

Inflatable car seat system

Summary:

Special devices are sold in Europe as restraint system allegedly complying with R44/04. These systems were already discussed in the past and were banned in several countries. This report deals with one system that is sold in EU and its evaluation in a dynamic test according to R44/04.

Evaluating an inflatable car seat system:

The system is described in figure 1. In order to operate the system has to be inflated by the user. It is claimed that it was approved according to UN ECE R44/04 as well as to US FMVSS213. In EU it is sold as universal group II/III seat.



Figure 1: test set-up with the inflatable system

Frontal test with P10 dummy with R44 set-up

The kinematic of the occupant is illustrated in Figure 2, with 3 sequences selected from the test video. It shows that the lap portion of the seat belt is intruding into the abdomen of the dummy, which is a clear indication of a severe submarining (Figure 2 a/b/c).



Figure 2a: Time 0 ms – Initial P10 dummy position



Figure 2b: Time 40 ms – P10 dummy and belt geometry during loading phase



Figure 2c: Time 80 ms – Start of the submarining – The lap belt has intruded into the abdomen.

Conclusion:

Such system does not comply with R44/04. The lap portion of the belt intrudes into the abdomen of the dummy, leading to a submarining situation. That means the system does not comply with §7.1.4.3.1 of R44/04. The major shortcoming of such systems is that they can't maintain belt geometry for a proper restraint of the child.
