Response to NHTSA NCAP Docket No. NHTSA-2021-0002		
	Question	Comments
Category III. ADAS Performance Testing Program		
1	Should the Agency award credit to vehicles equipped with LDW systems that provide a passing alert, regardless of the alert type? Why or why not? Are there any LDW alert modalities, such as visual-only warnings, that the Agency should not consider acceptable when determining whether a vehicle meets NCAP's performance test criteria? If so, why? Should the Agency consider only certain alert modalities (such as haptic warnings) because they are more effective at re-engaging the driver and/or have higher consumer acceptance? If so, which one(s) and why?	LDW is a feature with low consumer acceptance. Giving the OEM several possibilities will provide more possibilities for real life impact. Specially, haptic warnings have higher rates of acceptance and there is a lower risk of system shut down.
2	If NHTSA were to adopt the lane keeping assist test methods from the Euro NCAP LSS protocol for the Agency's LKS test procedure, should the LDW test procedure be removed from its NCAP program entirely and an LDW requirement be integrated into the LKS test procedure instead? Why or why not? For systems that have both LDW and LKS capabilities, the Agency would simply turn off LKS to conduct the LDW test if both systems are to be assessed separately. What tolerances would be appropriate for each test, and why?	LKA has a larger safety impact than LDW. It would be more convenient to have a single test protocol, mainly oriented to LKA where maybe there could be a minor requirement for LDW. LKA should have a complete test protocol. LDW could be a basic assessment, not performance oriented, but mostly as a fitment verification.
3	LKS system designs provide steering and/or braking to address lane departures (*e.g.,* when a driver is distracted). To help reengage a driver, should the Agency specify that an LDW alert must be provided when the LKS is activated? Why or why not?	LDW warning when LKA is activated could be convenient in safety critical scenarios (lane departure scenarios with risk of road departure or collision against other vehicles). However, LDW warning in minor LKA interventions could be skipped. LDW warnings based on haptic system would be more effective.
4	Do commenters agree that the Agency should remove the Botts' Dots test scenario from the current LDW test procedure since this lane marking type is being removed from use in California? If not, why?	The presence of botts' dots is tending to be minor. We agree that it is becoming a niche scenario with low relevancy.
5	Is the Euro NCAP maximum excursión limit of 0.3 m (1.0 ft.) over the lane marking (as defined with respect to the inside edge of the lane line) for LKS technology acceptable, or should the limit be reduced to account for crashes occurring on roads with limited shoulder width? If the tolerance should be reduced, what tolerance would be appropriate and why? Should this tolerance be adopted for LDW in addition to LKS? Why or why not?	In Euro NCAP, excursion limit is measured from the inner edge of the lane marking. It is also measured from the outer face of the tire. And lane markings are typically 0.2 m wide. That results in 0.1 m excursion after the lane marking. This tolerance is provided to avoid too intrusive systems that constantly correct vehicle trajectory and gain driver acceptance. The tolerance is low enough not to create a safety critical situation.
6	In its LSS Protocol, Euro NCAP specifies use of a 1,200 m (3,937.0 ft.) curve and a series of increasing lateral offsets to establish the desired lateral velocity of the SV towards the lane line it must respond to. Preliminary NHTSA tests have indicated that use of a 200 m (656.2 ft.) curve radius provides a clearer indication of when an LKS intervention occurs when compared to the baseline tests performed without LKS, a process specified by the Euro NCAP LSS protocol. This is because the small curve radius allows the desired SV lateral velocity to be more quickly established; requires less initial lateral offset within the travel lane; and allows for a longer period of steady state lateral velocity to be realized before an LKS intervention occurs. Is use of a 200 m (656.2 ft.) curve radius, rather than 1,200 m (3,937.0 ft.), acceptable for inclusion in a NHTSA LKS test procedure? Why or why not?	Euro NCAP uses fixed radius and variable arch lengths to generate multiple lateral speeds towards the lane marking. The LKA protocol should include a procedure to generate multiple lateral speeds. It is recommended to use variable radii and same arch length to generate them. Lateral speeds should range from 0.1 m/s to 0.6 m/s and probably they can be generated within 200 m to 1200 m radii.
7	Euro NCAP's LSS protocol specifies a single line lane to evaluate system performance. However, since certain LKS systems may require two lane lines before they can be enabled, should the Agency use a single line or two lines lane in its test procedure? Why?	None
8	Should NHTSA consider adding Euro NCAP's road edge detection test to its NCAP program to begin addressing crashes where lane markings may not be present? If not, why? If so, should the test be added for LDW, LKS, or both technologies?	Road departures show a large risk because the departure might generate a rollover situation. Therefore, road edge detection is an important technology. As it is a safety critical scenario, it is relevant mainly for self avoiding technologies, such as LKA.
9	The LKS and ''Road Edge'' recovery tests defined in the Euro NCAP LSS protocol specify that a range of lateral velocities from 0.2 to 0.5 m/s (0.7 to 1.6 ft./s) be used to assess system performance, and that this range is representative of the lateral velocities associated with unintended lane departures (*i.e.,* not an intended lane change). However, in the same protocol, Euro NCAP also specifies a range of lateral velocities from 0.3 to 0.6 m/s (1.0 to 2.0 ft./s) be used to represent unintended lane departures during ''Emergency Lane Keeping—Oncoming vehicle'' and ''Emergency Lane Keeping—Overtaking vehicle'' tests. To encourage the most robust LKS system performance, should NHTSA consider a combination of the two Euro NCAP unintended departure ranges, lateral velocities from 0.2 to 0.6 m/s (0.7 to 2.0 ft./s), for inclusion in the Agency's LKS evaluation? Why or why not?	None

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10	As discussed above, the Agency is concerned about LKS performance on roads that are curved. As such, can the Agency correlate better LKS system performance at higher lateral velocities on straight roads with better curved road performance? Why or why not? Furthermore, can the Agency assume that a vehicle that does not exceed the maximum excursion limits at higher lateral velocities on straight roads will have superior curved road performance compared to a vehicle that only meets the excursion limits at lower lateral velocities on straight roads? Why or why not? And lastly, can the Agency assume the steering intervention while the vehicle is negotiating a curve is sustained long enough for a driver to reengage? If not, why?	In principle, in a bend the driver is more active and shows a lower risk of being distracted. This is why most of LDW / LKA testing is done in a straight line. Curved scenarios can be added, but they are extremely difficult to implement.
11	The Agency would like to be assured that when a vehicle is redirected after an LKS system intervenes to prevent a lane departure when tested on one side, if it approaches the lane marker on the side not tested, the LKS will again engage to prevent a secondary lane departure by not exceeding the same maximum excursion limit established for the first side. To prevent potential secondary lane departures, should the Agency consider modifying the Euro NCAP ''lane keep assist'' evaluation criteria to be consistent with language developed for NHTSA's BSI test procedure to prevent this issue? Why or why not? NHTSA's test procedure states the SV BSI intervention shall not cause the SV to travel 0.3 m (1 ft.) or more beyond the inboard edge of the lane line separating the SV travel lane from the lane adjacent and to the right of it within the validity period. To assess whether this occurs, a second lane line is required (only one line is specified in the Euro NCAP LSS protocol for LKS testing). Does the introduction of a second lane line have the potential to confound LKS testing? Why or why not?	None
12	Since most fatal road departure and opposite direction crashes occur at higher posted and known travel speeds, should the LKS test speed be increased, or does the current test speed adequately indicate performance at higher speeds, especially on straight roads? Why or why not?	LKA protocols focus in many lane conditions and lateral speeds, but in only one driving speed. It is true that it covers only the lower limit of intervention of the systems (systems will be activated at >65 km/h) but it could be considered that only verification tests be done at higher speeds, up to 120 km/h.
13	The Agency recognizes that the LKS test procedure currently contains many test conditions (*i.e.,* line type and departure direction). Is it necessary for the Agency to perform all test conditions to address the safety problem adequately, or could NCAP test only certain conditions to minimize test burden? For instance, should the Agency consider incorporating the test conditions for only one departure direction if the vehicle manufacturer provides test data to assure comparable system performance for the other direction? Or, should the Agency consider adopting only the most challenging test conditions? If so, which conditions are most appropriate? For instance, do the dashed line test conditions provide a greater challenge to vehicles than the solid line test conditions?	It is not ok to focus on only the most challenging conditions. LKA systems have limited driver acceptance and there is a risk that vehicles are designed to support only in the worst case conditions (higher lateral speeds) and do not intervene in the lower speeds. In this case, the safety benefit is lost. Of course, if the test matrix combining driving speeds, lateral speeds and lane markings is large, some simplification can be applied. For example, testing at 0.2, 0.4 and 0.6 m/s. Or also introducing a GRID approach, where the matrix is large, OEM provides results for all the matrix but the agency only verifies an aleatory subsample of the test matrix.
14	What is the appropriate number of test trials to adopt for each LKS test condition, and why? Also, what is an appropriate pass rate for the LKS tests, and why?	Experience in LKA (and also AEB) testing shows that one test run per test condition is enough. Current systems are much more robust and do not show dispersion in the test results. Robustness of the systems can be checked by executing the same test many times (the 5 out of 7 criteria) or by executing many tests with one shot only.
15	Are there any aspects of NCAP's current LDW or proposed LKS test procedure that need further refinement or clarification? Is so, what additional refinements or clarifications are necessary?	None
16	Should all BSW testing be conducted without the turn signal indicator activated? Why or why not? If the Agency was to modify the BSW test procedure to stipulate activation of the turn signal indicator, should the test vehicle be required to provide an audible or haptic warning that another vehicle is in its blind zone, or is a visual warning sufficient? If a visual warning is sufficient, should it continually flash, at a minimum, to provide a distinction from the blind spot status when the turn signal is not in use? Why or why not?	Our experience shows that visual warning is good for information only (presence of a vehicle in the BSD area), but audio warning is good for alerting the driver when he tries to perform a lane change (risk of collision with a vehicle in the BSD area). Therefore, the ideal system would have an information system and a warning and/or actuation system.
17	Is it appropriate for the Agency to use the Straight Lane Pass-by Test to quantify and ultimately differentiate a vehicle's BSW capability based on its ability to provide acceptable warnings when the POV has entered the SV's blind spot (as defined by the blind zone) for varying POV–SV speed differentials? Why or why not?	None
18	Is using the GVT as the strikeable POV in the BSI test procedure appropriate? Is using Revision G in NCAP appropriate? Why or why not?	None

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19	The Agency recognizes that the BSW test procedure currently contains two test scenarios that have multiple test conditions (*e.g.,* test speeds and POV approach directions (left and right side of the SV)). Is it necessary for the Agency to perform all test scenarios and test conditions to address the real-world safety problem adequately, or could it test only certain scenarios or conditions to minimize test burden in NCAP? For instance, should the Agency consider incorporating only the most challenging test conditions into NCAP, such as the ones with the greatest speed differential, or choose to perform the test conditions having the lowest and highest speeds? Should the Agency consider only performing the test conditions where the POV passes by the SV on the left side if the vehicle manufacturer provides test data to assure the left side pass-by tests are also representative of system performance during right side pass-by tests? Why or why not?	If the information / warning / actuation approach is followed, then there is no driver acceptance issue. The information part (pass by test) can be easily done many times and it does not need to be simplified. The warning / intervention part has no risk of driver acceptance and therefore it can focus on the worst case scenario.
20	Given the Agency's concern about the amount of system performance testing under consideration in this RFC, it seeks input on whether to include a BSI false positive test. Is a false positive assessment needed to insure system robustness and high customer satisfaction? Why or why not?	None
21	The BSW test procedure includes 7 repeated trials for each test condition (*i.e.,* test speed and POV approach direction). Is this an appropriate number of repeat trials? Why or why not? What is the appropriate number of test trials to adopt for each BSI test scenario, and why? Also, what is an appropriate pass rate for each of the two tests, BSW and BSI, and why is it appropriate?	Experience in LKA (and also AEB) testing shows that one test run per test condition is enough. Current systems are much more robust and do not show dispersion in the test results. Robustness of the systems can be checked by executing the same test many times (the 5 out of 7 criteria) or by executing many tests with one shot only.
22	Is it reasonable to perform only BSI tests in conjunction with activation of the turn signal? Why or why not? If the turn signal is not used, how can the operation of BSI be differentiated from the heading adjustments resulting from an LKS intervention? Should the SV's LKS system be switched off during conduct of the Agency's BSI evaluations? Why or why not?	Both intended (turn indicator ON) and unintended (turn indicator OFF) tests are relevant for this function. It is difficult to ensure that both LKA and BSD functions are totally decoupled. But it should not be a concern; the objective is that the vehicle performs correctly in the scenario, no matter whether via a LKA function or a BSD function.
23	Is the proposed test speed range, 10 kph (6.2 mph) to 60 kph (37.3 mph), to be assessed in 10 kph (6.2 mph) increments, most appropriate for PAEB test scenarios S1 and S4? Why or why not?	10 to 60 km/h covers well the urban scenarios for crossing (S1), which are the most common. It is important to highlight that 10 km/h is a worst case scenario because of field of view limitations of the sensors.
24	The Agency has proposed to include Scenarios S1 a–e and S4 a–c in its NCAP assessment. Is it necessary for the Agency to perform all test scenarios and test conditions proposed in this RFC notice to address the safety problem adequately, or could NCAP test only certain scenarios or conditions to minimize test burden but still address an adequate proportion of the safety problem? Why or why not? If it is not necessary for the Agency to perform all test scenarios or test conditions, which scenarios/conditions should be assessed? Although they are not currently proposed for inclusion, should the Agency also adopt the false positive test conditions, S1f and S1g? Why or why not?	None
25	Given that a large portion of pedestrian fatalities and injuries occur under dark lighting conditions, the Agency has proposed to perform testing for the included test conditions (*i.e.,* S1 a–e and S4 a–c) under dark lighting conditions (*i.e.,* nighttime) in addition to daylight test conditions for test speed range 10 kph (6.2 mph) to 60 kph (37.3 mph). NHTSA proposes that a vehicle's lower beams would provide the source of light during the nighttime assessments. However, if the SV is equipped with advanced lighting systems such as semiautomatic headlamp beam switching and/or adaptive driving beam head lighting system, they shall be enabled during the nighttime PAEB assessment. Is this testing approach appropriate? Why or why not? Should the Agency conduct PAEB evaluation tests with only the vehicle's lower beams and disable or not use any other advanced lighting systems?	The vehicle should be tested as standard. If automatic headlamps are standard in the vehicle, then the vehicle should be tested with them.
26	Should the Agency consider performing PAEB testing under dark conditions with a vehicle's upper beams as a light source? If yes, should this lighting condition be assessed in addition to the proposed dark test condition, which would utilize only a vehicle's lower beams along with any advanced lighting system enabled, or in lieu of the proposed dark testing condition? Should the Agency also evaluate PAEB performance in dark lighting conditions with overhead lights? Why or why not? What test scenarios, conditions, and speed(s) are appropriate for nighttime (*i.e.,* dark lighting conditions) testing in NCAP, and why?	Lower beams is a worst case condition and it is also the common case in urban areas (with pedestrians). Maybe the test burden can be reduced by testing only with low beams (or automatic headlamps).

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27	To reduce test burden in NCAP, the Agency proposed to perform one test per test speed until contact occurs, or until the vehicle's relative impact velocity exceeds 50 percent of the initial speed of the subject vehicle for the given test condition. If contact occurs and if the vehicle's relative impact velocity is less than or equal to 50 percent of the initial SV speed for the given combination of test speed and test condition, an additional four test trials will be conducted at the given test speed and test condition, and the SV must meet the passing performance criterion (*i.e.,* no contact) for at least three out of those five test trials in order to be assessed at the next incremental test speed. Is this an appropriate approach to assess PAEB system performance in NCAP, or should a certain number of test trials be required for each assessed test speed? Why or why not? If a certain number of repeat tests is more appropriate, how many test trials should be conducted, and why?	PAEB has a huge potential if avoiding the crash, but also has an important potential in case of mitigation. Therefore, it is important to keep testing even if there is impact. Probability of survival in an overrun is very high for impact speeds above 40 km/h and very low above 40 km/h. So aiming for systems dropping the impact speed below 40 km/h is a good strategy. Robustness of the systems in the market are high. So, one single test run per scenario and speed and then doing a lot different speeds and scenarios is a good strategy.
28	Is a performance criterion of ''no contact'' appropriate for the proposed PAEB test conditions? Why or why not? Alternatively, should the Agency require minimum speed reductions or specify a maximum allowable SV-to-mannequin impact speed for any or all of the proposed test conditions (*i.e.,* test scenario and test speed combination)? If yes, why, and for which test conditions? For those test conditions, what speed reductions would be appropriate? Alternatively, what maximum allowable impact speed would be appropriate?	A good strategy is to avoid up to 40 km/h and make sure that above 40 km/h speed is reduced by 50%. Mannequins can widthstand impacts up to 40 km/h with minor damages and good durability.
29	If the SV contacts the pedestrian mannequin during the initial trial for a given test condition and test speed combination, NHTSA proposes to conduct additional test trials only if the relative impact velocity observed during that trial is less than or equal to 50 percent of the initial speed of the SV. For a test speed of 60 kph (37.3 mph), this maximum relative impact velocity is nominally 30 kph (18.6 mph), and for a test speed of 10 kph (6.2 mph), the maximum relative impact velocity is nominally 5 kph (3.1 mph). Is this an appropriate limit on the maximum relative impact velocity for the proposed range of test speeds? If not, why? Note that the tests in Global Technical Regulation (GTR) No. 9 for pedestrian crashworthiness protection simulates a pedestrian impact at 40 kph (24.9 mph).	None
30	For each lighting condition, the Agency is proposing 6 test speeds (*i.e.,* those performed from 10 to 60 kph (6.2 to 37.3 mph) in increments of 10 kph (6.2 mph)) for each of the 8 proposed test conditions (S1a, b, c, d, and e and S4a, b, and c). This results in a total of 48 unique combinations of test conditions and test speeds to be evaluated per lighting condition, or 96 total combinations for both light conditions. The Agency mentions later in the ADAS Ratings System section, that it plans to use check marks, as is done currently, to give credit to vehicles that (1) are equipped with the recommended ADAS technologies, and (2) pass the applicable system performance test requirements for each ADAS technology included in NCAP until it issues (1) a final decision notice announcing the new ADAS rating system and (2) a final rule to amend the safety rating section of the vehicle window sticker Monroney label). For the purposes of providing credit for a technology using check marks, what is an appropriate minimum overall pass rate for PAEB performance evaluation? For example, should a vehicle be said to meet the PAEB performance requirements if it passes two thirds of the 96 unique combinations of test conditions and test speeds for the two lighting conditions (*i.e.,* passes 64 unique combinations of test conditions and test speeds)?	PAB is already available in many vehicles and with relatively high performance. 2/3 is a good threshold.
31	Given previous support from commenters to include S2 and S3 scenarios in the program at some point in the future and the results of AAA's testing for one of the turning conditions, NHTSA seeks comment on an appropriate timeframe for including S2 and S3 scenarios into the Agency's NCAP. Also, NHTSA requests from vehicle manufacturers information on any currently available models designed to address, and ideally achieve crash avoidance during conduct of the S2 and S3 scenarios to support Agency evaluation for a future program upgrade.	None
32	Should the Agency adopt the articulated mannequins into the PAEB test procedure as proposed? Why or why not?	Yes. Articulated mannequins are needed for radar-based systems, because they monitor doppler frequencies from the leg movement.
33	In addition to tests performed under daylight conditions, the Agency is proposing to evaluate the performance of PAEB systems during nighttime conditions where a large percentage of real-world pedestrian fatalities occur. Are there other technologies and information available to the public that the Agency can evaluate under nighttime conditions?	Pedestrians are the most common casualties in night time conditions. No need for other scenarios. Also, there is evidence that other technologies (CIB, LKA...) still perfrom well at night.
34	Are there other safety areas that NHTSA should consider as part of this or a future upgrade for pedestrian protection?	None

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35	Are there any aspects of NCAP's proposed PAEB test procedure that need further refinement or clarification before adoption? If so, what additional refinement or clarification is necessary, and why?	PAEB protocol should have ambitious requirements for test accuracy, specially in the crossing scenarios. It is very important to ensure that vehicle and the pedestrian meet at the desired point (if PAEB does not intervene).
36	Considering not only the increasing number of cyclists killed on U.S. roads but also the limitations of current AEB systems in detecting cyclists, the Agency seeks comment on the appropriate timeframe for adding a cyclist component to NCAP and requests from vehicle manufacturers information on any currently available models that have the capability to validate the cyclist target and test procedures used by Euro NCAP to support evaluation for a future NCAP program upgrade.	There is a very little technical challenge in a system for detecting cyclists if the system is already able to detect pedestrians. There is a physical limitation with crossing cyclists (which move much faster) when compared to crossing pedestrians (which walk slower), that results in larger fields of view. If the requirements for crossing pedestrians include low cycling speeds and larger vehicle speeds, there should not be a technical issue.
37	In addition to the test procedures used by Euro NCAP, are there others that NHTSA should consider to address the cyclist crash population in the U.S. and effectiveness of systems?	Cyclists in blindspot area when a large vehicle (pickup truck) is turning right in a crossing. This is addressed in Europe by R151 and is mandatory for large vehicles.
38	For the Agency's FCW tests: —If the Agency retains one or more separate tests for FCW, should it award credit solely to vehicles equipped with FCW systems that provide a passing audible alert? Or, should it also consider awarding credit to vehicles equipped with FCW systems that provide passing haptic alerts? Are there certain haptic alert types that should be excluded from consideration (if the Agency was to award credit to vehicles with haptic alerts that pass NCAP tests) because they may be a nuisance to drivers such that they are more likely to disable the system? Do commenters believe that haptic alerts can be accurately and objectively assessed? Why or why not? Is it appropriate for the Agency to refrain from awarding credit to FCW systems that provide only a passing visual alert? Why or why not? If the Agency assesses the sufficiency of the FCW alert in the context of CIB (and PAEB) tests, what type of FCW alert(s) would be acceptable for use in defining the timing of the release of the SV accelerator pedal, and why? —Is it most appropriate to test the middle (or next latest) FCW system setting in lieu of the default setting when performing FCW and AEB (including PAEB) NCAP tests on vehicles that offer multiple FCW timing adjustment settings? Why or why not? If not, what use setting would be most appropriate? —Should the Agency consider consolidating FCW and CIB testing such that NCAP's CIB test scenarios would serve as an indicant of FCW operation? Why or why not? The Agency has proposed that if it combines the two tests, it would evaluate the presence of a vehicle's FCW system during its CIB tests by requiring the SV accelerator pedal be fully released within 500 ms after the FCW alert is issued. If no FCW alert is issued during a CIB test, the SV accelerator pedal will be fully released within 500 ms after the onset of CIB system braking (as defined by the instant SV deceleration reaches at least 0.5g). If no FCW alert is issued and the vehicle's CIB system does not offer any braking, release of the SV accelerator pedal will not be required prior to impact with the POV. The Agency notes that it has also proposed these test procedural changes for its PAEB tests as well. Is this assessment method for FCW operation reasonable? Why or why not? —If the Agency continues to assess FCW systems eparately from CIB, how should the current FCW performance criteria (*i.e.,* TTCs) be amended if the Agency aligns the corresponding maximum SV test speeds, POV speeds, SV-to-POV headway, POV deceleration magnitude, etc., as applicable, with the proposed CIB tests, and why? What assessment method should be used— one trial per scenario, or multiple trials, and why? If multiple trials should be required, how many would be appropriate, and why? Also, what would be an acceptable pass rate, and why? —Is it desirable for NCAP to	Visual warnings only have a limited impact on drivers, as the driver might not be looking at instrument panel. Combination of visual and audio warnings is preferred. FCW could be assessed by simple timing check in the CIB test. Ideal time of warning before braking is 1.2s, but if this is too large, a simplified alternative of 500 ms could be acceptable. As FCW is less important, the points for FCW should be decreased accordingly.
39	For the Agency's CIB tests: —Are the SV and POV speeds, SV-to-POV headway, deceleration magnitude, etc. the Agency has proposed for NCAP's CIB tests appropriate? Why or why not? If not, what speeds, headway(s), deceleration magnitude(s) are appropriate, and why? Should the Agency adopt a POV deceleration magnitude of 0.6 g for its LVD CIB test in lieu of 0.5 g proposed? Why or why not? —Should the Agency consider adopting additional higher tests speeds (i.e., 60, 70, and/or 80 kph (37.3, 43.5, and/or 49.7 mph)) for the CIB (and potentially DBS) LVD test scenario in NCAP? Why or why not? If additional speeds are included, what headway and deceleration magnitude would be appropriate for each additional test speed, and why? —Is a performance criterion of ''no contact'' appropriate for the proposed CIB and DBS test conditions? Why or why not? Alternatively, should the Agency require minimum speed reductions or specify a maximum allowable SV-to-POV impact speed for any or all of the proposed test conditions (i.e., test scenario and test speed combination)? If yes, why, and for which test conditions? For those test conditions, what speed reductions would be appropriate? Alternatively, what maximum allowable impact speed would be appropriate?	None

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40	For the Agency's DBS tests: —Should the Agency remove the DBS test scenarios from NCAP? Why or why not? Alternatively, should the Agency conduct the DBS LVS and LVM tests at only the highest test speeds proposed for CIB—70 and 80 kph (43.5 and 49.7 mph)? Why or why not? If the Agency also adopted these higher tests speeds (70 and 80 kph (43.5 and 49.7 mph)) for the LVD CIB test, should it also conduct the LVD DBS test at these same speeds? Why or why not? —If the Agency continues to perform DBS testing in NCAP, is it appropriate to revise when the manual (robotic) brake application is initiated to a time that corresponds to 1.0 second after the FCW alert is issued (regardless of whether a CIB activation occurs after the FCW alert but before initiation of the manual brake application)? If not, why, and what prescribed TTC values would be appropriate for the modified DBS test conditions?	DBS in combination with FCW has some importance, but much less than CIB. Procedure can be revised to cover higher speeds. Application at 1.0 or 1.2 s after warning is representative of real world conditions.
41	Is the assessment method NHTSA has proposed for the CIB and DBS tests (*i.e.,* one trial per test speed with speed increments of 10 kph (6.2 mph) for each test condition and repeat trials only in the event of POV contact) appropriate? Why or why not? Should an alternative assessment method such as multiple trials be required instead? If yes, why? If multiple trials should be required, how many would be appropriate, and why? Also, what would be an acceptable pass rate, and why? If the proposed assessment method is appropriate, it is acceptable even for the LVD test scenario if only one or two test speeds are selected for inclusion? Or, is it more appropriate to alternatively require 7 trials for each test speed, and require that 5 out of the 7 trials conducted pass the ''no contact'' performance criterion?	Yes, one trial is representative, because robustness of the system is obtained by doing many tests at different speeds, rather than many tests at the same speed.
42	The Agency's proposal to (1) consolidate its FCW and CIB tests such that the CIB tests would also serve as an indicant of FCW operation, (2) assess 14 test speeds for CIB (5 for LVS, 5 for LVM, and potentially 4 for LVD), and (3) assess 6 tests speeds for DBS (2 for LVS, 2 for LVM, and potentially 2 for LVD), would result in a total of 20 unique combinations of test conditions and test speeds to be evaluated for AEB. What is an appropriate minimum pass rate for AEB performance evaluation? For example, a vehicle is considered to meet the AEB performance if it passes two-thirds of the 20 unique combinations of test conditions and test speeds (*i.e.,* passes 14 unique combinations of test conditions and test speeds).	None
43	As fused camera-radar forward-looking sensors are becoming more prevalent in the vehicle fleet, and the Agency has not observed any instances of false positive test failures during any of its CIB or DBS testing, is it appropriate to remove the false positive STP assessments from NCAP's AEB (*i.e.,* CIB and DBS) evaluation matrix in this NCAP update? Why or why not?	Yes, it is appropiate to remove false positive tests.
44	For vehicles with regenerative braking that have setting options, the Agency is proposing to choose the ''off'' setting, or the setting that provides the lowest deceleration when the accelerator is fully released. As mentioned, this proposal also applies to the Agency's PAEB tests. Are the proposed settings appropriate? Why or why not? Will regenerative braking introduce additional complications for the Agency's AEB and PAEB testing, and how could the Agency best address them?	AEB systems should brake in the same manner with and without regenerative braking, therefore it is expected to have no effect on the braking performance. However, if regenerative braking is activated, it might have an effect in the speed control and cause the robot to overthrottle and result in an override action. This is why during the test, it is important to ensure that throttle robot is kept on hold position prior to AEB activation and that it is not causing system overrides.
45	Should NCAP adopt any additional AEB tests or alter its current tests to address the ''changing'' rear-end crash problem? If so, what tests should be added, or how should current tests be modified?	Covering higher speeds is a need of current systems, but it is not easy to test at higher speeds. Maybe, it can be added a requirement about system being operational up to 120 km/h.
46	Are there any aspects of NCAP's current FCW, CIB, and/or DBS test procedure(s) that need further refinement or clarification? If so, what refinements or clarifications are necessary, and why?	None
47	Would a 250 ms overlap of SV throttle and brake pedal application be acceptable in instances where no FCW alert has been issued by the prescribed TTC in a DBS test, or where the FCW alert occurs very close to the brake activation. If a 250 ms overlap is not acceptable, what overlap would be acceptable?	The overlap might be acceptable for FCW alert situations, but never for brake events (when the AEB is already starting to actuate). The reason why is to simulate what a driver would usually perform (operating both pedals with one single foot, so no overlap between both pedals, whenever this situation is met, that should be acceptable.
48	Should the Agency pursue research in the future to assess AEB system performance under less than ideal environmental conditions? If so, what environmental conditions would be appropriate?	None
49	The Agency requests comment on the use of the GVT in lieu of the SSV in future AEB NCAP testing,	Yes, SSV target is obsolete. GVT testing is recommended.
50	The Agency requests comment on whether Revisions F and G should be considered equivalent for AEB testing.	Revision G is the standard version. It offers more stable detection and is partially usable in some intersection scenarios. There will be an updated version soon to cover straight crossing path scenarios and head on. Once available, it should be considered.
51	The Agency requests comment on whether NHTSA should adopt a revision of the GVT other than Revision G for use in AEB testing in NCAP.	None

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	Question	Comments
Category IV. ADAS Rating System		
52	With regard to a future ADAS rating system, the Agency seeks comments on the components and development of a full-scale ADAS rating system,	An interesting option for an overall rating system is that it is related to risk exposure. From statistical data, for each speed, what is the collision rates and the probability of suffering injuries (and how many) during the accident. So the fact of introducing these safety features such as the AEB, the number of injuries that could be avoided could be statistically obtained. That is why a cumulative rating system makes sense too, so that as much points you obtain from all the different scenarios, the more injuries you are avoiding. A pass/fail rating configuration does not reach this level of information.
53	With regard to a future ADAS rating system, the Agency seeks comments on the aforementioned approaches as well as others deemed appropriate for the development of a future ADAS rating system in order to assist the Agency in developing future proposals	
54	With regard to a future ADAS rating system, the Agency seeks comments on the appropriateness of using target populations and technology effectiveness estimates to determine weights or proportions to assign to individual test conditions, corresponding test combinations, or an overall ADAS award,	
55	With regard to a future ADAS rating system, the Agency seeks comments on the use of a baseline concept to convey ADAS scores/ratings	
56	With regard to a future ADAS rating system, the Agency seeks comments on how best to translate points/ratings earned during ADAS testing conducted under NCAP to a reduction in crashes, injuries, deaths, etc., including which real world data metric would be most appropriate	
57	With regard to a future ADAS rating system, the Agency seeks comments on whether an overall rating system is necessary and, if so, whether it should replace or simply supplement the existing list approach	
58	With regard to a future ADAS rating system, the Agency seeks comments on effective communication of ADAS ratings, including the appropriateness of using a points-based ADAS rating system in lieu of, or in addition to, a star rating system.	
Category VI. Establishing a Roadmap for NCAP		
59	With regard to a roadmap, NHTSA requests feedback on the identification of safety opportunities or technologies in development that could be included in future roadmaps	1. Emergency Call System Testing and Verification. 2. Rear and Child Occupancy Protection.
60	With regard to a roadmap, NHTSA requests feedback on opportunities to benefit from collaboration or harmonization with other rating programs	None
61	With regard to a roadmap, NHTSA requests feedback on other issues to assist with long-term planning.	None
Category VII. Adding Emerging Vehicle Technologies for Safe Driving Choices		
62	What are the capabilities of the various available approaches to driver monitoring systems (*e.g.,* steering wheel sensors, eye tracking cameras, etc.) to detect or infer different driver state measurement or estimations (*e.g.,* visual attention, drowsiness, medical incapacity, etc.)? What is the associated confidence or reliability in detecting or inferring such driver states and what supporting data exist?	None
63	Of further interest are the types of system actions taken based on a driver monitoring system's estimate of a driver's state. What are the types and modes of associated warnings, interventions, and other mitigation strategies that are most effective for different driver states or impairments (*e.g.,* drowsy, medical, distraction)? What research data exist that substantiate effectiveness of these interventions?	None
64	Are there relevant thresholds and strategies for performance (*e.g.,* alert versus some degree of intervention) that would warrant some type of NCAP credit?	None
65	Since different driver states (*e.g.,* visual distraction and intoxication) can result in similar driving behaviors (*e.g.,* wide within-lane position variability), comments regarding opportunities and tradeoffs in mitigation strategies when the originating cause is not conclusive are of specific interest.	Communicating to consumers about a general mitigation strategy that is applied in different driver states might be confusing.
66	What types of consumer acceptance information (*e.g.,* consumer interest or feedback data) are available or are foreseen for implementation of different types of driver monitoring systems and associated mitigation strategies for driver impairment, drowsiness, or visual inattention? Are there privacy concerns? What are the related privacy protection strategies? Are there use or preference data on a selectable feature that could be optionally enabled by consumers (*e.g.,* for teen drivers by their parents)?	None
67	What in-vehicle and HMI design characteristics would be most helpful to include in an NCAP rating that focuses on ease of use? What research data exist to support objectively characterizing ease of use for vehicle controls and displays?	HMI design might be affected by other criteria with only a minor impact on safety.
68	What are specific countermeasures or approaches to mitigate driver distraction, and what are the associated effectiveness metrics that may be feasible and appropriate for inclusion in the NCAP program? Methods may include driver monitoring and action strategies, HMI design considerations, expanded in-motion secondary task lockouts, phone application/notification limitations while paired with the vehicle, etc.	None

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Category VII. Adding Emerging Vehicle Technologies for Safe Driving Choices (continued)		
69	What distraction mitigation measures could be considered for NCAP credit?	Generally: - Distraction (physical distraction), including phone use - Drowsiness, including other types of fatigue
70	Are there opportunities for including alcohol-impairment technology in NCAP? What types of metrics, thresholds, and tests could be considered? Could voluntary deployment or adoption be positively influenced through NCAP credit?	None
71	How can NCAP procedures be described in objective terms that could be inclusive of various approaches, such as detection systems and inference systems? Are there particular challenges with any approach that may need special considerations? What supporting research data exist that document relevant performance factors such as sensing accuracy and detection algorithm efficacy?	None
72	When a system detects alcohol impairment during the course of a trip, what actions could the system take in a safe manner? What are the safety considerations related to various options that manufacturers may be considering (*e.g.,* speed reduction, performing a safe stop, pulling over, or flasher activation)? How should various actions be considered for NCAP credit?	None
73	What is known related to consumer acceptance of alcohol-impaired driving detection and mitigation functions, and how may that differ with respect to direct measurement approaches versus estimation techniques using a driver monitoring system? What consumer interest or feedback data exist relating to this topic? Are there privacy concerns or privacy protection strategies with various approaches? What are the related privacy protection strategies?	None
74	Should NCAP consider credit for a seat belt reminder system with a continuous or intermittent audible signal that does not cease until the seat belt is properly buckled (*i.e.,* after the 60 second FMVSS No. 208 minimum)? What data are available to support associated effectiveness? Are certain audible signal characteristics more effective than others?	None
75	Is there an opportunity for including a seat belt interlock assessment in NCAP?	None
76	If the Agency were to encourage seat belt interlock adoption through NCAP, should all interlock system approaches be considered, or only certain types? If so, which ones? What metrics could be evaluated for each? Should differing credit be applied depending upon interlock system approach?	None
77	Should seat belt interlocks be considered for all seating positions in the vehicle, or only the front seats? Could there be an opportunity for differentiation in this respect?	None
78	What information is known or anticipated with respect to consumer acceptance of seat belt interlock systems and/ or persistent seat belt reminder systems in vehicles? What consumer interest or feedback data exist on this topic?	None
79	Could there be an NCAP opportunity in a selectable feature that could be optionally engaged such as in the context of a ‘‘teen mode’’ feature?	None
80	Should NHTSA take into consideration systems, such as intelligent speed assist systems, which determine current speed limits and warn the driver or adjust the maximum traveling speed accordingly? Should there be a differentiation between warning and intervention type intelligent speed assist systems in this consideration? Should systems that allow for some small amount of speeding over the limit before intervening be treated the same or differently than systems that are specifically keyed to a road’s speed limit? What about for systems that allow driver override versus systems that do not?	None
81	Are there specific protocols that should be considered when evaluating speed assist system functionality?	None
82	What information is known or anticipated with respect to consumer acceptance of intelligent speed assist systems? What consumer interest or feedback data exist on this topic?	None
83	Are there other means that the Agency should consider to prevent excessive speeding?	None
84	If NHTSA considers this technology for inclusion in NCAP, are door logic solutions sufficient? Should NHTSA only consider systems that detect the presence of a child?	None
85	What research data exist to substantiate differences in effectiveness of these system types?	None
86	Are there specific protocols that should be considered when evaluating these in-vehicle rear seat child reminder systems?	None
87	What information is known or anticipated with respect to consumer acceptance of integrated rear seat child reminder systems in vehicles? What consumer interest or feedback data exist on this topic?	None

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	Question	Comments
Category VIII. Revising the 5-Star Safety Rating System		
88	What approaches are most effective to provide consumers with vehicle safety ratings that provide meaningful information and discriminate performance of vehicles among the fleet?	None
89	Is the use of additional injury criteria/ body regions that are not part of the existing 5-star ratings system appropriate for use in a points-based calculation of future star ratings? Some injury criteria do not have associated risk curves. Are these regions appropriate to include, and if so, what is the appropriate method by which to include them?	None
90	Should a crashworthiness 5-star safety ratings system continue to measure a vehicle's performance based on a known or expected fleet average performer, or should it return to an absolute system of rating vehicles?	None
91	Considering the basic structure of the current ratings system (combined injury risk), the potential overlapping target populations for crashworthiness and ADAS program elements, as well as other potential concepts mentioned in this document such as a points based system, what would the best method of calculating the vehicle fleet average performance be?	None
92	Should the vehicle fleet average performance be updated at regular intervals, and if so, how often?	None
93	What is the most appropriate way to disseminate these updates or changes to the public?	None
94	Should the Agency disseminate its 5- star ratings with half-star increments?	None
95	Should the Agency assign star ratings using a decimal format in addition to or in place of whole- or half-stars?	Using decimal format could become confusing for the consumer; a 'full' or 'half' star rating is simpler for consumers to understand.
96	Should the Agency continue to include rollover resistance evaluations in its future overall ratings?	Yes. Especially in markets where large, high CofG vehicles are consistently the largest market seller, it should still be considered as a legal requirement.