



*NC Department of Environmental Quality*

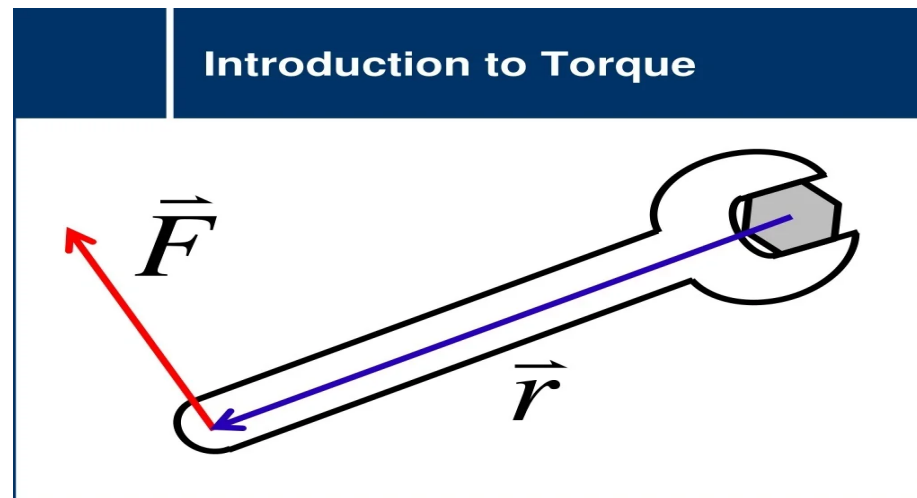
**Lug Nut Torque**

rev. 05-2026



# Lug Nut Torque

- Lug nut torque is the amount of twisting force used to tighten lug nuts that hold a wheel onto a vehicle.
- The torque range typical for tow vehicle and boat trailer wheels are measured in foot-pounds or newton-meters.



# Under-Torquing

- Under torquing refers to lug nuts which are not tight enough.
  
- Hazards of Under Torquing:
  - Wheel loosens while driving
  - Wheel vibration or wobble
  - Stud fatigue or breaking
  - Increased bearing wear
  - Reduced braking ability
  - Accelerated wear on wheel lug holes
  - Worst Case: Wheel separation from vehicle

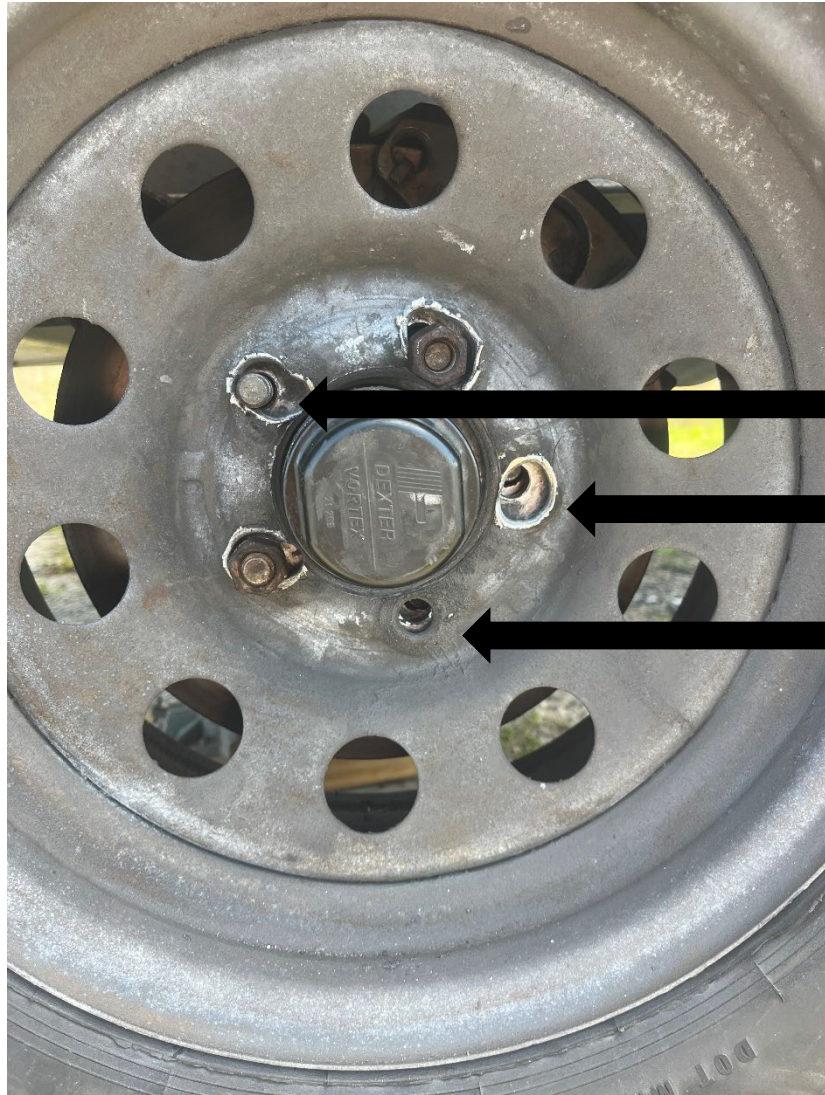


# Over-Torquing

- ❖ Over Torquing refers to lug nuts that are too tight.
- ❖ Hazards of Over Torquing:
  - Stretched and weakened wheel studs
  - Cracked or damaged wheels
  - Extra stress on hubs and hardware
  - Warped brake rotors
  - Increased risk of stud failure
  - Roadside tire change may be difficult or impossible



# Damage from Incorrect Torque



Missing lug nut

Broken stud

Broken stud

Notice that four holes are reamed out from wheel wobble



# General Torque Ranges: Trailers

<u>Type Trailer:</u>	<u>Wheel Torque (ft-lb)</u>
Small Utility/Jet Ski	75-90
Single Axle	90-120
Tandem Axle	100-140
Heavy Triple Axle	140+

**Note:** Always check the operator's manual for your specific vehicle. Torque value may change if you replace the factory wheels.



# General Torque Ranges: Ford Trucks

<u>Ford Trucks:</u>	<u>Wheel Torque (ft-lb)</u>
F-150	150
F-250 Super Duty	150-165
F-350 Super Duty SRW	165
F-350 Dual Rear Wheel	165-175

**Note:** Always check the operator's manual for your specific vehicle. Torque values may change if you replace the factory wheels.



# Torque Measuring Tools

- Impact Wrenches: Can be air powered (pneumatic) or rechargeable. They may or may not be adjustable.
- Torque Sticks: Calibrated extensions between an impact wrench and socket. They are set at one torque value and not adjustable.
- Torque Wrenches: Hand wrenches that may be adjusted to different torque settings.



# Impact Wrenches

- Can be powered by air (pneumatic) or rechargeable batteries.
- With air powered impact wrenches torque can be affected by the compressor.
- They may or may not be adjustable. When adjustable they have numeric values that don't correspond to specific torques.
- You must check them against a known value or use a torque stick.
- Price range: \$80 to several hundred.



# Torque Sticks

- Torque sticks are only used with impact wrenches and placed between the impact wrench and socket.
- They are calibrated to one torque value.
- You may need one torque stick for the trailer and another for the tow vehicle.
- Price range: \$30 and up for a set.



# Torque Wrenches

- Torque wrenches are adjustable.
- They click and do not allow further tightening when you reach the set torque.
- They can be analog or digital.
- They are sold in different torque ranges and drive sizes .
- Price range: \$40 up to several hundred.

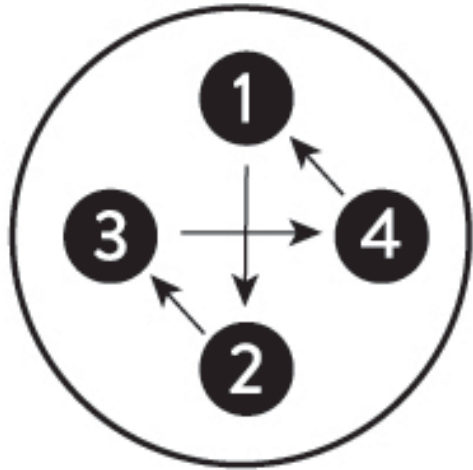


# How to Install Lug Nuts

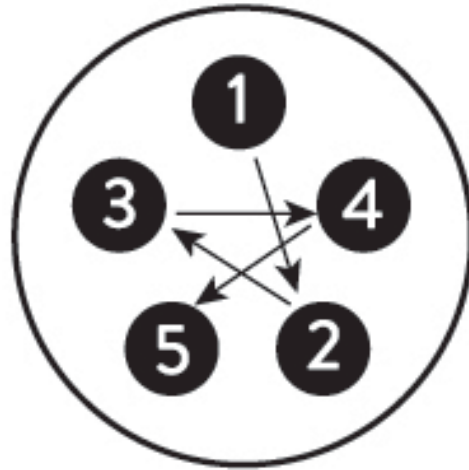
- Start all lug nuts by hand for 3 full turns. This prevents cross threading. Never begin threading a lug nut with a wrench or impact wrench. Make sure all nuts are snug before you use a torque-measuring device.
- Tighten all nuts in a star pattern (not in a circle). Once you tighten one nut move to one across from it and continue that pattern until all nuts are tightened to the correct torque. This pattern ensures the wheel is properly set against the hub.
- Don't use a torque-measuring device with the wheel off the ground. If the wheel can spin you cannot reach the proper torque.
- After a roadside tire change, loosen the lug nuts slightly and retighten them with a torque measuring tool at the first opportunity.



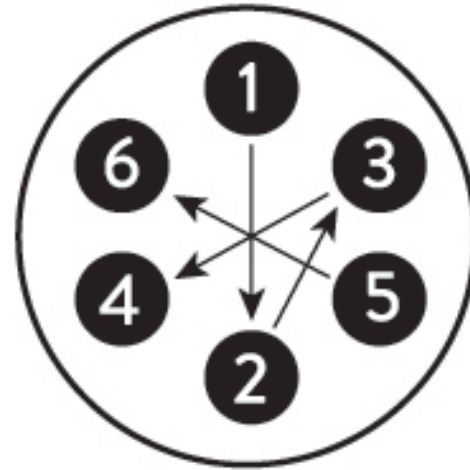
# Star Pattern Diagrams



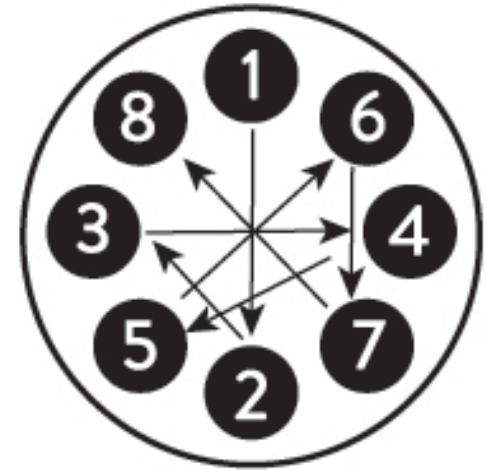
**4** Lug Tightening Pattern



**5** Lug Tightening Pattern



**6** Lug Tightening Pattern



**8** Lug Tightening Pattern

# Marking Lug Nuts for Tamper Detection

- Good mechanics use a torque marker after they torque a nut. The stripe lets them know if someone tampered with the nut to reduce warranty claims.
- DMF stripes lug nuts for two reasons:
  1. The stripe indicates the nut was properly torqued.
  2. It provides a quick, visual indicator of tampering.

(Ask for Cross Check in the DMF HQ Warehouse)



# Best Practices

- Keep a rechargeable impact wrench in your tow vehicle with deep well sockets for the trailer and tow vehicle lug nuts.
- Keep a reflective vest in your tow vehicle.
- Keep a torque wrench or torque sticks at every office with boats or tow vehicles.
- Tow vehicles should carry a spare bearing assembly and the necessary tools. Changing the assembly roadside is much faster than changing a bearing.
- Tow vehicles should carry emergency signal devices such as flares or reflective triangles.



# Miscellaneous Tips

- Never use anti-seize compound on wheel studs.
- Buy good quality torque sticks. They are only accurate to 10%-20% and are affected by the power of the impact wrench.
- Torque wrenches are more accurate and versatile than torque sticks.
- Always store torque wrenches at their lowest setting.

