Modification Code S10 Concessional Livestock Loading – Vehicle Rating

Stand-alone modification code for use in Queensland only.

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Introduction

The Scheme

The Queensland Livestock Loading Scheme (the Scheme) has been implemented by the Queensland Government to facilitate the safe and efficient transportation of livestock throughout Queensland while ensuring animal welfare and vehicle safety.

The Notice

Eligible vehicles operating under the *Heavy Vehicle National Law - Queensland Class 3 Livestock Loading Exemption Notice* (the Notice) are required to be certified under the S10 modification code (S10 Code) and be fitted with a compliant S10 modification plate.

The S10 Code requires an appropriately qualified and accredited Approved Vehicle Examiner (AVE) to assess the vehicle's suitability to operate under the Notice.

Purpose

The purpose of the S10 Code is to ensure vehicles used to transport livestock under the Notice have been suitably assessed, certified with appropriately rated maximum mass limits, and do not exceed the manufacturer's ratings or component ratings.

The S10 Code cannot increase any manufacturer's ratings.

Scope

This document covers the assessment and certified mass re-rating of an eligible vehicle to operate under the Notice.

This document does not cover the assessment of:

- Vehicles not used for the transportation of livestock,
- Rigid trucks, dog trailers or semitrailers, not fitted with a single or multiple deck stock crate, or
- Any other vehicle type.

Eligible vehicle

The following heavy vehicles may be considered for certification and operate under the Notice.

- Rigid trucks,
- 5 and 6 axle dog trailers,
- Prime movers,
- Semitrailers, and
- Tandem Axle Converter dolly trailers.

A vehicle listed in this section that can be assessed as per the S10 code and S10 checklist may be an eligible vehicle.

S10 Assessment & Certification

Eligible vehicles being assessed using the S10 Code must be in a completed state, ready for service, fully fuelled, equipped and without a payload.

Modifications

Modified vehicles can operate within the Scheme. However, all modifications must be properly certified. Every modified vehicle is required to display a modification plate that lists all applicable modification codes and ensures compliance with relevant Australian Standards Rules (ADRs), Australian Standards and association legislation.

Note: Any modifications carried out after a vehicle has been certified under the S10 Code may affect its certification to S10. In such cases the vehicle may need to be re-assessed and re-certified. For more information contact your AVE.

Design Conditions

Dimension Conditions

The eligible vehicle must comply with the Notice dimensions, S10 checklist and all relevant ADRs, Australian Standards, acts and regulations.

AVE's must ensure the eligible vehicle:

- Complies with dimension conditions listed in the Notice and S10 checklist, and
- all other regulatory dimension limits.

The required vehicle dimensions are detailed in the S10 Checklists, refer to the NHVR heavy vehicle modifications web page.

Note: Eligible vehicles operating in the Scheme must comply with all conditional dimension requirements in the Notice (operator condition).

Livestock Deck Conditions

The Scheme shows how many decks are needed to transport each animal.

AVE's must ensure the number of decks used to transport livestock cannot exceed:

- 2 for cattle or horses.
- 3 for pigs.
- 4 for sheep or goats.

Tow Coupling Conditions

Tow couplings must comply with the conditional requirements in Schedule 1 of the Notice.

AVE's must ensure the eligible vehicle:

- D-value ratings meet the minimum requirements detailed in the Notice, and
- any modifications performed to tow couplings are certified in accordance with Section P of VSB6.

Mass Conditions

Tyre Conditions

S10 laden mass must not exceed manufacturer/component ratings, and/or the mass limits within Schedule 1 of the Notice.

AVE's must ensure that:

- The tyre manufacturer's load rating is not exceeded,
- Where a vehicle is required by an ADR to be fitted with a 'tyre placard', ensure that tyre and rims continue to conform to the specifications detailed on the tyre placard, and
- Where an S10 imposed load exceeds 6.5t on a vehicle fitted with a single front steer axle or 11t for a twin steer, ensure the tyre section width:
  - is in accordance with the vehicle manufacturer's specification, or an approved axle configuration, and
  - complies with the requirements of the Notice.

Suspension and axle condition

S10 laden mass must not exceed manufacturer or component ratings for suspension or axle components.

AVE's must ensure that manufacturer's load carrying capacity of all suspension and axle components is not exceeded.

S10 Laden Masses

The S10 laden masses recorded on the S10 modification plate must not exceed manufacturer/component ratings or Notice mass limits.

S10 laden masses:

- Front S10 laden mass is the maximum steer axle group/kingpin mass limit for the eligible vehicle,
- Rear S10 laden mass is the maximum rear axle group mass limit for the eligible vehicle.
- Vehicle S10 laden mass is the maximum mass limit for the eligible vehicle.

AVE's must ensure that S10 laden masses do not exceed:

- Manufacturer or component axle ratings,
- Manufacturer GVM or ATM ratings, and
- Notice mass limits.

Calculating Imposed Load and Weight Distribution

Total Deck Space

To calculate the Total Deck Space (TDS) measure the average length, and width of each livestock section. In cases where the compartment is a non-regular shape, it may be easier to divide the compartment into smaller sections of regular shape (rectangular or square).

Total Deck Space (m^2) = Length x width

For example, 12.3 x 2.4 =29.52m^2.

Calculating Virtual Livestock Mass

To calculate the Virtual Livestock Mass (VLM) for rigid trucks and trailers, identify the livestock to be carried and apply the Specific Livestock Mass (SLM) listed in *Table 1*.

Calculate the VLM using the formula below,

VLM (kg) = SLM x TDS x Number of Decks

For example, 420 x 29.52 x 2 =24,796.8kg.

Note: the above formula applies only when the TDS of all decks is identical. If decks have different deck layouts or TDS values, an imposed livestock mass will must be calculated separately for each TDS. The total VLM is then the sum of the imposed livestock masses for **all** decks.

Table 1 Specific Livestock Mass

Livestock	SLM
Cattle or Horse	420kg/m^2
Pig	280kg/m^2
Sheep or Goat	210kg/m^2

Imposed Load

The imposed load on a vehicle can be:

- A simulated mass on a turntable,
- VLM in a stock crate, or

- a mix of both, for example, a semitrailer with a fifth wheel coupling at the rear of the trailer (for example a lead trailer).

For prime movers and converter dolly trailers the imposed load is:

- a simulated turntable load of 15,000kg applied through the centre of the fifth wheel coupling to simulate loading from a laden semitrailer.

For semitrailers and rigid trucks, the imposed load is:

- The VLM, and
- If the semitrailer has a fifth wheel coupling at the rear of the trailer, a simulated turntable load of 15,000kg is applied through the centre of the fifth wheel coupling to simulate loading from a laden semitrailer.

Note: If the semitrailer has a fifth wheel coupling at the rear of the trailer, this will need to be included in the weight distribution calculations.

Weight Distribution

The S10 weight distribution calculations are used to determine how the imposed load is distributed between the front axle group/kingpin and rear axle group.

The AVE must complete weight distribution calculations, refer to the NHVR heavy vehicle modifications web page.

AVE's are encouraged to use the S10 Checklist – Vehicle Drawings, however, AVE's may use their own drawings and weight distribution programs/software to complete S10 calculations provided that all calculations and methodology are clear and concise.

The following formulae can be used to calculate the distribution of the imposed load on a kingpin or axle group.

Forward Axle Mass (FAM)

$$FAM = \left(\frac{D}{WB}\right) x\ M$$

Rearward Axle Mass (RAM)

$$RAM = \left(\frac{WB - D}{WB}\right) x\ M$$

Formulae abbreviations:

- M (t) = calculated mass of the imposed load.
- WB (m) = distance between front most axle or kingpin and centre of rear axle group (wheelbase).
- D (m) = Distance from centre of mass of the imposed load to centre of rear axle group.

The S10 Checklists provide guidance on performing the weight distribution calculations using the above formulae, refer to the NHVR heavy vehicle modifications web page.

Calculating S10 Laden Masses

Unladen Mass

The unladen and unoccupied eligible vehicle must be weighed at a registered public weighbridge to determine the unladen masses in running order, ready for service, with:

- all standard equipment fitted,
- additional equipment used in normal operation fitted,
- empty effluent tank(s), and
- all other fluid reservoirs filled to capacity.

The following unladen masses are required for the S10 certification:

- front axle group/kingpin,
- rear axle group, and
- entire vehicle.

Front and rear S10 Laden Mass

The S10 laden mass is the front axle group/kingpin or rear axle group maximum mass.

Front S10 laden mass:

- Add the FAM to the unladen front axle group or kingpin mass to calculate the S10 laden mass for the front axle group or kingpin.

Rear S10 laden mass:

- Add the RAM to the unladen rear axle group mass to calculate the S10 laden mass for the rear axle group.

Vehicle S10 Laden Mass

The Vehicle S10 laden mass is the maximum mass of the eligible vehicle.

Add front and rear S10 Laden Mass values to calculate the vehicle S10 laden mass.

S10 Assessment & Certification Procedure

Below is an overview of the S10 assessment and certification procedure:

Table 2 Overview of assessment and certification

Step	Person	Action
1	Owner /supplier	Determine if the vehicle's basic design, i.e. axle configuration, deck configurations, etc. meets the general requirements to operate under the Notice. • If **yes**, proceed to step 2. • If **no**, the vehicle is not eligible to operate under the Notice.
2	Owner /supplier	Contact an accredited S10 AVE and organise for the vehicle to be inspected by the AVE. Proceed to step 3.
3	S10 AVE	Inspect the vehicle as per the S10 Code and S10 checklist. Complete the vehicle S10 Checklist, assess and determine if the vehicle can be certified under the S10 Code. • If **yes**, proceed to step 4. • If **no**, do not proceed and advise owner/supplier the vehicle is not able to be certified under the S10 Code.
4	S10 AVE	Issue modification certificate, attach a S10 modification plate listing the assessed ratings for the vehicle and maintain records as required in the Business Rules for Approved Persons (Vehicle Modifications).

Record Keeping

All records, including weight distribution and imposed load calculations, drawings, checklists, certificates and any other documents relating to the S10 rating must be maintained as required in the Business Rules for Approved Persons (Vehicle Modifications).

Further Information

Refer to *Appendix 1* for a glossary of terms used in S10.

Learn more about the S10 modification code: Heavy Vehicle Modifications.

For more guidance on S10 livestock loading please visit: Livestock Loading Operators Guide

For more information about the S10 livestock loading conditions: Clarification of QLD Livestock Loading Scheme Conditions.

Find out more about animal welfare during transport: Business Queensland.

For enquiries regarding the Scheme, S10 Code, the Notice or Operator's Guide please email TMR.

Appendix 1

General Terms

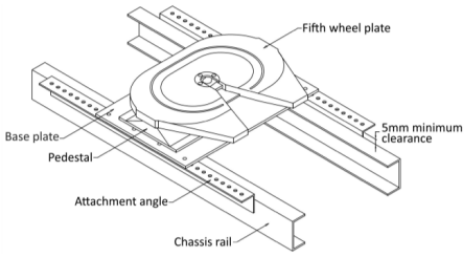
Approved Vehicle Examiner (AVE)	A person who is authorised under the HVNL to carry out a particular function based on their accreditation or approval from a jurisdiction to carry out the same or equivalent function.
Australian Design Rule	National vehicle standards under the Road vehicle Standards Act 2018.
Axle Group Tyre Load Capacity	The maximum mass that an axle group can support based on the total load capacity of all the tyres fitted to that axle group.
Axle Load Rating – Vehicle Manufacturer	The load limit for a vehicle axle group as rated by the vehicle manufacturer or a rating certified under VSB 6.
Axle Load Rating – Axle Manufacturer	The load limit for a vehicle axle group as rated by the axle manufacturer.
Axle Spacing	Horizontal distance between the centre of an axle to another.
D-Value	The theoretical horizontal reference force between a towing vehicle and trailer. A higher D-value indicates a higher rating.
Dual Tyres	An arrangement where two tyres are mounted side by side at each end of a single axle.
Equipment	Equipment fitted to a vehicle for a special purpose and not fitted by the original vehicle manufacturer as either standard equipment or as a regular production option. Includes items fitted to the truck or trailer at the time of weighing. These could include, but are not limited to, bullbar, fluid reservoirs, sleeper cab air conditioning, spare wheel/tyre(s)toolbox(s), refrigerator(s) and accessories etc. This includes any items carried on or in the vehicle during operational use.
Fluid Reservoir	A tank used to store a fluid. This may include (but not be exclusively restricted to) auxiliary fuel, AdBlue tanks, water and/or effluent tanks that are fitted to the truck and/or trailer.
Forward Axle Mass (FAM)	The proportion of weight that an imposed load or payload places onto the front axle group or kingpin of a unit.
Front S10 Laden Mass	The total VLM and/or simulated mass as calculated according to the Livestock Loading (S10) code on: • the front steer axle group of a truck, or • the front axle group of a dog trailer, or • the axle group of a dolly, or • the kingpin of a semitrailer. It is the sum of the unladen front axle group/kingpin (tare) mass and the forward axle mass.
Public Weighbridge	Weighbridge open for public use under the National Measurement Act 1960.
Rear S10 Laden Mass	The total VLM and/or simulated mass as calculated according to the Livestock Loading (S10) code on: • the rear axle group of a truck, or • the rear axle group of a dog trailer, or • the axle group of a semitrailer. It is the sum of the unladen rear axle group (tare) mass and the rearward axle mass.
Rearward Axle Mass (RAM)	The proportion of weight that an imposed load or payload places onto the rear axle group of a unit.
S10 Conditional Mass Limit	Maximum mass limits for the steer axle and S10 laden mass as specified in Table 1 of Schedule 1 Conditional Requirements of the Heavy Vehicle National Law - Queensland Class 3 Livestock Loading Exemption Notice 2024 (No.1).
S10 Modification Plate	Maroon-coloured modification plate fitted to a vehicle displaying details of the S10 rating and certification.
Stock Crate Length	The net length of a deck where livestock can be loaded inside a stock crate. It is the difference between the deck length and any interior distance(s) required for dividers or bulkheads. Where there is more than one load area on a deck (i.e. divided by a central bulkhead) this is the sum total internal length for that deck.
Tandem Axle Group	A group of at least two axles, in which the horizontal distance between the centre-lines of the outermost axles is at least 1m, but not more than 2m. 

Tow Coupling	An articulated connection between a trailer and it's towing unit. For eligible vehicles this coupling can be either a fifth wheel & kingpin or drawbar eye & pin coupling.
Tri-axle Group	A group of at least three axles, in which the horizontal distance between the centre-lines of the outermost axles is more than 2.0 metres but not more than 3.2 metres. 
Tyre Load Index	A numerical code that indicates the maximum mass that a tyre can carry at it's maximum speed and rated inflation pressure. This code corresponds to a mass that will be the load capacity of the tyre.
Unladen Mass	The mass of the vehicle in running order, ready for service, without payload, unoccupied and with all fluid reservoirs (excluding effluent tanks) filled to capacity, including fuel, and fitted with all equipment and accessories required for in-service operation fitted. Effluent tanks must be empty.
Vehicle Identification Number	A unique identifier that is allocated to a vehicle, and permanently recorded on the vehicle, in accordance with ADR 61/...
Vehicle S10 Laden Mass	The total mass as calculated according to the Livestock Loading (S10) code. For a semitrailer this will be S10 Mass + rear S10 Mass.

Measurement Terms

Height	The vertical parallel to the z-axis of a vehicle reference system from the ground to its highest point when sitting on a horizontal surface.
Loaded Deck Length	The length of the deck of the trailer measured from inside the front wall to inside the back wall of the loading space. It is the difference between the deck length and any interior distance(s) required for dividers or bulkheads.
Mass	Mass is to be calculated to the nearest kilogram.
Rear Overhang Line	The theoretical reference line parallel to the transverse (Y) axis passing through the centre of a rear axle group. Where any rear axle group includes a steerable axle in conjunction with one or more non-steerable axles, only the non-steerable axles shall be considered in determining the centre of an axle group.
'S' Dimension	The distance measured horizontally and parallel to the longitudinal (X) axis of the vehicle between the front articulation point (kingpin) to the rear overhang line. For a Semitrailer this can be considered as the Wheelbase.
Wheelbase	The distance measured horizontally and parallel to the longitudinal (X) axis of the vehicle between the foremost axle to the rear overhang line.

Truck Terms

Fifth Wheel	A device (other than an upper rotating element and a kingpin) used with a prime mover, semitrailer or converter dolly to: • permit quick coupling and uncoupling; and • provide for articulation.  Also sometimes called a 'B'-type coupling when used with a kingpin.
Fifth Wheel Offset	The horizontal distance between the centre of the fifth wheel hitch and the rear overhang line. A positive fifth wheel distance is a 'lead'. A negative fifth wheel distance is a 'lag'.
Gross Combination Mass	The maximum permissible mass of a vehicle and any trailers it may lawfully tow, including their own mass, accessories, equipment and fully loaded will all fluid reservoirs filled to nominal capacity
Gross Vehicle Mass	The maximum permissible mass of a vehicle, including it's own mass, accessories, equipment and fully loaded will all fluid reservoirs filled to nominal capacity.

Pin Coupling	A coupling using a vertical pin that passes through the drawbar eye to attach a trailer fitted with a drawbar. When used with a drawbar eye it is sometimes called an 'A'-type coupling
Prime Mover	A heavy motor vehicle designed to tow a semitrailer.

Trailer Terms

Aggregate Trailer Mass	The total mass of the laden trailer when carrying the maximum load recommended by the manufacturer. This will include any mass imposed onto the drawing vehicle when the combination is resting on a horizontal supporting plane.
Converter Dolly	A pig trailer with a fifth wheel coupling designed to convert a semitrailer into a dog trailer. 
Dog Trailer	A trailer (including a trailer consisting of a semitrailer and converter dolly) that has: • one axle group or a single axle at the front that is being steered by connection to a towing vehicle by a drawbar; and • one axle group or a single axle at the rear. 
Gross Trailer Mass	The specified mass transmitted to the ground by the trailer axles when a trailer is coupled to a towing vehicle on a horizontal surface and is loaded to its maximum permissible mass.
Kingpin	A large, tapered pin that fits into a fifth wheel to permit an articulated coupling between a semitrailer/converter dolly and a prime mover.
Semitrailer	A trailer that has: • one axle group or a single axle towards the rear; and • a means of attachment to a prime mover that results in some of the mass of the trailer's load being imposed on the prime mover.