CRS international standards update

ISO/TC 22/SC 12/WG 1
Child restraint systems (in road vehicles)

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Protection of children in cars, 5th International Conference, Munich, December 6-7, 2007

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This presentation will provide some background and the latest updates regarding

- ISOFIX (universal anchorages and attachments)
- Usability assessment of ISOFIX solutions
- Improved compatibility CRS to vehicle
- Automatic airbag suppression system (CPOD)
- CRS side impact test method
- Comparison of regulations and standards
- Further ISO CRS standards
- Possible future work items

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ISO work - Background

- ISO / TC 22 / SC 12 / WG 1
  Child Restraint Systems (in road vehicles)
- First meeting held in May 1989
- Approximately 85 experts from 19 countries on member list
- Approximately 30 experts participate at recent meetings
- Meetings twice a year + TF meetings
- Chair: Lotta Jakobsson, Volvo Car Corp. (since May 2007). Former chairman (1989-2006) Björn Lundell retired after leading the group through 35 meetings.
- Secretariat: SIS, Sweden, Peter Claeson

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Scope and focus

- "International harmonization and standardization in the field of child restraint systems in passenger cars in order to improve safety for children in cars"
- Focus on <u>compatibility</u> and <u>reduction of misuse.</u>

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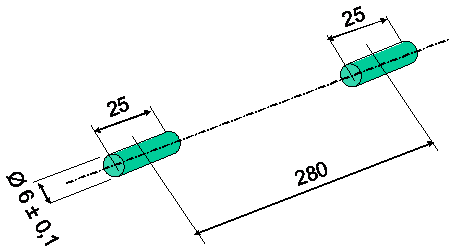
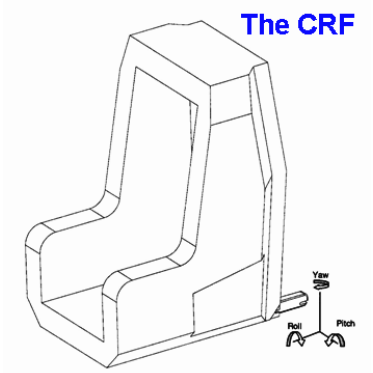
ISOFIX

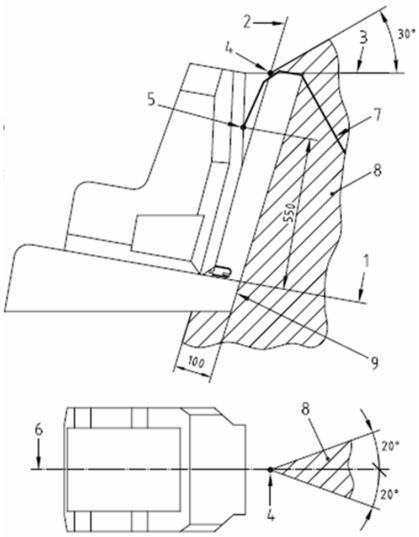
- ”ISOFIX story” presented by Björn Lundell at the conference held 2005, included in the proceedings.
- ISOFIX standard (ISO 13216-1) published in 1999.
- Part 1: Lower anchorages and attachments.





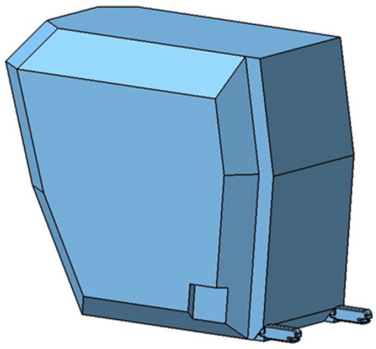
ISOFIX (continued)

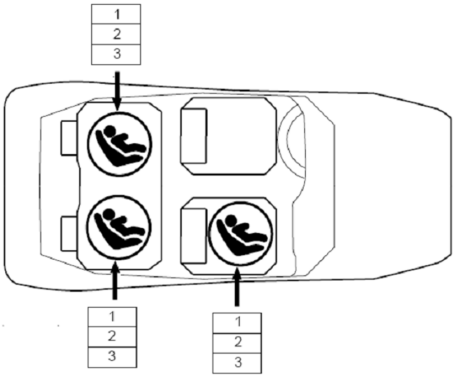
- Part 2:
  Top tether anchorages
  (and installation zones).
- Published in 2004.
- Wider installation zones
  are accepted for rigid
  ISOFIX.



ISOFIX (continued)

- Part 3: Child restraint dimensions and space in vehicle. Published 2006.
- Provides a size classification for main CRS types, and a corresponding classification for space in vehicle.





ISOFIX implementation in regulations

- USA: FMVSS 225 and 213 (LATCH), 2002
- Canada: CMVSS 210.1, 210.2, and 213 (UAS)
- Europe and ECE area:
  ECE R14 and R44, 2004. R16, 2006.
- ECE has implemented the ISO standards without alterations.
- FMVSS has implemented non-rigid attachments on the CRS side (which is an option in the ISOFIX standard).
- FMVSS and CMVSS have higher strength requirements in the frontal direction, both for lower anchorages (11 kN vs 8 kN) and for top tether anchorages (15 kN vs 8 kN). Some differences also in force application and criteria.

Revisions and amendments to ISOFIX

- Amendment 1: CRF:s for installation in low-roof cars. Published 2006.
- Amendment 2: ISOFIX tolerances (see next slide).
- Amendment 3: Detection of installed ISOFIX CRS. Published 2006.
- Amendments will be included in a revised consolidated version of ISO 13216-1.
- Update to take into account the experiences from practical use of ISOFIX since the publication of ISO 13216-1.
- Some discussions on the possibilities to harmonise the strength requirements related to the regulatory implementations. No indications of problems in practice.
- Data from dynamic force measurements during severe crash conditions would be a necessary input for further actions.
- Current ISOFIX limitation is child mass up to 22 kg.
- Desirable to include also ECE group II (up to 25 kg) within the current specification?

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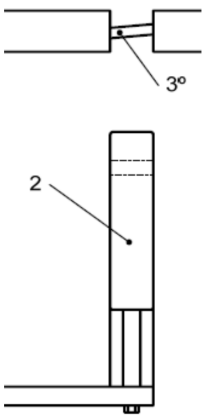
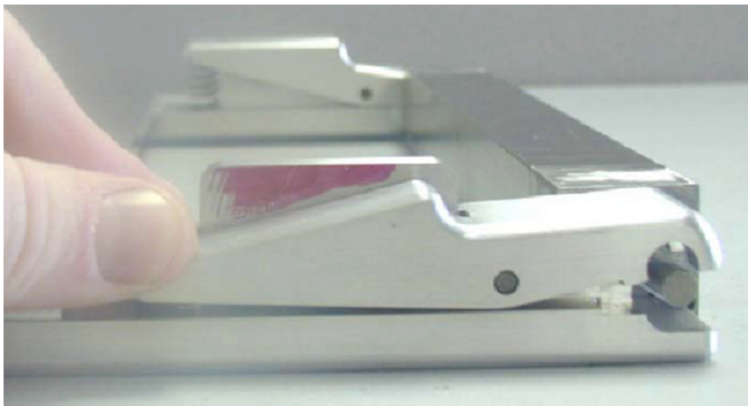
Amendment 2 – ISOFIX tolerance specifications

- To ensure compatibility with regard to bar alignment etc.
- Not ready, did not pass first voting. Will possibly be reworked to only specify gauges for the tolerance checking.
- Only rough specifications in current part 1, could be more optimised.
- Risk of incompatibility between US cars and rigid ISOFIX CRSs.





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Assessment of ISOFIX usability

- Work on a standard to assess the usability of ISOFIX designs has been ongoing for some time.
- Goal to promote easy-to-use ISOFIX solutions.
- Assessment of CRS, vehicle anchorages, CRS-vehicle combination.
- Starting point usability work in Canada and USA.
- Will become a future ISO 29061 standard, intended to be ready for first voting by end of 2007.
- A number of workshops in Europe and NA have been held to evaluate and improve the protocol.
- Project leader: Jocelyn Pedder, RONA Kinetics. Well assisted by Marie-Eve Nave, PSA.

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Usability protocol

- CRS independent evaluation (mainly labels, manual, preparation for use)
- Vehicle independent evaluation (owner's manual, labelling, user friendliness of lower and top tether anchorages.
- Systematic evaluation of mounting CRS into vehicle, including base evaluation and detachment.

Interface – Installing the CRS or base in the Vehicle

Vehicle	Nissan Note	Flexible Attachment?	☑ Not Applicable	Primary Anti-Rotational Device?	☐ Not Applicable
Seat	MaxiCosi Cabriofix/Easyfix	Top Tether?	☑ Not Applicable	Secondary Anti-Rotational Device?	☑ Not Applicable
		CRS Has Separate Base?	☐ Not Applicable	ISOFIX Capable of Being Tightened?	☐ Not Applicable

Attaching CRS or base to Lower ISOFIX Anchorages

		Good	Average	Poor	Importance	Notes
15	Using CRS, are the prepared lower ISOFIX anchorages accessible (i.e. is it possible to use them)?	Yes, can get positive attachment with both ISOFIX attachments sufficient clear space around the anchorage. ○	Yes, after single action, e.g. one-handed depression of seat cushion or moving seat belt buckle out of the way. ◉	Not accessible or ready to use Not possible without tools or physically modifying seat or extreme effort ○	A	
16	Do ISOFIX attachments remain accessible until they are secured to the vehicle anchorages?	Yes ○	◉	No ○	A	
17	Is there clear indication that the child restraint system is correctly attached to the ISOFIX anchorages?	Tactile plus visual or audible indication that both CRS lower ISOFIX attachments are correctly attached. ◉	Tactile indication that both CRS lower ISOFIX attachments are correctly attached. ○	None, or false ○	A	False means indicating correct attachment without actually being attached to anchorage.

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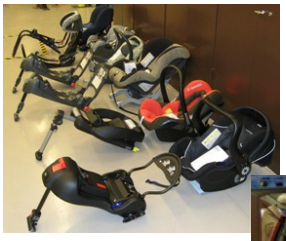
Usability workshops

Montlhéry, France

Vancouver, Canada

Linköping, Sweden



Child seats

Test vehicles

Usability workshops

Reading manuals

Installing - largest RF in smallest vehicle

ISOFIX well hidden behind buckles

Top rating!

Confusion with cargo securing

Installed in front passenger seat

Improved compatibility vehicle - CRS

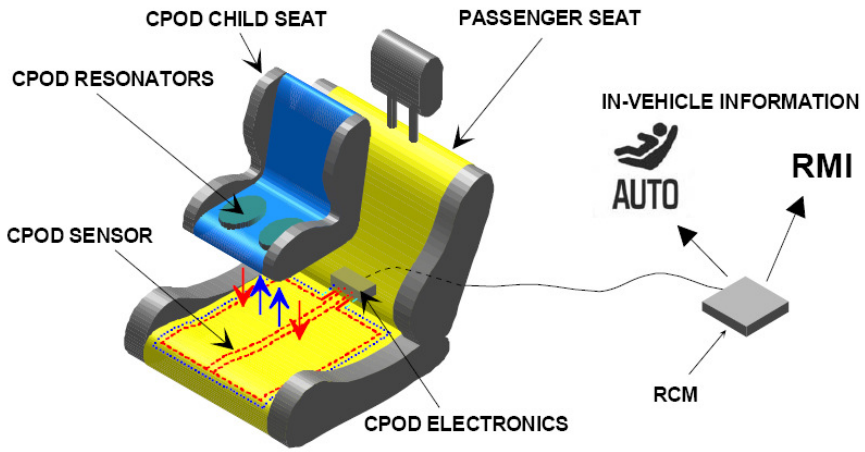
- New work on guidelines to improve interface between vehicle seats and (non-ISOFIX) CRSs, with regard to
  - seat geometry
  - belt geometry
  - belt buckle positioning
- Intended to provide measurement tools/templates and recommendations, both for CRS manufacturers and vehicle manufacturers.

Interface between CRS and automobile seats						
CRS				Automobile Seats		
Poor CRS	Interim	Better CRS	Interaction	Better Automobile Seat	Interim	Poor Automobile Seat
Poor belt path (over 90°)	→	Good belt path (under 80°)	⇄	Anchor at seat bight	←	Poor anchor location (offsets, symmetry)
Poor locking features	→	Good lock features	⇄	Locking retractors	←	non-locking retractors
Short belt path guide	→	Clearance at belt guide	⇄	Short buckle length	←	Long buckle length

CPOD - Automatic airbag suppression

- This ISO work was presented in detail by the project leader, Falk-Hagen Brämig, at the conference 2006.
- Following an intense work of the Task Force, and voting among the member countries, the specifications are now approved for publication as ISO Technical Specifications:
- ISO/TS 22239, Road vehicles — Child seat presence and orientation detection system (CPOD) —
  - Part 1: Specifications and test methods (to ensure compatibility between CRS and vehicle)
  - Part 2: Resonator specifications
  - Part 3: Labelling (includes also status indication)
- Publication is expected early 2008.
- It is intended to upgrade to ISO standards when experiences have been evaluated.

CPOD principle

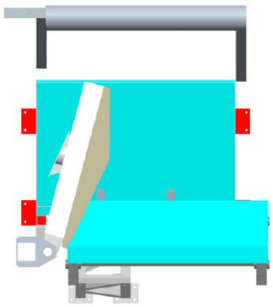


CRS side impact testing

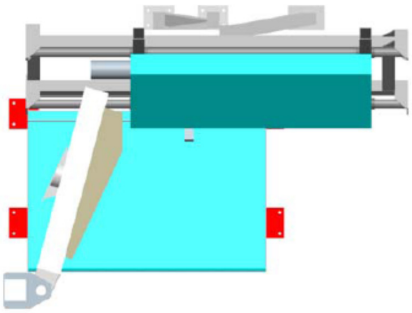
- The work was reported in detail by the project leader, Heiko Johannsen, at the last conference.
- ISO Technical Report 14646, describing the background data, method development and experiences, was recently published.
- Work continues on the ISO side impact test method, to become ISO 29062.
- This is intended to be ready for a first voting by end of 2007.
- Some highlights on the method are given on the next slide.

CRS side impact testing

- The ISO 29062 side impact testing is an upgraded version of the hinged door concept to improve behaviour and reproducibility, e.g.
  - Movable anchoring of the CRS to the sled
  - Adjustment of panel angular velocity and timing
  - Improved and more narrow corridors



Bench prepared for testing of RF CRS



Bench prepared for testing of FF CRS

Compilation of CRS regulations and standards

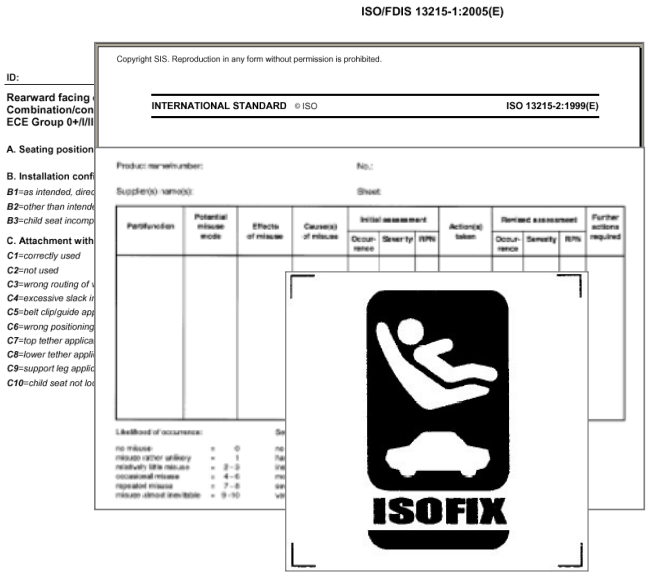
- ISO/TR 13214 was published in 1996.
- Intermediate internal updates, but soon ready for new issue, which also includes a comparison of regulations regarding universal CRS anchorages and attachments.

A comparison of main characteristics of regulations covering universal anchorage/attachment system, according to ECE (R.14, R.16, R.44), FMVSS (225, 213), CMVSS (210).

Item	Requirement Description	Current **FMVSS 225** (Effective 01Sep2004)	Current **CMVSS 210.1** (Effective April 1, 2007)	Current **CMVSS 210.2** (Effective April 1, 2007)	Current **ECE-R 14** (Effective Jan. 2006) For new homologation Feb. 2008 [S14.2] Effective for all produced vehicles Feb. 2013 [S 14.3]	Current **ADR 34/1** (Effective Dec. 2005)
	Comments	Deals with Lower and Top Tether Anchorages	Deals with Top Tether Anchorages Only	Deals with Lower Anchorages Only	Deals with Lower and Top Tether Anchorages	Deals with Top Tether Anchorages Only

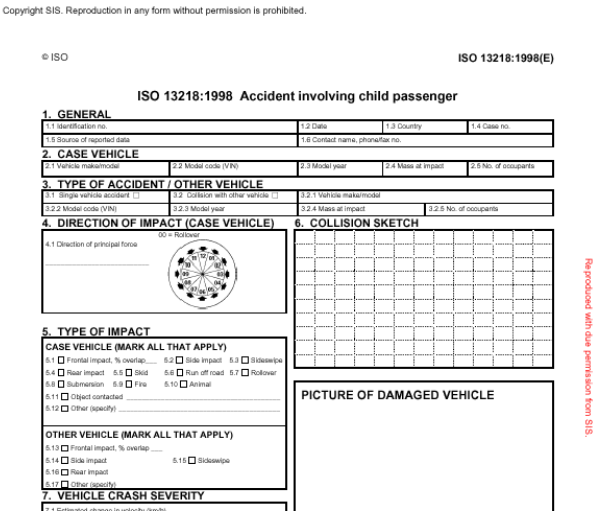
ISO 13215 series - Reduction of misuse risk

- Part 1, Forms for collection of data from field studies of misuse, published 2007.
- Part 2, Test methods for the evaluation of misuse risk: Panel method, published 1999.
- Part 3,Test methods for the evaluation of misuse risk: MMEA, published 1999.
- Part 4, Instructions and labels, example ISOFIX label (symbols are published in ISO 2575).



Report form for accidents involving child passengers

- ISO 13218, published 1998.



Possible future work items

- Compatibility work, further investigate what could be done
- Expand usability evaluation to include also
  - assessment of CRS attached with adult belts
  - assessment of child harness and daily use
- Suggestions for future items from the audience?

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Thank you!

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