

# ENCOURAGING SAFER VEHICLES THROUGH ENHANCEMENTS TO THE NCAP RATING SYSTEM

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### ABSTRACT

Since 1999 the Australasian New Car Assessment Program (ANCAP) has tested and rated vehicles using essentially the same protocols as Euro NCAP. This produces a rating out of 5 stars for front occupant (driver and front passenger) protection. More than half of the model ratings published by ANCAP in that time have been based on at least one set of crash test results from Euro NCAP. Crash test data from Europe is therefore an important component of ANCAP model coverage. Euro NCAP recently changed its rating system to encourage better performance in other areas, such as whiplash protection, child occupant protection and pedestrian protection. Euro NCAP also introduced a Safety Assist component of its rating system to encourage certain safety features.

The changes to Euro NCAP's rating system, together with the requirements of other World NCAP organisations have been evaluated by ANCAP and a Roadmap has been prepared. This takes into account the automotive regulatory and marketing environments in Australia and New Zealand. The process included consultation with the local automotive industry.

This paper describes the changes to the rating system that ANCAP will progressively introduce in coming years. These include recognition of a wide range of vehicle safety features and minimum performance in tests of pedestrian protection, whiplash protection and roof strength.

### INTRODUCTION

This document sets out the approved 2011-2015 ANCAP Road Map and provides details to industry and ANCAP stakeholders of what is required under the Road Map year by year.

### BACKGROUND

Since 1999 ANCAP has tested and rated vehicles using essentially the same protocols as Euro NCAP. This produces a rating out of 5 stars for front occupant (driver and front passenger) protection and a separate rating (originally out of 4 stars) for pedestrian protection.

More than half of the model ratings published by ANCAP in that time have been based on at least one set of crash test results from Euro NCAP. Crash test data from Europe is therefore an important component of ANCAP model coverage.

Euro NCAP also published a rating for child occupant protection but this was found to be unsuitable for ANCAP as different child restraints are supplied to the Australian market, when compared with Europe.

This Road Map has been developed in consultation with Australian and New Zealand automotive industry.

### AIMS OF THE ROADMAP

- To promote and reward improvements in vehicle safety beyond that covered by the 2010 ANCAP rating system
- To implement key priorities of ANCAP members in the field of vehicle safety
- To provide consumers with information about the availability of safety features and vehicle performance that go beyond regulatory requirements
- To provide the automotive industry with guidance of future ANCAP requirements to assist with the design and specification of new models.

## **CHANGES TO EURONCAP RATING SYSTEM**

Early in 2009 Euro NCAP introduced major changes to its rating system. This combined previous ratings and a new "Safety Assist" category into an overall rating out of 5 stars. Euro NCAP no longer publishes separate star ratings for front occupant, pedestrian or child occupant protection but continues to conduct the tests to the same protocols and continues to provide ANCAP with the test data. It is therefore possible for ANCAP to continue using the previous rating system and still republish results from Europe. A possible criticism is that ANCAP ratings might no longer match those by Euro NCAP but this has been the case since 2008 when ANCAP introduced a requirement for ESC as a pre-requisite for a 5 star rating. Several models in Australia have missed out on a 5-star rating due to a lack of ESC.

The Safety Assist component of the new Euro NCAP rating system currently covers three safety features: electronic stability control, speed limitation devices (initially manual systems) and seat belt reminders. Points are assigned to each feature. A minimum Safety Assist score is required for each star rating. For example, in 2009 a minimum Safety Assist score of 60% was required for a 5 star overall rating.

## **OTHER NCAP TESTS**

In addition to the offset frontal, mobile barrier side impact and side pole tests, several other types of ratings are conducted by NCAP organisations around the world:

- Pedestrian protection - conducted by Euro NCAP, ANCAP, KNCAP and JNCAP
- Child occupant protection - conducted by Euro NCAP (vehicle crash tests), Australian CREP (sled tests) and JNCAP (sled tests)
- Rear seat adult occupant protection - conducted by JNCAP from May 2009
- Whiplash rating - conducted by Euro NCAP, IIHS, NRMA Insurance and KNCAP
- Rollover propensity (cornering test) - conducted by US NCAP (NHTSA) and KNCAP
- Roof strength - static strength test conducted by IIHS since March 2009. Dynamic rollover tests are under development in the USA and research will soon commence in Australia.
- Dynamic braking tests - conducted by JNCAP and KNCAP
- Safety assist (active safety features) - conducted by Euro NCAP since 2009 and proposed by US NCAP

There are some variations in test and rating protocols amongst these organisations.

## **NCAP TEST AND RATING PROTOCOLS**

Based on NHTSA criteria, for NCAP purposes, a performance test needs to be:

- a) Repeatable and equitable amongst the full range of vehicles that will be subjected to the test
- b) Discriminating (showing a clear difference between best and worst performers in each class)
- c) Where possible, correlated with the outcomes of real-world crashes/injury outcomes
- d) Economically feasible (the need for fabrication of a test rig needs to be considered, as well the destruction of test vehicles)
- e) Credible with the automotive industry and consumers

These criteria are similar those applying to regulation performance tests (although many more conditions apply to regulations). Indeed, most NCAP performance tests are associated with a regulation test.

The availability of a suitable test protocol that meets these criteria is an important factor in the decision to introduce a new NCAP test.

## **CHANGES TO ANCAP'S TESTING REGIME**

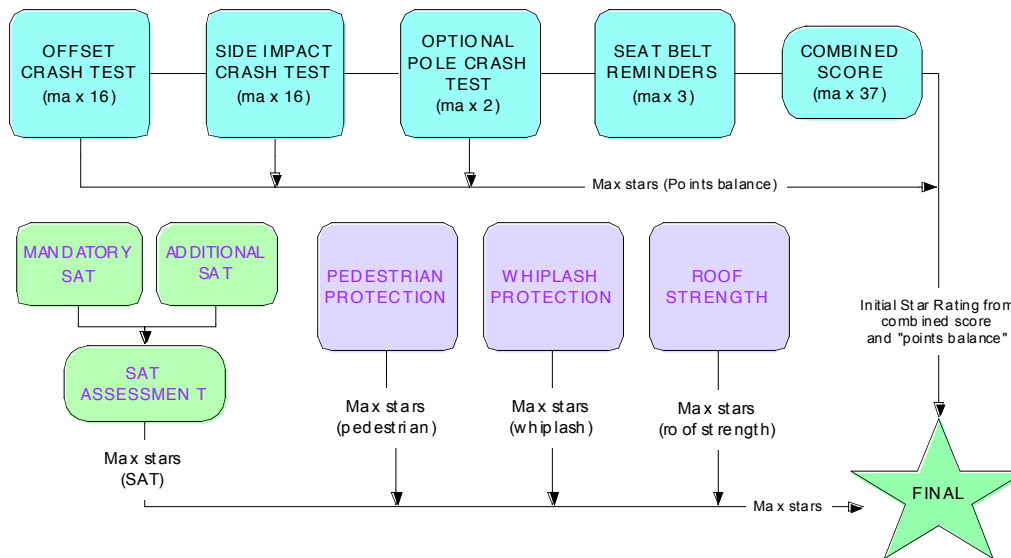
The ANCAP Road Map sets out a new testing regime for the assessment of vehicle safety and the awarding of an ANCAP star rating. Progressively over the life of the Road Map, ANCAP will be introducing new tests, new calculation methods and new safety assist technology ("SAT") requirements.

The Offset Frontal, Side Impact, Side Pole and Pedestrian tests will be retained. Adding to the physical test regime will be Whiplash tests (based on work currently undertaken by NRMA Insurance) and Roof Crush Strength tests (based on work undertaken by IIHS since 2009).

In relation to SAT, both mandatory and additional SAT will be required, with the requirements generally becoming more stringent each year.

Calculation of the overall ANCAP star rating is illustrated on Figure 1. All physical crash test results and the SAT elements will be included in the calculation of the overall ANCAP star rating.

Full details of the Road Map's revised star qualifiers can be found in Appendix A.



**Figure 1. Calculation of ANCAP Rating.**

A description of each mandatory SAT is included in Table 1. A description of all current SAT is included in Appendix B. Additional SAT may be selected from Appendix Table B1 or B2. Items in Appendix Table B3 do not count as Additional SAT.

**Table 1.**

**Mandatory SAT**

Feature (see appendix for definitions)	Comment
Electronic Stability Control (ESC)	Required by ANCAP for 5-stars since 2008. To be extended to other star ratings
Seat Belt Reminders (SBR) for fixed seating positions	Common on front seats for 5-star vehicles. It will remain part of the star rating score, as well as a SAT requirement. To be extended to other star ratings and to rear seats
Head-protecting technology - side airbags (HPT)	Required by ANCAP for front seats for 5-stars since 2004 (pole test). To be extended to other star ratings and to rear seats
Emergency Brake Assist (EBA)	Common on most 5-star vehicles
3-point seat belts for all forward facing seats (3PSB)	Common on most 5-star vehicles

**ROAD MAP REVIEW**

The ANCAP Road Map will be reviewed, updated and extended annually (in June) on 5 year rolling program basis. The review will be conducted by ANCAP in consultation with the automotive industry.

Updates will be published on the ANCAP website following each review.

**SAFETY ASSIST TECHNOLOGY (SAT)**

The ANCAP Road Map includes both mandatory and additional SAT. All SAT are detailed in Appendix B. For a vehicle to achieve a star rating it must meet the appropriate minimum requirements of the physical crash tests and have as standard fitting the minimum mandatory SAT - it must also have the required number of additional SAT. These additional SAT can be selected by the manufacturer/importer from the list of SAT set out in Appendix A.

Note that mandatory SAT must be standard equipment on the rated variant. Additional SAT will be scored at full value if fitted as standard equipment and at half value if fitted as optional equipment. It is possible that variants will have different star ratings due to differences in standard equipment. This situation has existed since 2008 where ANCAP has published two ratings for a model - with and without ESC.

**CONCLUSIONS**

A workable Roadmap has been developed in consultation with the local automotive industries. This will encourage improvements in vehicle safety beyond the occupant protection focus of the previous rating system, while providing continuity with that previous system.

A key feature of the Roadmap is that it encourages a wide range of safety features, all of which can be expected to reduce road trauma to some degree. Manufacturers are given flexibility in the choice of additional safety features to supplement the mandatory features. This avoids the need to rank safety features, with the inevitable debate that such ranking would generate.

APPENDIX A – NEW ANCAP STAR QUALIFIERS

Table A1.

ANCAP Road Map 2011 – 2015

Year	Minimum Frontal Offset Score	Minimum Side Impact Score	Minimum Side Pole Score	Minimum Combined Score <sup>4</sup>	Minimum Pedestrian Rating	Minimum Whiplash Rating	Minimum Roof Strength Rating	Mandatory SAT <sup>1</sup>	Minimum Additional SAT <sup>2</sup>
<b>Requirements for 5 Star Rating</b>									
2011	12.5	12.5	1	32.5	-	-	-	ESC, 3PSB, HPT front seats	-
2012	12.5	12.5	1	32.5	Marginal <sup>3</sup>	Acceptable	-	ESC, 3PSB, HPT front seats	2
2013	12.5	12.5	1	32.5	Marginal <sup>3</sup>	Acceptable	-	2012 + SBR front seats, EBA	3
2014	12.5	12.5	1	32.5	Acceptable <sup>3</sup>	Good	Acceptable	2013 + HPT 2nd row seats	4
2015	12.5	12.5	1	32.5	Acceptable	Good	Acceptable	2014 + SBR 2nd row fixed seats	5
<b>Requirements for 4 Star Rating</b>									
2011	8.5	8.5	-	24.5	-	-	-	-	-
2012	8.5	8.5	-	24.5	-	-	-	ESC	-
2013	8.5	8.5	-	24.5	-	-	-	ESC	1
2014	8.5	8.5	-	24.5	Marginal <sup>3</sup>	Acceptable	-	2013 + 3PSB, HPT front seats	2
2015	8.5	8.5	-	24.5	Acceptable <sup>3</sup>	Acceptable	-	2014 + SBR front seats, EBA	3
<b>Requirements for 3 Star Rating</b>									
2011	4.5	4.5	-	16.5	-	-	-		
2012	4.5	4.5	-	16.5	-	-	-	-	-

2013	4.5	4.5	-	16.5	-	-	-	ESC	-
2014	4.5	4.5	-	16.5	-	-	-	2013 + 3PSB	1
2015	4.5	4.5	-	16.5	-	-	-	"	2
<b>Requirements for 2 Star Rating</b>									
2011	1.5	1.5	-	8.5	-	-	-		
2012	1.5	1.5	-	8.5	-	-	-	-	-
2013	1.5	1.5	-	8.5	-	-	-	-	-
2014	1.5	1.5	-	8.5	-	-	-	ESC	-
2015	1.5	1.5	-	8.5	-	-	-	"	1
<b>Requirements for 1 Star Rating</b>									
2011	-	-	-	0.5	-	-	-	-	-
2012	-	-	-	0.5	-	-	-	-	-
2013	-	-	-	0.5	-	-	-	-	-
2014	-	-	-	0.5	-	-	-	-	-
2015	-	-	-	0.5	-	-	-	-	-

Notes:

1. Must be standard on the variant being assessed.
2. For additional SAT to score the full value, the particular SAT must be fitted by the manufacturer as standard equipment. SAT fitted by the manufacturer but specified as optional (extra) equipment only scores half value.
3. Vehicles with a seating reference height of 700mm or more may meet one grade less for pedestrian protection (eg "poor" instead of "marginal" and "marginal" instead of "acceptable".)
4. The Combined Score includes up to 3 points for seat belt reminders (1 for driver, 1 for front passenger and 1 for all 2nd row seats - this is separate from the SAT scoring)

## APPENDIX B - SAFETY ASSIST TECHNOLOGIES

The **coloured text** indicates it has been copied from Euro NCAP sources.

TBA = assessment method to be advised

**Table B1.**

### Existing Technologies (well established)

NAME	DESCRIPTION	ASSESSMENT METHOD
DAYTIME RUNNING LIGHTS (DRL)	Dedicated daytime running lights, preferably combined with auto headlights that automatically switch on at dusk	ADR76 or European Commission Directive 2008/89/EC
DRIVER KNEE AIRBAG	Extra airbags designed to cushion the knees of the driver.  Although a knee airbag contributes to the offset crash test score (by reducing upper leg loading and eliminating knee hazards) there are extra benefits that justify inclusion in the SAT list.	Observe after offset crash test
ELECTRONIC BRAKEFORCE DISTRIBUTION (EBD)	Distribution of braking forces is optimised to maximise the available friction	Functional definition (based on ADR 31)
ELECTRONIC STABILITY CONTROL (ESC)	Detects if vehicle is nearing the limits of traction during cornering and braking and adjusts braking to individual wheels and engine torque to improve stability.	Functional requirements of the GTR
EMERGENCY BRAKE ASSIST	Detects fast brake application. Provides emergency braking assistance	Functional definition. Possible Euro NCAP Advanced (pending)
EMERGENCY STOP SIGNAL (ESS)	A signal to indicate to other road users to the rear of the vehicle that a high retardation force has been applied to the vehicle relative to the prevailing road conditions. The emergency stop signal shall be given by the simultaneous operation of all the stop or direction indicator lamps. All the lamps of the emergency stop signal shall flash in phase at a frequency of $4.0 \pm 1.0$ Hz. However, if any of the lamps of the emergency stop signal to the rear of the vehicle use filament light sources the frequency shall be $4.0 +0.0/- 1.0$ Hz.	ADR 13/00 (ECE 48)
FATIGUE REMINDER	Monitors hours of driving and encourages rest breaks (trip timer)	Functional definition (+ road test?)
HEAD RESTRAINTS FOR ALL SEATS	Head restraints with a geometry designed to protect an adult in a collision from the rear	Vehicle inspection
REVERSING COLLISION AVOIDANCE	Visual aids (e.g. camera) to improve the rearward field of view plus sensors detect objects in the path of a reversing vehicle. Parking sensors alone would not meet the requirements	Functional definition based on RTA Technical Specification No 149  Possible NHTSA rule
SEAT BELT INTERLOCK/	Require driver to put on seat belt before the vehicle can be driven (interlock), or provide alert to driver	Reminder: Euro NCAP protocol

REMINDER	that seated occupants do not have seat belts connected	Interlock: TBA
SIDE AIRBAGS WITH HEAD PROTECTION	Side airbag or curtain airbag deploys in side impact and protects the head	Extra observation after a pole test using geometric assessment (e.g. whether a rear-seat occupant would have had head protection). No extra dynamic test is proposed.
THREE-POINT SEAT BELTS FOR ALL SEATS	Lap/sash seat belts in all forward facing seating positions	Vehicle inspection
TYRE PRESSURE MONITORING	Detects when a tyre drops below designated pressure and alerts driver	US FMVSS 138 (other standards may be accepted)

**Table B2.**

**New and Emerging Technologies**

NAME	DESCRIPTION	ASSESSMENT METHOD
ADAPTIVE FRONT LIGHTING SYSTEMS	Headlights and associated lights that adjust their direction and intensity to provide additional illumination on curves, turns, and hills and to highlight potential hazards.	ADR 13
ADDITIONAL OCCUPANT PROTECTION AIRBAGS	Additional airbags that are not associated with the crash tests conducted by ANCAP (e.g. centre console between front seats, rear seat frontal airbag, rear seat thorax side airbags). Each type of airbag system will count as one SAT (if standard).	Functional definition plus manufacturer's crash test data.
ALCOHOL /DRUG IGNITION INTERLOCK	Require driver to perform and pass a breath alcohol test before the vehicle can be driven	State government requirements? Possible Euro NCAP Advanced (pending)
ATTENTION ASSIST (FATIGUE DETECTION)	Attention Assist is a drowsiness detection system that warns drivers to prevent them falling asleep momentarily whilst driving. It will prompt them to take a break before it's too late.	Euro NCAP Advanced (pending?)
AUTOMATIC EMERGENCY CALL (eCall)	Alerts emergency services (or a contractor) if a severe collision occurs  Automatic Emergency Call (eCall) is a system giving an automatic message to an emergency call centre in case of a crash of the vehicle.  The Public Safety Answering Points are not yet set and equipped to receive the message in the European standardized format in all European Countries.	Euro NCAP Advanced
AUTOMATIC HIGH BEAM	Maximises use of the headlamp high beam facility to improve driver vision significantly during night conditions. It also makes use of the forward-looking camera to detect light sources ahead and, in the case of oncoming vehicles, automatically switches the	TBA

	lights to low beam to avoid glare. Additionally, the system will detect red tail lights ahead, even those with lower luminance, to make sure motorists in front are not distracted by high beam lights shining in their rear view mirrors. The high beam is also automatically deactivated in urban areas.	
<b>AUTONOMOUS EMERGENCY BRAKING</b>	<p>Detects distance and closing speed of objects in path of vehicle and automatically decelerates if driver does not heed warning</p> <p>Many accidents are caused by late braking and/or braking with insufficient force. A driver may brake too late for several reasons: he is distracted or inattentive; visibility is poor, for instance when driving towards a low sun; or a situation may be very difficult to predict because the driver ahead is braking unexpectedly. Most people are not used to dealing with such critical situations and do not apply enough braking force to avoid a crash.</p> <p>Several manufacturers have developed technologies which can help the driver to avoid these kinds of accidents or, at least, to reduce their severity. The systems they have developed can be grouped under the title:</p> <p>Autonomous: the system acts independently of the driver to avoid or mitigate the accident.</p> <p>Emergency: the system will intervene only in a critical situation.</p> <p>Braking: the system tries to avoid the accident by applying the brakes.</p>	Euro NCAP Advanced
<b>BLIND SPOT MONITORING</b>	<p>Detects distance and closing speed of objects in adjacent lanes and alerts driver if a collision is imminent</p> <p>On a motorway, a car which is far behind can be clearly seen in the rear view mirrors. However, as the car approaches, a point is reached where the car cannot be seen in either the interior or exterior mirrors. Typically this occurs when the car is just behind and to one side of the vehicle it is overtaking. It is a common mistake for drivers to change lanes when there is a vehicle in this so-called “blind spot”, a manoeuvre which causes many accidents on European motorways.</p> <p>Several manufacturers have developed systems which monitor the blind-spot and help a driver change lanes safely. Some systems are camera-based, others rely on radar. Either way, the area to one side and rearward to the vehicle is monitored and the driver is warned when there is a vehicle in a position where it</p>	Euro NCAP Advanced



	may not be seen in the rear view mirrors.	
ELECTRONIC DATA RECORDER (EDR)	Continuously records vehicle speed and other parameters and stores this in the event of a collision or for other analysis ("Black box" recorder)	TBA - standards available in USA
HILL LAUNCH ASSIST	Using the braking system, HLA is engaged when the car is stationary to prevent it from rolling. Effective on both uphill and downhill gradients, HLA provides a delay when the driver moves their foot from the brake pedal to the accelerator pedal, as the system maintains pressure to the braking system. The HLA feature avoids the need for the driver to go through an awkward sequence of events involving the handbrake to hold the car momentarily whilst on a hill. Once sufficient engine torque is reached the HLA feature automatically releases the brake system in a controlled manner.	TBA
INFLATABLE REAR SEAT BELTS	<p>Inflatable seatbelts have tubular inflatable bladders contained within an outer cover. When a crash occurs the bladder inflates with a gas to increase the area of the restraint contacting the occupant and also shortening the length of the restraint to tighten the belt around the occupant, improving the protection. The inflatable sections may be shoulder-only or lap and shoulder. The system supports the head during the crash better than a web only belt. It also provides side impact protection.</p> <p>Only rear -seat nflatable seat belts are counted as a SAT. Front-seat inflatable seat belts are not considered as these would be assessed through the performance requirements of the frontal offset crash test.</p>	<p>TBA.</p> <p>Could be superseded by crash tests with adult dummy in rear seat (e.g. Japan NCAP).</p> <p>Inflatable front seat belts are not counted and they contribute to performance in the offset crash test.</p>
INTERSECTION COLLISION WARNING	Detects vehicles approaching from the side at intersections. Alerts driver if a collision is possible	Under development?
LANE SUPPORT SYSTEMS	<p>Recognises lane markings and alerts driver if the lane boundary is crossed</p> <p>Lane Support Systems can assist and warn you when you unintentionally leave the road lane or when you change lane without indication.</p> <p><b>Lane Departure Warning</b></p> <p>Several manufacturers have developed technologies which warn the driver when the car is getting close to a lane marking. Different systems use different warnings: some give an audible signal while others use a vibrating steering wheel to simulate the feeling of the car running over a 'rumble strip'. The intention is simply to make the driver aware that the car is in danger of crossing the line. Some systems need a line only on one side of the vehicle while other systems rely on having a distinct marking on either side.</p> <p>Lane departure warning systems rely on distinct lane</p>	Euro NCAP Advanced

	<p>markings: their effectiveness is reduced if lines cannot be clearly distinguished such as in heavy rain or fog, or if the road markings are obscured by mud or snow. In such cases, an indication is given to the driver that the system is unable to assist’.</p> <p><b>Lane Keep Assist</b></p> <p>Lane-Keep Assist systems address similar accident situations to lane departure warning. However, whereas warning systems rely on the driver to take corrective action, Lane Keep Assist also proactively steers the car back into the lane. When the car is close to a marking, the system gently steers the car away from the line until it is safely within the lane. The system can steer the car either by applying gentle braking to one wheel or, in the case of electric steering systems, by applying a direct steering input.</p>	
NIGHT VISION ENHANCEMENT	Generally uses technology (e.g. infra-red lights) to enhance driver vision	TBA
PRE-CRASH SYSTEMS	<p>Detects imminent collision. Deploys safety devices such as seat belt pretensioners</p> <p>Manufacturers take care to ensure that their safety systems are effective for occupants of different sizes and for those sitting in different positions. However, the very best levels of protection can be achieved when the interaction between occupant and restraint systems is optimised. Several manufacturers have developed systems designed to allow a vehicle's protection systems to operate most effectively during an impact.</p> <p>Some of these systems react immediately following or during the impact to optimise occupant safety. For example, they may not directly restrain the occupant but may control the occupant's movement so that the restraint systems work most effectively. Other systems may predict when an accident is about to happen and in a split second prepare the vehicle and its occupants for the collision. Predicting the accident can be done in a number of ways: vehicle dynamics and driver actions can be monitored for panic reactions, or radar sensors can detect obstacles in front of the car. The actions which the systems take can also vary but, typically, slack will be removed from seatbelts, seating positions may be quickly adjusted to optimise airbag performance and windows shut to prevent ejection. In such cases, the actions taken are reversible in the event that the accident is avoided.</p>	Euro NCAP Advanced
ROLL STABILITY SYSTEM	Detects imminent rollover and initiates corrective (avoidance) action	Functional definition based on ESC GTR?
ROLLOVER OCCUPANT	Detects a rollover situation and deploys occupant protection systems such as inflatable curtains	TBA

PROTECTION SYSTEMS		
ROLLOVER WARNING	Alert drivers when the lateral forces or vehicle dynamics indicate a risk of rollover (this is mainly a heavy truck application).	TBA
SMART LICENCE	Vehicle will not operate without an appropriate electronic licence. This might have speed or time-of-day restrictions.	TBA
<b>SPEED ALERT SYSTEMS (ISA)</b>	<p>Determines current speed limit (mainly from digital map) and alerts driver if the limit is being exceeded (passive ISA) or limits the speed of the vehicle (active ISA).</p> <p>Excessive speed is a factor in the causation and severity of many road accidents. Speed restrictions are intended to promote safe use of the road network by keeping traffic speeds below the maximum that is appropriate for a given traffic environment, thereby protecting vehicle occupants and other road users. Greater adherence to speed limits would avert many accidents and reduce the severity of those that occur.</p> <p>Excessive speeding is sometimes unintentional. Drivers who are tired or otherwise distracted may allow their speeds to drift above the maximum allowed for that road. Others may inadvertently miss a traffic sign alerting them to a change in the speed limit, such as when entering a built-up area. Speed alert or Intelligent Speed Assistance (ISA) systems help drivers to keep their speeds within the recommended limits.</p> <p>Some systems display the current limit so that the driver is always aware of the maximum speed allowed on that road. The speed limit may, for example, be determined by software which analyses images from a camera and recognises traffic signs. Alternatively, satellite navigation is becoming increasingly accurate and could be used to provide information to the driver. However, this relies on the most up to date digital maps being available at all times. Systems may or may not issue a warning to the driver when the speed limit is being exceeded and current systems are voluntary: they can be switched off and they rely on the driver responding appropriately to the warning.</p>	Euro NCAP pending or ANCAP's proposed amendment to ECE Regulation 89 ( <a href="http://www-nrd.nhtsa.dot.gov/pdf/esv/esv21/09-0378.pdf">http://www-nrd.nhtsa.dot.gov/pdf/esv/esv21/09-0378.pdf</a> )
SPEEDOMETER SCALE AND DISPLAY	Speedometer maximum speed and scale match Australian maximum speed limits (e.g. 130km/h maximum)	Functional definition - see Top Speed Limiter
SPEED ALARM (MANUAL)	Alert drivers when the vehicle speed exceeds a pre-set limit (driver selects a speed for an audible alert)	Very limited proper use, compared with ISA.
TOP SPEED LIMITER	Vehicle is incapable of traveling above a set speed for prolonged periods. Recommended setting is 120km/h. PIN override could be allowed for each	Functional requirement TBA.

	<p>trip, to cater for Northern Territory.</p> <p>It is preferred that the system also limits the top speed in reverse to 10km/h</p> <p>A top speed limiter would discourage theft and car-jacking</p>	Nearly all vehicles already have a top speed limiter but it is set unrealistically high.
TRAFFIC SIGN RECOGNITION	Optical recognition of traffic signs for assisting driver	TBA
TRAILER STABILITY CONTROL	<p>The trailer stability control system ensures superior stability and safety when towing. With increasing speed, trailers tend to swing from side to side, and may even swing out of control. This is especially the case for heavier trailer loads or if the weight of the trailer load is not distributed evenly: even at relatively low speeds, a swaying motion can arise. This can destabilise both the trailer and the towing vehicle unless a stabilising measure quickly intervenes. The trailer stability control system recognizes the early signs of this dangerous swinging motion. It activates the brakes immediately to slow the trailer down and return stability. It discerns this danger by constantly monitoring the rotation movement of the vehicle using special sensors. If these values exceed the safe limit, trailer stability control activates the brakes and simultaneously, the engine output is reduced. The resulting drop in speed brings the trailer back to stability. As soon as stability is restored, the driver is again in full control of the vehicle's speed.</p>	TBA
VEHICLE2 VEHICLE COMMS	Standards for exchange of information between vehicles and roadways.	TBA
WORKLOAD MANAGER	Filters and prioritises the information made available to the driver. Postpones or cancels certain distractions, such as non-urgent vehicle warnings or integrated mobile telephone calls.	TBA

**TABLE B3.****Technologies that are not counted as SAT**

NAME	DESCRIPTION	COMMENT
ABS BRAKES	Prevents individual wheels from lock up during heavy braking (or on slippery surfaces) and subsequently assists driver to maintain control	Already part of ESC
ADAPTIVE CRUISE CONTROL (ACC)	Detects distance and speed of preceding vehicle and maintains appropriate headway	See Autonomous Emergency Braking (Not a separate SAT)
ACTIVE HEAD RESTRAINTS	Seat design responds to rearward collision by moving head restraint forward and other actions that reduce the risk of whiplash type injuries. Electronic detection of collision may offer better protection, compared with mechanical systems.	Superseded by dynamic whiplash tests. Do not include
BONNET FOR PEDESTRIAN PROTECTION	Detects collision with pedestrian and either deploys external airbag or raises bonnet to lessen impact	Now part of Euro NCAP pedestrian protection assessment. Do not include
FOLLOWING DISTANCE WARNING	Detects distance to preceding vehicle and alerts driver if the gap is less than recommended headway for the current speed	See Autonomous Emergency Braking (Not a separate SAT)
NAVIGATION SYSTEM (GPS)	Displays dynamic map of roads. Some give voice instructions for route following. Some give known hazard warnings such as blackspots.	Speed limit alerts already covered by ISA. No other major safety benefits.
PARKING ASSIST SYSTEMS	Automated reverse park system	Primarily to reduce risk of property damage.
OFF-ROAD ASSIST SYSTEMS	Features designed to assist off-road driving such as hill-descent control	Primarily for off-road use
TRACTION CONTROL	System detects potential wheel spin due to excessive driving torque and limits this torque.	Already part of ESC