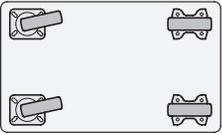
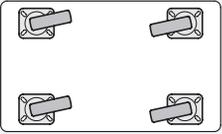
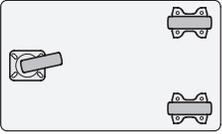
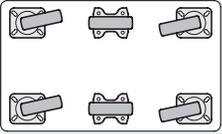
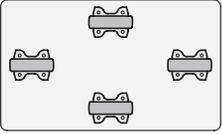
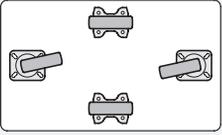


## Maneuverability

Maneuverability is the ability of a cart to be moved more or less easily during use. Production halls with limited space or winding paths require good maneuverability to make the operator's work easier.

In general, swivel brackets allow for easy direction changes, while rigid brackets ensure good directional stability. Rigid brackets must be mounted parallel to each another to avoid distortion.

The table shows the most frequently used arrangements and their features.

| Diagram                                                                             | Caster arrangement                                                                         | Special features                                                                                                                                                         | Application examples                                                                            |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|    | 2 swivel casters,<br>2 rigid casters,<br>identical height                                  | + Most common arrangement<br>+ Good directional stability<br>+ Good cornering<br>- Poor maneuverability in tight spaces                                                  | Workshops,<br>warehouses                                                                        |
|    | 4 swivel casters,<br>identical height                                                      | + Good steering ability<br>+ Can be turned on the spot<br>+ Good maneuverability in tight spaces<br>- Poor straight travel                                               | Supermarkets,<br>industrial plants,<br>logistics centers                                        |
|   | 1 swivel caster,<br>2 rigid casters,<br>identical height                                   | + Inexpensive<br>+ Good steering ability<br>+ Can be turned on the spot<br>+ Good maneuverability in tight spaces<br>- Poor directional stability<br>- Tends to tip over | Small carts,<br>light loads                                                                     |
|  | 4 swivel casters,<br>2 rigid casters,<br>identical height                                  | + Good for heavy loads<br>+ Good load distribution for long equipment<br>+ Good steering ability<br>+ Can be turned on the spot<br>- High cost                           | Parcel<br>distribution,<br>postal service,<br>train stations,<br>heavy loads,<br>long equipment |
|  | 4 rigid casters,<br>the middle rigid casters<br>have a higher overall<br>height            | + Inexpensive<br>+ Good directional stability<br>+ Good steering ability<br>- Tends to tip over                                                                          | Assembly lines,<br>industrial carts                                                             |
|  | 2 swivel casters,<br>2 rigid casters,<br>the rigid casters have a<br>higher overall height | + Good directional stability<br>+ Can be turned on the spot<br>- Tends to tip over                                                                                       | Workshops,<br>warehouses,<br>long material<br>carts                                             |



## Static Load Capacity

The static load capacity is the maximum load that can be supported by a stationary wheel or caster without causing permanent deformation that impairs its functionality. A wheel mounted on a device that is rarely moved and therefore almost always remains in the same position is defined as statically loaded.

## Dynamic Load Capacity

The dynamic load capacity of a wheel or caster is the maximum load that it can withstand based on the test procedure as per ISO 22878 – 22884 (DIN EN 12527 – 12533).

The load capacities specified in the standard sheet refer to the dynamic load capacities. The most important test conditions are listed in the table.

| Test conditions     | Light duty casters                                        | Medium duty casters / Heavy duty casters                                                                                                       | Heavy duty casters                                       |
|---------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Standard            | ISO 22881:2004<br>DIN EN 12530                            | ISO 22883:2004<br>DIN EN 12532                                                                                                                 | ISO 22884:2004<br>DIN EN 12533                           |
| Test load           | Rated load capacity                                       |                                                                                                                                                |                                                          |
| Test speed          | 1.86 mph                                                  | 2.49 mph                                                                                                                                       | 3.73 mph, 6.21 mph, 9.94 mph                             |
| Temperature range   | 59 °F to 82.4 °F (+15 °C to +28 °C)                       |                                                                                                                                                |                                                          |
| Floor               | Hard and horizontal floor with obstacles                  |                                                                                                                                                |                                                          |
| Obstacle height     | 3% of the wheel diameter                                  | -5% of the wheel diameter with soft tread<br>(hardness < 90 Shore A)<br>-2.5% of the wheel diameter with hard tread<br>(hardness ≥ 90 Shore A) |                                                          |
| Number of obstacles | Number of obstacles corresponds to 10x the wheel diameter | 500 obstacles                                                                                                                                  | Number of obstacles corresponds to 5x the wheel diameter |
| Test cycle          | 3-minute operating time; followed by max. 3-minute break  | 3-minute operating time; followed by max. 1-minute break                                                                                       |                                                          |
| Test duration       | Overcoming of all obstacles                               | 15,000 wheel rotations and overcoming of 500 obstacles                                                                                         | Overcoming of all obstacles                              |

## Recommended Ergonomic Maximum Load

The recommended ergonomic maximum load is determined by exerting a pulling or pushing force of 45 lbf (200 N) on a four-wheeled cart (44 lbf (200 N) / 4 = 11 lbf (50 N) per wheel) and measuring the maximum transportable load per wheel at a constant speed of 2.49 mph.

The applied drive force of 44 lbf (200 N) corresponds to the international workplace standard for moving carts indoors and is generally recognized as the limit of the load that a person can withstand over a longer period of time without signs of fatigue.

## Calculation of the Load Capacity per Wheel

To determine the required load capacity of a wheel or caster, the maximum applied load must be added to the empty weight of the cart, then this sum is divided by the number of wheels. For a cart with 4 wheels, however, the total load capacity should generally be divided by 3, as not all wheels will carry the load equally, e.g. due to uneven floors or uneven load distribution.

The formula for calculating the required load capacity is as follows:

$$W = \frac{G + Z}{n}$$

W = Required load capacity per wheel or caster  
 G = Empty weight of the cart  
 Z = Maximum applied load  
 n = Number of supporting wheels or casters