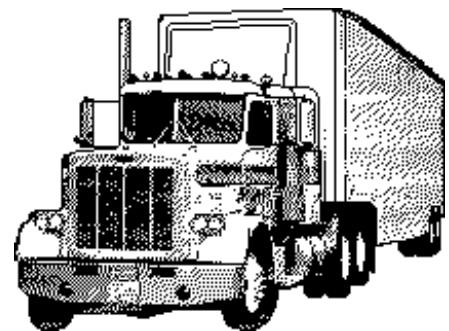
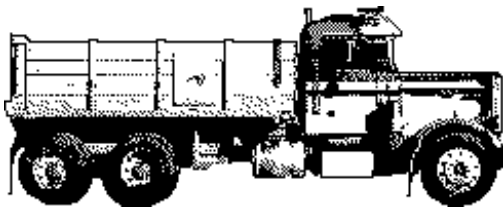


SECTION S
VEHICLE RATING



HEAVY VEHICLE MODIFICATIONS**1. SCOPE**

This section relates to the certification of mass ratings for powered vehicles and trailers and the certification of Road Train and B-Double vehicles.

It contains as appendices, separate Codes of Practice to allow a Certifying Officer who is approved by the relevant State or Territory Registration Authority to assign Gross Vehicle Mass, Gross Combination Mass and Aggregate Trailer Mass ratings to modified vehicles or vehicles for which the original Manufacturer's records are no longer available.

Codes of Practice are also included to provide guidelines for suitably qualified Certifying Officers to inspect, test and certify Road Train and B-Double vehicles as meeting the minimum requirements of National and State transport regulations.

2. GENERAL INFORMATION

The separate Codes of Practice included as Appendices in Section S are:

- S1 Gross Vehicle Mass Rating and Gross Combination Mass Rating to S2 or S3 approved design or within Manufacturer's Specification
- S2 Gross Vehicle Mass Rating Approved Design Certification for non-standard vehicles
- S3 Gross Combination Mass Rating Approved Design Certification for non-standard vehicles
- S4, S5 and S6 Bus Rating used in Queensland only
- S7 Aggregate Trailer Mass Rating to S12 Approved Design or within Manufacturer's Specification
- S8 Road Train Prime Mover Rating
- S9 B-Double Rating
- S10 Livestock Loading used in Queensland only
- S11 Road Train Trailer Rating
- S12 Aggregate Trailer Mass Rating Approved Design Certification for Non-standard Trailers

The intention of Codes S1 and S7 is to provide guidelines by which tradespersons may be authorised to certify mass ratings to vehicles or trailers which they have modified or have inspected on behalf of other persons.

The Codes require the rating to be based either on a manufacturer's rating for an identical vehicle or on a report prepared in accordance with Codes S2, S3 or S12 by a registered professional engineer.

The design certification Codes S2, S3 and S12 do not require the engineer to inspect the individual vehicle. The Codes specify guidelines under which a report may be prepared on the basis of information supplied by the S1 or S7 certifying officer, to recommend ratings which could be applied to a vehicle in good mechanical condition with the specified componentry.

3. ADR's AFFECTED

The ADR's affected under each Code are listed in the individual appendices.

HEAVY VEHICLE MODIFICATIONS**4. AFFECTING MODIFICATIONS**

The “S” series of Codes of Practice are applicable to powered vehicles or trailers which are modified in any way which affects the carrying or hauling capacity of the vehicle, except for trailer modifications where the basic trailer type is altered e.g. semitrailer conversion to dog trailer or pig trailer.

Where a trailer type is altered, the trailer is regarded as being remanufactured rather than modified and as such, requires an application to be made to the Department of Transport and Regional Services for a compliance plate approval to be issued. The remanufactured trailer will require a new VIN number to be issued to identify correctly the trailer type and the manufacturer.

The Road Train and B-Double rating Codes apply to trailers which have been built or modified for use in these applications but which lack the Manufacturer’s statement “ROAD TRAIN” or “B-DOUBLE” as applicable on the Vehicle Plate as specified in ADR 61/.. to signify the Manufacturer’s certification of conformance to all relevant Standards and Regulations.

5. GENERAL REQUIREMENTS

Section S applies to all vehicles and should be used in conjunction with the relevant Appendices which are specific for particular rating requirements.

5.1 Increase in GVM/GCM

For a vehicle to qualify for an increase in GVM and/or GCM, the total vehicle must be capable of safely performing and operating at the proposed increased rating. If modifications are necessary to obtain proposed mass ratings, it is preferable to modify the vehicle to reproduce a manufacturer’s standard specification.

A vehicle in standard manufacturer’s specification cannot be granted an increase in GVM/GCM above the manufacturer’s ratings unless specifically approved by the vehicle manufacturer.

When modifications such as additional axles or replacement axles with a greater load carrying capacity than original are fitted, the vehicle frame must be analysed to ensure that it is of sufficient strength to accommodate the proposed increase in GVM/GCM. Refer to Section H “Calculation of Chassis Strength” of this Code.

A simplified way to look at the frame requirements for each of these ratings, is to associate the bending strength of the chassis with the load carrying capacity (i.e. GVM), and the torsional strength of the chassis with the GCM rating.

When a significant increase in GCM is required, it is often necessary to perform a major rework of the vehicle’s chassis. Any rework would be required to stiffen the vehicle’s frame as vehicles with a high GCM rating would normally be fitted with larger crossmembers, as well as larger frame rails. The engine and driveline are also critical components in GCM rating. The GVM, however, is mainly dependent on the frame rail size and this is somewhat more readily upgraded.

The GVM rating cannot exceed the GCM rating.

The chassis, drivetrain, axles, suspension, brakes, steering, wheels and tyres are critical components which must be assessed individually to ensure that each is suitable to operate under the increased loads resulting from upgraded operating mass. Refer to the relevant sections of this Code of Practice.

HEAVY VEHICLE MODIFICATIONS**6. RECORDING**

Appendices of this document are S1, S2, S3, S7, S8, S9, S11 and S12, which:

- Summarise the scope of modification work which may be certified under each of the corresponding Modification Codes.
- Include lists of Sections of this National Code of Practice covering other areas of the vehicle which may have been affected by the modification and which should be analysed to determine whether they, too, require re-certification.
- Include checklists appropriate to the particular Modification Code that should be completed.

While the checklists allow recording of the most significant vehicle details pertinent to the rating being issued, it is suggested that records of analysis, work records, sketches and other vehicle data, together with the Calculation Sheets and completed checklists, be retained by the Certifying Officer for at least the period specified in Part A of this National Code of Practice.

HEAVY VEHICLE MODIFICATIONS

Appendix S1

Modification Code S1

**GROSS VEHICLE MASS RATING AND
GROSS COMBINATION MASS RATING
TO S2 OR S3 APPROVED DESIGN OR WITHIN
MANUFACTURER'S SPECIFICATION**

Certifications that are covered under this Modification Code are:

1. Gross Vehicle Mass (GVM) rating and Gross Combination Mass (GCM) rating for a vehicle which has been upgraded or downgraded to conform to an alternative standard manufacturer's specification.
2. Gross Vehicle Mass (GVM) rating and Gross Combination Mass (GCM) rating for a vehicle which has been inspected by the Certifying Officer and confirmed by the officer to have been modified to a design certified by an S2 or S3 Certifying Officer as suitable for the revised rating.
3. Gross Vehicle Mass (GVM) rating and Gross Combination Mass (GCM) rating for a vehicle for which the Manufacturer has issued a letter of authority certifying an alternative rating.

Certifications that are **not** covered under this Modification Code are:

1. Gross Vehicle Mass (GVM) rating and Gross Combination Mass (GCM) rating for a vehicle where a Certifying Officer does not hold a copy of a design specification certifying the alternative rating issued by the Manufacturer or by a Certifying Officer with S2 and/or S3 authorisation.
2. Gross Vehicle Mass (GVM) rating reductions for modifications undertaken for the purpose of reducing the statutory charges applying to the vehicle at the Manufacturer's GVM.

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the vehicle that may have been affected by the modifications and that may require re-certification, testing and/or data to show compliance for the modified vehicle.

| DETAIL | REQUIREMENTS |
|---------------|---|
| Brakes | ADR 35, 35A, 35/..., Modification Codes G4 and G7 |
| Suspension | Manufacturer's rating, Modification Code F1 |
| Steering | Modification Code E2 |
| Chassis | Manufacturer's rating, Modification Code H |

HEAVY VEHICLE MODIFICATIONS

| | |
|---------------------------|---|
| Engine | ADR 30, 30/.., 36, 36A, 36/.., 70/.. Modification Code A |
| Transmission Tailshaft | Manufacturer's rating, Modification Code B Modification Code C |
| Axles | Manufacturer's rating, Modification Codes D and E |
| Tyres | Manufacturer's rating, ADR 24, 24A, 24/.. |

If any of the areas listed above are affected by modifications made to the vehicle in order to achieve the GVM or GCM rating, they must comply with the prescribed standards and where necessary, must be approved by a Certifying Officer holding the appropriate modification code/s.

HEAVY VEHICLE MODIFICATIONS**Appendix S1****GROSS VEHICLE MASS RATING AND
GROSS COMBINATION MASS RATING
TO S2 OR S3 APPROVED DESIGN OR WITHIN
MANUFACTURER'S SPECIFICATION****SPECIFIC REQUIREMENTS****1.0 General**

Rerating under this Code is restricted to a vehicle modified either to a design configuration for which a certificate and checklist has been issued by an S2 or S3 Certifying Officer, or to the design configuration of an alternative vehicle produced by the vehicle manufacturer.

Ratings under this Code may be increased or decreased to suit the capability of the modified componentry.

Typical modifications could include changes from single axle to tandem axle configuration or vice versa, or replacement of engine, transmission, axles or suspension components with alternative components which would allow a different rating.

The rerating must address the compatibility of the entire vehicle for the revised rating and in particular must check that the chassis, suspensions, axles and drive train components are used within the manufacturer's rated capacities. Where a component manufacturer has published information reducing the rating capacity of a component for safety reasons, the reduced rating must apply.

Reductions in Gross Vehicle Mass (GVM) rating are not permitted in the case of modifications undertaken for the purpose of reducing the statutory charges applying to the vehicle at the Manufacturer's GVM.

The modified GVM must not exceed the original manufacturer's GCM unless the vehicle has been modified in accordance with Code S3.

2.0 Tyre and Wheel Rims

The sum of the load carrying capacities recommended for all the tyres and rims with which the vehicle is equipped, shall be not less than the GVM.

The load carrying capacity of any tyre or rim must not be exceeded when the vehicle is loaded to the revised GVM rating.

For a vehicle manufactured to comply with ADR 24/.., the tyres and rims must be selected and must comply in all respects with the requirements of that ADR at the revised GVM rating.

Where a tyre placard is fitted to a vehicle, this placard must be replaced or amended as necessary to indicate the correct tyre specifications for the vehicle at the revised GVM rating. The revised tyre size and load rating must also appear on the modification plate.

HEAVY VEHICLE MODIFICATIONS**3.0 Chassis**

The modified chassis must conform to the design specification certified by the S2 or S3 Certifying Officer or must be original in material specification, reinforcement and crossmember installation to the manufacturer's standard chassis for the vehicle to which the modified vehicle is being compared.

4.0 Brakes

The braking effectiveness of a vehicle is directly affected by changes in the vehicle's GVM. Before an increased GVM can be issued, it is necessary to upgrade the brakes in line with the Manufacturer's specification or the design specification certified by the S2 or S3 Certifying Officer. Where a manufacturer's specification is used for comparison, the braking system must be original to a system fitted by the manufacturer to a vehicle with a GVM equal to or greater than the proposed GVM rating.

5.0 Driveline**5.1 Gradability**

The vehicle gradability at the revised GVM must be at least 23%.

5.2 Engine/Transmission

The GVM rating assigned must not exceed the engine and transmission manufacturer's recommendations, or the limit set by vehicle manufacturers for a vehicle using the engine and transmission models being assessed. Where certification is by comparison with a manufacturer's standard vehicle, the engine and transmission fitted to the modified vehicle must be identical to those fitted by the manufacturer to the standard vehicle.

The engine/transmission mounting system must be assessed for adequacy to resist the maximum engine torque multiplied by the gear ratio of the transmission starting gear. This is particularly important where a transmission with lower gearing or an engine with higher torque output is used to improve the startability.

5.3 Tailshaft

A higher GVM will place greater demands on the torque capability of the tailshaft, with torque being limited either by the engine torque output or by wheel slip. The maximum possible torque must be established to be within the capability of the tailshaft.

5.4 Front and Rear Axles and Suspension Assemblies

Where certification is by comparison with a manufacturer's standard vehicle, the axle and suspension assemblies fitted to the modified vehicle must be original to those fitted by the manufacturer to the standard vehicle with the higher GVM rating.

Where a component manufacturer has published information reducing the rating capacity of a component for safety reasons, the reduced rating must apply.

The entire steering system must be identical to that fitted by the manufacturer to the standard comparison vehicle or must be approved under Code E2 of this National Code of Practice.

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S1

GROSS VEHICLE MASS RATING AND
GROSS COMBINATION MASS RATING
TO S2 OR S3 APPROVED DESIGN OR WITHIN
MANUFACTURER'S SPECIFICATION

1.0 Record of major componentry and manufacturer's load ratings:

| Component | Make/model | Component manufacturer's max load rating |
|-------------------|------------|--|
| Engine | | |
| Transmission | | |
| Aux. Transmission | | |
| Tailshaft | | |
| Rear Axle | |kg |
| Rear suspension | | kg |
| Rear tyres | | kg |
| Front axle | | |
| Front suspension | | |
| Front tyres | | |
| Chassis section | | |
| Wheelbase | | |
| Modified GVM | | kg |
| Modified GCM | | kg |

(Y = Yes, N = No)
Delete if not applicable

- | | | | |
|-----|---|---|---|
| 2.0 | Is the modified GVM/GCM within the component manufacturer's limits? | Y | N |
| 3.0 | Have component details of the vehicle model used for comparison been retained for future audit? or Has a copy of the S2/S3 Certifying Officer's certificate and checklist been retained for future audit? | Y | N |
| 4.0 | Is the vehicle's entire braking system, (including air compressor) identical to the braking system of the standard comparison vehicle or identical to the S2/S3 report specification? | Y | N |
| 5.0 | Tyres and Rims | | |
| 5.1 | Does the tyre placard fitted to a vehicle produced after 1 July 1990 record the correct tyre and rim sizes, axle configurations, axle loads and tyre inflation pressures for the modified vehicle? | Y | N |
| 5.2 | Are tyres and rims fitted in conformance to the tyre placard? | Y | N |
| 6.0 | Has gradability been established as adequate for the modified GVM/GCM? | Y | N |

HEAVY VEHICLE MODIFICATIONS

- 7.0 Is the subject chassis (including chassis rail, reinforcements and crossmembers) identical to the chassis of the standard comparison vehicle or identical to the S2/S3 Certifying Officer’s specification? Y N
- 8.0 Is the vehicle’s steering system equivalent to that fitted by the manufacturer or does it meet the requirements of Code E2? Y N
- 9.0 Is the vehicle in good mechanical condition? Y N
- 10.0 Is the quality of workmanship to a satisfactory standard? Y N

NOTE: If the answer to any relevant question is “NO”, the modification is not acceptable.

Vehicle Make/Model:

Chassis No./VIN: Year of Mfr:.....

Vehicle Modified By:.....

Vehicle make/model used for comparison:.....

or

Certifying S2/S3 Officer’s identity:.....

S2/S3 Officer’s number and certificate number: /

Examined and Approved By:

Examined by:.....

Company (if applicable):.....

Certifying Officer No:..... Modification Certificate No:.....

Modification Plate No:.....

Signed:..... Date:.....

HEAVY VEHICLE MODIFICATIONS

Appendix S2

Modification Code S2

**GROSS VEHICLE MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD VEHICLES OR SPECIAL VEHICLES e.g. MOTORHOMES**

Certifications that are covered under this Modification Code are:

1. Gross Vehicle Mass (GVM) rating increase or decrease for a vehicle which has been modified to a specification which differs from the manufacturer's standard specification.
2. Issue of a Gross Vehicle Mass (GVM) rating recommendation certificate and checklist to an S1 Certifying Officer who will inspect and plate the vehicle, for a vehicle specification supplied either by the owner or by the S1 Certifying Officer, where the vehicle itself has not been inspected by the S2 Certifying Officer.
3. Issue of a Gross Vehicle Mass (GVM) rating recommendation certificate and checklist to an S1 Certifying Officer who will inspect and plate the vehicle, for a vehicle whose manufacturer no longer exists and for which a manufacturer's GVM is not available.
4. Gross Vehicle Mass (GVM) rating reductions for Motorhome vehicles where the maximum possible laden vehicle mass can be established to be lower than the vehicle manufacturer's original GVM.

Certifications that are **not** covered under this Modification Code are:

1. Rating of a vehicle's Gross Combination Mass (GCM). (Refer S3)
2. Ratings which would cause any component of the vehicle to operate or be subjected to loads in excess of that component manufacturer's rating.
3. A reduction in Gross Vehicle Mass (GVM) rating without a physical change to the vehicle and which does not compromise its safety.

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the vehicle that may have been affected by the modifications and that may require recertification, testing and/or data to show compliance for the modified vehicle.

DETAIL**REQUIREMENTS**

Brakes

ADR 35, 35A, 35/.., Modification Codes G4 and G7

Suspension

Manufacturer's rating, Modification Code F1

Steering

Modification Code E2

HEAVY VEHICLE MODIFICATIONS

| | |
|--------------|--|
| Chassis | Manufacturer's rating, Modification Code H |
| Engine | ADR 30, 30/.., 36, 36A, 36/.., 70/.., Modification Code A |
| Transmission | Manufacturer's rating, Modification Code B |
| Tailshaft | Modification Code C |
| Axles | Manufacturer's rating, Modification Codes D and E |
| Tyres | Manufacturer's rating, ADR 24, 24A, 24/.. |

If any of the areas listed above are affected by modifications made to the vehicle in order to achieve the GVM rating, they must comply with the prescribed standards and where necessary must be approved by a Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS

Appendix S2

**GROSS VEHICLE MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD VEHICLES****SPECIFIC REQUIREMENTS****1.0 General**

The intention of this Code is to allow suitably qualified Certifying Officers to certify the permissible Gross Vehicle Mass (GVM) rating of modified vehicles, either by personal inspection of the vehicle or by examination of written specifications supplied by the owner or modifier.

Typical modifications would include changes from single axle to tandem axle configuration or vice versa, or replacement of engine, transmission, axles or suspension components with alternative components which would allow a different rating.

In the case of a vehicle which is not inspected by the S2 Certifying Officer, the S2 certificate and checklist should be issued. The checklist confirms the fact that the vehicle has not been inspected, identifies the source of the information and recommends an appropriate rating for a vehicle having componentry as listed in the checklist, subject to the vehicle being in satisfactory mechanical condition.

The certificate and checklist may then be used by an S1 Certifying Officer to rerate the individual vehicle after inspection to verify that the componentry is as described in the certificate checklist and that the vehicle's mechanical condition is satisfactory.

The rerating must address the compatibility of the entire vehicle for the revised rating and in particular must check that the chassis, suspensions, axles and drive train components are used within the manufacturer's rated capacities. Where a component manufacturer has published information reducing the rating capacity of a component for safety reasons, the reduced rating must apply.

A GVM cannot be downgraded without a physical change to the vehicle which does not compromise its safety. Replacement of the standard tyres with lower rated tyres to achieve a lower cost registration category is considered to compromise safety and is **not** permitted.

The modified GVM must not exceed the original manufacturer's GCM unless the vehicle has been modified in accordance with Code S3.

2.0 Tyres and Wheel Rims

The sum of the recommended load carrying capacities recommended for all the tyres and rims with which the vehicle is equipped shall be not less than the GVM.

The load carrying capacity of any tyre or rim must not be exceeded with the vehicle at the revised GVM rating.

Where a vehicle is manufactured to comply with ADR 24/..., the tyres and rims selected must comply in all respects with the requirements of that ADR at the revised GVM rating.

HEAVY VEHICLE MODIFICATIONS

Where a tyre placard is fitted to a vehicle, this placard must be replaced or amended as necessary to indicate the correct tyre specifications for the vehicle at the revised GVM rating. The revised tyre size and load rating must also appear on the modification plate.

3.0 Chassis

Certifying Officers must satisfy themselves that the vehicle's chassis has adequate strength for the revised GVM rating. Refer to Section 5.0 of the General Requirements which preface Section S of this National Code of Practice and to Section H - Chassis Frame.

4.0 Brakes

The braking effectiveness of a vehicle is directly affected by changes in the vehicle's GVM. Before an increased GVM rating can be issued, it is necessary to ensure that the braking system of that vehicle is recertified to the new GVM. Section G of this National Code of Practice contains details of the certification procedure.

5.0 Driveline**5.1 Engine/Transmission**

The GVM rating assigned must not exceed the engine and transmission manufacturer's recommendations and the limit set by vehicle manufacturer's for vehicles using the engine and transmission models being assessed.

The engine/transmission mounting system must be assessed for adequacy to resist the maximum engine torque multiplied by the gear ratio of the transmission starting gear. This is particularly important where a transmission with lower gearing or an engine with higher torque output is used to improve the startability.

5.2 Tailshaft

A higher GVM will place greater demands on the torque capability of the tailshaft, with torque being limited either by the engine torque output or by wheel slip. The maximum possible torque must be established to be within the capability of the tailshaft.

5.3 Rear Axles/Rear Suspension

The maximum GVM limit must be obtained either directly from the axle and suspension manufacturer or by comparison with a vehicle manufacturer's rating for a vehicle of similar axle and suspension componentry and axle ratio. Where a component manufacturer has published information reducing the rating capacity of a component for safety reasons, the reduced rating must apply.

6.0 Front Axle/Front Suspension

The GVM rating assigned must not result in the manufacturer's mass rating of the front axle, front suspension or steering being exceeded. The maximum mass ratings of these components must be obtained either directly from the axle and suspension manufacturer or by comparison with a vehicle manufacturer's rating for a vehicle of similar axle and suspension componentry.

HEAVY VEHICLE MODIFICATIONS**7.0 Motorhome vehicle rerating**

Commercial vehicles or omnibuses, when converted to motorhomes, frequently have manufacturer's GVM ratings considerably in excess of the maximum laden mass possible for the vehicle in motorhome configuration.

The GVM rating of a vehicle licensed for use as a motorhome may be reduced to the maximum vehicle laden mass as demonstrated by a weighbridge ticket increased where necessary to adjust for the following conditions:

- The vehicle fully furnished and with all personal possessions on board.
- All fluid reservoirs including fuel and water tanks filled to capacity.
- A mass of 68 kg for each occupant which the vehicle is licensed to carry.
- Any bicycle or motorcycle rack to be filled.

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S2

GROSS VEHICLE MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD VEHICLES

1.0 Record of major componentry and manufacturer’s load ratings:

| Component | Make / Model Manufacturer’s | max load rating |
|-------------------|--------------------------------|-----------------|
| Engine: | | |
| Transmission | | |
| Aux. Transmission | | |
| Tailshaft | | |
| Rear Axle | |kg |
| Rear suspension | |kg |
| Rear tyres | |kg |
| Front axle | |kg |
| Front suspension | |kg |
| Front tyres | |kg |
| Chassis section | | |
| Wheelbase | | |
| Modified GVM | kg | |

(Y = Yes N = No)
Delete if not applicable

- | | | | |
|---------------------------|---|---|---|
| 2.0 | Is the modified GVM within the component manufacturer’s limits? | Y | N |
| 3.0 | Does the chassis have adequate strength and have chassis strength calculations or details of a vehicle model used for comparison been retained for future audit? | Y | N |
| 4.0 | Has the appropriate G Code certification been completed? | Y | N |
| 5.0 Tyres and Rims | | | |
| 5.1 | Does the tyre placard fitted to a vehicle produced after 1 July 1990 record the correct tyre and rim sizes, axle configurations, axle loads and inflation pressures for the modified vehicle? | Y | N |
| 5.2 | Are tyres and rims fitted in conformance to the tyre placard? | Y | N |
| 6.0 | Has gradability been established as adequate for the modified GVM/GCM? | Y | N |
| 7.0 | At the revised GVM, are the loads on the front axle and suspension and rear axles and suspension within the manufacturer’s maximum mass ratings for these components? | Y | N |
| 8.0 | Is the vehicle in good mechanical condition? | Y | N |
| 9.0 | Is the quality of workmanship to a satisfactory standard? | Y | N |

HEAVY VEHICLE MODIFICATIONS

NOTE: If the answer to any relevant question is "NO", the modification is not acceptable.

Vehicle identity and information source

Vehicle make / Model:

Chassis No./VIN: Year of Mfr:

Vehicle Modified By:

.....

Vehicle examined or details supplied by:

Company (if applicable)

Certification

Vehicle inspected/not inspected (Delete as inapplicable)

Modification Plate No. issued (Applicable only if vehicle inspected)

Certificate number issued:

Certificate approved by:

Company (if applicable)

Signed: Certifying Officer No:..... Date:

If Certificate issued to S1 Certifying Officer:

Certificate and checklist issued to:

Name: Certifying Officer No.

Company:

Note: A copy of this checklist must be supplied with the certificate to the S1 Certifying Officer.

HEAVY VEHICLE MODIFICATIONS

Appendix S3

Modification Code S3

**GROSS COMBINATION MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD VEHICLES**

Certifications that are covered under this Modification Code are:

1. Gross Combination Mass (GCM) rating for a vehicle which has been modified to a specification which is beyond the manufacturer's standard specification.
2. Issue of a Gross Combination Mass (GCM) rating recommendation certificate and checklist to an S1 Certifying Officer who will inspect and plate the vehicle, for a vehicle specification supplied either by the owner or by the S1 Certifying Officer, where the vehicle itself has not been inspected by the S3 Certifying Officer.
3. Issue of a Gross Combination Mass (GCM) rating recommendation certificate and checklist to an S1 Certifying Officer who will inspect and plate the vehicle, for a vehicle whose manufacturer no longer exists and for which a manufacturer's GVM is not available.

Certifications that are **not** covered under this Modification Code are:

1. Rating of a vehicle's Gross Vehicle Mass (GVM).
2. Ratings which would cause any component of the vehicle to operate or be subjected to loads in excess of that component manufacturer's rating.
3. GCM rating of a road train prime mover (See Code S8) or a B Double Prime mover (See Code S9).

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the vehicle that may have been affected by the modifications and that may require recertification, testing and/or data to show compliance for the modified vehicle.

| DETAIL | REQUIREMENTS |
|---------------|--|
| Brakes | ADR 35, 35A, 35/.., Modification Codes G4 and G7 |
| Suspension | Manufacturer's rating, Modification Code F1 |
| Steering | Modification Code E2 |
| Chassis | Manufacturer's rating, Modification Code H |

HEAVY VEHICLE MODIFICATIONS

| | |
|---------------|---|
| Engine | ADR 30, 30/..., 36, 36A, 36/..., 70/..., Modification Code A |
| Transmission | Manufacturer's rating, Modification Code B |
| Tailshaft | Modification Code C |
| Axles | Manufacturer's rating, Modification Codes D and E |
| Tyres | Manufacturer's rating, ADR 24/.. |
| Tow Couplings | ADR 44/..., 62/..., Modification Code P |

If any of the areas listed above are affected by modifications made to the vehicle in order to achieve the GCM rating, they must comply with the prescribed standards and, where necessary, must be approved by an Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS

Appendix S3

**GROSS COMBINATION MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD VEHICLES****SPECIFIC REQUIREMENTS****1.0 General**

The intention of this Code is to allow suitably qualified Officers to certify the permissible Gross Combination Mass (GCM) rating of modified vehicles, either by personal inspection of the vehicle or by examination of written specifications supplied by the owner or modifier.

Typical modifications would include changes from single axle to tandem axle configuration or vice versa, or replacement of engine, transmission, axles or suspension components with alternative components which would allow a different rating.

In the case of a vehicle which is not inspected by the S3 Certifying Officer, the S3 certificate and checklist should be issued. The checklist confirms the fact that the vehicle has not been inspected, identifies the source of the information and recommends an appropriate rating for a vehicle having componentry as listed in the checklist, subject to the vehicle being in satisfactory mechanical condition.

The certificate and checklist may then be used by an S1 Certifying Officer to re-rate the individual vehicle after inspection to verify that the componentry is as described in the certificate checklist and that the vehicle's mechanical condition is satisfactory.

The rerating must address the compatibility of the entire vehicle for the revised rating and in particular must check that the chassis, suspensions, axles and drive train components are used within the manufacturer's rated capacities.

2.0 Chassis

Certifying Officers must satisfy themselves that the vehicle's chassis has adequate strength for the revised GCM rating. Refer to Section 5 of the General Requirements which preface Section S of this National Code of Practice and to Section H - Chassis Frame.

Particular attention must be paid to the adequacy of the tow coupling and its attachment where a GCM increase is being considered. Refer to Section P - Tow Couplings/Fifth Wheels.

3.0 Brakes

A GCM rating must not be assigned to a vehicle unless the vehicle is equipped with a trailer brake control system adequate for the intended GCM rating.

Where a GCM increase will permit a trailer with a greater number of axles to be towed or permit multiple trailers, the capacity of the air compressor or other trailer brake energy supply must be checked to ensure that it is adequate to supply the additional trailer brake requirements.

HEAVY VEHICLE MODIFICATIONS

4.0 Driveline

4.1 Gradability

The vehicle's gradability should permit starting on a 13% grade and climbing a 23% grade when the vehicle combination is laden to the revised GCM.

Note: 23% is a theoretical figure which will indicate acceptable performance under normal operating conditions.

This ability should be established either by physical test, comparison with a vehicle of similar componentry combination or by calculation using the formula:

$$\text{GCM (Maximum)} = \frac{K \times R \times M \times T}{g + 1} \quad (\text{kg})$$

where K = drive efficiency constant for type of drive axle fitted to the drawing vehicle

For single drive axles, K = 0.055

For single drive tandem axles, K = 0.053

For dual drive tandem axles, K = 0.051

For tri drive axles, K = 0.047

R = overall gear reduction between engine and drive wheels

M = tyre revolutions per kilometre, determined from Table 1

T = maximum engine net torque (N.m)

g = required minimum grade percentage capability = 23% for general haulage

Table 1

Tyre revolutions per kilometre (Source: ADR 65/00 Table 2)

| Tyre size | Nom. revs/km | Tyre size | Nom. revs/km |
|-----------|--------------|-------------|--------------|
| 8.25*16 | 385 | 9R22.5 | 345 |
| 8.25*20 | 345 | 10R22.5 | 325 |
| 9.00*20 | 325 | 11R22.5 | 315 |
| 10.00*20 | 315 | 12R22.5 | 305 |
| 11.00*20 | 310 | 13R22.5 | 295 |
| 12.00*20 | 295 | 255/70R22.5 | 355 |
| 13.00*20 | 285 | 275/70R22.5 | 345 |
| 14.00*20 | 270 | 275/80R22.5 | 330 |
| 10.00*22 | 300 | 295/75R22.5 | 323 |
| 11.00*22 | 295 | 295/80R22.5 | 320 |
| 11.00*24 | 280 | 315/80R22.5 | 310 |
| 12.00*24 | 270 | 385/65R22.5 | 315 |
| | | 425/65R22.5 | 300 |
| | | 445/65R22.5 | 290 |

HEAVY VEHICLE MODIFICATIONS**4.2 Engine/Transmission**

The GCM rating assigned must not exceed the engine and transmission manufacturer's recommendations, or the limit set by vehicle manufacturer's for vehicles using the engine and transmission models being assessed.

The engine/transmission mounting system must be assessed for adequacy to resist the maximum engine torque multiplied by the gear ratio of the transmission starting gear. This is particularly important where a transmission with lower gearing or an engine with higher torque output is used to improve the startability.

4.3 Tailshaft

A higher GCM will place greater demands on the torque capability of the tailshaft, with torque being limited either by the engine torque output or by wheel slip. The maximum possible torque must be established to be within the capability of the tailshaft.

4.4 Rear Axles/Rear Suspension

The maximum combination mass permitted by the rear axle manufacturer is frequently dependent on the engine torque and the axle ratio. The maximum GCM limit must be obtained either directly from the axle manufacturer or by comparison with a vehicle manufacturer's rating for a vehicle of similar drive train componentry and axle ratio. The suspension manufacturer may also have limits on the GCM permitted on certain components e.g. walking beams or four-spring suspensions.

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S3

GROSS COMBINATION MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD VEHICLES

1.0 Vehicle componentry:

EngineEngine No.
 Rated power @ R/m:.....Governed R/m
 Max torque @ R/m: N.m
 Tailshaft:Mfrs max torque N.m

| Component: | Make/model | Manufacturer's max GCM rating |
|-----------------------------|-----------------------|-------------------------------|
| Transmission: | ..... | ..... kg |
| Low/Top ratios: |/..... : 1 | |
| Aux. Transmission: | ..... | ..... kg |
| Low/Top ratios: |/..... : 1 | |
| Rear Axle: | ..... | ..... kg |
| Low/Top ratios: |/..... : 1 | |
| Rear suspension: | ..... | ..... kg |
| Front axle: | ..... |  |
| Front suspension: | ..... |  |
| Tyres Front: | ..... |  |
| Tyres Rear: | ..... |  |
| Chassis section: | ..... |  |
| Wheelbase: | Overhang: | |
| Tow coupling / Fifth wheel: | | |
| Make/model: |D-rating: | kg |
| Tow coupling overhang: | (if applicable) | |

Modified GCM rating assigned: kg

Vehicle make/model if used for comparison:

(Y = Yes N = No)
Delete if not applicable

- 2.0 Is the modified GCM within the component manufacturer's limits? Y N
- 3.0 Does the chassis have adequate strength and have chassis strength calculations or details of vehicle model used for comparison been retained for future audit? Y N
- 4.0 Are crossmembers and tow coupling adequate for any increase in GCM as outlined in Section P? Y N
- 5.0 Has the appropriate G Code certification been completed? Y N
- 6.0 Tyres and Rims

HEAVY VEHICLE MODIFICATIONS

- 6.1 Does the tyre placard fitted to a vehicle produced after 1 July 1990 record the correct tyre and rim sizes, axle configurations, axle loads and inflation pressures for the modified vehicle? Y N
- 6.2 Are tyres and rims fitted in conformance to the tyre placard? Y N
- 7.0 Has gradability been established to exceed 23% at the modified GCM? Y N
- 8.0 Is the vehicle in good mechanical condition? Y N
- 9.0 Is the quality of workmanship to a satisfactory standard? Y N

NOTE: If the answer to any relevant question is "NO", the modification is not acceptable.

Vehicle identity and information source

Vehicle make / Model:

Chassis No./VIN: Year of Mfr.:

Vehicle Modified By:

.....

Vehicle examined or details supplied by:

Company (if applicable)

Certification

Vehicle inspected/not inspected (Delete as inapplicable)

Modification Plate No. issued (Applicable only if vehicle inspected)

Certificate number issued:

Certificate approved by:

Company (if applicable)

Signed:Certifying Officer No:..... Date:

If Certificate issued to S1 Certifying Officer:

Certificate and checklist issued to:

Name: Certifying Officer No.

Company:

Note: A copy of this checklist must be supplied with the certificate to the S1 Certifying Officer.

HEAVY VEHICLE MODIFICATIONS

Appendix S7

Modification Code S7

**AGGREGATE TRAILER MASS RATING
TO S12 APPROVED DESIGN OR WITHIN
MANUFACTURER'S SPECIFICATION**

Certifications that are covered under this Modification Code are:

1. Aggregate Trailer Mass (ATM) rating for a trailer which has been upgraded or downgraded to conform to an alternative standard manufacturer's specification.
2. Aggregate Trailer Mass (ATM) rating for a trailer which has been inspected by the Certifying Officer and confirmed to have been modified to a design certified by an S12 Certifying Officer as suitable for the revised rating. The S7 Certifying Officer must inspect the vehicle to certify compliance.
3. Aggregate Trailer Mass (ATM) rating for a trailer whose manufacturer no longer exists and for which a manufacturer's ATM is not available, where the trailer has been inspected by the Certifying Officer and confirmed to conform to the trailer description of an ATM rating recommendation letter issued by an S12 Certifying Officer.

Certifications that are **not** covered under this Modification Code are:

1. Aggregate Trailer Mass (ATM) rating for a trailer which has been modified to change the registration category of the trailer e.g semitrailer to dog trailer, pig trailer to dog trailer, semi to dolly, etc. Such trailers are regarded as newly manufactured and must be issued with a new Vehicle Identification Number (VIN) and fitted with a new Compliance Plate issued by the Department of Transport and Regional Services which will identify the applicable ATM.
2. Aggregate Trailer Mass (ATM) rating for a trailer where the S7 Certifying Officer does not hold a copy of a design specification certifying the alternative rating, issued by the Manufacturer or by an Certifying Officer with S12 authorisation.
3. Aggregate Trailer Mass (ATM) rating of Road Train trailers (See Code S11) or B Double trailers (See Code S9).

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the trailer that may have been affected by the modifications and that may require re-certification, testing and/or data to show compliance for the modified trailer.

DETAIL**REQUIREMENTS**

HEAVY VEHICLE MODIFICATIONS

| | |
|---------------|--|
| Brakes | ADR 38, 38/.., Modification Code G3 |
| Suspension | Manufacturer's rating, Modification Code F2 |
| Chassis | Manufacturer's rating, Modification Code H5 |
| Tyres | Manufacturer's rating, ADR 24/.. |
| Tow Couplings | Manufacturer's rating, ADR 62/.., Modification Codes P1 and P2 |

If any of the areas listed above are affected by modifications made to the trailer in order to achieve the ATM rating, they must comply with the prescribed standards and, where necessary, must be approved by an Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS**Appendix S7****AGGREGATE TRAILER MASS RATING
TO S12 APPROVED DESIGN OR WITHIN
MANUFACTURER'S SPECIFICATION****SPECIFIC REQUIREMENTS****1.0 General**

Re-rating of modified trailers under this Code is restricted to trailers modified within the original registration category either to a design configuration for which a certificate and checklist have been issued by an S12 Certifying Officer, or to the design configuration of an alternative model produced by the trailer manufacturer.

Typical modifications would include changes from tandem axle to triaxle semi-trailer configuration, two axle to three axle dog trailer conversion or replacement of axles, suspensions or control systems with alternative components which would allow a different rating.

Issue of an Aggregate Trailer Mass (ATM) rating is also permitted to an existing trailer where the ATM is not recorded and where the manufacturer no longer exists. The ATM rating may be established by comparison with a trailer for which the ATM is known and which is similar in chassis beam dimensions, axles, suspension, braking system, drawbar (if applicable) and tow coupling or fifth wheel to the trailer to be rated. Alternatively, a rating recommendation letter should be obtained from an S12 Certifying Officer.

In all cases, the rerating must address the compatibility of all components at the revised rating and, in particular, must check that the chassis, suspensions, axles and tow couplings are used within the manufacturer's rated capacities.

2.0 Tyres and Wheel Rims

The sum of the load carrying capacities recommended for all the tyres and rims with which the trailer is equipped shall be not less than the Axle Group Load (AGL) rating for each axle group..

The load carrying capacity of any tyre or rim must not be exceeded with the trailer at the revised AGL rating.

For trailers manufactured to comply with ADR 24/.., the tyres and rims must be selected and must comply in all respects with the requirements of that ADR at the revised AGL rating.

Where a tyre placard is fitted to a trailer, this placard must be replaced or amended as necessary to indicate the correct tyre specifications for the trailer at the revised ATM and AGL rating. The revised tyre size and load rating must also appear on the modification plate.

3.0 Chassis

The modified chassis must conform to the design specification certified by the S12 Certifying Officer or must be equivalent to the manufacturer's chassis material specification, reinforcement and crossmember installation for the trailer to which the modified trailer is being compared.

HEAVY VEHICLE MODIFICATIONS**4.0 Tow coupling**

The tow coupling fitted to a modified trailer must be adequate for the proposed ATM and the coupling installation must conform to the requirements of Code P1 or P2 as applicable.

The drawbar of a pig or dog trailer must be designed to withstand the forces specified in ADR 62/.. .

5.0 Brake System Sub-assemblies**Control system, braked axles and suspension**

The maximum ATM permitted by an ADR 38 trailer braking system depends on the trailer mass which can be parked on an 18% grade. This is determined by calculations in which certified data published by the sub-assembly manufacturers is used to select brake chamber sizes and slack adjuster lengths and which will provide sufficient parking force without exceeding the suspension skid limits in an emergency breakaway application.

The brake chamber sizes and slack adjuster lengths must be checked for conformity with the information supplied in the S12 Certifying Officer's report, or for similarity with the installation used on the comparison trailer design.

Dog trailers are required by ADR 38/.. to meet additional requirements for friction utilisation to ensure that the rear axle group wheels do not lock before the front axle group wheels under specified braking conditions. This requires the front axle group brake torque output to be considerably greater than that of the rear axle group for short wheelbase trailers with a high centre of mass. This in turn requires the front axle group brakes to have a high axle mass rating to provide the necessary fade resistance. Before a revised ATM is assigned to a modified dog trailer, it should be established that this aspect of the ADR 38/.. requirements has been addressed by the G3 Code rerating.

The length and diameter of piping and the type of connecting fittings within a trailer control system are critical for achievement of brake response and release times within the limits specified by ADR 38 and ADR 38/... The maximum permitted lengths of piping are specified in Department of Transport and Regional Services certified brake system parts lists and installation diagrams which are available from the control system manufacturers. The actual installed lengths of piping should be validated against these specifications if the brake system response and release times are not tested by the officer approving the ATM rating.

6.0 Dimensions

The maximum dimensions of an individual trailer must not exceed the dimensions specified in the latest issue of ADR 43/.. .

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S7

AGGREGATE TRAILER MASS RATING
TO S12 APPROVED DESIGN OR WITHIN
MANUFACTURER'S SPECIFICATION

1.0 Trailer particulars

Make / Model: Month / Year of Manufacture:
 Chassis No./VIN:
 Wheelbase: mm Overhang: mm
 Forward radius: mm Tow coupling overhang: mm (if applicable)
 Drawbar length: mm (if applicable)
 Tare Mass: kg
 Modified GVM: kg
 Modified ATM: kg

1.1 Componentry details

| | | | |
|-------------------|-------------|---------------------------|--------------|
| Component: | Make/model: | Compliance Mark Approval: | Load rating: |
| Control system: | ..... | ..... | ..... |
| Braked axles: | ..... | ..... | ..... |
|kg | | | |
| Front suspension: | ..... | ..... |  |
|kg | | | |
| Rear suspension: | ..... | ..... |  |
|kg | | | |
| Tyre size: | ..... |  | .....kg |

| | | | | | | | |
|------------------------|----------|-------|-------|----------|-------|-------|-------|
| Axle group: | Front | | | Rear | | | |
| Axle number: | 1 | 2 | 3 | 1 | 2 | 3 | 4 |
| Brake chamber size: | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack adjuster length: | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Axle group loads: | kg | | | kg | | | |
| Chassis section: | ..... |  |  |  |  |  |  |

Tow coupling / Fifth wheel:
 Make/model: D-rating:
kg

1.2 Basis for rating determination

Trailer make/model used for comparison:
 Compliance Plate Approval number if ADR 38/.. approved:
 or
 S12 Certifying Officer's identity:.....
 S12 Certifying Officer's No. and Certificate number: /

HEAVY VEHICLE MODIFICATIONS

(Y = Yes N= No)
Delete if not

applicable

2.0 General

- 2.1 Have details of the trailer model used for comparison been retained for future audit? Y N
or
- 2.2 Has a copy of the S12 Certifying Officer's certificate and checklist been retained for future audit? Y N

3.0 Chassis

- 3.1 Does the chassis conform to the detail construction, section properties and crossmember location of the comparison chassis or the S12 Certifying Officer's report? Y N
- 3.2 Are the trailer dimensions within the permitted maximum limits? Y N

4.0 Brake system

- 4.1 Is the trailer's entire braking system, including brake chamber sizes and slack adjuster length setting, identical to the braking system of the standard comparison trailer or the S12 report specification? Y N
- 4.2 Have the brake system piping lengths been established to not exceed the maximum lengths specified in the control system manufacturer's certified data sheet? Y N
- 4.3 Does the parking ability exceed 18% gradient at the modified ATM? Y N

5.0 Tyres and Rims

- 5.1 Does the tyre placard fitted to a trailer produced after 1 July 1990 record the correct tyre and rim sizes, axle configurations, axle loads and inflation pressures for the modified trailer? Y N
- 5.2 Are tyres and rims fitted in conformance to the tyre placard? Y N

6.0 Tow Coupling

- 6.1 Do the tow coupling, tow coupling mounting and drawbar (if applicable) meet the requirements of ADR 62/..? Y N

7.0 Mechanical condition

- 7.1 Is the trailer in good mechanical condition? Y N

8.0 Workmanship

- 8.1 Is the quality of workmanship to a satisfactory standard? Y N

NOTE: If the answer to any relevant question is "NO", the modification is not acceptable.

Trailer Modified By:

HEAVY VEHICLE MODIFICATIONS

Examined and Approved By:

Company (if applicable):.....

Modification Plate No. issued:.....Certificate number issued:.....

Signed: Certifying Officer.No:..... Date:.....

Appendix S8

Modification Code S8

ROAD TRAIN PRIME MOVER RATING

Certifications that are covered under this Modification Code are:

1. Rating of prime movers which have been upgraded to conform to the requirements of ADR 35/.. and ADR 64/.. applicable to Road Train prime movers. The certification must verify that they comply with all the requirements for road train operation and assign a maximum Road Train Gross Combination Mass Rating (GCM).

Certifications that are **not** covered under this Modification Code are:

1. Road Train rating of prime movers which are already certified by the Manufacturer as being manufactured to meet ADR 35/.. and ADR 64/.. requirements. The words “ROAD TRAIN” are required by ADR 61/.. to appear on the Vehicle Plate for such prime movers.
2. Rerating of Road Train GCM to greater than original manufacturer’s maximum Road Train GCM rating except where componentry has been modified to allow such increase in GCM.
3. Rating which would cause any component of the vehicle to operate or be subjected to loads in excess of that component’s manufacturer’s rating.
4. Gross Vehicle Mass (GVM) rating. Codes S1 to S3 apply for this purpose.

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR’s, Australian Standards or Regulations/Acts.

Outlined below are the areas of the vehicle that may have been affected by the modifications and that may require recertification, testing and/or data to show compliance for the modified vehicle.

DETAIL

REQUIREMENTS

Chassis

Manufacturer’s rating, Modification Code H

Engine

ADR 30, 30/.., 36, 36A, 36/.., Modification Code A

HEAVY VEHICLE MODIFICATIONS

| | |
|-----------------------------------|---|
| Transmission | Modification Code B |
| Tailshaft | Modification Code C |
| Speed Controls | ADR 65/.., Modification Code A5 |
| Braking | ADR 35, 35A, 35/.., Modification Code G |
| Tyres Axles | Manufacturer's rating, ADR 24/.. Manufacturer's rating, Modification Codes D and E |
| Fifth Wheels and Turntables | ADR 62/.., Modification Code P |
| Towing Couplings and Drawbar Eyes | ADR 62/.., Modification Code P |
| Electrical/Lighting | ADR 64/.., 13/.. |

If any of the areas listed above have been affected by modifications made to the vehicle, the vehicle must comply with the relevant ADR and, where necessary, must be approved by a Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS

Appendix S8

ROAD TRAIN PRIME MOVER RATING

SPECIFIC REQUIREMENTS

1.0 General

Ratings of prime movers under this Code will require the fitting of a modification plate marked with a maximum Road Train Gross Combination Mass Rating and the issue of a modification certificate.

Ratings that are determined in accordance with this Code S8 will enable prime movers to be used in appropriate Road Train combinations subject to normal permit conditions.

Road Train prime movers that do not have a manufacturer's GCM must satisfy the following requirements in relation to the vehicle's chassis and driveline.

2.0 Chassis

The vehicle's chassis must have adequate strength for the relevant GCM rating. Refer to 5.0 General Requirements of this Section S and Section H - Chassis.

Evidence of this suitability is required in the form of at least one of the following:

- a manufacturer's letter stating that the chassis is adequate for the proposed GCM;
- comparison with a vehicle with an identical chassis and a GCM not less than the proposed GCM;
- a certificate letter from a registered professional engineer confirming the adequacy of the chassis design.

In addition, particular attention must be paid to the adequacy of towing couplings and attachments. Refer to Section P - Towing Couplings/Fifth Wheels of this National Code of Practice.

3.0 Driveline

3.1 Gradeability

A Road Train prime mover, at the proposed GCM, must be capable of starting on a 5% grade. Gradeability should be established by manufacturer's computer prediction or, when this is not available, by calculation using the formula:

$$\text{GCM (Maximum)} = \frac{K \times R \times M \times T}{g + 1} \quad (\text{kg})$$

where K = drive efficiency constant for type of drive axle fitted to the drawing vehicle

For single drive axles, K = 0.055

For single drive tandem axles, K = 0.053

For dual drive tandem axles, K = 0.051

For tri drive axles, K = 0.047

R = overall gear reduction between engine and drive wheels

M = tyre revolutions per kilometre, determined from Table 1

T = maximum engine net torque (N.m)

g = maximum grade expressed as a percentage (15%)

i.e. 10% starting ability plus 5% operating grade.

HEAVY VEHICLE MODIFICATIONS

Note: A maximum 42,500 kg GCM limit applies to prime movers with a single drive axle, including tandem rear suspension vehicles with a single drive axle and a lazy axle.

Table 1

Tyre revolutions per kilometre (Source: ADR 65/00 Table 2)

| Tyre size | Nom. revs/km | Tyre size | Nom. revs/km |
|-----------|--------------|-------------|--------------|
| 8.25*16 | 385 | 9R22.5 | 345 |
| 8.25*20 | 345 | 10R22.5 | 325 |
| 9.00*20 | 325 | 11R22.5 | 315 |
| 10.00*20 | 315 | 12R22.5 | 305 |
| 11.00*20 | 310 | 13R22.5 | 295 |
| 12.00*20 | 295 | 255/70R22.5 | 355 |
| 13.00*20 | 285 | 275/70R22.5 | 345 |
| 14.00*20 | 270 | 275/80R22.5 | 330 |
| 10.00*22 | 300 | 295/75R22.5 | 323 |
| 11.00*22 | 295 | 295/80R22.5 | 320 |
| 11.00*24 | 280 | 315/80R22.5 | 310 |
| 12.00*24 | 270 | 385/65R22.5 | 315 |
| | | 425/65R22.5 | 300 |
| | | 445/65R22.5 | 290 |

3.2 Engine/Transmission

The GCM rating assigned must not exceed the engine and transmission manufacturer's recommendations, or the limit set by the vehicle manufacturer for vehicles using the engine and transmission models being assessed.

The engine/transmission mounting system must be adequate to resist the maximum engine torque multiplied by the gear ratio of the transmission starting gear. This is particularly important where a transmission with lower gearing or an engine with higher torque output is used to improve the startability.

3.3 Rear Axles/Rear Suspension

The maximum combination mass permitted by the rear axle manufacturer is frequently dependent on the engine torque and the axle ratio. The maximum GCM limit must be obtained either directly from the axle manufacturer or by comparison with a vehicle manufacturer's rating for a vehicle of similar drive train componentry and axle ratio.

The suspension manufacturer will usually have limits on the GCM permitted on each suspension model, determined by the strength of certain components, e.g. aluminium walking beams, spring pins or torque rods, or by the torque reactivity of the design, e.g. four-spring suspensions. The maximum GCM limit must be obtained either directly from the suspension manufacturer or by comparison with a vehicle manufacturer's rating for a vehicle with identical suspension and drive axle componentry.

Hauling units with a GCM exceeding 42.5 tonnes are required to have tandem drive rear axles equipped to provide locking of the interaxle differential.

HEAVY VEHICLE MODIFICATIONS**4.0 Speed Limiting**

The maximum speed of the vehicle must be limited, by one of the methods permitted by ADR 65/.., to 90 km/h. The vehicle must also be capable of maintaining a constant 80 km/h on a level road when laden to the maximum rated GCM.

Vehicles not certified to comply with ADR 65/.. road train speed limits by the manufacturer must be certified by an Certifying Officer who holds Code A5 (Road Speed Limiter Installation). In addition, the Certifying Officer must fit a modification plate in a prominent position adjacent to the compliance plate. This modification plate must be engraved or stamped A5/90 to indicate the vehicle is speed limited to 90 km/h.

5.0 Braking**5.1 General requirements**

Road Train prime movers must comply with the requirements of ADR 35/.. and prime movers manufactured after 1 July 1991 must also comply with the requirements of ADR 64/..

To prevent incorrect coupling of brake lines, all couplings must be non-interchangeable (polarised) in accordance with Australian Standard D8, with all fittings having a clear bore (no restrictor or non-return valves).

The parking brake control of a road train prime mover must simultaneously apply the parking brake system on all attached trailers.

5.2 Brake application/release times

The brake application and release times at the trailer control line coupling must be tested, either as part of a road train combination or as an individual vehicle. The following tests are based on 650 kPa but if the manufacturer specifies an Average Operating Pressure other than 650 kPa, then that figure will suffice.

Combination vehicle test:

If tested as part of a road train combination, the combination must be a triple road train. The application and release times must meet the following criteria:

Application time

With the air reservoirs in all units of the train charged to no more than 650 kPa and the spring brakes released, the elapsed time for the pressure in the least favoured brake chamber to reach 420 kPa, must not exceed 1.5 seconds.

Release time

With the air reservoirs in all units of the train charged to at least 650 kPa, the elapsed time for the pressure in the least favoured brake chamber to decrease to 35 kPa from a full brake application, must not exceed 1.5 seconds.

Individual vehicle test:

If tested as a prime mover in isolation, the application and release times are measured at the end of an 800 ml test chamber connected to the trailer service brake coupling by a 2.0 metre long hose of 13 mm internal diameter. The application and release times must meet the following criteria:

HEAVY VEHICLE MODIFICATIONS**Application time**

With the air reservoirs charged to no more than 650 kPa and the spring brakes released, the elapsed time for the pressure in the 800 ml test chamber to reach 420 kPa, must not exceed 400 milliseconds.

Release time

From a full brake application with the air reservoirs charged to at least 650 kPa and the spring brakes released, the elapsed time for the pressure in the 800 ml test chamber to decrease to 35 kPa, must not exceed 500 milliseconds.

5.3 Compressor capacity

The air compressor fitted to a road train prime mover must have a minimum air delivery of 5.9 litres/second (12.5 ft³/min) at 690 kPa (100 lb/in²) head pressure for preferential use by the braking system when the engine is operating at the nominated maximum rated engine speed. This may be established by reference to the Manufacturer's specification.

6.0 Dimension and Axle Group Requirements

The vehicle must meet all dimensional requirements of the registering and permit issuing authority. All axle groups in Road Train combinations must be "conforming" and must meet the current requirements for individual State jurisdictions.

7.0 Electrical Requirements

All prime movers first introduced into road train service after 1 July 1991 will be required to comply with the requirements of ADR 64/.. which applies to hauling units first manufactured after 1 July 1991. It states that vehicles designed for use in a road train shall:

- (i) Be fitted with a lighting supply system having a minimum capacity available for connection to trailers of 30 amps at 12 V or 15 amps at 24 V in addition to normal vehicle electrical requirements.
- (ii) Be fitted with a single connector for trailer lighting and signalling systems.
- (iii) Be fitted with resettable circuit breakers for all lighting and signalling equipment circuits.
- (iv) Be equipped with a generator having a minimum rated power output capacity of 100 amps for nominal 12 V electrical systems or 50 amps for 24 V systems.

8.0 Fifth Wheels

The location, mounting and strength of fifth wheels used to couple road train units must comply with the appropriate Australian Standards or with ADR 62/.. where a vehicle was built after 1st July 1991.

HEAVY VEHICLE MODIFICATIONS

| | applicable | Delete if not | |
|---|-------------------|----------------------|---|
| 2.0 Chassis | | | |
| 2.1 Does the chassis have adequate strength for the assigned GCM and have details of the vehicle model used for comparison or the manufacturer's letter or engineer's report certifying adequacy of the chassis been retained for future audit? | | Y | N |
| 2.2 Are the tow couplings and attachments adequate for the GCM as outlined in Section P? | | Y | N |
| 3.0 Driveline | | | |
| 3.1 Does the gradeability satisfy the requirement of Section 3.1 of this Code? | | Y | N |
| 3.2 Are the capacities of all driveline components within the maximum rated GCM? | | Y | N |
| 3.3 In the case of a prime mover with a GCM in excess of 42.5 tonnes, is the vehicle fitted with tandem rear drive axles equipped to provide positive locking of the interaxle differential? | | Y | N |
| 4.0 Speed limiting | | | |
| 4.1 Does the vehicle satisfy the speed limiting requirements of Section 4.0 of this Code? | | Y | N |
| 5.0 Braking system | | | |
| 5.1 Does the vehicle meet the applicable requirements, including trailer signal application and release test times and air compressor capacity, of Section 5.0 of this Code? | | Y | N |
| 6.0 Dimensions and axle group requirements | | | |
| 6.1 Do the vehicle's dimensions meet the requirements of Section 6.0 of this Code? | | Y | N |
| 6.2 Are all axle groups on the vehicle "conforming" and do they comply with the applicable State axle group spacing requirements? | | Y | N |
| 7.0 Electrical | | | |
| 7.1 Does the vehicle meet the requirements of Section 7.0 of this Code? | | Y | N |
| 8.0 Mechanical condition | | | |
| 8.1 Is the vehicle in good mechanical condition? | | Y | N |
| 9.0 Workmanship | | | |
| 9.1 Is the quality of workmanship for any modifications to a satisfactory standard? | | Y | N |

NOTE: If the answer to any relevant question is "NO", the modification is not acceptable.

Vehicle make / Model:

HEAVY VEHICLE MODIFICATIONS

Chassis No/VIN: Year of Mfr:

Vehicle Modified By:

Examined and Approved By:

Company (if applicable):.....

Modification Plate No. issued:..... Certificate number issued

Signed:Certifying Officer No:..... Date:

HEAVY VEHICLE MODIFICATIONS

Appendix S9

Modification Code S9

B-DOUBLE RATING

Certifications that are covered under this Modification Code are:

1. Assessment of B-Double combinations (i.e. prime movers and trailers), to determine compliance with the standards specified for the operation of B-Double registered gross combination mass rating (RGCM-BD).

Certifications that are **not** covered under this Modification Code are:

1. B-Double rating of prime movers which are already certified by the Manufacturer as being manufactured to meet ADR 35/.. and ADR 64/.. requirements. The words "B-DOUBLE" are required by ADR 61/.. to appear on the Vehicle Plate for such prime movers.
2. Issue of a B-Double GCM greater than the original manufacturer's maximum B-Double GCM rating except where componentry has been modified to allow such increase in GCM.
3. Rating which would cause any component of the vehicle to operate or be subjected to loads in excess of that component's manufacturer's rating.
4. Gross Vehicle Mass (GVM) rating. Codes S1 to S3 apply for this purpose.

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the vehicle that may have been affected by modifications and that may require recertification, testing and/or data to show compliance for a modified vehicle.

| DETAIL | REQUIREMENTS |
|---------------|--|
| Chassis | Manufacturer's rating, Modification Code H |
| Engine | ADR 30, 30/.., 36, 36A, 36/.., Modification Code A |
| Transmission | Modification Code B |

HEAVY VEHICLE MODIFICATIONS

| | |
|----------------------------|--|
| Tailshaft | Modification Code C |
| Speed Controls | ADR 65/.., Modification Code A5 |
| Braking | ADR 35/.., ADR 64/.. (ABS), Modification Code G |
| Tyres | Manufacturer's rating, ADR 24/.. |
| Axles | Manufacturer's rating, Modification Codes D and E |
| Fifth Wheels and Turntable | ADR 62/.., Modification Code P |

If any of the areas listed above have been affected by modifications made to the vehicle, the vehicle must comply with the relevant ADR and where necessary must be approved by a Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS

Appendix S9

B-DOUBLE RATING

SPECIFIC REQUIREMENTS

1.0 General

Ratings in accordance with this Code will enable prime movers and trailers to be used in B-Double combinations.

Rating of B-Doubles under this Code requires the fitting of modification plates marked with a maximum B-Double Gross Combination Mass Rating to prime movers and trailers.

2.0 Gross Combination Mass

B-Double prime movers which do not have a manufacturer's GCM must satisfy the requirements of Codes S1 and S3.

3.0 Driveline

3.1 Gradeability

A B-Double must have sufficient power and gearing to be capable of starting on a ten (10) percent gradient. Gradeability should be established by manufacturer's computer prediction or, when this is not available, by calculation using the formula:

$$\text{GCM (Maximum)} = \frac{K \times R \times M \times T}{g + 1} \quad (\text{kg})$$

where K = drive efficiency constant for type of drive axle fitted to the drawing vehicle

For single drive axles, K = 0.055

For single drive tandem axles, K = 0.053

For dual drive tandem axles, K = 0.051

For tri drive axles, K = 0.047

R = overall gear reduction between engine and drive wheels

M = tyre revolutions per kilometre, determined from Table 1

T = maximum engine net torque (N.m)

g = maximum grade expressed as a percentage (15%)

i.e. 10% starting ability plus 5% operating grade.

Note: A maximum 42,500 kg GCM limit applies to prime movers with a single drive axle, including tandem rear suspension vehicles with a single drive axle and a lazy axle .

HEAVY VEHICLE MODIFICATIONS

Table 1

Tyre revolutions per kilometre (Source: ADR 65/00 Table 2)

| Tyre size | Nom. revs/km | Tyre size | Nom. revs/km |
|-----------|--------------|-------------|--------------|
| 8.25*16 | 385 | 9R22.5 | 345 |
| 8.25*20 | 345 | 10R22.5 | 325 |
| 9.00*20 | 325 | 11R22.5 | 315 |
| 10.00*20 | 315 | 12R22.5 | 305 |
| 11.00*20 | 310 | 13R22.5 | 295 |
| 12.00*20 | 295 | 255/70R22.5 | 355 |
| 13.00*20 | 285 | 275/70R22.5 | 345 |
| 14.00*20 | 270 | 275/80R22.5 | 330 |
| 10.00*22 | 300 | 295/75R22.5 | 323 |
| 11.00*22 | 295 | 295/80R22.5 | 320 |
| 11.00*24 | 280 | 315/80R22.5 | 310 |
| 12.00*24 | 270 | 385/65R22.5 | 315 |
| | | 425/65R22.5 | 300 |
| | | 445/65R22.5 | 290 |

3.2 Speed Capability

A B-Double prime mover, at rated GCM, must have the ability to maintain a constant speed of approximately 70 kilometres per hour on a one (1) percent incline. This should be established by manufacturer's computer predictions or by physical test.

3.3 Drive Axles

Hauling units for B-Double operation, where the gross combination mass exceeds 42.5 tonnes, are required to have tandem drive rear axles equipped to provide positive locking of the inter-axle differential.

Single-axle, single-drive (4x2) hauling units and tandem-axle, single drive (6x2) hauling units will be considered for loading applications up to a Registered Gross Combination Mass (RGCM) of 42.5 tonnes.

3.4 Speed Limiting

The maximum speed of the vehicle must be limited to 100 km/h in accordance with the requirements of ADR 65/...

Vehicles not certified to comply with ADR 65/.. by the manufacturer must be certified by a Certifying Officer who holds Code A5 (Road Speed Limiter Installation). In addition, the Certifying Officer must fit a modification plate in a prominent position adjacent to the compliance plate. This modification plate must be engraved or stamped A5/100 to indicate the vehicle is speed limited to 100 km/h.

HEAVY VEHICLE MODIFICATIONS**4.0 Braking****4.1 Existing Vehicles**

Vehicles previously rated for B-Double use are not required to be retro-fitted with anti-lock brakes. Fleets which allow interchange of trailers and hauling units may use existing prime movers without anti-lock, in combination with trailer sets with anti-lock and visa versa, providing that in the case of a non anti-lock equipped prime mover drawing trailers fitted with anti-lock, the prime mover must provide the electrical connections and driver warning lamps necessary for the operation of the trailer anti-lock systems.

4.2 Antilock Brakes

Prime movers first introduced into B-Double service on or after 1 July 1991 shall be fitted with anti-lock braking systems in accordance with ADR 64/...

Trailers intended for B-Double service may optionally be fitted with an anti-lock braking system. If fitted, the system must conform to the requirements of ADR 38/01, Appendix 1 or later issues.

4.2.1 Antilock System Performance

The braking systems of prime movers and trailers optionally equipped with ABS braking must comply with the requirements of ADR 35/.. and ADR 38/.. respectively, with the anti-lock systems operational and non-operational.

4.2.2 Antilock System Configuration

The antilock system, when provided, must be fitted to:

- Each single axle
- At least one axle in any tandem axle group
- At least two axles in any triaxle group

4.2.3 Antilock System Fail Safe

In the event of failure of the ant-lock device, the full braking performance of the braking system must be maintained.

4.2.4 Antilock System Electrical Shielding

The operation of the antilock system must not be adversely affected by magnetic or electric fields.

4.2.5 Antilock System Warning Lamps

Any break in the supply of electricity to the device and/or failure of the anti-lock system of the prime mover shall be signalled to the driver by an optical warning signal mounted in the prime mover in clear view of the driver.

This requirement also applies to the anti-lock device(s) of towed vehicles. The warning device for the anti-lock device(s) of the towed vehicle must not give a signal when a towed vehicle without an anti-lock device, or when no towed vehicle, is coupled. This requirement must be met automatically. The warning signal shall light up when the anti-lock device is energised and go off at the latest when the vehicle reaches a speed of 15 km/h and no defect is present. The lamps of the warning devices must be clearly visible in daylight.

HEAVY VEHICLE MODIFICATIONS

Prime movers shall be fitted with a warning lamp for the anti-lock devices of the trailers meeting the requirements described above. This function may be reciprocally combined with the warning lamp for failure of the prime mover anti-lock system.

Prime movers shall be fitted with a warning lamp to indicate to the driver if trailers are not equipped with anti-lock braking systems. If the attached trailers are not equipped with anti-lock brakes, the warning lamp/s shall illuminate no later than upon the first application of the braking system. This warning signal shall be visible in daylight. It shall not convey any signal if no trailer is attached. This function shall be automatic.

The function of each warning lamp is to be clearly identified.

Note: It is **not** permissible for a Certifying Officer to certify a B-Double combination if one trailer is fitted with ABS and the other is not.

4.2.6 Antilock System Definitions

An “**anti-lock device**” is a component of a service braking system which automatically controls the degree of slip, in the direction of the wheel(s) on one or more wheels of the vehicle during braking.

“**Sensor**” means a component designed to identify and transmit to the controller, the conditions of rotation of the wheel(s) or the dynamic conditions of the wheels.

“**Controller**” means a component designed to evaluate the data transmitted by the sensor(s) and to transmit a signal to the modulator.

“**Modulator**” means a component designed to vary the braking force(s) in accordance with the signal received from the controller.

“**Directly controlled wheel**” means a wheel whose braking force is modulated accordingly to the data provided by at least its own sensor.

“**Indirectly controlled wheel**” means a wheel whose braking force is modulate accordingly to data provided by the sensor(s) of other wheels.

4.3 Parking Brake

When the parking brakes of a B-Double prime mover are applied/released, the parking brakes of each trailer must be simultaneously applied/released by the prime mover park brake control.

4.4 Brake application/release times

Where a trailer is modified for utilisation in a B-Double configuration and fitted with a complete new certified control system in accordance with the control system sub-assembly manufacturer’s installation instructions, brake signal application and release times are **not** required to be tested.

A modified trailer brake signal application and release times must be tested in all cases where a complete new control system sub-assembly is not used, or is fitted not in accordance with the installation instructions.

HEAVY VEHICLE MODIFICATIONS

When testing is required, the trailer brake signal application and release times must be tested either as part of a B-Double combination or as an individual vehicle.

Combination vehicle test

If tested as part of a B-Double combination, the application and release times must meet the following criteria:

Application time

With the air reservoirs in all units of the train charged to no more than 650 kPa and the spring brakes released, the elapsed time for the pressure in the least favoured brake chamber to reach 420 kPa, must not exceed 1.0 second.

Release time

With the air reservoirs in all units of the train charged to at least 650 kPa, the elapsed time for the pressure in the least favoured brake chamber to decrease to 35 kPa, from a full brake application must not exceed 1.0 seconds.

Individual trailer test

If tested as a trailer in isolation, a test rig must be used which meets the requirements defined in ADR 38/.. The test rig, charged to 650 kPa, must be calibrated to achieve an application time of between .18 and .22 seconds for the pressure to reach 420 kPa when delivered through a 2.5 metre hose of 13 mm internal diameter to an 800 ml test chamber.

The application and release times must meet the following criteria:

Application time

With the test rig and trailer reservoirs charged to no more than 650 kPa and the trailer spring brakes released, the elapsed time for the pressure to reach 420 kPa must not exceed:

- At the least favoured trailer brake chamber 0.350 seconds.
- At the 800ml test chamber attached to the rear coupling 0.250 seconds.

Release time

From a full brake application with the test rig and trailer air reservoirs charged to at least 650 kPa, the elapsed time for the pressure to decrease to 35 kPa must not exceed:

- At the least favoured trailer brake chamber 0.650 seconds.
- At the 800ml test chamber attached to the rear coupling 0.550 seconds.

In these tests, the 800ml chamber may be attached directly to the trailer rear coupling.

Individual prime mover test

HEAVY VEHICLE MODIFICATIONS

If tested as a prime mover in isolation, the application and release times are measured at the end of an 800 ml test chamber connected to the trailer service brake coupling by a 2.0 metre long hose of 13 mm internal diameter. The application and release times must meet the following criteria:

Application time

With the air reservoirs charged to no more than 650 kPa and the spring brakes released, the elapsed time for the pressure in the 800 ml test chamber to reach 420 kPa, must not exceed 400 milliseconds.

Release time

From a full brake application with the air reservoirs charged to at least 650 kPa and the spring brakes released, the elapsed time for the pressure in the 800 ml test chamber to decrease to 35 kPa, must not exceed 500 milliseconds.

5.0 Fifth Wheels

The location, mounting and strength of fifth wheels used to couple B-Double units must comply with the appropriate Australian Standard or, for a vehicle manufactured on or after 1 July 1991, comply with ADR 62/.. .

Fifth wheels must be single plate, single oscillating. “Kompensator” or equivalent fifth wheels are acceptable only for vehicles with a high torsional stiffness (eg. tankers, freezer vans, skeletal container trailers).

Double oscillating type fifth wheels are **NOT** permitted.

6.0 Axle Groups and Spacing

All axle groups in B-Double combinations must be “conforming” and must meet the current requirements for individual State jurisdictions.

7.0 ABS Electrical Requirements

To ensure compatibility between various ABS systems fitted to vehicles and trailers, the following requirements must be met:

Power supply connection between prime mover and trailer and between trailers shall be by means of a connector complying with DIN Standard 72570. This connector is available from a number of suppliers. It is the same as the ISO standard 7638 (1985) connector used for 24 volt systems except that the keyway is located in a different position. This prevents accidental connection of 12 volt and 24 volt systems.

Table 2 prescribes the connector pin functions.

HEAVY VEHICLE MODIFICATIONS

Table 2: Electrical Connector Pin Functions

| Contact No. | Function | Current Carrying Capacity |
|-------------|--|---------------------------|
| No. 1 | +ve HIGH AMP 1ST AND 2ND TRAILERS COMMON SOLENOID VALVE POWER SUPPLY | 30 A |
| No. 2 | +ve LOW AMP 1ST (LEAD) TRAILER ELECTRONIC UNIT POWER SUPPLY | 2 A |
| No. 3 | -ve LOW AMP 1ST AND 2ND TRAILERS COMMON ELECTRONIC UNIT POWER SUPPLY | 2 A |
| No. 4 | -ve HIGH AMP 1ST AND 2ND TRAILERS COMMON SOLENOID VALVE POWER SUPPLY | 30 A |
| No. 5 | IN CAB TRAILER ABS FAILURE WARNING (SWITCHED TO PIN 3 BY EITHER TRAILER ELECTRONIC UNIT UPON FAULT DETECTION | 2 A |

The nominal system voltage for trailers must be 12 volts.

The combined maximum current demand of solenoid valves for the two trailers (pin 1) must not exceed 30 amps.

The minimum current capacity of the prime mover supply for the trailer solenoid valves (pin 1) must be at least 30 amps.

To avoid excessive voltage drops, the lead trailer power supply cable and earth return for the solenoid valves (pins 1 and 4) should have a cross section of not less than 6 mm² in the case of copper conductors.

8.0 Spray Suppression

It is necessary for all axles of B-Double vehicles to be fitted with a form of spray suppression which meets or exceeds the requirements prescribed in British Standard AU200-1984, Parts 1 and 2 "Spray Reducing Devices for Heavy Goods Vehicle s" or equivalent.

9.0 Dimensional Requirements

The maximum dimensions of a B-Double combination must not exceed the limits specified by individual State jurisdictions.

10.0 Sliding Tri-Axle Assembly

Where a sliding tri-axle assembly is fitted, the design of the trailer and assembly must be adequate to take all anticipated operating loads. Specific design requirements which must also be met are:

HEAVY VEHICLE MODIFICATIONS

- A positive locking device must be fitted to secure the assembly in both fore and aft positions. Air pressure is **not** considered satisfactory to secure a lock in position.
- The release mechanism must be spring loaded so that it immediately returns to the locked position when released.
- The release mechanism must be mounted in a lockable box on the offside of the trailer.
- Clear and concise operating instructions must be displayed in an area adjacent to the release control mechanism.
- Permanent stops of adequate size must be fitted to the trailer chassis to prevent the tri-axle assembly from becoming detached from the trailer.
- An audible or visual warning device must be fitted, in a prominent position, visible or audible from the driver's seated position, which will indicate incorrect location of all locking device mechanisms.

11.0 "LONG VEHICLE" Sign

A "Long Vehicle" sign is to be fitted to the rear of the combination. The sign is to be fitted in accordance with and must meet the current requirements for individual State jurisdictions.

The signs may be supplied (if ordered) in 2 pieces cut along a vertical line between the words "LONG" and "VEHICLE". In this case, "LONG" and "VEHICLE" should be mounted in close proximity so as to convey the intended message.

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S9

B-DOUBLE RATING

1.0 Prime mover unit

1.1 Vehicle componentry:

Vehicle make / Model: Reg. No:

Chassis No/VIN: Year of Mfr.:

Engine make/mode:..... Engine No:

.....

Rated power @ R/m: Governed R/m:

Max torque @ R/m: N.m

Tailshaft: Mfrs max torque: N.m

| | | |
|------------|------------|--------------------------------|
| Component: | Make/model | Manufacturer's max load rating |
| | | GVM / GCM |

Transmission: kg

Low/Top ratios:/..... : 1

Aux. Transmission: kg

Low/Top ratios:/..... : 1

Rear Axle:/..... kg

Low/Top ratios:/..... : 1

Rear suspension:/..... kg

Front axle: kg

Front suspension: kg

Tyres Front: kg

Tyres Rear: kg

Chassis section:

Wheelbase: Overhang:

Fifth wheel:

Make/model: D-rating:kN

1.2 B-Double prime mover test results

Speed limited by: Gearing ? / Road Speed Governor? (Delete as inapplicable)

Maximum governed speed: km/h

Brake timing test: Combination of vehicles? / Individual vehicle? (Delete as inapplicable)

| | | | |
|---------------|-------------|-------|----|
| Test results: | Application | ..... | ms |
| | Release | ..... | ms |

Gradeability: Calculated max gradeability at GCM %

HEAVY VEHICLE MODIFICATIONS

1.3 **B-Double GCM assigned**

| | | |
|--|-------|----|
| Calculated gradeability at 70 km/h, at GCM | ..... | % |
|  | ..... | kg |
| Vehicle make/model, if used for comparison | ..... |  |

HEAVY VEHICLE MODIFICATIONS

2.0 Leading Trailer particulars

Vehicle Make / Model: Reg. No:
 Chassis No. or VIN: Year of Mfr.

 Wheelbase: mm Overhang mm
 Forward radius: mm Tow coupling overhang mm (if applicable)
 Load deck length: mm Tare Mass kg
 Manufacturers AGL: kg (or modified AGL from S7/S12 certificate)
 Manufacturers ATM: kg (or modified ATM from S7/S12 certificate)
 Manufacturers Trailer Plate Approval number (from plate):

2.1 Componentry details

| Component | Make / model | | | Compliance Mark Approval | Load rating |
|-----------------------|--------------|-------|-------|--------------------------|-------------|
| Control system | | | | | |
| Braked axles | | | | | kg |
| Suspension | | | | | |
| Tyre size | | | | | kg |
| Axle number | 1 | 2 | 3 | | |
| Brake chamber size | | | | | |
| Slack adjuster length | | | | | |
| Axle group load | kg | | | | |
| Chassis construction | | | | | |
| Kingpin | | | | | |
| Make / model | | | | D-rating | kg |
| Rear Fifth wheel | | | | | |
| Make / model | | | | D-rating | kg |

2.2 Brake timing tests (if applicable):

Application time: Rear brake chamber ms Rear coupling to test cylinder ms
 Release time: Rear brake chamber ms Rear coupling to test cylinder ms

2.3 Diagram for entry of trailer dimensions

HEAVY VEHICLE MODIFICATIONS

3.0 Second Trailer particulars

Vehicle Make / Model: Reg. No:
 Chassis No. or VIN: Year of Mfr.

 Wheelbase mm Overhang mm
 Forward radius mm
 Load deck length mm Tare Mass kg
 Manufacturers AGL kg (or modified AGL from S7/S12 certificate)
 Manufacturers ATM kg (or modified ATM from S7/S12 certificate)
 Manufacturers Trailer Plate Approval number (from plate):

3.1 Componentry details

| Component | Make / model | Compliance Mark Approval | Load rating |
|-----------------------|--------------|--------------------------|-------------|
| Control system | | | |
| Braked axles | | | kg |
| Suspension | | | |
| Tyre size | | | kg |
| Axle number | 1 | 2 | 3 |
| Brake chamber size | | | |
| Slack adjuster length | | | |
| Axle group load | kg | | |
| Chassis construction | | | |
| Kingpin | | | |
| Make / model | | D-rating | kg |

3.2 Brake timing tests (if applicable):

Application time: Rear brake chamber ms Rear coupling to test cylinder ms
 Release time: Rear brake chamber ms Rear coupling to test cylinder ms

3.3 Diagram for entry of trailer dimensions

HEAVY VEHICLE MODIFICATIONS**4.0 GCM/ATM ratings**

Are the vehicle GCM or ATM ratings not less than the ratings required for B-Double application? Y N

5.0 Couplings

Are the tow couplings and attachments adequate for the GCM/ATM and do they meet the requirements of Section 5.0 of this Code? Y N

6.0 Driveline

6.1 Does the gradeability satisfy the requirement of Sections 3.1 and 3.2 of this Code? Y N

6.2 Are the capacities of all driveline components within the maximum rated GCM? Y N

6.3 In the case of a prime mover with a GCM in excess of 42.5 tonnes, is the vehicle fitted with tandem rear drive axles equipped to provide positive locking of the interaxle differential? Y N

7.0 Speed limiting

Does the vehicle satisfy the speed limiting requirements of Section 3.4 of this Code? Y N

8.0 Braking system

Does the vehicle meet the applicable requirements, including trailer signal application and release test times (if applicable) and air compressor capacity, of Section 4 of this Code? Y N

9.0 Dimensions and axle group requirements

9.1 Do the vehicle's dimensions meet the requirements of Section 6.0 of this Code? Y N

9.2 Are all axle groups on the vehicle "conforming" and do they comply with the applicable State Authority requirements for axle group spacing? Y N

10.0 Electrical

Does the vehicle meet the requirements of Section 7.0 of this Code? Y N

11.0 Lighting and signs

11.1 Do all lamps conform in specification and location to ADR 13/.. requirements? Y N

11.2 Are "long vehicle" signs fitted in accordance with Section 11.0 of this Code? Y N

12.0 Mechanical condition

Are the vehicles in good mechanical condition? Y N

13.0 Workmanship

HEAVY VEHICLE MODIFICATIONS

Is the quality of workmanship for any modifications to a satisfactory standard? Y N
NOTE: If the answer to any relevant question is "NO", the modification is not acceptable.

CERTIFICATION

Prime mover:

Vehicle make/Model:

Chassis No/VIN: Year of Mfr.

Examined and Approved By:

Company (if applicable)

Modification Plate No. issued
Certificate number issued

Signed: Certifying Officer No:..... Date:

First trailer:

Vehicle make/Model:

Chassis No/VIN: Year of Mfr.

Examined and Approved By:

Company (if applicable)

Modification Plate No. issued
Certificate number issued

Signed: Certifying Officer No :..... Date:

Second trailer:

Vehicle make/Model:.....

Chassis No/VIN: Year of Mfr.

Examined and Approved By:.....

Company (if applicable).....
Modification Plate No issued.....Certificate number issued

Signed: Certifying Officer No: Date:

HEAVY VEHICLE MODIFICATIONS

Appendix S11

Modification Code S11

ROAD TRAIN TRAILER RATING

Certifications that are covered under this Modification Code are:

1. Aggregate Trailer Mass (ATM) rating and Road Train Rating for a trailer which has been upgraded to conform to the requirements of ADR 38/.. and ADR 63/.. applicable to Road Train trailers.

Certifications that are **not** covered under this Modification Code are:

1. Road Train rating of trailers which are already certified by the Manufacturer as being manufactured to meet ADR 38/.. and ADR 63/.. requirements. The words "Road Train Trailer" are required by ADR 61/.. to appear on the Vehicle Plate for such trailers.

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the trailer that may have been affected by the modifications and that may require recertification, testing and/or data to show compliance for the modified trailer.

DETAIL**REQUIREMENTS**

Brakes

ADR 38/.., Modification Code G3

Suspension

Manufacturer's rating, Modification Code F2

HEAVY VEHICLE MODIFICATIONS

| | |
|--------------------------|---|
| Chassis | Manufacturer's rating, Modification Code H |
| Electrical wiring | Manufacturer's rating, ADR 63/.. |
| Kingpin and Tow Coupling | Manufacturer's rating, ADR 62/.., ADR 63/.., Modification Codes P1 and P2 |
| Tyres | Manufacturer's rating, ADR 24/.. |

If any of the areas listed above are affected by modifications made to the trailer in order to achieve the Road Train rating, they must comply with the prescribed standards and, where necessary, must be approved by a Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS

Appendix S11

ROAD TRAIN TRAILER RATING

SPECIFIC REQUIREMENTS

1.0 General

The intention of this Code is to allow suitably qualified Certifying Officers to certify the permissible Aggregate Trailer Mass (ATM) rating and the acceptability for road train rating of modified trailers or trailers manufactured for road train use prior to the introduction of ADR 63/...

The modified trailer must be proved to meet all road train requirements of ADR 38/..., all requirements of ADR 63/... and the Nationally agreed dimensional requirements for Road Trains.

Trailers manufactured to meet ADR 63/... will have the words "Road Train Trailer" displayed on the Vehicle Plate. This signifies that the trailer is suitable for use in any position in a road train having a maximum combination mass of 125 tonnes.

2.0 Tyre and Wheel Rims

The sum of the load carrying capacities recommended for all the tyres and rims with which the trailer is equipped shall be not less than the Axle Group Load (AGL) rating for each axle group.

The load carrying capacity of any tyre or rim must not be exceeded with the trailer at the revised AGL rating.

For a trailer manufactured to comply with ADR 24/..., the tyres and rims must be selected and must comply in all respects with the requirements of that ADR at the revised AGL rating.

Where a trailer is fitted with a tyre placard, this placard must be replaced or amended as necessary to indicate the correct tyre specifications for the trailer at the revised ATM and AGL rating. The revised tyre size and load rating must also appear on the modification plate.

3.0 Chassis

The chassis of a trailer modified for road train use must be confirmed by calculation to be adequate for use in any position of a road train with a maximum combination mass of 125 tonnes. The modified chassis must conform to the requirements of the Code of Practice Section H.

4.0 Electrical wiring

Electrical wiring and connectors must conform to the requirements of ADR 63/... This requires electrical connectors for lighting circuits to be rated at 30 amps for 12 volts or 15 amps for 24 volts. Main supply and return cables must have a minimum copper conductor cross sectional area of 5mm^2 or a DC resistance of not more than $4\text{m}\Omega/\text{metre}$.

5.0 Tow coupling

Strength requirement:

HEAVY VEHICLE MODIFICATIONS

The tow coupling fitted to a road train trailer must meet the requirements of ADR 63/...

The ADR 63/.. requirements for couplings include certification to nominated Australian Standards and minimum D-ratings.

The couplings, fifth wheels and kingpins of trailers manufactured after 1 July 1991 must be marked as conforming to the relevant Australian Standard.

Location requirements:

The location of couplings and drawbars is to be in accordance with ADR 62/.. and must meet the current requirements for individual State jurisdictions.

6.0 Brake system

Where a trailer is modified for utilisation in a Road Train configuration and fitted with a complete new certified control system in accordance with the control system sub-assembly manufacturer's installation instructions, brake signal application and release times are **not** required to be tested.

A modified trailer brake signal application and release times must be tested in all cases where a complete new control system sub-assembly is not used, or is fitted not in accordance with the installation instructions.

When testing is required, the trailer brake signal application and release times must be tested either as part of a road train combination or as an individual vehicle.

The trailer brake system application and release time at the furthest brake chamber and at the rear control line coupling must be tested, either as part of a road train combination or as an individual trailer as specified in ADR 38/...

Combination test

If tested as part of a road train combination, the combination must be a triple road train. The application and release times must meet the following criteria:

Application time

With the air reservoirs in all units of the train charged to no more than 650 kPa and the spring brakes released, the elapsed time for the pressure in the least favoured brake chamber to reach 420 kPa must not exceed 1.5 second.

Release time

With the air reservoirs in all units of the train charged to at least 650 kPa, the elapsed time for the pressure in the least favoured brake chamber to decrease to 35 kPa from a full brake application must not exceed 1.5 seconds.

Test in isolation

If tested as a trailer in isolation, a test rig must be used which meets the requirements defined in ADR 38/.. The test rig, charged to 650 kPa, must be calibrated to achieve an application time of between .18 and .22 seconds for the pressure to reach 420 kPa when delivered through a 2.5 metre hose of 13 mm internal diameter to an 800 ml test chamber.

HEAVY VEHICLE MODIFICATIONS

The application and release times must meet the following criteria:

Application time

With the test rig and trailer reservoirs charged to no more than 650 kPa and the trailer spring brakes released, the elapsed time for the pressure to reach 420 kPa must not exceed:

| | |
|---|---------------|
| At the least favoured trailer brake chamber | 0.350 seconds |
| At the 800ml test chamber attached to the rear coupling | 0.250 seconds |

Release time

From a full brake application with the test rig and trailer air reservoirs charged to at least 650 kPa, the elapsed time for the pressure to decrease to 35 kPa must not exceed:

| | |
|---|---------------|
| At the least favoured trailer brake chamber | 0.650 seconds |
| At the 800ml test chamber attached to the rear coupling | 0.550 seconds |

In these tests, the 800ml chamber may be attached directly to the trailer rear coupling.

The air reservoir capacity of each trailer must be not less than 8 times the combined brake chamber volume of the trailer.

7.0 Brake system calculated performance from sub-assembly data for control system, braked axles and suspension

The maximum ATM permitted by an ADR 38 trailer braking system depends on the trailer mass which can be parked on an 18% grade. This is determined by calculations in which certified data published by the sub-assembly manufacturer's is used to select brake chamber sizes and slack adjuster lengths, which will provide sufficient parking force without exceeding the suspension skid limits in an emergency breakaway application.

Where a trailer has been modified for road train applications, the trailer's conformance with all requirements of ADR 38/. must be established. The calculated ERC performance must fall within the limit bands and emergency ERC, parking ability, skid limit performance, friction utilisation and axle fade rating must all meet the specified requirements.

For a modified trailer, the following information must be recorded during the rating process:

- Certified subassemblies for control system, braked axles and suspension.
- Slack adjuster lengths used for each axle
- Brake chamber sizes used for each axle
- Tyre size
- Aggregate Trailer Mass
- Axle Group Loads

The calculated performance figures for ERC at various levels of Control pressure 'E', together with the upper and lower limit bands should also be included with the records.

8.0 Road Train Trailer Dimensions

HEAVY VEHICLE MODIFICATIONS

The maximum dimensions of a road train combination are to be in accordance with the limits specified by individual State jurisdictions.

9.0 Other Road Train requirements**Signs**

Signs bearing the words “ROAD TRAIN” are to be attached to the front and to the rear of a road train combination. The height of the rear sign must not exceed 3 metres from the ground and it must be clearly visible to following traffic.

The signs are to be fitted in accordance with and must meet the current requirements for individual State jurisdictions.

The signs must not be displayed when the trailer is not operating as a road train

10.0 Mass groupings

All axle groups in the road train combination must conform to minimum spacing requirements between adjacent single axle or axle group and must meet the current requirements for individual State jurisdictions.

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S11

ROAD TRAIN TRAILER RATING

1.0 Trailer particulars

Trailer Make / Model: Reg. No:
 Chassis No. or VIN: Year of Mfr:.....
 Wheelbase: mm Overhang: mm
 Forward radius: mm Tow coupling overhang: mm (if applicable)
 Drawbar length: mm Centre of mass height: mm (if applicable)
 Load deck length: mm Tare Mass: kg
 Modified GVM: kg
 Modified ATM: kg

1.1 Componentry details

| Component | Make / model | | | | Compliance | Load rating |
|---------------------------------|--------------|-------|----------|-------|-----------------|-------------|
| | | | | | Mark Approval | |
| Control system: | ..... |  |  |  | ..... |  |
| Braked axles: | ..... |  |  |  | ..... | ..... kg |
| Front suspension: | ..... |  |  |  | ..... | ..... |
| Rear suspension: | ..... |  |  |  | ..... | ..... kg |
| Tyre size: | ..... |  |  |  | ..... | ..... kg |
| Axle group: | Front | | Rear | | | |
| Axle number: | 1 | 2 | 3 | 1 | 2 | 3 4 |
| Brake chamber size: | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack adjuster length: | ..... | ..... | ..... | ..... | ..... | ..... |
| Axle group loads: | kg | | kg | | | |
| Chassis construction: | ..... |  |  |  |  |  |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Front Tow coupling/Fifth wheel: | | | | | | |
| Make/model: | ..... |  |  |  | D-rating: | kg |
| Rear Tow coupling/Fifth wheel: | | | | | | |
| Make/model: | ..... |  |  |  | D-rating: | kg |

1.2 Brake timing tests (if applicable):

Application time: Rear brake chamber ms Rear coupling to test cylinder ms
 Release time: Rear brake chamber ms Rear coupling to test cylinder ms

HEAVY VEHICLE MODIFICATIONS

1.3 Calculated braking performance

Calculated ERC deceleration performance relative to ADR 38/.. upper and lower boundaries at different control signal strengths.

| | | | | | |
|---|---------------------------------------|-------|-------|-------|-------|
| Control signal 'E' | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 |
| Control signal, kPa | 130 | 260 | 390 | 520 | 650 |
| Calculated ERC | ..... | ..... | ..... | ..... | ..... |
| Upper limit | .140 | .305 | .470 | .635 | .800 |
| Lower limit | .029 | .158 | .286 | .394 | .482 |
| Parking grade percent at modified ATM | % | | | | |
| Emergency skid limit | Certified suspension skid limit | | | | |
| Dog trailer: Front friction utilisation | at ERC | | | | |
| Rear friction utilisation | ..... |  |  |  |  |
| Axle fade rating required | tonnes | | | | |

(Y = Yes N = No)
Delete if not

applicable

2.0 General

2.1 Have all calculations required to establish the modified ATM been retained for future audit? Y N

3.0 Chassis

Has the chassis construction been calculated to be adequate for the modified axle group loads and ATM? Y N

4.0 Brake system

4.1 Are the requirements of ADR 38/.. met for ERC, emergency skid limits, friction utilisation and axle fade rating? Y N

4.2 Does the parking ability exceed 18% gradient at the modified ATM? Y N

4.3 Are the brake application and release times (if applicable) within the permitted maximum limits? Y N

5.0 Tyres and Rims

5.1 Does the tyre placard fitted to a trailer produced on or after 1 July 1990 record the correct tyre and rim sizes, axle configurations, axle loads and inflation pressures for the modified vehicle? Y N

5.2 Are tyres and rims fitted in conformance to the tyre placard? Y N

6.0 Fifth Wheel/Tow Coupling

6.1 Do the fifth wheel and fifth wheel mounting meet the requirements of ADR 63/..? Y N

6.2 Do the tow coupling, tow coupling mounting and drawbar (if applicable) meet the requirements of ADR 63/..? Y N

7.0 Dimensions

Are the trailer dimensions within the permitted maximum limits? Y N

8.0 Lighting and signs

8.1 Do all lamps conform in specification and location to ADR 13/.. requirements? Y N

8.2 Are road train signs fitted in accordance with Section 9.0 of Appendix S11? Y N

9.0 Workmanship

Is the quality of workmanship to a satisfactory standard? Y N

NOTE: If the answer to any relevant question is "NO", the modification is not acceptable.

Trailer Modified By:

.....
.....

Certificate approved by:

.....
.....

Company (if applicable):

.....
.....

Modification Plate No.issued:

Certificate number issued :

Signed:Certifying Officer No: Date:

Appendix S11

Annex 1

Test Rig to ADR 38/.. specification for trailer application/release time testing

Where a trailer 'Brake System' is required to be tested for compliance with application and release time requirements, the test rig described in Figure 2 of ADR 38/.. shall be calibrated in accordance with this procedure and connected as described in Figure 3 of ADR 38/..

Where a rear service coupling for towed trailers is provided, time responses shall be measured with an 800 millilitres vessel attached to the rear service coupling as in Figure 3 of ADR 38/..

The test rig described in Figure 2 of ADR 38/.. shall be calibrated by adjustment of the orifice (O) such that with the storage reservoir (R1) charged to 650 kPa, the time between the initial pressure drop measured between the storage reservoir and the control valve (V), and the pressure at the end of the calibrating vessel (R2) increasing to 420 kPa, is between 0.18 and 0.22 seconds.

The test rig and the trailer energy storage devices shall be charged to 650 kPa prior to the test being conducted and no additional energy shall be added to the storage vessel (R1) or the trailer 'Supply Line' during the period of the test.

The brake actuation time shall be taken from when the pressure level, measured between the storage reservoir and the control valve, initially drops to when the pressure in the least favoured brake actuator reached 420 kPa.

With an initial service brake application level of 650 kPa the brake release time shall be taken from when the pressure level, measured between the control valve and the orifice, initially drops to when the pressure in the least favoured brake actuator reaches 35 kPa.

The brake control valve shall be of a configuration that permits energy to flow from the storage reservoir to the orifice (O) when in the 'on' position and from the orifice to waste when in the 'off' position. It shall not allow additional energy to flow into the test rig 'Control Line' by way of its own 'Control Signal'. The brake control valve control shall be designed so that the manner of its operation shall have no effect on the output response of the test rig. The brake control valve may be arranged to provide a modulated test rig output signal for other brake development purposes but which for the purpose of measuring trailer 'Brake System' response will be rendered inoperative.

HEAVY VEHICLE MODIFICATIONS

Appendix S12

Modification Code S12

**AGGREGATE TRAILER MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD TRAILERS**

Certifications that are covered under this Modification Code are:

1. Aggregate Trailer Mass (ATM) rating increase or decrease for a trailer which has been modified to a specification which differs from the manufacturer's standard specification.
2. Issue of an Aggregate Trailer Mass (ATM) rating recommendation certificate and checklist to an S7 Certifying Officer who will inspect and plate the trailer, for a trailer specification supplied either by the owner or by the S7 Certifying Officer, where the trailer itself has not been inspected by the S12 Certifying Officer.
3. Issue of an Aggregate Trailer Mass (ATM) rating recommendation certificate and checklist to an S7 Certifying Officer who will inspect and plate the trailer, for a trailer whose manufacturer no longer exists and for which a manufacturer's GVM is not available.

Certifications that are **not** covered under this Modification Code are:

1. Aggregate Trailer Mass (ATM) rating for a trailer which has been modified to change the registration category of the trailer e.g. semitrailer to dog trailer, pig trailer to dog trailer, semi to dolly, etc. Such trailers are regarded as newly manufactured and must be issued with a new Vehicle Identification Number (VIN) and fitted with a new Compliance Plate issued by the Federal Office of Road Safety which will identify the applicable ATM.
2. Aggregate Trailer Mass (ATM) rating of Road Train trailers (See Code S11) or B Double trailers (See Code S9).

NOTE: The modified vehicle/modifications must continue to comply with all applicable ADR's, Australian Standards or Regulations/Acts.

Outlined below are the areas of the trailer that may have been affected by the modifications and that may require recertification, testing and/or data to show compliance for the modified trailer.

HEAVY VEHICLE MODIFICATIONS

| DETAIL | REQUIREMENTS |
|---------------|--|
| Brakes | ADR 38, 38/.., Modification Code G3 |
| Suspension | Manufacturer's rating, Modification Code F2 |
| Chassis | Manufacturer's rating, Modification Code H5 |
| Tyres | Manufacturer's rating, ADR 24/.. |
| Tow Couplings | Manufacturer's rating, ADR 62/.., Modification Codes P1 and P2 |

If any of the areas listed above are affected by modifications made to the trailer in order to achieve the ATM rating they must comply with the prescribed standards and where necessary must be approved by a Certifying Officer holding the appropriate modification code.

HEAVY VEHICLE MODIFICATIONS**Appendix S12****AGGREGATE TRAILER MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD TRAILERS****SPECIFIC REQUIREMENTS****1.0 General**

The intention of this Code is to allow suitably qualified Certifying Officers to certify the permissible Aggregate Trailer Mass (ATM) rating of trailers modified within the original registration category, either by personal inspection of the trailer or by examination of written specifications supplied by the owner or modifier.

Typical modifications would include changes from tandem axle to triaxle semitrailer configuration, two axle to three axle dog trailer conversion or replacement of axles, suspensions or control systems with alternative components which would allow a different rating.

In the case of a trailer which is not inspected by the S12 Certifying Officer, the S12 certificate and checklist should be issued. The checklist confirms the fact that the trailer has not been inspected, identifies the source of the information and recommends an appropriate rating for a trailer having componentry as listed in the checklist, subject to the trailer being in satisfactory mechanical condition.

The certificate and checklist may then be used by an S7 Certifying Officer to re-rate the individual trailer after inspection to verify that the componentry is as described in the certificate checklist and that the trailer's mechanical condition is satisfactory.

Issue of an Aggregate Trailer Mass (ATM) rating certificate is also permitted for an existing trailer where the ATM is not recorded and where the manufacturer no longer exists.

In all cases, the re-rating must address the compatibility of the entire trailer for the revised rating and in particular must check that the chassis, suspensions, axles and tow couplings are used within the manufacturer's rated capacities.

2.0 Tyres and Wheel Rims

The sum of the load carrying capacities recommended for all the tyres and rims with which the trailer is equipped, shall be not less than the Axle Group Load (AGL) rating for each axle group.

The load carrying capacity of any tyre or rim must not be exceeded with the trailer at the revised AGL rating.

For trailers manufactured to comply with ADR 24/..., the tyres and rims must be selected and must comply in all respects with the requirements of that ADR at the revised AGL rating.

Where a tyre placard is fitted to a trailer, this placard must be replaced or amended as necessary to indicate the correct tyre specifications for the trailer at the revised ATM and AGL rating. The revised tyre size and load rating must also appear on the modification plate

HEAVY VEHICLE MODIFICATIONS**3.0 Chassis**

The modified chassis must be confirmed by calculation to be adequate for the proposed ATM.

4.0 Tow coupling

The tow coupling fitted to a modified trailer must be adequate for the proposed ATM and the coupling installation must conform to the requirements of Code P1 or P2 as applicable.

The drawbar of a pig or dog trailer must be designed to withstand the forces specified in ADR 62/.. .

5.0 Brake control system - air braked trailer

The length and diameter of piping and the type of connecting fittings within a trailer control system are critical for achievement of brake response and release times within the limits specified by ADR 38 and ADR 38/... The maximum permitted lengths of piping are specified in Department of Transport and Regional Services certified brake system parts lists and installation diagrams, which are available from the control system manufacturers. The actual installed lengths of piping should be checked against these specifications if the brake system response and release times are not tested by the officer approving the ATM rating.

Where a certified brake control system is not used, or is installed with piping lengths exceeding the specified limits or with components other than those shown on the certified parts list, response and release time tests in accordance with the relevant section of ADR 38/.. must be conducted, unless it can be established that the system changes are beneficial to such time responses.

6.0 Brake System Subassemblies (air braked trailer)**Control system, braked axles and suspension**

The maximum ATM permitted by an ADR 38 trailer braking system depends on the trailer mass which can be parked on an 18% grade. This is determined by calculations in which certified data published by the subassembly manufacturers is used to select brake chamber sizes and slack adjuster lengths which will provide sufficient parking force without exceeding the suspension skid limits in an emergency breakaway application.

The conformance of the trailer design must be established to all requirements of ADR 38/... The calculated ERC performance must fall within the limit bands and emergency ERC, parking ability, skid limit performance, friction utilisation and axle fade rating must all meet the specified requirements.

Section 1 of the check list records the trailer data which is critical for these calculations.

The checklist must be supplied with the S12 certificate to the S7 Certifying Officer who is to conduct the physical inspection of the trailer.

Copies of the control system certified diagram and parts lists should also be included with the Certificate.

HEAVY VEHICLE MODIFICATIONS

CHECKLIST - S12

AGGREGATE TRAILER MASS RATING
APPROVED DESIGN CERTIFICATION
FOR NON-STANDARD TRAILERS

1.0 Trailer particulars

Wheelbase:..... mm Overhang: mm
 Forward radius:..... mm Tow coupling overhang:..... mm (if applicable)
 Drawbar length:.....mm Centre of mass height:.. mm (if applicable)
 Load deck length:..... mm Tare Mass: kg
 Modified GVM:.....kg
 Modified ATM:.....kg

1.1 Componentry details

| Component | Make/model | Compliance Mark Approval | Load rating |
|----------------------------|------------|--------------------------|------------------|
| Control system: | | | |
| Braked axles: | | | kg |
| Front suspension: | | | |
| Rear suspension: | | | kg |
| Tyre size: | | | kg |
| Axle group: | | | |
| | | Front | Rear |
| Axle number: | | 1 2 3 | 1 2 3 4 |
| Brake chamber size: | | | |
| Slack adjuster length: | | | |
| Axle group loads; | | kg | kg |
| Chassis construction:..... | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Tow coupling/Fifth wheel: | | | |
| Make/model: | | D-rating | kg |

HEAVY VEHICLE MODIFICATIONS

1.2 Calculated braking performance

Calculated ERC deceleration performance relative to ADR 38/.. upper and lower boundaries at increments of control signal strengths.

| Control signal | 'E' (kPa) | 0.2 (13) | 0.4 (260) | 0.6 (390) | 0.8 (520) | 1.0 (650) |
|---|---------------|---|--------------|--------------|--------------|--------------|
| Calculated ERC | | | | | | |
| Upper limit | | .140 | .305 | .470 | .635 | .800 |
| Lower limit | | .029 | .158 | .286 | .394 | .482 |
| Parking grade percent at modified ATM | |% | | | | |
| Emergency skid limit | | Certified suspension skid limit | | | | |
| Dog trailer: Front friction utilisation | | at ERC | | | | |
| Rear friction utilisation | | | | | | |
| Axle fade rating required | | tonnes | | | | |

(Y = Yes N = No)
Delete if not

applicable

2.0 General

2.1 Retention of records

2.1.1 Have all calculations required to establish the modified ATM been retained for future audit? Y N

2.2 Chassis

2.2.1 Has the chassis construction, been calculated to be adequate for the modified axle group loads and ATM? Y N

2.2.2 Are the trailer dimensions within the permitted maximum limits? Y N

2.3 Brake system

2.3.1 Are the requirements of ADR 38/.. met for ERC, emergency skid limits, friction utilisation and axle fade rating ? Y N

2.3.2 Does the parking ability exceed 18% gradient at the modified ATM? Y N

2.4 Tow Coupling

2.4.1 Do the tow coupling, tow coupling mounting components and drawbar (if applicable) meet the requirements of ADR 62/..? Y N

3.0 Trailer inspection records (Not required if certificate without plate is issued to an S7 Officer who will conduct the trailer inspection). Y N

3.1 Chassis

3.1.1 Does the chassis conform to the detail construction, section properties, crossmember location and dimensions of the S12 Officer's report? Y N

HEAVY VEHICLE MODIFICATIONS

3.2 Brake system

- 3.2.1 Is the trailer’s entire braking system, including brake chamber sizes and slack adjuster length setting, identical to the braking system described in Section 1 of this report? Y N
- 3.2.2 Have the brake system piping lengths been established to not exceed the maximum lengths specified in the control system manufacturer’s certified data sheet? Y N

3.3 Tyres and Rims

- 3.3.1 Does the tyre placard fitted to a trailer produced on or after 1 July 1990 record the correct tyre and rim sizes, axle configurations, axle loads and inflation pressures for the modified trailer? Y N
- 3.3.2 Are tyres and rims fitted in conformance to the tyre placard? Y N

3.4 Tow Coupling

- 3.4.1 Does the installation of the tow coupling, tow coupling mounting and drawbar (if applicable) meet the requirements of ADR 62/..? Y N

3.5 Workmanship

- 3.5.1 Is the quality of workmanship to a satisfactory standard? Y N

NOTE: If the answer to any relevant question is “NO”, the modification is not acceptable.

Trailer identity and information source

Trailer Make / Model:
 Chassis No. or VIN: Year of Mfr:
 Trailer Modified By:
 Trailer examined or details supplied by:
 Company (if applicable)

Certification

Trailer inspected/not inspected: (Delete as inapplicable)
 Modification Plate No. issued: (Applicable only if trailer inspected)
 Certificate number:
 Certificate approved by:
 Company (if applicable):
 Signed: Certifying Officer No:..... Date:

If Certificate issued to S7 Officer:

Certificate and checklist issued to:
 Company: Certifying Officer No:

HEAVY VEHICLE MODIFICATIONS

Note: A copy of this checklist must be supplied with the certificate to the S7 Certifying Officer.