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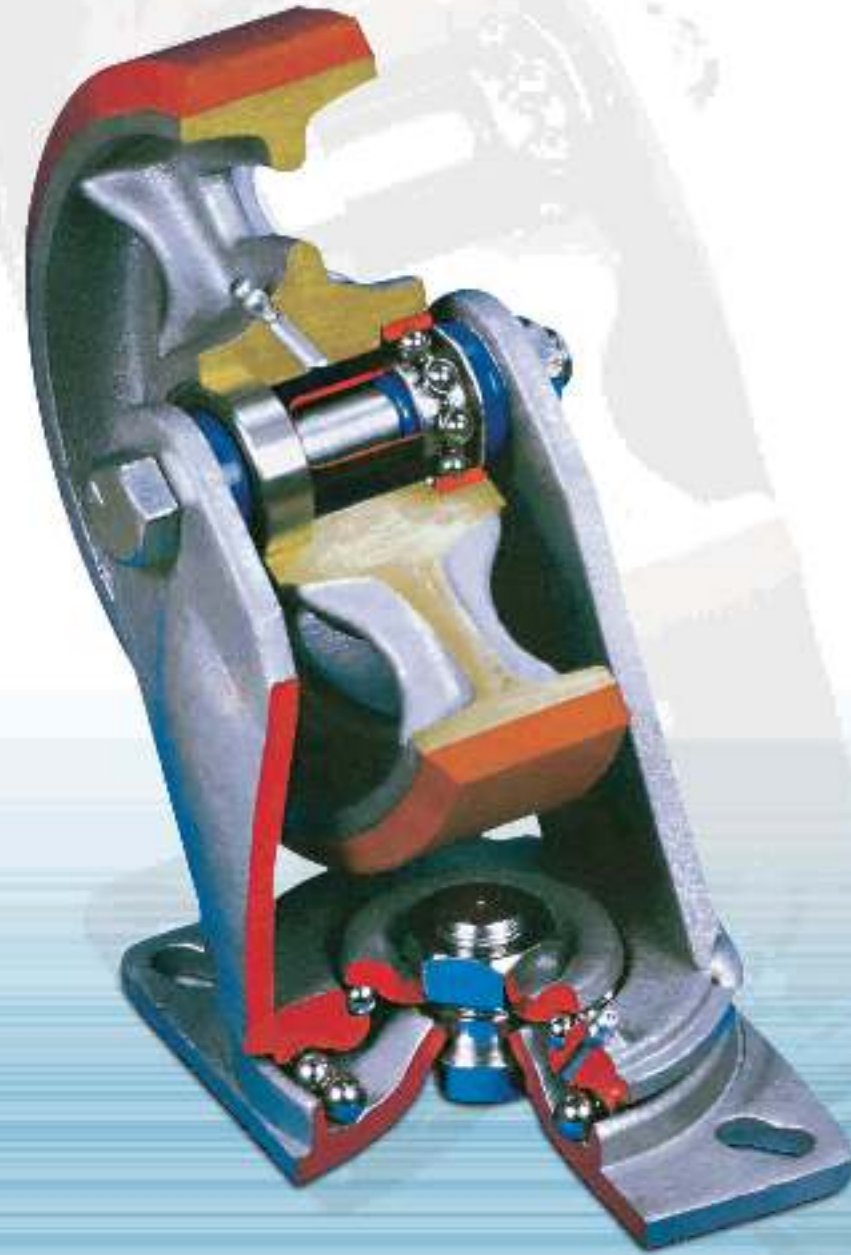


KAMA PRES SANAYİ ve TİCARET A.Ş.

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KAMA®



WHEELS AND CASTORS GUIDE



wrong choice,
wrong loading

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WHEELS AND CASTORS GUIDE

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product information

Please consider the supplied information carefully.
If you deviate from which is written in your use of the product you may release the manufacturer from their liability.
This information refers to castors and wheels, particularly to swivel castors which are used on non-powered equipment at a speed not exceeding walking pace and not being under continuous motion.
They can be divided into the following categories.

- Domestic Purposes : (e.g. furniture)
- General Services : (e.g. shopping trolleys, office equipment, hospital bed, patient trolleys)
- Industrial Purposes : Transport equipment (including medium and heavy duty load bearing capacities)

Our products will give a long and trouble free life if the following points are adhered to:

- Correct and secure fitting to the article.
- The fixing position must have adequate strength.
- The function of the castor must not be changed by the fixing.
- The swivel action axle must be vertical at all times.
- If all swivel castors are used then they must be common to each other.
- If fixed castors are used together with swivel castors then all castors must be compatible and as recommended by the factory.

Where castors are used in areas of outdoors, coastal areas, corrosive and aggressive areas, then special products may have to be specified.
For use in temperatures below 5°C and above 30°C the efficiency of the castor can be influenced. When selecting a castor it is necessary to consider all aspects of the symbol chart as published.



Misuse:

The definition of misuse is as follow.

- Overloading
- Unsuitable flooring
- Failure to release breke
- Excessive temperatures
- Exposure to caustic substances
- Ingression of foreign objects into wheel treads
- Excessive speed
- Excessive shock

Product Capacity:

Should the user can not find a product available to their purpose in the catalogues, then any new castor or wheel designed for the particular application has to be fully agreed with the factory.

Maintenance:

- Greasing the axle and swivel bearings
- Retightening axles and king pin
- Should any cleaning agents be used then these agents should not contain corrosive or grinding elements.

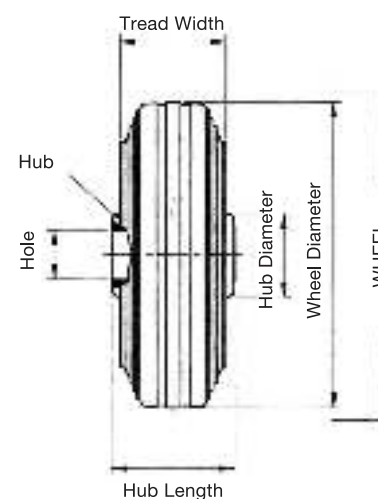
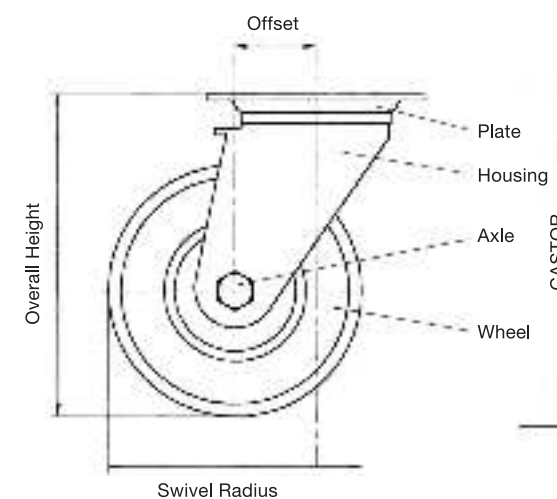
User Guide:

This manufacturer guide is available and when required the factory and resellers should ensure that the customer is supplied with necessary information.
The copies of this manufacturer guide can be ordered from the castor factory for distribution to the user.



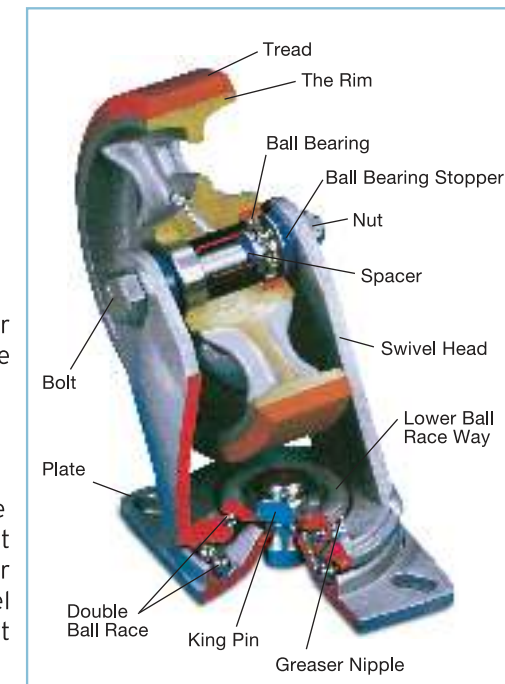
castor terminology

- Overall Height** : The vertical distance between the floor and the mounting point of the equipment.
- Offset** : The horizontal distance between vertical center lines through the king pin and the wheel center.
- Swivel Radius** : The horizontal distance from the vertical center line of the king pin to the outside edge of the wheel tread. This dimension specifies the minimum distance required for the castor to swivel 360° when mounted.
- Dynamic Load** : The load imposed upon a castor or wheel while in motion.
- Static Load** : The load imposed upon a castor while it is stationary
- Impact Load** : A momentary load imposed upon a castor when a load is dropped on the equipment.
- Steering** : Steering is affected by the type of the wheel, tread and swivel. Swivel offset is a factor in ease of steering. Too short a distance will increase steering effort, but too much lead can reduce load capacity and may cause wobble.
- Rollability** : Rollability is the ease with which a wheel or a castor can be rolled. Rollability is affected by wheel size, type of tread and type of bearings. The larger the wheel, the easier it will roll. A hard narrow crowned tread rolls easier than a flat soft tread on a smooth floor. But may be hard on floors soft tread protect floors and pass over floor obstructions more easily.



castor parts and nomenclature

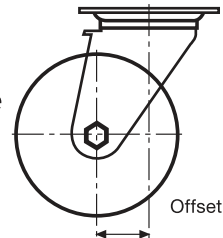
- Top Plate** : A horizontal plate for attaching a castor to equipment.
- Assembling Pin Or Bolt** : A bolt or a pin for attaching a castor to equipment. (for other mounting types see the front pages of the catalogue)
- King Pin** : (staked king pin or nut+bolt assembly) A threaded nut+bolt or staked assembly which holds the swivel assembly together. Threaded bolt also enables a precision assembly of the fork.
- Swivel Fork (Assembly)** : To an assembly of the Top plate with the fork. (sometimes without the top plate but only with upper and lower ball containers) Swivel fork assembly is an assembled part which we keep in stock before mounting the wheel.



- Single Level Ball Race** : A single row of balls in the raceway the series of Kama 1100-1200-1300-1600
- Double Ball Race** : Two rows of balls moving independently through two levels of ball races. All series of Kama except the above series.
- Upper Ball Cover** : The cover of the ball race on the top of the fork.
- Taper Roller Bearing** : A precision roller bearing mostly used on the lower part of the fork. (specially used for heavy duty constructions Ex: 5100 - 6700 series)
- Thrust Ball Bearing** : A precision roller bearing mostly used on top of the fork. (specially used for heavy duty constructions. Ex: 5100 - 6700 series)
- Mounting Bolt** : The bolt for assembling the wheel.
- Mounting Nut** : The nut for assembling the wheel.
- Spacer** : The pipe used as a spacer in constructing a double ball bearing wheel.
- Bearing Stopper** : Used to mount a double ball bearing wheel.
- Grease Nipple** : Greasing the upper and lower bearings.

technical information

- a) **Swivel Castors** : An assembly in which a housing containing a wheel is free to swivel 360° without restriction. About the vertical axis.
- b) **Fixed Castors** : An assembly housing a wheel which cannot swivel about its vertical axis.
- c) **Wheels** : A revolving centre rotating freely on an axle of which the external part (in contact with the ground) can be constituted by the material of the wheel itself or by various other materials.
- d) **Offset** : The horizontal distance between the centre of the wheel axle and the vertical axis of the swivel bearing.
- e) **Rolling (tractive) Resistance** : The effort required to move a piece of equipment litted with castors.



castor types

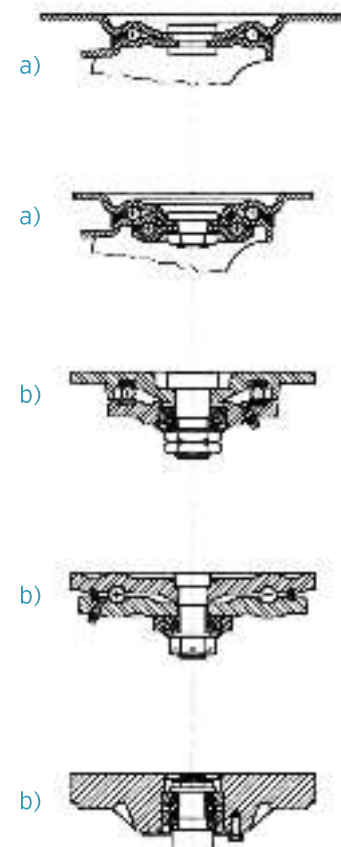
In general, castors can be sub-divided into two main types:

a) Pressed Steel:

Typical pressed steel type castors incorporate single and double ball race constructions. The balls run in tracks formed in the fork and top plate pressings which are accured together by a heavily riveted steel king pin.

b) Fabricated Steel: (extra heavy duty)

These usually consist of heavy steel forgings which are precision machined and house combinations of tapered roller bearings or ball races. The fork legs are securely welded to the body forging that is giving an extremely strong construction suitable for extra heavy loads.



castor usage

Castor applications can be divided into two main categories:

- a) Castors for use on trucks, trolleys, trailers etc. which one used as a means of transportation and moves regularly from one place to another.
- b) Castors litted to a machine another device to enable it to be delivered to the place it is used.

(a) In the case it is obviously essential that castors should have the lowest tractive resistance and should also be able to swivel freely so that the trolley can be manoeuvred without too much effort. To achieve this, wheels should be at least 125 mm diameter and preferably 150 mm or more regardless of the rated load capacity.

(b) In case of smaller castors may well be acceptable and are often used at their full rated capacity.

durability

CONSTRUCTION	DURABILITY	PRICE	CAPACITY
PRESSED OF THIN STEEL	xx	x	x
PRESSED OF MID-THICK STEEL	xxx	xx	xx
PRESSED OF THICK STEEL	xxx	xx	xxx
WELDED OF THICK STEEL	xxxx	xxxx	xxxx

* (xxxx) Upper-High, (xxx) High, (xx) Middle, (x) Low.

interpretation of catalogue load ratings:

Great care has been taken by KAMA in choosing ratings which will ensure satisfactory life, performance and ability to withstand reasonable abuse under normal conditions.

There are, however, many occasions when it is necessary to unde-rate castors to ensure the correct degree of mobility for the application.

When castors are fitted to a trolley which is used regularly for transportation of goods or products, it is necessary to specify a minimum of 150 mm wheel diameter and choose swivel heads for this type of application. When castors are to fitted to a piece of equipment for occasional movement, it is often possible to use quite small castors, provided they have sufficient load capacity according to the catalogue.



correct mounting of fixed and directional lock castors:

In accordance with the standard norms, top plate fixing holes have a working clearance of 1 mm for all bolts up to 12 mm and 2 mm for larger sizes. This accommodates minor positional errors in the manufacture of therolley but unfortunately also allows the castors to be misaligned to the point where drag and tyre wear could be excessive. It is therefore necessary to align the castors correctly before the bolts are finally tightened.

tractive resistance on wheels

For manual applications the choice of the correct wheel is very closely related to the effort which a man can exert. 18 kg is the generally accepted figure for moving from a standart start, but this must be reduced to 12 kg once the truck is on the move. A man is able to maintain this effort for reasonably shot distances, but for longer distances of travel he cannot be expected to maintain a force of more than 6 kg. In choosing the type of wheel to specify, the above figures relating to tractive resistance must be born in mind. The tractive resistance, which is usually expressed as a percentage of the total load carried, is dependent on a number of factors and will very for each application. I is impossible for KAMA to publish tractive resistance figures for particular applications.

Wheels are in the KAMA range can be divided into two main types

- a) Hard Treaded Wheels (tractive resistance is low)
- b) Soft treaded Wheels (tractive resistance is high)



soft treaded wheels

Soft treaded wheels, such as rubber or Polyurethane, give the ultimate in quietness and floor protection but introduce a penalty from the point of view of ease of movenet, as the tractive resistance or effort required to move them is generally up to three times greater than that of the equivalent size hard treaded wheels. Polyurethane, however, has the remarkable property of being able to carry loads approaching that of cast iron, and has a great resistance to tear and to abrasive wear. (Many times the life of the rubber). It also has a lower tractive resistance than the rubber for the same load end is impervious to mineral oils and greases. For many high load manual applications soft treaded wheels must be ruled out as although they may be capable of carrying a very high load the force required to move the equipment would require the efforts of several men. However, the quiet runnig and floor protecting properties of the resillient tread wheels make them particularly suitable for power towing applications.

hard treaded wheels

In the range of hard treaded wheels, it is usual to consider castors with the cast iron wheels as a basic standart, as these are generally the strongest and have the longest life, They are also certainly the easiest to push and in many cases will, therefore, be the first choice for maximum mobility.

They have the disadvantage, however, of being rather noisy and can sometimes cause excessive floor wear. As an alternative to cast iron, injection moulded solid nylon wheels have been developed. Nylon is unaffected by water and its use in the wet further enhances its self-lubricating properties. The load capacity of nylon approaches that of cast iron and these wheels also have the additional advantages of being quiet running, light in weight and almost incapable of damaging floors. They can be used in the temperature range -40°C to 80°C, although it may be necessary to devote the load capacity of the wheels by upto 25% for very arduous conditions. For higher temperature applications reinforced phenolic wheels are also available.

soft treaded wheels



Rubber
Tired
Plastic
Centre



Rubber
Tired
Plastic
Centre



Polyurethane
Tired
Nylon
Centre



Rubber
Tired
Plastic
Centre



Rubber
Tired
Steel Disc
Centre



Polyurethane
Tired
Cat Iron
Centre



Vulcanised
Rubber
Plastic
Centre



Vulcanised
Rubber
Plastic
Centre



Polyurethane
Injection
Plastic
Centre

hard treaded wheels



Nylon
Wheel



Polypropylene
Wheel



Cast Iron
Wheel



wheel bearing types

KAMA currently offer 4 basic types of wheel bearing.

- 1) Plain Bearing
- 2) Roller Bearing
- 3) Ball Bearing
- 4) Taper Roller Bearing

1- Plain Bearing : In the case of cast iron wheels and cast iron centred wheels, frequent lubrication is essential and except small sizes, a grease nipple is provided. In the case of nylon central wheels and those with nylon bushes, the axle is greased on assembly and in good conditions will run for a very long time without additional lubrication. There is however a risk of squeaking and excessive axle tube wear in dusty and dirty conditions.

2- Roller Bearing : For light duty applications, roller bearings are greased on assembly and should be under normal conditions do not require replacement. Castors designed for heavy duty applications are always provided with a means of refreshing the lubricant in the roller bearing. On cast iron wheels and cast iron centered wheels the roller bearing runs on a hardened steel split sleeve which gives extended life and reduced rolling resistance. When wheels have plastic centres the split sleeve is not necessary and therefore omitted.

3- Ball Bearing : Precision ball bearings are ideal for applications where high radial and moderate axial loads are present, and give very low rolling friction. The bearings are shielded to retain the grease and to exclude grit and dust, etc. A spacer inner tube is used to support the inner races which must be clamped end-wise an assembly. No adjustment is necessary. Ball journals are suitable for both manual and low speed power towing applications.

4- Taper Roller Bearing : Precision tapered bearings are suitable for the heaviest applications where high radial and axial loads are present. The bearing cups and cases are hardened for extended life and the bearing must be adjusted on installation to give optimum service life. This adjustment is only necessary on wheels fitted to customers axles. Seals are fitted to retain grease and exclude grit, dirt etc., and grease nipples are provided for replenishment under arduous working conditions.



castor loadings

If castors are not equivalent in size to the load, then it will get hard to move. Here we should consider both load and floor conditions.

Castors till 75mm must be used on only light duty equipments. Even 100mm castors need flat and smooth floor. In a vehicle which is in perpetual motion 125mm or larger diameter wheels are required.

Hard treaded wheels are easily rolled along a flat floor. But they can damage the floor. At the same time, hard treaded wheels are forced to jump the barriers.

Working conditions for castors may vary enormously both with regard to the type of floor and also the severity of the actual application. In recognition of the variation all KAMA castors and wheels are given separate, load capacity ratings for ideal and average working conditions.

Ideal working conditions indicate that overloading and shock loading are impossible, and that the floor is reasonably level and free from cracks, gullies, door guide rails, etc., and that the floor surface is not of an abresive nature.

Average working conditions are typified by many factors where one or more of the above hazards maybe presented to a limited degree. Although there are many variables in the selection of the correct castors for the particular application, the total load to be carried on the castors is generally known.

It must be appreciated, however, that the load capacity is not the only factor to be considered in choosing castors for a specific job. It may often be necessary to choose a castor having given a load capacity several times greater than the conditions appear to warrant to ensure that the castors are capable of giving the desired performance.

What load must each castor carry?;

Under ideal conditions the load is equally shared by all castors. However for uneven floors use the actual number of castors less one for calculation purposes.

Example : max. Load : 420 Kg. $\frac{\text{max. load} + \text{trolleys}}{\text{castors} - 1}$
 Trolleys : 105 Kg.
 Castors : 4

Load per castors = $\frac{420+105}{4-1} = \frac{525}{3} = 175 \text{ Kg.}$

Generally, select castors with extra load capacity rather than "just enough to get the job done"



What tyre material best suits your application?:

	SHOCK ABSORBEN CY	CAPACITY	PUSH EFFORT	FLOOR PROTECTION	DURABILITY	TYPICAL SURFACES
POLYURETHANE	xx	xxx	xx	xx	xx	MOST SURFACES
GREY RUBBER	xxx	xx	x	xxx	xx	QUALITY FLOORING, QUIET/CLEAN AREAS
BLUE RUBBER	xxx	xx	x	xxx	xx	QUALITY FLOORING, SMALL OBSTRUCTION
SENTETIC RUBBER	xx	xx	xx	xxx	xx	QUALITY FLOORING, CLEAN AREAS
BLACK RUBBER	xxx	xx	x	xx	x	INDUSTRIAL AREAS, CONCRETE
RESIN	x	xx	xx	xx	xx	ABRASSIVE, INDUSTRIAL FLOORS, OVEN FLOORS
PNEUMATIC	xxx	x	x	xxx	xx	OUTDOOR, IRREGULAR OR UNSEALED
CAST IRON	0	xxx	xxx	0	xxx	OVEN FLOORS, OUTDORS OR UNSEALED, BROKEN GLASS ETC.

* (xxx) EXCELLENT, (xx) GOOD, (x) FAIR, (0) POOR.

The diameter of the wheel;
The larger the wheel, the easier it rolls.

DIAMETER	USAGE FREQUENCY	LOAD	SPEED	DISTANCE	FLOOR CONDITION
50 mm	RARELY	LIGHT	HAND OPERATED	SHORT	SMOOTH
100 mm					
125 mm					
150 mm					
200 mm					
250 mm					
300 mm					
400 mm	OFTEN	HEAVY	HIGH SPEED	LONG	IRREGULAR LARGE OBSTRUCTIONS

Not: In situations where equipment operating space is limited, for example where there is low overhead clearance, the overall height and swivel radius of the castor will become important criteria. Wider wheels are harder to push but can carry heavier loads.

Selection of the right castor;
When specifying or replacing castor, answer the seven important questions.

- 1- What is the average load and the maximum load?
- 2- What wheel type is needed for floor protection?
- 3- What wheel diameter will give necessary mobility?
- 4- In what type of enviroment will the castors or wheel operate? (water, oil, acids, corrosive materials or excessive temperatures)
- 5- Will the unit be hand-pushed or powered?
- 6- How many swivel and how many rigid castors are needed?
- 7- How are the castors to be mounted? (top plate, stem or other mountig types)

selecting castors + wheels

1- Which category most closely matches the intended use:

	SOME TYPICAL USES	RECOMMENDED CASTOR SERIES	MAX. LOAD ACCORDING TO THE SIZE AND TYPE OF WHEEL KG./CASTOR
EXTRA HEAVY DUTY	MAINTENANCE PLATFORMS AND TROLLEYS, CARGO TROLLEYS HEAVY MOBILE LIFTING EQUIPMENT	5100 - 6700	2.000 - 10.000
HEAVY DUTY	HEAVY DUTY TROLLEYS, HEAVY MOBILE EQUIPMENT	5100	250 - 1.400
MEDIUM HEAVY DUTY	MEDIUM TROLLEYS, BAKERY OVEN RACKS, LARGE DISPLAY STANDS, LAUNDRY TROLLEYS, EQUIPMENT RACKS	4100	225 - 1.000
MEDIUM DUTY	MEDIUM LIGHT TROLLEYS, DISPLAY STAND, HEAVIER FURNITURE, TOOL BOXES	3200	100 - 400
LIGHT DUTY	MEDIUM / LIGHT TROLLEYS, LIGHT DISPLAY STANDS, HIGHT FURNITURE AND TOOL BOXES	3100 - 3300	80 - 205
INSTITUTIONAL	HOSPITAL BEDS AND FURNITURE, OFFICE EQUIPMEND, SERVING TROLLEYS, COMPUTER EQUIPMENT AND DISPLAY STANDS	1700 - 2600	75 - 125
FURNITURE	LIGHT FURNITURE, CHAIRS, LIGHT DISPLAY STANDS	1100-1400-1600-1700-2100	30 - 50

Castor and wheel capacities shown in our catalogue are based on normal operating conditions on a relatively smooth surface, (such as concrete) All bearings must be properly lubricated. Conditions of excessive temperature and/or dirt will reduce ratings. Do not exceed the capacity ratings published in our catalogue.



Wrong

Right

trolleys

A trolley should be:

- **Not too wide** : They have to go through doorways. Hand - pushed trolleys have to be at least 80 mm narrower than the narrowest doorway. Towed trolleys need to be at least 500 mm narrower than the narrowest doorway.
- **Not too long** : Otherwise it will not track smoothly around corners. If it must be long you may need to experiment to find the best castor arrangement to suit your particular needs.
- **Not too high** : Most trolleys are restricted in width to the aisles, and will topple over if too high.
- **Not too light** : As a rough guide the weight of the trolley is usually 15% to 20% of the load it is to carry. For the castor to function properly the frame of the trolley must be strong enough to hold the castor truly vertical so it can rotate freely. The most common cause of the castors not to track properly is that the mounting has twisted off square.
- **Not too heavy** : It is often safer and more efficient, to divide a heavy load over a number of trolleys rather than concentrating it into one. Trolleys which are too heavy to move conveniently remain unused, or people suffer back back injuries. Most industrial codes restrict the direct lift of an adult 13-18 Kg. Using wheels and castors allows this same person to move 600-1800 Kg. But greater loads require mechanical assistance roughly, using modern castors such as KAMA castors. A fit adult can push 600 Kg. continuously or 1200 Kg. for 10 meters or 1800 Kg for 1 meter considering the type of the floor. For heavier load, we need mechanical power.
- **Design of trolley** : The responsibility for the design of the trolley must ultimately rest with our customers good castors can make a well designed trolley work even better. In general the most comfortable shape for a trolley is one where the sides are about 1.5 to 2 times the width and not too high.



castor combinations for trucks

Various types of mountings are illustrated below:

<ul style="list-style-type: none">• Three swivel : For barrel dollies and small machines. Affords excellent manoeuvrability.	
<ul style="list-style-type: none">• Two Rigid, two Swivel : Most practical and inexpensive arrangement for straight and/or long distances, Can be used for heavy or medium loads, depending upon the weight capacity castors selected.	
<ul style="list-style-type: none">• Tilt Mounting : A tilt mounting is the most economical, but should be limited to lighter loads. The tilt is best when the load wheels are 3 mm taller than the balance wheels, Not recommended for use on ramps.	
<ul style="list-style-type: none">• Diamond Mounting : This also uses two rigid and two swivel castors. But the diamond shaped mounting greatly increases manoeuvrability. This mounting is not recommended for ramps.	
<ul style="list-style-type: none">• Four Swivel : Where a side motion is frequently needed the for swivel arrangement is excellent. If the castors are equipped with swivel locks, this mounting is also practical for long straight travel as well as use on ramps. A most versatile arrangement.	
<ul style="list-style-type: none">• Four Swivel, two rigid : This is level mounting design for heavy loads and long trucks. The two rigid castors help to distribute and reduce the load on the swivel units and there by maintain good. Manoeuvrability and easy steering.	

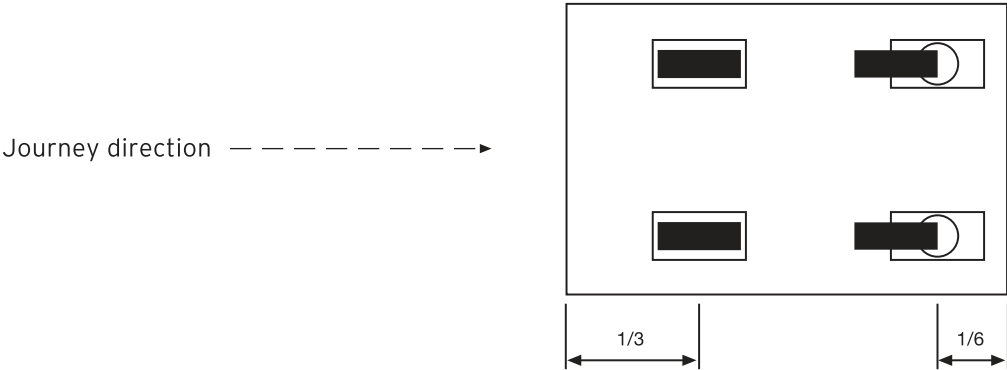
towing

When the load is too heavy to push then you will need motorized systems. There are limits to what a forklift can do. Generally it can only move one pallet. If there is a lot of goods to be moved some distance, the best economical way is to use more trolleys. In fact a forklift can tow a trolley. But for more than one you need a tractor. You must have seen them at airports or docks. It is ideal for moving over 100 meters distance.

Where you should use towing:

Towing can be done everywhere. Kama castors are designed for that purpose also Indoor or outdoor, smooth or rough. There is a Kama castor for every application. Tractors used indoors are restricted by safety regulations to about 10 Km/h. But even at this low speed both wheel and castor can suffer from uneven surfaces, so the castors chosen must be strong enough. Outdoor use can be even more severe so we recommend large diameter with thick cushion of polyurethane.

The suggested castor arrangement for towing is this;



This will give little whip and good trailing. But be careful not to load at the rear too much or they will tip backwards. Always make the mounting pads rigid enough not to bend under severe use. Castors must be mounted with the mounting plate truly horizontal if the castor is to swivel freely. If the mounting bends the castor will crab to the side. In order to do a job properly you have to choose the right castors and the right trolley. When the goods are to be moved in a limited area, the easiest way is to use motorized or hand pushed trolleys. In most industrial codes restrict the direct lift of an adult to 13-18 Kg. Greater loads require mechanical system. In using Kama castors an adult can push 600 kg continuously or 1,200 kg for 10 meters. According to the type and the size of wheel and the floor conditions. For greater loads motorized trolleys are advisable.



towing speeds

CHOOSE ANY CASTOR TYPE THEN LOOK IN THE CATALOGUE FOR MORE

USAGE	HEAVY DUTY INDOORS				VERY HEAVY DUTY INDOOR AND OUTDOORS			
SERIES	3200 HAND PUSHED		4100 - 5100 HAND PUSHED OR TOWED SLOWLY INDOORS			5100 - 6700 FOR TOUGHER TOWING INDOOR + OUTDOORS		
WHEEL DIAMETER AND TYRE WIDTH	150 x 45	200 x 50	150 x 45	200 x 50	260 x 70	200 x 50	260 x 70	300 x 80
FEATURES	DO NOT TOW	DO NOT TOW	SLOWEST TOWING ONLY	SLOW TOW SMOOTH FLOOR	SLOW TOW SMOOTH FLOOR	DESIGNED FOR TOUGHER TOWING INDOOR + OUTDOORS		
CAPACITY DECREASES WITH SPEED AND INCREASES WITH DIAMETER AND TYRE SIZE								
HAND PUSHED 6 KM / HOUR	400 Kg.	500 Kg.	600 Kg.	1,000 Kg.	1,100 Kg.	—	—	—
TOWED 6 KM / HOUR	DO NOT TOW	DO NOT TOW	500 Kg.	800 Kg.	850 Kg.	1,000 Kg.	1,400 Kg.	1,500 Kg.
TOWED 10 KM / HOUR	DO NOT TOW	DO NOT TOW	DO NOT TOW	600 Kg.	650 Kg.	850 Kg.	1,200 Kg.	1,300 Kg.
TOWED 16 KM / HOUR	DO NOT TOW	DO NOT TOW	DO NOT TOW	DO NOT TOW	DO NOT TOW	750 Kg.	1,000 Kg.	1,050 Kg.
PLATE SIZE mm	140 x 115	140 x 115	140 x 115	140 x 115	132 x 182	132 x 182 220 x 220	132 x 182 230 x 230	190 x 190

the use of temperature

Our wheel and castors work with no deformation within the limits of 0°C to 50°C. In colder or hotter conditions may need to be modified to work efficiently.

LOW TEMPERATURE:

Below 0°C you must specify the temperature. The standard grease we use in our castors and wheels have long life. But below 0°C it begins to stiffen quickly, and soon will freeze the bearing. So long as it is specified at the time of ordering we use a special grease which doesn't freeze down to -70°C. But it has to be refreshed every 5 - 8 months. Then it will continue to work effectively in chilling rooms, freezing stores and in outdoor in Northern countries.

As the temperature becomes lower the rubber and polyurethane treads begin to stiffen and become less elastic. For example polyurethane slowly stiffens down to -20°C but then rapidly stiffens until at -50°C it is brittle.

As the temperature goes below -20°C, nylon can become brittle also. At that situation we recommend fiberglass reinforced nylon wheels which can be used down to -30°C.



HIGH TEMPERATURE:

Above 40°C you must specify the temperature. As the temperature increases tyre materials become softer and this lowers the load capacity. At still higher temperatures deformation begins and the wheel becomes useless.

As a general rule you can use any product at its normal load up to 40°C. After that you must show some care. For example the polypropylene wheels begin to lose strenght between 60°C and 100°C and by 145°C it becomes useless.

Rubber tyred wheels are similar. Polyurethane tyres don't loose its function up to 90°C and can be used for short periods at even higher temperature.

Fiberglass reinforced nylon wheels are the prefered wheel for extended temperatures up to 210°C for short periods.

Phenolic Resin wheels are the preferred wheel for extended periods up to 280°C. (assuming most of their life is spent outside the oven) and for short periods up to 300°C.

For even higher temperature we offer iron wheel. We use high temperature grease for that purpose. Please get in touch with the factory.



chemical resistance:

The following table indicates how each tyre material is affected by common chemicals. Consult manufacturers for more advice.

	POLYURETHANE	NYLON	RUBBER	CAST IRON
SULPHURIC ACID	0	xx	xxx	0
HYDROCHLORIC ACID	xxx	xxx	0	0
NITRIC ACID	xxx	xxx	xxx	00
ACETIC ASID	0	00	0	00
METHYL ALCOHOL	xxx	00	00	00
SODIUM HYDROXIDE	00	00	00	00
CARBON TETRACHLORIDE	xxx	00	xxx	0
WATER	00	00	00	00
PETROL	0	00	xxx	00
SOAP SOLUTION	00	00	0	00

- * (00) Good, little or no effect.
(0) Satisfactory, minor to moderate effect.
(x) Test sample before use, most likely satisfactory.
(xx) Test sample before use, most likely unsatisfactory.
(xxx) Unsatisfactory, severe effect to total destruction.



product test

- Light Series** : Normally used in an office or home;
- **Static Test** : Lettering the castor in an unmovable position for two days with a load two time of what is indicated in the catalogue.
 - **Drop Test** : Let it fall from 2 meters height with a load 1/4 of what is indicated in the catalogue.
 - **Dynamic Test** : Testing on a turn-table with very small obstacles with a load one time of what is indicated in the catalogue. The time of testing is not less then six hours.

Light and Medium

Heavy Duty Castors: Normally hand pushed, but larger sizes can be towed at low speeds.

- **Static Test** : Let the castor in an unmovable position for one hour with a load two times of what is indicated in our catalogue.
- **Dynamic Test** : Testing on a turn-table with small obstacles with a 4 Km/h speed. The load must be one time of what is indicated in our catalogue. The test should last at least six hours.

Extra Heavy

Industrial Castors : Usually towed, and for use over 4 Km/h up to 16 Km/h.

- **Static Test** : Letting in unmovable position for one hour with test a load three times of what is indicated in our catalogue.
- **Dynamic Test** : This has to be tested in three ways.
 - 1- 6 Km/h speed with obstacles and bumps 1 meter apart.
 - 2- 10 Km/h speed with obstacles and bumps 1.5 meters apart.
 - 3- 16 Km/h speed with obstacles and bumps 3 meters apart.

The test is done outdoor, changing direction in 15-20 meters and it lasts at least three hours.



fixing instructions

Castors will not swivel properly unless they are mounted vertically.

SOME RECOMMENDATIONS:

Heavy trolleys need plate mountings, but the base of the trolley must be strong enough to withstand strains. Never mount a plate castor by three bolts only.

Of the castors does not stay mounted squarely, it will not swivel freely.



Medium Duty Castors are often mounted into tubular legs, but again it is important that these legs stay vertical.

We recommend that the leg never extend more that 125 mm below the nearest support, and (apart from the lightest uses), the tube should be 1.5 thick or more. Thinner gauges often split. If you wish to use lighter gauge in the rest of the trolley, insert a sleeve for at least 150 mm where the castor is mounted. Never put a round expanding fitting into a square tube. The first time a trolley hits a bump, the tube will elongate, and the castor will fall out.

We do have square fittings, and ask that you use them. Of for some reasons you need to put round into square, then well and insert sleeve of round tube.

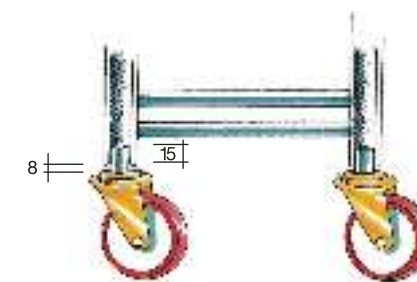


Our smallest fitting is 19 mm. To achieve the best performance from the large 175 mm and 200 mm castors, use solid stems.

If fixed and swivel castors are to be used together, have the fixed castors at the front, making it easier for it to turn.

When fitting pintle castors, make sure that the pintle is fully inserted into the tube. You can get up to 8 mm of adjustment with washers, and tighten firmly.

Never try to get the unevenness out of a warped trolley by half inserting fittings.



castor mounting types



fixing instructions

ANTISTATIC:
We have also electrically conductive wheels (>10 ohm)
These are recommended for hospital equipment.

BRAKE ARRANGEMENTS:
The brake mechanism of the castor has the task of holding
the equipment or the machine firmly in the stop position.
Therefore they are an important component in relation to
safety.
Almost all of the swivel castors have brake arrangement.



- a) Wheel locking brake : Brake locks the wheel from rotating.
- b) Total brake mounted in front : Brake for transport and heavy load bearing
castors locks the wheel and fork head at
the same time, mounted in front.
- c) Total brake mounted behind : Brake for apparatus and
transport castors mounted
behind locks the wheel and
the fork head.
- d) Directional Lock : Directional locking brake that can be retrofitted, locks
the steerable castor in the straight ahead position for
transporting castors.



notes:

Handwriting practice lines consisting of 20 horizontal dotted lines.



accurate choice,
accurate loading