

# Wheel mounting facts as they relate to the Vanagon and Syncro.

Below you will find some very useful information regarding mounting wheels to your Vanagon or Syncro. The information is broken down into the following sections:

- 1) Bolt Pattern –
- 2) Offset and Wheel Size –
- 3) Centerbore –
- 4) Wheel Lug Hole Diameter and Lug Seat Size –
- 5) Wheel Stud Specs and Measuring for Wheel Hardware –
- 6) Center Caps –
- 7) Note for those either running or contemplating Van-Café/Eurospec big brakes -
- 8) Additional Notes -

## **1) Bolt pattern:**

The Vanagon bolt pattern is 5x112. This is shared with Mercedes, many Audis and many VWs. Other bolt patterns can be used on a Vanagon through the use of adapters (Porsche, BMW, GM, Ford etc.). In order to use adapters, the offset of the wheels should be 45mm or more (at least for the front).

## **2) Offset and wheel size:**

Wheel size and offset go hand in hand in most cases. The ideal offset for the front of a Vanagon is 30mm through 39mm. A little more or less is sometimes okay, but it really is best to stay as close to the ideal as possible.

The offset (expressed as ET followed by a two digit number) and wheel size will almost always be cast or stamped into the wheel somewhere. Sometimes these markings are on the backside of one of the spokes, sometimes they are located close to the lug holes on the front side and of course they could be in a number of other locations. Knowing the exact offset and wheel size is critical to achieving the perfect fit.

The following is a list of wheel sizes and their recommended offsets in relation to the FRONT of a 2wd Vanagon (Syncro front applications can usually get away with slightly more offset and/or wheel width):

15x6 - ET30 through ET35

15x6.5 - ET30 through ET35

15x7 – ET30

15x7.5 – ET25 (not recommended)

15x8 – ET18 (not recommended at all – wheel will be outside the wheel opening)

16x6 – ET30 through ET35

16x7 – ET30 through ET35

16x7.5 – ET28 through ET30 (Tire width is critical in this application. The narrower the better)

16x8 – ET17 (not recommended at all – wheel will be outside the wheel opening)

17x7 – ET30 through ET42

17x7.5 – ET30 through ET36

17x8 – ET30

17x8.5 – ET23 (not recommended)

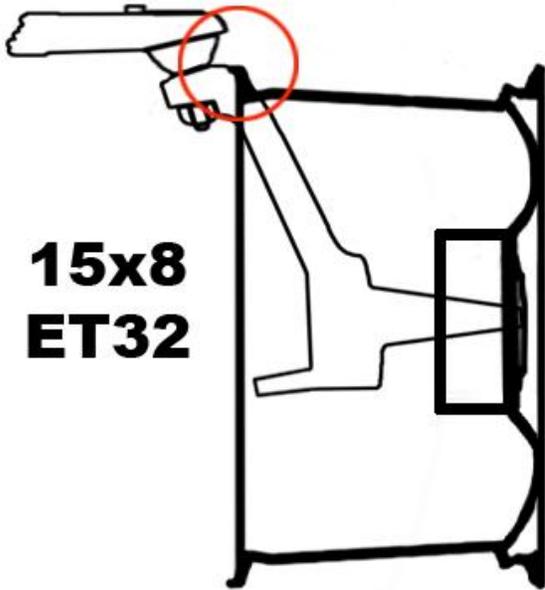
**\*Note\*** - Tire selection can be super critical for some wheel sizes/offsets as it is the tire that will make contact with the upper control arm before the wheel ever hits the upright/spindle. For the above recommended offsets, 205's should be just fine, 215's can fall into a gray area. Some fit fine at the higher recommended offsets, others will need slightly lower offsets in order to have enough clearance. 225's will definitely need to be inspected closely to ensure that they don't rub on the upper control arm. 225's on the wheel sizes above will usually require the offsets to be at the lower end of the recommended offset range.

**\*Note\*** - Certain aftermarket brake upgrades can change the offset requirement for the wheels. It is critically important that you understand the effects that any particular brake upgrade may have on your wheel fitment. Please ask us if you have any questions regarding this matter. Also see section 7) below.

Below are a series of illustrations showing how the Vanagon suffers from a height versus width issue when it comes to fitting wheels onto the front. The illustrations, although slightly exaggerated, clearly show how simply changing the diameter of the wheel can have a profound impact on the fitment.

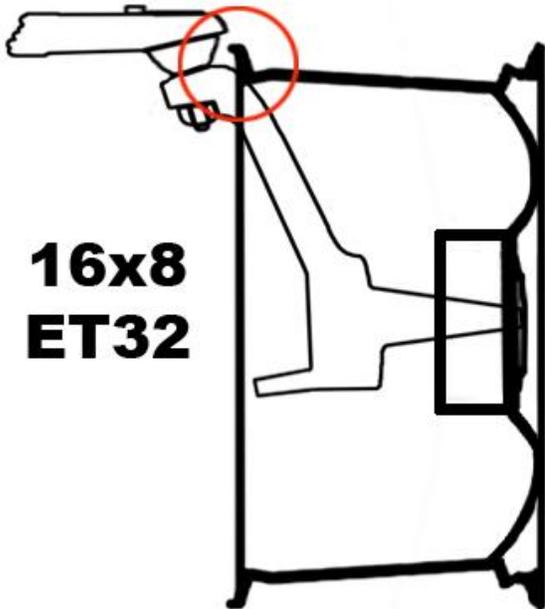
All of the wheels illustrated below have the same width and offset. Only their diameter is changed. The 15x8 ET32, 16x8 ET32 and 17x8 ET32 wheels all make contact with the suspension components. Only the 18x8 ET32 has enough clearance. This is why each different wheel diameter has its own set of fitment issues.

**wheel contact area**

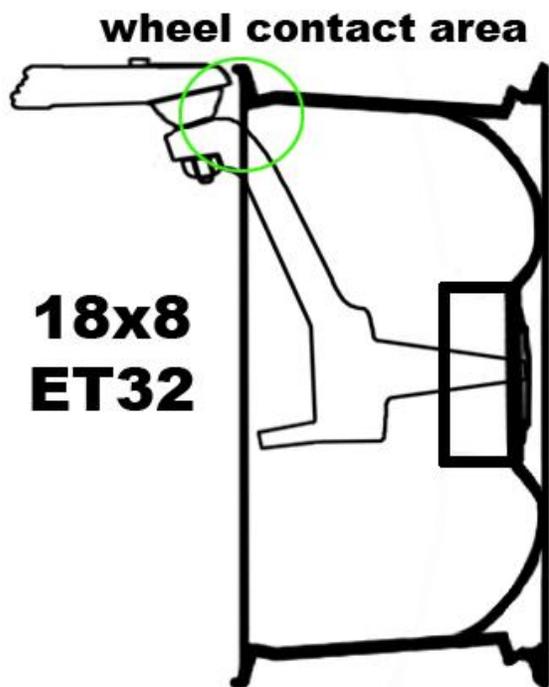
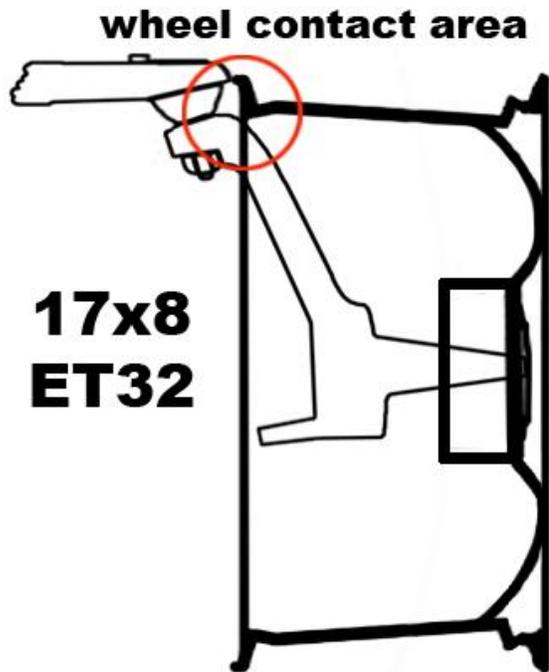


**15x8  
ET32**

**wheel contact area**



**16x8  
ET32**



\*\*\*Please see the notes at the end for more information\*\*\*

**3) Centerbore:**

Mercedes wheels have a 66.56mm centerbore. Audi/VW wheels have a 57.1mm

centerbore. Due the large diameter of the 2wd Vanagon's front grease cap, a centerbore of at least 64mm is required. Obviously the Mercedes wheels will fit just fine but the Audi/VW wheels must have their centerbores enlarged in order to fit. I recommend that the Audi/VW centerbore be opened up to the same inner diameter of the Mercedes wheels, 66.56mm. The reason for this specific measurement is that this gives good clearance for the grease cap as well as allows the owner of the wheels to install a 66.56 to 57.1 hubcentric ring adapter should they ever choose to sell or use these wheels on an Audi/VW again. It's nice to have options and if you are having the centerbores opened up anyway, you may as well have them opened to a specification that is useful.

#### **4) Wheel Lug Hole Diameter and Lug Seat Size:**

Mercedes wheels that originally were designed for use with 12mm lug bolts must be drilled to accommodate 14mm wheel hardware. Although a 9/16" drill bit will work for this, we recommend a 37/64" drill bit for a little more clearance around the lugs. Make sure you debur the hole after drilling.

12mm lugged Mercedes wheels and Audi/VW wheels use a small ball seat lug. Original Vanagon lugs are too big to seat properly. See the following picture for the difference.

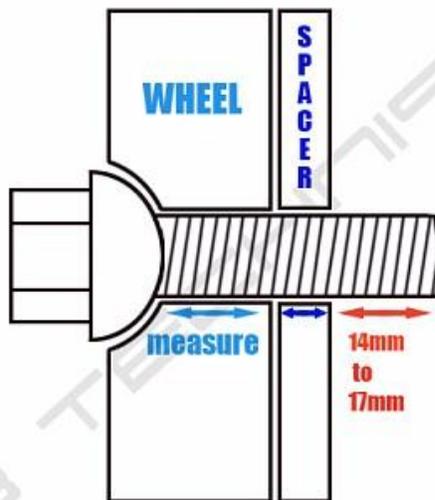


How do you know if your wheels require the small ball seat lugs or if the stock Vanagon lugs will work? Simple! If you had to drill out the lug holes of your factory Mercedes wheels (not aftermarket) for 14mm wheel hardware, you need the small ball seat lugs. If your wheels are factory Audi/VW, you need the small ball seat lugs.

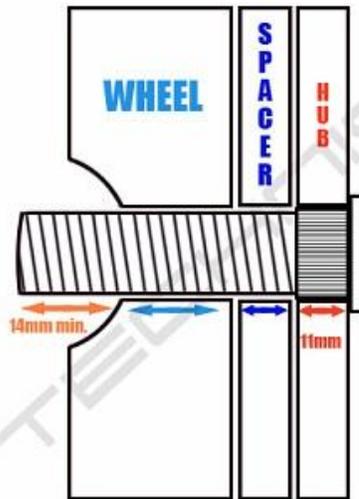
Mercedes wheels that originally came with 14mm lug bolts can be used in conjunction with the stock Vanagon steel wheel lug nuts or Porsche-style lug nuts (Large Ball Seat).

**5) Wheel Stud Specs and Measuring for Wheel Hardware:**

Each wheel measures slightly different from the base of the lug seat to the wheel mounting face. See the following illustrations for an explanation. The area in question is depicted as the lighter blue arrow. This measurement must be known in order to make an accurate assessment as to the necessary length for wheel studs and lug bolts.



## MEASURING FOR REAR WHEEL STUDS



**To determine stud length, measure the wheel thickness (light blue) and the thickness of your spacer (dark blue). Add a minimum of 14mm for the nut to thread onto and 11mm (hub thickness) to your two previous measurements to determine overall stud length.**

2wd and Syncro Vanagon rear wheel studs are 34.4mm long overall. 23.4mm protrudes from the hub/brake drum.

Syncro front wheel studs are 46.5mm long overall. Approximately 25mm protrudes from the hub/brake rotor. Porsche spec studs can be used as a replacement, but a tack weld at each stud head may be necessary to keep the stud from spinning in the bore under extreme conditions. T3 Technique also offers either a 45mm long or 65mm long stud that can be used as a direct replacement without the need for tack welding.

Lug torque will remain the same no matter what wheels you are running, however the overall torque value may change depending on the manufacturer of your wheel hardware. As a rule of thumb, any aftermarket stud or lug bolt should be torqued to 90 ft-lb and all factory VW lugs should be torqued to 123 lb-ft. Why the difference? There is a difference in the material make-up as well as a difference in heat treating. The aftermarket wheel hardware that T3 Technique is still rated at grade 10.9, just as the factory parts, but the manufactures of the aftermarket products specify a lower torque value.

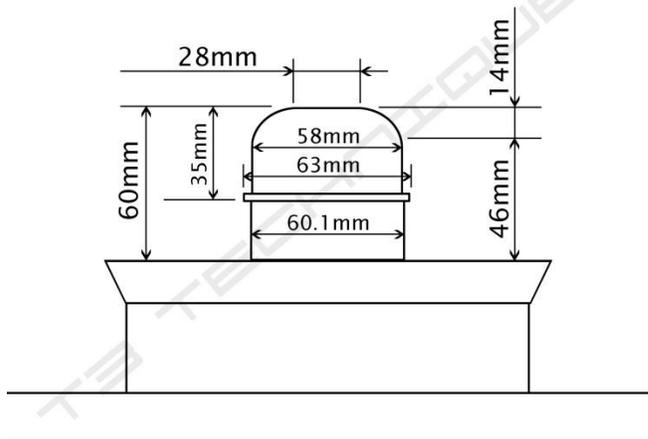
**\*Note\*** - When installing press-in studs, it is imperative that the old studs be pressed out and the new studs be pressed in. Pounding the old studs out can damage the hub and drawing in the new studs can damage the threads on the new studs. In order to install the new studs, the hub must be removed from the vehicle.

### **6) Centercaps:**

Due to the long hub/grease cap of the Vanagon, fitting centercaps can be a challenge. If you are overly concerned about having centercaps, try to choose a wheel that has the flattest face possible. The more that the wheel is “dished” in toward the center, the less likely it is that you will be able to fit a centercap. Even with a flat faced wheel, the mounting style of the centercap may still prevent its use.

See the following illustration to help you determine if a particular wheel’s centercap might fit.

### ***VANAGON GREASE CAP/ HUB DIMENSIONS***



Keep in mind that there are three sizes of grease caps that came on Vanagons. By far the most common is 35mm in height. The tallest version (rare) is about 55mm tall and the rest are 43mm in height. It is possible to shorten the 35mm grease cap by approx. 5mm if needed for centercap clearance. The 43mm grease cap could be shortened by 13mm.

The following photo shows the 43mm grease cap on the left, the 35mm cap in the center and a 35mm cap shortened by 5mm on the right.



T3 Technique offers the T3 Custom Center Caps as a solution to some center cap fitment issues. These caps can fit a variety of different wheels. Please consult with us to see if they are a good option for your particular application.



**7) Note for those either running or contemplating Van-Café/Eurospec big brakes:**

The VC/Eurospec big brake kit uses a hub that has different dimensions than the original Vanagon brake rotor/hub. They also use press in studs like the rear instead of lug bolts. Here are some critical specs from the VC/Eurospec big brake that one should be aware of when using them in conjunction with various wheels.

The VC/Eurospec hub tapers from approx. 60.1mm at the grease cap to 65.85mm at the

mounting face of the brake rotor. This information is critical when it comes to enlarging the centerbores of Audi/VW wheels as well as the use of hubcentric spacers. We still suggest that Audi/VW wheels have their centerbores opened up to 66.56mm.

The VC/ Eurospec hub also positions the track width (measured from mounting face to mounting face) 3mm (1.5mm per side) narrower than the stock brake set-up. This means that a given wheel will mount 1.5mm further inboard when using the VC/Eurospec brake kit as compared to the stock Vanagon brakes. If you're current wheel or wheel/spacer combination is really close to either the upright, upper control arm or both with the stock Vanagon brakes, it is possible that you could run into clearance issues when switching to the Vc/Eurospec brakes.

The VC/Eurospec hub uses press-in studs that are 51mm in overall length. 29.7mm protrude from the hub once the rotor is installed. This information is critical when it comes to knowing whether or not a particular wheel or wheel/spacer combination will leave you with enough threads to properly install the lug nuts. Porsche spec studs can be used as a replacement, but a tack weld at each stud head may be necessary to keep the stud from spinning in the bore under extreme conditions. T3 Technique also offers a 65mm long stud that can be used as a direct replacement without the need for tack welding.

### **8) Additional notes:**

Note: When installing spacers, adapters or even just changing wheels, it is usually necessary to remove the two 11mm headed bolts from the rear drums. These bolts serve no practical purpose and it is perfectly fine to discard them.

Note: Keep in mind that the higher the offset, the less clearance you will have to critical suspension components. If you plan on running a wider than normal tire, check your clearances very carefully.

Note: Spacers can only be used to correct a wheel's offset if it is too large. Spacers will not help you if the wheel's offset is too small. Only machining of the wheels can help you there.

Note: The offset does not need to be the same front and rear on a Vanagon. Sometimes it is actually better to have different offsets front and rear. The rear suspension is much less dynamic than the front and therefore is not nearly as sensitive to offset changes.

Note: If you follow the same fitting guidelines for the front and rear of your Vanagon, you can be assured that the rear will fit properly without any sliding door clearance issues. For example, 16x7 with an effective offset of 30mm (after any spacers) will work both front and rear with no problems.

Note: The offset of the wheels can affect the tire clearance greatly. More offset at the

front wheels will give you more clearance to the body but less clearance to the front suspension components. Body to tire clearance is usually not a problem on the rear of a Vanagon but more offset will decrease the clearance between the tire and rear control arm as will a larger diameter. Please keep this in mind when comparing wheel and tire combinations that others have used.

Note: Syncros and 2wd Vanagons have very different front suspension parameters. Syncros can handle a much wider variation of front wheel widths and offsets. However, if you follow the 2wd front wheel guidelines, you can be assured that the wheels will fit your Syncro as well.