



**EUROPEAN NEW CAR ASSESSMENT PROGRAMME  
(Euro NCAP)**



**ASSESSMENT PROTOCOL – CHILD OCCUPANT PROTECTION**

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### **1 INTRODUCTION**

Euro NCAP has carried out a child occupant safety assessment since its very first test to ensure that manufacturers take responsibility for the children travelling in their vehicles. In November 2003, Euro NCAP introduced a child occupant protection rating to provide clearer information for consumers about the results of these tests. As part of this assessment, Euro NCAP has used 18 month old and 3 year old sized dummies, placed in manufacturers ‘recommended’ child seats, in the frontal and side impact tests. As well as studying the results from the impact tests, Euro 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. In 2009, the child score became integral part of the overall rating scheme but the technical assessment remained the same.

Starting from 2013, the assessment of child safety is extended by an installation check of a selection of popular, well performing seats available in Europe. 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 and car. For this purpose, a so-called ‘top pick’ list is populated with widely available, well performing child seats that represent most common types of products available on the European market. The particular CRS included on the ‘top pick’ list are published on Euro NCAP’s website and will be reviewed every 2 years. The ‘top pick’ list may be extended to include manufacturer’s recommended seats and/or regionally popular seats.

This protocol contains several references to i-Size seating positions. Vehicles will qualify for any i-Size related rewards provided the relevant i-Size specifications detailed in Regulations 14, 16 and 129 are met. Further details of the i-Size requirements are contained in the relevant sections of this protocol. From the 1<sup>st</sup> January 2016, only fully i-Size complaint vehicles will be rewarded in the relevant vehicle based assessments.

**DISCLAIMER:** Euro 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, Euro NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

## 2 CHILD PROTECTION ASSESSMENT

This protocol defines how protection for children is assessed in Euro 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 popular child seats will be used to assess vehicle to CRS compatibility and Q Series dummies representing 1½ year old and 3 year old children will assess dynamic performance. The protocol is applicable to all classes of vehicles currently assessed by Euro 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 year old child are placed in child seats recommended by the vehicle manufacturer. For the intermediate period until testing with taller dummies will start, 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 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.

The Euro NCAP inspection manual contains examples of good and bad practices according to the requirements of this protocol.

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 Manufacturer's Recommendation

The principle behind the Child Occupant Protection assessment is that children should be as equally well protected as adults in the event of a crash. The overall responsibility of the vehicle manufacturer is reflected in the recommendation that the vehicle manufacturer must make regarding the CRS to be used in the full scale tests at the start of the process.

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 year 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 The vehicle manufacturer is given the choice to choose appropriate seats from the list of

- pre-selected seats used for the installation check (the ‘top pick’ list, see Section 3.1), using the installation mode identified on the list. Alternatively, the vehicle manufacturer may recommend different seats (with installation modes). In both cases, the following preconditions must be met for the manufacturer recommended CRS to be accepted:
- 2.1.3 The CRS must be recommended by the vehicle manufacturer, to their customers, in all countries of the European Union, where the vehicle is sold.
  - 2.1.4 Where the recommended CRS are not on the top-pick list, the CRS must be available for purchase by the public from dealers, in all countries of the European Union where the vehicle is sold. The CRS system must be available to the public within 5 working days of an order being made.
  - 2.1.5 The recommended CRS must have been fully type approved and evaluated by the ETC (or similar) programme (inc. dynamic tests) and obtain a ‘good’ performance rating. This is the case for CRS on the top pick list. For CRS not on the top pick list, it is the vehicle manufacturer’s responsibility to provide evidence of ‘good performance’ at the time of CRS recommendation, following the procedure described in Technical Bulletin 012. For Integrated CRS no ETC testing is necessary and the performance will be shown in Euro NCAP crash tests.
  - 2.1.6 Recommendation of ‘OEM rebranded’ CRS that are already on the top pick list can be accepted. Information will be added to the results to highlight the equivalency between original top pick list seat and ‘OEM rebranded’ seats to the consumer.
  - 2.1.7 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.
  - 2.1.8 Where no or no appropriate recommendation is provided, for example where the requirements of Section 3 are not met, Euro NCAP will select possible seats from the top pick list, or in case this is not feasible, acquire fitting seats for use in the full scale tests. 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**

Euro NCAP rewards vehicles that can accommodate a broad variety of child seats available on the European market. For this purpose, a limited number of popular child seats are installed in the vehicle. All CRS selected for the Euro NCAP fitment tests have demonstrated good (crash test) performance in leading independent consumer tests and are readily available in certain regions of the EU-28. The groups and recommended installation modes of the CRS selected represent those commonly most observed on the market, including some universal and semi-universal seats. This “top pick” list of CRS, how it is compiled and updated is explained in section 3.1 below.

#### **3.1 Top Pick List and Recommended Seats**

- 3.1.1 The child seats used for the fitment assessment are detailed in Euro NCAP Technical Bulletin TB012. This list contains a sample of widely available, well performing child seats that represent most common types of products available on the European market. The list will be checked annually and updated if seats are no longer available on the market. Each update will occur at the start of the year preceding the year of application. Euro NCAP does not assess or rate the child seats individually.
- 3.1.2 All CRS on the top pick 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 preconditions for acceptance of CRS are listed in Section 2.1.
- 3.1.3 In addition to the above, selected seats available in local markets and rated as ‘good’ performers can be used to extend the “top pick” list. Locally available CRS are only allowed if not already covered by other seats on the top pick list. Placing these seats on the “Extended Top Pick 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, all semi-Universal and vehicle specific CRS on the extended top pick list must be detailed on the approved vehicle list. Where this is not the case, no award will be given for CRS installation of these seats. Exemptions are based solely on the information in the vehicle handbook as specified in 3.2.3. Information in other documents, such as the CRS approved vehicle list, will not be taken into account.

#### **3.2 Installation Matrix**

- 3.2.1 The score for Installation of Child Seats is based on the number of CRS from the full 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), each CRS on the top pick list (including those recommended by the vehicle manufacturer) will be fitted on each seating position, using the installation modes identified in TB012. Semi-universal CRSs for which the car model is not identified on the CRS reference list at the time of the 1-2-1 meeting will be included in the assessment but are not be eligible for scoring (Section 3.1.4)
- 3.2.3 Where the vehicle handbook exempts the use of a CRS category (Group 0-III; U, UF, ..., ISO/R1,.. etc.) on a seating position according to Annex 17, Appendix 3 of ECE Regulation 16, supplement 3 to the 06 series of amendments, this position-CRS combination will not be considered in the CRS installation assessment (not eligible)<sup>1</sup>. Exemptions are accepted provided that:
- The vehicle handbook clearly details, in tabular format only, the CRS categories (universal and semi-universal) that are suitable or not suitable for installation for each position. Where the tables are not present, the CRS installation will be performed on all seating positions. It is acceptable for the table to be annexed in the vehicle handbook or provided on a permanent website provided that clear references are provided in the vehicle handbook.
  - Exemptions are based on the vehicle manufacturer's legal obligation to provide truthful advice on the suitability of each passenger seating position for the fitting of child restraint systems. Where there is any doubt, Euro NCAP may choose to include the exempted combination in the assessment.
- 3.2.4 Applying the above, the installation matrix is defined as shown in Table 1.
- 3.2.5 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.
- 3.2.6 Each passenger seating position must accommodate certain types and groups of top-pick CRS. Where a particular seating position has been clearly exempted in the vehicle handbook, only those positions that have NOT been exempted shall meet these requirements. Where the conditions of this section are not met, the final CRS Installation score, out of 12 points (Section 3.7), will be halved. The CRS are as follows:
- 3.2.6.1 Each non-exempted passenger seating position must be able to accommodate at least one Universal top-pick group 0+ CRS and one Universal top-pick group I CRS.
- 3.2.6.2 Each non-exempted passenger seating position must be able to accommodate at least one Semi-Universal top-pick group 0+ CRS and one Semi-Universal top-pick group I CRS, or one Semi-Universal top-pick CRS covering both groups.
- 3.2.7 At least one CRS from the top pick list of each group (0+ - III) must be accommodated by

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<sup>1</sup> Exemptions will only apply to the CRS installation assessment; dynamic and vehicle based assessments will apply to all relevant seating positions regardless of which seats have been exempted.

the vehicle. Handbook exemptions are NOT accepted for this requirement. Where the conditions of this section are not met, the final CRS Installation score, out of 12 points (Section 3.7) will be halved.

**Table 1. Example of top pick list exemptions**

CRS Installation Assessment					SEATING POSITION				SCORING			
					Front		2nd row		Pass	Fail	Exempt	Score
				Right	Left	Centre	Right					
UNIVERSAL	Group 0+	Maxi Cosi Cabriofix	B _ _ _	U	Pass	Pass	Pass	Pass	4	0	0	100.0%
	Group I	Römer King Plus	B _ _ _	U / UF	Pass	Pass	Pass	Pass	4	0	0	100.0%
		Römer Duo Plus	_ I _ S	ISO/F2X	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
	Group II/III	Römer KidFix	B _ _ _	U / UF	Pass	Pass	Pass	Pass	4	0	0	100.0%
SEMI-UNIVERSAL	Group 0+	Maxi Cosi Cabriofix & EasyFix	B _ L _	VEHICLE LIST	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
			_ I L _	ISO/R1	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
	Group 0+/I	BeSafe iZi Kid X3 ISOfix	_ I L _	ISO/R3	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
	Group I	Maxi Cosi Pearl & Familyfix	_ I L _	ISO/F2X	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
	Group II/III	Römer KidFix	B I _ _	VEHICLE LIST	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
OEM	Q1.5	SU FAIR G0/1S	_ I L _	ISO/R3	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
	Q3	SU FAIR G0/1S	_ I L _	ISO/F3	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
<b>SUMMARY</b>												
Universal assessment					5.000							
Semi-Universal assessment					5.000							
OEM assessment					2.000							
<b>Group 0 &amp; 1 coverage</b>					PASS							
<b>TOTAL INSTALLATION ASSESSMENT</b>					<b>12.000</b>							

B = Belted, I = ISOFIX, L = Support leg, S = Strap/Top-tether

### 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.

When installing each CRS in the vehicle, any instructions relating to the preparation of either the vehicle or CRS that are provided in the CRS handbook will be followed.

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 Euro NCAP Frontal ODB impact test position.
- The front seat may be adjusted during the assessment. The adjustments allowed are limited to normal day-to-day adjustments to ensure the best possible installation, i.e fore/aft movement to create sufficient space for the seat to be installed or small adjustments of the seatback angle.
- 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 initially be set in the Euro NCAP Frontal FW impact test position. The flat folded position of a seat is not considered as an in use position.
- Head restraints shall initially be set to the lowest/not in use position.
- Movable arm rests 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 Euro NCAP Frontal ODB impact test position.
- The front seat may be adjusted during the assessment. The adjustments allowed are limited to normal day-to-day adjustments to ensure the best possible installation, i.e fore/aft movement to create sufficient space for the seat to be installed or small adjustments of the seatback angle.
- Movable arm rests shall be set to the not in use position or fully vertical.

#### 3.3.1.2 CRS placement

##### *Procedure:*

- Where necessary, prepare 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.
- 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 be able 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.
- 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 sufficiently supported by the seat or 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 top pick 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.

$$\text{The installation score } CRS_i = \frac{T_i - F_i}{T_i}$$

$T_i$  = 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 top pick list (with or without manufacturer's additions) .

3.7.3 Where the total number of eligible seating positions for any CRS equals zero, this CRS will not be taken into account in the assessment and will be shown as 'Exempt'.

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

Universal CRS	<b>5 points</b>
Semi-universal CRS	<b>5 points</b>
OEM Recommended CRS	<b>2 points</b>

3.7.5 The Universal CRS score is calculated by taking the average of the  $CRS_i$  scores of all Universal seats on the original top pick list (excluding those exempted for all seating positions) and applying the percentage to 5 points; the Semi-universal CRS score is calculated by taking the average of the  $CRS_i$  scores of all Semi-universal seats on the top pick list (excluding those exempted for all seating positions) and applying the percentage to 5 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 top pick 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 Universal, Semi-universal and Recommended CRS (see Table 2).

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 top pick list and the division between universal, semi-universal 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 2. Example of CRS installation scoring (no OEM CRS recommended and points halved based on 3.2.6)**

CRS Installation Assessment					SEATING POSITION				SCORING			
					Front	2nd row			Pass	Fail	Exempt	Score
					Right	Left	Centre	Right				
UNIVERSAL	Group 0+	Maxi Cosi Cabriofix	B ___	U	Pass	Pass	Pass	Pass	4	0	0	100.0%
	Group I	Römer King Plus	B ___	U / UF	Pass	Pass	Fail	Pass	3	1	0	75.0%
		Römer Duo Plus	_ I _ S	ISO/F2X	Exempt	Fail	Exempt	Fail	0	2	2	0.0%
	Group II/III	Römer KidFix	B ___	U / UF	Pass	Pass	Fail	Pass	3	1	0	75.0%
SEMI-UNIVERSAL	Group 0+	Maxi Cosi Cabriofix & EasyFix	B _ L _	VEHICLE LIST	Exempt	Pass	Exempt	Pass	2	0	2	100.0%
			_ I L _	ISO/R1	Exempt	Fail	Exempt	Fail	0	2	2	0.0%
	Group 0+/I	BeSafe izi Kid X3 ISOfix	_ I L _	ISO/R3	Exempt	Fail	Exempt	Fail	0	2	2	0.0%
	Group I	Maxi Cosi Pearl & Familyfix	_ I L _	ISO/F2X	Exempt	Fail	Exempt	Fail	0	2	2	0.0%
	Group II/III	Römer KidFix	B I _ _	VEHICLE LIST	Exempt	Fail	Exempt	Fail	0	2	2	0.0%
OEM	Q1.5	NO CRS RECOMMENDED							0	0	0	0.0%
	Q3	NO CRS RECOMMENDED							0	0	0	0.0%
<b>SUMMARY</b>												
Universal assessment					3.125							
Semi-Universal assessment					1.000							
OEM assessment					0.000							
<b>Group 0 &amp; 1 coverage</b>					FAIL							
<b>TOTAL INSTALLATION ASSESSMENT</b>					<b>2.063</b>							

*Note: Red/fail means safety critical issues exist, 0 points awarded; Yellow/fail means a CRS can be installed correctly but more actions are needed that do not meet the requirements of Euro NCAP and 0 points are 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 Euro 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.

*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

If the Q1½ dummy is seated in a forward facing child restraint, the frontal impact head and neck scores will be given a default score of **0 points** regardless of the dynamic performance.

##### 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:

Q1½ (RWF only) and Q3 are awarded **4 points**

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

Q1½ (RWF only)	<b>4 points</b> ≤ 72g;	<b>0 points</b> ≥ 88g
Q3	<b>4 points</b> ≤ 87g;	<b>0 points</b> ≥ 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 ≤ 549mm; otherwise the points will be based on the following:

Q1½ (FWF only)	<b>0 points</b>
Q3	<b>4 points</b> ≤ 549mm; <b>0 points</b> ≥ 550mm

#### 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 Q1½ and Q3 will be awarded **4 points**.

- No compressive loads shall be applied to the top of the head.
- 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

Q1½ (RWF only) and Q3	<b>2 points</b> < 1.70kN; <b>0 points</b> ≥ 2.62kN
Q1½ (FWF only)	<b>0 points</b>

#### 4.2.2.5 Chest

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

Chest resultant acceleration, 3msec exceedence

Q1½	<b>2 points</b> ≤ 41g; <b>0 points</b> ≥ 55g
Q3	<b>2 points</b> ≤ 50g; <b>0 points</b> ≥ 66g

#### 4.2.2.6 Overall Dynamic Score for Frontal impact

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

$$\begin{aligned} & \text{Worst score from } \left( \begin{array}{l} \text{Head Contact with the CRS (Section 4.3.1.1)} \\ \text{Head Excursion (Section 4.3.1.2)} \\ \text{Head Exposure (Section 4.3.1.3)} \end{array} \right) & \mathbf{4 \text{ points}} \\ & + \text{ Score from Neck Tension (Section 4.2.2.4)} & \mathbf{2 \text{ points}} \\ & + \text{ Score from Chest (Section 4.2.2.5)} & \mathbf{2 \text{ points}} \end{aligned}$$

#### 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 is defined by either:

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

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 exceedence.

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

## 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 lap and diagonal seatbelts, **0 points** shall be awarded for the vehicle based assessments.

*CONCEPT: All forward or rearward facing seats should be equipped with a three-point belt.*

### 5.2 Gabarit Installation on all Passenger Seats

Where the 2<sup>nd</sup> row outboard seats are in compliance with the requirements in section 5.2.2 which are based on UN ECE Regulation 16.06 [2], **1 point** shall be awarded to the Child Protection score. Where all other passenger seats are also in compliance with the requirements, an additional **1 point** shall be awarded to the Child Protection score.

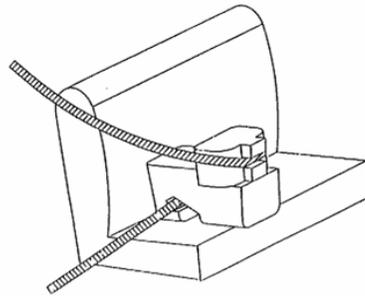
*CONCEPT: The layout of the adult seat belt should ensure compatibility between the adult seat belt and a Universal CRS.*

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

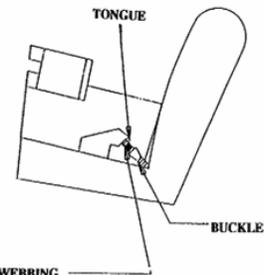
5.2.1 To assess compliance, the Gabarit, as specified in APPENDIX II, shall be installed on all passenger seats according to the following procedure:

- 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 5.2f). 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  $\pm 25$  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



CHECK FOR COMPATIBILITY



**Note:** THE SEAT BELT WEBBING MUST CONTACT THE CURVED EDGE ON BOTH SIDES OF THE FIXTURE

LAP BELT ONLY SHOWN

Figure 1

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 Universal CRS (U). ([2], Annex 17, Appendix 3.)
- 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 universal 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 ISOFIX/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 top pick CRS 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. 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 either ISOFIX or i-Size CRS including top-tether, **1 point** shall be awarded to the Child Protection score.
- 5.3.2.1 All ISOFIX/i-Size anchorages and top-tether anchorages must be marked with the relevant text and pictograms. Text and a pictogram is required for ISOFIX and top-tether markings. The requirements for markings are as detailed in Section 5.4.2 and 5.4.3 a, b, c etc.
- 5.3.2.2 For results published from the 1<sup>st</sup> January 2016, the vehicle must meet all i-Size requirements of Regulations No 14, 16 & 129. Currently, a combination of the i-Size pictogram and ISOFIX text will be accepted until the larger group of CRS are fully covered by i-Size regulations

### 5.4 i-Size Usability

- 5.4.1 Where two passenger seats are in compliance with the following requirements, **1 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.
- 5.4.2 Only seating positions that comply with ALL i-Size requirements of Regulations 14, 16 & 129 and are equipped with a top tether will be rewarded. The i-Size pictogram and

top tether markings will be required. The ISOFIX pictogram will NOT be rewarded.

- 5.4.3 Currently, a combination of the i-Size pictogram and ISOFIX text will be accepted until the larger group of CRS are fully covered by i-Size regulations.

**CONCEPT:** *The user of a vehicle equipped with i-Size compliant positions should be made aware of the existence and location of anchorages and top tether locations.*

- a) Each seat which is equipped with i-Size anchorages must be marked. It must be clear which pairs anchorages should be used together.
- b) The location of each i-Size anchorage must be marked.
- c) The location of each top tether anchorage must be marked and include both text and a pictogram.
- d) The i-Size markings require the relevant i-Size pictogram detailed in Regulation 14, Annex 10.
- 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) i-Size relevant information must be presented in the vehicle handbook.

## **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.
- d) The two R3 complaint positions shall have either ISOFIX or i-Size markings including top-tether marking. Anchorages must be marked with the relevant text and pictograms. The requirements for markings are as detailed in Section 5.4.2 a, b, c etc
- e) For results published from the 1<sup>st</sup> January 2016, the vehicle must meet all i-Size

requirements of Regulations No 14, 16 & 129. Currently, a combination of the i-Size pictogram and ISOFIX text will be accepted until the larger group of CRS are fully covered by i-Size regulations

## 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 version 5.3 or Regulation 94 and the requirements of Section 5.6.1 are met, a maximum of **4 points** will be awarded. Alternatively, **2 points** will be awarded where a label meets the above requirements and those of Section 5.6.2 are met.

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 Euro 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 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, **4 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.

5.6.2 The airbag can be de-activated manually and the following requirements are met, **2 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 below:



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



- 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.

## 5.7 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 two or more 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.
- 5.7.3 Where the vehicle is provided with one or more “Group I-III” integrated CRS, as standard, **1 additional point** shall be awarded to the Child Protection score.

**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 Euro 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 top pick seats and any manufacturer recommended seats will be installed on the passenger seat as detailed in Section 3. Where the passenger seat is able to meet the requirements of Sections 3.3, 3.4, 3.5 and 3.6 for Universal and Semi-Universal 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) must be represented by the top pick and manufacturer recommended CRS. Where this requirement is not met or the seating position is exempted, the CRS installation assessment will be **0 points**.

6.1.1.3 Where 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+9.

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 21 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:

##### *“5.1 Provision of Three-point Seat Belts”*

If the passenger seat is not equipped with a three-point lap and diagonal seatbelt, **0 points** shall be awarded for the vehicle based assessments.

##### *“5.2 Gabarit Installation on all Passenger Seats”*

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

##### *“5.4 i-Size Usability”*

Where the passenger seat is in compliance with the requirements, **1 point** shall be awarded to the Child Protection score.

##### *“5.5 Two or more Largest ISOFIX Positions”*

Where the passenger seat is in compliance with the following requirements, **1 point**

shall be awarded to the Child Protection score:

*“5.6 Passenger Airbag Warning Marking and Disabling”*

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

*“5.7 Integrated Child Restraints”*

Where 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 manufacturer cannot be installed with the front seats in the Euro 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 top pick seats and any 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 Universal and Semi-Universal 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 Where a 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 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
- 6.2.2.2 In order to reduce the test burden, it may be possible to install the recommended CRS in the official frontal ODB impact as the driver and passengers seat are more forward than in the side MDB test. Where this is the case, the official ODB test will be performed as normal and the manufacturer need only provide in house data from an equivalent side impact. It would also be acceptable for the front passenger seat in the official side MDB test to be moved forward by the least amount necessary to facilitate correct installation of the recommended CRS. The vehicle manufacturer would then only be required to provide in house data for the struck side child occupant.

- 6.2.2.3 The tests must be equivalent to the Euro 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 manufacturer to ensure that adequate film coverage of the impact, and specifically child head excursion and head containment, is provided.

6.2.2.4 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, Euro NCAP will indicate that it was not possible to install the CRS with an adult in the normal Euro 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 21 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	9

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)
<b>4</b>	<b>Dynamic Assessment</b>	<b>(24)</b>
4.1	Ejection	<i>switch</i>
4.2	Head Contact with the Vehicle	<i>switch</i>
<b>4.2.2</b>	<b>Frontal Impact</b>	<b>(16)</b>
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
<b>4.2.3</b>	<b>Side Impact</b>	<b>(8)</b>
4.2.3.1	Head Containment	<i>switch</i>
4.2.3.2	Head Contact with the CRS	8
<b>2.1</b>	<b>Installation of Child Restraints</b>	<b>(12)</b>
	Universal seats	5
	Semi-universal seats	5
	Recommended seats	2
<b>5</b>	<b>Vehicle Based Assessments</b>	<b>(13)</b>
5.1	Provision of Three-point Seat Belts	<i>Switch</i>
5.2	Gabarit Installation on all Passenger Seats	2
5.3	Three Simultaneous Use Seating Positions	2
5.4	i-Size Usability	1
5.5	Two or more Largest ISOFIX Positions	1
5.6	Passenger Airbag Warning Marking and Disabling	4 or 2
5.7	Integrated CRS	3

### 7.3 Child Protection Assessment Points Table (No Rear Seats)

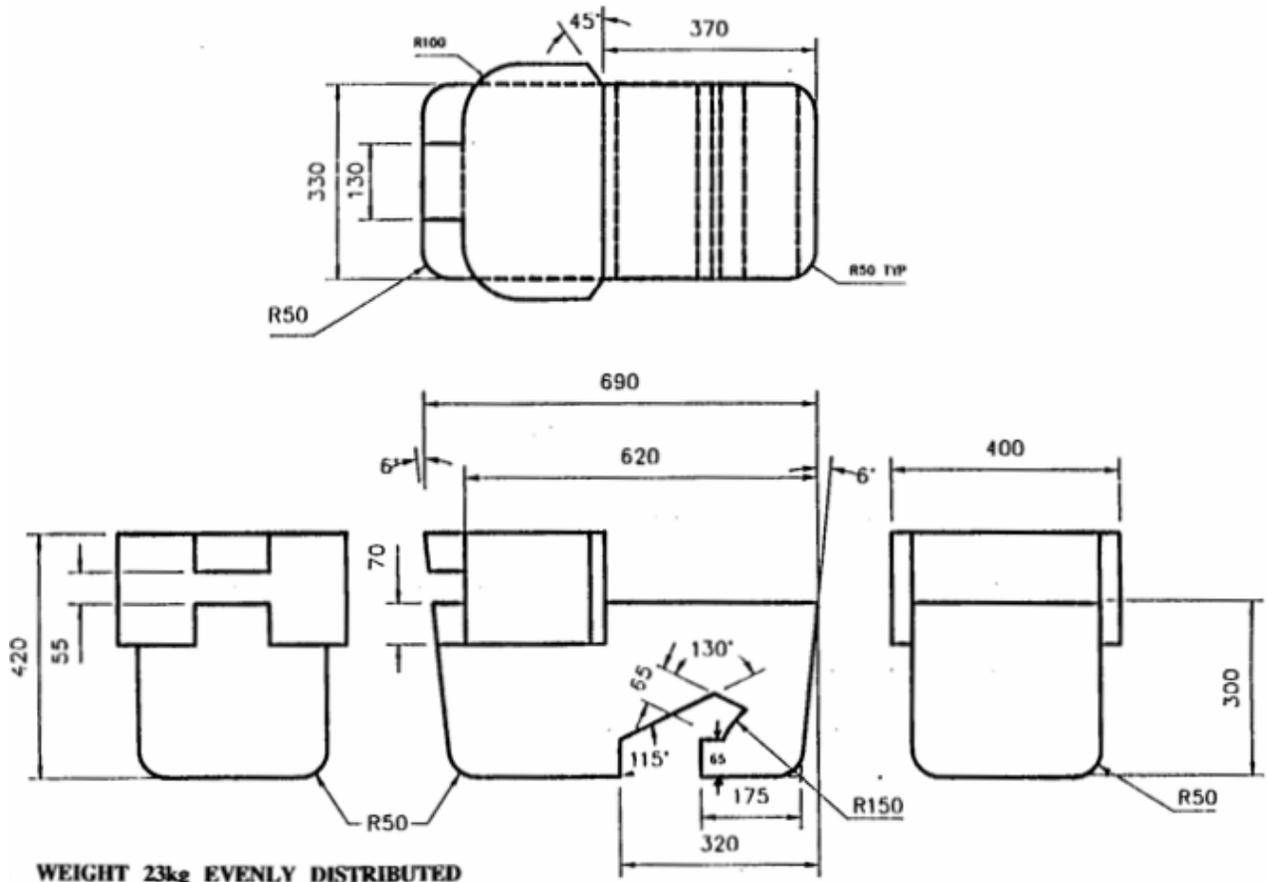
Section	Category	Total points (21)
<b>2.1</b>	<b>Installation of Child Restraints</b>	<b>(12)</b>
	Universal seats	5
	Semi-universal seats	5
	Recommended seats	2
<b>5</b>	<b>Vehicle Based Assessments</b>	<b>(9)</b>
5.1	Provision of Three-point Seat Belts	<i>switch</i>
5.2	Gabarit Installation on front Passenger Seat	1
5.3	Three Simultaneous Use Seating Positions	NA
5.4	i-Size Usability	1
5.5	Largest ISOFIX Position on front Passenger Seat	1
5.6	Passenger Airbag Warning Marking and Disabling	4 or 2
5.7	Integrated CRS	2

## **8 REFERENCES**

- 1 UN ECE 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 ECE Regulation 16 Revision 06 “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”, 24 February 2005.



**APPENDIX II**  
**GABARIT SPECIFICATION**



All dimensions are in mm