WHEEL LOAD SCALES

THE PURCHASING DECISION GUIDE

The term wheel weigher covers a wide range of products and prices and it is important to understand the competitive benefits and limitations of the various products before making a purchasing decision.

This guide is designed to allow you to make an informed choice from the many products on the market and compare products on a value for money basis rather than on straight price basis which can be very misleading and costly in the long term.

DIMENSIONS

The weighpad can be supplied in either a single tyre or double tyre length and it is important to decide which types of vehicle are to be weighed in order to make the order the correct specification.

The height of the weigh pads can vary from as little as 11mm high to 40mm high, dependent on the manufacturer.

The lower the height, the less weight transfer you will get in the vehicle and the easier it is for the vehicle to drive on to the pad. However the lower the height the less durable the weigh pad becomes and on any uneven surface or if there is any debris under the weighpad, the more likely the pad is to suffer permanent distortion and possibly total destruction of the weighing pad.

The answer is a compromise of around 25mm which is sufficiently low to provide easy access and high enough to provide durability in all conditions.

CAPACITY

The maximum legal individual axle load in most European countries is approximately 11,000 kgs and so a weigh pad capacity of 10,000 kgs (20,000 kgs per axle) gives over 80% more capacity than the legal maximum. In certain countries these axle limits are frequently exceeded and weigh pad capacity in excess of 10,000 kgs could be required.

STATIC OR IN MOTION OPERATION

The weighing of commercial vehicles on an axle by axle basis is a complex subject.

Weighing needs to be simple and fast.

Correct weighing procedures must be laid down to minimise the weight transfer within the vehicle suspension system that can generate significant weighing errors.

When weighing two-axle vehicles we can weigh statically by correctly positioning each tyre on to a weigh pad and reading or recording the weights found. These weights can then be manually added to produce an individual axle weight and then these axle weights can be added to produce a gross vehicle weight.

Even with two-axle vehicles, static weighing can be slow and needs a degree of driver co-operation and driving skill.

When weighing multi axle vehicles it is vital that correct weighing procedures are followed in order to minimise weighing errors.

Braking transfers weight in any mechanically compensating suspension system and so the very act of positioning and stopping individual axles of a multi axle vehicle on a static weighpad introduces weighing errors.

Without assistance or supervision it is also a most difficult procedure to correctly position an individual trailer axle on weighpads which might be 18/20m behind the driver.

It is not therefore recommended to use static weighing technology for other than two-axle vehicles.

“In Motion” Weighing removes the need for correct axle positioning and the braking which can create weight transfer and is therefore a far more suitable method of weighing multi axle vehicles. With no need to locate individual axles the weighing procedure is dramatically faster than static methods.

The second factor in obtaining accurate results is to ensure that all axles within compensating axle arrangements are on the same level as the axle being weighed. This can only be achieved either by recessing the weighing pads in to a level concrete roadway or by using special levelling mats which must be longer than the longest axle combination to be weighed (normally 3 to 4 m) These must be positioned before and after the weighing device.

CABLE OR CABLE FREE TECHNOLOGY

Weigh pads are available in Cabled or Cable Free versions.

The cable free Cheklode DP4000 shown here with levellers.

What does this mean?

The weigh pads produce an individual wheel weight. If linked together by cable, they can produce an individual axle weight. If the weigh pads do not incorporate an

integral weight display in each weigh pad the weights can only be viewed on a weighing terminal which must be connected to the weigh pads by cable.
If a print out is required, the console must incorporate such a device or a separate printer can be connected to the terminal by cable. If the console and/or printer are mains operated a cable is obviously needed between the console/printer and a mains supply.

Cables present several problems:

- They are a trip hazard for drivers/system operators;
- Running mains to a system location can be difficult and present a health and safety issue with trailing mains cables and connections, particularly in wet conditions;
- When drivers are inexperienced or non co-operative, they can easily cause a weigh pad to move as they are positioning by misuse of the brakes or clutch, which results in cable damage and in many cases causes any instrumentation connected to the weigh pads to be moved or damaged. This can be costly and creates significant system downtime.

Advantages of a cable free system

- Cable free systems rely on radio communication between the weigh pads and instrumentation, removing any cable hazards.
- The instrumentation can be located up to 30m from the weigh pads, allowing continuous operation in all weathers from within a building or vehicle.
- The multi power feature of these systems also allows them to be operated from a cigarette lighter or car battery in addition to their internal rechargeable battery system thus allowing continuous unrestricted operation.

DATA PROCESSING

The weighing data produced by a weighpad can be recorded manually or transmitted to a display only terminal. With the inclusion of a printer system, this data can be recorded with time and date information. The later designed and more advanced weighing terminals give a much wider range of operator benefits.

In addition to recording weights, date and time information, it is possible to record details of:-

- Site Address
- Driver/Operator name
- Goods carried
- Vehicle Type
- Vehicle Identification
- Destination
- Enforcement operator name

It is also possible to store legal axle and gross weight limits for each vehicle type in any country and thus automatically compare the results found with those legally permitted producing an instant overload warning and record.
It is also possible to produce unlimited operator selectable reports on all fields:

- Report on all vehicles weighed
- Number of overloads by vehicle type.

- Gross and nett weights of vehicles weighed.
- Totals of loads by product or haulier/customer.
- Overload Fine calculations.

The later systems are designed to interface with a PC for additional weighing analysis or long term data storage.

SAMPLE TICKET

CENTRAL WEIGHING LTD
HARTLEBURY TRADING ESTATE
KIDDERMINSTER
WORCS, DY10 4JB
TEL 01299 251242

Date :- 26/01/2003 Time :- 10:37
Transaction No. : 00006
Vehicle Id. :

	Weight (kg)				
	Left	***Right***	***Total***	***%L***	***%R***
Axle 1:	***2160***	***2580***	***4740***	***46***	***54***
Axle 2:	***2890***	***2930***	***5820***	***50***	***50***
Axle 3:	***3520***	***3420***	***6940***	***51***	***49***
Axle 4:	***2580***	***1930***	***4510***	***57***	***43***
Axle 5:	***2260***	***2120***	***4380***	***52***	***48***
Gross :	***13410***	***12980***	***26390***	***51***	***49***

Operator Signature……

Driver Signature……

ACCURACY AND APPROVALS

To compare products on a like for like basis it is essential that all products have been subjected to some form of Internationally recognised approval system, the most common being O.I.M.L Class 1111 or in the USA Handbook 44.

Many products are being offered from countries which do not require these standards and as such there is no independent guarantee of electrical safety compliance, EMC testing, or accuracy.

It is also important to understand whether the accuracy claims for any product are in static or in motion operational mode, as these will differ considerably and can be misleading.

Some companies quote a capacity of 10,000 x 10kgs but the 10 kgs is the weighing division size and not the accuracy you can expect, which in some cases is as much as 3% e.g. 1,200 kgs on a 40,000 kgs vehicle.

You will see from this guide that products can vary considerably in :-

- User friendly operation
- Safety
- Accuracy
- Data capture and reporting capability.

CONCLUSION

We hope that this guide enables you to obtain quotations which are directly comparable against specifications which you have clearly defined to meet both your current and future weighing needs.

Quality, well designed products will continue to give years of trouble free service long after the issue of initial cost has been resolved.

CHEKLODE 4P4000

CHECK OUT THE COMPETITION

HEIGHT AND WEIGHT

- The systems need to be portable and yet take the heaviest anticipated axle loading.

  This is a fine balance, too high and vehicles find it very difficult to get safely up on to the platforms: too low and any deviation in the surface levels will cause the pads to distort under load.

- The weigh needs to be under 25kgs to be easily carried by one man.
- The height needs to be under 25mm for easy access.
- Less than 20mm high and durability becomes a problem.

CHEKLODE DP4000 is the perfect combination

STATIC/DYNAMIC OPERATION

When weighing multi axle vehicles on an axle by axle basis, the transfer of weight in the compensating axles is a major problem. How is this best avoided? By weighing "In Motion". Static weighing causes weight transfer every time the vehicle is stopped and started. Weight transfer means weighing error.

Vehicle positioning is also a major headache. Stopping a single wheel on a small platform which may be up to 20m behind the driver is an impossible task and frequently requires a two man operation and some good driving skills.

Single wheel weighpads have to be repositioned for every axle to accommodate different wheel track widths.

In Motion weighing with double width weighpads removes all these difficulties.

CABLES

Cables can be a nightmare.

Cables for power to the indicator and a separate printer are a major heath and safety concern, trailing across a vehicle park or pedestrian area. Cables between weighpads and to the weighing console are a further hazard and can be easily damaged by the vehicle or by slipping weighpads. Either will cause system failure incurring cost and downtime.

Cheklode DP4000 is totally cable free

DATA CAPTURE

The capture of weighing data is a valuable feature. The ability to custom design reports and weighing tickets through the console is cost effective and user friendly. The ability to collect data in all weathers and regardless of the power supply available is a major operational benefit.

Cheklode has an advanced microprocessor which allows all these functions and more.

Weights found are automatically compared with those applicable for the vehicle type in any country, thus providing an instant overload status report and warning.

Weigh Information When You Need It,
Where You Need It!

CHEKLODE DP4000
FROM CENTRAL WEIGHING LTD

SITE CONSTRUCTION FOR IN MOTION WEIGHING

We wish to provide a definitive document which details the site construction requirements needed to achieve good results when weighing commercial vehicles on an axle-by-axle basis.

We must start by answering one popular misconception. The requirements detailed herewith apply regardless of whether the vehicle is to be weighed statically or in motion. The guidelines we are giving are to reduce the amount of weight transfer in compensating axles, and as a consequence weighing errors.

When weighing on an axle-by-axle basis it is vital that weight is not shifted within the suspension of the vehicle whilst weighing is in progress.

Let us start by looking at vehicles.

Ideally all vehicles need to be weighed on a level surface, which must be long enough to accommodate twice the length of the longest vehicle to be weighed. This ensures that vehicles of all lengths can be weighed in a straight line without turning during the weighing process.

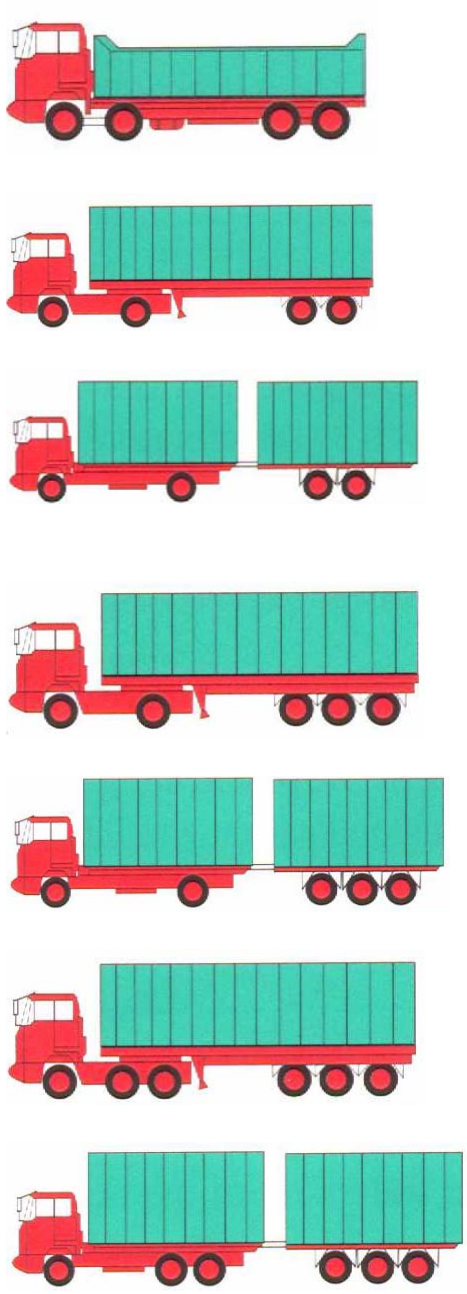
If your maximum vehicle length is 22m the overall weighing site will need to be 45m x 4m wide.
*This is the area of site needed to weigh vehicles of up to 22m long. It is not always necessary to reconstruct this whole area as you will read later.

Vehicles are divided into two types for the purposes of axle weighing.

1. Any 2 axle vehicle or 2 axle draw bar or three axle artic vehicles without tandem or triple axle combinations in the tractor or trailer.

2. All vehicles with compensating axles. This includes tandem and triple axle combinations.

   E.g. 3 axle rigid, 4 axle rigid, 5 axle artic, 6 axle artic, 5/6 axle drawbar outfits and road trains.



The first category of vehicle is simple to weigh on an axle-by-axle basis as weight cannot be transferred between the axles except where the site is not level.

Where there is a generally level site no special site preparation is needed before and after the weigher and the steel pit frame surround needs only to be installed as per our site construction drawing in a simple pit construction with drainage and signal cable ducts constructed as required.

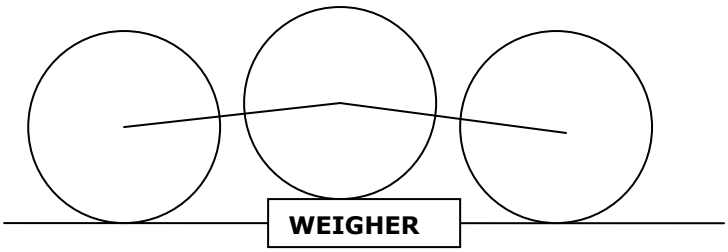
The second category of vehicles are more complex and the site construction is vital to the performance of the weigher. Tandem and triple axle combinations are designed to share the load between the axles within the same combination.

Vehicles with air or hydraulic suspension systems undertake this process very efficiently. Vehicles with mechanical suspension (leaf spring) systems are not as efficient and it is these vehicles that cause the very real problems for axle weighing equipment which must be addressed in the site construction process.

What we are trying to avoid is the transfer of weight from one axle to another during the axle weighing process. This would have the effect of temporarily reducing or increasing the weight on an individual axle as it is weighed and then transferring this weight onto another axle in the same combination to be weighed again thus creating weighing errors.

The load share can be redistributed by:

a) A difference in height of any axle within the same compensating arrangement from that axle that is being weighed.

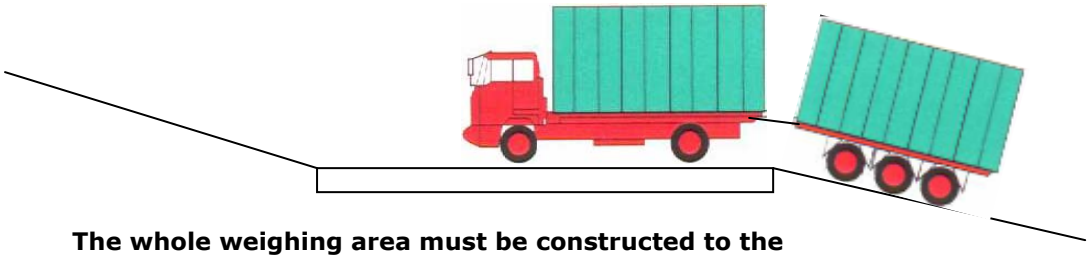


If the platform is installed even marginally higher or lower than the ground on which other axles within the same combination are sitting, weight will be transferred on to or off the axle being weighed.

- This can be as much as 100 kgs for each mm in height difference.
- Imagine then a platform height 5mm higher than the road either side of the platform. When weighing a triple axle combination this would have the effect of raising each axle weight by 500 kgs and an error of 1,500 could be generated just within this combination.

This effect is cured by constructing an approach and exit to the weigher in reinforced concrete that is sufficient to accommodate the longest tandem or triple axle combination to be weighed. In Europe this is about 4m before and after the weigher. We therefore need to construct this 4m approach and exit to the weigher to a tolerance of ± 3mm under a 4m straight edge. This is a tight tolerance but one we work on every day.

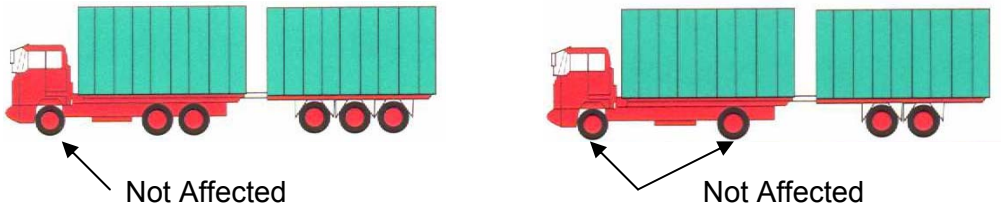
Before and after this smooth and level area the balance of the weighing area (twice the maximum vehicle length) should be generally level but with the exception of law enforcement sites need not be specifically constructed unless the surface is very irregular or changing in gradient. It is important that there are no steps from the existing site onto the 4m approaches and that the 4m on and off is laid within the general gradient of the site and not as a level area with changes of gradient on and/or off this level area.



The whole weighing area must be constructed to the

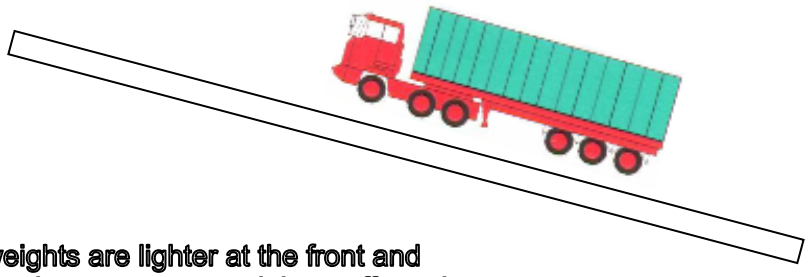
In the case of Law Enforcement sites a National Code of Practice may dictate that the whole of the weighing area outside the 4m approach and exit area be constructed to a tolerance of within ± 8mm.

- This effect only relates to compensating axles and any individual axles within the tractor or trailer unit would not be affected.



To accommodate existing site gradients and drainage we can allow a gradient of 1:200 and a crossfall of 1:50. You will understand from this that we are looking for a smooth consistent gradient throughout the weighing area rather than precise levels.

These gradients can be exceeded in certain circumstances but if too excessive this may have the effect of transferring weight within the vehicle even with 2 axle vehicles and the axle weights will be incorrect although the gross weight may remain within tolerance.



Axle weights are lighter at the front and heavier at the rear, gross weight unaffected.

b) Braking or acceleration during the weighing process

The vehicle should be started 4m back from the weigher and driven at a steady speed across the weigher without braking or acceleration. This will avoid any weight being transferred within the compensating axles.

c) Speed

The vehicle speed during weighing is critical to achieve high accuracy and meet OIML Class III requirement of 0.5%. Regulations dictate a maximum speed of 5 km/h to achieve this accuracy. The system produces an overspeed warning when this speed is exceeded and a ticket cannot be produced.

Where required vehicles can be weighed at speeds up to 15 km/h by resetting the maximum speed parameter. The weighing accuracy will be reduced but with good site conditions this should still be within 2 - 3%.