

**Supplementary Document on Japan's Proposal for Moderation of Safety Belt  
Retraction Force Standard in ECE R16**

Transmitted by the Expert from Japan

Concerning Japan's study (28th GRSP Informal Document No.18) indicating the appropriateness of Proposal GRSP/2000/12 for lowering the safety belt retraction force standard of ECE R16 to the level already effective in Japan and the US, the following questions were posed at the 28th GRSP meeting.

- 1) What will happen to the belt slack on the shoulder and laps if the belt retraction force is reduced?
- 2) What will happen to the belt slack on children and small women?

In the present Informal Document, Japan reports the data of an experiment conducted for answering the above questions. As in the case of the 28th GRSP Informal Document No.18, the amount of belt slack was obtained experimentally. To simulate a child and a small woman, a six-year-old child dummy and an AF05 dummy were employed. The following findings were obtained from the measurement results shown in Figures 1 through 8.

Figures 1 & 2: When retraction force was reduced, the amount of slack increased but this increase was moderate. This finding was obtained from all the groups of six-year children, small women, and adult males. The effect of retraction force on slack thus proved to be minimal among occupants of different stature.

Figures 3 & 4: The amount of slack was affected more by clothing conditions. The slack under thickly clothed conditions measured 1.5 to 2 times larger than that under normally clothed conditions.

Figures 5 & 6: In the thickly clothed conditions, the percentage of lap portion slack was particularly large (about 70% of the total amount of slack when thickly clothed and about 50% when normally clothed). This is probably because thick clothing produces more fabric folds between the occupant body and the belt. In the dummy simulation study reported in 28th GRSP Informal Document No.18, most slack was assumed to center on the chest area in order to obtain the worst-case injury value.

Figures 7 & 8: Although there were modest differences in the amount of slack among occupants of varied stature, there was no significant tendency of slack increasing in children and small women.

Consequently, the conclusion is that a reduction in retraction force does not cause a significant increase in the belt slack of children and small women.

**Outline of Slack Measurement:**

An AM50 dummy (Hybrid III), AF05 dummy (Hybrid II), and six-year-old dummy (Hybrid II 6Y) were seated and secured with a safety belt in a small passenger car and a mini van. The amount of slack was determined by comparing the belt length under the normal belt wearing condition and the belt length after the elimination of slack by deliberate tightening of the belt. The same measurement was repeated eight times, and the average value was taken as the amount of slack.

The measurement was performed for different retraction force levels and clothing conditions.

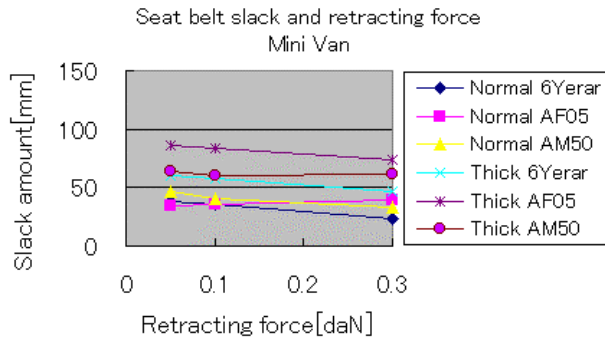


Fig 1

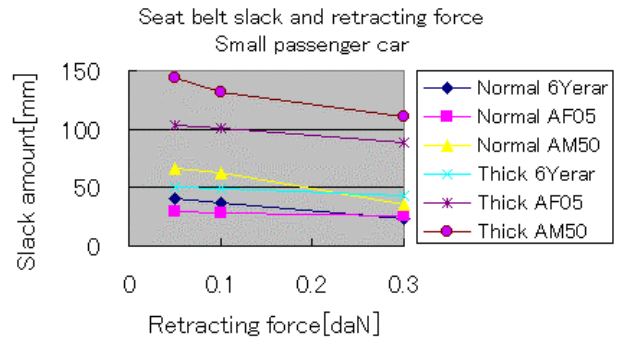


Fig 2

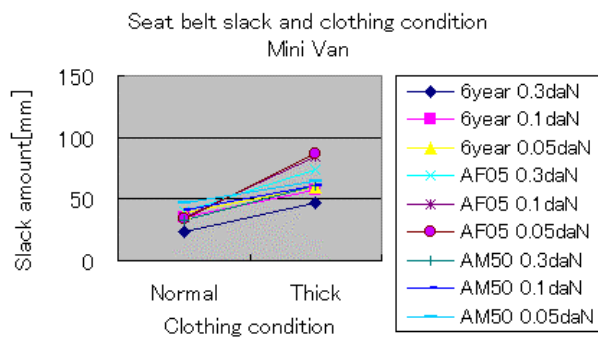


Fig 3

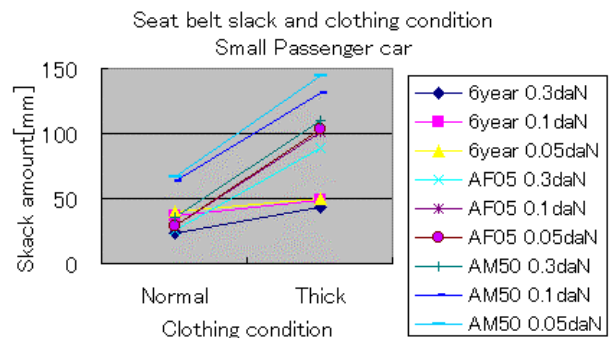


Fig 4

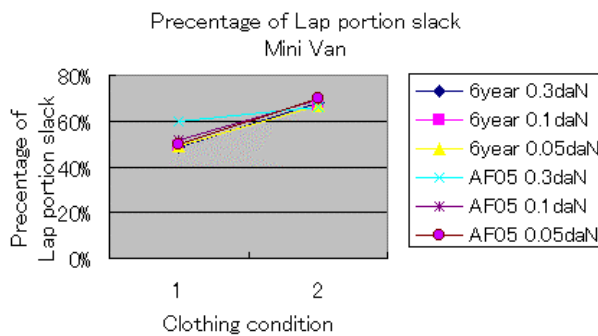


Fig 5

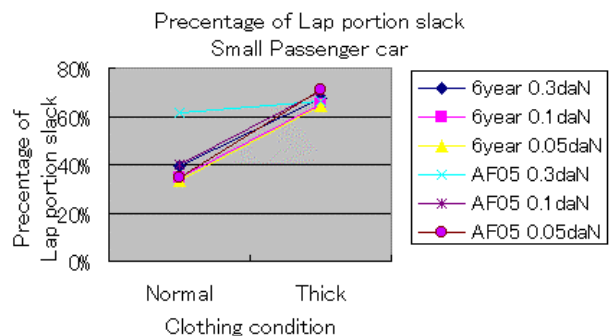


Fig 6

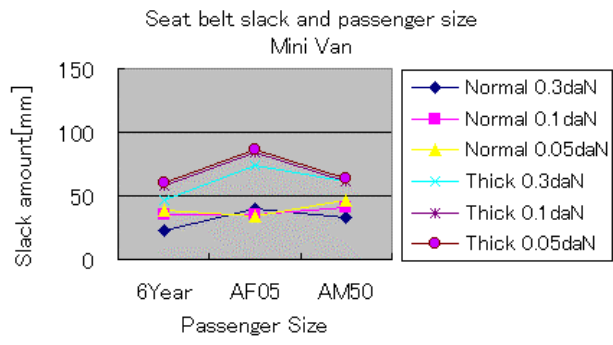


Fig 7

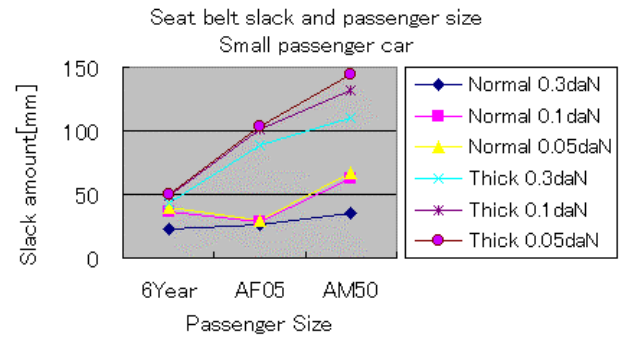


Fig 8