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## **2<sup>th</sup> Meeting: Electric Vehicles Post-Crash (EVPC)**

**Paris – Comité des Constructeurs Français d'Automobiles**

**13 January 2010**

**14 January 2010**

### **Meeting Report**

At the beginning of the meeting Serge Ficheux welcomed the attendees of the meeting. He informed that he and Pierre Castaing will chair the meeting together with Thomas Goldbach as the Secretary of the group.

He made also clear that the expert group is not an ad-hoc group of ELSA. Therefore the name of the group changed from "ad-hoc ELSA" to "Electric Vehicle Post-Crash" (EVPC).

It is the intention of the group to discuss in a first step only the amendment of ECE R94. As soon as it is finalized the amendment of ECE R95 will be made in the same way as both regulations have the same structure.

The action items out of the second EVPC meeting are listed in table 1 in the annex to this document.

#### **Agenda (EVPC-2-1)**

TRL informed that the European Commission assigned a study about electric vehicles. Therefore they asked for the possibility to make a presentation about "Review of type-approval legislation and potential risks". It was agreed to have the presentation on the second day.

With the above amendment the agenda was agreed.

#### **Report about the first EVPC meeting (EVPC-1-2)**

The secretary gave a short summary of the first Meeting of the group based on the report.

The representative from BMW asked for the following corrections of the Meeting Minutes:

- It has to be mentioned that BMW distributed an alternative proposal how the post crash requirements can be incorporated into the legal frame work. Furthermore he asked for the possibility to discuss the proposal.
- As EVPC is not an official ELSA group the documents of the first meeting are no ELSA documents
- The discussion about the strategy how to incorporate the post crash requirements into the legal framework took not place.
- It was not clearly mentioned that for the second meeting the passive safety experts should been invited.

With above corrections the meeting minutes were agreed.

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**Oral report about the 46. GRSP:****i) Electric safety requirements in ECE R100 (for information only)**

As the Secretary of ELSA attended the 46. session of GRSP he gave an overview about the outcome:

- **EVPC-2-9//GRSP-46-20** (from ELSA) gave an overview what happened in between GRSP 45 and 46.
- GRSP discussed document **EVPC-2-7// GRSP/2009/16** (from ELSA) amending ECE R100 page by page.
- The outcome of the discussion are **EVPC-2-2//GRSP-46-31** (by GRSP agreed amendments of ECE R100) and **EVPC-2-6//ECE/TRANS/WP.29/2010/52** (official document for March 2010 session of WP.29)
- In document **EVPC-2-2// GRSP-46-31** also the additional amendments agreed during the GRSP meeting are indicated.

**ii) Electric safety requirements in ECE R94**

Serge Ficheux introduced for France the proposed amendments of ECE R94 during GRSP. Therefore he gave an oral report to EVPC. He informed that he presented document **EVPC-2-11//GRSP-46-27 Rev. 1** which is based on the informal document **EVPC-2-8//GRSP-46-4**. The presentation was well recognized by GRSP. The chair expressed her hope that for the 47. GRSP in May 2010 working documents amending R94 and R95 will be available.

With informal document **EVPC-2-3//GRSP-46-37** French and Japan made clear that in **EVPC-2-11//GRSP-46-27 Rev. 1** it has to be added that the Japanese Technical Standard (Attachment 111) has to be mentioned as one basis for the activity of EVPC.

**Interface of the expert group to ISO:**

On the first day of the meeting Randy Dey representing the ISO organization attended the meeting. He informed that he is interested in getting an overview what the group is dealing with. Furthermore he wanted to be informed how the requirements of US FMVSS 305 are considered for the amendment of ECE R94/R95.

As EVPC group is working under the scope of the 1958 Agreement. The US standard FMVSS 305 will not be considered. But the US standard has to be considered for the further work of ELSA.

**8<sup>th</sup> Meeting of ELSA:**

The chair of ELSA informed that the 8<sup>th</sup> Meeting of ELSA in Washington was canceled. As soon as the US government published the re-write of FMVSS 305 NHTSA will invite for a meeting.

**Discussion how to amend ECE R94/R95**

Before the expert group could discuss the details how to amend ECE R94 it was necessary to decide which document(s) should be the basis for the further work. The following documents were available:

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**EVPC-2-8//GRSP-46-04 from France:**

This document was the outcome of first meeting of EVPC in Paris.

**EVPC-2-4 from Japan:**

This document combines the outcome of ELSA's 4<sup>th</sup> meeting regarding "post-crash", the French document **EVPC-2-8** and the proposals from Japan.

**EVPC-2-15 from OICA:**

This document combines **EVPC-2-4** and an industry proposal from German passive safety experts.

**The members of EVPC decided to use document EVPC-2-15.**

This proposal from OICA was structured in the following way:

- new definitions are mentioned under 2
- under 3 it has to be mentioned that some description for application for approval have to be delivered
- new annex 11 contains all the requirements regarding electric safety

It was decided by the group that the new definitions should be discussed after the technical amendments of R94 are agreed. Therefore the group started with the new annex 11.

During the discussion it became clear that there are also valid arguments to have the requirements in the main body of the Regulation. For the further work the chair of the group asked the representatives of the different parties what they prefer. France, United Kingdom, European Commission and the Netherlands mentioned that they are in favor of having the requirements in the main body of the Regulation and only the tests should be in the new Annex 11. Japan, Germany and OICA were in favor of having also the requirements in the new Annex 11. Therefore the group followed the majority and decided to incorporate the requirements in the main body of the Regulation.

**Amendments of ECE R94 (see EVPC-2-13):****Title of R94:**

No one was in favor of changing it. Therefore the title stays as it is.

**1. Scope:**

It was discussed whether the scope of the regulation has to be changed. But the new paragraph 5.2.8 clear states that only components or systems galvanically connected to the high voltage bus have to fulfill the electric safety requirements. Therefore an amendment of the scope is not necessary.

**2. Definitions:**

Proposed new definitions for electric safety were not been discussed because of lack of time and will be discussed during the 3<sup>rd</sup> meeting.

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**3. Application for approval:**

It was agreed that the application for approval has to be accompanied by a general description of the electric power source type, the location and the electric power train. Therefore paragraph 3.2.6 was added.

**4. Approval:**

No changes proposed.

**5. Specifications /5.2 Specifications:**

Paragraph 5.2 was amended in the way that it mentions now that vehicles equipped with electric power train have to fulfill in addition to the existing requirements the specifications mentioned under new paragraph 5.2.8.

Furthermore it is mentioned that the fulfillment of the specifications can be demonstrated by a separate test.

The amendment is still in brackets and has to be decided during the upcoming 3<sup>rd</sup> meeting.

New paragraph 5.2.8 with its subparagraphs describes the requirements about electric safety.

Regarding protection against electric shock one of the following alternatives has to be considered:

- Absence of high voltage
- Low electrical Energy
- Physical Protection
- Isolation resistance

The Japanese representative mentioned that in Japan only “isolation resistance” together with “direct contact” is allowed. He promised to discuss the topic again in Japan. Furthermore it was agreed that OICA should also discuss the necessity of a combination of the requirements.

As it was agreed by EVPC that there are 4 alternatives for protection against electric shock an automatic disconnection is not in general required.

France asked the question what the RESS has to fulfill. The answer is that the RESS is part of the electric power train and therefore it has to fulfill the specifications regarding electric shock.

Furthermore specifications regarding “electrolyte spillage” and “RESS retention” are mentioned under the new paragraph 5.2.

Regarding electrolyte spillage OICA has to come up with a justification whether 5 liters or 7% of the electrolyte should be the allowed amount of spillage. It was mentioned that the 7% are out of ECE R12 and that the 5 liters are mentioned in the US standard FMVSS 305.

Whether RESS is the wording which should be used for the energy storage system or not has to be decided during the 3<sup>rd</sup> meeting. Therefore RESS is still in brackets.

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**6. Instructions for users of vehicles equipped with airbags**

No changes proposed.

**7. Modification and extension of approval of the vehicle type**

No changes proposed.

**8. Conformity of production**

No changes proposed.

**9. Penalties for non-conformity of production**

No changes proposed.

**10. Production definitely discontinued**

No changes proposed.

**11. Transitional provisions**

No changes proposed.

**12. Names and addresses of Technical Service responsible for conducting approval tests, and of administrative departments**

No changes proposed.

**Annex 1: Communication**

New paragraph 5.3 requires a description of the location of the electric power source.

**Annex 2: Arrangements of the approval mark**

No changes proposed.

*(Remark: If the proposed amendments of R94 will become the 02 series amendments of this annex are necessary.)*

**Annex 3: Test procedure**

Paragraph 1.4.1 “General specification” was amended.

It should be allowed by the request of the manufacturer to perform the test with the engine or the energy conversion system running. Furthermore an appropriated amount of fuel can be used.

Paragraph 1.4.2.2 was amended.

Alternative gas or alternative liquid should be allowed during the tests.

New paragraph 1.4.4 “Electric power train adjustment” was added.

**Annex 4: Determination of performance criteria**

No changes proposed.

**Annex 5: Arrangement and installation of dummies and adjustment of restraint systems**

No changes proposed.

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**Annex 6: Procedure for determining the “H” point and the actual torso angle for seating positions in motor vehicles**

No changes proposed.

**Annex 6 – Appendix 1: Description of the three-dimensional “H” point machine**

No changes proposed.

**Annex 6 – Appendix 2: Three-dimensional reference system**

No changes proposed.

**Annex 6 – Appendix 3: Reference data concerning seating positions**

No changes proposed.

**Annex 7 – Test procedure with trolley**

No changes proposed.

**Annex 7 – Appendix: Equivalence curve – Tolerance band for curve**

$\Delta V = f(t)$

No changes proposed.

**Annex 8: Technique of measurement in measurement tests: instrumentation**

No changes proposed.

**Annex 9: Definition of deformable barrier**

No changes proposed.

**Annex 10: Certification procedure for the dummy lower leg and foot**

No changes proposed.

**New Annex 11: Protection of the occupants of vehicles operating on electric power [against/from] high voltage and electrolyte spillage**

It has to be checked by a native speaker whether “against” or “from” is the right word in the title.

New Annex 11 describes the test procedures to be followed to demonstrate that the vehicle fulfills the requirements defined under 5.2.8.

For the tests it is evident that the vehicle is in an “active driving possible mode”. Does the manufacturer want to conduct the tests without flammable fuel also it is necessary for an “active driving possible mode” he has to follow the requirements specified in Annex XX. This is also valid when the alternative gas or liquid is stored instead of hydrogen gas or liquid hydrogen. While the procedure of Annex XX is not finalized the introduction of Annex 11 is still in brackets. OICA has to come up with a proposal for Annex XX.

Under 2.2 the requirement that the measurement has to be made 5 s after the impact is in brackets. The discussion in the group made clear that the

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measurement has to be made within the 5 s or in between two time limits. OICA has to come up with a proposal for the 3<sup>rd</sup> meeting.

Under 2.3 the 5 seconds are also in brackets as under 2.2 above.

Under 2.4 the EVPC experts have to decide whether the wording has to be “original physical protection” or only “physical protection”.

Under 2.5 OICA has to justify the measurement of Vb before the crash and the requirement that Vb has to be equal or greater than the nominal operating voltage as defined by the manufacturer.

OICA has also to demonstrate why it should be possible to calculate or simulate Vb instead of measuring it after the crash.

Content of Annex XX has to be finalized by OICA.

**Presentation by TRL:**

During the second day TRL made a presentation with the topic “Electric vehicles: Review of type-approval legislation and potential risks” (see EVPC-2-12).

**Outlook:**

During the meeting of EVPC it was mentioned that the deadline for working documents for the 47. GRSP is 19.02.2010. France mentioned that there may be the possibility to send document EVPC-2-13 (or a document based on this document) and a similar document amending ECE R95 before the deadline to Geneva. These two documents could then be amended by the outcome of the third meeting of EVPC via informal documents. Such an approach could help that already the next GRSP agrees the documents and will send them to WP.29. But EVPC does not decide whether this approach should be followed or not.

**Next Meeting:**

Date: 11. / 12.03.2010

Venue: Paris (Remark: *The Meeting will now take place in Bonn.*)

Thomas Goldbach,

15.02.2010

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**Table 1 (2<sup>nd</sup> EVPC meeting in Paris)**

<b>“post-crash”</b>		
<b>Where</b>	<b>What</b>	<b>Who</b>
2. Definitions	Check and agree which new definitions are necessary for the introduction of the electric safety requirements into ECE R94 <b>Status:</b> OICA should come up with an proposal	OICA/EVPC <b>open</b>
5.2	The amendment of 5.2 is still in brackets and has to be decided during the upcoming 3 <sup>rd</sup> meeting. <b>Status:</b> EVPC has to decide	EVPC <b>open</b>
5.2.8	The Japanese representative mentioned that in Japan only “isolation resistance” together with “direct contact” is allowed. He promised to discuss the topic again in Japan. Furthermore it was agreed that OICA should also discuss the necessity of a combination of the requirements. <b>Status:</b> Discussion in Japan and at OICA ongoing	Japan / OICA <b>open</b>
5.2.8.2	Regarding electrolyte spillage OICA has to come up with a justification whether 5 liters or 7% of the electrolyte should be the allowed amount of spillage. <b>Status:</b> OICA should come up with an proposal	OICA <b>open</b>
5.2.8.3	Whether RESS is the wording which should be used for the energy storage system or not has to be decided during the 3 <sup>rd</sup> meeting. <b>Status:</b> EVPC has to decide	EVPC <b>open</b>
Annex 2	<i>Remark: If the proposed amendments of R94 will become the 02 series amendments of this annex are necessary.</i> <b>Status:</b> OICA should come up with a proposal	OICA <b>open</b>
Annex 11	It has to be checked by a native speaker whether “against” or “from” is the right word in the title. <b>Status:</b> Still open	EVPC/native speaker <b>open</b>



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Where	What	Who
Annex 11 2.2 and 2.3	The discussion in the group made clear that the measurement has to be made within the 5 s or in between two time limits. <b>Status:</b> OICA has to come up with a proposal for the 3 <sup>rd</sup> meeting	OICA <b>open</b>
Annex 11 2.4	The EVPC experts have to decide whether the wording has to be “original physical protection” or only “physical protection” <b>Status:</b> Decision still pending	EVPC <b>open</b>
Annex 11 2.5	<ul style="list-style-type: none"> <li>• OICA has to justify the measurement of Vb before the crash and the requirement that Vb has to be equal or greater than the nominal operating voltage as defined by the manufacturer.</li> <li>• OICA has also to demonstrate why it should be possible to calculate or simulate Vb instead of measuring it after the crash.</li> </ul> <b>Status:</b> OICA has to come up with a justification	OICA <b>open</b>
Annex XX	This annex which is dealing with the requirements of an alternative test method when vehicle does not become energized has to be finalized. <b>Status:</b> OICA has to come up with a proposal.	OICA <b>open</b>