EUROPEAN NEW CAR ASSESSMENT PROGRAMME
(Euro NCAP)

ASSESSMENT PROTOCOL – SAFETY ASSIST
COLLISION AVOIDANCE

Implementation 2023

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1 INTRODUCTION

The following protocol deals with the assessments made in the area of Safety Assist, in particular for Lane Support Systems and Autonomous Emergency Braking Systems.

DISCLAIMER: Euro 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, Euro 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 is based both on performance requirements verified by Euro NCAP. 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 or dual rating (as defined in the Vehicle Specification, Selection, Testing and Re-testing protocol). 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 ASSESSMENT OF AEB CAR-TO-CAR SYSTEMS

3.1 Introduction

For the assessment of AEB Car-to-Car systems, three areas of assessment are considered: the Autonomous Emergency Braking function, Forward Collision Warning function and the Human Machine Interface (HMI). The FCW function is only considered when the system provides dynamic brake support.

3.2 Definitions

3.2.1 General

Throughout this protocol the following terms are used:

Peak Braking Coefficient (PBC) – the measure of tyre to road surface friction based on the maximum deceleration of a rolling tyre, measured using the American Society for Testing and Materials (ASTM) E1136-10 (2010) standard reference test tyre, in accordance with ASTM Method E 1337-90 (reapproved 1996), at a speed of 64.4km/h, without water delivery. Alternatively, the method as specified in UNECE R13-H.

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 audio-visual warning that is provided automatically by the vehicle in response to 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.

Autonomous Emergency Steering (AES) – steering that is applied automatically by the vehicle in response to the detection of a likely collision to steer the vehicle around the vehicle in front to avoid the collision.

Emergency Steering Support (ESS) – a system that supports the driver steering input in response to the detection of a likely collision to alter the vehicle path and potentially avoid a collision.

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

Vehicle width – the widest point of the vehicle ignoring the rear-view mirrors, side marker lamps, tyre pressure indicators, direction indicator lamps, position lamps, flexible mud-guards and the deflected part of the tyre side-walls immediately above the point of contact with the ground.

Global Vehicle Target (GVT) – means the vehicle target used in this protocol as defined in ISO 19206-3:2021

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.

T_{AEB} – means the time where the AEB system activates. Activation time is determined by identifying the last data point where the filtered acceleration signal is below -1 m/s^2, and then going back to the point in time where the acceleration first crossed -0.3 m/s^2

T_{FCW} – means the time where the audible warning of the FCW starts. The starting point is determined by audible recognition

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

3.2.2 Test Scenarios

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.

Car-to-Car Front Turn-Across-Path (CCFtap) – a collision in which a vehicle turns across the path of an oncoming vehicle travelling at constant speed, and the frontal structure of the vehicle strikes the front structure of the other.

Car-to-Car Crossing Straight Crossing Path (CCCscp) – a collision in which a vehicle travels forwards along a straight path across a junction, towards a vehicle crossing the junction on a perpendicular path. The frontal structure of the vehicle under test strikes the side of the other vehicle.

Car-to-Car Front Head-On Straight (CCFhos) – a collision where a vehicle is travelling along a straight path within its defined lane and strikes another vehicle travelling in the opposite direction, which has drifted into the same lane as the original vehicle. The frontal structure of the vehicle strikes the frontal structure of the other.

Car-to-Car Front Head-On Lane change (CCFhol) – a collision where a vehicle is travelling along a straight path within its defined lane and strikes another vehicle travelling in the opposite direction which has intentionally moved into the lane of the original vehicle to attempt an overtake. The frontal structure of the vehicle strikes the frontal structure of the other.

3.3 Criteria and Scoring

To be eligible for scoring points in AEB Car-to-Car, the AEB and/or FCW system must:

- Not automatically switch off at a speed below 130km/h.
- 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.
- The audible component of the FCW system (if applicable) needs to be loud and clear.

Additionally, evidence must be provided to demonstrate the system is capable of similar performance when tested in the CCRm scenario with a test speed of 130km/h and GVT speed of 70km/h, as with an 80km/h test speed with a 20km/h GVT speed. Similar performance in considered within one colour band difference as per 4.3.2.

Additionally, for the AEB CCRs scenario points for this scenario are awarded only when the following preconditions are met:

- Whiplash score for the front seat is at least rated as "Good".
- 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 test point.

3.3.1 Assessment Criteria

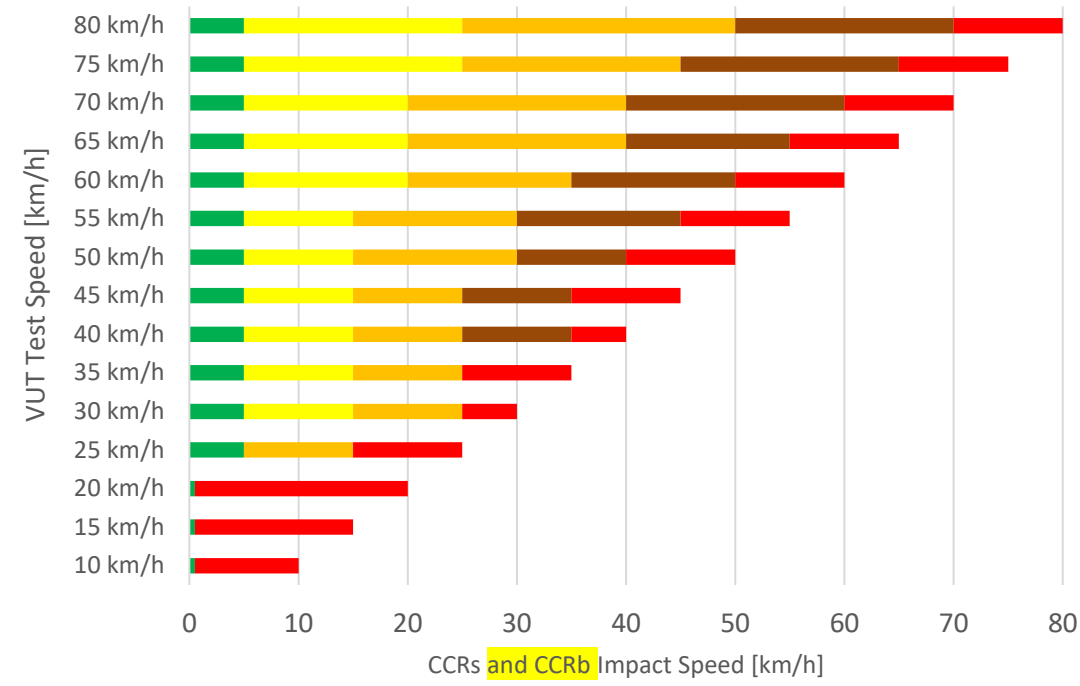
For CCRs (both AEB and FCW), CCRb, CCFhos, CCFhol and CCCscp tests the assessment criteria used is Vimpact. For CCRm tests the assessment criteria used is Vrel impact. For CCFtap tests the assessment criteria is collision avoidance.

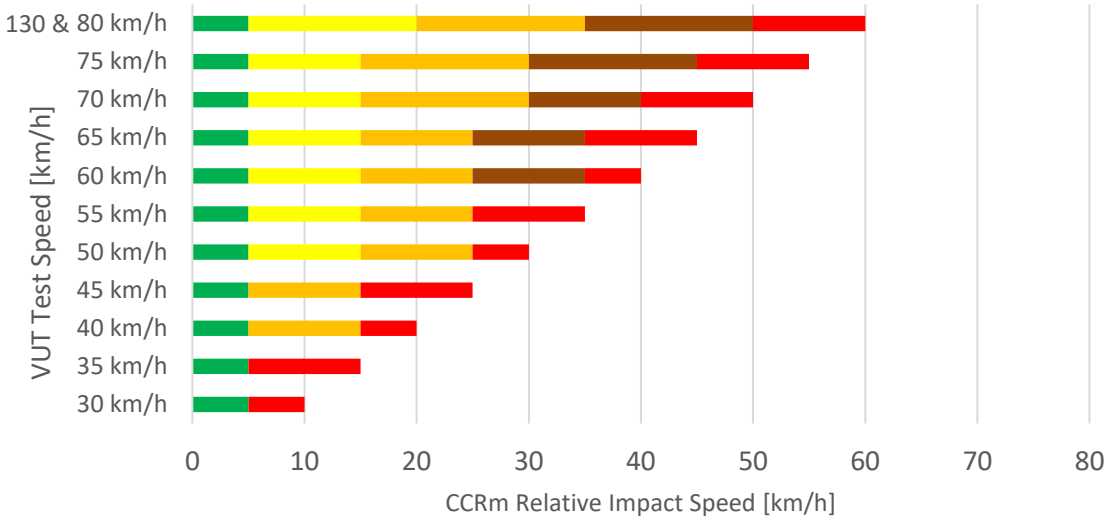
Alternatively, for CCRs FCW system tests @ -50% overlap (50% for RHD vehicles) where performance does not result in full avoidance, the manufacturer has the option to demonstrate to Euro NCAP at the test laboratory that their (driver initiated) ESS system will function to avoid the collision by steering support. Euro NCAP has elaborated a test procedure for ESS, which provisions can be found in TB 037.

3.3.2 Car-to-Car Rear

A maximum of 3.5 points is available for AEB/AES CCR. The scoring is based on normalized scores of the AEB and FCW/AES functions, assessed in the CCRs, CCRm and CCRb scenarios.

For each test point the result is given a colour based on the following tables. For the purpose of these tables, CCRb tests are considered to be equivalent to a CCRs test with a 50km/h VUT test speed.





To aid understanding, the following table illustrates the speed range for each colour in a CCRs and CCRb test with a VUT test speed of 50km/h.

Colour	Impact speed range (km/h)
Green	$0 < v_{impact} < 5$
Yellow	$5 \leq v_{impact} < 15$
Orange	$15 \leq v_{impact} < 30$
Brown	$30 \leq v_{impact} < 40$
Red	$40 \leq v_{impact}$

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.

$$\frac{score\ at\ [-50\%] + score\ at\ [-75\%] + (score\ at\ [100\%] \times 2) + score\ at\ [75\%] + score\ at\ [50\%]}{6}$$

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

Green	*1.000*
Yellow	*0.750*
Orange	*0.500*
Brown	*0.250*
Red	*0.000*

The points available for the different CCR grid points and/or scenarios are shown in the table below:

Test Speed (km/h)	AEB			FCW
	CCRs	CCRm	CCRb	CCRs
10	1.000			
15	2.000			
20	2.000			
25	2.000			
30	2.000	1.000		
35	2.000	1.000		
40	1.000	1.000		
45	1.000	1.000		
50	1.000	1.000	4 x 1.000	
55		1.000		1.000
60		1.000		1.000
65		2.000		1.000
70		2.000		1.000
75		2.000		1.000
80		2.000		1.000
Total	**14.000**	**15.000**	**4.000**	**6.000**
Scenario Points	**1.000**	**1.000**	**1.000**	**0.500**

3.3.2.1 Correction factors

The data provided by the manufacturer for CCRs and CCRm is scaled using two correction factors, one for AEB and one for FCW/AES, which are calculated based on a number of verification tests performed. The vehicle sponsor will fund 15 verification tests, 10 for AEB and 5 for FCW/AES where applicable. The vehicle manufacturer has the option of sponsoring up to 10 additional verification tests for AEB and 5 for FCW/AES.

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 CCRs and CCRm scores for the AEB and FCW/AES function scores. The final CCRs and CCRm scores for AEB and FCW/AES can never exceed 100% (3.0 and 0.5 points respectively) regardless of the correction factor.

3.3.2.2 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 3.3.2 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	$0 \leq v_{impact} < 5$	$0 \leq v_{impact} < 7$
Yellow	$5 \leq v_{impact} < 15$	$3 \leq v_{impact} < 17$
Orange	$15 \leq v_{impact} < 30$	$13 \leq v_{impact} < 32$
Brown	$30 \leq v_{impact} < 40$	$28 \leq v_{impact} < 42$
Red	$40 \leq v_{impact}$	excluded

3.3.3 Car-to-Car Front turn across path

A maximum of 1 point is available for AEB CCFtap. A normalised score is calculated based on the number of scenarios (out of 9) where the vehicle itself avoided the collision. This normalised score is multiplied with the available points for CCFtap.

Test Speed	**CCFtap**		
	GVT @ 30km/h	GVT @ 45km/h	GVT @ 60km/h
10 km/h	1.000	1.000	1.000
15 km/h	1.000	1.000	1.000
20 km/h	1.000	1.000	1.000
Total	**9.000**		
Scenario Points	**1.000**		

3.3.4 Car-to-car crossing straight crossing path

A maximum of 2 points is available for AEB CCCscp. A normalised score is calculated based on the results of the 30 test speed combinations.

Test Speed	CCCscp AEB				
	GVT Speed				
	20km/h	30km/h	40km/h	50km/h	60km/h
Start from stop	0.500	0.500	0.500	0.500	0.500
20 km/h	1.000	0.250	0.250	0.250	0.250
30 km/h	1.000	1.000	0.250	0.250	0.250
40 km/h	1.000	1.000	1.000	0.250	0.250
50 km/h	1.000	1.000	1.000	1.000	0.250
60 km/h	1.000	1.000	1.000	1.000	1.000
Total	**20.000**				
Scenario Points	**2.000**				

A maximum of 1 point is available for FCW CCCscp. A normalised score is calculated based on the results of the 15 test speed combinations.

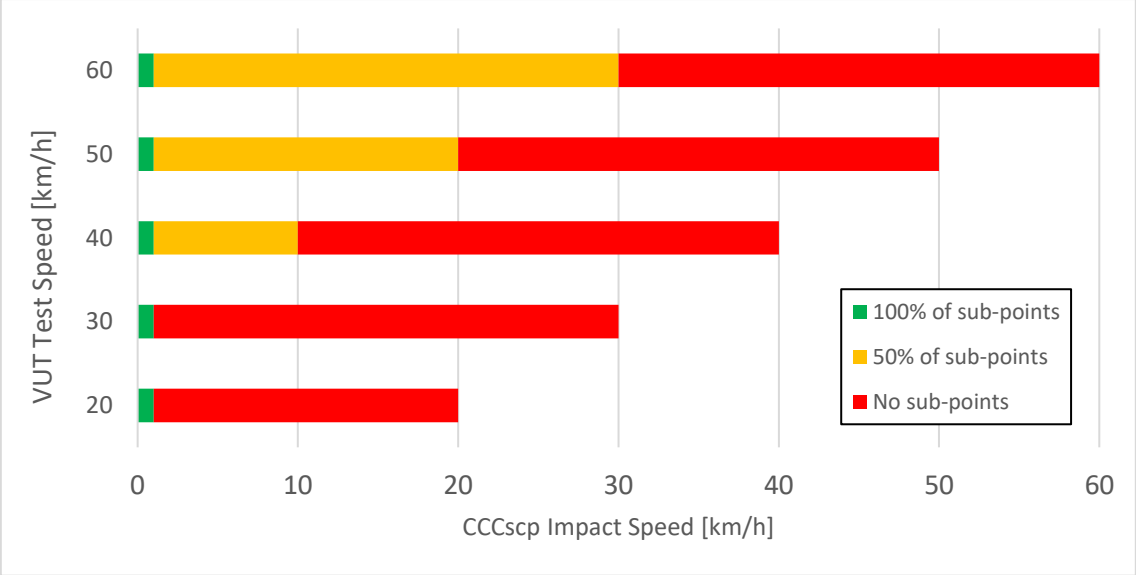
Where the AEB system avoided the collision, the points are automatically awarded for the corresponding FCW test.

Test Speed	CCCscp FCW				
	GVT Speed				
	20km/h	30km/h	40km/h	50km/h	60km/h
40 km/h	1.000	1.000	1.000	0.250	0.250
50 km/h	1.000	1.000	1.000	1.000	0.250
60 km/h	1.000	1.000	1.000	1.000	1.000
Total	**12.75**				
Scenario Points	**1.000**				

The criteria for scoring points for both AEB and FCW are:

- Where the VUT test speed is ≤30km/h (including start from stop) points are scored a pass/fail criteria based on collision avoidance.

- Where the VUT test speed is ≥40km/h:
    - Full points are awarded per test where the vehicle's AEB/FCW system activates, and the collision is avoided.
    - Half points are awarded per test where the vehicle's AEB/FCW system activates, mitigating the collision speed by ≥30km/h.
- Where a test speed combination is avoided by AEB, the points are automatically awarded for the corresponding FCW test.



3.3.5 Car-to-car front head on

A maximum of 1 point is available for AEB CCFhos/CCFhol .

The OEM must demonstrate, by means of a dossier, that in the following test scenarios the vehicle's AEB system will activate, mitigating the impact speed of the collision. The OEM must demonstrate that the system achieves the minimum mitigation required to score points across the specified speed range for each test scenario.

For each test scenario:

- 0.25 points are awarded if a speed reduction ≥20km/h is achieved.
- 0.125 points are awarded where 10km/h ≤ speed reduction < 20km/h is achieved.

Car-to-Car Head On			
Scenario	**Test Speed**		**Points**
	VUT	Test Target	(speed reduction ≥20km/h)
CCFhos	50 km/h	50 km/h	0.250
	70 km/h	70 km/h	0.250
CCFhol	50 km/h	50 km/h	0.250
	70 km/h	70 km/h	0.250
Total			1.000
Scenario Points			1.000

3.3.6 Human Machine Interface (HMI)

A maximum of 0.5 points are available for HMI. A normalised HMI score is calculated based on the two criteria below.

Points can be achieved for the following:

- Supplementary warning for the FCW system: 1 point

In addition to the required audio-visual warning, a more sophisticated warning like head-up display, belt jerk, or any other haptic feedback (with an exception to brake jerk, see below note) is awarded when it is issued at a TTC > 1.2s (applying to FCW

CCRs 55~80km/h including all overlaps). Alternatively, it will be awarded if all CCR scenarios are avoided up to 80 kph by AEB only.

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

NOTE: Additional requirements for using braking as a supplementary warning in CCR scenarios > 40kph relative speed:

- A brake jerk is accepted when issued ≥0.5s before main AEB intervention, with a jerk of ≥ 10m/s^3, reaching a deceleration more than 0.5m/s² (or lasting a minimum duration of 50 ms) OR
- A partial deceleration step is accepted when a constant acceleration ≤ -2m/s ² is seen for a duration of ≥0.5s before main AEB intervention.

- Reversible pre-tensioning of the belt in the pre-crash phase or ESS: 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.

As an alternative way to score 1 point, the vehicle shall be equipped with ESS, for which the system requirements and the testing procedure can be found in the Technical Bulletin TB037.

3.3.7 Total AEB Car-to-Car Score

The total score in points is the weighted sum of the CCR scores, the CCFtap score, the CCCscp scores, the CCFho scores and HMI. Where the scores are expressed as percentages:

$$
\begin{aligned}
&(CCRs\ AEB\ score\ x\ CCR\ AEB\ Correction\ factor\ x\ 1.0)\\
&+(CCRm\ AEB\ score\ x\ CCR\ AEB\ Correction\ factor\ x\ 1.0)\\
&+(CCRb\ AEB\ score\ x\ 1.0)\\
&+(CCRs\ FCW\ score\ x\ CCRs\ FCW\ Correction\ factor\ x\ 0.5)\\
&+(CCFtap\ score\ x\ 1.0)\\
&+(CCCscp\ AEB\ score\ x\ 2.0)\\
&+(CCCscp\ FCW\ score\ x\ 1.0)\\
&+(CCFhos/hol\ score\ x\ 1.0)\\
&+(HMI\ score\ x\ 0.5)
\end{aligned}
$$

$$= \boldsymbol{AEB\ CartoCar\ total\ score}$$

3.3.7.1 Scoring Example

AEB Car-to-car	Points	Correction Factor	Percentage	Score
CCR AEB				
CCRs	12	1.02	87.4	**0.874 /1.000**
CCRm	15	1.02	100	**1.000 /1.000**
CCRb	4		100	**1.000 /1.000**
CCR FCW				
CCRs	6	0.95	95%	**0.475 /0.500**
CCFtap	6		66.7	**0.667 /1.000**
CCCscp				
AEB	12.5		62.5	**1.250 /2.000**
FCW	12.75		100	**1.000 /1.000**
CCFhol / hos	0.5		50	**0.500 /1.000**
HMI	2		100	**0.500 /0.500**
Total	**7.266 /9.000**			

3.4 Visualisation

The AEB Car-to-Car 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	For sub Scores
Green	'Good'	6.751 – 9.000 points	75.0% - 100.0%
Yellow	'Adequate'	4.501 – 6.750 points	50.0% - 75.0%
Orange	'Marginal'	2.251 – 4.500 points	25.0% - 50.0%
Brown	'Weak'	0.001 – 2.250 points	00.0% - 25.0%
Red	'Poor'	0.000 points	00.0%

4 ASSESSMENT OF LANE SUPPORT SYSTEMS

4.1 Introduction

Lane support systems are becoming increasingly widespread and Euro NCAP has acknowledged their safety potential via the Euro NCAP Advanced award process from 2010. From 2014, these systems are included in the Safety Assist score.

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

4.2 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.

Driver Intention Monitoring system (DIM) - means a system that is effective at distinguishing intentional from unintentional lane crossing and suppressing undesired interventions.

4.3 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.

4.3.1 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 clearly relating to the lateral control of the vehicle noticeable by the driver (e.g. notable heading correction, steering wheel vibration, etc.) before a DTLE of -0.2m is awarded when active at lateral velocities up to at least 1m/s.

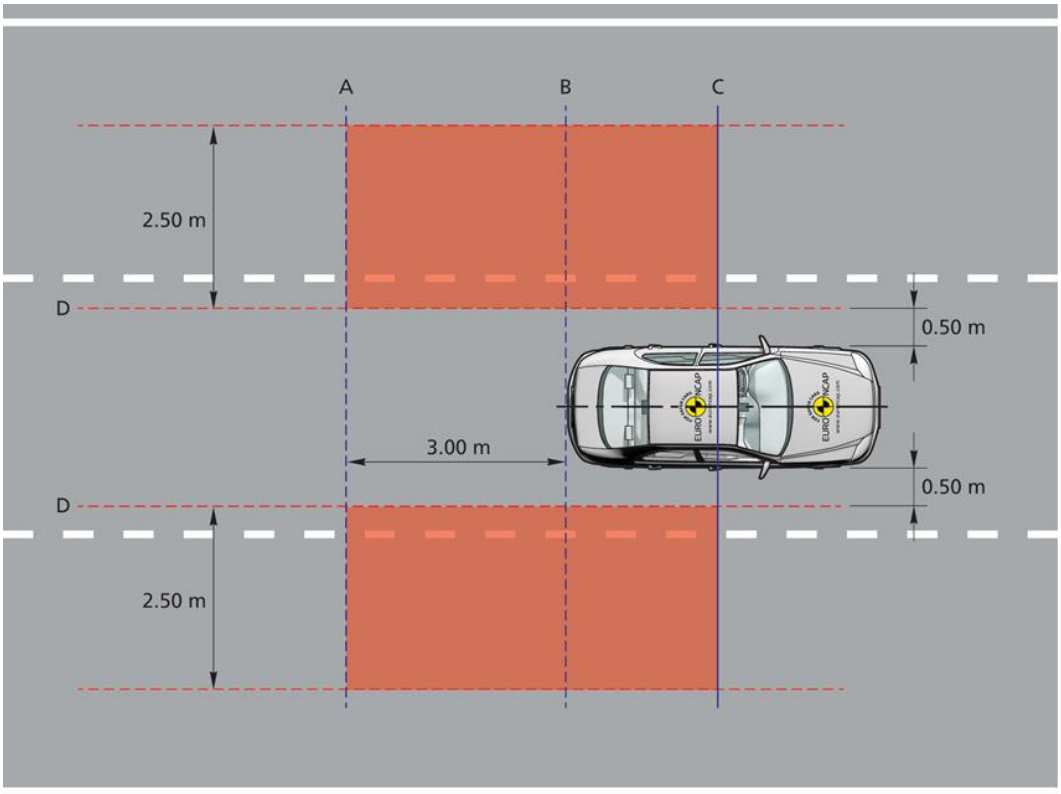
Blind Spot Monitoring 0.50 points

The vehicle is additionally equipped with a Blind Spot Monitoring system on both sides of the vehicle to warn the driver of other vehicles present in the blind spot.

4.3.1.1 Blind spot monitoring

For the Blind spot monitoring tests, the assessment criteria used is the blind spot information supplied in respect to the test target 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):



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.

Figure 4-1 Blind spot monitoring scenario assessment

4.3.2 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**

4.3.3 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.

Alternatively, ELK Oncoming and ELK Overtaking points may be achieved using an LKA system:

- For 2023, where LKA dashed line is implemented as an ELK functionality (default-on) and the LKA dashed line tests fulfils all LKA dashed lane criteria.
- From 2024, it shall meet 2023 requirements and be implemented with a DIM System, that is effective at distinguishing intentional from unintentional lane crossing and suppressing undesired interventions.
- For the evaluation of Driver Intention Monitoring system, Euro NCAP requires a dossier from the OEM containing a detailed technical assessment. The dossier shall contain, as minimum:
    1. Overview of the DIM System operating principle and its strategy/logic to determine driver ‘intention’, including a list of the Indirect/Direct input variables and their inter-dependency for suppressing undesired LKA interventions.

2. System Failsafe strategies in which DIM system is overruled e.g.,
    - To avoid a crash with a threat on a collision course
    - When a driver is deemed incapacitated
3. Information describing naturalistic driving in which lane marking crossing/lane changing manoeuvring typically occurs for the vehicle, and associated driver indicator usage
4. Evidence of the effectiveness of the system at suppressing undesirable LKA interventions and promoting driver acceptance
5. Any other information the OEM deems relevant to support their application

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 centre line & no line next to road edge	0.25
Solid Line	Fully marked lane (non-tested side dashed or solid)	0.50
Oncoming Vehicle	Fully marked lanes	0.50
Overtaking Vehicle	Fully marked lanes	0.50
Total		**2.00**

4.3.4 Total LSS Score

The total score in points is the sum of the HMI score, LKA score and ELK score.

LSS Function	Points
HMI	0.50
LKA	0.50
ELK	2.00
Total	**3.00**

4.4 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 Score	For sub Scores
Green	'Good'	2.251 – 3.000 points	75.0% - 100.0%
Yellow	'Adequate'	1.501 – 2.250 points	50.0% - 75.0%
Orange	'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%