EUROPEAN NEW CAR ASSESSMENT PROGRAMME
(Euro NCAP)

TEST AND ASSESSMENT PROTOCOL –
CHILD PRESENCE DETECTION

Implementation 2025

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Preface

DISCLAIMER: Euro NCAP has taken all reasonable care to ensure that the information published in this document is accurate and reflects the technical decisions taken by the organisation. In the unlikely event that this protocol contains a typographical error or any other inaccuracy, Euro NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

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Table of Contents

1. Introduction 1
2. Definitions 2
3. General Requirements for CPD Systems 5
4. Warning Requirements 8
5. Intervention 12
6. Scoring 13
7. Direct Sensing System Evaluation 14
8. Key to Use Cases 21

1. Introduction

1.1 Background

Leaving a child unattended in a parked car, even for a few minutes, can lead to hyperthermia, heatstroke and death, especially if the car is exposed to the sun. A child's inability to exit the vehicle on their own, combined with a low tolerance for high temperatures, requires that children never be left unattended in a car. Temperatures can reach a critical level in just 15 minutes and leaving windows ajar does little to reduce the threat.

Child deaths from vehicle-related heatstroke occur less frequently than those resulting from crashes, but the nature of these entirely avoidable deaths deserves special attention as the technology already exists to address the issue of child hyperthermia in vehicles.

Technological solutions for Child Presence Detection (CPD) are available that can detect a child's presence in the vehicle and alert the vehicle user or third-party services. Euro NCAP has rewarded vehicles that offer such solutions as standard since 2023.

1.2 Scope

To avoid heatstroke-related injury and death, some countries have made it illegal to leave a child alone in a car, even for a minute. Following this principle, CPD technology can address situations where the child is left behind, regardless of whether it was intentional or unintentional and in hot weather or not.

Young children up to the age of 4 years old are particularly at risk. However, there are reported cases of older children getting into unlocked vehicles on their own and not able to get out. As these cases occur less frequently, this scenario will be addressed and included in the CPD assessment in 2025.

The protocol details how CPD systems will be evaluated and rewarded by Euro NCAP.

Prior to assessment, information from the OEM is needed so that the system can be assessed. This is needed to explain system functionality, a description of the CPD warning and how it compares/differs to other signals from the vehicle (e.g. locking). Where an OEM chooses, a warning sequence using a mobile phone application must be provided by the OEM prior to assessment given than in some cases the vehicle under assessment is not yet sold and the application may not be available.

2. Definitions

Throughout this protocol the following terms are used:

2.1 Sensing

2.1.1 Direct sensing

The ability to detect the absolute presence of a human inside the vehicle by means of tracking heartbeat, respiration, movement, or any other sign of life. Direct sensing may or may not allow categorisation and localisation of the subject(s).

2.1.2 Indirect sensing

The ability to derive the potential presence of a subject or object inside the car based on logic using information such as door opening, pressure or capacitive sensing etc. Indirect sensing does not distinguish between live persons or objects. From 2025 onwards, indirect sensing system will NOT be rewarded by Euro NCAP.

2.2 Journey

2.2.1 Start of journey

The start of a journey is defined as engine running or forward movement for all types of vehicle, ICE, hybrid and fully electric etc.

2.2.2 End of journey

A journey is deemed to have finished 15 minutes after:

Engine off or
Ignition off or
Master control switch off.

In subsequent sections of the protocol, the term ‘ignition off’ is used to cover the three different actions detailed in this definition.

2.3 Vehicle master control switch

means the device by which the vehicle’s on-board electronics system is brought from being switched off, as in the case where a vehicle is parked without the driver being present, to a normal operation mode.

2.4 Warnings

2.4.1 Alert

Alert systems consider the potential presence of an occupant in the rear (only) and provide a signal from the vehicle in accordance with the US voluntary commitment (September 2019).

2.4.2 Initial warning

The first exterior signal from a vehicle that informs the driver/carer directly that a child may be in the vehicle. This is the first opportunity for a driver/carer to be warned that a child has been locked in a vehicle while they are in the vicinity of the vehicle. The requirements for initial warnings are detailed in Section 4.1.

2.4.3 Escalation warning

Provided after the initial signal, escalation warnings are more persistent and repetitive than initial warnings providing additional warning signals to the driver/carer and the surrounding environment that a child may be in the vehicle. The requirements for escalation warnings are detailed in Section 4.2.

2.5 Intervention

An action by which a system mitigates the threat to any child that has become locked in a vehicle either knowingly or unknowingly. It is considered a last resort when warnings have been ignored and the internal vehicle temperature may be critical. The requirements for intervention are detailed in Section 5.

2.6 Adult

For the purposes of this protocol only, an adult shall be defined as a person with a mass or stature as of 47kg or 140cm respectively (defined in UN ECE R16 lower boundary). It is likely there may be a minority of children (>10YO) with a mass or stature of that of a small adult, but they would also be considered capable of self-extrication in the event of being locked in a vehicle.

2.7 Six year old

For the purposes of this protocol only, a six year old child shall be defined as having a mass or stature of that of a 95th percentile child, 28kg or 125cm respectively. Growth Charts - 2000 CDC Growth Charts - United States.

2.8 Warning signal suppression

Signal suppression is specifically an intentional action by the driver/carer to either delay a signal before it has started or cancel a signal that has already started.

2.8.1 Delay of a signal

Delaying the initial signal may be necessary, for example at a fuel station, and is an intentional act by the driver/carer who is aware that there is a child in the vehicle. This can be done at any time between the start of journey up to the start of the escalation warning.

Delay of initial warnings must meet the requirements of Section 4.1.5. Delay of escalation warnings is permitted as a result of delaying the initial warning in accordance with Section 4.2.5.

2.8.2 Cancellation of a signal

Cancellation of a signal means stopping any CPD warning where the driver/carer has forgotten or intentionally left an unattended child in the vehicle. Cancellation occurs after the vehicle has been locked and the warning, initial or escalation, has commenced.

Cancellation of any warning must have no consequence on either the subsequent warnings or intervention when a child is in the vehicle. Cancellation of initial warnings must meet the requirements of Section 4.1.6. Cancellation of escalation warnings must meet the requirements of Section 4.2.7.

2.9 System deactivation

2.9.1 Temporary deactivation

Temporary deactivation of the CPD system means deactivation of all warnings and intervention for a single journey only. This is an intentional act from the driver/carer performed at any time before and during a journey. Temporary deactivation must not be confused with delaying or cancelling the CPD signal, see Section 3.2.11 for deactivation requirements.

2.9.2 Long term deactivation

Systems that allow the CPD system to be deactivated for more than a single journey will NOT be rewarded by Euro NCAP.

2.10 Child safety locks

For the purposes of this protocol only, Euro NCAP uses the same definition for child safety locks as that detailed in UN ECE Regulation 11.

Child Safety Lock System is a locking device which can be engaged and released independently of other locking devices and which, when engaged, prevents operation of the interior door handle or other release device. The lock release/engagement device may be manual or electric and may be located anywhere on or in the vehicle.

3. General Requirements for CPD Systems

3.1 Type approval and national legislation

3.1.1 The vehicle manufacturer is solely responsible for ensuring that their products comply fully with all appropriate road traffic laws. Type approval requirements and domestic construction and use provisions of differing countries must still be followed and nothing in this protocol provides exemption from those requirements.

3.1.2 Certain areas of the CPD protocol overlap with type approval and domestic requirements, in particular, warning signals (visual and audible). Euro NCAP requirements are intended to avoid conflict with legislation.

3.1.3 While type approval and national laws preclude the use of vehicular audio-visual signals, the initial warning requirements will remain unchanged. If type approval and national laws permit, Euro NCAP will implement stricter CPD warning requirements where the initial signal must be audio-visual. Confirmation of such an update would be expected at least 12 months prior to implementation.

3.2 CPD systems with warnings

3.2.1 To be eligible for scoring under warnings and intervention (Section 6.1), any CPD system must be:

3.2.1.1 Equipped with direct sensing and;

3.2.1.2 detect the presence of child trapped in a vehicle occupant compartment:

as defined in Scenarios 1 and 2 or;

as defined in Scenarios 1, 2 and 3;

3.2.1.3 provide the required warnings for as long as necessary (Section 4) and, where possible, intervene (Section 5) to mitigate the risk of hyperthermia.

3.2.2 The system must address children of ages up to and including six years old as defined in Section 2.7. The following potential situations shall be considered:

- Children left behind in a vehicle unintentionally (Scenario 1)
- Children left behind in a vehicle intentionally (Scenario 2)
- Children three to six years of age that have entered an unlocked vehicle and become trapped inside the vehicle without the knowledge of the carer (Scenario 3)

3.2.3 For Scenarios 1 & 2, the CPD system must account for all likely child positions inside the vehicle compartment. CRS will be installed on relevant vehicle seating positions and includes all positions of movable seats and all seat rows as well as optional and removable seats.

3.2.3.1 In additional to the coverage areas detailed in Section 3.2.3, the coverage area for Scenario 3 (only) includes also the driver's seat as well as other areas where a child may hide within the cabin such as all footwell areas. The luggage area, accessible from the occupant compartment behind the rearmost seatback, boot or

rear door will be excluded. The Scenario 3 extended coverage area (footwell etc) does not apply to Scenario 1 & 2 assessments.

3.2.4 The functionality of each system and their compliance with warning/intervention requirements is assessed in accordance with the procedures laid out in Section 7.

3.2.5 Any CPD system must be fitted as standard equipment to the vehicle as defined in the VSSTR Protocol.

3.2.6 The system must be Default ON.

3.2.7 Vehicles offering optional seats and/or rows will have those positions assessed.

3.2.8 For vehicles without rear seat rows, such as two seaters and pick-ups, only the one seat row is to be covered and an adjusted vehicle-based assessment will be applied as defined in the COP Assessment Protocol.

3.2.9 Systems that are not integrated into the vehicle, such as those incorporated into Child Restraint Systems (CRS), will not be rewarded by Euro NCAP.

3.2.10 Over the air updates may be used to modify system software. Where the CPD system functionality is not available during update, the assessment will performed once the update has been completed.

3.2.11 Temporary system deactivation

3.2.11.1 Temporary deactivation may deactivate all elements in the CPD system for a single journey only.

3.2.11.2 All elements of the system must automatically re-arm before or at the commencement of the subsequent journey.

3.2.11.3 It is not permitted to deactivate individual parts of the system, e.g. escalation warning only.

3.2.11.4 The process of deactivation must be more complicated than a short push of a button to avoid deactivation of the system inadvertently. This must be a different process to that required for delay and cancellation of a signal (Section 4.1.5 & 4.1.6).

3.2.11.5 Deactivation may be performed via the system menu but also with the use of a dedicated button, for example on the vehicle, keycard or via an application. Euro NCAP does not define how temporary deactivation is done.

3.2.11.6 Where the system can be deactivated from outside the vehicle, this must only be possible in vicinity of vehicle, i.e. not from distance.

3.2.11.7 If a system has been deactivated, the inactive status of the CPD system must be indicated by a dedicated telltale[1] that is clearly visible to the driver.

3.2.11.8 The telltale must be displayed for no less than 10 seconds from the moment of deactivation. The same telltale is also required for a duration of no less than 5 seconds after turning the ignition off.

3.2.11.9 When there is no physical means to either stop the engine or switch the ignition off at the end of journey, the deactivation telltale must be given when the gear

[1] When an ISO standard has been developed defining a CPD telltale, this will be adopted by Euro NCAP no more than two years following ISO TS publication and become mandatory for any rewards.

has been set from Drive to Park and/or the driver's belt has been unbuckled. The driver's door opening event cannot be used to trigger the telltale.

3.2.11.10 Text messages are acceptable providing all of the following conditions are met:

a) They clearly indicate that the system's intended purpose is to warn of an occupant's presence.

b) They clearly indicate the system's status ON or OFF.

c) They are provided in all languages of the EAA, Technical Bulletin TB 002.

3.2.11.11 If the initial warning has already been triggered, temporary deactivation may be performed.

3.2.12 Pet and camping modes

If such a function exists, it must be clear to the user where this would also deactivate the CPD system. For this reason, confirmation must be sought by the system to avoid unintended deactivation of the CPD system. Additionally, if the CPD system is deactivated, the CPD OFF telltale must be displayed as defined in Section 3.2.11.8.

4. Warning Requirements

From 2025 onwards, systems will only be reward when the CPD signal(s) are in compliance with the requirements detailed below. Systems with alerts will NOT be rewarded by Euro NCAP.

4.1 Initial warning

4.1.1 The system must detect the relevant ages of children in all of the configurations detailed in Section 7.9.

4.1.2 For Scenarios 1 and 2, where the system has detected that an unattended child is locked inside a vehicle, an initial warning outside the vehicle is required at the moment the vehicle is locked. Where the system can positively confirm that either an adult is present or no child is in the vehicle, an initial warning is not required.

4.1.2.1 The time between locking and the initial warning must be as short as possible. However, a delay of no more than 15 seconds is permissible to allow the system to assess occupancy.

4.1.2.2 Status notifications inside the vehicle, pre-empting the initial warning at or shortly following ignition off, are permitted but not required to avoid unnecessary notifications and the risk of carers routinely ignoring them.

4.1.3 For Scenario 3, where a child has gained access to the vehicle, and no doors have been locked, a delay of no more than 10 minutes from door closure is permitted to the initial warning. Door closure means the child safety locks are either operational (preventing the door being opened from the inside) or not operational and applies to the door in the primary latch position, i.e. fully closed.

4.1.4 The CPD initial warning must consist of at least an audible or visual signal. Haptic signals are also permitted providing they are accompanied by an audible or visual component.

4.1.4.1 The warning must come from either the vehicle or from the key. The key may be either a keycard or an electronic device required for operating the vehicle.

4.1.4.2 The warning must be heard, seen or felt, in accordance with Section 4.1.4, by a person exterior to and in the immediate vicinity of the vehicle.

4.1.4.3 The warning must be distinctive and differ from that used to signal normal locking or other similar daily functions, e.g. unique use of flashing or vibration pattern and audible signal.

4.1.4.4 The warning may be a simple beep and/or flash of lights but must continue for at least 3 seconds or until cancelled.

4.1.4.5 Gaps in the warning signal are permissible proving the start of the signal is positive i.e. audible and/or visual.

4.1.5 Initial warning delay

4.1.5.1 The initial warning may be delayed by the driver/carer for a duration not exceeding 10 minutes, after which the initial warning must either begin again or resume for a minimum duration of 3 seconds. The delay to the initial warning must not exceed 10 minutes and the initial warning must be triggered.

4.1.5.2 The actions to activate a delay must be more complex than those for cancelling a signal as it allows a significant amount of time before any warnings are issued. For example, this may be done by pushing a specific button or activating a temporary system delay in the system menu.

4.1.6 Initial warning cancellation

4.1.6.1 All aspects of the initial warning may be cancelled by acknowledging the warning. Examples of cancellation include those detailed below but other methods of intentional signal acknowledgement will be accepted.

a) Unlocking the vehicle or unlocking and opening any occupant entry/exit door while in the vicinity of the vehicle.

b) Cancelling via a mobile phone that is used as the vehicle key or directly connected to the vehicle by means of Bluetooth, UWB or Wifi. A 4/5G mobile phone signal is not a permissible method.

4.1.6.2 Cancellation must not affect the timing of the escalation warning or intervention, these are required where a child remains unaccompanied in the vehicle and:

a) The method of cancellation was an action other than the opening of any occupant entry/exit door and;

b) The vehicle has been locked after cancellation.

4.1.6.3 Cancellation by opening any occupant entry/exit door may apply to both initial and escalation warnings when a child remains in the vehicle and any door remains open.

4.1.6.4 An initial warning that tracks the presence of a mobile phone directly connected to the vehicle, e.g. via Bluetooth, must meet the signal requirements above. It must also warn either using the vehicle or mobile phone if the connection with the phone has been lost. For example, if the phone is out of range of the vehicle.

4.2 Escalation warnings

4.2.1 A reward is given to vehicles that issue escalation warnings if the system detects the continued presence of an unattended child after the initial warning has either ended or been cancelled and all doors are closed.

4.2.2 Rewards for escalation warnings are only available where:

4.2.2.1 An initial warning meets all of the requirements detailed in Section 4.1 and;

4.2.2.2 It has been demonstrated that a child is detected in all of the configurations detailed in Section 7.9.

4.2.3 Where the system can positively confirm that either an adult is present or no child is in the vehicle, an escalation warning is not required.

4.2.4 Timing

4.2.4.1 An escalation warning is required starting no more than 90 seconds after the end of the initial warning.

4.2.4.2 The escalation warning(s) shall repeat at least every 1 minute for no fewer than 20 minutes or cancelled as defined in 4.2.7.

4.2.4.3 Alternative warning signal configurations may also be rewarded providing that the timing is equivalent to 4.2.4.1 and 4.2.4.2.

4.2.5 If the initial warning is delayed, as defined in Section 4.1.5, the escalation warning must commence no more than 15 minutes from when the vehicle was first locked.

4.2.6 The escalation warning shall consist of either:

4.2.6.1 A vehicle based visual or audible component aimed at notifying individuals in the direct vicinity of the vehicle. The duration of the warning shall be at least 15 seconds, gaps are permissible providing the start of the signal is positive. Or,

4.2.6.2 Warnings notifying the driver and/or another carer either on the same journey or located elsewhere with any of the following either independently or a combination of:

- Haptic and audible feedback via an ignition key/card or mobile device used as the key.
- Mobile device via application*
- Warning messages to other mobile registered device(s)*

* Where the warning is transmitted with the use of a mobile device, for example via an application, the OEM must provide the necessary application to be used with the vehicle/CPD system for the assessment. Supporting instructions and any other information must also be provided in the vehicle handbook. Euro NCAP does not require the OEM to oblige the customer to install/use this app or to accept the connection of the mobile phone with the car/OEM-offered services. Transmission of these warning messages from vehicle shall be free of charge and available at least for the first six years.

4.2.7 Escalation warning cancellation

4.2.7.1 The escalation warning may be cancelled by acknowledging the warning.

4.2.7.2 This may be a simple action such as the press of a button. It does not need to be complex because the consequence on the alert is minimal. For example by:

- Unlocking the vehicle,
- Opening a door,
- Cancelling via the mobile phone of the carer directly connected to the vehicle by means of Bluetooth, UWB or Wifi etc. Mobile phone signal, xG, is not a permissible method.
- Cancelling via the mobile phone of another carer directly connected to the vehicle by means of Bluetooth, UWB or Wifi etc. Mobile phone signal, xG, is not a permissible method.

4.2.7.3 After an escalation warning has been cancelled, the system shall check the vehicle after no more than 90 seconds. If a child occupant's presence has been detected and the vehicle is locked the system must trigger another escalation warning cycle (Section 4.2.6) until a door is opened or intervention is initiated, unless Section 4.2.3 applies.

5. Intervention

5.1 A reward is given to vehicles that will initiate an intervention if there is a child in the vehicle and all doors are closed and locked. Intervention is defined in Section 2.5. Examples of intervention include, but are not limited to, those detailed below.

5.2 Rewards for intervention are only available where:

5.2.1 Initial and escalation warnings meet the respective requirements in Sections 4.1 and 4.2 and;

5.2.2 It has been demonstrated that a child is detected in all of the configurations detailed in Section 7.9 and;

5.2.3 The intervention must actively reduce the threat of hyperthermia to any children in the vehicle by either:

a) Instigating rescue of the child. For example, with the use of a mobile application*, eCall Advanced, contact with a third-party service (TPS) or other means of direct contact with other carers located elsewhere (not a driver or passenger on the same journey). If the system does NOT contact a carer located elsewhere as a form of escalation warning, then this can be considered as a form of intervention providing it meets the requirements in Section 4.2.6.2. Or,
b) Allowing access to the child, for example unlocking the doors or,
c) Reducing or controlling the interior temperature (excluding lowering windows).

* Where the warning is transmitted with the use of a mobile device, for example via an application, the OEM must provide the necessary application to be used with the vehicle/CPD system. Supporting instructions and any other information must also be provided in the vehicle handbook. Euro NCAP does not require the OEM to oblige the customer to install/use this app or to accept the connection of the mobile phone with the car/OEM-offered services. Transmission of these warning messages (e.g. TPS eCall) from the vehicle shall be free of charge and available at least for the first six years.

5.2.4 In addition to the intervention(s) detailed in Section 5.2.3, supplementary warnings, in addition to those used as escalations to contact the child carer(s) on the same journey (passenger and/or driver), must also be provided within the timings detailed in Section 5.2.5. For example, with the use of a mobile application* (see above) or other means of direct contact.

5.2.5 Intervention must occur within either:

a) 10 minutes of the vehicle being locked or,
b) 5 minutes after the first escalation was triggered (including initial warning delay) or,
c) The internal vehicle temperature or temperature gradient becomes critical, a duration and time of ‘critical temperature’ have not yet been defined.

6. Scoring

6.1 Scoring

From 2025 onwards, no points will be awarded to either vehicles with indirect sensing or where a vehicle is equipped with either an alert or initial warning only.

Sensing	**Warnings and intervention**	**Points**	
		All seats	**Rear seats only**
Direct sensing only Coverage of Scenario 1, 2 & 3	Initial and escalation warnings	3	1.5
	Initial, escalation and Intervention	4	2

Sensing	**Warnings and intervention**	**Points**	
		All passenger seats	**Rear seats only**
Direct sensing only Coverage of Scenario 1, 2	Initial and escalation warnings	2	1
	Initial, escalation and Intervention	3	1.5

7. Direct Sensing System Evaluation

7.1 The evaluation of direct sensing systems will be based on information provided by the vehicle manufacturer and laboratory checks. A dossier is required detailing how the system establishes the presence of a child and the sequence, including timing, of subsequent warnings and intervention(s). The information required is detailed in the following sections.

7.2 Euro NCAP reserves the right to check any and/or all of the CPD requirements during the vehicle assessment. This includes all system functionality such as sensing, warnings, intervention and HMI.

7.3 In order for any points to be awarded, the dossier must contain the information detailed in the following sections and system must react correctly to all of the scenarios outlined in this section.

7.4 The sensing test tool validation must be approved by Euro NCAP in advance of dossier delivery and vehicle assessment. Where a technology is presented to Euro NCAP that is not adequately evaluated with the test procedure, the OEM must contact the Euro NCAP Secretariat and a way to proceed will be developed.

7.4.1 If the test tool is already approved by Euro NCAP and listed in TB 029 it will not be necessary to provide further validation of the tool providing the tool is listed in combination with the corresponding sensor technology used in the vehicle under assessment.

7.5 Dossier contents

It is the OEM's responsibility to provide all of the necessary information required to demonstrate the performance of the system in accordance with the Euro NCAP assessments. The following must be included as a minimum:

7.5.1 General system information – required for laboratory checks:

- Sensor type and principle: wi-fi, RF, camera etc.
- Sensor location and CPD system architecture
- Detection: movement, respiration etc.
- Coverage areas, including influence of unoccupied seat range adjustments, footwell and all optional seats, e.g. 3rd row
- Deactivation: temporary/long term (where applicable)
- CPD mobile device applications necessary for warnings (where applicable)
- Occupant age coverage for children and, where applicable adults

7.5.2 Sensing data:

- Respiration monitoring output
- Movement monitoring output, other as applicable
- Triggering thresholds and any grey zone information
- Influence from any external interference e.g. sunlight, electromagnetic or radio waves

Sensing data is required to demonstrate detection capabilities and validate functionality in 'worst case' conditions, see Section 7.8.

7.5.3 Demonstration of system compliance:

- Sensing of scenarios detailed in Section 3.2 and 7.6
- Sensing and decision time to warning activation detailed in Sections, 4.1, 4.2 and 5.
- Warning and intervention functionality detailed in Sections, 4.1, 4.2 and 5
- CRS to be used as detailed in Section 7.6.3:
- Warning signal demonstration
- Intervention demonstration (where applicable, not mandatory)

7.5.4 Validation of test tool (where applicable)

- See Section 7.8 for further information

7.6 Evaluation scenarios

Direct sensing systems must be able to react correctly to all possible use cases. The necessary required child occupant details are below.

The assessments may be performed either in-door (parking garage) or outside. However, elements that are necessary to the function of the system should be present, such as phone signals and temperature where applicable.

7.6.1 Scenarios 1 & 2 (forgotten and intentionally left behind)

7.6.1.1 New-born infant in a rearward-facing CRS:

- Sleeping without limb movement under blanket/sun shield

7.6.1.2 One-year old infant/child in a rearward-facing CRS:

- Sleeping under blanket without limb movement
- Awake under blanket with limb movement

7.6.1.3 Three-years old child in forward-facing CRS:

- Sleeping under blanket without limb movement
- Awake under blanket with limb movement

7.6.1.4 Six-years old on booster cushion installed with three-point belt

- Sleeping without limb movement
- Awake with limb movement

7.6.2 Blanket and sun-shade

For the sleeping situations the blanket shall be placed over the child from the shoulders down to cover the feet with arms beneath. For the awake situations, the blanket shall be placed over the child from the chest down to cover the feet with the arms above the material. The blanket to be used shall be no less than 70cm x 90cm, 300GSM in weight and made from Cotton or Polyester.

A sun-shade shall also be used with rearwards facing CRS that attaches from the carry handle to the seat shell around the head. Alternatively, a shade may be improvised from a cotton cloth placed around the shell of the CRS and covering the opening.

7.6.3 CRS to be installed

The following CRS must be used for each of the use cases detailed in Section 7.9. The CRS will be installed on 'relevant' vehicle positions, for example Universal CRS on all belted seating positions.

a) New-born infant (4kg) in a Maxi Cosi Cabriofix or Pebble 360. Universal CRS, belted installation rearward facing.

b) New-born infant (4kg) in a Maxi Cosi Pebble 360 on FamilyFix 360 base, rearward facing. Installation of child only, CRS (base and shell) already installed in vehicle.

c) P3 or Q3 in Britax Roemer King II LS, belted installation, forward facing.

d) Q6 on a Concord Vario XT-5, belted installation, or Joie Signature i-Spin XL forward facing.

7.6.4 Scenario 3 (child enters unlocked vehicle),

The conditions for evaluating Scenario 3 are detailed below.

7.6.4.1 Parked vehicle with unlocked doors

7.6.4.2 A door (any door) is opened, test subject enters vehicle and door is closed (not locked) but with child lock activated

7.6.4.3 Sensor is triggered (directly, or after a delay time detailed in Section 4.1.3) to check if a living being is in the vehicle (footwell included)

7.6.4.4 Where presence is confirmed, the initial warning must be triggered in accordance with Section 4.1.3.

7.7 Specific system requirements

Systems may use a range of parameters either individually or in combination to establish occupancy and/or categorisation. For systems that detect occupant respiration or movement, the individual parameters to be proven by the OEM are as follows:

<u>Respiration</u>

The following respiration rates shall be used for sleeping children:

- New-born infant 30bpm
- One year old 22bpm
- Three year old child 20bpm
- Six year old 18bpm

Movement and motion

Presence of childlike manikin, sizes and cases requiring random movement.

The following movement is accepted for children in a CRS:

- Head: Pitch, roll, yaw
- Upper and lower limbs: Waving, kicking, playing on a mobile phone…

Day and night

Systems that rely on optical sensing methods, such as cameras, demonstrations will be required to show that occupants can be detected in a range of lighting conditions, for example day and night-time.

7.8 Test tool validation

The OEM and/or system supplier is required to provide information detailing the validation of any test tools used. Where tools are used in place of human subjects, validation data is required to demonstrate that the test tool can be used as a suitable human surrogate.

A direct comparison between the output recorded with humans and the test tool(s) is required in a vehicle environment. The test scenarios described above shall be replicated along with details of the 'worst case' conditions/subject for the sensing technology. A range of human subjects is required from new-born to 6YO, along with age, weight and stature must also be provided to demonstrate the worst-case human for the detection system is covered by the test tool. Depending on what parameter is being evaluated, it may be necessary to seat the children, or position the respective test tool(s), in an appropriate CRS.

Where human subjects are used either in the development of test tools or validation of a CPD system, all relevant ethical and privacy guidelines must be followed.

7.9 Laboratory tests

Vehicle assessments will be carried out by the vehicle inspectors and assessed using a number of 'use cases' representing typical journey conditions. The use cases, detailed below, represent typical situations that might occur when a child is taken on a journey. Only systems that trigger a correct response in all defined use cases below are eligible for scoring.

Each use case is detailed with the use of certain subsequent steps (actions) to be carried out in a specific order. The assessment will be carried out by following the individual actions in the order detailed for each use case.

The numerical part of each action details the type of action to be performed, such as opening/closing doors and locking the vehicle. The alphabetic part of each step provides specific details of what action to perform where multiple possibilities exist. The key to each of the individual actions is in Section 8.

1) Preparation

2) Simulated entry – adult and/or child
3) Driving
4) Stopping
5) Simulated exit
6) Activation – at end of journey
7) Warning – required or not

Where the system can only detect occupants and not classify, triggering of the system may be done with any human subject.

7.9.1 This simulates two separate journeys, one is starting with a locked and the other an unlocked vehicle. In both cases, the driver forgets to remove the child at the end of the journey and locks the vehicle. A CPD initial warning is required. These are two independent use cases that should be assessed separately.

Actions

Locked 1A→ 2B→ 3C→ 4B→ 5A→ 6A→ 7A→ End

Unlocked 1B→ 2B→ 3C→ 4B→ 5A→ 6A→ 7A→ End

7.9.2 This simulates a journey, starting with a locked vehicle, where a child remains in the vehicle at the end of the journey but only the driver door is opened and closed. No other doors are opened and, where fitted, the CPD initial warning is delayed by the driver for example refuelling. A CPD warning is required within 10 minutes of delay activation.

Actions

1A→ 2B→ 3C→ 4B→ 5A→ 6C→ 7B→ 10mins (max) → 7A End

If a system does not offer the possibility to delay the CPD signal, this assessment can be ignored.

7.9.3 This simulates a journey, starting with a locked vehicle, where a child is installed in the vehicle and only the driver door is opened and closed during a journey. No other doors are opened and, where fitted, the CPD signal is delayed by the driver for refuelling. The driver then continues the journey (within 10 mins) and then forgets to remove the child at the end of the journey (only). A CPD initial warning is required upon door locking at the end of the journey. This is one single use case for one journey.

Actions

1A→ 2B→ 3C→ 4B→ 5A→ 6C→ 7B→ <10min

Journey recommences

1A→ 2A→ 3C→ 4B→ 5A→ 6A→ 7A End

If a system does not offer the possibility to delay the CPD signal, this assessment can be ignored.

7.9.4 This simulates a journey, starting with a locked vehicle, where a child is installed in the vehicle but only the driver door is opened and closed. No other doors are opened and, where fitted, the CPD initial warning is delayed by the driver for refuelling. A warning is expected within 10 minutes of delay activation. The same journey recommences (within 15min of door locking), the driver forgets the child at the end of the journey, no other doors have been opened, a CPD warning is required. This is one single use case in one journey.

Actions

1A→ 2B→ 3C→ 4B→ 5A→ 6C→ 7B→ 10mins→ 7A

Journey recommences

1A→ 2A→ 3C→ 4B→ 5A→ 6A→ 7A End

If a system does not offer the possibility to delay the CPD signal, this assessment can be ignored.

7.9.5 This simulates a journey, starting with a locked vehicle with no rear doors, where the driver forgets to remove the child at the end of the journey and locks the vehicle. A CPD warning is expected if the actions required to access the rear seat and child (e.g. move driver's seat) are not repeated before door locking.

Actions

1A→ 2B*→ 3C→ 4B→ 5A→ 6A→ 7A End

*2B shall include the necessary actions to access the rear seats.

7.9.6 This simulates a journey, starting with a locked vehicle, where there are two children installed in the vehicle. One child exits the vehicle mid-journey and the journey continues. At the end of the journey the driver exits the vehicle and forgets the one remaining child. A CPD warning is required.

Actions

1A→2B→ 3C→ 4C→ 5E→ 5A→ 6A→ 7A End

7.9.7 This simulates a journey, starting with a locked vehicle, where there is no child in the vehicle at the start of the journey. A child then enters the vehicle mid-journey and the journey continues. At the end of the journey the driver exits the vehicle and forgets the child. A CPD warning is required.

Actions

1A→ 2A→ 3C→ 4C→ 2D→ 3E→ 4D→ 5A→ 6A→ 7A End

For vehicles with seven seats and a 3rd row, the child entry mid-journey (2D) shall be through the boot door to access the 3rd row seats where the boot is considered a reasonable means of access.

7.9.8 This simulates a journey, starting with a locked vehicle, where a child is installed in the vehicle. The journey ends and the driver exits the vehicle. The rear door adjacent to the child is opened and closed without the child being removed from the vehicle, which is then locked. This is the intentionally left case and a CPD warning is required. This scenario (2) is monitored for 2025 and the outcome will not be included in the system assessment. However, the datasheet and website publication will detail if this scenario is covered by the system or not.

Actions

1A→ 2B→ 3C→ 4B→ 5B→ 6A→ 7A End

7.9.9 Avoid false positives

Systems will be checked for false positives in the two scenarios detailed below. However, although compliance with the case below is strongly recommended, the outcome will not be included in the system assessment.

This simulates a journey, starting with a locked vehicle, where the driver removes the child at the end of the journey. No children are in the vehicle when locked, in this case a warning is NOT required.

Actions

1A→ 2B→ 3C→ 4B→ 5D→ 6A→ 7B End

This simulates a journey, starting with a locked vehicle, where the driver opens the door and places/hangs and object in the rear before the journey. At the end of the journey, the door remains unopened at the time of locking, in this case a warning is NOT required.

Actions

1A→ 2C→ 3C→ 4B→ 5A→ 6A→ 7B End

8. Key to Use Cases

			A	B	C	D	E
1	*Prepare*		Unlock car	Start with unlocked car, left for [30] minutes			
2	*Simulate entry*	↓	Open driver's door	Open any door (for at least 7 sec, no more than 12 sec) adjacent to where a child can be placed*	Open any door (for at least 7 sec, no more than 12 sec) adjacent to where a child can be placed*	Open any door (for at least 7 sec, no more than 12 sec) adjacent to where a child can be placed*	Open any door (for at least 7 sec, no more than 12 sec) adjacent to where a child can be placed*
			Close driver's door	Place surrogate/CRS on seat**	Close door	Place surrogate/CRS on seat**	Close door
				Close door	Open driver's door	Close door	
				Open driver's door	Close driver's door		
				Close driver's door			
3	*Journey (in motion)*	↓	No action	Ignition on	Ignition on	Ignition on	Simulate driving
					Simulate driving	Simulate driving	
						Simulate second entry or exit***	
4	*Stopping*		No action	Ignition off	Vehicle stops, ignition on	Vehicle stops, ignition off	
5	*Simulate exit*	↓	Driver door opens	Driver door opens	Door adjacent to seating position where child can be retrieved is opened	Driver door opens	Door adjacent to seating position where child can be retrieved is opened
			Driver door closes	Driver door closes	Simulate further driving/Stopping/Exit	Driver door closes	Retrieve child surrogate
				Door adjacent to seating position where child can be retrieved is opened		Door adjacent to seating position where child can be retrieved is opened	Simulate further driving/Stopping/Exit
				Door closed		Retrieve child surrogate	
						Door closed	
6	*Activation*		Doors locked	No further actions performed.	Doors locked, delay active		
7	*Initial warning*		Warning expected	Warning not expected			

Key: Highlighted actions can be performed out of order

*for 3 door car, driver's door included

**for 3 door car, perform action to access rear seats

***7 seaters, access through boot door