

Selection of a Suitable *Tow-Vehicle*... For a Caravan or Camper-Trailer

Selecting a suitable tow-vehicle for a caravan or camper-trailer is just as important as selecting a caravan or camper-trailer that best-suits your particular travel needs.

Sometimes a 'vanner already owns a caravan or camper-trailer, and wants to buy a tow-vehicle to tow it. Sometimes a 'vanner already owns a tow-vehicle, and wants to buy a suitable caravan or camper-trailer. Either way, it is vitally important to make a sound decision, based on doing sufficient "home-work", to ensure that the purchase is *exactly* what you want, to best-suit your travel plans.

The No: 1 requirement is that the *combination* is 100% legal (compliant), regarding Masses and Ratings, and provides the best-possible safety on the road.

It is a *major* investment, so take your time to compare a number of different makes and models, noting the various specifications and ratings. Apart from the necessary technical and legal considerations, there are of course, numerous items that will be personal preferences.

This article provides a fairly comprehensive *Check-list* to best-ensure a specific tow-vehicle is suitable for towing a particular caravan or camper-trailer.

It is suggested that you use a separate Check-list for each vehicle that you are considering, listing your "score" for each item, so that you can then compare all final "Total Scores".

Important Ratings & Masses of each Vehicle: (Refer to *Ratings & Masses* drawing for Definitions)

Caravan (Camper-Trailer) Ratings & Masses (kg):

- | | |
|---|----------------------|
| 1: Caravan ATM (Aggregate Trailer Mass) Rating: | <input type="text"/> |
| 2: Caravan GTM (Gross Trailer Mass) Rating: | <input type="text"/> |
| 3: Caravan Tare Mass: | <input type="text"/> |
| 4: Caravan (empty) Ball-loading: | <input type="text"/> |
| 5: Caravan Maximum Permitted Ball-loading: | <input type="text"/> |
| 6: Maximum Legal Pay-load: (1 minus 3) | <input type="text"/> |

Tow-Vehicle Ratings & Masses (kg):

- | | | |
|---|------------------|----------------------|
| a: GVM (Gross Vehicle Mass) Rating: | <i>Essential</i> | <input type="text"/> |
| b: GCM (Gross Combination Mass) Rating: | <i>Essential</i> | <input type="text"/> |
| c: Tare Mass: | | <input type="text"/> |
| d: Maximum Towing Capacity Rating: | <i>Essential</i> | <input type="text"/> |
| e: Maximum Tow-bar Down-load Rating: | <i>Essential</i> | <input type="text"/> |
| f: Maximum Legal Pay-load: (a minus c) | | <input type="text"/> |
| g: Rear Axle Rating: | | <input type="text"/> |

Note: Sometimes the GCM may be *less* than “GVM + ATM”, in which case the GCM *must* be used.

The “Rear Axle Rating” of the tow-vehicle must *also* be considered, to ensure that it is *not* exceeded. Due to the hitch overhang the ball-loading applies a leverage “moment such that the additional loading on the rear axle is actually more than the ball-loading itself.

Assessment Check-List for each Possible Make & Model Tow-Vehicle:

Item	Criteria	Standard - Legal	Yes – No
Ratings & Masses	Towing Capacity	Legal - “d” <i>must</i> exceed “1”	
Ratings & Masses	Tow-Ball Down-load	Legal - “e” <i>must</i> exceed “5”	

If either answer to these two items is “NO”, stop... as the vehicle would not be suitable.

Item	Criteria	Standard S = Suggested	Rating Y - N	Score 1 - 10
GVM	In excess of ATM	S - GVM at least 1.3 times ATM		
Restrictions	Any conditions	Required factory up-grades?		
Axle - Rear	Solid or Independent	Seek recommendations		
Suspension	Air-bag; Booster	Required / Recommended / Prohibited		
WDH	Weight-distribution	Required / Recommended / Prohibited		
Towing Aids	Anti-sway, etc.	Required / Recommended / Prohibited		
Engine Power	Safely Sufficient	S - kW / GCM (tonne) more than 25		
Engine Torque	Safely Sufficient	S - Nm / GCM (tonne) more than 65		
Fuel	Range, availability	Choice: Petrol or Diesel		
Fuel Economy	High as possible	Compare City & Highway Figures		
Driving Range	Fuel tank capacity	Fuel availability and travel distance		
Transmission	Personal Choice	Choice: Manual or Automatic		
2WD / 4WD / AWD	On-road, off-road	Paved; Mild / Moderate / Extreme Dirt		
Ground Clearance	On-road, off-road	Paved; Mild / Moderate / Extreme Dirt		
Under-side Angles	On-road, off-road	OK for Mild / Moderate / Extreme Dirt		
Wheel-base	On-road, off-road	Paved; Mild / Moderate / Extreme Dirt		
Wheels	As per ‘van?	Same diameter / width / off-set - studs		
Tyres	On-road, off-road	Traction / Noise / Tyre life		
Tow-Bar over-hang	Short as possible	S - Less than 0.3 times Wheel-base		
Coupling & Height	Must be legal	Confirm compliance with ADR 62		
Warranty	Long as possible	Kilometres / Years limits; Conditions		
Servicing Costs	Low as possible	Service intervals / Cost of parts		
Air-Conditioning	Personal Choice	Comfort level desired		
Other Options	Highly desirable	ABS / ESC / Traction-control, etc.		
‘Van Dealer Advice	Technical Issues	(Non-commercial) recommendations		
Re-sale Value	High as possible	Check with used-vehicle dealer ads		
Make / Model	Personal Choice	Preferences		
Safety Rating	Crash Test Results	Ratings as high as possible		
Reputation	From other ‘vanners	Reliability / Durability / Service / Parts		
Price	Personal Choice	Budget constraints		
Test Drive	Are you happy with it?	Do you feel comfortable and confident?		
Total		Score: “1” Low – “10” High		

Note: The four *suggested* – GVM / Engine Power / Engine Torque / Tow-Bar over-hang – “Safety or Comfort Factors” are just that... *suggestions* or *recommendations*. It may *not* be possible to find a tow-vehicle that meet these figures, but it would be *most* prudent to select a tow-vehicle that comes close to meeting them.

Ratings & Masses: This is the *most* important consideration from a legal and safety point of view. While the law in some jurisdictions may state that the “actual mass” - *not* the “ATM Rating” - of the caravan/camper-trailer, that must not exceed the “Towing Rating” of the tow-vehicle, it can be extremely difficult (if not impractical) to prove what the “actual mass” is.

Ratings & Masses: The actual Ball/Coupling load exerted onto the tow-bar at any time must *not* exceed the down-ward Rating of both the tow-vehicle *and* the tow-bar... which are required to be provided by their manufacturers. It is expected that the caravan/camper-trailer manufacturer will provide the “maximum permissible ball/coupling load”, that the vehicle was designed for, when loaded in a “reasonable and typical manner”.

GVM: Having a caravan/trailer sway - or jack-knife - is an extremely frightening and dangerous situation. There are three major items that determine the stability/handling on the road: (a) The length, weight and design of the caravan/trailer, (b) The manner in which it is loaded, and (c) The speed and road conditions.

It is essential that the “tail never wags the dog”... that is, it is important that the tow-vehicle has the ability - primarily mass - to control the caravan/trailer, rather than the other way round. In addition to the legal requirements regarding Ratings & Masses, it is strongly recommended that, at any time, the mass of the tow-vehicle be appreciably more than the mass of the caravan/trailer. It is **suggested** that for added safety and peace-of-mind, the laden tow-vehicle should weigh **30%** more than the laden caravan/trailer.

Restrictions: It is important to obtain - in writing, typically the *Owner's Manual* - details of any restrictions or conditions from the manufacturer of the tow-vehicle, regarding towing a caravan/trailer. Is there a stipulated maximum speed when towing? For particular Towing Ratings, are up-grades - such as oil-coolers, transmissions, brakes and/or suspension components - required?

Axle - Rear: With solid (beam) rear axles most commonly used for tow-vehicles, recommendations should be sought - regarding vehicle handling, tyre life, etc. - if you are considering a vehicle with *independent* rear suspension.

Suspension: Does the tow-vehicle manufacturer (a) Require, (b) Recommend, or (c) Prohibit the use of rear axle booster-springs or air-bags? If required for towing, are they to be removed when *not* towing? If supplementary air-bags are fitted, how are they to be attached to the chassis?

WDH: Does the tow-vehicle manufacturer (a) Require, (b) Recommend, or (c) Prohibit the use of a WDH (weight-distribution hitch)? If fitted, what *rating* should they be, and *setting* should be used? Are there any restrictions or conditions regarding the use of a WDH?

Does the caravan/trailer manufacturer (a) Require, (b) Recommend, or (c) Prohibit the use of a WDH (weight-distribution hitch)? If fitted, what *rating* should they be, and *setting* should be used?

Towing Aids: Does the tow-vehicle manufacturer (a) Require, (b) Recommend, or (c) Prohibit the use of any other “towing aids”, such as mechanical or electronic “anti-sway” systems?

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Engine Power: From Isaac Newton's laws, it must be appreciated that it takes much more time - and much more (over-taking) distance - to accelerate a combination, than it does to accelerate *just* the tow-vehicle, over the same speed range. There is nothing more frustrating - and dangerous - than to be “stranded”, with not enough power on tap to get you out of a tight situation... such as when over-taking a slower vehicle, or when avoiding a collision, or just trying to “get up to speed” so as to prevent all of the motorists behind you from cursing you.

It is **suggested** that the ratio of kW : GCM (tonne) should be more than **25**. For example, it is suggested that with a GCM Rating of 6.0 tonne, that the engine has a power output of at least 150 kW.

Engine Torque: Likewise, when towing, you need plenty of engine torque - or *pulling power* - to accelerate quickly. When you compare the performance of different engines, you will see that diesel engines have more “low-down (rpm)” torque available, than do petrol engines. This permits a faster acceleration from low speeds, with less gear-changes required.

It is **suggested** that the ratio of Nm : GCM (tonne) should be more than **65**. For example, it is suggested that with a GCM Rating of 6.0 tonne, the engine has a (maximum) torque of at least 390 Nm.

Fuel: While LPG has many financial and environmental advantages, it is not always suitable for extended outback travel. The choice of fuel is therefore usually between petrol and diesel. Considerations include the costs and availability in different regions of the country, any extra cost of the vehicle, and differences between servicing periods and expenses.

Fuel Economy: Inherently, diesel engines have a higher efficiency - hence higher fuel economy - along with more “pulling power” than comparable petrol engines. Comparisons therefore need to be made between similar engines from various manufacturers.

Driving Range: Knowing the anticipated fuel economy (litres per 100 km), the driving range can be determined by taking into account the capacity (litres) of the fuel tank(s) fitted.

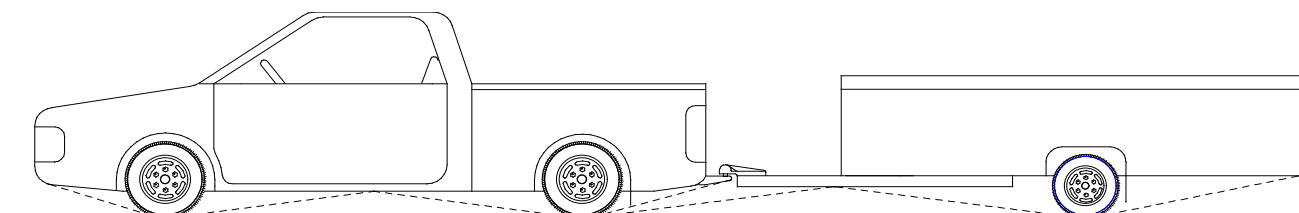
Transmission: Some ‘vanners prefer automatic transmissions because they “do all of the work”, and make starting off from rest - especially up a hill - much easier, with no worry about stalling the engine, or rolling back-wards. Some ‘vanners prefer manual transmissions as they believe they have more “positive control”. Many automatic transmissions also have a manual over-ride, to provide the best of both worlds. The choice is personal preference, after evaluating the cost - and fuel economy - of each type of transmission, along with the towing recommendations, or conditions, from the tow-vehicle manufacturer. It is important that the “first gear” is “low” (high reduction) enough to enable the combination to comfortably take off from rest up an incline.

2WD / 4WD / AWD: This is a very important consideration, depending primarily on what type of roads you will be travelling on. For paved and dry/hard/fairly-level roads, 2-wheel-drive is fine. However, just *one* incident of being bogged, or an unintended off-road “excursion”, may well have you wishing that you had invested in the more-expensive option.

All-wheel-drive, or 4-wheel drive, certainly provides major benefits in traction and safety, and is really a necessity when towing off-road (*mild, moderate, and certainly extreme*) that are muddy, icy or are snow-covered. 4WD / AWD provides additional benefits of better traction on bends, wet roads, and hilly roads.

Ground Clearance: Depending on whether your travel plans will be confined to *on-road*, or will include *off-road*, be it mild, moderate, or extreme, the choice will be quite simple. Of course your caravan or camper-trailer will need to have been designed and manufactured to reliably and durably withstand the same arduous conditions, so that you have a “balanced” combination.

Under-side Angles: Hand-in-hand with ground-clearance requirements for the combination, each vehicle needs to have comparable and adequate angles of approach, ramp and departure, so as best ensure you do not get “stranded”, or suffer any under-side damage.



Check that angles of approach / ramp / departure are sufficient for your anticipated off-road travel.

Wheel-base: A long wheel-base will provide more stability on straight roads, and will cause less axle-load variations because of the coupling force on the tow-bar. However, it will reduce the ramp-angle ground-clearance between the axles. A short wheel-base will generally provide easier handling on sharp winding roads, and rough dirt tracks.

Wheels: It is more convenient to have identical wheels on both the tow-vehicle and the caravan/camper-trailer, so as to enable the same spare wheel/tyre(s) to be suitable for both vehicles. "Identical" means having (a) exactly the same rim diameter, width and *off-set*, and (b) *exactly* the same hub-mounting flange design, stud hole pattern, and stud diameter. However, often it is cost-prohibited, or *not* practical, to do this.

Tyres: Likewise, it is more convenient to have identical tyres on both the tow-vehicle and the caravan/camper-trailer. The choice of tyre is important, especially the tread pattern, which primarily depends on whether or not your travel plans include any possible sand, muddy or snow-covered roads... or even wet grass. Traction is *vital* under these conditions... it is pointless having plenty of engine power available if the tyres cannot obtain sufficient grip.

Many people prefer to use LT (light truck) tyres, rather than passenger-car tyres, on their caravan or camper-trailer... especially if *any* off-road travel is anticipated. While "chunky tread" tyres have major off-road advantages, their road noise and tread wear on paved roads will be worse.

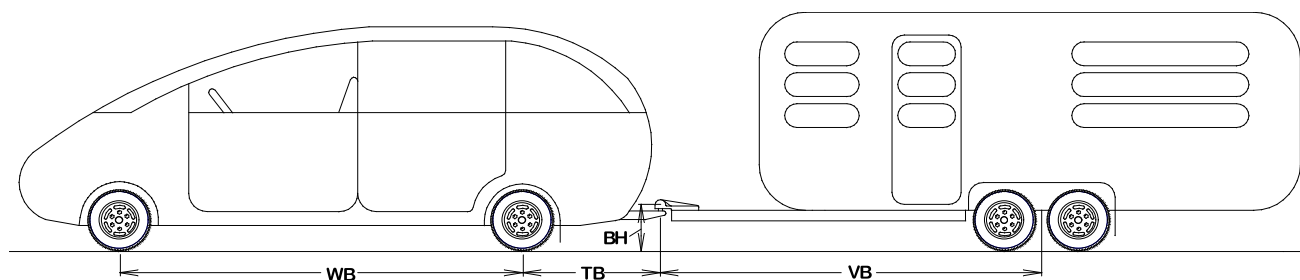
Tow-Bar Over-hang: Unlike 5th-wheelers where the "articulation point" is *above* the rear axle of the tow-vehicle, caravans and camper-trailers have a significant disadvantage - regarding handling and stability on corners - because the "articulation point" (coupling) is quite some distance *behind* the rear axle of the tow-vehicle. Because of this, when the tow-vehicle is steered in one direction, the coupling moves in the *opposite* direction. This can cause an extremely dangerous situation if rapid corrective steering action is required to stop the caravan/camper-trailer from swaying.

The further the coupling is behind the rear axle of the tow-vehicle, the worse the problem becomes, and with certain types of caravans, jack-knifing can occur very quickly... even at moderate highway speeds.

It is **suggested** that the tow-bar over-hang be no more than **30%** of the wheel-base... refer to "TB & "WB" in the drawing.

Coupling & Height: ADR (Australian Design Rule) 62 prescribes legal requirements for "couplings" (which include balls, couplings, tow-bars, safety-chains, etc.) the different versions of which prescribe minimum and maximum heights of certain couplings above the ground, when the vehicles are fully-loaded. In particular, there are specific limits for "50 mm ball-couplings" because of their limited "angles of articulation". Tow-bars must have been strength-tested by their manufacturers, and have their two ratings - towing capacity and down-load - marked on them.

You need to obtain confirmation from the manufacturers of both the caravan/camper-trailer and the tow-vehicle that the coupling units comply with the ADR (and AS [Australian Standard] 4177) requirements... especially the coupling height (BH in the drawing). Confirmation is also required as to whether the height for "50 mm ball-couplings" apply to *all* "50 mm ball-couplings", or just "fixed" (non-pivoting) couplings.



Check that the Coupling Height is legal for the particular type of coupling fitted, and that the tow-bar is marked with the manufacturer's name and the two Ratings.

- Warranty:** Evaluate the warranty range - kilometres & years - and any conditions or restrictions that may affect your planned usage of the vehicle.
- Servicing Costs:** Evaluate the required - and expected - servicing costs of the tow-vehicle. Are there any conditions regarding who may service it, or when, or where? What are the labour charges for dealer servicing? What is the cost of replacement service items? What is the cost and availability of glasses and body components?
- Air-Conditioning:** The choice of having air-conditioning or not is a personal preference, depending on the degree (pardon the pun) of comfort required. It is generally acknowledged that running an air-conditioner does *not* lower the fuel economy as much as driving with open windows.
- Other Options:** Enjoying your travels is important... but not *nearly* as much as your safety. Tow-vehicles now provide exceptional safety features, such as ABS (anti-lock braking system), ESC (electronic stability control), and Traction-control. It is *highly* recommended that you select these features. They greatly improve road safety... but don't rely on them to get you out of a "hopeless situation". Double-check to ensure that they are full-compatible with any electronic stability units fitted to your caravan/camper-trailer. Also check that any electronic controls can be used while "cruise control" is activated. It is recommended that "cruise control" is *not* used when towing.
- 'Van Dealer Advice:** Ask the Dealer of your caravan/camper-trailer if they have any (non-commercial) technical requirements or recommendations regarding the *specifications* for a suitable tow-vehicle for your specific unit. Again, ensure that your Dealer has supplied (in writing) *all* of the specific ratings and masses that you need to know in order to make sound decisions.
- Re-sale Value:** Check dealers, internet sites and newspapers for the same make/model vehicle of various ages and kilometres travelled.
- Make & Model:** Very strictly... a personal consideration!
- Safety Rating:** What are the official *Safety Ratings* for the various crash tests? Hopefully you will *never* be involved in an accident, but if you are, high survival chances are paramount.
- Reputation:** Ask other 'vanners, and anyone driving the same make/model of tow-vehicle that you are considering, exactly what they think of their vehicle, especially its suitability for towing.
- Price:** Very simple... what is your budget??? However, *don't* skimp on safety just for a few \$\$\$.
- Test Drive:** Before making a decision, test-drive each vehicle - ideally towing your 'van - to see if you feel at ease driving it. Comfort, good all-round vision, and predictable controls are vital.
- Final Decision:** Carefully add up your scores for the various contenders... Hopefully you will make the best choice!!!

Happy & Safe Travels...

Whatever tow-vehicle is chosen, ensure that it has sufficient mass and power / torque to do the job.

Ensure all *Ratings* of the tow-vehicle - and the tow-bar - are suitable and legal for the specific 'van.

Check that the height of the coupling above the ground is legal, when the vehicles are fully-loaded.

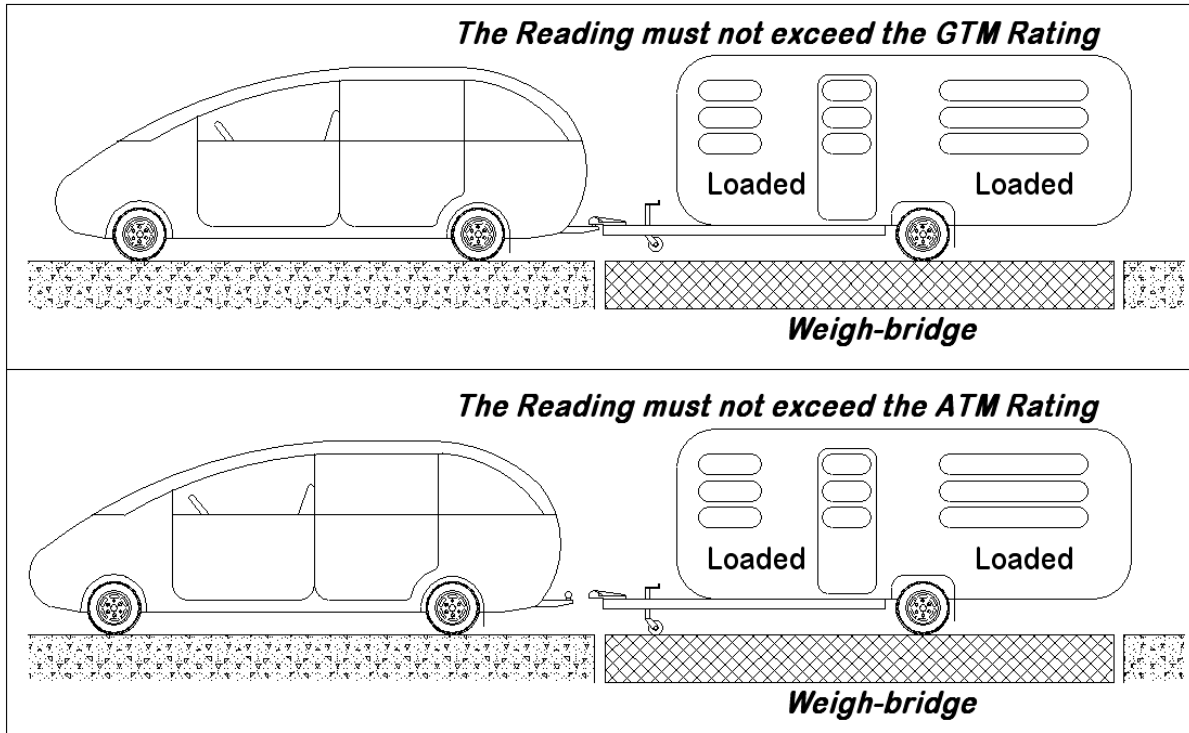
Disclaimer: The above information is believed to be correct, and is offered in good faith. However, no liability whatsoever is accepted for any consequences arising from the reliance or use of this information. None of the information is to be deemed to be legal advice. If you have any questions on any issues, consult an expert in the relevant field for advice.

Caravan Ratings & Masses

The GTM & ATM are Ratings... allocated by the *Manufacturer*

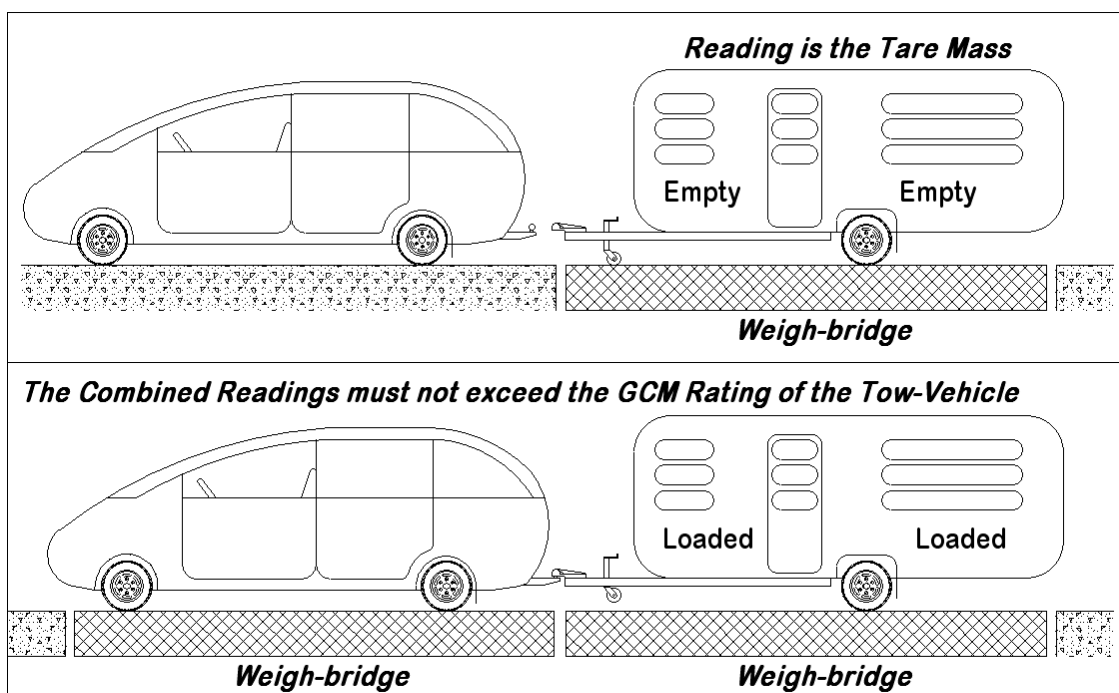
The Tare Mass and Ball-Loading are Actual Masses... that must be measured

The Tare Mass is the *actual measured mass* of the vehicle as it leaves the *Supplier*.
The vehicle is fitted with everything that was stated on the *Purchase Contract*.
The vehicle is empty. The gas cylinder(s) and the water tank(s) must be empty.

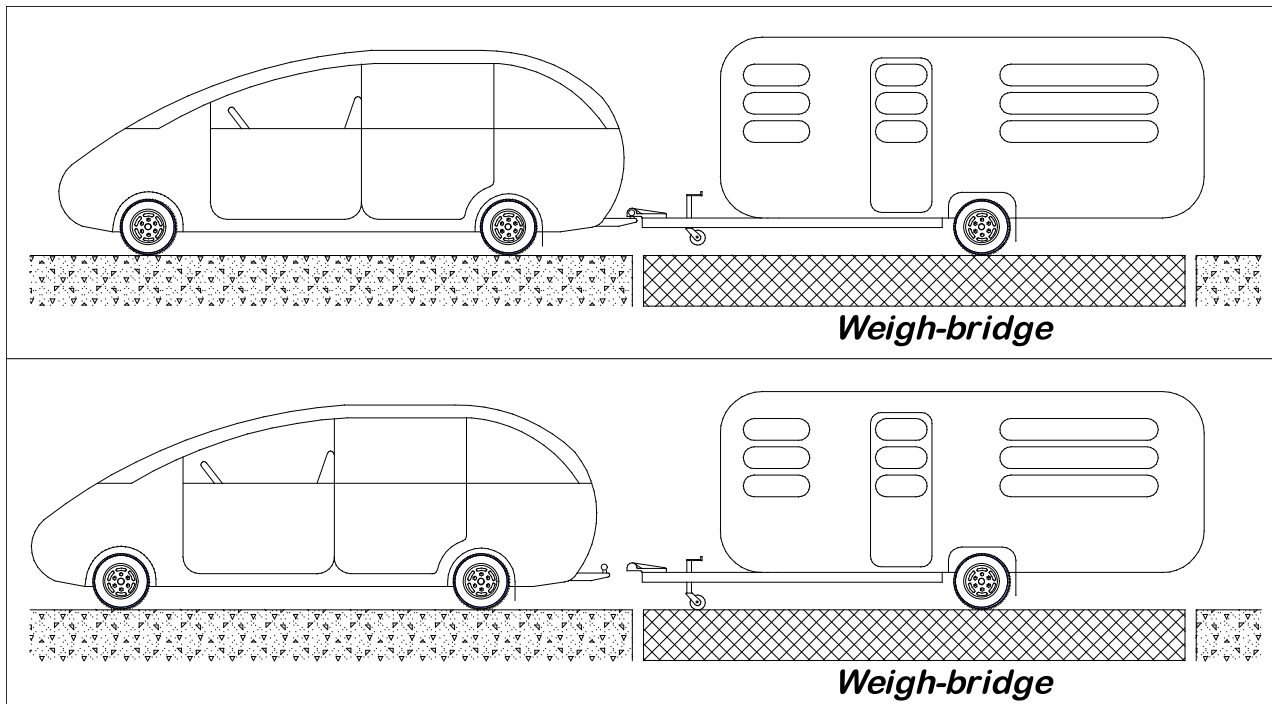


Drawing 1 shows measuring the “**Axle-Loading**” Must not exceed the **GTM** Rating

Drawing 2 shows measuring the “**All-Up Mass**” Must not exceed the **ATM** Rating



Legal Load-Carrying Capacity = ATM Rating – Tare Mass



The Ball-Loading is the *difference* between the two readings

ATM: Aggregate Trailer Mass (Rating)

GTM: Gross Trailer Mass (Rating)

The GTM Rating must *not* exceed the *lowest* of the “Axle-Group” Ratings.

The “Axle-Group” comprises the:

- **Wheels & Tyres**
- **Suspension Structure**
- **Springs**
- **Axles & Wheel-Bearings**

Tow-Vehicles:

- **GVM: Gross Vehicle Mass (Rating)**
- **GCM: Gross Combination Mass (Rating)**
- **RAC: Rear Axle Capacity (Rating)**
- **Maximum Permitted Towing Capacity: (Rating)**
- **Maximum Permitted Coupling Down-load Capacity: (Rating)**

Tow-Bar: Maximum Permitted Towing & Down-load Limits: (Ratings)