



Performance Based Standards (PBS)  
Complexity of PBS Compliance  
Les Bruzsa

**IRTEENZ**  
**TRANSPORT INNOVATION**  
**2017 OCT, Rotorua**

# Little History

- PBS package was approved and endorsed by Transport Ministers in 2007 that included Standards and guidelines for the PBS Scheme
  - The standards and vehicle assessments rules
  - Assessor accreditation rules
  - Vehicle certification rules
  - Network classification guidelines
  - PBS vehicle application guideline
  - Operating conditions for PBS vehicles
- Guidelines were going to be developed
  - Bridge Assessment Guidelines
  - Compliance Assurance Guidelines
  - Enforcement Guidelines
  - Operator Certification Guidelines
- Heavy Vehicle National Law (HVNL, 2014)

*A risk-based analysis will underpin the PBS compliance and enforcement provisions, including consideration of aggravating factors.*

*The model Compliance and Enforcement Bill will enable enforcement of PBS, including roadside powers, compliance monitoring powers and investigative powers.*

# On-road compliance and enforcement

- In most states **road compliance officers** are employed by State and Territory Road Transport Authorities while performing functions on behalf of the NHVR
- In South Australia, **Safety and Compliance Officers** are employed directly by the NHVR
- Enforcement activities for
  - Defective heavy vehicles
  - Driver fatigue
  - Load restraint
  - Mass and dimensions
  - Restricted access vehicles including PBS combinations
- Under the HVNL, **state and territory police**, and **enforcement officers** continue to monitor heavy vehicle activities
- **Police officers** possess additional enforcement powers and responsibilities (such as enforcing road rules)



# PBS operating conditions



The following operating conditions are to be applied:

**Applies to all vehicles with triaxles requesting Higher Mass Limits (HML)**

- HML requires National Heavy Vehicle Accreditation Scheme (NHVAS) – Mass Management Module and certified road friendly suspensions ([http://www.infrastructure.gov.au/roads/vehicle\\_regulation/suspension.aspx](http://www.infrastructure.gov.au/roads/vehicle_regulation/suspension.aspx)).

**Applies to all vehicles with tandem axes requesting HML**

- HML requires certified road friendly suspensions ([http://www.infrastructure.gov.au/roads/vehicle\\_regulation/suspension.aspx](http://www.infrastructure.gov.au/roads/vehicle_regulation/suspension.aspx)) to be fitted to all tandem axle groups.

**Applies to all vehicles requesting Concessional Mass Limits (CML)**

- CML requires NHVAS – Mass Management Module.

**Applies to vehicles with components that might require specific routine maintenance to ensure that PBS compliance is maintained, e.g. steerable axles**

- NHVAS – Maintenance Management Module.

**All Class 'B' vehicles**

- A 'long vehicle' sign must be displayed at the front and rear of all vehicles over 22.0 m in length.

**All vehicles with quad axles**

- Compliance with the ATC quad axle policy.

- Operating conditions are introduced for a number of reasons:
  - Achieving compliance with PBS standards
  - Infrastructure protection
  - Operational and traffic safety
- **National operating conditions** are set by NHVR
  - Mass limits
  - Dimensions
  - Design specific requirements
- These conditions are detailed in the **PBS Design Approval (DA)** and **Vehicle Approval (VA)**
- PBS vehicles must be inspected and certified
- **Specific conditions** could also be introduced by the road managers
- These conditions are part of the **PBS Access permits**

# PBS Vehicle Approval (VA)



PBS Vehicle Approval – V17xxxxx – VA3996

## Performance-Based Standards (PBS) Vehicle Approval

Heavy Vehicle National Law Section 23

Heavy Vehicle (General) National Regulation Section 17

This is not an authorisation to access the road network.  
You must comply with the relevant Notice or if required, obtain an access permit.

18 October 2017

Ref No: PBS – V17xxxxx – VA3996 –

This PBS Vehicle Approval modifies any previously issued approval for the vehicles listed herein operating under Application Number V17xxxxx.

Applicant details		Operator	
Application Number	V17xxxxx	Vehicle	4-axle truck 5-axle dog
Load	Quarry and Bulk	Length (mm)	≤ 23850
Assessor	XXXXXXXX	Height (mm)	≤ 4300

Mass Limits	Level 2
GML (t)	63.0
CML (t)	65.0
HML (t)	68.5
Bridge Assessment	Tier 1

Axle Group Masses	Level 2		
	GML	CML	HML
Steer (t)	6.5	6.5	6.5
Drive (t)	20.0	21.0	22.5
Trailer Front (t)	16.5	17.0	17.0
Trailer Rear (t)	20.0	21.0	22.5



PBS Vehicle Approval – V17xxxxx – VA3996

## Operating conditions

The NHVR approves the vehicles listed herein for the level(s) shown in the “Mass Limits” table with the following operating conditions:

- The total combination mass must not exceed the limits in the “Mass Limits” table.
- The axle group masses must not exceed the limits in the “Axle Group Masses” table.
- If the “Mass Limits” table specifies Tier 2 or 3, a bridge assessment is required.
- Payload must be contained within the bins. Maximum payload heights measured from the ground must not exceed: (m)
  - Truck: 2.820
  - Trailer: 2.850
- 6.5 tonne complying steer axle requirements:
  - an engine that complies with the engine emission standards of Australian Design Rule (ADR) 80/01 (Euro 4) or a later version of ADR 80; and
  - a front underrun protection device (FUPD) that complies with UN ECE Regulation 93 or ADR 84; and
  - a cabin that complies with UN ECE Regulation 29.
- Concessional Mass Limits (CML) requirements:
  - National Heavy Vehicle Accreditation Scheme (NHVAS) – Mass Management Module.
- Higher Mass Limits (HML) requirements:
  - for tandem axles groups, road friendly suspensions;
  - for tri-axle groups, National Heavy Vehicles Accreditation Scheme (NHVAS) – Mass Management Module and road friendly suspensions.
- When the trailer mass exceeds the truck mass, at least 16t on the drive axle group is required. This clause does not apply for an unladen vehicle.
- A “LONG VEHICLE” sign must be displayed at the rear of the vehicle.
- The outermost surface of the drawbar must be fitted with yellow reflective material that complies with Class C material requirements of United National Economic Commission for Europe Regulation No. 104 Uniform provisions concerning the approval of retro-reflective markings for vehicles of category M, N and O.
- The lift axle fitted to the dog trailer can only be retracted if the vehicle is unladen.

# PBS Vehicle Approval (VA)



PBS Vehicle Approval – V17xxxxx – VA3996

## Exemptions

Heavy Vehicle National Law Section 24

Heavy Vehicle (General) National Regulation Section 28

The following table lists exemptions from prescribed vehicle standards that have been granted for the vehicle(s) in this vehicle approval.

Exemptions	
ADR	Rule 43, Clause 6.2.2 (Drawbar length – Trailers) Rule 43, Clause 9.4 (Retractable axles)
HV(MDL)NR	Schedule 6, Clause 3 (Length – General) Schedule 6, Clause 6 (Length – Trailer drawbars)
HV(VS)NR	NA

ADR

Australian Design Rules

HV(MDL)NR

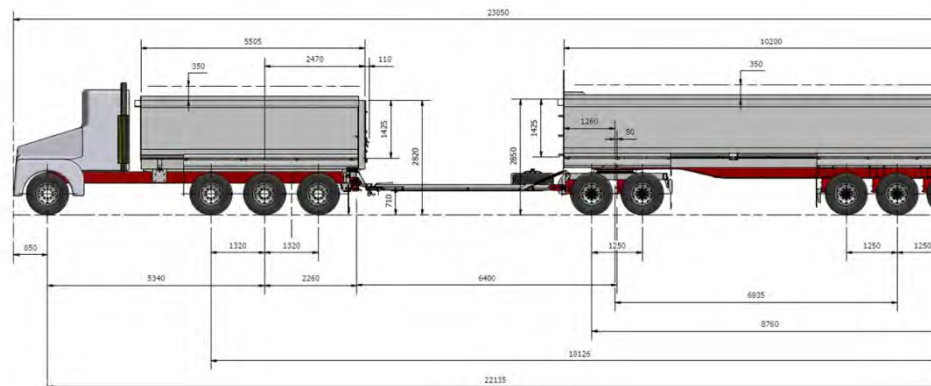
Heavy Vehicle (Mass, Dimension and Loading) National Regulation

HV(VS)NR

Heavy Vehicle (Vehicle Standards) National Regulation



PBS Vehicle Approval – V17xxxxx – V



## Details of truck(s) or prime mover(s)

Make	Kenworth
Model	T610SAR
VIN(s)	6F5000000HA459536
Engine make/ model/ rating	Cummins / X15-525 550hp / 2508Nm - ADR80/03
Transmission make/ model	Eaton / RTLO22918B
Differential make/ model/ FD ratio	Meritor / RT46-160GP / FDR 4.30:1
Suspension make/ model (Steer)	Kenworth / Parabolic
Suspension make/ model (Drive)	Kenworth / <a href="#">Airglide</a> 460 RF2012
Suspension make/ model (Pusher)	Hendrickson / HLM2
Tyres make/ size/ model (Steer)	295/80R22.5 Bridgestone R150 II
Tyres make/ size/ model (Drive)	11R22.5 Bridgestone M766
Tyres make/ size/ model (Pusher)	11R22.5 Bridgestone M766
Brakes (Load Proportioning, ABS, ECB, etc.)	ABS
Tow coupling make/ D rating	Ringfeder 3030aus – 320kN / 39.50 tonne
Wheelbase (mm)	5340
Vehicle height (Measured from the ground) (mm)	2820
Number of axles	4
ADR category	NC
GVM (kg)	30,100
GCM (kg)	97,000

# PBS operating conditions

- PBS generic conditions
  - Mass
  - Dimensions
  - Specification
- Specific operating conditions
  - Payload height
  - Tanker capacity
  - Livestock loading
  - Lift axles
  - Drawbar length
  - Drive axle group mass requirements
  - Steerable axles
  - Quad axles
  - Load management procedure

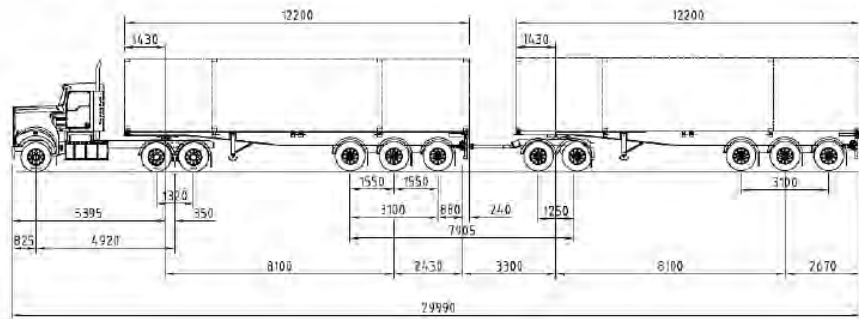


# Number of vehicle options

- Large number of vehicle options

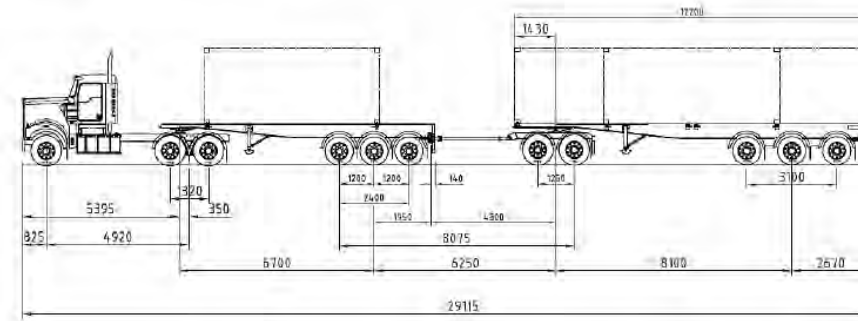
PRIME MOVER - KENWORTH T909, 4920 WB, Serial Nos 445147 & 445148  
 SKEL Serial Nos - 81237, 38, 39, 40, 84771, 72, 73  
 SKEL Serial Nos - 86755, 89093, 89182  
 LUSTY-EMS DOLLY Serial No - 6F9T25000W25E3077

Option 1



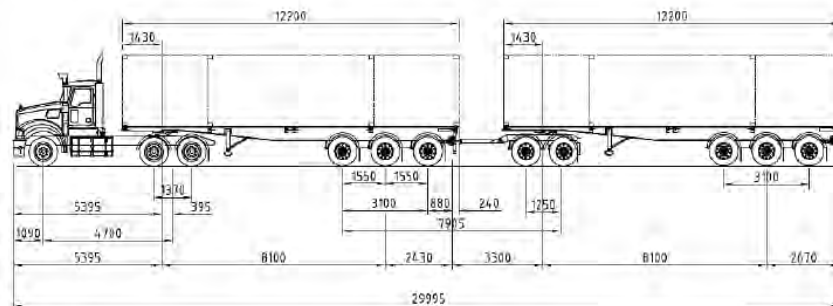
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 "B" SKEL Serial Nos - 81237, 38, 39, 40, 84771, 72, 73, 86755, 89093, 89192  
 "A" SKEL Serial No - 84770  
 LUSTY EMS DOLLY Serial No - 6F9T250005LE04241

Option 2



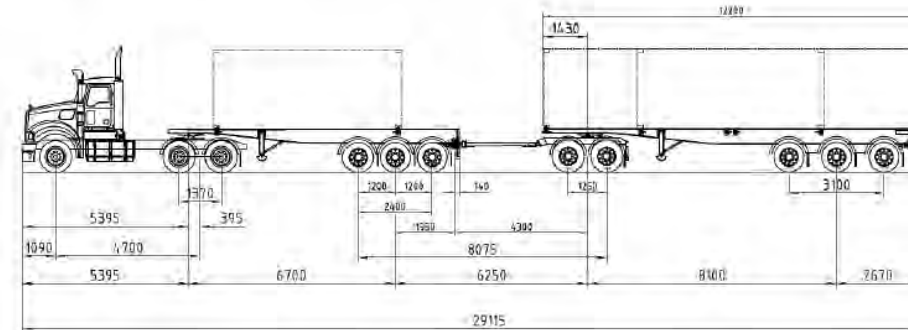
PRIME MOVER - MACK SUPERLINER, 4700 WB, SNo 806872  
 SKEL Serial Nos - 81237, 38, 39, 40, 84771, 72, 73  
 SKEL Serial Nos - 86755, 89093, 89182  
 LUSTY DOLLY Serial No - 6F9T25000W25E3077

Option 3



PRIME MOVER - MACK 4700 WB  
 "B" SKEL Serial Nos - 81237, 38, 39, 40, 84771, 72, 73, 86755, 89093, 89192  
 "A" SKEL Serial No - 84770  
 LUSTY EMS DOLLY Serial No - 6F9T250005LE04241

Option 4





# Special operating conditions – loading requirements



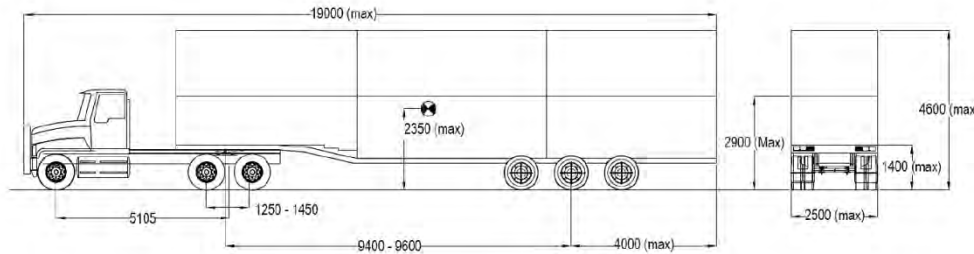
- 4-axle truck and 5-axle dog
- livestock transport
- 4.6m
- Compliance with PBS SRT conditions

# Special operating conditions – loading requirements

- Specific loading requirements for the truck
- When transporting **four decks** of animals (sheep, goats or pigs): **85% of the payload** (number of head) on the truck must be contained in the bottom three decks
- When transporting **two decks** of animals (cattle): **65% of the payload** (number of head) on the truck must be contained in the bottom deck
- The applicant must manage the ratio of the livestock (number of head) that are loaded onto each deck in accordance with the specific loading requirements
- Livestock which does not completely fill a deck shall be securely restrained in position by full width barriers
- Livestock must not be carried in an upper deck of the combination unless any lower decks of the stock crate are fully laden



# Special operating conditions – loading requirements



- Prime mover and 3-axle semitrailer
- Livestock transport, 4.6m height
- Compliance with PBS SRT conditions
- When transporting **larger animals (cattle)**, at least **60% of the animals** must be contained in **the bottom deck**, i.e. for every 2 animals on the top deck there must be at least 3 animals on the bottom deck
- When transporting **smaller animals (sheep, goats, or pigs)**, **50% of the payload** on the trailer must be contained in the bottom deck
- Mixed livestock loads are permitted, provided that larger animals are contained in the bottom deck and 50% of the payload on the trailer must be contained in the bottom deck
- For any loading condition, larger animals must be loaded onto the bottom deck

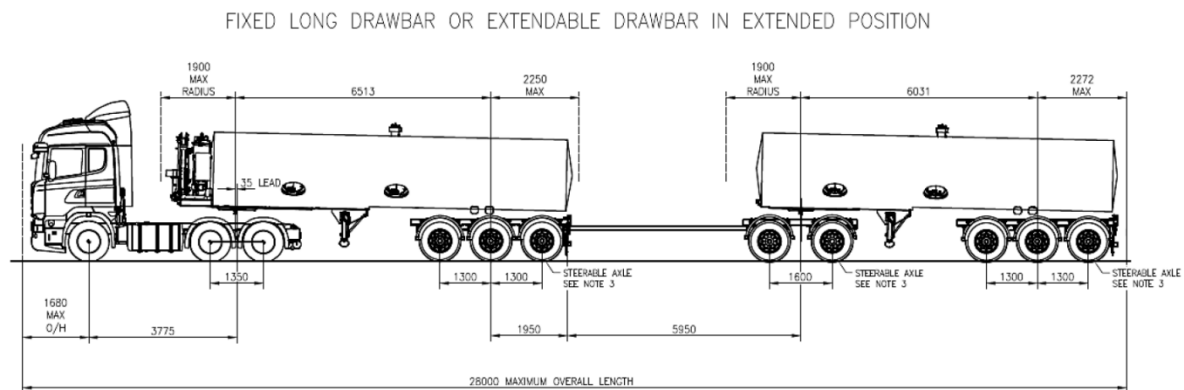
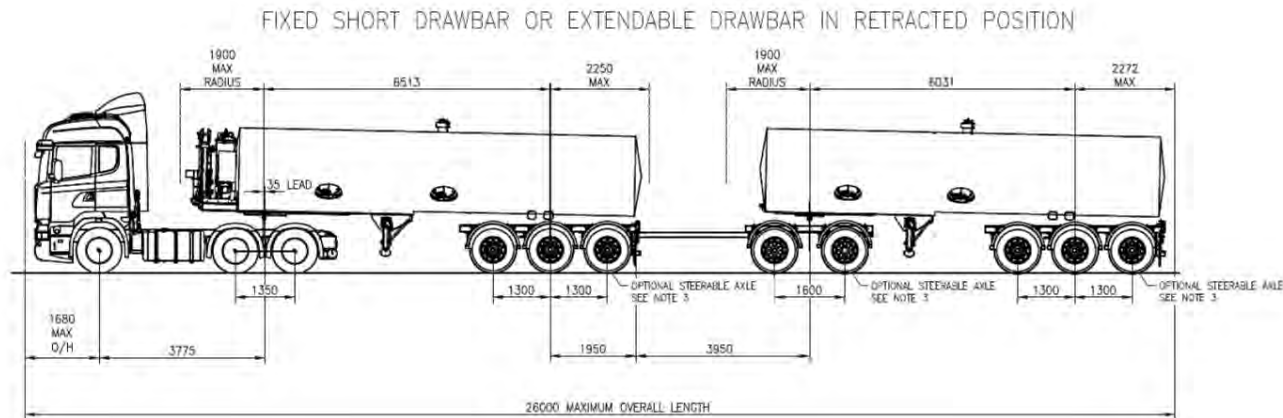
# Complexity of PBS Vehicle Approvals

- PBS approved A-double



# Complexity of PBS Vehicle Approvals

- It is approved for Level 1 or Level 2 access depending on the length and mass
  - Level 1, GCM < 50.5t
  - Level 2, GCM < 85.0t
  - 2 different length options depending on the drawbar length (3.95m;5.95m) OAL < 26m or < 28m



# Complexity of PBS Vehicle Approvals

- **Drive axle loads:** when operating at **Level 1**, the drive axle group load must exceed 26% of vehicle combination's total mass (Drive axle group load = 0.26 x total combination mass, e.g. at 37.875t total combination mass as measured,  $37.875 \times 0.26 = 9.9\text{t}$  is required on the drive axle group). This clause does not apply for an unladen vehicle
- When operating at **Level 2**, the drive axle group load must exceed 20% of vehicle combination's total mass (Drive axle group load = 0.2 x total combination mass, e.g. at 59.625t total combination mass as measured,  $59.625 \times 0.2 = 12\text{t}$  is required on the drive axle group). This clause does not apply for an unladen vehicle
- If using the long drawbar option, **steerable axles must fitted to the semi-trailers and the dolly**
- **If steerable axles** are fitted to the semi-trailer(s) or the dolly, **they must be locked at highway-speeds above 40km/h and unlocked below 35km/h**
- If steerable axles are fitted to the semi-trailer(s) or the dolly, a **National Heavy Vehicle Accreditation Scheme (NHVAS) – Maintenance Management accreditation** of the vehicle must be in force for the operator of the vehicle
- If the drawbar **length exceeds 5m**, the outermost surface of the drawbar must be fitted with yellow **reflective material** that complies with Class C of UNECE Regulation No. 104



# Tanker capacity

- PBS approved 20 long B-double



# Tanker capacity

- **Maximum barrel heights** measured from the ground must not exceed:

	Barrel Heights			
	Lead Trailer		Rear Trailer	
	Front	Rear	Front	Rear
Max Top	3.375	3.280	3.300	3.265
Max Bottom	1.435	1.300	1.500	1.065

- Compartment fill levels not constrained provided safe fill levels and maximum axle loads are observed. Safe fill level is the maximum compartment capacity less 3% or 230 litres, whichever results in less fill volume
- For combinations with **Kenworth prime movers, compartment 2 on the lead trailer is limited to 5530L** (compartment capacity 7150L)
- All other fill levels are not constrained provided safe fill levels and maximum axle loads are observed



# Payload management

- PBS approved 20 long quad-axle semi



# Payload management

- **Maximum heights** measured from the ground must not exceed:

Variant 1, 2	Minimum Trailer Tare 5300kg		Minimum Trailer Tare 7300kg	
	Uniform Density Payload	Mixed Freight Payload	Uniform Density Payload	Mixed Freight Payload
GML	3.800	4.300	3.950	4.300
CML	3.750		3.850	
HML	3.500	4.100	3.700	4.200

Variant 3	Uniform Density Payload	Mixed Freight Payload
GML	4.300	4.300
CML		
HML		

- The operator will need to **demonstrate how the final payload heights are managed** prior to the issue of the Vehicle Approval. This information must be provided to the NHVR, and the results of the method used must be measurable and verifiable
- When using **tyres that are not on the approved list**, the steerable trailer axle(s) must be **locked at speeds greater than 30km/h**
- If the quad-axle group is fitted with a **retractable axle**, the retractable axle must comply with ADR 43/04. The transition mass is 18t

# Payload management

- Operations where payload heights cannot be verified on the road
- Payload management procedure is approved by NHVR before the VA is issued

## Payload Management Procedure

**Document Reference** – DA863 V130408 V4– Broadbent Bulk Services

**Vehicle Type** – A-Double (3-3-2-3)

This document sets out the procedure to comply with the PBS Design Approval conditions limiting the maximum payload height under some conditions. All parties involved in the operation and loading of the vehicle must follow this procedure.

The drivers must keep in their possession a copy of this procedure and be able to produce it for inspection by compliance officers.

## Definitions

**Uniform Density** payloads have the mass equally distributed throughout the volume of the payload. Examples of uniform density payloads are – grain, gravel, sand, boxed ceramic tiles and canned drinks.

**GML** – General Mass Limits

**CML** – Concessional Mass Limits

**HML** – Higher Mass Limits

## Instructions –

1. **Determine the container weight**
  - A. If the container is already loaded –
    - a. Check the shipping documents for the Container Weight Declaration, or
    - b. Record the weight of the container using the calibrated on board scales of
  - B. If the weight of the freight to be loaded in the container is known –  
Add the tare weight of the container to the weight of the freight.
  - C. If the weight of the freight to be loaded into the container is unknown or to  
weighbridge or container handler to determine the weight of the container



# Heaped load heights

- Significant differences in assessment methods

4. Maximum bin heights measured from the ground must not exceed:

	Lead Trailer	Rear Trailer
Option 1	3.670	3.660
Option 2	3.720	3.705

5. Maximum payload heights measured from the ground must not exceed: (m)

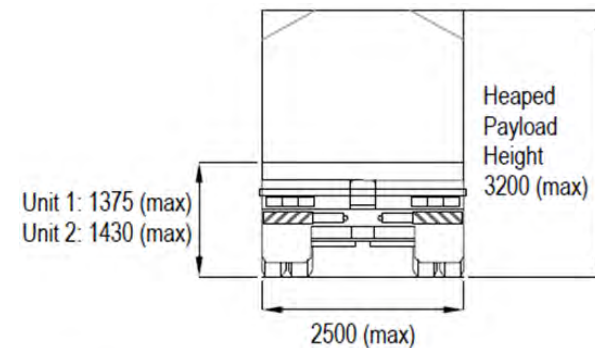
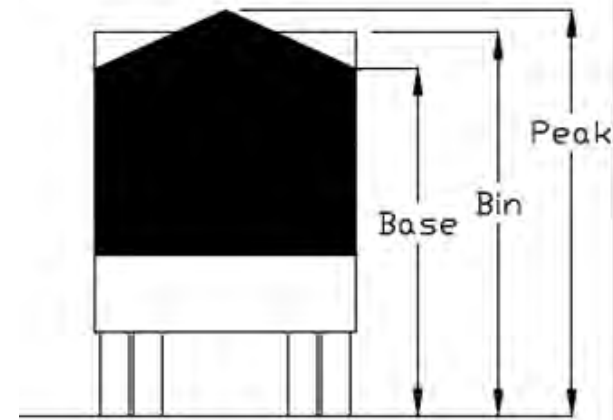
Option 1	Lead Trailer			Rear Trailer		
	GML	CML	HML	GML	CML	HML
Water level	3.670	3.640	3.570	3.660		
Heaped - height of base	3.290	3.240	3.170	3.280		
Heaped - height of peak	4.010	3.960	3.890	4.000		

Option 2	Lead Trailer			Rear Trailer		
	GML	CML	HML	GML	CML	HML
Water level	3.720	3.670	3.670	3.700	3.500	
Heaped - height of base	3.340	3.290	3.290	3.320	3.100	
Heaped - height of peak	4.060	4.010	4.010	4.040	3.820	

4. Maximum payload heights measured from the ground must not exceed: (m)

	Heaped payload	Water level payload
Truck	3.200	3.000
Trailer		

Diagram of base and peak payload heights

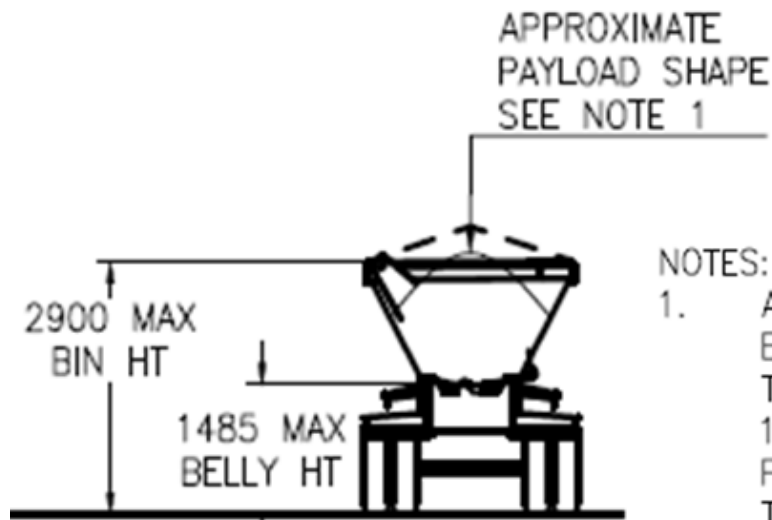


NOTES:

- 1) Water level payload height is 200 mm less than heaped payload height
- 2) Tier 1 critical axle spacings have been underlined in Table 3.

# Heaped load heights

- Significant differences in assessment methods
  4. Maximum bin heights measured from the ground must not exceed 2.900m.
  5. Maximum heaped payload heights measured from the ground must not exceed:
    - Lead and Middle Trailer: 3.000m;
    - Rear Trailer: 2.830m.



## NOTES:

1. ASSESSMENT BASED ON HEAPED PAYLOAD CONSISTENT WITH BEING DUMPED IN TWO PLACES BY A LOADER. TRAILER 1 AND TRAILER 2 PAYLOADS MUST NOT BE LOADED HIGHER THAN 100 MM OVER THE TOP OF THE BIN WALL. TRAILER 3 PAYLOAD MUST NOT BE LOADED HIGHER THAN 70 MM BELOW THE TOP OF THE BIN WALL. FOR MORE DETAILS ABOUT THE PAYLOAD, SEE THE PART A FORM.

# PBS Vehicle Approval (2009)

PART A2: TRAILER/SEMI-TRAILER			
TRAILER	Make Model	GTE Semi Trailer	YES <input type="checkbox"/> NO <input type="checkbox"/>
MASS	Aggregate Trailer Mass	46,000 kg	YES <input type="checkbox"/> NO <input type="checkbox"/>
TYRES	Tyre size, make and model <u>OR</u> Tyre rolling radius, cornering characteristics & vertical stiffness	11R22.5 Bridgestone R285	YES <input type="checkbox"/> NO <input type="checkbox"/>
BODY/ CONSTRUCTION	Body type	Side tipper	YES <input type="checkbox"/> NO <input type="checkbox"/>
	Rolling losses	0.0075 (conservative estimate based on UMTRI research)	YES <input type="checkbox"/> NO <input type="checkbox"/>
	Wheelbase	5778 mm For PBS certification purposes, the acceptable tolerance for any dimensional measurement is considered to be $\pm 1\%$ , or $\pm 20$ mm, whichever is the lesser.	YES <input type="checkbox"/> NO <input type="checkbox"/>

# PBS Vehicle Approval (2015)

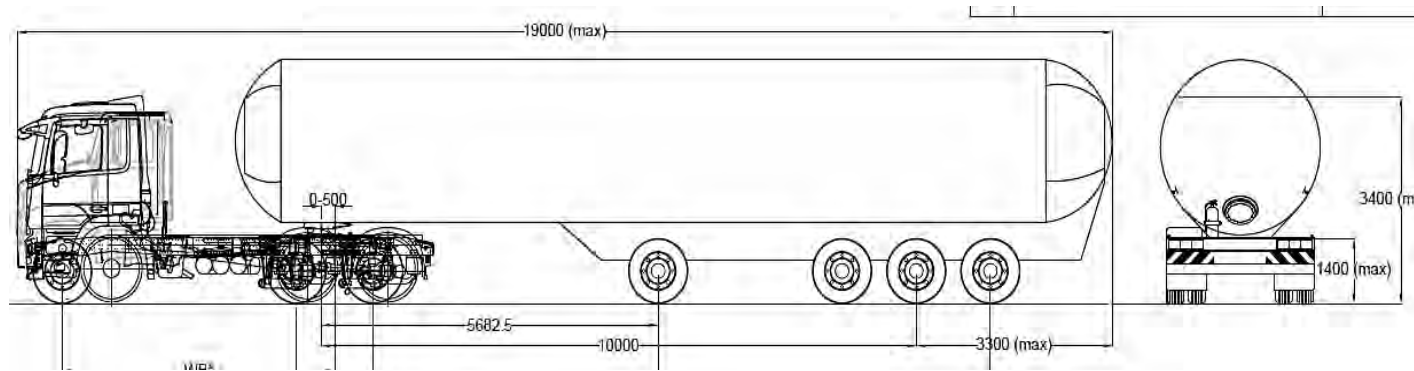
VEHICLE PHYSICAL CHARACTERISTICS (A2)			
TYRES	<p>Tyre size, make and model <u>OR</u></p> <p>Tyre rolling radius and vertical stiffness</p>	<p><b>Formula 1 (Level 1 &amp; 2)</b></p> <p><b>PBS Reference Tyre TS001</b></p> <p><b>11R22.5:</b> Bandag BRL3, Bridgestone R109/R168/R187/R285Z/R295Z, Continental HT3, Dunlop SP430/SP431, Firestone FS567, Goodyear LHT, Michelin XTE2/XZA, <u>Haulmax</u>, ATT101/ATT202</p> <p><b>11R22.5 (Retread):</b> Bandag BRL3 (Minimum tread width 210 mm)</p> <p><b>255/70R22.5:</b> Goodyear LHTII</p> <p><b>265/70R19.5:</b> Goodyear LHT</p> <p><b>305/70R22.5:</b> Michelin XZU2T</p> <p>Or</p> <p><b>11R22.5</b> Aeolus HN266/HN06</p> <p><b>Formula 2 (Level 2 only)</b></p> <p><b>PBS Reference Tyre TS003</b></p> <p><b>11R22.5:</b> Aeolus HN06/HN266, <u>Austyre</u> 16PR, Bandag BRL3/R4200/RT (203), Bridgestone R109/R168/R187/R285Z/R295Z, Westlake/Chao Yang/Good Ride CR926D/CR960A/CR944, Continental HTR/HT3, Double Coin RR/RR680, Dunlop SP430, Firestone FS567 Goodyear G367(667)/LHT/G182RSD, Michelin XTE2/XZA, <u>Haulmax</u> ATT101/ATT202</p> <p><b>275/70R22.5:</b> Double Coin RR680, Dunlop SP430</p> <p><b>255/70R22.5:</b> Goodyear G661/LHTII</p> <p><b>265/70R19.5:</b> Goodyear LHT</p> <p><b>295/80R22.5:</b> Dunlop SP350A</p> <p><b>305/70R22.5:</b> Michelin XZU2T</p> <p>Or equivalent or better</p>	<p>YES <input type="checkbox"/> NO <input type="checkbox"/></p>







# Innovative combinations



# Access conditions imposed by the road managers

- **Road conditions**
  - Enrolment into Intelligent Access Program (IAP)
  - IAP must be fitted and remain operational on all occasions
  - On Board Mass Monitoring (OBM)
  - OBM must be fitted and remain operational on all occasions
  - Speed: “Vehicle to travel at a speed of 20km/h under the posted speed limit whilst travelling on Kerry Road, Acacia Ridge”
- **Vehicle conditions**
  - The vehicle combination must comply with the Vehicle Approval “PBS V150303.....”
- **Travel Conditions**
  - “The vehicle is to be driven only in a forward direction when entering or existing the site”
  - “All loading and unloading is to occur off road. No queuing and parking in local roads unless in designated areas”
  - “Vehicles entering and exiting property in a forward direction only, without mounting or damaging Council assets”
- **Other conditions**
  - The driver must keep a copy of the PBS Final/Vehicle approval for this permit in the driver’s possession

# Questions

