

Technical considerations

Normally, three hinges are fitted to each door. Their positions are determined by the weight of door and its resistance to warping or whipping.

Adjusted door weight calculation table			
Actual door weight	Doors of excess width, please refer to side loading calculation table		Actual 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 below.

Side loading calculations			
Door size		Factor	Normal increase of mass of door leaf %
Door height	Door width		
2000mm	1000mm	2	0
2000mm	1050mm	1.9	10
2000mm	1100mm	1.82	18
2000mm	1150mm	1.74	26
2000mm	1200mm	1.66	33
2000mm	1250mm	1.6	40

Standards and certification

BS EN1935 Single Axis Hinges

This European standard specifies requirements for single-axis hinges for windows and doors opening in one direction only, whose rotation axis is no more than 30 mm from the face of the sash or door. It covers both fixed pin and lift-off hinges, and contains additional requirements for hinges intended for use on fire doors.

BS EN 1935:2002 classifies door furniture by using an 8-digit coding system. Each digit refers to a particular feature of the product measured against the standard's performance requirements.

1

Digit 1 – Category of use

Four categories of use are identified:

- grade 1: light duty
- grade 2: medium duty
- grade 3: heavy duty
- grade 4: severe duty

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Digit 2 – Durability

Three grades are identified for single-axis hinges manufactured to this European standard:

- 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

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Digit 3 – Test door mass

Eight door mass grades related to single-axis hinges are identified in this European standard as shown in table below.

Test door mass grade	Door mass
0	10 kg
1	20 kg
2	40 kg
3	60 kg
4	80 kg
5	100 kg
6	120 kg
7	160 kg

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Digit 4 – Suitability for fire/smoke door use

Two grades of suitability are identified for single-axis hinges:

- grade 0: not suitable for fire/smoke resistant door assemblies
- grade 1: suitable for fire/smoke resistant door assemblies subject to satisfactory assessment of the contribution of the single axis hinge to the fire resistance of the specified fire/smoke door assemblies.

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Digit 5 – Safety

Single-axis hinges are required to satisfy the essential requirements of safety in use. Therefore, only grade 1 is identified.

6

Digit 6 – Corrosion resistance

Five grades of corrosion resistance are identified in accordance with BS EN 1670:2007

- grade 0: no defined corrosion resistance
- grade 1: mild resistance
- grade 2: moderate resistance
- grade 3: high resistance
- grade 4: very high resistance

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Digit 7 – Security

Two grades of security are identified for single-axis hinges:

- grade 0: not suitable for use on burglar-resistant door assemblies
- grade 1: suitable for applications requiring a degree of security.

Annex C of this European standard details the hinge grade to use for the level of security required.

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Digit 8 – Hinge grade

Fourteen grades are identified in this European standard and are detailed in the table below. The full classification is shown in the standard.

Hinge Grade	Usage	Text Cycles	Door Mass
1	Window	10,000	10 kg
2	Window	10,000	20 kg
3	Window/Door	25,000	20 kg
4	Door	200,000	20 kg
5	Window	10,000	40 kg
6	Window/Door	25,000	40 kg
7	Door	200,000	40 kg
8	Window	10,000	60 kg
9	Window/Door	25,000	60 kg
10	Door	200,000	60 kg
11	Door	200,000	80 kg
12	Door	200,000	100 kg
13	Door	200,000	120 kg
14	Door	200,000	160 kg