Transmitted by the expert from Japan

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(43rd GRSP, 19-23 May 2008
agenda item 12(a))

Impact-Shield Type CRS in JNCAP

National Agency for Automotive Safety and Victims' Aid

Scene of the Sled Test

Difference of CRS regulation and Assessment

Japanese CRS Regulation

Vehicle crash speed 50km/h

CRS Assessment

Vehicle crash speed 55km/h

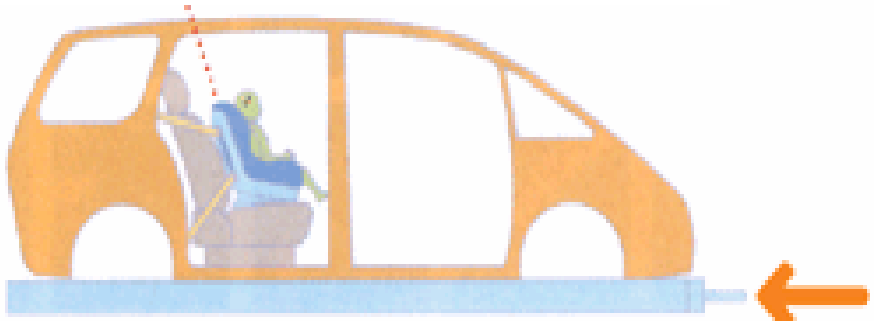
CRS Assessment Test Procedure

-JNCAP conducts sled tests of CRS.

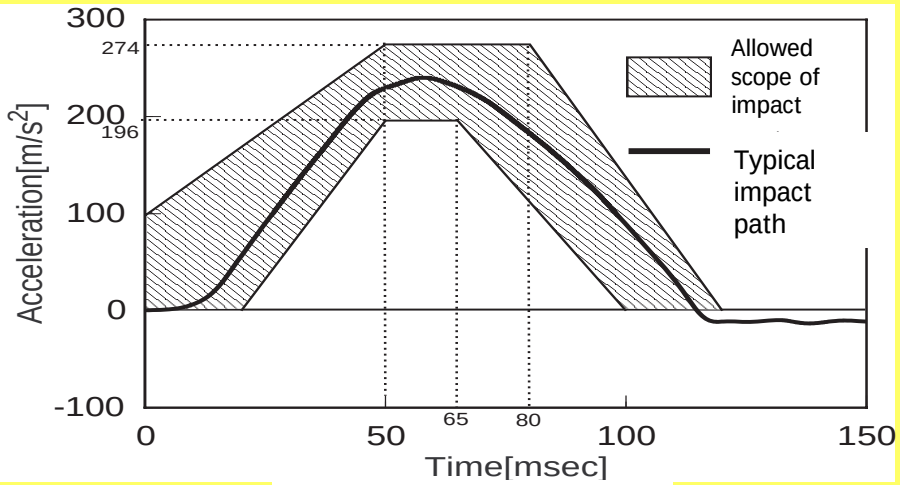
-The CRS are fixed behind the driver's seat.

-The test speed of the sled is 55km/h, which is 10% higher than that used in Japanese regulation.

-The sled is the structure of Toyota Estima, which is one of the best seller cars in Japan.



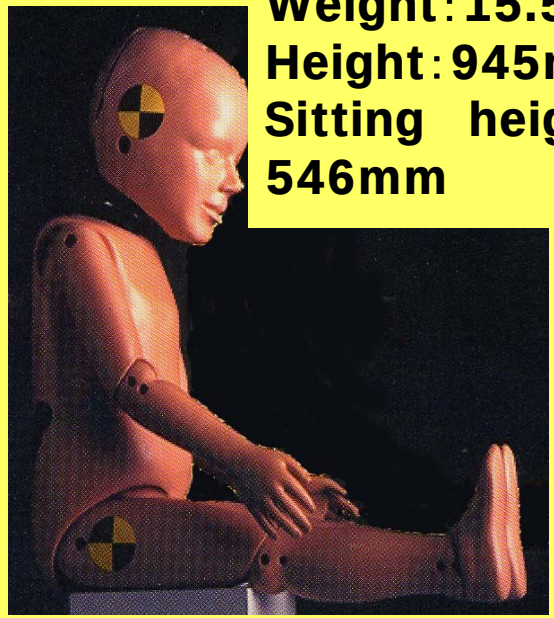
Equivalent to collision at a speed of 55 km/h



Impact scope

Dummies for CRS Assessment

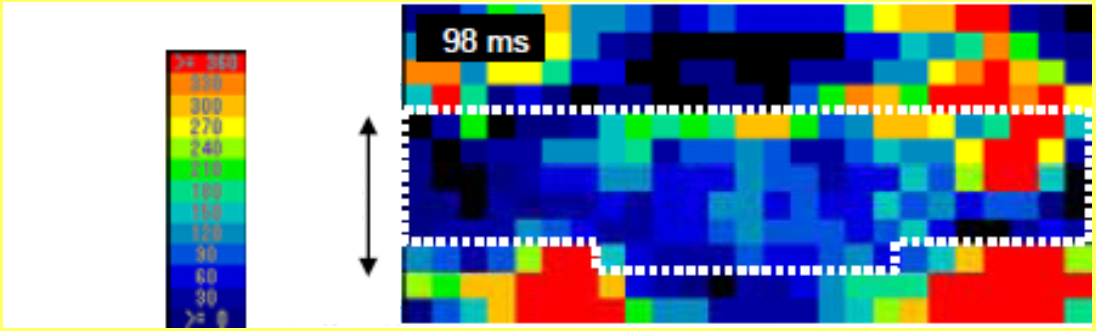
-JNCAP adopts three types of dummies according to types of CRS

TNO P3/4 (Rear-facing infant CRS)	CRABI 6MO (Bed-type infant CRS)	Hybrid-III 3YO (Forward-facing toddler CRS)
		
Weight：9.0kg Height：708mm Sitting height：450mm	**Weight：7.4kg Height：71mm Sitting height：439mm**	**Weight：15.5kg Height：945mm Sitting height 546mm**

Abdominal Load

- In order to quantitatively measure the degree of pressure, a surface pressure gauge is installed on the abdomen of the dummy (Hybrid III 3YO).

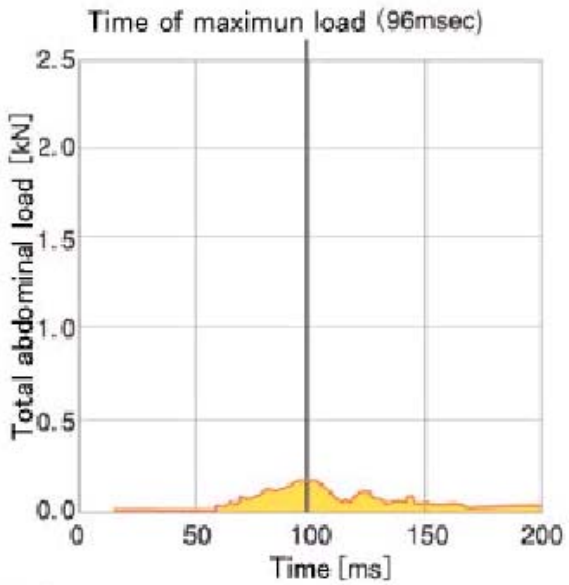
Surface pressure gauge installed on the dummy's abdomen



Example of the measurement result

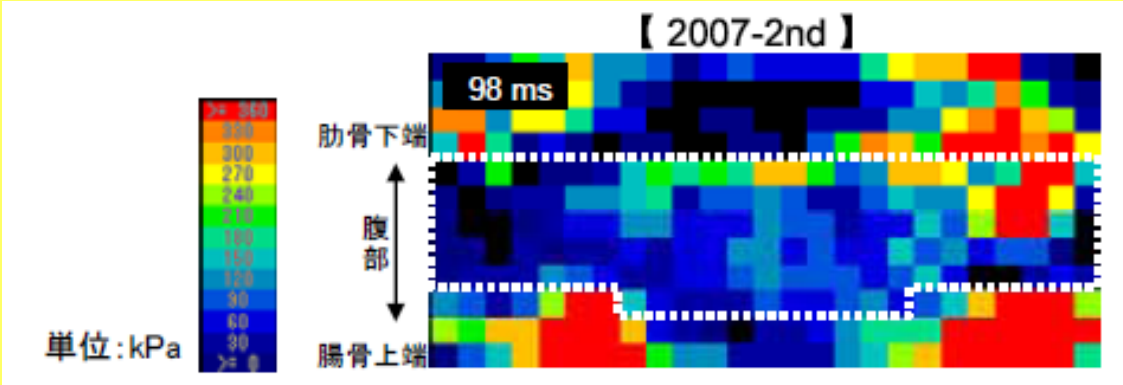
Abdominal Load

Maximum load 0.175kN



Abdominal Load

Example of Impact-Shield



The impact shield type CRS, which is restrained the CRS and a child body simultaneously by the vehicle seat belt and impact shield that is the system to protect the child body flying out from the seating position during the crash, is caused big deformation over the measurement range of dummy's chest and abdomen by the impact shield during the crash, cannot measure often the pressure to the abdomen properly.

Note:

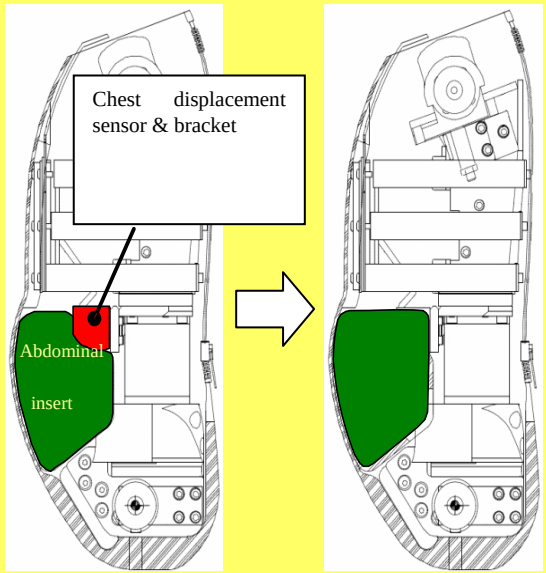
Therefore, it has not evaluated total evaluation for frontal collision test of subjected products since 2003 when starting the measurement of abdominal pressure.

The History of Abdominal Load Measurements

- In 2003, measurement using a surface pressure gauge was introduced in the JNCAP to quantitatively evaluate the abdominal pressure generated by vest-type CRSs.
- In the 2005 results of tests using the surface pressure gauge found that the abdominal pressure becomes larger in impact-shield type CRSs than harness-type CRSs, and thus we investigated the cause.
- As a result, it was clarified that, in the impact-shield type CRSs, large abdominal deformations were generated and the abdominal load distribution was affected by the mounting bracket for the chest displacement sensor.

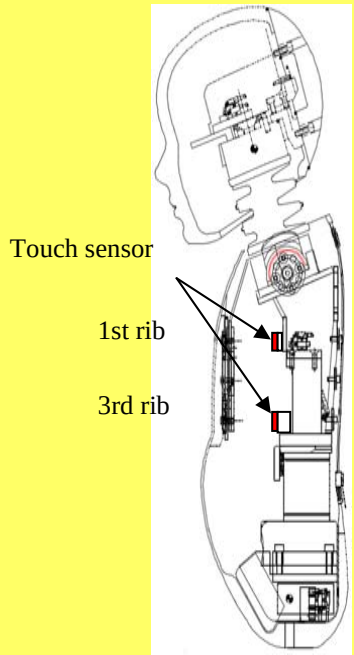
The History of Abdominal Load Measurements

- Therefore, we made an improvement by eliminating the chest displacement sensor and installing touch sensors between sternum and thoracic spine so as to monitor the chest deformation



Standard dummy

Improved dummy



The History of Abdominal Load Measurements

- In 2007, tests were conducted on four impact-shield type CRSs using the improved dummy, and the dummy's chest bottomed out on the touch sensors in all the tested CRSs.
- Furthermore, the measurements using the surface pressure gauge also presented higher numerical values for impact-shield type CRSs than harness-type CRSs, but since a question was raised as to whether it is appropriate to apply the existing harness threshold to the abdominal load evaluation,
- We decided to exclude the impact-shield type CRS from the evaluation for now.

Our request to supply information on impact-shield type CRSs

- Do you have any data on accidents involving impact-shield type CRSs or information on the chest displacement or abdominal pressure caused by impact-shield type CRSs?
- If a displacement of about 40 mm is generated on the chest of a dummy (Hybrid III 3YO), does it mean that the same injury would occur in a human body as well?
- In the case of children, the rib fracture is unlikely because their ribs are flexible. If injuries to internal organs are possible, what kind of injuries are they?

Our request to supply information on impact-shield type CRSs

- Are there any differences in the injury mechanism between abdominal pressure given by wide surfaces such as impact shields and that given by strips such as harnesses?
- According to the German accident data (from “A Study on Children’s Injury Risks by CRS Type,” published by the Institute for Vehicle Safety of the German Insurance Association [GDV]), the injury probability is lower for impact-shield type CRSs than 5-point-harness-type CRSs. This result differs from the JNCAP result that the dummy injury value is lower in 5-point-harness-type CRSs. What is the cause of this difference?

Our request to supply information on impact-shield type CRSs

- From the JNCAP test results, which show that chest displacement and abdominal loads in crashes are larger in impact-shield type CRSs than harness-type CRSs, we can judge that the safety performance of impact-shield type CRSs is lower.
- However, since the results of some other studies indicate that the injury probability in actual accidents is lower for impact-shield type CRSs, **Japan finds it difficult to decide how we should evaluate this type of CRSs in the future.**

Impact-Shield Type CRS in JNCAP

- Please give us any advice for impact-shield type CRS

  to “yonezawa@ntsel.go.jp”!

- Thank you for your attention!