AEB 07 – Euro NCAP Summary

Overview

- Euro NCAP is a private consumer test organization, based in Leuven, Belgium,
  partly funded by European governments
- Euro NCAP was established in 1997
- Euro NCAP tests apply to (passenger car) vehicles with standard equipment across EU-28
- Euro NCAP tests are optional,
  one does not need to have a valid star rating to be able to sell a vehicle in Europe
- Euro NCAP stars are intended to be consumer information,
  there is no other implication from the test results

AEB 07 – Euro NCAP Summary

2018 Rating Scheme

5 star threshold to be achieved in each box

Adult Occupant Protection (AOP)

Offset Frontal Impact	8 points
Full-width Frontal Impact	8 points
Side Impact (MDB)	8 points
Side Impact (Pole)	8 points
Whiplash Front	1,5 points
Whiplash Rear	0,5 points
AEB City	4 points[1]
Sum	38 points

★★★★★	80% (30.4 points)
★★★★	70% (26.6 points)
★★★	60% (22.8 points)
★★	50% (19.0 points)
★	40% (15.2 points)

Child Occupant Protection (COP)

Dynamic Tests Frontal	16 points
Dynamic Tests Side	8 points
Installation of CRS	12 points
Safety features in vehicle	13 points
Sum	49 points

★★★★★	80% (39.2 points)
★★★★	70% (34.3 points)
★★★	60% (29.4 points)
★★	50% (24.5 points)
★	40% (19.6 points)

Pedestrian Protection (PP)

Head Impact	24 points
Leg Impact	6 points
Upper Leg Impact	6 points
AEB VRU-Pedestrian	6 points[2]
AEB VRU-Cyclist	6 points[2]
Sum	48 points

★★★★★	60% (28.8 points)
★★★★	50% (24.0 points)
★★★	40% (19.2 points)
★★	30% (14.4 points)
★	20% (9.6 points)

Safety Assist (SA)

Seat Belt Reminder	3 points
Speed Assist System	3 points
Lane Support Systems	4 points
AEB Interurban	3 points
Sum	13 points

★★★★★	70% (9.1 points)
★★★★	60% (7.8 points)
★★★	50% (6.5 points)
★★	40% (5.2 points)
★	30% (3.9 points)

1: minimum 1,0 points for Whiplash Front required to gain any AEB City points

2: minimum 22,0 points for passive safety measures inside the PP box required to gain any AEB VRU points

a car with a five star rating does not need to have any AEB system

AEB 07 – Euro NCAP Summary

AEB Vehicle-to-Vehicle

- **AEB V2V** is part of the rating since 2014
- Scoring is based on collision speed
- **AEB City:**
  - **A**dult **O**ccupant **P**rotection Box (4/38 points) (max. speed tested 50 km/h)
  - Automatic Intervention
  - stationary target only
- **AEB Interurban:**
  - **S**afety **A**ssist Box (3/13 points) (max. speed tested 80 km/h)
  - **F**orward **C**ollision **W**arning followed by **D**ynamic **B**rake **S**upport and/or Automatic Intervention
  - stationary, moving and braking target
- Rating of FCW/DBS is based also on collision speed (pre-configured brake robot triggered by FCW)

AEB 07 – Euro NCAP Summary

AEB City Test Scenarios

Total **45 AEB City tests:**

- **Stationary target vehicle (GVT)**
- **9 different ego speeds** (10 km/h – 50 km/h in steps of 5 km/h)
- **5 different variants of lateral overlap**
  (50% left - 75% left - 100% - 75% right - 50% right)
- Score is dependent on impact speed.
- OEM hands in a prediction **"grid"** (based on own tests, simulation, etc.), no participation of Euro NCAP in prediction
- **Euro NCAP will perform sample tests** to verify the results, a correction factor could apply
- **Total score: 4 points**

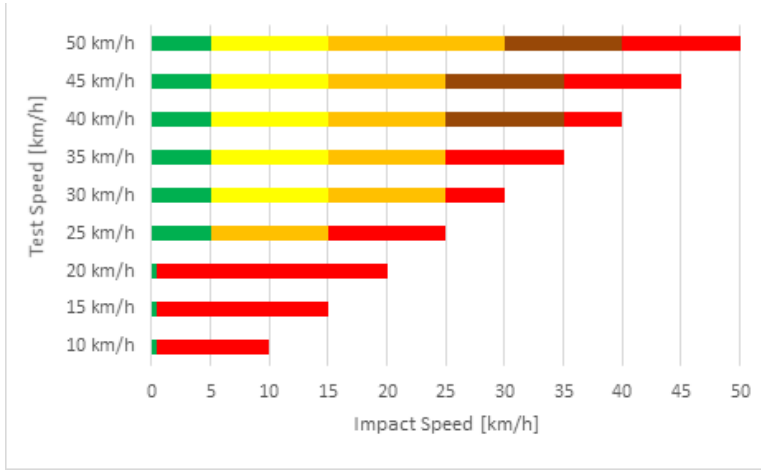
Full score (4 points):

- **No collision at 10 – 20 km/h**
- **max. 5 km/h impact speed at 25 – 50 km/h**

GRID example:

Overlap

VUT Test Speed v_0	50% L	75% L	100%	75% R	50% R
50					
45					
40					
35					
30					
25					
20					
15					
10					



AEB 07 – Euro NCAP Summary

AEB Interurban Test Scenarios

Stationary target vehicle (CCRs)
Ego: 30 – 80 km/h

Test of FCW/DBS only (braking robot) (30-80 km/h)

Slower target vehicle (CCRm)
Ego: 30 – 80 km/h
Target: 20 km/h

Test of Automatic Intervention (30-80 km/h) and/or FCW/DBS (braking robot) (50-80 km/h)

Braking target vehicle (CCRb)
Distance: 12/40m
Ego: 50 km/h, Target: -2/-6 m/s²

Test of Automatic Intervention and/or FCW/DBS (braking robot)

Grid approach
- as in AEB City
- variation of overlap value for CCRs and CCRm test
- No grid applied for CCRb test (100% overlap only)

For full score (3 points, combination of Automatic Intervention (1.5), FCW/DBS (1.0) and HMI (0.5)):
- **max. 5 km/h (relative) impact speed allowed across the complete speed range**

AEB 07 – Euro NCAP Summary

AEB Vehicle-to-Pedestrian

- AEB V2P is part of the rating since 2016
- Pedestrian/VRU Protection Box (6/48 Points)
- Tests during daylight and obscure light conditions
- Lateral and longitudinal tests
- Rating is based on collision speed

AEB 07 – Euro NCAP Summary

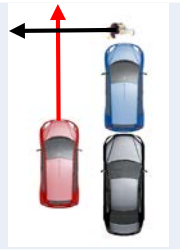
AEB VRU Pedestrian Scenarios

6 Points in total**:**

- **3 Points for day tests**
- **3 Points for night test**

Test conduct:

- All tests performed by Euro NCAP
- OEM has a prediction for performance
- If deviation between prediction and test results by >5km/h: up to three tests for each speed

	CPFA-50	CPNA-25	CPNA-75	CPNC-50	CPLA-50	CPLA-25
VUT speed	20-60 km/h	20-60 km/h	20-60 km/h	20-60 km/h	20-60 km/h	50-80 km/h
Ped speed	8 km/h	5 km/h	5 km/h	5 km/h	5 km/h	5 km/h
Obstruction	No	No	No	Yes	No	No
Impact point	50%	25%	75%	50%	50%	25%
AEB/FCW	AEB	AEB	AEB	AEB	AEB	FCW
						

AEB 07 – Euro NCAP Summary

AEB VRU Pedestrian Scoring Principle

- Lateral Scenarios (CPFA-50, CPNA-25, CPNA-75, CPNC-50):

v_o (km/h)	20	25	30	35	40	45	50	55	60
	Scoring by linear sliding scale (e.g. 40% speed reduction → 40% score)					Min. speed reduction of 20km/h per test PASS/FAIL			

- Longitudinal Scenario Braking (CPLA-50):

v_o (km/h)	20	25	30	35	40	45	50	55	60
	Scoring by linear sliding scale (e.g. 40% speed reduction → 40% score)					Min. speed reduction of 20km/h per test PASS/FAIL			

- Longitudinal Scenario Warning (CPLA-25):

v_o (km/h)	50	55	60	65	70	75	80
	FCW warning at TTC >= 1.7s per test PASS/FAIL						

Full score (6 points):

- **No collision at 20 – 40 km/h**
- **Min. speed reduction of 20 km/h from 45 km/h onwards**
- **Warning at min. 1.7 TTC for CPLA-25 scenario**

AEB 07 – Euro NCAP Summary

AEB Vehicle-to-Bicyclist

- AEB V2B is part of the rating since 2018
- Pedestrian/VRU Protection Box (6/48 Points)
- Tests during daylight conditions
- Lateral and longitudinal tests
- Rating is based on collision speed

AEB VRU Bicyclist Scenarios

6 Points in total

Test conduct:

- All tests performed by Euro NCAP
- OEM has a prediction for performance
- If deviation between prediction and test results by >5km/h: up to three tests for each speed

	CBNA-50	CBLA-50	CBLA-25
VUT speed	20-60 km/h	25-60 km/h	50-80 km/h
Cyclist speed	15 km/h	15 km/h	20 km/h
Obstruction	No	No	No
Impact point	50%	50%	25%
AEB/FCW	AEB	AEB	FCW
			

AEB 07 – Euro NCAP Summary

AEB VRU Bicyclist Scoring Principle

- Lateral Scenario (CBNA-50):

v_o (km/h)	20	25	30	35	40	45	50	55	60
	Scoring by linear sliding scale (e.g. 40% speed reduction → 40% score)					Min. speed reduction of 20km/h per test PASS/FAIL			

- Longitudinal Scenario Braking (CBLA-50):

v_o (km/h)		25	30	35	40	45	50	55	60
		Scoring by linear sliding scale (e.g. 40% speed reduction → 40% score)				Min. speed reduction of 20km/h per test PASS/FAIL			

- Longitudinal Scenario Warning (CBLA-25):

v_o (km/h)	50	55	60	65	70	75	80
	FCW warning at TTC >= 1.7s per test PASS/FAIL						

Full score (6 points):

- **No collision at 20/25 – 40 km/h**
- **Min. speed reduction of 20 km/h from 45 km/h onwards**
- **Warning at min. 1.7 TTC for CBLA-25 scenario**

Outlook 2020/2022

- Euro NCAP plans to
  - allow automatic emergency steering (AES) as an alternative to braking for applicable AEB scenarios from 2020
  - include intersection and crossing scenarios for AEB V2V and V2P starting from 2020
  - include Reverse AEB V2P starting from 2020
  - update AEB existing V2B requirements in 2020
  - include PTW as target for AEB VRU from 2022
  - include an AEB Head-On function from 2022

- From 2020 AEB is an (implicit) requirement for five stars in Euro NCAP
  Four stars are (theoretically) still possible w/o AEB

AEB 07 – Euro NCAP Summary

Summary

- Euro NCAP tests are optional, one does not need to have a valid star rating to be able to sell a vehicle in Europe
- Euro NCAP stars are intended to be consumer information, there is no other implication from the test results
- until today (2018) AEB is no prerequisite for a five star rating
- some AEB tests are sample tests only
- in some cases it is possible to repeat a failed AEB test,
  or repeat a test where the result deviates from the prediction of the OEM
- full collision avoidance across the complete defined speed range is not required for a full score in any AEB test scenario