



**EUROPEAN NEW CAR ASSESSMENT PROGRAMME
(Euro NCAP)**



ASSESSMENT PROTOCOL – SAFETY ASSIST

Version 5.0
May 2009

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1 INTRODUCTION

Euro NCAP's original assessment protocol was developed jointly by TRL and Vehicle Safety Consultants Ltd. under contract to the UK Department of the Environment Transport and the Regions and International Testing, respectively. Subsequent versions of the protocol have been developed and released by the Euro NCAP Secretariat. Beginning Version 5 important changes have been included that have been brought about by the introduction of the overall rating scheme. Individual documents are released for the four main areas of assessment:

- Assessment Protocol – Adult Occupant Protection;
- Assessment Protocol – Child Occupant Protection;
- Assessment Protocol – Pedestrian Occupant Protection;
- Assessment Protocol – Safety Assist;

In addition to these four assessment protocols, a separate document is provided describing the method and criteria by which the overall safety rating is calculated on the basis of the car performance in each of the above areas of assessment.

The following protocol deals with the assessments made in the area of Safety Assist, in particular for the Seat Belt Reminder, Speed Limiters and ESC.

2 METHOD OF ASSESSMENT

Unlike the assessment of protection offered in the event of a crash, the assessment of Safety Assist functions does not require destructive testing of the vehicle. Assessment of the Safety Assist functions can be based both on fitment requirement and performance requirements (seat belt reminder and Speed Limitation Devices) or fitment requirements alone (Electronic Stability Control). The intention is to promote standard fitment across the car volume sold in the European Community in combination with good functionality for these systems, where this is possible.

It is important to note that Euro NCAP only considers assessment of safety assist systems that meet the fitment requirements for base safety equipment (as defined in the Car Specification, Selection, Testing and Re-testing protocol). For the performance assessment of seat belt reminder and speed limiter, the car is subjected to a number of trial sequences designed to highlight the effectiveness of the systems. The car performance is scored using the observations made by the inspector during driving. In addition to the basic Euro NCAP assessment, additional information may be recorded that may be added to the Euro NCAP assessment in the future.

3 SEAT BELT REMINDER ASSESSMENT

3.1 Introduction

- 3.1.1 It is well recognised that the correct wearing of seat belts is the most effective way of providing protection for vehicle occupants in a crash. Currently, wearing rates vary greatly across the European Union and research has shown that many of the non-wearers would use their seat belt with some encouragement. A small proportion of non-wearers will not be persuaded to use their belts.
- 3.1.2 Seat Belt Reminder (SBR) systems are intended to encourage the first of these groups to use their seat belt, whilst at the same time not be so annoying that the second group would take undesirable action to disable the system. Such action could include, tampering with or cutting electrical connections which might have undesirable consequences.
- 3.1.3 It is intended that habitual users who always put their seat belt on, before starting their journey, would hardly notice the existence of the system and would not be annoyed by it.
- 3.1.4 To avoid the danger that dedicated non-users would try to tamper with the system, Euro NCAP recommends that SBR systems are capable of being deactivated. Deactivation could be long term and/or short term for individual journeys.
- 3.1.5 Although, simple seat belt reminder systems have been available for some time, the technology behind the more sophisticated systems is new. Euro NCAP has set some minimum requirements but wishes to allow the development of increasingly improved systems.
- 3.1.6 Some recommendations are made for how improvements may occur and these may eventually become Euro NCAP requirements. The expectation is that the requirements will develop in the light of further knowledge.
- 3.1.7 The terms used in this protocol are defined in Appendix I.

3.2 Information Required from Manufacturers

- 3.2.1 Before the SBR system can be evaluated by Euro NCAP, it is necessary for the manufacturer to explain which seating positions are covered by the system and how the system is intended to work. See Appendix II. This information should be supplied to Euro NCAP prior to the assessment.
- 3.2.2 Only those seating positions, requested by the manufacturer, will be assessed by Euro NCAP, even if the system extends to other seats. However, where reminders are fitted to seats which have not been nominated for assessment, they should not adversely affect the seat being assessed.

3.3 Seat Occupancy Requirement

- 3.3.1 In the case of the driver's seat, occupancy can be assumed so the system does not have to be capable of detecting whether or not the seat is in use.
- 3.3.2 For the front seat passengers, seat use must be detected. Euro NCAP defines occupancy as use by an occupant larger, taller or heavier than a small female (5 percentile).
- 3.3.3 Rear seat occupant detection is not required but it is recommended.

3.4 Seat Belt Use

- 3.4.1 For all seats offered for assessment, seat belt use must be monitored. Their use needs to be identified at the start of the journey and any change of use must be detected throughout the period of use of the vehicle.
- 3.4.2 Monitoring of rear seat belt secondary buckles that require a key to unlock them, is not required.

Note: In some cases, systems are unable to reliably meet the requirements of Section 3.8.1. For example, if the seat belt is used to retain a child restraint, the belt may be unbuckled but sufficient webbing has been drawn off the reel for the system to interpret the belt as being buckled, resulting in false indication of belt use. This potentially hazardous situation could also occur with CRS lock-offs and where the belt is left over the occupants shoulder.

3.5 Removable Seats

- 3.5.1 Where seats, covered by the reminder system, are removable as part of the cars normal usage, Euro NCAP has minimum requirements for any electrical connections used by the reminder system.
- 3.5.2 It is recommended that such electrical connections are made automatically when the seat is installed in the vehicle.
- 3.5.3 Alternatively, a manual connection can be made by the installer. Where this is the case, all of the following requirements must be complied with:
 - Connectors must be conspicuous and easily visible to the installer, during the installation process.
 - Clear markings must indicate the purpose of the connection and show how the connection is made.
 - The markings must be permanently attached to the vehicle.
 - The markings must be conspicuous using contrasting colours.
 - The markings must be easily visible to the installer during the installation process.

- 3.5.4 The presence or absence of the seat must not adversely affect the operation of other parts of the reminder system.
- 3.5.5 The SBR system must not give any false indication of belt use, whether the seats are installed in the vehicle or not. For example, when a seat is installed in the vehicle, but the electrical system is not connected, the seat belt reminder system should not indicate that the seat belt is being worn, when it is not being worn.
- 3.5.6 If the removable seat is optional, the assessment will be based on a car equipped with the optional removable seat.

3.6 Start and Duration of Signal

3.6.1 Front seating positions

- 3.6.1.1 The reminder system should "start" at the commencement of each "journey" that the vehicle makes. Short breaks in the journey are allowed, where the reminder system is not required to start again. Such short breaks, of up to 30 seconds, are to allow for events such as stalling of the engine.

3.6.1.1.1 Initial Signal

It is recommended that an audio and/or visual signal is started, shortly after the ignition is switched on or shortly after the vehicle starts to move, where one or more seat belts are not in use.

3.6.1.1.2 Intermediate Signal

Optionally, an intermediate signal may be given, at some time before the "Final Signal" is required, where one or more seat belts are not in use.

If this "Intermediate Signal" is more sophisticated than a simple audiovisual signal, the start of the Final Signal may be delayed. Such an Intermediate Signal might be a clear, easily visible text message or a loud and clear voice message.

3.6.1.1.3 Final Signal

The audiovisual Final Signal is the only signal which is a Euro NCAP requirement, where one or more seat belts are not in use.

The start and duration requirements are defined as follows:

(1) *Start*

The Final Signal must start before at least one of the following:

- The engine has been running for 60 seconds, or
- The car has been in "Forward Motion" for 60 seconds, or
- The car has been in "Forward Motion" for 500 meters, or
- The car has reached a forward speed of 25 km/h.

(2) Where an Initial Signal is employed, the start of the Final Signal may be delayed provided that the Initial Signal meets one of the requirements detailed below. In this circumstance, the Final Signal must start within 30 seconds of the car having reached a forward speed of 25 km/h.

- A constant, flashing or intermittent visual signal for at least 30 seconds
- A text message for at least 5 seconds
- A clear voice message

The duration of the Initial Signal may be reduced provided the Final Signal commences immediately after the Initial Signal stops.

For systems which have Initial, Intermediate and Final Signals, the start of the Intermediate and/or Final Signals may be delayed provided that the Initial Signal meets one of the requirements detailed above. In this circumstance, the Intermediate Signal must start within 30 seconds of the car having reached a forward speed of 25 km/h and lead into the Final Signal after an additional 30 seconds.

The duration of the Initial Signal may be reduced provided that either the Intermediate or Final Signal commences immediately after the Initial Signal stops.

(3) Where a "more sophisticated Intermediate Signal" is employed, the start of the Final Signal may be delayed. However, the Final Signal must start before at least one of the following:

- The engine has been running for 90 seconds, or
- The car has been in "Forward Motion" for 90 seconds, or
- The car has been in "Forward Motion" for 1000 meters, or
- The car has reached a forward speed of 40 km/h.

(4) For the purpose of defining the start of the Final Signal, forward motion at less than 10 km/h, or rearward motion, is not deemed to be motion.

(5) *Duration*

The duration of the Final Signal must be at least 90 seconds.

If the audiovisual Final Signal is not continuous:

- The signal must start with a positive audiovisual signal, for at least 5 seconds.
- Gaps of more than 1 second in the signal must not occur more frequently than every 5 seconds.
- Gaps of less than 1 second, which allow for visual signals which flash and audio signals which "beep," are ignored.
- If gaps in the signal exceed 3 seconds, that time is not included in the "Duration" time.

- No gap must last for more than 25 seconds.
- (6) Once the Final Signal has started, it must only stop under one of the following circumstances.
- The signal has operated for the Duration specified.
 - The related seat belts are put into use.
 - The engine has stopped.
 - Reverse gear has been selected.
- Note: When forward gear is re-selected and forward motion commences (>10 km/h), the Final Signal must resume again.*
- The occupant leaves the car, unless the signal is required to indicate the belt use status of others.

3.6.1.2 The signal requirements when there is a change of belt status are described in Section 3.8.

3.6.2 **Rear seating positions**

3.6.2.1 The reminder system should "start" at the commencement of each "journey" that the vehicle makes. Short breaks in the journey are allowed, where the reminder system is not required to start again. Such short breaks, of not more than 30 minutes, are to allow for events such as stalling of the engine or re-fuelling, where passengers may remain in the vehicle.

3.6.2.1.1 For the rear seat belt reminder, it is acceptable for a journey to be considered as having been completed when 30 minutes have elapsed, after the engine has stopped.

3.6.2.1.2 In the absence of seat occupancy information, only a visual signal is required by Euro NCAP, unless there is a change of status. See Section 3.8 for further requirements.

3.6.2.1.3 The start and duration requirements of the signal are defined as follows:

(1) *Start*

The signal must start within five seconds of at least one of the following:

- Engine start, or
- The start of forward motion (>10 km/h).

(2) Where seat occupancy is monitored, the start of the signal may be delayed by 10 seconds. With good justification, longer delays may be acceptable.

(3) For the purpose of defining the start of the signal, forward motion at less than 10 km/h, or rearward motion, is not deemed to be motion.

(4) *Duration*

The duration of the visual signal must be at least 30 seconds.

If the visual signal is not continuous:

- Gaps of more than 1 second in the signal must not occur more frequently than every 5 seconds.
- Gaps of less than 1 second, which allow for visual signals which flash are ignored.
- If gaps in the signal exceed 3 seconds, that time is not included in the "Duration" time.
- No gap must last for more than 25 seconds.

3.6.2.2 The system may allow the driver to acknowledge the signal, so switching it off.

3.6.2.3 No signal is required if the system is able to determine that there are no occupants in the rear seating positions.

3.6.2.4 The signal requirements when there is a change of belt status are described in Section 3.8.

3.7 Signal

3.7.1 Euro NCAP only requires the provision of simple audiovisual or visual signals. However, manufacturers are recommended to use the best possible means of communicating the reminder message to the driver and all the passengers. The provision of a visual signal for the user of each seat, the use of a loud and clear voice message or the use of a prominent text message on satellite navigation or other LCD screen is recommended.

3.7.2 The signal should not annoy users, to the extent that they may be tempted to tamper with the restraint or the vehicle's electrical system.

3.7.3 A progressive or stepped audible signal is recommended. However, there is no requirement regarding the volume of any audible signal other than the Final Signal.

3.7.4 If for any reason, multiple audible signals are being generated at the time that the reminder signal is operating, they must not interfere with each other, to the extent that the message is less clear, unless a more critical safety warning is being made.

3.7.5 Front seating positions

3.7.5.1 The Final Signal used for the front seating positions must be both audio and visual.

3.7.5.2 The audible component of the Final Signal must be "Loud and Clear" for the driver and all relevant passengers.

Note: If, in future, an effective objective method of assessing a Loud and Clear signal is developed, Euro NCAP will consider its use for marginal cases.

3.7.5.3 The visual signal and its message must be clearly visible to driver, without the need for the head to be moved from the normal driving position.

3.7.5.4 There must be a clear and obvious link between the audible and visual signals. In the

case of flashing or intermittent visual or audible signals, this may be achieved by having them in synchronisation.

- 3.7.5.5 It is recommended that all front seat passengers can see the visual signal relevant to their seating position.
- 3.7.5.6 It is recommended that the relevant visual signals are illuminated for the whole of the time that the seat is occupied without the seat belt being used.
- 3.7.5.7 Where text messages are used, they must be in at least one of the languages of each of the countries in which the car is offered for sale.

3.7.6 **Rear seating positions**

- 3.7.6.1 The start signal(s) for the rear seating positions (as defined in Section 3.6.2.1.3) need only be visual.
- 3.7.6.2 From 1 January 2008 an audible component for change of status is required; the signal must be "loud and clear" for the driver. A single audible signal, such as one chime or beep, when each belt is unbuckled is acceptable. The requirements for change of status are detailed in Section 3.8.
- 3.7.6.3 The visual signals and their message must be clearly and easily visible to driver, without the need for the head to be moved from the normal driving position.
- 3.7.6.4 It is recommended that all rear seat passengers can see the visual signal relevant to their seating position. It is recommended that the relevant visual signals are illuminated for the whole of the time that the seat is occupied without the seat belt being used.
- 3.7.6.5 The visual signals must clearly indicate to the driver the number of seat belts in use or not in use. No signal is required if all of the rear occupants are belted.
- 3.7.6.6 No signal is required if the system is able to determine that there are no occupants in the rear seats.
- 3.7.6.7 Where text messages are used, they must be in at least one of the languages of each of the countries in which the car is offered for sale.

3.8 **Change of Status**

- 3.8.1 If during the journey, after the Final Signal has stopped, any seat belt experiences a "change of status," where a buckled belt is unbuckled, the reminder must indicate this immediately with an audiovisual signal.
- 3.8.2 A change of status signal for all seating positions is required at vehicle speeds above 25km/h.

3.8.3 **Front seating positions**

3.8.3.1 An audiovisual signal must commence immediately once any front row seat belt is unbuckled. This must be indicated with the use of an "Intermediate Signal" or the Final Signal.

3.8.3.1.1 Where the Final Signal is used the following requirement must be met:

- The signal must meet the requirements detailed in Section 3.7.5.
- The signal must start immediately with a positive audiovisual signal, for at least 5 seconds.
- There must be no gaps greater than 10 seconds.

3.8.3.1.2 Where an "Intermediate Signal" is used the following requirement must be met:

- The signal must be audiovisual.
- The signal must start with a positive audiovisual signal, for at least 5 seconds.
- There must be no gaps greater than 10 seconds.
- The final signal must commence after a maximum duration of 30 seconds.

3.8.4 **Rear seating positions**

3.8.4.1 A visual signal must commence immediately when any rear seat belt is unbuckled.

3.8.4.1.1 The visual signal must continue for its full duration of 30 seconds or until the rear belts are buckled for the seats in use.

3.8.4.1.2 When implemented, an audible component must also commence immediately and be "loud and clear" to the driver. A single audible signal, such as one 'chime' or 'beep', when each belt is unbuckled is acceptable.

3.8.4.1.3 Where two or more belts are unbuckled within 5 seconds of each other, a single chime or beep is acceptable. Where more than 5 seconds elapses between belts being unbuckled, an audible signal for each unbuckled belt is required.

3.8.4.1.4 For the rear seats, the system may allow the driver to acknowledge the signal, so switching it off.

3.9 **Test Conditions for Assessment of Loud and Clear Audible Signals**

3.9.1 The sound level will be assessed by a user, having normal hearing acuity, sitting in the relevant seat.

- 3.9.1.1 The assessment will be made with the vehicle being driven at constant speed, of 25 km/h, in second gear. Vehicles with automatic transmission will have it locked in second gear, if this is possible. Note: Where a more sophisticated Intermediate Signal is employed, it may be necessary to travel at 40 km/h before returning to 25 km/h, to assess the audible signal.
- 3.9.1.2 The ventilation fan will be set to its maximum setting.
- 3.9.1.3 All ventilation vents will be fully opened, if this is possible.
- 3.9.1.4 The radio / audio system will be switched off.

Note: It is recommended, that reminder systems are designed so that, if they sound whilst the radio / audio system is playing, they interrupt the radio / audio sound. Alternatively, the radio/ audio system could be used to convey the reminder message.

- 3.9.1.5 The air conditioning will be switched off, if this is possible
- 3.9.1.6 With convertibles, the roof will be closed.
- 3.9.1.7 All windows will be closed.

Note: It is recommended that the reminder system is designed so that the audible signal can be easily heard under any normal usage conditions.

3.10 Deactivation

- 3.10.1 The reminder system may be designed to allow deactivation. Short term deactivation can cover a single journey. Long term deactivation may be used for dedicated non-users of seat belts. It is intended that this would reduce the likelihood that users might tamper with the system.
- 3.10.2 The Seat Belt Reminder system must not be deactivated at the time that the car is offered for sale.
- 3.10.3 Short term single journey deactivation
- 3.10.3.1 Short term deactivation must be more difficult than putting the seat belt on and off once. Short term deactivation must only affect the seating position for which deactivation had been chosen.
- 3.10.3.2 The Reminder system must reactivate if ignition is switched off for more than 60 seconds.
- 3.10.4 Long Term
- 3.10.4.1 Long term deactivation must require a sequence of operations, which could not be guessed at or carried out accidentally.
- 3.10.4.2 Re-activation must be simple. It should not be more difficult to reactivate than it was to deactivate. No new components or special tools should be required.

- 3.10.4.3 It is recommended that seating positions can be deactivated individually.
- 3.10.4.4 Instructions for long term deactivation must not be supplied with the car. However, they can be supplied to the user on their request.
- 3.10.4.5 Included with the deactivation instructions must be the instructions on how to reactivate the system.
- 3.10.4.6 If deactivation has to be carried out by dealer, reactivation may also be carried out by the dealer.
- 3.10.4.7 In the case of low volume, special purpose vehicles, the Euro NCAP Secretariat can give ad hoc approval to remove the Euro NCAP requirement for the fitting of the SBR system to those vehicles.

3.11 Scoring & Visualisation

- 3.11.1 For Seat Belt Reminder systems which fully comply with the Euro NCAP requirements, the following points will be awarded to the overall occupant score for that vehicle:
 - 3.11.1.1 *Driver*

Driver's seating position	1 point
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 - 3.11.1.2 *Front Passenger Seats*

For each of 'n' front passenger seats	1/n point
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 - 3.11.1.3 *Rear Passenger Seats*

For each of 'p' rear passenger seats	1/p point
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 - 3.11.1.4 If the third or more row of seats is optional, on any variant, the assessment will be based on a vehicle fitted with the optional seats.
 - 3.11.1.5 In future, up to two additional points may become available to reward very sophisticated systems with enhanced capability. Such capability is not yet defined.
 - 3.11.1.6 The result of the Seat Belt Reminder assessment is not visualised.

3.12 Future Developments

- 3.12.1 It is expected that the protocol will continue to develop, in the light of experience with these new systems. Consideration will also be given to converting some of the current recommendations to requirements.

4 ASSESSMENT OF SPEED LIMITATION DEVICES

4.1 Introduction

Excessive speed is a factor in the causation and severity of many road accidents. Speed restrictions are intended to promote safe operation of the road network by keeping traffic speeds below the maximum that is appropriate for a given traffic environment, thereby protecting vehicle occupants and other road users, both motorised and non-motorised. These maximum speeds are intended to control energy levels in typical crashes and to allow sufficient time for drivers to react to traffic situations. Properly selected speed limits should facilitate efficient traffic flow, reduce violations and promote safe driving conditions. Greater adherence to speed limits would avert many accidents and mitigate the effects of those that occur.

Voluntary speed limitation devices are a means to assist drivers to adhere to speed limits. The only technical requirements for such devices are laid down in ECE Regulation 89 [1], which is not mandatory in Europe. By rewarding those systems which meet the requirements of this protocol, Euro NCAP hopes to encourage manufacturers to promote such speed-limitation devices, to make them available on more models and to fit them as standard equipment. This, it is hoped, will lead to greater demand by consumers and an increased uptake of speed limitation systems. At the same time, the procedure should provide an incentive for manufacturers to develop and fit systems which are more sophisticated and offer greater safety benefits than those which simply meet Regulation 89.

This version of the protocol contains technical requirements only for voluntary-set adjustable speed limitation devices, such as fall within the scope of Regulation 89, and passive warning systems which are not covered by the regulation. However, other means of speed-limitation offer further benefits. Euro NCAP will incorporate technical requirements for such systems into subsequent versions of the protocol, the following being of highest priority:

Long-Term Speed Limitation

Some car owners want to be able to limit the maximum speed of their vehicles on a permanent or semi- permanent basis. Euro NCAP foresees that this can be done by dealers or by the use of special starting keys.

Intelligent Speed Adaptation (ISA)

Systems have been developed which "know" the speed limit at the current position of the vehicle. Currently these voluntary support systems are based on a combination of a digital map containing speed limit information and a GPS receiver which determines the current position of the vehicle. The systems currently available have limitations in the map coverage and map quality. When these technical limitations have been resolved, or when systems are available which use other technical approaches, Euro NCAP will incorporate ISA systems into the protocol.

4.2 Definitions

Throughout this protocol the following terms are used:

- ASLF – Adjustable Speed Limitation Function. ASLF means a function which allows the driver to set a vehicle speed V_{adj} , to which he wishes the speed of his car to be limited or above which he wishes to be warned.
- V_{adj} – Adjustable limit speed V_{adj} means the speed voluntarily set by the driver. Active ASLF means an ASLF which, when activated, requires the driver to make a positive action in order to exceed V_{adj} .
- Passive ASLF – means an ASLF which, when activated, warns the driver that V_{adj} is being exceeded but places no requirements on the driver in order to exceed V_{adj} .
- V_{stab} – Stabilised speed V_{stab} means the mean vehicle speed when operating in the condition specified in the test procedure.
- V_{max} – Maximum speed V_{max} is the maximum speed reached by the vehicle in the first half period of the response curve as defined in the test procedure.

4.3 Requirements for ASLFs

4.3.1 General Requirements

4.3.1.1 The V_{adj} value shall be permanently indicated to the driver and visible from the driver's seat. This does not preclude temporary interruption of the indication for safety reasons or driver's demand.

4.3.1.2 *Setting of V_{adj}*

- It shall be possible to set V_{adj} by steps not greater than 10km/h between 30km/h and 130km/h.
- In the case of vehicles manufactured for sale in any country where imperial units are used, it shall be possible to set V_{adj} by steps not greater than 5mph between 20mph and 80mph.
- This shall be achieved by a control device operated directly by the driver.
- It shall be possible to set V_{adj} independently of the vehicle speed.
- With the ASLF activated, if V_{adj} is independently set to a speed lower than the current vehicle speed, the ASLF shall start to limit the vehicle speed to the new V_{adj} no later than 30s after V_{adj} has been set or when the vehicle speed drops below V_{adj} , whichever happens sooner.

4.3.1.3 *Activation / de-activation*

- When V_{adj} is set by the driver it shall not be capable of being modified by any means other than the designated control device.

- The ASLF must be capable of being activated/de-activated at any time.
 - The ASLF must be de-activated each time the engine is stopped.
 - When the ASLF is activated the initial setting of V_{adj} shall not be less than the current vehicle speed.
- 4.3.1.4 The car shall be tested in accordance with Section 4.3.2. The test shall be considered satisfactory if, for each speed chosen by the test laboratory (see paragraph 4.3.2.4.1), the following conditions are met¹:
- 4.3.1.4.1 The driver is informed by a warning signal other than the speedometer when the actual speed of the vehicle is exceeding V_{adj} by more than 3 km/h.
- 4.3.1.4.2 The driver continues to be informed for the duration of the time that V_{adj} is exceeded by more than 3 km/h.
- 4.3.1.4.3 The warning signal does not preclude temporary interruption of the indication for safety reasons.
- 4.3.2 Test Details
- 4.3.2.1 *Vehicle preparation*
- 4.3.2.1.1 The tyres shall be bedded and the pressure shall be as specified by the manufacturer for the vehicle.
- 4.3.2.1.2 The vehicle mass shall be no less than the minimum kerb weight declared by the manufacturer.
- 4.3.2.2 *Characteristics of the test track*
- 4.3.2.2.1 The test surface shall be suitable for enabling stabilized speed to be maintained and shall be free from uneven patches. Gradients shall not exceed 2 percent.
- 4.3.2.2.2 The test surface shall be free from standing water, snow or ice.
- 4.3.2.3 *Ambient wind conditions*
- 4.3.2.3.1 The mean wind speed measured at a height of at least 1m above the ground shall be less than 6 m/s with gusts not exceeding 10m/s.
- 4.3.2.4 *Test for the driver being informed that V_{adj} is being exceeded.*
- 4.3.2.4.1 Three different speeds will be chosen for the tests by the test laboratory.
- 4.3.2.4.2 In the case of active ASLFs, the positive action (as referred to in paragraph 4.4.2.1) required to enable V_{adj} to be exceeded shall be applied when the vehicle is running at a speed 10 km/h below V_{adj} .
- 4.3.2.4.3 The vehicle shall be accelerated up to a speed at least 10km/h greater than V_{adj} .

¹ Other than in the case of a positive action - See section 4.4.2.1.

- 4.3.2.4.4 This speed shall be maintained for at least 30 seconds.
- 4.3.2.4.5 Instantaneous vehicle speed shall be recorded during the test and measured with an accuracy of ± 1 percent.

4.4 Requirements for Active Speed-Limitation Devices

- 4.4.1 The vehicle speed shall be limited to V_{adj} .
- 4.4.2 It shall still be possible to exceed V_{adj} when tested in accordance with the test procedure.
 - 4.4.2.1 To exceed V_{adj} a positive action² will be required.
 - 4.4.2.2 The ASLF shall be reactivated when the vehicle speed drops to a speed less than V_{adj} .
 - 4.4.2.3 The speed limitation function shall permit a normal use of the accelerator control for gear selection.
- 4.4.3 The method used to limit speed when reaching V_{adj} must be independent of the transmission type (automatic or manual).
- 4.4.4 The car shall be tested in accordance with section 4.4.5. The test shall be considered satisfactory if the following conditions are met:
 - 4.4.4.1 After V_{stab} is reached for the first time:
 - 4.4.4.1.1 V_{max} shall not exceed V_{stab} by more than 5 percent;
 - 4.4.4.1.2 The rate of change of speed shall not exceed 0.5 m/s^2 when measured over a period greater than 0.1s;
 - 4.4.4.1.3 The stabilized speed conditions shall be attained within 10s of first reaching V_{stab} ;
 - 4.4.4.2 When stable speed control has been achieved:
 - 4.4.4.2.1 Speed shall not vary by more than $\pm 3 \text{ km/h}$ of V_{stab} .
 - 4.4.4.2.2 V_{stab} shall not vary by more than $\pm 3 \text{ km/h}$ of V_{adj} .
 - 4.4.4.2.3 The rate of change of speed shall not exceed 0.2 m/s^2 when measured over a period greater than 0.1s.
 - 4.4.4.2.4 V_{stab} is the average speed calculated for a minimum time interval of 20 seconds beginning 10 seconds after first reaching $V_{adj} - 3\text{km/h}$.
- 4.4.4.3 Tests in acceleration shall be carried out and the acceptance criteria verified for each gear ratio allowing in theory V_{adj} to be achieved by driving in normal condition.

² E.g. kickdown

4.4.5 Test Details

4.4.5.1 Vehicle preparation, test track characteristics and ambient wind conditions shall be as described in sections 4.3.2.1, 4.3.2.2 and 4.3.2.3.

4.4.5.2 *Tests for Active ASLFs*

4.4.5.2.1 The test laboratory shall choose three test speeds between 30km/h and 130km/h with a difference of not less than 30km/h between any two test speeds.

4.4.5.2.2 The test laboratory shall use either the test method described in 4.4.5.2.3 or the method described in 4.4.5.2.4.

4.4.5.2.3 Test method using pedal force:

(1) With the ASLF deactivated, for each gear ratio selected for the chosen test speed V_{adj} (see paragraph 4.4.4.3), the test laboratory shall measure the forces required on the accelerator control to maintain a speed V_{adj}^* which is at least 20km/h faster than V_{adj} .

(2) With the ASLF activated and set at V_{adj} , the vehicle shall be run at a speed of 10km/h below V_{adj} . The vehicle shall then be accelerated by increasing the force on the accelerator control over a period of $1s \pm 0.2s$ to that required to maintain V_{adj}^* .

(3) This force shall then be maintained for a period of at least 30 seconds after the vehicle speed has stabilised.

4.4.5.2.4 Test method using pedal position:

(1) With the ASLF deactivated, for each gear ratio selected for the chosen test speed V_{adj} (see paragraph 4.4.4.3), the test laboratory shall measure the accelerator pedal position³ required to maintain a speed V_{adj}^* which is at least 20km/h greater than V_{adj} .

(2) With the ASLF activated and set at V_{adj} , the vehicle shall be run at a speed of 10km/h or more below V_{adj} . The vehicle shall then be accelerated by increasing the pedal position over a period no greater than 1.2s to a position no less than that needed to maintain V_{adj}^* , but not so far as to engage the positive action referred to in section 4.4.2.1.

³ The method of measuring pedal position shall be at the discretion of the test laboratory but string or rotation potentiometers may typically be used.

- 4.4.5.2.5 The instantaneous vehicle speed shall be recorded during the test in order to establish the curve of the speed versus the time and during the operation of the ASLF as appropriate. The accuracy of the speed measurement shall be ± 1 percent. The accuracy of the time measurement shall be less than 0.1s.

4.5 Requirements for 'Set-at-Speed' Function

Additional points are available for ASLFs if V_{adj} can be set-at-speed i.e. if V_{adj} can be set to the current vehicle speed with a single operation, as well as meeting the general requirements of sections 4.3.1.2 and 4.3.1.3.

- 4.5.1 It shall be possible to set V_{adj} to the current vehicle speed with a single operation⁴.

4.5.2 Test Details

- 4.5.2.1 Vehicle preparation, test track characteristics and ambient wind conditions shall be as described in sections 4.3.2.1, 4.3.2.2 and 4.3.2.3.
- 4.5.2.2 Measurement of speed and time shall conform to the requirements of paragraph 4.4.5.2.5.
- 4.5.2.3 The test laboratory shall choose three test speeds between 30km/h and 130km/h with a difference of not less than 30km/h between any two test speeds.
- 4.5.2.4 For each test speed with the ASLF deactivated the car shall be driven at the test speed ± 1 km/h.
- 4.5.2.5 The single action required to set V_{adj} to the current vehicle speed shall be performed and that speed shall be recorded.
- 4.5.2.6 The vehicle speed shall be decreased by at least 10km/h, and then accelerated to the point where the ASLF operates.
- 4.5.2.7 For active ASLFs, no positive action shall be made to exceed V_{adj} .
- 4.5.2.8 The car shall then be accelerated beyond V_{adj} (following, in the case of active ASLFs, application of the positive action referred to in 4.4.2.1).
- ##### 4.5.3 Requirements
- 4.5.3.1 In the test condition described in 4.5.2.7 the requirements of sections 4.4.1 to 4.4.4 shall be met.
- 4.5.3.2 In the test condition described in 4.5.2.8 the requirements of sections 4.3.1.4.1 and 4.3.1.4.2 shall be met.

⁴ For cars fitted with cruise control, it is allowed for the speed limiter function to be activated before the requirement for the single operation is applicable. This single operation does not include operation of main switch and/or switching from one system to another system.

4.6 Requirements for Additional Warning Signals

The warning signal referred to in paragraph 4.3.1.4 does not need to contain an audio or visual component. However, additional points (see section 4.7) are available for those ASLFs meeting the requirements of this paragraph.

4.6.1 Audio-Visual Warnings

4.6.1.1 *Test Details*

4.6.1.1.1 The sound level will be assessed by a user, having normal hearing acuity, sitting in the relevant seat.

4.6.1.1.2 The ventilation fan will be set to its maximum setting.

4.6.1.1.3 All ventilation vents will be fully opened if this is possible.

4.6.1.1.4 The radio / audio system will be switched off.

4.6.1.1.5 The air conditioning will be switched off, if this is possible

4.6.1.1.6 With convertibles, the roof will be closed.

4.6.1.1.7 All windows will be closed.

4.6.1.2 *Test details specific to Passive Systems*

4.6.1.2.1 The test procedure described in paragraph 4.3.2 shall be repeated for a single test speed of 80km/h

4.6.1.2.2 The gear used for the test shall allow 80km/h to be achieved with a minimum engine speed of 3000rpm.

4.6.1.3 *Test details specific to Active Systems*

4.6.1.3.1 The test will be carried out in an overrun condition⁵ with V_{adj} set to 80km/h.

4.6.1.3.2 The gear used for the test shall allow 80km/h to be achieved with a minimum engine speed of 3000rpm.

4.6.1.4 *Requirements*

4.6.1.4.1 The audio warning signal shall be distinguishable from audio signals used for other purposes by way of different frequency, different signalling patterns etc.

4.6.1.4.2 The audio signal shall meet the following requirements:

- The signal must start with a positive audiovisual signal, for at least 5 seconds.
- Gaps of more than 1 second in the signal must not occur more frequently than every 5 seconds.

⁵ E.g. by driving down a steep slope or by towing with another vehicle or by using a chassis dynamometer. Systems fitted with active braking which prevent V_{adj} from being overrun will get a scoring as if a suitable audio visual signal was detected.

- Gaps of less than 1 second, which allow for visual signals which flash and audio signals which "beep," are ignored.
- If gaps in the signal exceed 3 seconds, that time is not included in the "Duration" time.
- No gap must last for more than 25 seconds.

4.6.1.4.3 Requirements for Passive ASLFs

- (1) The audio signal shall be clear to the driver.
- (2) The audio signal commences when the actual speed of the vehicle is exceeding V_{adj} by more than 3km/h.
- (3) The audio signal shall sound for a duration not less than 10s or until V_{adj} is no longer exceeded.
- (4) For each exceedence of V_{adj} , the audio signal is only required once until the vehicle speed has reduced to not more than 5km/h below V_{adj} .

4.6.1.4.4 Requirements for Active ASLFs

- (1) The audio signal shall be clear to the driver
- (2) The audio signal shall commence no later than 5s after the vehicle first exceeds V_{adj} by more than 3km/h
- (3) The audio signal shall sound for a duration not less than 10s or until V_{adj} is no longer exceeded.
- (4) No audio signal needs to be given if V_{adj} is exceeded as a result of the positive action referred to in paragraph 4.4.2.1.

4.6.2 Visual Warnings

4.6.2.1 *Requirements*

- 4.6.2.1.1 The visual signal must be clearly visible to driver, without the need for the head to be moved from the normal driving position.
- 4.6.2.1.2 There must be a clear and obvious link between the audible and visual signals. In the case of flashing or intermittent visual or audible signals, this may be achieved by having them in synchronisation.

4.7 **Scoring and Visualisation**

- 4.7.1 The following points are awarded for systems that meet the requirements:

	Passive ASLD	Active ASLD	Must comply with requirements of Section
System meets general requirements	+0.1	+0.8	4.3 (& 4.4 for active ASFL)
Can system be set at speed?	+0.1	+0.1	4.5
Suitable audio-visual signal	+0.3	} OR +0.1	4.6
Active braking system	N/A		

4.7.2 Euro NCAP will accept that speed-limitation devices approved to ECE Regulation 89 can be considered to meet the requirements of sections 4.3 and 4.4.

4.7.3 The result of the Speed Limitation Device assessment is not visualised.

5 ASSESSMENT OF ELECTRONIC STABILITY CONTROL

5.1 Introduction

Electronic Stability Control (ESC) systems have existed for some 15 years and their use is becoming increasingly widespread. They have a demonstrable safety benefit: cars fitted with ESC systems are involved in fewer accidents than those which are not and the accidents they have are less severe.

Car manufacturers and their suppliers perform many hundreds of different tests to ensure that their ESC systems perform satisfactorily in a wide range of situations. Euro NCAP does not have the resources to recreate this wide range of tests but a single test, or a few simple tests, cannot predict the safety benefit which different systems would offer in real life. Therefore, it is not possible at this time to rate cars on the basis of their ESC systems. This reflects the accident statistics which show a clear distinction between cars fitted with ESC and those without, but no discernible differences between different manufacturers' systems.

Euro NCAP will seek to develop stand-alone tests, or tests which complement any legislative requirements, to be able to rate ESC systems in the future. In the meantime, to try to encourage manufacturers to fit ESC more broadly, Euro NCAP offers a reward based on the fitment rate across the model range.

5.2 Definitions

Throughout this chapter the following terms are used:

- Model Range – means all of the variants of a particular car model.
- Variant – means a particular combination of body style, powertrain and equipment grade. The term covers non-standard or 'special' specifications introduced by distributors in individual countries.

5.3 Methodology

5.3.1 Euro NCAP will consider ESC for assessment only if it meets the requirements for basic safety equipment (as defined in the Car Specification, Selection, Testing and Retesting protocol):

5.3.1.1 ESC is standard or optional on every variant in the model range throughout EU27 (there is no variant where it is not possible to have ESC fitted)

5.3.1.2 The manufacturer sells, or expects to sell, at least 85 percent (for 2009, increasing by 5% per year to 2012 [2]) of vehicles with ESC as standard equipment across EU27 as a whole.

5.3.2 Information is provided to Euro NCAP by the vehicle manufacturer regarding the fitment and sales of ESC across the model range.

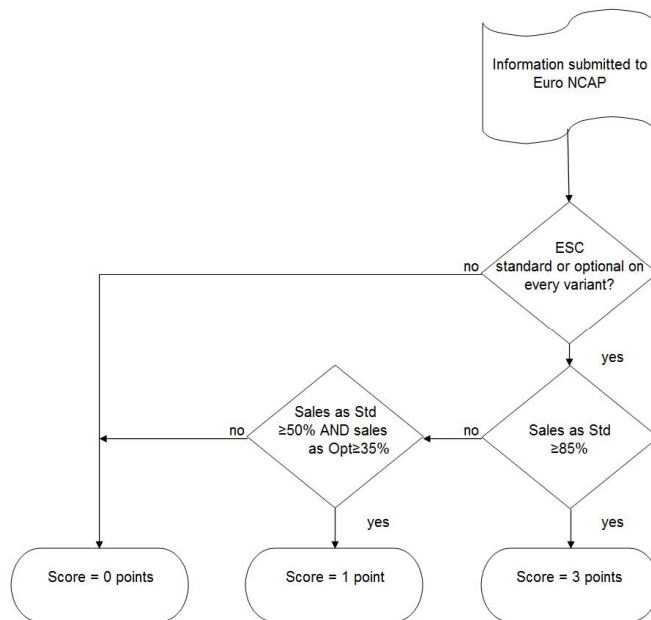


Figure 1

Flowchart for the assessment of Electronic Stability Control

(Notes: 1 point option valid for 2009 only; 85% escalating to 100% in 2012 [2])

- 5.3.2.1 For vehicles currently on sale, information should be provided regarding ESC sales in the previous 12 months and expected sales in the forthcoming 12 months.
- 5.3.2.2 For vehicles not yet on sale, or whose sales have only recently begun, the manufacturer must provide expected figures.

5.4 Scoring and Visualisation

- 5.4.1 Based on the information provided by the manufacturer, points are awarded as follows:
 - 5.4.1.1 Vehicles whose ESC systems meet the requirements for basic safety equipment are rewarded with 3 points, added to the Safety Assist score.
 - 5.4.1.2 Vehicles whose ESC systems do not meet the requirements receive no points.
 - 5.4.1.3 For 2009 only, one point is awarded to vehicles whose ESC systems meet the following:
 - 5.4.1.3.1 ESC is standard or optional on every variant in the model range (there is no variant where it is not possible to have ESC fitted).
 - 5.4.1.3.2 The manufacturer sells, or expects to sell, at least 50 percent of vehicles with ESC as standard equipment and at least a further 35 percent with ESC as optional equipment.

6 REFERENCES

- 1 ECE Regulation 89 – Uniform Provisions concerning the Approval of I. Vehicles with regard to Limitation of their Maximum Speed; II. Vehicles with regard to the Installation of a Speed Limitation Device (SLD) of an approved type; III Speed Limitation Devices. Date of entry into force 1 October 1992.
- 2 Car Specification, Sponsorship, Testing and Retesting Protocol, Version 2.3 April 2009.

APPENDIX I

SEAT BELT REMINDER DEFINITIONS

Change of Status

The change in use of the seat belt, where a buckled belt is unbuckled.

Deactivation

Short Term deactivation for a single journey or Long Term deactivation for a longer period.

Final Signal

The only signal required by Euro NCAP.

Forward Motion

Forward motion of more than 10 km/h.

Initial Signal

A signal, for the front seating positions, which commences at the start of the journey. It is desirable but is not required by Euro NCAP. No specifications are given for the signal, leaving manufacturers the freedom to use the signal they believe is most effective.

Intermediate Signal

A signal, for the front seating positions, which does not commence at the start of the journey but which commences before the Final Signal. It is desirable but is not required by Euro NCAP. No specifications are given for the signal, leaving manufacturers the freedom to use the signal they believe is most effective.

Journey

Movement of the vehicle under its own power.

Monitored

The continuous checking of the use, non-use or change in use of the seat belt or seat occupancy.

More Sophisticated Intermediate Signal

An intermediate signal, with a clear, easily visible text message or a loud and clear voice message. No specifications are given for the signal, leaving manufacturers the freedom to use the signal they believe is most effective.

Occupancy

Use by an occupant larger, taller or heavier than a small female (5 percentile).

Recommendation

A feature which is desirable but which is not required for the Euro NCAP assessment.

Requirement

A feature that is necessary to be awarded points in the Euro NCAP assessment.

Short Break

A short period of time during which the vehicle is stopped, where it would be un-necessary to start the reminder signal again when the journey re-commences.

Start of Reminder System

The commencement of the Seat Belt Reminder sequence.

APPENDIX II

SEAT BELT REMINDER INFORMATION FORM

The following details should be provided by the vehicle manufacturer prior to the assessment:

1. Details of the vehicle to be assessed

Make	
Model	
VIN (if known)	

2. Which seats are protected by the SBR system? (Tick as appropriate)

Driver	
Passenger	
2nd row	
3rd row or more	

3. System description

	Driver		Passenger		2nd Row		3rd Row/ Others	
	yes	no	yes	no	yes	no	yes	no
Does the system have multiple stages?								
Initial signal								
Intermediate signal								
Final signal								

4. Description of the system trigger for driver

	Applicable	Ignition ON	Speed (km/h)	Distance (m)	Time (s)
Initial signal					
Intermediate signal					
Final signal					

5. Description of the system trigger for passenger (if different)

	Applicable	Ignition ON	Speed (km/h)	Distance (m)	Time (s)
Initial signal					
Intermediate signal					
Final signal					

6. Description of the system trigger for 2ns row (if different)

	Applicable	Ignition ON	Speed (km/h)	Distance (m)	Time (s)
Initial signal					
Intermediate signal					
Final signal					

7. Description of the signal(s) for driver

Audible:

	Applicable	Frequency	Total duration (s)	Gap(s) in signal?
Initial signal				
Intermediate signal				
Final signal				

Visual:

	Applicable	Frequency	Total duration (s)	Gap(s) in signal?
Initial signal				
Intermediate signal				
Final signal				

a. Does the system have a progressive audible signal? For example, a change in volume/frequency?

If yes, give details of the various amplitude/frequencies.

b. Does the system time out?

Yes, the system times out after: (seconds)

8. Description of the signal(s) for passenger, if different

Audible:

	Applicable	Frequency	Total duration (s)	Gap(s) in signal?
Initial signal				
Intermediate signal				
Final signal				

Visual:

	Applicable	Frequency	Total duration (s)	Gap(s) in signal?
Initial signal				
Intermediate signal				
Final signal				

a. Does the system have a progressive audible signal? For example, a change in volume/frequency?

If yes, give details of the various amplitude/frequencies.

b. Does the system time out?

Yes, the system times out after: (seconds)

9. Can the system be deactivated? If so how, short/long term?

System can be deactivated?	Yes		No
How is the system deactivated?	Short term	Long term	

10. How is the passenger seat(s) occupancy detection triggered?

Provide details:

11. How is the rear seat reminder triggered?

Provide details: