

Meeting of the GRSP Informal Group on UNECE R29 - Cab Strength

11 September 2008

OICA offices - Paris

1. WELCOME and INTRODUCTION

The Chairman, Mr Salnikov, welcomed the participants and stressed that the aim of this meeting was to finalize a draft proposal to amend UNECE Regulation 29, for submission to GRSP in December 08. He also thanked OICA for the hospitality. Mr van der Straaten agreed to act as secretary of the group.

The participants (Russian Federation, Czech Republic, Sweden, Germany, and OICA) are listed in document GRSP-INF-CS-13.

2. REVISED PROPOSAL BY THE RUSSIAN FEDERATION – GRSP/INF/CS/14

The Russian Federation presented a revised proposal to amend UNECE R29, replacing document GRSP/2007/14 –see document GRSP/INF/CS/14. This new proposal is based on previous discussions and on the agreement to concentrate on the most important accident scenarios. The new revised proposal aims at 4 tests, i.e.:

- Test A - Frontal Impact – see item 3 below
- Test B - A-Pillar Test – see item 4 below
- Test C - Roof Strength Test – see item 5 below
- Test D – Rear Wall Test – see item 6 below

The chairman suggested a detailed review of these proposals and stressed the Russian's willingness to compromise.

3. TEST A – FRONTAL IMPACT TEST (front to rear impact)

Revising its former proposal for an offset test, the Russian Federation now proposes a full lap pendulum test (800 mm x 2500 mm), similar to the current R29 requirements, but with different energy levels depending on the mass of the truck (R29.02 levels for N1 and for $N2 \leq 7.5$ t GVM; 78.4 kJ for $N2 > 7.5$ t GVM and for N3).

OICA welcomed this new approach, but insisted that the pendulum should be rigidly suspended by beams, and not by chains, in order to avoid serious repeatability problems because of the difficulty to control the pendulum movement during the impact. Furthermore, OICA insisted to review the energy levels, since this is strongly dependant on the type of pendulum suspension – a rigid suspension results in a more severe impact (by about 20%) compared to a chain suspension.

The Czech Republic and Germany clearly favoured a rigid suspension. Sweden pointed out that its Swedish test, using a flexible suspension, was developed in the 1960s, when

repeatability was not a real concern; experience however shows that there are repeatability issues and Sweden can now accept or even support a rigid suspension. The Russian Federation then agreed with the concept of a rigidly suspended pendulum test.

In conclusion, it was agreed that a rigid pendulum should be used for the full lap frontal impact.

As concerns the energy levels, OICA (Daimler) showed some simulations, conducted on the basis of the original OICA frontal impact proposal, with 50kJ energy level; results show that such energy level with a rigid pendulum is very severe for the cab connections and it is obvious that the 78 kJ level proposed by Russia would result in serious technical difficulties.

OICA added that, even if reducing the energy by 20% reduction to take into account the rigid pendulum suspension, the energy level of about 60 kJ is still very severe, as shown by these calculations. OICA referred to its original proposal of 50 kJ, but could accept discussion on a level of [50 – 60] kJ.

Russia however pointed out that the energy levels in UNECE R94 are much higher, but OICA objected that R94 is totally different, since passenger cars have a deformation zone, since a large part of the impact energy is absorbed by the deformable barrier itself, and since the speed differential between trucks is much lower than in the case of cars.

The Czech Republic supported OICA.

The Russian Federation could however not accept an energy level below about 60 kJ.

In conclusion, the group agreed to set the level at [60] kJ for the time being. OICA was requested to conduct some new calculations with this energy level in preparation of the December 08 GRSP session.

Taking into account the above discussions, the group agreed that it would be sufficient for the pendulum mass to define only a minimum mass of 1500 kg, taking into account the existing equipment.

As concerns the height positioning of the pendulum, the group in principle agreed that its centre of gravity should be set at [50 ± 5 mm below the R –point of the driver's seat]. OICA (Daimler) undertook to review the issue and to make alternative proposals for review by GRSP in December .

It was also agreed that the frontal impact test would only apply to cab-over trucks, thereby exempting so-called "conventional" trucks. It was agreed that a definition would be needed and note was taken of the proposal in § 2.5 of GRSP/2007/14. OICA however noted that some designs may have part of the engine behind the firewall. After some further review, the following was provisionally agreed:

["Conventional truck" means such a truck in which the cab is situated behind the engine, such that at least 75% of the engine length is situated in front of the lowest edge of the windscreen."]

Conclusion for the frontal impact test:

- Full lap pendulum test
- Pendulum dimensions: h=800 mm; l=2600 mm
- Pendulum mass: minimum 1500 kg
- Pendulum to be rigidly suspended
- Centre of gravity of pendulum: [50 ± 5 mm below R-point]
- Energy: N1, and N2 ≤ 7.5t: see R29.02 (i.e. 29.4 kJ)
N2 > 7.5t and N3: [60] kJ
- Exemption for N1, and N2 ≤ 7.5t, approved to UNECE R33 or UNECE R94
- Exemption for "conventional" trucks (definition to be finalized)

4. TEST B – A-PILLAR TEST (90° rollover with subsequent impact)

The Russian Federation, following previous discussions on the accident statistics, now supports the concept of this test, proposed by OICA on the basis of the current Swedish requirements (but with amendments).

The Russian proposal is to use a cylindrical impactor on a suspended pendulum, impacting horizontally both A-pillars at a height midway of the windscreen. The impactor would have a diameter of 600 mm and a length of 2500 mm; Russia noted its openness as to the diameter of the impactor, since this is supposed to represent a tree or a lamp post, impacted by the truck following a 90° rollover. The impact energy for heavy trucks > 7.5t GVM would be 29.4 kJ.

OICA recalled that its own proposal was aimed at representing various types of obstacles. Sweden supported the concept of an A-pillar test, but pointed out that the current Swedish test (offset cylindrical barrel suspended on chains) may give some technical difficulties. Russia pointed out that there are still several questions regarding the OICA proposal, especially the detailed test procedure and the rationale behind it.

OICA explained some details of its own proposal, on the basis of computer simulations (Daimler), but after some further discussions, agreed to use the new Russian proposal as a basis for discussions. OICA however suggested that the cylinder should be minimum 2500 mm long in order to take into account the width of modern trucks; OICA also suggested that, in order to improve repeatability of the test, the cylinder should be centred in width between the A-pillars. The group endorsed these suggestions.

OICA however requested some further time to study the proposed test procedure, including the energy levels; other delegations also suggested further internal study.

In conclusion, it was agreed to use the Russian proposal as a basis for further review by GRSP in December 08, however between square brackets, especially as concerns the required energy levels. OICA undertook to study this proposal internally, for confirmation by the December 08 GRSP session. The group also agreed that in any case, N1 and N2 ≤ 7.5t would not be subjected to this test.

5. TEST C – ROOF STRENGTH TEST (180° rollover)

Both the OICA and the Russian proposals were reviewed in detail. OICA explained that its proposal copies an SAE standard, already in practice in the USA, and aimed at closely reproducing a real world rollover: the 90° rollover laterally deforms and weakens the cabin (simulated by applying a pre-load on the upper edge of the vehicle), until the truck rests on its roof (quasi-static vertical load). The Russian proposal in effect combines both parts of the accident in a single test, by tilting the cab 25° before applying the vertical load.

The pros and cons of each method were discussed at length. Some of the comments made to the Russian proposal related to the presence of tires, potentially creating test difficulties, and especially to the fact that this test seems to stress the cab attachments more than the cab itself. Russia however doubted that the OICA proposal for the side impact (17.6 kJ) would actually deform the cab at all; OICA showed a movie of an actual test, demonstrating the huge strain on the cab, both laterally and vertically, and explained that the SAE standard which the OICA proposal is based on, actually limits the lateral load to a maximum of 17.6 kJ, depending on the vehicle size. OICA however decided to use the full amount of 17.6 kJ and further explained that, in order to avoid deformation, and consequently weakening prior to the vertical load, many current cabs would need serious reinforcements.

In conclusion, the group finally agreed to use the OICA proposed test procedure as a basis for the December 08 GRSP meeting; the Russian Federation however requested OICA to present detailed rationale for the 17.6 kJ energy level in the side impact.

The group also agreed that this test would be applicable to heavy trucks of categories N2 > 7.5t and N3; for lighter trucks (N1 and N2 ≤ 7.5t), the current requirements of R29.02 would remain unchanged.

6. TEST D – REAR WALL STRENGTH TEST

Note was taken that the Russian proposal includes a 4th test addressing the strength of the rear wall of the cabin against an impact by the load in the back, as in R29.02. The revised Russian proposal, applicable to heavy trucks (N2 > 7.5t and N3) however calls for a suspended pendulum impact of 29.4 kJ, using an impactor with a height of 500 mm and a width of 1600 mm and a mass of 1000 kg.

OICA repeated its previous request for accident data justifying this test since, according to OICA's investigation, such impact is relevant in only 2% of the accidents with fatalities/injuries and since in any case these are usually "horror" accidents unrelated to any laboratory test. OICA also pointed out that existing requirements in terms of trailer construction and securing of the load are sufficient and that the test proposed by Russia, though probably not too severe, is yet another test on a truck cab, with all the associated huge costs.

Germany noted that truck cabs must in any case meet UNECE R14 (strength of the belt anchorages), and this should ensure that the cab strength is adequate.

The Russian Federation however insisted that this is a fairly frequent accident configuration with injuries in Russia, especially in the case of smaller trucks. Russia therefore insisted that this test should be retained, but agreed that it would be optional at

the choice of the manufacturer, such that this test would not be mandatory, but applied on a purely voluntary basis. The Russian Federation also agreed that the rear wall test, whether the existing R29.02 one for lighter trucks or the new one for the heavier trucks, would only be applicable to vehicles with a separate cab.

In conclusion, it was agreed to retain a rear wall test, as suggested by the Russian Federation, with the following characteristics:

- Optional, at the choice of the manufacturer (no mandatory test for type approval)
- Only for vehicles with a separate cab
- N1 and N2 \leq 7.5t: current UNECE R29.02 procedure
- N2 > 7.5t and N3:
 - Pendulum, mass 1000 kg, height 500 mm, width 1600 mm
 - Impact energy 29.4 kJ

7. CRITERIA

The group agreed to maintain the principle of the pass/fail criteria on the survival space. Note was taken that OICA proposed to replace the current R29 manikin by an un-instrumented 50th percentile Hybrid III dummy. On the other hand, the Russian Federation, in GRSP/2007/14, proposed detailed geometric measurements to assess the required survival space.

It was agreed that both proposals were acceptable, as alternative at the choice of the manufacturer.

8. FURTHER STEPS

Upon a proposal by OICA, it was agreed to give a detailed presentation of the basic concept to amend UNECE R29 to GRSP in December 08. Based on the decisions by GRSP, a formal proposal to amend R29 would then be drafted for final review by GRSP.

9. CLOSURE OF THE MEETING

Mr Salnikov thanked all participants for their successful cooperation and closed the meeting.
