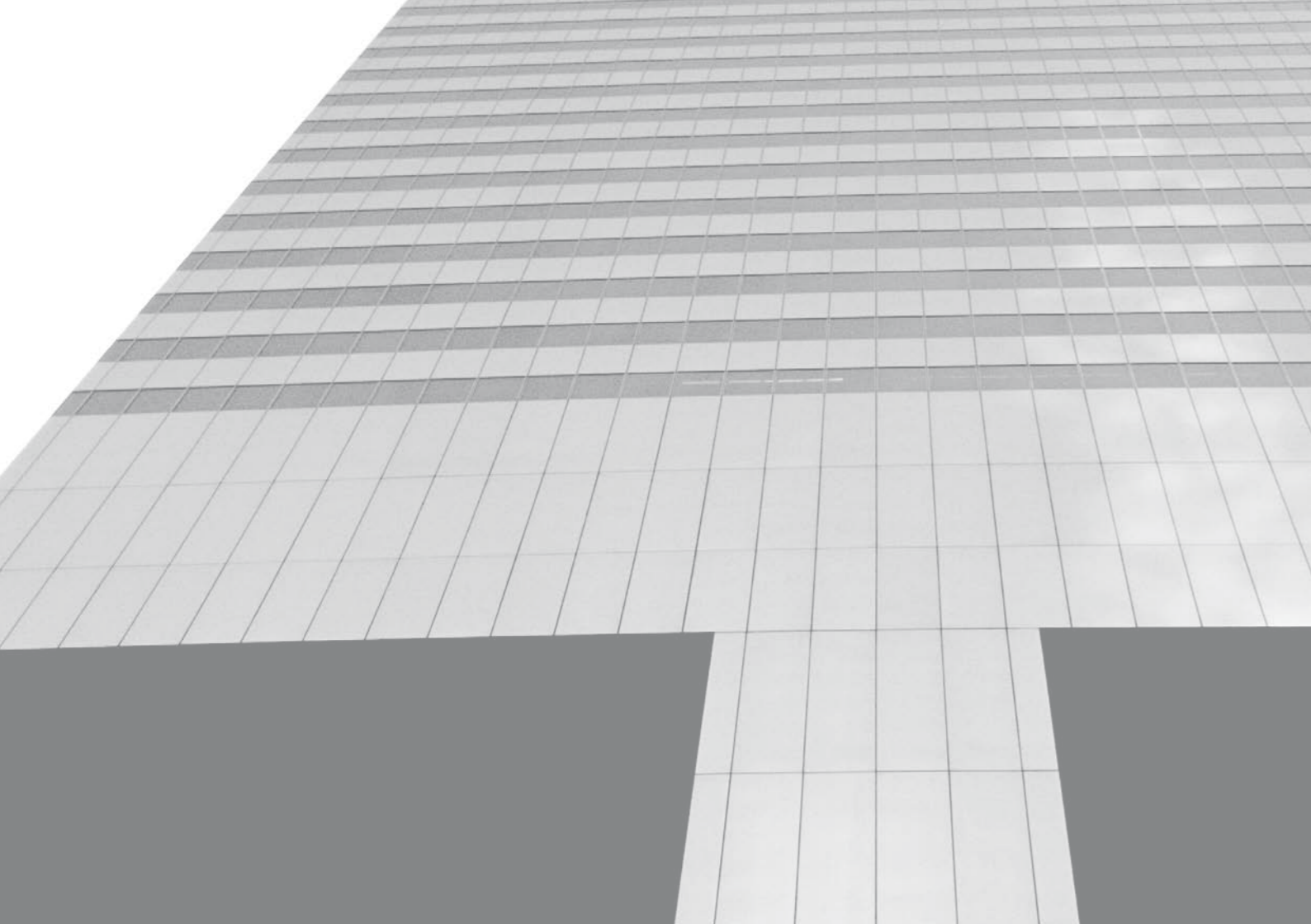
Lift systems should be designed to meet BCO service guidelines based on a net population density of 1:12.

The lift performance must provide an up-peak handling capacity of 12 – 15% of the total building population in a 5 minute period.

Target an average waiting time at the main entrance of ≤ 25 s. (This figure is obtained by simulation).

Rules of Thumb

- One lift for every two floors or two and a half floors, depending on the occupancy of the building. The higher the population density, the more lifts needed.
- In buildings of four to eight floors, a separate service lift should be considered. Over nine floors, a service lift is a requirement. For each additional 10 floors an additional service lift is required up to a maximum of four.
- The number of lifts in a single group should not normally exceed eight and, for high rise buildings, no single group should typically serve more than 18 – 22 levels.
- Upper-floor, special-use areas, such as restaurants, bars, conference facilities, dealer floors, transfer bridges, etc, could significantly increase the required number of lifts.



Commercial Offices Typical Lift Requirements

Although shown below, the use of 13 person cars (or smaller) is not recommended.

Full DDA compliance is achieved by the use of 17 person cars with internal dimensions of 2000mm wide x 1400mm deep.

Transportation planning advice should be sought. Additionally, car parking areas are best served with separate shuttle lifts to the main lobby.

For higher rise, mixed use, multiple entrance floors, very large floor plates etc then preliminary Vertical

Number of lifts required for the size of the building

Number of floors served (with typical net area per floor 1500m²)

	2	3	4	5	6	7	8	9	10	11-15	16-20	21-25	26-30	31-35	36-40
13	1-2	2	2	2-3	3	Consider Larger Cars									
17	1-2	2	2	2-3	3	3-4	4	4-5	5	5-6	7-8	Larger Cars Required			
21	0	2	2	2-3	3	3-4	4	4-5	5	5-6	7-8	8-10	10-12	12-14	14-16
26	0	2	2	2-3	3	3-4	4	4-5	5	5-6	7-8	8-10	10-12	12-14	14-16
33	Exceptional Case														

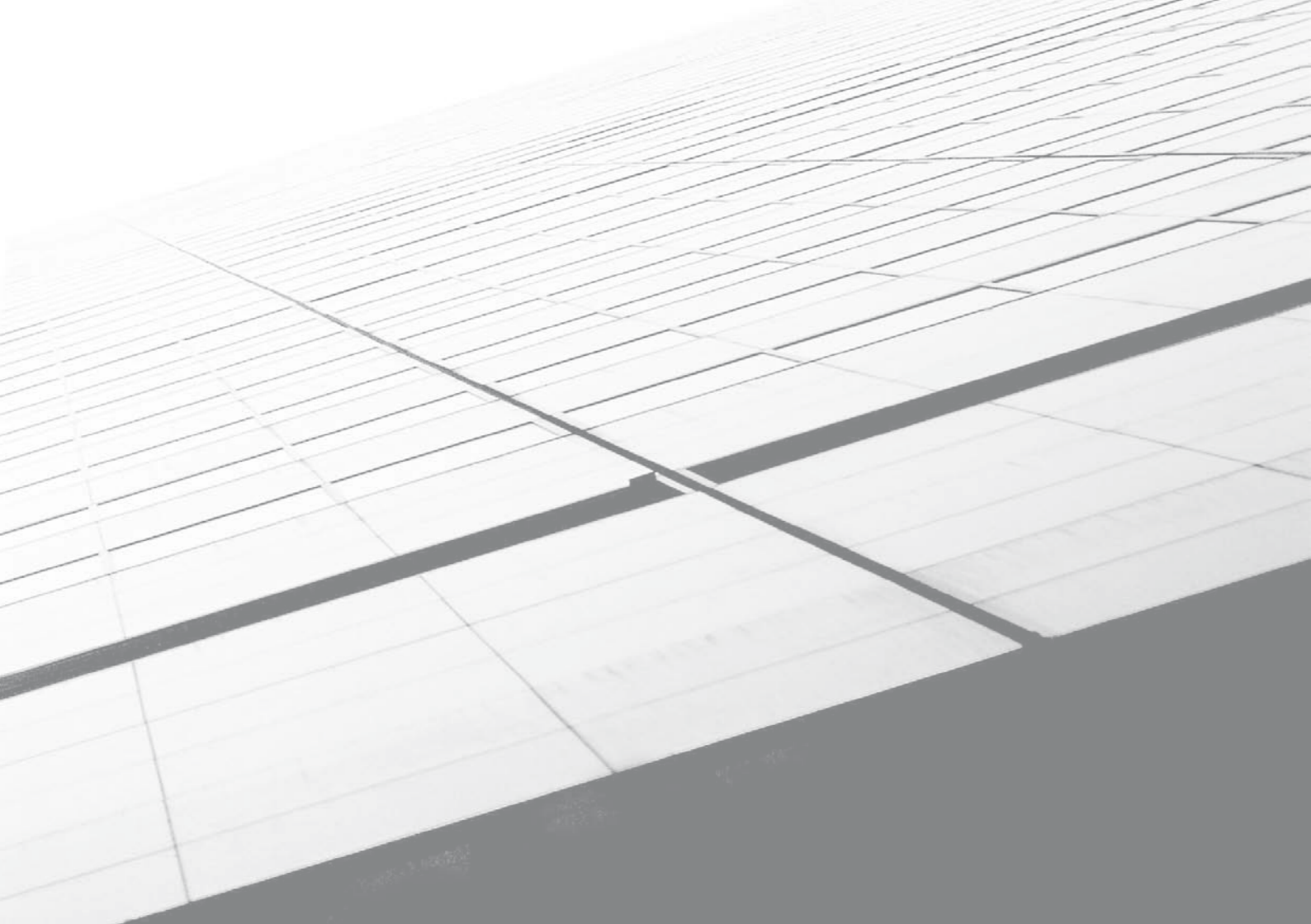
Low Population 1 : 14

High Population 1 : 10

Normal Population 1 : 12

Very High Population ≥1 : 8

Split into different banks High and Low etc



Residential Buildings

The target market determines the performance expectations. Luxury developments demand higher performance but usually have lower building populations.

Developments for the normal or low income market have lower expectations but higher populations.

Generally, these factors offset one another and therefore a similar number of lifts would be required for the building regardless of the target market.

Type	Interval (s)	Handling Capacity
Low Income	50 – 70	5 – 7%
Normal	50 – 60	6 – 8%
Luxury	48 – 50	8%

Interval is defined as the time between successive lift arrivals at the main floor.

Typical Lift Requirements

Rules of Thumb

- Generally, allow one lift for every 90 units with a maximum distance of 50m from lifts to the most distant unit.
- Urban locations or high-price units may require one lift for every 60 units.
- Make at least one lift suitable to accommodate furniture. A 13 person car with dimensions of 1100mm wide x 2100 deep is the minimum size recommended for this purpose.
- Buildings >3 – 4 floors should ideally have at least 2 lifts to provide resilience.

Number of lifts required for the size of the building

		Number of upper floors served								
		2	3	4	5	6 – 7	8 – 9	10 – 14	15 – 20	21 – 30
Type	Low Income	1	1	1	1-2	2	2	2	2	2
	Normal	1	1	1-2	2	2	2	2-3	2-3	3-4
	Luxury	1	1	2	2	2	2	2-3	2-3	3-4

- Low Income
- Normal
- Luxury

Hotels

Based on an occupancy of between 1.5 – 1.9 persons/ room and an arrival rate per 5 mins of between 10 – 15% of the building population, the expected interval would be between 30 & 50 seconds depending on the quality of the hotel.

Rules of Thumb

- Typically, for a medium quality hotel, provide one lift for every 100 guests with a minimum of one lift up to three floors.
- Do not exceed 40 – 60m from the farthest room to the lift.
- For cleaning and room service provision, allow for one separate service lift for every two passenger lifts.
- Conference facilities, meeting rooms, bars and restaurants or lobby areas above (or below) the entry level can increase the number of lifts and consideration should be given for a separate provision.

Car sizes for hotels should be a minimum of 17 persons, for DDA compliance, passenger comfort and to cater for guest luggage.



Schools and Colleges

Population densities can be very high with several peak periods during the day. Calculating the number of lifts based on moving this population would prove onerous and would have a high capital cost.

Lift provision for these buildings is therefore primarily limited to those who need to use lifts and for goods transport. Lifts should therefore be sized and positioned accordingly following stakeholder involvement.

Healthcare

Lifts are essential for healthcare facilities >1 level. Consideration should be given to the requirement for general passenger lifts, bed lifts & goods lifts.

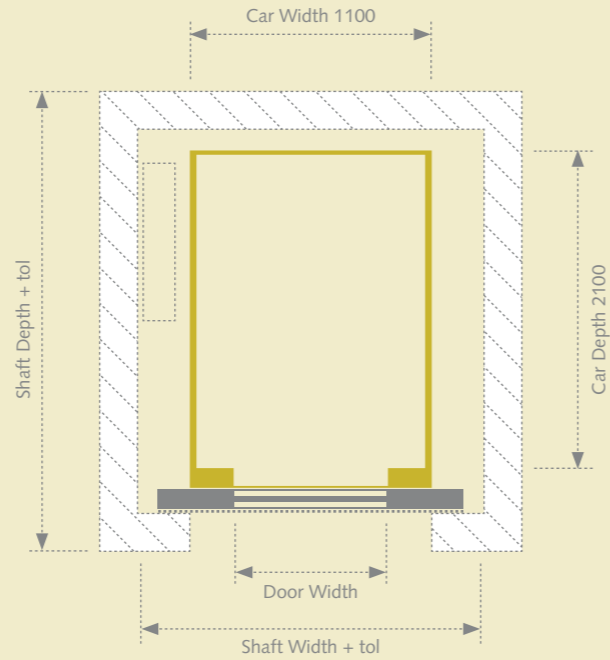
Planning for lifts must include provision for redundancy so lifts are usually located in pairs or greater numbers. The NHS has specific guidelines for lifts.

Deep Car Arrangement

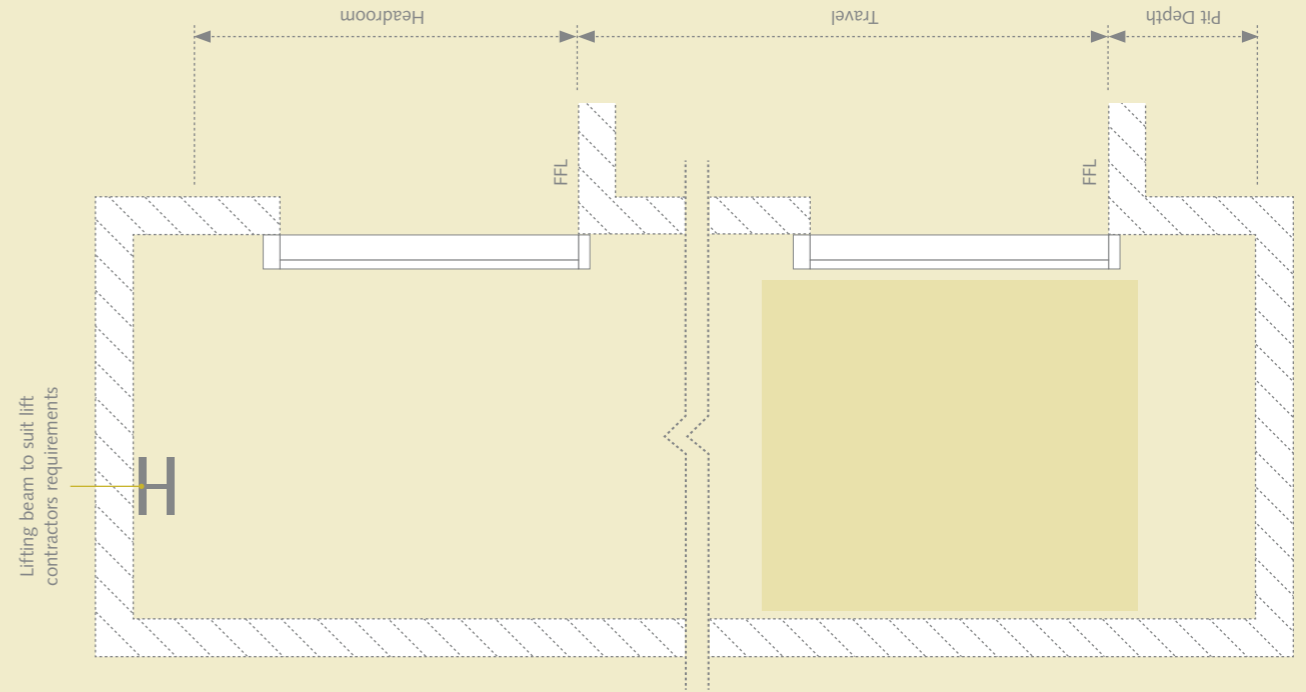
Shaft Plan 13 Person 1000kg

13 Person 1000kg deep car with centre opening doors					
Speed m/s	Door Width	Shaft Width	Shaft Depth	Headroom*	Pit Depth
1.0	800	1800	2550	3800	1600
	900	2000			
	1000	2200			
	1100	2400			
1.6	800	1800	2550	4000	1700
	900	2000			
	1000	2200			
	1100	2400			
2.0	800	1800	2550	4350	2000
	900	2000			
	1000	2200			
	1100	2400			

Typical Dimensions



Shaft Elevation



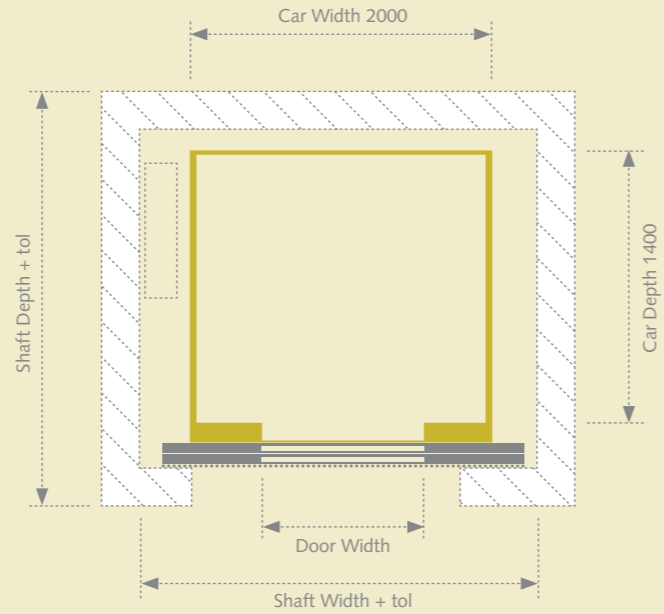
*Based on car height of 2200mm
All dimensions shown are in mm and are generic, actual dimensions may vary between manufacturer

Wide Car Arrangement

Shaft Plan 17 Person 1275kg

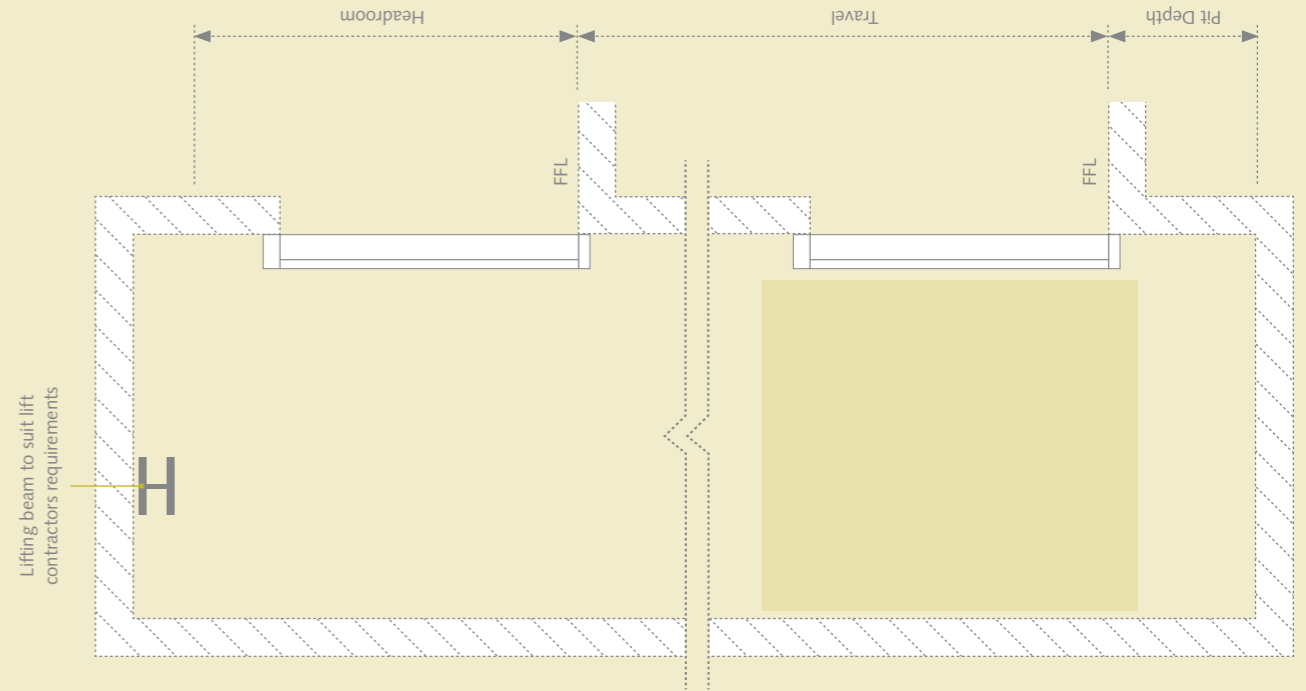
17 Person 1275kg wide car with centre opening door					
Speed m/s	Door Width	Shaft Width	Shaft Depth	Headroom*	Pit Depth
1.0	1000	2750	2000	3800	1600
	1100				
1.6	1000				
	1100				
2.0	1000				
	1100				

Typical Dimensions



*Based on car height of 2200mm
All dimensions shown are in mm and are generic, actual dimensions may vary between manufacturer

Shaft Elevation

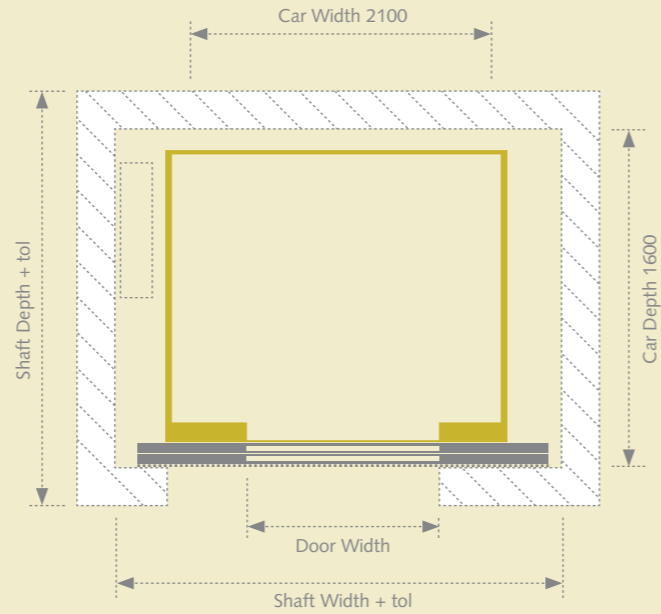


Standard Car Arrangement

Shaft Plan 21 Person 1600kg

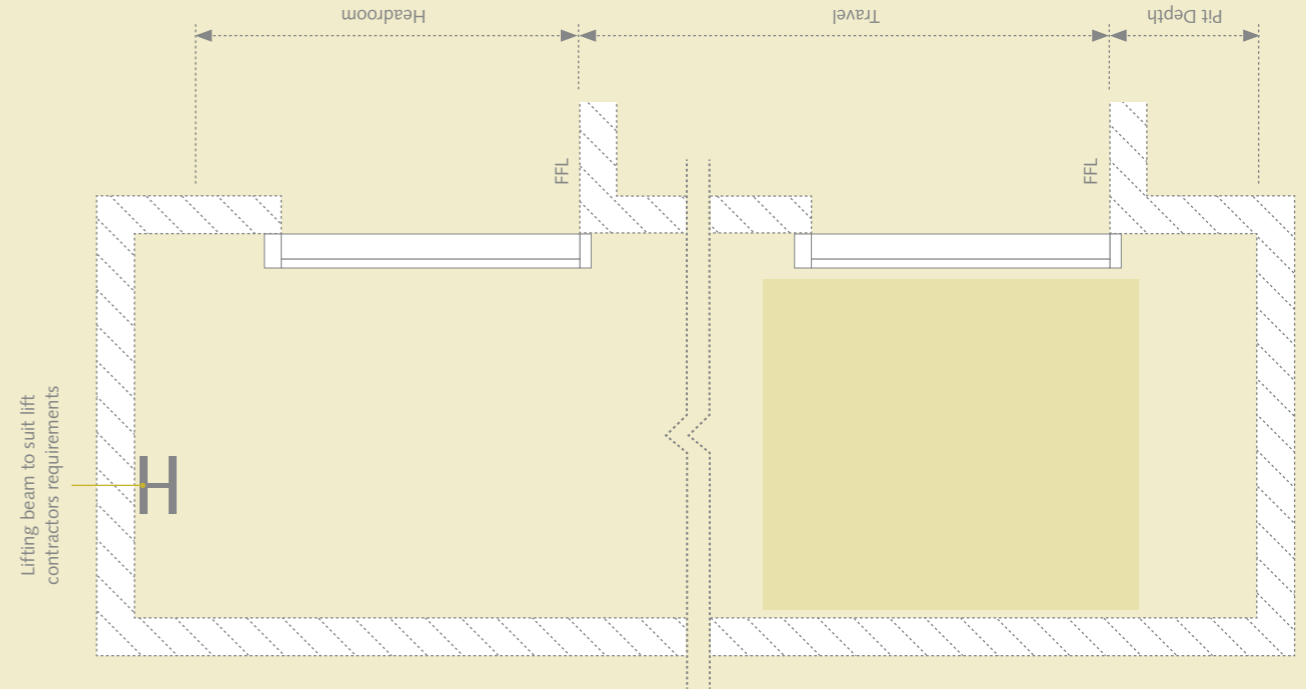
21 Person 1600kg wide car with centre opening door					
Speed m/s	Door Width	Shaft Width	Shaft Depth	Headroom*	Pit Depth
1.0	1000	2800	2150	3800	1600
	1100				
1.6	1000	2800	2150	4000	1700
	1100				
2.0	1000	2800	2150	4350	2000
	1100				

Typical Dimensions



*Based on car height of 2200mm
All dimensions shown are in mm and are generic, actual dimensions may vary between manufacturer

Shaft Elevation





Builders and Electrical Work

In the initial stages of building design, the following must be planned for:

- Shaft construction noting structural requirements
- Shaft tolerance to be +25/-0mm
- Shaft temperature to be maintained between +5 and 40 degrees centigrade
- Permanent 3 phase, 50Hz, 240v power supply terminating in a lockable isolator (typically located on top floor served)
- Dedicated telephone line for each lift
- Lighting levels on the lobby by the controller to be 200 lux

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