EURO NCAP

#FORSAFERVANS

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Overall Assessment Protocol

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PREFACE

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).

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1 EURO NCAP OVERALL RATING SCHEME

The overall rating is composed of scores achieved in the four areas of assessment, also referred to as “stages”: Safe Driving, Crash Avoidance, Crash Protection and Post-crash Safety. The score in each stage is based on the vehicle performance in the different tests and assessments in each area. Each test has been allocated a maximum score as indicated in the table below. The total score of each stage equals the sum of the test scores, with a maximum of 100. A vehicle must achieve the necessary points score in each stage to be eligible for a certain star rating as explained in section 0. Furthermore, additional constraints, known as backstops, may limit the overall star rating, even if the point scores satisfy the thresholds. Finally, each of the stages is also given a weight, however these are used solely to calculate a weighted average score used for the annual Best in Class ranking (see section 2.3).

For each stage, a table is added to specify the applicable protocols. Where the protocol name does not start with “Euro NCAP CV Protocol”, but with “Euro NCAP Protocol” it means that the car protocol is to be followed.

Safe Driving		Crash Avoidance		Crash Protection		Post-Crash	
Occupant Monitoring	**25**	Frontal Collisions	**65**	Frontal Impact	**40**	Rescue Information	**40**
Driver Engagement	**25**	Lane Departure Collisions	**25**	Side Impact	**10**	Post-Crash Intervention	**25**
Vehicle Assistance	**50**	Low Speed Collisions	**10**	VRU Impacts	**50**	Vehicle Extrication	**35**
Total	**100**	Total	**100**	Total	**100**	Total	**100**

1.1 Fitment requirements

Unless otherwise noted, all tested safety equipment needs to be installed either as standard throughout the Euro NCAP Application Area for a vehicle (for base ratings) or must meet agreed fitment installation rates (for optional rating) to be eligible for scoring under the new rating system.

1.2 Language requirements

For all elements in the rating that include language requirements, Technical Bulletin G001 on Euro NCAP Application Area and Official Languages applies.

1.3 Safe Driving

The Safe Driving stage covers technology that supports the driver and occupants for a safe and comfortable journey. This stage is divided into three main elements as shown below. Further details can be found in the Safe Driving protocols and technical bulletins.

Safe Driving	Points
Occupant Monitoring	**25**
Seatbelt usage	25
Driver Engagement	**25**
Driver monitoring	20
Driving controls	5
Vehicle Assistance	**50**
Speed assistance	30
ACC performance	15
Steering assistance	5

1.3.1 Safe Driving Protocols

Safe Driving	Protocol
Occupant Monitoring	Euro NCAP CV Protocol - Safe Driving - Occupant Monitoring
Driver Engagement	Euro NCAP CV Protocol - Safe Driving - Driver Engagement
Vehicle Assistance	Euro NCAP Protocol - Safe Driving - Vehicle Assistance

1.4 Crash Avoidance

For safety critical situations, Euro NCAP encourages the fitment of crash avoidance technology that will mitigate or avoid crashes by warning the driver or by automatic interventions. This stage is divided into three main elements as shown below. Further details can be found in the test and assessment protocols and technical bulletins.

Crash Avoidance	Points
Frontal Collisions	**65**
Car & PTW	40
Pedestrian & Cyclist	25
Lane Departure Collisions	**25**
Lane departure	15
Car & PTW	10
Low Speed Collisions	**10**
Pedestrian & Cyclist	10

To ensure that cooperation between passive and active safety measures is maintained in this area, a minimum performance is required in subsystem testing to be eligible of scoring points in pedestrian and cyclist scenarios in Frontal Collisions under Crash Avoidance. See section **Error! Reference source not found.** for more details.

1.4.1 Crash Avoidance Protocols

Safe Driving	Protocol
Frontal Collisions	Euro NCAP CV Protocol - Collision Avoidance - Frontal Collisions
Lane Departure	Euro NCAP CV Protocol - Crash Avoidance - Lane Departure Collisions
Low Speed	Euro NCAP CV Protocol - Crash Avoidance - Low Speed Collisions

1.5 Crash Protection

Traditional crash protection systems, such as seatbelt, airbags, crash structures and head restraints, designed to mitigate occupant injuries in a crash are assessed in the Crash Protection stage. Under the new rating, also passive protection measures for vulnerable road user are included. This stage is divided into three main elements as shown below. Further details can be found in the test and assessment protocols and technical bulletins.

Crash Protection	Points
Frontal Impact	**40**
Offset	20
Compatibility	20
Side Impact	**10**
HPD	10
VRU Impact	**50**
Head impact	25
Pelvis & Leg impact	25

A vehicle that meets the balance criteria for a 5-star overall rating cannot have any red rated body regions after modifiers are applied. In such case, the vehicle is limited to a maximum of 4-stars. See section **Error! Reference source not found.** for more details.

1.5.1 Crash Protection Protocols

Safe Driving	Protocol
Frontal Impact	Euro NCAP CV Protocol - Crash Protection - Frontal Impact
Side Impact	Euro NCAP CV Protocol - Crash Protection - Side Impact
VRU Impact	Euro NCAP Protocol - Crash Protection - Vulnerable Road User Impact

1.6 Post-Crash Safety

After the crash, clear information and technologies will help emergency services to respond to the crash within the “golden hour”. This stage is divided into three main elements as shown below. Further details can be found in the test and assessment protocols and technical bulletins.

Post-Crash	Points
Rescue Information	**40**
Rescue sheets	35
Rescue guide	5
Post-Crash Intervention	**25**
Advanced eCall	20
Multi-Collision Brake	5
Vehicle Extrication	**35**
Energy management	20
Occupant extrication	15

1.6.1 Post-Crash Protocol

Safe Driving	Protocol
Post-Crash	Euro NCAP Protocol - Post-Crash - Post-Crash

2 OVERALL RATING REQUIREMENTS

An overview of the rating scheme and points allocation is given in the table below. The overall rating is calculated based on balance thresholds as detailed below.

2.1 Star rating limits

A vehicle must achieve the necessary points score in each stage in order to be eligible for a certain star rating, the so-called *worst score* principle. For this purpose, balance thresholds are introduced as follows.

Star Rating	Safe Driving	Crash Avoidance	Crash Protection	Post-Crash
5-stars	70%	70%	70%	70%
4-stars	60%	60%	60%	60%
3-stars	50%	50%	50%	50%
2-stars	40%	40%	40%	40%
1-stars	30%	30%	30%	30%

2.1.1 Compensation rule

Within the first three stages, a maximum of 10 points can be used for compensation of the adjacent stage when needed to achieve a higher star level. A surplus of points can only be used for compensation of an adjacent stage and only used once. For instance, this means that Safe Driving and Crash Protection cannot compensate each other. However, a 10-point surplus in Crash Avoidance can be split between Safe Driving and Crash Protection. This rule is a new feature of the rating scheme, created primarily to improve the mathematical stability of the rating. It also reflects the fact that technology in two adjacent stages to some extent can address similar crashes in the real world.

2.2 Prerequisites and links between stage elements

Any rating system that relies on calculating the relative performance levels of vans based on a variety of tests and criteria can introduce unintended consequences. The following backstop procedures are introduced to stop this from happening.

2.2.1 Crash Avoidance

In the new rating approach, front-end countermeasures to reduce injuries to pedestrians and cyclists and avoidance technologies addressing vulnerable road user crashes end up in different stages. Although both safety measures may address comparable crashes, in practise they work better together than separately.

To ensure that cooperation between passive and active safety measures is maintained in this area, a minimum of 25 points need to be scored within VRU impacts in Crash Protection to be eligible of scoring points in pedestrian and cyclist scenarios in Frontal Collisions under Crash Avoidance.

2.2.2 Crash Protection

A vehicle that satisfies all of the balancing thresholds for a 5-star overall rating cannot have any body parts that are red, after modifiers are applied. The vehicle can only receive a maximum rating of four stars in this situation. This backstop for 5-star overall ratings is applied to all official full scale and sub-system tests under Crash Protection.

Crash Protection	Body Regions	
	Driver	Front Passenger
Frontal Impact	Head & Neck Chest & Abdomen	Head & Neck Chest & Abdomen

VRU Protection	Body Regions		
	Child/Small Adult	Adult	Cyclist
Head impact	Head	Head	Head
Pelvis & Leg impact		Pelvis Femur Knee & Tibia	

2.3 Weight Factors for Best in Class

The weighted overall score is calculated from the individual assessment scores using weight factors as shown in the table in chapter 1. These weight factors reflect the relative importance of the four stages. The weighted overall score, determined by taking the weighted average of the scores in the four stages, is only used to rank vehicles for determining the best in class vehicles at the end of each year. The rules for determining Euro NCAP Best in Class can be found on Euro NCAP's website.

2.4 Calculation rules

The following rounding rules will be applied in the calculation of the overall rating.

Star Rating	Number of decimales	Examples	
Input values	2	354.25503	-> 354.26
Intermediate calculations	N/A		
Criteria scores	2	67.66667	-> 67.67
Body region scores	4	0.31333	-> 0.3133
Dummy scores	4	0.83333	-> 0.8333
Test scores	3	8.86667	-> 8.667
Stage scores	0, floored	79.879	-> 79

2.5 Extension of rating validity

The validity of the star rating is described in the Application of Star Rating protocol.