DTU

DISCOUNT TIRE UNIVERSITY

WHEEL BASICS

PARTICIPANT REFERENCE GUIDE

WHEEL BASICS INTRODUCTION

Welcome to Wheel Basics!

Did you know there are many things to consider when working with new or existing wheels on a customer's vehicle? Factors such as style, finish, and detailing can influence which wheel is put on a vehicle; however, the most important factor is choosing a proper fitment. Wheels need to be compatible with the vehicle and tire selection, regardless of style preferences.

We service wheels that are original equipment and aftermarket:

Original Equipment or **OE** means that the wheels came on the vehicle from the manufacturer and are designed specifically for that vehicle.

Aftermarket signifies that the wheels were not installed by the manufacturer. They were put on at a later time to provide a unique look for the customer.

In this course, we are going to introduce you to the sections of a wheel and their purpose, wheel measurements, and wheel accessories. After that, we will identify and distinguish different brands, finishes, and sizes. You will potentially use all of this information within the first thirty days of working in the Service Area. Last, we will wrap it up with a brief assessment.

Critical to Safety

Processes that must be followed to ensure a safer working environment for our People, provide a quality service for our Customers, and adhere to Discount Tire's core values with regard to Integrity, Honesty, and doing what we believe is right.

Critical to Quality

Processes that must be followed to ensure the Quality of our work, increase overall delivery, and adhere to Discount Tire's core values with regard to Integrity, Honesty, and doing what we believe is right.

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SECTIONS OF A WHEEL

In this section, you will be introduced to the sections of a wheel and their purpose.

Face

The **face** is the most exposed part of the wheel and comes in different designs and finishes.

Rim Flange

The **rim flange** is the outside structure that secures the tire to the wheel. It is the area that locks the bead into place.

Barrel

The **barrel** is located in between the face and the inner rim flange. The barrel includes items such as the drop center and retention hump.

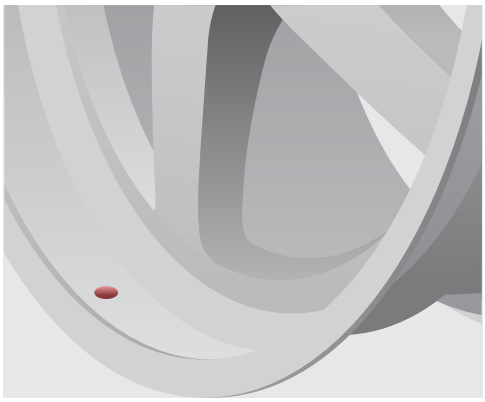
⚠ Critical to Quality ⚠

It is important that we not gouge the barrel of the wheel while servicing.

SECTIONS OF A WHEEL *(continued)*

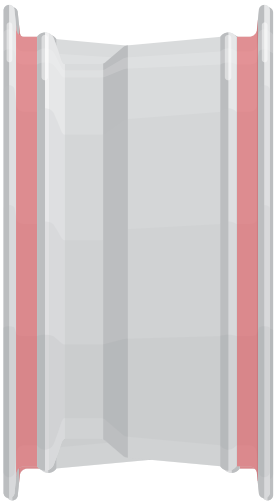
Valve Hole

The **valve hole** is where the valve-stem or TPMS sensor is installed.



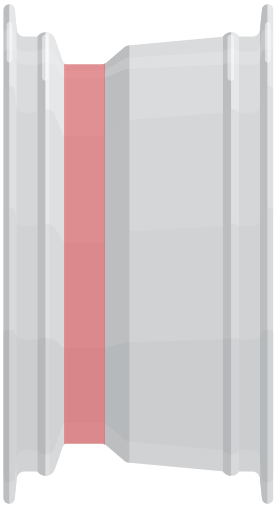
Bead Seat

The **bead seat** is the section between the rim flange and the retention hump that prevents the tire from slipping off the wheel.



Drop Center

The **drop center** is the depression in the wheel that allows the tire bead to go over the bead retention hump during mounting.



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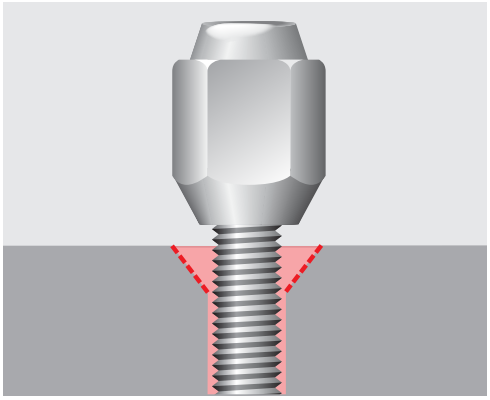
SECTIONS OF A WHEEL *(continued)*

Lug Holes

The **lug holes** are where the lug nuts are fastened and properly torqued to the vehicle studs. This will be discussed in greater detail later on.

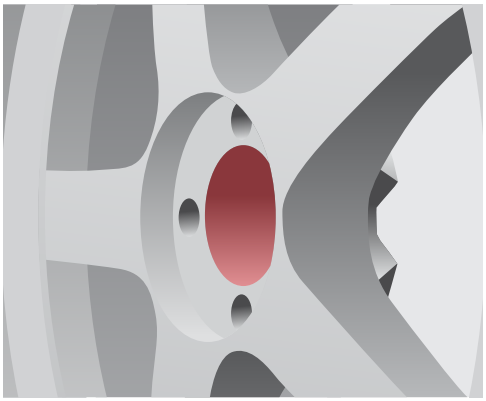
Lug Seat

The **lug seat** is where the lug nuts contact the wheel after it is tightened.



Center Bore

The **center bore** is the hole in the center of the wheel that is matched to the hub pilot of the vehicle.



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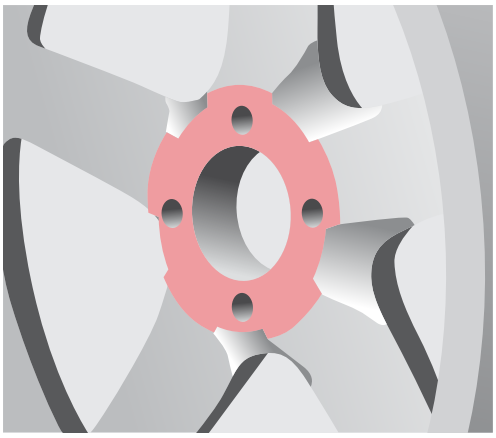
SECTIONS OF A WHEEL *(continued)*

Mounting Surface

The **mounting surface** is where the wheel comes into contact with the hub and rotor surfaces.



Wheel Finishes

Every wheel model has a different style and finish to match the customer's true needs. Let's quickly review the five main finishes.

Chrome

Chrome wheels have a very reflective, mirror-like shine.

Polished

Polished wheels are raw aluminum that is buffed to a mirror-like finish.

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SECTIONS OF A WHEEL *(continued)*

Wheel Finishes *(continued)*

Mirror Machined

Mirror machined wheels are very similar to polished wheels. The primary difference is that a clear coat finish has been applied to the top of the bare aluminum.

Painted

Painted wheels enable manufacturers to create a variety of color options and styles.

Powder Coated

Powder coated wheels offer a finish that is smooth and very durable.

⚠ Critical to Quality ⚠

It is important that we not scratch, dent, or gouge the face of the wheel while servicing them.

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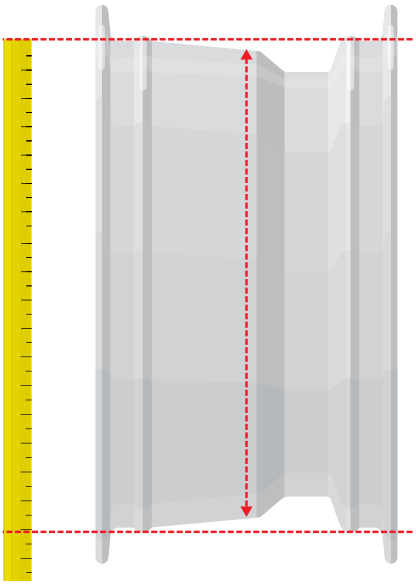
WHEEL MEASUREMENTS

In this section, you will discover how wheel measurements are taken and the components of a wheel sizing system. They play an important role in how the wheel interacts with the tire and how the wheel fits onto the vehicle's hub.

Rim Diameter

Rim diameter on a wheel is measured from bead seat to bead seat.

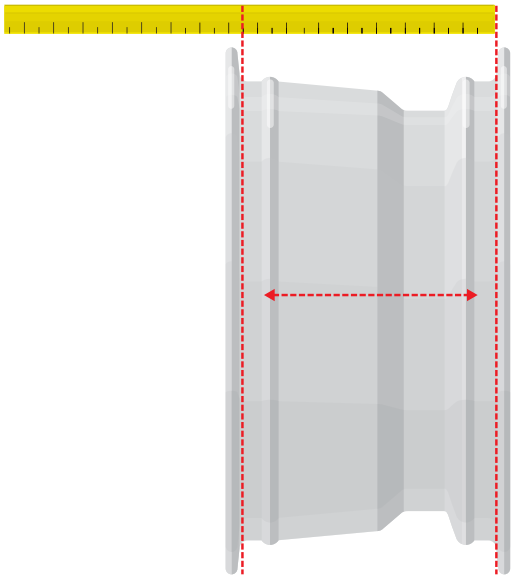


Critical to Safety

When mounting a tire on a wheel, the tire and wheel diameters must match, failure to do so could result in the tire exploding during inflation.

Rim Width

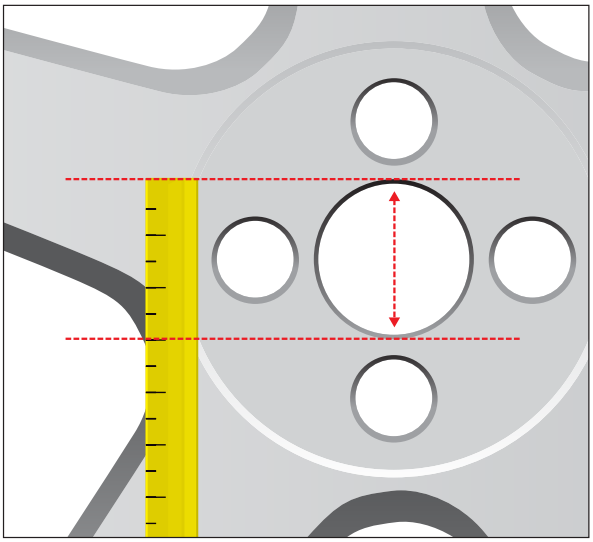
Rim width is the measurement from bead seat to bead seat on the inside of the rim flange.



WHEEL MEASUREMENTS *(continued)*

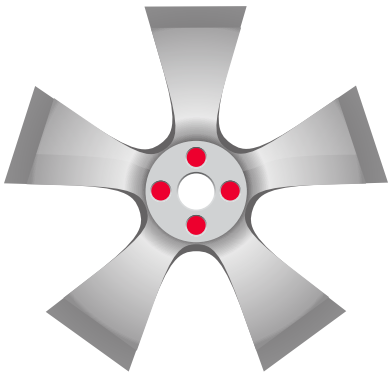
Bore Diameter

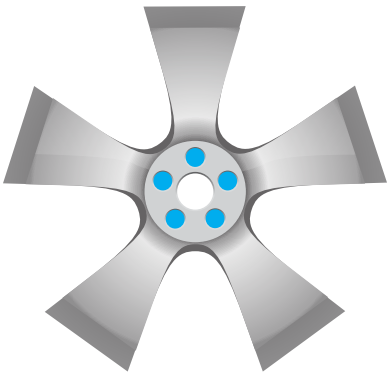
Bore diameter represents the size of the center bore in millimeters.

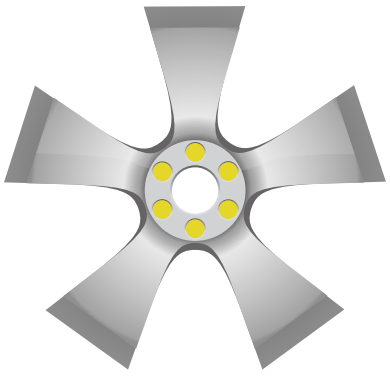


Bolt Pattern

Bolt pattern is a measurement of lug holes on a wheel that are meant to be matched with the bolt pattern of the studs on the vehicle's hub.



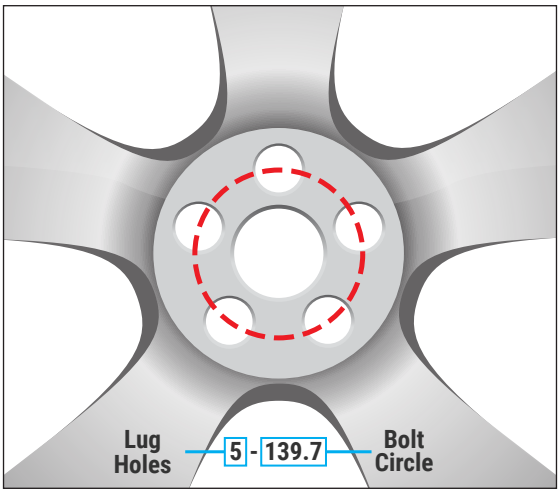


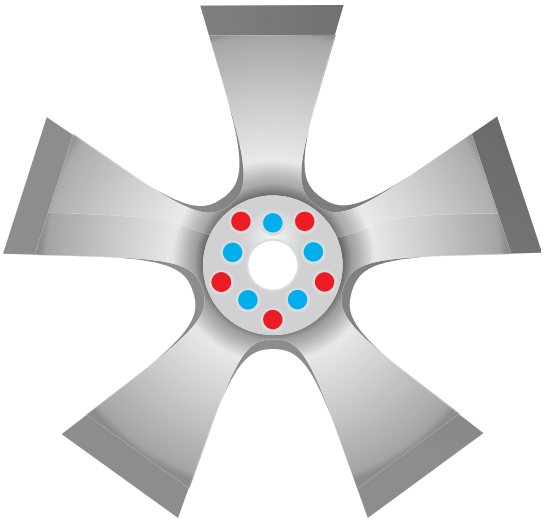


WHEEL MEASUREMENTS *(continued)*

Bolt Pattern *(continued)*

As indicated in the diagram, the Bolt Pattern consists of two numbers, the lug holes and the bolt circles. The first number indicates how many lug holes are in the wheel and the second describes the diameter of the imaginary circle they make. This is known as the **bolt circle**.





Bolt Pattern *(continued)*

In addition to the bolt patterns listed above, many manufacturers produce wheels with **dual** bolt patterns.

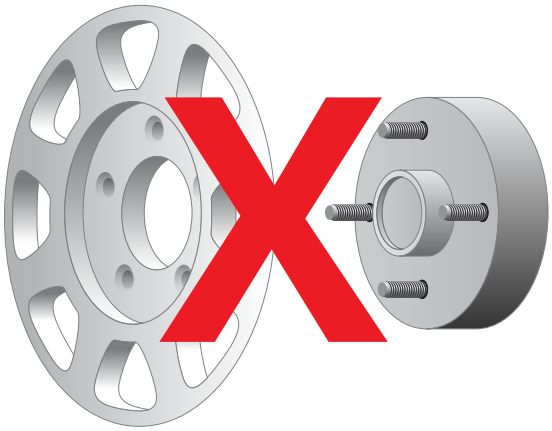
Dual-drill bolt patterns have an additional set of bolt holes, enabling the wheel to accept two different bolt patterns.

Wrap Up

Later in your career, we will go into more detail on how to measure bolt patterns.

Critical to Safety

The bolt pattern of the wheel must be the exact same as the bolt pattern on the vehicle.



5 Lug Holes ≠ 4 Bolts

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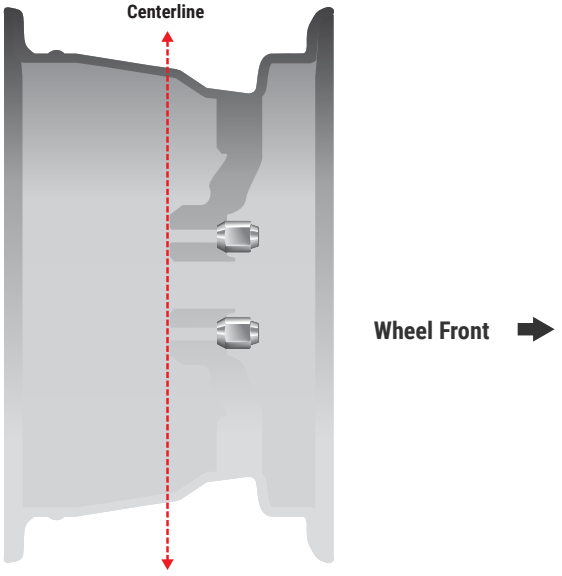
WHEEL MEASUREMENTS *(continued)*

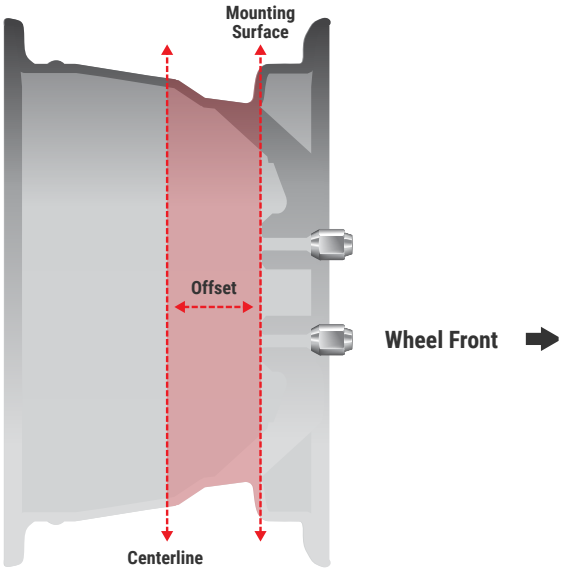
Centerline

Centerline is the center of the barrel, with equal distance to each rim flange.



Offset

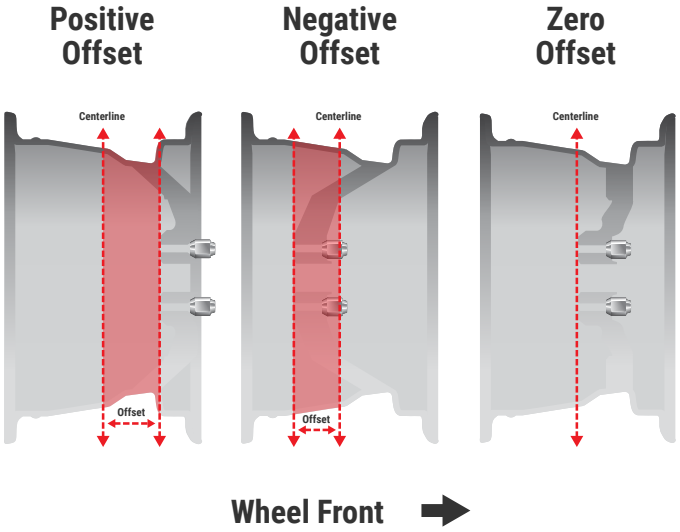
Offset is the distance between a wheel's mounting surface and centerline. This measurement helps you understand how the wheel fits into the wheel well.



WHEEL MEASUREMENTS *(continued)*

Offset *(continued)*

The offset measurement is often referred to as positive, negative, or zero offset. We will cover this later in your career as to how this affects the overall fitment.



Wrap Up

Most of the measurements we have defined are found on the label of a wheel box. Some of these measurements are stamped on the backside of the wheel. This is beneficial if a wheel's box is missing.

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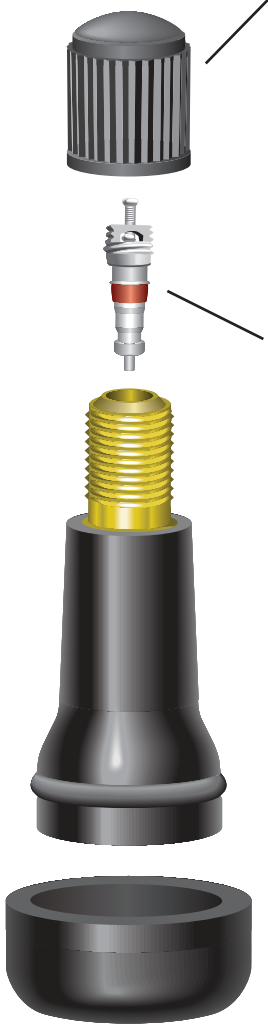
VALVE STEMS AND TPMS

This section provides the purpose and anatomy of valve stems and TPMS. Valve stems and TPMS sensors are essential to inflating or deflating a tire with air.

Valve Stem Anatomy

Valve stems are small, rubber valves installed on a wheel that allows airflow in and out of the tire.

Regardless of the type of valve stem, they all have the same anatomy, which is made up of four main components.



The **cap** encloses the valve opening to keep debris out.

⚠ Critical to Quality ⚠

It is important that we install a valve cap on all valve stems before returning the vehicle to the customer.

The **core** screws into the valve opening.

The **body** is made of rubber and protects the valve.

The **base** seals around the valve hole of the wheel.

VALVE STEMS AND TPMS *(continued)*

Valve Stems

There are multiple types of valve stems available, which can be grouped into two main categories: standard and high-pressure.

Standard Valves

Standard valves are designed for assemblies with less than 65 PSI.

High-pressure Valves

High-pressure valves are designed for up to 100 PSI. Notice they have a flat base at the bottom of the valve.

Critical to Safety

Valve stems must be replaced every time a tire is mounted or re-mounted.

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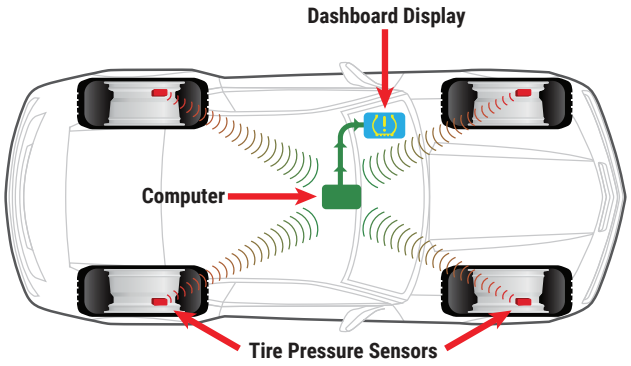
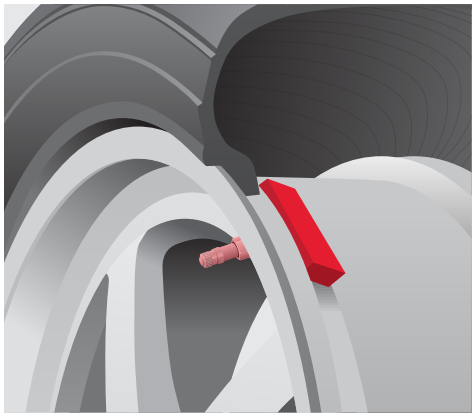
VALVE STEMS AND TPMS *(continued)*

TPMS

TPMS stands for **Tire Pressure Monitoring System**. Most tire pressure monitoring systems contain sensors that are attached to each assembly and transmit data to the vehicle's computer regarding the tire's air pressure. Increased tire life and improved fuel economy is achieved when the TPMS system notifies the user on their dashboard to maintain the proper air pressure.

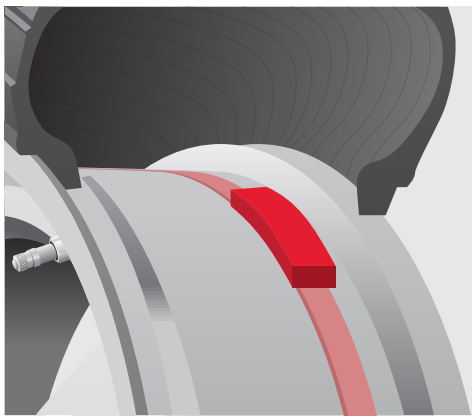


There are two main types of TPMS sensors: **valve stem** and **banded**.



Valve Stem Sensors

Valve stem sensors are installed in place of a valve stem on an assembly. Valve stem sensors still serve the same purpose as a Valve stem, as well as a TPMS sensor. This is the most common sensor and it comes in two types: rubber and aluminum.



Banded Sensors

Banded sensors are found on an aluminum band that is found along the barrel of a wheel. Assemblies that have banded sensors use regular valve stems to allow air into the tire.

VALVE STEMS AND TPMS *(continued)*

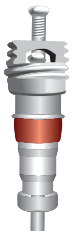
TPMS *(continued)*

Valve Stem TPMS Anatomy is made up of six main components:

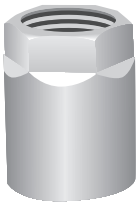
The **cap** protects the valve opening. To reduce the chance of corrosion, or the TPMS sensor seizing to the cap, you must use TPMS friendly caps.

⚠ Critical to Quality ⚠

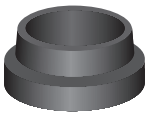
It is important that we install a valve cap on all valve stems before returning the vehicle to the customer.



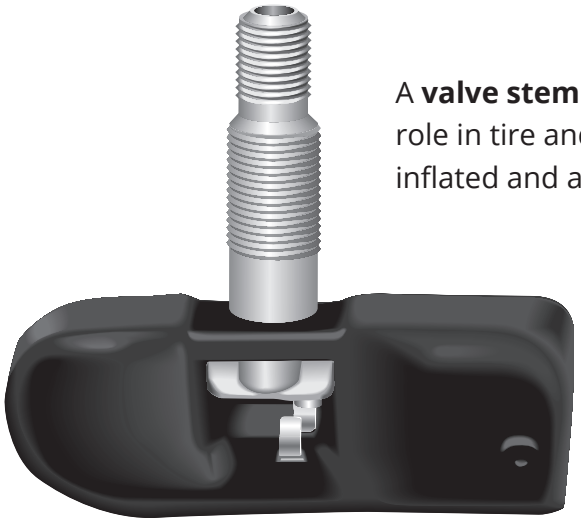
The **core,** which is replaced each time, must be made of nickel in order to prevent corrosion.



The **hex nut** is a nut that provides the torque to seat the grommet to the wheel.



The **grommet** is a rubber gasket that seals the sensor stem to the valve hole. Due to its exposure to heat and excessive forces, it must be replaced each time the tire is serviced.



A **valve stem** is a basic feature of your wheel and plays a critical role in tire and wheel safety. It is necessary to keep your tires inflated and allow you to add or remove air as needed.

The **sensor** itself transmits information to the in-dash computer.

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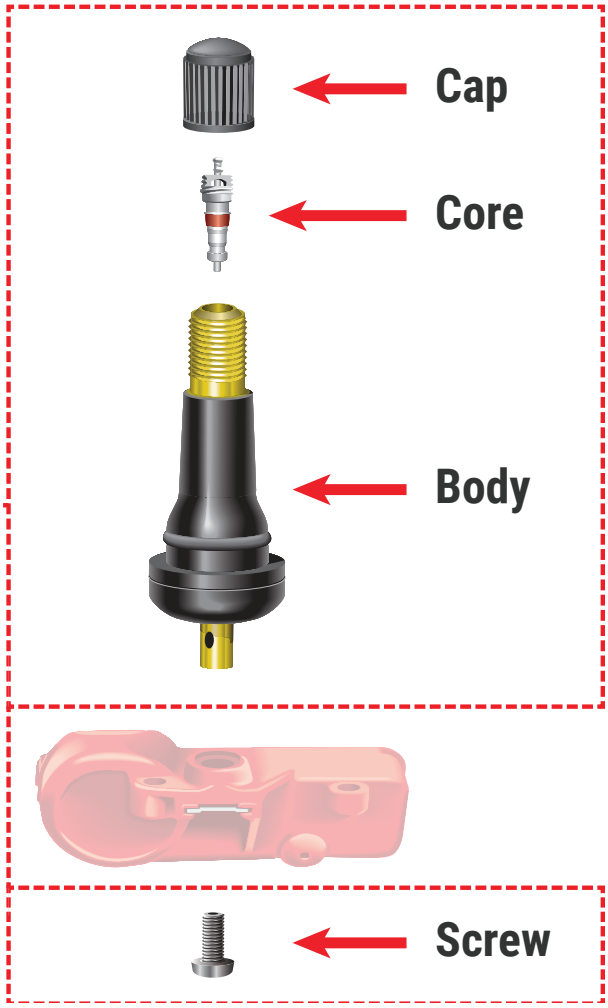
VALVE STEMS AND TPMS *(continued)*

TPMS *(continued)*

Just like regular valve stems, it is important to regularly maintain valve stem TPMS sensors. To do so, we install rebuild kits.

Rubber Sensor TPMS Rebuild Kit Components



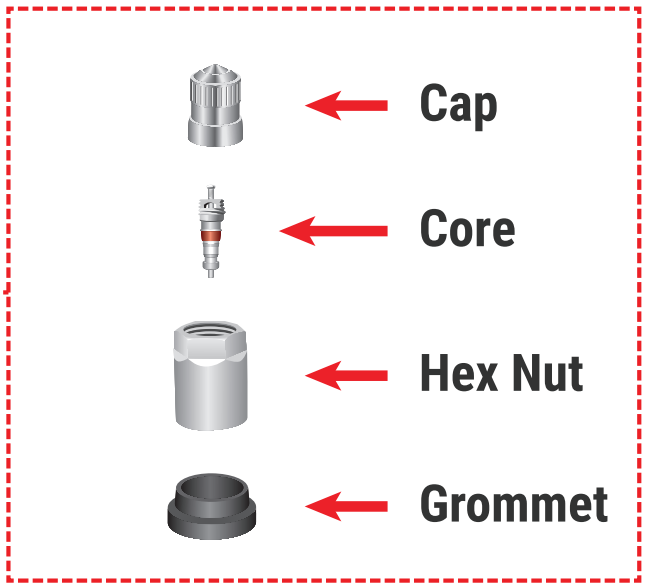
Rubber Valve TPMS

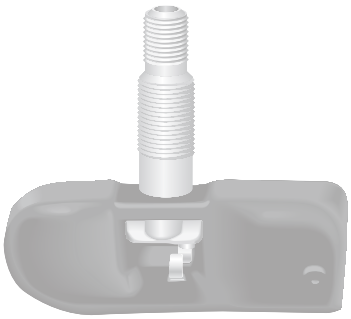
For most rubber valve TPMS sensors, we replace the cap, core, screw, and body.

VALVE STEMS AND TPMS *(continued)*

TPMS *(continued)*

Metal Sensor TPMS Rebuild Kit Components





Aluminum Valve Stem TPMS

For most aluminum valve stem TPMS sensors we replace the cap, core, grommet, and hex nut.

Critical to Safety

TPMS sensors must be rebuilt every time a tire is mounted or re-mounted.

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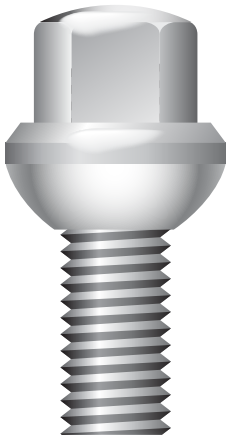
LUG NUTS AND HUB RINGS

In this section, you will be introduced to the purpose and different common types of lug nuts. We are also going to introduce the concept of hub-centric versus lug-centric wheels and the purpose of hub rings. These accessories are used to secure and align the wheel onto the vehicle's hub.

Lug Nuts

Lug nuts are used to secure the wheel onto a vehicle. There are different types and sizes of lug nuts available. Having the proper lug nut helps ensure that your wheel is safely and securely installed on your vehicle.



Lug Bolt

Lug bolts feature a lug nut with a bolt attachment.

Lug bolts function differently than a standard lug nut. Most vehicles have wheel studs coming from the vehicle's hub. Standard lug nuts are fastened onto the wheel studs to create torque.

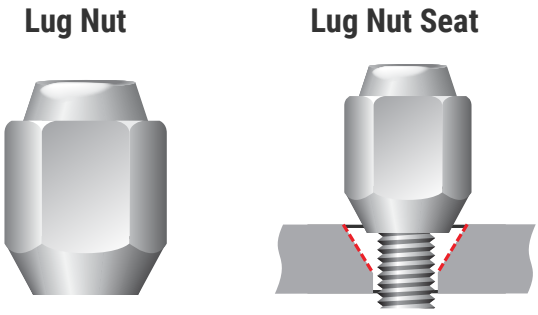
For many European vehicles, lug bolts are used to function as both the lug nut and the wheel stud.

Most lug nuts and bolts we sell come in wheel installation kits.

LUG NUTS AND HUB RINGS *(continued)*

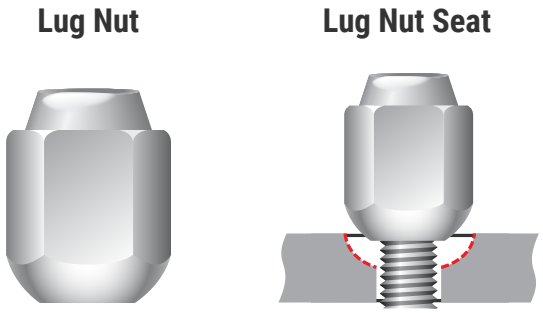
Lug Seats

All lugs have a specific lug seat. The seat of the lug must match the wheel seat type, as it is possible mismatched seats could damage the wheel. It is also likely that a mismatched lug nut and wheel could potentially cause the lug nut to loosen and the wheel to become unsecure on the vehicle.



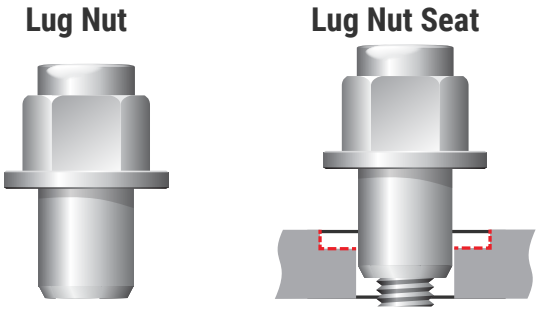
Conical, Bulge, or Acorn

Conical, bulge, or acorn lug nuts feature a tapered seat.



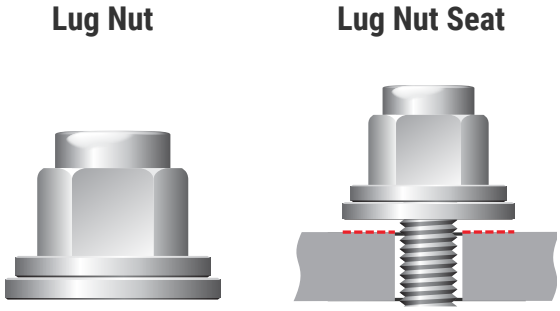
Radius or Ball Seat

Radius or ball seat lug nuts feature a bowl shaped seat.



Mag or Shank

Mag or shank lug nuts feature a flat mounting surface underneath a lug nut.



Torque Retention

Torque retention lug nuts feature a lug nut with a floating washer.

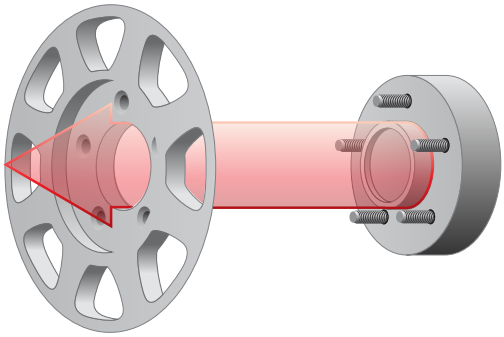
Critical to Safety

It is very important that the lug seat of the wheel and the base of the lug match. If at any point you question the lug nut, STOP and get your supervisor immediately.

LUG NUTS AND HUB RINGS *(continued)*

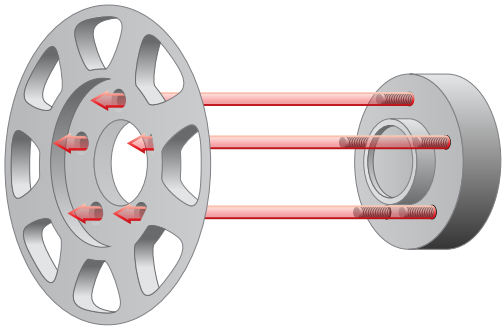
Hub-centric vs. Lug-centric Wheels

When installing wheels on a vehicle, it must be secured to the center of the vehicle's hub. For this, wheels are designed to be centered using two different methods: **hub-centric** and **lug-centric.**



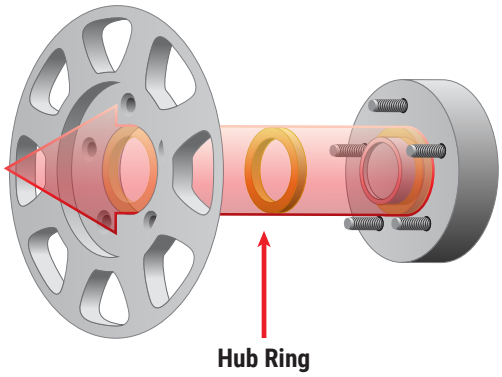
Hub-centric

Hub-centric wheels are designed for the hub center bore of the wheel to be a perfect fit to the vehicle. This ensures the wheel is centered while spinning, reducing the chance of vibration. Most original equipment wheels are designed to be hub-centric because the manufacturer designs wheels specifically for each vehicle.



Lug-centric

Lug-centric wheels are centered on the mounting surface using lug holes. Most aftermarket wheels are lug-centric.



Hub Ring

Hub-centric rings, or hub rings, can be installed on most lug-centric wheels. A hub-centric ring is a plastic, or metal, ring that sits inside the hub bore and on the hub of the axle. This fills the gap between the hub bore and the hub pilot, essentially making lug-centric wheels hub-centric.

⚠ Critical to Quality ⚠

It is important to install hub rings on aftermarket wheels to reduce vibration, when applicable.

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CENTER CAPS AND COVERS, SPACERS, HUB EXTENSIONS, AND LUG ADAPTERS

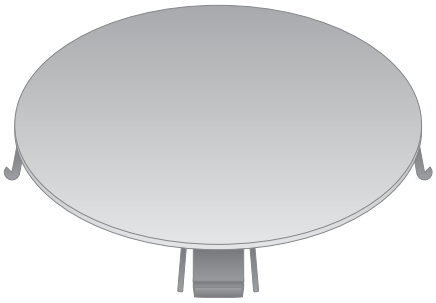
This section provides an overview of different wheel center caps and covers and why they are used. Next, we will define wheel spacers, lug adapters, and hub extensions. Some of these accessories have safety warnings which require you to stop service and get your supervisor right away.

Center Caps and Covers

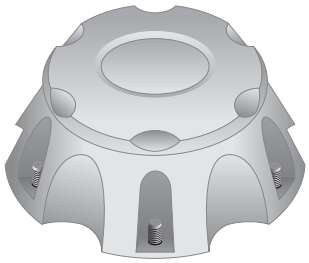
The purpose of wheel center caps and covers is to protect the center of the axle and the wheel hub. Dirt and grime is often kicked up from the road which may cause excessive wear on these items. Wheel center caps also cover unsightly lug nuts and bearings.

⚠ Critical to Quality ⚠

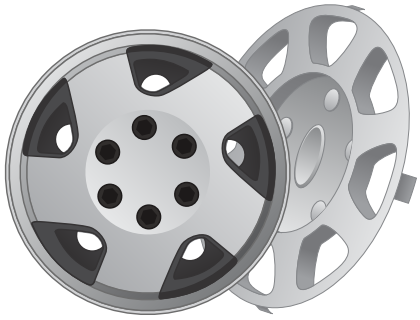
It is important that when we service wheels, we do not scratch, dent, or gouge the exposed face of the wheel.



Snap-In
Snap-in caps have brackets that snap into the center bore, from the front of the wheel.



Screw On
Screw on caps attach through screws or bolts at the front or rear.



Hub Caps
Hub caps cover the entire face of the wheel and are secured by brackets, or lug nuts.

Push-In
Push-in caps go into the center bore, from the back of the wheel.

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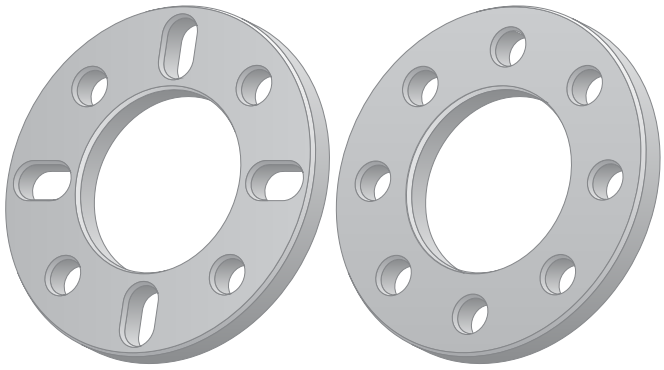
CENTER CAPS AND COVERS, SPACERS, HUB EXTENSIONS, AND LUG ADAPTERS

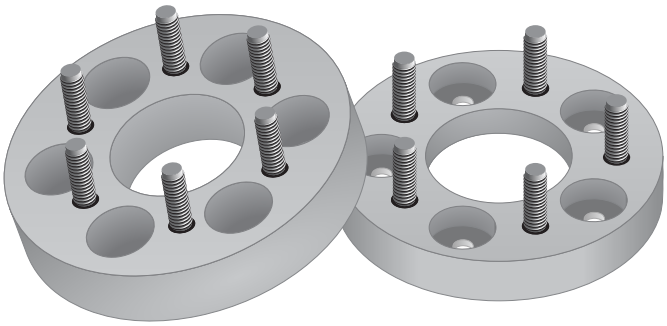
Wheel Spacers, Hub Extensions, and Lug Adapters

Wheel spacers, hub extensions, and lug adapters are used when the offset of the wheel is not ideal for the vehicle on which they are being installed. This often occurs when the customer is trying to achieve a specific look.



Wheel Spacers

Wheel spacers are plates that are placed between the mounting surface of the wheel and the vehicles hub.



Hub Extensions and Lug Adapters

Hub extensions and **lug adapters** bolt onto the existing studs.

Critical to Safety

As a company, we do not sell or recommend hub extensions, lug adapters, or wheel spacers. If you see any of these, STOP and get your supervisor immediately.

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MATCHING WHEELS WITH WORK ORDERS

Wheel Box Label

The wheel box label provides critical information similar to how a tire tag provides information about a tire. Once you have identified all the information on the work order, you will use it to verify the correct product before installing or mounting a tire on the wheel.

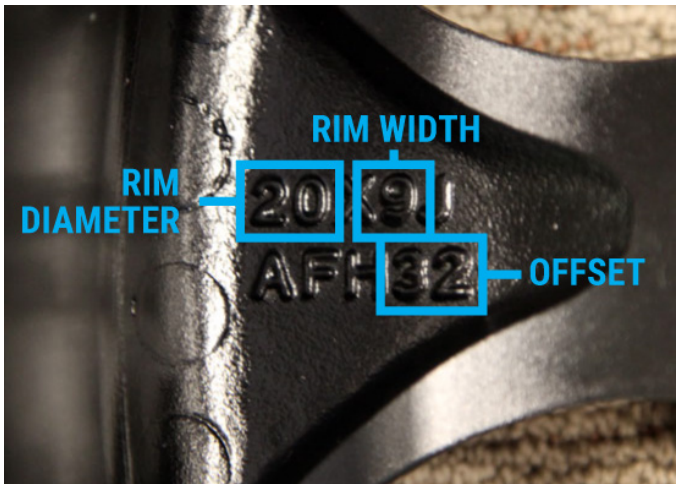
All of the same information is provided on the wheel box label and the work order.

We sell a variety of different sizes and styles of wheels.

Wheel Stamp

There are also times in the Service Area where there may not be a wheel box label available. It is important to understand how to read the wheel stamp. Stamped onto the back of the wheel is the rim diameter, rim width, and offset.

Each of these methods is used to ensure the correct wheel on the work order matches the product to be installed.



Understanding how to match the correct wheel with the work order will help to ensure proper fitment and demonstrate your ability as a Trusted Expert.

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