



# CIRCULAR 35/06 – 2 – 1

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## SELECTION OF TEST VEHICLES

### 1. INTRODUCTION

- 1.1 This circular should be read in conjunction with circular 0-2-11 “General Procedures for Selection of Vehicles and Components for ADR Compliance Testing” containing requirements applicable to all ADRs, as well as clause 8.14 of ADR 35/06 (Alternative Procedures). This circular is applicable to all vehicles certified to ADR 35/06.
- 1.2 The intention of the criteria in this circular is to reduce the number of vehicle variants required to be tested. This circular details the criteria to be considered in selecting the variants of a vehicle model to be tested. The Administrator will usually accept tests conducted in accordance with the criteria as having demonstrated compliance for all variants in the model range. Additional tests may be required for combinations of characteristics not anticipated in this circular.
- 1.3 The Administrator will consider requests for further reductions in the number of tests than established by criteria in this circular on receipt of documented evidence that if tested, the braking test results of the untested vehicles would not result in a less favourable result compared to the tested vehicle. The untested vehicle evidence may be simulated or calculated with any such simulations or calculations being traceable to similar comparisons between tested vehicles.
- 1.4 It remains the responsibility of the vehicle manufacturer to ensure that every vehicle supplied to the market for use in transport complies with ADR 35/06 as applicable.

### 2. SELECTION REQUIREMENTS FOR BRAKING SYSTEM TESTS

#### Grouping of Braking Systems

- 2.1 Each unique braking system must be tested.
  - 2.1.1 For any two or more vehicle variants to be considered to have the same unique braking system, their brake systems must have a combination of components that have the same physical (material or metallurgical), functional and dimensional properties.
    - 2.1.1.1 Any variation of the components of a braking system will constitute a different unique braking system, except for:
      - (a) length, diameter, material or routing of hydraulic, vacuum or air exhaust lines, or electrical wiring included in the system;
      - (b) location of valves, fittings or other devices within a hydraulic or vacuum line; and
      - (c) routing of air pressure lines included in the system.



### **Grouping of Vehicle Variants**

- 2.2 Any untested vehicle variant with the same unique braking system as a tested vehicle variant, will not require testing if when compared to the tested vehicle it:
- (a) has the same calibration of any electronic control unit for the braking or suspension systems<sup>1</sup>; and
  - (b) has the same configuration of axles; and
  - (c) where applicable, has an equal or lower unbraked trailer mass; and
  - (d) has tyres that are smaller, the same or no more than 2% greater in diameter; and
  - (e) has tyres of the same or greater section width; and
  - (f) has greater or equal brake cooling airflow; and
  - (g) has no higher a road speed per 1,000 rpm for the gear ratio required for the Service Brake Fade Test unless the tested vehicle was fitted with an automatic transmission such that negligible engine braking is provided (e.g. a system with a fluid coupling torque converter); and
  - (h) has no lower Lightly Loaded Test Mass (for tests conducted at the Lightly Loaded Test Mass);
  - (i) has no greater Maximum Loaded Test Mass (for tests conducted at the Maximum Loaded Test Mass); and
  - (j) in the case of a vehicle without an Antilock System or a Variable Proportioning Brake System (load sensing brake system):
    - (i) has no less of the proportion of the unladen mass on the rear wheels; and
    - (ii) has no shorter wheelbase length.<sup>2</sup>

### **Selection of Vehicle Variants for Testing**

- 2.3 Where the maximum laden vehicle speeds of all the vehicles in the range are less than 100 km/h, at least one test vehicle must have the power train giving the highest maximum laden vehicle speed of all vehicles within the range.
- 2.4 Where the maximum laden vehicle speed of any vehicle in the range is 100km/h or greater, at least one test vehicle must have a power train giving a maximum laden vehicle speed of 100 km/h or greater.
- 2.5 Where the maximum interval between brake applications specified for the service brake fade test cannot be maintained by any vehicle within the model range, at least one test vehicle shall have a power train, which most nearly permits the specified maximum interval to be maintained.

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<sup>1</sup> In the case of vehicles types having a complete chassis control system with multiple functions (e.g. Antilock System, Traction Control System, Vehicle Stability Function etc.), the calibration for the purposes of this paragraph 2.2 shall be considered the same where the manufacturer can demonstrate that a change in a calibration function such as the Traction Control System or Vehicle Stability Function does not alter the normal braking performance.

<sup>2</sup> Where it is not possible to select from a range of vehicle variants, a single test vehicle that satisfies both (h) and (i), the manufacturer may choose a test vehicle that does not meet (h) and (j)(ii), provided that the wheelbase of the selected vehicle does not exceed the shortest available wheelbase by more than 15%.



- 2.6 Where the maximum interval between applications specified for the service brake fade test can be maintained by one or more vehicles within the range, at least one test vehicle shall have a power train, which gives the acceleration that maintains the maximum interval between brake applications specified in clause 8.9 of ADR 35/06.
- 2.7 For static actuating time and energy reservoir recovery tests, the untested vehicle (or installation) must when compared to the tested vehicle:
- (a) have no longer length of brake pipe; and
  - (b) have no smaller an internal diameter of the corresponding brake pipes; and
  - (c) have no lower a rating of the brake energy generating device (i.e. compressor); and
  - (d) have no lower capacity of the energy reservoir.

### **3. SELECTION REQUIREMENTS FOR VEHICLE STABILITY FUNCTION TESTING**

**This section only applies to vehicles for which ADR compliance testing is required. This currently includes Category ME vehicles with a GVM > 12 tonnes and Category NC Prime Movers.**

#### **Grouping of Vehicle Stability Functions**

- 3.1 Each unique Vehicle Stability Function must be tested.
- 3.1.1 For any two or more vehicle variants to be considered to have the same Vehicle Stability Function, they must be equipped with the same roll-over control and directional control systems, including the same active components (e.g. sensors, electronic control unit(s) and control valves).
- 3.1.1.1 Each roll-over and/or directional control unit must use the same sensors (i.e. steering wheel angle, yaw rate, lateral acceleration, wheel speed, axle load, engine torque/speed, vehicle speed etc.) for data input and feedback control purposes, as well as the same software (i.e. control algorithms) to determine automatically and selectively commanded brake outputs, and must have the same learning (e.g. automatic mass estimation) functions.

#### **Grouping of Vehicle Variants**

- 3.2 Vehicle variants sharing the same Vehicle Stability Function (as defined in paragraphs 3.1 to 3.1.1.1 above) may be grouped for the purpose of selecting the least dynamically competent<sup>3</sup> vehicle variant(s)<sup>4</sup> for Vehicle Stability Function performance testing to Appendix 3 – Annex 1 of ADR 35/06.

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<sup>3</sup> “Dynamically competent” describes the handling behaviour of a vehicle as an attribute when subjected to the Vehicle Stability Function tests specified in Appendix 3 – Annex 1 of ADR 35/06. A vehicle’s dynamic competence is relative to the level of assistance and when (in relation to the lateral acceleration and/or rate of yaw) that the Vehicle Stability Function will be required to intervene to stabilise the vehicle and/or maintain the direction of travel intended by the driver. The least Dynamically Competent vehicle will require earlier and/or greater intervention.

<sup>4</sup> Where a manufacturer is unable to determine a single variant that is the least dynamically competent variant from a group of vehicle variants, multiple variants may (also refer paragraph 5.2) be required to be tested.



3.2.1 Grouped variants must also have the same:

- (a) axle configuration(s) (e.g. 4x2, 4x4, 6x2, 6x4, 6x6);
- (b) steering axles and working principle (e.g. forced steering, self-steering);
- (c) steering ratio (+/- 5%);
- (d) wheelbase (within +/- 10% or +/- 500 mm (whichever is greater) where the Vehicle Stability Function includes this as an end-of-line programmable feature or as a self-learning feature and there is no change in the Ackerman geometry; otherwise +/- 5%);<sup>5</sup>
- (e) track width (+ 75 / -25 mm);
- (f) brake system type (e.g. air over hydraulic, full air);
- (g) brake type (e.g. disc, drum(single wedge, twin wedge, S-cam));
- (h) suspension type (e.g. air, hydraulic, mechanical, rubber);
- (i) engine management (communication, control and response); and
- (j) Antilock System configuration (e.g. 6S/6M, 4S/4M etc.).

**Selection of Vehicle Variant(s) for Testing**

3.3 The least dynamically competent<sup>3</sup> vehicle variant(s)<sup>4</sup> of any group of variants sharing the same Vehicle Stability Function must be tested.

3.3.1 Each tested variant may be an actual variant listed on the Road Vehicle Descriptor for the particular vehicle model or may be specially assembled to include a worst-case combination of available options (e.g. tyres, foundation brakes, actuators, suspension etc.) to cover a range of actual variants.

3.3.2 In determining the least dynamically competent<sup>3</sup> vehicle variant(s)<sup>4</sup>, manufacturers should consider (where relevant) the following criteria:

- (a) overall mass;
- (b) centre of gravity height;
- (c) wheelbase;<sup>5</sup>
- (d) gearbox characteristics (in particular, any effects of engine torque reduction through the gearbox and driveline on overall vehicle retardation);
- (e) drive axles (including any effect on wheel speed sensing and vehicle speed);
- (f) other drive train options (e.g. the effect of any retarder, regenerative braking and/or auxiliary propulsion system);
- (g) individual axle loads (including distribution of total load among axles);
- (h) axle functionality (e.g. free running, driven, steered) and position;
- (i) suspension characteristics (e.g. spring and dampening rates);
- (j) brake characteristics (e.g. foundation brakes including friction elements, actuators);
- (k) tyre and rim installation type (i.e. single, wide single or dual tyre fitment);
- (l) tyre specifications (e.g. carcass construction, compounds, tread and tyre size designation (i.e. section width, aspect ratio, rim diameter));
- (m) lateral acceleration sensor position; and
- (n) yaw rate sensor position.

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<sup>5</sup> Wheelbase needs to be considered in the grouping of variants as well as the selection of the least dynamically competent variant(s) from the grouped variants.



#### **4. PARTIAL TESTING OF VEHICLE VARIANTS**

- 4.1 A previously tested vehicle variant fitted with a variation of a unique braking system need only undergo the tests that are relevant to the variation in the braking system.
- 4.1.1 The parking brake system may be tested to clause 8.11 of ADR 35/06, or clause 5.1.2.3 of UN R13 (as applicable).
- 4.1.2 The brake power or assist unit may be tested to clauses 8.6, 8.7 and 8.8 of ADR 35/06 or Annex 4 of UN R13 (as applicable).
- 4.1.3 The air pressure actuation system as described in paragraph 2.7 above may be tested to clauses 8.12 and 8.13 of ADR 35/06 or Annex 6 of UN R13 (as applicable).
- 4.1.4 A Variable Proportioning Brake System (load sensing brake system) or pressure proportioning control system may be tested to clauses 8.3, 8.4, and 8.5 of ADR 35/06 or Annex 4, paragraph 2.1 (unladen tests only) of UN R13 (as applicable).
- 4.1.5 An Antilock System may be tested to Appendix 2 of ADR 35/06 or Annex 13 of UN R13 (as applicable).<sup>6</sup>
- 4.1.6 A Vehicle Stability Function may be tested to Appendix 3 – Annex 1 of ADR 35/06.<sup>7</sup>
- 4.2 Each varied design must be assigned its own unique brake system identifier.
- 4.3 The test report referenced on the SE form for the varied braking system must either:
- (a) reference the original test report; or
  - (b) include the original test report together with extension sheets as attachments to detail the additional required tests.
- 4.4 Summary evidence for variations requiring the retesting described in paragraphs 4.1.4, 4.1.5 and/or 4.1.6 above, must be reported on the same SE form as all other in motion tests required for the base braking system.

#### **5. ALTERNATIVES TO PRACTICAL TESTING OF A VEHICLE STABILITY FUNCTION**

- 5.1 Where simulation according to Appendix 3 – Annex 2 of ADR 35/06 is used to demonstrate compliance of a variant, the manufacturer must hold an original practical test report and validating simulation for at least one reference variant, together with the simulation results of the variant for which compliance is being demonstrated.
- 5.1.1 The simulation must be performed using the same simulator and the test report must reference the validation tests.

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<sup>6</sup> The manufacturer must also be able to demonstrate that any change to the active components of the Antilock System would not adversely affect the performance of the vehicle in any of the other prescribed braking and/or Vehicle Stability Function tests.

<sup>7</sup> The manufacturer must also be able to demonstrate that any change to the active components within the Vehicle Stability Function would not adversely affect the performance of the vehicle in any of the other prescribed braking and/or Antilock System tests.



5.1.2 The variant for which compliance is being demonstrated must be equipped with the same Vehicle Stability Function (see paragraphs 3.1 to 3.1.1.1 above) and the same number of axles as the reference variant.

## **6. FLEET SELECTION FORM (SFVBS) REQUIREMENTS**

6.1 Any variants shown on the SFVBS form that require demonstration of compliance to the Vehicle Stability Function requirements, must be shown on the SFVBS form as “T”, “S” or “NT”.

6.1.1 Variants subjected to practical testing must be shown as tested “T”.

6.1.2 Variants demonstrating compliance by simulation must be shown as “S”.

6.1.3 Variants not requiring demonstration of compliance to the Vehicle Stability Function system requirements by practical testing or simulation must be shown as “NT”.

## **7. ALTERNATIVE STANDARDS**

7.1 An untested variant which is listed in an appropriate UN R13 approval document (to one of the series of amendments of UN R13 listed as an alternative standard for the vehicle type in the ADR) may be certified without the selection criteria in the circular being applied.

7.1.1 All variants to be covered in the application must be included on the fleet selection form.

7.1.2 If all variants listed on the SF form are covered by a UN approval the tested/untested status is to be recorded as “UN-A”.

7.2 An untested variant that is not listed in an appropriate UN R13 approval document (to one of the series of amendments of UN R13 listed as an alternative standard for the vehicle type in the ADR) may be certified on the basis of a comparison to a vehicle variant tested in accordance and compliant with the technical requirements of an appropriate series of amendments to UN R13 if:

(a) the tested variant is listed in an appropriate UN R13 approval document;  
and

(b) the untested variant, when compared to the tested variant, meets the criteria of this circular (refer paragraph 2).

7.2.1 All variants to be covered in the application must be included on the fleet selection form.

7.2.2 The variant(s) tested to UN R13 and included on the UN R13 approval are to show the tested/untested status as “UN - Tested”.

7.2.3 The variants not tested to UN R13 but included in the UN R13 approval are to show the tested/untested status as “UN - Approved”.

7.2.4 The variants not tested to UN R13 and not included on the UN R13 approval are to show the tested/untested status as “Untested”.

7.2.5 A variant marked as Untested may only be compared with a relevant variant which is either “UN - Tested” or “Tested”.



- 7.3 A vehicle variant fitted with a variation of a unique braking system (see paragraph 4.1) may be certified on the basis of comparison to a vehicle variant shown as “UN – Tested” on the SF form.
- 7.3.1 In this case, the variant must be listed on the SF form and shown as “Tested – Partial”.