



Vehicle Standard (Australian Design Rule 97/00 – Advanced Emergency Braking for Omnibuses, and Medium and Heavy Goods Vehicles) 2022

I, KEVIN HOGAN, Assistant Minister to the Deputy Prime Minister, determine this national road vehicle standard under section 12 of the *Road Vehicle Standards Act 2018*.

Dated 24 February 2022

[SIGNED]

Kevin Hogan

Assistant Minister to the Deputy Prime Minister

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1. LEGISLATIVE PROVISIONS

- 1.1. Name of Standard
 - 1.1.1. This standard is the Vehicle Standard (Australian Design Rule 97/00 – Advanced Emergency Braking for Omnibuses, and Medium and Heavy Goods Vehicles) 2022.
 - 1.1.2. This standard may also be cited as the Australian Design Rule 97/00 – Advanced Emergency Braking for Omnibuses, and Medium and Heavy Goods Vehicles, the Australian Design Rule 97/00, or ADR 97/00.
- 1.2. Commencement
 - 1.2.1. This standard commences on the day after it is registered.

2. FUNCTION

- 2.1. The function of this vehicle standard is to specify requirements for Advanced Emergency Braking Systems fitted to omnibuses, and to goods vehicles over 3.5 tonnes '*Gross Vehicle Mass*', to avoid or mitigate the severity of rear-end in lane collisions.

3. APPLICABILITY

- 3.1. This vehicle standard applies to category MD, ME, NB, and NC vehicles, from the dates set out in clauses 3.1.1 to 3.1.3 and the table under clause 3.4 below.
 - 3.1.1. 1 November 2023 for all new model vehicles.
 - 3.1.2. 1 November 2024 for all category MD and ME vehicles.
 - 3.1.3. 1 February 2025 for all category NB and NC vehicles.
- 3.2. Notwithstanding clause 3.1 above, a category MD, ME, NB, or NC vehicle is not required to comply with this vehicle standard, if it:
 - (a) is an omnibus specially designed with spaces for standing passengers; or
 - (b) is an '*Articulated Omnibus*'; or
 - (c) has four or more '*Axles*'; or
 - (d) is '*designed for off-road use*', according to the applicable definition in Appendix B of this standard.
- 3.3. For the purposes of clause 3.1.1 above, a "new model" is a vehicle model first produced with a '*Date of Manufacture*' on or after the date prescribed in that clause.

3.4. Applicability Table

Vehicle Category	ADR Category Code	UN Category Code*	Manufactured on or After**	Acceptable Prior Rules
Moped 2 wheels	LA	L1	Not Applicable	
Moped 3 wheels	LB	L2	Not Applicable	
Motor cycle	LC	L3	Not Applicable	
Motor cycle and sidecar	LD	L4	Not Applicable	
Motor tricycle	LE	L5		
	LEM		Not Applicable	
	LEP		Not Applicable	
	LEG		Not Applicable	
Passenger car	MA	M1	Not Applicable	
Forward-control passenger vehicle	MB	M1	Not Applicable	
Off-road passenger vehicle	MC	M1	Not Applicable	
Light omnibus	MD	M2		
up to 3.5 tonnes 'GVM' and up to 12 seats	MD1		1 November 2023	Nil
up to 3.5 tonnes 'GVM' and more than 12 seats	MD2		1 November 2023	Nil
over 3.5 tonnes and up to 4.5 tonnes 'GVM'	MD3		1 November 2023	Nil
over 4.5 tonnes and up to 5 tonnes 'GVM'	MD4		1 November 2023	Nil
Heavy omnibus	ME	M3	1 November 2023	Nil
Light goods vehicle	NA	N1	Not Applicable	
Medium goods vehicle	NB	N2		
over 3.5 tonnes and up to 4.5 tonnes 'GVM'	NB1		1 November 2023	Nil
over 4.5 tonnes and up to 12 tonnes 'GVM'	NB2		1 November 2023	Nil
Heavy goods vehicle	NC	N3	1 November 2023	Nil
Very light trailer	TA	O1	Not Applicable	
Light trailer	TB	O2	Not Applicable	
Medium trailer	TC	O3	Not Applicable	
Heavy trailer	TD	O4	Not Applicable	

* The category code may also be in the format L₁, L₂, L₃ etc

** See clauses 3.1 to 3.3.

4. DEFINITIONS

- 4.1. For vehicle categories, definitions and meanings used in this standard, refer to:
 - 4.1.1. Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005; and
 - 4.1.2. Definitions in Appendix A of this standard or in the alternative standard at clause 7; and
 - 4.1.3. Definitions in Appendix B of this standard.

5. REQUIREMENTS

- 5.1. All vehicles must be equipped with an Advanced Emergency Braking System and meet the requirements of Appendix A, as varied by Section 6 Exemptions and Alternative Procedures.

6. EXEMPTIONS AND ALTERNATIVE PROCEDURES

- 6.1. Compliance with the following parts, sections and annexes of Appendix A is not required for the purposes of this standard:

Section 3	Application for approval
Section 4	Approval
Section 7	Conformity of production
Section 8	Penalties for non-conformity of production
Section 9	Modification of vehicle type and extension of approval
Section 10	Production definitively discontinued
Section 11	Names and addresses of the Technical Services responsible for conducting approval tests and of Type Approval Authorities
Section 12	Transitional provisions

Annexes

Annex 1	Communication
Annex 2	Arrangements of approval marks

- 6.2. Vehicles may as an alternative to the anti-lock braking requirement in paragraph 5.1.1 of Appendix A, be equipped with an ‘*Antilock System*’ meeting the requirements of the Australian Design Rule 35/...¹ – Commercial Vehicle Brake Systems.
- 6.3. In paragraph 5.2.1.1 of Appendix A, omit “paragraph 5.5.1 above”, substitute “paragraph 5.5.1 below”.

¹ The ellipsis (...) indicates the version(s) of the ADR in force at the ‘*Date of Manufacture*’.

- 6.4. Paragraph 5.2.3 of Appendix A is not applicable for sub-category NB2 or category NC vehicles equipped with an automatic system to deactivate the Advanced Emergency Braking System function when the vehicle is connected through a compatible electrical connector to the lighting and light signalling devices of a towed trailer, without any connection through a '*Prescribed*' electrical connector to a trailer '*Antilock System*'.
- 6.5. In paragraph 5.3.3 of Appendix A, omit 'to the technical service at the time of type approval', substitute 'to the Approved Testing Facility'.
- 6.6. In paragraph 5.5.2 of Appendix A, omit 'provided by the vehicle manufacturer at the time of type-approval and'.
- 6.7. Paragraph 6.2.1 of Appendix A is not applicable for the purposes of this national standard.
- 6.7.1. Except where otherwise provided in clause 6.7.2 below, vehicles must meet the requirements of paragraphs 6.4, 6.5 and 6.8 of Appendix A when loaded to '*Lightly Loaded Test Mass 35/...*' and again when loaded to '*Maximum Loaded Test Mass 35/...*'.
- 6.7.2. In the case of a category ME or NC vehicle, the requirements of paragraphs 6.4, 6.5 and 6.8 of Appendix A must be met with the vehicle loaded to:
- (a) '*Lightly Loaded Test Mass 35/...*'; and
 - (b) '*Maximum Loaded Test Mass 35/...*', or (at the option of the '*Manufacturer*') at least the Group '*Axle Load*' limits specified in Table 1 below if this results in a vehicle mass that is lower than the '*Gross Vehicle Mass*'.
- 6.7.3. In the case of a '*Prime Mover*', any test required to be performed with the vehicle laden, may be performed while towing an un-braked '*Semi-trailer*', loaded such that the required mass and mass distribution of the '*Prime Mover*' is achieved.
- 6.8. Footnote 2 in Appendix A is not applicable for the purposes of this national standard.
- 6.8.1. Where a 'soft target' is used, this must be representative of a regular UN category M₁ AA saloon² or UN category M₁ AB hatchback², in terms of its identification characteristics according to ISO 19206-1:2018, for the particular sensor system of the Advanced Emergency Braking System under test.

² As defined in the United Nations Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6.

Table 1: Group ‘Axle Load’ Limits

Number of ‘Axles’ in ‘Axle Group’	Tyre Type “a” and Configuration	Group ‘Axle Load’ Limit (tonnes)
1	S	6.0
	W ₁	6.7
	W ₂	7.0
	D	9.0
	D (RFS)	10.0
2	S S	11.0
	S D or D S	13.0
	W ₁ W ₁	13.3
	W ₂ W ₂	14.0
	D D	16.5
	D D (RFS)	17.0
3 (see note below)	S S S	15.0
	W ₁ W ₁ W ₁	20.0
	W ₂ W ₂ W ₂	20.0
	D D D	20.0
	D D D (RFS)	22.5

Tyre Type “a”:

S Single tyre per wheel

W₁ Wide single tyre (375 to 450 mm ‘Section Width’) per wheel

W₂ Wide single tyre (over 450 mm ‘Section Width’) per wheel

D Dual tyres per wheel

RFS means ‘Road Friendly Suspension’.

Note: As per clause 3.2 above, category MD, ME, NB, or NC vehicles with four or more ‘Axles’ are not required to comply with this vehicle standard.

- 6.9. In paragraphs 6.4.5 and 6.5.4 of Appendix A, omit ‘Compliance shall be verified by either actual measurement during the test or using documentation provided by the vehicle manufacturer, as agreed between the Technical Service and the vehicle manufacturer’.
- 6.9.1. The commencement of the ‘emergency braking phase’, for both the stationary target and the moving target, must be established from actual test measurements.
- 6.10. The documentation referred to in Annex 4 of Appendix A need not be provided, submitted or made available to any particular ‘Technical Service’, in which case it shall instead be made available for inspection upon request as part of an application for Type Approval and/or a Conformity of Production assessment.
- 6.11. ‘Type Approval Authority’ in Annex 4 of Appendix A must be read as ‘Secretary’.
- 6.12. Vehicles will be deemed, for the purposes of this national standard, to meet the technical requirements of paragraph 5.1.3 and Annex 4 of Appendix A, if compliance can be demonstrated as part of an application for Type Approval and/or a Conformity of Production assessment.

7. ALTERNATIVE STANDARDS

- 7.1. For vehicles equipped with an Advanced Emergency Braking System, the technical requirements of the United Nations Regulation No. 131 – UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLES WITH REGARD TO THE ADVANCED EMERGENCY BRAKING SYSTEMS (AEBS), incorporating the 01 series of amendments, are deemed to be equivalent to the technical requirements of this standard.
 - 7.1.1. Any requirement, procedure and/or test in the United Nations Regulation No. 131, incorporating the 01 series of amendments, which is agreed between the manufacturer and the Technical Service (or vice versa), shall be taken to be an administrative requirement, not a technical requirement.
 - 7.1.1.1. Except for vehicles meeting all the approval requirements of this alternative standard and/or where otherwise provided by the Australian Design Rule – Harmonisation, clauses 6.7.1, 6.7.2, 6.7.3, 6.8.1 and 6.9.1 of this rule (all above) shall apply.
 - 7.1.2. Vehicles will be deemed for the purposes of this national standard, to meet the technical requirements of paragraph 5.1.3 and Annex 4 of the United Nations Regulation No. 131, incorporating the 01 series of amendments, if compliance can be demonstrated as part of an application for Type Approval and/or a Conformity of Production assessment.

APPENDIX A

Agreement

Concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations*

(Revision 3, including the amendments which entered into force on 14 September 2017)

Addendum: 130 - Regulation: 131

Incorporating by the Department of Infrastructure, Transport, Regional Development and Communications, all valid text up to:

01 series of amendments – Date of entry into force: 26 January 2014

Supplement 1 to 01 series of amendments – Date of entry into force: 13 February 2014

Supplement 2 to the 01 series of amendments – Date of entry into force: 8 October 2016

Uniform provisions concerning the approval of motor vehicles with regard to the Advanced Emergency Braking Systems (AEBS)

* Former titles of the Agreement:
Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958 (original version);
Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, done at Geneva on 5 October 1995 (Revision 2).

Regulation No. 131

Uniform provisions concerning the approval of motor vehicles with regard to the Advanced Emergency Braking Systems (AEBS)

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Introduction (for information)

The intention of this Regulation is to establish uniform provisions for Advanced Emergency Braking Systems (AEBS) fitted to motor vehicles of the categories M₂, M₃, N₂ and N₃¹ primarily used under monotonous highway driving conditions.

While, in general, those vehicle categories will benefit from the fitment of an AEBS, there are sub-groups where the benefit is rather uncertain because they are primarily used in other conditions than highway conditions (e.g. buses with standing passengers i.e. Classes I, II and A¹, category G vehicles¹, construction vehicles, etc.). Regardless from the benefit, there are other sub-groups where the installation of AEBS would be technically difficult or not feasible (e.g. position of the sensor on vehicles of category G¹, construction vehicles mainly used in off-road areas and gravel tracks, special purpose vehicles and vehicles with front mounted equipment, etc.). In some cases there may be a possibility of false emergency braking events because of vehicle design constraints.

In addition, systems intended for vehicles not equipped with a pneumatic rear-axle suspension require the integration of advanced sensor technology to take into account the variation of the pitch angle of the vehicle.

The system shall automatically detect a potential forward collision, provide the driver with a warning and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating the severity of a collision in the event that the driver does not respond to the warning.

The system shall only operate in driving situations where braking will avoid or mitigate the severity of an accident, and shall take no action in normal driving situations.

In the case of a failure in the system, the safe operation of the vehicle shall not be endangered.

The system shall provide as a minimum an acoustic or haptic warning, which may also be a sharp deceleration, so that an inattentive driver is made aware of a critical situation.

During any action taken by the system (the warning and emergency braking phases), the driver can, at any time through a conscious action, e.g. by a steering action or an accelerator kick-down, take control and override the system.

The Regulation cannot include all the traffic conditions and infrastructure features in the type-approval process. Actual conditions and features in the real world should not result in false warnings or false braking to the extent that they encourage the driver to switch the system off.

1. Scope and purpose

This Regulation applies to the approval of vehicles of category M₂, N₂, M₃ and N₃¹ with regard to an on-board system to avoid or mitigate the severity of a rear-end in lane collision.

2. Definitions

- 2.1. "Advanced Emergency Braking System (AEBS)" means a system which can automatically detect a potential forward collision and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating a collision.
- 2.2. "Vehicle type with regard to its Advanced Emergency Braking System" means a category of vehicles which do not differ in such essential respects as:
- (a) The manufacturer's trade name or mark;
 - (b) Vehicle features which significantly influence the performances of the Advanced Emergency Braking System;
 - (c) The type and design of the Advanced Emergency Braking System.
- 2.3. "Subject vehicle" means the vehicle being tested.
- 2.4. "Target" means a high volume series production passenger car of category M₁ AA saloon¹ or in the case of a soft target an object representative of such a vehicle in terms of its detection characteristics applicable to the sensor system of the AEBS under test.
- 2.5. "Moving target" means a target travelling at a constant speed in the same direction and in the centre of the same lane of travel as the subject vehicle.
- 2.6. "Stationary target" means a target at standstill facing the same direction and positioned on the centre of the same test lane of travel as the subject vehicle.
- 2.7. "Soft target" means a target that will suffer minimum damage and cause minimum damage to the subject vehicle in the event of a collision.
- 2.8. "Collision warning phase" means the phase directly preceding the emergency braking phase, during which the AEBS warns the driver of a potential forward collision.
- 2.9. "Emergency braking phase" means the phase starting when the AEBS emits a braking demand for at least 4 m/s² deceleration to the service braking system of the vehicle.
- 2.10. "Common space" means an area on which two or more information functions (e.g. symbol) may be displayed, but not simultaneously.
- 2.11. "Self-check" means an integrated function that checks for a system failure on a semi-continuous basis at least while the system is active.
- 2.12. "Time to collision (TTC)" means the value of time obtained by dividing the distance between the subject vehicle and the target by the relative speed of the subject vehicle and the target, at an instant in time.

3. Application for approval

- 3.1. The application for approval of a vehicle type with regard to the Advanced Emergency Braking System shall be submitted by the vehicle manufacturer or by his authorized representative.
- 3.2. It shall be accompanied by the documents mentioned below in triplicate:
 - 3.2.1. A description of the vehicle type with regard to the items mentioned in paragraph 2.2., together with a documentation package which gives access to the basic design of the AEBS and the means by which it is linked to other vehicle systems or by which it directly controls output variables. The numbers and/or symbols identifying the vehicle type shall be specified.
- 3.3. A vehicle representative of the vehicle type to be approved shall be submitted to the Technical Service conducting the approval tests.

4. Approval

- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5. below, approval of that vehicle shall be granted.
- 4.2. An approval number shall be assigned to each type approved; its first two digits (at present 01 corresponding to the 01 series of amendments) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to the same vehicle type equipped with another type of AEBS, or to another vehicle type.
- 4.3. Notice of approval or of refusal or withdrawal of approval pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 and documentation supplied by the applicant being in a format not exceeding A4 (210 x 297 mm), or folded to that format, and on an appropriate scale or electronic format.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark conforming to the model described in Annex 2, consisting of:
 - 4.4.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval;¹
 - 4.4.2. The number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1. above.

¹ The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev. 6 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

- 4.5. If the vehicle conforms to a vehicle type approved under one or more other Regulations, annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1. above need not be repeated; in such a case, the Regulation and approval numbers and the additional symbols shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1. above.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle data plate.

5. Specifications

- 5.1. General
 - 5.1.1. Any vehicle fitted with an AEBS complying with the definition of paragraph 2.1. above shall meet the performance requirements contained in paragraphs 5.1. to 5.6.2. of this Regulation and shall be equipped with an anti-lock braking function in accordance with the performance requirements of Annex 13 to Regulation No. 13.
 - 5.1.2. The effectiveness of AEBS shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by fulfilling the technical requirements and respecting the transitional provisions of Regulation No. 10 by applying:
 - (a) The 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);
 - (b) The 04 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries).
 - 5.1.3. Conformity with the safety aspects of complex electronic control systems shall be shown by meeting the requirements of Annex 4.
- 5.2. Performance requirements
 - 5.2.1. The system shall provide the driver with appropriate warning(s) as below:
 - 5.2.1.1. A collision warning when the AEBS has detected the possibility of a collision with a preceding vehicle of category M, N or O in the same lane which is travelling at a slower speed, has slowed to a halt or is stationary having not being identified as moving. The warning shall be as specified in paragraph 5.5.1. above.
 - 5.2.1.2. A failure warning when there is a failure in the AEBS that prevents the requirements of this Regulation of being met. The warning shall be as specified in paragraph 5.5.4. below.
 - 5.2.1.2.1. There shall not be an appreciable time interval between each AEBS self-check, and subsequently there shall not be an appreciable delay in illuminating the warning signal, in the case of an electrically detectable failure.
 - 5.2.1.3. A deactivation warning, if the vehicle is equipped with a means to manually deactivate the AEBS, shall be given when the system is deactivated. This shall be as specified in paragraph 5.4.2. below.

- 5.2.2. Subsequent to the warning(s) of paragraph 5.2.1.1. above, and subject to the provisions of paragraphs 5.3.1. to 5.3.3. below, there shall be an emergency braking phase having the purpose of significantly decreasing the speed of the subject vehicle. This shall be tested in accordance with paragraphs 6.4. and 6.5. of this Regulation.
- 5.2.3. The system shall be active at least within the vehicle speed range of 15 km/h up to the maximum design speed of the vehicle, and at all vehicle load conditions, unless manually deactivated as per paragraph 5.4. below.
- 5.2.4. The system shall be designed to minimize the generation of collision warning signals and to avoid autonomous braking in situations where the driver would not recognize an impending forward collision. This shall be demonstrated in accordance with paragraph 6.8. of this Regulation.
- 5.3. Interruption by the driver
 - 5.3.1. The AEBS may provide the means for the driver to interrupt the collision warning phase. However, when a vehicle braking system is used to provide a haptic warning, the system shall provide the driver with a means to interrupt the warning braking.
 - 5.3.2. The AEBS shall provide the means for the driver to interrupt the emergency braking phase.
 - 5.3.3. In both cases above, this interruption may be initiated by any positive action (e.g. kick-down, operating the direction indicator control) that indicates that the driver is aware of the emergency situation. The vehicle manufacturer shall provide a list of these positive actions to the technical service at the time of type approval and it shall be annexed to the test report.
- 5.4. When a vehicle is equipped with a means to deactivate the AEBS function, the following conditions shall apply as appropriate:
 - 5.4.1. The AEBS function shall be automatically reinstated at the initiation of each new ignition cycle.
 - 5.4.2. A constant optical warning signal shall inform the driver that the AEBS function has been deactivated. The yellow warning signal specified in paragraph 5.5.4. below may be used for this purpose.
- 5.5. Warning indication
 - 5.5.1. The collision warning referred to in paragraph 5.2.1.1. above shall be provided by at least two modes selected from acoustic, haptic or optical.

The timing of the warning signals shall be such that they provide the possibility for the driver to react to the risk of collision and take control of the situation, and shall also avoid nuisance for the driver by too early or too frequent warnings. This shall be tested in accordance with the provisions of paragraphs 6.4.2. and 6.5.2. of this Regulation
 - 5.5.2. A description of the warning indication and the sequence in which the collision warning signals are presented to the driver shall be provided by the vehicle manufacturer at the time of type-approval and recorded in the test report.
 - 5.5.3. Where an optical means is used as part of the collision warning, the optical signal may be the flashing of the failure warning signal specified in paragraph 5.5.4. below.

- 5.5.4. The failure warning referred to in paragraph 5.2.1.2. above shall be a constant yellow optical warning signal.
- 5.5.5. Each AEBS optical warning signal shall be activated either when the ignition (start) switch is turned to the "on" (run) position or when the ignition (start) switch is in a position between the "on" (run) and "start" that is designated by the manufacturer as a check position (initial system (power-on)). This requirement does not apply to warning signals shown in a common space.
- 5.5.6. The optical warning signals shall be visible even by daylight; the satisfactory condition of the signals must be easily verifiable by the driver from the driver's seat.
- 5.5.7. When the driver is provided with an optical warning signal to indicate that the AEBS is temporarily not available, for example due to inclement weather conditions, the signal shall be constant and yellow in colour. The failure warning signal specified in paragraph 5.5.4. above may be used for this purpose.
- 5.6. Provisions for the periodic technical inspection
- 5.6.1. At a periodic technical inspection it shall be possible to confirm the correct operational status of the AEBS by a visible observation of the failure warning signal status, following a "power-ON" and any bulb check.
- In the case of the failure warning signal being in a common space, the common space must be observed to be functional prior to the failure warning signal status check.
- 5.6.2. At the time of type approval, the means to protect against simple unauthorized modification of the operation of the failure warning signal chosen by the manufacturer shall be confidentially outlined.
- Alternatively, this protection requirement is fulfilled when a secondary means of checking the correct operational status of the AEBS is available.

6. Test procedure

- 6.1. Test conditions
- 6.1.1. The test shall be performed on a flat, dry concrete or asphalt surface affording good adhesion.
- 6.1.2. The ambient temperature shall be between 0 °C and 45 °C.
- 6.1.3. The horizontal visibility range shall allow the target to be observed throughout the test.
- 6.1.4. The tests shall be performed when there is no wind liable to affect the results.
- 6.2. Vehicle conditions
- 6.2.1. Test weight
- The vehicle shall be tested in a condition of load to be agreed between the manufacturer and the Technical Service. No alteration shall be made once the test procedure has begun.

- 6.3. Test targets
- 6.3.1. The target used for the tests shall be a regular high volume series production passenger car of category M₁ AA saloon, or alternatively a "soft target" representative of such a vehicle in terms of its identification characteristics applicable to the sensor system of the AEBS under test.²
- 6.3.2. Details that enable the target(s) to be specifically identified and reproduced shall be recorded in the vehicle type approval documentation.
- 6.4. Warning and activation test with a stationary target
- 6.4.1. The subject vehicle shall approach the stationary target in a straight line for at least two seconds prior to the functional part of the test with a subject vehicle to target centreline offset of not more than 0.5 m.
- The functional part of the test shall start when the subject vehicle is travelling at a speed of 80 ± 2 km/h and is at a distance of at least 120 m from the target.
- From the start of the functional part until the point of collision there shall be no adjustment to any control of the subject vehicle by the driver other than slight adjustments to the steering control to counteract any drifting.
- 6.4.2. The timing for the collision warning modes referred to in paragraph 5.5.1. above shall comply with the following:
- 6.4.2.1. At least one warning mode shall be provided no later than specified in Table I, Column B, of Annex 3.
- In the case of the vehicles referred to in Table I, row 1, of Annex 3, the warning shall be haptic or acoustic.
- In the case of the vehicles referred to in Table I, row 2, of Annex 3, the warning shall be haptic, acoustic or optical
- 6.4.2.2. At least two warning modes shall be provided no later than specified in Table I, Column C, of Annex 3.
- 6.4.2.3. Any speed reduction during the warning phase, shall not exceed either 15 km/h or 30 per cent of the total subject vehicle speed reduction, whichever is higher.
- 6.4.3. The collision warning phase shall be followed by the emergency braking phase.
- 6.4.4. The total speed reduction of the subject vehicle at the time of the impact with the stationary target shall be not less than the value specified in Table I, column D of Annex 3.
- 6.4.5. The emergency braking phase shall not start before a TTC equal to or less than 3.0 seconds.
- Compliance shall be verified by either actual measurement during the test or using documentation provided by the vehicle manufacturer, as agreed between the Technical Service and the vehicle manufacturer.

² The identification characteristics of the soft target shall be agreed upon between the Technical Service and the vehicle manufacturer as being equivalent to a passenger car of category M₁ AA saloon.

- 6.5. Warning and activation test with a moving target
- 6.5.1. The subject vehicle and the moving target shall travel in a straight line, in the same direction, for at least two seconds prior to the functional part of the test, with a subject vehicle to target centreline offset of not more than 0.5m.
- The functional part of the test shall start with the subject vehicle travelling at a speed of 80 ± 2 km/h, the moving target at speed of the value specified in Table I, column H of Annex 3, and a separation distance of at least 120 m between them.
- From the start of the functional part of the test until the subject vehicle comes to a speed equal to that of the target there shall be no adjustment to any subject vehicle control by the driver other than slight steering adjustments to counteract any drifting.
- 6.5.2. The timing for the collision warning modes referred to in paragraph 5.5.1. above shall comply with the following:
- 6.5.2.1. At least one haptic or acoustic warning mode shall be provided no later than specified in Table I Column E of Annex 3.
- 6.5.2.2. At least two warning modes shall be provided no later than specified in Table I Column F of Annex 3.
- 6.5.2.3. Any speed reduction during the warning phase shall not exceed either 15 km/h or 30 per cent of the total subject vehicle speed reduction, whichever is higher.
- 6.5.3. The emergency braking phase shall result in the subject vehicle not impacting the moving target.
- 6.5.4. The emergency braking phase shall not start before a TTC equal to or less than 3.0 seconds.
- Compliance shall be verified by either actual measurement during the test or using documentation provided by the vehicle manufacturer, as agreed between the Technical Service and the vehicle manufacturer.
- 6.6. Failure detection test
- 6.6.1. Simulate an electrical failure, for example by disconnecting the power source to any AEBS component or disconnecting any electrical connection between AEBS components. When simulating an AEBS failure, neither the electrical connections for the driver warning signal of paragraph 5.5.4. above nor the optional manual AEBS deactivation control of paragraph 5.4. shall be disconnected.
- 6.6.2. The failure warning signal mentioned in paragraph 5.5.4. above shall be activated and remain activated not later than 10 seconds after the vehicle has been driven at a speed greater than 15 km/h and be reactivated immediately after a subsequent ignition "off" ignition "on" cycle with the vehicle stationary as long as the simulated failure exists.

- 6.7. Deactivation test
- 6.7.1. For vehicles equipped with means to deactivate the AEBS, turn the ignition (start) switch to the "on" (run) position and deactivate the AEBS. The warning signal mentioned in paragraph 5.4.2. above shall be activated. Turn the ignition (start) switch to the "off" position. Again, turn the ignition (start) switch to the "on" (run) position and verify that the previously activated warning signal is not reactivated, thereby indicating that the AEBS has been reinstated as specified in paragraph 5.4.1. above. If the ignition system is activated by means of a "key", the above requirement shall be fulfilled without removing the key.
- 6.8. False reaction test
- 6.8.1. Two stationary vehicles, of category M₁ AA saloon, shall be positioned:
- (a) So as to face in the same direction of travel as the subject vehicle,
 - (b) With a distance of 4.5 m between them³,
 - (c) With the rear of each vehicle aligned with the other.
- 6.8.2. The subject vehicle shall travel for a distance of at least 60 m, at a constant speed of 50 ± 2 km/h to pass centrally between the two stationary vehicles.
- During the test there shall be no adjustment of any subject vehicle control other than slight steering adjustments to counteract any drifting.
- 6.8.3. The AEBS shall not provide a collision warning and shall not initiate the emergency braking phase.

7. Modification of vehicle type and extension of approval

- 7.1. Every modification of the vehicle type as defined in paragraph 2.2. above shall be notified to the Type Approval Authority which approved the vehicle type. The Type Approval Authority may then either:
- 7.1.1. Consider that the modifications made do not have an adverse effect on the conditions of the granting of the approval and grant an extension of approval;
 - 7.1.2. Consider that the modifications made affect the conditions of the granting of the approval and require further tests or additional checks before granting an extension of approval.
- 7.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3. above to the Contracting Parties to the Agreement which apply this Regulation.
- 7.3. The Type Approval Authority shall inform the other Contracting Parties of the extension by means of the communication form which appears in Annex 1 to this Regulation. It shall assign a serial number to each extension, to be known as the extension number.

³ The point of reference of each stationary vehicle for establishing the distance between the two stationary vehicles, shall be determined in accordance with ISO 612-1978.

8. Conformity of production

- 8.1. Procedures concerning conformity of production shall conform to the general provisions defined in Article 2 and Schedule 1 to the Agreement (E/ECE/TRANS/505/Rev.3) and meet the following requirements:
- 8.2. A vehicle approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements of paragraph 5. above;
- 8.3. The Type Approval Authority which has granted approval may at any time verify the conformity of control methods applicable to each production unit. The normal frequency of such inspections shall be once every two years.

9. Penalties for non-conformity of production

- 9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 8. above are not complied with.
- 9.2. If a Contracting Party withdraws an approval it had previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by sending them a communication form conforming to the model in Annex 1 to this Regulation.

10. Production definitively discontinued

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall so inform the Type Approval Authority which granted the approval, which in turn shall forthwith inform the other Contracting Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

11. Names and addresses of the Technical Services responsible for conducting approval tests and of Type Approval Authorities

The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which granted approval and to which forms certifying approval or extension or refusal or withdrawal of approval are to be sent.

12. Transitional provisions

- 12.1. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying the 01 series of amendments to this Regulation, shall refuse to grant type approvals in accordance with the 01 series of amendments of this Regulation.

- 12.2. As from the date of entry into force of the 01 series of amendments to this Regulation, Contracting Parties applying this Regulation may continue granting type approvals and extensions of type approvals to the 00 series of amendments to this Regulation.
- In accordance with Article 12 of the 1958 Agreement, the 00 series of amendments may be used as an alternative to the 01 series. Contracting Parties shall notify to the Secretariat General which alternative they apply. In the absence of notification of Contracting Parties to the United Nations Secretary-General, Contracting Parties will be considered to apply the 01 series.
- 12.3. As from the date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse national or regional type approval of a vehicle type approved to the 01 series of amendments to this Regulation.
- 12.4. Until 1 November 2016, no Contracting Party applying this Regulation shall refuse national or regional type approval of a vehicle type approved to the 00 series of amendments to this Regulation.
- 12.5. As from 1 November 2016, Contracting Parties applying the 01 series of amendments to this Regulation shall not be obliged to accept, for the purpose of national or regional type approval, a vehicle type approved to the 00 series of amendments to this Regulation.

Annex 1

Communication

(Maximum format: A4 (210 x 297 mm))



issued by :

Name of administration:

.....
.....
.....

- Concerning:²
- Approval granted
 - Approval extended
 - Approval refused
 - Approval withdrawn
 - Production definitively discontinued

of a type of vehicle with regard to the advanced emergency braking system pursuant to Regulation No. 131

Approval No.: Extension No.

1. Trademark:
2. Type and trade name(s):
3. Name and address of manufacturer:
4. If applicable, name and address of manufacturer's representative:
5. Brief description of vehicle:
6. Data to enable the identification of the type of AEBS:
7. Date of submission of vehicle for approval:
8. Technical Service performing the approval tests:
9. Date of report issued by that Service:
10. Number of report issued by that Service:
11. Approval with regard to the AEBS is granted/refused:²
12. Place:
13. Date:
14. Signature:

¹ Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).

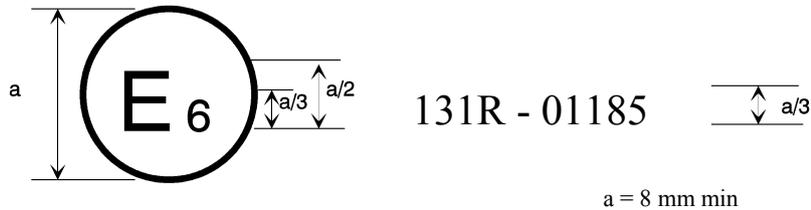
² Delete what does not apply.

15. Annexed to this communication are the following documents, bearing the approval number indicated above:
 - List of the positive actions enabling the driver to interrupt the braking phase
 - Description of the AEBS warning strategy
 - Details which enable the targets to be specifically identified
16. Any remarks:.....

Annex 2

Arrangements of approval marks

(See paragraphs 4.4. to 4.4.2. of this Regulation)



The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in Belgium (E 6) with regard to the 131 pursuant to Regulation No. 131. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of the 01 series of amendments to the Regulation No. 131

Annex 3

Warning and activation test requirements – Pass/fail values

A	B	C	D	E	F	G	H	Row
	<i>Stationary target</i>			<i>Moving target</i>				
	<i>Timing of warning modes</i>		<i>Speed reduction (ref. paragraph 6.4.4.)</i>	<i>Timing of warning modes</i>		<i>Speed reduction (ref. paragraph 6.5.3.)</i>	<i>Target speed (ref. paragraph 6.5.1.)</i>	
	<i>At least 1 (ref. paragraph 6.4.2.1.)</i>	<i>At least 2 (ref. paragraph 6.4.2.2.)</i>		<i>At least 1 (ref. paragraph 6.5.2.1.)</i>	<i>At least 2 (ref. paragraph 6.5.2.2.)</i>			
$M_3^1, N_2 > 8\text{ t}$ and N_3	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	Not less than 20 km/h	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	No impact	$12 \pm 2\text{ km/h}$	1
$N_2 \leq 8\text{ t}^{2,4}$ and $M_2^{2,4}$	Not later than 0.8 s before the start of the emergency braking phase	Before the start of the emergency braking phase ³	Not less than 10 km/h	Not later than 0.8 s before the start of the emergency braking phase	Before the start of the emergency braking phase ³	No impact	$67 \pm 2\text{ km/h}^5$	2

¹ Vehicles of category M_3 with hydraulic braking system are subject to the requirements of row 2.

² Vehicles with pneumatic braking systems are subject to the requirements of row 1.

³ Values shall be specified by the vehicle manufacturer at the time of Type Approval (Annex 1, paragraph 15.).

⁴ Manufacturers of vehicles covered by row 2 may elect to gain vehicle Type Approval to the values specified in row 1; in this instance compliance shall be demonstrated with all the values contained in row 1.

⁵ The values for the target speed in cell H2 shall be reviewed before 1st November 2021.

Annex 4

Special requirements to be applied to the safety aspects of complex electronic vehicle control systems

1. General

This annex defines the special requirements for documentation, fault strategy and verification with respect to the safety aspects of Complex electronic vehicle control systems (definition 2.3. below) as far as this Regulation is concerned.

This annex may also be called, by special paragraphs in this Regulation, for safety related functions which are controlled by electronic system(s).

This annex does not specify the performance criteria for "The System" but covers the methodology applied to the design process and the information which must be disclosed to the Technical Service, for type approval purposes.

This information shall show that "The System" respects, under normal and fault conditions, all the appropriate performance requirements specified elsewhere in this Regulation.

2. Definitions

For the purposes of this annex:

- 2.1. "*Safety concept*" is a description of the measures designed into the system, for example within the electronic units, so as to address system integrity and thereby ensure safe operation even in the event of an electrical failure.

The possibility of a fall-back to partial operation or even to a back-up system for vital vehicle functions may be a part of the safety concept.

- 2.2. "*Electronic control system*" means a combination of units, designed to co-operate in the production of the stated vehicle control function by electronic data processing.

Such systems, often controlled by software, are built from discrete functional components such as sensors, electronic control units and actuators and connected by transmission links. They may include mechanical, electro-pneumatic or electro-hydraulic elements.

"*The System*", referred to herein, is the one for which type approval is being sought.

- 2.3. "*Complex electronic vehicle control systems*" are those electronic control systems which are subject to a hierarchy of control in which a controlled function may be over-ridden by a higher level electronic control system/function.

A function which is over-ridden becomes part of the complex system.

- 2.4. "*Higher-level control*" systems/functions are those which employ additional processing and/or sensing provisions to modify vehicle behaviour by commanding variations in the normal function(s) of the vehicle control system.

This allows complex systems to automatically change their objectives with a priority which depends on the sensed circumstances.

- 2.5. "*Units*" are the smallest divisions of system components which will be considered in this annex, since these combinations of components will be treated as single entities for purposes of identification, analysis or replacement.

- 2.6. "*Transmission links*" are the means used for inter-connecting distributed units for the purpose of conveying signals, operating data or an energy supply.

This equipment is generally electrical but may, in some part, be mechanical, pneumatic, hydraulic or optical.

- 2.7. "*Range of control*" refers to an output variable and defines the range over which the system is likely to exercise control.

- 2.8. "*Boundary of functional operation*" defines the boundaries of the external physical limits within which the system is able to maintain control.

3. Documentation

3.1. Requirements

The manufacturer shall provide a documentation package which gives access to the basic design of "The System" and the means by which it is linked to other vehicle systems or by which it directly controls output variables.

The function(s) of "The System" and the safety concept, as laid down by the manufacturer, shall be explained.

Documentation shall be brief, yet provide evidence that the design and development has had the benefit of expertise from all the system fields which are involved.

For periodic technical inspections, the documentation shall describe how the current operational status of "The System" can be checked.

3.1.1. Documentation shall be made available in 2 parts:

- (a) The formal documentation package for the approval, containing the material listed in paragraph 3. of this annex (with the exception of that of paragraph 3.4.4. below) which shall be supplied to the Technical Service at the time of submission of the type approval application. This will be taken as the basic reference for the verification process set out in paragraph 4. of this annex.
- (b) Additional material and analysis data of paragraph 3.4.4. below, which shall be retained by the manufacturer, but made open for inspection at the time of type approval.

- 3.2. Description of the functions of "The System"
- A description shall be provided which gives a simple explanation of all the control functions of "The System" and the methods employed to achieve the objectives, including a statement of the mechanism(s) by which control is exercised.
- 3.2.1. A list of all input and sensed variables shall be provided and the working range of these defined.
- 3.2.2. A list of all output variables which are controlled by "The System" shall be provided and an indication given, in each case, of whether the control is direct or via another vehicle system. The range of control (see paragraph 2.7. of this annex) exercised on each such variable shall be defined.
- 3.2.3. Limits defining the boundaries of functional operation (see paragraph 2.8. of this annex) shall be stated where appropriate to system performance.
- 3.3. System layout and schematics
- 3.3.1. Inventory of components
- A list shall be provided, collating all the units of "The System" and mentioning the other vehicle systems which are needed to achieve the control function in question.
- An outline schematic showing these units in combination shall be provided with both the equipment distribution and the interconnections made clear.
- 3.3.2. Functions of the units
- The function of each unit of "The System" shall be outlined and the signals linking it with other Units or with other vehicle systems shall be shown. This may be provided by a labelled block diagram or other schematic, or by a description aided by such a diagram.
- 3.3.3. Interconnections
- Interconnections within "The System" shall be shown by a circuit diagram for the electric transmission links, by an optical-fiber diagram for optical links, by a piping diagram for pneumatic or hydraulic transmission equipment and by a simplified diagrammatic layout for mechanical linkages.
- 3.3.4. Signal flow and priorities
- There shall be a clear correspondence between these transmission links and the signals carried between units.
- Priorities of signals on multiplexed data paths shall be stated, wherever priority may be an issue affecting performance or safety as far as this Regulation is concerned.

- 3.3.5. Identification of units
- Each unit shall be clearly and unambiguously identifiable (e.g. by marking for hardware and marking or software output for software content) to provide corresponding hardware and documentation association.
- Where functions are combined within a single Unit or indeed within a single computer, but shown in multiple blocks in the block diagram for clarity and ease of explanation, only a single hardware identification marking shall be used.
- The manufacturer shall, by the use of this identification, affirm that the equipment supplied conforms to the corresponding document.
- 3.3.5.1. The identification defines the hardware and software version and, where the latter changes such as to alter the function of the unit as far as this Regulation is concerned, this identification shall also be changed.
- 3.4. Safety concept of the manufacturer
- 3.4.1. The manufacturer shall provide a statement which affirms that the strategy chosen to achieve "The System" objectives will not, under non-fault conditions, prejudice the safe operation of systems which are subject to the prescriptions of this Regulation.
- 3.4.2. In respect of software employed in "The System", the outline architecture shall be explained and the design methods and tools used shall be identified. The manufacturer shall be prepared, if required, to show some evidence of the means by which they determined the realisation of the system logic, during the design and development process.
- 3.4.3. The manufacturer shall provide the technical authorities with an explanation of the design provisions built into "The System" so as to generate safe operation under fault conditions. Possible design provisions for failure in "The System" are for example:
- (a) Fall-back to operation using a partial system.
 - (b) Change-over to a separate back-up system.
 - (c) Removal of the high level function.
- In case of a failure, the driver shall be warned for example by warning signal or message display. When the system is not deactivated by the driver, e.g. by turning the Ignition (run) switch to "off", or by switching off that particular function if a special switch is provided for that purpose, the warning shall be present as long as the fault condition persists.
- 3.4.3.1. If the chosen provision selects a partial performance mode of operation under certain fault conditions, then these conditions shall be stated and the resulting limits of effectiveness defined.
- 3.4.3.2. If the chosen provision selects a second (back-up) means to realize the vehicle control system objective, the principles of the change-over mechanism, the logic and level of redundancy and any built in back-up checking features shall be explained and the resulting limits of back-up effectiveness defined.
- 3.4.3.3. If the chosen provision selects the removal of the higher level function, all the corresponding output control signals associated with this function shall be inhibited, and in such a manner as to limit the transition disturbance.

- 3.4.4. The documentation shall be supported, by an analysis which shows, in overall terms, how the system will behave on the occurrence of any one of those specified faults which will have a bearing on vehicle control performance or safety.

This may be based on a Failure Mode and Effect Analysis (FMEA), a Fault Tree Analysis (FTA) or any similar process appropriate to system safety considerations.

The chosen analytical approach(es) shall be established and maintained by the manufacturer and shall be made open for inspection by the technical service at the time of the type approval.

- 3.4.4.1. This documentation shall itemize the parameters being monitored and shall set out, for each fault condition of the type defined in paragraph 3.4.4. above, the warning signal to be given to the driver and/or to service/technical inspection personnel.

4. Verification and test

- 4.1. The functional operation of "The System", as laid out in the documents required in paragraph 3. above, shall be tested as follows:

4.1.1. Verification of the function of "The System"

As the means of establishing the normal operational levels, verification of the performance of the vehicle system under non-fault conditions shall be conducted against the manufacturer's basic benchmark specification unless this is subject to a specified performance test as part of the approval procedure of this or another Regulation.

4.1.2. Verification of the safety concept of paragraph 3.4. above

The reaction of "The System" shall, at the discretion of the Type Approval Authority, be checked under the influence of a failure in any individual unit by applying corresponding output signals to electrical units or mechanical elements in order to simulate the effects of internal faults within the unit.

The verification results shall correspond with the documented summary of the failure analysis, to a level of overall effect such that the safety concept and execution are confirmed as being adequate.

APPENDIX B

Definitions used in this standard for omnibuses, and medium and heavy goods vehicles ‘designed for off-road use’

1. **Omnibuses with a ‘*Gross Vehicle Mass*’ not exceeding 12 tonnes and medium goods vehicles**
 - 1.1. Category MD vehicles, category ME vehicles with a ‘*Gross Vehicle Mass*’ not exceeding 12 tonnes, and category NB vehicles are considered to be ‘designed for off-road use’ if all their wheels are designed to be driven simultaneously, including vehicles where the drive to one axle can be disengaged, or if the following three criteria are satisfied:
 - (a) At least one front axle and at least one rear axle are designed to be driven simultaneously, including vehicles where the drive to one axle can be disengaged; and
 - (b) There is at least one differential locking mechanism or at least one mechanism having a similar effect; and
 - (c) They can climb a 25 per cent gradient calculated for a solo vehicle.
2. **Omnibuses with a ‘*Gross Vehicle Mass*’ exceeding 12 tonnes and heavy goods vehicles**
 - 2.1. Category ME vehicles with a ‘*Gross Vehicle Mass*’ exceeding 12 tonnes and category NC vehicles are considered to be ‘designed for off-road use’ if all of the following criteria are satisfied:
 - (a) All wheels are driven; and
 - (b) There is at least one differential locking mechanism or at least one mechanism having a similar effect; and
 - (c) They can climb a 25 per cent gradient calculated for a solo vehicle; and
 - (d) At least four of the following six criteria are satisfied:
 - (i) The ‘*Approach Angle*’ is at least 25°;
 - (ii) The ‘*Departure Angle*’ is at least 25°;
 - (iii) The ‘*Breakover Angle*’ is at least 25°;
 - (iv) The ‘*Ground Clearance*’ under the front axle is at least 250 mm;
 - (v) The ‘*Ground Clearance*’ between the axles is at least 300 mm;
 - (vi) The ‘*Ground Clearance*’ under the rear axle is at least 250 mm.
3. **Load and checking conditions**
 - 3.1. The measurements referred to clause 2.1 of this appendix are determined with the vehicle loaded to its ‘*Gross Vehicle Mass*’.
 - 3.2. When measuring the ‘*Approach Angle*’ and the ‘*Departure Angle*’, no account is taken of underrun protective devices.