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Extract taken from: Heavy vehicle specialist certification > Structure > Steering, suspension and axles

## 4-3 Steering, suspension and axles

Certifier categories: HVEC | HMCD

### Reasons for rejection

1. An articulated bus cannot complete a 360° turn in either direction without any part of the vehicle except for collapsible mirrors encroaching within a concentric internal radius of 5.3m.
2. In carrying out a 360° turn at the 25m diameter, any part of a vehicle in a combination, other than its articulation mechanism, makes contact with the other vehicle in the combination.
3. A heavy rigid motor vehicle is not supported by:
  - a) one axle set towards the front of the vehicle, which is either a single-axle set or a twin-steer axle set, and
  - b) one axle set towards the rear of the vehicle which is a single set, a tandem set or a tri-axle set.
4. Except as provided in Note 3 a heavy motor vehicle has a rear-steering axle (Note 3).
5. Steering axles do not turn through an angle of at least 15° in either direction (Note 3).
6. A mobile crane does not have a mechanism to lock at least one rear axle.
7. A rigid motor vehicle or semi-trailer, fitted with rear-steering axles, does not comply in all configurations with the rear overhang requirements and forward distance requirements.
8. An axle set, apart from a twin-steer axle set, of a heavy motor vehicle is not load sharing.
9. A vehicle with a tandem-axle set (except for a tandem axle set in a heavy passenger service vehicle) that has a single large-tyred axle with a load-share ratio of 60%:40% or 55%:45%, has not been affixed with an indelible plate, so that it is clearly visible to the person who is weighing the vehicle, that specifies the:
  - a) load-share ratio of the axle set, and
  - b) tyre size on each axle, and
  - c) maximum individual axle ratings.
10. An A-train does not have two motor-driven axles in a tandem-axle set or a tri-axle set, or three motor-driven axles in a tri-axle set.
11. A semi-trailer is not supported by one axle set only which is set towards the rear of the vehicle and is:
  - a) a single-axle set, or
  - b) a tandem-axle set, or
  - c) a tri-axle set, or
  - d) a quad-axle set provided that the semi-trailer is not intended for use in an A-train or B-train combination.

12. The axle set towards the front of a full trailer does not connect all wheels for that part of the trailer to the drawbar steering system.
13. The axle set towards the front of a full trailer is not either a single-axle set or a tandem-axle set.
14. The axle set towards the rear of a full trailer is not one of the following:
- a) a single-axle set
  - b) a tandem-axle set
  - c) a tri-axle set provided that the front axle set is a tandem-axle set.
15. A simple trailer is not supported by one of the following:
- a) a single-axle set
  - b) a tandem-axle set
  - c) a tri-axle set.
16. On a pole trailer with two axle sets, the axle set towards the front of the trailer does not connect all wheels for that part of the trailer to the drawbar steering system.
17. The axle set towards the front of a pole trailer with two axle sets is not either a single-axle set or a tandem-axle set.
18. The axle set towards the rear of a pole trailer with two axle sets is not one of the following:
- a) a single-axle set
  - b) a tandem-axle set
  - c) a tri-axle set provided that the front axle set is a tandem-axle set.
19. A heavy motor vehicle, other than an A-train or a B-train, has a retractable axle (Note 4) where:
- a) the retractable axle is not in a rear-axle set, or
  - b) the retractable axle does not have an automated control that ensures the remaining axle or axles and axle set or axle sets in contact with the ground remain within all manufacturer's component ratings for all retractable axle configurations, or
  - c) the forward distance requirements and rear overhang requirements are not complied with when the axle is in contact with the road and is in a retracted position.
20. A specialist overdimension motor vehicle or a motor vehicle designed principally to transport an overdimension load or an overweight load or both does not have load sharing suspension.
21. A steering system on a motor vehicle, and associated systems and components that could directly or indirectly affect the directional control of the vehicle is not:
- a) sound and in good condition and provides the vehicle with safe, efficient, convenient and sensitive control
  - b) strong, durable and fit for its purpose, taking into account whether adverse effects have resulted from a loss of integrity of any protective system used by a relevant component.
22. A motor vehicle capable of a speed more than 50km/h and equipped with a steering system with no direct mechanical connection between the driver's means of control and the wheels or other means of changing the vehicle's direction does not have at least one additional means of steering that:

- a) is sound and in good condition and provides the vehicle with safe, efficient, convenient and sensitive control, and
- b) is strong, durable and fit for its purpose, taking into account whether adverse effects have resulted from a loss of integrity of any protective system used by a relevant component, or
- c) is approved by the NZTA.

23. A modification to a steering system or to a system or component that could affect the directional control of a motor vehicle prevents the vehicle from having a steering system that is:

- a) sound and in good condition and that provides the vehicle with safe, efficient, convenient and sensitive control
- b) strong, durable and fit for its purpose, taking into account whether adverse effects have resulted from a loss of integrity of any protective system used by a relevant component
- c) compatible with the manufacturer's design or specification for the vehicle.

24. An axle fitted to a vehicle is not of adequate strength or does not have appropriate performance characteristics for all loading and operation for which the vehicle was constructed.

25. (Note 4) A device for altering the distribution of mass between axles has been fitted to a vehicle when:

- a) the device does not lift an unpowered axle clear of the ground, or
- b) the device does not reduce the mass carried by an unpowered axle without lifting it clear of the ground, or
- c) it does not have a control that is spring loaded so that, when the control is released, the mass on the unpowered axle reverts to what it was before the operation of the controls, or
- d) it does not have a control with an automatic timing device with an activation time of not more than two minutes after which the mass on the unpowered axle reverts automatically to what it was before the operation of the control and with a non-activation time of at least 30 seconds during which the control cannot be activated again.

26. The suspension system of a vehicle is not of adequate strength or does not have appropriate performance characteristics for all conditions of loading and operation for which the vehicle was constructed.

27. An axle stop device fitted to a vehicle has not been maintained within safe tolerance of its original condition.

28. A modification to a vehicle has not been carried out:

- a) in accordance with instructions from the vehicle manufacturer and the manufacturer of any equipment being fitted to the vehicle, or
- b) in accordance with the design and certification of an HV certifier.

29. A modification to a vehicle has not been carried out using components that are suitable for automotive application.

30. An axle, a suspension system or an axle and suspension system, fitted to a vehicle to replace the one fitted by the vehicle manufacturer does not have a load rating and performance characteristics that are suitable for all normal conditions of loading and operation for which the vehicle was constructed.

31. If an axle of a vehicle is fitted with tyres in a way that results in the wheel track being altered beyond the vehicle manufacturer's specified limits, or the number of tyres fitted to an axle exceeds the number specified by the vehicle manufacturer, either:

- a) a new axle load rating has not been established, or
- b) the current axle load rating has not been confirmed as being valid by an HV certifier.

32. A second steering axle fitted to a vehicle does not have a means of steering that is compatible with the existing steering components.
33. A steering box has been used that is not the manufacturer's standard or option, and the origin and specifications have not been identified and recorded.
34. The replacement steering box component is not of at least equal specification to the original with regard to:
- a) steering ratio
  - b) input/output torque.
35. If a new steering box or rack assembly is not used, then any second-hand components has not been crack tested or x-rayed at a non-destructive testing (NDT) authority approved by the Certification Board for Inspection Personnel, or the steering box or steering rack has not been overhauled and all details recorded.
36. The steering column has not been transferred without alteration to the integrity of the column or any collapse mechanism contained therein.
37. Where new column mountings have been fabricated they are not at least of the strength of the original mounts.
38. The use of chain and sprocket, hydraulics or bevel drive boxes have been used where not specifically permitted (Note 7).
39. The original steering geometry has not been preserved and the vehicle does not meet the 25m turning circle requirement.
40. The steering box and steering idler assembly is not positioned so as to mirror the original.
41. When mounting the steering box, care has not been taken to ensure that it is positioned so that when at maximum travel (lock to lock), the chassis frame does not become excessively loaded.
42. The steering linkages contact the stops while there is still substantial travel remaining in the steering box.
43. Steering components other than mounting brackets have been welded on to the chassis or body and this is not supported by a welding procedure and certification by an HV certifier.
44. The primary steering position and controls do not remain on the right-hand side when a left-hand drive dual steering is added.
45. A replacement rear/drive axle does not have:
- a) a mass rating that is adequate for the mass rating of the vehicle.
  - b) a suitable final drive ratio.
46. All welding performed on an axle housing is not in accordance with the axle manufacturer's specifications or is not supported by a welding procedure and certification by an HV certifier.
47. The axles are not fitted within the axle manufacturer's installation specifications.
48. If the axle final drive ratio has been changed, it is no longer suitable for the road speed or gradability or the speedometer accuracy is not maintained.
49. A replacement front axle does not have a mass rating that is adequate for the mass rating of the vehicle.
50. All welding performed on an axle housing is not in accordance with the axle manufacturer's specifications.
51. The axle has not been installed within the vehicle/axle manufacturer's specified caster angle limits.
52. If the front axle is driven, then the axle final drive ratio is not suitable for the road speed and gradability.

53. The mass rating of the modified suspension is not sufficient for the mass rating of the vehicle.
54. The modified suspension does not maintain the vehicle's suspension balance under braking.
55. A modified suspension component fouls during its full travel.
56. The suspension system is not fitted according to the suspension manufacturer's specifications.
57. Variable ride height and constant ride height mechanisms have not been fitted and adjusted in accordance with the suspension manufacturer's specifications.
58. The wheel alignment has not been checked and adjusted to within the appropriate specifications.
59. Bump stops have been attached to the chassis flange.
60. Shock absorbers fully compress or fully extend through the full suspension travel.
61. A pitman arm has been heated, welded, bent or drilled and it has not been stress relieved.
62. A pitman arm has been welded and the affected area has not been x-rayed and demonstrated to be sound.
63. Steering stops have not been mounted in accordance with the specifications of the steering box manufacturer.
64. Not all hoses, steel tubing and reservoirs connected with a power steering pump are in accordance with the hydraulic standard, size, flow and pressure ratings recommended by the steering box or hydraulic cylinder manufacturer.
65. The steel tubing connected with a power steering pump is not of sufficient length to allow adequate cooling.
66. A hydraulic pump does not have a flow and pressure rating that is compatible with the steering box or hydraulic cylinder used.
67. Hoses and steel tubing have not been routed clear of exhaust areas and areas likely to cause abrasion or other damage.
68. The mounting point for the cylinder in a Ram type steering system has not been designed to take into account the cylinder's peak loading and deflections or for fatigue.
69. The mounting of the cylinder does not allow the cylinder full and free movement through the entire arc of the steering components and suspension travel.
70. Drag links have not been made of one continuous length of material between end fittings or are not supported by certification of an HV certifier.
71. A power steering system has not been fitted with a pressure relief valve.
72. A forged or heat-treated steering component has been cut, welded or heated and is not supported by certification of an HV certifier.
73. Any replacement component does not have a rating suitable for the loading imposed on it.
74. Any standard part, such as splines, tapers and keyways does not conform to a recognised standard.
75. Any standard part that is a mating component does not comply with compatible standards.
76. End fittings, ball joints, plain bearing end fittings and idler arm pivots have been used and they do not have manufacturer's ratings in excess of the loads or angular travel to be imposed on them.
77. A moving component may be fouled through its full travel movement and suspension movement.

78. For suspension, axle and steering system attachments, threaded fasteners are not of an appropriate grade for the application.
79. A vehicle has not been road-tested after a steering or suspension modification.
80. The steering system does not provide safe and positive handling of the vehicle.
81. The steering system is not free of any undue restrictions to operation through its range of operation.
82. The steering control is not in the normally accepted direction in relation to the effect on the vehicle.
83. The minimum steering effort with power assist is less than five newtons force measured at the steering wheel rim under all conditions.
84. The maximum steering effort measured at the steering wheel rim exceeds 250 newtons force when tested under the following conditions:
- a) the vehicle is loaded to its GVM and is correctly distributed on the vehicle axles, and
  - b) the tyres are inflated at the recommended tyre pressure, and
  - c) the vehicle is travelling at a speed of 10 km/h or less, and
  - d) the steering wheel is turned at a constant rate so that in four seconds the steering angle acquired is sufficient to turn the vehicle within a 25-metre diameter circle, and
  - e) the turn is made to both the left and right.
85. With the power steering system disabled, the steering effort required exceeds 600 newtons when doing the above test, with the exception that the turn rate can be decreased to six seconds.
86. A repaired or replaced spring slipper has not been fitted or replaced in a tradesman like manner using materials that are fit for purpose and are within safe tolerance of original manufacture.
87. A spring slipper has been fitted to reduce spring lash and has not been certified by a HV certifier.
88. A spring slipper has been repaired more than once and is not supported by certification or a report from a HV certifier relating to the most recent repair.
89. A modification to an axle, the steering or the suspension that may affect the brakes has not been referred to a HV certifier with the brakes category (HVEK).
90. The brake system of an air-braked heavy vehicle does not have priority of the supply of air from the air compressor.
91. An air operated device has been fitted to a heavy vehicle and the device draws air directly from the air reservoir supplying the brakes without protecting the brake circuit.
92. An air operated device has been fitted to a heavy vehicle and the device draws air directly from the air reservoir supplying the brakes and the external diameter of the supply hose or pipe is larger than 8mm.
93. An air operated device has been fitted to a heavy vehicle and the device draws air directly from the air reservoir supplying the brakes and the device operates when the vehicle is moving.
94. An air operated device has been fitted to a heavy vehicle and the device draws air directly from the air reservoir supplying the brakes and the vehicle manufacturer does not allow it.
95. A vehicle that is modified by fitting an additional axle, removing an axle, replacing an axle with one that is not of the same make and model, or replacing the brake of an axle with one that is not of the same make and model has not been referred to a HV certifier with the Brakes category (HVEK).

96. A powered vehicle with an hydraulic service brake has been fitted with an additional rear axle that does not have the same type of braking system as the original axle or an air operated disc brake as a service brake.

97. A vehicle that has been damaged in a crash has not had its steering and suspension components inspected to ensure that damage has not occurred to these critical safety systems and they have not been reinstated to within safe tolerance of original manufacture or most recent certification and certified appropriately (see [Technical bulletin 1: Heavy vehicle repair thresholds](#)).

98. A vehicle that has been damaged by fire has not had its steering and suspension components inspected to ensure that damage has not occurred to these critical safety systems and they have not been reinstated to within safe tolerance of original manufacture or most recent certification and certified appropriately (see [Technical bulletin 1: Heavy vehicle repair thresholds](#)).

99. A vehicle that has been damaged by immersion in water has not had its steering and suspension components inspected to ensure that damage has not occurred to these critical safety systems and they have not been reinstated to within safe tolerance of original manufacture or most recent certification and certified appropriately (see [Technical bulletin 1: Heavy vehicle repair thresholds](#)).

#### **Note 1**

Notwithstanding requirement 1 of this section any person may operate any motor vehicle having the steering column to the left of the longitudinal centreline of the body of the vehicle if the vehicle:

- a) was purchased from the Crown by the owner or any former owner, or
- b) is for the time being exempt from subclause 1 of this regulation by virtue of an exemption granted under regulation 90 of these regulations.

#### **Note 2**

New and used replacement systems, components and equipment:

A repairer must use systems, components and equipment that will enable a vehicle to comply with requirement 8.

The systems, components and equipment used to enable the vehicle to comply with requirement 8 may be new or used.

Replacement systems, components and equipment used in a repair must comply with an approved vehicle standard applicable as specified by the relevant rule or regulation to the year of manufacture of the vehicle, system, component or equipment.

#### **Note 3**

A forklift, the rear unit of an articulated bus or a mobile crane may have one or more rear steering axles.

A rigid vehicle without a heavy tow coupling or a semi-trailer (other than a semi-trailer in an A-train combination or a B-train combination) may have steering axles in the rear-axle set, if no more than half of the axles within the axle set steer at any time.

A semi-trailer with a quad-axle set must have at least one but not more than two steering axles within the quad-axle set provided that they are:

- a) the two rearmost axles which must be capable of turning in the same direction through an angle of at least 15 degrees, or

b) the foremost and rearmost axle which must be capable of turning in opposite directions through an angle of at least 15 degrees, or

c) where fitted with a single steering axle in a quad-axle set, the steering axle must be the rearmost axle.

A steering axle in the last case must be capable of turning through an angle of at least 15 degrees in either direction and have that confirmed by certification by a HVS certifier with the chassis category.

#### **Note 5**

A modification to a steering system or to a system or component that could affect the directional control of a motor vehicle must be certified.

#### **Note 6**

Major reworking of the design of the vehicle relates to subsequent major modification of the standard vehicle as produced and tested by the vehicle manufacturer and includes:

a) fitting of different types of engine and relocation of engine and/or transmission

b) addition or removal of axles

c) alteration of wheelbase by:

i. moving axles on chassis rails

ii. extending or shortening the chassis

d) replacement of the original chassis rails by a structure of different form

e) addition of heavy duty equipment for special purpose operations, for example hydraulic hoists which may place extra

stress on localised areas of the chassis and/or other equipment

f) conversion to left-hand drive dual steering (in special purpose vehicles only).

#### **Note 7**

Dual steering conversions may only be carried out on special purpose vehicles such as street sweepers, weed sprayers, road markers, refuse collection and the like.

All of the relevant requirements also apply to dual steering conversions except where the left-hand steer position is being added, that is. the vehicle is originally right-hand steer. The steering motion may be transferred by way of chain and sprocket or bevel boxes.

#### **Note 8**

Where a spring slipper has been repaired or replaced a LT400 is not required if a CoF inspector is satisfied that the spring slipper plate has been repaired or replaced in a tradesman like manner, using components and materials that are fit for purpose and within safe tolerance of its state when manufactured.

However, if there is evidence of successive repairs or the spring slipper has been fitted in such a way that it may reduce spring lash then certification is required and a LT400 presented.

# Summary of legislation

## Applicable Legislation

- *New Zealand Gazette* 21 August 1980, page 2457 (Note 2)
- [Land Transport Rule: Frontal Impact 2001](#)
- [Land Transport Rule: Heavy Vehicles 2004](#)
- [Land Transport Rule: Steering Systems 2001](#)
- [Land Transport Rule: Vehicle Dimensions and Mass 2002](#)
- [Land Transport Rule: Vehicle Repair 1998](#).

## Frontal Impact Rule (section 2.2)

1. The performance of a motor vehicle in relation to protecting occupants in a frontal impact collision must not be reduced below a safe tolerance of its state when manufactured or modified by any factors including corrosion, structural damage, material degradation, inadequate repair, the fitting of additional equipment or the removal of equipment.
2. In assessing whether Requirement 1 above has been complied with a certifier may take into account:
  - a) the function of the additional equipment fitted to the motor vehicle after manufacture and the measures taken to minimise the risk of injury from the equipment,
  - b) evidence that the motor vehicle is within the manufacturer's operating limits.
3. A modification to a motor vehicle that affects its frontal impact performance (section 3.1):
  - a) must not prevent the vehicle from complying with this rule, and
  - b) must be certified.
4. A repair to a component or a group of components that affects a motor vehicle's frontal impact performance must comply with [Land Transport Rule: Vehicle Repair 1998](#) and must not prevent the vehicle from complying with this rule.

## Vehicle Repair 1998, rule 34001 (section 2.1)

5. A repair to a vehicle, its structure, systems, components or equipment, must restore the damaged or worn vehicle, structure, system, component or equipment so that they are within safe tolerance of the state of the vehicle, structure, system, component or equipment when manufactured or modified.
6. In repairing a vehicle (section 2.2) to comply with Requirement 5 above, a repairer must use a suitable repair method that takes into account the following:
  - a) the date of manufacture of the vehicle
  - b) the class, make and other relevant characteristics of the vehicle
  - c) the approved vehicle standards with which the vehicle is required to comply
  - d) the existence of relevant manufacturer's recommendations and alternative methods
  - e) the material specifications used for construction of the vehicle, structure, systems and components or equipment
  - f) the compatibility of the intended repair process with materials specifications (Note 3).

#### Vehicle Dimensions and Mass 2016 (section 4)

7. An articulated bus must be able to complete a 360-degree turn in either direction without any part of the vehicle except for collapsible mirrors encroaching within a concentric internal radius of 5.3m.
8. In carrying out a 360-degree turn at the 25m diameter as specified in chapter 3-1 Dimensions, no part of a vehicle in a combination, other than its articulation mechanism, may come into contact with the other vehicle in the combination.
9. A heavy rigid motor vehicle must be supported by:
  - a) one axle set towards the front of the vehicle, which must be either a single-axle set or a twin-steer-axle set, and
  - b) one axle set towards the rear of the vehicle which must be a single set, a tandem set or a tri-axle set.
10. Except as provided in (Note 3) a heavy motor vehicle must not have any rear-steering axle.
11. A mobile crane must have at least one rear axle locked so that it is non-steering, when the crane is being operated on the road.
12. A rigid motor vehicle or semi-trailer, fitted with rear-steering axles must comply in all configurations with the rear overhang requirements and forward distance requirements in chapter [3-1 Dimensions](#).
13. The axle sets, except a twin-steer axle set, of a heavy motor vehicle must be load sharing.
14. If a tandem-axle set has a single large-tyred axle with a load-share ratio of 60%:40% or 55%:45%, the manufacturer of the vehicle must securely affix to the vehicle an indelible plate, so that it is clearly visible to the person who is weighing the vehicle, that specifies the:
  - a) load-share ratio of the axle set, and
  - b) tyre size on each axle, and
  - c) maximum individual axle ratings.
15. An A-train must have two motor-driven axles in a tandem-axle set or a tri-axle set, or three motor-driven axles in a tri-axle set.
16. A semi-trailer must be supported by one axle set only which must be set towards the rear of the vehicle and must be:
  - a) a single-axle set, or
  - b) a tandem-axle set, or
  - c) a tri-axle set, or
  - d) a quad-axle set (except if the semi-trailer is in an A-train combination or a B-train combination).
17. The axle set towards the front of a full trailer must connect all wheels for that part of the trailer to the drawbar steering system and must be either a single-axle set or a tandem-axle set.
18. The axle set towards the rear of a full trailer must be one of the following:
  - a) a single-axle set,
  - b) a tandem-axle set,
  - c) a tri-axle set provided that the front axle set is a tandem-axle set.
19. A simple trailer must be supported by one of the following:
  - a) a single-axle set,

b) a tandem-axle set,

c) a tri-axle set.

20. A pole trailer with one axle set may only carry poles or long loads that are not part of the trailer and must be supported by a single-axle set, a tandem-axle set or a tri-axle set.

21. For a pole trailer with two axle sets the axle set towards the front of the trailer must connect all wheels for that part of the trailer to the drawbar steering system and must be either a single-axle set or a tandem-axle set.

22. The axle set towards the rear of a pole trailer with two axle sets must be one of the following:

a) a single-axle set,

b) a tandem-axle set,

c) a tri-axle set provided that the front axle set is a tandem-axle set.

23. A heavy motor vehicle, other than an A-train or a B-train, may have a retractable axle (Note 5) provided that:

a) the retractable axle is in a rear-axle set,

b) the retractable axle has an automated control that ensures the remaining axle or axles and axle set or axle sets in contact with the ground remain within the mass limits and within all manufacturer's component ratings for all retractable axle configurations,

c) the forward distance requirements and rear overhang requirements are complied with whether the axle is in contact with the road or is in a retracted position.

24. A specialist overdimension motor vehicle designed principally to transport an overdimension load or an overweight load or both must be load sharing.

### **Steering systems 2001 (sections 2 and 3)**

25. A steering system on a motor vehicle, and associated systems and components that could directly or indirectly affect the directional control of the vehicle must be:

a) sound and in good condition and must provide the vehicle with safe, efficient, convenient and sensitive control

b) strong, durable and fit for their purpose, taking into account whether adverse effects have resulted from a loss of integrity of any protective system used by a relevant component.

26. A motor vehicle capable of a speed more than 30 km/h and equipped with a steering system with no direct mechanical connection between the driver's means of control and the wheels or other means of changing the vehicle's direction must have at least one additional means of steering that complies with requirement 27.

27. A modification to a steering system or to a system or component that could affect the directional control of a motor vehicle must not prevent the vehicle from complying with requirement 27 (Note 6).

28. If a steering system or a system component that could affect the directional control is modified:

a) the steering system must be compatible with the performance and component specifications of the manufacturer of the vehicle or steering system for the original steering system, and

b) the loads and stresses on the steering system and its components must be demonstrably within the design and performance criteria established by their manufacturer for the specific application in which they were originally used.

29. A repair to a steering system, or a repair to a motor vehicle that affects its steering system must comply with all other requirements in this section.

## **Heavy Vehicle Rule**

### **Section 3**

30. An axle fitted to a vehicle must be of adequate strength and have appropriate performance characteristics for all loading and operation for which the vehicle was constructed.

31. A device for altering the distribution of mass between axles must not be fitted to a vehicle unless:

- a) the device lifts an unpowered axle clear of the ground, or
- b) the device reduces the mass carried by an unpowered axle without lifting it clear of the ground, and
  - i. it has a control that is spring loaded so that, when the control is released, the mass on the unpowered axle reverts to what it was before the operation of the controls, or
  - ii. it has a control with an automatic timing device with an activation time of not more than two minutes after which the mass on the unpowered axle reverts automatically to what it was before the operation of the control and with a non-activation time of at least 30 seconds during which the control cannot be activated again.

32. The suspension system of a vehicle must be of adequate strength and have appropriate performance characteristics for all conditions of loading and operation for which the vehicle was constructed.

33. An axle stop device fitted to a vehicle must be maintained within safe tolerance of its original condition.

### **Modification (section 6)**

#### **Section 6 applies to all modifications carried out after 1 April 2005.**

34. A modification to a vehicle that may affect the safety of the vehicle's components or the overall safety of the vehicle must not prevent the vehicle from complying with this Rule.

35. If practicable, a modification to a vehicle must be carried out in accordance with instructions from the vehicle manufacturer and the manufacturer of any equipment being fitted to the vehicle.

36. A modification to a vehicle must be carried out:

- a) as specified by the manufacturer of the vehicle, if the manufacturer produces more than 1000 vehicles in a year for a market where compliance with Australian, Japanese, UN/ECE standards or the requirements of the United States, is compulsory, or
- b) in accordance with the specifications of an HVS certifier.

37. A modification to a vehicle must be carried out using components that are suitable for automotive application.

38. An axle, a suspension system or an axle and suspension system, fitted to a vehicle to replace the one fitted by the vehicle manufacturer, must have a load rating and performance characteristics that are suitable for all conditions of loading and operation for which the vehicle was constructed.

39. If an axle of a vehicle is fitted with tyres in a way that results in the wheel track being altered beyond the vehicle manufacturer's specified limits, or the number of tyres fitted to an axle exceeds the number specified by the vehicle manufacturer, either:

- a) a new axle load rating must be established or
- b) the current axle load rating must be confirmed as being valid.

40. A second steering axle fitted to a vehicle must have a means of steering that is compatible with the existing steering components.

41. The steering system of a vehicle fitted with a second steering axle, as part of a twin-steer axle set, must be suitable for operating a twin-steer axle set.

42. A repair to the chassis of a vehicle or to a structural element of a monocoque body of a vehicle must be carried out:

- a) as specified by the manufacturer of the vehicle, if the manufacturer produces more than 1000 heavy vehicles in a year for a market in which compliance with Australian, Japanese, UN/ECE standards or the requirements of the United States is compulsory, or
- b) in accordance with the specifications of an HVS certifier, or
- c) in accordance with the Minor Repair Code, approved by the NZTA and published by the New Zealand Truck-Trailer Manufacturers' Federation.

### **Conversion of a vehicle to right-hand drive**

45. If a vehicle is converted from left-hand drive to right-hand drive:

- a) if practicable, original equipment must be used, and
- b) non-original equipment must not be used unless approved by the vehicle manufacturer or a vehicle inspector or inspecting organisation appointed to carry out specialist inspection and certification activities, and
- c) the steering -column must be transferred without altering the integrity of the column or its collapse mechanism, and
- d) except when fixing mountings to the chassis or body of the vehicle, steering components must not be welded, unless:
  - i. the welding is designed by the vehicle manufacturer or a vehicle inspector or inspecting organisation appointed to carry out specialist inspection and certification activities, and
  - ii. appropriate non-destructive testing is carried out by a qualified person, and
- e) steering performance and characteristics must be maintained, and
- f) the parking brake, auxiliary brake, accelerator and clutch controls must be transferred to the right-hand side of the vehicle, and
- g) new mounting points for the parking brake, accelerator and clutch controls must be of equivalent strength to the original mounting points.

46. If a vehicle is converted from left-hand drive to right-hand drive:

- a) the service brake control assembly must be transferred to the right-hand side of the vehicle, or
- b) the service brake pedal assembly must be transferred to the right-hand side of the vehicle and the motion of the brake pedal must be transmitted to the master cylinder or treadle valve by:
  - i. a torque shaft, or
  - ii. levers and rods.

47. For a vehicle to which 46(b) applies, the master cylinder or the treadle valve and the mechanism that transfers the braking effort from the right-hand side to the left-hand side must be protected to ensure that the service brake can be activated only by the driver.

### **Conversion of a vehicle to dual steering**

48. A conversion to dual steering may be carried out only on a special purpose vehicle.

49. If a special purpose vehicle is converted to dual steering:

- a) if practicable, original equipment must be used, and
- b) non-original equipment must not be used unless approved by the vehicle manufacturer or a vehicle inspector or inspecting organisation appointed to carry out specialist inspection and certification activities, and
- c) except when fixing mountings to the chassis or body of the vehicle, steering components must not be welded, unless:
  - i. the welding is designed by the vehicle manufacturer or a vehicle inspector or inspecting organisation appointed to carry out specialist inspection and certification activities, and
  - ii. appropriate non-destructive testing is carried out, and
- d) steering performance and characteristics must be maintained, and
- e) new mounting points for the parking brake, accelerator and clutch controls must be of equivalent strength to the original mounting points.

50. If a special purpose vehicle is converted to dual steering:

- a) the service brake control assembly must be replicated on the other side of the vehicle in a way that prevents the hydraulic or pneumatic line pressure from acting on the non-operating master cylinder or treadle valve, or
- b) the motion of the brake pedal must be transmitted to the master cylinder or treadle valve by:
  - i. a torque shaft, or
  - ii. levers and rods.

51. The steering motion on a special purpose vehicle that has been converted to dual steering may be transmitted by chain and sprocket or bevel gear boxes, if proper means are provided to eliminate backlash.

### **Priority and protection of air brakes**

52. The compressor must supply only the brake reservoirs with compressed air until the pressure in those reservoirs reaches the pressure specified by the vehicle manufacturer or the brake manufacturer, or, if such information is not available, two thirds of the maximum operational pressure specified by the vehicle manufacturer or brake manufacturer.

53. An air brake must have priority of the supply of compressed air from the brake reservoir.

54. An air-operated device may be connected to the air brake of a vehicle, only if:

- a) the brake is protected so that the operation or failure of the device cannot lower the pressure in [any service brake or parking brake reservoir(s)] below the pressure specified by the vehicle manufacturer or brake manufacturer, or, if such information is not available, two-thirds of its maximum operational pressure specified by the vehicle manufacturer or brake manufacturer, and

b) the supply to the device is drawn from a reservoir separate from the service brake or parking brake reservoir(s) supplying the brake, except as specified in 55.

55. Despite 54(b), an air-operated device may be supplied with compressed air from the service brake or parking brake reservoir(s), if:

- a) the operation of the device requires only a small amount of compressed air and it is supplied with compressed air by a hose or pipe with an external diameter not exceeding 8mm, or
- b) the device is operated only when the vehicle is stationary, or
- c) the vehicle manufacturer allows it.

56. A vehicle that is modified by fitting an additional axle, removing an axle, replacing an axle with one that is not of the same make and model, or replacing the brake of an axle with one that is not of the same make and model, must either:

- a) be modified so as to continue to meet the technical and performance requirements of the approved standard in the Rule with which the vehicle originally complied, or
- b) comply with all other applicable requirements in this Rule.

57. A powered vehicle with an hydraulic service brake may be fitted with an additional rear axle that has an air operated disc brake as a service brake.