Hinge Guide & BS EN 1935 Classification

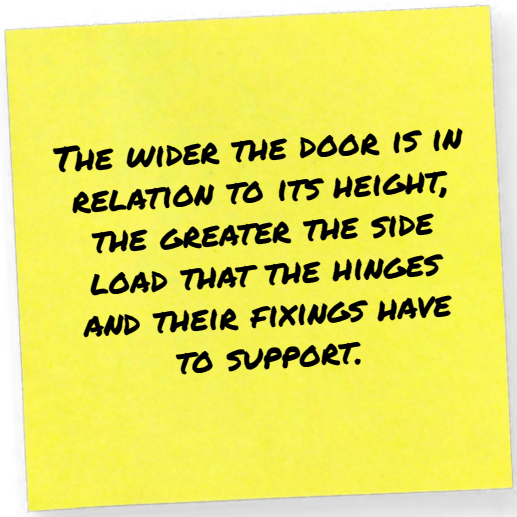
When selecting and specifying hinges, there are various factors to consider:

- Is it a fire, smoke or emergency escape door?
- What is the size and weight of the door?
- Is it an internal or external door; is it near the coast or a swimming pool?
- Is it to be used in an office environment with minimal use or for higher volume traffic such as a hospital, school or shopping centre?
- Is there any other door hardware to be fitted that may affect performance (ie door closer, door stops).
- When fitted to a fire or escape door, hinges must be CE marked to EN 1935

FORCES OPERATING ON A DOOR

There are two main forces that the hinge has to cope with. The vertical load; and, as hinged doors are sidehung, the horizontal or lateral load.

- The **vertical** load is a direct result of the gross door weight.
- The **horizontal** load is created by:
  - The door weight
  - The door height to width ratio
  - Where the hinges are positioned.



ADJUSTED DOOR WEIGHT

Hinge specification is also determined by the adjusted door weight. We recommend wherever possible to refer to the actual weight supplied by the door manufacturer.

Adjusted Door Weight Calculation Table		
Actual door weight	Doors of excess width, please refer to Side Loading Calculation table	= Adjusted door weight
	Door Closer + 20%	
	Door Closer (backcheck) +75%	
	Extra Heavy Use +10% Light Use -10%	

HINGES FOR USE WITH DOORS OF EXCESS WIDTHS

Wider doors obviously increase the pressure and bending moment exerted on the hinge. This must be allowed for by reduction in the maximum mass of the door leaf supported by each grade of hinge.

The factors by which the door mass has to be adjusted for excessive widths of door are calculated by dividing the door height by its width. For a factor of 2 or greater, no allowance has to be made. When the factor is less than 2, the door mass has to be increased by the value required to bring the factor to 2 expressed as a percentage.

These percentages are shown in the side loading calculations table shown here:

Side Loading Calculations			
Door size		**Factor**	**Normal increase of mass of door leaf %**
Door Height (mm)	Door Width (mm)		
2000	1000	2.00	0
2000	1050	1.90	10
2000	1100	1.82	18
2000	1150	1.74	26
2000	1200	1.66	33
2000	1250	1.60	40

LOCATING THE HINGES

It is usual for at least three hinges to be fitted on doors; their positioning is determined by the size, weight and construction of the door and its intended use. Hinges should be fitted to fire doors within the position recommended by the fire door manufacturer.

The most common fixing positions are shown here:

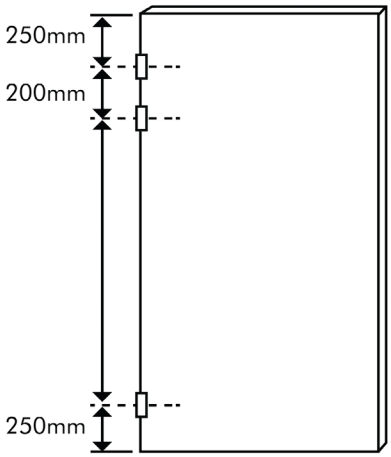


Fig 1.

STANDARD DOORS
The standard positioning when fitting three hinges to a door. This gives the most effective load bearing capability.

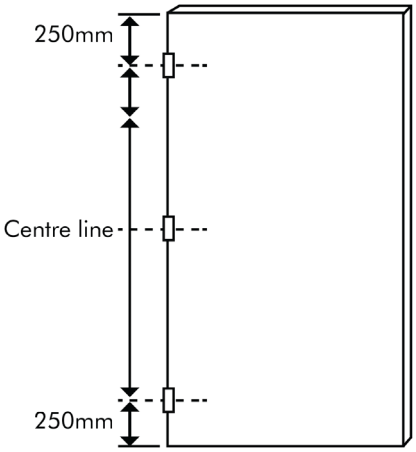


Fig 2.

LIGHTWEIGHT DOORS
Three hinges may be fitted as shown. On doors subject to warping (such as glazed doors), fit a third hinge at the centre of the door.

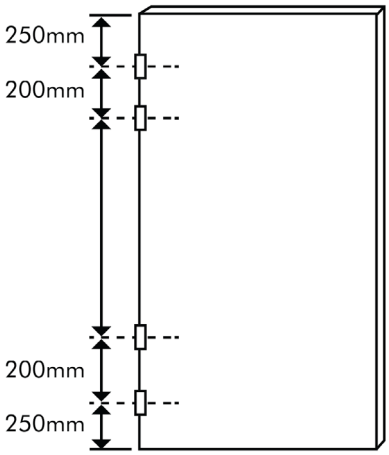


Fig 3.

HEAVY DOORS
When load bearing is the prime consideration, fit four hinges as shown.

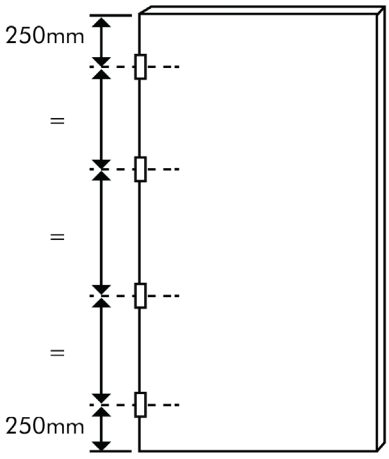


Fig 4.

TALL DOORS (OVER 2100mm)
On all door or those which are particularly subject to warping (such as glazed doors) fit four hinges equally spaced, as shown.

Standard positioning

BS EN 1935 classifies hinges using an digit coding system. A similar classification applies to all building hardware product standards so that complementary items of hardware can be specified to, for instance, a common level of corrosion resistance, category of use, etc. Each digit refers to a particular feature of the product measured against the standards performance requirements.

Digit 1 – Category of use
Four grades are identified:
- Grade 1: Light Duty
- Grade 2: Medium Duty
- Grade 3: Heavy Duty
- Grade 4: Severe Duty

Digit 3 – Door mass and closing force
Eight door mass grades are identified:
- Grade 0: 10kg
- Grade 1: 20kg
- Grade 2: 40kg
- Grade 3: 60kg
- Grade 4: 80kg
- Grade 5: 100kg
- Grade 6: 120kg
- Grade 7: 160kg

Digit 5 – Safety
Single-axis hinges are required to satisfy the essential requirements of safety in use. Therefore, only one grade is identified

Digit 6 – Corrosion resistance
Five grades are identified:
- Grade 0: No defined corrosion resistance
- Grade 1: Mild resistance
- Grade 3: Moderate resistance
- Grade 4: Very high resistance

Digit 7 – Security
Two grades are identified:
- Grade 0: not suitable for burglar resistant door assemblies
- Grade 1: suitable for applications requiring a degree of security

4	7	7	1	1	4	0	14

Digit 2 – Durability
Three grades are identified:
- Grade 3: 10,000 test cycles, for light duty hinges on windows only
- Grade 4: 25,000 test cycles, for light duty hinges on windows and doors
- Grade 7: 200,000 test cycles, for medium, heavy and severe duty hinges on doors only

Digit 4 – Fire resistance
Two grades are identified for single-axis hinges:
- Grade 0: not approved for use on fire/smoke door assemblies
- Grade 1: suitable for use on fire/smoke door assemblies tested to BS EN 1634-1 etc.

Digit 8 – Hinge grade
Fourteen grades are identified:

HINGE GRADE	USAGE	TEST CYCLES	DOOR MASS
1	Window	10,000	10kg
2	Window	10,000	20kg
3	Window/Door	25,000	20kg
4	Door	200,000	20kg
5	Window	10,000	40kg
6	Window/Door	25,000	40kg
7	Door	10,000	40kg
8	Window	25,000	60kg
9	Window/Door	200,000	60kg
10	Door	200,000	60kg
11	Door	200,000	80kg
12	Door	200,000	100kg
13	Door	200,000	100kg
14	Door	200,000	100kg

POOLE WAITE

HINGE CLASSIFICATION

Category of use: severe duty	Door mass 160kg	Safety	Not suitable for burglar resistant assemblies
4	7	7	1	1	4	0	14
Test cycles 200,000	Suitable for fire/smoke doors	Corrosion resistance: very high	Hinge grade