

The Draft Regulation on Driver's Field of Vision Submitted by Japan

June 7, 2001

1. Background

With the recent proliferation of SUVs (multi-purpose sports utility vehicles), society's attention has been focused on increasing number of accidents involving infants killed by SUVs, and those involving motorcyclists and bicyclists killed by remodeled SUVs whose road clearance has been raised. The need for introducing requirements of basic driver visibility has been pointed out, based on the possibility that such accidents are caused by driver's blind spots of the SUVs .

Aiming at the prevention of accidents involving pedestrians, "Safety Regulations for Road Vehicles" have already been established setting out driver visibility requirements for the front and side views of large vehicles. But there are no such visibility requirements currently in place for passenger cars.

Recognizing these situations, a study has been conducted with the purpose of establishing requirement of driver visibility for passenger cars including SUVs in order to prevent these accidents caused the blind spots of the vehicles.

2. Recent Trends in Accidents Involving SUVs

In order to grasp the state of accidents arising in Japan due to the blind spots of passenger cars, we searched the databases of newspapers and other information media and analyzed the macro accident data of the Institute for Traffic Accident Research and Data Analysis.

2.1 Accident Databases of Information Media

The following fatal accidents involving infants by station wagons (including SUVs) occurred during the 8-year period between 1992 and 1999.

- * There were 23 fatal accidents in 8 years and 4 fatal accidents yearly between 1997 and 1999, showing a rising tendency.
- * Of the 23 fatal accidents, 15 occurred near the homes or in front of the homes of the victims, 2 occurred on public roads and at nursery schools, and 4 occurred in public parking lots.
- * In 11 cases the accident was perpetrated by the victim's father, and in 2 cases the perpetrators were respectively the victim's mother and grandfather.
- * The vehicle impact area was the front end in 13 cases and the left side in 5 cases.
- * Three accidents were due to blind spots, 6 were not related to blind spots, and the causes of the remaining accidents were unclear.

2.2 Analysis of Macro Accident Data

Macro accident data for the 3-year period between 1996 and 1998 were utilized to analyze accidents involving pedestrians and vehicles taking off from a parked position or turning left at low speeds (below 10km/h), where poor driver visibility was thought to play a part as the cause of the accident. The findings are summarized as follows.

- * Accidents involving children 12 years of age and under by vehicles taking off from a parked position occurred at a higher percentage with 1BOX vehicles (a kind of SUVs) than with other vehicle types.
- * There were 13 fatal accidents during the 3-year period between 1996 and 1998 by 1BOX vehicles taking off from a parked position. Of these, 11 accidents involved children 12 years of age and under. Other vehicle types accounted for only 1 fatal accident in which the victim was a child under the age of 12.
- * The impact area was more likely the front end or the left side in accidents by 1BOX vehicles taking off from a parked position (vehicle-pedestrian accidents), than other vehicle types.
- * There was no marked difference among vehicle types in accidents involving vehicles turning left.

The above results indicate that there is a high probability that poor driver visibility was a factor in accidents involving children 12 years of age and under by 1BOX vehicles taking off from a parked position, in which the impact area was the front end or the left side.

3. Estimating the Accident-Reducing Effect of Improved Visibility

The accident-reducing effect of introducing regulation on driver's field of vision for passenger cars was estimated, based on the analysis of the above macro accident data.

Assuming that poor driver visibility is a factor of accidents involving children 12 years of age and under by 1BOX vehicles taking off from a parked position, in which the impact area is the front end or the left side, the number of accidents in one year is estimated to drop as follows, if the 1BOX vehicle visibility were improved to that of a regular passenger car.

- * The number of accidents involving children 12 years of age and under will drop by 20, from the current 36 to 16. (Overall, the number of accidents involving vehicles taking off from a parked position will drop by 20, from the current 133 to 113.)
- * The number of fatal accidents by vehicles taking off from a parked position will drop from the current 4 to either 2 (using the fatal accident rate for 1BOX vehicles) or 1 (using the fatal accident rate for passenger cars).

4. Driver Visibility in Passenger Cars

In order to grasp the range of driver visibility in passenger cars sold on the market, we measured the field of vision of typical domestically manufactured models and imported models. All vehicles used in the measurements were right-hand drive vehicles. The following conclusions were drawn from this study.

- * Passenger cars have blind spots on the left side due to pillar A and the outside rearview mirror.
- * Vehicles with high road clearances have blind spots in the front and on the left side.

5. Driver Visibility in Modified Vehicles

In order to investigate how re-modeling that raise the vehicle road clearance affect driver visibility, we looked at field of vision data and estimated the field of vision of re-modeled SUVs whose road clearance has been increased by 50cm and 100cm.

- * With a vehicle that has a factory vehicle height, an object 1m from the ground in front of the vehicle can be seen when it is approximately 2.4m from the driver's eye position; with an SUV raised by 50cm, the object has to be twice as far away, approximately 4.8m; and with an SUV raised by 100cm, it has to be three times as far away, approximately 7m.

6. Specifying Object Sizes for the Regulation on Driver's Field of Vision

From the analysis of macro accident data, accidents linked to driver visibility can be thought of as accidents involving children as pedestrians. In order to obtain basic data on the age range of infants that regulations will be aimed at, we reviewed studies on the behavioral patterns of young children and sent out questionnaires to their guardians.

6.1 Legislation

The responsibilities of guardians regarding infants are stipulated in the Road Traffic Law Article 14, Par. 3.

- * Infants (under the age of 6) shall not walk on public streets unaccompanied by a guardian.

6.2 Existing Research

In 1970, Ryoko Saito of the National Research Institute of Police Science investigated the behavioral patterns of infants.

- * Before the age of 4, children do not have the capacity to make judgments on their own. (Ryoko Saito, Children's Characteristics and Their Safety Education, Traffic Monthly, December 1984, p33 - 49)
- * Children must be at least 5 years old before they can walk on public streets by themselves. (Interview with Ryoko Saito, formerly with the National Research Institute of Police Science, currently with the TRS Research Center)

6.3 Survey of Guardians of Infants

As a result of questionnaires sent to the parents of infants between the ages of 1 year and 6 years, the following was concluded.

- * At least 95% of parents will accompany children up to the age of 5 when they go out.

- * At least 95% of parents think that it is generally accepted that children under the age of 5 should be accompanied by an adult when they go out.

The results of this survey indicate that it is appropriate to assume that children up to the age of 4 be accompanied by a guardian when they go out, and that the target of accident-preventing measures for vehicles be children of 5 years of age and older.

6.4 Body Size Measurement Data of 5-Year-Olds

- * According to supervision data from the Maternal and Child Health Division of the Children and Families Bureau, Ministry of Health and Welfare, the 3-percentile height of 5-year-olds is 100.8cm.
- * According to the Survey of Japanese Physiques, the average back shoulder width of a 5-year-old is 27.9cm.

The above findings indicate that the use of a 1-meter body height as the object size for visibility requirements would cover a 5-year-old child. It is therefore appropriate to use a 1m cylindrical object (equivalent to the height of a 5-year-old child) as the visibility requirement which is currently used in the safety regulation of large vehicles.

7. Requirements of Driver's Field of Vision for Passenger Cars (Draft)

The following visibility requirements are proposed as a result of the above findings.

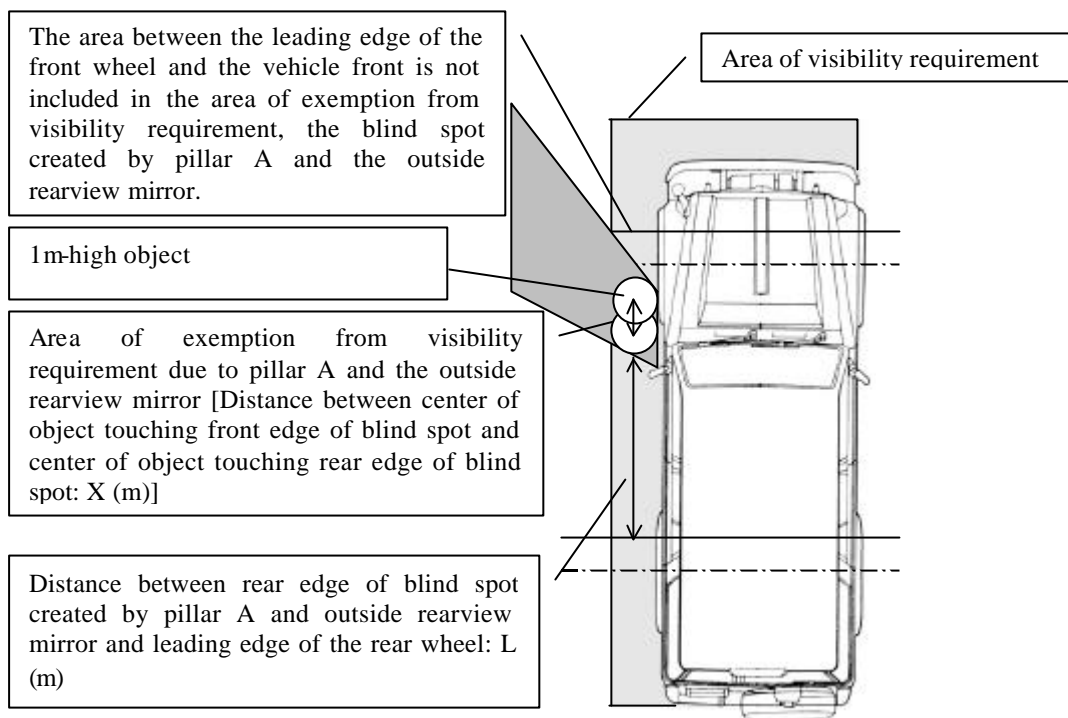
Driver Visibility Requirements for Passenger Cars (Draft)

A 1m object (cylinder with a height of 1m and diameter of 0.3m) located between the vehicle and an upright surface 0.3m in front of the vehicle or between the vehicle and an upright surface 0.3m from the left side of the vehicle (the right side, in the case of a left-hand-drive vehicle) shall be partially visible to the driver of the vehicle.

In consideration of the need for safety during a collision and for securing rearward visibility, however, the above requirement shall not be applied to the blind spot created by pillar A and the outside rearview mirror, within the minimal requirements of that area. To secure safety even in the area where the exemption is applied, the limits of the exempted area, which is determined according to the distance between the rear of the blind spot and the leading edge of the rear wheel, must not be exceeded. The area between the leading edge of the front wheel and the vehicle front, where an object can be dragged in by the wheel, shall not be exempted from this requirement (and shall be treated as an area where visibility can be either directly or indirectly checked).

Based on the premise that the driver will check the surroundings of his vehicle before taking off from a parked position, the above requirement of visibility of a 1m-high object is deemed to be satisfied if a vehicle is in condition that the object is partially visible from one of the following eyepoints.

- (a) the driver's standard eyepoint
- (b) the driver's upward eyepoint
- (c) the driver's forward eyepoint
- (d) the driver's side eyepoint



* Limits of area of exemption: $X \leq 0.292L - 0.203$

where

X (m): distance between center of cylindrical object touching front edge of blind spot and center of cylindrical object touching rear edge of blind spot.

* Eyepoints when checking surroundings of vehicle

* Upper eyepoint: 40mm above and 10mm to the left of the standard eyepoint

* Forward eyepoint: 10mm above, 140mm ahead, and 15mm to the left of the standard eyepoint

* Side eyepoint: 15mm above, 31mm behind, and 110mm to the left of the standard eyepoint

8. Future Schedule (Draft)

- | | |
|---------------------------------------|----------------|
| (1) Official announcement: | March 2002 |
| (2) Implementation Date: | to be decided. |
| (3) Vehicles subject to requirements: | All vehicles |