

## **DRAFT REPORT**

### **1<sup>st</sup> meeting of the GRSG informal group on the introduction of plastic glazing for windscreens and laminated plastic panes other than windscreens in UN/ECE Regulation N°43**

Venue: OICA Offices, 4 rue de Berri, Paris  
Date : 18-19 January 2011

Chairman: Dr. Klaus Preußner (D) (dr.klaus.preusser@t-online.de)  
Secretariat: Mr. Olivier Fontaine (OICA) (ofontaine@oica.net)

**Attendees:**

ACKERMANN, Doris	OICA/Opel
BENYAHIA, Rym	Saint-Gobain/Freeglass
BERTHET, Florence	OICA/Renault
BIERENS, Mark	Delta Glass BV
BOELAERTS, Olivier	Vinçotte International
Dr. BUCKEL, Frank	Bayer Material Science
DELNEUFCOURT, Jean-Paul	European Commission
ESSER, Matthias	OICA/Daimler
FONTAINE, Olivier	OICA
GILIS, Francis	Vincotte International
HARA, Junichi	JASIC Japan
HELMICH, Gerd	Pilkington
HOSHIKAWA, Akira	JASIC Japan
NAWROTH, Manfred	Bayer Material Science
NEIFER, Brigitte	Saint-Gobain
PAULL, Nicole	Sabic/Exatec
PICHON, Christian	UTAC
Dr. PREUSSER, Klaus	Germany
PROCHAZKA, Jan	TÜV SÜD Czech s.r.o.
RIJKAART, Victor	Polyplastic BV
SAX, Bernhard	Sabic
Dr. SCHMITZ, Jürgen	KRD
TERRAGNI, Matteo	Sabic
VEENEMAN, Jan Peter	Polyplastic BV
YAMAKAWA, Takehisa	OICA/JAMA
ZAFARI, François	Altuglas International

#### **1. Welcome and Introduction**

#### **2. Approval of the agenda**

Documents: IGPG-01-01 (Chair)  
IGPG-01-02 (Report of February 2010 meeting)

The agenda was adopted with no modification.

The Chair orally recalled the background for the creation of the informal Group:

Germany tabled a preliminary document at the 96<sup>th</sup> session of GRSG (May 2009) referenced as document ECE/TRANS/WP.29/GRSG/2009/8, with the aim of amending UNECE R43 for regulating plastics

windshields and laminated rigid plastic panes other than windshields. This document did not reach consensus at GRSG and Germany undertook to organize an informal meeting (held in Bonn on 9 February 2010) with the interested parties with the aim of determining the most efficient way to proceed with the introduction of plastics windshields and laminated rigid plastic panes other than windshields into UNECE R43 (see document IGPG-01-02 for a report of this meeting). The attendees to this informal meeting quickly arrived to the conclusion that the most efficient way to proceed is to set up an informal group attached to GRSG. Germany subsequently officially agreed to sponsor such informal group. Some Terms of Reference were produced at the occasion of a special meeting organized in Paris on the 6<sup>th</sup> of October 2010, and WP29 in its 152<sup>nd</sup> session in November 2010 gave its consent to the establishment of the informal group subject to the approval at its March 2011 session.

The experts at this above mentioned informal meeting agreed to proceed with amendments to the existing UNECE Regulation 43 instead of creating a new Regulation.

### **3. Revision of the draft minutes of the pre-meeting held on 6 October 2010**

Documents:     GRSG-99-23 (D)  
                   GRSG-99-24 (D)  
                   GRSG-99-25 (D)

The pre-meeting of the GRSG informal group devoted to the establishment of terms of reference and rules of procedure was held on 06 October 2010 at the OICA offices in Paris (France) and produced the Terms of Reference referenced as GRSG-99-24, indicating a 2-year mandate.

The informal group endorsed the time scale as proposed in document GRSG-99-25(D).

France requested the informal group to address in particular the following items:

1. The problem of the installation: the expert found necessary to clarify the installation requirements as some different interpretations and applications of the text with regard to the installation requirements can be done. The expert from France gave the example of a plastic pane in a bus, not conform to the requirements.
2. The abrasion test: there is currently not anymore any correlation between the laboratories using the Taber abrasion equipment. The expert said that changing the wheels is not enough, there is a need to modify the machine as well, because the new wheels have other characteristics.

The group agreed that the 1<sup>st</sup> item should be discussed at GRSG level. Concerning the 2<sup>nd</sup> item, it was acknowledged as a relevant task for the informal group. The experts also started a short debate on the need to adapt the tests to the plastic material. France made reference to the particular problem of plastic windscreens with integrated demist/defrost systems, as the heat could have an effect on e.g. the coating.

### **4. Revision of the Terms of Reference**

Documents:     GRSG-99-24 (D), ECE/TRANS/WP.29/GRSG/78 (para. 22 and Annex IV)

The Terms of Reference were elaborated at the pre-meeting of 6 October 2010 and presented at the 99<sup>th</sup> session of GRSG, in October 2010.

The informal group adopted the Terms of Reference.

## 5. Presentations about plastic glazing

Documents: IGPG-01-03 (Dr. Buckel – Bayer)  
 IGPG-01-04 (Dr. Schmitz – KR D)  
 IGPG-01-05 (Mr. Terragni, Mrs. Paull – SABIC)  
 IGPG-01-06 (Mr. Hoshikawa – JASIC)

Dr. Buckel presented document IGPG-01-03.

The European Commission requested clarification about integration of plastic glazing in busses and coaches, about the possible optical distortions and about the recyclability of the plastic material.

Concerning the introduction of the material in busses and coaches, the experts from the plastic Industry raised the concern of the relatively low volumes, compared with the passenger cars market. In addition, with regard to the optical distortion, some improvement in the optical characteristics can be expected and even some new possibilities could appear, as e.g. the moulding of a Fresnel lens in the pane. About recyclability, the examples of CDs and DVDs have already demonstrated the high degree of recyclability of the plastic material.

Dr. Schmitz presented document IGPG-01-04.

He recalled the request from the Police in Germany for re-enforced glass on police cars. The plastic material is 250 time more break resistant than an equivalent glass. He informed about the existing possibility in the USA to equip vehicles < 40 km/h, and some rulemaking in Japan with regard to plastic windcreens.

Concerning the HIC value (Head Injury Criterion), the regular headform test of UNECE R43 results in a HIC value of 1000. The Chair recalled that in 1997, some data were published about HIS value (Influence of clamping on the results of simulated impact tests on plastics – Karrenberg, Müller and Preußner - Hanser Publishers, Munich 1987): the value depends on the clamping requirements. He however drew the attention on that the windshields are curved and fixed differently in reality compared to the samples during the test.

Mr. Terragni presented document IGPG-01-05.

He clarified that “plasma” means according to SABIC a deposition of glass-like surface on the polycarbonate. He also informed that plasma withstands the Taber test similar to the glass and that the hydrophobic characteristics of the coat makes it better than glass, making perhaps a need to adapt the wiper blades. In addition, some indirect benefits can be expected in terms of CO<sub>2</sub> emissions because the moisture does not appear as fast as for glass (data cannot be shared now, perhaps later)

Mr. Hoshikawa presented document IGPG-01-06.

J is keen to add the following tests in the discussions for the update of the test procedures: “wiper abrasion test”, “Chipping test followed by solvent test” and “Chemical resistance test following a scratch”

## 6. Update of the test procedures

Document: UNECE Regulation N°43 (safety glazing)

### 6.1. Mechanical strength (Annex 3, paragraph 2.)

The experts found reasonable to keep the existing test unchanged, as for glazing. Vinçotte International was keen to check whether the height of drop is relevant: why three times less high than for laminated windscreen.

Conclusion:

- principle of the test kept for plastic glazing
- Vincotte International to check relevancy of drop height
- Decision postponed to next meeting

#### 6.2. Headform test (Annex 3, paragraph 3.2)

The European Commission and Vincotte International supported the need for mandatory HIC test.

The European Commission in addition challenged the philosophy of re-testing (see Annex 14, paragraph 4.4.3.2.) because it could jeopardise the inclusion of gtr6 into UNECE R43. The experts held a debate on this item. Industry informed that prohibiting the re-testing can have huge consequences as the test is conducted on the final component (real windshield). It was suggested to introduce the concept of rate of success.

Conclusion:

- Headform test adopted in principle
- Decision about pass/fail criteria postponed to the next meeting (7/8 success w/o re-test, or 1 accepted failure with re-test, or 4 successes w/o re-test, or other)
- Informal group to ask guidance from GRSG on this item

#### 6.3. Abrasion test (Annex 3, paragraph 4), including the change of the characteristics of the abrasion device (Taber abrasion tool)

Dr. Buckel questioned how representative is the test as the samples are flat, while the windscreens are curved.

Mrs. Paull informed about the procedure followed by SABIC. Facing the alternative between abandoning the Taber test or trying to manage it for nevertheless using it, they decided to keep performing the Taber test. They internally take a reference wheel as a comparison tool, to overcome the discrepancies in the Taber wheels, keeping in mind that the reference wheel wears as well.

Mr. Helmich (Pilkington) was of the opinion that the reproducibility of the Taber test is better with the new wheels than before, and considered the Taber test as really relevant. France insisted on the need to clarify and complete the test method, including the test machine and clarify the characteristics of the wheels.

Dr. Buckel suggested to conduct a round Robin test for evaluating the test method.

Conclusion:

- principle of the abrasion Taber test kept
- round robin on both glass and plastic materials to be conducted under informal group responsibility (creation of a Task Force – see item 9.1. below).
- Informal group open to any proposal for other equivalent tests (Amtec-Kistler, falling sand, oscillating sand test. Wiper test has not been standardized with a fixed protocol, hence not added to the list).

#### 6.4. High temperature test (Annex 3, paragraph 5)

The group firstly adopted such test in principle.

Mr. Schmitz however found this test unnecessary because it was designed for detecting appearance of potential bubbles in laminated windows. Such test is not necessary if the process does not include lamination. This convinced the experts that such test can be dropped for plastic material.

Conclusion: high temperature test deleted from the proposal.

6.5. Radiation test (Annex 3, paragraph 6)

The informal group accepted the preliminary consensus that the radiation wave length should not be < 300 nm and adopted the test in principle.

Further debates however revealed that such test is redundant with the weathering test and that it was primarily designed to address the interlayer of a laminated glass. : the group decided to keep the test for laminated rigid plastics.

6.6. Humidity test (Annex 3, paragraph 7)

Adopted in principle.

6.7. Light transmission test (Annex 3, paragraph 9.1)

Adopted in principle.

6.8. Optical distortion test (Annex 3, paragraph 9.2)

Adopted in principle.

6.9. Secondary image (Annex 3, paragraph 9.3)

Adopted in principle.

6.10. Identification of colours (Annex 3, paragraph 9.4)

Adopted in principle.

6.11. Resistance to temperature changes (Annex 3, paragraph 8)

Adopted in principle.

The group acknowledged that this test was originally designed to check the difference of dilatation between the layers.

Vinçotte International, UTAC and TUV SUD Czech were keen to check internally the relevancy of such test. They suggested to perform a similar test, increasing the number of cycles to about 10 (currently ½ cycle is performed) with the aim of assessing whether the layers could separate due to the temperature cycles, then performing an abrasion test, for assessing durability via the abrasion resistance (see also item 6.18 below).

Bayer and Sabic committed to provide PC samples and Polyplastic BV to provide PMMA samples to the three test laboratories. The laboratories committed to provide the results of their internal investigation at GRSG-IGPG-02 (June 2011).

The experts held a short debate about the relevancy of adding some test combinations.

The three following combinations were considered meriting further discussions:

- Weathering followed by cross-cut
- Humidity + ball drop 227g
- Abrasion (Taber not appropriate) + chemical resistance.

Conclusion:

- Vinçotte International, UTAC and TUV SUD Czech to perform the test of resistance to temperature mentioned above (procedure increased to 10 cycles,

followed by abrasion test) and to provide the results at the 2<sup>nd</sup> meeting of the informal group (June 2011).

- decision according to the outcomes of the laboratories internal inquiries.

6.12. Fire resistance (Annex 3, paragraph 10)

Adopted in principle.

6.13. Resistance to chemicals (Annex 3, paragraph 11. – immersion test; test under load)

Adopted in principle.

6.14. Durability test (to be defined or Amtec-Kistler test according to ISO 20566)

The experts were of the opinion that the abrasion and weathering tests cover the assessment of durability. They found not necessary to have a dedicated test addressing durability.

Conclusion: durability test deleted from the list of tests to be performed on plastic glazing.

6.15. Weathering test (to be defined) (Annex3, paragraph 6.4.)

Adopted in principle.

6.16. Cross cut test for measuring adhesion properties of coatings (Annex 3, paragraph 13)

Adopted in principle.

6.17. Flexibility test (Annex 3, paragraph 12)

The European Commission pointed out that the windscreen must anyway be rigid because it usually participates to the rigidity of the vehicle, and hence considered not necessary to have a test addressing rigidity.

The group however found necessary to verify that the windscreen is really rigid in order to avoid too flexible panes.

Conclusion: item “flexibility test” is kept in the list of tests to be performed on plastic glazing.

6.18. Others

The European Commission drew the attention of the group on some European legislation, not existing in the UNECE framework, on demist/defrost in the text covering the driver’s field of vision (Directive 661/2009).

France raised the potential problem of the change of colour in case of hot air for defrost. The expert suggested to investigate a test addressing cycles of T° changes. The expert was concerned that the test currently proposed in Annex 3, paragraph 8 is only one half cycle. Mr. Benyahia (Saint-Gobain) informed having no field experience of colour change due to T° changes. He was of the opinion that the raw material suppliers should indicate the group whether there is risk. Bayer pointed out that the T° does not change the colour, on the contrary the colour makes the T° change. A colour change can be easily seen in the transmission test. France however made an official request for input from the plastic glazing suppliers about the quality of their product, and on whether the

tests proposed in Annex 3, paragraph 8 are sufficient for plastic glazing. The expert from France recalled the example of the headlamp coverings with PC which were of bad quality in the.

The Chair was of the opinion that the vehicle manufacturers should report about their experience with the approval of plastic side windows. St Gobain reminded that the aim is to avoid the diffusion of products of bad quality on the market and was confident that the market will regulate this aspect, taking the PVV inside the windscreens as a good example. He warned the experts not to overregulate by adding new tests for 5% of products which would anyway be rejected by other existing tests.

Vinçotte International suggested introducing a sequence of tests such as a 1<sup>st</sup> addressing T° change, then second one addressing abrasion (combination of tests). This suggestion however received mitigated comments. On the one hand, the experts were reluctant to combine two ageing tests, in addition it was felt overregulation to add unnecessary tests (glass plastic windscreen do not report any ageing problems). Some experts were sceptical about overloading new products just because we imagine there could be some problem in the future. Also, it seems the current testing criteria guarantee a good safety level for the moment and there is experience for T° change for glass plastic glazing. Should the new material show weaknesses in the future, it is always possible to amend the regulation as necessary.

KRD raised the concern of the dilatation of the windscreen noting that e.g. a PC windscreen could dilate by about 6mm.

Bayer raised the concern that some tests may not be relevant to the material. Some current materials are able to withstand the tests currently in the Regulation, but present weaknesses in real life. They would withstand e.g. the Taber test, but not the carwash test because the brushes can enter between the hard nanoparticle ranks/layers, and in practice the material would not be that good. The Taber test would not be appropriate in all cases to discriminate bad vs good materials. The expert suggested to make a list of existing abrasion tests, in order to choose among the list which are the relevant ones.

The group also held a short debate about the lack of existing definition of windscreen in the current text of UNECE R43. Such definition however does exist in gtr6:  
*“Windscreen means the glazing in front of the driver through which the driver views the road ahead”.*

## **7. Review of the draft regulatory text**

Document: ECE/TRANS/WP.29/GRSG/2009/8 (D)

The informal group started to consider document GRSG/2009/8 from page 9 with paragraph 3 “Flexibility Test” (discussion of rigidity of windscreens) and went on to paragraph 4 “Headform Test” on a complete windscreen ( discussion of pass-rates) and ended with 5 Ball Test (discussion on drop heights) because of limited time..

## **8. Any other business**

## 9. List of action items for next IG meeting

### 9.1. Establishment of a Task-force for conducting a round Robin test for the Taber test

Objective:

- answering the question “do the test laboratories all get the same results when performing the abrasion Taber test?”
- clarifying and completing the test method, including the test machine and the characteristics of the wheels

Working plan: Task-Force to act in 2 steps.

- 1<sup>st</sup> step: defining what are the variations in the results.
- 2<sup>nd</sup> step: deciding what to do for improving the situation

Task-Force members:

Company	Action requested	Contact expert	Coordinate
Saint Gobain (Freeglass)	provide the 3 glass samples without hole to each test laboratories	Mr. Rym BENYAHIA	rym.benyahia@saint-gobain.com
		Mrs. Daniela JAHN	Daniela.Jahn@saint-gobain.com
		Mrs. Brigitte NEIFER	brigitte.neifer@saint-gobain.com
TUV SUD Czech Republic	Perform test according to ISO 3537 (ISO/TC 22 / SC 11 N 528)  Results to be provided for the next meeting of the informal group	Mr. Jan PROCHAZKA	prochazka@ktg.cz
Vinçotte International		Mr. Francis GILLIS	fgilis@vincotte.be
UTAC		Mr. Olivier BOELAERTS	oboelaerts@vincotte.be
Sabic (suggest to invite Taber, contact under responsibility of Nicole)	provide the 3 plastic samples to each test laboratories	Mr. Christian PICHON	christian.pichon@utac.com
		Mrs. Nicole PAULL	npaull@exatec.biz
NSG	provide the 3 plastic samples to each test laboratories	Mr. Matteo TERRAGNI	matteo.terragni@sabic-ip.com
		Mr. Gerd HELMICH	gerd.helmich@nsg.com
Bayer (Chair)	Perform test according to ISO 3537 (ISO/TC 22 / SC 11 N 528)  Results to be provided for the next meeting of the informal group	Dr. Frank BUCKEL	frank.buckel@bayer.com

<b>Company</b>	<b>Action requested</b>	<b>Contact expert</b>	<b>Coordinate</b>
KRD	Perform test according to ISO 3537 (ISO/TC 22 / SC 11 N 528)  Results to be provided for the next meeting of the informal group	Dr. Jürgen SCHMITZ	juergen.schmitz@krd-gruppe.de
MPA	Perform test according to ISO 3537 (ISO/TC 22 / SC 11 N 528)  Results to be provided for the next meeting of the informal group	Dr. Matthias DUEMMLER	duemmler@mpanrw.de
Daimler AG		Mr. Matthias ESSER	Matthias.esser@daimler.com
Taber Industries		Mr. Alan JAENECKE	jaenecke_a@taberindustries.com
MPA		Mr. Dümmler	duemmler@mpanrw.de
WEBASTO		Mr. Kaindle Mr. Lang	Roland.Kaindl@webasto.com Andreas.Lang@webasto.com
Polyplastic	Will provide 3 samples to each test house, but will not participate in testing	Mr. Victor RIJKAART	v.rijkaart@polyplastic.nl
LCOE	Will not participate in testing	Mr. Salinero	ssalinero@lcoe.etsii.upm.es

9.2. Laboratories commit to provide the results of their internal inquiry on Resistance to T° changes (see item 6.11 above) at GRSG-IGPG-02 (June 2011)

9.3. Informal group to establish a list of abrasion tests

9.4. Informal group to address COP measures. Annex (20) to be amended for integrating the plastic windscreens

## 10. Schedule for further IG meetings

Document: GRSG-99-25 (D)

IGPG-02 on 14-15 June 2011, venue to be decided (Hamburg, Bonn or Paris)

IGPG-03 on 21-22 November 2011 in Leverkusen (Cologne)

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