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Item 19 of the provisional agenda

New Regulation on Enhanced Child Restraint systems

Proposal for Supplement 2 to Regulation [129] (Enhanced Child Restraint Systems (ECRS))

Submitted by the expert from France*

The text reproduced below was prepared by the expert from France to introduce all the modifications suggested by the experts of the informal working group on child restraint systems. The modifications to the text of the UN Regulation (ECE/TRANS/WP.29/2012/53 and Corr.1 and ECE/TRANS/WP.29/2013/37) are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

List of Annexes,

Insert new Annex 21, to read:

"Annex 21. Load application devices"

Paragraph 2.31., amend to read:

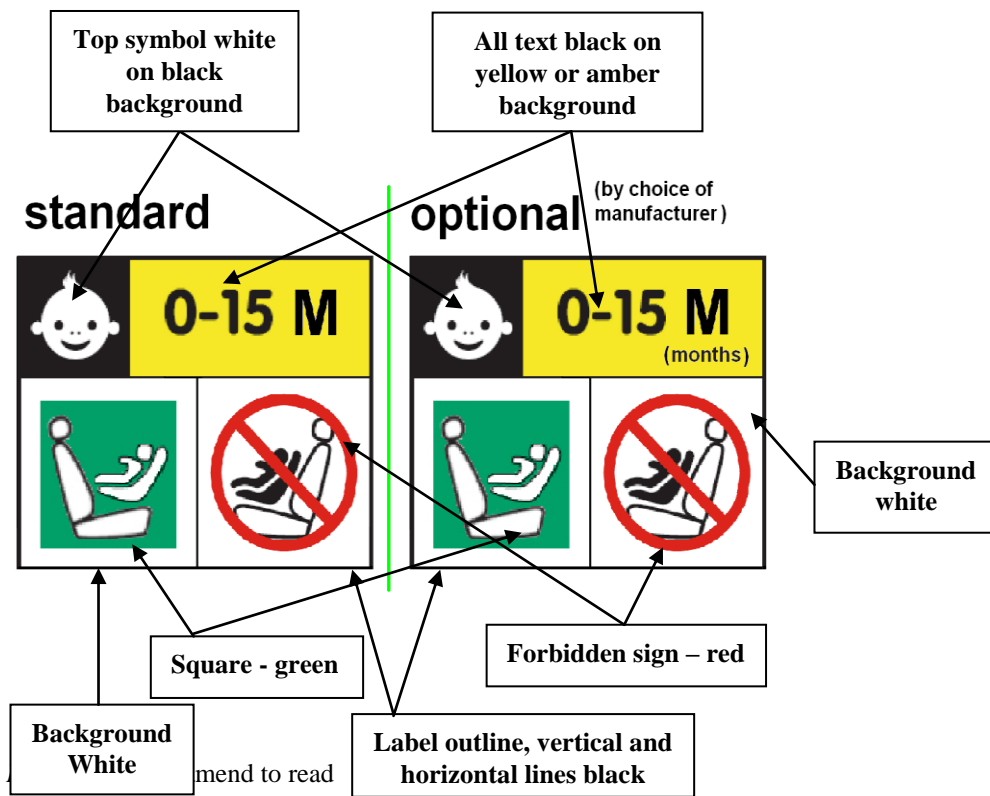
"2.31. *"Lap strap"* means a strap which, either in the form of a complete belt or in the form of a component of such a belt passes across the front of, and restrains, **directly or not**, the child's ~~pelvic region~~ **pelvis**."

Paragraph 3.2.1., amend to read:

"3.2.1. A technical description of the child restraint system ... , declaration on toxicity (para. ~~6.1.3~~ **6.3.1.1**) and flammability (para. ~~6.1.4~~ **6.3.1.2**), the drawings shall show the position intended for a single approval number and additional symbol(s) in relation to the circle of the approval mark;"

Paragraph 4.5., the figure, amend to read:

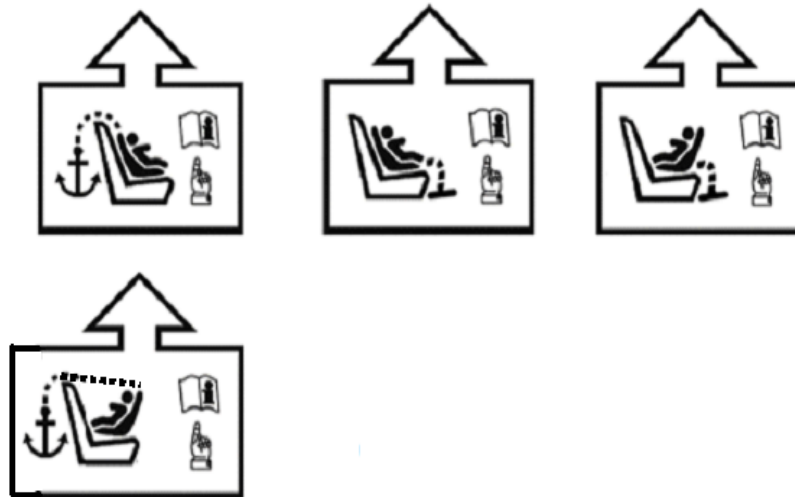
"4.5. In the case of...
Minimum label size 40 x 40 mm



"4.8. Additional Markings

...

(c) The position....



(d)...

..."

Paragraph 5.4.1.2., amend to read:

"5.4.1.2., An approval number, **the words "Regulation No." followed by the number of this regulation, a slash and the series of amendment ("Regulation No. XXX/XX")**;"

Paragraph 5.4.2.1., amend to read:

"5.4.2.1. The ~~word(s)~~ **words "i-Size universal ISOFIX" or "specific vehicle ISOFIX"** depending on the category of Child Restraint System;"

Paragraph 6.2.1.4., amend to read:

"6.2.1.4. To prevent submarining, either by impact or through restlessness, a crotch strap shall be required on all forward-facing restraints incorporating an integral harness belt system. ~~With the crotch strap attached and in its longest position of adjustment (if adjustable), it shall not be possible to adjust the lap strap to lie above the pelvis of the dummy;~~ "

Paragraph 6.2.1.5., amend to read:

"6.2.1.5. ~~The Child Restraint~~ **All restraint devices utilizing a "lap strap" must positively guide the "lap strap" to ensure that the loads transmitted by the "lap strap" are transmitted through the pelvis. The** assembly shall not ... collision;"

Insert new paragraphs 6.2.1.7. and 6.2.1.8., to read:

"6.2.1.7. **With the crotch strap attached and in its longest position if adjustable, it shall not be possible to adjust the lap strap to lie above the pelvis of both the smallest and largest dummy within the mass groups covered by the approval. For all forward-facing restraints, it shall not be possible to adjust the lap strap to lie above the pelvis of both the smallest and largest dummy within the mass groups covered by the approval.**"

6.2.1.8. **During the dynamic test, as prescribed in paragraph 8.1.3., the lap belt shall not pass fully beyond the pelvic structure of the dummy during the**

period prior to maximum horizontal head excursion. An assessment shall be carried out using high speed video imaging."

Paragraphs 6.3.1.1. and 6.3.1.2., amend to read:

"6.3.1.1. The child restraint system ... of **EN 71-3:1994/A1:2000/AC**. Tests confirming the validity of the declaration may be carried out at the discretion of the test authority.

6.3.1.2. The child restraint system ... of **EN 71-2:2011**. Tests confirming the validity of the declaration may be carried out at the discretion of the test authority."

Paragraphs 6.3.5. to 6.3.5.3., amend to read:

"6.3.5. i-Size child restraint system support-leg and support-leg foot requirements

...

The orientation ... fixture(s):

- (a) The **X'** axis shall be parallel to the child restraint fixture (CRF)² bottom surface and in the median longitudinal plane of the CRF;
- (b) The **Y'** axis shall be perpendicular to the median longitudinal plane;
- (c) The **Z'** axis shall be perpendicular to the CRF bottom surface.

In fulfilling the ...

...

6.3.5.1. Support-leg and support-leg foot geometrical requirements

The support leg, ...is defined as follows:

- (a) In width by two planes parallel to the **X' – Z'** plane separated by 200 mm, and centered around the origin; and
- (b) In length by two planes parallel to the **Z'-Y'** plane and positioned at distances of 585 mm and 695 mm forward of the origin along the **X'** axis; and
- (c) In height by a plane parallel to the **X'-Y'** plane, positioned at a distance of 70 mm above **the** origin and **measured** perpendicular to the **X'-Y'** plane. Rigid, non-adjustable parts **of the support leg** shall not extend beyond a plane parallel to the **X'-Y'** plane, positioned at a distance of 285 mm below the origin and perpendicular to the **X'-Y'** plane. ~~For parts adjustable in the Z' direction there shall be no limitation in height below the level of the CRF bottom surface, providing it is also possible to adjust them to meet the requirements of the support leg dimension assessment volume.~~

6.3.5.2. Support-leg foot adjustability requirements

The support-leg ... 20 mm.

The support leg foot assessment volume is defined as follows:

- (a) In width by two planes parallel to the **X'-Z'** plane, separated by 200 mm, and centered around the origin; and

² Child restraint fixture (CRF) as defined in Regulation No. 16 (Safety-belts).

- (b) In length by two planes parallel to the **Z'-Y'** plane and positioned at distances of 585 mm and 695 mm forward of the origin along the **X'** axis; and
- (c) In height by two planes parallel to the **X'-Y'** plane positioned at distances of 285 mm and 540 mm below the origin along the **X'** axis.

It shall be permissible for the support-leg to be adjustable beyond the height limits in the **Z'** direction (**as indicated by key 6 in figure 3 of Annex 19**), providing that no parts extend beyond the limiting planes in the **X'** and **Y'** directions.

6.3.5.3. Support-leg foot dimensions

The dimensions ...

...

- (b) Minimum outside dimensions shall be 30 mm in the **X'** and **Y'** ...

..."

Paragraph 6.6.2.1., amend to read:

"6.6.2.1. For all devices with backrests ~~there shall be internal surfaces, the areas defined in Annex 14 to this Regulation, comprising material with,~~ **when tested according to Annex 13, shall give** a peak acceleration of less than 60g ~~when measured in accordance with Annex 13 of this Regulation.~~ This requirement applies also to areas of impact shields which are in the head strike area."

Paragraph 6.6.2.2., amend to read:

"6.6.2.2. In the case of child restraint systems with permanent mechanically attached adjustable head support devices, in which the height **of either the adult safety belt or** of the child harness is directly controlled by the adjustable head support, it is not necessary to demand energy ~~absorbing material absorption~~ in areas as defined in Annex ~~14~~ **18**, which are not contactable by the ~~dummy's~~ **manikin's** head, i.e. behind the head support."

Paragraph 6.6.3.1., amend to read:

"6.6.3.1. The child restraint system shall be tested as prescribed in paragraph 7.1.2.; **at no point during the dummy whole test shall not fall out of the manikin be fully ejected from the device. and, In addition** when the test seat is in the upside down position, the dummy's head shall not move more than 300 mm from its original position in a vertical direction relative to the test seat."

Paragraph 6.7.3.2.6., amend to read:

"6.7.3.2.6. The strap shall be repeatedly withdrawn from the retractor and allowed to retract, in the conditions prescribed in paragraph 7.2.4.2., until 40,000 cycles have been completed. The retractor shall then be subjected to the temperature test operation requirements given in paragraph ~~7.2.4.1.~~ **7.2.7.** and corrosion test described in paragraph ~~8.1.1~~ **7.1.1.** and to the dust-resistance test described in paragraph 7.2.4.5. ~~It shall then satisfactorily complete a further 5,000 cycles of withdrawal and retraction (making 45,000 in all). After the above tests the retractor shall continue to operate correctly and to meet the requirements of paragraphs 6.7.3.2.1. to 6.7.3.2.5. above.~~"

Insert new paragraphs 6.7.5.1. and 6.7.5.2., to read:

- "6.7.5.1. **ISOFIX attachments and latching indicators shall be capable of withstanding repeated operations and shall, before the dynamic test prescribed in paragraph 7.1.3., undergo a test comprising 2000 ± 5 opening and closing cycles under normal conditions of use.**"
- 6.7.5.2. **ISOFIX attachments shall have a locking mechanism which complies with the requirements specified in (a) or (b) as follows:**
- (a) **Release of the locking mechanism of the complete seat, shall require two consecutive actions, the first of which should be maintained while the second is carried out; or**
 - (b) **The ISOFIX attachment opening force shall be at least 50 N when tested as prescribed in paragraph 7.2.8. below."**

Paragraph 7.1.2.1., amend to read:

- "7.1.2.1. The dummy shall be **equipped with the load application device as described in Annex 21 and** placed in the restraints installed in accordance with this Regulation and taking into account the manufacturer's instructions and with the standard slack as specified in paragraph 7.1.3.5., **applied for all systems identically."**

Paragraph 7.1.2.2., amend to read:

- "7.1.2.2. The restraint shall be fastened to the test bench or vehicle seat. The whole **child restraint system shall be rotated around a horizontal axis contained in the median longitudinal plane of the child restraint system through an angle of ~~360~~ 540° +/- 5°** at a speed of 2-5 degrees/second **and stopped in this position.** For the purposes of this test, devices intended for use in specific cars may be attached to the test bench described in Annex 6."

Insert new paragraphs 7.1.2.3. to 7.1.2.5., to read:

- "7.1.2.3. **At this static inverted position, a mass equivalent to four times that of the dummy shall be applied vertically downwards in a plane perpendicular to the axis of rotation in addition to the dummy utilizing the load application device described in Annex 21. The load shall be applied in a gradual controlled manner at a rate not exceeding gravitational acceleration or 400mm/min. Maintain the prescribed maximum load for a duration of 30 -0/+5 seconds.**
- 7.1.2.4. **Remove the load at a rate not exceeding 400 mm/min and measure displacement.**
- 7.1.2.5. **Rotate the whole seat for 180° to return to the starting position."**

Paragraphs 7.1.2.3.(former), renumber as paragraph 7.1.2.6. and amend to read:

- "7.1.2.6. This test **cycle shall be carried out again rotating in the reverse direction**~~after having repositioned, if necessary, the dummy in its initial position.~~ With the rotational axis in the horizontal plane and at 90° to that of the two earlier tests, the procedure shall be repeated in the two directions of rotation."

Paragraph 7.1.2.4.(former), renumber as paragraph 7.1.2.7. and amend to read:

- "7.1.2.7. These tests shall be carried out using both the smallest and the largest appropriate dummy of the size range for which the restraining device is intended. **Any adjustment of the dummy or child restraint systems during the complete test cycle is not allowed."**

Paragraph 7.1.2.5.(former), renumber as paragraph 7.1.2.8.

Paragraph 7.1.3.52.1., amend to read:

"7.1.3.5.2.1. Installation of a child restraint system on the test bench.

...

The dummy ... The resulting ~~length~~ **height** of the spacer is listed in the table below for the different dummy sizes. The board should follow as closely as possible the curvature of the chair and its lower end should be at the height of the dummy's hip joint.

..."

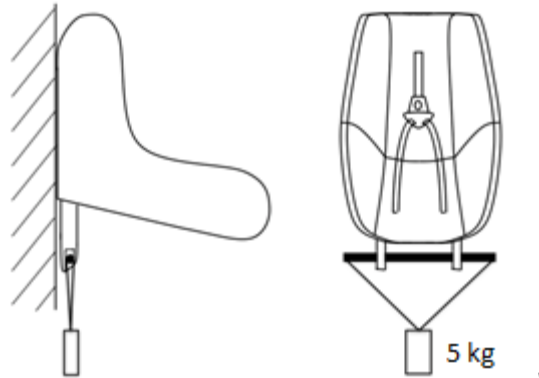
Paragraph 7.2.1.3.2., amend to read:

"7.2.1.3.2. Annex ~~47~~ **16** shows a typical device ..."

Insert new paragraphs 7.2.8. to 7.2.8.5., to read:

- 7.2.8. The complete seat, or the component fitted with ISOFIX attachments (e.g. ISOFIX base) if it has a release button, is attached rigidly to a test rig in such a way that ISOFIX connectors are vertically aligned as shown in Figure 3. A 6 mm diameter bar, 350 mm long, shall be attached to the ISOFIX connectors. A mass of 5 kg shall be attached to the extremities of the bar.**
- 7.2.8.1. An opening force shall be applied to the release button or handle along a fixed axis running parallel to the initial direction of motion of the button/handle; the geometric centre applies to that part of the surface of the ISOFIX attachment to which the release pressure is to be applied.**
- 7.2.8.2. The ISOFIX attachment opening force shall be applied using a dynamometer or similar device in the normal manner and direction as indicated in the manufacturers user manual. The contact end shall be a polished metal hemisphere with radius 2.5 ± 0.1 mm for a release button or a polished metal hook with a radius of 25 mm.**
- 7.2.8.3. If the design of the child restraint prevents the application of the procedure described in paragraphs 7.2.8.1. and 7.2.8.2., an alternative method may be applied with the agreement of the Technical Service carrying out the test.**
- 7.2.8.4. The ISOFIX attachment opening force to be measured shall be that needed to disengage the first connector.**
- 7.2.8.5. The test shall be carried out on a new seat, and repeated on a seat that has been subjected to the cycling procedure specified in paragraph 6.7.5.1.**

Figure 3



Paragraph 9.2., amend to read

"9.2. Qualifying the production of Child Restraint Systems

The production of each new approved type of child restraint system of categories i-Size and specific to vehicle shall be subjected to production qualification tests. Additional qualifications of production may be prescribed following paragraph 11.1.3.

For this purpose..."

Insert a new paragraph 11.1.3., to read:

"11.1.3. If a further test report is required, compare the horizontal head excursion result with the worst case from all results previously recorded:

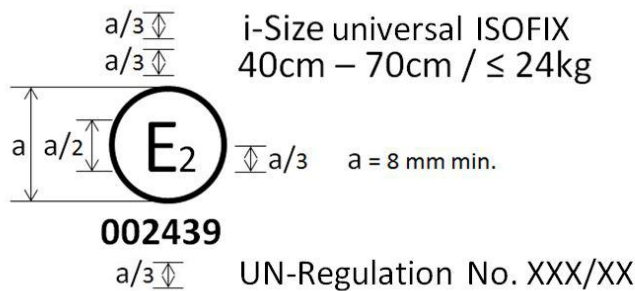
- (a) If the excursion is greater, then new production qualification testing must be carried out;
- (b) If the excursion is less, production qualification tests do not need to be carried out."

Paragraph 11.1.3.(former), renumber as paragraph 11.4.

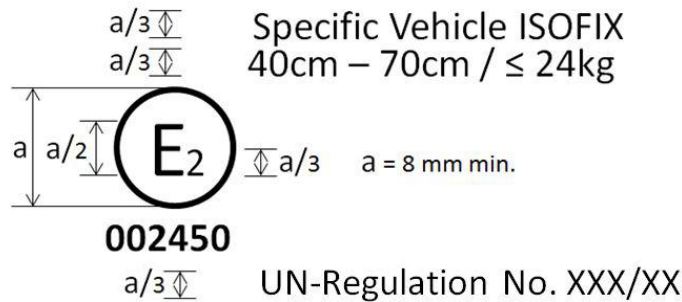
Annex 2, amend to read:

"Annex 2

Arrangements of the approval mark



The child restraint system bearing the above approval mark is a device capable of being fitted in any i-size compatible vehicle **seating position** and of being used for the 40 cm to 70 cm size range and mass limit of 24 kg; it is approved in France (E2) under the number ~~00xxx~~ **002439**. The approval number indicates that the approval was granted in accordance with the requirements of the Regulation concerning the approval of enhanced Child Restraint Systems used onboard of motor vehicles as amended by the 00 series of amendments. **In addition the name of the regulation has to be identified on the approval mark followed by the series of amendment according to which the approval has been granted.**



The child restraint system bearing the above approval mark is a device not capable of being fitted in every vehicle and of being used for the 40 cm to 70 cm size range and mass limit of 24 kg; it is approved in France (E2) under the number 002450. The approval number indicates that the approval was granted in accordance with the requirements of the Regulation concerning the approval of specific vehicle ISOFIX child restraint systems used on board of motor vehicles as amended by the 00 series of amendments. **In addition, the name of the regulation has to be identified on the approval mark followed by the series of amendment according to which the approval has been granted.**

Note: the approval..."

Annex 6 - Appendix 1,

Figures 1 and 2, amend to read:

"Figure 1

Dimensions of the seat and the seat cushions

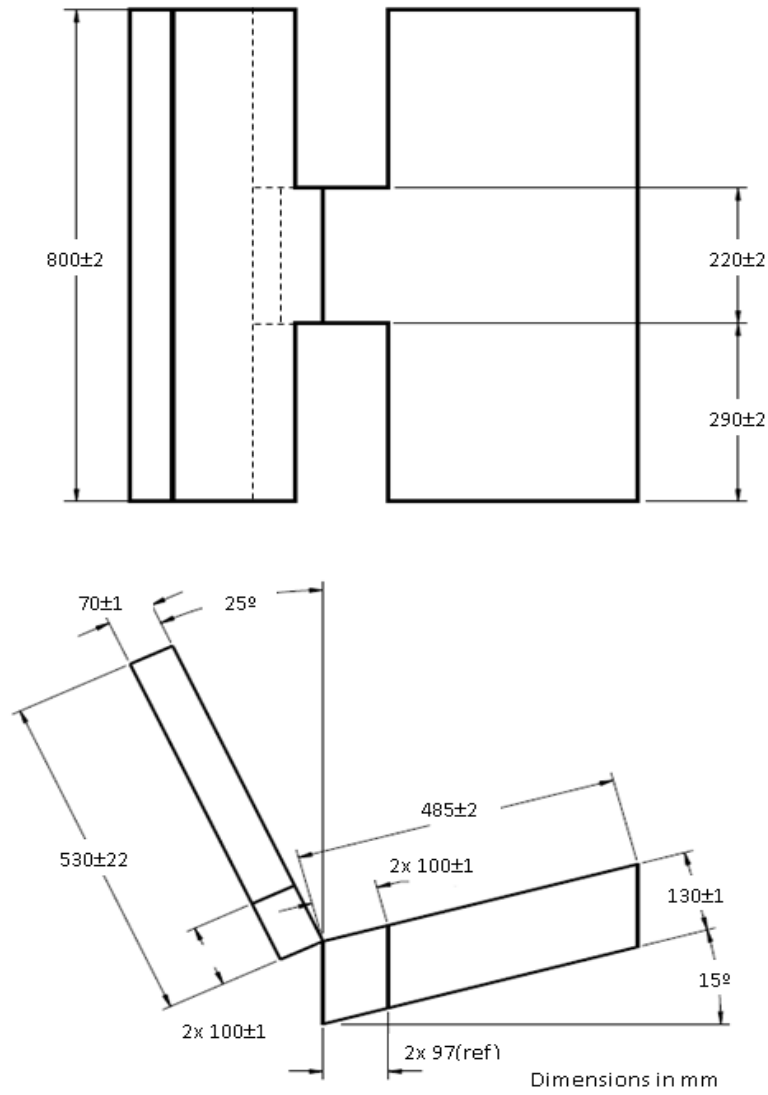


Figure 2
Dimensions of the aluminum bottom-plate

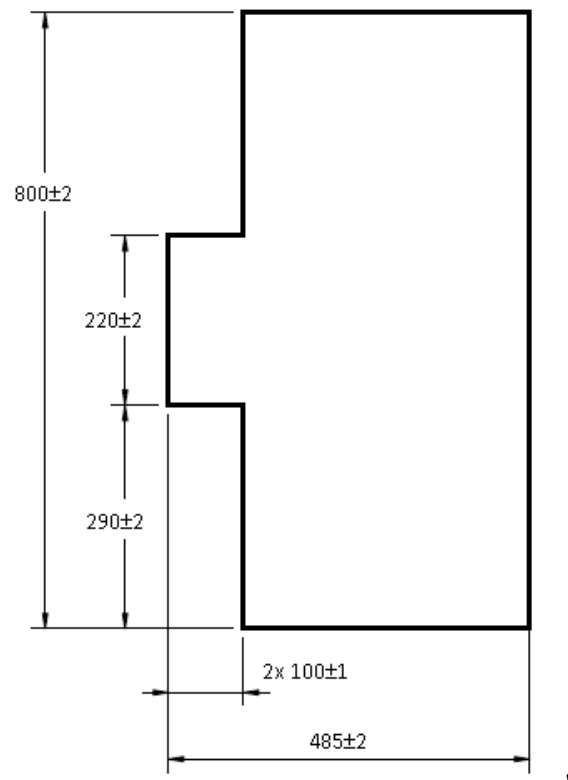
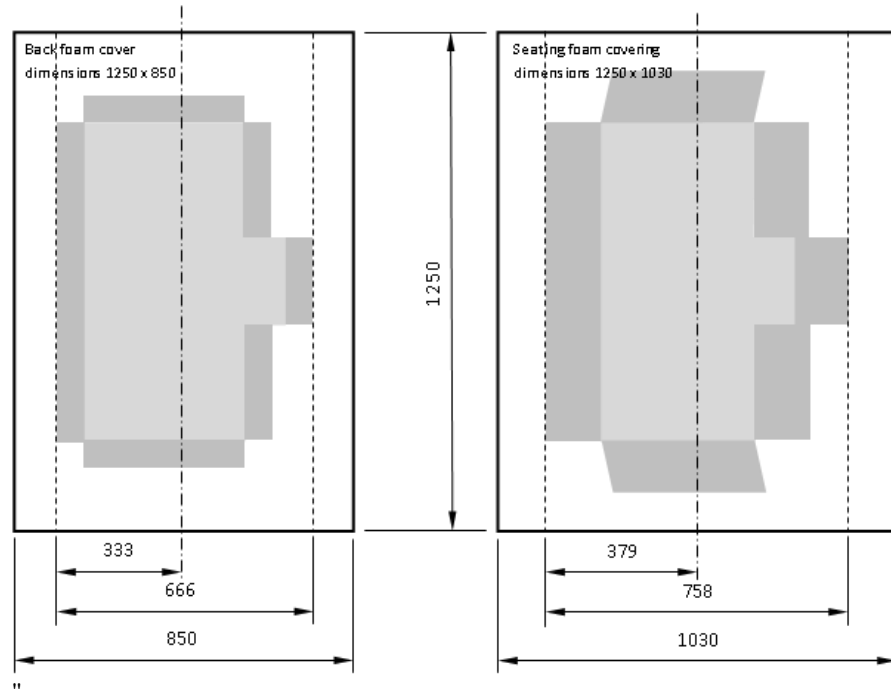


Figure 3, shall be deleted

Figure 4(former), renumber as figure 3 and amend to read:

"Figure 3
Dimensions of the cover material (dimensions in mm)



Annex 13,

Paragraphs 3.1. and 3.2., amend to read:

- "3.1. The test shall be conducted on a completely assembled child restraint with **ashall be placed in the region of impact on a rigid flat surface, whose** minimum of modification only where necessary to ensure access for the support (directly beneath dimensions are 500 x 500 mm, so that the point direction of impact) and for is perpendicular to the impactor device and such that there is minimal effect on inner surface of the performance by the modification
- 3.2. The assembled child restraint shall be fully supported on its outer surface in the region of impact and be supported directly beneath the point system in **the area** of impact on a smooth rigid base for example a solid concrete plinth."

Paragraph 3.3. (former), renumber as paragraph 3.2.

Annex 14, paragraph 1, amend to read:

- "1. Place the device on the test bench-seat described in Annex 6. Reclinable devices shall be set in the most upright position. Place the smallest **dummy manikin** in the device in accordance with the ~~manufacturer's~~ **manufacturer's** instructions. Mark a point "A" on the backrest on the same horizontal level as the shoulder of the smallest ~~dummy manikin~~ **dummy manikin** at a point 2 cm inside the outer edge of the arm. All internal surfaces above the horizontal plane passing through point A, shall ~~comprise special energy absorbing material~~ be tested in accordance with Annex ~~4~~**17**. This ~~material area~~ shall ~~cover the internal surface of~~ include the backrest and side wings, including

the inner edges (zone of radius) of the side wings. ~~The energy absorbing material may be an integral part of the Child Restraint System.~~ In the case of ~~carry-cot carrycot~~ devices where a symmetrical installation of the dummy is not possible according to the device and manufacturer instructions, the ~~lower limit of area at which material~~ **internal surfaces above a point "A", as previously defined**, in the head direction, when measured with this dummy in the ~~carry-cot carrycot~~ in its worst position consistent with the ~~manufacturers manufacturer~~ instructions and the ~~carry-cot carrycot~~ positioned on the test bench.

If a symmetrical installation of the dummy in the ~~carry-cot carrycot~~ may be possible, the whole inner ~~surfaces area~~ shall be covered with material ~~complying comply~~ with Annex 13; this material has to fulfill its purpose together with the inner side structure; the Technical Service may assess this aspect with further tests."

Annex 17,

Paragraphs 1.2.1., the reference to footnote ¹ shall be deleted

Paragraphs 1.3., the reference to footnote ² and footnote ² shall be deleted

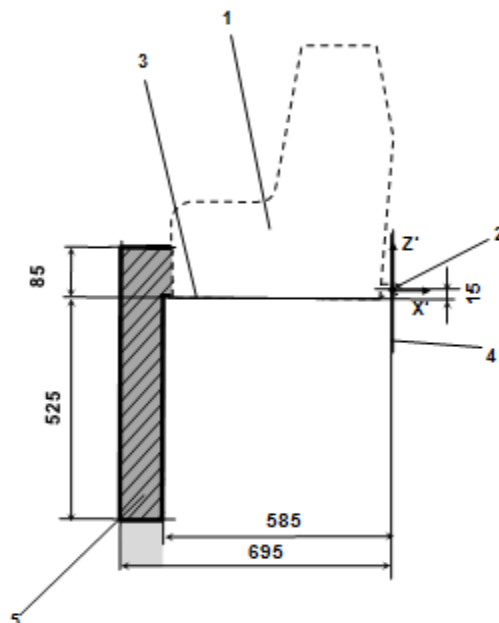
Annex 19, amend to read:

"Annex 19

Assessment volumes for i-size support-legs and support-leg feet

Figure 1

Side view of the support leg dimension assessment volume



Key:

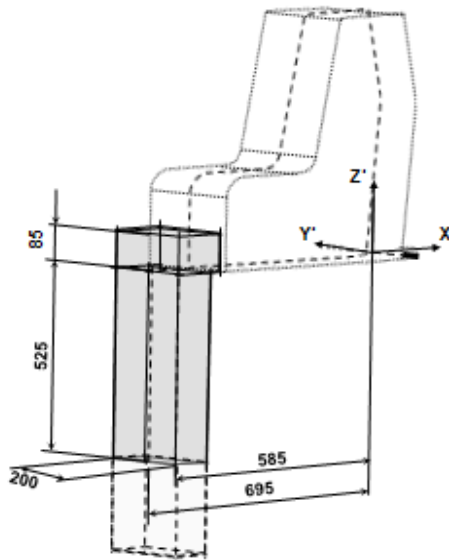
1. Child Restraint Fixture (CRF)

2. ISOFIX low anchorages bar
3. Plane formed by the bottom surface of the CRF, which is parallel to and 15 mm below the $X'-Y'$ plane of the coordinate system
4. $Z'-Y'$ plane of the coordinate system
5. Upper part of the support-leg dimension assessment volume, which shows the dimensional limitations in X' and Y' direction, the upper height limit in Z' direction, as well as the lower height limitation in Z' direction for rigid, not in Z' direction adjustable support leg components

Notes:

1. Drawing not to scale.
2. Volumes (5 and 6) are defining the maximum limits of the support leg and its foot. No parts of the CRS shall exceed these limits in any position of adjustment when in use configuration.

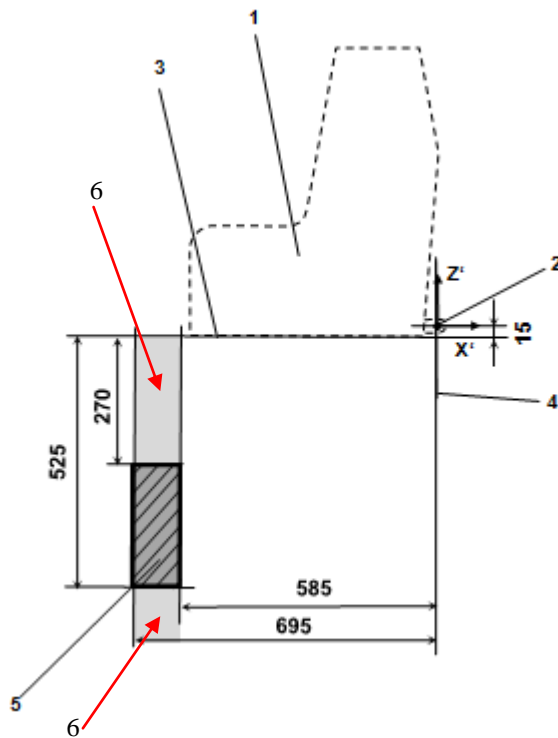
Figure 2
3D view of the support leg dimension assessment volume



Notes:

1. Drawing not to scale.

Figure 3
Side view of the support leg foot assessment volume



Key:

1. Child Restraint Fixture (CRF)
2. ISOFIX low anchorages bar
3. Plane formed by the bottom surface of the CRF, which is parallel to and 15 mm below the $X'-Y'$ plane of the coordinate system
4. $Z'-Y'$ plane of the coordinate system
5. Support-leg foot assessment volume, which shows the required adjustment range of the support-leg foot in Z' directions, as well as the dimensional limitations in X' and Y' direction
6. Additional volumes shows the additional permissible adjustment range in Z' direction for the support-leg foot

Notes:

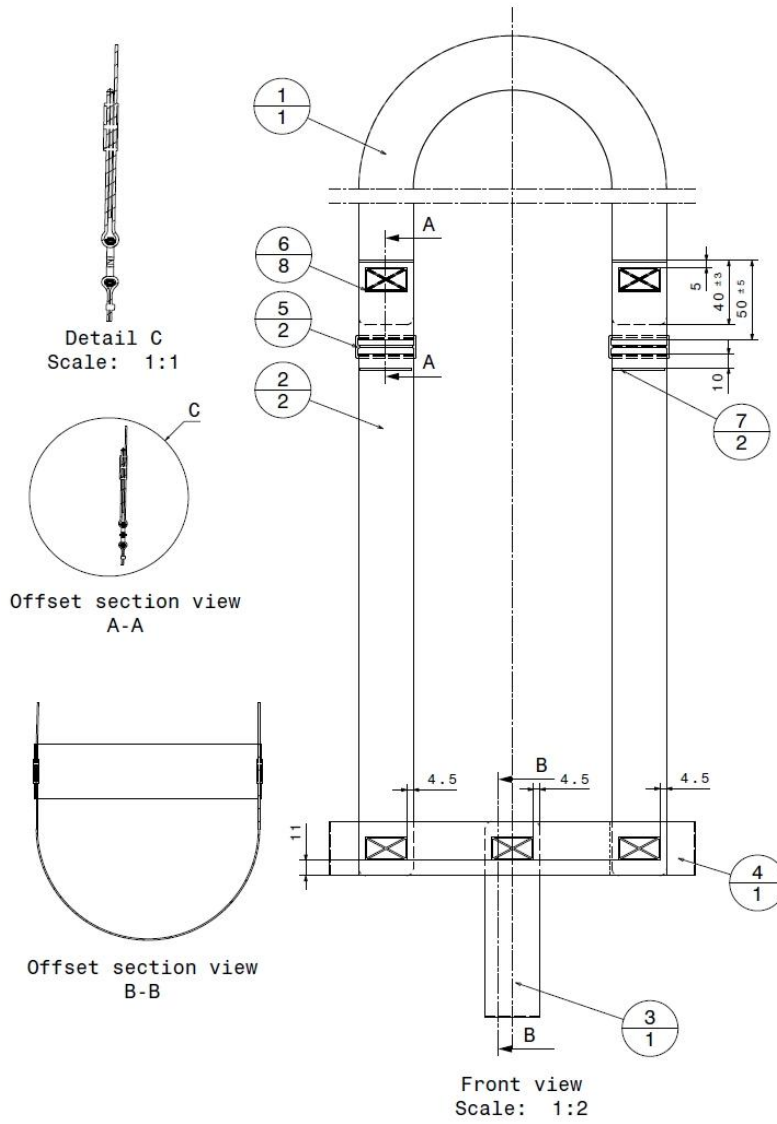
1. Drawing not to scale.

Figure 4
3D view....
...."

Insert new Annex 21, to read:

"Annex 21

Load application device I (to be used for Q0, Q1, Q1.5 dummies)

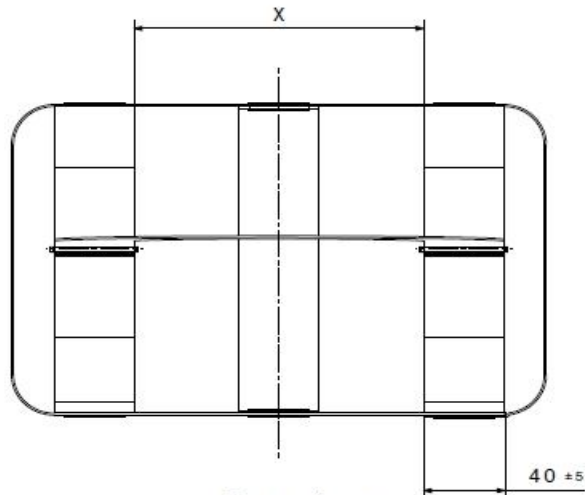


No.	Name	Information	Quantity
1	head belt - 39mm	-	1
2	shoulder belt lh/rh - 39mm	-	2
3	crotch belt - 39mm	-	1
4	hip belt - 39mm	-	1
5	stitch pattern (30x17)	stich: 77, thread: 30	8
6	plastic buckle	-	2
7	stitch pattern (2x37)	stich: 77, thread: 30	2

stretch length	(+/-5mm)					
	Dummy P/Q 0	Dummy P/3/4	P/Q 1,5	P/Q 3	P/Q 6	P/Q 10
head belt	1000mm	1000mm	1000mm	1200mm	1200mm	1200mm
shoulder belt	750mm	850mm	850mm	1000mm	1100mm	1300mm
crotch belt	300mm	350mm	400mm	400mm	450mm	570mm
hip belt	400mm	500mm	550mm	600mm	700mm	800mm
dimension X	120mm	130mm	140mm	140mm	150mm	160mm

stich pattern	min. required force
12x12mm	3,5 kN
30x12mm	5,3 kN
30x17mm	5,3 kN
30x30mm	7,0 kN

all belt radius = 5mm

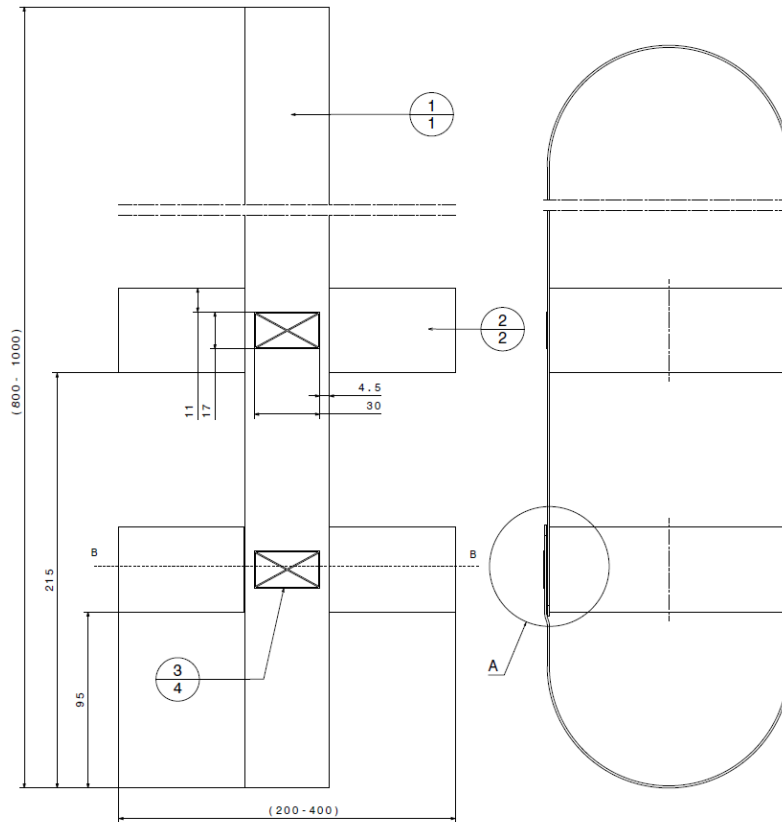


Top view
Scale:1:2



Isometric view
Scale:1:10

Load application device II (to be used for Q3, Q6, Q10 dummies)

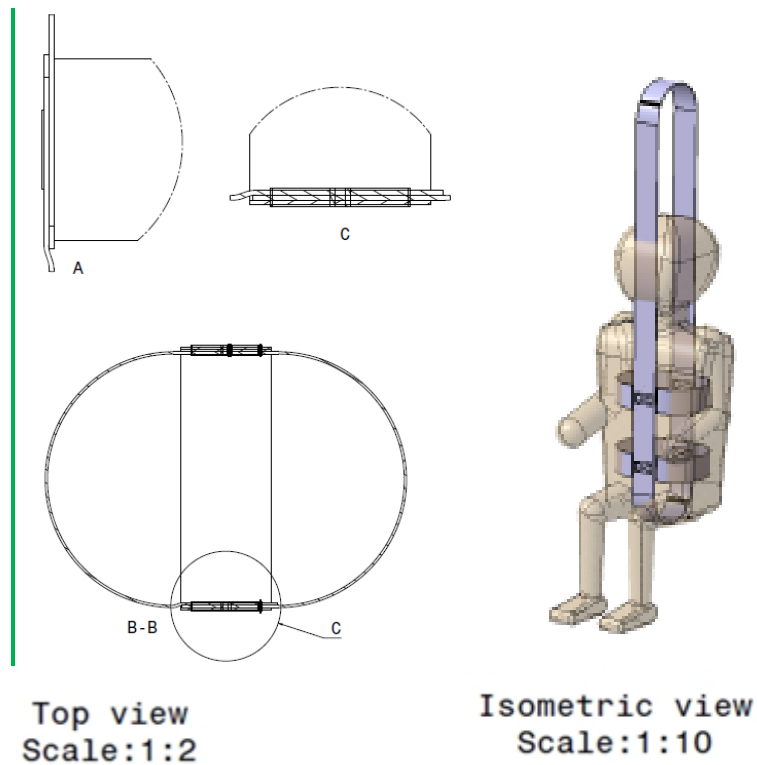


No.	Name	Information	Quantity
1	main belt - 39mm	-	1
2	hip belt (upper/lower) - 39mm	-	2
3	stitch pattern (30x17)	stich: 77, thread: 30	4

stretch length	(+/-5mm)					
	Dummy P/Q 0	Dummy P/S/4	P/Q 1,5	P/Q 3	P/Q 6	P/Q 10
main belt	1800mm	1600mm	1600mm	2000mm	2000mm	2000mm
hip belt	440mm	540	640mm	740mm	740mm	840mm

stich pattern	min. required force
12x12mm	3,5 kN
30x12mm	5,3 kN
30x17mm	5,3 kN
30x30mm	7,0 kN

all belt radius = 5mm



II. Justification

1. During the fifty-second session of the Working Party on Passive Safety (GRSP) (see ECE/TRANS/WP.29/GRSP/52, para. 46) it was agreed to consolidate all proposals of amendments of new regulation in a unique document.

2. The document proposed as a basis includes the proposals adopted by the World Forum for Harmonization of Vehicle Regulations (WP.29) at its November 2012 session: ECE/TRANS/WP.29/2012/53 and Corr 1 and ECE/TRANS/WP.29/2013/37 submitted to WP.29 submitted for consideration and vote at its March 2013 session. The proposed changes to this consolidated basis includes the following proposals:

- (a) GRSP-52-16 tabled by the expert from Germany on I Size marking
- (b) GRSP agreed at its December 2012 session to take over most recent amendments from UN Regulation No. 44 to UN Regulation No. [129] to keep align both UN Regulations on common principles. Accordingly, the following proposals have been incorporated:
 - (i) GRSP-52-11-Rev.1 tabled by the expert from France and adopted by as Supplement 7 to the 04 series of amendments to UN Regulation No. 44.
 - (ii) GRSP-52-20 tabled by the expert from France (editorial , right coordinate system for support leg) and right reference to flammability test, superseding WP.29-158-22.
 - (iii) ECE/TRANS/WP.29/2012/98 (France) adopted by WP.29 at its November 2012 session

- (iv) ECE/TRANS/WP.29/2012/44 - (GRSP) Proposal for Supplement 5 to the 04 series of amendments to Regulation No. 44 (Child restraint systems)
-