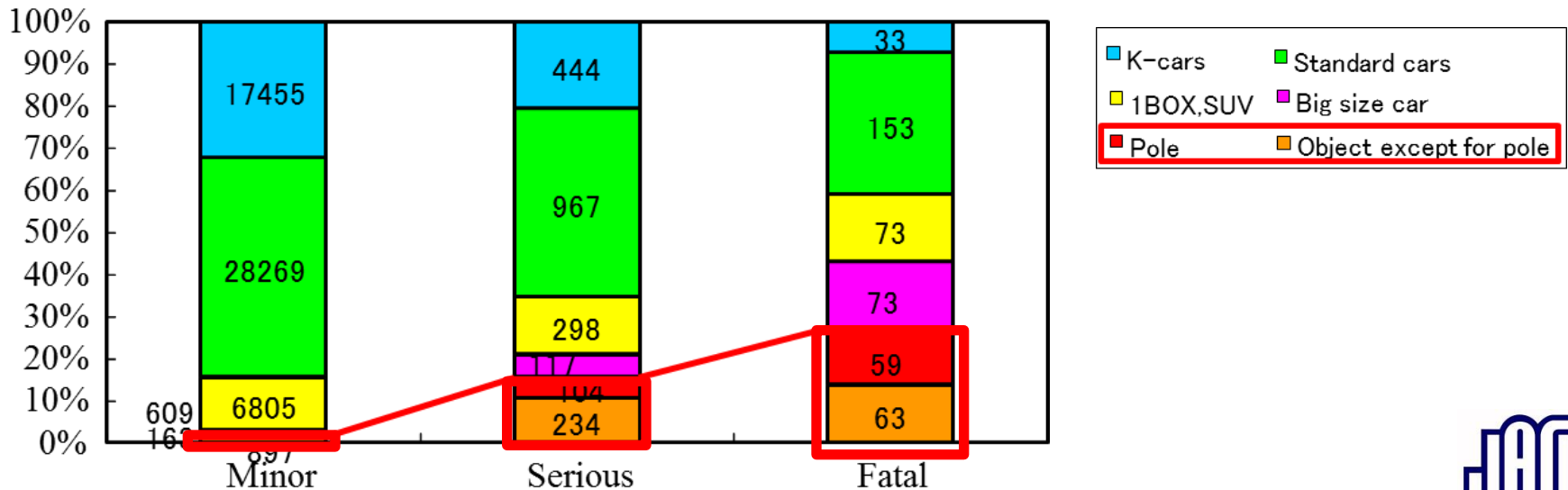


Research TEST Result & Japanese Proposal JASIC / Japan

Background

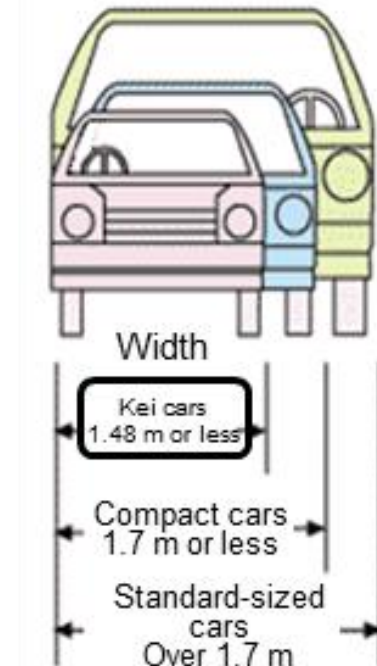
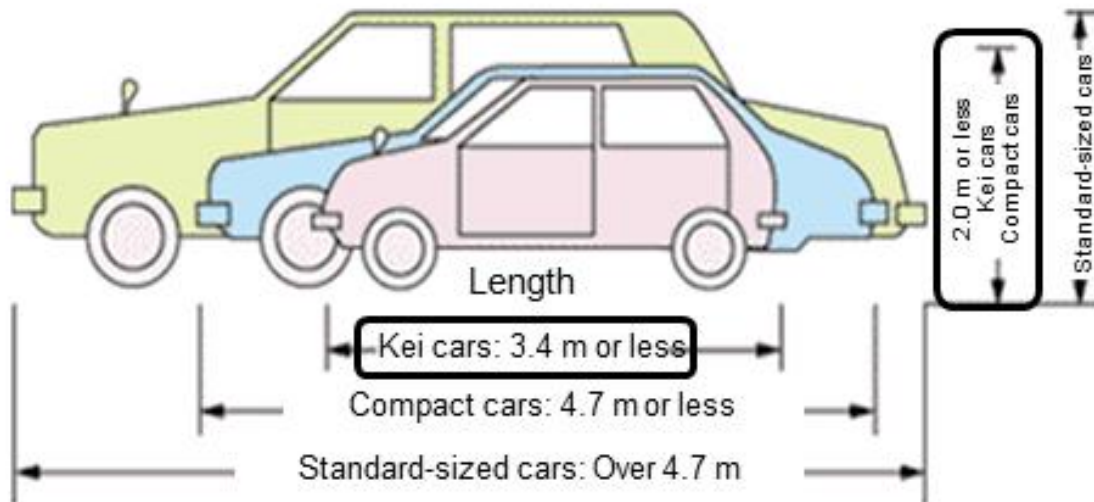
- ✓ Though number of pole side impact accidents is small, the fatal and serious injury risk of pole side impact accidents are high. So we need to introduce pole side impact GTR to vehicle regulation in Japan.
- ✓ The curtain airbag and side airbag are necessary to satisfy pole side impact GTR. And they are also effective for other side impact.

Number of Side Impact Accident (2005-2007)



Japan vehicle categories

- ✓ In Japan, there are 3 categories for passenger vehicles. The smallest vehicle category is Light-motor-vehicle, commonly known as Kei cars in English. It refers to automobiles with a size of 3.4 m in length, 1.48 m in width, and 2 m in height or less, respectively, and a displacement of 0.66 liter or less.



Source: Japan Mini Vehicles Association web site

Situations of Kei cars in Japan

About 30% of passenger cars are Kei cars in Japan.

Some reasons why Kei cars are popular are as below:

1. Small width

Japanese land area being so small, there are lots of small parking places and narrow roads (less than 4.0m road).

Kei cars are easier to park in small parking and drive such narrow roads than larger cars.

2. Light weight (About 750 kg – 950 kg)

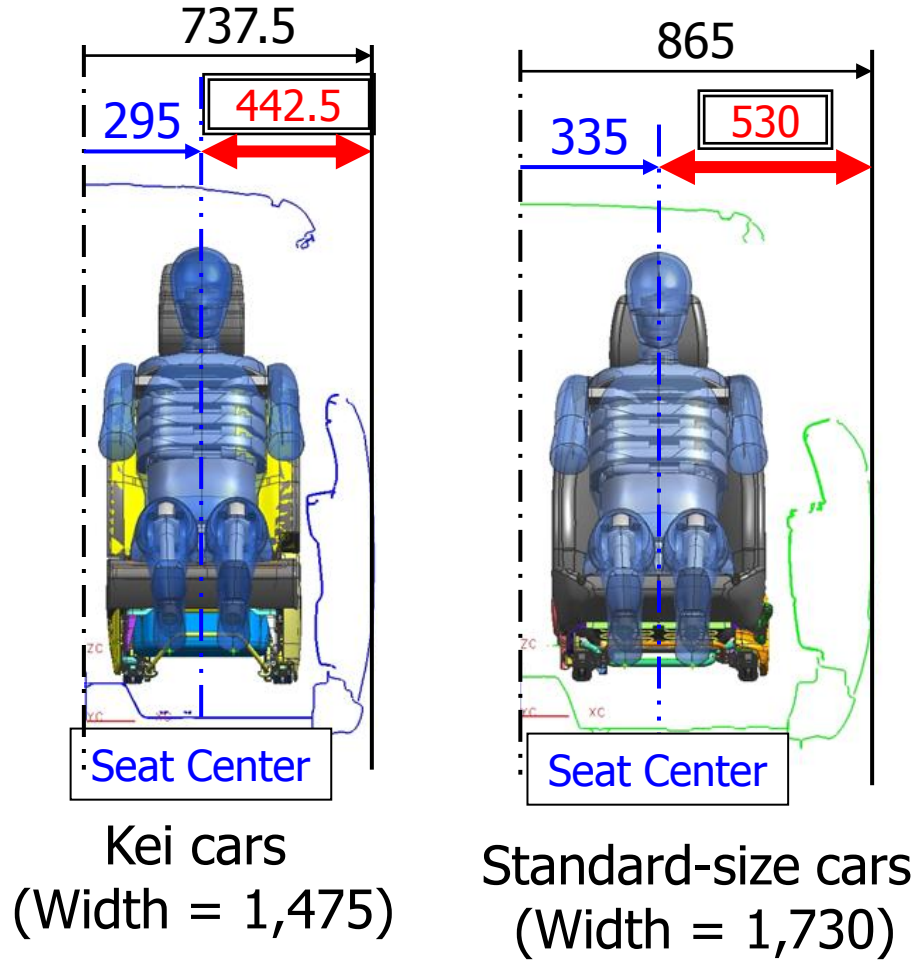
Most Kei cars have better fuel consumption and made less using material than larger cars. So Kei cars are more ecological and economical.

 **Many people need Kei cars in Japan**



Matter for Kei cars in Pole Side Impact

Comparison of the size of Kei cars and Standard-size cars



As for the distance of the door outer and the seat center, K-car is 87.5mm smaller than Standard-size car.

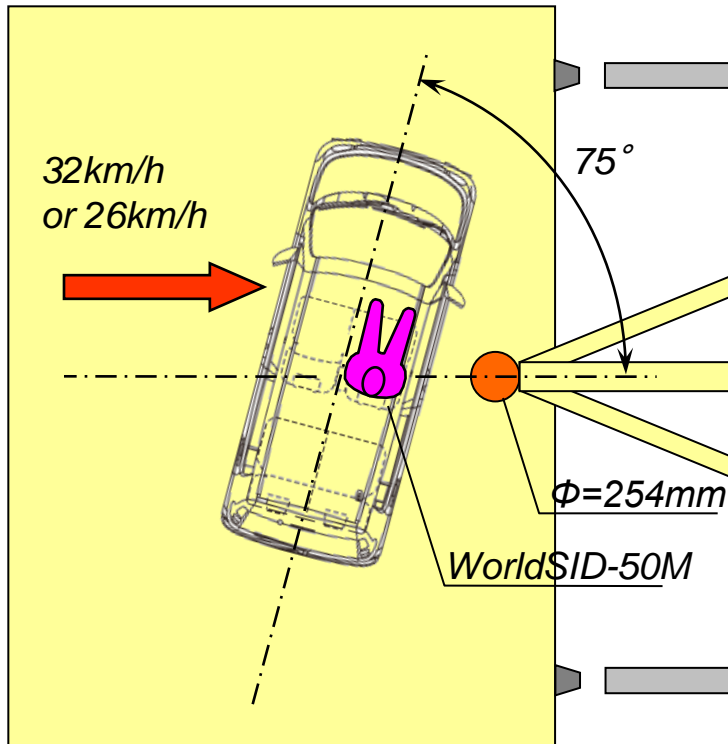


We think that it is difficult for Kei cars to have enough performance for pole side impact test, because of the small space between the door outer and passenger.

Test Configuration

Test Protocol ; Pole Side Impact GTR DRAFT

Ref. “Amended Draft Text of PSI Regulation (Seoul Meeting).docx”



Test Velocity

- Test No.F11_1201_428 = 32km/h
- Test No.F12_0101_428 = 26km/h

Test Vehicle = Typical Model of Kei-Car
Driver Dummy = WorldSID-50M (SBL-E)

Test Vehicle Mass = 1047kg

Seat-slide = Mid-track + 2 notch

Seat-height = Lowermost

Airbag Deployed by Timer:8msec

Test Set-Up



No.F11_1201_428 ; 32kmph



No.F12_0101_428 ; 26kmph



Test Results – Dummy Kinematics - 2

F11_1201_428 (32kmph)



F12_0101_428 (26kmph)



Test Results – Airbag Deployment

F11_1201_428 (32kmph)



F12_0101_428 (26kmph)



Test Results – Dummy Injury Measure

Injury Measure		Proposed Req's*	F11_1201_428	F12_0101_428	
HIC36		1000	254	143	
Shoulder Rib Disp.	mm	[65]	74.6 **	61.8	
Shoulder Force Resultant	kN	[2.56]	3.30	2.27	
Thorax Rib Disp.	mm	[50/57]	60.6	49.4	Thorax Rib #1
			31.8	20.2	Thorax Rib #2
			38.4	18.9	Thorax Rib #3
Thorax Rib V*C	m/s	[0.82]	0.91	0.75	Thorax Rib #1
			0.23	0.17	Thorax Rib #2
			0.73	0.16	Thorax Rib #3
T12 Resultant Acc.(3ms)	G	[75]	61.7	46.5	
Abdomen Rib Disp.	mm	[57]	44.8	27.6	Abdomen Rib #1
			44.2	27.2	Abdomen Rib #2
Abdomen Rib V*C	m/s	[0.82]	0.90	0.29	Abdomen Rib #1
			0.88	0.36	Abdomen Rib #2
Pubic Force	kN	[3.12]	1.64	1.26	
Pelvis Resultant Acc .(3ms)	G	[111]	94.2	64.2	

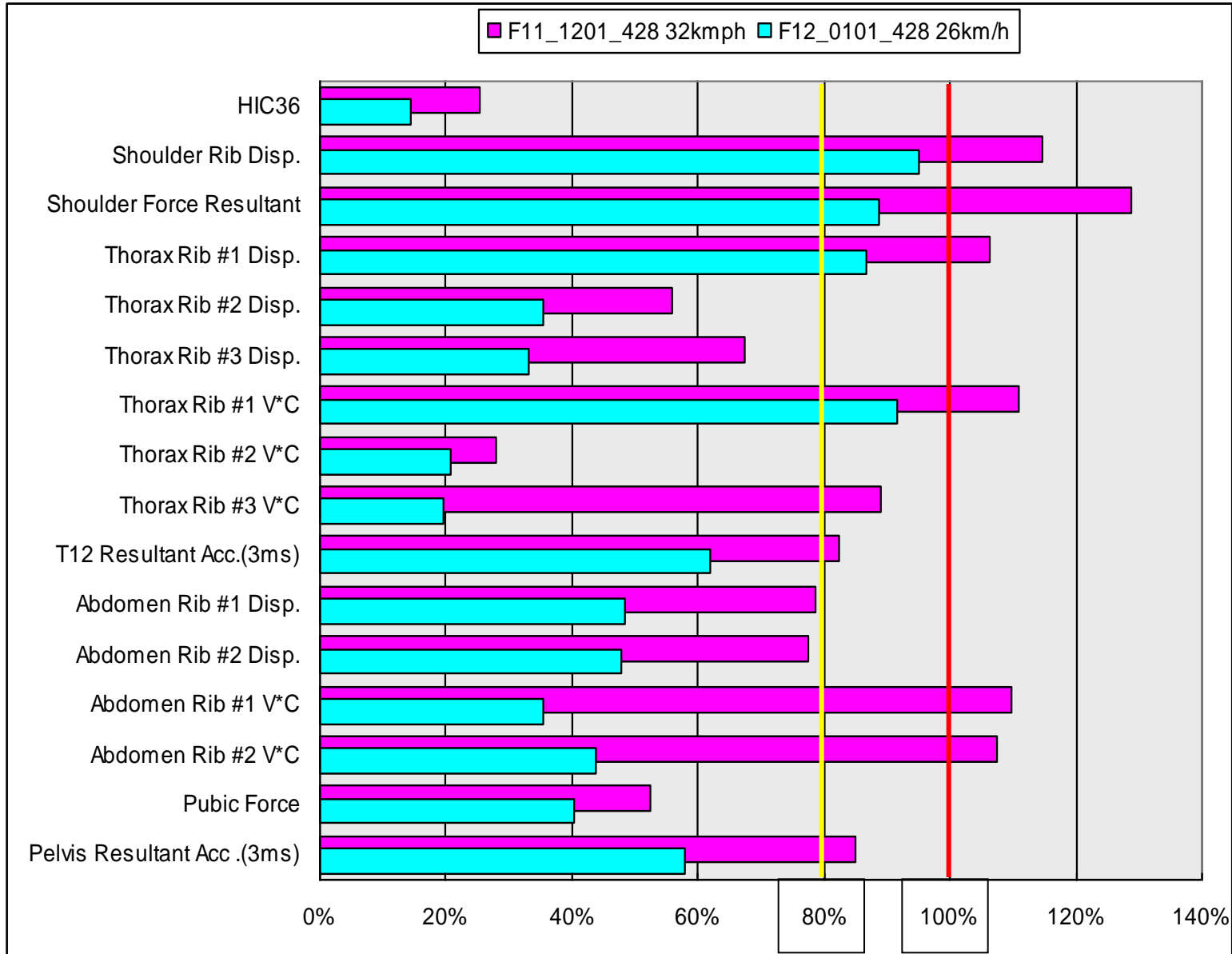
* ; Ref. “Amended Draft Text of PSI Regulation (Seoul Meeting).docx”

** ; Shoulder Rib Displacement was Bottoming-Out

 ; Exceeding proposed Req' s  ; 80% or above of proposed Req's



Test Results – Dummy Injury Measure



Test Results

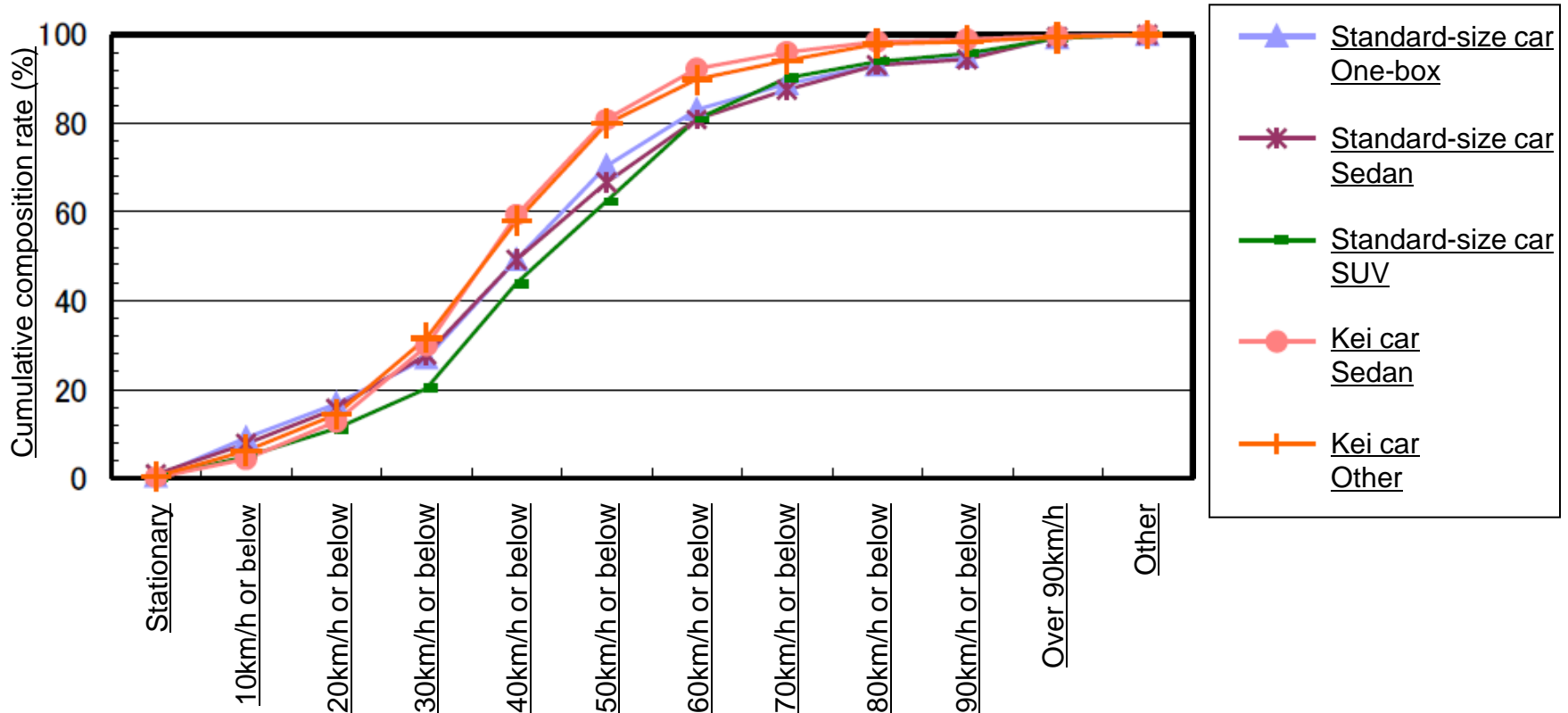
The tests performed on Kei cars, where the side and curtain airbags were deployed as early as possible, resulted in the shoulder, thorax and abdomen injury values not meeting the proposed threshold values in a pole side impact at 32 km/h.

In a pole side impact at 26 km/h, on the other hand, all the injury values were met.

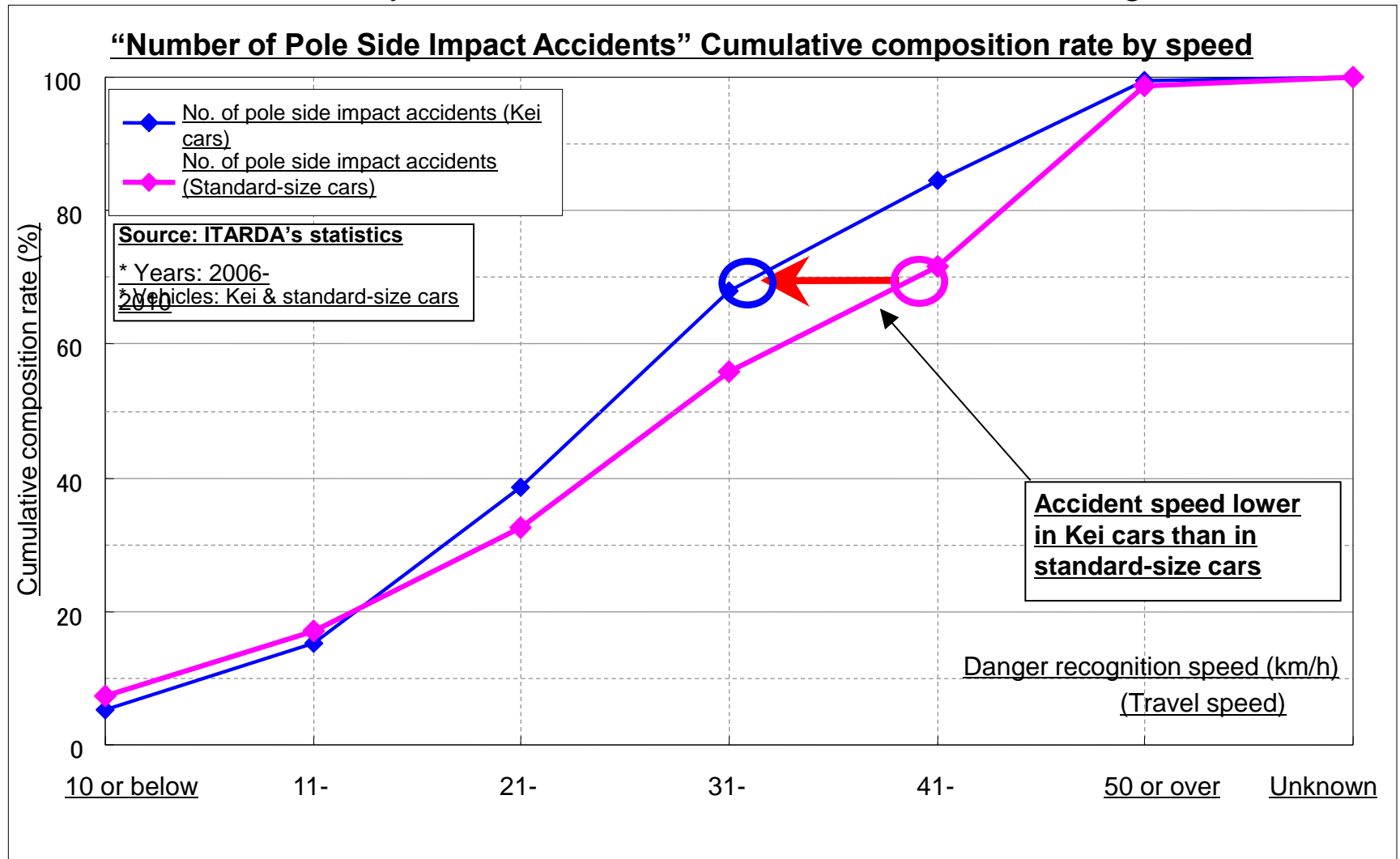
Based on the above results, we consider it difficult to achieve the early deployment at 32 km/h for Kei cars.

Accident data in Japan

- ✓ A survey on accidents in Japan shows that the danger recognition speed in single vehicle crashes of Kei cars is lower than standard-size cars by about 5 km/h in the 50%tile range of all the accidents.



- ✓ Further, a survey on pole side impact accidents in Japan also shows that the danger recognition speed in single vehicle crashes of Kei cars is lower than standard-size cars by about 5 to 7 km/h around the 70%tile range.



Japanese Proposal

Taking into account the Kei-car use rate and the results of surveys on accident speeds in Japan, we propose the following impact speeds for pole side impact tests :

- * 32 km/h for vehicles with a width of 1,500 mm and more,**
- * 26 km/h for vehicles with a width of less than 1,500 mm.**

Annex1, 6.1., amend to read

- 6.1. A carrier sled shall be used to impact a test vehicle prepared in accordance with paragraph 3, paragraph 4 and paragraph 5 of this Annex, at any velocity up to and including 32 km/h, with a stationary rigid pole.

However, if the vehicle width is less than 1,500 mm, the test velocity shall be 26 km/h.