i-Size SL X-length review

Another approach;
Additional requirements for CRS will create smaller CRS and provide more vehicle space.
Current i-Size X-definition

X-short: 585 mm

- This is formed by:
  - Largest vehicle in the market
    - (IsoFix to leading edge of cushion)
    - CRS needs to bridge this distance

X-long: 695 mm

- The second limit is formed by:
  - the IsoFix range adjustment of 80 mm
  - the thickness of the support leg (30 mm)
Current i-Size; consequences

- SL cannot be positioned closer than 585 mm from ISOFIX. (That’s quite far forward in a small vehicle)
- Can have a SL positioned at 695 from ISOFIX
- On average i-Size CRS will require 50 mm more in X compared to current R44 products with SL.
- On average 50 mm more space required for i-size CRS compared to current R44 CRS designs.
- Interference with front seat backrest (lower portion)
- Less space for front seat occupant with installed CRS

All discussed and accepted in the Ad Hoc working group.

However, wouldn’t it be good if we had the same “Universal” results, but none of these negative aspects?
Thought....

• If we split the requirements for fixed base length CRS and adjustable base length CRS, then both the X-short and X-long can be redefined closer to ISOFIX.

• Can we then;
  – provide more space for the vehicle occupant?
  – allow CRS’ses to be shorter, lighter and more easier to handle?
There are 2 CRS concepts

Based on design of the anti rebound device (ARD) function

1. Fixed base length
   1A  SL always touches same floor area; No movement of SL
       Anti rebound by tethers etc.
   1B  Shell can move relative to base
       Base can’t move relative to anchor

2. Adjustable base length
   Base with SL will move relative to anchor, SL slides up to 80 mm.
   SL foot slides over the vehicle floor until:
   - back of child seat contacts vehicle backrest, or
   - SL foot touches heelkick, or
   - SL upr area contacts front leading edge of seating cushion.
Requirements for fixed base length CRS

• Allow only 1 position for the SL of a CRS with a fixed base length
• Must be > longest vehicle in the market (Isofix to leading edge of cushion = 585 mm)
• Distance X-short to X-long is only the thickness of the SL (585+30=615 mm)
• Optional; CLEPA would like a bit more space for the SL thickness; eg not 30 but 50 mm.
• TBD later. Keep 585-615 for now
Adjustable base, X-short for a vehicle with ISOFIX at +10 mm

Reasoning:

• To guarantee ARD contact, the CRS should bridge the longest cushion to CR. If not, SL will contact seat cushion leading edge before ARD contact backrest.

• Longest cushion to CR = Vectra = 540 mm

• Bridge length: 540-10=530

This defines Xshort as 530 mm,
• with guaranteed ARD contact
• keeping it “Universal”
Adjustable base; X-long for a vehicle with ISOFIX at -70 mm

Reasoning
• X-short +range
• Range 110 mm
• $530 + 110 = 640$ mm
• + 10 mm Safety Margin (OICA)

This defines X-long as 650 mm
• with guaranteed ARD contact
• keeping “Universal”
• Improvement compared to current i-Size = 45 mm
## Summary of values

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1. Due to SL thickness; + 30 mm

2. X-short is derived from vehicle with longest distance CR to seat cushion leading edge and +10 mm ISOFIX anchor; ‘bridge’ is 530. OICA prefers 540 mm for “safety margin”

3. X-long is simply X-short +110 mm

* = X-short for vehicle can be limited. See next page
To be considered; vehicle aspect

- Floor surface limited by heel kick?

1. Vehicle floor not necessary to reach all the way from front to 530 mm. Rigid area of vehicle floor may be cut-off at point of heel kick.

2. Additional benefit: As a consumer may install the CRS without fully unfolding the SL, any position possible, forward of the heelkick, is OK. In current i-size draft this misuse is not solved; in most vehicles, the floor will extend <585 mm.

3. May require definition of max radius?
So, how does this translate to real life? Time for examples.

He: Did buckle little Johny up, my dear?
Examples in large vehicle

CRS with a **fixed support leg** in a vehicle with a **long seat cushion** (Citroen C5)

i-Size square on floor; 585 to 695 mm

New proposal;
Fixed SL to contact floor at 585 to 615 mm

New proposal
Adjustable SL to contact floor at 540 to 650 mm
Example, small vehicle

Fixed X-position SL
Small vehicle (Toyota Aygo 5Dr)

Flexible X-position SL
Small vehicle (Toyota Aygo 5Dr)

i-Size square on floor; 585 to 695 mm

New proposal for fixed SL 585 to 615 mm

New proposal for flexible SL 540 to 650 mm
Example, short cushion vehicle

**Fixed X-position SL**
Short cushion (VW Touran)

**Adjustable X-position SL**
Short cushion (VW Touran)

- New proposal for fixed SL 585 to 615 mm
- New proposal for flexible SL 540 to 650 mm
Consequences for CRS manufacturer

Advantages
• Allows X-long to be reduced from 695 to 650 mm.
• 45 mm shorter base & lighter CRS allows easier installation.
• CRS use in smaller vehicles will be easier; increases marketshare of i-Size seats vs R44 seats.

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Disadvantages
• For fixed base length, only 1 position allowed.
• Adjustable base length:
  • SL may contact heel kick before anti rebound device contacts vehicle backrest. -> CLEPA to rethink anti rebound device constructions
Consequences for vehicle manufacturer

- Stiff floor area same or smaller compared to current i-Size def.
- Thought needed on heel kick to floor area; min/max radius?
- No consequence for rear seat design compared to current i-Size (positioning of ISOFIX anchor, cushion shape etc)

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- R14/R16 update with new values
Secondary positive effect F2 / Class B enveloppe

Picture shows 35 mm space required for upper area of support leg; i-Size currently needs 90 mm

Z values
• To be recalculated, based on avg vehicle’s pitch angle
If the idea works…

Consequence for CLEPA

- Splitting requirements for CRS keeps all universal for consumer
- Anti Rebound Device contact guaranteed for flex x-length systems
- 45 mm shorter X-long vs i-Size; less stiffness req.
- Less mass = less cost
- Less mass = easier handling by user
- Less mass is less fuel consumption.

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Consequence for OICA

- Adding only requirements for CRS, no additional requirements for vehicle
- 45 mm shorter vs i-Size, so …
- 45 mm more space for front seat occupant!
- Smaller problem with upper area of SL
Check items (currently checked by OICA)

- Is the longest cushion (CR to seat cushion leading edge) indeed 540 mm (Vectra)?
- Do we require definition of heelkick to floor corner?
- Recalculate Z values.

_lower priority_

- can we increase X-Long for a fixed base length CRS from 615 to 630 ? This will allow more design freedom in the telescopic system. Consequence for vehicles? None?
Action list

- OICA and CLEPA discussed together 20 nov 2011. No problems encountered.
- OICA to use the CLEPA prepared physical jig to assess the proposal in their cars
- Circulate jig within OICA from Nov-Feb 2012
- Allow for feedback before Feb 2012 meeting
- Pre meeting in Feb 2012.