

Report
Meeting of GRSG-Experts on Plastic Glazing

Date: 09 February 2010
Time: 10:00 – 16:00
Venue: BMVBS in **Bonn** (Germany)

List of Participants: Annex 1

1. Welcome

Mr. Damm welcomed the participants to the meeting and introduced organisational items. Each participant gave a short introduction.

2. Adoption of the Agenda

Presentations of KR D and Bayer have been added to the agenda under agenda item 3.2. Agenda was adopted.

3. ECE-Regulation No. 43

3.1. GRSG-Documents GRSG/2009/8 and GRSG-97-22

Dr. Preusser started the technical discussion presenting the GRSG-Documents GRSG/2009/8 and GRSG-97-22 on plastic glazing. He started with an introduction of the requirements for the different types of glazing tabled in document GRSG/2009/8. He explained the intention for the different tests that shall be applied to plastic windscreens according to the current proposal and he summarised the comments raised by experts at the 97th GRSG regarding potential problems of plastic glazing especially with abrasion, radiation and high temperature.

He mentioned the target of the meeting to have an exchange of information and to get the opinions of the different experts. This shall lead to the decision on needed activities to be started in the future.

3.2. Test Requirements for Plastic Glazing (esp. windscreens)

KRD (Dr. Schmitz) started with a presentation (Annex 2) showing information on activities working with plastic glazing that were used on vehicles in Germany. He gave an explanation on the different approvals that were received in Germany for front windows for specific vehicles (e.g. for vehicles with a maximum velocity of 40 km/h and for police cars) and for windows other than windscreens.

The details of different tests used in various countries were introduced. The Florida

weathering test (G26) was shown. The requirements of a modified G26 test were presented.

KRD showed current development of laminated plastic glazing and the functional properties which are possible.

KRD proposed a modification of the test requirements to be used for the approval of plastic glazing :

- Abrasion resistance test → change current test method
- Abrasion UV-Irradiation test → current test does not reflect the real-world situation
- Others / windscreen wiper test
- Penetration test method

Drop Test Videos were shown:

1st video: with a 8 mm monolithique plastic glazing, 10kg impact cylinder with a tip at the front end, drop height 3m, in alignment with DIN 52306;

2nd video: with a dart, 2m drop height.

Dr. Preusser summarized the presentation asking KRD about the HIC measurements during the drop tests with plastic glazing. KRD mentioned that this type of glazing fulfils the requirements for the HIC at a drop height of 3m.

OICA asked about the adhesion test, if this test would be an additional test?

KRD: This is no additional test, it is a standard test called cross-cut test, checking the adhesion of the coating.

OICA asked about the thin wire in the UVIREX product. Why is it used?

KRD: It is just used for heating purposes (defrosting and demisting).

OICA also asked for the sizes of the test pieces in the video, as these were different for the tests. Is the requirement comparable for the tests shown?

KRD: By using a smaller test sample, the requirement is more difficult to be fulfilled.

Dr. Preusser asked where the test set-ups for the drop tests come from?

KRD: The tests shown were derived from the technical guideline (German document) for safety glazing.

EC: Asked about the abrasion tests and the windscreens. In which vehicles are the windscreens used at the moment?

KRD: The windscreens are used in vehicles VW T4, T5, Ford Transit, Mercedes Sprinter.

The EC wanted to know if KRD has some experience in aircraft business?

KRD: Some customers use plastic glazing products of KRD in helicopters.

Pilkington: In the KRD presentation a haze increase was proposed to go up to 10% for the Taber test. Is this proposed for all windscreens?

KRD: Yes. Requirements shall be changed and a sand trickle test shall be added, as it is more realistic compared to the Taber test.

Opel: For side windows a local stress has to be added. Has this been done for the plastic glazing?

KRD: Yes.

Bayer Material Science (Dr. Buckel) presented their research activities on plastic glazing (*Annex 3*). First an overview was given where plastic glazing is used at the moment (e.g. for a driver cab of a forestry machinery). Plastic glazing (polycarbonate) is also used in current cars, e.g. for side windows, head lamp covers, roofs.

Bayer checked the performance of plastic glazing parts (e.g. side windows) by taking vehicles that were in use in real-life for 6 to 7 years. All parts show after 6 years on the road a haze value of < 1%. Also head lamp covers were checked after a use time of 7 years on a car. The haze was 2 to 3 % after this time of use.

Bayer raised the question on an acceptable level of haze: is 2% acceptable or 10%?

Bayer explained in detail the changes in the Taber test requirements (changes of test wheels, refaced stone, cleaning liquid, vacuum pick-up nozzle; Info from Taber Ind., www.cs-10f.com).

Suitability of the Taber test is questionable regarding the application on plastic glazing. Therefore a real car wash test was investigated and compared to the Taber test requirements.

Comparison of four different coating types show differences in the performance in the Taber test and the washing street test.

The washing operation tests were run up to 150 / 200 times, which better reflects the real life time of a vehicle than a Taber test.

The conclusion was, that the washing operation tests (Amtec-Kistler Test according to ISO 20566) could be used as a standardized test for checking abrasion requirements.

A wiper resistance test (SAE standard) was investigated looking at the real world performance compared to laboratory performance. Using this test set-up a comparison between glass and plastic materials was performed looking at the increase of the haze levels.

A basic question was raised: what do the test cycles represent? The real lifetime of a vehicle? What number of test cycles is necessary to reflect the real world situation?

These questions have to be clarified.

The main characteristics of polycarbonate were explained (transparency, heat resistance, toughness). Additional advantage of PC is the reduction in mass due to the low density

which is half the density of glass. The CO₂ emission efficiency shows an advantage for PC compared to standard glass taking into account the production process and the product lifetime.

Information was given on weathering test requirements and different procedures (e.g. Xenon WOM 0.75 based on ASTM G155; which is similar to Florida test).

Combination of QUVB test and Xenon WOM 0.75 would be a good combination to test the radiation requirements of plastic glazing (criteria haze and Yellowness Index (YI)). During the Florida test, micro fractures and yellowness can be seen after 4 to 6 years for plastic glazing; haze and yellowness level were both above the limit values.

Lifetime for plastic glazing would be limited by weathering, for standard glass due to impact.

Lifetime for PC due to weathering would be around 6 years, in Europe (due to less UV radiation) around 10 to 12 years.

Question was raised: What is the exchange rate of glass windscreens in vehicles on the roads due to fractures resulting due to impacts? Investigations of information in the world-wide web gives an indication of an exchange rate of approx. 6% per year for vehicles in Germany.

Saint-Gobain: German proposal was discussed at the GRSG, up to now no answers to the questions of abrasion, resistance, optical properties and pedestrian protection were given.

Changing the current haze level of 2%, it has to be beared in mind that an increasing number of inquiries due to haze shows, that customers are sensitive to this requirement. Saint-Gobain asked whether it would be possible to limit the usage of plastic glazing for vehicles with a maximum speed of less than 40 km/h to gain experience on the material.

Mr. Damm mentioned, that a study on pedestrian safety will be performed and the planning is to present the results of this study in October 2010.

Sabic/ Exatec showed information on testing with the Taber abrasion test and in addition a SAE wiper test (1 mio cycles). Regulatory vs. Functional Requirements were shown (Weathering, Abrasion, Optical quality, Defroster, Solar load, appearance, color..).

Question: What is the optical requirement, that is needed?

Dr. Preusser answered that the requirements are the same as for laminated windscreens.

A discussion about the needs and requirements in regulations was started. Opel

mentioned, that vibration at high-speed could be a needed requirement as well. Ms. Neifer mentioned, that one critical point at the GRSG session was the missing radiation test for plastic windscreens. Daimler sees additional tests, that have to be discussed like the washing operation tests and alternative abrasion tests. Freeglas (Saint-Gobain) mentioned, that first of all, the question would be if plastic can fulfil the requirements of the current ECE reg. no. 43.

EC sees a wiper test as a realistic approach to check the abrasion of a material. But the absence of a pedestrian HIC study makes it premature to decide on plastic glazing.

EC criticized the automobile industry to be inactive in this field. No prototypes were shown, no studies. What is the reason for that?

OICA emphasized the importance of bringing plastic glazing in the ECE regulation. But due to the missing possibility to use this material in current vehicles, the activities were quite low. The situation can change, as soon as it is made possible to use plastic for all windows in vehicles.

4. Next Step – Proposal to GRSG

OICA thinks it is worth to go on with the activity on working on plastic glazing and to try to find solutions for the open questions that were raised during this meeting. A way forward could be to ask WP.29 / GRSG for a mandate of an informal working group to work on this topic. The EC supported OICA's proposal to set up an informal working group. Germany could be the sponsor of that group.

KRD proposed to have also a national German group working on this item.

OICA would prefer to have an international group as many parties around the world are interested in this technology.

Germany mentioned that the activities shall be continued on an international level, if so. Germany will decide whether it is in a position to sponsor an informal group on further developing ECE regulation no. 43.

Mr. Damm closed the meeting by thanking the participants for the fruitful discussion and the contributions to the meeting.

5. A. O. B.

Documents of the meeting, list of participants and a report of the meeting will be distributed. In addition a short document will be prepared for the 98th GRSG session summarising the conclusions of this meeting.