VENTURE
TRAILERS

# User Manual

Venture Trailers
5301 North Point Blvd.
Sparrows Point, MD 21219
(410) 388-1000
www.venuretrailers.com

# *Congratulations on your new Venture Trailer!*

Thank you for choosing Venture. Our trailers are built with quality and reliability in mind, backed by a lifetime of support through educational resources and dedicated customer service—so you can stay out on the water for years to come.

We are confident you'll be completely satisfied with your purchase. Our mission is simple: to provide you with a dependable trailer at a fair price.

For your safety, please read and understand this manual before operating your trailer. If you have any questions about the information provided, consult your dealer.

Keep this and all other manuals supplied with your trailer in a safe place for future reference.

**To help keep your trailer on the road for years to come, we offer a wide selection of high-quality boat trailer parts made to fit your Venture Trailer.**

**Explore our online catalog to find what you need:**
**www.venturetrailers.com/order-parts**

# Preparing Your Trailer for Towing

## 1. Hitch & Load Compatibility

Before towing, it's essential to ensure your trailer and tow vehicle are compatible in terms of hitch size, towing capacity, and hitch height. Incorrect setup can cause unsafe handling, excessive trailer sway, or structural stress.

**Hitch Ball Size:**

Use the correct size based on your trailer type:

- **2"** ball for single-axle and small tandem trailers.
- **2-5/16"** ball for large tandem and triple axle trailers.

Your tow vehicle and hitch must have a towing capacity **equal to or greater than** the combined weight of the boat (with full tanks and gear) and the trailer.

### Hitch Height: Ensuring Level Towing

The trailer should always be towed level, meaning the trailer's tongue and frame should be parallel to the ground when hitched. A level setup ensures safe handling, even weight distribution, and proper braking and suspension performance.

### How to Determine the Correct Hitch Height:

1. Start with an empty trailer on flat, level ground.
2. Use the tongue jack to adjust the trailer so that:
    - The frame at the rear (near the taillights) and the frame at the tongue junction are the same height from the ground.
    - Measure both points with a tape measure to ensure the trailer is truly level.
3. Once the trailer is level, measure from the ground to the top of the coupler on the trailer tongue.This measurement is the required hitch ball height for your tow vehicle.

**TIP:** Make sure the tongue weight is between **5%–7%** of your trailer's fully loaded gross weight.

- Proper tongue weight is critical to trailer performance. If the tongue weight is too low or too high, it can cause the trailer frame to sag or distort, preventing it from sitting level. A level trailer ensures optimal handling, reduces the risk of sway, and minimizes structural strain. Always verify tongue weight and adjust as needed to maintain safe and efficient towing conditions
- You may see higher recommendations for tongue weight, up to 15%, online, but those typically apply to RV or cargo trailers. These trailers have shorter tongues, which need more tongue weight for stability. Boat trailers, however, often have long tongues (up to 10 ft.), which provide leverage. For this reason, 5%–7% tongue weight is ideal for boat trailers.

## 2. Electrical Connections

Ensure your vehicle has the appropriate trailer connector and that all lights and signals function correctly.

**Connector Types:**

- **Flat 4-pin connector**-Recommended for trailers without brakes.
- **Flat 5-pin connector** – Recommended for trailers with standard surge disc brakes.
- **7-pin round RV-style connector** – Required if the trailer is equipped with an electric-over-hydraulic (EOH) braking system.
    - A **7-to-5 adapter** can be used and is available at most auto parts stores or major retailers.

**Backup Considerations (Surge Brakes):**
Venture trailers that are manufactured with disc brakes will come standard with a 5-pin connector. The blue wire powers the reverse lockout solenoid, which disables the brakes when the tow vehicle is in reverse.

---

# Adjusting Your Trailer to Your Boat

Accurate fitment ensures safe towing and protects your boat's hull and structure.Trailer adjustment may vary per boat manufacturer. These are general guidelines.

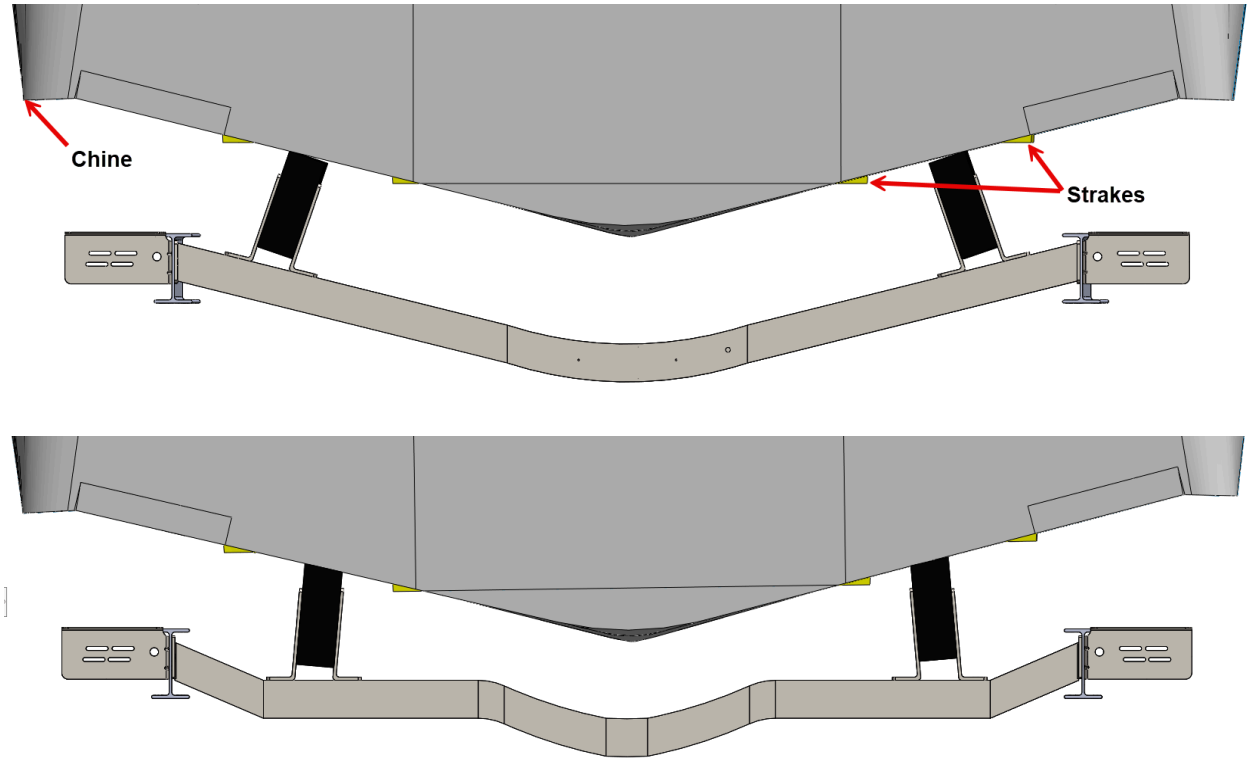
**Measuring for Fit:**

- Measure from the bow eye to the transom – this is the most important dimension when matching a trailer to your boat.
- For boats with outboard engines or I/Os, the transom should sit flush with the end of the bunks to ensure maximum support.
- Boats with mid-mounted inboard engines may extend slightly beyond the bunks, since hull stress is concentrated near the engine rather than at the transom.
- It is acceptable for bunks to extend beyond the transom, provided the transom is supported by the rear crossmember of the trailer.
- Set the bow stop about 1 foot farther forward than this final position to allow for adjustment during first loading.

## 1. Bunk Adjustments

Proper bunk adjustment is essential to supporting your boat's hull correctly, ensuring stability during transport and avoiding structural damage. This section explains how to adjust both the main load-bearing bunks and the target (guide) bunks, using your hull's features as alignment references.

**Main Load-Bearing Bunks:**
The main bunks carry the entire weight of the boat and should be adjusted to align with the strongest parts of the hull.




### How to Position:

- Ideally, align the main support bunks directly in between the outermost set of lifting strakes, or if possible, under the chines of the hull (see Diagram 1 above).
- Avoid placing bunks under:
    - Water pickups
    - Transducers
    - Hull stringers or sensitive structural elements

⚠️ Position the bunks as wide as possible for maximum lateral stability.

This adjustment determines how your boat will sit on the trailer going forward — take the time to get it right. Once adjusted, these bunks should fully support the hull without needing further repositioning.

### Target Bunks:

Target or guide bunks are smaller, vertically or diagonally mounted bunk boards (usually carpeted or plastic-covered) positioned near the bow or along the sides of the trailer. Their main job is to:

- Help center the boat during loading
- Prevent side-to-side movement
- Guide the bow toward the winch post or bow stop

They are not designed to support significant weight, unlike main bunks.

**1. Initial Target Bunk Setup (Before First Loading):**
- Loosen the mounting set screws or U-bolts.
- Lower the target bunks so they sit just below the expected contact point with the hull.
- Leave enough clearance so they don't interfere with initial boat placement on the trailer.
- They should not lift or carry the boat's hull during this first alignment.

**2. Final Target Bunk Setup (After Boat is Centered and Winched):**
- With the boat fully on the trailer, raise the guide bunks so they sit snug against the hull, especially near the bow.
- Ensure both bunks are evenly adjusted to avoid pushing the boat off-center.
- Tighten all hardware securely.

⚠️ Avoid overtightening or angling the bunks so they press excessively on the hull — they are meant for guidance, not support. If used improperly (e.g. too high or angled), they can cause uneven hull pressure or even minor damage.

⚠️If, after loading the boat, the guide bunks are carrying excessive weight and are already set at their lowest point, the bow may be positioned too low. To correct this:

- Raise the bow by moving the main load-bearing bunks closer together, and/or raise the front ends of the main bunks upwards.

# 2. Axle Placement & Load Balance

Proper axle alignment is essential for safe towing and optimal trailer performance. The axles must be positioned in relation to the center of gravity (CG) of the loaded trailer and boat. Incorrect axle placement can lead to excessive tongue weight, trailer sway, or even structural stress on the frame.

## Understanding Axle Placement

The axle position determines how the weight is distributed between the trailer coupler (tongue) and the trailer wheels. Ideally, the tongue should carry 5-7% of the total trailer load.You may see higher recommendations for tongue weight, up to 15%, online, but those typically apply to RV or cargo trailers. These trailers have shorter tongues, which need more tongue weight for stability. Boat trailers, however, often have long tongues (up to 10 ft.), which provide leverage. For this reason, 5%–7% tongue weight is ideal for boat trailers.

**Center of Gravity (CG) Definition:**
The point where the trailer and boat's combined mass could be supported in

equilibrium is called the center of gravity. Axles should be placed slightly behind this point, allowing the tongue to carry its proper share of the load.

## How to Check Axle Placement

### Step 1: Load the Boat Correctly on the Trailer

- Ensure the bunks are as close to the transom as possible.
- The boat should be centered laterally and resting properly on the bunks.

### Step 2: Move the Trailer to Level Ground

- Block the wheels.
- Detach the trailer from the vehicle.
- Measure tongue weight (see below).

### Step 3: Measure Tongue Weight

There's a few ways to measure tongue weight, at a commercial scale, the bathroom scale method or purchase a tongue weight scale. Regardless of which method is used your goal is to be within the **5%–7% range** of the total loaded trailer weight.

Our first recommendation would be to take your vehicle and trailer to a nearby commercial scale. Commercial scales can be found at truck stops, landfills, quarries, and supply centers. There is typically a small fee when utilizing a commercial scale. Here's some helpful websites that will locate commercial scales near you:

https://www.publicscaleslocator.com/
https://catscale.com/cat-scale-locator/ .

Steps to calculate your tongue weight when going to a commercial scale.

1. Make sure your trailer is fully loaded as it would be when taking it on a trip. Drive all 4 wheels of your vehicle on the scale while your trailer is still attached. Record the weight. DO NOT drive your trailer on the scale with your vehicle. You are getting the weight of your vehicle only while under load.
2. While the vehicle is still on the scale, unhook the trailer and lift the tongue jack high enough so that there is no weight on the hitch ball. Again, be sure that no part of the trailer is on the scale. Record the weight. This is the weight of your tow vehicle.
3. Subtract the two weights from each other to give you your tongue weight.

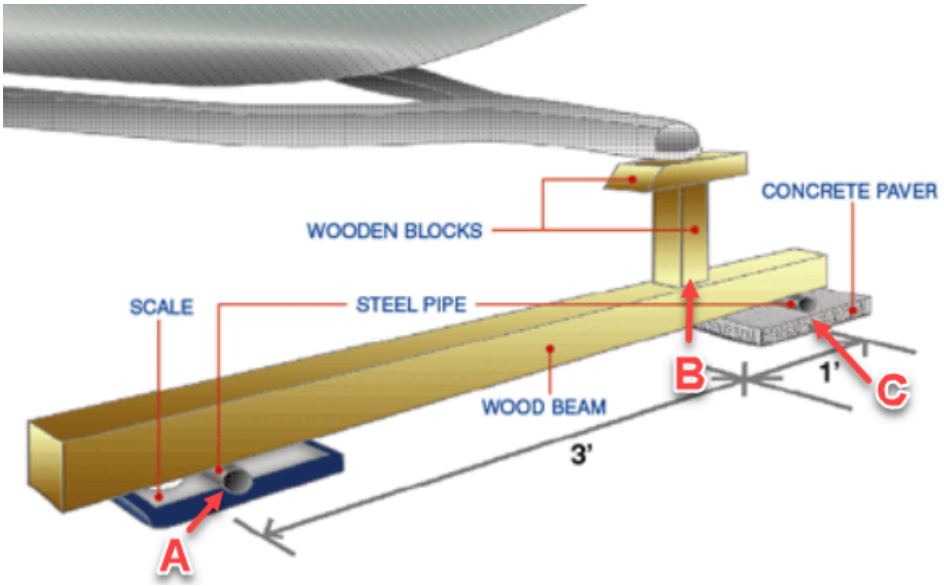
While you are at the scale we always recommend getting the weight of your boat and trailer package too. This is helpful for verifying if you have the correct tow vehicle and trailer capacity.

Our second recommendation would be to use the bathroom scale method. Although it's at the convenience of being at your own home it does require some supplies and set up. You will need:

- Bathroom scale
- 2 pieces of steel pipe
- Concrete paver or brick (or something that is the same thickness as your scale so that your set up is level)
- 2'x4′ between four to five feet long and possibly some extra pieces of wood to use to get your coupler the same height as your vehicle's tow ball would be.

The idea is to set the tongue of  the trailer onto a beam that spreads the load between the bathroom scale and another support point. The load represented on the bathroom scale is the ratio of the scale **(A)** to the coupler support distance **(B)** and the tongue support distance **(C)**. If there is a 3′ gap between the scale support pipe to the coupler support and a 1′ gap between the opposing support pipe to the coupler, that equates to a 4:1 ratio. You'll want to set your 2'x4′ up using a 3:1 or 4:1 ratio. In the example below we are using a 4:1 ratio, which we recommend for heavier trailers.

1. Chock your trailer tires.
2. Lay the brick/paver or similar item and the bathroom scale **three feet** apart.
3. Lay one pipe long ways on the scale and one long ways on the brick/paver.
4. Set your 2'x4′ on top of the pipes.
5. Mark the 2'x4′ one foot over from where it rests on the pipe that is on the brick/paver. This is where you will rest the tongue of the trailer on additional block(s) of wood.
6. Measure 3 feet over from your first mark, and center the other piece of pipe long ways under the 2'x4′.
7. Place the tongue of your trailer on of the first mark you made in step #5. Here's where you may need to use some extra pieces of wood to get your coupler at the same height as your vehicle's tow ball.
8. Get the reading on the bathroom scale and multiply it by 4 since the weight on the scale is at the 4:1 ratio. Example: If scale reads 200 lbs, actual tongue weight is 800 lbs.



Our third recommendation is to purchase a tongue weight scale. There's a variety of models available. Here are two popular manufacturers:

www.haulgauge.com
https://www.sherline.com/product/sherline-trailer-tongue-weight-scale/
www.weigh-safe.com

⚠️ **Warning:**

- Too little tongue weight (<5%) causes **trailer sway** and unsafe handling.
- Excessive tongue weight (>7%) can place too much strain on the hitch, potentially impairing steering and braking performance. It may also cause the trailer frame to bow noticeably in front of the axles.

**Target Range:**

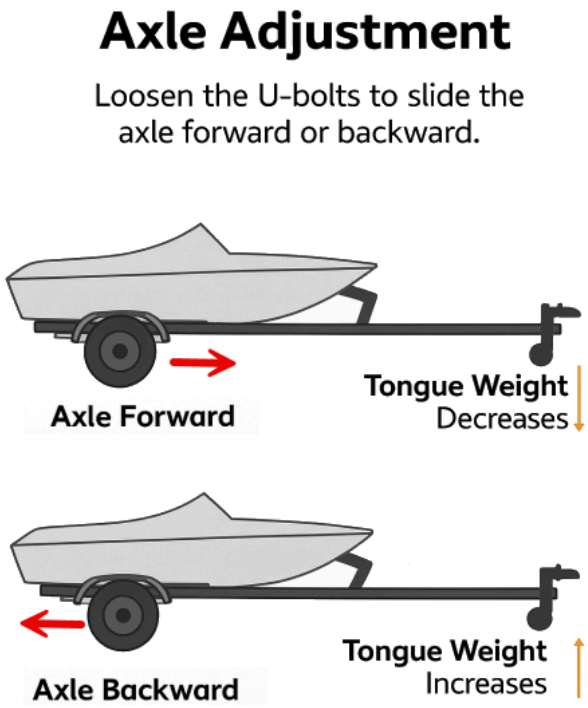
- 5%–7% of the total loaded weight (boat + trailer + gear + fuel)

## Adjusting Axle Position (if needed)

If your tongue weight is outside the safe range, try the following adjustments in 4” increments:

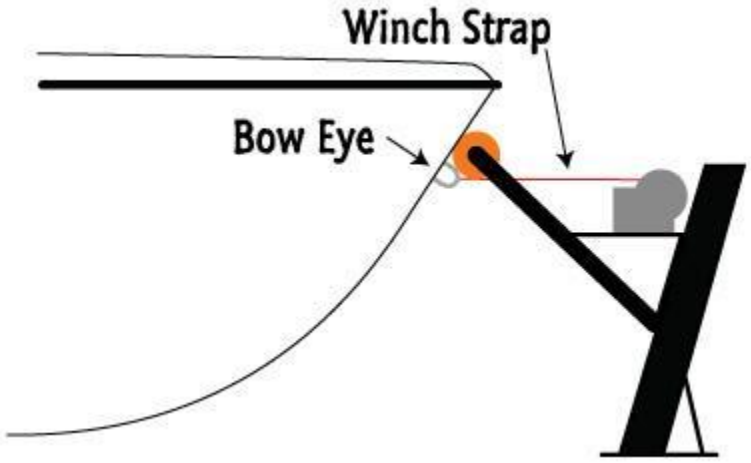
- **Too little tongue weight:**
  Move the axle(s) rearward or shift the boat slightly forward on the trailer.
- **Too much tongue weight:**
  Move the axle(s) forward or shift the boat slightly aft (be cautious not to exceed transom overhang limits).

Both torsion and spring axle suspensions on our trailers are mounted via u-bolt application which allows for incremental adjustments. Always recheck weight balance after any change.



# 3. Adjusting The Winch Stand/Bow Stop

The winch stand (or winch post) must be properly adjusted to safely secure the boat, maintain ideal tongue weight, and ensure that the boat does not shift during transport or in emergency braking situations.




To correctly align the winch stand:

1. Align the bow roller so it sits just above or directly on top of the bow eye (the metal loop on the bow of the boat).
    - The roller should contact the hull firmly but not deform or lift it.
    - Avoid setting the roller below the bow eye — this can let the boat ride over the stop in hard braking.
2. Adjust the winch strap or cable so it runs horizontally (parallel) to the trailer frame when connected to the bow eye.
    - The winch should pull straight forward, not upward or downward.
    - Angled winch lines can pull the boat off-center, put stress on the strap, and make winching more difficult.
3. Ensure the bow stop or vertical roller contacts the front face of the bow to act as a positive stop during towing.This prevents the boat from sliding forward if you brake suddenly.

⚠️**Warnin**g, failure to tie down the bow independently from the winch line could allow the boat to shift while traveling, causing loss of control of the tow vehicle and resulting in serious injury or property damage.

## How to adjust the winch stand:

Most winch stands can be adjusted by:

- Loosening the U-bolts or mounting bolts at the base of the stand
- Sliding the stand forward or backward along the trailer tongue
- Raising or lowering the winch post if the stand has a slotted mount
- Once aligned, tighten all hardware securely and use lock nuts and preferably thread locker to prevent loosening over time

# 4. Adjusting an Optional Windlass Bow Stop

Many modern boats are equipped with a windlass anchor at the bow, which can create clearance issues with a standard winch stand during launching and retrieval. To address this, some trailers use an optional separate bow stop (also called a bow catcher) designed to keep the bow properly positioned without interfering with the anchor system.

Important: Neither the winch stand nor the bow stop should ever be used to support the full weight of the boat's bow. Their purpose is to guide and secure the boat during transport.

1. **Reposition the Winch Stand**
    - Move the winch stand forward so it clears the anchor and does not interfere with the windlass system.
    - Adjust until the bow safety chain can be attached and pulled taut.
    - In some cases, you may need to reposition the trailer tongue jack or swap its mounting location with the winch stand to achieve proper clearance.
2. **Align the Winch Line**
    - Raise or lower the winch mount so that the winch line runs parallel to the trailer frame when connected to the bow eye.
    - A straight pull prevents side-loading the bow eye and keeps tension evenly distributed.
3. **Install the Bow Stop**
    - Mount the bow stop separately from the winch stand so it contacts the bow securely.
    - If the bow stop is extendable or articulating, keep it as short as possible and extend only enough to make contact.
    - Tighten all hardware firmly to prevent movement during trailering.
4. **Secure the Bow**
    - Attach the bow stop safety chain directly to the bow eye.
    - Add a vertical bow tie-down strap between the bow eye and the trailer frame. This prevents the bow from bouncing and slamming against the bow stop while traveling.
    - The bow stop should act as a positive stop, while the tie-down strap and transom straps provide the actual restraint.

## Safety Considerations:

- Never leave a gap between the hull and bow roller after winching the boat. A gap means the boat can slide forward under braking, damaging the bow stop or trailer.
- A winch strap that pulls upward increases the chance of the bow rising during travel, especially at high speed or rough roads.
- A properly adjusted winch stand helps maintain correct tongue weight, especially when paired with correct axle position and boat placement.

# Checklist Before You Tow

- **Check tire pressure on both the tow vehicle and trailer.** Under-inflated or over-inflated tires can lead to blowouts, poor handling, and uneven wear. For trailers, refer to the PSI listed on the tire sidewall. For the tow vehicle, use the placard on the driver's door jamb or owner's manual.
- **Ensure the trailer is level when hitched.** An unlevel trailer can cause uneven tire wear, compromised braking, poor handling, trailer sway, and undue strain on hitch components.
- **Torque all lug nuts to manufacturer-recommended settings.** Incorrect torque can result in loose wheels or damaged studs, increasing the risk of wheel separation while towing. See Wheel Torque Maintenance section for more information.
- **Inspect trailer wheel hubs for proper bearing lubrication.** Dry or contaminated bearings can overheat and fail during transit, potentially leading to wheel loss or axle damage.
- **Secure outboard engines or stern drives in the raised position.** Failure to raise can cause ground strikes, damage to propulsion systems, and unsafe towing dynamics.
- **Tightly fasten the boat cover if towing with it on.** A loose cover can flap, tear, or detach entirely, becoming a road hazard or damaging your boat's finish.
- **Confirm coupler, hitch, and ball are the same size.** Mismatched components can result in trailer detachment during transit, posing a severe safety risk.
- **Lock the trailer coupler securely to prevent accidental release.** An unsecured coupler can open mid-trip, causing trailer disconnection and loss of control.
- **Attach safety chains properly and cross them under the coupler.** Chains prevent the trailer from hitting the ground if disconnected, and crossing them forms a cradle to catch the tongue.
- **Connect trailer lights and verify all lights work (including brakes and turn signals).** Non-functioning lights reduce visibility and increase accident risk, and may result in traffic citations.
- **Secure breakaway cable and safety chains or cables.** A breakaway cable engages the trailer brakes in case of disconnect, reducing the chance of runaway trailer incidents.
- **Raise and lock the trailer tongue jack.** Leaving it down can result in ground strikes, jack damage, and potential trailer instability.
- **Tighten the winch bow strap and fasten the safety bow chain/cable.** Loose or unfastened bow points can allow the boat to shift forward during braking, damaging the hull or trailer.
- **Attach and secure transom tie-downs.** These prevent the boat from bouncing or shifting during transit, protecting both the boat and trailer.
- **Ensure all gear inside the boat is properly stowed and secured.** Loose items can become dangerous projectiles or cause damage from shifting during towing.
- **Adjust mirrors on the tow vehicle for better rear visibility. P**roper visibility helps detect traffic, blind spots, and trailer sway, improving overall safety.
- **Review local and state laws for brake requirements and additional towing equipment.** Compliance avoids fines and ensures your setup meets minimum safety standards.

### Safety Reminder

Venture Trailers recommends keeping a roadside emergency kit that includes essentials like a fire extinguisher, flares, and reflectors. We also strongly recommend carrying a spare tire—it can save you valuable time and hassle in the event of a flat or blowout. Less time on the side of the road means more time on the water. Stay safe and be prepared every time you tow.

---

# Towing / On The Road

## General Handling

### Speed

- Observe posted speed limits.
- Slow down at curves/bends, in inclement weather, work zones, and highway exits.
- A trailer may seem stable at higher speeds, but this can be misleading. A tow vehicle with a trailer will not react the same way at 55 mph as it does at 45 mph.
- To avoid hitting a curb with either the tow vehicle or trailer, swing wider at corners and turns. Take turns slowly.

### Braking Speed

- It takes longer to slow down or stop when towing a trailer.
- Maintain adequate following distance behind other vehicles. A rule of thumb: keep at least the same length as the tow vehicle and trailer combined.

### Sway

- If the trailer begins to sway:
    - Stop accelerating (remove foot from gas pedal).
    - **Do NOT brake.**
    - Keep steering straight — do not turn the wheel.

- Once swaying stops:
    - Pull over safely.
    - Inspect the tow vehicle and boat for shifted cargo; secure if needed.
    - Ensure the trailer is loaded heavier in the front.
    - Confirm the tow vehicle is not overloaded.
    - Check all tires (tow vehicle and trailer) for proper inflation and secure lug nuts.

- Resume travel at reduced speed. Higher speeds increase sway risk.

### Acceleration and Passing

- Allow more time and distance to accelerate or pass other vehicles.
- If sway begins, slow down until it stops. If it continues, follow the sway guidance above.

### Downgrades and Upgrades

- Shift to a lower gear when climbing an upgrade. This reduces risk of engine overheating, improves fuel economy, and lessens stress on the tow vehicle.
- On downgrades, reduce speed before descending. Sway occurs more frequently downhill.

### Backing Up / Reverse

- Keep one hand at the bottom of the steering wheel.
- To move the trailer left, slowly turn the wheel left while backing up.
- To move the trailer right, slowly turn the wheel right while backing up.
- If the trailer jack-knifes or moves incorrectly, stop and drive forward to straighten out before retrying.

**Tip:** Having a spotter stand to the side (visible in mirrors, near ramp/dock) helps provide direction and visibility.

---

# Launching / Loading

The position of your trailer in the water is one of the most important factors in making boat launching and loading smooth and safe. The right depth prevents your boat from floating away uncontrollably at launch or fighting against misaligned bunks and winch straps when loading.

## Launching

### Preparation

- Stop in a staging area near the ramp without blocking traffic.
- Remove tie downs.
- Tilt up the boat engine.
- Insert transom drain plugs.
- Do not disconnect the wire harness, winch cable/strap, or safety chain until positioned at the water.
- Do not disconnect electric trailer brakes if equipped.

### Roller Trailers

- Secure a mooring line to the boat and set it inside for quick access.
- Back the trailer down the ramp, avoiding soft ground.
- Remove bow safety chain.
- Hold winch handle, unlock, and unwind cable/strap slowly.
- If the boat doesn’t move, re-lock winch and push boat toward water. Unlock and retry.
- Boat should roll gently into water on rollers.
- Use mooring line to secure the boat once afloat before parking tow vehicle.

### Bunk Trailers

- Secure a mooring line to the boat and set it inside for quick access.
- Back trailer until boat begins to float; avoid soft ground.
- Remove bow safety chain.
- Hold winch handle, unlock, and unwind cable/strap slowly.

- If the boat doesn't move, re-lock winch and push boat toward water. Retry.
- If still not moving, lower trailer deeper into the water and try again.
- Secure boat with mooring line once afloat.

### How far should your trailer be in the water for launching?

When launching your boat, back the trailer down until the tops of the fenders are just at or slightly below the water surface. At this depth, the bunks or rollers are wet, allowing the boat to float free with minimal throttle. If you go too deep, the boat may float off before you're ready, and your tow vehicle could end up on a slippery ramp. On steeper ramps, you may not need to back in as far, while on shallow ramps, you may need the trailer a little deeper. Adjust for ramp angle, water depth, and boat size, as this is not a one-size-fits-all approach.

## Loading

- Unlock winch and unwind cable/strap.
- Attach winch hook to bow eye of boat.
- Do not unwind cable/strap completely. Lock winch.
- Begin winding boat onto trailer.
    - Roller trailers: rollers self-adjust and center the boat.
    - Bunk trailers: boat centers as it is pulled out of water.
- Winch bow eye tight to bow roller or bow stop.
- Reattach bow safety chain.
- Tow vehicle should pull to a safe area out of traffic.
- Reconnect tie downs and secure all cargo.
- Walk around trailer for a final inspection before departure.

### How far should your trailer be in the water for loading?

When loading your boat, the trailer should be slightly shallower than when launching. Ideally, the forward ends of the bunks should be just out of the water, giving the hull something to "catch" and helping the boat self-center as you drive it on. If the trailer is too deep, the boat may float over the bunks and fail to center; too shallow, and you'll struggle to drive it up without excessive throttle. A good rule of thumb is to keep the rear two-thirds of the bunks submerged and the front third above water, which provides the right balance for centering and winching. Adjust for ramp angle, water depth, and boat size, as this is not a one-size-fits-all approach.

# Boat Trailer Maintenance

Boat trailers operate in highly corrosive environments and require more than just a rinse with fresh water after use. Proper, consistent maintenance is essential not only to maximize the trailer's lifespan but also to prevent inconvenient and potentially costly breakdowns.

While this section provides general maintenance guidelines, please note that certain components—such as brake actuators, disc/drum brakes, tongue jacks, winches, and others—may be manufactured by third parties. These parts often come with their own operating and maintenance instructions. Always consult the specific manufacturer's manual for detailed procedures and product-specific recommendations.Most third-party component manuals can be found on our website under the **Trailer Maintenance** section. We recommend reviewing them for detailed procedures and product-specific recommendations.

## Fastener Nuts & Hardware Torque Maintenance

Throughout your trailer, ½-inch hardware is used to secure major structural components such as frame rails, crossmembers, bunks, suspension parts, and brackets. These fasteners must be properly maintained to ensure structural integrity and towing safety.

### Inspection & Tightening Guidelines

- **Initial Inspection:** All fasteners should be checked for proper torque after the first few uses, especially following trailer assembly or dealer setup.
- **Routine Maintenance:** Recheck all ½" fasteners at least once every 12 months as part of your annual maintenance routine, or more often if the trailer is used in rough or corrosive conditions.
- **Tightening Best Practice:** Hardware should be firmly tightened, but not over-torqued to the point that it distorts the structural components, such as main frame rails or crossmembers.

### Suspension Hardware (Leaf Spring Trailers Only)

Some suspension hardware must **not** be fully torqued tight — these bolts are designed to allow movement:

- **Leaf Spring Eye Bolts:**
  These bolts connect:
  - Rear shackle plates to the trailer frame (on single-axle trailers), or

    - Shackles to the equalizer bar (on tandem/multi-axle trailers)
- **Torque Spec:**
  These should be tightened only snug—tight enough to hold the hardware in place, but loose enough to allow rotation of the spring eye and shackle during normal suspension movement.

⚠️Over-tightening these bolts can cause the suspension to bind, reducing ride quality and increasing wear on bushings and hardware.

The majority of Venture Trailers uses ½" hardware which requires 3⁄4" socket or wrench

# Hubs & Bearings Maintenance

Regular inspection, lubrication, and service of your trailer's hubs and bearings are essential to prevent overheating, premature failure, or roadside breakdowns.

### Routine Bearing Greasing

Bearings should be greased every **3 months or every 1,000 miles**, whichever comes first.

### ⚠️ Important Exception:

If you tow the trailer a long distance and then immediately submerge the hot hubs into cold water, water can be drawn into the hub due to thermal contraction.
To prevent damage:

- Grease the hub immediately after submersion using the grease zerk fitting located behind the rubber grommet at the center of the hub. This forces out any infiltrated water through the front of the hub.

**Use Only the Correct Grease:**
Lithium Complex NLGI #2 Grease
Recommended options:

- Castrol Pyroplex Red
- Lucas Red 'N' Tacky
- Lucas Marine Grease (blue)

### Annual Bearing & Seal Service (Every 12 Months)

Even with regular greasing, the bearings and seals must be removed, inspected, and serviced annually, regardless of mileage.

**Disassembly & Inspection:**

- Remove the hub carefully from the spindle.
- Be cautious not to drop the outer bearing.
- Remove the outer bearing and set it aside.
- Place the hub stud-side down on a clean surface.

- Remove and discard the inner hub seal.
- Remove the inner bearing from the hub.
- Clean the spindle thoroughly with a clean, lint-free cloth.
- Inspect the following components:
    - Inner and outer bearings
    - Bearing races
    - Spindle surfaces

  Look for signs of:
    - Discoloration
    - Pitting or scoring
    - Rust or corrosion
    - Cracks or deformation

**Service Note:**
Always replace the inner hub seal and cotter pin during reassembly, even if they appear to be in good condition.

## Reassembly Procedure

- Repack bearings with fresh grease (by hand, using a bearing packer or by the grease fitting if equipped with a Super Lube spindle).
- Install the inner bearing into the hub.
- Install a new inner hub seal.
- Slide the hub assembly back onto the spindle.
- Insert the spindle washer and then the castle nut.
- Use a 1½" socket or 12" wrench to apply 50 ft-lbs of torque while rotating the hub. This "seats" the bearings properly.
- Loosen the nut by ⅛ to ¼ turn to relieve torque.
    - ⚠️ Do not rotate the hub during this step.
- Tighten the castle nut by hand until snug, only backing off slightly as needed to align the cotter pin hole.
- Insert and bend the cotter pin to lock it in place.
- Pump grease into the spindle-end zerk fitting until fresh grease is visible near the castle nut.
- Rotate the hub at least three full turns to distribute grease.
- Reinstall the dust cap and rubber grommet.

⚠️Do Not Overfill:
It is not recommended to pack the dust cap full of grease. Leave room for heat expansion during towing.

## Hubs & Bearings Maintenance Summary Chart

| Task | Recommended Interval | Important Notes |
|---|---|---|
| Grease wheel bearings | Every 3 months or 1,000 miles | Use **Lithium Complex NLGI #2 grease** only (Castrol Pyroplex Red, Lucas Red 'n' Tacky, or Lucas Marine Grease). |
| Grease hubs after hot submersion | As needed (after long tows + immediate water entry) | Grease through the zerk fitting to displace water drawn into the hub. |
| Remove, inspect, and service bearings & seals | Every 12 months (regardless of mileage) | Replace any worn bearings/races. Always replace the inner seal and cotter pin. |
| Torque spindle nut (seating bearings) | During annual service | Apply 50 ft-lbs of torque, then back off 1/6–¼ turn, hand-tighten, and align cotter pin. |
| Replenish grease via zerk fitting | After assembly and as needed | Stop when fresh grease reaches the castle nut. Do not overfill the dust cap. |

Visit the **Trailer Maintenance section** on our website, **venturetrailers.com** for step-by-step instructions, detailed diagrams, and helpful service videos covering bearing greasing, hub service, and more.

# Brake Maintenance

Proper maintenance of your trailer's hydraulic braking system is essential for safe operation and long-term durability. Boat trailer brake systems are particularly vulnerable to corrosion, contamination, and neglect due to infrequent use. This section outlines maintenance intervals, fluid handling, usage best practices, and inspection guidance.

## Rotors, Calipers & Brake Pads

Regular inspection and maintenance of the calipers, rotors, and brake pads are essential to ensure reliable braking performance and to avoid corrosion-related failures — especially in marine environments.

## Calipers

Inspection & Maintenance

- Inspect calipers for functionality and wear at least every 12 months.
- During brake operation, calipers should:
    - Engage (squeeze) the rotor when brakes are applied
    - Release fully when brakes are disengaged

⚠️ Note: If the brakes appear to be "stuck" after long periods of non-use, this is often caused by brake pads rusted to the rotor, not necessarily a seized caliper. Light rust bonding is common and usually clears after initial braking cycles.

What to Check:

- Caliper bolts are tight and properly lubricated
- Bleeder valves are fully closed and tight when not in use
- Caliper mounting hardware (brackets to brake flange) is securely fastened
- Inspect for fluid leaks, piston binding, or worn seals

## Rotors

Inspection & Maintenance
Inspect rotor condition at least seasonally, and especially after the trailer has sat idle or been exposed to saltwater:

- Uneven or abnormal wear (e.g. one side thinner, scalloped edges)
- Scoring, grooving, or heat-discoloration (bluing or “heat spots”)
- Rust pitting, especially on the rotor face
- Cracks or structural damage (rare, but visible under magnification)
- Compare both rotors on an axle — a significant mismatch in wear is a red flag
- On a boat trailer, check for salt or corrosion deposits in the caliper, rotor vents, or between fins (if vented)

If any of the above defects are present, further action (resurfacing or replacement) is needed.

## Cleaning & Pre-Reassembly

1. **Rinse with Fresh Water Immediately After Use**
   If the trailer has been in saltwater, rinse the entire brake area (rotors, calipers, hardware) with fresh water as soon as possible. Salt accelerates corrosion.
2. **Use Brake Cleaner**
   Spray a brake-specific solvent or cleaner to dissolve grease, oil, and brake dust.
   Wipe dry thoroughly with a clean, lint-free cloth.
3. **Dry / Blow Out Crevices**
   Use compressed air or a gentle blast to remove water, debris, and trapped grit from vents, caliper bores, and rotor recesses.
4. **Mask Off the Friction Surface (If Painting Is Planned)**
   If you intend to lightly coat the rotor (see below), mask or shield the rotor friction zone where the brake pads contact, or use a light coating only on exposed faces and vanes.

## Rotor Thickness / Replacement Criteria

The minimum allowable thickness for vented rotors on boat trailers varies by manufacturer and rotor type, so always verify the exact specification for your system. Using a general figure can be unsafe.

**Examples of manufacturer minimum thicknesses:**

- **Kodiak 225 rotors:** 21.6 mm (0.85 in)
- **Tie Down Eliminator integral rotors:** 17 mm (0.67 in)
- **Tie Down Eliminator "Cap Style" rotors:** 21.6 mm (0.85 in)

**How to find your rotor's minimum thickness:**

1. **Check the rotor itself** – most rotors have the minimum stamped or etched into the outer edge.
2. **Refer to the manufacturer's website** – companies such as Kodiak, Tie Down, and Dexter Axle publish product specification sheets online.

⚠️ **Important:** Do not rely on general brake guidelines (e.g., automotive or bicycle rotor specs). Trailer rotors are designed for heavier loads, and a new rotor may be significantly thicker (up to 37 mm or more). Replace any rotor that falls below the manufacturer's stated minimum or shows visible cracking, pitting, or damage.

## Preventing Rust Buildup on Brake Rotors

Rust buildup on rotors is normal when the trailer is sitting idle. If the brakes are properly maintained and in good working condition, this surface rust will typically be scrubbed off during the next use.

However, when the trailer is not in use for extended periods of time (such as during winter storage), additional steps can be taken to minimize rust:

- **Apply a Protective Coating:** Lightly spray the rotors with a protective coating such as Cold Galvanizing spray paint. This coating helps prevent rust formation while the trailer is in storage.
- **Reapply Annually:** A fresh coat should be applied each year at the end of the season, or anytime the trailer will remain unused for a long period.
- **Stainless Steel Rotors:** If your trailer is equipped with stainless steel rotors, no protective coating is necessary.
- **Do Not Use WD-40:** Never spray rotors with WD-40 or similar products. These can soak into the brake pads, resulting in loss of braking power and reduced safety.

By following these steps, you can extend the life of your brake rotors and ensure reliable braking performance when your trailer returns to service.

## "Lot Lock" / Freeze to Rotor Risk

On heavily oxidizing environments (especially marine), rotors and pads may corrode together during storage and cause "lot lock" — the brakes seize, especially on an empty trailer

- Before you tow after storage, check if the wheels rotate freely.
- If stuck, gently rock forward/backward or tap (carefully) to release.
- In persistent cases, disassemble, separate pads from rotor, and clean the mating surfaces.

## Brake Pads

Inspect brake pads **at least once every 12 months**, or sooner if you notice:

- Reduced braking performance
- Unusual noises (squealing, grinding, or metal-on-metal sounds)
- Increased drag or resistance while towing
- Extended storage in humid or marine environments

**During inspection, check for:**

- Contamination from grease, oil, water, or salt (common in marine use)
- Uneven or excessive wear
- Rust or corrosion bonding pads to rotors (common with saltwater exposure)
- Pad misalignment due to vibration or improper installation
- Sticking calipers that accelerate pad wear

⚠️ **Replacement Criteria:** Replace brake pads immediately if:

- Friction material is **worn to 3/32" (2.4 mm) or less**
- Pads show signs of cracking, glazing (shiny/hardened surface), or separation of the friction material from the backing plate
- Heat damage is visible (blue discoloration, crumbling surface)
- Pads are unevenly worn, which may indicate rotor or caliper issues

## Brake Lines

Inspect all brake lines from the actuator to the calipers, including all junction points (e.g. T-blocks) after the **trailer's first use and routinely inspect once every 12 months**, regardless of mileage or use. If the trailer is frequently used in saltwater, inspect the brake lines more frequently, as salt accelerates corrosion.

**During inspection, check for:**

- Visual signs of damage such as: cracks, wear or abrasion, kinks or bends, leaks, corrosion or rust buildup
- **Suspension Flex Points:** Pay special attention to sections where brake lines flex with the trailer's suspension, which are more prone to fatigue.
- **Floating Calipers:** Closely inspect brake lines at the floating calipers, which experience movement and stress.
- **Fittings Inspection:**
    - Examine brass fittings at connection points (actuator, calipers, T-blocks).
    - Look for leaks, cracks, corrosion, or any signs of loose fittings.

If any issues are discovered during your inspection—such as physical damage, signs of corrosion, or compromised connections—the affected brake lines should be replaced immediately. Any condition that could impair the performance, sealing, or integrity of the brake system is considered a safety concern and must be addressed before operating the trailer.

**Fitting Torque Specification**

All brake line fittings should be torqued to **15 ft-lbs**, as specified by Venture Trailers. It is crucial **not to overtighten** these fittings, as applying excessive torque can distort the fitting, damage the threads, and cause sealing or performance issues within the brake system.

## Brake Fluid

Purge and bleed the brake system at all calipers after the first year of use, regardless of mileage. After this initial service, repeat the procedure every 12–24 months depending on how often the trailer is used and the environment it operates in. Trailers frequently launched in saltwater or stored in humid climates should follow the shorter 12-month interval.

Brake fluid is hygroscopic, meaning it absorbs moisture over time through microscopic pores in hoses and seals. In a marine environment, brake fluid can absorb up to 10% water in just two years. Once contaminated, the fluid's boiling point drops significantly, which increases the risk of failure during towing, especially on long downhill grades or emergency stops.

**Risks of Old Brake Fluid**

- Internal corrosion of calipers, master cylinder, and brake lines
- Vapor lock, caused when absorbed water turns to gas under heat
- Reduced braking performance or complete brake system failure

**Fluid Type & Handling**

- Use only fresh **DOT 3 or DOT 4 brake fluid**.
- Keep the master cylinder reservoir filled to approximately **¾ capacity**.
- **Never reuse brake fluid** that has been exposed to air, opened, or drained from the system. Once fluid is exposed, it begins to draw in moisture.

## Monthly Brake Exercise (Recommended)

To extend the life of your trailer brakes, **use the trailer regularly**, even during off-season storage.

**Monthly Brake Cleaning Cycle:**

1. Drive the trailer at normal road speeds
2. Perform 3–4 complete stops using the brakes
3. This helps:
    - Clean rust from rotors
    - Exercise caliper pistons
    - Prevent pad and piston seizing
4. After use, thoroughly rinse the calipers and rotors with fresh water
5. Tow the trailer briefly, applying brakes several times to allow the components to dry fully before parking or storing

This greatly reduces the risk of brake pads rusting to the rotors during storage.

**Post-Use Parking Procedure (Actuator Reset)**

When backing into a parking spot:

1. After positioning the trailer, shift from Reverse to Drive
2. Pull forward a few inches, then shift to Park
3. Chock the tires
4. If backing up an incline:
    - Chock the tires immediately after reversing
    - Manually pull out the actuator's coupler, or gently tap the accelerator while tires are chocked
    - Ensure the actuator is fully extended before leaving the trailer parked

This step reduces stress on the actuator and ensures the brakes are fully released, preventing caliper drag or pressure buildup.

## Brake System Maintenance Summary Chart

| Task | Recommended Interval | Important Notes |
|---|---|---|
| Inspect calipers | Every 12 months | Ensure pistons engage/release properly, bolts are tight, and bleeder valves are sealed. Pads may stick after storage due to rust bonding, which is not always a faulty caliper. |
| Inspect rotors | Seasonally and every 12 months (more often in saltwater use) | Look for scoring, cracks, rust, vent clogging. Confirm thickness above minimum spec. Rust buildup is normal and scrubbed off during towing. For storage, lightly spray with cold galvanizing compound. |
| Inspect brake pads | Every 12 months, or sooner if performance declines | **Replace when pad thickness ≤ 3/32" (2.4 mm)**, or if cracked/separated |
| Inspect brake lines | After first use, then every 12 months (more often in saltwater use) | Look for cracks, leaks, kinks, or corrosion. Pay attention to flex points and fittings. |
| Brake fluid service | Purge/bleed at all calipers after 1 year, then every 12–24 months | **Use only fresh DOT 3 or DOT 4 fluid. Keep reservoir ¾ full.** Never reuse old/exposed fluid. |

# Coupler & Actuator Maintenance

Proper maintenance of the coupler and actuator is essential for safe towing and reliable braking performance on your boat trailer. These components form the critical connection between your tow vehicle and trailer, and they also control hydraulic braking in surge-brake systems. Regular lubrication prevents wear and binding, while visual inspections help identify damage or corrosion before it leads to unsafe conditions. Because boat trailers are often exposed to water—especially saltwater—extra attention to greasing, flushing, and checking for rust is necessary to ensure the coupler and actuator continue to operate smoothly and safely.

## Greasing & Lubrication

- **Ball Latch Assembly (Coupler):** Spray WD-40 under the coupler to lubricate the block and spring. Ensure the latch mechanism moves freely without sticking.
- **Tow Ball:** Apply a light coating of bearing grease to the tow ball and inside the coupler socket. Replace the tow ball if it becomes out-of-round, pitted, corroded, or excessively worn.
- **Actuator Roller Pins:** Grease through the fittings on the actuator using Lucas Marine Grease (blue) or a similar such as Quicksilver 2-4-C with PTFE, LubriMatic Marine/Trailer Grease. Do not overtighten the bolts housing the grease fittings, as this can restrict proper roller movement.

## Visual Inspections (Every Use or Monthly)

- **Emergency Brake Cable:** Inspect for fraying, cracks, or rust. Replace immediately if compromised. The breakaway system is critical for safe towing.
- **Entire Actuator Assembly:** Inspect for visible damage, deformation, or lateral twisting. The coupler should align squarely with the actuator housing; misalignment is a sign of internal damage. Replace the actuator assembly if structural issues are observed.

| Task | Recommended Interval | Important Notes |
|---|---|---|
| Lubricate ball latch assembly | Every 3 months or as needed | Spray **WD-40** under coupler to reach block and spring. Ensure latch moves freely. |
| Grease tow ball & coupler socket | Before towing and before storage | Light coat of bearing grease prevents wear and rust. Replace tow ball if worn, pitted, or out-of-round. |
| Grease actuator roller pins | Every 12 months or more often in heavy use | Use **Lucas Marine Grease (blue)**, Quicksilver 2-4-C with PTFE or LubriMatic Marine/Trailer Grease. Do not overtighten bolts holding grease fittings. |
| Inspect emergency brake cable | Before each tow / monthly | Replace immediately if frayed, cracked, or rusted. Breakaway cable is a key safety feature. |
| Inspect actuator housing & coupler alignment | Every 12 months, or sooner if towing issues arise | Look for deformation, twisting, or misalignment. Replace assembly if damaged. |
| Flush with fresh water (marine use) | After every saltwater launch | Rinse coupler and actuator to prevent internal corrosion. |
| Check hydraulic fluid (if surge brakes) | At least every 12 months | Verify master cylinder fluid is full. Low fluid may indicate a leak in brake system. |

# Suspension Maintenance

## Leaf Spring Suspensions

Boat trailer suspension systems that use leaf springs rely on several components working together, including galvanized spring hangers, brackets, equalizers (on multi-axle trailers), shackles, shackle bolts, leaf springs, and the hardware that clamps the axle and springs together.

- **Inspection Frequency:** Visually inspect all components at least every 6 months. Replace any worn or damaged parts immediately.
- **Spring Hangers / Yokes:** If surface rust is visible, lightly sand with an emery cloth and spray with “cold galvanizing” paint to restore corrosion resistance. If cracks are found, replace the hanger immediately.
- **Axle Alignment Check:** Just like with a car, a trailer axle can become misaligned. Check alignment every 12 months or 6,000 miles (whichever comes first). On leaf-spring systems, axle alignment depends on the spring and equalizer mounting brackets. Because leaf-spring axles “float” forward, back, and side to side with terrain, the axles themselves are not reliable measuring points. Instead:
    - Measure from the end of the trailer frame along the bottom rail to the angled spring or equalizer hanger on each side.
    - Record the measurements.
    - If the difference between sides is greater than ¼”, realign the suspension.
- **Leaf Spring Replacement:** If a leaf spring is cracked, all springs and related hardware should be replaced as a set. If a spring fails while towing, replace the broken spring temporarily to move the trailer to a safe location, then replace the remaining springs before the next trip.
- **Rust and Water Entrapment:** Leaf springs are prone to rust because water and contaminants collect between the leaves. This cannot be fully prevented by simply rinsing with a hose. Longevity depends heavily on use and maintenance. To extend spring life, it is recommended to **annually paint or coat the entire leaf spring with recycled bearing grease, forcing the grease between the leaves.** This barrier helps prevent water intrusion and prolongs service life.

## Torsion Axle Suspensions

Trailers equipped with **torsion axles** use a sealed suspension system built inside the axle tube. Unlike leaf springs, torsion systems have no serviceable suspension components.

- **Inspection & Replacement:** If the torsion arms appear bent, sagging, or compromised, the entire axle assembly must be replaced. Internal wear or failure cannot be repaired.
- **Independent Suspension Benefits:** Torsion axles allow each wheel to move independently, improving ride quality and reducing road shock to the boat. This design benefits towing stability, especially on uneven roads.
- **Operator Caution:** Because torsion axles carry weight independently at each wheel, impacts are concentrated on a single torsion arm:

    - Stop before crossing railroad tracks.
    - Avoid potholes, curbs, or other road hazards whenever possible.
    - Crossing obstacles at an angle (rather than straight on) reduces the chance of transferring the boat and trailer's full weight onto a single torsion arm.
- **Sagging / Uneven Ride Height:** Over time, torsion arms may lose elasticity, causing the trailer to sit unevenly or with reduced ground clearance. This is a sign that the axle is nearing the end of its service life and should be replaced.

# Trailer Frame Maintenance

Your trailer frame is built from galvanized steel or aluminum for strength and corrosion resistance. Proper care is essential to maximize lifespan and ensure safe operation.

⚠️ **Do not store the trailer under trees or vegetation.** Sap, leaves, and moisture can stain or discolor galvanized and aluminum surfaces, making them appear rusted or corroded.
⚠️ **Avoid harsh boat cleaners on the trailer.** Many cleaners contain acids or chemicals that can damage galvanized steel or aluminum. Always remove the boat from the trailer before washing with aggressive cleaners.

## Galvanized Steel Frames, Crossmembers, and Axles

- **After-Use Cleaning:** Rinse thoroughly with fresh water after every launch or tow. Scrub with a soft bristle brush, mild soap, and hot water to remove salt and road grime.
- **Inspection Frequency:** Visually inspect all galvanized steel components at least every 6 months. Pay special attention to:
    - Crossmembers and axles where water collects.
    - Welded joints and bracket attachment points.
    - Undersides of bunks or rollers, where moisture and debris can remain trapped.
- **Surface Rust:** Touch up any visible rust every 12 months. Sand lightly with emery cloth, then apply at least two coats of "cold galvanizing" paint.
- **Component Replacement:** Replace any cracked, severely corroded, or weakened components immediately. Do not tow with compromised frame parts.

## Aluminum Frames

Aluminum resists rust because it contains no iron, but it can corrode by forming aluminum oxide—a white, chalky buildup.

- **After-Use Cleaning:** Rinse with fresh water after every use, followed by scrubbing with mild soap and a soft bristle brush.
- **Aluminum Oxide Removal:** Once aluminum oxide forms, it can be difficult to remove. Use natural cleaners such as vinegar or lemon juice mixed with cream of tartar, or purchase aluminum-specific commercial cleaners.
- **What to Avoid:** Never use ammonia, trisodium phosphate, or other aggressive chemicals, as these accelerate aluminum corrosion.
- **Surface Protection:** After cleaning, apply an aluminum-safe metal polish paste followed by a thin coat of automotive wax to slow future oxidation.

- **Inspection Points:** Check weld seams, bunk/roller mounting areas, and contact points where dissimilar metals (like stainless bolts in aluminum) can create galvanic corrosion.

### Considerations

- **Saltwater Exposure:** Saltwater is highly corrosive to both galvanized and aluminum frames. Freshwater rinsing is mandatory after every use, especially for trailers stored near the coast.
- **Hidden Corrosion Areas:**
    - Under bunks and brackets, where wood and carpet trap moisture against the frame.
    - Around hardware, fasteners, and brake line mounts.
    - Inside hollow frame sections that can hold water if drain holes are blocked.
- **Preventive Care:**
    - Keep drain holes clear to prevent standing water inside the frame.
    - Consider applying a corrosion inhibitor spray to welds, brackets, and other high-risk areas every season.
    - On aluminum trailers, monitor areas where galvanized steel or stainless hardware contacts aluminum to avoid galvanic corrosion. Use nylon or plastic isolator pads where possible.

# Lighting & Wiring Maintenance

Your trailer's lighting and wiring system is exposed to constant vibration, water, and road contaminants. Regular inspection and maintenance are essential for safety and reliability.

### General Maintenance

- **Inspection Frequency:** Inspect the wiring harness and light plugs every 12 months, even if all lights appear to be functioning properly. Boat trailers often experience hidden corrosion that may not immediately cause failure.
- **Wire Condition:** Look for bare wire, frayed insulation, or pinched areas where wires pass through frame holes or under brackets. Repair damaged areas using marine-grade waterproof heat-shrink tubing or connectors.
- **Plug Connections (Plug-and-Play Systems):**
    - Unplug each light from the harness.
    - Inspect plugs for corrosion or oxidation.
    - Lightly sand away corrosion with emery cloth.
    - Dip all plugs into **dielectric grease** to protect against water intrusion and prolong service life.
- **Corrosion Prevention:** After exposure to saltwater, rinse the trailer frame, wiring, and plug connections thoroughly with fresh water.

### Light Types

- **Incandescent Tail Lights:**

- Remove the lenses annually.
- Coat all internal metal components with dielectric grease or apply a light spray of WD-40.
- Replacement bulbs: **#1157 12V 32/3CP** and **C193**.

- **Clearance Lights (incandescent style):**
  - Bulbs are non-replaceable.
  - Replace the entire unit if a clearance light fails.

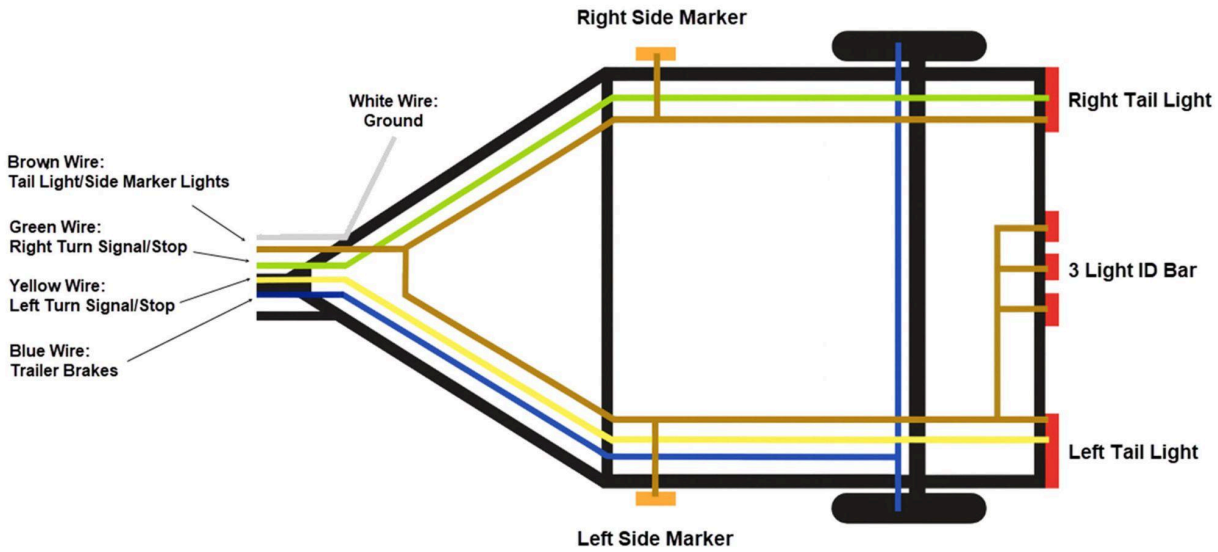
- **LED Lights):**
  - LEDs and internal diodes are not serviceable.
  - Replace the entire light unit if failure occurs.
  - LED units are generally sealed and better suited for saltwater immersion, but still require inspection of the wiring harness and ground connections.

## Wiring Color Code & Trailer Plug

The following standard wiring color code applies to most 5-pin flat connectors used on boat trailers:

1. **White Wire** – Ground (female plug lead)
2. **Brown & Yellow Wires** – Left-side clearance lights
   **Brown & Green Wires** – Right-side clearance lights and rear 3-bar light (if equipped)
3. **Yellow Wire** – Left stop/turn signal
4. **Green Wire** – Right stop/turn signal
5. **Blue Wire** – Auxiliary (used for reverse lockout solenoid on trailers equipped with surge brakes).

⚠️ **Note:** The blue wire is not active on trailers without brakes.



# Winch Maintenance

The winch is a critical safety component of your boat trailer, responsible for launching and retrieving your boat. Proper maintenance ensures safe, reliable operation and prevents costly failures.

- **Inspection Frequency**: Check the winch every 6 months for smooth operation.
- **Lubrication**: Apply marine-grade grease to all gears on the pinion shaft and reel shaft, including the drum teeth. Re-grease after heavy use or exposure to saltwater.
- **Component Wear:** Replace any damaged or severely worn gears, shafts, or pawls immediately. Do not operate the winch with compromised parts.

## Winch Strap or Cable

- **Before Each Trip**: Inspect the winch strap (or cable, if equipped) for fraying, cuts, or worn stitching. Replace at the first sign of damage.
- **Straps vs. Cables:**
    - Most modern boat trailers use polyester winch straps, which resist stretching and are safer to handle than cables.
    - Steel cables can rust quickly in marine environments and may develop sharp frays—replace with a strap if possible.
- **Attachment Point:** Confirm the hook and safety latch are intact and securely fastened to the boat's bow eye.

## Winch Stand & Mount

- **Annual Inspection:** Inspect the winch stand, mounting bolts, and welds every 12 months for bending, cracking, or fatigue.
- **Corrosion Check**: Pay special attention to the winch post base plate and U-bolts that secure the stand to the trailer tongue. Saltwater exposure can accelerate rust in these areas. Replace compromised parts immediately.

## Considerations

- Saltwater Use: Always rinse the winch, strap, and stand with fresh water after launching or retrieving your boat in saltwater. Salt buildup shortens the life of gears, pawls, and straps.
- Pawl Safety: Ensure the ratchet pawl engages fully when the boat is loaded. A slipping pawl can allow the boat to roll back on the trailer.
- Load Limits: Winches are designed for pulling the boat onto the trailer, not for securing it during highway travel. Always use transom straps or tie-downs for transport.
- Storage: When storing for extended periods, release tension on the winch strap to prevent stretching or gear binding.

# Tongue Jack Maintenance

Tongue jacks support the front of the trailer when not connected to the tow vehicle. Proper care ensures smooth operation, corrosion resistance, and long service life.

## General Maintenance

- **Finish Protection:** Keep the jack clean and apply a light coat of automotive wax periodically to protect against corrosion.
- **Lubrication:** Tongue jacks are pre-lubricated at the factory, but if operation feels rough or produces grinding when cranked:
    1. Support the trailer so weight is off the jack.
    2. Remove the plastic cap.
    3. Pull the pin (1) holding the handle in place.
    4. Carefully remove the bevel gear (2) at the top of the screw.
    5. Remove the dowel pin (3) located under the bevel gear.
    6. Carefully slide out the inner tube assembly (⚠️ do not attempt to remove the screw from the inner tube).
    7. Work marine-grade grease into the entire screw thread.
    8. Reassemble and apply grease to the bevel gears before replacing the cap.

## Swivel Tongue Jacks with Wheels

- **Swivel Lock:** Always confirm the swivel lock pin is fully engaged and secured before lowering or towing.
- **Use Limitation:** Wheeled tongue jacks are not designed to move a fully loaded trailer. They are only intended to position an unloaded trailer on level ground.
- **Side Load Warning:** When the trailer is loaded and the tongue jack is down, avoid pushing or pulling the trailer tongue side-to-side. This places stress on the swivel mounting bracket and can cause permanent damage.

## Considerations

- **Saltwater Rinse:** After launching or retrieving in saltwater, rinse the jack thoroughly with fresh water. Salt buildup around the screw or wheel swivel mechanism accelerates corrosion.
- **Storage Tip:** When storing the trailer, raise the jack fully to minimize screw exposure and prevent moisture or debris buildup inside the housing.
- **Corrosion Points:** Pay attention to the wheel fork, swivel bracket, and footplate welds (on fixed jacks). These are high-risk areas for rust and should be touched up with cold-galvanizing spray if surface rust appears.
- **Weight Distribution:** Use wheel chocks when parked. The tongue jack is not a substitute for stabilizing the trailer on uneven ground.

# Tire Maintenance

Trailer tires are critical to safe towing. Because boat trailers often sit unused for long periods, tires are prone to weathering, flat-spotting, and premature wear. Proper inspection, inflation, and storage practices are essential.

## Tire Pressure

- **Load Capacity:** Always maintain tire pressure at the maximum cold inflation pressure listed on the tire sidewall. This ensures the tire can support the rated load.
- **Placard Information:** Proper tire pressure, size, and load rating are also listed on the trailer's tire placard and VIN label (located on the frame).
- **Check Frequency:**
    - Check and adjust tire pressure at least once per month when the tires are cold.
    - Always check before each tow.

⚠️ **Underinflation is the leading cause of trailer tire failure.**

## Tire Rotation & Wear Tracking

- **Rotation:** Rotate trailer tires annually to promote even wear.
- **Pre-Rotation Inspection:** Before rotating, inspect each tire for uneven wear patterns (inside edge, outside edge, center, or cupping).
- **Recordkeeping:** Log tire pressure, wear type, and position at the time of inspection (e.g., FL = Front Left, FR = Front Right, CL = Center Left, CR = Center Right, RL = Rear Left, RR = Rear Right). Compare results annually to identify suspension, alignment, or loading issues.
- **Tire Wear Chart:**


## Tire Wear Indications

Understanding tire wear patterns helps identify underlying issues with inflation, suspension, or alignment. Inspect trailer tires regularly and compare with the patterns below.

### Edge Wear

- **Appearance:** Excessive wear on both outer edges of the tire tread.
- **Cause:** Underinflation — the tire is not holding enough pressure, causing the edges to bear more weight than the center.
- **Correction:** Inflate to the **trailer manufacturer's recommended Cold Tire Inflation Pressure**. Never exceed the **Maximum Cold Tire Inflation Pressure** shown on the sidewall.

### Side Wear

- **Appearance:** Uneven wear on just the inside or outside edge of the tire.
- **Cause:** Misalignment, bent axle, or worn suspension components causing the tire to lean (camber issue).
- **Correction:** Have the trailer axle and suspension inspected by a qualified service center.

### Center Wear

- **Appearance:** Excessive wear through the middle of the tread.
- **Cause:** Overinflation — the tire is carrying the load primarily on the center ribs instead of the full tread width.

- **Correction:** Adjust to the **recommended Cold Tire Inflation Pressure** listed on the trailer's tire placard. Never exceed the maximum PSI printed on the tire sidewall.

### Cupping

- **Appearance:** Scalloped, patchy wear across the tread, often repeating around the circumference.
- **Cause:** Tires are bouncing due to imbalance, worn or bent suspension, or loose/worn wheel bearings.
- **Correction:** Have the **bearings, suspension, and tire balance** inspected and serviced at a qualified shop.

### Flat Spot

- **Appearance:** A section of tread is worn noticeably thinner than the surrounding tread.
- **Cause:** Wheel lockup or tire skidding, often from brake system issues.
- **Correction:** Inspect and service the **brakes and brake controller** at a qualified service center.

## Wheel Torque

To ensure safe towing and maximum wheel life, always torque your lug nuts to the proper specifications listed in the chart below.

- Use a properly calibrated torque wrench.
- After any new wheel installation, check the torque values at **10, 25, and 50 miles**, and then periodically during normal use.Repeat this procedure **any time the lug nuts are removed and reinstalled**.

⚠️ Over- or under-torquing lug nuts can result in wheel separation or damage. Always follow the sequence diagrams provided when tightening lug nuts.
⚠️ Failure to re-torque can result in wheel separation.

| Size | Bolt Pattern | Offset | **Steel Wheels** Recommended Torque(ft/lbs) | **Aluminum Wheels** Recommended Torque (ft/lbs) |
|---|---|---|---|---|
| 12” | 4-4" or 5-4.5" | 0" | 50-75 | 95-105 |
| 13” | 4-4" or 5-4.5" | 0" | 50-75 | 95-105 |
| 14” | 5-4.5" | 0" | 90-120 | 110-120 |
| 15” | 5-4.5" | 0" | 90-120 | 110-120 |
| 15” | 6-5.5" | 0" | 100-120 | 110-120 |
| 16" (1/2" Stud) | 6-5.5" or 8-6.5" | 0" | 100-120 | 110-120 |
| 16" (9/16" Stud) | 8-6.5" | 0" | 110-120 | 125-130 |
| 17.5" (9/16" Stud) | 8-6.5" | 0" | 125-130 | 125-130 |
| 17.5" (5/8" Stud) | 8-6.5" | 0" | 275-325 (Flange Nut) | 150 |

## Storage & Protection

- **Ground Contact:** If storing on surfaces other than pavement, place a wooden board under each tire to prevent moisture absorption and sinking.
- **Sunlight:** Use tire covers to shield against UV damage. Ensure covers allow airflow—never fully enclose the trailer in a tarp, as this creates a greenhouse effect that accelerates corrosion of suspension and brake components.
- **Long-Term Storage:** Raising and blocking the trailer off the ground is not required annually. Only block the trailer if it will remain unused for 24 months or more to reduce stress on tires and suspension.

## Considerations

- **Ramp & Saltwater Exposure:** Tires are frequently submerged at boat ramps. Always rinse wheels and tires with fresh water after launching or retrieving in saltwater to prevent corrosion of steel belts and rims.
- **Sidewall Cracking:** Boat trailers often sit for extended periods, leading to UV damage and dry rot. Inspect sidewalls closely for cracking before each towing season.
- **Speed Rating:** Many trailer tires (ST-rated) have lower speed ratings than automotive tires. Never exceed the manufacturer’s speed rating printed on the sidewall. The tires used on Venture Trailers have an M speed rating indicating the maximum safe speed is up to 81mph.

- **Spare Tire:** Always carry a properly inflated spare tire, mounted on a wheel that matches your trailer's lug pattern and load rating. Check its pressure monthly along with the main tires.

# Bunk Maintenance

Bunk boards provide evenly distributed weight support for the boat's hull. While bunks require relatively little upkeep, neglect can lead to hull scratches, carpet wear, or lumber damage. Proper care extends the life of the bunks and helps protect the boat.

## Cleaning & Hull Protection

- **Debris Removal:** Before retrieving your boat, always check and clean the **top surface of the bunks.** Sand, gravel, or small debris trapped between the bunk carpet and the hull are the leading cause of hull scratches.

- **Rinsing After Saltwater Use:** After saltwater exposure, rinse the bunks thoroughly with fresh water to prevent salt buildup inside the carpet fibers and on hardware.

## Bunk Carpet

- **Inspection:** Inspect carpet frequently for tears, fraying, or areas where wood is exposed. Replace as needed.
- **Replacement Material:** Only use marine-grade carpet designed for bunk applications. This type is breathable, quick-drying, and prevents water from being trapped against the lumber. Standard indoor/outdoor carpet holds water and accelerates wood rot.
- **Low-Friction Options:**
    - Some aftermarket sprays can be applied to bunk carpet to reduce friction.
    - Venture also offers poly bunk sleeves, which mount directly over existing bunk boards to create a smooth, slick surface when wet. These reduce wear on both carpet and hull.

## Bunk Lumber

- **Inspection Frequency:** Inspect lumber annually. Replace boards if they are cracked, rotted, or broken.
- **Warping:** Bunk boards can warp if the boat is not resting on them for extended periods. In some cases, boards will re-conform to the hull once wet and reloaded. Severely warped boards should be replaced.
- **Lumber Type:**
    - Venture uses **Kiln-Dried Southern Yellow Pine**, which is more dimensionally stable and less prone to twisting than pressure-treated wood.
    - Suitable alternatives include treated pine, oak, or cypress if replacements are sourced locally.

# Trailer Warranty Information

Registering your trailer is an important step in protecting your investment. In the event of a warranty claim, recall, or product update, Venture Trailers will use your registration information to contact you directly. Without registration, you may not receive important safety or service notifications in a timely manner.

In addition, it is the **owner's responsibility** to register trailer tire information directly with the tire manufacturer. This ensures that you can be notified in the event of a **tire recall or safety alert**. Tire registration links are provided in this manual and on the Venture Trailers website for your convenience.

By completing both trailer and tire registration, you help ensure:

- Warranty coverage is active and can be verified quickly.
- You are notified of any recall or service action affecting your trailer or tires.
- Your trailer remains in compliance with safety regulations.

**Trailer Warranty Registration**
**Tredit Tire Registration**
**Kenda/Loadstar Tire Registration**

**Limited Warranty**
Venture Trailers Inc. ("Venture"), warrants each new Venture Trailer (the "Trailer") to be free from defects in material and workmanship for a period o**f two years beginning from the date of original purchase by the original purchaser**. Venture shall repair or replace at Venture's sole option, without charge, any parts that are determined by Venture to be defective because of imperfect workmanship or materials within a reasonable time after the Trailer is returned at purchaser's expense to any Venture authorized dealer or distributor.

This warranty is extended to the original purchaser only and does not extend to any other persons to whom the Trailer may be transferred. The use of any Trailer as part of a rental fleet or for commercial purposes voids this warranty.

Provisions of this warranty shall not apply to any product which is found to have been modified or altered in any way or to any defect or malfunction which was caused by damage, unreasonable use or failure to provide reasonable and necessary maintenance. This warranty will not cover damage caused by overloading the Trailer beyond stated capacities or the use of improperly installed weight distribution hitches. The formation of rust is not covered by this warranty due to the highly corrosive conditions to which a trailer may be exposed. This warranty does not cover winches, lights, couplers, brakes, tongue jacks, springs, axles and tire or wheels, as these items are warranted separately by the manufacturer of those parts. This warranty also does not cover defects, damage or malfunctions caused by improper configuration caused by any dealer or distributor of the Trailer.

Certain components on trailers are considered wear items including, but not limited to: tires, bearings, seals and races, brake friction surfaces and carpet. These items must be inspected, maintained and replaced by the owner as necessary. Bearings, seals and races are covered for 120 days from the date of purchase.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE AND EXCLUSIVE WARRANTIES OF VENTURE WITH RESPECT TO THE TRAILER AND ARE MADE IN LIEU OF ALL OTHER WARRANTIES. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE FOR THE TRAILER AND VENTURE DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL VENTURE, ITS SUBSIDIARIES, AFFILIATES, AGENTS OR EMPLOYEES BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE PURCHASE OF THE TRAILER, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS OR REVENUES, LOSS OF TIME, TOWING CHARGES, TRAVEL EXPENSES, LODGING, TELEPHONE, GAS LOSS, DAMAGE TO PERSONAL PROPERTY, LOSS WAGES, LOSS OF USE OF THE TRAILER OR ANY MARINE EQUIPMENT, DAMAGE TO MARINE EQUIPMENT, COSTS OF SUBSTITUTE MARINE EQUIPMENT, OR CLAIMS FOR SUCH DAMAGES.

IN NO EVENT SHALL VENTURE, ITS SUBSIDIARIES, AFFILIATES, AGENTS OR EMPLOYEES BE LIABLE FOR THE NEGLIGENCE, GROSS NEGLIGENCE OR OTHER INTENTIONAL MISCONDUCT OF ANY THIRD PARTY NOR SHALL VENTURE BE LIABLE FOR ITS OWN NEGLIGENCE. THE PURCHASER'S SOLE REMEDY FOR ANY LIABILITY OF VENTURE OF ANY KIND SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF THE TRAILER OR TRAILER PARTS, AT VENTURE'S SOLE OPTION, AS SET FORTH IN THE FIRST PARAGRAPH OF THIS WARRANTY.

This warranty is intended to comply with the 'Mangusson-Moss Warranty Federal Trade Commissions Improvement Act, as amended,
and any provisions of this warranty or actions taken by Venture pursuant to this warranty shall be construed accordingly.

Some states do not allow limitations on how long an implied warranty lasts, so those limitations may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so those limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Venture reserves the right to change models or
specifications without prior notice.

# Reporting Safety Defects

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to Notifying Venture Trailers.

If NHTSA receives similar complaints, it may open an investigation if it finds that a safety defect does exist in a group of vehicles. It may order a recall and recall campaign.  However, NHTSA cannot become involved in individual problems between you, your dealer, or Venture Trailers.

To contact NHTSA, you may visit their website at www. nhtsa.gov,

Email the Vehicle Safety Hotline: nhtsa.webmaster@dot.gov
Call toll-free at 888-327-4236
Hearing Impaired (TTY): 888-275-9171

# Tire Safety Information

**This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6 and is not written by Venture Trailers.**

**Section 1.1** contains "Steps for Determining Correct Load Limit - Trailer".
**Section 1.2** contains "Steps for Determining Correct Load Limit – Tow Vehicle".
**Section 1.3** contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.
Section 2.4 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It". This brochure This brochure, as well as the preceding subsections, describes the following items.

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN).
- Recommended tire inflation pressure, including a description and explanation of:
  A. Cold inflation pressure.
  B. Vehicle Placard and location on the vehicle.
  C. Adverse safety consequences of under inflation (including tire failure).
  D. Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices.
- Vehicle load limits, including a description and explanation of the following items:
  A. Locating and understanding the load limit information, total load capacity, and cargo capacity.
  B. Calculating total and cargo capacities with varying seating configurations including quantitative examples showing / illustrating how the vehicles cargo and luggage capacity decreases as combined number and size of occupants' increases. This item is also discussed in Section 3.
  C. Determining compatibility of tire and vehicle load capabilities.
  D. Adverse safety consequences of overloading on handling and stopping on tires.

## 1.1. Steps for Determining Correct Load Limit-Trailer

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

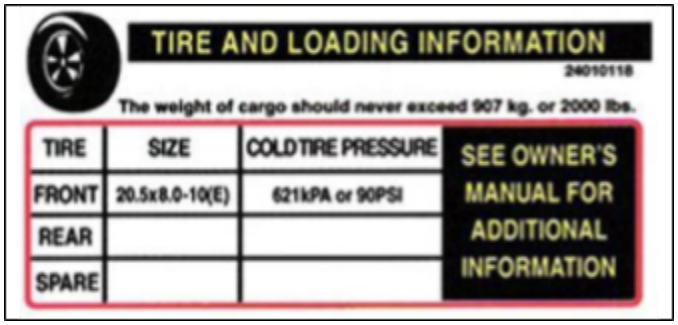
If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

### *1.1.1. Trailers 10,000lbs. Or Less*




Tire and Loading Information Placard – Figure 1-1

1. Locate the statement, “The weight of cargo should never exceed XXX kg or XXX lbs.,” on your vehicle’s placard. See figure 1-1.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

The trailer’s placard refers to the Tire Information Placard attached adjacent to or near the trailer’s VIN (Certification) label at the left front of the trailer.

### *1.1.2. Trailers Over 10,000lbs GVWR (Note: These Trailers are Not Required to Have a Tire Information Placard on the Vehicle)*

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.

### 1.2. Steps for Determining Correct Load Limit-Tow Vehicle

1. Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo and luggage capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. (1400-750 (5 x 150) = 650 lbs.).
5. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in Step # 4.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

### 1.3. Glossary of Tire Terminology

**Accessory weight**

The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

**Bead**

The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

**Bead separation**

This is the breakdown of the bond between components in the bead.

**Bias ply tire**

A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

**Carcass**

The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

**Chunking**

The breaking away of pieces of the tread or sidewall.

**Cold inflation pressure**

The pressure in the tire before you drive.

**Cord**

The strands forming the plies in the tire.

**Cord separation**

The parting of cords from adjacent rubber compounds.

**Cracking**

Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

**CT**

A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

**Curb weight**

The weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

**Extra load tire**

A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

**Groove**

The space between two adjacent tread ribs.

**Gross Axle Weight Rating**

The maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.

**Gross Vehicle Weight Rating**

The maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.

**Hitch Weight**

The downward force exerted on the hitch ball by the trailer coupler

**Inner liner**

The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

**Innerliner separation**

The parting of the inner liner from cord material in the carcass.

**Intended outboard sidewall**

The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

**Light truck (LT) tire**

A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

**Load rating**

The maximum load that a tire is rated to carry for a given inflation pressure.

**Maximum load rating**

The load rating for a tire at the maximum permissible inflation pressure for that tire.

**Maximum permissible inflation pressure**

The maximum cold inflation pressure to which a tire may be inflated.

**Maximum loaded vehicle weight**

The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

**Measuring rim**

The rim on which a tire is fitted for physical dimension requirements.

**Pin Weight**

The downward force applied to the 5th wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

**Non-pneumatic rim**

A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

**Non-pneumatic spare tire assembly**

A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

**Non-pneumatic tire**

A mechanical device which transmits,

either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

**Non-pneumatic tire assembly**

A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

**Normal occupant weight**

This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

**Occupant distribution**

The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

**Open splice**

Any parting at any junction of tread, sidewall, or inner liner that extends to cord material.

**Outer diameter**

The overall diameter of an inflated new tire.

**Overall width**

The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

**Ply**

A layer of rubber-coated parallel cords.

**Ply separation**

A parting of rubber compound between adjacent plies.

**Pneumatic tire**

A mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

**Production options weight**

The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

**Radial ply tire**

A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

**Recommended inflation pressure**

This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

**Reinforced tire**

A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

**Rim**

A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

**Rim diameter**

This means the nominal diameter of the bead seat.

**Rim size designation**

This means the rim diameter and width.

**Rim type designation**

This means the industry of manufacturer's designation for a rim by style or code.

**Rim width**

This means the nominal distance between rim flanges.

**Section width**

The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

**Sidewall**

That portion of a tire between the tread and bead.

**Sidewall separation**

The parting of the rubber compound from the cord material in the sidewall.

**Special Trailer (ST) tire**

The "ST" is an indication the tire is for trailer use only.

**Test rim**

The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

**Tread**

That portion of a tire that comes into contact with the road.

**Tread rib**

A tread section running circumferentially around a tire.

**Tread separation**

Pulling away the tread from the tire carcass.

**Treadwear indicators (TW**I)

The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

**Vehicle capacity weight**

The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

**Vehicle maximum load on the tire**

The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

**Vehicle normal load on the tire**

The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CRF 49 571.110) and dividing by 2.

**Weather side**

The surface area of the rim not covered by the inflated tire.

**Wheel center member**

In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separable, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separable, to the non-pneumatic tire and provides the connection between tire and the vehicle.

**Wheel-holding fixture**

The fixture used to hold the wheel and tire assembly securely during testing.

## 1.4. Tire Safety-Everything Rides On It

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

https://www.nhtsa.gov/sites/nhtsa.gov/files/one.pdf

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on
The following topics:

- Basic tire maintenance
- Uniform Tire Quality
- Grading System
- Fundamental characteristics of tires
- Tire safety tips.

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

## 1.5. Safety First-Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

### *1.5.1. Finding Your Vehicle's Recommended Tire Pressure and Load Limits*

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire
- inflation pressure

- Vehicle capacity weight (VCW–the maximum occupant and cargo weight a vehicle is designed to carry) Front and rear gross axle weight ratings (GAWR–the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

### *1.5.2. Understanding Tire Pressure and Load Limits*

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure– measured in pounds per square inch (psi)–a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kpa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)
Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

### *1.5.3. Checking Tire Pressure*

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.
The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

### *1.5.4. Steps for Maintaining Proper Tire Pressure*

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated. Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

### *1.5.5. Tire Size*

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

### *1.5.6. Tire Tread*

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

### *1.5.7. Tire Balance and Wheel Alignment*

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be perfectly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

### *1.5.8. Tire Repair*

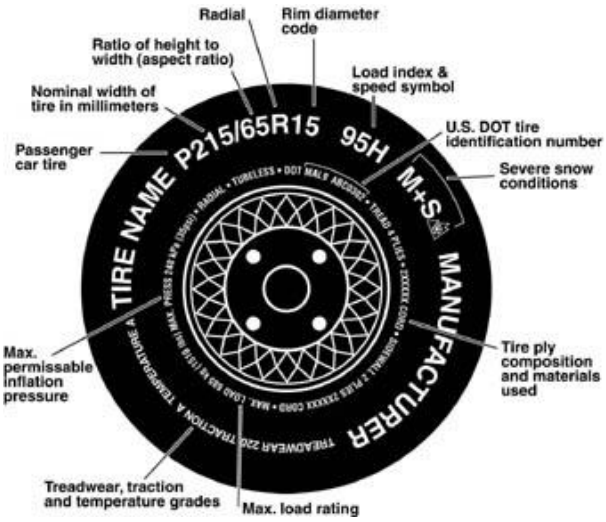
The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

### *1.5.9. Tire Fundamentals*

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

#### 1.5.9.1 Information on Passenger Vehicle Tires

Please refer to the diagram below.




**P**

The "P" indicates the tire is for passenger vehicles.

**Next number**

This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

**Next number**

This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

**R**

The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

**Next number**

This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

**Next number**

This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

**M+S**

The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

**Speed Rating**

The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. Note: You may not find this information on all tires because it is not required by law.

Tire Safety Information

| Letter Rating | Speed Rating |
|---|---|
| Q | 99 mph |
| R | 106 mph |
| S | 112 mph |
| T | 118 mph |
| U | 124 mph |
| H | 130 mph |
| V | 149 mph |
| W | 168* mph |
| Y | 186* mph |

** For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.*

**U.S. DOT Tire Identification Number**

This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

**Tire Ply Composition and Materials Used**

The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

**Maximum Load Rating**

This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

**Maximum Permissible Inflation Pressure**

This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

### 1.5.9.1. UTQGS Information

**Treadwear Number**

This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

**Traction Letter**

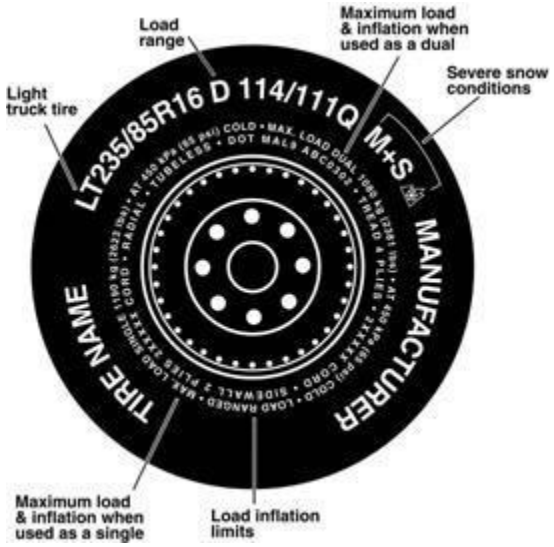
This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA","A", "B", and "C".

**Temperature Letter**

This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

### 1.5.9.2. Additional Information on Light Truck Tires

Please refer to the following diagram.




Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

**LT**

The "LT" indicates the tire is for light trucks or trailers.

**ST**

An "ST" is an indication the tire is for trailer use only.

**Max. Load Dual kg (lbs) at kPa (psi) Cold**

This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

**Max. Load Single kg (lbs) at kPa (psi) Cold**

This information indicates the maximum load and tire pressure when the tire is used as a single.

**Load Range**

This information identifies the tire's load-carrying capabilities and its inflation limits.

## 1.6. Tire Safety Tips

**Preventing Tire Damage**

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs or other foreign objects in the roadway and try not to strike the curb when parking.

**Tire Safety Checklist**

- Check tire pressure regularly (at least once a month), including the spare.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or

other signs of wear or trauma.

- Remove bits of glass and foreign objects wedged in the tread. Make sure your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the Tire Information and Loading Placard or User’s Manual for the maximum recommended load for the vehicle.