

Trailering Safely: Decoding the Letters and Numbers

For the majority of us, hitching up truck and trailer is a routine we are quite familiar with. It is important to remember that a truck and trailer is a surprisingly complex system with numerous components, all of which must be sized and rated properly to work together safely. This article is intended as a guide to help decode the “alphabet soup” of letters and numbers used to rate components of the truck, trailer and hitch system. To begin, terminology and abbreviations which will be used throughout are described below.

Conventional – A trailer hitch configuration in which the trailer attaches to a hitch pivot point located near the tow vehicle’s rear bumper. (The term “bumper pull”, which dates from an era when vehicle bumpers were all metal and solid enough to actually support a trailer of substantial size, is often used interchangeably with “conventional” however no modern vehicle bumper should ever be used for towing.)

Curb Weight - Curb weight is the total weight of a vehicle apart from any passengers, cargo or non-factory items. Curb weight *does* include the weight of gasoline, oil and other fluids necessary for operation. A good description of curb weight is *“the weight of a vehicle, as it sits parked at the dealership”*.

GAWR - Gross Axle Weight Rating. A rating specified by the vehicle manufacturer which states the maximum amount of weight that can be placed on *each* of the axles. A gross axle weight rating is likely to differ between front and rear axles, as different ends of the vehicle can handle different amounts of weight.

GCWR - Gross Combination Weight Rating. This is the maximum weight of a tow vehicle and trailer combination, as determined by the tow vehicle manufacturer. Combined weight means the weight of both the tow vehicle and the trailer together. It is the maximum weight of a vehicle with a trailer attached and includes any cargo or load placed in tow vehicle and trailer.

The rating for gross combination weight is determined for the tow vehicle based on the strength of its frame, suspension, axles and other towing-related components.

Gooseneck – A trailer hitch configuration which attaches to a hitch ball located in the truck bed, over the rear axle.

GVWR - Gross Vehicle Weight Rating. This is the maximum loaded weight of your tow vehicle (or trailer), as determined by the manufacturer. GVWR is curb weight plus payload.

Payload - The maximum amount of weight a truck or other vehicle can haul, in terms of cargo and passengers, specifically in the truck cab, truck bed or cargo area. For our horse trailers, payload is the weight of the horses plus tack, feed, supplies, and any other items.

Tongue Weight – The static force (weight) which the trailer tongue places on the hitch. Tongue weight is typically higher on a gooseneck trailer than a conventional trailer.

TWR - Trailer Weight Rating. This is the maximum total (GVWR) weight of a trailer the tow vehicle is rated to pull.

VIN - Vehicle Identification Number. This is a serial number which is unique to the vehicle and is required on tow vehicles *and* trailers.

Weight Carrying Hitch – A hitch system in which all of the trailer’s tongue weight is carried by the hitch. Tow vehicle and trailer are typically joined by a ball and coupler.

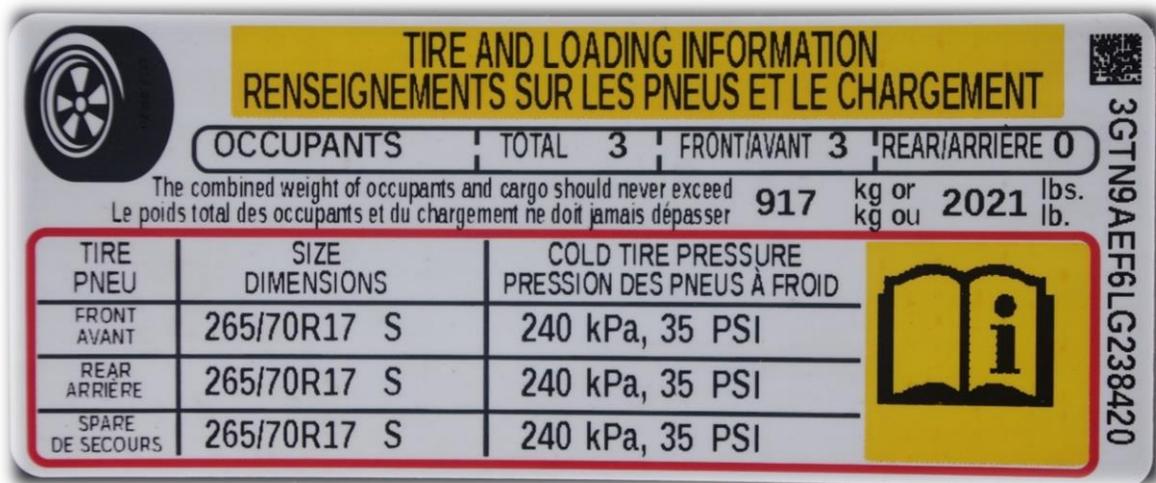
Weight Distribution Hitch – A hitch system which joins tow vehicle and trailer with a ball and coupler and uses spring bars to transfer weight from rear of tow vehicle to all axles of tow vehicle and trailer. The spring bars are sometimes referred to as “equalizer bars”. Weight distribution hitches are often used on camping trailers, less commonly seen on horse trailers.



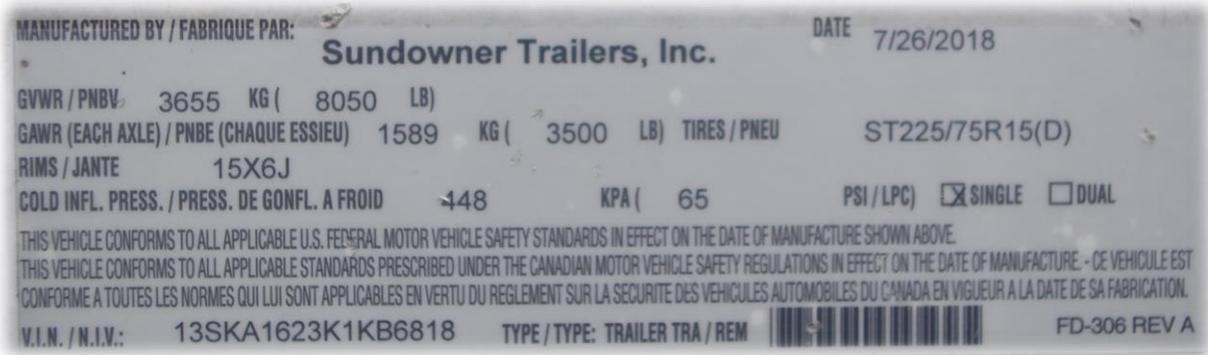
Using the tow vehicle and conventional trailer combination pictured, let’s look at and decode that “alphabet soup” of letters and numbers.



First, the tow vehicle. Shown above is the trawling information decal, located on driver side door jamb. Tow vehicle VIN (unique to this vehicle) is displayed on decal. GVWR is 6900 pounds. Maximum payload (passenger and cargo capacity) is 2021 pounds. GCWR is 15000 pounds – this is the maximum combined weight of tow vehicle and trailer. TWR is 9800 pounds for a conventional (“bumper pull”) trailer with a maximum tongue weight of 980 pounds. Note that even though TWR is 9700 pounds for a gooseneck trailer, maximum tongue weight is 1455 pounds because of the different weight distribution on a gooseneck trailer.



Tow vehicle tire and loading information decal. This information is extremely important because the tow vehicle’s GVWR and TWR are based on tires of the correct size and inflation pressure as specified by the manufacturer. Notice that tow vehicle’s VIN is duplicated on tire and loading information decal.



Trailer information decal. This includes useful information such as the VIN, wheel rim dimensions, tire size, and tire inflation pressure. The number we are most concerned with here is the trailer GVWR of 3655 KG (8050 pounds). This is well within the 4445 KG (9800 pounds) TWR for a conventional trailer shown on tow vehicle trailering information decal.



On an older trailer the information decal may have become faded and difficult to read. In this example GVWR is legible in both KG and pounds but other information is hard to determine. This trailer is a three horse gooseneck with living quarters and, with a GVWR of 17500 pounds, is over twice the weight of the conventional trailer we are using as our example. A much heavier duty truck than our example pickup is required to safely tow this trailer. If the information decal is damaged or missing, contact trailer manufacturer and provide the VIN (VIN should appear on your trailer's registration paperwork) which manufacturer can cross reference to obtain the GVWR and other information.

A truck and trailer should be thought of as two separate vehicles, joined by the trailer hitch. The trailer hitch itself is a system with multiple components. Each component must be rated to carry, at a minimum, the weight of trailer. Ideally there should be excess capacity. Think of each component of the hitch system as a link in a chain, with the chain only being as strong as its weakest link.



First link in the chain is tow vehicle hitch. This may be factory installed (as shown here) or an aftermarket item supplied by manufacturers such as Reese, Curt, or others. Check hitch condition. A rusted hitch may no longer be of rated, designed strength. A decal should be present with hitch capacities clearly marked. On some vehicles, such as the example truck used for this article, the decal can be a little hard to read because of location as shown above.



Close up view of decal shows that hitch is rated for 12500 pound TWR and 1250 pound tongue weight maximum. TWR exceeds trailer’s 8050 GVW and tongue weight range is also within specifications as a conventional trailer’s tongue weight is generally 10% - 15% of trailer GVW. At the 8050 maximum GVW of example trailer, tongue weight will be 805 – 1207 pounds.

CURT™ The **FIRST** Name in Towing Products™

6,000 lbs GROSS TRAILER WEIGHT POIDS BRUT DE REMORQUE PESO BRUTO DE REMOLQUE	600 lbs TONGUE WEIGHT POIDS AU TIMON CARGA EN PTO. ENGANCHE	11,000 lbs WEIGHT DISTRIBUTION DISTRIBUTION DE CHARGE DISTRIBUCIÓN DE PESO	1,100 lbs WD TONGUE WEIGHT POIDS FLÈCHE AVEC DC DP CARGA PTO. ENGANCHE
--	---	--	--

MADE IN USA
FABRIQUÉ AUX É.U.
HECHO EN EE.UU.

DO NOT OVERLOAD ANY PART OF YOUR TOWING SYSTEM
ÉVITEZ DE SURCHARGER TOUTE PARTIE DU SYSTÈME DE REMORQUAGE
NO SOBRECARGUE NINGUNA PIEZA DEL SIST. DE REMOLQUE

Check hitch ratings carefully. This aftermarket hitch, installed on an F150, is limited to 6000 pounds trailer weight and 600 pounds tongue weight unless a weight distribution hitch is used. If used as a weight carrying hitch, capacity is 2050 pounds less than example trailer's maximum GVW of 8050 pounds.



Example of a weight distribution hitch on camping trailer. Ball and coupler are similar to a weight carrying hitch but added spring bars transfer load from rear of tow vehicle to all axles on tow vehicle and trailer.



Drawbar to which hitch ball is bolted is the next component. This one is rated for 10000 pounds, well in excess of the trailer's 8050 GVW. Use the pin supplied by drawbar manufacturer when attaching drawbar to hitch. If the pin is lost or damaged, purchase the correct replacement part (never use a bolt as a "temporary" replacement) and always remember to attach the spring clip which secures drawbar pin. A spare pin and spring clip to keep in trailer or tow vehicle is a worthwhile investment.



Drawbars are available in a range of heights to suit your specific tow vehicle and trailer combination to ensure the trailer rides level. A level ride is important for the following reasons: Comfort for your horses who travel standing up, security of the trailer hitch connection which has a limited range of vertical motion and is designed to work in a level position, and keeping axle weights equal. Horse trailers generally use rubber torsion axles, which provide a smooth ride and low floor height but have a limited amount of suspension travel. A trailer which is nose-high or nose-low will place the majority of its weight on only one axle, possibly resulting in tire failure from overloading. Wheels on the other axle will be carrying very little weight and are likely to lock up and skid when braking which may result in flat spots on the tires.



Trailer hitch ball. Many horse trailers use a 2-5/16" diameter ball. Check rating stamped into the ball to be sure it is of sufficient capacity. The hitch ball pictured on left is from example truck and has a 10000 pound rating which matches drawbar. Ball shown on right is also 2-5/16" diameter but is only rated for 6000 pounds, well below our example trailer's 8050 pound GVW.



Trailer coupler is next part of the system. Make sure it is also of the proper size and capacity. This example is 2-5/16" and rated for 12,500 pounds.

All of the components described above make up the hitch system connecting tow vehicle and trailer together. Think of this hitch system as “Plan A”.

Safety chains are “Plan B”. The purpose of safety chains is to keep the trailer connected to tow vehicle if the hitch system fails from either parts breakage or human error. (A common human error is forgetting to lock the trailer coupler in closed position.)

Chain is manufactured in different sizes and grades, with size being the diameter of steel the chain is made from and grade designated by one of the following numbers: 30, 43, 70, 80, 100, with the lowest number (Grade 30) being the weakest. Grade 70 chain generally has a gold coloured finish and the number 7, 70, or 700 will be visible on about every sixth link.

3/8” grade 70 chain is what many trailer manufacturers provide. If it is necessary to replace safety chains on your trailer, be sure to purchase chain and hooks of the correct size and grade.



Safety chain hooks must be of the same size and grade as the chain itself. Chain and hook pictured above are 3/8” grade 70, as indicated by gold coloured finish and “G70” on hook. Hook also has a spring loaded safety latch to keep it securely attached to tow vehicle’s hitch.



Examples of commonly seen but incorrect safety chain hooks are shown above. At left is a 5/16" hook, lighter than 3/8" chain, and with no safety latch. Centre hook is 3/8" and grade 70 but also does not have a safety latch. Never rely on gravity alone to keep safety chains attached! Snap link at right is convenient to use but is not rated for any kind of load and should never be used to attach trailer safety chains.



Safety chains should be crossed so they form a cradle into which trailer tongue will drop if trailer becomes disconnected from tow vehicle. Chains should be a length that will allow full range of motion when maneuvering trailer but not drag on the road surface. Attach hooks to hitch with safety latches down as shown.



The breakaway system, mentioned in previous trailer “Spring Health Check” article, can be considered “Plan C” because its function is to apply the trailer brakes if trailer becomes *completely* separated from the tow vehicle – a worst case situation where the hitch and safety chains both fail or become detached.



Because of its “Plan C” nature, the trailer’s breakaway switch cable should be attached to a point on the tow vehicle that is completely independent from hitch and safety chains. In the example shown a small eyebolt has been installed in a pre-existing hole in truck bumper bracket, completely separate from hitch and safety chains. Since the breakaway switch cable does not carry any weight, a snap link is suitable for attachment to tow vehicle.



To test breakaway system operation before you head out on the road, pull plastic pin out of the breakaway switch housing as shown in picture. This should fully apply trailer brakes. Attempt to drive forward. Trailer brakes should be fully applied and prevent forward motion. If truck/trailer combination does move forward with no resistance, manually apply trailer brakes using tow vehicle's brake controller to check if brakes are operational. If trailer brakes do operate when applied manually, one or more of the following issues may exist in the breakaway system:

- Breakaway battery low or completely discharged
- Damage or corrosion in wiring between breakaway switch and brake circuit
- Damaged or defective breakaway switch

If trailer brakes still do not operate when applied manually, a more serious problem exists with the braking system and must be repaired before taking trailer on the road. Some common causes of inoperative trailer brakes are:

- Poor connection at electrical plug connecting tow vehicle to trailer
- Damaged brake wiring and/ or corroded wiring connections, including any grounds
- Damaged or defective brake electromagnets
- Brakes out of adjustment
- Badly worn brake shoes and/ or drums



The last step is setting output and sensitivity on the trailer brake controller. Refer to your specific brake controller's manufacturer instructions for this step.

Output is the maximum amount of power the brake controller will apply to the trailer brakes. The 5.0 setting pictured is one that we have found works well for the example truck and trailer with two horses on board.

Sensitivity is how aggressively the controller will apply the trailer brakes. Too low a sensitivity setting will result in trailer brakes applying very slowly. If the sensitivity is set too high, trailer brakes will apply very quickly which could result in one or more trailer wheels locking up and skidding. In addition to the jerking motion and rough ride this will create, tire damage in the form of flat spots from skidding is also possible.

Safe travels!

Beverly Sheremeto and Robert Nagle