

To: Heavy Vehicle Specialist Certifiers

No. **56a**

From: Steve Bullôt

Date: 15 September 2010

Subject: Class TC Trailers and the Heavy-vehicles Brake Rule

Please remove Memo 56 and replace with Memo 56a

This is an update on the requirements for the certification of electric braked TC trailers based on experience and feedback from Memo 56. Electric braked TC trailers must continue to be certified to comply with the Heavy-vehicle Brakes Rule by a HVS certifier with the 'brakes' category (HVEK) and have an exemption from the requirements of Schedule 5, but experience has shown that some changes can be made. Experience has also shown that vehicles must be properly prepared before being presented for certification. This certification is not a simple or trouble free task but must be undertaken correctly to ensure electric braked TC trailers and the combinations they operate in meet the requirements of the Heavy-vehicle Brakes Rule 2006.

This procedure is for use on electrically controlled braking systems fitted to TC trailers and their prime movers only. The purpose of the procedure is to ensure balanced braking between the vehicles in combination and is approved by exemption for the combination once all required tasks are completed and information provided to;

The Vehicle Compliance Specialist,
Heavy Vehicles,
Access & Use,
NZ Transport Agency,
PO Box 5084,
Lambton Quay,
Wellington, 6145.

This procedure results in a dedicated combination in that only the towing vehicle that has been certified with it may tow the certified trailer.

Reference should also be made to Memo 67 where the TC trailer is towed by a light vehicle

Park Brake Application & Efficiency;

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

The Rule originally required the park brake of the trailer to be operated from the towing vehicle using the same control as that used for the park brake of the towing vehicle, however, a Rule amendment addressing this issue in a practical way has since been passed. This adds clause 2.3(9A) to the Rule allowing a mechanical park brake control to be mounted in an easily accessible



Memo

For Heavy Vehicle Specialist Certifiers

position on the towed vehicle as long as a temporary brake, operated by the driver from the normal driving position and consistent in design and operation with Section 5.3 in the Rule, is fitted to the towing vehicle. This can be in the form of a switch which controls the electric brake.

This will result in a dedicated combination where only specified towing vehicle(s) may tow the specified trailer.

Variable Proportioning Devices;

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

Boat Switch;

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

Inertia/Timer operated Brakes;

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

Preparation;

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

Initial preparation;

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

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Memo

For Heavy Vehicle Specialist Certifiers

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

Certification to HVEK;

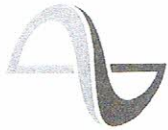
These modifications must be certified by a HVS certifier with the HVEK category who must also certify the vehicle to the Rule. While TC trailers are not required to have ABS they must still meet the performance requirements of the NZ Heavy-vehicle Brake Specification as set out in Schedule 5 or Section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

In the first instance a coupling voltage needs to be established for the trailer to achieve a minimum 0.5g braking efficiency.

- Ensure client has had the foundation brakes fully serviced and that they are operating to achieve a minimum braking efficiency of 0.5g and balanced from left to right and between axles (+/- 10% is suggested).
- Use an approved and calibrated RBM to test the combination for service and park brake performance to the requirements of Section 2.3(3) & 2.3(11), or 2.3(12) for semi trailers.
- When setting up a semi trailer combination both the towing and towed vehicle should be tested at presented weight with no tie down. This will be reflected at CoF.
- Measure trailer and get split weights for calculation purposes.
- Carry out weight transfer calculations and braking requirements for testing.
- Put trailers first axle over brake rollers and measure coupling voltage at 0.5g (typically 3 to 7 Volts).
- Test Temporary park brake.
- Test permanent park brake if fitted to the first axle.
- Repeat the above procedure until all axles have been completed, ensuring balanced braking.
- From the testing done on all axles, the HVEK to establish the average voltage to brake trailer at 0.50g.
- Note this trailer testing should also validate weight transfer calculations carried out earlier to meet braking requirements of the Rule.

Once a coupling voltage has been established for the trailer the truck controller needs to be calibrated to produce a matching coupling voltage when it is producing 0.5g braking efficiency.

- With the trailer attached and, providing a majority of the imposed load is through the rear axle of the towing vehicle, put the rear axle on the brake rollers and use this to calibrate the coupling voltage. If the position of the fifth wheel connection is significantly ahead of the rear axle then an average of both front and rear axles should be used to calibrate the coupling voltage.



Memo

For Heavy Vehicle Specialist Certifiers

- Run the brake rollers and apply the truck brakes to achieve a balanced braking efficiency of 0.5g.
- Measure the voltage at the coupling and calibrate the brake controller to achieve the desired voltage to allow for weight transfer (for 5th Wheel trailers). A different calculation for the coupling voltage differential is required for other trailer types (simple, full etc) dependant on the load they impose on the towing vehicle.
- At the onset of braking both vehicles in the combination should commence braking as close as possible to simultaneously. Any deviation from simultaneous operation should be biased towards the trailer where possible or towards the towing vehicle if the towed vehicle is a semi trailer.
- Road test with an approved decelerometer following the requirements of Section 6 of the rule, notwithstanding that these requirements are for non towing vehicles, and a minimum of three tests for each facet of the brake test is to be carried out.

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

- The certifier to plate both vehicles with the following data;
 - VIN numbers of both vehicles
 - Brake Test Mass
 - Certified Trailer Braking Efficiency
 - Signal voltage/current @ Certified Braking Efficiency.

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

Notes

Like all heavy vehicles TC trailers are required to undergo CoF testing using an approved, calibrated roller brake machine operated by a TSDA.