LATIN AMERICAN & CARIBBEAN
NEW CAR ASSESSMENT PROGRAMME
(Latin NCAP)

ASSESSMENT PROTOCOL – SAFETY ASSIST
2025 - 2029

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AKNOWLEDGEMENT

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1 INTRODUCTION

The Latin NCAP programme is designed to provide a fair, meaningful and objective assessment of the safety performance of cars and provide a mechanism to inform consumers. This protocol is based upon that used by the European New Car Assessment Programme for the Safety Assist box.

In 2020 Latin NCAP introduced relevant changes to the SA protocol such as the overall rating scheme and together with it, the assessment of new technologies such as Speed Assist, Autonomous Emergency Breaking (AEB), Lane Support Systems (LSS) and Blind Spot Detection (BSD). This current protocol continues in the same line while adding other relevant areas of assessment new to the program such as Alcohol Interlock Capability and Driver State Monitoring.

Individual documents are released for the four 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, a document describing the testing protocols to be used and a car specification, sponsorship and testing protocol.

The following protocol deals with the assessments made in the area of Safety Assist, in particular for the Seat Belt Reminder (SBR) front and rear, Speed Assist Systems (SAS), Electronic Stability Control Systems (ESC), Blind Spot Detection (BSD), Lane Support Systems (LSS) and Autonomous Emergency Braking Systems in both urban (“City”) and Inter-urban scenarios, now called AEB car to car (C2C). AEB City, previously on the AOP box, will score under the safety assist box from the entry into force of this protocol onwards.

DISCLAIMER: Latin NCAP has taken all reasonable care to ensure that the information published in this protocol is accurate and reflects the technical decisions taken by the organisation. In the unlikely event that this protocol contains a typographical error or any other inaccuracy, Latin NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

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 will be based on performance requirements (SBR, ESC, SAS, BSD, LSS, AEB) verified by Latin NCAP according to the criteria detailed in this document. Some functions will allow a fitment requirement to score such as AEB C2C, LSS, ISA, DMS, e-Call. The assessments will only be carried out on vehicles randomly selected by Latin NCAP. In-house data or simulations will not be accepted. The intention is to promote standard fitment across the sales volume sold in the Latin American and Caribbean countries in combination with good functionality for these systems, where this is possible.

It is important to note that Latin NCAP only considers assessment of safety assist systems that meet the fitment requirements (as defined in the CSSTR and Overall Rating Protocols). Passive safety technology as well as ESC, SBR and MSA will only be considered when they are fitted as standard in all versions of the model. For the performance assessment of seat belt reminder and speed assistance systems, 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 Latin NCAP assessment, additional information may be recorded that may be communicated to consumers and added to the Latin NCAP assessment in the future.

3 SEAT BELT REMINDER SYSTEMS

3.1 Introduction

It is well known that the correct use of seat belts is the most effective way of providing protection for vehicle occupants in a crash. Currently, usage rates are very low across the Latin American and Caribbean (LAC) Countries and research has shown that many of the non-wearers would use their seat belt with some encouragement.

Although, simple seat belt reminder systems have been available for some time, the technology behind the more sophisticated systems continues to evolve. Latin NCAP, following Euro NCAP assessment protocol, has set some minimum requirements but wishes to encourage the development of increasingly improved systems. Special focus should be made in misuse of seat belts in order to “cheat” the SBR system. For example, it is well known that many users in LAC countries (and other regions of the world) will sit over a buckled seat belt to prevent the chime to turn on. Systems that address the misuse by a trick-proof system will be considered by Latin NCAP when its functionality has been tested and verified. Future protocols may include this feature as a requirement for scoring.

Latin NCAP will assess Seat Belt Reminder Systems as indicated in the latest version of Latin NCAP Testing Protocols document. In addition, the visual signal of the Seat belt reminder must be located in a place where the driver without moving its head and only moving its eyes not more than 15 degrees vertically and 15 degrees horizontally (centre console not acceptable). Manufacturer must indicate which positions are fitted with SBR systems as standard prior to the test. Rear seats will only be assessed for “buckled” and “unbuckled” condition. Short or long term deactivation of seatbelt reminders is not allowed. OEMs must communicate in advance with Latin NCAP secretariat should this function exist in the car prior to the assessment.

3.2 Scoring and Visualization

For Seat Belt Reminder systems which fully comply with the Latin NCAP requirements[1] as well as the visual requirements described in 3.1, the following points will be awarded to the overall occupant score for that vehicle.

3.2.1 Driver seat

Where driver seating position meets the assessment criteria, 3 points will be awarded.

3.2.2 Passenger seat

Where passenger seating position meets the assessment criteria AND 3 points have been awarded for the driver position, 3 additional points will be awarded.

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1 Please refer to the latest version of *Latin NCAP testing protocols* document

3.2.3 Rear seats

Where 6 points have been awarded for all front seating positions and all rear seating positions meet the assessment criteria, an additional 4 points will be awarded. No distinction is made between the rear seating positions, all must simultaneously meet the requirements for scoring.

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. The result of the Seat Belt Reminder assessment is not visualized.

3.3 Future Developments

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, such as the ones described in section 4.3, to requirements. Latin NCAP will likely require rear occupant detection for the next protocol.

4 ADVANCED FEATURES: DRIVER MONITORING SYSTEMS, ENHANCED SEAT BELT REMINDERS & ALCOHOL INTERLOCK INSTALLATION FACILITATION

4.1 INTRODUCTION

Driver monitoring systems play a vital role in reducing fatalities in cars by detecting and addressing driver distractions, drowsiness, and impairment. These systems utilize various technologies such as cameras, sensors, and algorithms to monitor the driver's behaviour and alertness level. By providing timely warnings and interventions, they help prevent crashes caused by human errors, thus saving lives and reducing injuries. Additionally, driver monitoring systems can contribute to enhancing overall road safety by encouraging safer driving habits and increasing awareness among drivers about the importance of staying focused and alert while behind the wheel.

In a similar way, alcohol interlocks aim to prevent intoxicated individuals from operating vehicles. By promoting the standardisation and facilitation of alcohol interlocks being installed in vehicles, Latin NCAP aims to reduce the risk of alcohol-related crashes, contributing to the reduction of injuries and fatalities in the region.

4.2 DRIVER MONITORING SYSTEMS

For the evaluation of Driver Monitoring Systems, a simplified Euro NCAP Advanced approach will be used for this protocol. This means that the manufacturer must provide a dossier containing a detailed technical assessment as per Euro NCAP Advanced protocol[2]. The dossier should contain:

- Technical detail about the system, to fully understand its functionality, relevant components, and intended availability.
- Test procedures, criteria and limits by which the performance of the system was verified
- If available, the dossier should summarize the findings from real-world or simulated real-world evaluations. It should also indicate the potential and real life group of accidents addressed by the system.

4.2.1 Prerequisites

In order to be rewarded any points DSM systems must be fitted according to the requirements described in Latin NCAP Overall Rating protocol.

To be eligible for scoring points in DSM:

- All seating positions must have met the SBR requirements detailed in Section 3.
- The vehicle under assessment must be equipped with an AEB system (meeting the Latin NCAP C2C and VRU preconditions as a minimum) and an LSS.

2 https://cdn.euroncap.com/media/39217/euro-ncap-advanced-assessment-protocol-v20.pdf

- Systems using Time-on-Task only will not be awarded.

4.2.2 General requirements

To be eligible for scoring points in DSM, the system needs to be default ON at the start of every journey and deactivation of the system should not be possible with a momentary single push on a button.

4.2.3 Detection of Driver State

This section is foreseen to follow *Euro NCAP Safety Assist – Safe Driving protocol*

4.2.4 System Warning and/or Intervention

This section is foreseen to follow *Euro NCAP Safety Assist – Safe Driving protocol*

The Latin NCAP Secretariat will review the DSM dossier as provided by the manufacturer and will decide on the applicability of awarding the point for DSM. Latin NCAP aims that DSM systems fitted to cars are compliant with Euro NCAP DSM requirements described in Euro NCAP Safe Driving protocols implemented as of 2023.

4.3 ENHANCED SEAT BELT REMINDERS

Systems that address the misuse of Seat Belt Reminders for both front passenger positions by a “trick-proof” system, will be awarded extra points by Latin NCAP when its functionality is tested and verified. Some examples of common misuse are, occupants seated on top of a buckled seatbelt, seatbelt routed behind the car seat and extra buckle tongue buckled in to silence the warning signal.

Latin NCAP does not specify a testing protocol or which technology should be used to prevent misuse and will assess the technology based on the manufacturer information. Manufacturers should communicate with Latin NCAP in advance to discuss the details of the technology to check if meets Latin NCAP requirements.

Being the misuse of seatbelt an recurring issue reality on the real world statistics, Latin NCAP will further push for this feature beyond 2029 for SBR scoring.

4.4 ALCOHOL INTERLOCK INSTALLATION FACILITATION

Alcohol interlock installation facilitation’ means a standardized interface that facilitates the fitting of aftermarket alcohol interlock devices in motor vehicles. Manufacturers must provide evidence that the system fulfils the requirements of EN 50436:2016

4.5 Scoring & Visualization

A maximum of **1 point** can be awarded to the total SA box score when either 4.2, 4.3 or 4.4 requirements are met and accepted by Latin NCAP secretariat.

The "Advanced Features" point is only eligible for scoring when the car has been awarded a minimum of 1.25 points in Speed Assist Systems (SAS) according to Section 5, "ASSESSMENT OF SPEED ASSIST SYSTEMS"

5 ASSESSMENT OF SPEED ASSIST SYSTEMS

5.1 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. Latin NCAP hopes to encourage manufacturers to promote such speed-limitation devices, to fit them as standard equipment. This, it is hoped, will lead to greater demand by consumers and an increased introduction of speed limitation systems.

The margins for alarm activation set out in this document are based on prevailing speedometer accuracy, which is specified by regulation and typically overstates the vehicle speed by several km/h.

This version of the protocol contains technical requirements for both Manual Speed Assist (MSA) systems where the driver needs to set the limited speed and Intelligent Speed Assist (ISA) systems where the car ‘knows’ the current legal speed limit to be used in the warning or speed limitation function. To be able to score full points for the speed limitation function the system (both MSA and ISA) need to fulfil the warning function and speed setting requirements.

5.2 Definitions

Throughout this protocol the following terms are used:

- **Vindicated** – The speed the car travels as displayed to the driver by the speedometer as in ECE R39.
- **Speed Limit** – Maximum allowed legal speed for the vehicle at the location, time and in the circumstance the vehicle is driving.
- **Vadj** – Adjustable speed Vadj means the voluntarily set speed for the MSA/ISA, which is based on Vindicated and includes the offset set by the driver.
- **MSA – Manual Speed Assistance**. MSA means a system which allows the driver to set a vehicle speed Vadj, to which he wishes the speed of his car to be limited and/or above which he wishes to be warned.
- **SLIF - Speed Limit Information Function**. SLIF means a function with which the vehicle knows

and communicates the speed limit.

- **ISA – Intelligent Speed Assistance.** ISA is a MSA combined with SLIF, where the Vadj is set by the SLIF with or without driver confirmation.

The following terms are used for the assessment of the Speed Limitation function:

- **Vstab** – Stabilised speed Vstab means the mean actual vehicle speed when operating. Vstab is calculated as the average actual vehicle speed over a time interval of 20 seconds beginning 10 seconds after first reaching Vadj – 10 km/h.

5.3 Requirements for SLIF, MSA and ISA

5.3.1 The Speed Assist Systems is developed in such a way that it allows different types of Speed Assist Systems to be assessed. Four types of possible Speed Assist Systems are foreseen:

- SLIF — Speed Limit Information Function
- MSA — Manual Speed Assistance
  - Warning function only
  - Speed Limitation function only
  - Warning function & Speed Limitation function
- SLIF + MSA — Both SLIF and MSA but not coupled
- ISA — Intelligent Speed Assistance, SLIF and MSA coupled

5.3.2 The table below details which sections are applicable for the different types of SA systems:

Type	Sections
SLIF	5.4
MSA	5.5.1, 5.6, 5.7
ISA	5.4, 5.5.1, 5.5.2, 5.6, 5.7

5.4 Speed Limit Information Function

The Speed Limit Information Function can be a standalone function or an integrated part of ISA. Any SLIF, camera or a combination of both camera and map based, need to fulfil the requirements of this section. The speed limit information could either be provided by vehicle-integrated devices or by mobile devices connected to the vehicle network. A list of compatible devices needs to be mentioned in the vehicle handbook.

Manufacturers need to supply Latin NCAP with background information of the SLIF to be eligible for scoring (if applicable to the technology).

5.4.1 General Requirements

5.4.1.1 The speed limit shall be shown using a traffic sign and shall be in the direct field of view of the driver, without the need for the head to be moved from the normal driving position, i.e. instrument cluster, heads up display.

5.4.1.2 The speed limit information must be shown or accessible at any time with a simple operation and needs to be shown at the start of the next journey (excluding the initialization period).

5.4.1.3 The indicated speed limit information may indicate the level of reliability of the speed limit.

5.4.1.4 In the presence of conditional speed limits the system needs to either properly identify and show (for example when raining) the applicable speed limit or alternatively, needs to indicate the presence of a conditional speed limit which the system is not able to compute.

5.5 Setting the Speed

Both MSA and ISA systems must comply with section 5.5.1. ISA systems meeting the requirements of section 5.4 are eligible for a higher score when also meeting the requirements in section 5.5.2.

5.5.1 Manually setting the speed (MSA and MSA function of ISA)

5.5.1.1 Activation / de-activation of the system

- The system must be capable of being activated/de-activated as well as have access to speed setting at any time with a simple operation.
- At the start of a new journey, the system should be de-activated by default..

5.5.1.2 Setting of Vadj

- It shall be possible to set Vadj, by a control device operated directly by the driver, by steps not greater than 10km/h between 30km/h and 130km/h or by steps not greater than 5mph between 20mph and 80mph when imperial units are used.
- It shall be possible to set Vadj independently of the vehicle speed.
- If Vadj is set to a speed lower than the current vehicle speed, the system shall limit the vehicle speed to the new Vadj within 30s or shall initiate the supplementary warning (section 4.6.2) no later than 30s after Vadj has been set.

5.5.1.3 The Vadj 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.

5.5.2 Automatic setting the speed (ISA)

An automatic setting is using the speed limit information from the SLIF to advise (requiring driver confirmation) or directly set the Vadj. Systems fulfilling the requirements from section 5.4 and section 5.5.1 are eligible for scoring when meeting the following additional requirements:

5.5.2.1 Activation / de-activation of the system

- The system must be capable of switching between MSA and ISA mode at any time with a simple operation.
- At the start of a new journey, the vehicle shall not limit the speed without confirmation from the driver

5.5.2.2 Setting of Vadj

- The system should adopt, or offer the driver to adopt, an adjusted Vadj within 5s after a change in the speed limit.
- If Vadj is set to a speed lower than the current vehicle speed, the system starts to limit the vehicle speed to the new Vadj or shall initiate the supplementary warning (section 4.6.2) no later than 30s after Vadj has been set.
- A negative and/or positive offset with respect to the known speed limit is allowed but may not be larger than 10 km/h (5 mph). This offset is included in Vadj.
- The Vadj in the automatic mode of an ISA system may be retained at the end of a journey.

5.5.2.3 Where Vadj is set to the speed limit advised by the SLIF, the indication of Vadj may be suppressed.

5.6 Warning Function

All MSA and ISA systems need to meet the warning requirements of section 5.6.1 to indicate the driver that Vadj is exceeded. In addition a supplementary warning is required, e.g. audible, haptic and head-up display meeting the requirements in section 5.6.2. A head-up display warning meeting the requirements of both 5.6.1 and 5.6.2 will be accepted.

Vehicles with Speed Limiter function activated do not need a warning function when active braking is applied to limit the vehicle speed.

It shall still be possible to exceed Vadj by applying a positive action, e.g. kickdown. After exceeding Vadj by applying a positive action, the speed limitation function shall be reactivated when Vindicated drops to a speed less than Vadj.

5.6.1 <u>Visual warning requirements</u>

5.6.1.1 The visual signal must be in the direct field of view of the driver, without the need for the head to be moved from the normal driving position, i.e. instrument cluster, heads up display.

5.6.1.2 The driver is informed when Vindicated of the vehicle is exceeding Vadj by more than 5 km/h.

5.6.1.3 The driver continues to be informed for the duration of the time that Vadj is exceeded by more than 5 km/h.

5.6.1.4 The warning signal does not preclude temporary interruption of the indication for safety reasons.

5.6.2 Supplementary warning requirements

5.6.2.1 The warning shall be clear to the driver.

5.6.2.2 No supplementary warning needs to be given when Vadj is exceeded as a result of a positive action.

5.6.2.3 The warning commences when the Vindicated of the vehicle is exceeding Vadj by more than 5km/h.

5.6.2.4 The total duration of the warning must be at least 10 seconds and must start with a positive signal for at least 2 seconds. Gaps of less than 1 second, which allow for signals which flash and audio signals that “beep”, are ignored. If the signal is not continuous for the first 10 seconds, it needs to be repeated every 30 seconds or less, resulting in a minimum total duration of at least 10 seconds.

5.6.2.5 The warning sequence does not need to be reinitiated for each exceedence of Vadj until Vindicated has reduced to more than 5km/h below Vadj.

5.7 Speed Limitation Function

Scoring is only eligible when the warning signal requirements from section 5.6 are met or when active braking is applied to limit the vehicle speed.

5.7.1 Speed Limitation

5.7.1.1 The vehicle speed shall be limited to Vadj, also see sections 5.5.1.2 and 5.5.2.2

5.7.1.2 It shall still be possible to exceed Vadj by applying a positive action, e.g. kickdown.

5.7.1.3 After exceeding Vadj by applying a positive action, the speed limitation function shall be reactivated when the vehicle speed drops to a speed less than Vadj.

5.7.1.4 The speed limitation function shall permit a normal use of the accelerator control for gear selection.

5.7.1.5 The speed limitation function shall meet the following requirements (see test protocol): When stable speed control has been achieved, Vstab shall be within -10/+0 km/h of Vadj and within -5/+0 km/h of Vadj for full points.

5.8 Scoring and Visualisation

The following points are awarded for systems that meet the requirements. These points will contribute to the Safety Assist Score[3].

	SLIF	MSA	ISA
Communicating speed limit (Section 5.4)	**1.25**	**-**	**1.00**
Camera based	1.15	-	0.75
Camera and Digital Map combined	1.25	-	1.00
Warning Function (Section 5.5 and 5.6)	-	**0.25**	**1.00**
Speed Limitation Function (Section 5.7) - Vstab within -10/+0 km/h of Vadj - Vstab within -5/+0 km/h of Vadj	-	**0.50** **0.75**	**0.75** **1.00**

6 ASSESSMENT OF AEB CAR-TO-CAR SYSTEMS

6.1 ASSESSMENT OF AEB CITY SYSTEMS

6.1.1 Introduction

For the assessment of AEB City systems, the AEB function is assessed using a stationary Global Vehicle Target in a speed range of 10-50km/h combined with an overlap range of -50%-50%.

6.1.2 Definitions

Throughout this protocol the following terms are used:

Autonomous Emergency Braking (AEB) – braking that is applied automatically by the vehicle in response to the detection of a likely collision to reduce the vehicle speed and potentially avoid the collision.

Car-to-Car Rear Stationary (CCRs) – a collision in which a vehicle travels forwards towards another stationary vehicle and the frontal structure of the vehicle strikes the rear structure of the other.

Vehicle under test (VUT) – means the vehicle tested according to this protocol with a pre-crash collision mitigation or avoidance system on board.

Global Vehicle Target (GVT) – means the vehicle target used in this protocol as specified in Annex A of the AEB test protocol.

Vrel_test – means the relative speed between the VUT and the GVT by subtracting the velocity of the GVT from that of the VUT at the start of test.

Vimpact – means the speed at which the VUT hits the GVT.

Vrel_impact – means the relative speed at which the VUT hits the GVT by subtracting the velocity of the GVT from Vimpact at the time of collision.

6.1.3 Criteria and Scoring

AEB City points are awarded only when the following preconditions are met:

- Whiplash score for the front seat is at least 2.0 points.
- The AEB system needs to be default ON at the start of every journey and deactivation of the AEB system should not be possible with a single push on a button.

- Full avoidance needs to be achieved for test speeds up to and including 20 km/h for all overlap situations, which is verified by one randomly selected testpoint.

6.1.3.1 **Assessment Criteria**

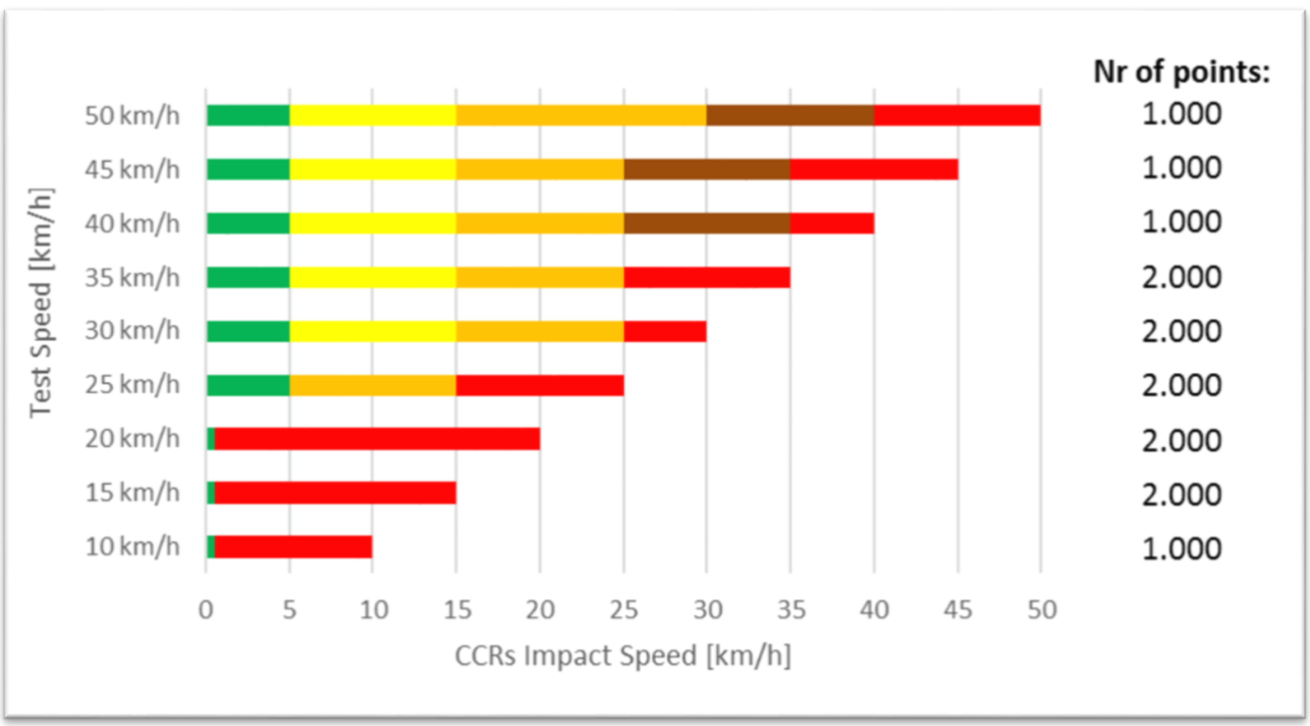
For the AEB function tests, the assessment criteria used is the relative impact speed Vrel_impact.

6.1.3.2 **Scoring**

A maximum of 4 points is available for AEB City. The total score for all five grid points per test speed is calculated as a percentage of the maximum achievable score per test speed, which is then multiplied by the points available for this test speed. It should be noted that the 100% overlap score is double counted.

The total amount of points is subsequently scaled from a maximum 14 points down to 4 points available for AEB City.

The points available and the colour distribution for the different test speeds for CCRs are detailed in the graph below:



For each predicted colour the following scaling is applied to the grid point:

Green	*1.00*
Yellow	*0.750*
Orange	*0.500*
Brown	*0.250*
Red	*0.000*

6.1.3.3 **AEB City Correction factor**

The data provided by the manufacturer is scaled using a correction factor, which is calculated based on a number of verification tests performed. The vehicle sponsor will fund 10 verification tests. The vehicle manufacturer has the option of sponsoring up to 10 additional verification tests for AEB City.

The verification points are randomly selected grid points, distributed in line with the predicted colour distribution (excluding red points).

The actual tested total score of the verification test points is divided by the predicted total score of these verification test points. This is called the correction factor, which can be lower or higher than 1.

$$Correction\ Factor = \frac{Actual\ Tested\ Score}{Predicted\ Score}$$

The correction factor is multiplied to all the grid points. The final score for the vehicle can never exceed 100% (4 points) regardless of the correction factor.

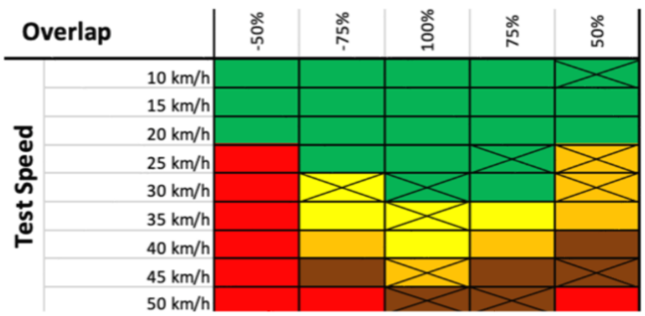
6.1.3.4 **Impact speed tolerance**

As test results can be variable between labs and in-house tests and/or simulations a 2 km/h tolerance to the impact speeds of the verification test is applied. The tolerance is applied in both directions, meaning that when a tested point scores better than predicted, but within tolerance, the predicted result is applied. The tolerance only applies to verify whether the predicted colour of the tested verification point is correct. When, including tolerance, the colour is not in line with the prediction, the true colour of the test point will be determined by comparing the actual measured impact speed with the colour band in section 6.1.3.2 without applying a tolerance to the impact speed. As an example the accepted impact speed ranges for the 45km/h tests are as follows:

Prediction	***Impact speed range [km/h]***			***Accepted range [km/h]***		
Green	*0 ≤*	v_{impact}	*< 5*	*0 ≤*	v_{impact}	*< 7*
Yellow	*5 ≤*	v_{impact}	*< 15*	*3 ≤*	v_{impact}	*< 17*
Orange	*15 ≤*	v_{impact}	*< 25*	*13 ≤*	v_{impact}	*< 27*
Brown	*25 ≤*	v_{impact}	*< 35*	*23 ≤*	v_{impact}	*< 37*
Red	*35 ≤*	v_{impact}			*excluded*	

6.1.3.5 **Scoring Example**

Manufacturer X has provided the following prediction to Latin NCAP, where the predicted score is 2.845 points:



PREDICTION						
CCRs	Green	Yellow	Orange	Brown	Red	Points
10 km/h	6				0	1.000
15 km/h	6				0	2.000
20 km/h	6				0	2.000
25 km/h	4		1		1	1.500
30 km/h	3	1	1		1	1.417
35 km/h	0	4	1		1	1.167
40 km/h	0	2	2	1	1	0.458
45 km/h	0	0	2	3	1	0.292
50 km/h	0	0	0	3	3	0.125
Predicted AEB City score						2.845

Where the predicted AEB City score is calculated by scaling the total amount of points from a maximum of 14.000 points to a maximum score of 4.000.

The randomly chosen verification points and test results are:

VERIFICATION				
Testpoint	Prediction	Points	Impact Speed	Points
50,75		0.250	27.58	0.500
35,100		0.750	3.01	0.750
30,100		1.000	6.99	1.000
30,-75		0.750	10.20	0.750
45,50		0.250	36.25	0.250
25,75		1.000	0.00	1.000
50,100		0.250	29.85	0.250
25,50		0.500	8.00	0.500
45,100		0.500	27.58	0.250
30,50		0.500	12.85	0.750
Total		**5.750**		**6.000**

$$Correction\ Factor = \frac{Actual\ Tested\ Score}{Predicted\ Score} = \frac{6.000}{5.750} = 1.043$$

a) **The FINAL AEB City score is: 2.845 x 1.043= 2.968 points (yellow)**

6.1.4 Visualisation

The AEB City scores are presented separately using a coloured top view of the scenario for the different overlap situations; left overlap, full overlap and right overlap. The colours used are based on the overlap scores respectively, rounded to three decimal places.

Colour	Verdict	Applied to Total Score	Applied to Scenario
Green	‘Good’	3.001 - 4.000 points	75.0% - 100.0%
Yellow	‘Adequate’	2.001 - 3.000 points	50.0% - 75.0%
Organge	Marginal’	1.001 - 2.000 points	25.0% - 50.0%
Brown	‘Weak’	0.001 - 1.000 points	00.0% - 25.0%
Red	‘Poor’	0.000 points	00.0%

6.2 ASSESSMENT OF AEB INTER-URBAN SYSTEMS

6.2.1 Introduction

AEB Inter-Urban systems are AEB systems that are designed to work at speeds typical for driving outside of the city environment, for example on urban roads or highways. For the assessment of AEB Inter-Urban systems, three areas of assessment are considered: the Autonomous Emergency Braking function, Forward Collision Warning function and the Human Machine Interface (HMI). The AEB function is assessed in two different types of scenarios, while the FCW function is scored separately and assessed in three different types of scenarios. The FCW function is only considered when the system provides dynamic brake support.

6.2.2 Definitions

Throughout this protocol the following terms are used:

Autonomous Emergency Braking (AEB) – braking that is applied automatically by the vehicle in response to the detection of a likely collision to reduce the vehicle speed and potentially avoid the collision.

Forward Collision Warning (FCW) – an audiovisual warning that is provided automatically by the vehicle in response the detection of a likely collision to alert the driver.

Dynamic Brake Support (DBS) – a system that further amplifies the driver braking demand in response to the detection of a likely collision to achieve a greater deceleration than would otherwise be achieved for the braking demand in normal driving conditions.

Car-to-Car Rear Stationary (CCRs) – a collision in which a vehicle travels forwards towards another stationary vehicle and the frontal structure of the vehicle strikes the rear structure of the other.

Car-to-Car Rear Moving (CCRm) – a collision in which a vehicle travels forwards towards another vehicle that is travelling at constant speed and the frontal structure of the vehicle strikes the rear structure of the other.

Car-to-Car Rear Braking (CCRb) – a collision in which a vehicle travels forwards towards another vehicle that is travelling at constant speed and then decelerates, and the frontal structure of the vehicle strikes the rear structure of the other.

Vrel_test – means the relative speed between the VUT and the EVT by subtracting the velocity of the EVT from that of the VUT at the start of test

Vimpact – means the speed at which the VUT hits the EVT

Vrel_impact – means the relative speed at which the VUT hits the EVT by subtracting the velocity of the EVT from Vimpact at the time of collision

6.2.3 Criteria and Scoring

6.2.3.1 To be eligible for scoring points in AEB Inter-Urban, the AEB and/or FCW system must operate up to speeds of at least 80 km/h, needs to be default ON at the start of every journey and and deactivation of the system should not be possible with a single push on a button.

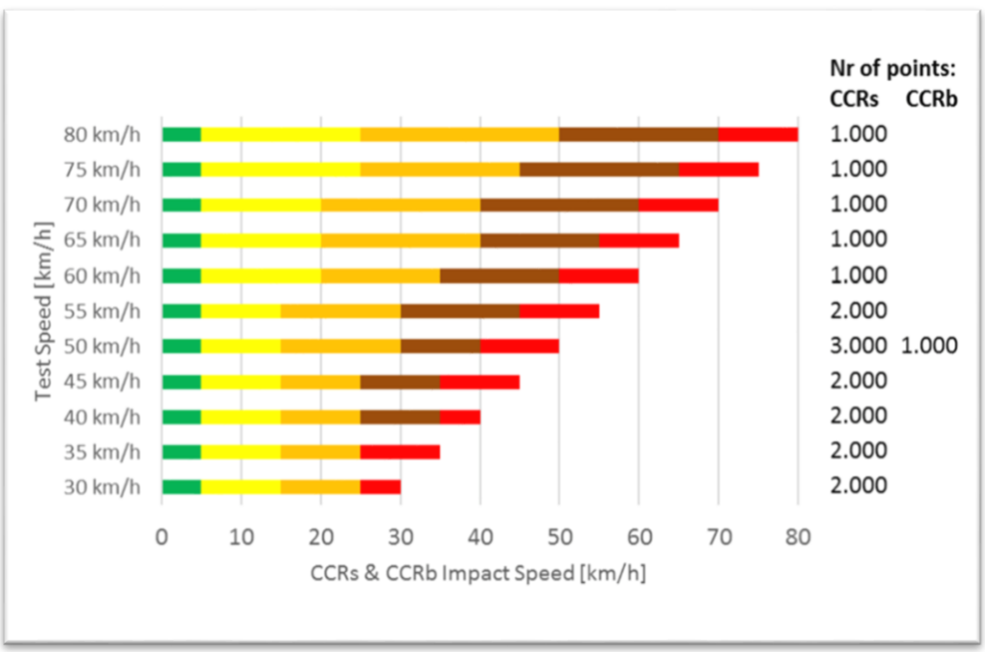
6.2.3.2 The audible component of the FCW system (if applicable) needs to be loud and clear.

6.2.3.3 Assessment Criteria

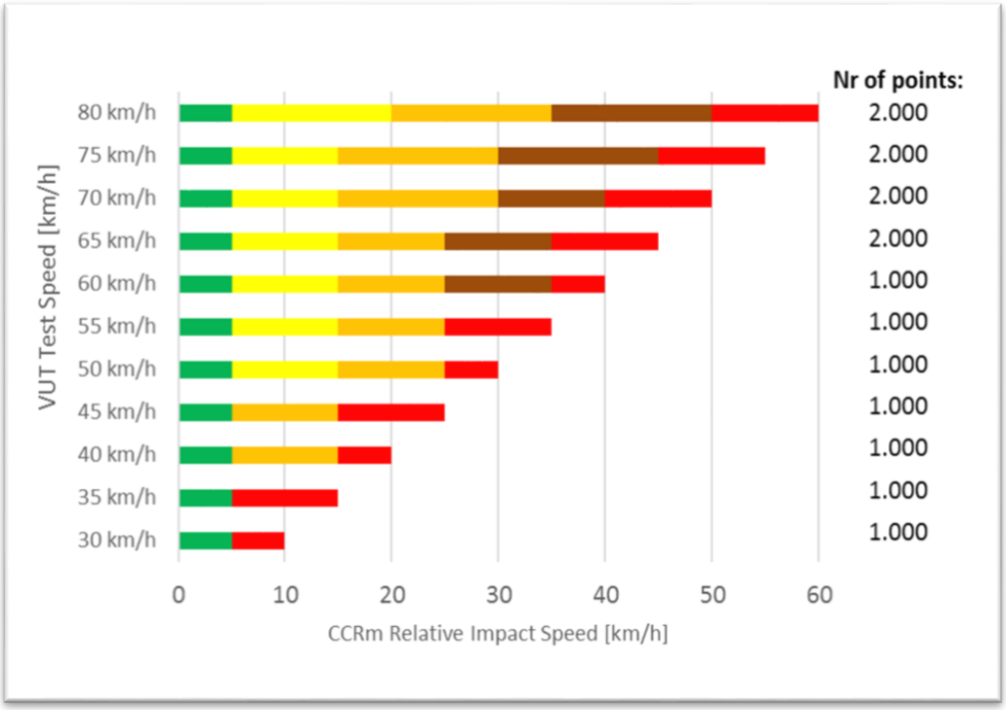
For both AEB and FCW system tests, the assessment criteria used is the relative impact speed Vrel_impact. For CCRb scenarios, the relative test speed is assumed equal to the initial test speed.

6.2.3.4 <u>Scoring</u>

The scoring is based on normalized scores of the AEB and FCW functions, assessed in the CCRs, CCRm and CCRb scenarios. For the CCRs and CCRm scenarios, the total score for all five grid points per test speed is calculated as a percentage of the maximum achievable score per test speed, which is then multiplied by the points available for this test speed. It should be noted that the 100% overlap score is double counted. The points available and the colour distribution for the different test speeds for CCRs and CCRb (50 km/h only) are detailed in the graph below:



Similar for CCRm, where the relative impact speed is used:



For each predicted colour the following scaling is applied to the grid point:

Green	*1.00*
Yellow	*0.750*
Orange	*0.500*
Brown	*0.250*
Red	*0.000*

6.2.3.5 AEB Inter-Urban Correction factors

The data provided by the manufacturer is scaled using two correction factors, one for AEB and one for FCW, which are calculated based on a number of verification tests performed. The vehicle sponsor will fund 20 verification tests, 10 for AEB and 10 for FCW where applicable. The vehicle manufacturer has the option of sponsoring up to 10 additional verification tests for AEB and 10 for FCW.

The verification points are randomly selected grid points, distributed in line with the predicted colour distribution (excluding red points). The actual tested total score of the verification test points is divided by the predicted total score of these verification test points. This is called the correction factor, which can be lower or higher than 1.

$$Correction\ Factor = \frac{Actual\ Tested\ Score}{Predicted\ Score}$$

The correction factor is used to calculate the AEB and FCW function scores. The final AEB and FCW scores for the vehicle can never exceed 100% (1.5 and 1.0 points respectively) regardless of the correction factor.

6.2.3.6 Impact speed tolerance

As test results can be variable between labs and in-house tests and/or simulations a 2 km/h tolerance to the impact speeds of the verification test is applied. The tolerance is applied in both directions, meaning that when a tested point scores better than predicted, but within tolerance, the predicted result is applied. The tolerance only applies to verify whether the predicted colour of the tested verification point is correct. When, including tolerance, the colour is not in line with the prediction, the true colour of the test point will be determined by comparing the actual measured impact speed with the colour band in section 6.2.3.4 without applying a tolerance to the impact speed. As an example the accepted impact speed ranges for the 50km/h CCRs and CCRb tests are as follows:

Prediction	***Impact speed range [km/h]***			***Accepted range [km/h]***		
Green	*0 ≤*	v_{impact}	*< 5*	*0 ≤*	v_{impact}	*< 7*
Yellow	*5 ≤*	v_{impact}	*< 15*	*3 ≤*	v_{impact}	*< 17*
Orange	*15 ≤*	v_{impact}	*< 30*	*13 ≤*	v_{impact}	*< 32*
Brown	*30 ≤*	v_{impact}	*< 40*	*28 ≤*	v_{impact}	*< 42*
Red	*40 ≤*	v_{impact}			*excluded*	

6.2.3.7 Human Machine Interface (HMI)

HMI points can be achieved for the following:

- **Supplementary warning for the FCW system** **1 point**
  In addition to the required audiovisual warning, a more sophisticated warning like head-up display, belt jerk, brake jerk or any other haptic feedback is awarded when it is issued at a TTC > 1.2s. This is only valid for cases where the AEB system is not able to fully avoid the impact at full overlap.

  NOTE: The supplementary warning point is not applicable to AEB only systems

- **Reversible pre-tensioning of the belt in the pre-crash phase** **1 point**
  When the system detects a critical situation that can possibly lead to a crash, the belt can already be pre-tensioned to prepare for the oncoming impact.

The HMI score is calculated by dividing the points achieved by 2.

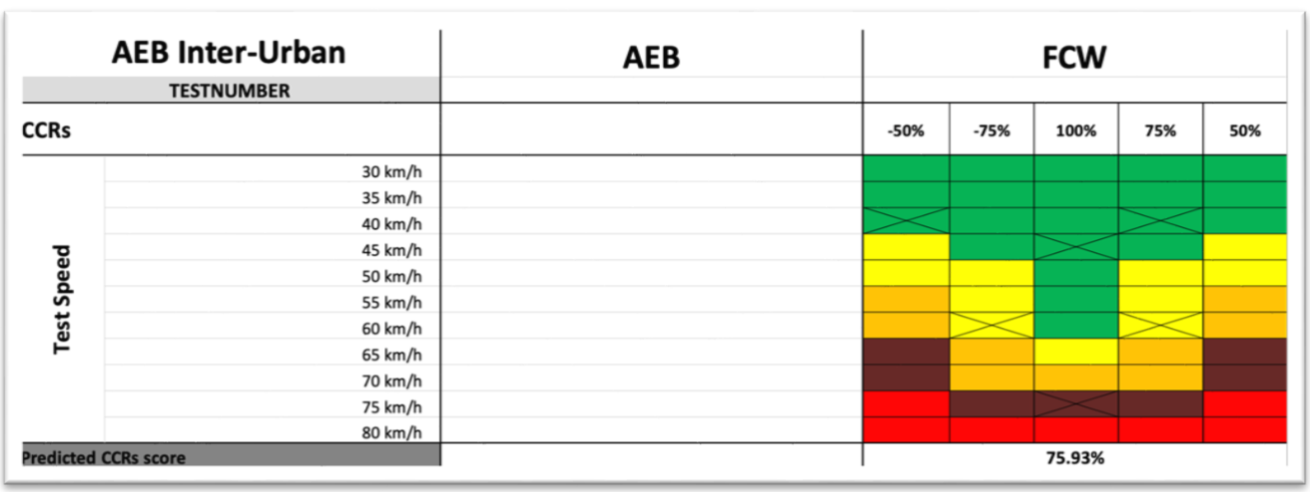
6.2.3.8 Total AEB Inter-Urban Score

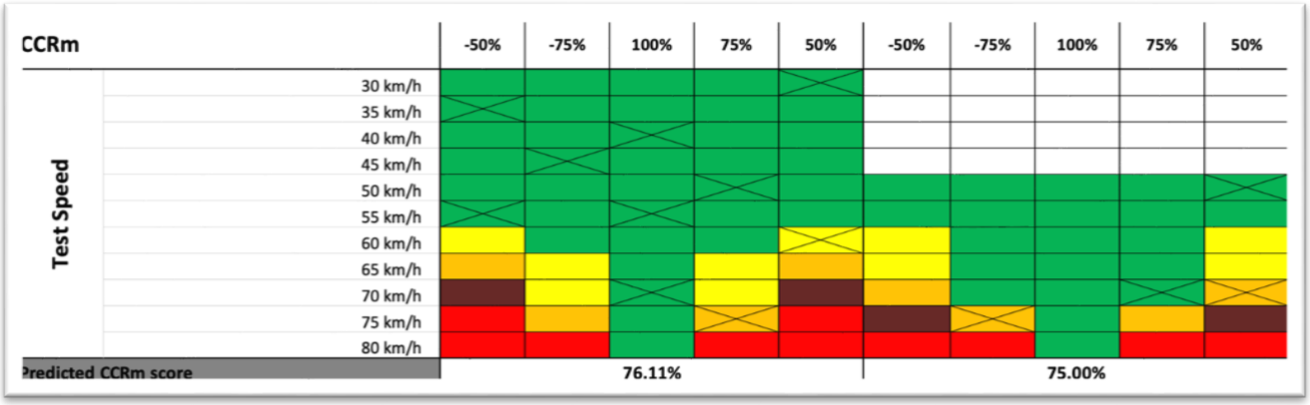
The total score in points is the weighted sum of the AEB score, FCW score and HMI score as shown below.

$$\begin{aligned}&(AEB\ score\ x\ AEB\ Correction\ factor\ x\ 1.5)\\ &+ (FCW\ score\ x\ FCW\ Correction\ factor\ x\ 1.0)\\ &+ (HMI\ score\ x\ 0.5)\\ &\text{---}\\ &(AEB\ Inter\ Urban\ total\ score)\end{aligned}$$

6.2.3.8.1 <u>Scoring Example</u>

Manufacturer X has provided the following prediction to Latin NCAP, where the predicted score is 2.669 points:





The randomly chosen verification points and test results provide the following scores:

	Predicted score	Actual tested score	Correction Factor
AEB	9.250	9.000	0.973
FCW	7.750	8.000	1.032

Using the following AEB Inter-Urban scenario and HMI scores:

SUMMARY		
CCRs (prediction x correction factor)		78.4%
CCRm (prediction x correction factor)	74.1%	77.4%
CCRb	100.0%	100.0%
HMI	100.0%	

TOTAL	
AEB	1.305
FCW	0.853
HMI	0.500

TOTAL AEB INTER-URBAN	**2.658**

6.2.4 Visualisation

The AEB Inter-Urban scores are presented separately using a coloured top view of the scenario for the different overlap situations (where applicable); left overlap, full overlap and right overlap. The colours used are based on the overlap scores respectively, rounded to three decimal places.

Colour	**Verdict**	**Applied to Total Score**	**Applied to Scenario**
Green	'Good'	2.251 - 3.000 points	75.0% - 100.0%
Yellow	'Adequate'	1.501 – 2.250 points	50.0% - 75.0%
Organge	Marginal'	0.751 - 1.500 points	25.0% - 50.0%
Brown	'Weak'	0.001 – 0.750 points	00.0% - 25.0%
Red	'Poor'	0.000 points	00.0%

6.3 SCORING OF AEB CAR-TO-CAR SYSTEMS

Latin NCAP will score both AEB City and Inter Urban systems in a single score referred to as AEB Car-to-car systems reflecting the performance of the car in both city and interurban scenarios. A total of **9 points** can be scored in AEB car-to-car systems by scaling the AEB City and Inter Urban scores described in 6.1.3.2 and 6.2.3.8 respectively:

$$AEB\ Car\ to\ Car\ Score = \left(\frac{AEB\ City\ Score}{4}\right)\ x\ 3 + \left(\frac{AEB\ Inter\ Urban\ total\ score}{3}\right)\ x\ 6$$

7 ASSESSMENT OF ELECTRONIC STABILITY CONTROL

7.1 Introduction

Electronic Stability Control (ESC) systems have a demonstrable safety benefit: cars fitted with ESC systems are involved in fewer loss-of-control crashes than those which are not and the accidents they have are less severe. Latin NCAP has promoted standard fitment of ESC since 2010 and encourages the adoption of this technology as standard across the region. Unfortunately, there is currently no mandatory requirement for ESC in many of the LAC countries.

Latin NCAP will conduct its own tests, based on the UN R13H, UN R140, GTR8 requirements and/or Euro NCAP ESC assessment protocol. Additionally, Latin NCAP will conduct at least 3 runs of a “moose test” in two different scenarios with a professional driver from the accredited crash test facility in order to assure the real-life robustness of the electronic stability control system. The test will be performed according to the latest version “Latin NCAP Moose test Testing Protocol”.

This assessment has been performed by Latin NCAP since 2020 and will continue to monitor the performance of the vehicles and reserves the right to propose further changes to the setup, scenario, criteria or rating, if any. These may include an increase in the test speed.

7.2 Criteria and Scoring

7.2.1 **ESC points are only eligible for scoring when the car has been awarded a minimum of 1 point in Speed Assist Systems (SAS) according to section 5.**

7.2.2 Vehicles whose ESC systems meet the UN R13H, UN R 140 or GTR8 requirements, as defined in regulation, are rewarded with 15 points to be included in the Safety Assist box.

7.2.3 Vehicles not equipped with ESC systems do not meet the above requirements, will score zero points.

7.2.4 Three runs of the “moose test” according to the latest version of “**Latin NCAP Moose test Testing Protocol**“ will be performed.

7.2.5 The results of both Moose tests scenarios will be reported as indicating the maximum speed reached in both tests before any fail criteria is recorded. The consumer will be presented with a brief overall analysis of the performance of the ESC system in both scenarios, along with the maximum speed in which one of the fail conditions was met.

7.2.6 Additionally, ESC score will be affected as follows:

- ESC points will be reduced by 10 points if the first run (lower speed[4]) of the Moose test runs is a fail.
- ESC points will be reduced by 7 points if the first run of the Moose test runs is a pass the

[4] As defined in the latest version of Latin NCAP “TESTING PROTOCOL – MOOSE TEST”

second one a fail.

- ESC points will be reduced by 3 point if the first two runs of the Moose test are a pass and the last one a fail.
- ESC points will not be affected if there is no fail in all three Moose tests runs.

8 ASSESSMENT OF LANE SUPPORT SYSTEMS

8.1 Introduction

Lane support systems are becoming increasingly widespread and Latin NCAP has acknowledged their safety potential via the Latin NCAP Advanced award. From 2020, these systems are included in the Safety Assist score.

Latin NCAP adopted the tests that Euro NCAP has developed which complement any legislative requirements, to be able to rate lane support systems in more detail.

8.2 Definitions

Emergency Lane Keeping (ELK) – default ON heading correction that is applied automatically by the vehicle in response to the detection of the vehicle that is about to drift beyond the edge of the road or into oncoming or overtaking traffic in the adjacent lane.

Lane Keeping Assist (LKA) – heading correction that is applied automatically by the vehicle in response to the detection of the vehicle that is about to drift beyond a delineated edge line of the current travel lane.

Lane Departure Warning (LDW) – a warning that is provided automatically by the vehicle in response to the vehicle that is about to drift beyond a delineated edge line of the current travel lane.

Vehicle under test (VUT) – means the vehicle tested according to this protocol with a Lane Keep Assist and/or Lane Departure Warning system.

Time To Collision (TTC) – means the remaining time before the VUT strikes the GVT, assuming that the VUT and GVT would continue to travel with the speed it is travelling.

Lane Edge – means the inner side of the lane marking or the road edge

Distance To Lane Edge (DTLE) – means the remaining lateral distance (perpendicular to the Lane Edge) between the Lane Edge and most outer edge of the tyre, before the VUT crosses Lane Edge, assuming that the VUT would continue to travel with the same lateral velocity towards it.

8.3 Criteria and Scoring

To be eligible for scoring points in Lane Support Systems, the vehicle must be equipped with an ESC system that complies with UNECE Regulation 13H.

For any system, the driver must be able to override the intervention by the system.

8.3.1 Human Machine Interface (HMI)

A maximum of 0.50 HMI points can be achieved for one of the following:

Lane Departure Warning **0.50 points**
Any LDW system that issues a haptic warning before a DTLE of -0.2m is awarded when active at lateral velocities of at least 0.7m/s

8.3.2 Lane Keep Assist (LKA)

For LKA system tests, the assessment criteria used is the Distance to Lane Edge (DTLE).

The limit value for DTLE for LKA tests is set to -0.3m for testing against lines, meaning that the LKA system must not permit the VUT to cross the inner edge of the lane marking by a distance greater than 0.3m.

The available points per test are awarded based on a pass/fail basis where all tests within the scenario and road marking combination need to be a pass. The points available for the different LKA scenario and road marking combinations are detailed in the table below:

LKA Scenario	Road Marking	Points
Dashed Line	Single Lane Marking	0.25
Solid Line	Single Lane Marking	0.25
Total		**0.50**

8.3.3 Emergency Lane Keeping (ELK)

To be eligible for scoring points in ELK, the ELK part of the LSS system needs to be default ON at the start of every journey and deactivation of the system should not be possible with a momentary single push on a button.

For ELK Road Edge and Solid line tests, the assessment criteria used is the Distance to Lane Edge (DTLE).

The limit value for DTLE for ELK Road Edge tests is set to -0.1m, meaning that the vehicle is only allowed to have a part of the front wheel outside of the road edge. The limit value for DTLE for ELK Solid line tests is set to -0.3m for testing against lines, meaning that the ELK system must not permit the VUT to cross the inner edge of the lane marking by a distance greater than 0.3m.

For ELK tests with oncoming and overtaking vehicles, the assessment criteria used is no impact, meaning that the VUT is not allowed to contact the overtaking or oncoming vehicle target at any time during the test.

The available points per test are awarded based on a pass/fail basis where all tests within the scenario and road marking combination need to be a pass. The points available for the different ELK scenario and road marking combinations are detailed in the table below:

ELK Scenario	**Road Marking**	**Points**
Road Edge	Road Edge Only	0.25
	Dashed centerline & no line next to road edge	0.25
	Dashed centerline & dashed line next to road edge	0.25
	Dashed centerline & solid line next to road edge	0.25
Solid Line	Single lane marking	0.50
Oncoming vehicle	Fully marked lanes	1.00
Overtaking vehicle	Fully marked lanes	0.50
Total		**3.00**

8.3.4 Total LSS Score

The total score in points is the sum of the HMI score, LKA score and ELK score, scaled down to 3 points.

LSS Function		**Points**
HMI		0.50
LKA		0.50
ELK		3.00
Total RAW		**4.00**
Total Scaled		**((Total RAW) x 3) / 4**

8.4 Visualisation

The LSS scores are presented separately using a colour for the different LSS functions; HMI, LKA and ELK. The colours used are based on the function scores respectively, rounded to three decimal places.

Colour	Verdict	Applied to Total RAW Score	Applied to Scenario
Green	‘Good’	3.001 - 4.000 points	75.0% - 100.0%
Yellow	‘Adequate’	2.001 – 3.000 points	50.0% - 75.0%
Organge	Marginal’	1.001 – 2.000 points	25.0% - 50.0%
Brown	‘Weak’	0.001 – 1.000 points	00.0% - 25.0%
Red	‘Poor’	0.000 points	00.0%

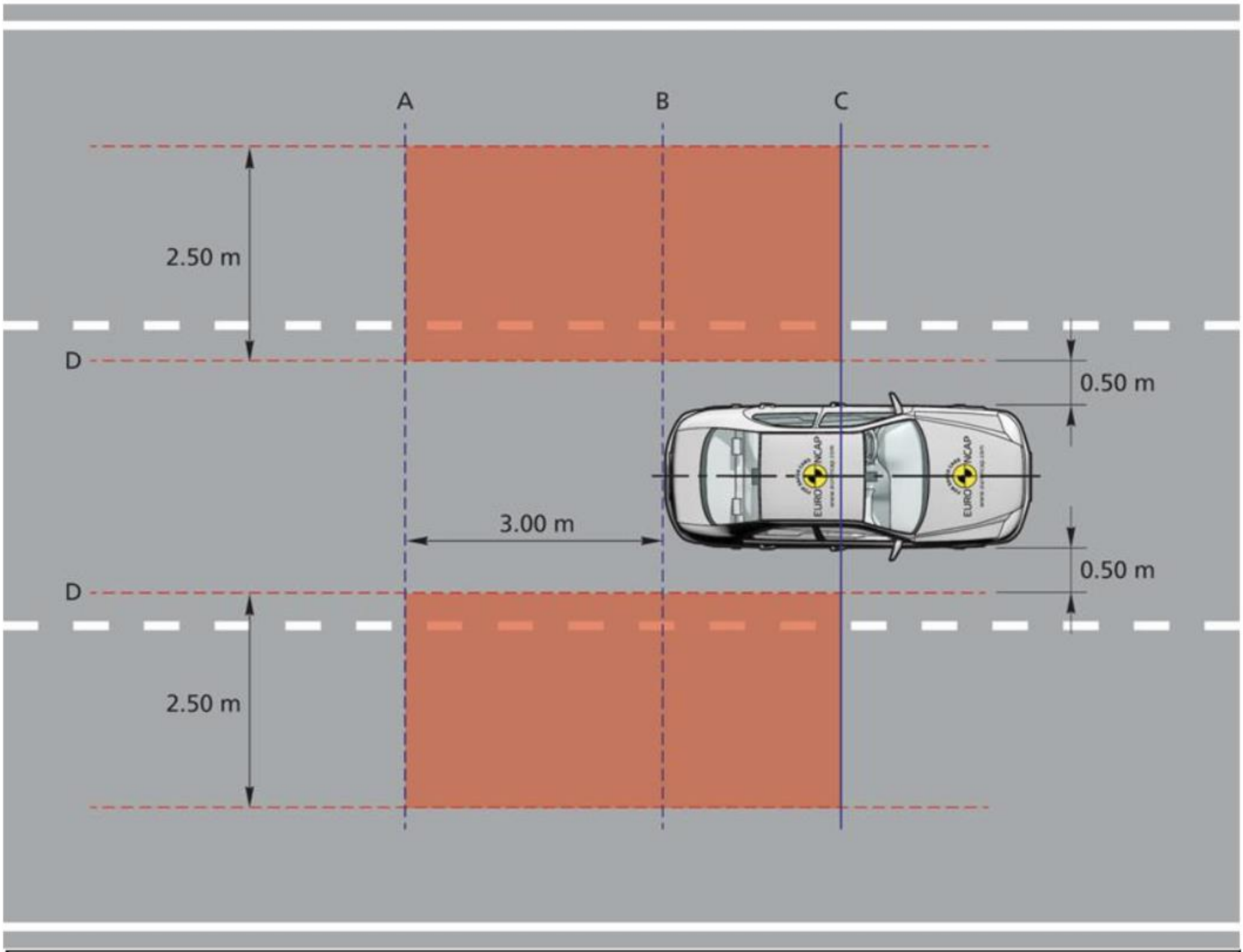
9 BLIND SPOT DETECTION

For vehicles equipped with a Blind Spot Detection (BSD) system to warn the driver of other vehicles present in the blind spot, 3 points are available in the SA box. Manufacturers are encouraged to implement technologies that further reduce the risk of crashes with an oncoming vehicle beyond the BSD area described below or take additional actions to prevent or mitigate crashes.

For the Blind spot monitoring tests, the assessment criteria used is the blind spot information supplied in respect to the test target position. The position of the warning most commonly used is in the rearview mirrors, Latin NCAP encourages manufacturers to communicate in advance if the visual warning is located in a different position. For a pass to be awarded visual blind spot information must be provided continuously when the front end of the test target is within the red areas shown in red in the following diagram (NOTE: to avoid a collision, the virtual box around the test target shall never exceed D). Additionally, Latin NCAP can test any position of the test target within the area described below in which the BSD should also continuously warn the driver.

The tests are conducted with a VUT speed of 42 km/h and 72 km/h, and a target speed of 50km/h and 80km/h respectively. Latin NCAP reserves the right to test at different speeds to verify the robustness of the system. Tests will be conducted with a small motorcycle of not more than 125 cc. Electric powered scooters can also be used as well as a small motorcycle target such as the ASEAN NCAP Motorcycle Target. Manufacturers should check with Latin NCAP secretariat for approval of the target or any alternative target proposal.

The BSD function must not be capable of being de-activated with a simple operation and must be default ON at the start of every journey. Latin NCAP would like to encourage manufacturers to implement advanced BSD systems that provide an additional audible, visible or haptic warning when a lane change is engaged with a target vehicle in the adjacent lane.



Reference:

Symmetry left and right side of the VUT.

A - Line A parallel to trailing edge of VUT and located 3.0 m behind the trailing edge of VUT

B - Line B is the bidirectional extension line of the trailing edge of VUT.

C - Line C is parallel to the leading edge of the VUT and located at the center of the 95th percentile eye ellipse.

D – Line D is parallel to the center line of VUT and located left (/right) of the outermost edge of the left (/right) side of VUT body (excluding the rear-view mirrors), 0.5m away from the outermost edge of the left (/right) side.

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