Informal document **GRSP-51-39**
(51st GRSP, 21 – 25 May 2012,
agenda item 20)

~~GRSP Inf. Group on Child Restraint Systems~~
~~CRS-31-09~~

~~April 11th , 2012~~

Japanese Proposal for the New Regulation

JASIC / Japan

Background & Purpose

- ✓ NTSEL (type approval test department in Japan) uses the acceleration type sled test system. So, it is necessary to compare the results of the CRS side impact sled test between when tested by the deceleration type sled system and when tested by the acceleration type sled test system.

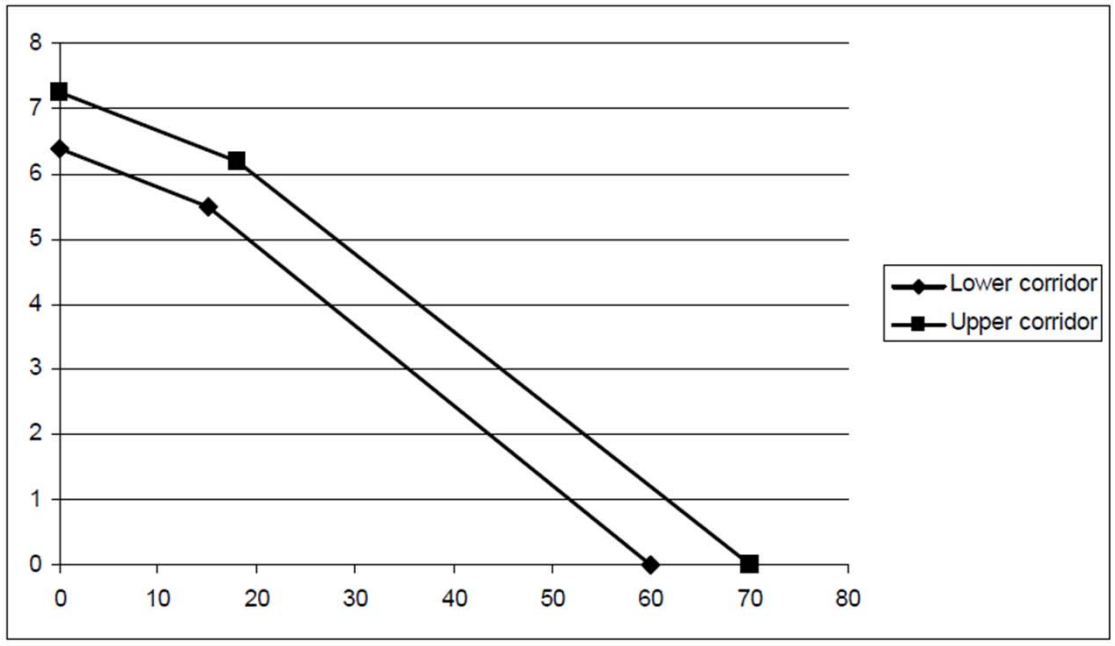
- ✓ We conducted CRS side impact sled tests using the acceleration type sled test system:
  1. to compare the test severity between deceleration sled and acceleration sled
  2. to confirm main test parameters which determine dummy injury measures.

Parameters of New Side Impact Test

Relative velocity between door and sled

Curve of relative velocity between trolley and door panel as function of time

Lateral Impact – Test velocity corridor 3

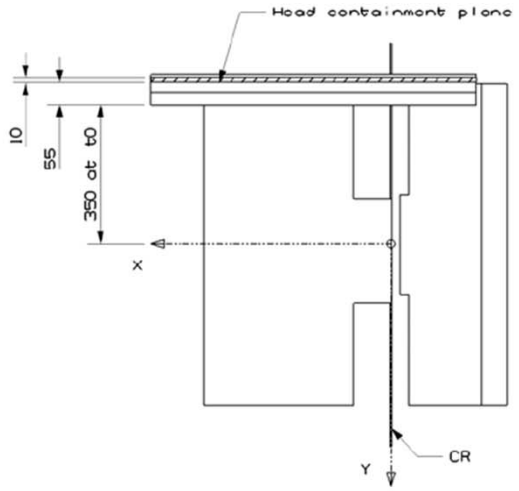


Door intrusion

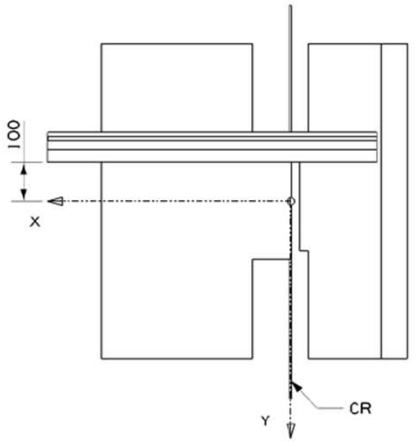
Intrusion

Figure 1

Door panel geometry and position at T0 – Top View



Door panel approximate maximum intrusion – Side View (For information)



There are 2 parameters for the dynamic Side Impact Test Procedure.

Concept of CRS Side Impact Test Using the Acceleration Type Sled System

Photos before sled tests

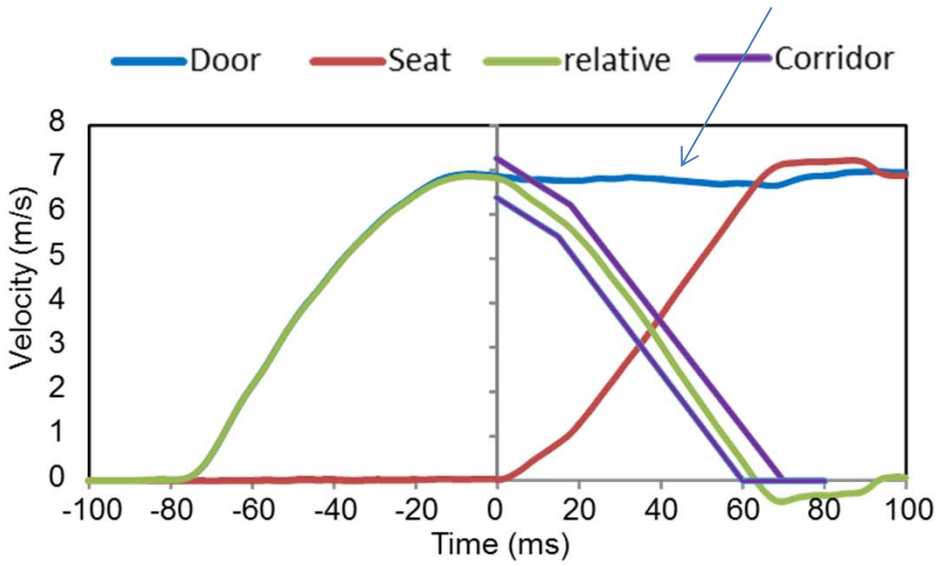
Our jig for the CRS side impact test
using the acceleration type sled system

Video

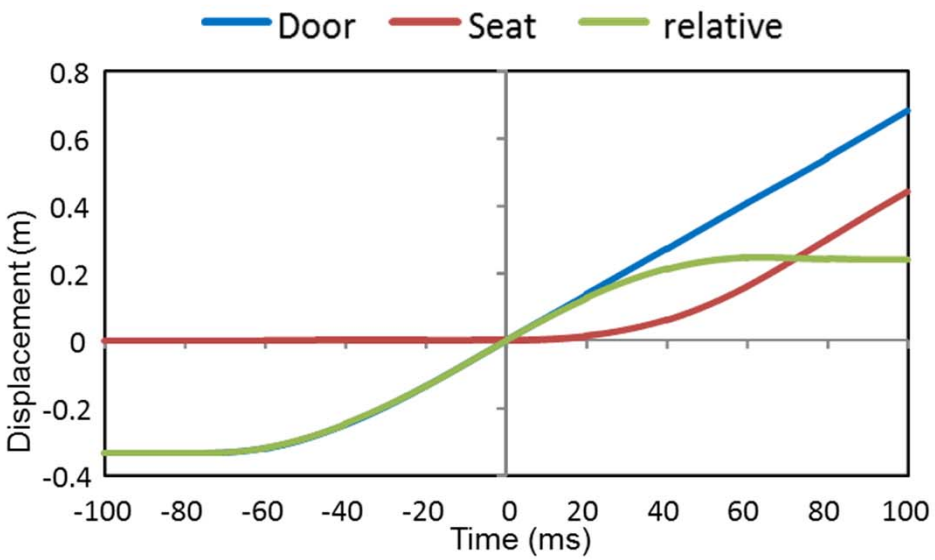
Test Concept

Relative velocity

Door velocity



Intrusion



The concept is that the door moves with the sled, and the seat moves on the sled.

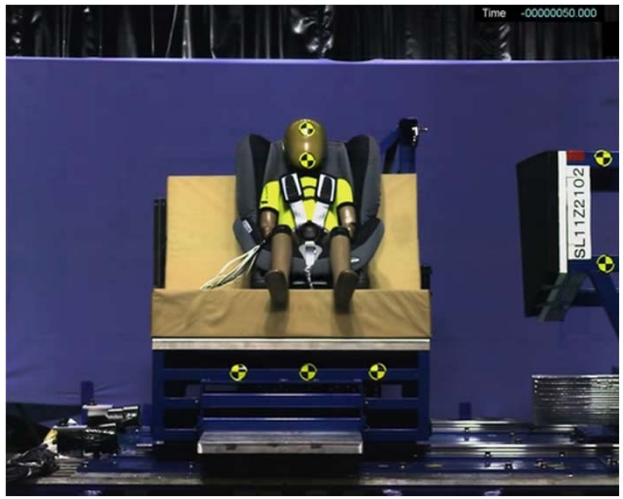
Influence of Door Ground Velocity

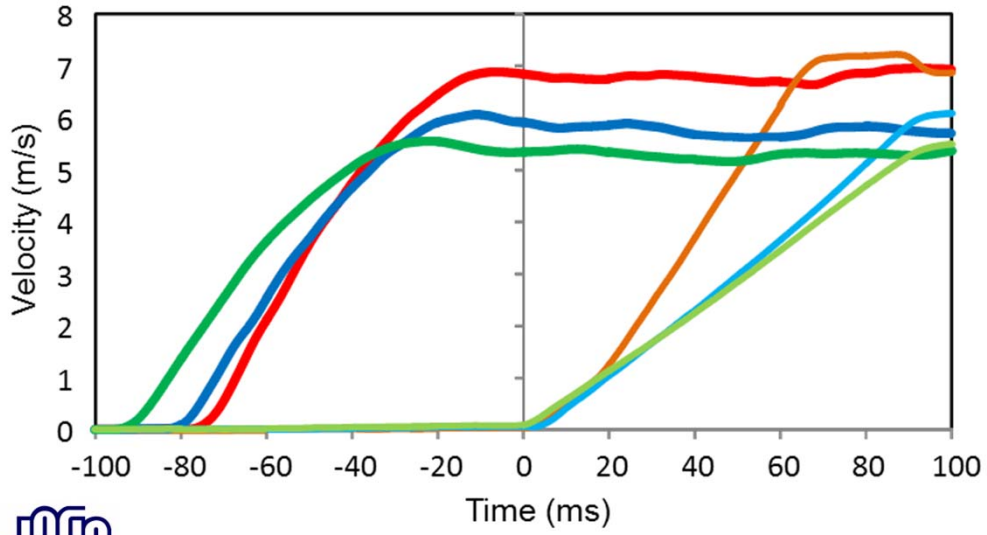
Testing the Influence of Door Ground Velocity

6.6m/s

6.0m/s

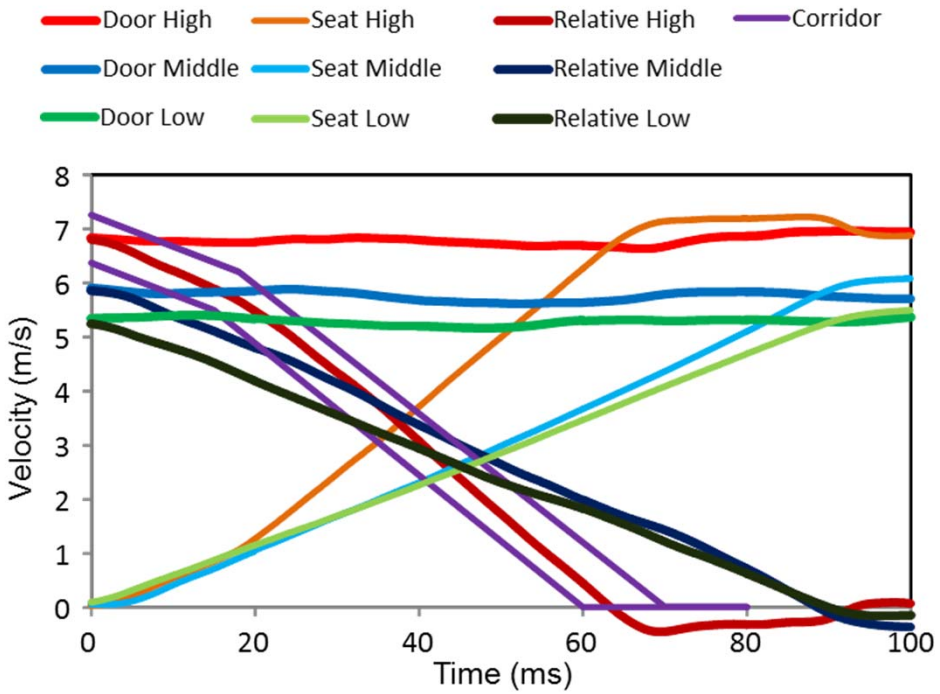
5.3m/s

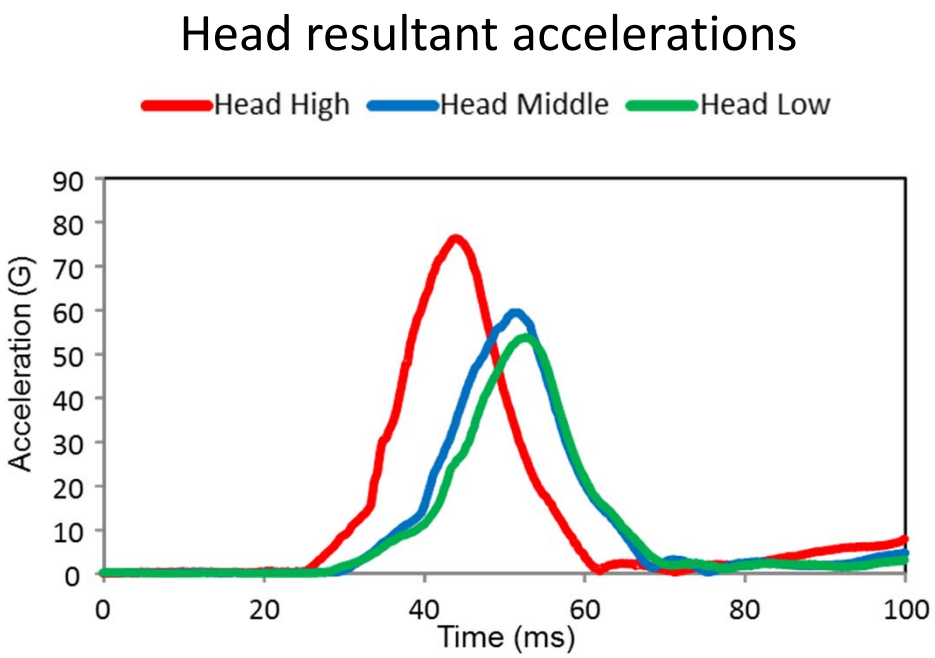




- We tested 3 door ground velocities.
- Door intrusions were the same.
- Relative velocities were different.

Testing the Influence of Door Ground Velocity

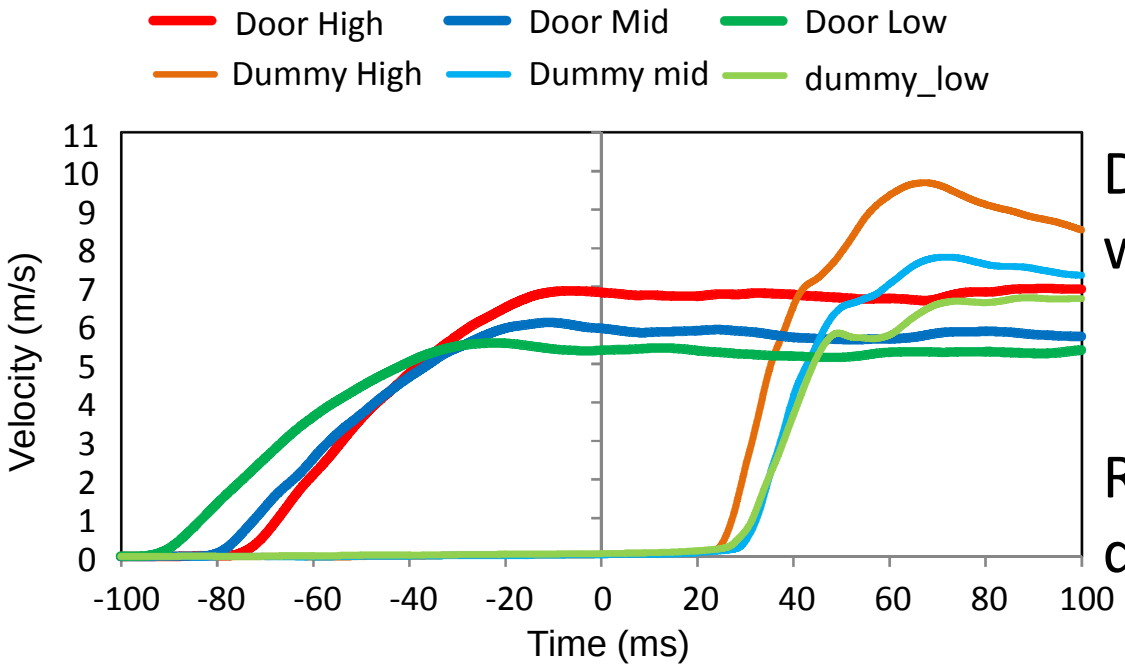




region	Injury measures	unit	High	Middle	Low
Head	HIC15		410	234	173
	Head Maximum Acceleration (3ms)	G	73.3	57.1	52.1

Door ground velocities influences dummy injury measures

Reason Why Door Ground Velocity Influences Dummy Injury Measures



Dummy velocity catches up with door velocity.

Relative velocity between door and dummy is important.

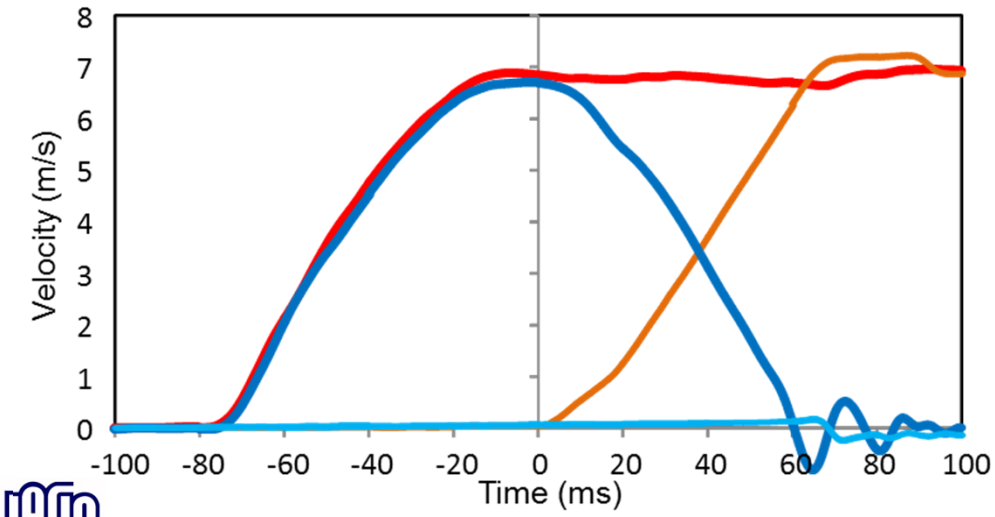
To catch up with door velocity, the dummy needs to get enough energy. So, under the same conditions except for the door ground velocity in our tests, the relative velocity between door and dummy influences dummy injury measures.

Influence of Relative Velocity between Door and Seat

Test of Influence of Relative Velocity

Test A

Test B

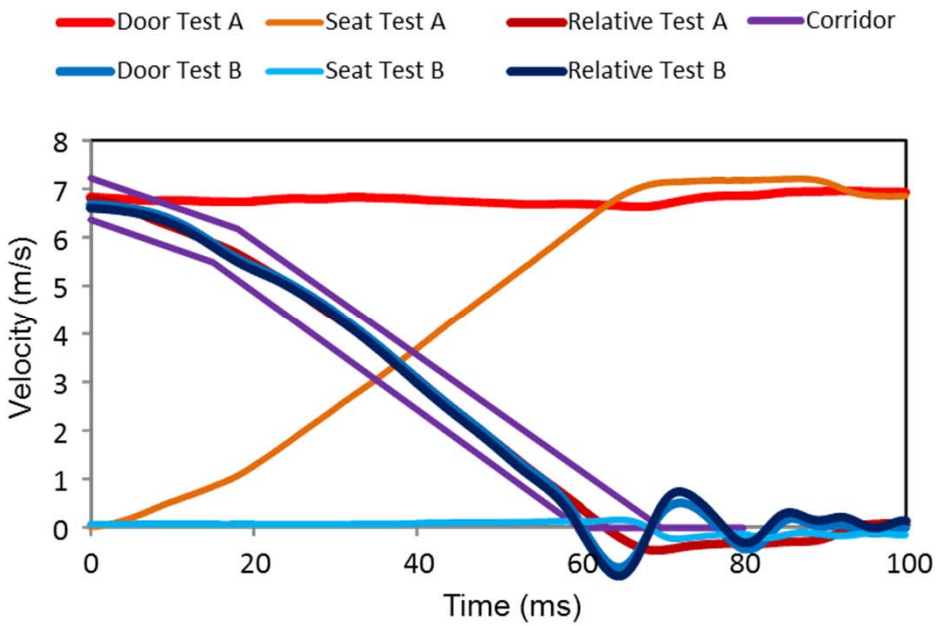


Door Test A
Seat Test A
Door Test B
Seat Test B

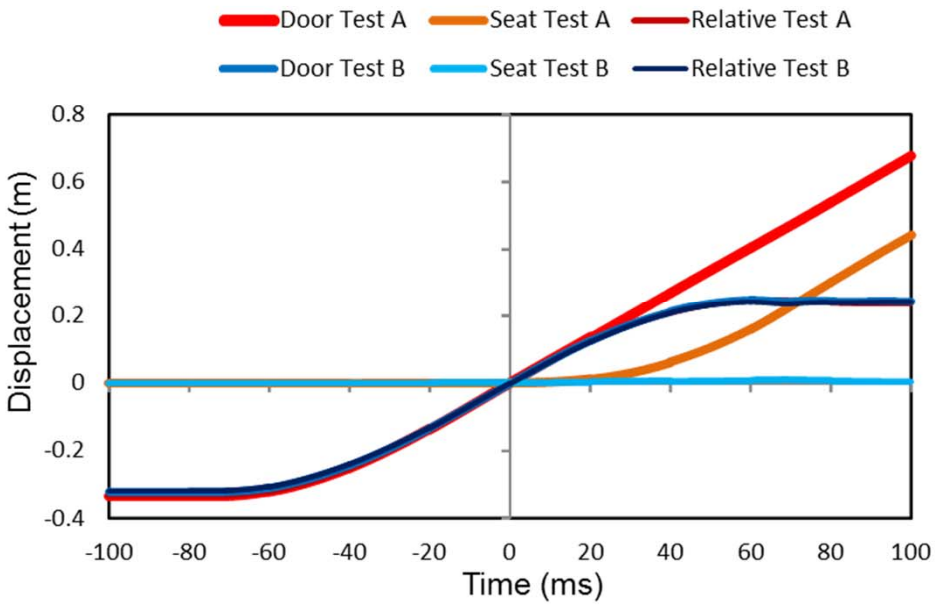
The relative velocities between door and seat, and door intrusions of 2 tests are almost similar.

Test of Influence of Relative Velocity

Relative Velocity



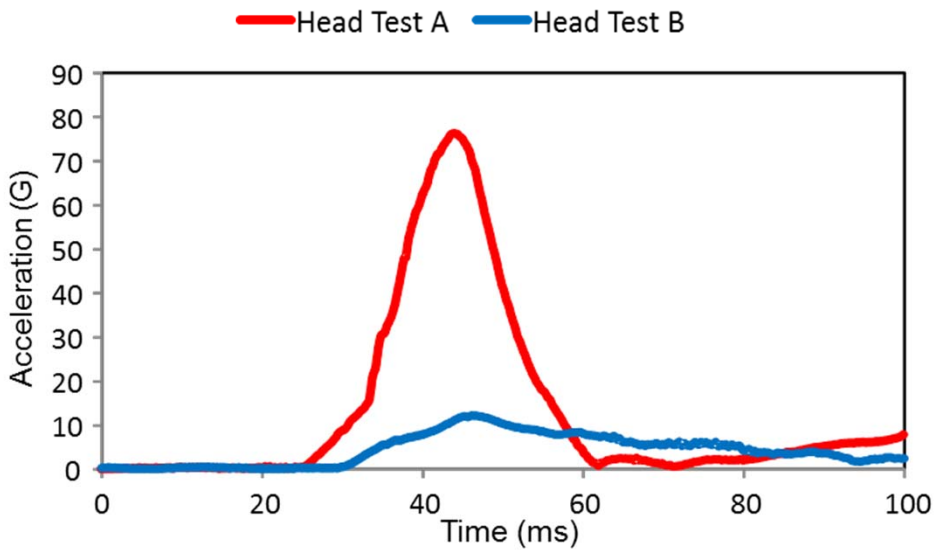
Intrusion



Relative velocity and intrusion are almost same

Test of Influence of Relative Velocity

Dummy head acceleration

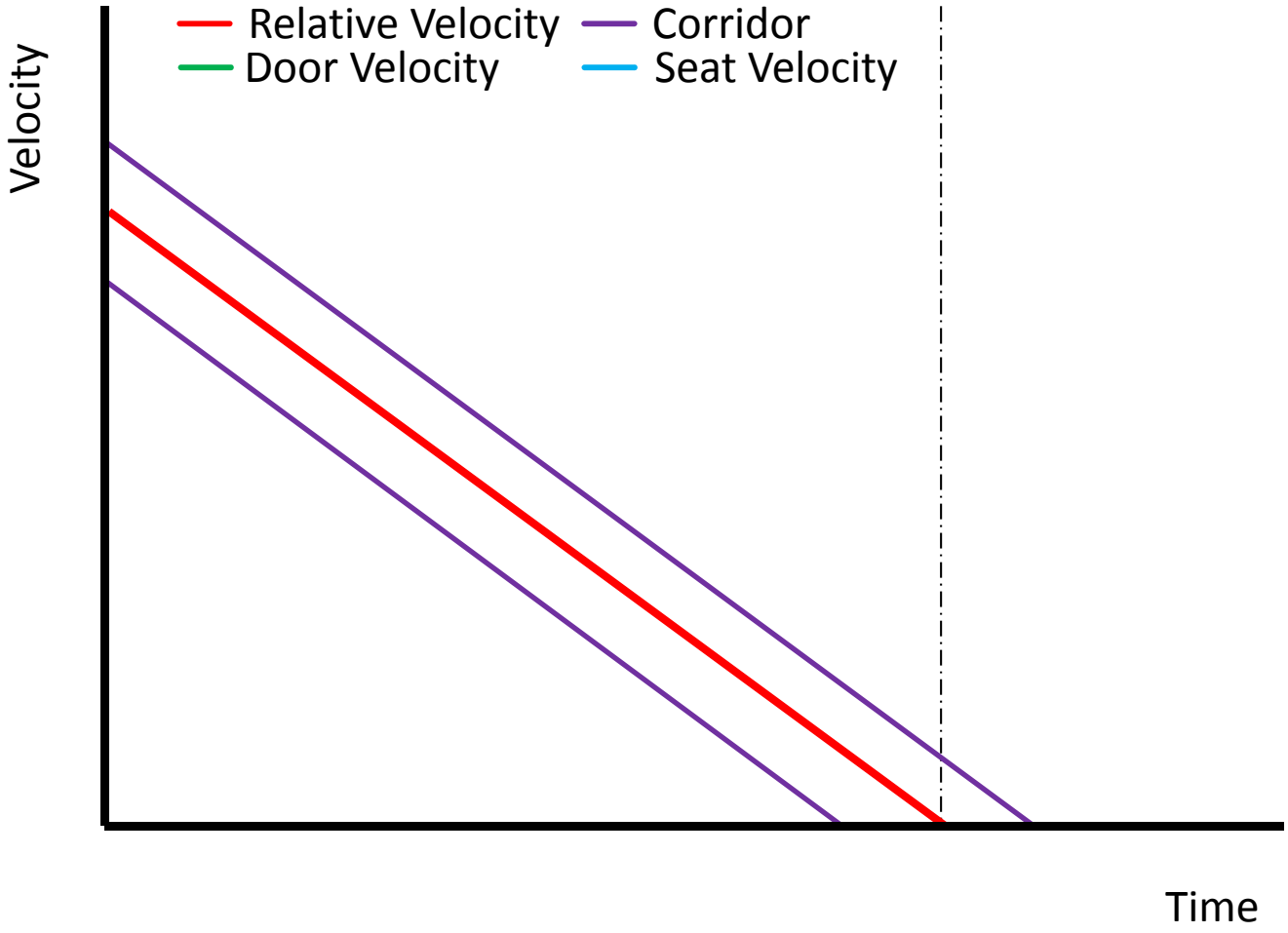


region	Injury measures	unit	Test A	Test B
Head	HIC15		411	5
	Head Maximum Acceleration (3ms)	G	73.3	11.7

Same relative velocity but different injury measures

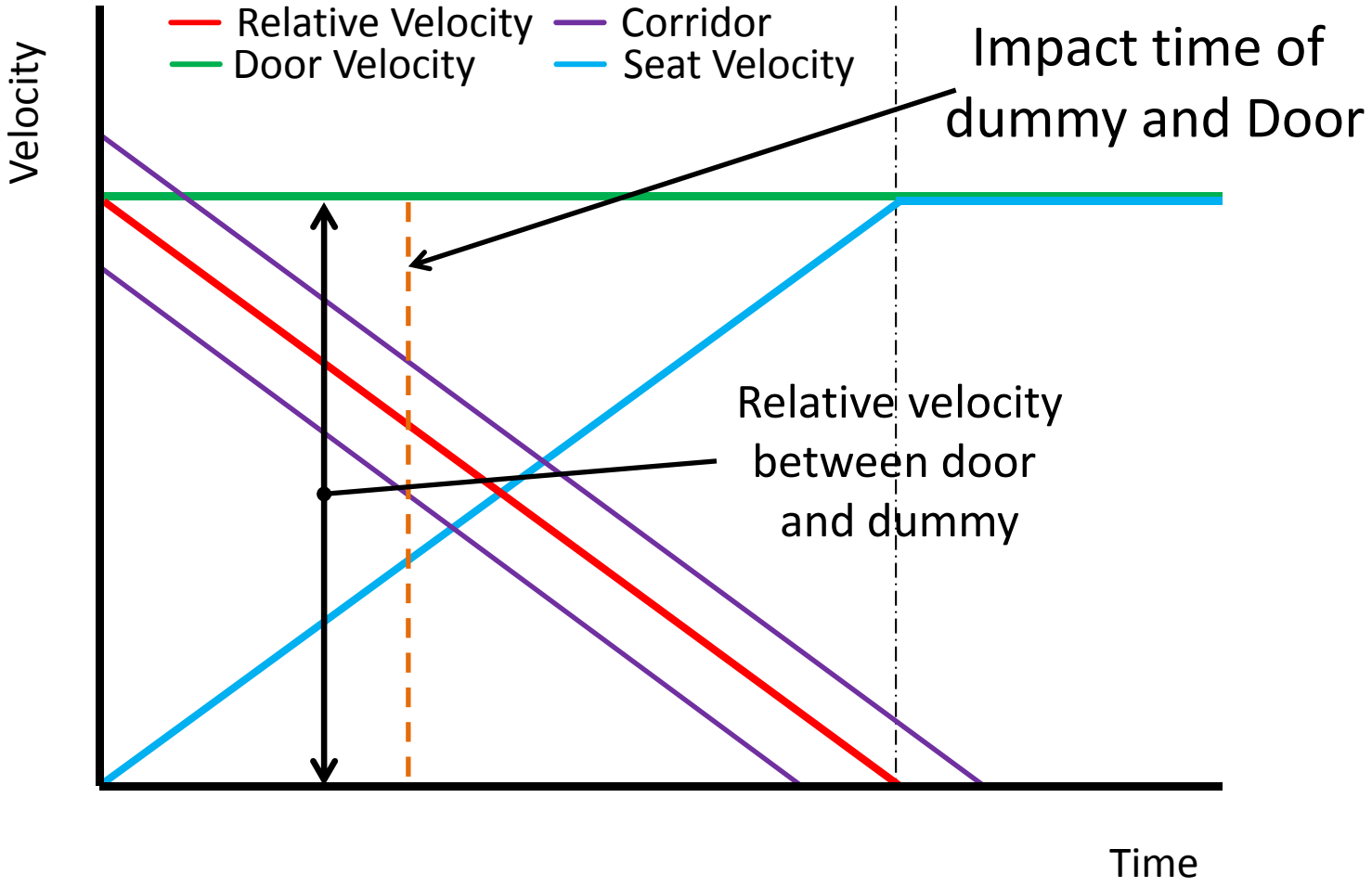
⇒ **The relative velocity has little influence on injury measures.**

Problem of the Test Procedure



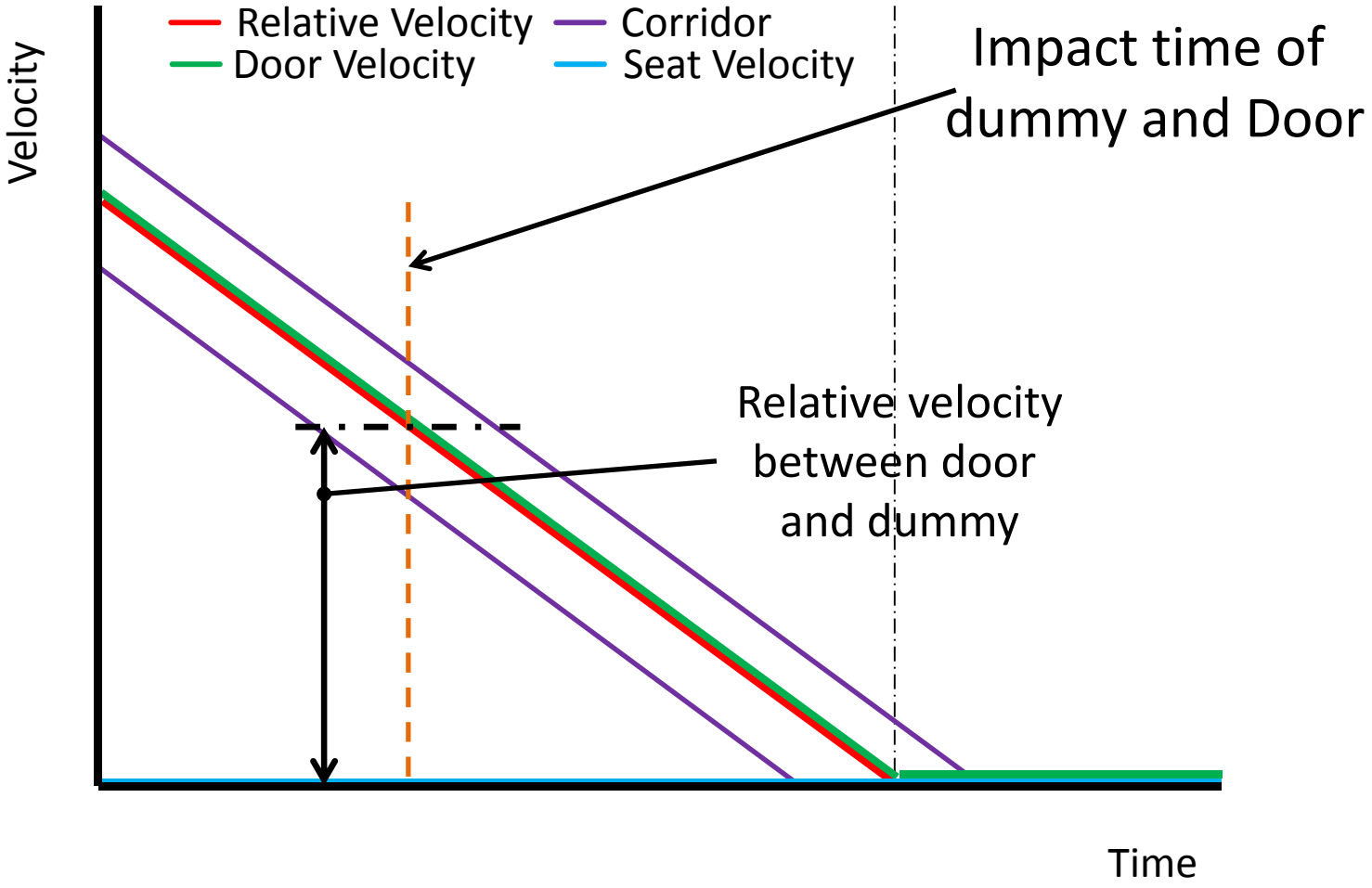
The current draft regulation that defines solely relative velocity allows various test conditions to be set.

Problem of the Test Procedure



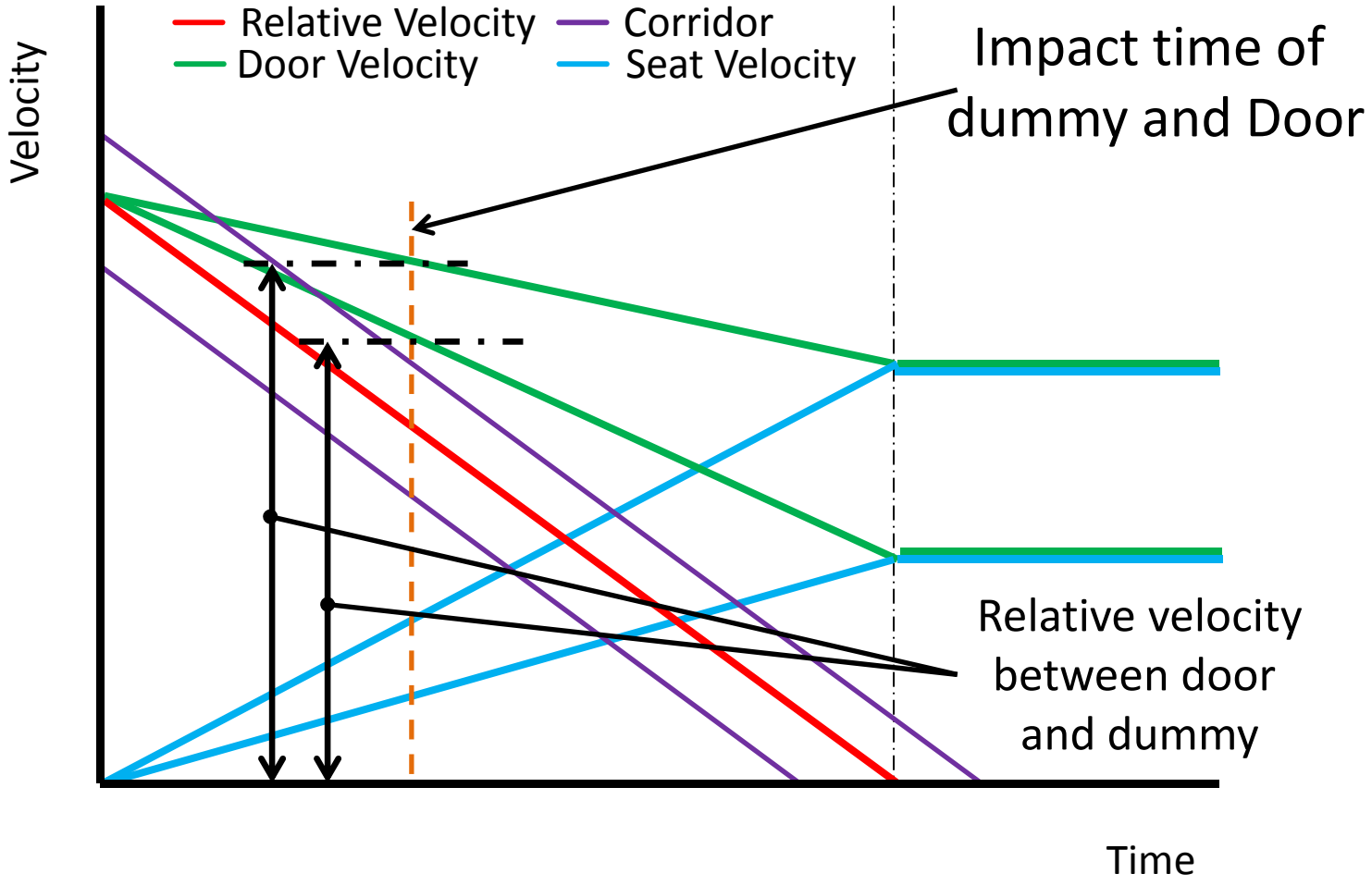
The door speed is constant and the seat is moved rapidly (Test A condition)

Problem of the Test Procedure



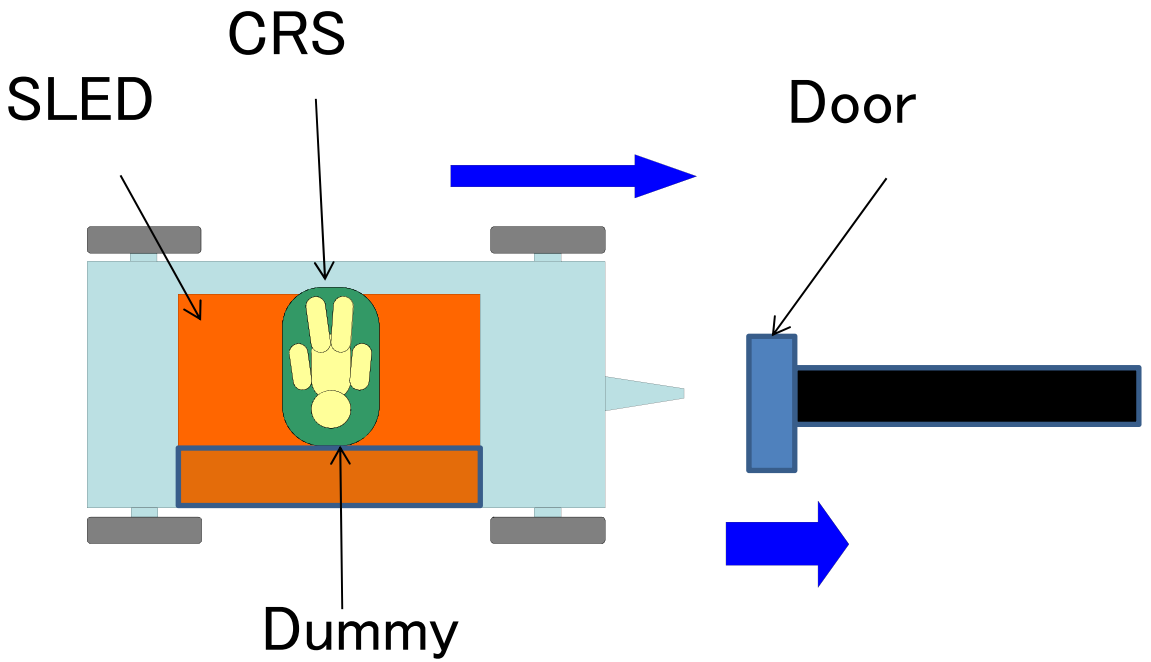
The door speed decreases and the seat stops
(Test B condition)

Problem of the Test Procedure



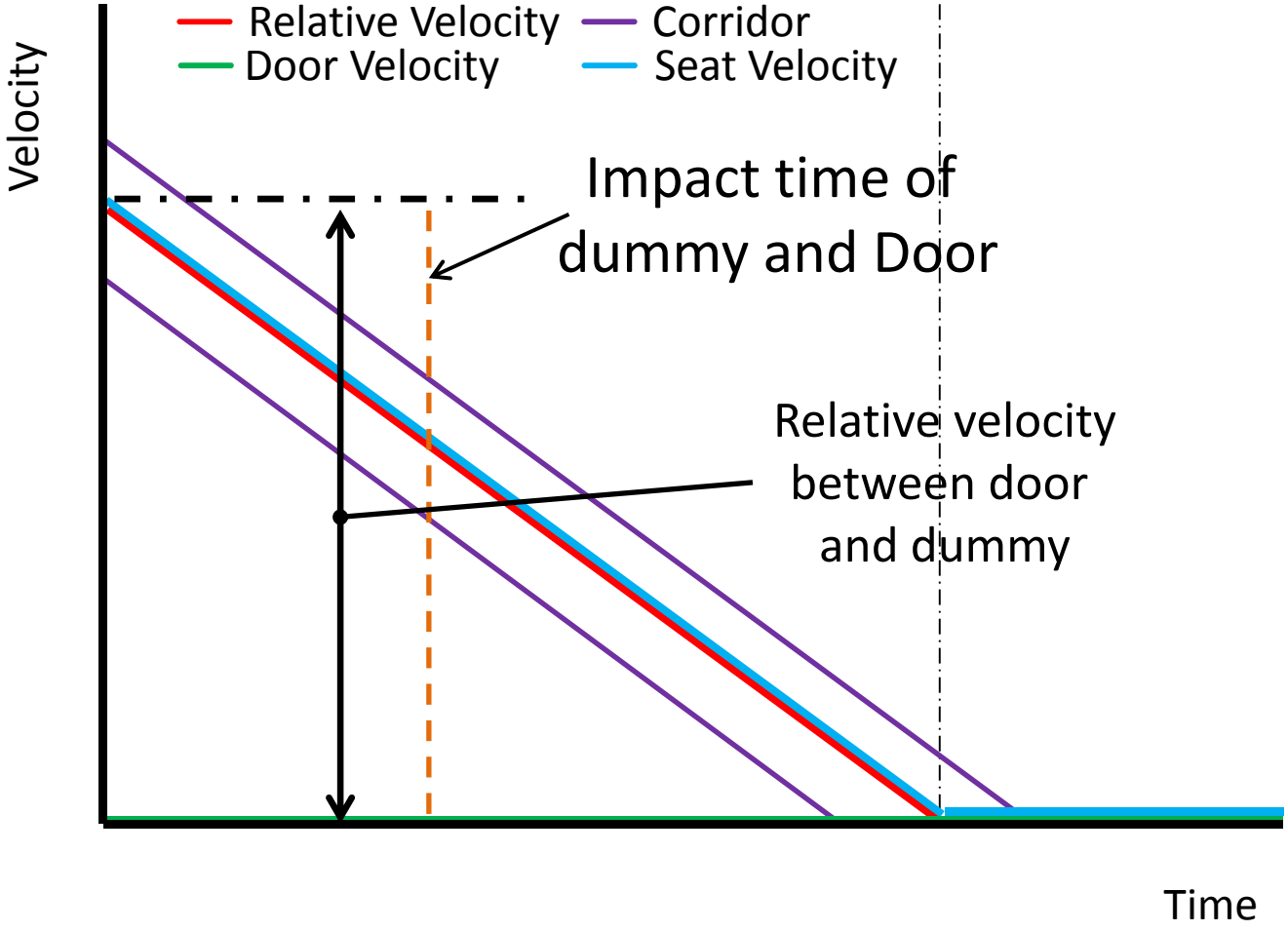
The door speed decreases and the seat moves
(Various conditions between Test A and B)

Same Results in Deceleration Type Sled



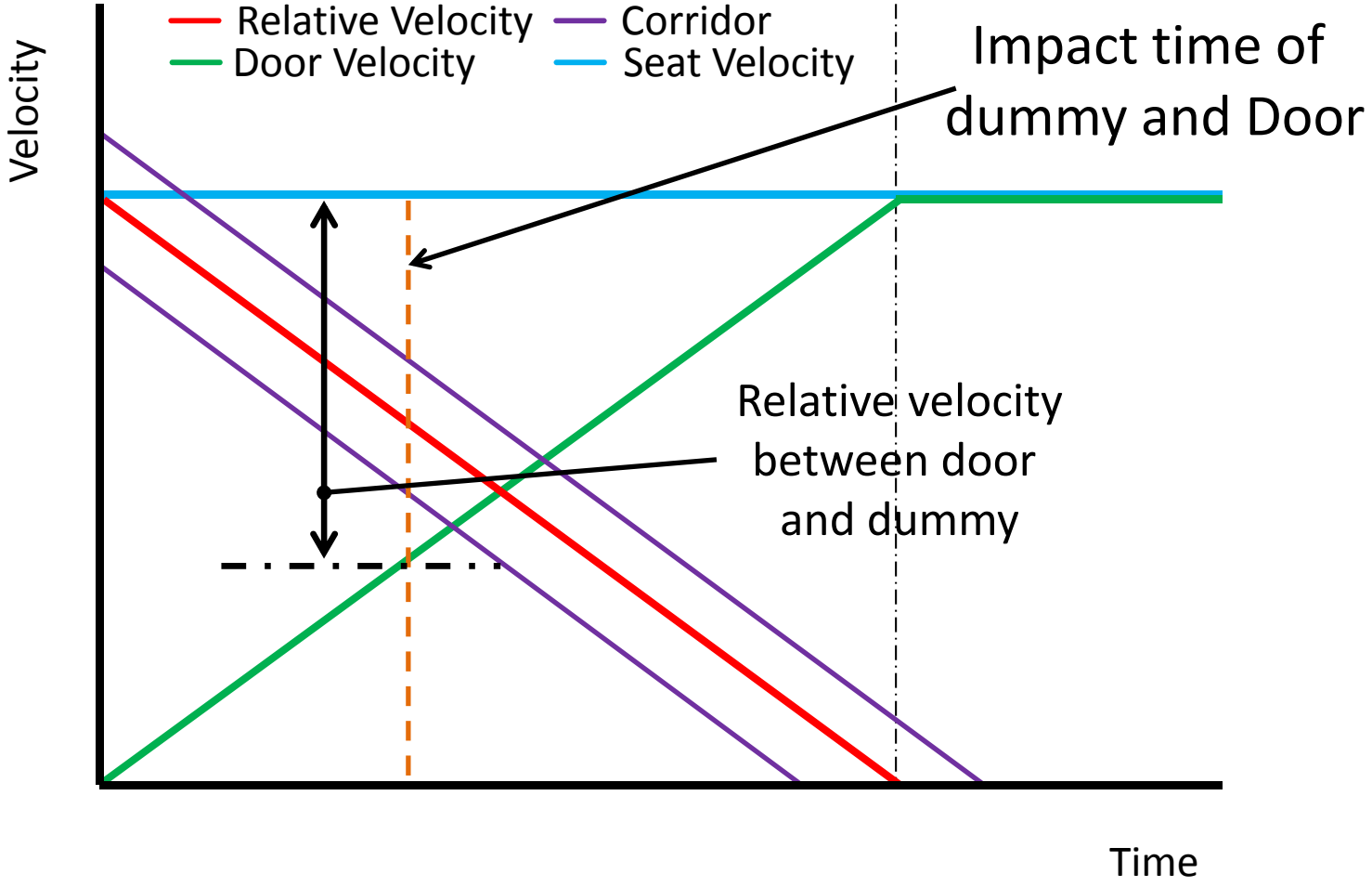
We get same results using the deceleration sled,
if the door is moving when the door hit the CRS.

Problem of the Test Procedure in Deceleration Type Sled



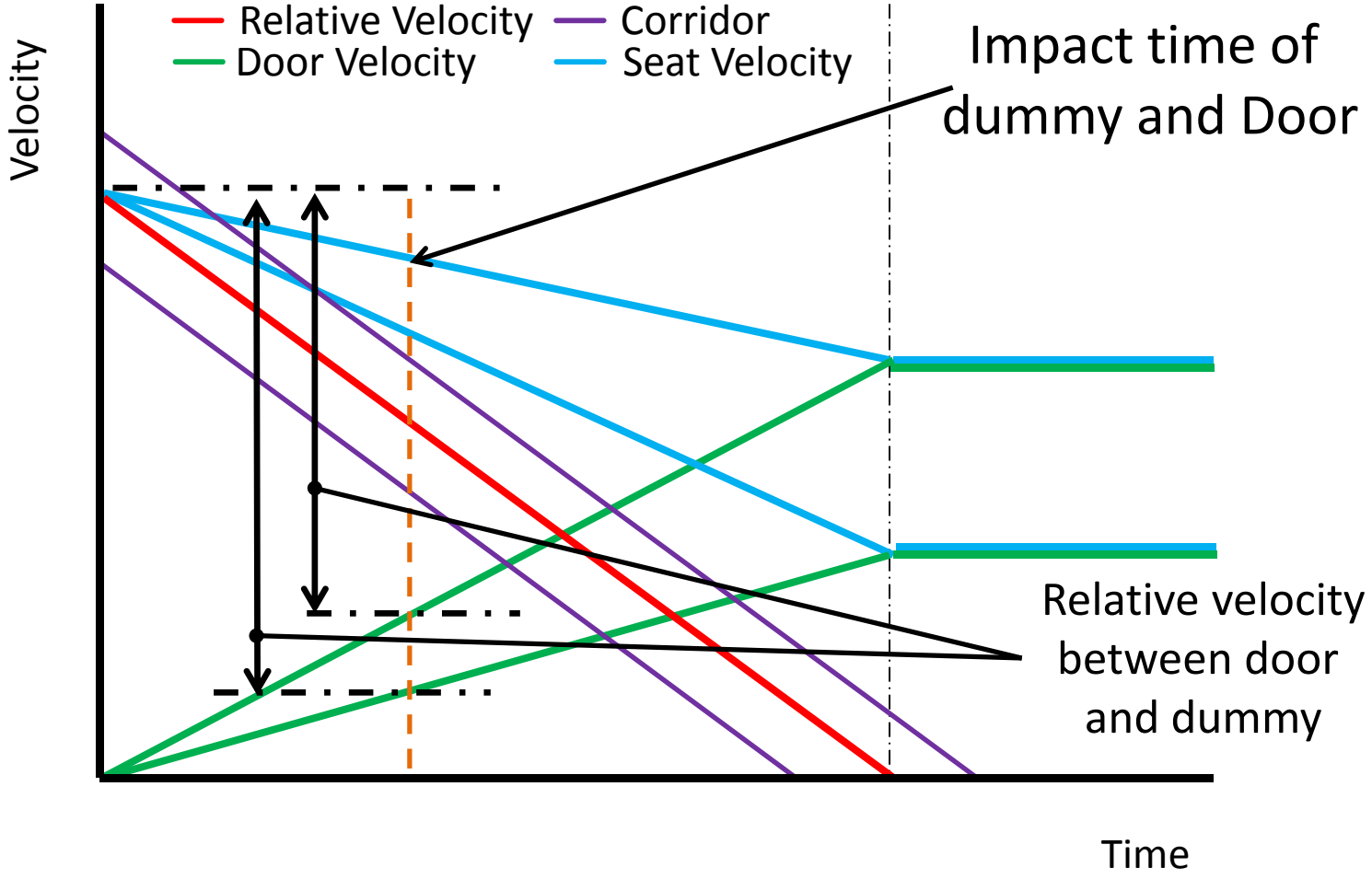
The door stops and the seat speed decreases in corridor
(Same condition as Test A)

Problem of the Test Procedure in Deceleration Type Sled



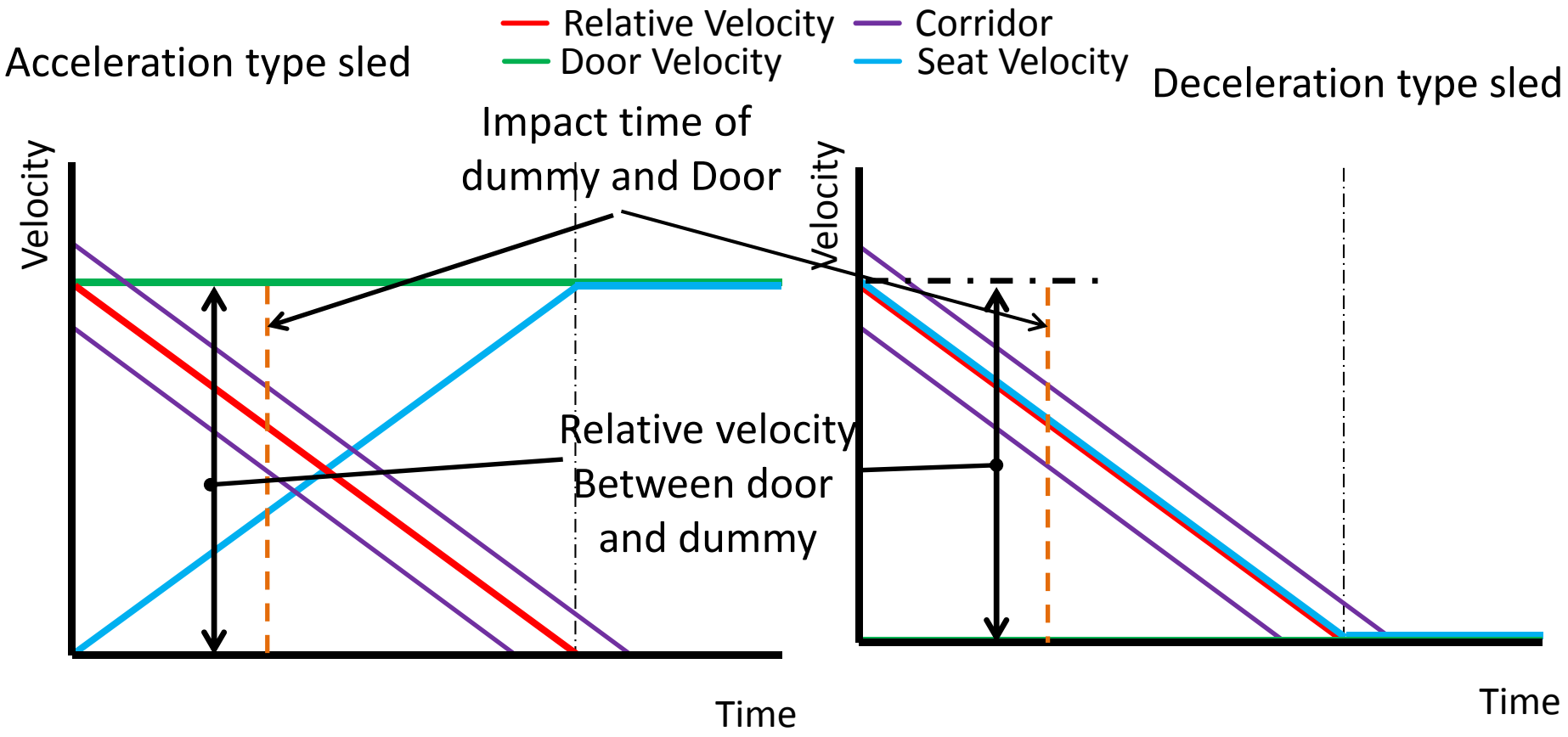
The door speed increases and the seat speed is constant
(Same condition as Test B)

Problem of the Test Procedure in Deceleration Type Sled



The door speed increases and the seat speed decreases (Various conditions)

Same Severity Condition



The relative velocity between the door and the dummy is the same, both tested by moving the door at a constant speed on the acceleration type sled, and tested by keeping the door fixed on the deceleration type sled.

Conclusion

- It is possibility that the relative velocity between door and dummy influences dummy injury measures.
- Under the condition which satisfy the CRS side impact test procedure of the new regulation, dummy injury measures varied.
- The current draft regulation that defines solely relative velocity allows various test conditions to be set.

Additional conditions are needed for the CRS side impact test procedure of the new regulation to make the conditions the same in various tests.

Japanese Proposal

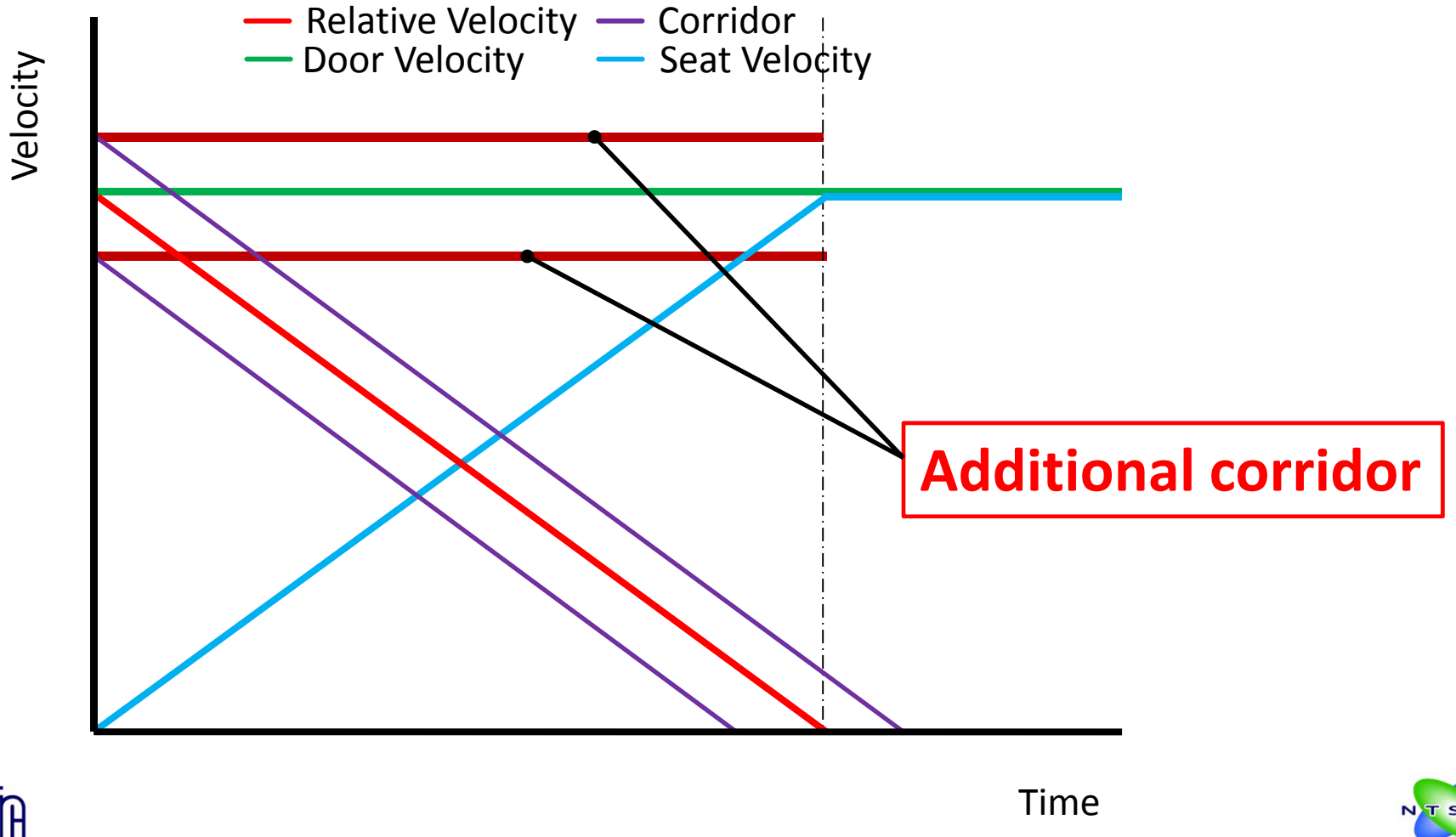
Add door ground velocity to define one test condition

- In a test which the door is moving at T = 0ms, (i) the door ground velocity shall be between [6.375m/s] and [7.25m/s] at least the time when the door intrusion is maximum, and (ii) dummy is stayed at T = 0ms.

- In a test which the door is stayed at T = 0ms, (i) the door shall be fixed, and (ii) the dummy's [chest] ground velocity shall be between [6.375m/s] and [7.25m/s] at T = 0ms.

Japanese Proposal

Acceleration type sled



Japanese Proposal

Deceleration type sled