



ASSESSMENT PROTOCOL CHILD OCCUPANT PROTECTION

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1. INTRODUCTION

Global NCAP has carried out a child occupant safety assessment since its very first test to ensure that the car manufacturers take responsibility for the children travelling in their vehicles. As from this beginning Global NCAP published a child occupant protection rating to provide clearer information for consumers about the results of these tests. As part of this assessment, Global NCAP has used 18 months old and 3 years old sized dummies, placed in car manufacturers 'recommended' child seats, in the frontal impact test. As well as studying the results from the impact tests, Global NCAP verified the clarity of instructions on child seat and vehicle as well as the seat installation in the vehicle to ensure that the child seat could be fitted safely and securely. The installation assessment will also consider the Gabarit result, instruction manual and airbag disconnection for each seating position.

The assessment of child safety is extended by an installation check of a selection of child seats available in the local market. This will assess the vehicle's ability to safely and correctly accommodate a broader range of CRS instead of a single combination of recommended CRS. For this purpose, a so-called 'CRS installation list' is populated with child seats available in the local market.

This protocol contains several references to i-Size seating positions. Vehicles may qualify for any i-Size related rewards provided the relevant i-Size specifications detailed in UN14 and 16, and UN94 are considered further in this protocol.

DISCLAIMER: Global NCAP has taken all reasonable care to ensure that the information published in this protocol 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, Global NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

2. CHILD OCCUPANT PROTECTION ASSESSMENT

This protocol defines how protection for children is assessed in Global NCAP. There are three areas of Child Protection that are assessed; the requirements for each are detailed in the following sections. All contribute to the overall child protection rating, the assessments are:

- Installation of child restraints (Section 3)
- Dynamic performance (Section 4)
- Vehicle based assessments (Section 5)

A number of child seats available in the local market(s) covered by the assessment will be used to assess vehicle to CRS compatibility and Q Series dummies representing 1½ year old and 3 years old children will assess dynamic performance. The protocol is applicable to all classes of vehicles currently assessed by Global NCAP, including vehicles where there is no rear bench or where there is limited space for carrying CRS on the rear seats.

Dummy response data will be recorded in the frontal impact and side impact tests. Two Q series crash dummies, representing a 1½ year old and 3 years old child are placed in child seats recommended by the vehicle manufacturer. The dynamic assessment remains focused on head, neck and chest only.

During a post-crash vehicle inspection, the car will be assessed on aspects such as labelling, airbag disabling, ISOFIX, ISOFIX usability, i-Size readiness and more. The scores achieved in the three main categories (fitment of CRS, dynamic performance and vehicle based assessments) are combined to calculate the total Child Occupant Protection Score.

Cars with limited or no rear space such as two seaters do not allow a typical dynamic assessment using dummies in the rear. For these classes of vehicles, special provisions have been made to the protocol.

2.1 Car Manufacturer's Recommendation

A sliding scale system of points scoring has been adopted for the biomechanical assessments. This involves two limits for each parameter, a more demanding limit (higher performance), beyond which a maximum score is



obtained and a less demanding limit (lower performance), below which no points are scored. Where a value falls between the two limits, the score is calculated by linear interpolation.

- 2.1.1 The vehicle manufacturer must recommend two CRS for use in dynamic assessments. Of those two recommended seats, one CRS must be suitable for 18 month and one for 3 years old children. The compatibility of the recommended CRS with the vehicle will be separately assessed as part of the installation check. In order to be used in the dynamic tests, both CRS must meet the installation requirements detailed in Section 3 on the two rear outboard seating positions.
- 2.1.2 For the dynamic test, the vehicle manufacturer is given the choice to recommend appropriate CRSs from the market(s) where the vehicle tested is being sold, and must be available for consumers to purchase in at least the 3 largest markets (countries) and in the 3 main cities of each one and at least 3 retailers in each one of the cities. When CRS models are not available in regular retailers, vehicle manufacturer can make the CRS available as an original part through their own dealership network. An installation assessment using specific CRSs, models and sizes will be performed following the installation mode identified in the installation list. The CRSs recommended by the vehicle manufacturer will also be assessed for installation in the same mode as the one recommended for the dynamic test. In both scenarios, the following preconditions must be met for the vehicle's manufacturer recommended CRS to be accepted:
 - 2.1.2.1 The CRSs must be recommended by the vehicle manufacturer, to their customers, in all countries or the country that cover Global NCAP for the specific assessment, where the vehicle is sold.
 - 2.1.2.2 The recommended CRS must be available for purchase by all consumers from retailers or dealers. It must be available in at least the 3 largest markets (countries) where the vehicle is sold, in the 3 most important cities of each market, in at least 3 retailers per city. Alternatively, it can be sold as an original part of the car manufacturer following the same availability criteria. For a CRS available in retailers to be considered and accepted by Global NCAP, CRS manufacturer must be officially represented locally in the market or present established retailers in the market.
- 2.1.3 Where a vehicle is equipped with an integrated seat(s) covering 18 month and/or one 3 years old children on the rear outboard test positions, the integrated seat will be used in the dynamic tests. Integrated seats will be used even if they are optional equipment. However, they must be standard equipment in order to gain points in the vehicle based assessments (Section 5).
 - Where a vehicle is equipped with only one integrated restraint on either outboard position covering both or only one of two child ages, the integrated seat will be used only where applicable. An alternative installable CRS must be recommended for the case where the integrated seat is not suitable for the age of the dummy of choice.
- 2.1.4 Where no or not appropriate recommendation is provided, for example where the requirements of Section 3 are not met, Global NCAP will select possible seats available in the local market, or in case this is not feasible, acquire fitting seats for use in the full scale tests. Where this is the case, the dynamic points for CRS will not be awarded. Additional preconditions exist for vehicles equipped with two seats or have limited space in the rear. Refer to Section 6 for further details.

3. INSTALLATION OF CHILD RESTRAINTS

Global NCAP rewards vehicles that can accommodate a broad variety of child seats available in the Global NCAP assessed market. For this purpose, a limited number of child seats are installed in the vehicle. All CRS selected for the Global NCAP installation list are available in the assessed markets when they were selected. The groups and recommended installation modes of the CRS selected represent those available in the assessed market. This "installation list" of CRS, how it is compiled and updated is explained in section 3.1 below.

3.1 Installation List and Recommended Seats

- 3.1.1 The child seats on the "Installation List" are detailed in Appendix III. This list contains child seats



available in the assessed market(s). The list will be checked on a regular basis to confirm availability to consumers. Global NCAP does not assess or rate the child seats individually.

- 3.1.2 All CRS on the “Installation List” will be considered for installation in the vehicle. Where the vehicle manufacturer has recommended CRS for dynamic testing that are not on the above list, these will also be included in the fitment assessment using the installation mode used in dynamic testing (the total list of seats is referred to as the CRS installation list). The preconditions for acceptance of CRS are listed in Section 2.1.
- 3.1.3 In addition to the above, the fitment assessment results of the selected seats (available in the assessed market(s)) will also be published. Placing these recommended seats on the “Installation List” is exclusively done at the request of the sponsor at the time of nomination of the vehicle and does not contribute toward the score. This is for information only.
- 3.1.4 To be eligible for assessment and scoring, any CRS on the “extended installation list” (Installation list + CRS recommended by the OEM for the dynamic test) must be detailed on the approved vehicle list when the CRS is not approved as Universal. Where this is not the case, no award will be given for CRS installation of these seats.

3.2 Installation Matrix

- 3.2.1 The score for Installation of Child Seats is based on the CRS from the “extended installation list” that can be successfully installed in the vehicle considering all eligible seating positions. Hence, before the assessment starts, the total number of passenger seating positions in the vehicle must be identified including 1st, 2nd and 3rd row if available. Where a vehicle is available with an optional 3rd row on any variant, the installation assessment will be based on a vehicle fitted with the optional seats.
- 3.2.2 Provided that the CRS can be placed in the vehicle without problems (Section 3.3.1), a list of CRS representing the most demanding scenarios for installation (plus those recommended by the vehicle manufacturer) will be fitted on each seating position, using the installation modes identified in Appendix III.

3.2.3 Universal (Belted) CRS

Seating positions must meet the extended Gabarit check (Section 5.2) to be included in the Installation Matrix for the Universal CRS's. In addition, these seating positions must be marked with 'U' or 'UF' in the Universal CRS table. A combination of Universal CRS group and seating position that do not meet these requirements will automatically fail the CRS installation assessment for Universal CRS of that group on the list. Where a vehicle can be equipped with optional inflatable seatbelts or other advanced adult restraint systems, this equipment will not be assessed provided that the vehicle handbook clearly states that CRS cannot be installed when this equipment is present. The vehicle manufacturer is asked to contact Global NCAP in advance of the vehicle assessment to confirm this exemption.

The semi-universal CRS on the list that are installed with the adult belt and support leg will be exempted from installation on any seating position when the CRS vehicle list identifies that the CRS cannot be used on this seating position and that it is clearly identified in the vehicle handbook (adjacent to the Universal CRS table) not to install a belted CRS with a support leg. When this is the case, the belted semi-universal CRS installation score on that seating position will be awarded the available points.

3.2.4 I-Size CRS

I-Size seating positions must meet the i-Size technical requirements (Section 5.4 C) to be included in the Installation Matrix for the i-Size/ISOFIX CRS's. In addition, these seating positions must be marked with 'i-U' in the i-Size CRS table ('i-UF' will be accepted only for seating positions equipped with airbags). A seating position that does not meet these requirements will automatically fail the CRS installation assessment for i-Size CRS in case it is listed.

3.2.5 ISOFIX CRS

ISOFIX seating positions must either meet the i-Size marking requirements (Section 5.4 C) or simply



be labelled according to the ISOFIX marking requirements in Regulation 14 to be included in the Installation Matrix for the ISOFIX CRS's. In addition, these seating positions must be marked with 'IL' or 'IUF' in the ISOFIX CRS table. A combination of ISOFIX size class and seating position that does not meet these requirements will automatically fail the CRS installation assessment for ISOFIX CRS of that size class in case that it is listed.

ISO/R3 size class seats will be exempted from installation on any seating position when the CRF ISO/R3 cannot be installed according to section 5.5 and is clearly identified with an "X" in the ISOFIX CRS table as unsuitable for this size. When this is the case, the combination of ISO/R3 size class CRS given installation score on that seating position will be awarded the available points (see section 3.7).

3.2.6 Passenger Airbag Warning and Disabling

Seating positions which have a frontal passenger airbag present must meet the requirements for Passenger Airbag Warning Marking and Disabling (Section 5.6) to be included in the Installation Matrix. A seating position that does not meet these requirements will automatically fail the CRS installation assessment for all rearward facing Universal belted, ISOFIX and i-Size seats on the list for these seating positions.

3.2.7 Integrated Child Restraints

Where an integrated CRS is offered as standard and indicated as such in the vehicle handbook, this seating position will automatically pass the assessments and no installation check is required with the CRS installation list of the weight/size group covered by the integrated CRS.

3.2.8 In practice, for the purpose of assessing the vehicle to child seat compatibility, it may not be necessary to verify each eligible CRS-seating position combination. For example, where for a given passenger seating position an integrated CRS is available (optional or standard fit), no installation check is required with the CRS of the age group covered by the integrated CRS.

3.2.9 Finally, it is important to note that for each passenger seating position at least one of the Installation List CRS covering groups 0+ and I must be accommodated. Additionally, at least one CRS from the Installation List of each group (0-III) must be accommodated by the vehicle. Where one or both of the above conditions are not met, the final CRS Installation score, out of 12 points, (Section 3.7) will be halved. When a recommended CRS fails in the position to be tested it will be considered as no recommended CRS by the car manufacturer.

3.3 Assessment of Problem-Free Installation & Requirements for all CRS

All combinations of CRS and vehicle seat position will be subsequently checked by installing the CRSs on all seating positions. If any outboard seating positions are identical (adult belts, anchorages, etc) then installation may be performed on one side only, all other positions will be assessed. Where there is any asymmetry in a vehicle, including sliding doors, B-pillar position etc. then all seating positions must be assessed individually.

CRS that use more than one installation mode or are equipped with anti rotation devices must meet the requirements of all applicable sections for a successful installation. For example, a CRS using the adult belt AND ISOFIX must meet the full requirements of both Sections 3.4 and 3.5 for a successful installation. A CRS that uses the adult belt AND a support leg must meet the full requirements of Section 3.4 and Section 3.6.

The vehicle seating position is compatible with the CRS fitted as long as the following conditions are met:

3.3.1 Ease of installation in car

This assessment is of the vehicles ability to allow for easy installation of a range of different CRS by evaluating its provision of sufficient space and access. This does not include fastening the CRS to the vehicle, only positioning on the rear or front seat in preparation for fastening.

3.3.1.1 Initial vehicle settings

Installations on the rear seat:

- The front row seats shall initially be set in the Global NCAP Frontal ODB impact test position unless clearly instructed otherwise in the vehicle handbook.



- If the vehicle has only 3 doors, then it is acceptable to utilise any 'easy entry' function to move the front seat forward and allow access to the rear seats.
- Vehicles with adjustable rear seats shall have the seat back angle and fore/aft set to the mid in-use position and are to be used, unless clearly instructed otherwise in the vehicle handbook. The flat folded position of a seat is not considered as an in use position. If the mid position cannot be obtained due to notched adjustments, the next most vertical position for the seat back or the next rearward position for fore/aft shall be used.
- Head restraints shall be in the lowest/not in use position, unless clearly instructed otherwise in the vehicle handbook.
- Movable arm rests shall be set to the position recommended in the vehicle handbook. Where there is no recommendation they shall be positioned so as not to interfere with the CRS installation.
- Where the front seat interacts with the steering wheel, for example with easy entry functions, the steering wheel shall be set to mid/mid.

Installations on the front seat:

- The front seat(s) shall initially be set in the Global NCAP Frontal ODB impact test position unless instructed otherwise in the vehicle handbook.
- The front seat adjustments shall remain the same for all further assessments. Where the vehicle handbook contains details of alternative front seat positions for individual CRS, this alternative position will be used.
- Head restraints shall be in the lowest position, unless clearly instructed otherwise in the vehicle handbook.
- Movable arm rests shall be set to the not in use position or fully vertical.

3.3.1.2 CRS placement

Procedure:

- Where necessary, ready the CRS for installation by lengthening straps and top-tethers so they are accessible once the CRS is in place.
- Pass the CRS through the nearest occupant entry door. Vehicles with moveable roofs shall have the roof closed during this assessment. No other access routes shall be used, such as the rear hatch/boot.
- If the CRS cannot be easily placed in the vehicle due to the position of the front seat, adjust the front seat to allow CRS placement. Following this, the front seat should then be repositioned back to the handbook/initial position.
- For CRSs that allow the child to be carried in the seat the orientation of the CRS may be changed by up to 40 degrees about its axes (x, y), is acceptable to enable the CRS to fit into the vehicle. For CRSs that are not intended as carry-cots then any orientation may be used to place the CRS in the vehicle.
- Where the CRS contains multiple parts, e.g. base and seat, then both items may be installed sequentially and assessed in the same way.
- For CRS that do not allow installation with the child in the CRS, there must be sufficient space within the vehicle to allow an adult to place and child in the CRS. This will be assessed using the appropriate sized child dummy.
- The vehicle meets the requirements if all of the following are met:
- The CRS can be placed on the rear seats without excessive force, difficulty or interaction with the door aperture.
- After adjustment of the front seat, it does not prevent or interfere with correct placement of the CRS. An easy entry function may be used.
- Where applicable, the easy entry function allows the front seat to return and lock in the same seating position after placement of the CRS. If the easy entry function does not return the front seat to the position mentioned in the handbook, it will be adjusted to and assessed in the handbook position.
- If there is sufficient space within the vehicle for a child to be correctly placed in the CRS and the child is not prevented from sitting normally in the CRS.

The vehicle would not meet the requirements if any of the following occur:

- The child seat or base does not individually fit through the door aperture.
- The CRS cannot be placed in the vehicle.
- The CRS must be rotated more than the permissible amount to enable placement or where applicable.



- An easy entry system does not allow the front seat to return and lock in the position detailed in the handbook.
- Vehicle structures prevent a child from being placed correctly in the CRS.
- There is insufficient space within the vehicle to allow the child to occupy the CRS as normal.

3.4 Requirements for seat belt mounted CRSs

3.4.1 Use of 3-point belts

3.4.1.1 Ease of fastening seatbelt

Procedure:

- Once placed in the vehicle, the CRS shall be positioned along the centreline of the chosen seating position.
- Route the adult seatbelt around the CRS in accordance with the instructions on the CRS.
- Engage the buckle tongue into the buckle.
- If necessary, some small movement of the CRS is permitted to expose the seat belt buckle. This is limited to rotation of up to 20 deg about the x and z-axes or 50mm lateral movement from the seat centreline.
- For CRS that are not equipped with integral harnesses an appropriate sized dummy shall be placed in the CRS during this procedure.

The vehicle meets the requirements if all of the following are met:

- The tongue can be engaged in the buckle with the use of only one hand and without the need to reposition the CRS to enable access to the buckle, or the tongue can be engaged using two hands to insert the buckle, where one supports the buckle, and the other is used to insert the tongue.
- The adult seat belt adjacent to the assessed seating position does not prevent installation of the CRS or lead to any instability.
- With the CRS installed, the three point belt on another seating position in that same row should be capable of restraining one other occupant.

The vehicle would not meet the requirements if any of the following occur:

- The belt cannot be buckled due to insufficient belt length.
- The belt length is such that the CRS is not in the correct position on the seat.
- The CRS has to be moved or rotated more than prescribed above to allow access to the buckle, e.g. the buckle is positioned underneath the CRS.
- The installation of the CRS means that an adult cannot occupy another seating position on that row, for example due to limited space or interference with the adult belt system.

3.4.1.2 Ease of tightening belt (Ease of operating the lock-off clip)

This assessment is of the vehicles ability to correctly restrain the CRS using the adult belt systems.

Procedure:

- With the seat belt buckled and belt routed correctly around the CRS, tension shall be introduced into the adult seatbelt by pulling on the diagonal section of the belt in the direction of the reel.
- Tension in the lap section is established by pulling the diagonal section of the belt with no more than 150N force. The tension shall be applied to the diagonal part of the belt before it passes through any upper belt guide or lock off next to the buckle. Away from friction points.
- Seatbelt load cells will be required for this installation.
- For seats that do not have an integral harness, a child dummy of the appropriate size shall be placed in the CRS during this process.

The vehicle meets the requirements if all of the following are met:

- When 150N is applied to the diagonal section of the adult belt, the slack in all parts of the lap section is removed.
- The CRS is held firmly against the seat back and seat base by the adult belt.
- Any movement of the CRS base or back must result in increasing tension within the belt system, e.g. with forward movement of the CRS. The belt reel shall be prevented from spooling out during this check.



- Where applicable, the seat belt must restrain the dummy and the seat correctly.
- The vehicle would not meet the requirements if any of the following occur:
- When slack has been removed from the belt system, the buckle tongue stops interfere with the belt lock off.
- It is not possible to remove the slack in any part of the lap section.

3.4.2 Additional tethers and/or support leg

Where the chosen CRS is equipped with an additional tether or support leg apply the relevant assessment outlined in Section 3.6 before moving on to the next section.

3.4.3 Obstruction & Stability of the CRS

Procedure:

- The CRS shall be installed in the vehicle with the seat belt buckled and any tethers or support legs attached as per the previous steps. The largest appropriate P or Q dummy shall also be installed in the CRS.
- Any comfort adjustments on the CRS shall be changed e.g. incline, recline etc.
- Check any contact points between the CRS, dummy and vehicle.
- The CRS shall be rocked from side to side about the x axis over a 10° to 15° arc. No other restraint shall be placed on the CRS during rocking.
- The CRS shall be pulled toward the front of the vehicle and twisted about the z axis.
- The CRS shall be returned to the initial position with the belt tightened as per Section 3.4.1.2 and a force of 100N shall be applied perpendicular to the CRS in the y direction at the shoulder level of the dummy. This assessment will not be applied to the Group 0+ CRS.
- The CRS shall be returned to the initial position with the belt tightened as per Section 3.4.1.2 and a force of 100N shall be applied perpendicular to the CRS in the y direction at a small distance above the vehicle seat. This assessment will not be applied to the Group 0+ CRS.

The vehicle meets the requirements if all of the following are met:

- The vehicle interior can accommodate installation of the CRS in all orientations and adjustments without interaction with other parts of the vehicle. E.g. booster seats with adjustable head restraints must not be restricted by the rear head restraints or C-pillars.
- The presence of head restraints does not prevent correct installation of the CRS and does not lead to significant forward rotation of the CRS or create lateral instability.
- Contact between the CRS and vehicle interior is permitted provided that the CRS is correctly installed, stable and is not rotated by more than 5 degrees.
- The measured backrest angle of the CRS does not exceed 90 degrees. This can be measured using the device described in APPENDIX I .
- The vehicle interior provides stable support for the CRS in the selected installation modes and adjustments. E.g. the CRS back or base tensioning system must be in contact with the vehicle seat base and seat back cushions.
- The CRS sits flat on the seat base cushion and, for forward facing CRS, is supported by the seat back and/or head restraint.
- With the load applied to the CRS the rotation about the X axis does not exceed 20 degrees and the CRS remains secured and has a tendency to return back to the original position.
- As any load is applied, the tension in the belt system increases with the displacement of the CRS.

The vehicle would not meet the requirements if any of the following occur:

- The CRS does not sit correctly on the seat base cushion or is not supported by the seat back including head restraint.
- The vehicle interior can accommodate installation of the CRS with only limited adjustments of the CRS i.e. tilt or adjustable backrests cannot be used due to interference from the vehicle.
- The vehicle interior encroaches into the space in which the child dummy sits resulting in any contact between the dummy head and legs. For example, where the roof is too low or the knees or tibia are against the back of the front seat. Contact with the toes or feet is acceptable.
- Any part of the vehicle interior, including bolsters, arm rests, pillars obstruct the CRS or prevents a particular adjustment from being made. E.g. C-pillar, roof or rear head restraints prevent correct installation of CRS.



- With the appropriate child dummy installed, the size of the car limits the possible age groups that can be installed and exclusions are not made clear in the vehicle handbook.
- There is limited support offered to the CRS through lack of contact with the supporting structures, e.g. large side bolsters prevent the CRS from sitting flat on the seat base; or where applicable, poor or inadequate support is provided to CRS support legs.
- When load is applied to the CRS it can move more than the allowed amount or the CRS can move without increasing tension on the belt system.

3.5. Requirements for ISOFIX CRS

3.5.1 Insert and locking ISOFIX probes (only)

This is an assessment of the ease of which the CRS ISOFIX probes can be engaged with the vehicle ISOFIX anchorages. It does not include assessment of any other tethers, straps or supports.

Procedure:

- The position and orientation of the vehicle anchorages shall be identified and prepared for CRS attachment. Simple, preparatory actions such as sliding a seat belt away from the anchorage, lifting a dedicated flap or covering to expose the anchorage are permissible. Plastic guide funnels supplied with CRS will NOT be used.
- The CRS shall be placed on the seat centreline, the CRS ISOFIX probes shall be made ready for attachment to the vehicle.
- The CRS and probes shall be pushed toward the anchorages until they are engaged, keeping the CRS on the vehicle seat cushion. Lifting of the CRS from the seat base is not allowed, but some rotation/tilting of the CRS is permissible provided there is still contact with the seat cushion. Separate support frames and bases (if available) may be lifted.
- If necessary, 50mm of lateral movement of the CRS is permitted to allow engagement with the ISOFIX anchorages. Where the CRS has movable ISOFIX probes, they may be adjusted to facilitate engagement provide the CRS remains on the vehicle seat.
- Where the adult belt prevents engagement with the ISOIFX anchorages, it is permissible to reposition the belt to improve access provided that the belt does not have to be held in that position.

The vehicle meets the requirements, once preparatory steps have been performed, if all of the following are met:

- Each vehicle ISOFIX anchorage can be easily engaged. For example, the anchorages are easily accessible or they are equipped with permanent guidance (plastic funnel, fabric slit, etc) which helps the CRS ISOFIX probes align with the vehicle anchorages avoiding any obstruction from the seat, such as the fabric or cushion etc.
- For CRS where the probes are attached to the shell, the CRS can be attached to the vehicle by simply pushing it toward the anchorages, with some tilting but without any other actions that are not described on the CRS itself.
- If the CRS uses a separate support frame, the frame can be easily engaged onto the ISOFIX anchorages without removing fabric, etc.
- With the CRS installed, one of the three point belts on another seating position in that same row should be capable of restraining one other occupant.

The vehicle would not meet the requirements if any of the following occur:

- If the anchorages cannot be engaged without further actions. For example, where the seat cushions have to spread apart by hand in order to create access to the anchorages.
- The CRS has to be lifted off the seat cushion to allow engagement with the anchorages. Lifting of separate support frames is permissible.
- Any part of the seat or cushion prevents attachment of the CRS.
- Where the CRS probes are clearly misaligned with the ISOFIX anchorages.
- Where physical guidance is required, such as plastic funnels, they are not permanently attached to the vehicle.

3.5.2 Additional tethers and/or support leg

Where the chosen CRS is equipped with an additional tether or support leg apply the relevant assessment outlined in Section 3.6 before moving on to the next section.



3.5.3 Obstruction & Stability of the ISOFIX CRS

The principle here is identical to that of Section 3.4.3.

Procedure:

- The CRS shall be installed in the vehicle with ISOFIX and any tethers or support legs attached. A child dummy of the appropriate size shall also be installed in the CRS.
- Any comfort adjustments on the CRS shall be changed e.g. incline, recline etc.
- Check any contact points between the CRS and vehicle.
- The CRS shall be pulled toward the front of the vehicle and twisted about the z-axis.

The vehicle meets the requirements if all of the following are met:

- The vehicle interior can accommodate installation of the CRS in all orientations and seat adjustments without interaction with other parts of the vehicle. E.g. booster seats with adjustable head restraints must not be restricted by the rear head restraints or C-pillars.
- The presence of head restraints must not lead to significant forward rotation of the CRS or create lateral instability.
- Contact between the CRS and vehicle interior is permitted provided that the CRS is correctly installed, stable and is not rotated by more than 5 degrees.
- The measured backrest angle of the CRS does not exceed 90 degrees. This can be measured using the device described in APPENDIX I.
- The vehicle interior provides stable support for the CRS and its attachments with the vehicle in all installation modes and adjustments.
- There is little or no rotation of the CRS about all axes.

The vehicle would not meet the requirements if any of the following occur:

- The vehicle interior can accommodate installation of the CRS with only limited adjustments of the CRS i.e. tilt or adjustable backrests cannot be used due to interference from the vehicle.
- The vehicle interior encroaches into the space in which the child dummy sits resulting in any contact between the dummy head and legs. For example, where the roof is too low or the knees or tibia are against the back of the front seat. Contact with the toes or feet is acceptable.
- Any part of the vehicle interior, including bolsters, arm rests, pillars, obstructs the CRS or prevents a particular adjustment from being made. E.g. C-pillar or rear head restraint prevents correct installation of CRS.
- The size of the car limits the possible age groups that can be installed and insufficient exclusions are not made clear in the vehicle handbook.
- There is limited support offered to the CRS through lack of contact with the supporting structures. E.g. poor or inadequate support is provided to CRS support legs or the support legs cannot be correctly positioned.

3.6 CRS Installed Using Additional Tethers, Straps and Support Legs

3.6.1 Ease of use of tethers & straps

This is an assessment of the ease of which the additional tether anchorages such as top tethers can be engaged with the vehicle, where applicable.

Procedure:

- Once the CRS has been attached to the vehicle with the belt or ISOFIX, any additional tethers, straps and corresponding anchorages or brackets shall be readied. Simple, preparatory actions such as lifting a dedicated flap or covering to expose the attachment point are permissible.
- The removal or repositioning of a parcel shelf or tonneau cover is allowable. It must be possible to replace these parts once the CRS installation has been completed.
- Head restraints may be repositioned or removed for CRS installation if instructed in the vehicle handbook.

The vehicle meets the requirements if all of the following are met:

- The top tether can be engaged and tightened easily, without having to carry out any further actions other than already mentioned.
- Where equipped, any additional tethers can be easily attached to the anchorage and tightened, for example the front seat rail or any other attachment points.



- The vehicle would not meet the requirements if any of the following occur:
- The strap(s) or tether(s) cannot be engaged without any further actions of vehicle adjustments, e.g. it would not be acceptable to tilt the rear seat forward to be able to engage the tether.
 - The strap(s) or tether(s) pass through luggage or occupant space and prevent the use of other parts of the vehicle, including rear seats. Top tether straps that remain above the top of the vehicle seat back are acceptable.
 - The strap(s) or tether(s) obstruct the function or movement of other parts of the vehicle, such as the front seats or luggage space.

3.6.2 Ease of use of support legs

This is an assessment of the vehicles ability to provide adequate support to any support legs, where applicable.

The vehicle meets the requirements if all of the following are met:

- The vehicle provides sufficient space to allow stable placement of any support legs.
- The support leg must be installed in the intended positions, for example fully locked out.
- The area upon which a support rests must also be capable of providing adequate restraint during an impact as described in ECE-TRANS-WP29-2012-53e and Regulation No 14.

The vehicle would not meet the requirements if any of the following occur:

- Poor or inadequate support is provided to CRS support legs or where the support leg cannot be positioned correctly due to interference from the front seat or other vehicle structures.
- The support leg cannot be fully locked out or cannot provide the intended level of support for any reason, such as due limited space.

3.7 CRS Installation Scoring

3.7.1 Each eligible CRS-seating position combination from the Installation Matrix will be deemed successful when the requirements of Section 3 are met. Where an integrated seat is provided for a similar age group as the respective CRS on the CRS Installation List, the case will be treated as if the CRS-seating combination meets the requirements of Section 3. Where the requirements of Section 3 are not met, the CRS-Seating position combination is considered as a fail.

3.7.2 The score for each individual CRS on the installation matrix will be calculated by dividing the number of successful installations in the vehicle by the total number of eligible positions in which it was fitted.

$$\text{The installation score CRS}_i = \sum \frac{T_i - F_i}{T_i}$$

T_i = Total number of eligible positions in the vehicle for the CRS_{*i*}.

F_i = Number of failed installations, and where $i = 1, \dots, M$; the total number of CRS on the extended Installation List.

3.7.3 Where the total number of eligible seating positions for any CRS equals zero, this CRS will not be considered as a 'FAIL' but it will get zero points in installation'.

3.7.4 Separate points will be given for fitment of the CRS from each category as follows:

Installation listed CRS	10 points
OEM Recommended CRS	2 points

3.7.5 The CRS score is calculated by taking the average of the CRS_{*i*} scores of all CRS on the original Installation List (excluding those exempted for all seating positions only for the case of single seat row cars) and applying the percentage to 10 points

3.7.6 The OEM Recommended CRS score is calculated by taking the average of the CRS_{*i*} scores of the two recommend seats and applying the percentage to 2 points. The calculation is performed regardless whether the recommended CRS are taken from the original Installation List or not.



- 3.7.7 The resulting point scores are expressed as numbers, with 3 decimal points. The total score for CRS installation is the sum of the points for fitment of all CRS (see Table).
- 3.7.8 The maximum available score for the installation assessment will be 12 points and is independent on the number of seats on the CRS Installation List and recommended seats.
- 3.7.9 If there is no recommendation for CRS, the maximum available score for CRS fitment will be **10 points**.

Table 1: Example of CRS installation scoring

CRS Installation Assessment				SCORING								
				2nd row			3rd row		Pass	Fail	Exempt	Score
				Right	Left	Centre	Right	Left				
Reference List	Group 0+	Peg Perego Viaggio Switchable	B ___	Exempt	Pass	Exempt	Pass	N/A	2	0	2	100.0%
	Group 0+	Roemer Baby Safe	_ I _L	Exempt	Pass	Exempt	Pass	N/A	2	0	2	100.0%
	Group 0+	Bébé Confort Streety Fix / Maxi Cosi Citi SPS	B ___	Exempt	Fail	Exempt	Fail	N/A	0	2	2	0.0%
	Group I	Peg Perego Viaggio Switchable FWF	B ___	Pass	Pass	Exempt	Pass	N/A	3	0	1	100.0%
	Group I	Graco Cadeira Nautilus FWF	B ___	Pass	Fail	Exempt	Fail	N/A	1	2	1	33.3%
	Group II/III	Cyber Solution M-Fix	B ___	Fail	Pass	Exempt	Pass	N/A	2	1	1	66.7%
	Group II/III	Graco Cadeira Nautilus	B ___	Pass	Pass	Exempt	Pass	N/A	3	0	1	100.0%
OEM	Q1.5	Manufacturer CRS for Q1.5	_ I _L	Exempt	Pass	Exempt	Pass	N/A	2	0	2	100.0%
	Q3	Manufacturer CRS for Q3	_ I _L	Exempt	Pass	Exempt	Pass	N/A	2	0	2	100.0%
N/A												
SUMMARY												
Reference list				7.143								
OEM assessment				2.000								
Group 0+ and I coverage				PASS								
TOTAL INSTALLATION ASSESSMENT				9.143								

Note: Red/fail means safety critical issues exist, 0 points awarded;

4. DYNAMIC ASSESSMENT

The protection offered by the combination of vehicle and recommended CRS in the event of a crash is assessed by Q-series of child dummies in the full scale front and side impact test. This section is only applicable to vehicles equipped with rear seats; vehicles without rear seats shall be assessed according to Section 6.

4.1 Ejection

If the child dummy is ejected or partially ejected from the CRS at any time throughout the impact including rebound, that CRS is awarded zero points for its dynamic performance in front and side impact. If the CRS is partially or wholly unrestrained by any of the vehicle interfaces at any time throughout the impact including rebound, that CRS is awarded zero points for its dynamic performance in front and side impact. The vehicle interfaces for ISOFIX restraints are the two ISOFIX anchorages, top tether anchorage or any other means of rotation limiting device such as a support leg resting on the floor. Seat belt lock-offs, tethers, straps or any other attachments which are specifically used to anchor the CRS to the vehicle will also be penalised if their failure presents a risk of total or partial ejection of the child or child restraint. Ejection is an unusual and highly undesirable situation. The idea of "partial ejection" has been included to allow Global NCAP to deal with situations where the dummy is only partly held within the restraint, such as: by a foot under the impact shield. Where the child dummy and CRS are fully restrained throughout the impact, points are awarded as given below.



4.1.1 Use of a FWF seat for Q1,5 the score will be reduced by 6 points, 4 for head and 2 for neck dynamic assessment.

CONCEPT: *The child should be held securely in the restraint and not be ejected from the restraint.*

4.2 Head Contact with the Vehicle

4.2.1 If there is head contact with any part of the vehicle at any time throughout the impact including rebound, the CRS containing that dummy is awarded zero points for its head performance, in that test. This will reduce the maximum achievable number of points in that test to 4 points (neck and chest). Otherwise, points are awarded as given below.

4.2.2 Frontal Impact

4.2.2.1 Head Contact with the CRS

Contact with the CRS is defined by either:

- a) Direct evidence of contact
- b) Peak resultant acceleration: $Q1\frac{1}{2} \geq 80g$
 $Q3 \geq 96g$

In the absence of contact:

$Q1\frac{1}{2}$ and $Q3$ are awarded **4 points**

In the presence of contact, the score is based on the Head Resultant Acceleration, 3msec exceedance. Hard contacts occurring during the head rebound will not be considered.

$Q1\frac{1}{2}$ **4 points** $\leq 72g$; **0 points** $\geq 88g$
 $Q3$ **4 points** $\leq 87g$; **0 points** $\geq 100g$

Note: Between limit values, a sliding scale will be used, for this and other parameters.

4.2.2.2 Head Excursion (Forward Facing CRS)

Where possible the maximum forward excursion of the head, relative to the Cr point, is estimated. If the forward excursion cannot be estimated, it will be deemed to be $\leq 549mm$; otherwise the points will be based on the following:

$Q1\frac{1}{2}$ and $Q3$ **4 points** $\leq 549mm$; **0 points** $\geq 550mm$

If in future a more precise method of measuring head excursion becomes available, a sliding scale may be introduced. Again, in future, consideration may be given to basing the limits on internal geometry of the vehicle.

4.2.2.3 Head Exposure (Rearward Facing CRS)

CONCEPT: *The CRS shell must be in a position to provide some energy absorption between the child's head and an intruding object at all times during the forward excursion of the dummy.*

Where the following requirements are complied with, the $Q1\frac{1}{2}$ and $Q3$ will be awarded **4 points**.

- a) No compressive loads shall be applied to the top of the head.
- b) The head must remain fully contained within CRS shell, during the forward movement of the dummy (i.e. the top of the head must not be exposed to the possibility of direct contact with parts of the vehicle)

4.2.2.4 Neck Tension

The neck tension assessment is based on the parameter detailed below.

Upper neck Fz
 $Q1\frac{1}{2}$ and $Q3$ **2 points** $\leq 1.70kN$; **0 points** $\geq 2.62kN$



4.2.2.5 Chest

The chest score is based on the chest resultant acceleration, as detailed below.

Chest resultant acceleration, 3msec exceedance

Q1½ **2 points** ≤ 41g; **0 points** ≥ 55g

Q3 **2 points** ≤ 50g; **0 points** ≥ 66g

4.2.2.6 Overall Dynamic Score for Frontal impact

The Overall Dynamic Score for the Frontal Impact is calculated as:

Worst score from	Head Contact with the CRS (Section 4.3.1.1) Head Excursion (Section 4.3.1.2) Head Exposure (Section 4.3.1.3)	4 points
+ Score from Neck Tension (Section 4.2.2.4)		2 points
+ Score from Chest (Section 4.2.2.5)		2 points

4.2.3 Side Impact

4.2.3.1 Head Containment

If the head is not contained within the shell of the CRS at any time throughout the impact including rebound, the CRS containing that dummy is awarded **zero points**. Otherwise, points are awarded as given in section 4.2.3.2 below.

“Contained” requires that some energy absorbing section of the side wing remains between the head and a virtual intruding vertical plane, representing the side structure of the vehicle. There must also be no fracturing of the CRS which might compromise the performance of the side wing of the CRS.

CONCEPT: *The CRS shell must be in a position to provide some energy absorption between the child’s head and an intruding vertical plane striking the seat from the struck side.*

4.2.3.2 Head Contact with the CRS

Contact with the CRS is defined by either:

- a) Direct evidence of contact
- b) Peak resultant acceleration: Q1½ ≥ 80g
Q3 ≥ 80g

In the absence of contact: Q1½ and Q3 are awarded **4 points**

In the presence of contact, the score is based on the Head Resultant Acceleration, 3msec exceedance: Q1½ and Q3 **4 points** ≤ 72g; **0 points** ≥ 88g

5. VEHICLE BASED ASSESSMENTS

All vehicle based assessments will be only performed on vehicles that meet the relevant fitment requirements at the time of assessment.

5.1 Provision of Three-point Seat Belts

If any passenger seat is not equipped with three-point automatic lap and diagonal seatbelts and/or they do not meet UN or FMVSS regulations, 0 points shall be awarded for the vehicle based assessments.

CONCEPT: *All forward or rearward facing seats should be equipped with a three-point automatic belt that meets a technical standard.*



5.2 Gabarit Installation on all Passenger Seats

Where all other passenger seats are in compliance with the requirements in section 5.2.2 which are based on UN Regulation 16.05 [2], **2 points** shall be awarded to the Child Protection score.

CONCEPT: The layout of the adult seat belt should ensure compatibility between the adult seat belt and any CRS.

CONCEPT: All possible seating positions should be capable of providing a good interface with a CRS, secured by an adult seat belt.

5.2.1 To assess compliance, the Gabarit, as specified in APPENDIX II, shall be installed on all passenger seats according to the following procedure:

- Adjust the seat to its fully rearward and lowest position, the seat back to an angle of 25 degrees from the vertical or nearest fixed position and the upper seat belt anchorage to its lowest position. Adjustable rear seats shall be set fully rearward.
- If alternative seat, seat-back or safety-belt anchorage adjustments are to be used for either front or rear seats when installing CRS, information about the alternative position must be included in the Vehicle Handbook giving the information required in 5.2.2f). Where this information is provided, set the seat to this position.
- Place a cotton cloth on the seat-back and cushion.
- Place the Gabarit on the vehicle seat.
- Arrange the safety-belt strap around the fixture in approximately the correct position as shown in Figures 1 and 2, and then latch the buckle.
- Ensure that the fixture is located with its centreline on the apparent centreline of the seating position ± 25 mm with its centreline parallel with the centreline of the vehicle.
- Ensure that all webbing slack is removed. Use sufficient force to remove the slack, do not attempt to tension the webbing.
- Push rearwards on the centre of the front of the fixture with a force of $100 \text{ N} \pm 10 \text{ N}$, applied parallel to the lower surface, and remove the force.
- Push vertically downwards on the centre of the upper surface of the fixture with a force of $100 \text{ N} \pm 10 \text{ N}$ and remove the force.

INSTALLATION OF FIXTURE ONTO VEHICLE SEAT

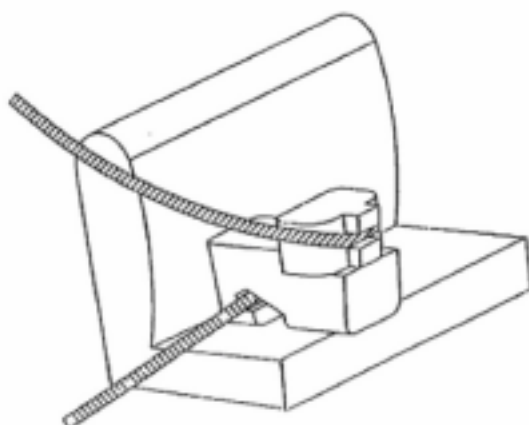
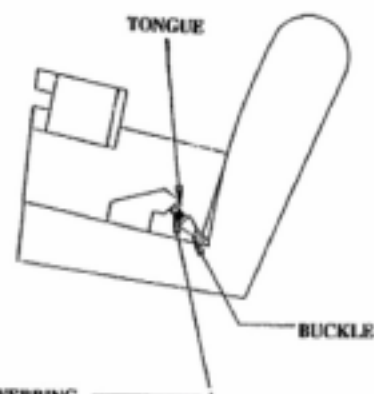


FIGURE 1

CHECK FOR COMPATIBILITY



LAP BELT ONLY SHOWN

FIGURE 2



5.2.2. Requirements:

- a) With correct routing of the adult seat belt around the Gabarit, the base of the Gabarit shall contact both the forward and rearward parts of the seat cushion upper surface. If such contact does not occur due to the belt access gap in the Gabarit, this gap may be covered in line with the bottom surface of the Gabarit.
- b) The lap portion of the belt shall touch the fixture on both sides at the rear of the lap belt path.
- c) There shall be sufficient seat belt webbing to fit around the entire Gabarit while allowing the contact between the Gabarit and both the forward and rearward parts of the seat cushion upper surfaces.
- d) Once the belt is correctly routed around the fixture, it should be possible to draw a further 150mm of belt webbing from the reel.
- e) With the Gabarit in position and the buckle fastened, it must be possible to establish a tension of at least 50 N in the lap section of the belt by external application of tension in the diagonal section of the belt in the direction of the upper seat belt guide. This may result in movement of the lower anchorages and/or buckles from their anticipated 'design position'. For example, the tension may cause the lap section of the belt to slide between the rear of the seat base and bottom of the seat back, hence shortening the length of the lap section. However, if this is considered to be achievable through 'normal use' then the assessment will be made with the anchorage/buckle in this position.

To achieve the 1 point for all seating passenger positions, the following requirements must be met in addition to those detailed above:

- f) The Vehicle Handbook must indicate which passenger seats are suitable for use with a Group 0 and Group 1 CRS.
- g) Where a passenger frontal airbag is fitted, the vehicle handbook must clearly indicate that when the passenger airbag is active the seat is NOT suitable for RWF CRS as well as indicating that it is suitable for CRS when the airbag has been disabled.
- h) Where a passenger frontal airbag is fitted, it must be possible to activate and deactivate the passenger airbag, either automatically or manually. The requirements of Section 5.6 need not be met to qualify for this award, but airbag disabling equipment must be standard.

5.3 Three Simultaneous Use Seating Positions

CONCEPT: Vehicles that provide three or more seating positions suitable for an i-Size CRS should be rewarded.

5.3.1 Where the vehicle is provided with three seating positions that can simultaneously accommodate any combination of the CRS in the Installation List covering Groups 0 to III, 1 point shall be awarded to the Child Protection score. A combination of three CRS will be used to assess this, which may be proposed by the vehicle manufacturer.

5.3.1.1 If the assessment includes the front passenger seat and if a passenger frontal airbag is fitted, it must be possible to activate and deactivate the passenger airbag, either automatically or manually for RWF CRS. The requirements of Section 5.6 need not be met to qualify for this award, but airbag disabling equipment must be standard. Car Manufacturer recommended combinations of CRS and seating positions will be considered where provided.

5.3.1.2 There must be sufficient space within the vehicle to accommodate simultaneously the CRS and relevant sized child dummies. For example, if the handbook recommends that the front passenger seat is moved fully rearward, it must not prevent the relevant CRS and child from being installed on the seating position behind.

5.3.2 Where the vehicle is provided with three seating positions that can simultaneously accommodate i-Size CRS, **1 point** shall be awarded to the Child Protection score. For a period of 3 years after i-Size is adopted within Regulation, it will only be necessary for the vehicle to meet the geometric and strength testing requirements of Regulations UN 14 and 16. i-Size labelling requirements will not be needed until regulation (then label) becomes mandatory in at least one of the market(s) assessed.



5.4 ISOFIX Usability

Where two passenger seats are in compliance with the following requirements (detailed in A, B and C simultaneously), **up to 2 point** shall be awarded to the Child Protection score. If the vehicle is a 2 seater then only the passenger seat(s) is required to meet the requirements.

CONCEPT: *The car must have ISOFIX according to UN regulation, the user of a vehicle equipped with ISOFIX anchorages should be made aware of the existence and location of the anchorages, including any top tether anchorages.*

A) *ISOFIX system is present and approved according to UN14*

B) *When the requirement in A) is met and the car meets the following requirements: 1 point shall be awarded to the Child Protection Score.*

- a) Each seat which is equipped with ISOFIX anchorages must be marked. It must be clear which pairs anchorages should be used together.
- b) The location of each ISOFIX anchorage must be marked.
- c) The location of each top tether anchorage must be marked.
- d) The ISOFIX and top tether markings must include both text and a pictogram.
- e) All markings must be of conspicuous design and both the text and pictogram must have colours which contrast with their background.
- f) All markings must be permanently visible. Flag type labels are not acceptable.
- g) All marking must be permanently attached to the vehicle.
- h) ISOFIX relevant information must be presented in the vehicle handbook.

C) *When the i-size requirements are met [i-size ready] by the ISOFIX system and requirements in A) and B) are met then **1 extra point** shall be awarded to the Child Protection Score.*

Where i-Size seating positions are offered, they need to comply with the following marking requirements to be eligible for scoring the available points specified below.

- a) The location of each i-Size anchorage must be marked.
- b) The location of each top tether anchorage must be marked and include both text and a pictogram.
- c) The i-Size markings must show the relevant i-Size pictogram detailed in UN Regulation 14, Annex 10. It is allowed to add the word ISOFIX adjacent to the i-Size pictogram.
- d) All markings must be of conspicuous design and both the text and pictogram must have colours which contrast with their background.
- e) All markings must be permanently visible. Flag type labels are not acceptable.
- f) All marking must be permanently attached to the vehicle.

Summary

Meeting just A will award 0 point.

Meeting just A and B will award 1 point

Meeting A, B and C will award 1 extra point

A is a precondition to B and B a precondition to C.

5.5 Two or more Largest ISOFIX Positions

Where two seating positions are in compliance with the following requirements, **1 point** shall be awarded to the Child Protection score:

CONCEPT: *Vehicles in which at least two ISOFIX positions are capable of accommodating the largest size of rearward-facing ISOFIX CRS should be rewarded.*

- a) For vehicles with rear seats, two or more passenger seats are suitable for simultaneous use with the largest size of rearward facing (Class C) ISOFIX CRS, Fixture (CRF) ISO/R3.

Note: When checking a CRF on a rear seat, the vehicle seat located in front of this rear seat may be adjusted



longitudinally forward but not further than the mid position between its rearmost and foremost positions. The seat backrest angle may also be adjusted, but not to a more upright angle than corresponding to a torso angle of 15 degrees.

- b) For vehicles without rear seats, one or more passenger seats are suitable for simultaneous use with the largest size of rearward facing (Class C) ISOFIX CRS, Fixture (CRF) ISO/R3.
- c) This information must be presented in the vehicle handbook.

5.6 Passenger Airbag Warning Marking and Disabling

If the vehicle is fitted with a serial or optional front seat passenger's frontal protection airbag, is marked with a permanent airbag warning label that meets either the requirements of the Child protection protocol or UN Regulation 94 latest version, and the requirements of Section 5.6.1 are met, a maximum of **4 points** will be awarded. Alternatively, **3 points** will be awarded where a label meets the above requirements and those of Section 5.6.2 are met.

When no passenger airbag disconnection is possible and the permanent airbag warning label meets either the requirements of the Child protection protocol version 1.0 or Regulation 94, **1 point** shall be awarded.

If no passenger airbag is available on the entire model range, **2 points** will be awarded to the Child Protection score.

CONCEPT: A warning regarding the hazard posed by a frontal protection air bag to the occupant of a rearward-facing child restraint should be permanently and explicitly marked on the vehicle and be designed to last the lifetime of the vehicle.

The vehicle should make provision for the safe carrying of a child in a rearward facing CRS in the front passenger seat, without additional actions by the installer.

Where a manual switch is used to disable the airbag, precautions should be taken to ensure that the switch cannot be operated by a child, without the knowledge of the driver.

Where Global NCAP refers to the airbag deactivation components as '**the system**', this refers to the switch, airbag status indicator, airbag and any other components associated with the deactivation of the airbag.

5.6.1 In case Dealer disconnection is possible and warning criteria meets 5.6.2, **1 extra point** will be awarded

5.6.2 The airbag can be de-activated manually and the following requirements are met, **2 extra points** will be awarded:

General requirements:

- a) Any text, labelling and instructions in relation to airbag disabling must be permanently attached to the vehicle.
- b) The information provided must be clear, without reference to the vehicle's handbook or other source.
- c) There must be no possibility of the users being given false information.

Airbag status indicator requirements:

- d) Easily visibly information and warnings must be provided for the driver and front seat passenger, showing the status of the airbag.
- e) The status indicator must be labelled with the words 'Passenger AIRBAG OFF/ON'. Abbreviations such as 'Pass', 'AB' or any other combination is NOT acceptable.
- f) The AIRBAG ON pictogram must be based upon that of the sun visor label (ECE R94) as shown:



- g) The AIRBAG OFF pictogram must be based upon that detailed in ECE R121 as shown:





- h) Slight alterations to the ON/OFF pictograms above are acceptable provided that the basic geometry of the pictogram remains the same. Mirroring and monochrome colours are acceptable.
- i) If the information to indicate that the airbag is enabled is provided by an illuminated signal, the signal is only required to be illuminated for a period of 60 seconds after the ignition is switched on.
- j) Information to indicate that the airbag is disabled must be permanently displayed, when the ignition is on.
- k) If at any time the airbag is switched from the OFF position to the ON position, the status indicator showing that the airbag is ON must signal this immediately after checking period for at least 60 seconds, regardless of the length of time the ignition has been switched on, or until the ignition is switched off again.

Manual airbag deactivation requirements:

- l) Where a switch is used, it must be labelled with the words 'Passenger AIRBAG OFF/ON' and the same pictograms detailed above indicating ON and OFF.
- m) The individual switch positions must be marked with the same pictograms that are used to indicate the airbag status. The two positions must be marked with the text ON & OFF along with the corresponding pictogram.
- n) Where the two switch positions are marked not on the switch but on an adjacent label, the label must be sufficiently close to the switch, such that the user clearly associates one with the other.
- o) Where a hardware switch is used, it must be accessible and clearly visible when installing CRS. For example, where a switch is located in the glove box, the presence of the switch must be clearly highlighted either by switch itself or an additional, permanent, label when the lid is open. For example, the switch may not be located on the driver's side of the vehicle.
- p) It must not be possible for a rearward facing child; restrained on the front passenger seat; to operate the switch at any time.
- q) Where a software based switch is used, clear instructions detailing 'Passenger AIRBAG OFF/ON' (no abbreviations) must be presented in the menu at the same time as the corresponding pictograms used for the status indicator.
- r) If, with the ignition on and with engine running or not, the airbag status can be changed, the system must react correctly to the change immediately. Systems will be checked once the vehicle diagnostics/system checks have been completed.

5.6.3 If the vehicle is equipped with a system which automatically switches the airbag off for ANY rearward facing CRS and obviates any risk associated with airbag deployment, **3 extra points** will be awarded:

- a) The General and Airbag status indicator requirements detailed in Section 5.6.2 are met.
- b) If, with the ignition on and with engine running or not, the airbag status can be changed, the entire system must react correctly to the change immediately. Systems will be checked once the vehicle diagnostics/system checks have been completed.
- c) The system must automatically re-activate the airbag when an adult occupant occupies the seat.

Summary:

No airbags in all model range: total 2 points.

Passenger Airbag as standard:

Label not Ok: total 0 point.

Label Ok, but no airbag disconnection: total 1 point.

Dealer disconnection possible and label OK: total 2 points (Label is pre-condition).

Manual disconnection possible and label OK: total 3 points (Label is pre-condition).

Automatic disconnection possible and label OK: total 4 points (Label is pre-condition).

5.7 Integrated Child Restraints

5.7.1 Where the vehicle is provided with an integrated CRS as standard equipment, **1 point** shall be awarded to the Child Protection score. For vehicles without rear seats, **1 point** will be awarded in case one or more passenger seats are provided with integrated CRS.



5.7.2 Where the vehicle is provided with one or more “Group I-III” integrated CRS, as standard equipment, 1 additional point shall be awarded to the Child Protection score. For vehicles without rear seats, 1 point will be awarded in case one or more passenger seats are provided with integrated CRS.

CONCEPT: Vehicles that provide, as standard, two or more integrated restraints should be rewarded.

CONCEPT: Vehicles that offer at least one integrated restraint suitable for all age groups except the youngest children, who use portable restraint systems, should be rewarded.

Group I for children of mass from 9kg to 18kg

Group II for children of mass from 15kg to 25kg

Group III for children of mass from 22kg to 36kg

6. TWO SEATERS AND VEHICLES WITH LIMITED REAR SPACE

This Section details how protection for children is assessed by Global NCAP in vehicles equipped with two seats and in vehicles where space is limited in the rear.

6.1 Vehicles with only Two Seats

6.1.1 CRS installation assessment

6.1.1.1 The “Installation CRS List” and any car manufacturer recommended seats will be installed on the passenger seats as detailed in Section 3. Where the passenger seat is able to meet the requirements of Sections 3.3, 3.4 and 3.5 for CRS the vehicle will be awarded **12 points**. The score will be calculated as described in Section 3.7.

6.1.1.2 All groups (0-III) are represented by the CRS Installation List and the car must pass the installation for all these CRS. Exemptions by user manual will only be accepted when there is sufficient technical evidence to justify the excluded position. For example, positions where 3-point belts can be installed, 2 points belts will be rated as “Fail” independently from manual indications.

6.1.1.3 When the manufacturer exempts the front passenger seat, **0 points** will be awarded for the CRS installation assessment.

6.1.2 Dynamic assessment

6.1.2.1 For two seater sports cars there will be no dynamic assessment, therefore the maximum number of points is 12+10.

6.1.2.2 To ensure that these vehicles are not penalised for having no dynamic assessment, the relative score weighting of the available assessments remains the same between the applicable assessments. The score out of 22 points for two seaters is scaled to be equivalent to any other vehicle that is assessed out of the full 49 points.

6.1.3 Vehicle based assessments

The following vehicle based assessments will be applied to two seater vehicles:

(Expected that no front passenger seat to be equipped with only a 2 point belt)

6.1.3.2 Gabarit Installation on all Passenger Seats

When the passenger seat is in compliance with the requirements in Section 5.2.2, 1 point shall be awarded to the Child Protection score.

6.1.3.3 ISOFIX Usability

When the passenger seat is in compliance with the requirements, **2 points** shall be awarded to the Child Protection score.



6.1.3.4 Largest ISOFIX Positions

When the passenger seat can accommodate a largest ISOFIX, **1 point** shall be awarded to the Child Protection score.

6.1.3.5 Passenger Airbag Warning Marking and Disabling

When the vehicle is in compliance with the requirements, a maximum of **4 points** shall be awarded to the Child Protection score.

6.1.3.6 Integrated Child Restraints

When the vehicle is provided with an integrated CRS as standard equipment, **1 point** shall be awarded to the Child Protection score.

Where the vehicle is provided with one "Group I-III" integrated CRS as standard, **1 additional point** shall be awarded to the Child Protection score.

6.1.4 Two seater vehicles with passenger airbag that are not equipped with a passenger airbag deactivation switch will not be eligible to score in the vehicle based assessments. Where this is the case, the vehicle based assessment will be **0 points**.

6.2 Vehicles with Limited Rear Space

Vehicles will be considered as having limited rear space when the normal CRSs recommended by the car manufacturer cannot be installed with the front seats in the Global NCAP Frontal ODB impact test position. Where this is the case, the vehicle manufacturer should provide evidence showing that the CRS and/or child cannot be installed without interference from the vehicle.

6.2.1 CRS installation assessment

6.2.1.1 The CRS Installation List seats and any car manufacturer recommended seats will be installed on the passenger and rear seats as detailed in Section 3, using the front seat settings as specified in the vehicle handbook. Where the passenger seat is able to meet the requirements of Sections 3.3, 3.4 and 3.5 for CRS the vehicle will be awarded 12 points. The score will be calculated as described in Section 3.7.

6.2.2 Dynamic assessment

6.2.2.1 When a car manufacturer wishes to avoid being awarded zero points for the CRS dynamic assessments, data from additional full scale frontal and side impact tests may be provided by the car manufacturer. These tests shall be performed using the appropriate CRS with the front seats positioned as required to allow for installation of the CRS. This front seat position should be mentioned in the vehicle handbook. The tests must be equivalent to the Global NCAP front and side impact tests and contain an equivalent level of instrumentation. Adult dummies are not required. It is the responsibility of the vehicle car manufacturer to ensure that adequate film coverage of the impact, and specifically child head excursion and head containment, is provided.

A "hybrid rating" would be produced using the adult data from the normal full scale test (performed without CRS) and the child data from the additional tests. In the final vehicle rating, Global NCAP will indicate that it was not possible to install the CRS with and adult in the normal Global NCAP front seat test position. A maximum of **24 points** can be achieved.

6.2.3 Vehicle based assessment

All vehicle based assessments will apply as detailed in Section 5 and be assessed out of a maximum **13 points**.

7. SCORING AND VISUALISATION

7.1 Scoring

Currently, the maximum number of points available for child protection in vehicles with rear seats is 49.



For vehicles without rear seats, the maximum score is 23 points. The maximum points available in each assessment area are as follows:

	With rear seats	Without rear seats
Dynamic Assessment	24	0
Installation of Child Restraints	12	12
Vehicle Based Assessments	13	10

The child protection score will be the sum of all three areas.

The tables below summarise the maximum possible score in each (sub)category for vehicles with limited rear space and for vehicles with no rear seats (such as two seaters).

7.2 Child Protection Assessment Points Table (Normal and Limited Rear Space)

SECTION	CATEGORY	TOTAL POINTS (49)
4	DYNAMIC ASSESSMENT	(24)
4.1	Ejection	switch
4.2	Head Contact with the Vehicle	switch
4.2.2	FRONTAL IMPACT	(16)
4.2.2.1	Head Contact with the CRS	8
4.2.2.2	Head Excursion (Forward Facing CRS)	
4.2.2.3	Head Exposure (Rearward Facing CRS)	
4.2.2.4	Neck Tension	4
4.2.2.5	Chest	4
4.2.3	SIDE IMPACT	(8)
4.2.3.1	Head Containment	Switch
4.2.3.2	Head Contact with the CRS	8
3	INSTALLATION OF CHILD RESTRAINTS	(12)
	CRS Installation list	10
	OEM Recommended CRS	2
5	VEHICLE BASED ASSESSMENTS	(13)
5.1	Provision of Three-point Seat Belts	switch
5.2	Gabarit Installation on all Passenger Seats	2
5.3	Three Simultaneous Use Seating Positions	2
5.4	ISOFIX Usability	2
5.5	Two or more Largest ISOFIX Positions	1
5.6	Passenger Airbag Warning Marking and Disabling	0 to 4
5.7	Integrated CRS	2



7.3 Child Protection Assessment Points Table (No Rear Seats)

SECTION	CATEGORY	TOTAL POINTS (22)
2.1	INSTALLATION OF CHILD RESTRAINTS	(12)
	CRS Installation list	10
	Recommended seats	2
5	VEHICLE BASED ASSESSMENTS	(10)
5.2	Gabarit Installation on front Passenger Seat	1
5.3	Three Simultaneous Use Seating Positions	NA
5.4	ISOFIX Usability	2
5.5	Largest ISOFIX Position on front Passenger Seat	1
5.6	Passenger Airbag Warning Marking and Disabling	0 to 4
5.7	Integrated CRS	2

7.4 Score and stars correlation

The maximum number of points available for child protection is 49 points, the rating is based on the total points scored in the assessment as follows:

Passenger cars and limited rear space:

41.00 - 49.00 points	5 stars
35.00 - 40.99 points	4 stars
27.00 - 34.99 points	3 stars
18.00 - 26.99 points	2 stars
9.00 - 17.99 points	1 star
0.00 - 8.99 points	0 stars

2 seater vehicles

20.00 - 22.00 points	5 stars
17.00 - 19.99 points	4 stars
13.00 - 16.99 points	3 stars
9.00 - 12.99 points	2 stars
5.00 - 8.99 points	1 star
0.00 - 4.99 points	0 stars

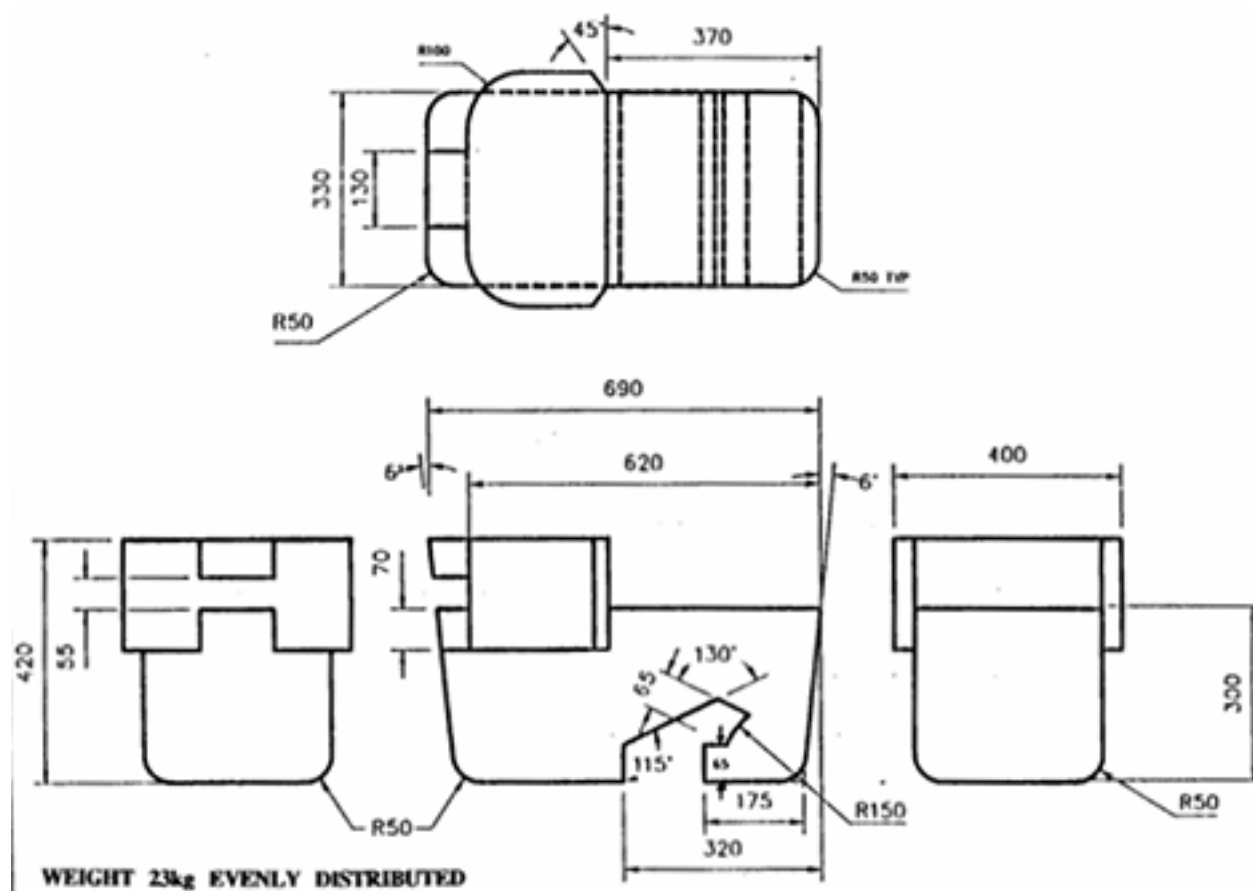
8. REFERENCES

- 1 UN Regulation 44, Revision 2, "Uniform Provisions Concerning The Approval Of Restraining Devices For Child Occupants Of Power-Driven Vehicles ("Child Restraint System")", 4 February 2008.
- 2 UN Regulation 16 Revision 05 "Uniform Provisions Concerning The Approval Of: I. Safety-Belts, Restraint Systems, Child Restraint Systems And ISOFIX Child Restraint Systems For Occupants Of Power-Driven Vehicles; II. Vehicles Equipped With Safety-Belts, Restraint Systems, Child Restraint Systems and ISOFIX Child Restraint Systems", October 2012.
- 3 UN Regulation 129 "Uniform provisions concerning the approval of enhanced Child Restraint Systems used on board of motor vehicles (ECRS)", July 2013



APPENDIX II

GABARIT SPECIFICATION



All dimensions are in mm



APPENDIX III

CRS for installation assessment

- Group 0+/I - Peg Perego Viaggio Switchable FWF and RWF (Belted)
- Group 0+ - Roemer Babysafe Plus w/Isofix base (ISOFIX/support Leg)
- Group 0+ - Maxi Cosi Citi SPS (belted)
- Group I/II/III - Graco Cadeira Nautilus, (belted)
- Group II/III - Cybex Solution M-Fix (Belted / ISOFIX)

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