

Wheels and castors guide

Classification of wheels and castors

International standards divide wheels and castors into the following categories:

- light-duty wheels and castors
- wheels and castors for transport equipment
- heavy-duty wheels and castors

Each of these are used for different applications and are subject to different test conditions.



Blickle light-duty wheels and castors

Light-duty wheels and castors and compact castors are normally used indoors. They are designed to handle speeds of up to 3 km/h. They have a load capacity of up to 280 kg (light-duty wheels and castors) or 1,750 kg (compact castors). They maximise manoeuvrability and smooth rolling performance while reducing rolling resistance. They are typically used for medical equipment, display stands, industrial kitchen equipment and similar applications.

The load capacity of Blickle light-duty wheels and castors and compact castors is tested on a rotating bench in accordance with DIN EN 12530 / ISO 22881

The main test conditions:

- speed: 3 km/h
- temperature: +15 °C to +28 °C
- hard, horizontal surface with obstacles with a height equal to 3 % of the wheel diameter
- test duration: the number of times that obstacles are crossed is equivalent to ten times the wheel diameter (in millimeters)
- rest time: max. 3 minutes after 3 minutes running time

Blickle wheels and castors for transport equipment

Wheels and castors for transport equipment are used for indoor and outdoor industrial applications. They are designed to handle speeds of up to 4 km/h. They have a load capacity of up to 1,000 kg. Wheels and castors for transport equipment are resistant to environmental factors, largely maintenance-free and capable of functioning properly for long periods. They are typically used for machinery and equipment of all kinds, in addition to pallets, scaffolding, waste containers and the like.

The load capacity of Blickle wheels and castors for transport equipment is tested on a rotating bench in accordance with DIN EN 12532 / ISO 22883.

The main test conditions:

- speed: 4 km/h
- temperature: +15 °C to +28 °C
- hard, horizontal surface with obstacles at the following height:
 - 5 % of wheel diameter for wheels with soft tread (hardness < 90 Shore A)
 - 2.5 % of wheel diameter for wheels with hard tread (hardness ≥ 90 Shore A)
- test duration: 15,000 revolutions with a minimum of 500 crossing obstacles
- rest time: max. 1 minute after 3 minutes running time

Blickle heavy-duty wheels and castors

Heavy-duty wheels and castors are used to handle heavy loads and / or high speeds. They are particularly strong in their design. Castors with two wheels (twin wheel castors) are also used in this area to handle particularly heavy loads. Spring-loaded castors are particularly suitable when there is a need to avoid vibration during transport. They are typically used on forklift trucks and industrial trucks, assembly and transport systems and similar equipment.

The load capacity of Blickle heavy-duty wheels and castors is tested on a rotating bench at a speed of 4 km/h in accordance with DIN EN 12532 / ISO 22883. Wheels and castors designed for higher speeds are tested for load capacity in accordance with DIN EN 12533 / ISO 22884.

The main test conditions according to DIN EN 12532 / ISO 22883:

- speed: 4 km/h
- temperature: +15 °C to +28 °C
- hard, horizontal surface with obstacles at the following height: 5 % of wheel diameter for wheels with soft tread (hardness < 90 Shore A) 2.5 % of wheel diameter for wheels with hard tread (hardness ≥ 90 Shore A)
- test duration: 15,000 revolutions with a minimum of 500 crossing obstacles
- rest time: max. 1 minute after 3 minutes running time

The main test conditions according to DIN EN 12533 / ISO 22884:

- speed: 6 km/h, 10 km/h, 16 km/h, 25 km/h (standard: max. 16 km/h)
- temperature: +15 °C to +28 °C
- hard, horizontal surface with obstacles at the following height:
 - 5 % of wheel diameter for wheels with soft tread (hardness < 90 Shore A)
 - 2.5 % of wheel diameter for wheels with hard tread (hardness ≥ 90 Shore A)
- test duration: the number of times that obstacles are crossed is equal to five times the wheel diameter (in millimeters)
- rest time: max. 1 minute after 3 minutes running time

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Load capacity

Dynamic load capacity

The load capacity listed for a wheel or castor is the load capacity which that wheel or castor was capable of withstanding when tested on a rotating bench in accordance with DIN EN 12527–12533 (ISO 22878–22884).

In order to determine the load capacity that a wheel or castor needs to have, it is important to know the dead weight of the transport equipment, the maximum additional weight and the number of supporting wheels or castors. When using four or more wheels or castors, the load on each individual wheel or castor may vary. The necessary load capacity is calculated as follows:

$$T = \frac{E+Z}{n} \times S$$

T = required load capacity per wheel or castor
 E = dead weight of the transport equipment
 Z = maximum additional weight
 n = number of supporting wheels or castors
 S = safety factor

Wheels and castors with ball bearings are capable of exceeding speeds of 4 km/h with a reduced load capacity.

Recommended safety factors for different applications

The safety factor S is used to account for deviations from the standard application conditions (smooth surface, walking speed of 4 km/h, equal load distribution, travelling straight, ambient temperature of between 15 °C and 28 °C). The safety factor is affected by the speed of movement and the ratio of wheel Ø to the height of the obstacle. There are four different categories (see table).

Safety factors do not take tread wear into consideration.

Determining safety factor S

	Transport	Environment	Height of the obstacle	Safety factor
	manual	indoors	< 5 % of wheel Ø	1.0–1.5
	manual	outdoors	> 5 % of wheel Ø	1.5–2.2
	motorized	indoors	< 5 % of wheel Ø	1.4–2.0
	motorized	outdoors	> 5 % of wheel Ø	2.0–3.0

Static load capacity

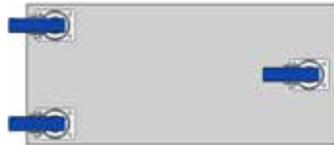
If a wheel or castor is exposed to mainly static loads, its static load capacity is tested in accordance with ISO 22878. One of the criteria that this test looks at is the extent to which the tread flattens after a specific period.

Information about the static load capacity of our products is available in our product data sheets. You can contact us directly to request them or download them from www.blickle.com.

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Manoeuvrability

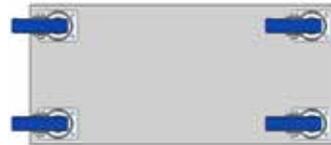
Castors must be positioned to meet requirements for the manoeuvrability and steering of units and machines. A number of different castor arrangements are described below.



Three swivel castors with identical mounting height

Suitable for small loads and narrow routes. The transport equipment is very easy to move in any direction. The transport equipment is relatively difficult to manoeuvre when travelling straight. This can be improved by fitting a directional lock to one of the three swivel castors. This castor arrangement can make the transport equipment more susceptible to tipping.

Load capacity	■ ■ ■ ■
Manoeuvrability	■ ■ ■ ■
When travelling straight	■ ■ ■ ■
Cornering	■ ■ ■ ■
Stability	■ ■ ■ ■



Four swivel castors with identical mounting height

Suitable for narrow routes. The transport equipment is very easy to move in any direction. The transport equipment is relatively difficult to manoeuvre when travelling straight. Attaching directional locks to two swivel castors can improve this situation.

Load capacity	■ ■ ■ ■
Manoeuvrability	■ ■ ■ ■
When travelling straight	■ ■ ■ ■
Cornering	■ ■ ■ ■
Stability	■ ■ ■ ■



Two swivel and fixed castors with identical mounting height

Most common castor arrangement, suitable for towing. The transport equipment is easy to manoeuvre when cornering and moving in a straight line. The transport equipment is relatively difficult to manoeuvre in tight spaces. The fixed castor can be replaced with a wheel set, i.e. two wheels on an axle.

Load capacity	■ ■ ■ ■
Manoeuvrability	■ ■ ■ ■
When travelling straight	■ ■ ■ ■
Cornering	■ ■ ■ ■
Stability	■ ■ ■ ■



Four fixed castors, with the central castors having a slightly higher mounting height

Cost-effective castor arrangement. The transport equipment is easy to manoeuvre when moving in a straight line. Arranging the load over the central fixed castors makes the transport equipment relatively easy to steer and rotate on the spot. This castor arrangement can make the transport equipment more susceptible to tipping and swinging. The central fixed castors can be replaced with a wheel set, i.e. two wheels on an axle.

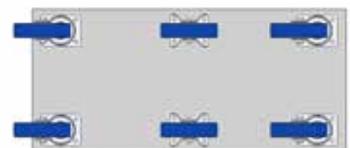
Load capacity	■ ■ ■ ■
Manoeuvrability	■ ■ ■ ■
When travelling straight	■ ■ ■ ■
Cornering	■ ■ ■ ■
Stability	■ ■ ■ ■



Two swivel and two fixed castors, with the fixed castors having a slightly higher mounting height

Suitable for towing. The transport equipment is easy to manoeuvre when cornering and moving in a straight line and rotates easily on the spot. This castor arrangement can make the transport equipment more susceptible to tipping and swinging. We recommend using swivel castors with spring-loaded castors. The central fixed castors can be replaced with a wheel set, i.e. two wheels on an axle.

Load capacity	■ ■ ■ ■
Manoeuvrability	■ ■ ■ ■
When travelling straight	■ ■ ■ ■
Cornering	■ ■ ■ ■
Stability	■ ■ ■ ■



Four swivel castors and two fixed castors with identical mounting height

Complicated castor arrangement, suitable for towing. The transport equipment is easy to manoeuvre when cornering and moving in a straight line and rotates easily on the spot. It is particularly well suited for heavy loads and long units. Constant surface contact of the fixed castors is required for manoeuvrability. The central fixed castors can be replaced with a wheel set, i.e. two wheels on an axle.

Load capacity	■ ■ ■ ■
Manoeuvrability	■ ■ ■ ■
When travelling straight	■ ■ ■ ■
Cornering	■ ■ ■ ■
Stability	■ ■ ■ ■