

Euro NCAP Rating Review 2015

Report from the Ratings Group

European New Car Assessment Programme
Ratings Group Report
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Preface

This document explains how the strategic items presented in Euro NCAP's "Roadmap 2020" will be included into the Rating Scheme from 2016 onwards.

The content of this document reflects the discussions held at the Ratings Group meetings between July 2014 and February 2015 and takes into account input from various stakeholders inside as well as outside the group.

Abbreviations

| | |
|---------|--|
| AOP | Adult Occupant Protection |
| AEB | Autonomous Emergency Braking in City (AEB City) and Interurban scenarios (AEB Interurban) |
| AEB VRU | Autonomous Emergency Braking for Vulnerable Road Users, including Pedestrians (AEB VRU-Pe) & Cyclists (AEB VRU-Cy) |
| C-ITS | Cooperative – Intelligent Transport Systems |
| COP | Child Occupant Protection |
| CRS | Child Restraint System |
| ESC | Electronic Stability Control |
| FW | Full Width |
| IWI | Information, Warning and Intervention |
| LDW | Lane Departure Warning |
| LKA | Lane Keep Assist |
| LSS | Lane Support System |
| ODB | Offset Deformable Barrier |
| PP | Pedestrian Protection |
| SA | Safety Assist |
| SAS | Speed Assistance System |
| SBR | Seat Belt Reminder |

Introduction

Background

In June 2014, Euro NCAP announced its plans for how it will further develop the 5 star overall safety rating system over the next years. New goals and priorities have been set for updating the assessment programme in order to promote and reward continued safety improvements in vehicles on the European market.

The rating of key advanced driver assistance and crash avoidance systems form the backbone of the strategy as this plays an essential role in the proliferation of new technology and guides improved capability at the same time. The “Roadmap 2020” logically builds upon the topics that were implemented since 2009 when the overall rating was first introduced. For the first time, however, it places these in the context of emerging vehicle automation.

The roadmap promotes systems that help the driver to drive safely, avoid crashes with other road users and to mitigate the consequences of unavoidable accidents: robust systems that road users can rely on and are effective in the real world. The technical solutions that are chosen and how best to develop and integrate these systems should be left to the vehicle manufacturers.

For this reason, the rating criteria and thresholds set by Euro NCAP should preferably be neutral and based on performance rather than design or hardware. The weight in the star rating for a given safety function should be linked to its expected potential to reduce crashes and/or mitigate injuries on European roads. This shows how challenging a task it is to define future rating targets for the next generation of systems, whose technical performance, market availability, test limitations, driver acceptance etc. can only be assumed.

Objectives

The Ratings Group was re-instated in the summer of 2014 to define the detailed rating scheme for the period up to 2020 based on the roadmap. As part of the work, the group reviewed the rating scheme of Euro NCAP to date, including the updates already announced for 2016, and proposed a rationale and method for implementing new items based on accident evidence and market intelligence. Performance thresholds were defined for each star level, based on the results of recently tested cars combined with projections of future performance.

It is believed that the resulting rating scheme is challenging yet feasible, allowing vehicles in all classes, budget to premium, to be able to achieve 5 stars. Importantly, it will reward those car manufacturers who continue to prioritise safety. This way, the rating stays meaningful to consumers and fleet operators who are looking for objective guidance for their next purchase.

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This report contains the detailed targets, points and percentages for the years 2016 up to 2020. The allocated points will serve as goal posts to the technical committees responsible for setting the limits and sliding scales on future criteria.

As the underlying protocols and assessment criteria are under development or, in other instances, are still not known, the numbers in this report will need to be checked and confirmed closer to the date of implementation. This is particularly true for the years 2018 to 2020.

Finally, Euro NCAP encourages car manufacturers to continue to put forward Euro NCAP Advanced dossiers on their latest technologies 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.

Table 1. Representatives in Euro NCAP's Rating Group

| | | | | |
|---------------------------|-----------|--|-----------------|--------|
| Andre Seeck (Chair) | BASt | | Pierre Castaing | UTAC |
| Aled Williams (Secretary) | Euro NCAP | | Anders Lie | STA |
| Michiel van Ratingen | Euro NCAP | | Volker Sandner | ADAC |
| Richard Schram | Euro NCAP | | Ronald Vroman | ICRT |
| Andrew Miller | Thatcham | | Joaquim Huguet | IDIADA |
| Matthew Avery | Thatcham | | Henry Gutman | CSI |

Guiding Principles

Lessons Learnt

The experience of the last several years has helped shape the thinking about how the future rating scheme should continue to evolve. The system, which combines crash protection and crash avoidance into a single star rating, has been flexible and robust enough to allow for annual updates, many of which were substantive. As hoped, the vehicle industry has demonstrated that it can meet the demands by skilful engineering and the introduction of advanced technology on their latest models.

The original intention of a single star rating covering all aspects of a car's safety was that the message to consumers could remain relatively simple and straightforward. However, this has been challenged by the year on year changes to the rating scheme and the decreasing number of 5 star cars over recent years, despite the fact that cars have, on average, got safer during this period. The outcome of this is that, while the overall rating is a powerful and very effective instrument to promote safer vehicles, greater care must be taken to ensure that the system is stable over the coming years.

This stability has been achieved firstly by creating more constancy in boxⁱ limits and by planning safety improvements mainly via protocol content updates. Secondly, the weighting factors between boxes have been left unchanged from 2014 for the entire period up to 2020. Lastly, important changes to the rating scheme have been clustered in the years 2016, 2018 and 2020 instead of the annual updates. This means that for a few exceptional cases, the timing of the introduction of new or revised protocols as indicated in the “Roadmap 2020” has been slightly alteredⁱⁱ.

Active versus Passive Safety

Substitution

Most of the new content is related to active safety or accident avoidance rather than to passive safety. As before, points are attributed to assessments in boxes based on their expected safety potential, the current state-of-the-art in system performance and test restrictions. The limitations of today's 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 is still required to be eligible for the active safety points.

Target Setting

To meet future crash avoidance requirements, identifying a sensor strategy that delivers the best possible value for the consumer is not a simple question. In the short term,

ⁱ Euro NCAP scores 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).

ⁱⁱ An updated “Roadmap 2020” (Revision 1, March 2015) document is available online.

target setting at Euro NCAP should not favour any specific hardware solution whether it is sensor fusion, radar-only or camera-only systems. Instead, target levels are set to deliver key safety functions, allowing an appropriate level of balance and trade-off by the manufacturer. By setting thresholds carefully, only well-equipped cars will become eligible for 5 and 4 stars, while 3 star cars offer “5 star” passive safety only.

From 2018 onwards, it is expected that 5 star cars gradually would need to demonstrate higher levels of crash avoidance performance. To achieve this, a multi-sensor solution would be required. Finally, the next generation of systems that will emerge in the years 2020 and after will offer even higher performance.

System Fitment

From 2016 Euro NCAP only allows standard safety equipment on the tested variant to generate the “base” rating. The vehicle manufacturer can request a second (“dual”) rating with optional active safety systems included, provided these are offered as a safety pack on all variants in all European markets. The safety pack must be installed on 25 percent and 55 percent of model sales calculated over the first and second three year periods of sales, respectively. Which optional technologies are eligible for inclusion in the safety pack is detailed in the next chapter for each publication year.

Rating Plan

Preface

Below, the ratings plan for the years 2016-2020 is outlined, more specially for the years 2016, 2018 and 2020. In the intermediate years, no major updates are planned and the targets will carry over from the preceding year. An overview of points, weights, overall criteria and balance criteria limits for all years is presented in the Appendix to this report.

2016

Scheduled content updates

Child Occupant Protection – Update to the child occupant protection protocol to include Q6 and Q10 child dummies; simplified requirements for CRS installation and vehicle based assessment.

Pedestrian Protection – Introduction of the assessment of AEB systems for Vulnerable Road Users (AEB VRU-Pe) in crossing scenarios.

Safety Assist – Removal of ESC points from the box. Introduction of a lane support test (rewarding LKA and LDW systems) and updated SAS requirements.

Rating scheme

Table 2. 2016 Points allocation

| AOP (40%) | | COP (20%) | | PP (20%) | | SA (20%) | |
|-----------|-----------------|-----------|------------------|----------|-----------------|----------|-----------------|
| 8 | Front ODB | 24 | Dynamic tests | 24 | Head forms | 3 | SBR |
| 8 | Front FW | 12 | CRS installation | 6 | Upper leg form | 3 | SAS |
| 8 | Side barrier | 13 | Vehicle based | 6 | Lower leg form | 3 | LKA/LDW |
| 8 | Side pole | | | | | | |
| 3 | AEB City | | | 6 | AEB VRU-Pe | 3 | AEB Interurban |
| 3 | Whiplash F/R | | | | | | |
| 38 | Total available | 49 | Total available | 42 | Total available | 12 | Total available |

Notes

- The total points for PP increase from 36 (for subsystem performance only) to 42. Only vehicles that achieve a score of 22 points or higher in the subsystem tests can gain up to 6 points for AEB VRU-Pe.
- Allocated points for Dynamic tests in COP and SAS in SA remain the same.
- Points related to LKA and LDW performance increase from 1 to 3. This may include an incentive for availability of blind spot systems.

Thresholds

The Balance thresholds for AOP, PP and SA are adjusted to get better resolution in the middle star bands, amongst other reasons. Detailed limits are provided in the Appendix.

2018

Scheduled content updates

Adult Occupant Protection – Far-side protection incentive added to the side barrier test. Revised Whiplash seat assessment procedure and broadened AEB City test scenarios.

Pedestrian Protection – Extension of the assessment of AEB systems for Vulnerable Road Users with pedal cyclist scenarios (AEB VRU-Cy) and update of pedestrian tests with longitudinal scenario.

Safety Assist – Updated SBR assessment, broadened test suite for AEB Interurban to improve system robustness and “best practice” IWI strategy (see also page 13). Implementation of an advanced lane support system (LSS) test including road edge detection systems.

Rating scheme

Table 3. 2018 Points allocation

| AOP (40%) | | COP (20%) | | PP (20%) | | SA (20%) | |
|-----------|-----------------|-----------|------------------|----------|-----------------|----------|-----------------|
| 8 | Front ODB | 24 | Dynamic tests | 24 | Head forms | 3 | SBR |
| 8 | Front FW | 12 | CRS installation | 6 | Upper leg form | 3 | SAS |
| 8 | Side barrier | 13 | Vehicle based | 6 | Lower leg form | 4 | LSS |
| 8 | Side pole | | | | | | |
| 4 | AEB City | | | 6 | AEB VRU-Pe | 3 | AEB Interurban |
| 2 | Whiplash F/R | | | 6 | AEB VRU-Cy | | |
| 38 | Total available | 49 | Total available | 48 | Total available | 13 | Total available |

Notes

- The head protection in side impact will be assessed based on the worst performing result in near and far side impact criteria (linked to 4 protocol points, or 2 overall points in the box). The total number of points for the side barrier test is unaffected.
- Rebalancing of points between Whiplash F/R assessment and AEB City alongside the update in technical requirements. “Good” performance in the front seat test remains a condition for AEB City scoring.
- The total points for PP increase from 42 to 48. Only vehicles that achieve a score of 22 points or higher in the subsystem tests can gain up to 6 points for AEB VRU-Pe and/or AEB VRU-Cy.
- SBR will keep 3 points associated. Of these points, 2 points will be for rear seat SBR including ½ point for advanced occupant sensing systems.
- Points allocated to the assessment of advanced Lane Support Systems increase from 3 to 4. AEB Interurban updates will not aim at addressing significantly different crash scenarios (e.g. no braking in head-on scenarios) so the points remain the same.

Thresholds

The Balance thresholds for SA and COP are adjusted as system performance is expected to improve. Detailed limits are provided in the Appendix.

2020*Scheduled content updates*

Adult Occupant Protection – Replacing the ODB test with an off-set mobile barrier test specifying an advanced frontal dummy.

Safety Assist – Adoption assessment of technology that can assist in junction (crossing and turning) and head-on scenarios.

*Rating scheme***Table 4. 2020 Points allocation**

| AOP (40%) | | COP (20%) | | PP (20%) | | SA (20%) | |
|-----------|-----------------|-----------|------------------|----------|-----------------|----------|-----------------|
| 8 | Front ODB | 24 | Dynamic tests | 24 | Head forms | 3 | SBR |
| 8 | Front FW | 12 | CRS installation | 6 | Upper leg form | 3 | SAS |
| 8 | Side barrier | 13 | Vehicle based | 6 | Lower leg form | 4 | LSS |
| 8 | Side pole | | | | | | |
| 4 | AEB City | | | 6 | AEB VRU-Pe | 4 | AEB Interurban |
| 2 | Whiplash F/R | | | 6 | AEB VRU-Cy | 2 | Junction assist |
| 38 | Total available | 49 | Total available | 48 | Total available | 16 | Total available |

Notes

- (a) The 16 points available for front impact are divided between the new mobile barrier test (8 points) and current FW test (8 points).
- (b) SA total points increase from 13 to 16 points with the extension of AEB Interurban and inclusion of Junction Assist.

Thresholds

All thresholds remain the same. Detailed limits are provided in the Appendix.

Dual Rating Policy

For each publication year, a dual rating may be requested for vehicles that offer at least one of the listed technologies as part of an optional safety pack, available on all variants.

| | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|----------------------------|------|------|------|------|------|------|------|
| AEB City ^(a) | x | x | x | | | | |
| AEB Interurban | x | x | x | | | | |
| AEB VRU-Pe | x | x | x | x | x | | |
| AEB VRU-Cy | | | x | x | x | x | x |
| Junction Assist | | | | | x | x | x |
| LKA/LDW/LSS ^(b) | x | x | x | x | x | | |
| SAS ^(c) | x | x | x | | | | |

Notes

- (a) Only if sensor technology used also supports other safety functions.
- (b) From 2018, only LSS including road edge detection.
- (c) From 2017, only for systems that offer the ISA functionality.

Beyond 2020

Safety technology will continue to evolve in the years to come as emerging vehicle automation takes the next big steps forwards. The upcoming C-ITS technology, combined with vehicle automation, will create new opportunities to further reduce the number of crashes in traffic.

Euro NCAP will monitor and stimulate the development and market availability of key technology such as C-ITS and driver monitoring systems for inclusion into the rating scheme from 2020 onwards.

Further Remarks

In the previous chapter the preferred scenario for inclusion of roadmap items in the rating scheme has been presented. Below some final remarks are made to compliment the information already provided.

IWI

In many of the emerging safety systems, the driver behaviour plays an important role. Driver reactions to warnings and acceptance of the systems in general may determine to a large extent how effective these systems are in real traffic. Euro NCAP has started a dialog with industry regarding the information, warning and intervention (IWI) strategy related to safety functions. It intends to develop general guidelines that will support the relevant protocols implemented from 2018 onwards.

Heavy Vehicles

As of 2016, vans and people carriers will be rated under an identical scheme as passenger cars. Minor protocol exemptions are provided as detailed in the Heavy Vehicles Test and Assessment Protocol Version 2.0 (or later). The validity of the rating applied to vans is set for 6 years, similar to passenger cars. Two additional years of protection against retesting are given to accommodate the longer life cycle of this category of vehicles.

Pole Test

Euro NCAP has made the pole test a manufacturer sponsored test in 2015. The intention is to continue to use pole test data in the rating of the vehicle but to allow the assessment to be done on the basis of third party or car manufacturer's data, no later than such time that the pole test will be performed on all new vehicles as part of European type approval.

Acknowledgements

The members of the Euro NCAP Rating Group would like express their gratitude towards the industry representatives who provided input in the process.

Appendix

To be included in the base rating, all safety equipment (passive and active) must be fitted as standard across EU-28. See the “Vehicle Specification, Sponsorship, Testing and Retesting” (VSSTR) protocol for more information about test variants.

Summary points tables

Adult Occupant Protection

| Test | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------------------|-------------|-------------|-------------|-------------|-------------|
| Frontal ODB / Mobile barrier | 8 | 8 | 8 | 8 | 8 |
| Frontal FW | 8 | 8 | 8 | 8 | 8 |
| Side MDB | 8 | 8 | 8 | 8 | 8 |
| Side pole | 8 | 8 | 8 | 8 | 8 |
| Whiplash front | 2 | 2 | 1.5 | 1.5 | 1.5 |
| Whiplash rear | 1 | 1 | 0.5 | 0.5 | 0.5 |
| AEB City | 3 | 3 | 4 | 4 | 4 |
| Total | 38 | 38 | 38 | 38 | 38 |

Child Occupant Protection

| Test | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| Dynamic performance | 24 | 24 | 24 | 24 | 24 |
| Vehicle-CRS compatibility | 12 | 12 | 12 | 12 | 12 |
| Vehicle based assessment | 13 | 13 | 13 | 13 | 13 |
| Total | 49 | 49 | 49 | 49 | 49 |

Pedestrian Protection

| Test | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------------|-------------|-------------|-------------|-------------|-------------|
| Headforms | 24 | 24 | 24 | 24 | 24 |
| Upper Legform | 6 | 6 | 6 | 6 | 6 |
| Lower Legform | 6 | 6 | 6 | 6 | 6 |
| AEB VRU-Pe | 6 | 6 | 6 | 6 | 6 |
| AEB VRU-Cy | | | 6 | 6 | 6 |
| Total | 42 | 42 | 48 | 48 | 48 |

Safety Assist

| Test | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|-------------|-------------|-------------|-------------|-------------|
| ESC | - | - | - | - | - |
| SBR | 3 | 3 | 3 | 3 | 3 |
| SLD/SAS | 3 | 3 | 3 | 3 | 3 |
| AEB (Interurban) | 3 | 3 | 3 | 3 | 4 |
| LDW/LKD/LSS | 3 | 3 | 4 | 4 | 4 |
| Junction Assist | | | | | 2 |
| Total | 12 | 12 | 13 | 13 | 16 |

Rating scheme thresholds and weights

| | AOP | COP | PP | SA | Total |
|----------------------------|------------|------------|------------|------------|--------------|
| 2016 | | | | | |
| For five stars, at least: | 80% | 75% | 60% | 50% | 69% |
| For four stars, at least: | 70% | 60% | 50% | 40% | 58% |
| For three stars, at least: | 60% | 30% | 40% | 25% | 43% |
| For two stars, at least: | 50% | 25% | 30% | 15% | 34% |
| For one star, at least: | 40% | 15% | 20% | 10% | 25% |
| Weight | 40% | 20% | 20% | 20% | |
| 2017 | | | | | |
| For five stars, at least: | 80% | 75% | 60% | 50% | 69% |
| For four stars, at least: | 70% | 60% | 50% | 40% | 58% |
| For three stars, at least: | 60% | 30% | 40% | 25% | 43% |
| For two stars, at least: | 50% | 25% | 30% | 15% | 34% |
| For one star, at least: | 40% | 15% | 20% | 10% | 25% |
| Weight | 40% | 20% | 20% | 20% | |
| 2018 | | | | | |
| For five stars, at least: | 80% | 80% | 60% | 70% | 74% |
| For four stars, at least: | 70% | 70% | 50% | 60% | 64% |
| For three stars, at least: | 60% | 60% | 40% | 50% | 54% |
| For two stars, at least: | 50% | 50% | 30% | 40% | 44% |
| For one star, at least: | 40% | 40% | 20% | 30% | 34% |
| Weight | 40% | 20% | 20% | 20% | |
| 2019 | | | | | |
| For five stars, at least: | 80% | 80% | 60% | 70% | 74% |
| For four stars, at least: | 70% | 70% | 50% | 60% | 64% |
| For three stars, at least: | 60% | 60% | 40% | 50% | 54% |
| For two stars, at least: | 50% | 50% | 30% | 40% | 44% |
| For one star, at least: | 40% | 40% | 20% | 30% | 34% |
| Weight | 40% | 20% | 20% | 20% | |
| 2020 | | | | | |
| For five stars, at least: | 80% | 80% | 60% | 70% | 74% |
| For four stars, at least: | 70% | 70% | 50% | 60% | 64% |
| For three stars, at least: | 60% | 60% | 40% | 50% | 54% |
| For two stars, at least: | 50% | 50% | 30% | 40% | 44% |
| For one star, at least: | 40% | 40% | 20% | 30% | 34% |
| Weight | 40% | 20% | 20% | 20% | |