



NCAP ROADMAPS REGARDING THE ASSESSMENT OF ACCIDENT AVOIDANCE SYSTEMS

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Outline

- Current status
- Roadmaps
- General trends

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- Roadmaps
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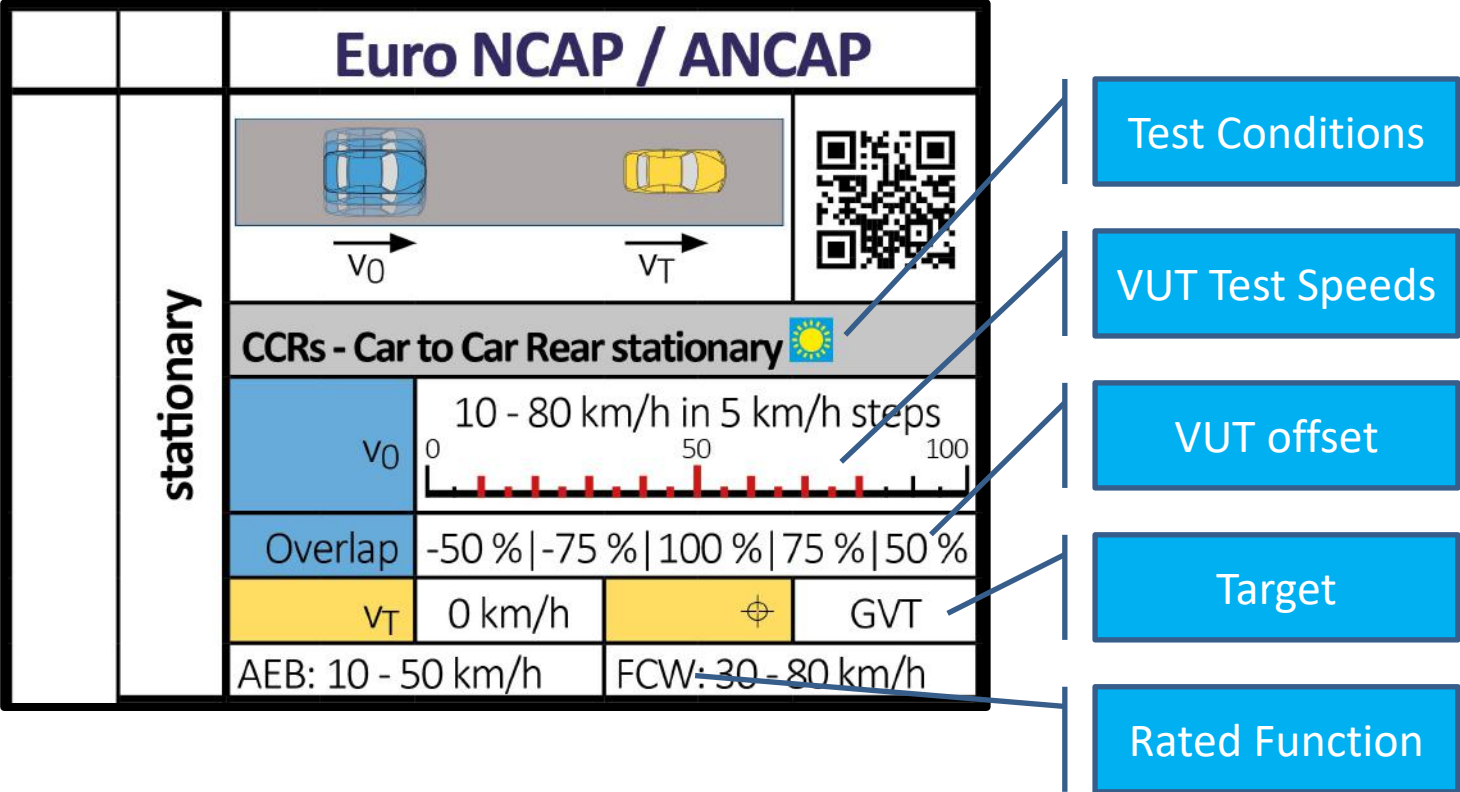
order more
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Current status

| | EUro NCAP / ANCAP | US NCAP | C-NCAP | C-EB | INCAP | KRNCAP | ASEAN NCAP | US NCAP | BHS | Latin NCAP |
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Current status

| | Euro NCAP / ANCAP | UN R152 | C-NCAP ⁸ | C-IASI | JNCAP | KNCAP | ASEAN NCAP |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Car to Car | stationary CCRs - Car to Car Rear stationary 10 - 80 km/h in 5 km/h steps Overlap: -75% 100% 100% v_0 : 0 km/h v_T : 0 km/h AEB: 10 - 50 km/h FCW: 30 - 80 km/h | stationary CCRs - Car to Car Rear stationary 20 42 60 km/h Overlap: 100% (± 0.2 m offset) v_0 : 0 km/h v_T : 0 km/h ISO AEB: 10 - 60 km/h FCW: 10 - 60 km/h | stationary CCRs - Car to Car Rear stationary 20 - 80 km/h Overlap: -50% 100% +50% v_0 : 0 km/h v_T : 0 km/h GVT AEB: 20 30 40 km/h FCW: 50 60 70 80 km/h | stationary CCRs - Car to Car Rear stationary 30 50 72 km/h Overlap: 100% v_0 : 0 km/h v_T : 0 km/h EVT/GVT AEB: 30 50 km/h FCW: 72 km/h | stationary CCRs - Car to Car Rear stationary 10 - 60 km/h in 5 km/h steps Overlap: 100% v_0 : 0 km/h v_T : 0 km/h EVT AEB: 10 - 60 km/h FCW: 10 - 60 km/h | stationary CCRs - Car to Car Rear stationary 10 - 50 km/h in 5 km/h steps Overlap: 100% v_0 : 0 km/h v_T : 0 km/h EVT AEB: 10 - 50 km/h FCW: 10 - 50 km/h | stationary CCRs - Car to Car Rear stationary 10 - 60 km/h in 5 km/h steps Overlap: 100% v_0 : 0 km/h v_T : 0 km/h EVT AEB: 10 - 60 km/h FCW: 10 - 60 km/h |
| | moving (slower) CCRm - Car to Car Rear moving 30 - 80 km/h in 5 km/h steps Overlap: -50% -75% 100% 75% 50% v_0 : 20 km/h v_T : 20 km/h GVT AEB: 30 - 80 km/h FCW: 50 - 80 km/h | moving (slower) CCRm - Car to Car Rear moving 30 60 km/h Overlap: 100% (± 0.2 m offset) v_0 : 20 km/h v_T : 20 km/h ISO AEB: 10 - 60 km/h FCW: 10 - 60 km/h | moving (slower) CCRm - Car to Car Rear moving 30 - 80 km/h Overlap: -50% 100% +50% v_0 : 20 km/h v_T : 20 km/h GVT AEB: 30 40 50 km/h FCW: 60 70 80 km/h | moving (slower) CCRm - Car to Car Rear moving 50 70 72 km/h Overlap: 100% v_0 : 20 32 km/h v_T : 20 32 km/h EVT/GVT AEB: 50 70 km/h FCW: 72 km/h | moving (slower) CCRm - Car to Car Rear moving 35 - 60 km/h in 5 km/h steps Overlap: 100% v_0 : 20 km/h v_T : 20 km/h EVT AEB: 35 - 60 km/h FCW: 35 - 60 km/h | moving (slower) CCRm - Car to Car Rear moving 30 - 70 km/h Overlap: 100% v_0 : 20 km/h v_T : 20 km/h EVT AEB: 30 - 70 km/h FCW: 30 - 70 km/h | moving (slower) CCRm - Car to Car Rear moving 30 - 60 km/h in 5 km/h steps Overlap: 100% v_0 : 20 km/h v_T : 20 km/h EVT AEB: 30 - 60 km/h FCW: 30 - 60 km/h |
| | braking CCRb - Car to Car Rear braking 50 km/h d_0 : 12 m 14 m 12 m 40 m v_{10} : 50 km/h a_T : -2 -2 -2 -6 -6 m/s ² AEB: 50 km/h FCW: 50 km/h | | | braking CCRb - Car to Car Rear braking 72 km/h d_0 : 30 m v_{10} : 72 km/h a_T : -3 m/s ² AEB: - FCW: 72 km/h | | braking CCRb - Car to Car Rear braking 50 km/h d_0 : 12 m 14 m 12 m 40 m v_{10} : 50 km/h a_T : -2 -2 -2 -6 -6 m/s ² AEB: 50 km/h FCW: 50 km/h | |
| | intersection CCTap - Car to Car Front turn across path 10 - 20 km/h in 5 km/h steps Impact@: 50% v_0 : 30 45 55 km/h v_T : 30 45 55 km/h GVT AEB: 10 - 20 km/h FCW: - | | | | | | |




Current Status

Car to Car


|  | Euro NCAP | C-NCAP | C-IASI | JNCAP | KNCAP | ASEAN NCAP | U.S. NCAP | IIHS | Latin NCAP |
|----------------------------------------------------------------------------------|-----------|--------|--------|-------|-------|------------|-----------|------|------------|
| stationary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| moving | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| braking | ✓ | | ✓ | | ✓ | | ✓ | | ✓ |
| intersection | ✓ | | | | | | | | |

Current Status

Car to Pedestrian

|  | Euro NCAP | C-NCAP | C-IASI | JNCAP | KNCAP | ASEAN NCAP | U.S. NCAP | IIHS | Latin NCAP |
|-----------------------------------------------------------------------------------|-----------|--------|--------|-------|-------|------------|-----------|------|------------|
| crossing | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| longitudinal | ✓ | ✓ | ✓ | | | | | ✓ | |
| reverse | ✓ | | | | | | | | |
| intersection | ✓ | | | | | | | | |

Current Status Car to Cyclist

|  | Euro NCAP | C-NCAP | C-IASI | JNCAP | KNCAP | ASEAN NCAP | U.S. NCAP | IIHS | Latin NCAP |
|----------------------------------------------------------------------------------|-----------|--------|--------|-------|-------|------------|-----------|------|------------|
| crossing | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| longitudinal | ✓ | ✓ | ✓ | | | | | ✓ | |

Current Status

Car to Powered Two Wheeler

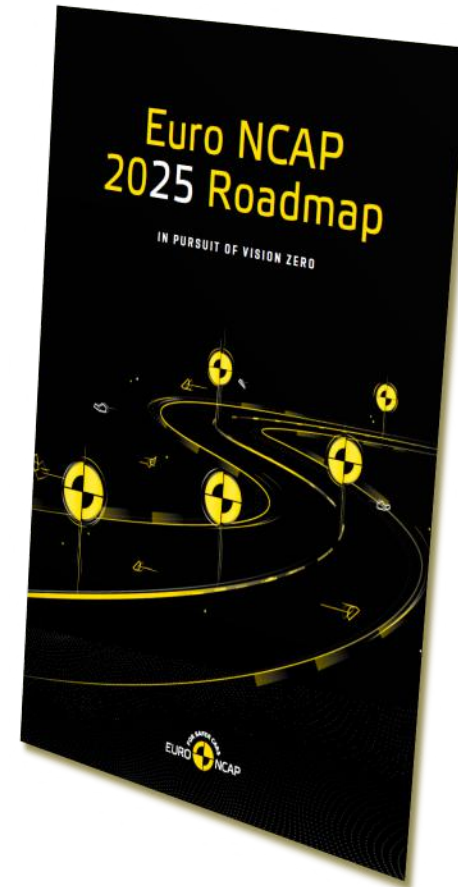
|  | Euro NCAP | C-NCAP | C-IASI | JNCAP | KNCAP | ASEAN NCAP | U.S. NCAP | IIHS | Latin NCAP |
|----------------------------------------------------------------------------------|-----------|--------|--------|-------|-------|------------|-----------|------|------------|
| crossing | | ✓ | | | | | | | |

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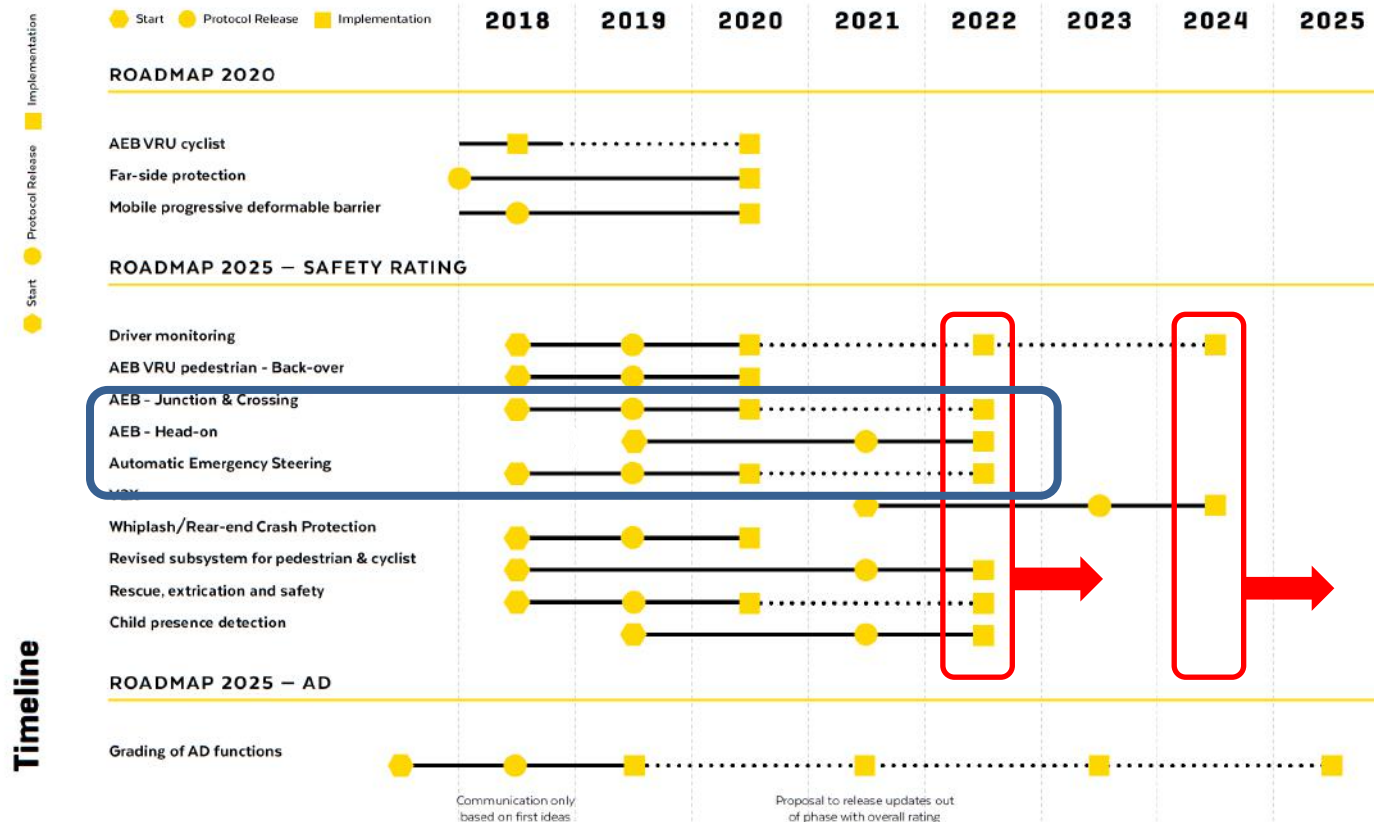
Euro NCAP

- Current Road Map 2025

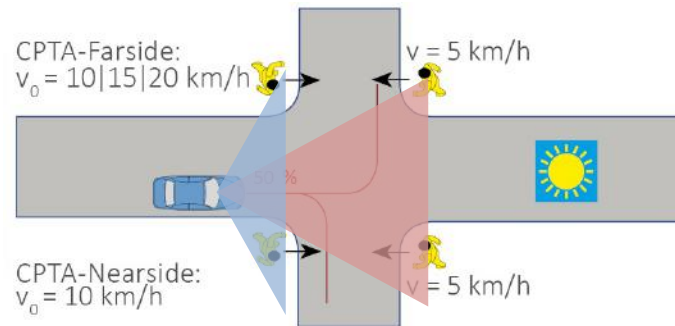


<https://bit.ly/3jkYnwi>

Euro NCAP



- New 2023 AEB requirements
 - AEB Car to Car: *under discussion*
 - Crossing (nearside & farside)
 - Head-on (overtake & drift)
 - AEB Car to Pedestrian: *published*
 - Crossing, far side adult and obstructed child now also tested at **night**
 - Intersection turn across path pedestrian in **same direction** added
 - Scores for **night** scenarios increased
 - Scores for daylight scenarios decreased



Euro NCAP

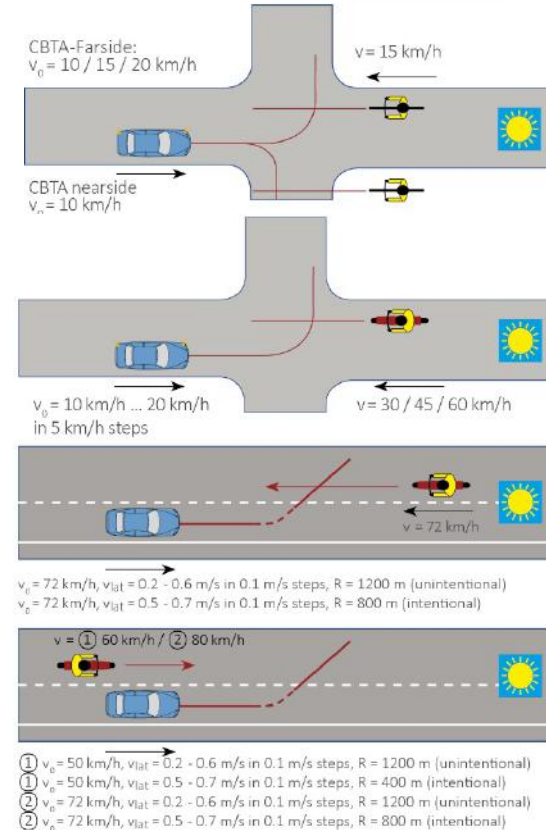
■ New 2023 AEB requirements

■ AEB Car to Cyclist: *published*

- Intersection turn across path scenario added
- Dooring added
- New scenarios get 1/3 of the points

■ AEB/LSS Car to PTW: *published*

- Stationary PTW
- Braking PTW
- Intersection turn across path oncoming
- Emergency Lane Keeping oncoming/overtaking PTW



Euro NCAP

- Road Map 2030
 - Development Process started in 2021
 - Industry consultation in Q1 and Q2 /2022
 - Publication targeted for end of 2022

SAFETYUPDATE Roadmap 2030: Strategic Drivers

Technology Innovation

- Connected and automated vehicles: from assisted to autonomous driving
- Next generation ADAS including driver monitoring systems
- Over-the-air update of safety functions

Rating Methodology

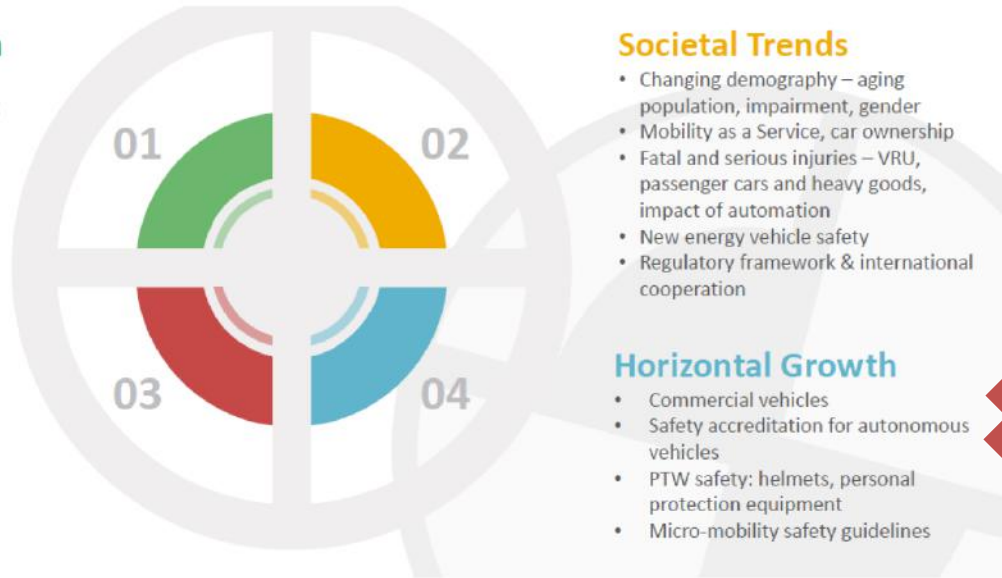
- Deployment of virtual testing
- Improved accuracy of test hardware and software
- Rating methodology – include (assisted or automated) driving and improve real-world impact

Societal Trends

- Changing demography – aging population, impairment, gender
- Mobility as a Service, car ownership
- Fatal and serious injuries – VRU, passenger cars and heavy goods, impact of automation
- New energy vehicle safety
- Regulatory framework & international cooperation

Horizontal Growth

- Commercial vehicles
- Safety accreditation for autonomous vehicles
- PTW safety: helmets, personal protection equipment
- Micro-mobility safety guidelines



Roadmaps C-NCAP

| Test and assessment items | | 2022 (C-NCAP2021 edition) | 2025 (C-NCAP2025 edition) |
|---------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Class A (AEB) | Safety Assistance Between Vehicles | <ul style="list-style-type: none"> ■ CCRs rear-end offset scenario ■ CCRm rear-end offset rate scenario | <ul style="list-style-type: none"> ■ The scenario of vehicle intersection conflict. ■ Research on car target technology based on China's national conditions ■ C-V2X technology: V2X anti-collision warning at intersections; Early warning of vehicle emergency braking. |
| | Pedestrian Safety Assistance | <ul style="list-style-type: none"> ■ The scene of pedestrians crossing at night ■ The scene of pedestrians longitudinal during the day ■ The scene of pedestrians longitudinal at night | <ul style="list-style-type: none"> ■ Conflict scenes at intersections between vehicles and pedestrians. ■ Research on dummy target technology based on China's national conditions. |
| | Safety Assistance for Two wheelers | <ul style="list-style-type: none"> ■ The scene of Two-wheelers crossing ■ The scene of Two-wheelers longitudinal | <ul style="list-style-type: none"> ■ Conflict scenes between vehicles and two-wheelers at intersections. ■ Research on bicycle target based on china's national conditions. |

| Sub-index | Research Project | 2023 Version | | | |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------|---------------------|------------------------|
| | | 2021 | 2022 | 2023 | 2024 |
| Damageability and Repairability | <ul style="list-style-type: none"> - Frontal low-speed structure collision, rear-end low-speed structure collision - Full-width bumper frontal collision, full-width bumper rear-end collision - Bumper static test | Project rating plan | Regulations draft for solicitation of comments | Officially released | Officially implemented |
| Vehicle Occupant Safety | <ul style="list-style-type: none"> - Small Overlap Frontal Crash (evaluation of female dummy in the back row) - Side impact crash (new barrier, remote occupant protection) - Frontal 50% offset deformable barrier crash (MPDB evaluation) - Seat/Head restraint (high-intensity wave, rear seat) - Roof strength - Emergency rescue service (E-call) - Overall rating adjustment | | | | |
| Pedestrian Safety | <ul style="list-style-type: none"> - Pedestrian protection, two-wheeled vehicle protection - Automatic emergency braking-car to pedestrian and cyclist (CVRU) | | | | |
| Vehicle Assistant Safety | <ul style="list-style-type: none"> - Automatic emergency braking-car to car (C2C), AEB intersection - Lane departure assist (LDW+LDP), emergency lane keeping (ELK), emergency automatic steering (AES/ESS) - Headlight evaluation - Driver monitoring (DMS) - Smart key | | | | |

- Significant changes targeted for 2023
 - A revised front crash prevention evaluation to include pedestrian autonomous emergency braking tests in **low-light conditions**.
- Possible changes for 2023 and later
 - A revised front crash prevention test to evaluate additional vehicle-to-vehicle impact configurations **beyond colinear** front-rear alignment with full overlap.

Source: IIHS TSP Letter 2022, Feb. 1, 2021

| | | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|-----------------------------------------|----------|---------------------------------------------------|-----------|-----------|-----------|------|-----------|------|
| Accident Prevention [20] | Rollover | Abolish SSF and Roll-over | | Phase out | | | | |
| | Braking | Abolish | Phase out | | | | | |
| | FCWS | Assess AEBS Function | Phase out | | | | | |
| | LDWS | Assess LKAS Function | Phase out | | | | | |
| | LKAS | In conjunction with LDWS | Implement | | | | | |
| | | In conjunction with FCWS Cyclist, Night AEB added | Implement | | | | | |
| | AEBS | New scenarios (Interurban, City, Pedestrian) | | | Implement | | | |
| | | Cross-Junction, Offset, Reverse | | | | | Implement | |
| | ACC | Abolish as convenient devices | Phase out | | | | | |
| | RCTA | Add Active Function to RCTA(Stand) | Implement | | | | | |
| | ESF | New | | | Implement | | | |

| | | 2019年度 | | 2020年度 | | 2021年度 | | 2022年度 | | 2023年度 | | 2024年度 | | 2025年度～ | | |
|---------------|------------------------------------------------|------------------------------------------------------|---------------------|-------------|-------------------------------------------------|----------------------------|----------------|--------|-----------------|-------------|-------------|-----------------|-----------------|------------|------------|--|
| より安全な自動車の普及対策 | 予防・衝突等総合安全性能 | | 普及方策の検討 | | | | | | | | | | | | | |
| | 被害軽減ブレーキ | 対車両 | 基準化を見据えた試験・評価方法検討 | | | 試験・評価方法の再検討(義務化に伴う見直し) | | | | | | | | | | |
| | | 対歩行者(昼間) | 基準化を見据えた試験・評価方法検討 | | | 注)国産車2021年11月～、輸入車2024年7月～ | | | | | | | | | | |
| | | 対歩行者(夜間・車灯あり) | 2018年度～ | | | | | | | | | | | | | |
| | | 対歩行者(夜間・車灯なし) | 2019年度～ | | | | | | | | | | | | | |
| | | 対自転車 | 試験・評価方法検討 | 評価方法検討/予備試験 | | | 予備試験 | | | | | | | | | |
| | | 交差点 | | 調査・研究 | | | 試験・評価方法検討/予備試験 | | | | 予備試験 | | | | | |
| | 高機能走行用前照灯 | 2018年度～ | | | | | | | | | | | | | | |
| | ペダル踏み間違い時加速抑制装置 | 2018年度～ | | 試験・評価方法再検討 | | | | | | | | | | | | |
| | 車両後方視界情報提供装置 | 2015年度～ | | | | | | | | | | | | | | |
| | 車線逸脱警報装置・車線逸脱抑制装置 | 車線逸脱警報装置は2014年度、車線逸脱抑制装置は2017年度～ | | | | | | | | | | | | | | |
| | その他運転支援技術(被害軽減ブレーキ[後述時歩行者]、被害軽減ブレーキ[対向車]、V2X等) | | | | | 追加新規項目検討 | | | | 調査・研究(追加項目) | | 試験・評価方法検討(追加項目) | | 予備試験(追加項目) | | |
| | 予防安全性能評価全体の総合的な安全性能 | 普及期の評価方法から競争期の評価方法への変更検討 | | | 普及期の評価方法から競争期の評価方法への変更検討 新規項目導入の際の評価(考え方)の検討 | | | | | | | | | | | |
| | 乗員保護 | 前面(フルラップ) | 1996年度～ | | 高齢者を考慮した閾値等への変更(助手席) | | | | | | | | | | | |
| | | 前面(オフセット) | 2006年度～ | | 高齢者を考慮した閾値等への変更(後座) | | | | | | | | | | | |
| | | 前面(MFDB(含THORダミー)) | | | 調査・研究 | | 試験・評価方法検討/予備試験 | | | | 予備試験 | | | | | |
| | | 側面 | 1999年度～ | | | | | | | | | | | | | |
| | | 後面頭部保護 | 試験・評価方法再検討 | | | | | | | | | | | | | |
| | | 助手席・後座シートベルトリマインダー | 試験・評価方法再検討 | | | | | | | | | | | | | |
| | 歩行者保護 | 頭部 | 2003年度～ | | | | | | | | | | | | | |
| | | 脚部 | 2011年度～ | | | | 調査・研究(aPLI) | | 試験・評価方法検討(aPLI) | | 予備試験 | | | | | |
| | | その他衝突安全技術(スモールオーバーラップ、ポール衝突、後部側面衝突、後座の頭部保護、フーサイド衝突等) | | | | | 追加新規項目検討 | | | | 調査・研究(追加項目) | | 試験・評価方法検討(追加項目) | | 予備試験(追加項目) | |
| | 衝突安全性能評価全体の総合的な安全性能 | | | | | | | | | | | | | | | |
| | 事故後援体情報提供装置 | 事故自動通報装置 | 次世代/法規対応試験・評価方法検討 | | 試験・評価方法変更 | | | | | | 調査・研究(次世代) | | 試験・評価方法検討(次世代) | | 予備試験(次世代) | |
| | より安全なCRSの普及対策 | CRS安全性能 | 2001年度～ | | | | | | | | | | | | | |
| | | 使用性 | 2001年度～ | | | | | | | | | | | | | |
| | | 啓発 | i-size対応CRS等普及方策の検討 | | | | | | | | | | | | | |

specifically tailored to the requirements of the ASEAN population. Depending on the situations and problems that shall emerge in future, larger dummies such as Q6 or Q10 will possibly feature in ASEAN NCAP future crash tests.

8.3 Safety Assist

Come 2026, there is a high possibility that autonomous cars shall begin to populate the roads in Southeast Asia. Singapore, for example, has been making headway for the advent of autonomous driving. Such an interesting development will also mark the arrival of several other devices including the Advanced Driving Assist (ADAS) technology, which by the way is already introduced by several automakers. In addition, ASEAN NCAP anticipates that various technologies such as ESC and AEB will likely become a standard fit in cars. Thus, evaluations as regards these inventions such as AEB for Motorcycle etc., shall possibly be included. Further, the effectiveness of AEB Pedestrian and AEB in poorly lighted areas shall also be put under the microscope to determine whether their application might be considered in our future roadmap, particularly if pedestrian safety emerged as a cause for concern in the ASEAN region.

Beyond 2024... towards 2030



- Extrication score in AOP assessment
- Small adult dummy in rear seat (alternating with Q3 or Q1.5)
- WSID will be used in Pole and MDB.
- MDB weight of cart increase as well as impact speed increase
- AEB City will likely be moved from AOP to the SA Box
- Rear seat whiplash
- Far side impact (not immediate consideration).

- Child passenger detection

- Pedestrian protection subsystems requirements will increase to equal Euro NCAP's
- AEB VRU will be tested in night scenarios

- Fittment rates from today's protocols will turn 100% as from 2024.

- Rear SBR will still be accepted without passenger detection
- Speed assist will include ISA assessment
- More AEB, RED and LSS testing scenarios will be included
- Driver monitoring: "how alert or tired is the driver"
- Driver monitoring: "Alcohol levels"
- AEB when the car is moving in reverse mode



Outline

- Current status
- Roadmaps
- **General trends**

- NCAP Programs around the world will add multiple scenarios in the coming years
- Focus on
 - Intersection scenarios requiring larger sensor angles
 - Nighttime scenarios (+ rain, low temperature, ...)
 - VRU scenarios
 - Oncoming scenarios at higher speeds
- Grid approach: Manufacturer predicts results for all scenarios, NCAP verifies prediction in a small sample of scenarios



Source: 4activeSystems

THANKS FOR YOUR ATTENTION

Learn more @ www.safetywissen.com and @ www.carhs.de

Connect @ <https://www.linkedin.com/in/ralf-reuter/>

Get in touch ralf.reuter@carhs.de

Abbreviations

| | |
|------|-------------------------------|
| AEB | Autonomous Emergency Braking |
| AES | Autonomous Emergency Steering |
| ELK | Emergency Lane Keeping |
| FCW | Foward Collision Warning |
| GVT | Global Vehicle Target |
| LDP | Lane Departure Prevention |
| LDW | Lane Departure Warning |
| LSS | Lane Support Systems |
| NCAP | New Car Assessment Program |
| PTW | Powered Two Wheeler |
| RED | Roadside Detection Systems |
| VUT | Vehicle Under Test |