

# Interim report of vehicle performance investigation for VtP

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AEBS-HDV-05

30<sup>th</sup> June 2021

MLIT, Japan

NTSEL, Japan

## Outline :

- The performance of AEBS Vehicle to Pedestrian was investigated by the actual vehicle test.
- The vehicles of two categories (N2, N3) were tested.
- The tests were carried out in accordance with R152 (AEBS tests for M1/N1).
- Test speed was 10, 15, 20, 25, 30, 35, (40, 50, 60) km/h.

## Test vehicles :

N2 (Hydraulic brake)

N3 (Air brake)



N2 (Hydraulic brake)



N3 (Air brake)

Weight of vehicles	Unladen	Laden
N2 (Hydraulic brake)	2930 kg	5030 kg
N3 (Air brake)	10905 kg	—— *1

\*1 The test of Laden condition of N3 was omitted, because the loads to make the vehicle laden condition (almost 25000kg) could not be prepared.

Pedestrian target : ISO 19206-2:2018

As well as R152, a child soft target in accordance with ISO 19206-2 was used. Additionally, an adult soft target in accordance with ISO 19206-2 was used in the particular test speed.

Non-articulated (fixed legs) soft targets were used, because there was concern of bigger damage of legs of the soft targets by collisions with large truck.



ISO 19206-2:2018  
(Child)



ISO 19206-2:2018  
(Adult)

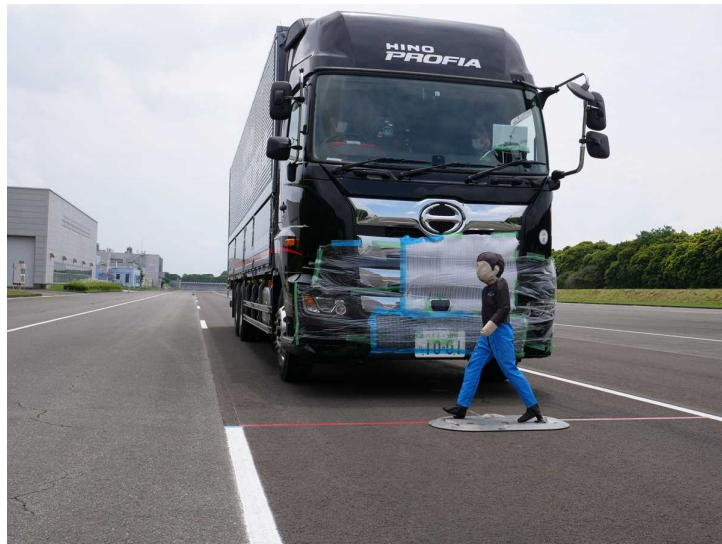
Testing scenario	Moving speed	Collision offset
Stationary (Child)	0 km/h	50 %
Crossing (Child)	5 km/h	50 %
Stationary (Adult)	0 km/h	50 %
Crossing (Adult)	5 km/h	50 %



N3(Air), Crossing (child)



N2(Hydraulic), Crossing (child)



N3(Air), Stationary (child)

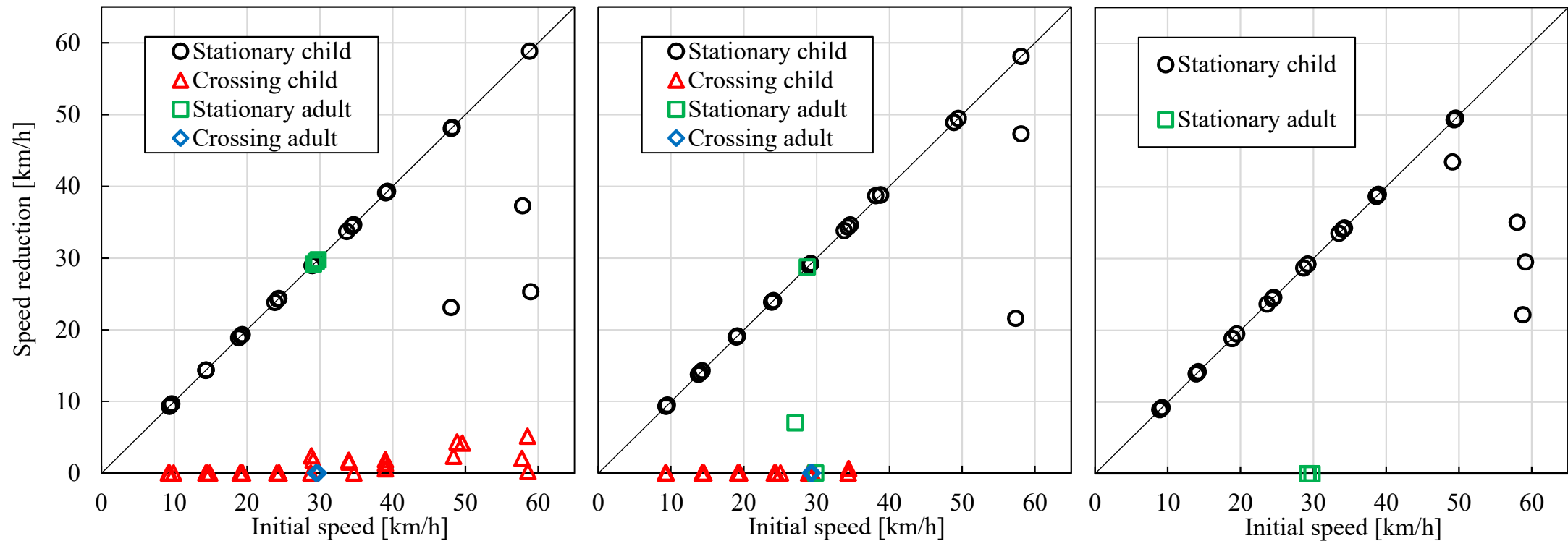


N2(Hydraulic), Stationary (child)

N3 (Air) Unladen

N2(Hydraulic) Unladen \*2

N2(Hydraulic) Laden \*3



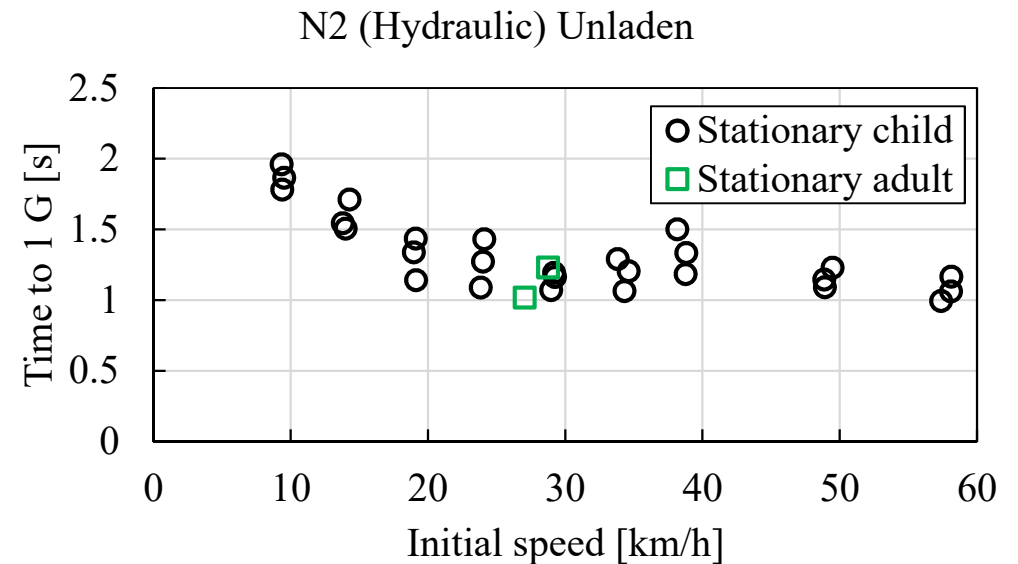
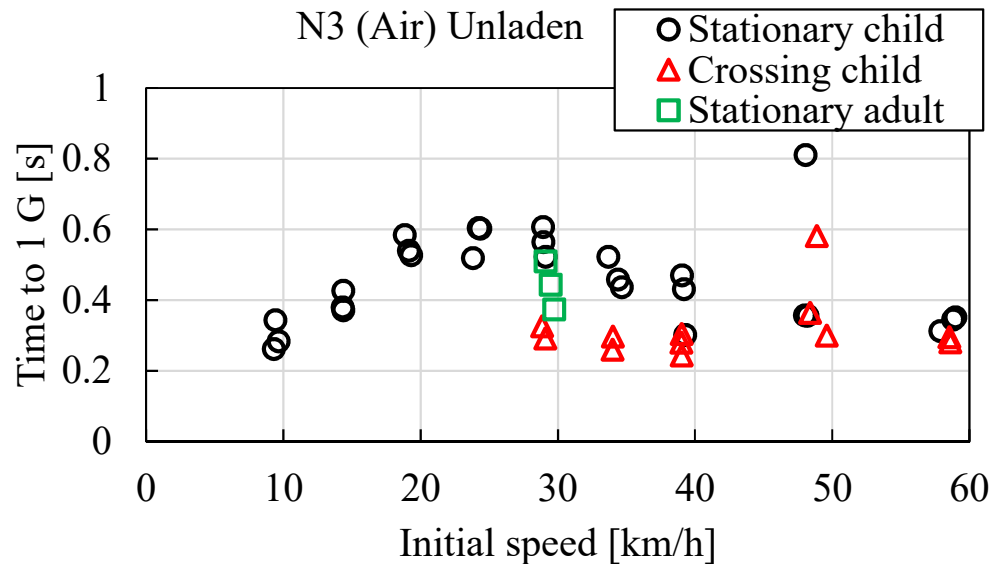
Initial speed means actual vehicle speed, and it was defined as below.

- In the case that emergency braking was observed : Vehicle speed at when deceleration exceeds  $0.3 \text{ m/s}^2$ .
- In the case that emergency braking was not observed : Vehicle speed at TTC 4 s.

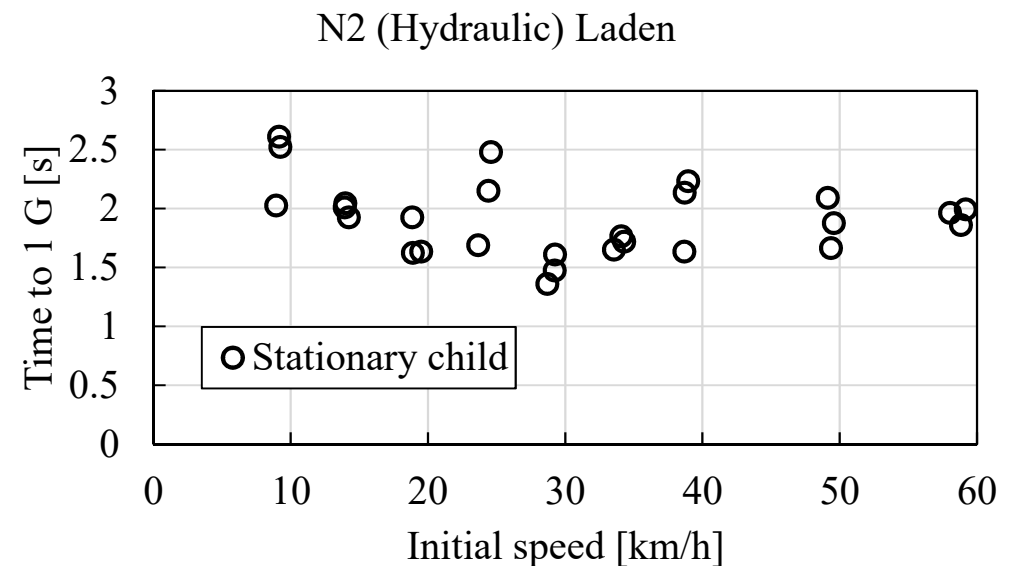
\*2 In N2 Unladen condition, tests of initial speed of 40 km/h or higher of crossing pedestrian scenario were omitted, because no emergency braking was observed below 35 km/h.

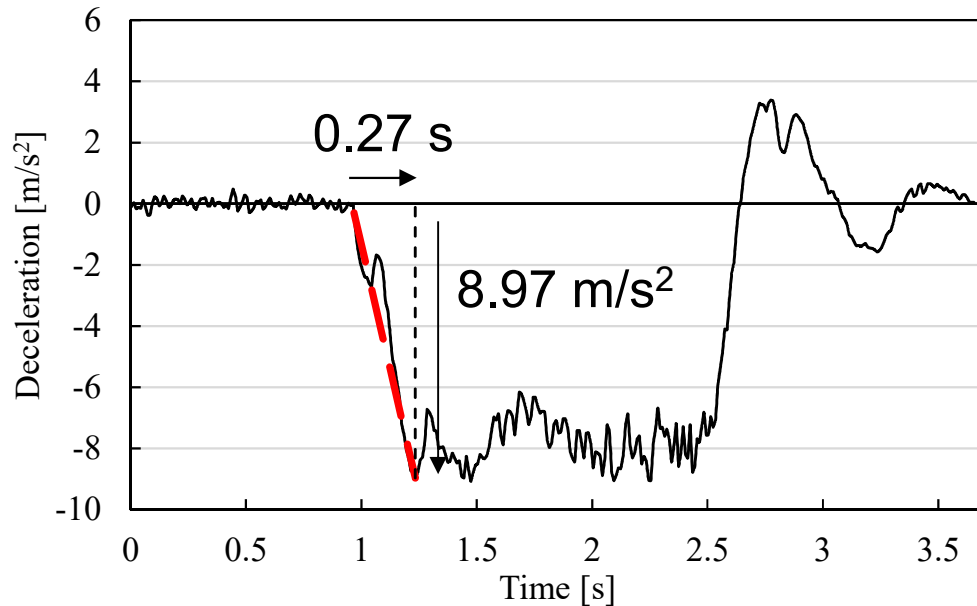
\*3 In N2 Laden condition, only the tests of stationary scenario were performed, because no emergency braking was observed in the tests of crossing scenario in Unladen conditions.





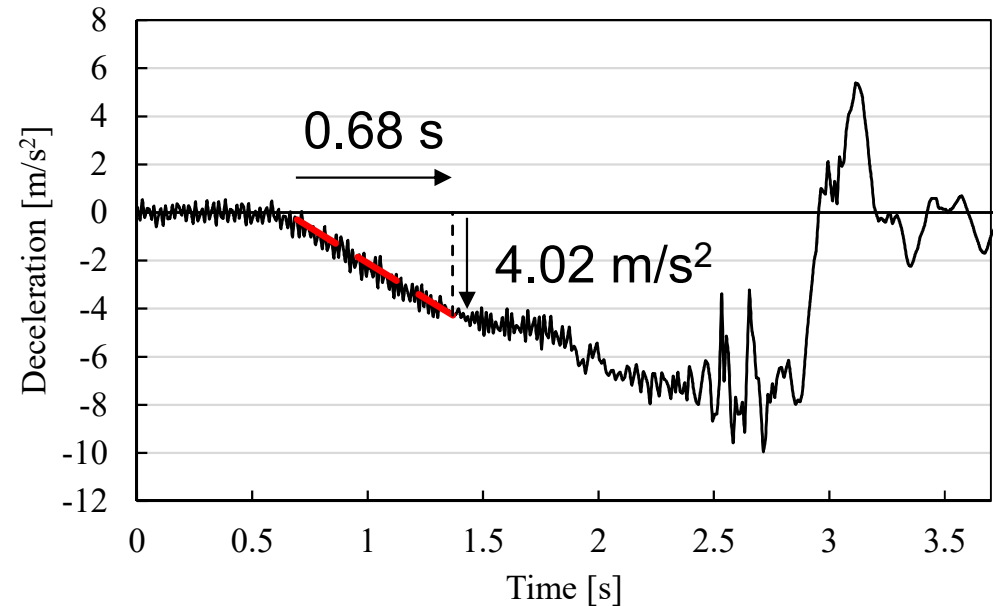
Only data in the case when deceleration by emergency braking was significantly observed was shown in the figure.





N3(Unladen), Stationary child,  
test speed 40km/h

0.27 s to 8.97 m/s<sup>2</sup>  
→ 0.30 s to 9.8 m/s<sup>2</sup>

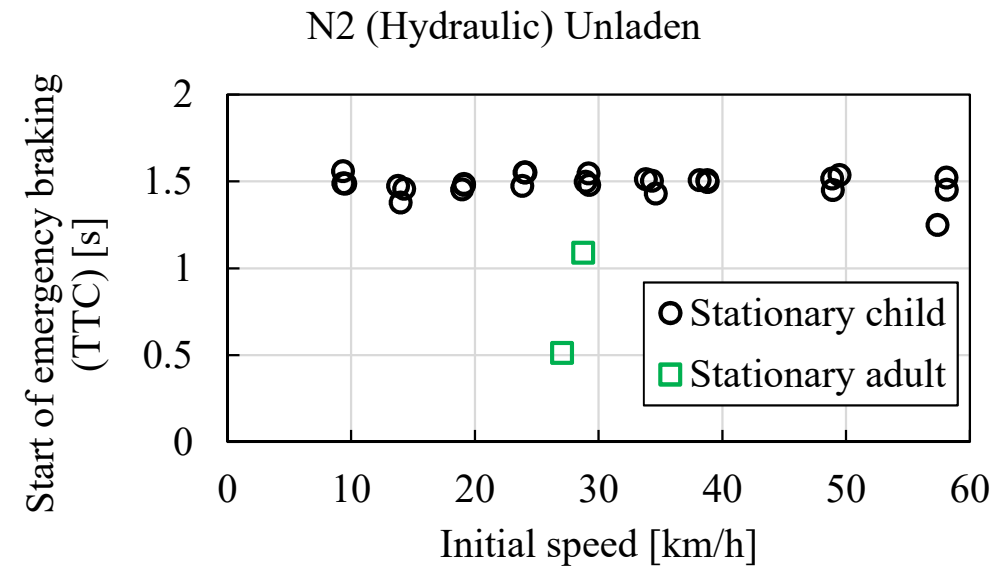
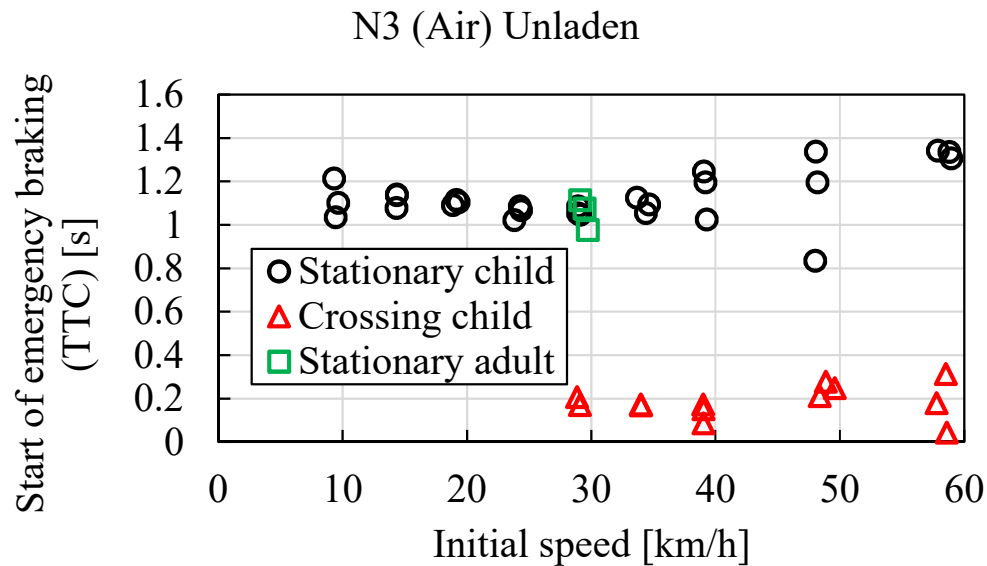


N2(Laden), Stationary child,  
test speed 40km/h

0.68 s to 4.02 m/s<sup>2</sup>  
→ 1.67 s to 9.8 m/s<sup>2</sup>

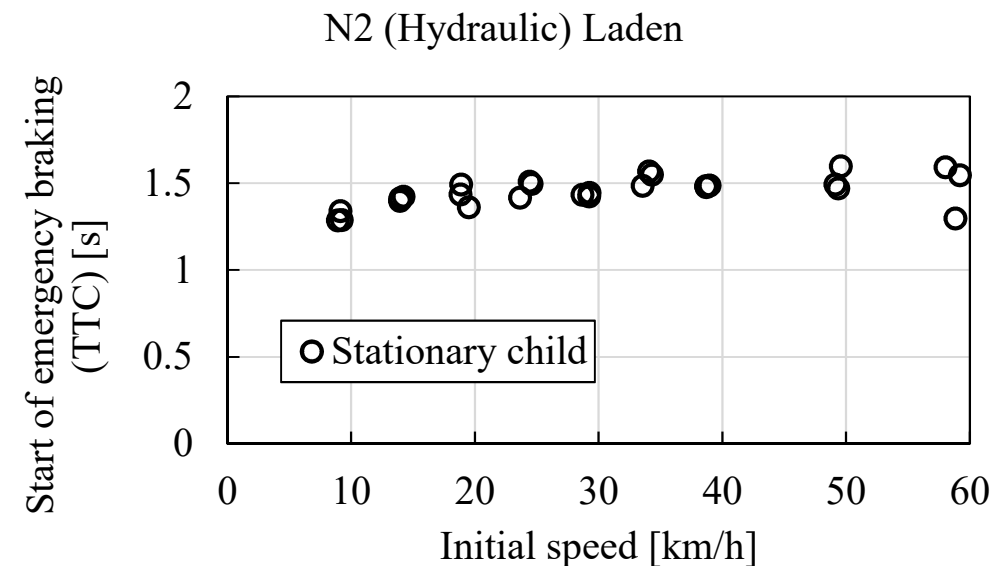
Time to 1G was measured from time series data of deceleration by the following method.  
N3 Air brake : From the timing of deceleration 0.3 m/s<sup>2</sup> to the first peak value  
N2 Hydraulic brake : From the timing of deceleration 0.3 m/s<sup>2</sup> to the first linear area

# Test Result : Start of emergency braking (TTC)



Only data in the case when deceleration by emergency braking was significantly observed was shown in the figure.

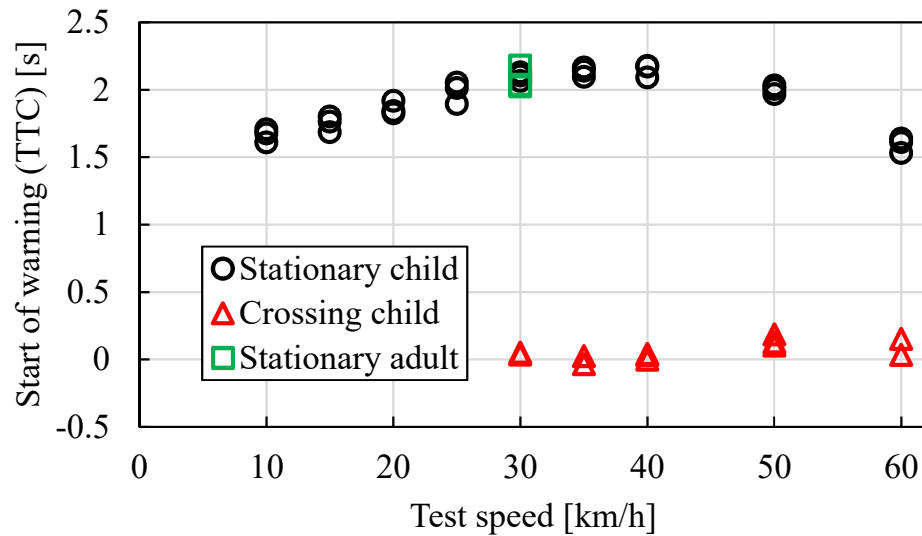
AEBS activation timing :  
Timing at when deceleration exceeds  $0.3 \text{ m/s}^2$ .



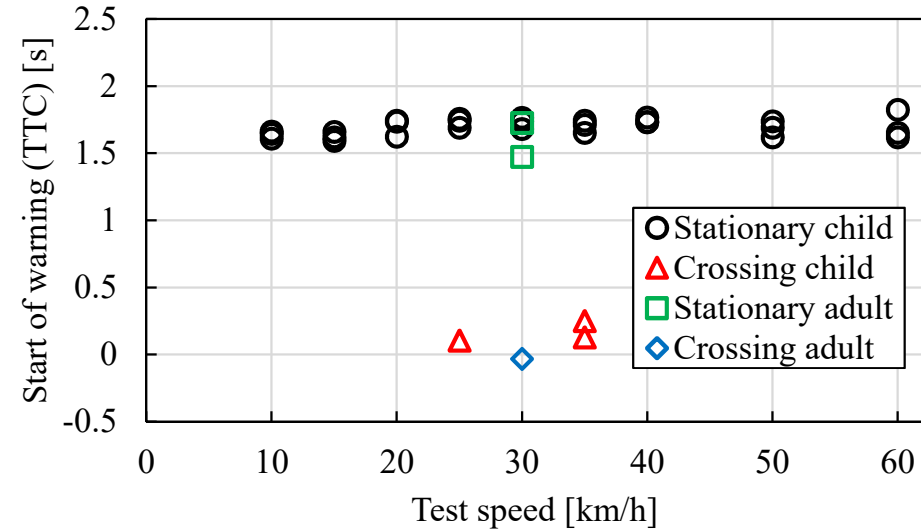


# Test Result : Start of warning (TTC)

### N3 (Air) Unladen

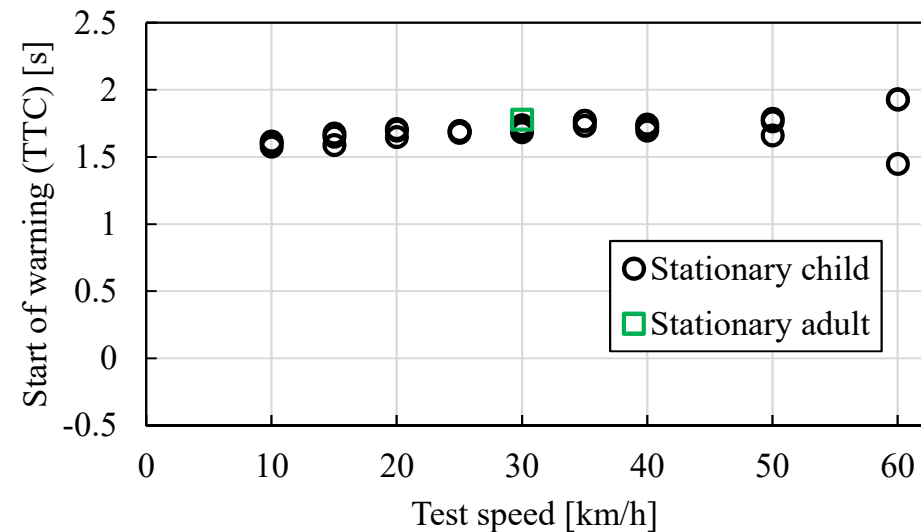


### N2 (Hydraulic) Unladen



Test speed:  
It is defined as the speed of test condition, and distinguished from the Initial Speed.

### N2 (Hydraulic) Laden



## 1. Overviews of the results

- In testing the performance of HDVs in avoiding collisions with stationary pedestrians, the vehicles managed to avoid the collision when running at a speed of 10km/h to 60km/h (failing in some cases though).
- In testing the performance of N3 vehicles in avoiding collisions with pedestrians crossing the road, they could not avoid the collision when running at a speed of 30 to 60km/h, but the activation of the alarm and the emergency brake was confirmed.

## 2. Expected reasons why they failed to avoid the collision with a crossing pedestrian

- The test vehicles were not provided with systems that assumed pedestrians crossing the road.
- Due to the angle of view of the onboard camera, it was difficult for the vehicles to detect pedestrians when running at low speeds (less than 30km/h).

## 3. Future plan

Due to Covid-19 crisis and time constraints, we could evaluate vehicles of **only** one manufacturer. As we plan to survey also other manufacturers' vehicles in early August, we would like to submit a specific Japanese proposal, compiling the results of both surveys.

**Thank you for your kind attention!**