

Potential Consequences of Installing Custom Aftermarket Wheels and Tires



It's a good bet that some of your customers consider their Mercedes-Benz vehicles a fashion statement. Maybe they're wild about some particular wheel and tire combination that's impractical, maybe even unsafe. What do you do?

We've all seen them going down the road and often in the shop: The giant 22-inch or bigger wheels that fill the fender wells from edge to edge. There is no shortage of aftermarket wheels available for just about every make or model. Aftermarket meaning not manufactured by, or specifically for, Mercedes-Benz. Owners seek these out for a number of reasons. Whether it's for flashy looks, sleek style, or perceived performance, oversized rims have become popular in recent years. These large wheels have even reached a mind-boggling 30 inches nowadays. With the flood of new manufacturers and styles hitting the marketplace, the trend shows no signs of slowing.

LOOKS VS. SAFETY

This is alarming because bigger usually doesn't mean better. With today's Mercedes-Benz vehicles, when it comes to swapping original equipment (O.E.) wheels for aftermarket replacements, there's often more than meets the eye. In most cases, safety is being sacrificed for style as more and more people ignore the unintended consequences of installing these aftermarket wheels. You as an independent service provider (ISP) must be aware of and carefully consider many variables before going down that road. Not only could your reputation as a technician or shop owner be at risk,

Opposite Pages: Wretched excess! This 22-inch aftermarket tire/wheel assembly is just asking for trouble -- harsh ride, compromised safety systems, clearance problems, big repair bills, etc. Simply not practical.

but also you could be setting yourself up for liability issues. Aside from ride quality, fitment issues, and spectacular repair bills, safety has become a huge legal risk when looking at this type of installation.

The evolution of electronic controls has such as modern anti-lock braking systems (ABS), Electronic Stability Control (ESP), Brake Assist (BAS), and Distronic Plus (DTR) systems have only added to the list of what potential problems could develop from the use of aftermarket wheels. That's not to say all aftermarket wheels are bad. Wheels manufactured to meet the Society of Automotive Engineers equivalent for safety and staying within the industry standard of + or - 3% of factory size and weight are usually safe. Generally, we have seen minimal issues in the shop. It's those that go beyond that range, however, that we want to take a closer look at.

WHAT WE KNOW

Mercedes Benz vehicles were engineered and manufactured to extremely strict standards. Installing larger-than-approved oversized wheels can and does greatly affect many aspects of the vehicle. Deviating from the factory sizes not only affects suspension geometry and handling characteristics, but also increases the cost of ownership in the form of repair bills from abnormal wear and tear. Here are some of the common concerns and problems that show up when dealing with this type of modification:

- A rough and unpleasant ride is a common complaint. Oversized wheels usually have ultra-low-profile tires. The shallower sidewalls have less give and ability to absorb bumps in the road. When engineering the suspension system, Mercedes-Benz factored in the tire profile. The loss of give and shock absorption not only affects the ride, but also can ultimately lead to damage within the vehicle.
- Oversized wheels add weight, as much as three times what's normal for the vehicle. This in turn raises rolling mass and inertia. If you played with a gyroscope as a child, you're familiar with the force involved here. Big wheels want to keep turning; this extra rolling mass can decrease braking system performance. Increased stopping distance and braking effort, premature pad/rotor wear, and, worst-case, brake fade if the system becomes overheated.

These conditions can end up in critical system failure. Added weight stresses lug bolts and wheel bearings, and lug bolt breakage or wheel bearing lock up at speed could be deadly for both the occupants of the vehicle and bystanders alike.

- Oversized wheels can cause power and acceleration loss due to added rotating mass. In addition, the increased diameter will affect the drive gear ratio and speedometer accuracy.
- Heavy wheels add to the unsprung weight of the vehicle (weight not controlled by the springs). This causes stress on ball joints and bushings, and accelerates tire wear.
- Rims that are too tall raise the center of gravity, leading to increased body roll during cornering. Rims that are too wide pose clearance problems, limiting spring travel so that the wheel bottoms out over bumps. Also, we have seen catastrophic tire failures from contact with a

VEHICLE TIRE INFORMATION

VEHICLE CAPACITY WEIGHT	218 KG (480 LBS)	
SEATING CAPACITY	2	
RECOMMENDED TIRE SIZE	FRONT	REAR
SUMMER TIRE	255/40 R18 95W	285/35 R18 97W
WINTER TIRE SIZE	255/45 R17 98V M&S (FRONT AND REAR)	
	255/40 R18 95V M&S (FRONT AND REAR)	
COLD TIRE PRESSURE		
NORMAL LOAD	FRONT 30 PSI	REAR 33 PSI
MAXIMUM LOAD	FRONT 32 PSI	REAR 39 PSI
SUMMER TIRE	USE ONLY MICHELIN OR PIRELLI TIRES	
FOR ADDITIONAL INFORMATION SEE INSIDE FILLER PIPE COVER AND OWNER'S MANUAL.		
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It's just common sense to stay close to the factory-recommended wheel and tire size for any car as built, even more so with a Mercedes-Benz vehicle because of the many integrated safety systems aboard.

suspension component that wears through the sidewall.

Other side effects include rubbing fenders, wheel wells, control arms, and shocks. Increased turning radius, and tie rod wear from excessive tire scrub are also problems.

- Oversized wheels can, and in many cases do, affect suspension geometry, which throws vehicle alignment out of specifications and in many instances beyond the adjustment range built in at the factory. This causes accelerated, uneven tire wear, under- or over-steer, and pulling complaints.
- Mercedes-Benz factory wheels are hub-centric, meaning the center flange of the hub or rotor is used to locate the wheel axially. This type of mounting produces a better-balanced, truer-spinning wheel, and reduces the load on lug bolts. Many aftermarket wheels are manufactured to be universal-fit so the same wheel can be



Here you can see tire wear and damage from an oversized wheel -- three inches larger than stock. This W220 also had heavy tie-rod wear/play from the sheer weight of the aftermarket rims.

installed on many different automobiles. A universal rim uses a plastic adapter ring to make it hub-centric. Common shop problems with these are where rings are missing, worn away, or wrong sized. This results in the wheels being centered by the lugs only, which commonly causes the vehicle to have steering wheel shake. A shaking wheel can make a vehicle hard to control at speed and dangerous to drive, besides simply being unpleasant.

- Sometimes it's the little things that get you into trouble. Aftermarket lug bolts often present their own gremlins. Over the years, we have seen these cause several problems. Wheels with bolts that are too short may not stay tight, bolts that are too long can damage the parking brake assembly, and, worse yet, bolts with not enough tensile strength for the wheel size can break under the increased load and weight. This is especially true with chrome-plated bolts.

It's important to remember when making any modifications, proper engineering and component upgrades must be taken into consideration to maintain safety. It's not just the driver that takes the risk when mounting a set of oversized wheels. Passengers and the public at large could be greatly impacted by such actions.

IMPACT ON ELECTRONIC SYSTEMS

Most of you probably know about the mechanical problems that installing oversized wheels can cause. What's lesser known, however, is the possibly negative influence

on the electronic safety systems. These are the systems that run silently in the background such as the ABS, ESP, and DTR mentioned before. Others include the tire pressure monitoring system (TPMS), Active Body Control (ABC), Airmatic with Active Dampening (ADS), Pre-Safe (SRS), and Attention Assist systems. There has been limited research in this area, but it stands to reason that changing wheels could have an overall negative effect. Mercedes-Benz safety systems were designed to operate with the factory wheels sizes. Being data dependent, these systems need the most accurate information in order to operate correctly. Increased wheel size changes wheel speed, drive ratio, suspension travel, and maneuverability, thus corrupting critical factors the system needs to calculate the appropriate amount of response in an emergency actuation. When milliseconds count, do you want to be the one who compromises active safety by installing oversized wheels? These safety

systems were installed for a reason, and some are now being made mandatory standard equipment and should not be altered.

Some of the known conflicts with these systems have come through our shop, such as:

- Missing TPMS sensors. A customer comes in with a TPMS light on wanting diagnosis. After a quick computer check and a hard code “Loss of communication to one or more sensors” present, a quick look at the aftermarket wheels makes the cause become apparent. The wheels were not manufactured to accommodate the factory TPMS sensors. So, the installer had just left them out.
- A vehicle comes in with an ABS/ESP light on above 50 mph. A check of the system reveals a “Wheel speed implausible” codes. Live data shows sensors to be working. In this case, the oversized wheels were the



This GL450 has a damaged aftermarket wheel from hitting a pothole. There was not enough sidewall to absorb the impact. Also, this rim's construction is inferior with too much offset

culprits. The tires had enough difference in tread depth along with the increased circumference to cause the problem. The system senses that the speeds are too far apart to function properly.

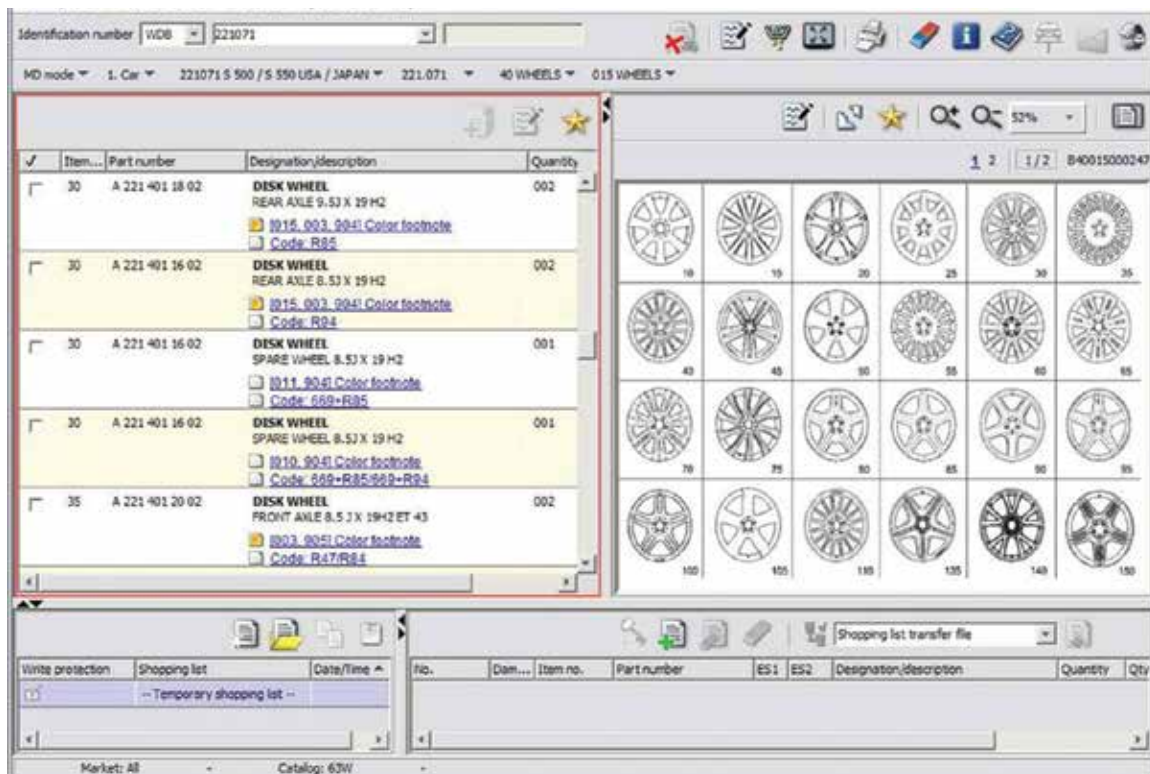
- Countless calls from customers looking to have their Airmatic or ABC system “recalibrated” to accommodate the new ride height of oversized wheels.
- Vehicles needing TPMS pressures parameters changed to match the new operating pressures of the non-stock wheels and tires.

In most cases the ultimate fix is to reinstall the factory Mercedes-Benz wheels and tires. Luckily for most shops, these types of repair orders are few and far between. Over time as popularity increases and systems become more sensitive, the potential for new problems is sure to arise.

A BETTER SOLUTION

How do you as an ISP offer a better option? The answer may be as close as your local Mercedes-Benz dealer’s parts counter or the Electronic Parts Catalog (EPC). On most vehicles, there is already a built-in sport or appearance option that was factored in during the design process. A search through the catalog will show all of the approved optional wheels available. Wheels from the Mercedes-Benz performance wing (AMG) are also available for many applications. With numerous size and style options, this is the best overall compromise. The greatest benefit is that the Mercedes-Benz part was manufactured to the highest standard. High-quality parts are designed for a precise fit.

In the end, however, it will always come down to personal preferences. There will always be those who are willing to sacrifice safety for looks. Aftermarket wheels, no matter the consequences, are here to stay. |



Here’s a screen shot of the wide range of custom wheels available for the W221 S-Class from Mercedes-Benz. Better choices for safe, trouble-free motoring.