

Axle Weighing & Overloading Guide

This guide provides you with information about technical terms and relevant aspects of the overloading of goods vehicles regulation.

Why does overloading matter so much?

1. ROAD SAFETY:

Lorries which are loaded beyond their design weight are less able to stop quickly in an emergency and the steering of the vehicle can be affected.

2. ROAD WEAR AND TEAR:

It is estimated that the overloading of good vehicles costs the community over £50M a year through additional wear and tear to roads and bridges. Heavy axles cause proportionately far more wear and tear, and overloading drive axles (legal limit 11.5tonnes) are the biggest single cause of excessive wear and tear on roads.

3. COMPETITION:

Gross overloading is unfair to the majority of law-abiding operators who accept the constraints of the plated weight limits set by the law. An operator who persistently overloads a lorry can earn additional profits amounting to thousands of pounds per annum.

Some Technical Terms Explained

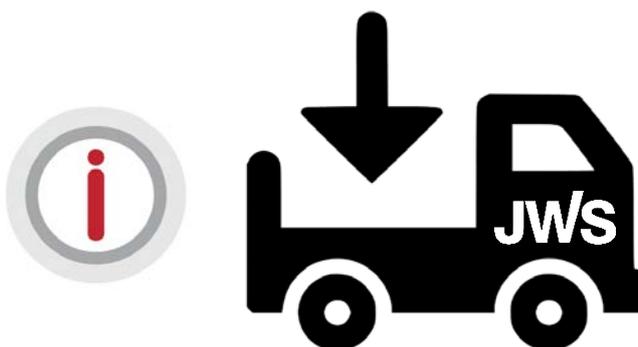
- ✓ **AXLE WEIGHT** : The total weight transmitted to the road by all the wheels on one axle.
- ✓ **GROSS VEHICLE WEIGHT** : The total weight of a vehicle and its load.
- ✓ **TRAIN WEIGHT** : The weight of a vehicle, a trailer and its load.
- ✓ **PLATED WEIGHT** : Either the design weight limit given on a manufacturer's plate or the legal weight limit given on the Department's plate.

- ✓ **TRAILER** : Any vehicle drawn by a motor vehicle.
- ✓ **TANDEM AXLE WEIGHT** : The weight placed on the road by two or more axles spaced more than 40 inches, but no more than 96 inches, apart.
- ✓ **GROUP OF AXLES WEIGHT** : The weight placed on the road by two or more axles spaced more than 8 feet apart.
- ✓ **DRAW-BAR TRAILER** : A trailer pulled by a rigid vehicle.
- ✓ **SEMI-TRAILER** : A trailer forming part of an articulated vehicle.
- ✓ **ARTICULATED VEHICLE** : A tractor unit with a semi-trailer attached where part of the load is borne by drawing vehicle.
- ✓ **TYRE WIDTH** : The with indicated on the side of the tyre by the manufacturer.
- ✓ **WHEELBASE** : The distance in feet between two or more axles, as measured from the centre of each axle.
- ✓ **KERB WEIGHT** : The Kerb weight is the weight of the vehicle as it stands "at the kerb" i.e. ready to drive with fuel and oil in the engine, but excluding the driver, additional equipment such as racking or a roof rack, and the load to be carried. The kerb weight of each axle can be found in the manufacturer's brochure. Simply subtract the kerb weight of each axle from the maximum legal axle weight figure on the plate. The difference between the two figures is the maximum load that can be carried on each axle.

Overloading

Goods vehicles are subject to U.K. weight limits. The weight limits are given on the manufacturer's plate or the Department's plate on each vehicle. They are determined by the technical specification of the vehicle and the need to protect U.K. roads and bridges from excessive wear and tear. Vehicles over 41 tonnes operate under special arrangements. 44 tonnes is allowed for combined (road to rail) transport.

A vehicle is overloaded if it exceeds the plated weight limits. A vehicle could be overloaded on all its axles, on its gross weight and on its train weight. Each of these would be separate offences, e.g. a 3 axle articulated which exceeded the plated weights on the 1st axle, 2nd axle and gross weight would make both the vehicle operator and driver liable to three separate offences



Recommended Description		Identifier	UK Maximum Gross Weight (tonnes)	Shape	
LIGHT GOODS VEHICLES		2 axles	3.5	no rear side windows 	
LORRIES	SMALLER 2-AXLE LORRIES	2 axles	Over 3.5 7.5		
	BIGGER 2-AXLE LORRIES	2 axles	Over 7.5 18		
	HEAVY GOODS VEHICLES	MULTI-	3 axles rigid	25 26*	
			3 axles artic.	26	
			4 axles rigid	30 32*	
	VEHICLES (Vehicles over 7.5 tonnes gross require a Heavy Goods Vehicle Driver's Licence)	MULTI-	4 axles artic.	36 38*	
			Vehicle and draw-bar trailer 4 axles	30 36**	
		AXLE	5 axles or more artic. See note (a)	40	
			Vehicle and draw-bar trailer 5 axles See note (a)	40**	
		LORRIES	6 axles artic. See note (b)	41*	
			6 axles draw-bar See note (b)	41* and **	
			5 or 6 axles artic. See notes (b) and (c)	44* and ***	
			6 axles draw-bar	44*,** and ***	
			6 axles artic. See note (b) and (d)	44*	
6 axles draw-bar See note (b) and (d)			44* and **		

* If the driving axle, if it is not a steering axle, has twin tyres and road friendly suspension, or each driving axle is fitted with twin tyres and the maximum weight for each axle does not exceed 8.55 tonnes.

** Distance between the rear axle of the motor vehicle and the front axle of the trailer is not less than 3 metres.

*** If the vehicle is being used for combined transport.

(a) 5 axles or more artic and the 5 axles or more drawbar could alternatively have a 3 axle motor vehicle and a 2 axle trailer.

(b) Conditions:
- each vehicle must have at least 3 axles.
- drive axle has twin tyre and road friendly suspension and maximum of 10.5 tonnes, or each driving axle is fitted with twin tyres and has a maximum of 8.5 tonnes
- trailer has road friendly suspension

(c) Conditions for operation on 5 axles:
- must have 3 axles on tractor unit
- single container 40ft in length conforming to standards laid down by the International Standards Organisation being carried only
- vehicle being used for international journey.

(d) Powered by a low pollution engine.

Tips for safe loading

KG Ensure that your vehicle is suitable for the load you want to carry.

KG Use the correct equipment to secure the load.

KG Make sure your load is stable before you tie it down.

KG Don't load heavy items on a roof-rack.

KG Put heavy items on the bottom of the load if it is going to be stacked. Make sure those heavy items are along the centre line of the vehicle, and within the wheelbase.

KG Spread the load evenly to ensure you do not exceed the legal maximum weight for each axle.

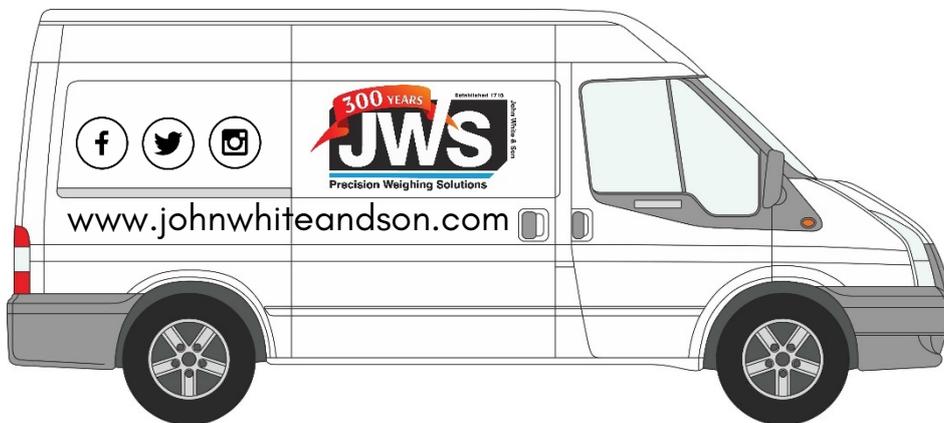
KG Changes in the load distribution will occur as you go along your delivery route. Be prepared to move the load around to maintain an equal weight distribution.

KG Use the proper anchorage points on your vehicle.

KG Check the load restraints at regular intervals.

An Example axle load calculation

Consider the vehicle below. How do we ensure that we do not overload it on either of the axles or exceed the gross vehicle weight?



Assume it has the following weights and dimensions:

-Wheelbase 3,098mm.

Rear axle (A2)

- Kerb Weight of 635 kg.
- Plated weight of 1,550 kg.
- Hence the axle load tolerance is 915 kg.

Front axle (A1)

- Kerb Weight of 1,036 kg.
- Plated weight of 1,450 kg.
- Hence the axle load tolerance (the payload that can be imposed on the axle) is the difference between the kerb weight and the plated weight, i.e. 414 kg.

Assume that the gross vehicle weight is 2,700 kg. We know that the kerb weight of the vehicle is 1,036 kg + 635 kg, i.e. 1,671 kg. Therefore the maximum permitted payload of the vehicle is the difference between the kerb weight and the gross vehicle weight, i.e. 1,029 kg. Supposing a 750 kg load is placed 2,000 mm behind the centre of the front axle. This weight is well within the payload. The effect of this weight on the axles can be calculated from the following:

$$\frac{\text{Distance of load from front axle}}{\text{Wheelbase}} \times \text{weight} = \text{effect on rear axle}$$

$$\frac{2,000 \text{ mm}}{3,098 \text{ mm}} \times 750 \text{ kg} = 484 \text{ kg effect on rear axle}$$

The effect on the front axle is the difference between the weight of the load and the effect on the rear axle, i.e. 266 kg. The next step is to add these weights to the kerb weights for each axle. Doing so, we find that the total load on the front axle is 1,302 kg, and the total load on the rear axle is 1,120 kg. Both axles are therefore within the maximum weight limit and the load can be carried safely. However, if the same 750 kg load is placed against the front bulkhead, 1,000 mm from the front axle, the axle loads are as follows:

- Total load on the front axle is 1,036 kg + 507 kg, i.e. 1,543 kg.
- Total load on the rear axle is 635 kg + 242 kg, i.e. 877 kg.

Comparing these figures to the plated weights of each axle shows that the front axle is now overloaded, even though the weight of the load is only three-quarters of the vehicle's total maximum payload. Remember, although you can obtain the kerb weight of your van from the manufacturer's brochure, if you weigh your van at a public weighbridge, you will get a more precise value, because it will include personal belongings and other items in the vehicle.

Source of information



- *UK Government - Department for transport*
- *Oregon Government - Oregon Truck Weight*
- *Energy Saving Trust - Transport*
- *TATA Steel - Technical information*

Please note

This information is intended for guidance; only the courts can give an authoritative interpretation of the law.

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