

# WHEELS - PCD AND OFFSET (ET) EXPLAINED

## **PCD:**

PCD stands for (pitch circle diameter) and is the diameter of a circle drawn through the centre of your wheels bolt holes. PCD is measured in millimetres and also indicates the number of studs or bolts the wheel will have.

The most common fitment has 4 studs and a PCD of 100mm, hence the fitment 4x100. Check the fitment guide above to check the fitment of your car, if you are unsure consult a technician.

## **OFFSET (also referred to as 'ET'):**

Your car requires a unique offset. Simply this is where the outside of the wheel needs to be in relation to the bodyline of the vehicle, realistically you can go 5-7mm outside these recommendations, but always consult a technician if you are unsure, as there are often other factors that need to be considered.

## **DETAILED EXPLANATION:**

There are 2 main reasons for fitting Alloy Wheels: **Weight** and **Style**.

Alloy wheels are a lot lighter than the equivalent size of steel wheels, so the unsprung weight of the car is reduced. They also look 10 times smarter than a steel wheel, even with a fancy plastic trim covering it.

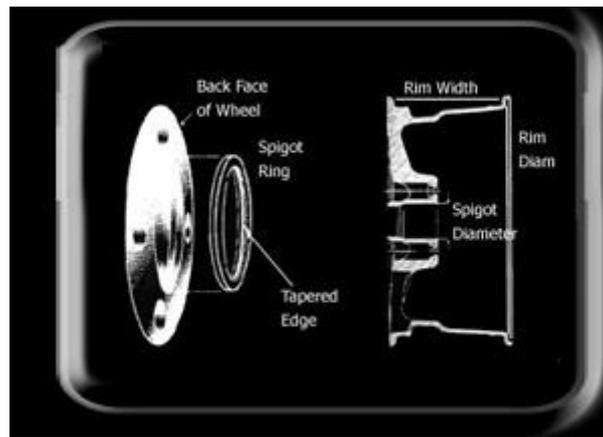
Two things to look for when fitting after market wheels is the PCD

(Pitch Circle Diameter, ) and spigot size. The PCD is easy to match as this relates to the number of studs you need to hold the wheel on the car. The ACTUAL meaning is the diameter of the studs from the centre of the wheel.



Spigot size is a bit trickier....the spigot is the bit in the centre of the hub that you rest the inside centre of the wheel on whilst aligning the studs and screwing back the wheel nuts. On generic after market wheels, the spigot hole inside the wheels is a lot bigger than the spigot on the car. So what you need to do in this case is fit spigot locating rings. These are just rings of aluminium or hard plastic that fit over the spigot on your car and then have a proper fit with the spigot hole on the wheel. If you don't have the spigot taking all the weight of the car, chances are you'll break one or more studs when you drive the car hard or have to brake hard. Remember the wheel nuts are simply there to hold the wheel on, NOT support the weight of the car. Also, as there is nothing to

centre the wheel, you'll notice the wheels go in and out of balance because as you drive around, they'll move around on the hub.



It is quite normal to alter the size of wheel when fitting alloys. When changing to alloys - you can replace with the same size of wheel, and keep the same size tyre, or move up to 13" wheels. The larger the wheel and the smaller the tyre profile the more impact the wheel chosen will have on the overall look of the car.

The important thing is to keep the same overall tyre diameter. This is done by using a lower profile tyre. Increasing the tyre width and reducing the profile height will give the vehicle different handling characteristics. The car will be a lot more responsive when cornering, but a lot more sensitive to bumps and irregularities in the road.

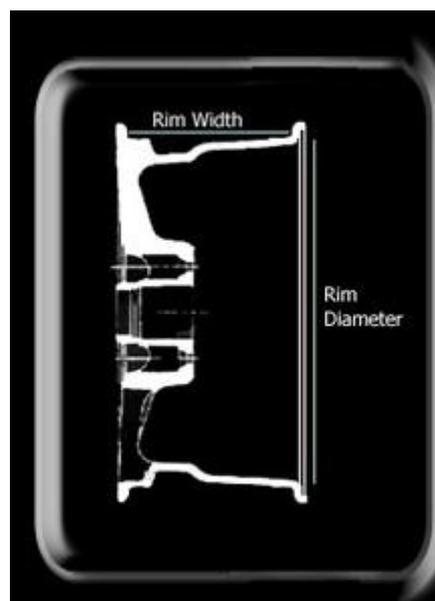
To give you an indication of what can be done if you want to change to a bigger wheel. Take the first number of your tyre size (this is the width of the tread) and multiply it by the second number (this is the profile height expressed as a percentage) and then divide by 100. You now have the height of one sidewall in millimetres.

Multiply it by 2 (for top and bottom sidewalls) and divide this by 25.4 to convert to inches and add it to the third number of your tyre size (the rim diameter in inches) to give the overall diameter in inches.

If you want to convert back to millimetres multiply by 25.4

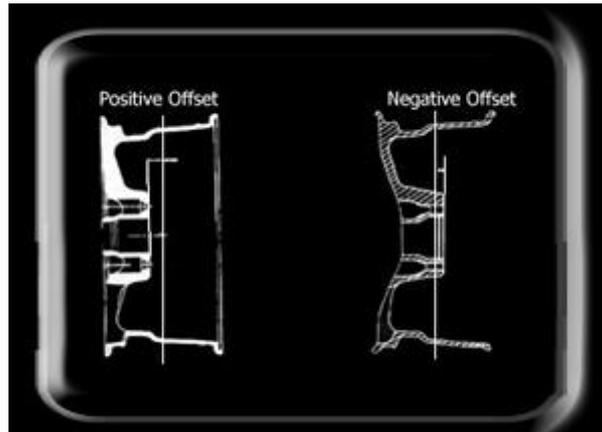
### Wheel Size

Two measurements, the Rim Diameter and the Rim Width, normally determine the wheel size. This is best explained with reference to the diagram:



The 'Offset' of a wheel measures the distance between the wheel centreline and the wheel mounting face and is measured in millimetres. It is extremely important that

wheels of the correct offset are used in order to maintain the correct track of the vehicles.  
Offset can be Positive or Negative and is best illustrated in the two diagrams below.



Most Modern vehicles are front-wheel drive, and as such generally require positive offset wheels. The main exception to this rule is 4x4 vehicles, which often use negative offset wheels.

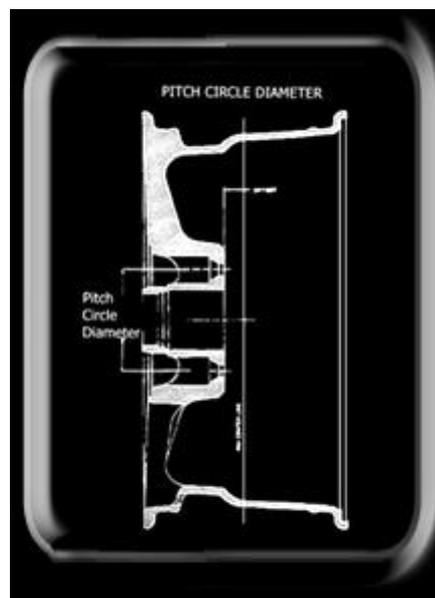
### **Clearance**

It is, of course, extremely important that the clearance Pitch Circle Diameter of both the vehicle body work and steering/suspension components are maintained. Failure to do so would most likely cause damage to both the tyre/wheel assembly as well as the body of the vehicles. Clearance is achieved by selecting a wheel of the correct size and type of tyre. Quality alloy wheel suppliers can give such information.

### **Pitch Circle Diameter (PCD)**

The P.C.D. can be defined as the diameter (in millimetres) of an imaginary circle drawn through the centre of the stud holes on the wheel and/or the vehicle wheel hub.

When new wheels are required, it is essential that they have the correct P.C.D. for the vehicle concerned. Just because a wheel from one vehicle has the same PCD and offset as the wheel from another does not mean they are interchangeable - the centre bore of the wheel and hub must also be the same to ensure centralisation of the wheel, and the shape of the spokes must ensure clearance of the brake calipers. Many manufacturers use the same wheel fitments as others, but some are unique.

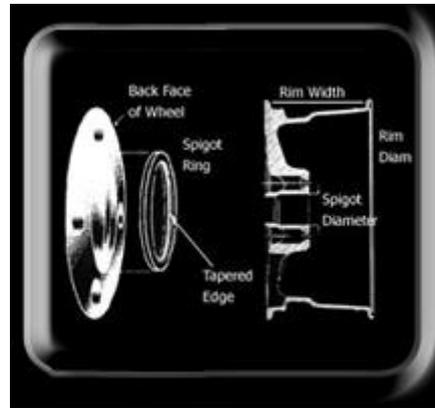


### Wheel Location on Hub

Adaptor / Spigot Ring Arrangement Motor vehicle manufacturers use a central location collar on the stub axle hub in order to accurately locate the wheel. The wheel collar diameter varies, depending on the make of vehicle.

Many replacement allow wheel manufacturers use an adapter (spigot ring) to vary the diameter of the locating hole. In this way, a particular wheel can, by changing the spigot ring, be used on a variety of vehicles.

The adapter/spigot ring arrangement is illustrated in the diagram.



As an example, TSW Spigot rings should always be fitted without the tapered edge facing the vehicle hub. This is to allow easy and accurate location of the ring onto the hub collar.

### Stepping up to High Performance

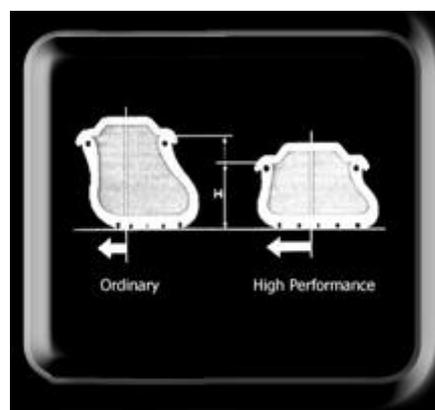
Vehicle performance can be maximised by selecting a lower profile tyre and larger wheel diameter combination. Care must be taken to select the appropriate replacement wheel/tyre combination to avoid problems.

For example, it is a legal requirement that the tyre and wheel assemblies stay within the body of the car. The fitting of larger diameter replacement wheels is referred to as 'up-stepping'. Up-stepping 'Plus One' or 'Plus Two' denotes how much larger the wheel diameter is.

This approach of 'up-stepping' allows the tyre section width to be increased whilst maintaining the correct overall diameter. This allows the optimisation of cornering force and grip whilst maintaining the original gearing of the vehicle.

### Aspect Ratio

Aspect ratio is the ratio of section height to section width. It should be noted that in general, tyres with a lower section height (i.e. where the aspect ratio is lowered) have a higher cornering force and therefore improved performance-handling characteristics.



When you have bought your new alloy wheels, you will need the special nuts to fit them to the hub. Stud threads vary, so don't rush out and buy the first set of wheel nuts you see at a bargain price because they may not fit and will strip the thread on the studs. Then you'll need to buy new studs and either fit them yourself or pay a garage to do it for you.

Alloy wheels need special studs so that they fit inside the indent in the wheel and tighten up onto the stud properly. Normal nuts used on steel wheels are not suitable, as the nut will probably only go halfway down the stud, and when you brake suddenly or with normal driving over a period of time the nuts will work loose, or wear away the alloy hole in the wheel making the wheel useless, and the worse scenario would be the studs breaking and the wheel coming off completely.

Rover Alloys use Rover nuts, many other manufacturers use either generic nuts or special nuts to fit their own brand of wheels. These nuts are not interchangeable, you can't use Rover nuts on some alloy wheels, and vice versa.

You should also ensure that if using wider wheels that they do not protrude outside the line of the car, as in the diagram below.



**So check you have the right specification alloys and the right nuts to hold them on!**