



# New Zealand Heavy Vehicle Brake Test Protocol

Waka Kotahi NZ Transport Agency

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## Record of amendments

| Version number | Description of change  | Effective date  |
|----------------|--|-----------------|
| 1.1            | Minor corrections and updated procedures   | 1 December 2022 |
| 1.2            | RBM test exemptions list for vehicles with CSB updated.<br>Brake test weight requirement changed from maintaining brake test weight to meeting static test weight.<br>Minor grammatical corrections. | 1 May 2023      |
| 1.3            | Additional vehicle classes added for RBM testing for vehicles fitted with CSB.   | 11 July 2023    |
| 1.4            | Minor corrections and number of days on page 35 updated.   | 7 November 2023 |

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## Glossary

|          |  |
|----------|--|
| ALB/ABS  | Anti-lock brake system that controls the vehicle's braking effort to avoid any axle or wheel lock up   |
| AQP      | Approved qualified person appointed by the RBM manufacturer and approved by Waka Kotahi to calibrate approved RBMs                                   |
| Bf       | Brake force, a measurement of the force generated by the brake that is measured by sensors attached to the RBM                                       |
| BTW      | Brake testing weight for the vehicle when brake tested in a loaded state, being 65% of the legal maximum mass limit for the axle                     |
| CO       | Certification officer employed by Waka Kotahi  |
| CSB      | Transmission or Cardan shaft (driveshaft) park brake system that holds the driveline from movement when parked rather than at individual wheels      |
| CoF      | Certificate of Fitness issued to a heavy motor vehicle (HMV)   |
| CoL      | Certificate of Loading, issued to an HMV and displayed in the windscreen which carries vehicle loading information                                   |
| CVIR     | Commercial vehicle inspection report used by Police for Commercial Vehicle Safety Centre (CVSC) and roadside inspections                             |
| CVSC     | Waka Kotahi/NZ Police Commercial Vehicle Safety Centre   |
| CVST     | NZ Police commercial vehicle safety team   |
| daN      | Brake force measured in deca-newton metres   |
| EBD/EBS  | An electronic system that manipulates the brake effort at the wheels and includes an ABS function. It may also include a rollover stability function |
| g        | Deceleration of a vehicle generated by the brakes measured in gravity, sometimes expressed as % of efficiency, i.e. 0.5g = 50%                       |
| GVM      | Gross Vehicle Mass as defined in the Land Transport Act 1998   |
| HMV      | Heavy Motor Vehicle (GVM greater than 3500kg)  |
| HVBR     | Land Transport Rule: Heavy-vehicle Brakes 2006   |
| IO       | Inspecting organisation appointed by Waka Kotahi to be responsible for inspection and certification outcomes.  |
| kgF      | Force measured in kilograms  |
| kN       | Brake force measured in kilonewtons  |
| LSV      | Load sensing valve, generally fitted to an axle or axle set to mitigate risk of wheel lock-up when a vehicle is not loaded                           |
| Protocol | New Zealand Heavy Vehicle Brake Test Protocol  |
| RBM      | Roller brake testing machine either in-ground or mobile  |
| VDAM     | Land Transport Rule: Vehicle Dimensions and Mass 2016  |
| VIRM     | Vehicle Inspection Requirements Manual   |
| VI       | Vehicle Inspector appointed by Waka Kotahi to undertake entry certification and/or in-service inspection and certification of motor vehicles         |
| VS       | Vehicle specialist employed by Waka Kotahi   |
| VSO      | Vehicle Safety Officer warranted as an enforcement officer by NZ Police  |

# Introduction

The New Zealand Heavy Vehicle Brake Test Protocol has been developed in consultation with suppliers and operators of roller brake machines (RBM) in New Zealand and with similar brake testing jurisdictions around the world. The proposed changes were consulted on in March 2022. Seven submissions were received and taken into account for the production of the final draft protocol. The final draft protocol was consulted on in June 2022. Eleven submissions were received and, where appropriate, changes were intergrated into the New Zealand Heavy Vehicle Brake Test Protocol V1 (1 December 2022).

This protocol comes into force on 1 December 2022.

The aim of this protocol is to create a consistent approach for heavy vehicle brake testing using an RBM at Waka Kotahi-approved inspection facilities and sites throughout New Zealand.

This protocol replaces all previous versions of the *Heavy vehicle brake testing: CoF and entry certification brake test protocol and procedure (versions 1 – 12) October 2021*. This protocol introduces new requirements not contained in previous versions. Therefore all heavy vehicle brake testing organisations and approved RBM operators must comply with this protocol from 1 December 2022.

Heavy motor vehicles (HMs) used on New Zealand roads (except those exempted in the Land Transport Act 1998 or Land Transport Rules) are required to be brake tested for entry certification, in-service Certificate of Fitness (CoF B) and roadside enforcement. All owners and operators must ensure a heavy vehicle complies with the rules and regulations at all times. Heavy vehicle repairers also have duties under the [Land Transport Rule: Vehicle Repair 1998](#) to ensure the continued compliance of the vehicles they repair.

The [Land Transport Rule: Heavy-vehicle Brakes 2006](#) (HVBR) requires the service brakes in most heavy vehicles to be capable of bringing the vehicle to a stop within 7m from a speed of 30km/h in all conditions of loading. This equates to a minimum brake performance deceleration of 0.5g or 50% efficiency as measured on an RBM (see [Appendix 1](#)). Section 2.4 of the HVBR requires that all heavy vehicles are tested in a way that evaluates brake performance in all conditions of loading, to increase the safety of heavy vehicles by minimising braking defects and reducing the risk of a crash. The HVBR sets the requirements for all brake systems to meet the standards in the rule; this protocol is designed only to test the brake performance of the service and park brake. All other component requirements are set out in the VIRM.

This protocol sets the requirements for the two types of heavy vehicle brake testing currently carried out in New Zealand:

- **Compliance brake testing** – a brake test carried out for entry certification and in-service certification (CoF B) inspections including Annex C
- **Enforcement brake testing** – a brake test carried out for on-road enforcement and as required from time to time for fleet auditing or crash investigation.

Each brake test must fairly assess the brake performance of the vehicle at the time it is presented for inspection. However, only compliance brake tests can be used for entry certification and in-service certification (CoF B) purposes.

Compliance brake testing and enforcement brake testing must follow the same process and procedure, but it must be noted there can be varied results between the two. This is due mostly to the way the vehicle is presented for inspection – compliance sites are a controlled environment that can deliver consistent results for all vehicles based on the brake test weight (BTW). On-road enforcement sites are varied and vehicles are tested at their presented weight. These two factors can influence the results therefore they must be treated differently.

Brake testing with an approved in-ground RBM is the default test for all compliance activities, with the exception of off-sites using a mobile RBM (see [Appendix 6](#)). On-road enforcement

brake testing can be carried out using an approved in-ground RBM at a Commercial Vehicle Safety Centre (CVSC) or with a mobile RBM at a roadside inspection site or at a CVSC. However, due to the presented weight and loading of the vehicle, these tests may produce very different results.

This protocol has been designed to guide vehicle inspectors (VI), who are approved to carry out RBM testing for entry certification or in-service certification CoF B inspection, and for Waka Kotahi vehicle specialists (VS) and certification officers (CO), NZ Police vehicle safety officers (VSOs) and HMV crash investigators. It may also be used as reference material for heavy vehicle specialist certifiers, service providers, owners and operators to help ensure all heavy vehicles are repaired and operated in the safest condition possible.

No deviation from the requirements in this protocol will be allowed unless approved by Waka Kotahi. Approvals will be granted on a case by case basis and may result in restrictions on an individual or site's ability to carry out HMV brake testing. Only enforcement authorities have the discretion to deviate from this protocol when selecting roadside inspection sites and certain other requirements specified throughout this protocol.

Waka Kotahi will continue to monitor heavy vehicle brake testing to ensure brake performance meets the intent of the HVBR and may from time to time amend the procedures described in this protocol.

## Brake testing fundamentals

The minimum requirements for brake performance are based on the loaded weight of the vehicle when presented for inspection. The brake test is designed to only test the foundation brakes, it is not a test of any anti-lock brake/anti-brake skid system (ALB/ABS), electronic brake distribution system (EBD) or load-sensing valve (LSV) system. All other brake system components must be inspected as per the Vehicle Inspection Requirements Manual (VIRM) brakes section.

To ensure accurate and consistent brake test results are achieved with the RBM, all heavy vehicles must be tested in a loaded state to simulate on-road conditions. The load for compliance brake testing is represented as the Brake Test Weight (BTW) and is set at a minimum of 65% of the legal weight limit for the axle being tested. Nothing in this protocol precludes a vehicle being tested above this level, provided the equipment specifications can accommodate the load and all other requirements (such as health and safety procedures) are followed.

As stated above, all heavy vehicles presented for a compliance brake test must have a 'loaded' RBM test, which can be accomplished in one of two ways:

|                |   |
|----------------|---|
| Actual load    | The vehicle is presented and tested with an actual load of a minimum 65% of the maximum legal weight limit on each axle as set by the Land Transport Rule: Vehicle Dimensions and Mass 2016 (VDAM).   |
| Simulated load | The vehicle is presented with no load or an actual load that is less than a minimum 65% of the maximum legal weight limit on each axle. Additional load is simulated by the use of chassis or axle tie-down equipment or by using lifting roller bed technology or by a combination of both to achieve the minimum 65% of the maximum legal weight limit on each axle as set by VDAM. |

In most cases the BTW can be found on the Certificate of Loading (CoL) or from the ILOAD screen in LANDATA. A load of a minimum 65% is defined as applying to the lesser of the statutory limit, the manufacturer's axle rating, the tyre capacity (only if the axle rating is not available) or a calculated proportion of the Gross Vehicle Mass (GVM) where no axle limit is available.

The VDAM sets the maximum mass limits for axles, axle sets, axle groups and GVM for all vehicles. However, in some cases the legal weight limit is lower than the vehicle manufacturer's axle limit. Some vehicles have a high tare mass to GVM ratio (i.e. some buses and coaches) so they can be presented with no load or partially loaded and still meet the BTW.

Vehicles may be presented in any loaded state, but the Inspecting Organisation (IO) has the discretion to refuse inspection of a vehicle that is overloaded, incorrectly loaded or unsafe. A vehicle that is presented for an inspection at below the minimum 65% loaded condition for the RBM brake test must have:

- extra actual load added to bring the axle/s to the correct BTW, or;
- a simulated load applied to bring the axle/s to the correct BTW.

While the vehicle must be loaded to the BTW for the RBM test, the IO may accept and test a vehicle above BTW at their discretion.

Alternatively, for compliance testing, the vehicle inspection can be split into two portions. The first portion could be the vehicle inspection is completed as it is presented but the second portion is the RBM test with weight removed or vice, versa. Where a vehicle is inspected or RBM tested first and then sent away before completing the remainder of the inspection, it is treated as a 'split test'. This inspection process is detailed in [Appendix 4](#).

Where a vehicle is presented loaded and the weight may present a safety risk or could exceed the capacity of equipment at the inspection site, it is up to the IO to ensure all persons are safe.



All vehicles must be tested on an approved RBM, which includes load cells and brake force transducers. The RBM must be capable of calculating deceleration force in 'g' (the force of gravity), brake imbalance in % and other required test results. These must be captured directly from the RBM to provide a record of the brake test results. The test record must show the required information as detailed in the sample 'RBM brake test results record' in [Appendix 9](#).

All approved RBMs operated at entry certification sites, in-service CoF B inspection sites (including off-sites) and Waka Kotahi/ Police Commercial Vehicle Safety Centres must be maintained and serviced according to the manufacturer's instructions and must be calibrated and certified annually by a Waka Kotahi Approved Qualified Person (AQP) (see [Appendix 2](#)).

Entry certifiers and in-service VIs operating an RBM for compliance brake testing must be trained and assessed to a Waka Kotahi-recognised level of competency by an approved training provider using the criteria set out in this protocol (see [Appendix 3](#))

Waka Kotahi VSs, COs and Police VSOs operating an RBM for enforcement brake testing must be trained and assessed to a Waka Kotahi/Police-recognised level of competency by an approved training provider or by an internal trainer using the criteria set out in this protocol (see [Appendix 3](#)).

## Actual vs simulated loads

Any load, either actual or simulated, must be distributed across an axle correctly to prevent early lock-up of one wheel set and the possibility of low brake efficiency. The aim should be for less than 10% difference between the weight of each wheel set on a common axle.

It is the vehicle operator's responsibility to meet any brake testing requirements. This may include providing engineered tie-down points or a decluttered chassis/axle (to allow the use of chassis/axle tie-down equipment) where load simulation is required.

Where engineered tie-down points are fitted in an appropriate location, they must be used. It must be noted that some HMV manufacturers do not support or recommend direct tie down of the chassis except through engineered tie-down points.

Load simulation is best achieved by attaching the tie-down equipment to chassis tie-down points, if fitted, as close as practicable to the axle being tested or by strops over a decluttered axle, chassis or subframe. Loads may also be simulated by using a lifting-bed RBM and or chassis/axle tie-down equipment. The appropriate BTW is applied by hydraulic or mechanical pressure in a measured, controlled and limited way to reduce the risk of damage to the vehicle or RBM or extra equipment. The simulated load must be maintained at no less than the BTW throughout the test.

On some vehicles, tie down of the front axle is unnecessary because they have tare weight that meets or exceeds the BTW. Rear axle BTW can be difficult to achieve without load simulation and care must be taken to avoid damage to fragile components i.e. brake lines, suspension components etc. However, difficulty in applying a simulated load cannot be used as a reason to avoid the loaded brake test.

## Inspection sites and equipment

Inspection sites carrying out compliance brake testing for both entry certification and in-service CoF B inspections must be approved by Waka Kotahi. Not all sites will be approved for entry inspection (these have additional site requirements) and some sites will face restrictions to the classes/types/sizes of vehicles they are approved for (eg off-sites). Site requirements are set out in the VIRM and must be met for all approved sites, except where Waka Kotahi has approved an exemption for one or more conditions.

All approved sites must have an approved RBM that is serviced, maintained, calibrated and functioning correctly, and have a current calibration certificate signed by an AQP (see [Appendix 2](#)).

### Inspection site requirement for RBM

All in-ground RBMs used for compliance brake testing must be covered and mounted flat and level with the inspection area. They must be on the same site as the rest of the inspection facility and have 19 metres either side of the RBM. Restrictions to vehicle type and/or size may be put in place for smaller sites.

Lifting bed RBMs are designed to supply some or all of the simulated load and brake performance test in one unit, therefore the bed may be raised above the inspection area to test each axle, the manufacturers' operating instructions must be followed

Vehicles must be able to drive on and off the RBM at right angles to the plane of the rollers without deviation during the brake test until the rollers are cleared. The length and level of flat area, entry and exit, plus the ability to approach and depart the RBM without deviation or compromising the ability to seat all axles square in the RBM will be evaluated during the site approval process and may limit the vehicles that can be inspected at that site.

An approved mobile RBM may be used for compliance brake testing at a main site only when the vehicle is raised and presented at the same level as the roller bed, i.e. there are sufficient raised platforms mounted either side of the roller bed to keep the vehicle being tested at the same level as the axle being tested. An approved mobile RBM may also be used for compliance brake testing when it is recessed into the floor so that the roller bed is level with the inspection area.

An approved mobile RBM may be used at an approved off-site or specialist inspection site without platforms provided the BTW is achieved for each axle.

If an RBM cannot be used due to a breakdown or other circumstances, an alternative brake testing method may be allowed which will be for a limited period and must have written approval from Waka Kotahi (see [Appendix 5](#)).

### Off-site requirements

Off-sites that have been approved under the *Heavy Vehicle Brake Testing: CoF and Entry Certification Brake Test Protocol and Procedure, (versions 1 – 12) October 2021* and with grandfather rights will continue to be approved and can function as they currently are.

Unless exceptional circumstances apply, no new off-sites or changes to current off-sites, including ownership, will be approved from the date of this protocol. However, a current off-site may apply to become a full inspection facility (see [Appendix 6](#)).

### Commercial Vehicle Safety Centres and roadside inspection sites

These inspection sites carry out roadside vehicle inspections, including enforcement brake testing. Operations at these sites where a vehicle is stopped and inspected are controlled by Police, they could include Waka Kotahi and other government agency personnel.

Commercial Vehicle Safety Centres (CVSCs) may inspect any motor vehicle. However, enforcement brake tests carried out on an HMV must use an approved RBM and follow the test requirements in this protocol. These sites are not approved for entry certification or in-service CoF B inspections but may include an in-ground RBM and therefore will carry out the same brake testing procedures. The criteria for ordering a vehicle out of service is detailed in the Land Transport Act 1998 and may be used by Police CVST/Waka Kotahi.

Mobile RBMs used for enforcement brake testing at roadside sites or at a CVSC may cause load transfer as they are used on uneven surfaces and without leveling platforms. Therefore a fully loaded vehicle may exceed an axle weight limit due to load transfer and not be able to produce the required brake force. Likewise if the vehicle is empty or lightly loaded the brake force may induce early lock-up of the rollers. For this reason, the pass/fail criteria for enforcement brake testing is detailed in the Police CVST Standard Operating Procedure (SOP) – level 6 brake performance testing.

Where a mobile RBM is used for enforcement brake testing, the site set-up must be checked – the RBM should be mounted on a reasonably flat and level surface in both lateral planes. Before any enforcement brake testing, the RBM must be powered up in an unloaded state and all its parameters checked using the manufacturer’s self-checking facility or instructions contained in the operation manual. A method to confirm all functions remain correct must be completed each time the mobile RBM is moved to another site. The equipment and training should be provided by the supplier of the RBM and detailed in the training manual or through an approved training provider.

If a defect is found or fault code is displayed during the self-check, the RBM must not be used for enforcement testing until the fault is repaired.

## Specialist inspection sites

Some in-service CoF B inspections, including compliance brake tests are carried out at a specialist inspection facility because the vehicle/s cannot move from the site or fit into a main site facility. A specialist site is usually used only once or twice a year for CoF B services by one transport operator. There may be more than one specialist site in an area. These sites must meet minimum requirements of a grade 4 off-site (see [Appendix 6](#)) and be approved by Waka Kotahi. Specialist sites cannot be used to inspect standard vehicles.

## Auditing of inspection sites and equipment

All sites carrying out entry certification, in-service CoF B inspection (including off-sites), specialist sites and CVSCs may be audited at intervals of up to three years or as detailed in their Quality Management System (QMS) manual. Site audits will check adherence to this protocol and results will be recorded. If remedial action is required to meet the requirements of Waka Kotahi and this protocol, an action plan may be developed in consultation with all parties concerned or, in appropriate circumstances, regulatory enforcement action may be taken. Remedial action could include limiting the activities of the inspection site until the requirements for carrying out RBM brake testing are fulfilled. In some cases, inspections will not be able to be carried out until all issues are resolved to the satisfaction of Waka Kotahi.

Waka Kotahi Certification Officers (COs) conduct inspection site and equipment audits to ensure the requirements of this protocol are being met and that there is consistency and accuracy for all HMV brake testing. IOs must adhere to the requirements regarding maintenance and servicing of all equipment as set out in the VIRMs.

## RBM operators

An entry certifier or VI operating an RBM for compliance brake testing must be trained and assessed to the Waka Kotahi recognised level of competence by a Waka Kotahi approved training provider. It is the responsibility of the IO to provide this training.

A VS, CO or VSO operating an RBM for enforcement brake testing must be trained and assessed to the Waka Kotahi/Police level of competence by a Waka Kotahi approved training provider. It is the responsibility of Waka Kotahi or Police CVST to provide this training.

RBM training providers must ensure their training material, system or manual is approved by Waka Kotahi before any RBM training is delivered. RBM training material must cover the training curriculum set out in this protocol and all training records must be maintained to ensure compliance. Training must be completed before an RBM operator is approved to operate an RBM for compliance or enforcement brake testing.

Approved training providers are the only **persons** who can sign off the training assessment for an RBM operator and must forward the assessment result to the IO or enforcement authority. A list of approved training providers is in this [link](#).

The training curriculum is in [Appendix 3](#).

Only trained and approved VIs can carry out an RBM compliance brake test for entry certification and in-service CoF B inspections or for an annex C permit. This includes the operation of the brakes and vehicle controls throughout the entire RBM test wherever possible, or at the RBM operators discretion. Assistance with the RBM test may also be carried out by another VI, but that person must be approved for CoF B RBM testing in accordance with the protocol. The inspection check sheet must show which inspector completed each aspect of the vehicle inspection.

Only trained and appointed VSOs, VSs, and COs can carry out an RBM enforcement brake test. They may direct another person to perform certain aspects of the RBM test, however, this will be at the discretion of the RBM operator. The Commercial Vehicle Inspection Report (CVIR) must show the identification number (QID) of the VSO, VS, or CO.

## Brake testing procedures

All HMVs (except 'special vehicles' detailed elsewhere in this protocol) must be tested on an approved RBM with a load of a minimum 65% of the legal axle mass limit, or with a simulated load of a minimum 65% of the legal axle mass limit.

Where a vehicle is fitted with an 'RBM test mode' function the RBM operator must follow the manufacturer's instructions for vehicle settings during the brake test, the performance requirements in this protocol must be met. Any other electronic aid that interferes with the test must be disabled during the test.

A vehicle fitted with Load Sensing Valve(s) (LSV) must be brake tested with enough load or load simulation to ensure the LSV does not adversely affect the brake test. The IO has discretion to allow the LSV to be disconnected and manually operated for the brake test. However, this is permitted only where the BTW is insufficient for full articulation of the valve and therefore full braking effort cannot be attained. If the above procedure cannot be done the IO may request the operator to load the vehicle with sufficient actual load to ensure the LSV delivers full brake effort. Care must be taken to ensure the valve setting is returned to the correct operational state following any manual override for the test.

Entry certification and in-service CoF B inspection check sheets must contain the BTW if the information can be correctly loaded from LANDATA. Where the LANDATA information is incomplete or incorrect an error message will appear prompting the VI to ensure the correct BTW data is added. This situation must not prevent the brake test being undertaken and therefore the BTW may have to be taken from the CoL or a chart supplied by the IO or be calculated using the vehicle's tyre rating.

The in-service pass/fail criteria in the VIRM must be used for all compliance brake testing.

A record of the brake test results must come directly from the RBM. The record of the results can be in hard copy (printed) or in electronic format (Photo or PDF) and must be attached to, or electronically copied to, and retained with the vehicle inspection check sheet.

A record of the brake test results must be given to the operator for a failed brake test and if required, must be available to the operator or vehicle owner on request at the time of inspection. The record may be provided in hard copy or electronic format.

The brake test record must show all of the required information as detailed in the 'sample RBM brake test result record (see [Appendix 9](#)), however for early RBM's that cannot produce all of the information some results may be hand written on the printout by the RBM operator

All the inspection check sheets, and brake test records must be retained by the IO for their records and auditing for a minimum of 12 months from the vehicle pass date.

Enforcement brake testing is done at the presented weight, or at the discretion of the VSO, VS, or CO with load simulation. The vehicle details must be recorded on the CVIR. A record of the brake test results may be manually recorded on the CVIR or linked electronically to the CVIR. A printout of the test results may be made available to the operator or vehicle owner on request at the time of the inspection, this may be provided in hard copy or electronic format.

Due to operational requirements and Police procedures (contained in the SOP – level 6 brake performance inspections) the pass/fail and out of service criteria for enforcement brake testing is at the discretion of Police CVST/Waka Kotahi.

# Service brake performance

## Efficiency

Service brake deceleration of a minimum 0.5g (50% efficiency) must be achieved by the vehicle's brake system during the RBM test. This is the minimum required for all conditions of loading. This requirement also applies to mobile RBMs used at an off-site for compliance brake testing. However, a mobile RBM operated at a CVSC or a roadside inspection site may, due to the presented weight of the vehicle, be guided by the CVST SOP – level 6 brake performance inspections.

Also, refer to [Appendix 7](#) for special vehicles and other exemptions.

The RBM must be set up according to the manufacturer's instructions, including self check and any diagnostic functions. All vehicle and operator data, such as registration, axle numbers, inspector ID, date and time etc must be input to the RBM as required.

The vehicle's first axle is then positioned squarely in the RBM rollers and the presented weight checked. If additional load is required to reach the BTW, the vehicle must be tied down or the lifting bed activated to apply the extra load until the required BTW is achieved. Once the correct load is achieved the axle can be tested:

- Start the RBM in dynamic mode. Weight transfer may occur during a brake test due to the influence of the suspension or RBM.
- Check roller activation and the rolling resistance. The wheel must complete at least one revolution, then wait for the RBM test proceed light or for the countdown to be completed.
- Using light pedal pressure, check the brakes apply together, continue to apply the brakes up to a reading of between 250daN (2.5kN) - 450daN (4.5kN) (depending on make of RBM), and **hold for at least 2 seconds or follow the RBM manufacturers' instructions**. Release the brakes, checking they release together and that there is no residual binding, then:
  - Slowly and continually apply the brakes until the RBM shows greater than 400daN (4kN). Continue applying the brakes and observe the display unit until the slip setting is overcome, the brakes lock and the test is terminated, or
  - for at least two full wheel rotations until the maximum brake effort (deceleration) is produced.
- At the RBM operators discretion, termination of the brake test before maximum brake effort or lock-up is achieved is allowed, but a deceleration of at least 0.65g (65%) must have been measured on the tested axle.
- It is not acceptable to test the service brake one wheel at a time unless 4WD mode is required for a specific vehicle (see [Appendix 7](#)).

To pass a compliance brake test the service brake efficiency of the axle **must** reach a total deceleration of a minimum 0.5g (50%), once above the 400daN reading. A tolerance of 0.05g (5%) is acceptable for one axle provided a total vehicle deceleration of 0.5g (50%) or more is achieved.

## Imbalance

Brake imbalance must be tested at the same time as brake efficiency. When testing for imbalance it is good practice to ensure any load is as evenly distributed across an axle as possible.

To pass a compliance or enforcement brake test the service brake imbalance throughout the range above the 400daN threshold must be no more than 30% on any axle.

- Imbalance at brake forces below a threshold value of 400daN (4kN) are to be ignored and not recorded unless the RBM fails to register an imbalance due to one or both of the

maximum brake forces (LH or RH) not reaching 400 daN (4kN). The vehicle should then be tested in the 'car' mode and imbalance considered throughout the range or calculated.

- Where the RBM displays the imbalance even when one wheel does not meet the 400daN (4kN) threshold, the machine's calculation must be used.
- If one wheel fails to meet the 400daN (4kN) threshold, a separate calculation must be carried out to confirm the imbalance on the axle. For this use the formula:

Calc:  $(BF1-BF2)/BF1 \times 100 = \% \text{ imbalance}$ , where BF1 is greater than BF2. The result must be recorded on the brake report printout by the VI.

Any result showing more than 30% imbalance during the brake test over 400daN (4kN) is a failed test result. However, a second test per axle may be made at the discretion of the VI and the result from the second test result must be treated and recorded as the final result.

The test results for that axle are stored by the RBM. Any applied load is released and the test is repeated for all subsequent axles for that vehicle.

## Class TC trailers with electric brakes

A class TC trailer with an electric brake system that can be controlled by the driver through a towing vehicle control unit must have HVEK certification and an exemption from the HVBR as a dedicated combination. The exemption must be checked to ensure the VINs are applicable to the unit being brake tested.

For compliance or enforcement RBM testing:

- The towing vehicle's control unit may be bypassed or manipulated to provide maximum system voltage to the trailer brake system if the voltage supplied at the RBM roller speed is less than the maximum system voltage.
- Where the vehicle is not fitted with a park brake control, the breakaway function may be used as the park brake and a "stall test" carried out.

## Special vehicles

Special vehicle entry certification and in-service CoF B brake testing procedures have been developed where, due to the type of axles or vehicle dimensions, an RBM cannot be used. These procedures are explained in specific detail in [Appendix 7](#). As additional special vehicle types are identified, new brake test procedures may need to be developed and included in the next revision of this protocol or as required.

The default brake test for these vehicles is with an approved decelerometer, which must have a print capability, or certain special vehicles may be tested using a stopping test. The vehicle must stop within a marked distance of 7m from a verified speed of 30km/h in a controlled and progressive manner<sup>1</sup>. Vehicles approved for stopping tests are also detailed in [Appendix 7](#).

## Park brake performance

Where the park brake is incorporated with the service brake on the same axle, the test for park brake performance must be completed following the service brake efficiency and imbalance tests for each axle that has a park brake function, using the following procedure:

- Check the BTW is achieved Start RBM.
- Apply the park brake as smoothly as possible until the RBM locks or maximum brake effort is achieved.

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<sup>1</sup> Brake lock-up does not necessarily verify compliance as a vehicle may no longer be 'controlled' when the wheels are locked and skidding.

- The RBM calculates and displays the total deceleration in 'g' at the completion of all park braked axles.
- If lock-up occurs and pulls the vehicle out of the rollers, the test may be terminated.
- To avoid any risk to other persons, consider the use of chocks to hold the vehicle.
- A spring applied park brake may be tested one wheel at a time to prevent lock-up from the axle increasing the risk of climbing out of the rollers and to ensure both spring brakes activate.
- To pass a compliance brake test the park brake must achieve a total vehicle deceleration of a minimum 0.2 g (20%) or lock-up each individual wheel of the axle (when tested separately).
- It is important the VI checks that the correct park brake control is used for this test and, if the vehicle has only one park braked axle or is tested using a lifting bed, then another axle must be chocked to ensure the vehicle cannot climb out of the rollers, creating a situation that may damage the vehicle or the RBM equipment or pose a safety risk to other people.

## Alternative performance tests for other park brake systems

### Transmission or Cardan shaft park brakes (CSB)

All heavy motor vehicles fitted with a transmission/Cardan shaft park brake (CSB) must be tested on an RBM using the following method (some vehicles with a CSB, listed below, are exempted from this requirement).

The RBM test provides a repeatable, effective, and accurate performance assessment of the brake force required from the CSB to simulate a fully loaded vehicle parked on an 18% slope, as required by the HVBR.

The VI must test a CSB with due care so that no damage is done to the brake or the RBM. Do not use excessive force, repeated or rapid application. The VI must operate the brakes and vehicle controls throughout the entire RBM test for CSB. Always apply the CSB with a smooth and gradual application keeping the lock pawl disengaged. The RBM test can be conducted with the rollers turning the wheels in the same forward direction as the service brake test. If chocks are required for the service brake test they must be used for the CSB test.

Visually inspect all park brake components before, during or after the RBM test and check they are adjusted to the manufacturer's specifications. Obtain the total brake force (Bf) requirement applicable to the GVM of the vehicle from the chart contained in the VIRM. The GVM must be taken from the Certificate of Loading (CoL).

Immediately after the service brake has been tested and with the rear axle still at the BTW carry out the test as follows:

**Note:** the BTW is only used to provide a loading on the axle and assist with keeping the vehicle in the rollers and to attain the highest test result.

- On a vehicle fitted with a tandem drive axle ensure only one axle is tested. The other must be completely disconnected
- If the other axle offers no resistance and does not climb out of the rollers the RBM test must be completed.
- If the axles cannot be completely disconnected, carry out a stall test.
- Start both rollers and check for brake binding. Wait for the RBM test proceed light or for the countdown to be completed.
- Slowly and gently apply the park brake using a reasonable force while keeping the lock button pressed.
- While applying the park brake, observe the brake force readings;
- Stop the test and record a pass if:



- the minimum Bf required is reached (taken from the chart supplied) on the display dials or digital readout
  - the wheels lock the rollers
- Stop the test and record a fail if:
  - the minimum Bf required (taken from the chart supplied) is not reached on the display dials or digital readout
  - a severe judder or mechanical noise occurs that indicates a brake fault and which causes the vehicle to move excessively on the rollers preventing the minimum Bf being achieved
- Remove any load simulation, if used, and continue with the remainder of the vehicle inspection.

If a mobile RBM is used for enforcement brake testing and it does not have load simulation or the weight as presented is insufficient to hold the axle in the rollers, the park brake may be tested on an 18% gradient in both directions (slope test), or by using the 'stall test' method.

Vehicles (if fitted with a CSB) exempt from the RBM test:

- Any vehicle manufactured prior to 1980
- Any vehicle where the brake is applied by an air spring brake chamber or other device where the brake cannot be applied gradually
- Any vehicle with a tandem drive rear axle set where the axles cannot be completely disconnected from each other e.g. power divider, permanent 4X4
- Any Land Rover and Range Rover vehicles of Class NB
- An armoured vehicle used exclusively by the NZ Defence Force
- Bedford models SB, J, K, TK or RL
- All Pinzgauer and Tatra, all models with offset wheelbase

Vehicles exempt from the RBM test must pass a 'stall test' or a slope test as per the requirements outlined in this protocol or specialist vehicle section.

### **WABCO park-release emergency valve (PREV)**

This system is approved by exemption, but must be checked on an RBM. Vehicles fitted with these units can be identified by the multi-port WABCO marked valve fitted midway down the chassis. This valve has two coloured knobs: a red park brake control knob and a black yard release knob.

The vehicle must have the park braked axle positioned on the RBM. The RBM must then be started, and the red park brake control knob pulled. The normal park brake procedure must then be followed. In some cases, the PREV is located in a position that cannot be operated without impinging on the testing agent's 'operator exclusion zone'. In such cases the stall test can be used.

### **Combination park brakes**

A heavy vehicle with a disc service brake and a drum park brake on the same axle may be stall tested in accordance with the manufacturer's instructions.

**Semi-trailer park brakes** (only applicable if registered before 1 November 1990 and unmodified).

The operation of the park brake on a trailer means the air hoses must be disconnected to operate the park (emergency) brakes.

**WARNING** – extreme caution must be taken when conducting this test. There is a chance the vehicles may move during the test and trap, crush, collide-with or otherwise harm the inspector.

The inspector must assess their personal safety and conform to all health and safety requirements.

- The test is to be performed after the service brake test on an axle fitted with the spring (emergency/park) brake.
- With the wheels still in the rollers and the RBM rotating, ensure there is full application of the spring brakes by disconnecting the trailer air hoses.
- On completion of the test, operate the 'emergency release valve' to ensure the full release of the spring (emergency/park) brakes and move the trailer so the wheels on the next axle are in the rollers.
- To test the brake on this axle, start the RBM and close the 'emergency release valve' to operate the spring (emergency/park) brake. Once all axles with a park brake have been completed the air lines can be reconnected and other tests can be completed normally.
- Where the operation of the trailer park brake requires the draining of the service brake air tank, the park brakes should be tested using the stall test process. Ensure the trailer air tanks are refilled before continuing the inspection.

**Mechanical or wind-up park brakes** are non-compliant with the HVBR. If the vehicle was registered before 1 March 2007, the operator may have been granted an exemption from the requirements in clause 2.3(9) of the HVBR. A valid exemption must be produced before testing these systems.

- The vehicle should be stopped on a level sealed area, the trailer park brake applied, and the towing vehicle moved forward with no rotation of the braked wheels on the trailer.

## Stall test

A stall test must be used only where an RBM park brake performance test is not suitable for the vehicle type.

- With the vehicle on a flat, sealed area, switch off Hill Start Assist (if possible), apply the park brake to the manufacturer's specification (see VIRM for a guide to the settings).
- Apply the park brake, for lever type, with a reasonably strong force using one hand only.
- Ensure the lever travel is not excessive, i.e. more than 60% of the total travel available or exceeding the manufacturer's setting.
- Feel for any excessive resistance when applying the brake.

Attempt to move the vehicle forward taking care not to overload the transmission.

For a manual transmission (MT):

- MD3, MD4, ME and NB Class – select second gear, bring the revs up to 1500 rpm and gently release the clutch.
- ME and NC Class – select second gear, bring the revs up to 1000 rpm and gently release the clutch.

For an automatic transmission (AT): select Drive or Low (if possible), bring the revs up to 1200 rpm for no more than five seconds.

For an automated manual transmission (AMT): select Drive mode, bring the revs up to 1500 rpm for no more than three seconds.

Record a **FAIL** if the vehicle moves forward and inform the owner that a completed 4085D form must be presented at re-check.

Record a **PASS** if the vehicle does not move and note on the inspection sheet 'stall test'.

The 4085D form requires the owner to have the park brake system serviced and correctly adjusted to the manufacturers' recommendations. The service provider must fill out and sign the form before the vehicle is returned for re-inspection and another stall test completed.

**The 4085D form must only be used where the park brake fails the stall test. Do not use for a failed RBM test. Refer to [Technical Bulletin 9. RBM Retests](#)**

Where a vehicle is presented for a retest, the following requirements apply.

- Retest for service brake performance (efficiency): requires all service brakes on the vehicle to be retested at the BTW.
- Retest for service brake imbalance: Requires only the affected axle set to be retested. However, where any repairs carried out to rectify the imbalance may affect other axles, the VI must retest the complete vehicle at the BTW.
- Retest for park brake performance (except transmission/Cardan shaft): Requires all axles to have a BTW recorded, this is to allow the RBM to calculate the efficiency, only the park braked axles need to be retested. For transmission/Cardan shaft park brakes, only a rear axle requires retest at the BTW to check the required Bf.

## Recording the brake test results

On completion of a compliance or enforcement brake test the RBM calculates and displays total deceleration and brake imbalance % for each axle and the efficiency totals for the vehicle in % or 'g' for both the service and park brakes. The RBM must produce a record of the results. Some RBM models will also display any overall rolling resistance and any ovality recorded during the test.

A record of the brake test results must come directly from the RBM. The record of the results can be in hard copy (printed) or in electronic format (Photo or PDF) and must be attached to, or electronically copied to, and retained with the vehicle inspection check sheet.

A record of the brake test results must be given to the operator for a failed brake test and if required, must be available to the operator or vehicle owner on request at the time of inspection. The record may be provided in hard copy or electronic format.

The brake test record must show all of the required information as detailed in the 'sample RBM brake test result record (see [Appendix 9](#)), however for early RBM's that cannot produce all of the information some results may be hand written on the printout by the RBM operator.

All the inspection check sheets, and brake test records must be retained by the IO for their records and auditing for a minimum of 12 months from the vehicle pass date.

# Appendix 1: RBM specifications and settings

RBM's used for compliance and enforcement brake testing must be approved by Waka Kotahi in a notice of approval placed in the *Gazette*. To be approved the RBM must meet the following requirements at all times:

- Comply with the Waka Kotahi approved specifications for an RBM, (ISO 21069-1 and AS/NZS 4163:2017 can provide guidance).
- Safely test vehicles fitted with advanced driver aids such as; ALB/ABS, EBD, ESC, AWD and 4WD.
- Include an axle weighing facility that records static and dynamic weight (load cells).
- Automatically calculate the dynamic deceleration rate of each axle.
- Automatically calculate the total dynamic deceleration rate of all axles combined.
- Rollers must complete at least one full rotation of the wheels during the performance portion of a brake test to ensure full analysis of inspection requirements including imbalance.
- Measure and record imbalance for each wheel from 400daN (4kN) brake force.
- Record, highlight and display peak brake imbalance across an axle.
- Where an imbalance filter is fitted, its setting must not prevent the brake force being measured and recorded at a minimum of 20Hz.
- Rollers must meet the manufacturer's specification and be capable of achieving a coefficient of friction ( $\mu$ ) of at least 0.7 dry or 0.5 wet. Rollers must have less than 10% difference in their coefficient of friction to ensure brake imbalance is not adversely affected. See [Appendix 2](#) for details.
- The lock up or slip point must be set and locked by factory trained technicians at installation to meet the requirements of ISO 21069-1 (slip rate 27% +/- 3%). The slip setting must be checked and verified during each successive calibration.
- Rollers must stop simultaneously on termination of a test.
- Calculate, display and record the results in dynamic mode, including dynamic weight at maximum brake-force readings.
- Provide a record of the results directly from the RBM in the format approved by Waka Kotahi.
- Have a current calibration certificate.
- All RBM's, whether installed in a new or existing site after January 2017, must be able to store all test results electronically directly from the RBM. Stored information must be able to be readily retrieved and provided to Waka Kotahi if required.

## Printers

- A printer must be connected to the RBM and provide a record of the brake test results in the approved format (see [Appendix 9](#)). All details must be presented in a clear and legible format.
- If an RBM printer breaks down the IO may continue to use the RBM for no more than two days to facilitate repair or replacement (a longer period must be approved by Waka Kotahi). All vehicles tested during this time must have the brake test results manually entered on the check sheet or electronically stored by the RBM. Where the vehicle has failed a note should be made in the comments field of the IHIST screen to indicate the printer was not functional.

For information on approval of new roller brake machines, contact: [info@nzta.govt.nz](mailto:info@nzta.govt.nz)



## Appendix 2: RBM calibration

All RBMs used to test HMV brakes for entry certification and in service CoF B or Annex C inspections and those used for roadside enforcement brake testing must be calibrated every 12 months and after any major service or repair work that may affect the calibration of the RBM.

Calibration must be done by an Approved Qualified Person (AQP). Components and/or functions requiring calibration or re-validation after repair include:

- the brake force measuring system including deceleration force transducers
- the load weighing system, including load cells
- roller speed and lock-up 'slip' control
- rollers (co-efficient of friction<sup>2</sup>)
- printer operation.

An AQP is a person trained and authorised by the RBM manufacturer, or their New Zealand representative, and approved by Waka Kotahi.

An AQP may only calibrate RBMs they have approval for and must hold a current training certificate for all RBMs they are authorised to calibrate. They must be issued with and carry a unique ID confirming their authorisation to calibrate the make and model they represent. The ID must record **the expiry date of that authorisation** and the ID must be shown on the RBM calibration certificate to verify calibration protocols have been followed.

An AQP is approved for a period of two years. If an AQP wishes to renew their approval, refresher training must be undertaken, and approval renewed before expiry of the current approval. Waka Kotahi will verify that training or refresher training has been completed with the manufacturer/agent.

The manufacturer/agent must maintain training records for their AQPs. These records, as well as individual calibration records, are to be available to Waka Kotahi for auditing. Failure to properly carry out the duties and responsibilities of an AQP may lead to suspension or revocation of approval by Waka Kotahi. When calibrating an RBM an AQP must operate in a professional and independent manner that is disconnected from their role as a maintainer or supplier. They must calibrate the RBM as it is presented, regardless of allegiance or bias for the machine, components or maintenance regime.

It is a condition of approval that an AQP must carry out at least two calibrations per year on each type of RBM they are approved to calibrate. Calibration records must be kept by the manufacturer/agent and a calibration certificate must be produced and provided to the owner of the machine showing the ID and signature of the AQP. It is the responsibility of the manufacturer/agent to ensure Waka Kotahi is advised of any change of AQP.

Any calibration carried out by a non-approved person is not valid. The RBM cannot be used for compliance or enforcement brake testing until it is properly calibrated and certified as accurate.

When calibration is complete a heavy vehicle must be tested at its BTW to confirm the RBM is functioning as required. A record of the results must be printed directly from the RBM confirming date and time of the test. This must be attached to the calibration record and may be in either electronic or hard copy format.

Waka Kotahi may audit or review calibration outcomes and the performance of AQPs. Audits will be on an 'as required' basis and would take a minimum of one hour or until a complete calibration is witnessed.

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<sup>2</sup> While the rollers cannot be calibrated, as a component their co-efficient of friction must be maintained within the tolerances stated in this protocol and must be verified to ensure compliance is maintained.

## Approved AQP list

Go to <https://vehicleinspection.nzta.govt.nz/resources/technical-info-page/aqp-list>.

### Specific calibration component requirements

The lock-up or slip<sup>3</sup> point must be consistent across all approved RBMs. However, it is specified or measured to achieve the highest possible brake force readings without damaging tyres. This function must be checked, recorded and, if necessary, adjusted when the RBM is confirmed as being fully calibrated. If confirmation of the slip % requires a printout to confirm it and a printout cannot be printed, the RBM must not be issued a calibration certificate.

The lock up or slip point is set and locked at 27% (+/- 3%) by factory trained technicians at installation and can be reset only by an AQP. This is not an operator adjustable setting but must be checked at each calibration.

Where an imbalance filter is fitted its setting must not prevent the brake force being measured and recorded at a minimum of 20Hz.

The rollers<sup>4</sup> of an approved RBM must be in good condition with no excessive wear or ungritted areas. Each roller must meet a co-efficient of friction ( $\mu$ ) of 0.5 or more (wet) around the most worn area of the roller. A small area of damage may be acceptable provided the co-efficient of friction requirement is unaffected.



Circumferential damage to the roller in the operational area is allowed if it is less than 8mm wide, no longer than 1/3 of the circumference (120°) and the required co-efficient of friction is maintained.



Minor damage in the roller operational area confined to one area no more than 50mm in any direction, adding to less than 10cm<sup>2</sup> is allowed provided the required co-efficient of friction is maintained.

Roller damage in the operational area more than the tolerances shown above, (even if the minimum co-efficient of friction is achieved) means the RBM does not comply with this protocol and cannot be issued with a calibration certificate until repaired.

<sup>3</sup> The RBM locks or terminates the test when the RBM detects a speed differential (or slip) between the tyre and the roller of 27% (+/- 3%), and terminates the test.

<sup>4</sup> Testing has identified that open mesh steel rollers do not maintain their co-efficient of friction in wet or damp conditions so are not approved for use at entry or CoF.

A roller may have up to two ungritted areas outside the operational area with a total area of no more than 40cm<sup>2</sup> without being placed out of service provided the co-efficient of friction is achieved.

Regritting or epoxy filling of worn or damaged areas of the rollers is allowed if it is supported by the manufacturer of the RBM. Open steel mesh rollers are not approved for compliance or enforcement brake testing.

If the rollers are not checked or their co-efficient of friction is not confirmed for any reason the RBM must not be issued with a calibration certificate.

As part of the calibration record, the AQP must ensure that the RBM has a working printer attached and that a printout of brake test results comes directly from the RBM and meets Waka Kotahi requirements. A calibration certificate cannot be issued to an RBM without a working printer.

Calibration of an RBM must be outcome based and verify that the required functions for that RBM remain within the manufacturer's operational tolerances (default) and those of Waka Kotahi where specified.

## Repairs and maintenance

Approved RBMs must be maintained to the requirements defined in the operation and maintenance manual and have all components checked to ensure they continue to perform within the tolerances<sup>5</sup> defined. This requirement does not prohibit the RBM owner from using non-genuine parts during maintenance provided they meet the Original Equipment manufacturer's specifications. The purpose of this is to assure transport operators that all RBM testing is conducted fairly and consistently whenever and wherever<sup>6</sup> their vehicles are tested.

An approved RBM used for compliance or enforcement brake testing must have a maintenance and servicing schedule to ensure the RBM's operation remains within the tolerances stated in the operating and/or maintenance manual supplied with each machine. Maintenance and repairs are to be carried out to the performance requirements stated in the manual. The operator must ensure that the RBM remains within calibration whenever it is in use. It must be taken out of service immediately after it is damaged or otherwise becomes out of calibration and may not be used for compliance or enforcement brake testing until it has been successfully repaired and calibration has been confirmed.

Calibration, service and maintenance records must be recorded for each RBM. These must be retained by the owner of the RBM for all sites under their control and be made available for auditing.

When commissioning a new RBM the factory calibration must be confirmed by an AQP to meet the requirements of this protocol before the calibration certificate can be issued. The ex-factory calibration record may be used to aid in the initial calibration once the machine has been installed but does not constitute the calibration certificate. Initial test results and calibration certificates are to be supplied to [vehicles@nzta.govt.nz](mailto:vehicles@nzta.govt.nz) for verification and approval. Failure to provide such information may mean approval for the RBM is withheld.

The list of approved RBMs is published in the [VIRM: In-service certification introduction: Inspection premises and equipment, section 5-7](#). An RBM must not be issued a calibration certificate until it can be shown to meet all the requirements in this protocol.

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<sup>5</sup> The maintenance requirement is "to operational tolerances" as set out in the operators and/or maintenance manual supplied with each RBM.

<sup>6</sup> 'Wherever' includes all in-service CoF B and HV Entry certification sites, off-sites and specialist sites, CVST safety centre or roadside inspection site, Waka Kotahi fleet audit and roadside inspection areas and Annex 'C' inspection sites.



## Sample roller brake machine calibration report format

The brake test calibration report must be on the RBM supplier's letterhead, or that of their New Zealand representative or the organisation that has approval to use their format.

The standard layout from the RBM manufacturer or New Zealand representative may be used as long as all required data is included.

RBM make \_\_\_\_\_ Model \_\_\_\_\_ Serial No \_\_\_\_\_

Date of calibration \_\_\_\_\_ Date of next calibration \_\_\_\_\_

Calibration number \_\_\_\_\_

|                   | Roller slip % recorded |       | Roller co-efficient of Friction recorded |   | Load cells weight recorded |       | Brake force recorded |       |
|-------------------|------------------------|-------|--|---|----------------------------|-------|----------------------|-------|
|                   | Before                 | After | Wet                                      |   | Before                     | After | Before               | After |
| Calibration LHS   |                        |       | 1  | 2 |                            |       |                      |       |
| Calibration RHS   |                        |       | 1  | 2 |                            |       |                      |       |
| Explanatory notes |                        |       |  |   |                            |       |                      |       |

Printer attached and operating Yes / No (circle one)

Vehicle test after calibration, Make \_\_\_\_\_ Time \_\_\_\_\_ (results attached)

As an approved AQP authorised by the RBM manufacturer, I confirm the roller brake machine listed in this calibration certificate has been calibrated and is operating to the manufacturer's standard in all areas.

I further confirm that, on completion of the calibration the RBM was operated as per the brake test procedure in the New Zealand Heavy Vehicle Brake Test Protocol and that it meets the requirements of the protocol.

AQP ID \_\_\_\_\_ Name \_\_\_\_\_ Signature \_\_\_\_\_

# Appendix 3: Training requirements for approved RBM operators

## RBM operators

RBM operators must be trained to the requirements below to be approved to carry out brake performance testing with approved brake test equipment. The requirements are:

- All VIs employed by an IO to carry out RBM compliance brake testing of HMVs for entry certification or in-service CoF B inspections must be trained by a Waka Kotahi-approved training provider.
- NZ Police Authorised Officers (VSO) operating an RBM at a Waka Kotahi/NZ Police CVSC or roadside inspection site and carrying out enforcement brake testing must be trained by Police using a Waka Kotahi approved training provider or an internal training provider.
- Waka Kotahi
  - Vehicle Specialist (VS) and Compliance Officers (CO) carrying out HMV entry certification and in-service CoF B reviews, and
  - vehicle specialists involved in crash investigation or fleet audits at sites where an approved RBM is operatedmust be trained by an approved training provider or an internal training provider.

Systems must be in place to ensure all those testing heavy vehicle brakes on an RBM are trained to use the approved brake testing equipment accurately, consistently and fairly.

To ensure all compliance and enforcement brake testing is consistent with the required brake performance standards in the HVBR and this protocol, each IO and enforcement authority must ensure RBM operators have completed the RBM training requirements and have been assessed for theoretical and practical RBM modules approved by Waka Kotahi. Training records and certificates are to be held by the training provider for audit purposes.

The training requirements to be approved as an RBM operator must cover the RBM operation and this protocol. One or more training providers may need to be engaged to train to the required regulatory aspects and operator requirements for all brake testing equipment approved for entry certification, in-service (CoF B) inspections and random roadside inspections. If equipment specific training is required, it must be incorporated into the training programme. Brake test equipment suppliers may assist a training provider by supplying information and material for the development of training material and RBM operating procedures.

Training providers must base the course on the requirements detailed below and have it approved by Waka Kotahi. Training course materials are to be submitted to [VIRMupdates@nzta.govt.nz](mailto:VIRMupdates@nzta.govt.nz) for approval and will be auditable in both delivery and outcome.

## Training requirements

Waka Kotahi approved training programmes must include sections or modules on the following topics:

- Health and Safety at Work Act 2015 (HSWA) (induction and site safety training).
- Understanding how an RBM works.
- Operation, approval and calibration of RBMs.
- Operation of a mobile RBM (additional module required)
- Operation of an electronic decelerometer.

- Brake testing fundamentals and performance requirements.
- Vehicle faults from physical inspection.

An RBM operator can only be approved to carry out HV brake testing once all of the training modules in each section are satisfactorily completed. The following are the module requirements for each section.

## Understanding how an RBM works

- What is brake force and how is it measured?
- How axle weight is measured and monitored.
- How brake efficiency is measured and displayed.
- How brake imbalance is measured and displayed.
- How load simulation is applied, through tie-down or lifting-bed technology.
- How air pressure affects brake performance.

## Operation, approval and calibration of RBMs

- Health and safety site and RBM requirements.
- Identifying approved RBM, make, model.
- Confirming approval, how often and why.
- Identifying different braking systems.
- Identifying the component parts/functions of an RBM requiring calibration.
- Confirming calibration, how and why.
- Procedure when an RBM is out of calibration or unserviceable.
- Correct use of an RBM.
- Set-up of in-ground RBMs.
- Start-up and self-test procedure (including printer).
- How to identify faults in RBM operation.
- Input of data to the RBM including test weight.
- Using the load simulation equipment, tie-down and lifting-bed systems.
- Operating an RBM and using remote control (RBM model specific).
- Positioning the vehicle on the rollers.
- Reading and understanding the display.
- Completing the test and printing the report.
- Understanding the written or recorded information.
- Ability to identify test area (balance, brake force, rolling resistance etc).
- The pass/fail decision.
- Explaining results.
- Leaving RBM ready for the next test.

It is important the RBM operator is able to identify all current braking systems and components because different test procedures may be required. These include:

- Air brakes.
- Air/vac over hydraulic brakes.
- Hydraulic brakes.
- Park brake systems.
- Load sensing valves.
- ABS and/or EBS systems.
- Electric brakes.

## Operation of a mobile RBM

An additional training module for operators of mobile RBMs details the specific set-up and operation of the mobile RBM as per the manufacturer's instructions and covers;

- Health and safety requirements.
- Location, off-site or roadside inspection.
- Inspection area (access/entry/exit) and any restrictions placed on the site.
- Unpacking the RBM prior to deployment and pack up after operation.
- Set-up and levelling of the roller field using manufacturer's instructions.
- Start up procedure including any self-check and calibration functions (load and brake force measurements).

## Operation of an electronic decelerometer

From time to time an RBM may not be available due to a breakdown or, in the case of a specialist vehicle, the RBM brake test is not suitable. In these circumstances an approved electronic decelerometer with print capability may be used where approved by Waka Kotahi. This module should include:

- Manufacturer's operating instructions.
- Correct placement of the decelerometer.
- Specific instructions for specialist vehicles contained in the protocol.
- Understanding the results and making a determination for a pass/fail result.
- Recording of results on the check sheet and if required entering notes in the IO PRS system for audit purposes.

## Brake testing fundamentals and performance requirements

The RBM operator must understand the reasons behind the loaded RBM brake performance test and be able to tell the vehicle operator why the requirements are in place. This background information ensures the RBM operator understands why they are doing what they are doing and enables them to confidently give accurate and factual information.

- The legal background to loaded testing.
- The effect of weight vs brake force and the effects of axle weight in relationship to test results.

- VIRM requirements- the minimum requirements when brake performance is measured.
- The 0.5g/50% minimum deceleration requirement.
- How brake performance is expressed.
- What is % or g in terms of deceleration rate? How is this calculated from brake force readings?
- Ensuring and applying the correct load.
- The reasons for testing at a minimum of 65% of the statutory axle weight.
- The difference between loaded and unloaded.
- The rolling resistance and its importance.
- What the brake balance requirement for a heavy vehicle is. Is it the same for all vehicles and axles?
- The importance and possible faults if brakes do not operate together on both application and release.
- How is the axle brake performance used in the total vehicle brake performance?
- How brake adjustments are used to ensure brake performance is at its best.

## Vehicle faults from physical inspection

Being able to advise on any visible defects in the braking system could assist the operator with further inspection and repair. Possible faults identified from visual inspection and brake test results could include hub seals leaking, faulty air valves, worn suspension, non-operational or incorrect load sensing valves etc. The RBM operator is not required to and should not provide a diagnosis to the operator.

## Summary

An RBM operator can be approved to complete compliance or enforcement RBM brake testing only if all modules are satisfactorily completed. The mobile RBM module isn't required unless a mobile RBM is used. Operators must sit a practical test of knowledge and use of an RBM, and a theory test on the brake performance testing section of the protocol and relevant VIRM, including the ability to understand and interpret the test results correctly and convey those results to the owner or operator.

## Appendix 4: Split test at CoF – limits and requirements

A 'split test' may be carried out when a heavy vehicle is presented laden but the load conditions for inspection or brake testing could not be met at the time. The vehicle may have been presented with a load suitable for brake testing but too heavy for a safe and proper inspection of other CoF requirements or the vehicle could be presented too light to complete the RBM test and cannot be tied down, though the rest of the CoF inspection can be completed.

In circumstances where the brake test cannot be completed, the remaining components of the full CoF inspection can be done. However, the operator must return to the same testing station within two working days<sup>7</sup> with a compliant load for the brake test component.

Any failure during either component of the split test inspection counts as a failed test. The split test does not allow an operator to repair faults without having a failed test recorded against the vehicle. Notes should be made in LANDATA to assist the VI carrying out the second phase of the CoF B inspection.

### Requirements

- A split test has two inspection phases which when combined make up the full in-service CoF B inspection. These can be separated for the brake performance test (including deceleration and imbalance) and the remaining vehicle inspection as defined in the VIRM.
- The brake performance test or the remaining vehicle inspection, may be carried out in any order, but the check sheet must be printed at the first portion of a split test.
- During a split test the brake performance test must be the only inspection carried out in that phase of the inspection.
- When a brake retest is required, it must be done with the vehicle in the loaded condition (at least 65% of maximum legal operating weight). This may be completed using either actual or simulated load.
- Both phases of a split test must be completed within two working days following the day of initial inspection.
- Both phases of a split test must be completed at the same inspection site (off site or main site).<sup>8</sup>
- Once the two phases of a split test are completed a recheck may be completed at any approved CoF B inspection site operated by the same IO.
- A recheck of brake efficiency must be in the loaded condition, either actual load or simulated, and must be a full test of all brakes on the vehicle including the park brake.
- A recheck of brake imbalance must be in the loaded condition, either actual load or simulated, but may be a recheck of the failed axle set only.
- A vehicle that has failed either phase of the split test may not be driven until all faults have been rectified and the recheck inspection has been successfully completed. The only exception is if the vehicle is being operated solely for the purpose of bringing it into compliance or solely for the purposes of obtaining certification, and the vehicle is safe to be operated for the relevant purpose.

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<sup>7</sup> Unless there is approval in writing from Waka Kotahi for an alternative time. Approval is not automatic and applications will be considered on a site by site basis for individual cases.

<sup>8</sup> Unless there is approval in writing, from Waka Kotahi, for an alternative site. Approval is not automatic and applications will be considered on a site by site basis for individual cases.

- The recheck window (28-days) in place for the re-inspection of a failed vehicle will start at the completion of the first split test phase.

### Notes:

- An in-service conditional 28-day permit can be given only after the full CoF inspection is completed, i.e. no vehicle can be given a 28-day permit for a fault identified in the first phase of the inspection until the second phase of the inspection has been completed. The 28 day permit period starts at the completion of the second phase of the split test.
- A split test that has not been completed must be recorded as a failed inspection.

# Appendix 5: Alternative brake testing methods

## Using a decelerometer

All approved entry certification and in-service CoF B inspection sites must have access to an approved decelerometer. These may be used for compliance brake testing on some special vehicles (see [Appendix 7](#)), or, with approval from Waka Kotahi, when the inspection site RBM cannot be used due to:

- a breakdown
- when urgent repairs are required
- when a calibration is being undertaken
- when it is unsuitable for a specific vehicle.

Use of a decelerometer during the above periods must be approved by a Waka Kotahi, Safer Vehicles regional manager. Applications for approval will be considered on a case by case basis and approval will be granted only until the RBM is repaired or an alternative arrangement can be made.

- Testing with a decelerometer cannot start until approval is gained, except for a maximum period of 24 hours in the case of an emergency breakdown or where a regional manager cannot be contacted.
- Approval may be granted by a regional manager for up to five working days from the time alternative testing began. Approval for continued use must come from Waka Kotahi Regulatory Services ([vehicles@nzta.govt.nz](mailto:vehicles@nzta.govt.nz)). Some conditions may apply to the types of vehicles able to be tested.
- The test details and results must be recorded by the VI on the check sheet and notes must be made in the comments field of the IHIST screen to indicate a decelerometer has been used.
- Where available a printout of the results directly from the decelerometer must be attached to the inspection sheet. This can be in hard copy or electronic format.
- Testing trailers or combinations using a decelerometer is not recommended. Consideration should always be given to using another RBM where possible.

To apply for the approval to use an approved decelerometer for compliance brake testing, see [Appendix 8](#).

To complete a brake test:

- The decelerometer should be fitted to the vehicle being tested.
- If the test is carried out on a public road, then appropriate 'brake test' signage must be fixed to the rear of the vehicle.
- Ensure the test area has a hard level surface free from loose material.
- Accelerate the vehicle to 30km/h and, taking appropriate safety precautions, complete a brake test following the equipment suppliers' instructions.

Braking must be in a controlled and progressive manner and the wheels should not lock or skid. The decelerometer must show a minimum deceleration rate of 0.5g or 50% efficiency and stop without excessive imbalance (i.e. felt by the tester as the vehicle pulling or steering to one side during brake application). If the decelerometer records imbalance the result must be included on the check sheet.

For the park brake test, except where a transmission or similar park brake is fitted that has an alternative test process, the above procedure must be repeated and a minimum deceleration rate of 0.2 g or 20% efficiency must be recorded.



The brake efficiency must be recorded on the inspection sheet and a note included that the brake test results were achieved with a decelerometer. These must be stored in either hard copy or electronic format for one year after the vehicle pass date. Where available, a printout of the results from the decelerometer must be attached to the check sheet for every test carried out.

## Special vehicles

Special vehicle entry certification and in-service compliance brake testing procedures are available in [Appendix 7](#). As additional special vehicle types are identified, a new brake test procedure may be required. It will be developed and included in the next revision of this protocol or as required.

Certain special vehicles may use a stopping test, where a vehicle is required to stop within a marked distance of 7m from a verified speed of 30km/h in a controlled and progressive manner.<sup>9</sup> Vehicles approved for stopping tests are identified in [Appendix 7](#).

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<sup>9</sup> Brake lock-up does not necessarily verify compliance as a vehicle may no longer be 'controlled' when the wheels are locked and skidding.

## Appendix 6: Using off sites for CoF B inspection

Off-sites approved for CoF B inspections are not full-time inspection facilities. Current off-sites may continue to operate to the limit of their grading.

The status and conditions of current off-sites and urban bus sites will remain unchanged. Their status may not be transferred to an alternative site or upgraded to a higher grading. Any alterations to a current off-site or change in its terms of use that would affect the operation of that site must be approved by Waka Kotahi.

New off-sites or urban bus sites will not be approved by Waka Kotahi unless in exceptional circumstances, this does not preclude an off-site becoming a full inspection site, in which case an application must be made to Waka Kotahi.

Where a mobile RBM is used the site set-up must be checked. The RBM frame must be mounted flat and level with a tolerance of  $\pm 5^\circ$  in both lateral planes. Before operation the RBM must be powered up in the unloaded state and all its parameters checked using the manufacturer's self-checking facility or standard operating procedure. Any fault code displayed during set-up must be recorded and the RBM must not be used for any testing purposes until the fault is repaired.

Mobile RBMs that have adjustable feet connected to the load cells must have a manufacturer's approved method of confirming the accurate operation of the load cells each time the machine is set up at an inspection site. Confirmation methods must be included in the operators' manual supplied and must be able to be undertaken by the RBM operator.

### Off-site grading

Off-site testing facilities are graded using a risk matrix based on volume versus site facilities and equipment. This grading does not include urban bus sites that are rated separately and must provide an appropriate inspection facility. Individual site details and their gradings are held and maintained by Waka Kotahi.

| Grade | Site description  | Facility standard (minimum)  | Vehicles   | Maximum frequency   |
|-------|-------------------|--|--|---------------------|
| 1     | Existing off-site | Drive through undercover inspection facility, pit and compliant RBM. Meets calibration /maintenance requirements. Site equivalent to a CoF testing station, including a loaded brake test.   | All<br>May be split tests<br>Locally based vehicles* | Up to 4 days/week   |
| 2     | Existing off-site | Undercover drive-through inspection area, pit and compliant RBM. Meets calibration /maintenance requirements. Facility must be fit for purpose for vehicle types inspected. Site to provide equivalent inspection to a CoF testing station, including a loaded brake test. | All<br>May be split tests<br>Locally based vehicles* | Up to 10 days/month |
| 3     | Existing off-site | Undercover inspection area, compliant RBM on same site. Meets calibration/maintenance requirements. Facility must be fit for purpose for vehicle types inspected. Site to provide equivalent inspection  | May be split tests<br>Locally based vehicles*        | Up to 6 days/month  |

|   |   |  |                             |                    |
|---|---|--|-----------------------------|--------------------|
|   |   | to a CoF testing station, including a loaded brake test.   |                             |                    |
| 4 | Existing off-site at remote location (e.g. island site) | Undercover inspection area. Facility must be fit for purpose for vehicle types inspected. Brakes tested as presented using approved decelerometer. | Locally based vehicles only | Up to 12 days/year |

\* Locally based vehicles – vehicles that are closer in time or distance to the off-site than to a higher grade of facility.

## Appendix 7: Special vehicle brake testing protocols

**Important:** Due to the exemption from loaded brake testing for some 'special vehicles' the axle test tolerance described for compliance brake testing requirements does not apply to some special vehicle types.

### Passenger service vehicle (PSV) - brake type testing

#### Qualification for type testing

Type testing is available only at specifically approved sites operated by IOs and VIs who are specifically approved for the extra controls required. Type testing must be carried out using an approved RBM.

Where a PSV operator has a vehicle or vehicles that do not meet the 65%<sup>10</sup> loaded requirement on one or more axles and the addition of actual load or simulated load by tie-down or lifting-bed RBM is impractical, the vehicle or vehicles can qualify and take advantage of the 'type testing' procedures described in this protocol. Despite this, type testing is optional and is the operators' choice. Type testing is available to all operators of heavy PSVs although the forms are supplied and charged for by the Bus and Coach Association.

#### Type test conditions

Multiple PSVs of the same type<sup>11</sup> owned and operated by the same operator, can use the same type test result as long as they remain in the same configuration and are presented within the specified weight tolerance.

Vehicles of the same type owned by one operator can use the same type test result from different locations.

Type testing carried out at an in-service CoF B site using an 'in ground' RBM is the accepted and preferred method. Mobile RBMs can be used at other approved sites if the vehicle is level with the RBM throughout the test, i.e. ramps and platforms of at least 4m either side of the roller bed must be used to keep the vehicle at the height of the rollers for the entire length of the vehicle.

At the operator's request, the vehicle manufacturer or body builder may type test a vehicle or fleet of vehicles at time of manufacture and before sale, provided that type testing is conducted for one specific operator/customer only.

Where a manufacturer has type tested a vehicle or fleet for an operator/customer, subsequent testing of those vehicles on the manufacturer's initial type test results is only available to the original operator/customer.

Multiple vehicle types or variants in a fleet must have individual type tests but they can be used for as long as they remain in the same configuration and are presented for testing within the specified weight tolerance.

If a vehicle has one or more axles that do not meet the 65% loaded requirement, all axles on the vehicle must be type tested.

If a vehicle presents outside the weight tolerance of its type test, the type test is invalid and is withdrawn for that vehicle. The vehicle must then be tested in the 65% loaded state or be type tested again in its new state.

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<sup>10</sup> 65% - means 65% of the maximum legal weight for the axle.

<sup>11</sup> Same type – means a vehicle which is of the same make and model chassis and running gear, with the same braking system, has the same wheelbase, the same suspension (springs/air) and number and type of axles/wheels and tyres, has a body of a similar design and manufacture and with the same seating/load configuration.

If a vehicle's configuration has been changed but remains within its specified axle weight tolerance (the weight distribution remains within tolerance), then that vehicle may continue to use its type test in its new configuration. It must be tested in the 65% loaded state or be type tested again only if it cannot meet the individual weights required on each axle when presented for its CoF.

Type testing does not apply to vehicles that meet the 65% loaded requirement on all axles or where the vehicle owner chooses to achieve the 65% loaded requirement by adding a load or simulated load via tie-down or lifting-bed equipment.

A decelerometer must NOT be used for type testing.

### **Type testing procedure**

- Type testing is carried out, approved and added to LANDATA by the approved CoF B VI employed by a specifically approved IO. Additional training is required for this function.
- Testing must be identified, and the results recorded on a Waka Kotahi-approved form<sup>12</sup>, which defines the vehicle(s) and its (their) configuration and, on completion, this form is to be filed by the IO for auditing, and a copy retained by the operator. This form must have a unique identifier.
- The type test is to be completed by loading (actual or simulated) the control vehicle to at least 65% on all axles and brake testing each axle on the RBM. The axle weights must be recorded on the form as reference weights (RW).
- Provided each axle has balanced braking (less than 25% variation across the axle) and a deceleration rate of 0.5g or better, this result can be recorded against each axle as the reference value (R). To ensure consistency, the test on each axle must be repeated three times and a minimum reference value achieved, provided none of the three tests is a failed test (less than 0.5g).
- The vehicle is then unloaded and presented, within the same working day, in its normal, unloaded condition without other modifications.
- These axle weights must be recorded as the control axle weights (CAW) and used to calculate the weight tolerance.
- The axles are then individually tested on the same RBM. The minimum of the three tests is used provided none of the tests is a failed test. This result is recorded as the control deceleration rate (CDR).
- The CAWs and CDRs are recorded on LANDATA for the control vehicle and each additional vehicle covered by the type test. The vehicle(s) are identified by adding HVEX in the certification box on the ivcert screen. The VI must also use the unique six-digit identifier on Form A.
  - Use the comments field of the ivcert screen to enter the CAWs and CDRs. Identify the axle with F(ront), R(ear) or T(ag) then the CAW (in kg), then a dash, then the CDR followed by the percentage character (e.g. F2920-70%R3120-73%T3120-73%).
- Each specifically approved IO has been provided a unique certifier ID. Current approvals are:
  - PSVTNZ-Vehicle Testing NZ;
  - PSVINZ-Vehicle Inspection NZ;
  - PSVAA-AA New Zealand.

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<sup>12</sup> The provision of the 'approved form' will be a Bus and Coach Association responsibility and will be controlled and issued through its Wellington office.

- The park brake must be type tested using the same procedure.
- A three-axle PSV with a transmission/Cardan shaft park brake or similar (see main test procedures) must be included in the type test and a note added to the type test sheet indicating the type of park brake test conducted.
- At each subsequent CoF inspection the standard park brake test for that vehicle should be carried out at the presented weight.
- At each subsequent CoF a vehicle covered by a type test will be tested as presented and must be in the same configuration as the control vehicle and be within +/-100 kg of the CAW.
- Each axle must have equal or greater deceleration to the CDR when measured on an RBM, within a tolerance of 0.05g to accommodate manufacturing tolerances, as long as the measured deceleration is greater than 0.5g.

## Brake testing - heavy haulage special vehicles

### Test procedure and conditions

Heavy haulage vehicles that can't be compliance brake tested on an RBM at an inspection site may use this procedure. Vehicles must be physically brake tested by stopping tests using an approved electronic decelerometer, with print capability, fitted to the vehicle.

The brake test must be completed by an approved RBM VI on a firm and flat surface that is long enough to do so safely. Due to their significant tare weight these vehicles may be tested as presented.

Eligible vehicle types include: rows of eight, house-moving trailers, heavy haulage trailers that are over dimension and cannot fit on an RBM.

It is important to ensure the test result reflects the deceleration of the individual vehicle being inspected, not other vehicles in the combination.

- Test speed 30km/h.
- Minimum deceleration rate: 0.5g or 50% efficiency.
- Imbalance must not be significant (30% or less), felt through the vehicle pulling or stepping out of line.
- Stopping tests to be performed without loss of control.

Heavy haulage special vehicles covered by this procedure may be brake tested at the IO's premises, and/or at the operators' premises if it is an approved site.

If the brake test is completed at the operator's premises (approved by Waka Kotahi), it is to be treated as a split test, with the remainder of the CoF test completed at the IO's approved site unless the operator's site is a recognised specialist site.

When testing the park brake of a heavy haulage trailer, a stall test is to be used. On a flat level area free of loose material, engage the park brake of the combination vehicle, disconnect the air coupling between the vehicles, release and reapply the trailer park brake. Release the park brake of the towing vehicle and engage an intermediate gear or 'D' in an automatic. Attempt to drive the vehicle forward taking care not to overload the transmission. If the vehicle does not drive forward or the engine stalls the trailer has passed the test.

This is recorded on the check sheet as a stall test pass.

If the vehicle is dragged forward, the park braked wheels must be checked to confirm they have locked and not rotated. If all park braked wheels have locked, then the trailer has passed the test and it can be recorded on the check sheet as a pass.

Waka Kotahi may also give approval for a stopping test, where a vehicle is required to stop within a 7m marked distance at a verified speed of 30km/h in a controlled and progressive manner. Note, brake lock-up alone may not verify compliance, as control may be lost.

## Brake testing - dedicated stock vehicles (including horse floats)

### Test procedure and conditions

This procedure applies only to dedicated stock vehicles and some horse floats that cannot be tested with their normal load for WorkSafe and/or animal welfare reasons, and where it is also not practical for them to be loaded with a simulated load for CoF inspection.

These procedures can be used only at off-sites without load simulation for vehicles that are:

- dedicated stock vehicles, including horse floats, and<sup>13</sup>
- which historically use the off-site.

The brake test must be completed by an approved RBM CoF B VI using an approved RBM at that site.

The 65%<sup>14</sup> loaded requirement is waived for these vehicles at sites without load simulation capability and they are tested as presented.

- To pass, the vehicle must have a minimum deceleration of 0.5g (50%) on each axle – no tolerance is allowed.
- All other test conditions and reasons for rejection in the VIRM remain in place.
- The park brake should be tested using the appropriate protocol, and, where possible, the park brake should be tested on the RBM.

Decelerometer or stopping tests are not approved except in special circumstances with written approval from Waka Kotahi.

A vehicle presented as a stock or horse transport vehicle without a crate fitted is not eligible for this procedure and must have a loaded test, possibly resulting in a split test, or a simulated load test at a main site.

## Brake testing - specialist over dimension vehicles

### Test procedure and conditions

This procedure covers only specialist over-dimension vehicles not able to be tested on an RBM due to excess dimensions or weight. Not all specialist over-dimension vehicles will qualify as some can be configured in standard dimensions.

### Procedure

- Special over-dimension vehicles covered by this procedure can be tested at main sites, approved off-sites and approved specialist vehicle sites.
- The brake test is to be completed as part of a CoF inspection by a qualified CoF B VI employed by an appointed IO.
- Due to the significant tare weight and low numbers involved, the 65%<sup>15</sup> loaded requirement is waived and vehicles are to be tested as presented. The brake test is to be

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<sup>13</sup> Dedicated stock or horse transport vehicle – where the chassis/body is one unit or the stock crate is permanently mounted and sealed to the vehicle i.e. monocoque construction or permanent stock crate welded/bolted to the deck.

<sup>14</sup> 65% - means 65% of the maximum legal weight.

<sup>15</sup> 65% - means 65% of the maximum legal weight.

verified by using an approved electronic decelerometer with print capability fitted to the vehicle.

- A stopping test may also be used with Waka Kotahi approval. A vehicle is required to stop within a marked distance of 7m from a verified speed of 30km/h in a controlled and progressive manner. Note: brake lock-up may not verify compliance as control may be lost.
- It is important to ensure the test result reflects the deceleration of the vehicle being inspected not other vehicles in the combination.
- Test speed 30km/h.
- Minimum deceleration rate: 0.5g.
- Imbalance must not be significant (30% or less), felt as the vehicle pulling to one side or stepping out of line.
- Stopping tests are to be performed without loss of control.
- All other test conditions and reasons for rejection in the VIRM remain in place.
- The park brake should be tested using the stall test as described elsewhere in this protocol. This is recorded on the check sheet as a stall test inspection.

Individual vehicles not mentioned above that the VI believes cannot be successfully brake tested on an RBM may use an alternative testing method only with the specific approval of Waka Kotahi. Any approval granted will be loaded on the notes screen in LANDATA. This does not include 4WD vehicles, which are covered in a separate procedure in this appendix: [see Brake testing procedure for full-time multiple-drive vehicles.](#)

## Brake testing – Pinzgauer and Tatra vehicles.

### Test procedure and conditions

This procedure only covers the New Zealand Defence Force Pinzgauer LOV vehicles and some special-version Tatra vehicles with a wheelbase longer on one side than the other (offset). As a result, the rear axles do not sit squarely in an RBM, potentially leading to inaccurate brake efficiency readings. Where these vehicles are in a 6x6 configuration, the rear axle set is full-time 4WD.

The following RBM test procedure only applies to the rear axle or rear axle set (6x6) and has been adapted from “*Field information*”, BAE Systems, the manufacturer of Pinzgauer vehicles. The front axle can be tested in the normal way. This approved test for the NZDF Pinzgauer fleet may also be suitable for some specific Tatra models with similar rear axle offset.

### Cautions to prevent damage to the vehicle:

- Only rotate the wheel station under test to simulate forward motion. The other wheel on the axle must be rotated in the opposite direction.
- When testing the rear axle or an axle in the rear axle set, only test one wheel station at a time.
- Ensure the park brake is disengaged before starting the RBM brake test.

### Procedure

- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO on an approved RBM.
- When testing the front axle, the test is to be completed normally.



- When positioning the vehicle for a right-side rear axle test, centralise the wheel station in the rollers. Complete the test with the vehicle in N (neutral).  
Note: where load simulation is used, release the load until the wheel station is centralised. Once the wheel station is centralised, reapply the load before starting the test.
- When positioning the vehicle for a left side rear axle test, position the vehicle so the left side wheel station is in the rollers. Engage N and allow the engine to return to idle. With the engine at idle, engage first gear or D (drive) and allow the wheel to centralise in the rollers. Complete the test with the vehicle in neutral, ensuring the engine speed remains at idle.  
Note: where load simulation is used, release the load until the wheel station is centralised. Once the wheel station is centralised, re-apply the load before starting the test.
- Minimum brake performance of 0.5g must be achieved.
- All other test conditions and reasons for rejection in the VIRM remain in place. However, as imbalance can only be recorded at lock-up this is the figure that must be used to define % imbalance rather than the maximum imbalance throughout the range above 400dN (4kN).

### **Park brake test**

On a flat, dry, hard area, with the engine at idle, firmly engage the park brake and complete the stall test. The park brake must hold the vehicle in a stationary position. Do not exceed the stall test duration as damage to driveline components can occur.

## **Brake testing - full-time multiple-drive vehicles**

### **Test procedure and conditions**

This procedure only covers vehicles with full-time multi-axle drive (4x4, 6x6, 6x4 etc) where it is not possible to disengage the drive from the axle that is not seated in the rollers of the RBM. This makes it impossible to adequately test the vehicle brakes.

### **Caution to prevent damage to the vehicle:**

- Rotate only the wheel station being tested to simulate forward motion. The other wheel on the axle must be rotated in the opposite direction.
- When testing the axle(s), test only one wheel station at a time.
- Ensure the park brake is disengaged before starting the RBM brake test (on axles fitted with a park brake).

### **Procedure**

- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO, on an approved RBM.
- Test the axle one wheel station at a time. Rotate the wheel station under only the wheel being tested to simulate forward motion. To prevent damage and achieve a valid test, the other wheel on the axle must be rotated in the opposite direction.
- Minimum brake performance of 0.5g per axle must be achieved.
- All other test conditions and reasons for rejection in the VIRM remain in place.

### **Exceptions**

Where a vehicle has mechanical, fully locking, interconnected differentials with a geared reduction drive, or a mechanical limited slip differential, and the wheels on such an axle cannot

be counter-rotated without damaging the vehicle's drive system, the vehicle may have its brakes tested using an approved decelerometer with print capability. However, any axle not affected must be tested on an RBM in the loaded condition. The axle(s) tested on the RBM and the vehicle must both have a minimum of 0.5g deceleration.

### Park brake test

Where possible the park brake should be tested using the RBM in the normal manner or an alternative in this protocol should be used. If a stall test is used, do not exceed the stall test duration as damage to the driveline components can occur.

## Brake testing - specialist ground-spreading vehicles fitted with lugged tyres

### Test procedure and conditions

- This procedure covers only specialist ground-spreading vehicles fitted with tyres (specified in the table below) that do not allow the vehicle to be properly tested on an RBM. Tyre brands/models may be added or removed as circumstances require. Special ground-spreading vehicles and some vehicles fitted with lugged tyres covered by this procedure can be tested at any approved site.
- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO.
- Due to the significant tare weight and low numbers of ground spreaders involved, the 65%<sup>16</sup> loaded requirement is waived and they are to be tested as presented.
- The test is to be carried out using an approved electronic decelerometer with print capability, fitted to the vehicle being tested.
- Test speed 30km/h.
- Minimum deceleration rate: 0.5g or 50% efficiency.
- Imbalance must not be significant, felt as the vehicle pulling to one side.
- All other test conditions and reasons for rejection in the VIRM remain in place.

The park brake should be tested using the stall test method in this protocol. This is recorded on the check sheet as a stall test inspection.

### Approved tyres by brand, type, size and description:

|             |        |      |
|-------------|--------|------|
| Michelin    | 425x75 | R20  |
|             | 445x70 | R24  |
| Continental | 445x65 | 22.5 |

## Brake testing – specialist vehicles fitted with lugged tyres

### Test procedure and conditions

This procedure covers only other specialist vehicles fitted with lugged tyres that affect the vehicle brake test on an RBM. This procedure must be used only if a fail is recorded for the RBM test. Use of this test procedure must be approved by Waka Kotahi.

<sup>16</sup> 65% - means 65% of the maximum legal weight.

Waka Kotahi will require test reports, including RBM printouts, showing the initial failure and any subsequent pass using this procedure to maintain the currency of approvals.

**Caution to prevent damage to the vehicle:**

- When testing an axle, test only one wheel station at a time.
- Ensure the park brake is disengaged before starting the RBM brake test.

**Procedure**

- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO, on an approved RBM at an approved site.
- Minimum deceleration rate: 0.5g or 50% efficiency.
- Imbalance must not be significant, felt as the vehicle pulling to one side.
- Each wheel on a common axle is to be tested independently and the average result across the axle is to be used as the brake efficiency/deceleration for that axle. No tolerance for a single axle is allowed.

The park brake should be tested using the stall test described in this protocol. This is recorded on the check sheet as a stall test inspection.

## Brake testing - motorcaravans at off-sites without load simulation equipment

**Test procedure and conditions**

This procedure covers only privately owned heavy motorcaravans and motorhomes tested at off-sites without load simulation. The reason for this procedure is that it can be difficult to present these vehicles for a compliance brake test with additional load due to door size, interior layout restrictions or because of the difficulty some operators may have with the loading process. Vehicles eligible for this test are privately operated motorhomes or motorcaravans, and

- historically use an off-site for CoF B inspection.

This procedure may not be used:

- at sites that have load simulation equipment; or
- for the purposes of entry certification inspection; or
- for motorhomes or motorcaravans that are rental service vehicles.

The vehicles listed immediately above must have a loaded test, possibly a split test or a simulated load test at a main site.

**Procedure**

- Motorhomes and motorcaravans must be tested at approved off-sites on an approved RBM.
- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO.
- Due to their significant tare weight, the 65% loaded requirement is waived for these vehicles, and they are to be tested as presented.
- The vehicle must have a minimum deceleration of 0.5g (50%) on each axle.
- Imbalance to be no greater than 30% across any axle.
- The park brake should be tested using the procedure for the park brake type, and where applicable must be tested on the RBM.
- All other test conditions and reasons for rejection in the VIRM remain in place.

The use of a decelerometer or stopping test is not approved, unless the RBM is out of service for a limited period (see [Appendix 5](#)).

## Brake testing - vehicles unable to carry alternative loads at off-sites without load simulation

### Test procedure and conditions

This procedure covers only vehicles that cannot be tested with their normal load for safety or operational reasons, and it is not practical for them to be loaded for CoF inspection.

These vehicles may be tested at an approved off-site without load simulation where it is inappropriate or impossible for them to carry an alternative load. Vehicles eligible for this test are those which historically use the off-site and are of a type identified below.

This procedure may not be used at sites that have load simulation equipment or for the purposes of entry certification inspection.

### Procedure

- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO and on an approved RBM.
- Due to the normally significant tare weight, difficulty obtaining appropriate alternative loads and low numbers involved, the 65% loaded requirement is waived and therefore they are to be tested as presented.
- To pass, the vehicle must have a minimum deceleration of 0.5g (50%) on each axle. No tolerance is allowed.
- All other test conditions and reasons for rejection in the VIRM remain in place.
- The park brake should be tested using the appropriate procedure for the type of park brake in this protocol. Where possible, the park brake should be tested on the RBM.

The use of a decelerometer or stopping tests are not approved except where the RBM is out of service for a limited period (see [Appendix 5](#)).

### Vehicle types

- Specialist vehicles designed to carry unpackaged raw or processed food stuffs
- Tankers, either food grade or DG, including chemicals and bitumen
- New Zealand Fire Service appliances carrying water and/or full equipment
- Mobile workshop vehicles, fully loaded (not sales vehicles)
- Specialist vehicles fitted out as road markers that cannot carry alternative loads

Note: extra vehicles may be added to this list at the discretion of Waka Kotahi.

## Brake testing - (6x2) heavy vehicles with ECE13-compliant braking systems incorporating a mass sharing device on the tag axle

### Test procedure and conditions

This procedure covers heavy vehicles with ECE13-compliant braking systems incorporating a mass sharing device on the tag axle being tested for either entry or in-service certification at sites without load simulation. The vehicles listed below may not meet the 0.5g requirement on the tag axle due to the actions of the electronic load sharing device.

## Procedure

- The brake test must be completed by an approved RBM CoF B VI employed by an appointed IO and on an approved RBM.
- Due to electronic off-loading of the tag axle, the minimum requirement for the tag axle is 0.30g (30%), provided that:
  - the vehicle has a total minimum deceleration of 0.5g (50%), and
  - the vehicle is loaded to a minimum of 65% of maximum legal axle weight.
- All other test conditions and reasons for rejection in the VIRM remain in place.
- The park brake acting on the second axle only, when tested on an approved RBM, may be passed, provided there is a minimum of 0.15g (15%) deceleration and there is lock-up.

The use of decelerometer or stopping tests are not approved except when the RBM is out of service for a limited time (see [Appendix 5](#)).

Extra vehicles may be added at the discretion of Waka Kotahi.

## Vehicle types

- IVECO Stralis, Model AT1360.
- Mercedes Benz Econic 6X2/4, ENA
  - VIN starting with WDB, WMI and W1T

# Appendix 8: Application to use alternative brake testing equipment or methods

## Overview

You need to apply in writing to Waka Kotahi to use an alternative heavy vehicle brake testing method and/or alternative equipment for compliance or enforcement brake testing.

The decision-making process involves two steps and considers:

- the reason for the application
- the time or duration applied for
- the cost to the IO
- whether the decision is fair and consistent with legislation and policy.

Other considerations include:

- Could it give someone an unfair competitive advantage?
- Could it unnecessarily increase the cost of compliance?
- Could it stifle the ability to create transport solutions?
- The necessity of maintaining the integrity of the land transport system.

## Applying for temporary use of decelerometer due to RBM breakdown

### In-service CoF B only

If the RBM is likely to be out of service for 5 working days or less, approval can be given by a Safer Vehicles regional manager via email. All tests must be carried out using an approved decelerometer and must have the results recorded on the check sheet with **decelerometer** noted. A note of the number of vehicles tested should be made by the IO for auditing.

If the RBM is likely to be out of service for more than 5 working days, approval must be obtained from [VIRMupdates@nzta.govt.nz](mailto:VIRMupdates@nzta.govt.nz).

Applications for more than 5 working days must include:

- The inspection site ID.
- The type of decelerometer and whether it is print capable (a new decelerometer must be print capable).
- The number and the types of vehicles (especially trailers) expected to be inspected.
- The expected completion time of the RBM repair.

Approval, if granted, may include an expiry date and conditions appropriate in the circumstances.

## Applying for approval of a new decelerometer or an alternative brake test method

To apply for approval for a new decelerometer or a new alternative brake testing method contact [VIRMupdates@nzta.govt.nz](mailto:VIRMupdates@nzta.govt.nz). The application must provide as much information as possible including, but not limited to:

- reason for seeking approval
- site identification
- make, model and type of decelerometer
- details of procedures, test recording and retention of results for auditing
- type of alternative brake testing method - what, when and how the tests will be done
- type of vehicles the test will involve.

Note: new approvals will be granted only for a digital decelerometer capable of providing test results in either electronic or print format.

## Applying for an additional specialist vehicle type

Applications for an additional specialist vehicle type must be emailed to Waka Kotahi for approval. Email [inspections@nzta.govt.nz](mailto:inspections@nzta.govt.nz).

Applications must include:

- All vehicle attributes including dimensions and mass, type of brake system, owner/operator and VIN/Registration number.
- Inspection site ID (indicate if main or off-site).
- Type of brake testing suggested (e.g. approved RBM split test, approved decelerometer, with print capability or stopping test).
- Type of park brake.
- Any vehicle limitations that prevent a standard brake test.

If approved:

- The applicant will be notified.
- An update will be scheduled for appendix 7 of this protocol.
- The notes screen for individual vehicles will be updated.
- A file with all emails and information will be held at Waka Kotahi.

Extra specialist vehicles are added to this protocol at the discretion of Waka Kotahi.

Individual vehicles not mentioned in the procedures, but which the VI believes cannot be successfully brake tested on their RBM cannot be tested using alternative procedures unless specific approval has been given by Waka Kotahi.

## Appendix 9: Sample RBM brake test results record

The sample below will be required for all new RBM applications. All current approved layouts for test results from either the RBM manufacturer or NZ representative or the IO may continue to be used provided all approved data is included. Where an early RBM cannot produce all of the information below, some results may be hand written on the printout by the RBM operator. All brake test details must be recorded and stored directly from the RBM. The record of the results may be printed in hard copy or transmitted electronically.

### (Letterhead)

Waka Kotahi NZ Transport Agency compliance brake performance test record:

Time/date \_\_\_\_\_

Test number \_\_\_\_\_

Vehicle Reg. No \_\_\_\_\_

Inspector ID \_\_\_\_\_

RBM Serial No \_\_\_\_\_

Date of next calibration \_\_\_\_\_

|                       | Maximum brake force | Maximum imbalance | Brake Test Weight (BTW) or Static weight | Dynamic deceleration |
|-----------------------|---------------------|-------------------|--|----------------------|
| <b>Axle 1 Service</b> |                     |                   |  |                      |
| <b>Axle 1 Park</b>    |                     |                   |  |                      |
| <b>Axle 2 Service</b> |                     |                   |  |                      |
| <b>Axle 2 Park</b>    |                     |                   |  |                      |
| <b>Axle 3 Service</b> |                     |                   |  |                      |
| <b>Axle 3 Park</b>    |                     |                   |  |                      |
| <b>Axle 4 Service</b> |                     |                   |  |                      |
| <b>Axle 4 Park</b>    |                     |                   |  |                      |
| <b>Axle 5 Service</b> |                     |                   |  |                      |
| <b>Axle 5 Park</b>    |                     |                   |  |                      |

### Total vehicle performance

#### Service brake

Brake force \_\_\_\_\_ daN

Dynamic weight \_\_\_\_\_ Kgs

Efficiency \_\_\_\_\_ %

#### Park brake

Brake Force \_\_\_\_\_ daN

Dynamic weight \_\_\_\_\_ Kgs

Efficiency (if required) \_\_\_\_\_ %

**Note:** Where the RBM manufacturer or their representative has a calibration recording system that differs in detail from this format, application can be made to Waka Kotahi as long as any requirements for traceability and accountability are met.