



Euro NCAP Roadmap on Fatigue-related Impairment

2026 and beyond



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14/10/2025

Vision 2030 rating scheme

Safe Driving		Crash Avoidance		Crash Protection		Post-Crash	
Occupant Monitoring	30	Frontal Collisions	60	Frontal Impact	40	Rescue Information	40
Seatbelt usage	10	Car & PTW	40	Offset	20	Rescue Sheets	35
Occupant classification	10	Pedestrian & Cyclist	20	Full Width	10	Rescue Guide	5
Occupant presence	10			VT & Sled	10		
		Lane Departure Collisions	20			Post-Crash Intervention	25
Driver Engagement	30	Lane Departure	10	Side Impact	35	Advanced eCall	20
Driver Monitoring	25	Car & PTW	10	MDB	15	Multi-collision Brake	5
General Vehicle Controls	5			Pole	10		
		Low Speed Collisions	20	Farside	10	Vehicle Extrication	35
Vehicle Assistance	40	Car & PTW	10			Energy Management	20
Speed Assistance	20	Pedestrian & Cyclist	10	Rear Impact	5	Occupant Extrication	15
ACC Performance	15						
Steering Assistance	5			VRU Impact	20		
				Head impact	10		
				Pelvis & Leg impact	10		
Weight: 20	100	Weight: 20	100	Weight: 50	100	Weight: 10	100

Driver Monitoring contributes **25 points out of 100** to the **Safe Driving** stage.

Driver Monitoring

Scoring overview

Category	Driver Monitoring assessment	Total points: 25
Transient driver states (15 pts)	Long distraction	5
	Short distraction (VATS)	5
	Phone Use (VATS)	5
Non-transient driver states (10 pts)	Impairment (drowsiness & non-fatigue related impairment)	4
	Microsleep	2
	Sleep	2
	Unresponsive	2

Fatigue-related elements include **Drowsiness** (a subset of impairment), **Microsleep**, **Sleep**, and **Unresponsiveness**.

Fatigue-related driver states

Detection requirements:

- **Drowsiness:** $KSS > 7$ (or equivalent metrics)
- **Microsleep:** Eye closure 1~2s + additional inputs (optional)
- **Sleep:** Eye closure ≥ 3 s + additional inputs (optional)
- **Unresponsive Driver:** ≤ 3 s gaze off-road after 1st distraction alert, or ≥ 6 s eye closure

Fatigue-related driver states

Vehicle Response requirements:

- **Warning:**
 - Visual + Acoustic alert
 - For impairment, navigation prompts to nearby rest areas is allowed as warning.
- **Intervention:**
 - Forward Support Sensitivity (e.g., FCW, AEB)
 - Lane Support Sensitivity (e.g., LDW, ELK)
 - “Assisted Mode” for sleep & microsleep allowed as alternative

Driver State	Distraction Type	Glance Target Type	Movement Type	Maximum available points					
				Warning	Intervention			Sub Total	Total
					Forward Support Sensitivity	Lane Support Sensitivity	Total		
Transient	Long Distraction	Non-Driving Task	Owl	0,5	0,4	0,1	0,5	1	5
			Lizard	0,5	0,4	0,1	0,5	1	
			Body Lean	0,5	0,4	0,1	0,5	1	
		Driving Task	Owl	-	0,8	0,2	1	1	
			Lizard	-	0,8	0,2	1	1	
			Multi-target	Lizard	0,5	0,4	0,1	0,5	
	Short Distraction (VATS)	Non-Driving Task	Owl	0,5	0,4	0,1	0,5	1	5
			Lizard	0,5	0,4	0,1	0,5	1	
		Driving Task	Owl	-	0,8	0,2	1	1	
			Lizard	-	0,8	0,2	1	1	
Phone Use	Basic	Owl + Lizard	1,25	1	0,25	1,25	2,5	5	
	Advanced	Lizard	1,25	1	0,25	1,25	2,5		
Non-transient	Impairment	Drowsiness	0,5	1,5			2	4	
		Non-fatigue	0,5	1,5			2		
	Microsleep		0,5	1,5			2	2	
	Sleep		0,5	1,5			2	2	
	Unresponsive driver		-	2			2	2	
								25	

Vehicle response must be effective at ≥ 20 km/h (≥ 50 km/h for impairment).
 A 10-minute learning window is allowed for impairment.

Fatigue-related driver states

Intervention requirements:

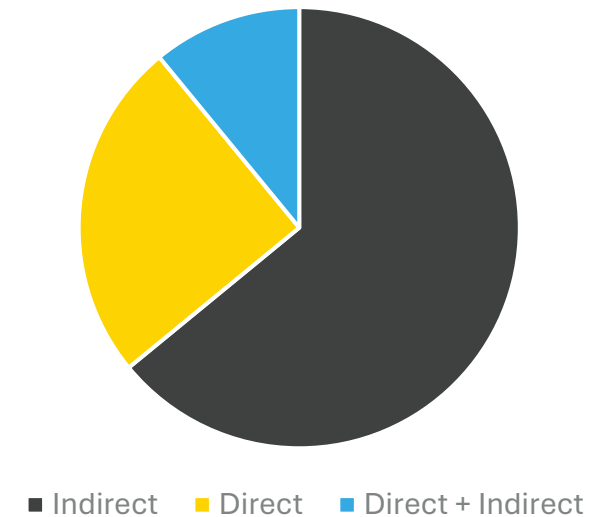
Behaviour/state	Intervention type	Intervention termination condition
All transient states	Forward Support w/wo Lane Support	≥2s after end of state
Short off-road glances	Forward Support w/wo Lane Support**	≥1s after continuous gaze towards forward road view
Non-fatigue impairment	Forward Support w/ Lane Support	End of journey or End of state
Drowsiness impairment		End of journey or End of state*
Microsleep	Forward Support w/ Lane Support OR Assisted Mode	End of journey or End of state
Sleep		
Unresponsive	Emergency Function	Driver response

* “End of state” termination condition for drowsiness only allowed if the DSM system offers microsleep and sleep functionality

Drowsiness assessment (2023~2025 campaign)

- **Assessment method:**
 - OEM Dossier review (no test track verification)
- **Detection strategies:**
 - Indirect systems: Steering and/or vehicle position in-lane patterns
 - Direct systems: variety of eye/head movements
 - PERCLOS
 - “Fatigue blinking”
 - Single yawning
 - Double yawning in a 5-min window
 - Combination of any of above incl. head pose
 - Direct + Indirect systems

Detection strategies
(approx. share 2023~2025 campaign)



Drowsiness assessment (2023~2025 campaign)

- **Performance declaration (dossier)**
 - 100% OEMs used KSS to demonstrate detection performance
 - Validation typically based on ~10 participants using driving simulator or test track (DDAW method).
 - Detailed TP/FP results expose the robustness
 - Many OEMs simply copy-paste the DDAW approval report and expect to automatically get Euro NCAP points

DDAW compliancy ≠ Euro NCAP drowsiness points!

2029 Milestones to tackle fatigue

- **Develop an objective, scenario-based drowsiness assessment**
 - Dossier-based assessment of drowsiness is problematic, especially when the criteria points to an inherently subjective metric.
 - Euro NCAP assessment must remain technology agnostic and only focus on accurate detection of driver states.
 - Ultimately, drowsiness should be detected well in advance before a sleep onset (e.g., \geq 30 min) that will eventually result in a run off-road event.
 - Objectively evaluating timely drowsiness detection should be therefore as simple as letting test subjects drive until they fall asleep.
 - Safe test execution is currently feasible with e.g., safety driver on passenger seat, or dual command system actuating when vehicle goes out of bounds in a geofenced track.

Work in progress...! The above concepts are not yet a commitment

2029 Milestones to tackle fatigue

- **Tackling Driver Acceptance issues**
 - From 2026, the 5-Star Rating will include a > 2000 km on-road evaluation across EU public roads (city, interurban, highway; day and night).
 - Naturalistic driving, without provoking scenarios.
 - Primarily goal: calculate SLIF accuracy
 - Secondary goal: Researching in parallel feasibility and methodology for the evaluation of other functions e.g., LSS, ACC, DMS.
 - On-road evaluation presents a unique opportunity to annotate FPs and flagging driver acceptance issues
 - Straightforward for e.g., distraction events
 - May be more complex for drowsiness: Somewhat linked to driver self-assessment of fitness to drive.



2029 Milestones to tackle fatigue

- **Re-evaluating effectiveness of Vehicle Response strategies**
 - Drowsiness, Microsleep, Sleep, and Unresponsive driver states resemble an escalation from moderate to severe impairment, and are still considered as valuable and valid for 2029.
 - Ultimately, the safety benefit will only be realized:
 - If the driver becomes aware of /feels identified with the risk AND takes action
 - If ADAS (i.e., lateral and/or longitudinal control) timely gets automatically adjusted to provide a more effective safeguards to avoid a collision
 - From a human factors perspective, is worth re-evaluating whether current Vehicle Response strategies are effective in mitigating or avoiding risk

About Euro NCAP

Euro NCAP provides consumers with an independent assessment of the safety level of the most popular cars sold in Europe.

Euro NCAP is a catalyst for encouraging significant safety improvements to new car design. We hope that when buying a new car **Euro NCAP** will help you choose for safety.

CONTACT US

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ADAS at a turning point

Drivers baffled by in-car safety assistance systems
'Widespread confusion creates safety concerns and erodes confidence', says new report
By: **Chris Rosamond**
2 APR 2025

Modern ADAS driver-assistance systems can be borderline dangerous
Editor Paul Barker believes that some modern car safety systems are a hindrance than a benefit
By: **Paul Barker**
18 SEP 2024



Car industry piling on the pressure for weak assisted driving system safety rules in Europe

Are Car Safety Systems Driving Motorists To Switch Off?

Turn That @#% Off!
Report: Automated ADAS Safety Features Are A 'Nightmare' For Drivers
By **Nicole Kobie**, Contributor. © Nicole Kobie is a tech and transport journalist ...
22, 2025, 04:05pm EDT

British drivers turning off EU car safety features despite risk of traffic and accident nightmare



Car safety tech driving motorists round the bend, Which? finds

Motorists are switching off automatic safety tech designed to help cars adhere to the speed limit, stay in the right lane or brake to avoid collisions because they find it dangerous, distracting or useless, according to new Which? research

ADAS at a turning point

A “trigger happy” ADAS ensures performance for 5-star configurations...

...but will lead to a disastrous user experience!

Balancing out performance:

Ensure safety (**minimum sensitivity**) while keeping false positive rate as low as possible (**maximum specificity**)

