DAIHATSU
Innovative Reliable Motoring

DELTA

The Daihatsu Delta

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Maximum Mass & Dimensions

DELTA

Engine

Reliable engine and gearbox

The 14B Dyna motor is the most tested, reliable and durable engine available.

Further from Daihatsu's parent company is the M153 gearbox. The Delta never stops running, the Delta never breaks down, the Delta is there for you.

Available in 3.5 ton and 4.0 ton variants, with among the lowest per kilometre running costs. The Delta is the most cost efficient, reliable and best value vehicle available.

Warranty: 1 year unlimited kms and
                       1 year anti-corrosion (on cab)
Service intervals: Every 7 500 kms
                       First service at 1 000 km

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3.5/4.0 ton

Specifications: 3.7 4 Cyl OHV direct injection 14B engine
                          Diesel distributor pump
Power: 71 kW @ 3 400 rpm
Torque: 247 Nm @ 2 000 rpm
Compression Ratio   18:1
Bore/Stoke   102 mm X 112 mm

Thanks to a direct injection system, the 14B diesel engine delivers real power with low noise and superb fuel economy. The durable valve mechanism ensures excellent reliability.

Maintenance costs

Service costs up to 60 000 km
± R13 800 = 0.23 c/km Excluding Diesel*

* Correct at time of print
(The above costs exclude Tyres)

Transmission

Type M153 5-Speed Manual

This is a tried and tested gearbox manufactured by Toyota.

An added benefit to our Delta range is that our vehicles are equipped with an automatically adjusting clutch, which minimises maintenance. The driver thus enjoys the same, familiar pedal operation throughout the clutch's life.

The transmission has been designed to take full advantage of the engine's characteristics to ensure excellent fuel consumption and acceleration.

Allows for PTO
(Power take off for specialised bodies).

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Suspension

The entire Delta Range have heavy-duty front and rear suspension systems that absorb shocks for smooth riding comfort with or without a load. On rough roads, the rugged suspension protects your cargo and provides superb road holding at the same time.

Front: *Rigid axle, semi oval leaf spring, double acting shock absorber*

Rear: *Rigid axle, double semi oval leaf spring, double acting shock absorber*

The Double Semi Oval Dual acting Springs on the rear complement the leaf springs to improve the stability and drive. The addition of springs means that the reliability is higher than all other trucks and the springs improve the suspension action on the road, minimising the impact of smaller bumps in a smoother, more controlled manner.

The shock absorber acts to absorb all of the bumps in the road to prevent them being transmitted by the much heavier leaf springs which are there to absorb the weight from the load on the truck. This improves the road holding, reduces tyre wear and reduces the wear on the truck body.

Braking System

Self Adjusting Clutch and Brakes minimise downtime and maintenance to ensure that the truck stays where it belongs, on the road generating income.

Front: Drum type
Rear: Dual drum type

Our Delta range is fitted with automatic bake adjusters that maintain ideal drum-shoe clearance, ensuring stable stopping power at all times.

Our 3.5 and 4.0 ton range is also fitted with an exhaust braking system. When the accelerator pedal is released for deceleration, resistance is created in the exhaust system, rapidly reducing the engine speed and slowing the vehicle. This reduces the need to frequently apply the brakes on long downhills and eliminates brake overheating, minimises wear and reduces maintenance.

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Steering, Wheels & Tyres

Type:	**Recirculating ball type, Power assisted**
Turns :	**3.75 (Lock to Lock)**
Turning Radius:	**6.5 m (3.5 & 4.0 ton)**
Rim Type:	**Steel**
Tyre (3.5 ton) :	**7.00 X 16 X 10 PLY**
Tyre (4.0 ton) :	**7.50 X 16 X 12 PLY**

Chassis

The entire Delta range is built on an extra strong box frame, this tough welded box frame resists twisting and heavy stress from any direction.

Dimensions (mm)	3.5 ton	4.0 ton
Length	5 950	5 950
Cab-Axle Length	2 700	2 700
Width	1 995	1 995
Height	2 110	2 110
Wheelbase	3 280	3 280
Track Front	1 410	1 410
Track Rear	1 470	1 410
Ground Clearance	190	190

Weights (kg)	3.5 ton	4.0 ton
Licensing Mass	2 360	2 360
GVM	6 260	7 004
GCM	8 500	8 500
Front Axle	2 260	2 508
Rear Axle	4 000	4 496
V Rating	6 260	7 004
D/T	8 500	8 500
A1	2 260	2 508
A2	4 000	4 496
Licensing M Front	9 400	1 400
Licensing M Rear	960	960

The Double Strength Box-Chassis, also with ladder bracing, resists twisting, handles higher loads and lasts longer than conventional channel chassis. When a body is fitted to this stronger, stiffer chassis it lasts longer because the chassis is taking all of the stress.

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Cab

Driver comfort is critical to driver performance and the Daihatsu Delta certainly does that by offering the following comfort enhancement features:

- Tilt steering, the steering tilts up or down in an overall 14 degree arc
- Power steering offering manoeuvring with minimal effort
- Anti-glare rear view mirror, to ease driver fatigue at night
- Extra low lookout windows on each door, for greater safety when turning corners or manoeuvring in tight spots
- Left under mirror for checking the lower area in front of the vehicle, to assist manoeuvring in awkward spots
- Big bright and easy to read meters and indicators for reduced eye strain and ease of recognition
- Comfortable seats, the separate driver seat slides a full 120 mm and reclines up to 12 degrees. And includes a centre seatback tray for document storage
- Rev Counter
- Ashtray and lighter
- Storage compartments in both doors and the dashboard
- Heater and ventilation systems
- Front row 3 seats. Central storage compartment in the middle seat. Fold middle seat forward to access large cubby space

Table of Maximum Dimensions

	Maximum	Regulation
Overall Length		
Trailer with one axle or one axle unit	11,3 m	221 (b) (i)
Trailer with two axles or one or more axle units	12,5 m	221 (c)
Any other vehicles	12,5 m	221 (f)
Combination of vehicles	22 m	221 (g)
Overall Width		
Goods vehicle, the gross vehicle mass of which does not exceed 12 000 kg	2,5 m*	223 (b) & (c)
Overall Height		
All goods vehicles	4,3 m	224 (b)
Turning Radius		
Maximum at full lock. Both ways	13,1 m	225 (a)
Wheelbase		
Semi-trailer	10 m	
Trailer	8,5 m	225 (b)
All other goods vehicles	8,5 m	

* Delta maximum 2.3 m due to mirrors.

	Maximum	Regulation
Front Overhang		
Semi-trailer	1,8 m	226 (1) (a) and (b)
Goods vehicle, 60% of wheelbase, or (a) If the driver's seat is not more than 1,7m from the front end	6,2 m - 1/2 wb	
(b) Any other goods vehicle (including a trailer) - In the case of a front axle axles unit, the front over = hang is measured from the foremost axle and not the centre of the axle unit	5,8 m - 1 / 2 wb	
Rear Overhang		
Refuse collectors, road making and road construction vehicles and farming vehicles – 70 % of wheelbase	70 %	226 (2) (a)
A trailer with one axle or one axle unit (excluding a semi- trailer) 50 % of body length	50 %	226 (2) (a)
Any other vehicle 60 % of wheelbase. The rear overhang is measured from the rear most axle	60 %	226 (2) (c)

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|	Maximum	Regulation
Load Projections		
Load projections must not be confused with overhang. Basically, overhang is part of the vehicle, whereas projection is that part of the load which extends beyond the front end and/or rear end of the vehicle. Maximum load projections are		
Side Load Projection		
In the case of a goods vehicle which has a GVM exceeding 12 000 Kg, maximum each side of longitudinal centre line. In the case of any other goods vehicle	1,3 m	227 (aa)
	1,25 m	227 (bb)
Front Load Projection		
All goods vehicles, the projection of the load beyond the front end of the vehicle or	300 mm	227 (a) (ii)
The front overhang plus the front load projection must not exceed the front overhang as prescribed Regulation 226		227 (b) (i)

	Maximum	Regulation
Rear Load Projection		
All goods vehicles, the projection of the load beyond the rear end of the vehicle. Note: The combined length of vehicle or combination of vehicles plus projection must not exceed the prescribed overall length of the vehicle of combination	1,8 m	222 (2) (a) (iii)
Drawbar Length		
Maximum length of conventional drawbar	2 m	222 (2) (b)
The length of an underslung drawbar – the maximum drawbar length is not prescribed, but the maximum distance between the rear end of the towing vehicle and the front end of the trailer must not exceed	2,5 m	222 (2) (b)

Restriction on Combination of Motor Vehicles

(a) Regulation 222 (1) A combination of motor vehicles may consist of:

   (i) A truck drawing two drawbar trailers;

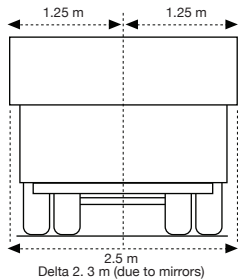   (ii) A truck-tractor drawing a semi-trailer and a drawbar trailer.

Rear Overhang & Load Projections

Rear Overhang

Wheelbase | 60% of Wheelbase
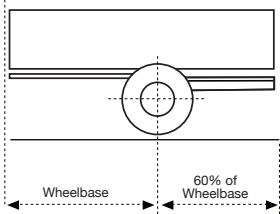
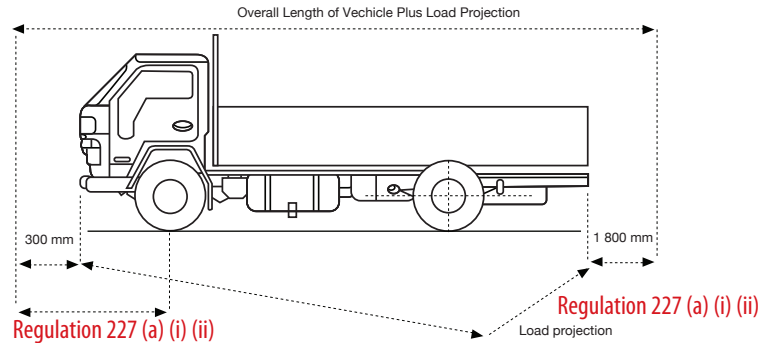The rear overhang of refuse collector, road making and road construction vehicles and farming vehicles is 70% of the wheelbase.
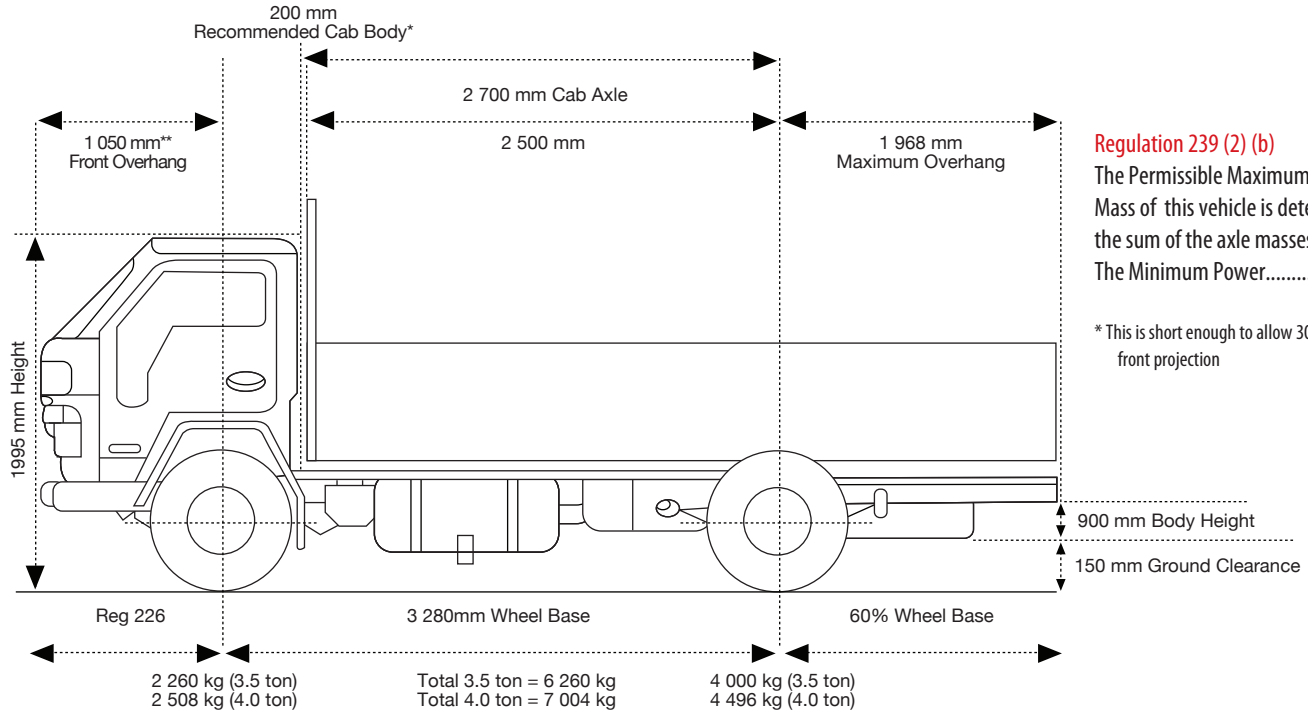
Load Projections

1.25 m | 1.25 m

2.5 m
Delta 2. 3 m (due to mirrors)

Regulation 277 (bb)
Vechicle not more than 12 000 kg GVM.

Load Projections

Overall Length of Vechicle Plus Load Projection

300 mm

1 800 mm

Regulation 227 (a) (i) (ii)

Regulation 227 (a) (i) (ii)
Load projection

The actual front overhang plus load projection must not exceed the dimension prescribed for the front overhang.

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Two Axle Vehicles Without & With Trailer

200 mm
Recommended Cab Body*

2 700 mm Cab Axle

1 050 mm**
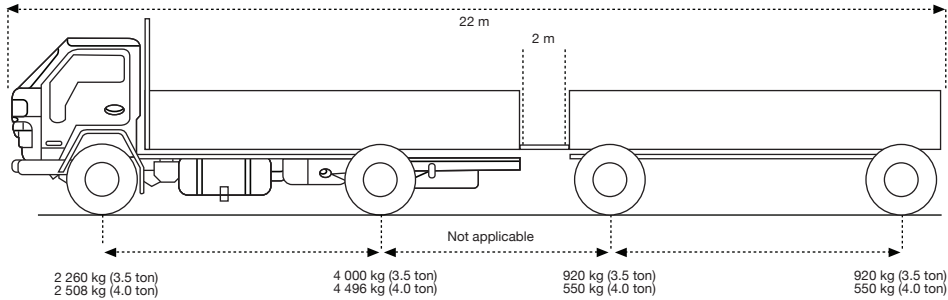Front Overhang

2 500 mm

1 968 mm
Maximum Overhang

1995 mm Height

Regulation 239 (2) (b)
The Permissible Maximum Vehicle
Mass of this vehicle is determined by
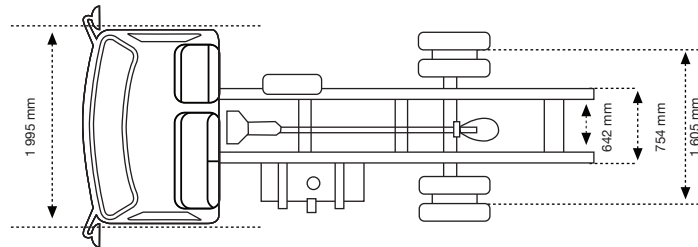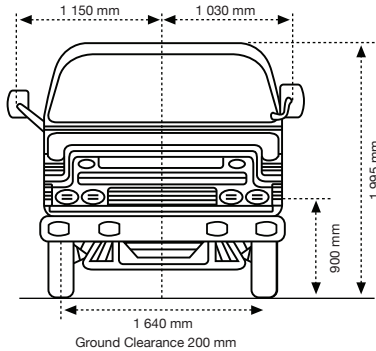the sum of the axle masses.
The Minimum Power..........70KW

* This is short enough to allow 300 mm
   front projection

900 mm Body Height

150 mm Ground Clearance

Reg 226

3 280mm Wheel Base

60% Wheel Base

2 260 kg (3.5 ton)
2 508 kg (4.0 ton)

Total 3.5 ton = 6 260 kg
Total 4.0 ton = 7 004 kg

4 000 kg (3.5 ton)
4 496 kg (4.0 ton)

Two Axle Vehicles Without & With Trailer

22 m

2 m

Not applicable

2 260 kg (3.5 ton)
2 508 kg (4.0 ton)

4 000 kg (3.5 ton)
4 496 kg (4.0 ton)

920 kg (3.5 ton)
550 kg (4.0 ton)

920 kg (3.5 ton)
550 kg (4.0 ton)

Please note
i) Mechanical brake needed on trailer
ii) Do not tow without full load on truck

1 150 mm   1 030 mm

1 995 mm

900 mm

1 640 mm

Ground Clearance 200 mm

1 995 mm

642 mm

754 mm

1 605 mm

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Vehicle Data & Vehicle Plating

Road traffic Regulation 245 requires that all buses, mini-buses, goods vehicles and truck-tractors must display certain prescribed information clearly imprinted or stamped on a metal plate affixed in an accessible position.

This requirements has been in place in the road Traffic Legislation since 1 January 1972 and its importance is often not appreciated by many operators.

Failure to display the information or displaying the wrong information may well result in prosecution and it must not be forgotten that it is the operator's responsibility to see that the information is correctly displayed.

This step-by-step procedure is to assists in the determination of the information to be displayed.

Vehicle Data & Vehicle Plating

Bus, minibus and goods vehicle

Step 1	Establish manufacturer's GVM/BVM (see definition) from vehicle data sheet
Step 2	Establish manufacturer's GCM/BKM (see definition) from vehicle data sheet
Step 3	Establish engine power in kW – (P/D) from manufacturer's engine chart
Step 4	Establish manufacturer's front axle rating (GA/BA) or (GAU/BAE) from vehicle data sheet
Step 5	Establish manufacturer's rear axle rating (GA/BA) or (GAU/BAE) from vehicle's data sheet
Step 6 / 7	Establish tyre loadings front and rear. Tyre size from vehicle datasheet. Tyre ratings from SABS 1550 of 1992
Step 8	Establish maximum legal rear axle mass load – Reg 240
Step 9	Establish maximum legal rear axle massload – Reg 240 or axle unit massload – Reg 240
Step 10	Establish maximum group mass – Reg 241. First to last axle- from vehicle data sheet
Step 11	Determine permissible maximum front axle massload (A) or (AU/AE). Take least of steps 4 -6 and 8
Step 12	Determine permissible maximum rear axle massload (A) or (AU/EU). Take least of steps 5 -7 and 9
Step 13	Determine the permissible maximum vehicle mass (V). Add step 11 and 12 then check with step 1 and 10. Take whichever is the least
Step 14	Determine permissible maximum combination mass in terms of traction – Reg 239. Multiply step 12 by five (traction ratio)
Step 15	Determine maximum permissible combination mass in terms of power / mass ratio – Reg 239. Multiply step 3 by 240 (Kg/kW)
Step 16	Determine permissible maximum combination mass in terms of manufacturer's rating – Reg 239. This is also step 2
Step 17	Determine permissible maximum drawing vehicle mass (D/T). Take least of steps 14, 15 and 16

Following the above step-by-step procedure the Permissible Mass Plating Data Sheet can be completed by inserting the appropriate information.

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Understanding Permissible Maximum Drawing Vehicle Mass & Combination Mass

An understanding of Regulation 244 (c) D/T
Permissible maximum Drawing Vehicle Mass

Regulation 244(c) prescribes that the permissible drawing vehicle mass is determined by the least of :

- The manufacturer's gross combination mass… denoted GCM/BKM
- The power of the engine in kW x 240… denoted P/D Regulation 239(2) and
- The actual permissible mass on the driving axle(s) x 5… Regulation 239(3).
  For plating purposes the permissible maximum mass on the driving axle(s) is used

Calculations

GVM = Gross Vehicle Mass
*   = A1 + A2*

3.5 tons: 2 260 kg + 4 000 kg = 6 260 kg
4.0 tons: 2 508 kg + 4 496 kg = 7 004 kg

Payload =
GVM - Weight of Body
- Licensing Mass (Tare)

3.5 tons = 6 260 kg - 560 kg* - 2 360 kg = 3 340 kg
4.0 tons = 7 004 kg - 560 kg* - 2 360 kg = 4 084 kg

Body Length =
Maximum Overhang - Cab Body
Distance + Cab Axle

Both = 1 968 mm - 200 mm + 2 700 mm = 4 468 mm

GCM = Gross Combination Mass

Towing Mass =
GCM - GVM - Weight of Trailer

3.5 tons = 8 500 kg - 6 260 kg - 400 kg** = 1 840 kg
4.0 tons = 8 500 kg - 7 004 kg - 400 kg** = 1 096 kg

Total Weight of Body =
Weight/m x Length

Approximates	
Dropside	120 kg/m
Flatbed	100 kg/m
Closed Body	135 kg/m

E.g. 4.3 m dropside = 4.3 m x 120 kg = 516 kg

* Approximate dropside body weight

** Approximate Dual Axle trailer weight (of appropriate size)

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Transport Productivity

Let's calculate a hypothetical workload.

The Task	Transport 100 tons 50km
Workload	100 x 50 x 2 = 10 000 ton.km
Time on the road	10 hours (excludes turn-around time)
Production rate	10 000/10 = 1 000 ton.km/h

The two factors that make up transport production are tons (units) and the distance travelled an hour.

Before progressing further with our hypothetical example, let's digress for a moment and define a truck.

When is a truck, a truck?

*   When it is fully loaded and is standing   – it is a warehouse
*   When a truck is empty and standing   – it is a monument
*   When a truck is empty and moving   – it is a job opportunity for the driver
*   Only when a truck is fully loaded and moving – is it a truck

Only now can we begin to decide on how best to transport the 1 000 ton.km/h. Do we choose one large truck, or perhaps two or smaller capacity vehicles.

Transport Productivity

One large vehicle with a payload of approximately 4.0 tons capable of travelling at an average speed of 70 km/h will successfully complete the task:

4 x 70 = 280 ton.km/h

If we choose a vehicle that can carry 3.5 tons, an average speed of 80 km/h will be sufficient to do the job.

3.5 x 80 = 280 ton.km/h

The 4.0 ton Delta vehicle provides a GVM: Payload ratio of 60 %.
The 6.0 ton vehicle yields a ratio of 65 %.
A 1.3 ton bakkie yields a ratio of 42 %.

A payload to GVM ratio must, if at all possible, exceed 50 % if it is to be economical to operate. The capital cost per payload ton of large vehicles is more beneficial than smaller payload units. The lower average speeds adds to fuel-efficiency, less tyre wear and damage and longer economic life. One large truck costs less than even three smaller trucks. Smaller trucks for this operation would be favoured if there were logistical reasons to do so.

Workload (the transport) should be clearly identified and defined before deciding on the type and size of truck. Unfortunately, in practice it is almost always the other way round.

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In choosing a truck to achieve a particular workload in a given time you have two elements to consider. These are Payload and Average Speed.

Over-the-road performance is governed by the driveline components to overcome resistance – these include rolling resistance, air-drag, gradients and gross mass.

Average speed is limited to the vehicle's tractive capability, road traffic conditions and by legislation – speed limits. Where road conditions permit, an economical average speed to achieve is 70 to 80 % of the speed limit. Below this figure more vehicles will be required. In excess of 80 % is uneconomical in terms of fuel usage and ownership cost due to reduced economic life expectancy.

When you acquire a truck for full-time use, you are committed to pay the standing costs (also known as fixed costs) whether you use it or not. This is so whether you own or lease it. Most fleet owners expect their vehicles to be available for work at least 90 % of the available hours. This leaves sufficient time to service and maintain them.

Theoretically speaking, the vehicle is available 24/365 or 8 760 hours a year. A 50 % availability suggests and availability of 4 380 hours a year (8760 x 0, 5). In the real world, our ability to use the vehicle will be impacted by a variety of factors some which we cannot control.

Transport Productivity

Regardless of the reason why, the fleet owner pays for the lost ton/km that could be produced. Let's agree to 70 % of the available hours per year. This equates to 2 847 hours a year (4 380 x 0.65).

Assume our truck is operating in a 60 km/h zone. Assume further that we can maintain 80 % of the speed limit, say 48 km/h making it possible to cover 147 168 km a year (48 x 5066). At an average of 80 % of an 100 km/h speed limit (Inner City), the potential is 245 280 km a year. As we know, multi-drop vehicles working in metropolitan areas frequently cover 30 000 km a year or less. When this is so efficiency is less than 14 %. When we consider the overall productivity measured in ton/km-hr the result is absurdly low.

Assume a 4.0 ton truck (Inner City):
147 168 km x 4.0 tons = 588 672 ton.km
30 000 km x 4.0 tons = 120 000 ton.km
20% efficiency

Assume a 6.0 ton truck with a 4 ton payload (Inner City):
147 168 km x 6.0 tons = 883 000 ton.km
30 000 km x 4.0 tons = 180 000 ton.km
13.5% efficiency

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The examples illustrates why transport is seen to be expensive by so many financial and other managers not informed about vehicle use and efficiency.

To achieve 1 000 ton.km/h at 48 km/h (80% of 60 km/h), you would need a 20.83 ton payload capacity truck, or 2 x 10.41 tons, or 3 x 6.95 tonners or 4 x 5.2 tonners (decimals to be rounded off according to the task. Turnaround time not included). If the average speed was 70 % of the 60 km/h, you would need one 23, 8 ton truck or three 7, 94 tonners and so on.

The example highlights possibilities to trade-off average speed against payload. Invariably, high payload so in long haul, big rig operations.

Transport Productivity

Payload factors

Two factors contribute to the payload. The first is the tare (or unladen mass) when the vehicle is road ready and the second is the gross vehicle mass (GVM). The GVM is limited by the vehicle manufacturer's specification or by legal limits set by legislation.

Payload has a considerable impact on ownership costs - the capital cost per payload ton. Large trucks cost less than smaller vehicles. Smaller trucks are chosen for logistical reasons. Here are a few current examples of capital cost per payload ton (figures sourced from FleetWatch Operating Cost Benchmarks and correct at the time of writing):

Payload capacity (tons) cost per Payload ton		
3.0 ton	R75 000	Panel Van
5.5 ton	R130 000	Insulated Volume Van
8.5 ton	R60 000	Flat-Deck Truck
30 ton	R39 000	6-Axle Articulated Rig
36 ton	R37 000	7-Axle Interlink

Tare and gross allowable mass are the determining factors. When evaluating a truck, examine its payload efficiency.
 A measure of payload efficiency is to strive for the optimum payload GVM ratio. Rigid vehicles: >55 % to 60 % of GVM *
Articulated: >60% of GCM.

*Delta 60% of GVM

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Vehicle Limits

Fesarta	Axle & Vehicle combination Load Limits in East and Southern Africa									
	Steering Axle Two Tyres	Single Axle Two Tyres	Single Axle Dual Tyres	Tandem Axle Four Tyres	Tandem Axle Dual Tyres	Tridem Axle Six Tyres	Tridem Axle Twelve Tyres		Allowance	
Angola	6		10		6		24	38		
Lesotho	7.7	8	8.2	15.4	16.4	23.1	24.6	*50.2	5%	* In practice, there is no limit. New act due
Botswana	7.7	8	9	15.4	18	24	24	56	5%	
Malawi	8	8	10	16	18	24	24	56	*5%/10%	* 5% for static weighbridges/ 10% for mobiles
Mozambique	8	8	8	16	16	24	24	*48	** Nil	* Excludes N4 corridor which is 56 tons ** Except for Tete, Machipanda
Namibia	7.7	8	9	16	18	24	24	56	5%	
South Africa	7.7	8	9	16	18	24	24	56	**5%	* Bridge formula 18 + 2.1 L in place ** Free State applies 2% on veh/combintion mass
Swaziland	7.7	8	9	16	18	21	24	56		
Tanzania	8	8	10	12	18	15	24	**56	Nil	*Does not permit interlinks ** Load limit for vehicle is 28 tons
Zambia	8	*4	10	*8	16	*12	24	55	10%	* Permits more for Super Single Tyres
Zimbabwe	8	8	10	16	18	24	24	56	5%	
SADC*	8	8	10	16	18	24	24	56		* No official document for these figures
Comesa	8	8	10	16	16	24	24	53		* Requested to adopt SADC limits

Information supplied by Fesarta

Vehicle Dimension Limits

The movement of goods and people between the several countries in the Southern African Region by road transport creates the need for what the various countries allow in terms of Maximum Mass and Dimensions of Vehicles. These limits are given in the following table:

Fesarta	Vehicle Dimensions Limits in East and Southern Africa (For vehicles with a GVM < 12 tons)							
	Vehicle Combination Length	Articulated Vehicle Length	Width	Height	Rigid Vehicle Length	Trailer Length	Semi-Trailer Length	
Angola	20	18	2,5	4	15	15	15	
Lesotho	22	17	2,6	4,1	12,5	12,5	12,5	
Malawi	22	17	2,5	4,6	12,5	12,5	12,5	
Mozambique	18/22*	15	2,5	4	12.5	12	12	*22 m for N4 Corridor
Namibia	22	18,5	2,6	4,3	12,5	12,5	N/A	
South Africa	22	18,5	2,5	4,3	12,5	12,5	N/A	
Swaziland	20	17	2,5	4,1	12,5	12,5	12,5	
Tanzania	22	17	2,6	4,6	12,5	12,5	12,5	
Zambia	22	17	2,65	4,6	12,5	12,5	12,5	
Zimbabwe	22	17	2,65	4,6	12,5	12,5	N/A	
SADC*	22	18,5	2,6	4,6	12,5	12,5	N/A	*In Proposed document
Comesa	22	17	2,65	4,6	12,5	12,5	12,5	

N/A = Not Applicable
This information is upplied by Fesarta

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Determination Of The Legal Payload
& Mass Of Axle Loads

The National Department of Transport has been complaining about the overloading of good vehicles for many years, even to when the loads on vehicles were determined under the purview of the four Provincial Road Traffic Ordinances. It was firmly believed that when the Road Traffic Act succeeded the Provincial Ordinances, the overloading problems would be resolved, but the problem is as bad as ever, and for the last couple of years buses have become involved.

The root of the overloading problem is three-fold:

(a)   The attitude of many operators who believe that to overload brings them more profit;
(b)   Inadequate and ineffective law enforcement with appropriate and effective penalties; and
(c)   The fact that the customer is always looking for the cheapest possible price for delivering his goods and this forces the operator to look for bigger loads per trip so he can offer a cheaper price.

It is certain that until the second problem is dealt with, the first will never be solved – the policy of self/voluntary compliance with the law will never win until the attitude of operators changes!

One of the major stumbling blocks in any effort to change the attitude of many operators in regard to overloading is the total enforcement of the applicable regulations, and the means of doing so has been available to the National Department of Transport for years! To avoid being prosecuted for overloading, it is conceded that there is scope for an improvement in the visible enforcement of the Road Traffic Regulations, but when Law Enforcement Officers issue prosecutions, the fines imposed for admissions of guilt, or when offenders are found guilty by courts, the penalties imposed do not resemble the magnitude of the offences.

Determination Of The Legal Payload & Mass Of Axle Loads

But all this could be rectified. If the National Department of Transport would implement the Administrative Adjudication of the Road Traffic Offences Act which was first published as a Bill in the Government Gazette on 29 May 1998 and as an Amendment Act No. 22 in 1999, and on 14 May 1999 the first draft of the regulations was gazette. The AARTO Act has been Gazetted (8744) and will be implemented on a phased in basis from early 2008.

A further problem which contributes largely to overloading is the inability of many operators, drivers and consignors to determine the legality of payloads on the various categories of goods vehicles, and this may not always be the maximum payload. This frequently occurs when goods, other than bulk loads, are offloaded en route which changes the distribution of the remainder of the load. In an effort to assist operators, drivers and consignors with a simple and easy means of checking the legality of payloads on goods vehicles, firstly, and mostly importantly, every operator must physically weigh every goods vehicle to determine the actual unladen mass – total and on each of the axles / axle units, and it must be remembered unladen mass is not tare mass.

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The operator must also check the following in respect of the vehicles in the fleet for legal compliance with the Road Traffic Regulations:

Single unit – overall length	12,5 m maximum
Overall Width	2,5 m (if GVM is less than 12 000 kg) (Delta is 2.3 m due to mirrors)
Combinations of Vehicles – overall length	22 m
Drawbar Length	2 m

- Now that the operator has recorded the essential information of all the details of the vehicles operated by the particular operator and receives the details of loads to be transported, the checking of the legality of all consignments becomes possible before proceeding on the road

The maximum carrying capacity of goods vehicles

By understanding the Road Traffic Regulations, it is a very simple matter to determine the maximum payload, which may be legally loaded on many goods vehicles, both in respect of single vehicles and combinations of vehicles.

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Furthermore, the essential information must be displayed on a data plate, which is affixed to every goods vehicle. The problem is knowing how to interpret the information.

Single Vehicles – no trailers

Regulation 245 requires that all goods vehicles, excluding semi-trailers, must be provided with a metal plate which includes the permissible maximum vehicle mass- denoted "V" – on the data.

When the unladen mass of the vehicle is subtracted from the permissible maximum vehicle mass – denoted "V" – the result is maximum legal payload, but this does not check on the position of the centre of the payload mass in relation to the front and rear axles.

In order to check the mass distribution of the payload, the position of the centre of the payload mass relative to the front and rear ends, must be known, and in the case of an evenly distributed load, the load centre will be on the longitudinal centre of the load. If there is any doubt, the consignor must provide the load centre, then the payload mass distribution can be checked as follows: multiply the total payload mass by the distance from the centre of the front axle to the centre of the payload and divide by the vehicle wheelbase and the answer will be the payload on the rear axle to which the unladen mass on the rear axle is added to get the laden rear axle massload. This must be checked to ensure that the laden rear axle massload does not exceed the A-rear as displayed on the Vehicle Data Plate.

The legal massload on the front axle can also be checked. Multiply the total payload mass by the distance from the centre of the rear axle to the centre of the payload and divide by the vehicle wheelbase and the answer will be the payload mass on the front axle to which is added the unladen mass on the front axle. The total is the laden massload on the front axle, which must not exceed the A-front on the Vehicle Data Plate. Similarly, the rear axle mass can be recalculated.

But the position of the actual payload centre might be fixed and then the formulae must be transported as follows:

(i) $\dfrac{\text{Payload Mass on Front Axle x Vehicle Wheelbase}}{\text{Total Payload Mass}}$ = Distance Centre of Rear Axle to Load Centre

(ii) $\dfrac{\text{Payload Mass on Rear Axle x Vehicle Wheelbase}}{\text{Total Payload Mass}}$ = Distance Centre of Front Axle to Load Centre

and the sum of answers (i) and (ii) must be equal the vehicle wheelbase.

It is also necessary to check that the massload on the front axle is not less than 20 % of the total gross laden mass of the vehicle – Regulation 242.

Ideally the axle load on a loaded vehicle should be a similar % of the maximum axle mass.
E.g. If front axle is at 50% then rear axle should be at 50%.

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Payload 3.5 ton:

GVM 3.5 ton		= 6 260 kg
Total Unladen Mass Chassis Cab (Licensing Mass)	2 360 kg	
Body Mass*	+ 560 kg	
Total Unladen Mass		- 2 920 kg
Payload		3 340 kg

Payload 4.0 ton:

GVM 4.0 ton		= 7 004 kg
Total Unladen Mass Chassis Cab (Licensing Mass)	2 360 kg	
Body Mass*	+ 560 kg	
Total Unladen Mass		- 2 920 kg
Payload		4 084 kg

* Approximate Dropside

Example Calculations:

$$\text{Distance to Rear Axle} = \left(1 - \frac{\text{Load Centre Distance to Cab}}{\text{Cab Axle}}\right) \times \text{Cab Axle}$$

$$= \left(1 - 2/3\right) \times 2\,700\text{ mm} = 900\text{ mm}$$

$$\text{Distance to Front Axle} = \text{Wheelbase} - \text{Distance to Rear Axle}$$
$$= 3\,280\text{ mm} - 900\text{ mm} = 2\,380\text{ mm}$$

Assuming that the Payload is 3500kg and is a uniform distributed load with the load centre on the longitudinal centre line.**

* If load is 2/3 from cab axle

$$\text{Payload Front Axle} = \frac{\text{Total Payload} \times \text{Distance from Centre Rear Axle to Centre Load}}{\text{Wheelbase}}$$

$$= \frac{3\,500\text{ kg} \times 900\text{ mm}}{3\,280\text{ mm}} = 960\text{ kg}$$

$$\text{Payload Rear Axle} = \frac{\text{Total Payload} \times \text{Distance from Centre Front Axle to Centre Load}}{\text{Wheelbase}}$$

$$= \frac{3\,500\text{ kg} \times 2\,380\text{ mm}}{3\,280\text{ mm}} = 2\,539\text{ kg}$$

** 20% of Total Truck Laden Mass must be on Front Axle

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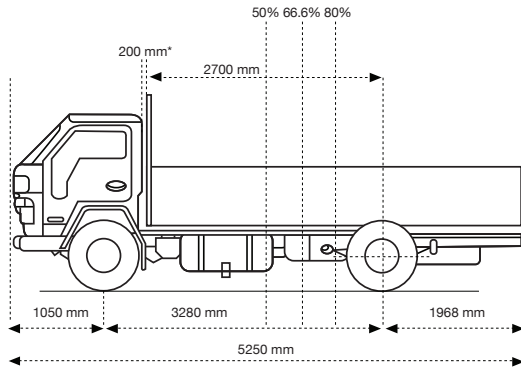
*Recommended Cab body distance

Locations of Payload
(% of Cab to Axle Distance)

	50%	66.6%	80%
Distance from the Front Axle to Load Centre	1 480 mm	2 380 mm	2 740 mm
Distance from the Rear Axle to Load Centre	1 800 mm	900 mm	540 mm
Wheelbase	3 280 mm	3 280 mm	3 280 mm

Total Mass per Axle

Front Axle

Licensing Mass on Front Axle	1400 kg
Dropside Body Mass on Front Axle	+ 220 kg*
Total Unladen Mass on Front Axle	1 620 kg
Payload Front Axle	+ 960 kg
Total Mass on Front Axle	2 880 kg

Total Front Axle Mass always < than A1, therefore to stay within legal axle mass a higher payload must be loaded further back. But never behind Rear Axle.

Rear Axle

Licensing Mass on Rear Axle	960 kg
Dropside Body Mass on Rear Axle	+ 340 kg*
Total Unladen Mass on Rear Axle	1 300 kg
Payload Rear Axle	+ 2 539 kg
Total Mass on Rear Axle	3 839 kg

Total Rear Axle Mass always < than A2

*Assume Dropside of 560kg

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