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Extract taken from: Heavy vehicle specialist certification > Brakes

## 5 Brakes

### 5-1 Brakes (General)

Certifier categories: **HVEK** | **HMKD**

#### Reasons for rejection

1. A vehicle that is not an armoured vehicle used exclusively by the NZ Defence Force, a steam powered vehicle, a vehicle with self laying tracks, a traction engine, a mechanically propelled roller, a tractor or machine used solely in farm or roading operations, whether for traction or otherwise, and not capable of a speed exceeding 30km/h, together with any trailer used on the road only while drawn by that tractor or machine, a vehicle normally propelled by mechanical power while it is being temporarily towed without the use of its own power or an agricultural trailer, does not have a service brake, a parking brake and an emergency brake unless it is a semi trailer first registered before 1 November 1990.
2. A semi trailer first registered before 1 November 1990 is not fitted with a service brake.
3. A vehicle that does not require a service brake, a parking brake and an emergency brake does not have a means for the driver to control the movement of the vehicle, stop it and hold it stationary under all conditions of use.
3. A brake is not easily adjustable to compensate for wear or does not have a means of automatic adjustment.
4. A brake is not maintained in good condition and efficient working order.
5. A brake is out of adjustment so that the braking effect across an axle is not approximately equivalent and there is no system operating where the braking effect is modulated by a control device to prevent wheel lock up or improve stability.
6. A brake is not maintained within safe tolerance of the vehicle manufacturer's specifications.
7. The brake friction material is not secure, not in good condition or has defects that may adversely affect the performance of the brake.
8. A vehicle's brake is applied on a hard, dry, level surface that is free of loose material, and without assistance from the compression of the vehicle's engine or other auxiliary braking device that is not part of the vehicle's service brake the vehicle or its controls vibrates so as to noticeably and adversely affect the control of the vehicle.
9. A vehicle's brake is applied on a hard, dry, level surface that is free of loose material, and without assistance from the compression of the vehicle's engine or other auxiliary braking device that is not part of the vehicle's service brake the braking effect on each braked wheel of the vehicle does not provide stable and efficient braking without adverse effect on the directional control of the vehicle.
10. A vehicle's brake is applied on a hard, dry, level surface that is free of loose material, and without assistance from the compression of the vehicle's engine or other auxiliary braking device that is not part of the vehicle's service brake and if the vehicle is equipped with an anti-lock braking system, any of the vehicle's rotationally sensed wheels lock when the speed of the vehicle is above the ABS-activation parameters set by the vehicle manufacturer.

11. Except for brake pad warning systems, a warning system that is fitted to a vehicle and is part of, or associated with the use of, a brake component or system does not function correctly.
12. The service brake of a vehicle is not able to be applied by the driver from the driver's normal driving position in a controlled and progressive manner.
13. The service brake of a vehicle, not being a heavy haulage trailer or a military trailer, has a device fitted by which the driver would be able to adjust the brake force distribution between the axles or between the vehicles that are used in a combination vehicle.
14. The service brake of a vehicle, whether or not it is being operated as a combination vehicle, has more than one control except where it is being operated in a combination and is fitted with a trailer-brake hand control.
15. A vehicle that has been converted to dual steering does not have its service brake replicated on the other side of the vehicle.
16. A service brake is not capable of stopping the vehicle at any load condition up to the gross vehicle mass or gross combination mass, as applicable, either within a distance (s) in metres calculated by the following equation:  $s = 0.15v + (v^2/130)$  where the speed of the vehicle (v) in km/h before the start of braking is at least the lesser of 50 km/h or 80% of the maximum speed of the vehicle, or within a distance of 7m from a speed of 30 km/h, measured from the point at which movement of the brake control commences and finishing at the point when the vehicle comes to a complete stop.
17. A vehicle of class MD3, MD4, ME, NB, NC, TC or TD, first registered in New Zealand on or after 1 November 1990, does not have a service brake that acts on each wheel.
18. The parking brake of a vehicle, whether or not it is being operated as a combination vehicle, is not able to be applied by the driver from the normal driving position using one control only except for a class TC vehicle.
19. A class TC vehicle is not able to have its parking brake activated by the driver from the normal driving position and the vehicle is not part of a dedicated combination and does not have an air brake or a brake that is operated with the assistance of compressed air or it is not fitted with a temporary park brake that complies with the Rule or the control is not fitted in a readily accessible position or the towing vehicle is not fitted with appropriate signage.
20. The parking brake of a vehicle first registered in New Zealand on or after 1 November 1990 does not act on at least 40% of the wheels.
21. A class NB or NC vehicle fitted with a transmission/Cardan shaft park brake does not have a warning label, visible to the driver, advising that a transmission/Cardan shaft park brake is fitted to this vehicle (see Figure 5-1-1).
22. The parking brake of a vehicle, other than a semi-trailer, is not, at any load condition up to the gross vehicle mass or gross combination mass, as applicable, capable of stopping the vehicle within a distance of 18m from a speed of 30 km/h, or holding the vehicle stationary on a slope of 18% whether facing uphill or downhill.
23. A semi-trailer first registered in New Zealand on or after 1 November 1990, does not have a parking brake that generates a deceleration load of at least 20% of the maximum weight that can be carried on the axle or axle set.
24. A vehicle does not have an emergency brake that operates either in combination with the parking brake or the service brake of a powered vehicle, if the vehicle is fitted with a full dual-circuit service brake, and either one of those circuits activates the brake on all the front wheels and the other circuit activates the brake on all the rear wheel or each circuit activates the brake on at least 1/3 of the wheels.
25. For a powered vehicle first registered in New Zealand during the period beginning on 1 November 1990 and ending on 31 December 1994, the brake remains unmodified since the vehicle was manufactured, the vehicle has a mechanically-operated parking brake acting on the transmission and the vehicle does not have either a dual-line service brake that is fitted with a tandem/dual master cylinder or a single-line hydraulic service brake that is divided into two independent circuits through an excess flow prevention valve, and the brake fluid reservoir is fitted with a low-level

warning device.

25. The emergency brake of a trailer does not operate immediately and automatically to stop and hold the trailer stationary if it becomes disconnected from the towing vehicle.

26. The emergency brake of a semi-trailer does not, as far as is practicable, act on the wheels that remain in contact with the ground if the semi-trailer becomes disconnected from the towing vehicle during operation.

27. The emergency brake of a vehicle first registered in New Zealand on or after 1 November 1990 does not act as directly as practicable on those wheels without the interposition of any differential gearing.

28. The emergency brake of a vehicle, other than a semi trailer, first registered in New Zealand on or after 1 November 1990 is not capable of stopping the vehicle at any load condition up to the gross vehicle mass or gross combination mass, as applicable, within a distance of 18 m from a speed of 30 km/h.

29. The emergency brake of a semi trailer, first registered in New Zealand on or after 1 November 1990, is not capable of generating brake forces to the sum of at least 20% of the maximum weight that can be carried on the axle or axle set.

30. An imported vehicle, other than a trailer, first registered in NZ on or after 1 July 2008 does not meet one of the approved brake standards in the Rule.

31. A vehicle used in combination, manufactured in NZ and first registered on or after 1 July 2008, is not certified to Schedule 5 of the Rule using:

a) manual calculations, or

b) the version of the approved proprietary software, with NZ compatibility requirements superimposed (Note 3), or

c) the NZ brake calculator current at the time of certification.

32. a vehicle not used in combination, manufactured in NZ and first registered on or after 1 July 2008 is not certified to Schedule 5 or Section 6 (Note 1) of the Rule.

33. A vehicle has been fitted with a retarder or an engine brake on or after 1 March 2007 that does not have a control that can be operated from the driver's normal driving position.

34. A vehicle has been fitted with a retarder or an engine brake on or after 1 March 2007 that is not designed so that its operation does not cause wheelslip that could result in loss of directional control of the vehicle.

35. A vehicle has been fitted with a retarder or an engine brake on or after 1 March 2007 and the retardation cannot be regulated by the driver using the control to prevent wheelslip that could result in loss of directional control of the vehicle.

36. A retarder or an engine brake of a powered vehicle, which activates the brake of a trailer that is being towed, may cause wheelslip on the vehicle that could result in loss of directional control.

37. A trailer is fitted with a device that allows the release of its parking brake even when the brake of the trailer is not connected to the brake of the towing vehicle but it does not ensure that the parking brake of the trailer is automatically applied when the trailer's brake is reconnected to the brake of the towing vehicle and the parking brake is reapplied.

38. A vehicle is fitted with a device that can be operated by the driver from the driver's normal driving position to keep the vehicle stationary temporarily but the device does not allow the safe operation of the service or parking brake of the vehicle.

39. A device in requirement 35 which can only be de-activated by the driver does not have a label permanently attached displaying the words: "NOT FOR PARKING".

40. A device in requirement 35 that can be de-activated by the control system of the vehicle does not have either a label permanently attached displaying the words: "NOT FOR PARKING" or an audible warning device that operates when the driver's door is open while the device is activated and the parking brake is not fully applied.

41. A vehicle of class MD3, MD4, ME, NB or NC manufactured or modified in New Zealand on or after 1 July 2008 in a way that affects the performance of a brake, and that does not have a towing connection to tow a heavy trailer does not comply with requirement 40.

42. A heavy vehicle not fitted with a towing connection does not demonstrate compliance of the service brake with the requirements in requirements 7(b) and 11(a) by either certification for compliance with the requirements in Schedule 5 or stopping tests (Note 1).

43. An imported vehicle of class MD3, MD4, ME, NB or NC first registered in New Zealand on or after 1 July 2008 and that does not have a towing connection to tow a vehicle of class TC or class TD does not comply with one or more of the approved vehicle standards in requirement 23.

44. The brake of a heavy vehicle that has been fitted with a towing connection to tow a vehicle of class TC or class TD do not comply with requirement 42.

45. A vehicle imported into or manufactured in New Zealand prior to 1 March 2007 and certified for compliance with one of the codes or specifications in Schedules 1 to 4 does not comply with that code or specification, if that vehicle (Note 2):

a) has been modified on or after 1 March 2007, and/or

b) Is not being operated in a combination that has a gross mass exceeding 39,000kg but not exceeding 44,000kg.

46. A vehicle in requirement 42 first registered in New Zealand after 1 March 2007 and before 1 July 2008 that is being operated in a combination vehicle that has a gross mass exceeding 39,000kg but not exceeding 44,000kg, does not comply with:

a) the New Zealand Heavy Vehicle Brake Code, Second Edition (1997) in Schedule 4, or

b) the Interim Specification for Heavy Vehicle Braking in Schedule 1, or

c) the requirements with which a vehicle of the same class must comply if first registered in New Zealand or modified in New Zealand on or after 1 July 2008.

47. An imported vehicle of class NB or class NC to which 41 applies that is first registered in New Zealand on or after 1 July 2008 does not comply with:

a) at least one of the approved vehicle standards in requirement 23 (a) or (b), and

b) requirement 47, or

c) all of the following:

i. one or more of the approved vehicle standards in requirement 23(c), (d), (e), (f) and (g), and

ii. be fitted with an anti-lock braking system except for a logging vehicle, provided that the standard with which it complies does not require an ABS function, and

iii. requirement 47.

48. A vehicle of class NB or class NC in requirement 42 that is manufactured in New Zealand and is first registered on or after 1 July 2008, or a vehicle of class NB or class NC modified in New Zealand on or after that date, does not comply with requirements 61 to 64.

49. A vehicle in requirements 44, 45 or 46 that is fitted with an air brake does not, when the trailer becomes disconnected from the towing vehicle, have a means by which:

a) the air brake of the towing vehicle is protected from the loss of air pressure, or

b) the air brake of the trailer is activated.

50. A vehicle of class TC or class TD in requirement 42 first registered or modified in New Zealand on or after 1 July 2008 does not comply with the requirements in 61 to 64.

51. A vehicle of class TC or TD, certified for compliance with one of the codes or specifications in Schedules 1 to 4 before 1 March 2007 does not continue to comply with that code or specification and that vehicle:

a) has not been modified on or after 1 March 2007, or

b) is being operated in a combination vehicle that has a gross mass exceeding 39,000kg, but not exceeding 44,000kg.

52. A vehicle of class TC or TD, first registered in New Zealand or modified on or after 1 March 2007 and before 1 July 2008 that is being operated in a combination vehicle with a gross mass exceeding 39,000 kg but not exceeding 44,000 kg, does not comply with either:

a) the New Zealand Heavy Vehicle Brake Code, Second Edition (1997) in Schedule 4, or

b) the Interim Specification for Heavy Vehicle Braking in Schedule 1, or

c) requirements 61 to 64.

53. A vehicle of class TC or class TD first registered in New Zealand on or after 1 July 2008, or modified on or after that date, does not comply with the requirements in requirements 61 to 64.

54. An air-braked vehicle of class TC or TD, except a vehicle that complies with the Interim Specification for Heavy Vehicle Braking in Schedule 1, or a vehicle that has an electronic control device which is capable of regulating and optimising vehicle deceleration according to an electric signal provided by the driver's brake control, does not have a threshold pressure between 55 and 80 kPa (inclusive).

55. An anti-lock braking system of a vehicle of class NB, NC, TC or TD first registered in New Zealand on or after 1 July 2008, or that was fitted to a vehicle of those classes in New Zealand on or after that date, is not capable of continuously controlling and adjusting the braking effort on the wheels during braking to prevent:

a) the wheels from locking, or

b) the loss of directional control of the vehicle that could be caused by the application of the brake.

56. A control device in requirement 54 does not meet the technical requirements in

a) one or more of the approved vehicle standards in requirement 23, if those standards specify requirements for that device, or

b) requirements 56 to 59.

57. A control device to which requirement 55(b) applies does not act on each axle or is not capable of modulating the brake force separately for:

a) each axle set, or

b) each side of all axle sets except steering axles.

58. A control device to which requirement 55(b) applies does not have sensors to monitor the rotational speed of the wheels.

59. The wheel sensors are not fitted to at least one wheel on each side of all axle sets.

60. If an axle set consists of more than one axle, wheel sensors are not fitted as follows:

a) if the axle set consists of two axles designed to carry the same or a similar load, the sensors are fitted at least to the axle on which the wheels are more likely to lock during braking, or

- b) if the axle set consists of two axles and they are designed to carry significantly different loads, the sensors are fitted at least to the axle that carries the greater load, or
- c) if the axle set consists of more than two axles and they are designed to carry the same or a similar load, the sensors are fitted at least to the axle on which the wheels are neither the most likely nor the least likely to lock during braking, or
- d) if the axle set consists of more than two axles and one of them is designed to carry a significantly greater load than other axles in the set, the sensors are fitted at least to the axle that carries the greatest load, or
- e) if the axle set consists of more than two axles and two or more of them carry a greater load than the remaining axle or axles in the set, the sensors are fitted at least to an axle:
  - i. that is one of the axles carrying a greater load, and
  - ii. the wheels of which are most likely to lock
- f) if the axle set consists of more than two axles and two or more of them carry a greater load than the remaining axle or axles in the set and the likelihood that their wheels will lock is similar, the sensors are fitted to any of the axles that carries the greater load, or
- g) if the axle set consists of two or more axles that carry a similar load, and the likelihood that their wheels will lock is similar, the sensors are fitted to any of the axles.

61. A control device in 53 that is fitted to a trailer of class TC or class TD does not:

- a) comply with the requirements in 53 to 60, without being connected to the control device of the towing vehicle, or
- b) be capable of being supplied with power for its operation by means of an electric cable from the towing vehicle.

62. The power connection between vehicles that can be operated in a combination vehicle does not comply with Parts 1 and 2 of ISO 7638: 1997, Road vehicles – Electrical connectors for braking systems.

63. A vehicle first registered on or after 1 July 2008 is fitted with brake hoses or tubes that do not meet one of the approved standard in the Rule.

64. A vehicle modified on or after 1 July 2008 is fitted with brake hoses or tubes that are not OE and do not meet one of the approved standard in the Rule.

65. A vehicle has been modified in such a way that it no longer complies with the Rule.

66. A vehicle has been modified in a way that may affect compliance with this Rule, such as by alteration of a vehicle's wheelbase, fitment of an additional axle, removal of an axle, replacement of an axle with one that is not of the same make and model, or replacement of the brake of an axle with one that is not of the same make and model and the performance of the brake has not been checked and modified if necessary to ensure continued compliance with this Rule.

67. A vehicle that is modified has not been either modified so as to continue to meet the technical and performance requirements of the approved standard with which the vehicle originally complied or to comply with all other applicable requirements in this Rule.

68. A repair to a brake, or to a vehicle that affects its braking performance, does not comply with this Rule or with Land Transport Rule: Vehicle Repair 1998.

69. A brake lining or a brake pad on an axle has been replaced but all the brake linings or brake pads on that axle were not replaced or all the replacement brake linings and brake pads on that axle were not of the same make, type and grade.

70. A component used in a repair does not have equivalent performance characteristics to that of the original component.

71. A repair or adjustment of a brake does not ensure that the brake:

- a) complies with this Rule, or
- b) complies with Land Transport Rule: Vehicle Repair 1998.

72. A person who modifies a vehicle so as to affect the braking performance of the vehicle has not:

- a) ensured that the modification does not prevent the vehicle from complying with this Rule, or
- b) notified the operator that the vehicle must be inspected and, if necessary, certified by a person or organisation appointed to carry out specialist inspection and certification of heavy vehicle brakes (refer to [Technical bulletin 4](#)).

73. A vehicle inspector or inspecting organisation has certified a motor vehicle under Land Transport Rule: Vehicle Standards Compliance 2002 and they had reason to believe that the vehicle did not comply with this Rule.

74. During the certification of a vehicle, compliance of a vehicle's brakes with the performance requirements in this Rule has not been verified by means of appropriate tests, using approved testing devices and following correct test procedures.

75. For a vehicle to which requirement 11 applies, if a certifier an excessive delay between the time the driver starts to brake and when effective braking starts, has not verified compliance with the stopping-distance requirements by measuring the stopping distance as specified in requirement 13.

#### **Note 1**

Where a non-towing vehicle is being complied using Section 6 of the Rule instead of Schedule 5, the format below must be used with the certifier's letterhead to record the test results used to prove compliance as part of certification.

- [Download MS Word version](#)



Figure 5-1-1. Cardan shaft park brake warning sticker



## Summary of legislation

### Applicable legislation

- [Land Transport Rule: Heavy Vehicles 2004](#)
- [Land Transport Rule: Heavy Vehicle Brakes 2006](#)

### Heavy Vehicle Brakes

1. A vehicle, other than an armoured vehicle used exclusively by the NZ Defence Forces, a steam powered vehicle, a vehicle with self laying tracks, a traction engine, a mechanically propelled roller, a tractor or machine used solely in farm or roading operations, whether for traction or otherwise, and not capable of a speed exceeding 30km/h, together with any trailer used on the road only while drawn by that tractor or machine, a vehicle normally propelled by mechanical power while it is being temporarily towed without the use of its own power, an agricultural trailer, must have a service brake, a parking brake and an emergency brake, except for a semitrailer first registered before 1 November 1990 that must have a service brake only.
2. Vehicles exempt the requirements in 1 must have a means by which the driver of the vehicle can control its movement and can stop and hold the vehicle stationary under all conditions of use.
3. A brake must:
  - a) be easily adjustable to compensate for wear or have a means of automatic adjustment, and
  - b) be maintained in good condition and efficient working order
4. A brake that simultaneously applies braking pressure on two wheels with a common axis must be adjusted or fitted so that the braking effect is approximately the same on both wheels when the brake is applied by the driver, except if the braking effect is modulated by a control device to prevent the wheels locking or to improve stability.
5. A brake must be maintained within safe tolerance of its state when manufactured, having regard to the vehicle manufacturer's or brake manufacturer's specifications.
6. The friction materials of a brake must be:
  - a) secure, and

b) in good condition, and

c) free of defects that could noticeably and adversely affect the performance of the brake.

7. When a vehicle's brake is applied on a hard, dry, level surface that is free of loose material, and without assistance from the compression of the vehicle's engine or other auxiliary braking device that is not part of the vehicle's service brake:

a) the vehicle or its controls must not vibrate so as to noticeably and adversely affect the control of the vehicle, and

b) the braking effect on each braked wheel of the vehicle must provide stable and efficient braking without adverse effect on the directional control of the vehicle, and

c) if the vehicle is equipped with an anti-lock braking system, the vehicle's rotationally sensed wheels must not lock, when the speed of the vehicle is above the ABS-activation parameters set by the vehicle manufacturer.

8. Except for brake pad warning systems, a warning system that is fitted to a vehicle and is part of, or associated with the use of, a brake component or system must function correctly.

## Requirements for different types of brake

### Service brake

9. The service brake of a vehicle:

5-2 Brakes (Air)

## Reasons for rejection

1. A vehicle using compressed air to operate the braking system is not equipped with one or more

a) air compressors or other means of generating compressed air, or

b) air reservoirs or other means of storing compressed air, or

c) pressure gauges and pressure warning devices.

2. The compressor of a passenger service vehicle first registered in New Zealand on or after 10 February 1978 is not capable of raising, in not more than 90 seconds, the pressure in the air storage system from the pressure in 3 to the maximum operating pressure specified by the vehicle manufacturer or brake manufacturer at either:

a) the maximum governed speed of the vehicle's engine, or

b) an engine speed determined by the certifier, if the engine is not governed.

3. The compressor of the air brake does not have the capacity required if measured by starting from the pressure to which the air brake falls from the maximum specified operating pressure as a result of five full service-brake applications made in accordance with requirement 14.

4. The compressor of a vehicle, other than a passenger service vehicle, is not capable of raising the pressure in the air storage system to the maximum operating pressure specified by the vehicle manufacturer or brake manufacturer, at a speed specified in requirement 2(a) or (b), in not more than:

a) 3 minutes, starting from the pressure at which the low-pressure warning device ceases to operate, or when the emergency brake operates, or

b) 90 seconds, starting from the pressure to which the air brake falls from the maximum operating pressure, specified by the vehicle manufacturer or brake manufacturer, as a result of fully applying and releasing the service brakes five times in accordance with requirement 14.

5. A powered vehicle to which requirements 8 to 10 applies, other than a passenger service vehicle first registered in New Zealand before 10 February 1978, is not fitted with a device that provides a continuous signal that is clearly visible or audible from the driver's normal driving position if any service brake reservoir is below the minimum safe operating pressure as defined in requirement 22.

6. A passenger service vehicle first registered in New Zealand on or after 10 February 1978 is not fitted with at least one gauge that:

a) is readily visible to the driver at all times from the driver's normal driving position

b) indicates, to the driver, the pressure in at least one service brake reservoir.

7. The compressed-air reservoir of the service brake of a passenger service vehicle that was first registered in New Zealand before 10 February 1978 is not fitted with:

a) a pressure gauge in requirement 7, or

b) a visual warning device in requirement 2.

9. A powered vehicle, other than a passenger service vehicle, is not fitted with at least one gauge that:

a) is readily visible to the driver at all times from the driver's normal driving position, or

b) indicates, to the driver, the pressure in at least one service brake reservoir.

10. A pressure gauge in requirements 7 to 9 does not indicate the pressure in pressure units, or on a coloured scale, or in an equivalent way

11 The compressed-air reservoir capacity of a passenger service vehicle first registered in New Zealand on or after 10 February 1978, and of a powered vehicle other than a passenger service vehicle, does not, when the air pressure in the brake is at its maximum operational pressure specified by the vehicle manufacturer or brake manufacturer and the compressor is stopped, enable the reserve of compressed air of the brake to provide:

a) at least five full service-brake applications with full release of the brakes after each application before the low pressure warning device operates, or

b) two full service-brake applications with full release of the brakes after each application following activation of the low pressure warning device.

Except the at least three full service brake applications before the emergency valve operates as allowed for in a combination vehicle that is equipped with:

a) both:

i. an emergency or a breakaway valve on the trailer, and

ii. a tractor protection valve on the towing vehicle, or

b) other devices that are fitted to protect the air system of the towing vehicle and to activate the brake of the trailer when the trailer becomes disconnected from the towing vehicle. or

c) meets one of the approved standards in 5.1 Summary of Legislation 23 (a) or (b)

12. A full service-brake application is not made in that all brake actuators on the vehicle do not operate to apply their associated brakes in an effective manner.

13. The compressor does not 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.
14. An air brake does not have priority of the supply of compressed air from the brake reservoir.
15. An air-operated device is connected to the air brake of a vehicle, and:
- a) the brake is not 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, or
  - b) the supply to the device is not drawn from a reservoir separate from the service brake or parking brake reservoir(s) supplying the brake, except as specified in 18.
16. Despite requirement 17(b), an air-operated device is supplied with compressed air from the service brake or parking brake reservoir(s), and the operation of the device requires a large amount of compressed air.
17. 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
18. 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
19. 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
20. If a vehicle to which requirement 5 and/or 6 applies has more than one compressed-air service or parking brake circuit, a failure in any service or parking brake circuit that lowers the pressure in any service or parking brake reservoir, below the minimum safe operating pressure, reduces the pressure in any other service or parking brake reservoir below the minimum safe operating pressure.
21. The brake system does not meet the minimum safe operating pressure by meeting either:
- a) the minimum safe operating pressure specified by the vehicle manufacturer or brake manufacturer, or
  - b) if no minimum safe operating pressure is specified by the vehicle manufacturer or brake manufacturer, 50% of the correctly adjusted cut-out pressure for the compressor-governor.
22. An air-braked vehicle that has been fitted with a towing connection to tow a vehicle of class TC or class TD or is a class TC or class TD trailer, except a vehicle that complies with the Interim Specification for Heavy Vehicle Braking in Schedule 1, or a vehicle that has an electronic control device which is capable of regulating and optimising vehicle deceleration according to an electrical signal provided by the driver's brake control, does not have a threshold pressure between 55 and 80 kPa (inclusive).
23. 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).
24. 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.
25. The air brake of a vehicle first registered in New Zealand on or after 1 March 2007 or modified on or after that date that can be operated in a combination vehicle is not capable of being connected to the air brake of the other vehicle by means of a two-line system.

26. A two-line system does not consist of:

- a) a supply line that supplies compressed air from the towing to the towed vehicle, and
- b) a control line that supplies a control signal, in the form of modulated air pressure, to regulate the intensity of the brake application on the towed vehicle or vehicles.

27. For vehicles towing semi-trailers and for semi-trailers, the hoses connecting the towed and towing vehicles are not part of the towing or towed vehicle or are not detachable at both ends.

28. For vehicles other than those towing semi-trailers, the hoses not part of the trailer or securely attached to the drawbar

29. A towing vehicle or a towed vehicle in requirement 26 is not fitted with a coupling device, approved by the Transport Agency, to connect the brake to, and disconnect it from, that of the other vehicle, or that device is not:

- a) robust, durable, and suitable for automotive application, or
- b) able to prevent, either through the design of the coupling device or through its installation, the incorrect connection of the control and supply lines, or
- c) set so that it cannot adversely affect the performance of the brake of either the towing or towed vehicle(s), or
- d) able to have an effective breakaway function.

30. Subject to requirement 31, if a vehicle is fitted with a duomatic- or triomatic-type coupling device, the control line in 25 is not connected to the port of the coupling device that is closest to the opening handle.

31. Subject to requirement 31, if a vehicle is fitted with a duomatic- or triomatic-type coupling device, the supply line in 26(a) is not connected to:

- a) the middle port of the triomatic coupling device, or
- b) the port of the duomatic coupling device that is farthest away from the opening handle.

32 . A vehicle, other than one that complies with the Interim Performance Specification for Heavy Vehicle Braking in Schedule 1, that was fitted with a duomatic- or triomatic-type coupling device before 1 July 2008 and that was not required to comply with the requirements in 29 and 30, does not comply with these requirements by the date of its first certificate of fitness inspection on or after 1 July 2008.

33. The socket of a duomatic- or triomatic-type coupling device is not fitted:

- a) to the rear of a towing vehicle, or
- b) to the front of a semi-trailer.

34. The socket of a coupling device in requirement 28 is not fitted as close as practicable to:

- a) the centre-line of the vehicle, or
- b) the towing connection by which the towed and towing vehicles are connected.

35. The socket of a coupling device in requirement 28 that is fitted to the front of a semi-trailer is fitted with a non-return valve.

36. The fitting of a coupling device in requirement 28 has been carried out without regard to the instructions of the vehicle manufacturer

# Summary of legislation

## Applicable legislation

- [Land Transport Rule: Heavy Vehicle Brakes 2006](#)

## Use of compressed air

1. A vehicle using compressed air to operate the braking system must be equipped with one or more:
  - a) air compressors or other means of generating compressed air, and
  - b) air reservoirs or other means of storing compressed air, and
  - c) pressure gauges and pressure warning devices.

## Compressor capacity

2. The compressor of a passenger service vehicle first registered in New Zealand on or after 10 February 1978 must be capable of raising, in not more than 90 seconds, the pressure in the air storage system from the pressure in 3 to the maximum operating pressure specified by the vehicle manufacturer or brake manufacturer at either:

- a) the maximum governed speed of the vehicle's engine, or
- b) an engine speed determined by a vehicle inspector or inspecting organisation, if the engine is not governed.

3. For the purposes of 2, the compressor capacity of the air brake must be measured by starting from the pressure to which the air brake falls from the maximum specified operating pressure as a result of five full service-brake applications made in accordance with 13.

4. The compressor of a vehicle, other than a passenger service vehicle, must be capable of raising the pressure in the air storage system to the maximum operating pressure specified by the vehicle manufacturer or brake manufacturer, at a speed specified in 2a) or b), in not more than:

- a) 3 minutes, starting from the pressure at which the low-pressure warning device ceases to operate, or when the emergency brake operates, and
- b) 90 seconds, starting from the pressure to which the air brake falls from the maximum operating pressure, specified by the vehicle manufacturer or brake manufacturer, as a result of fully applying and releasing the service brakes five times in accordance with 13.

## Pressure warning devices

5. A powered vehicle to which 7 to 9 applies, other than a passenger service vehicle first registered in New Zealand before 10 February 1978, must be fitted with a device that provides a continuous signal that is clearly visible or audible from the driver's normal driving position if any service brake reservoir is below the minimum safe operating pressure as defined in 21.

6. The audible signal of the device in 5 may be rendered inoperative if the parking brake is fully applied or the vehicle is fitted with an automatic transmission and it is in the park position.

## Pressure gauges

7. A passenger service vehicle first registered in New Zealand on or after 10 February 1978 must be fitted with at least one gauge that:

a) is readily visible to the driver at all times from the driver's normal driving position

b) indicates, to the driver, the pressure in at least one service brake reservoir.

8. The compressed-air reservoir of the service brake of a passenger service vehicle that was first registered in New Zealand before 10 February 1978 must be fitted with:

a) a pressure gauge in 6, or

b) a visual warning device in 2.

9. A powered vehicle, other than a passenger service vehicle, must be fitted with at least one gauge that:

a) is readily visible to the driver at all times from the driver's normal driving position, and

b) indicates, to the driver, the pressure in at least one service brake reservoir.

10. A pressure gauge in 6 to 8 must indicate the pressure in pressure units, or on a coloured scale, or in an equivalent way

### **Reservoir capacity**

11 The compressed-air reservoir capacity of a passenger service vehicle first registered in New Zealand on or after 10 February 1978, and of a powered vehicle other than a passenger service vehicle, must, when the air pressure in the brake is at its maximum operational pressure specified by the vehicle manufacturer or brake manufacturer and the compressor is stopped, enable the reserve of compressed air of the brake to provide:

a) at least five full service-brake applications with full release of the brakes after each application before the low pressure warning device operates, and

b) two full service-brake applications with full release of the brakes after each application following activation of the low pressure warning device.

12. The requirement for at least five full service-brake applications in 11(a) may be reduced to four for a vehicle that complies with the approved standard in 5.1 Summary of Legislation 23 (a) or (b)

13. The requirement for at least five full service-brake applications in 11(a) may be reduced to at least three before the emergency valve operates for a combination vehicle that is equipped with:

a) both:

i. an emergency or a breakaway valve on the trailer, and

ii. a tractor protection valve on the towing vehicle, or

b) other devices that are fitted to protect the air system of the towing vehicle and to activate the brake of the trailer when the trailer becomes disconnected from the towing vehicle.

14. For the purposes of 3, 4(b), 11 and 12, a full service-brake application is made when all brake actuators on the vehicle are operated to apply their associated brakes in an effective manner.

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

15. 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.

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

17. 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 18.

18. Despite 17b), 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 8 mm, or
- b) the device is operated only when the vehicle is stationary, or
- c) the vehicle manufacturer allows it.

19. If a vehicle to which 5 and/or 6 applies has more than one compressed-air service or parking brake circuit, a failure in any service or parking brake circuit that lowers the pressure in any service or parking brake reservoir, below the minimum safe operating pressure, must not reduce the pressure in any other service or parking brake reservoir below the minimum safe operating pressure.

#### **Minimum safe operating pressure**

20. **Minimum safe operating pressure** means:

- a) the minimum safe operating pressure specified by the vehicle manufacturer or brake manufacturer, or
- b) if no minimum safe operating pressure is specified by the vehicle manufacturer or brake manufacturer, 50% of the correctly adjusted cut-out pressure for the compressor-governor.

21. An air-braked vehicle that has been fitted with a towing connection to tow a vehicle of Class TC or Class TD or is a Class TC or Class TD trailer, except a vehicle that complies with the Interim Specification for Heavy Vehicle Braking in Schedule 1, or a vehicle that has an electronic control device which is capable of regulating and optimising vehicle deceleration according to an electrical signal provided by the driver's brake control, must have a threshold pressure between 55 and 80 kPa (inclusive).

#### **Modifications**

22. 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.

#### **Modifications that do not require specialist certification**

23. The following modifications do not require specialist certification:

- a) an adjustment of the brake system for the purpose of complying with an 80kPa threshold pressure on a prime mover or trailer
- b) the replacement of an air brake coupling device on a powered vehicle for the purpose of complying with 7.3

- c) the fitting of an air brake coupling device to a powered vehicle that is carried out:
  - i. for the purpose of complying with 7.3, and
  - ii. in accordance with the manufacturer's recommendations
- d) the fitting of a valve to a powered vehicle to allow the parking brake of any towed trailer(s) to operate.

#### **Requirements for the connection of the air brake of vehicles in a combination vehicle**

24. The air brake of a vehicle first registered in New Zealand on or after 1 March 2007 or modified on or after that date that can be operated in a combination vehicle must be capable of being connected to the air brake of the other vehicle by means of a two-line system.

25. A two-line system must consist of:

- a) a supply line that supplies compressed air from the towing to the towed vehicle, and
- b) a control line that supplies a control signal, in the form of modulated air pressure, to regulate the intensity of the brake application on the towed vehicle or vehicles.

26. For vehicles towing semi-trailers and for semi-trailers, the hoses connecting the towed and towing vehicles are to be considered as part of the towing or towed vehicle or to be detachable at both ends.

27. For vehicles other than those towing semi-trailers, the hoses are to be treated as part of the trailer and must be securely attached to the drawbar

28. A towing vehicle and a towed vehicle in 26 must be fitted with a coupling device, approved by the Agency, to connect the brake to, and disconnect it from, that of the other vehicle, and that device must:

- a) be robust, durable, and suitable for automotive application, and
- b) prevent, either through the design of the coupling device or through its installation, the incorrect connection of the control and supply lines, and
- c) not adversely affect the performance of the brake of either the towing or towed vehicle(s), and
- d) have an effective breakaway function.

29. Subject to 31, if a vehicle is fitted with a Duomatic- or Triomatic-type coupling device, the control line in 25 must be connected to the port of the coupling device that is closest to the opening handle.

30. Subject to 31, if a vehicle is fitted with a Duomatic- or Triomatic-type coupling device, the supply line in 25a) must be connected to:

- a) the middle port of the Triomatic coupling device, or
- b) the port of the Duomatic coupling device that is farthest away from the opening handle.

31 . A vehicle, other than one that complies with the Interim Performance Specification for Heavy Vehicle Braking in Schedule 1, that has been fitted with a Duomatic- or Triomatic-type coupling device before 1 July 2008 and that was not required to comply with the requirements in 29 and 30, must comply with these requirements by the date on which the first

#### **Certificate of Fitness inspection is due on or after 1 July 2008.**

32. The socket of a Duomatic- or Triomatic-type coupling device must be fitted:

- a) to the rear of a towing vehicle, and

b) to the front of a semi-trailer.

33. The socket of a coupling device in 28 must be fitted as close as practicable to:

a) the centre-line of the vehicle, and

b) the towing connection by which the towed and towing vehicles are connected.

34. The socket of a coupling device in 28 that is fitted to the front of a semi-trailer must not be fitted with a non-return valve.

35. The fitting of a coupling device in 28 must be carried out having regard to the instructions of the vehicle manufacturer

## 5-3 Brakes (Hydraulic)

### Reasons for rejection

1. A vehicle fitted with an hydraulic brake does not, comply with the requirements in the Heavy-vehicles Brake Rule.

2. The volume of the hydraulic fluid supplied by the master cylinder or booster cylinder of an hydraulic brake during a single stroke is not sufficient for the effective operation of the wheel brakes, even if all wheel brakes are worn to the permitted wear limit or are in the permitted maximum out-of-adjustment position.

3. A passenger service vehicle first registered in New Zealand on or after 10 February 1978, has a parking brake acting solely through the transmission and is fitted with an hydraulic service brake, does not have a dual or tandem master cylinder that allows:

a) one of those cylinders to actuate the brakes on the front wheels of the vehicle and the other cylinder to actuate the brakes on the rear wheels of the vehicle, or

b) each circuit to activate the brake on at least 1/3 of the wheels.

4. A vehicle of class NB or class NC first registered in New Zealand on or after 1 November 1990, that has a parking brake acting solely through the transmission and is fitted with an hydraulic service brake, does not have a dual or tandem master cylinder that allows:

a) one of those cylinders to actuate the brakes on the front wheels of the vehicle and the other cylinder to actuate the brakes on the rear wheels of the vehicle, or

b) each circuit to activate the brake on at least 1/3 of the wheels.

5. A passenger service vehicle first registered in New Zealand on or after 1 September 1954, fitted with a brake that is operated by pump-generated hydraulic pressure, is not fitted with the following devices that provide to the driver a signal that is clearly audible and readily visible from the driver's normal driving position to ensure that, at all times, the driver is aware immediately that the hydraulic pressure is less than the pressure necessary for the safe operation of the vehicle:

a) an audible warning device, and

b) either:

i. a warning lamp, or

ii. a suitable pressure gauge that is able to indicate both the maximum and minimum pressures being used.

6. A passenger service vehicle with more than nine seating positions first registered in New Zealand on or after 10 February 1978, which utilises vacuum to boost the force supplied by the driver to apply the brakes and is fitted with a vacuum reservoir, is not equipped with:
- a) a warning device to give a continuous signal audible to the driver if the vacuum in the reservoir is less than 25kPa or its equivalent, and
  - b) a vacuum gauge to indicate to the driver, in kilopascals or other units, the vacuum available in the reservoir.
7. 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 does not have an air operated disc brake as a service brake.
8. 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).

## Summary of legislation

### Applicable legislation

- [Land Transport Rule: Heavy Vehicle Brakes 2006](#)

1. A vehicle fitted with an hydraulic brake, whether or not the operation of the brake is assisted by compressed air, vacuum or other means of energy, must comply with the requirements in this section.
2. The volume of the hydraulic fluid supplied by the master cylinder or booster cylinder of an hydraulic brake during a single stroke must be sufficient for the effective operation of the wheel brakes, even if all wheel brakes are worn to the permitted wear limit or are in the permitted maximum out-of-adjustment position.
3. A passenger service vehicle first registered in New Zealand on or after 10 February 1978, or a vehicle of class NB or class NC first registered in New Zealand on or after 1 November 1990, that has a parking brake acting solely through the transmission and is fitted with an hydraulic service brake, must have a dual or tandem master cylinder that allows:
  - a) one of those cylinders to actuate the brakes on the front wheels of the vehicle and the other cylinder to actuate the brakes on the rear wheels of the vehicle, or
  - b) each circuit to activate the brake on at least 1/3 of the wheels.
4. A passenger service vehicle first registered in New Zealand on or after 1 September 1954, fitted with a brake that is operated by pump-generated hydraulic pressure, must be fitted with the following devices that provide to the driver a signal that is clearly audible and readily visible from the driver's normal driving position to ensure that, at all times, the driver is aware immediately that the hydraulic pressure is less than the pressure necessary for the safe operation of the vehicle:
  - a) an audible warning device, and
  - b) either:
    - i. a warning lamp, or
    - ii. a suitable pressure gauge that is able to indicate both the maximum and minimum pressures being used.
5. A passenger service vehicle with more than nine seating positions first registered in New Zealand on or after 10 February 1978, which utilises vacuum to boost the force supplied by the driver to apply the brakes and is fitted with a vacuum reservoir, must be equipped with:

a) a warning device to give a continuous signal audible to the driver if the vacuum in the reservoir is less than 25kPa or its equivalent, and

b) a vacuum gauge to indicate to the driver, in kilopascals or other units, the vacuum available in the reservoir.

6. 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.

## 5-4 Brakes (Electric)

### Reasons for rejection

1. A vehicle, unless exempt, does not have a service brake operating on all wheels

2. A vehicle, unless exempt, does not have a parking brake operating on at least 40% of the wheels, (except a semitrailer first registered before 1 November 1990 that must have a service brake only).

3. A vehicle, unless exempt, does not have an emergency brake, (except a semitrailer first registered before 1 November 1990 that must have a service brake only).

4. The service brake of a vehicle is not able to be applied by the driver from the driver's normal driving position in a controlled and progressive manner.

5. The service brake of a vehicle, unless exempt, must not have any device fitted by which the driver would be able to adjust the brake force distribution between the axles or between the vehicles that are used in a combination vehicle (Note 1).

6. The service brake of a vehicle, whether or not it is being operated as a combination vehicle, does not have one control only except where a trailer brake hand control has been fitted

7. A service brake of class MD3, MD4, ME, NB, NC, TC and TD vehicles first registered in New Zealand on or after 1 November 1990 must act on each wheel.

8. The parking brake of a vehicle, whether or not it is being operated as a combination vehicle, is not able to be applied by the driver from the normal driving position using one control only (Note 1).

9. For a semi-trailer first registered in New Zealand on or after 1 November 1990, the total brake forces generated by the parking brake is not at least 20% of the maximum weight that can be carried on the axle or axle set.

10. The emergency brake of a vehicle does not have a separate circuit and is not combined with either:

a) the parking brake, or

b) the service brake of a powered vehicle, if the vehicle is fitted with a full dual-circuit service brake, and either:

i. one of those circuits activates the brake on all the front wheels and the other circuit activates the brake on all the rear wheels, or

ii. each circuit activates the brake on at least 1/3 of the wheels

11. The emergency brake of a trailer does not operate immediately and automatically to stop and hold the trailer stationary if it becomes disconnected from the towing vehicle.

12. The emergency brake of a semi-trailer does not act on the wheels that remain in contact with the ground if the semi-trailer becomes disconnected from the towing vehicle during operation.

13. The emergency brake of a vehicle first registered in New Zealand on or after 1 November 1990 does not:

- a) act on at least 1/3 of the wheels, unless there is a front/rear split
- b) act as directly as practicable on those wheels without the interposition of any differential gearing.
- c) have capacity to:
  - i. stop the vehicle at any load condition up to the gross vehicle mass or gross combination mass, as applicable, within a distance of 18 m from a speed of 30 km/h, or
  - ii. for a semi-trailer, generate brake forces the sum of which are at least 20% of the maximum weight that can be carried on the axle or axle set.

14. A vehicle that needs it is not fitted with a device that can be operated by the driver from the driver's normal driving position to keep the vehicle stationary temporarily (Note 1)

15. A vehicle is fitted with a device that can be operated by the driver from the driver's normal driving position to keep the vehicle stationary temporarily but the device prevents the safe operation of the service brake or the parking brake of the vehicle.

16. A device in requirement 13 which can only be de-activated by the driver does not have a label permanently attached displaying the words: "NOT FOR PARKING" (Note 1)

17. A device in requirement 13 which can be de-activated by the control system of the vehicle does not have either:

- a) a label permanently attached displaying the words: "NOT FOR PARKING", or
- b) an audible warning device that operates when the driver's door is open while the device is activated and the parking brake is not fully applied.

18. A heavy vehicle certified for compliance with one of the codes or specifications in *Schedules 1 to 4* before 1 March 2007 does not continue to comply with that code or specification.

19. A heavy vehicle certified for compliance with one of the codes or specifications in *Schedules 1 to 4* before 1 March 2007 and has been modified on or after 1 March 2007, and does not continue to comply with that code or specification.

20. A heavy vehicle certified for compliance with one of the codes or specifications in *Schedules 1 to 4* before 1 March 2007 does not continue to comply with that code or specification in that it is not being operated in a combination vehicle that has a gross mass exceeding 39,000 kg, but not exceeding 44,000kg.

21. A vehicle in requirement 17 or 23, first registered in New Zealand or modified on or after 1 March 2007 and before 1 July 2008 that is being operated in a combination vehicle with a gross mass exceeding 39,000kg but not exceeding 44,000kg, does not comply with either:

- a) the *New Zealand Heavy Vehicle Brake Code*, Second Edition (1997) in *Schedule 4*, or
- b) the *Interim Specification for Heavy Vehicle Braking* in *Schedule 1*, or
- c) the specific performance requirements for vehicles manufactured or modified in New Zealand in the Heavy-vehicles Brake Rule (Note 1).

22. A vehicle of in requirement requirement 17 or 23 first registered in New Zealand on or after 1 July 2008, or modified on or after that date, must comply with the specific performance requirements for vehicles manufactured or modified in New Zealand in the Heavy-vehicles Brake Rule (Note 1).

23. An anti-lock braking system of a vehicle of class NB, NC, TC or TD first registered in New Zealand on or after 1 July 2008, or that was fitted to a vehicle of those classes in New Zealand on or after that date, are not able to continuously control and adjust the braking effort on the wheels during braking to prevent:

- a) the wheels from locking, and

b) the loss of directional control of the vehicle that could be caused by the application of the brake.

24. A control device in requirement 26 does not meet the technical requirements in

a) one or more of the approved vehicle standards in the Rule, if those standards specify requirements for that device, or

b) requirements 27 to 32.

25. A control device to which requirement 27(b) applies does not act on each axle or is not capable of modulating the brake force separately for:

a) each axle set, and

b) each side of all axle sets except steering axles.

26. A control device to which requirement 27(b) applies does not have sensors to monitor the rotational speed of the wheels.

27. The sensors in requirement 29 are not fitted to at least one wheel on each side of all axle sets.

28. If an axle set consists of more than one axle, the sensor in requirement 29 is not fitted as follows:

a) if the axle set consists of two axles and they are designed to carry the same or a similar load, the sensors must be fitted to the axle on which the wheels are more likely to lock during braking.

b) if the axle set consists of two axles and they are designed to carry significantly different loads, the sensors must be fitted to the axle that carries the greater load.

c) if the axle set consists of more than two axles and they are designed to carry the same or a similar load, the sensors must be fitted to the axle on which the wheels are neither the most likely nor the least likely to lock during braking.

d) if the axle set consists of more than two axles and one of them is designed to carry a significantly greater load than other axles in the set, the sensors must be fitted to the axle that carries the greatest load.

e) if the axle set consists of more than two axles and two or more of them carry a greater load than the remaining axle or axles in the set, the sensors must be fitted to an axle:

i. that is one of the axles carrying a greater load, and

ii. the wheels of which are most likely to lock.

f) if the axle set consists of more than two axles and two or more of them carry a greater load than the remaining axle or axles in the set and the likelihood that their wheels will lock is similar, the sensors may be fitted to any of the axles that carries the greater load.

g) if the axle set consists of two or more axles that carry a similar load, and the likelihood that their wheels will lock is similar, the sensors may be fitted to any of the axles.

29. A control device in requirement 26 that is fitted to a trailer of class TC or class TD does not:

a) comply with the requirements in requirement 26 to 36 without being connected to the control device of the towing vehicle, or

b) is not capable of being supplied with power for its operation by means of an electric cable from the towing vehicle.

30. The power connection between vehicles that can be operated in a combination vehicle does not comply with Parts 1 and 2 of *ISO 7638: 1997, Road vehicles – Electrical connectors for braking systems*<sup>1</sup>.

31. The brake force applied to a wheel of a heavy vehicle first registered in NZ or modified on after 1. July 2008 during braking on a hard, dry, clean and level surface is not approximately proportional to the load on the wheel, taking into account the dynamic load transfer that occurs during braking between the axles of a vehicle and that also may occur between the vehicles of a combination vehicle, at all conditions of loading up to the vehicle's gross vehicle mass even if not fitted with ABS other than a vehicle covered in 35(c).

32. The brake force applied to a wheel of a heavy vehicle first registered in NZ or modified on after 1. July 2008 during braking on a hard, dry, clean and level surface is not, for a vehicle with ABS, be approximately proportional to the load on the wheel without relying on the operation of ABS, taking into account the dynamic load transfer that occurs during braking between the axles of a vehicle and that also may occur between the vehicles of a combination vehicle, when the vehicle is loaded to its gross vehicle mass.

33. A vehicle does not comply with the requirements in the specific performance requirements for vehicles manufactured or modified in New Zealand and it has been certified for compliance with the requirements in *Schedule 5* and is within safe tolerance of its state when certified.

34. A repair to a brake, or to a vehicle that affects its braking performance, does not comply with [Land Transport Rule: Heavy Vehicle Brakes 2006](#) and with [Land Transport Rule: Vehicle Repair 1998](#).

35. When a brake lining or a brake pad on an axle has been replaced and all the brake linings or brake pads on that axle have not been replaced

36. When a brake lining or a brake pad on an axle has been replaced and the replacement brake linings and brake pads on that axle are not of the same make, type and grade.

37. A component used in a repair does not have equivalent performance characteristics to that of the original component.

38. A repair or adjustment does not comply with [Land Transport Rule: Vehicle Repair 1998](#).

39. A modification to a vehicle that affects the braking performance of the vehicle does not ensure that the modification does not prevent the vehicle from complying with this Rule.

40. A modification to a vehicle that affects its braking performance is not certified by a person or organisation appointed to carry out specialist inspection and certification of heavy vehicle brakes.

41. An electric braked vehicle has not been certified as part of a dedicated combination (Note 1)(Note 2).

42. An electric braked vehicle in a dedicated combination has been certified without both vehicles in the combination being plated with the required certification details (Note 1).

43. An electric braked vehicle is fitted with an operating variable proportioning device (Note 1).

44. An electric braked vehicle is fitted with a brake proportioning switch that provides two levels of braking, laden and unladen, and the switch does not operate automatically when the load is laden or unladen (Note 1).

45. An electric braked vehicle is fitted with any form of indirect application controller (Note 1).

46. An electric braked vehicle has been certified without an exemption from meeting the requirement for compliance with *Schedule 5* of the Rule (Note 1).

#### **Note 1**

Electric braked TC trailers must continue to be certified to comply with the Heavy-vehicle Brakes Rule by a HVS certifier with the 'brakes' category (HVEK) and have an exemption from the requirements of Schedule 5.

Please view the content under the [Procedure](#) tab.

## Note 2

An electric braked class TC trailer may be towed by a light vehicle and there are additional requirements for this covered in [Technical Bulletin 6](#).

# Summary of legislation

## Applicable legislation

- [Land Transport Rule: Heavy Vehicle Brakes 2006](#)

## General safety requirements

1. A vehicle, unless exempt, must have a service brake, a parking brake and an emergency brake, except a semitrailer first registered before 1 November 1990 that must have a service brake only.

2. A brake must:

- a) be easily adjustable to compensate for wear or have a means of automatic adjustment, and
- b) be maintained in good condition and efficient working order, and
- c) enable the vehicle to comply with the requirements in 2.2(5), 2.2(8), 2.3(3), 2.3(5) to 2.3(7), 2.3(11) to 2.3(13) and 2.3(17), when the brake is applied by the driver:
  - i. on a hard dry surface that is free of loose material, and that is level except when the parking brake is applied on a slope, and
  - ii. without assistance from the compression of the vehicle's engine or other auxiliary braking device in *section 5* that is not part of the vehicle's service brake.

## Service brake

3. The service brake of a vehicle:

- a) must be able to be applied by the driver from the driver's normal driving position in a controlled and progressive manner, and
- b) except for a heavy haulage trailer or a military trailer, must not have any device fitted by which the driver would be able to adjust the brake force distribution between the axles or between the vehicles that are used in a combination vehicle.

4. The service brake of a vehicle, whether or not it is being operated as a combination vehicle, must have one control only except where a trailer hand control has been fitted

5. A service brake of class MD3, MD4, ME, NB, NC, TC and TD vehicles first registered in New Zealand on or after 1 November 1990 must act on each wheel

## Parking brake

6. The parking brake of a vehicle, whether or not it is being operated as a combination vehicle, must be able to be applied by the driver from the normal driving position using one control only.

7. Despite 6, the parking brake control of a class TC vehicle may be fitted to the vehicle if:

- a) the vehicle is part of a dedicated combination and does not have an air brake or a brake that is operated with the assistance of compressed air, and
- b) the vehicle is fitted with a compliant temporary brake, and
- c) the control is fitted in a readily accessible position, and
- d) the towing vehicle has a compliant NOT FOR PARKING markings.<sup>8</sup> For a semi-trailer first registered in New Zealand on or after 1 November 1990, the total brake forces generated by the parking brake must be at least 20% of the maximum weight that can be carried on the axle or axle set.

### **Emergency brake**

9. The emergency brake of a vehicle may be combined with either:

- a) the parking brake, or
- b) the service brake of a powered vehicle, if the vehicle is fitted with a full dual-circuit service brake, and either:
  - i. one of those circuits activates the brake on all the front wheels and the other circuit activates the brake on all the rear wheels, or
  - ii. each circuit activates the brake on at least 1/3 of the wheels, or

10. The emergency brake of a trailer must operate immediately and automatically to stop and hold the trailer stationary if it becomes disconnected from the towing vehicle.

11. The emergency brake of a semi-trailer must, as far as is practicable, act on the wheels that remain in contact with the ground if the semi-trailer becomes disconnected from the towing vehicle during operation.

12. The emergency brake of a vehicle first registered in New Zealand on or after 1 November 1990 must:

- a) act on at least 1/3 of the wheels, except if there is a front/rear split
- b) act as directly as practicable on those wheels without the interposition of any differential gearing.
- c) be capable of:
  - i. stopping the vehicle at any load condition up to the gross vehicle mass or gross combination mass, as applicable, within a distance of 18 m from a speed of 30 km/h, or
  - ii. for a semi-trailer, generating brake forces the sum of which is at least 20% of the maximum weight that can be carried on the axle or axle set.

### **Devices to keep a vehicle stationary for a limited time**

13. A vehicle may be fitted with a device that can be operated by the driver from the driver's normal driving position to keep the vehicle stationary temporarily, provided that the device does not prevent the safe operation of the service brake or the parking brake of the vehicle.

14. A device in 13 may utilise the service brake by:

- a) applying the service brake, either partially or fully, on some or all of the vehicle's wheels, or
- b) preventing the release of the service brake, when applied by the driver, on some or all of the vehicle's wheels.

15. A device in 13 which can only be de-activated by the driver must have a label permanently attached displaying the words: "NOT FOR PARKING".

16. A device in 13 which can be de-activated by the control system of the vehicle must either have:

- a) a label permanently attached displaying the words: "NOT FOR PARKING", or
- b) an audible warning device that operates when the driver's door is open while the device is activated and the parking brake is not fully applied.

#### **Additional requirements for towing vehicles**

17. The brake of a heavy vehicle that has been fitted with a towing connection to tow a vehicle of class TC or class TD must comply with 17 to 22.

18. A vehicle in 17 certified for compliance with one of the codes or specifications in *Schedules 1 to 4* before 1 March 2007 must continue to comply with that code or specification, if that vehicle:

- a) has not been modified on or after 1 March 2007, and
- b) is being operated in a combination vehicle that has a gross mass exceeding 39,000kg but not exceeding 44,000kg.

19. A vehicle in 17 first registered in New Zealand after 1 March 2007 and before 1 July 2008 that is being operated in a combination vehicle that has a gross mass exceeding 39,000kg but not exceeding 44,000kg, must comply with:

- a) the *New Zealand Heavy Vehicle Brake Code, Second Edition (1997)* in *Schedule 4*, or
- b) the *Interim Specification for Heavy Vehicle Braking* in *Schedule 1*, or
- c) the requirements with which a vehicle of the same class must comply if first registered in New Zealand or modified in New Zealand on or after 1 July 2008.

20. An imported vehicle of class NB or class NC to which 17 applies that is first registered in New Zealand on or after 1 July 2008 must comply with:

- a) at least one of the approved vehicle standards in the Rule that require ABS, and
- b) all of the following:
  - i. one or more of the approved vehicle standards in the Rule, and
  - ii. be fitted with an anti-lock braking system except for a logging vehicle, provided that the standard with which it complies does not require an ABS function

21. A vehicle of class NB or class NC in 17 that is manufactured in New Zealand and is first registered on or after 1 July 2008, or a vehicle of class NB or class NC modified in New Zealand on or after that date, must comply with 7.5.

22. A vehicle of class TC or class TD in 17 first registered or modified in New Zealand on or after 1 July 2008 must comply with the specific performance requirements for vehicles manufactured or modified in New Zealand.

#### **Additional requirements for trailers**

23. A vehicle of class TC or TD certified for compliance with one of the codes or specifications in *Schedules 1 to 4* before 1 March 2007 must continue to comply with that code or specification, if that vehicle:

- a) has not been modified on or after 1 March 2007, and
- b) is being operated in a combination vehicle that has a gross mass exceeding 39,000 kg, but not exceeding 44,000kg.

24. A vehicle in 23, first registered in New Zealand or modified on or after 1 March 2007 and before 1 July 2008 that is being operated in a combination vehicle with a gross mass exceeding 39,000kg but not exceeding 44,000kg, must comply with either:

- a) the *New Zealand Heavy Vehicle Brake Code*, Second Edition (1997) in *Schedule 4*, or
- b) the *Interim Specification for Heavy Vehicle Braking* in *Schedule 1*, or
- c) the specific performance requirements for vehicles manufactured or modified in New Zealand in the Heavy-vehicles Brake Rule.

25. A vehicle of class TC or class TD in 23 first registered in New Zealand on or after 1 July 2008, or modified on or after that date, must comply with the specific performance requirements for vehicles manufactured or modified in New Zealand in [Land Transport Rule: Heavy Vehicle Brakes 2006](#).

#### **Requirements for anti-lock brake systems (ABS)**

26. An anti-lock braking system of a vehicle of class NB, NC, TC or TD first registered in New Zealand on or after 1 July 2008, or that was fitted to a vehicle of those classes in New Zealand on or after that date, must be capable of continuously controlling and adjusting the braking effort on the wheels during braking to prevent:

- a) the wheels from locking, and
- b) the loss of directional control of the vehicle that could be caused by the application of the brake.

27. A control device in 26 must meet the technical requirements in

- a) one or more of the approved vehicle standards in the Rule, if those standards specify requirements for that device, or
- b) 28 to 32.

28. A control device to which 27(b) applies must act on each axle and must be capable of modulating the brake force separately for:

- a) each axle set, and
- b) each side of all axle sets except steering axles.

29. A control device to which 27(b) applies must have sensors to monitor the rotational speed of the wheels.

30. The sensors in 29 must be fitted to at least one wheel on each side of all axle sets.

31. If an axle set consists of more than one axle, the sensor in 29 must be fitted as follows:

- a) if the axle set consists of two axles and they are designed to carry the same or a similar load, the sensors must be fitted to the axle on which the wheels are more likely to lock during braking.
- b) if the axle set consists of two axles and they are designed to carry significantly different loads, the sensors must be fitted to the axle that carries the greater load.
- c) if the axle set consists of more than two axles and they are designed to carry the same or a similar load, the sensors must be fitted to the axle on which the wheels are neither the most likely nor the least likely to lock during braking.
- d) if the axle set consists of more than two axles and one of them is designed to carry a significantly greater load than other axles in the set, the sensors must be fitted to the axle that carries the greatest load.
- e) if the axle set consists of more than two axles and two or more of them carry a greater load than the remaining axle or axles in the set, the sensors must be fitted to an axle:
  - i. that is one of the axles carrying a greater load, and
  - ii. the wheels of which are most likely to lock.

f) if the axle set consists of more than two axles and two or more of them carry a greater load than the remaining axle or axles in the set and the likelihood that their wheels will lock is similar, the sensors may be fitted to any of the axles that carries the greater load.

g) if the axle set consists of two or more axles that carry a similar load, and the likelihood that their wheels will lock is similar, the sensors may be fitted to any of the axles.

32. A control device in 26 that is fitted to a trailer of class TC or class TD must:

- a) comply with the requirements for ABS in the Rule, without being connected to the control device of the towing vehicle, and
- b) be capable of being supplied with power for its operation by means of an electric cable from the towing vehicle.

33. The power connection between vehicles that can be operated in a combination vehicle must comply with Parts 1 and 2 of *ISO 7638: 1997, Road vehicles – Electrical connectors for braking systems*.

### **Specific performance requirements for vehicles manufactured or modified in New Zealand**

34. A vehicle to which 21, 22, 24(c) or 25 applies must, in addition to complying with the other applicable requirements in this Rule, comply with the specific performance requirements for vehicles manufactured or modified in New Zealand.

35. The brake force applied to a wheel of a vehicle in 34 during braking on a hard, dry, clean and level surface must:

- a) for a vehicle without ABS other than one in 35(c), be approximately proportional to the load on the wheel, taking into account the dynamic load transfer that occurs during braking between the axles of a vehicle and that also may occur between the vehicles of a combination vehicle, at all conditions of loading up to the vehicle's gross vehicle mass.
- b) for a vehicle with ABS, be approximately proportional to the load on the wheel without relying on the operation of ABS, taking into account the dynamic load transfer that occurs during braking between the axles of a vehicle and that also may occur between the vehicles of a combination vehicle, when the vehicle is loaded to its gross vehicle mass.
- c) for a class TC vehicle, a logging vehicle, a heavy haulage trailer or a military trailer, be the brake force specified in 35(a) only when the vehicle is loaded to its gross vehicle mass, even if ABS is not fitted.

36. A vehicle complies with the requirements in the specific performance requirements for vehicles manufactured or modified in New Zealand, if it has been certified for compliance with the requirements in *Schedule 5* and is within safe tolerance of its state when certified.

### **Repair**

37. A repair to a brake, or to a vehicle that affects its braking performance, must comply with [Land Transport Rule: Heavy Vehicle Brakes 2006](#) and with [Land Transport Rule: Vehicle Repair 1998](#).

38. When a brake lining or a brake pad on an axle is replaced:

- a) all the brake linings or brake pads on that axle must be replaced, and
- b) all replacement brake linings and brake pads on that axle must be of the same make, type and grade.

### **Replacement components for vehicle repair**

39. Subclauses 41 and 42 apply to any component that affects the braking performance of a vehicle and that is:

- a) manufactured, stocked or offered for sale in New Zealand, and
- b) supplied for fitting to a vehicle to be operated on a New Zealand road.

41. A component used in a repair must have equivalent performance characteristics to that of the original component and must not prevent a vehicle from complying with this Rule.

42. A brake lining assembly used as a replacement component, whether or not the brake to which it is fitted is required to comply with an approved vehicle standard, complies with this Rule if it complies with *UN/ECE Regulation No. 90, Uniform Provisions concerning the approval of replacement brake lining assemblies and drum brake linings for power-driven vehicles and their trailers (E/ECE/324E/ECE/TRANS/505/Rev.1/Add.89)*.

### **Responsibilities of repairers**

43. A person who repairs or adjusts a brake must ensure that the repair or adjustment:

- a) does not prevent the vehicle from complying with this Rule, and
- b) complies with [Land Transport Rule: Vehicle Repair 1998](#).

### **Responsibilities of modifiers**

44. A person who modifies a vehicle so as to affect the braking performance of the vehicle must:

- a) ensure that the modification does not prevent the vehicle from complying with this Rule, and
- b) notify the operator that the vehicle must be inspected and, if necessary, certified by a person or organisation appointed to carry out specialist inspection and certification of heavy vehicle brakes.

### **Responsibilities of vehicle inspectors and inspecting organisations**

45. A vehicle inspector or inspecting organisation must not certify a motor vehicle under [Land Transport Rule: Vehicle Standards Compliance 2002](#) if they have reason to believe that the vehicle does not comply with this Rule.

46. During the certification of a vehicle, compliance of a vehicle's brakes with the performance requirements in this Rule must be verified by means of appropriate tests, using approved testing devices and following correct test procedures.

### **Functions and powers of the Transport Agency**

47. The Transport Agency may revoke, by giving written notice, a record of determination issued after specialist inspection and certification that a vehicle complies with this Rule, if the Transport Agency is satisfied on reasonable grounds that the applicable requirements have not been complied with.

## **Procedure**

Electric braked TC trailers must continue to be certified to comply with the Heavy-vehicle Brakes Rule by a HVS certifier with the 'brakes' category (HVEK) and have an exemption from the requirements of Schedule 5.

This procedure is for use on electrically controlled braking systems fitted to TC trailers and their prime movers only. The purpose of the procedure is to ensure balanced braking between the vehicles in combination and is approved by exemption for the combination once all required tasks are completed and information, including the [CA11 Application for an exemption from land transport vehicle rules form](#) and applicable payment, are provided to:

HV Exemption Assessments

NZ Transport Agency

Private Bag 6995

Wellington 6141.

This procedure results in a dedicated combination in that only the towing vehicle that has been certified with it may tow the certified trailer. Reference should also be made to [Technical bulletin 6](#) where the TC trailer is towed by a light vehicle.

### **Park brake application and efficiency**

Most TC trailers are fitted with electrically controlled brakes with no mechanical park brake mechanism. Electrically controlled braking systems on their own, are not capable of holding a vehicle stationary indefinitely because electric power is required to hold the brake on. These vehicles must be fitted with a brake system that incorporates a mechanical parking brake.

The Rule includes a clause, 2.3(9A) in the Rule, allowing a mechanical park brake control to be mounted in an easily accessible position on the towed vehicle as long as a temporary brake, operated by the driver from the normal driving position and consistent in design and operation with Section 5.3 in the Rule, is fitted to the towing vehicle. This can be in the form of a switch which controls the electric brake. This will result in a dedicated combination where only specified towing vehicle(s) may tow the specified trailer.

### **Variable proportioning devices**

The Rule requires that no device is fitted which enables the driver to adjust the brake force distribution between axles or vehicles used in a combination [2.3(1)(b)]. So, any of these devices, which may be used by the engineer when setting up the brakes for the combination, must be permanently set or removed on certification.

### **Boat switch**

As TC trailers are not required to be fitted with ABS there have been brake lockup problems reported with some vehicles, such as large boat trailers, with a large differential between laden and unladen weight. This issue may be addressed by switching the brake function between a 'light' and 'heavy' setting automatically by way of a switch operated by the loading and unloading of the boat or other load. Any switch must operate automatically with no independent input from the operator and be solely dependent on the actual loading or unloading of the trailer. Alternatively, there are electronic load sensing devices available from the major brake component suppliers which can be used to regulate brake force with respect to changing loads.

### **Inertia/timer operated brakes**

The Rule requires that the service brake of a heavy vehicle, whether in combination or not, must be able to be applied from the driver's normal driving position in a controlled and progressive manner using one control only, [2.3(1)(a) and 2.3(2)]. This means that any Inertia or timer service brake controls fitted to a TC or TD trailer are not allowed by the Rule and must be replaced by a progressive control operated from the same control as the service brake of the towing vehicle.

### **Preparation**

The foundation brake must be in good condition with all components well maintained, bedded in and operating within the manufacturer's tolerances. Brake shoes must be clean and dry and any wear should be even. The full face of the shoe must match up with the drum and the magnetic pad must be within the manufacturer's tolerance for wear and that wear must be even. Some systems may require heavier wiring to prevent excessive voltage losses or heat build up in the electrical system which can lead to inefficiency and inconsistent braking. It is unlikely that proper certification will be possible if the electric brake system has not been properly maintained or adequately bedded in.

## Initial preparation

Prior to commencing the actual certification task certain calculations are required. Firstly, the axle weight transfer, due to a peak deceleration of 0.45g, as required in 6.1(2), must be calculated at full GVM [from 7.5(2)(c)]. This weight transfer calculation can be completed using a centre of gravity estimated by using the same calculation as for SRT for mixed freight. Then, calculate the residual axle load, the gross axle load less the weight transfer due to the 0.45g deceleration

previously calculated and complete a laden roller test at the residual axle weight and test to achieve a 0.45g deceleration on each axle without lockup or wheel slip occurring.

## Certification to HVEK

These modifications must be certified by a HVS certifier with the HVEK category who must also certify the vehicle to the Rule. While TC trailers are not required to have ABS they must still meet the performance requirements of the NZ Heavy-vehicle Brake Specification as set out in Schedule 5 or Section 7 of the Rule. This certification can be proven by a combination of physical testing and calculation. To achieve this, the following steps are to be followed:

- In the first instance a coupling voltage needs to be established for the trailer to achieve a minimum 0.5g braking efficiency.
- Ensure the vehicle has its foundation brakes fully serviced and that they are operating to achieve a minimum braking efficiency of 0.5g and balanced from left to right and between axles (+/- 10% is suggested).
- Use an approved and calibrated RBM to test the combination for service and park brake performance to the requirements of section 2.3(3) & 2.3(11), or 2.3(12) for semi trailers.
- When setting up a semi trailer combination both the towing and towed vehicle should be tested at presented weight with no tie down. This will be reflected at CoF.
- Measure trailer and get split weights for calculation purposes.
- Carry out weight transfer calculations and braking requirements for testing.
- Put trailer's first axle over brake rollers and measure coupling voltage at 0.5g (typically 3 to 7 Volts).
- Test Temporary park brake.
- Test permanent park brake if fitted to the first axle.
- Repeat the above procedure until all axles have been completed, ensuring balanced braking.
- From the testing done on all axles, the HVEK is to establish the average voltage to brake trailer at 0.50g.
- Note this trailer testing should also validate weight transfer calculations carried out earlier to meet braking requirements of the Rule.
- Once a coupling voltage has been established for the trailer the truck controller needs to be calibrated to produce a matching coupling voltage when it is producing 0.5g braking efficiency.
- With the trailer attached and, providing a majority of the imposed load is through the rear axle of the towing vehicle, put the rear axle on the brake rollers and use this to calibrate the coupling voltage. If the position of the fifth wheel connection is significantly ahead of the rear axle then an average of both front and rear axles should be used to calibrate the coupling voltage.
- Run the brake rollers and apply the truck brakes to achieve a minimum balanced braking efficiency of 0.5g.
- Measure the voltage at the coupling and calibrate the brake controller to achieve the desired voltage to allow for weight transfer (for 5<sup>th</sup> Wheel trailers). A different calculation for the coupling voltage differential is required for other trailer types (simple, full etc) dependent on the load they impose on the towing vehicle.
- At the onset of braking both vehicles in the combination should commence braking as close as possible to simultaneously. Any deviation from simultaneous operation should be biased towards the trailer where possible or towards the towing vehicle if the towed vehicle is a semi trailer.
- Road test with an approved decelerometer following the requirements of Section 6 of the rule, notwithstanding that these requirements are for non towing vehicles, and a minimum of three tests for each facet of the brake test is to be carried out.

**Note:** when weight transfer is calculated for a 5<sup>th</sup> wheel trailer it generally requires a voltage reduction when calibrating the truck controller. From reported experience and road testing 10 – 20% works well achieving good smooth braking with no wheel lock up. For example, with a trailer coupling voltage of 5 Volts the truck coupling would typically be set at 4 to 4.5 Volts. If set at 5 Volts the trailer brakes may be set too aggressively resulting in wheel lock up.

The certifier to plate both vehicles with the following data:

- VIN numbers of both vehicles
- Brake Test Mass
- Certified Trailer Braking Efficiency
- Signal voltage/current @ Certified Braking Efficiency.

An exemption from the requirements of 7.5(3) is required as part of the certification of the combination.

**Note:** like all heavy vehicles, TC trailers are required to undergo CoF testing using an approved, calibrated roller brake machine.