

Euro NCAP Rating Review

Report from the Ratings Group

European New Car Assessment Programme
Ratings Group Report
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Preface

This document presents a plan to implement strategic Roadmap items, currently in development, into the Rating Scheme of 2013 onwards. In particular, it addresses the most important challenge which is how to effectively combine passive safety and active safety items in order to create an incentive for avoidance systems without compromising on the levels reached in passive safety.

The content of this document reflects the discussions held at the Rating Group meetings between September 2011 and January 2012; during the subsequent industry consultation phase from February until May 2012 and at the Board of Directors meeting in June 2012.

Abbreviations

AOP	Adult Occupant Protection
AEB	Autonomous Emergency Braking
COP	Child Occupant Protection
CRS	Child Restraint System
ESC	Electronic Stability Control
FW	Full Width
SAS	Speed Assistance System
LDW	Lane Departure Warning
LKA	Lane Keep Assist
ODB	Offset Deformable Barrier
PP	Pedestrian Protection
SA	Safety Assist
SBR	Seat Belt Reminder
SLD	Speed Limitation Device

Introduction

Background

This year marks the final step in the introduction of Euro NCAP's new overall rating scheme. From 2009, the year in which the system was first applied, the safety requirements have step by step become more challenging thus providing vehicle manufacturers some lead time to adjust to the new system. However, for the years 2013 and beyond, Euro NCAP, has not yet set any targets.

After the introduction of the overall rating, Euro NCAP set new goals and priorities for improving the assessment programme in order to promote and reward further vehicle safety improvements over the next years. The framework which was developed emphasized four important strategic goals, the most vital of which to Euro NCAP's future is the inclusion of emerging crash avoidance technologies into the assessment scheme.

It has been a little over two years since the Strategic Roadmap "Moving Forward" has been sent out. During this period, various working groups have been set up, first deliverables have come available and necessary adjustments made on timing. The most important new items, such as Speed Assistance, Autonomous Emergency Braking and new crash tests, however must find their way into the rating scheme in the upcoming three years. How exactly this is best achieved has been discussed by the Ratings Group.

Process

The Ratings Group is a temporary assembly of main stakeholders represented in Euro NCAP's Board of Directors. For the purpose of formulating the rating scheme for the next period, the group was re-instated in the summer of 2011. The individual representatives involved are listed below.

Table 1. Representatives in Euro NCAP's Rating Group

Andrew Miller (Chair)	Thatcham	Pierre Castaing	French MOT
Aled Williams (Secretary)	Euro NCAP	Matthew Avery	Thatcham
Michiel van Ratingen	Euro NCAP	Lesley Upham	Thatcham
Richard Schram	Euro NCAP	Anders Lie	STA
Andre Seeck	BASt	Andreas Rigling	ADAC
Rob Wegman	NL MOT	Ronald Vroman	ICRT
Joaquim Huguet	IDIADA	Bernie Frost	DfT

The Ratings Group has convened on several occasions between September 2011 and January 2012. On this basis, a draft proposal was put together and circulated to industry. A formal industry consultation phase has taken place between February and May 2012. Euro NCAP has used industry's feedback to validate various assumptions on which the proposal is based, regarding timing, equipment fitment levels and so forth.

This document is the final outcome of the group's effort, based on a consolidation of the comments and subsequent reconsiderations. While the aim of the group was to establish a basis agreed to by all parties, it should be noted that individual members may have had divergent opinions concerning the relative importance and/or introduction timing of certain parts of the scheme.

Objectives

The Ratings Group was formed with the following goals:

- To review the ratings scheme of Euro NCAP;
- To provide a method for implementing new items identified in the Roadmap;
- To propose a detailed scoring scheme for the years 2013-2015 with an outlook to the subsequent years.

The rating scheme proposed should remain plausible, reliable, challenging but feasible to car manufacturers. Above all, it should be fair, allowing cars in all classes, from a technical point of view, to be able to achieve 5 stars. Last but not least, the rating should remain understandable to consumers.

Guiding Principles

Overall Rating

The overarching principle behind the overall safety rating is that a safe vehicle offers good protection to the occupants; reduces the risk to other road users; and delivers support to the driver. By bringing these aspects under one star rating, fairly complex technical issues can be condensed into a simple, straightforward message to consumers. It is understood and accepted that in the process, distinctly different subject matters like *self protection* and *partner protection* or *crash protection* and *crash avoidance* need to be combined.

To assess the level of overall safety offered, Euro NCAP scores the vehicle performance in four main areas (the so called boxes): Adult Occupant Protection (AOP), Child Occupant Protection (COP), Pedestrian Protection (PP) and Safety Assist (SA). The calculation scheme, which combines the individual box scores into a star rating, allows some flexibility to the manufacturer on how to achieve the desired rating.

Weights

The weights between boxes and the thresholds applied to the overall score will determine the outcome, as long as the scores in the individual boxes meet the required minimum performance for each star level. The weights, which are designed to evolve over time, not only reflect the (changing) relative importance of the individual areas of safety but also provide a way to give less emphasis to boxes that are not yet fully developed as far as the content. Seen in this light, some adjustment of the weighting factors in conjunction with the implementation of the Roadmap items in various boxes is logical.

Combining Active and Passive Safety

The Roadmap outlines several assessment items that will be new to or updated in the rating scheme. Most of the new items are related to active safety or accident avoidance rather than passive safety.

The decision to put a new item in one box or the other has been guided by the underlying accidents and/or injuries addressed by the technology assessed. Where such technology is targeting a reduction in accidents or injuries which are largely addressed by one or more protocols already available, the new item will be placed alongside the original protocol(s) in the same box. Where a new item covers new scenarios and injuries, or typically addresses diverse real world accident outcomes, the item will be added to the Safety Assist box. For example, AEB Pedestrian technology targets identical injuries as the existing subsystems tests, which means that it should be added to the Pedestrian Protection box. On the contrary, LDW addresses lane change manoeuvres with various injury consequences. This scenario is not yet addressed in any of the boxes and is hence best placed in the Safety Assist Box.

The consequence of this approach is that the assessment of AEB technology should be split up over three boxes, depending on whether it applies to low speed (whiplash); mid to high speed or pedestrian crash avoidance.

Substitution

Whereas it is believed that the potential benefits of crash avoidance systems may ultimately exceed those offered by passive safety measures, the limitations of today's driver assist and crash avoidance systems and the general lack of real world evidence do not justify substitution of passive safety by active safety in the rating scheme at this time. Therefore, where both avoidance and crash related protocols are combined in one box a minimum performance in passive safety will be required to be eligible for the active safety assessment.

Equipment Fitment

As of 2012, Euro NCAP only allows standard safety equipment on the tested variant. This principle is maintained for the next period and for all equipment covered by protocols in the first three boxes. Not having crash avoidance equipment as standard therefore means that no related points can be gained in these boxes, however, thresholds will be set in such way that 5 stars would be still achievable initially.

Rating Plan

Reference

Below the ratings plan for the years 2013-2016 is outlined and a first indication is given for the subsequent years. It should be noted that where underlying protocols and assessment criteria are still under development, the setting of limits and sliding scales on criteria will have to be done with the allocated points in mind. Points, weights, overall criteria and balance criteria limits are presented in the Appendix and in more detail in the Excel file [Rating 2013-2017 - Version 2.1.xlsx](#) that comes with this report.

2013

Scheduled updates

Child Occupant Protection – Update to the new child occupant protection protocol that includes revised CRS compatibility assessment and Q3 and Q18months child dummies.

Pedestrian Protection – Update to the Pedestrian test and assessment protocols including the grid method for bonnet testing.

Safety Assist – (1) Extension of the SLD assessment protocol to Speed Assistance Systems (SAS) assessment protocol; (2) SBR assessment scoring updated.

Rating scheme

Table 2. 2013 Points allocation

50% AOP	20% COP	20% PP	10% SA
(16) Front ODB	(24) Dynamic	(24) Head form	(3) SBR ^(a)
	(12) CRS fitment	(6) Upper leg form	(3) SAS
(8) Side barrier	(13) Vehicle based	(6) Lower leg form	(3) ESC
(8) Side pole			
(4) Whiplash front			
(36) Total AOP^(b)	(49) Total COP	(36) Total PP^(b)	(9) Total SA^(c)

Notes

- (a) The option to get 1 point for driver SBR is removed, instead either 2 points (driver and passenger) or 3 (driver, passenger and rear positions) will be rewarded.
- (b) The total points for COP and PP are not affected by content changes. Consideration is given to the immediate impact of the new COP protocol on cars of which the design has already been frozen (see below).
- (c) The total points for SA will increase from 7 today to 9 due to the increase from SLD to SAS.

Thresholds

The overall and balance thresholds are unchanged from 2012, except for Safety Assist which values are amended to reflect content changes and mandatory fitting of

Electronic Stability Control for all new vehicles. SAS must be fitted in at least 50% of vehicles sold on the EU-27 market to be eligible for scoring. For COP, a one year (2013) exemption is given for cars that are adversely affected by the introduction of the new COP protocol. Detailed limits are provided in the Appendix and in the Excel file [Rating 2013-2017 - Version 2.1.xlsx](#).

2014

Scheduled updates

Adult Occupant Protection – (1) Update of whiplash seat assessment, adding a rear seat static assessment; (2) Introduction of a new protocol for assessment of AEB systems for low speed rear-end longitudinal car collisions.

Pedestrian Protection – Update to the Pedestrian test and assessment protocols including the grid method for new bumper test using the Flex PLI.

Safety Assist – (1) Introduction of a new protocol for assessment of AEB systems for mid to high speed rear-end longitudinal car collisions (“Interurban”); (2) Update to ESC test protocol; (3) New fitment requirements for LDW/LKA systems.

Rating scheme

Table 3. 2014 Points allocation

40% AOP ^(a)	20% COP ^(a)	20% PP ^(a)	20% SA ^(a)
(16) Front ODB	(24) Dynamic	(24) Head form	(3) SBR
	(12) CRS fitment	(6) Upper leg form	(3) SAS
(8) Side barrier	(13) Vehicle based	(6) Lower leg form	(3) ESC ^(e)
(8) Side pole			
(2) Whiplash front ^(b)			
(1) Whiplash rear ^(b)			(1) LDW/LKD ^(f)
(3) AEB City ^(b)			(3) AEB Interurban ^(g)
(38) Total AOP^(c)	(49) Total COP	(36) Total PP^(d)	(13) Total SA^(h)

Notes

- (a) The weighting factors between boxes AOP, COP, PP and SA change from 50%, 20%, 20%, 10% to 40%, 20%, 20%, 20% to reflect the increased importance of the SA box.
- (b) In AOP, a total of 6 points can be achieved for whiplash, which includes both self and partner protection. Today’s 4 points for the front seat are halved and 1 point is added for the rear seat assessment (new item). Cars that score 1.5 out of 2 points for the front seat assessment can gain another 3 points for AEB “City” (low speed), provided the system is standard fitted.
- (c) The total points for AOP increase from 36 to 38.
- (d) The update to the lower leg form test in PP is not affecting total points.
- (e) The updated ESC tests are not affecting the points in SA.

- (f) Following Euro NCAP Advanced assessments in 2010 and 2011, an additional 1 point (or a fraction thereof) can be gained for LDW/LKA, provided the uptake meets the required percentage.
- (g) A total of 3 points (or a fraction thereof) are available for AEB “Interurban” (mid to high speed), provided the uptake meets the required percentage.
- (h) The total points for SA increase from 9 to 13.

Thresholds

To provide more stability, the balance thresholds inside the boxes and the overall thresholds are left mostly unaffected, with the exception of the 3 stars AOP, 2 and 3 stars PP and overall thresholds. The proposed 5-star threshold for SA will make the fitment of one or more active systems needed on each model (50% of higher for SAS, LDW/LKD and AEB “Interurban”). In the following years these fitment requirements will gradually increase. Detailed limits are provided in the Appendix and in the Excel file [Rating 2013-2017 - Version 2.1.xlsx](#).

2015

Scheduled updates

Adult Occupant Protection – Update to the Front and Side test and assessment protocols including the introduction of a full-width test with small female dummies.

Child Occupant Protection – Update to the child occupant protection protocol to include Q6 and Q10+ child dummies.

Pedestrian Protection – Update to the Pedestrian test and assessment protocols including the grid method for the BLE using an updated impactor.

Rating scheme

Table 4. 2015 Points allocation

40% AOP	20% COP	20% PP	20% SA
(8) Front ODB ^{(a) (b)}	(24) Dynamic ^(c)	(24) Head form	(3) SBR
(8) Front FW ^{(a) (b)}	(12) CRS fitment	(6) Upper leg form	(3) SAS
(8) Side barrier ^(b)	(13) Vehicle based	(6) Lower leg form	(3) ESC
(8) Side pole ^(b)			
(2) Whiplash front			
(1) Whiplash rear			(1) LDW/LKD
(3) AEB (City)			(3) AEB Interurban
(38) Total AOP^(b)	(49) Total COP^(c)	(36) Total PP^(d)	(13) Total SA

Notes

- (a) The 16 points available for front impact are divided between the ODB and new FW test.

- (b) Content changes to the crash procedures for front and side impact are not affecting total points available for AOP.
- (c) Update to taller child dummies does not affect total points for COP.
- (d) The update to the BLE (upper leg form) test in PP is not affecting total points.

Thresholds

It is proposed to increase the 5-stars Balance threshold for Pedestrian Protection from 60% to 65%, the level at which it would then remain constant for the subsequent years. This threshold percentage increase, however, will need to be confirmed by Euro NCAP in 2013 when more details about the planned protocol changes and their respective impact will be available.

SA balance thresholds are updated. The fitment requirement applied to SAS rises to 70%. Detailed limits are provided in the Appendix and in the Excel file [Rating 2013-2017 - Version 2.1.xlsx](#).

2016

Scheduled updates

Pedestrian Protection – Introduction of the assessment of AEB systems for Pedestrians (Pedestrian detection), based on validated protocols.

Rating scheme

Table 5. 2016 Points allocation

40% AOP	20% COP	20% PP	20% SA
(8) Front ODB	(24) Dynamic	(24) Head form	(3) SBR
(8) Front FW	(12) CRS fitment	(6) Upper leg form	(3) SAS
(8) Side barrier	(13) Vehicle based	(6) Lower leg form	(3) ESC
(8) Side pole			
(2) Whiplash front			
(1) Whiplash rear			(1) LDW/LKD
(3) AEB (City)		(6) AEB Pedestrian	(3) AEB Interurban
(38) Total AOP	(49) Total COP	(42) Total PP^(a)	(13) Total SA

Notes

- (a) The total points for PP increase from 36 to 42. Cars that score 23.1 points in the subsystem tests (55% of the total 42 points) can gain another 6 points for AEB “Pedestrian”, provided the system is standard fitted (see also 2017 and beyond).

Thresholds

The Balance threshold for Pedestrian Protection 4-star rise to 55%. All other thresholds are kept the same, despite the fact that the number of points in PP have increased. The 65% 5 star PP threshold and the minimal performance requirement of 55% for inclusion of active safety in the box will be confirmed in 2013 (see under 2015 above). Equipment

fitment requirements for AEB “Interurban” and LDW/LKA rise to 70%, SAS to 100% (serial fitment). Detailed limits are provided in the Appendix and in the Excel file [Rating 2013-2017 - Version 2.1.xlsx](#).

2017 and beyond

Equipment fitment requirements for AEB “Interurban” and LDW/LKA will continue to increase in the years following 2016. The Roadmap itself does not address any content changes beyond 2015. Nevertheless, it is clear that further updates will be considered as new and better technology comes available. This is particularly true for forward looking systems where today’s state-of-the-art in sensing limits their effectiveness in darkness.

As a significant part of pedestrian fatality crashes occurs at night or in circumstances where there is bad visibility, it is important to promote further system development in this direction by allocating adequate points in the rating scheme in the future. The actual number of points should be based on the agreed number of vulnerable road user fatalities during darkness as a proportion of all vulnerable road user fatalities in EU-27 that can be covered by the technology and evaluation methods available.

Similarly, for LDW/LKA systems, the number of points may be increased to better match the estimated real world benefit, as more effectiveness data and a real-world performance based protocol may come available.

Euro NCAP encourages car manufacturers to continue to put forward Euro NCAP Advanced dossiers on Pedestrian Detection, Lane Support and other technology to enhance the knowledge base and to allow for a better understanding of the safety potential offered by the newest generation of systems on the market.

In light of the above, the numbers provided in the Appendix for the years 2016 and 2017 are for reference only and will have to be confirmed in the coming year.

Further Recommendations and Open Items

In the previous chapter the preferred scenario for inclusion of roadmap items in the rating scheme has been presented. Euro NCAP is aware about the many changes that are being introduced in a relative short period and appreciates that some car manufacturers may no longer achieve the top level of 5 stars for all models. It is important therefore that the somewhat ‘tarnished’ image of the 4 stars rating is actively restored by Euro NCAP.

During the past discussions, some other topics were identified that were believed to be essential for a successful implementation of the roadmap. It has been agreed that the group continues to convene in 2012 - on its own and with industry - to decide on the issues below.

Costs

The consequence in terms of costs of the plan needs to be detailed further. Potentially, to curb costs, Euro NCAP will use manufacturer’s in-house or third party data to fulfil some of the demands of the rating scheme. An ad-hoc committee with industry participation will develop a proposal before the end of 2012.

Fitment check

As mentioned earlier, only standard safety equipment qualifies for points. Rewarding points for technology that is not standard, as is suggested for LDW/LKA and AEB “Interurban” in 2014 and further allows car manufacturers to gradually improve uptake on sales over a few years.

For new cars, Euro NCAP has historically asked manufacturers to confirm standard equipments and provide sales forecast for EU-27 to assess whether fitment requirements are met. Examples are known however where either standard equipment is purposely removed (e.g. passenger SBR) a year after release or the actual sales on optional equipment fell short significantly on the predicted forecast.

The Rating Group recommends that an operational process is developed with industry in order to improve the reliability of fitment numbers for the European market. ACEA, JAMA and KAMA have in principle agreed to support this initiative.

LDW/LKA

The implementation of Beyond NCAP technology in overall rating was one of the goals identified in the Roadmap (Goal 3A). Assuming a successful roll-out of Beyond NCAP by early 2010, it was expected that first adoption in the new rating system of safety functions rewarded under Beyond NCAP would take place no earlier than 2013. Based on an analysis of the safety potential of LDW/LKA systems rewarded under Euro NCAP

Advanced and the current market availability of these types of systems in general, the item was added to the current plan.

At this stage, Euro NCAP believes it is too early to discriminate between LDW and LKA systems and points will be rewarded based on fitment and manufacturers' evidence primarily. Further guidelines will be made available before the end of 2012.

Heavy vehicles

Euro NCAP released a modified rating scheme for people carriers in 2010. The scheme is based on that of all other vehicles with some changes in test parameters. More importantly, a “soft landing” is specified in which requirements are ramped up covering the years 2010 to 2014.

The changes presented in this document are likely to affect the Heavy Vehicles protocol. It is therefore recommended that the protocol is reviewed and amended where needed.

Acknowledgements

The members of the Euro NCAP Rating Group would like express their gratitude towards the ACEA, JAMA, KAMA and CLEPA representatives who shared their views with us and gave us their time and comments on the proposal.

Appendix

Attached to this report is Excel file [Rating 2013-2017 - Version 2.1.xlsx](#) with further details on the Rating Plan 2013-2017. Below a summary of the key figures is provided.

To be eligible for scoring, all safety equipment (passive and active) must be fitted as standard across EU-27, unless specified otherwise. See the “Car Specification, Sponsorship, Testing and Retesting” (CSSTR) protocol for more information about test variants and fitment requirements.

Summary points tables

Adult Occupant Protection

Test	2012	2013	2014	2015	2016	2017
Frontal ODB	16	16	16	8	8	8
Frontal FW				8	8	8
Side MDB	8	8	8	8	8	8
Side pole	8	8	8	8	8	8
Whiplash front	4	4	2	2	2	2
Whiplash rear			1	1	1	1
AEB (City)			3	3	3	3
Total	36	36	38	38	38	38

Child Occupant Protection

Test	2012	2013	2014	2015	2016	2017
Dynamic performance	24	24	24	24	24	24
Vehicle-CRS compatibility	12	12	12	12	12	12
Vehicle based assessment	13	13	13	13	13	13
Total	49	49	49	49	49	49

Pedestrian Protection

Test	2012	2013	2014	2015	2016	2017
Headform	24	24	24	24	24	24
Upper Legform	6	6	6	6	6	6
Lower Legform	6	6	6	6	6	6
AEB (Pedestrian)					6	6
Total	36	36	36	36	42	42

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Safety Assist

Test	2012	2013	2014	2015	2016	2017
SBR	3	3	3	3	3	3
SLD/SAS	1	3	3	3	3	3
DH (ESC)	3	3	3	3	3	3
AEB (Interurban)			3	3	3	3
LDW/LKD			1	1	1	2
Total	7	9	13	13	13	14

Phase-in fitment requirements

Test	2012	2013	2014	2015	2016	2017
SAS		50%	50%	70%	100%	100%
AEB (Interurban)			50%	50%	70%	100%
LDW/LKD			50%	50%	70%	100%

Next page: Rating scheme thresholds and weights.

Rating scheme thresholds and weights

	AOP	COP	PP	SA	Total
2012					
For five stars, at least:	80%	75%	60%	60%	80%
For four stars, at least:	70%	60%	50%	40%	70%
For three stars, at least:	40%	30%	25%	25%	60%
For two stars, at least:	30%	25%	15%	15%	55%
For one star, at least:	20%	15%	10%	5%	45%
Weight	50%	20%	20%	10%	
2013					
For five stars, at least:	80%	60%	60%	65%	80%
For four stars, at least:	70%	60%	50%	55%	70%
For three stars, at least:	40%	30%	25%	30%	60%
For two stars, at least:	30%	25%	15%	20%	55%
For one star, at least:	20%	15%	10%	10%	45%
Weight	50%	20%	20%	10%	
2014					
For five stars, at least:	80%	75%	60%	65%	75%
For four stars, at least:	70%	60%	50%	55%	65%
For three stars, at least:	50%	30%	40%	30%	50%
For two stars, at least:	30%	25%	20%	20%	40%
For one star, at least:	20%	15%	10%	10%	30%
Weight	40%	20%	20%	20%	
2015					
For five stars, at least:	80%	75%	65%	70%	75%
For four stars, at least:	70%	60%	50%	60%	65%
For three stars, at least:	50%	30%	40%	40%	50%
For two stars, at least:	30%	25%	20%	20%	40%
For one star, at least:	20%	15%	10%	10%	30%
Weight	40%	20%	20%	20%	
2016					
For five stars, at least:	80%	75%	65%	70%	75%
For four stars, at least:	70%	60%	55%	60%	65%
For three stars, at least:	50%	30%	40%	40%	50%
For two stars, at least:	30%	25%	20%	20%	40%
For one star, at least:	20%	15%	10%	10%	30%
Weight	40%	20%	20%	20%	
2017					
For five stars, at least:	80%	75%	65%	70%	75%
For four stars, at least:	70%	60%	55%	60%	65%
For three stars, at least:	50%	30%	40%	40%	50%
For two stars, at least:	30%	25%	20%	20%	40%
For one star, at least:	20%	15%	10%	10%	30%
Weight	40%	20%	20%	20%	