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Report of the Working Party on Passive Safety on its forty-seventh session

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I. Attendance

1. The Working Party on Passive Safety (GRSP) held its forty-seventh session from 17 to 21 May 2010 in Geneva, under the chairmanship of Mrs. S. Meyerson (United States of America). Experts from the following countries participated in the work following Rule 1(a) of the Rules of Procedure of the World Forum for Harmonization of Vehicle Regulations (WP.29) (TRANS/WP.29/690 and Amend.1): Australia, Canada; China; Czech Republic; France; Germany; Hungary; India; Italy; Japan; New Zealand; Netherlands; Norway; Poland; Republic of Korea; Russian Federation; Spain; Sweden; Switzerland; United Kingdom of Great Britain and Northern Ireland and United States of America. An expert from the European Commission (EC) participated. Experts from the following non-governmental organizations participated: International Organization of Motor Vehicle Manufacturers (OICA); European Association of Automotive Suppliers (CLEPA); Consumers International (CI) and Foundation for the Automobile and Society (FIA Foundation).
2. The informal documents distributed during the session are listed in Annex I to this report.

II. Adoption of the agenda (agenda item 1)

Documentation: ECE/TRANS/WP.29/GRSP/2010/1 and
ECE/TRANS/WP.29/GRSP/2010/1/Add.1,
Informal document No. GRSP-47-05

3. GRSP adopted the agenda proposed for the forty-seventh session with the new agenda items 24.3 to 24.7 and 25 (see paras. 48, 49, 50, 51, 52 and 53) (ECE/TRANS/WP.29/GRSP/2010/1 and ECE/TRANS/WP.29/GRSP/2010/1/Add.1) as well as the running order (GRSP-47-05). The list of informal groups of GRSP is contained in Annex IX to this report.

III. Global technical regulation No. 1 (Door locks and door retention components) (agenda item 2)

Documentation: ECE/TRANS/WP.29/GRSP/2009/2,
ECE/TRANS/WP.29/GRSP/2008/3,
ECE/TRANS/WP.29/GRSP/2008/4,
ECE/TRANS/WP.29/GRSP/2008/20, ECE/TRANS/WP.29/AC.3/18
Informal documents Nos. GRSP-47-08 and GRSP-47-20

4. The expert from the United States of America introduced GRSP-47-08, superseding ECE/TRANS/WP.29/GRSP/2008/3, ECE/TRANS/WP.29/GRSP/2008/4 and ECE/TRANS/WP.29/AC.3/18, as the final consolidated proposal for amendments to gtr No. 1. The proposal received some comments to paragraph 5.2.4.2.1., amongst other (direction of the test sphere from interior to exterior regarding the protection of occupants against ejection), and study reservation. Regarding the provisions for side doors that open vertically, the expert from the European Commission introduced GRSP-47-20, superseding ECE/TRANS/WP.29/GRSP/2009/2 and ECE/TRANS/WP.29/GRSP/2008/20 on doors that open vertically. GRSP agreed to resume discussion on this agenda item and requested the secretariat to distribute GRSP-47-08 with an official symbol at its December 2010 session. Regarding the issue of doors that open

vertically, GRSP also agreed to resume discussion at its next session on the basis of an updated version of GRSP-47-20, voluntarily prepared by the expert from EC.

IV. Global technical regulation No. 7 (Head restraints) (agenda item 3)

Documentation: Informal documents Nos. WP.29-150-26, GRSP-47-16/Rev.1 and GRSP-47-17/Rev.1

5. The expert from the United Kingdom introduced the first status report (GRSP-47-16/Rev.1) on the progress of work of the informal group on gtr No. 7 phase 2. The expert from Japan complemented GRSP-47-16/Rev.1 with a table (GRSP-47-17/Rev.1) showing the open issues on the amendment proposed to the gtr. Finally, GRSP requested the secretariat to submit GRSP-47-16/Rev.1 with an official symbol to the World Forum for Harmonization of Vehicle Regulations (WP.29) and the Executive Committee of the 1998 Agreement (AC.3) at their November 2010 session (see ECE/TRANS/WP.29/2010/136)

V. Global technical regulation No. 9 (Pedestrian safety) (agenda item 4)

A. Phase 2 of the global technical regulation (Flexible legform impactor provisions) (agenda item 4.1)

Documentation: ECE/TRANS/WP.29/GRSP/2010/2,
ECE/TRANS/WP.29/GRSP/2010/2/Corr.1,
ECE/TRANS/WP.29/GRSP/2010/4,
Informal documents Nos. GRSP-47-12, GRSP-47-13, GRSP-47-32
and GRSP-47-34

6. GRSP noted that AC.3 at its March 2010 session (ECE/TRANS/WP.29/1083, para. 90) had recommended GRSP to consider alternative solutions instead of transitional provisions regarding a suitable transition between the two legform impactors. The expert from Japan introduced GRSP-47-32, as a compromise proposal regarding the remaining pending issues (encompassing GRSP-47-13 and superseding ECE/TRANS/WP.29/GRSP/2010/2 and ECE/TRANS/WP.29/GRSP/2010/2/Corr.1). He also introduced the status report on the flexible pedestrian legform (Flex-PLI) prepared by the Flex-PLI technical evaluation group (GRSP-47-12). The expert from United States of America confirmed her disagreement with fixing any precise lead time in the gtr and expressed concerns on the durability of the Flex-PLI as a test tool. The expert from OICA urged for a solution to the general issue of proper lead times in the global technical regulations in order to make more effective the 1998 Agreement. He also strongly opposed the suggestion to introduce the FlexPLI impactor as an option, at the discretion of the Contracting Parties, since this would run counter to harmonization and cannot be accepted; such an approach of coexistence of the two test tools as options could possibly cause incompatibility of vehicle designs. Moreover, the expert from United Kingdom expressed concerns on the lack of objective benefits introduced by the proposal tabled by the expert from Japan and advised in depth discussion to ascertain the proper time to introduce the Flex-PLI. Finally, the expert from Japan introduced a table (GRSP-47-34), showing the main pending issues and requested further comments from GRSP experts to his proposal (GRSP-47-32) before submitting it as an official document at the 2010 December session of GRSP.

7. GRSP endorsed in principle the incorporation of the Flex-PLI into the gtr No. 9 and in a future amendment of the draft Regulation of the 1958 Agreement on the same subject. Finally, GRSP agreed to resume discussion at its next session on the basis of a revised proposal voluntarily prepared by the expert from Japan.

B. Proposal for Amendment 1 to global technical regulation No. 9 (agenda item 4.2)

Documentation: ECE/TRANS/WP.29/GRSP/2010/5,
ECE/TRANS/WP.29/GRSP/2010/6,
Informal document No. GRSP-47-18/Rev.2

8. GRSP considered ECE/TRANS/WP.29/GRSP/2010/6 tabled by the expert from Germany regarding the introduction in the gtr of a tolerance of the geometric criteria that determines the exemption of flat front vehicles (approved as categories 1-2 and 2 or as category 1-1 with a gross vehicle mass exceeding 2.5 t which are derived from category 2). The expert from the United States of America introduced GRSP-47-18/Rev.2 in order to amend the preamble of the gtr accordingly.

9. GRSP recommended ECE/TRANS/WP.29/GRSP/2010/6 (amended by GRSP-47-18/Rev.2) and ECE/TRANS/WP.29/GRSP/2010/5, both as amended by Annex II to this report, for their establishment in the Global Registry by AC.3. The secretariat was requested to submit the proposal and its final report, to WP.29 and AC.3 at their November 2010 sessions, as draft Amendment 1 to global technical regulation No. 9.

C. Proposal for Corrigendum 2 to global technical regulation No. 9 (agenda item 4.3)

Documentation: ECE/TRANS/WP.29/GRSP/2010/7

10. GRSP considered and recommended ECE/TRANS/WP.29/GRSP/2010/7, not amended, for its establishment in the Global Registry by AC.3. The secretariat was requested to submit the proposal to WP.29 and AC.3 at their November 2010 session as draft Corrigendum 2 to gtr No. 9.

VI. Side impact (agenda item 5)

Documentation: ECE/TRANS/WP.29/2010/81,
ECE/TRANS/WP.29/2010/82
Informal documents Nos. GRSP-47-28, GRSP-47-30 and
GRSP-47-31

11. The expert from Australia introduced ECE/TRANS/WP.29/2010/81 and GRSP-47-28 regarding the development of a proposal for a pole side impact global technical regulation and the establishment of an informal group. Some GRSP experts stressed the need to consider in the proposal the beneficial effects introduced by the electronic stability control (ESC), in reducing the severity of collisions, before proceeding with the actual development of a gtr. The expert from the United States of America stated support and cooperation to the initiative proposed by the expert from Australia. Accordingly, she made a presentation (GRSP-47-31), showing the major provisions of the rulemaking in progress in her country on the introduction of the oblique pole test. Moreover, she introduced the first progress report GRSP-47-30 (referring also to ECE/TRANS/WP.29/2010/82) of the informal group to develop harmonized provisions for

the fiftieth male and fifth female WorldSID dummies, also as a complementary activity of the proposal to develop the gtr on pole side test.

12. GRSP endorsed the proposed harmonization activity on pole side test and the establishment of an informal group on this subject under the chairmanship of Australia, subject to the consent of WP.29 and AC.3. GRSP also agreed to send at the earliest convenience further comments to the expert from Australia (regarding GRSP-47-28 and ECE/TRANS/WP.29/2010/81), in order to allow the representative of his country to introduce a draft of term of reference of the informal group at WP.29 and AC.3 June 2010 sessions. Finally, GRSP requested the secretariat to submit GRSP-47-30 with an official symbol to WP.29 and AC.3 at their November 2010 session (see ECE/TRANS/WP.29/2010/144)

VII. Crash compatibility (agenda item 6)

13. GRSP noted that no new information was provided.

VIII. Hydrogen and fuel cell vehicles (agenda item 7)

14. The expert from the United States of America informed GRSP on the work progress of the subgroup on safety (SGS). She stated that the action plan of the gtr was revised to reflect the new completion date by the end of 2011, as agreed by AC.3 at its November 2009 session. She added that the draft includes requirements addressing the concern with over-pressurization of the system, the issue of the air-tightness and of the hydrogen storage system. Moreover, GRSP noted that notwithstanding the group's good progress, several issues still remain to be discussed, such as the finalization of electric safety requirements for both in-use and post-crash under the Electrical Safety Subgroup (ELSA). Finally, GRSP noted that the ninth and the tenth SGS meetings will be held respectively from 14th to 18th of June 2010 in Seoul, Republic of Korea and in September 2010 in the United States of America.

IX. Regulation No. 11 (Door latches and hinges) (agenda item 8)

Documentation: ECE/TRANS/WP.29/GRSP/2010/16,
ECE/TRANS/WP.29/GRSP/2010/17
Informal document No. GRSP-47-23

15. GRSP agreed to resume discussion on this agenda item at its December 2010 session, due to the lack of time and requested the secretariat to distribute GRSP-47-23 with an official symbol.

X. Regulation No. 12 (Steering mechanism) (agenda item 9)

Documentation: ECE/TRANS/WP.29/GRSP/2010/14,
ECE/TRANS/WP.29/GRSP/2010/19,
Informal documents Nos. GRSP-47-01/Rev.3, GRSP-47-22,
GRSP-47-29/Rev.2

16. GRSP noted ECE/TRANS/WP.29/GRSP/2010/19 regarding the inclusion of updated provisions for electric vehicles in the Regulation, as an outcome of the group of interested experts on "Electric Vehicles Post-Crash"(EVPC) provisions (1958 Agreement). After discussion GRSP adopted ECE/TRANS/WP.29/GRSP/2010/19, amended by

GRSP-47-01/Rev.3 (superseding GRSP-47-22) and by GRSP-47-29/Rev.2, as amended by Annex III to this report. Regarding the transitional provisions, GRSP agreed to leave them in square brackets, subject to the guidance and revision of WP.29 at its November 2010 session. This at the aim of harmonizing them with the national legislation of some Contracting Parties to the 1958 Agreement, still in progress, regarding the entry into service of electric vehicles. The secretariat was requested to submit the proposal to WP.29 and the Administrative Committee of the 1958 Agreement (AC.1), for consideration and vote at their November 2010 sessions, as draft 04 series of amendments to Regulation No. 12.

17. GRSP also considered and adopted ECE/TRANS/WP.29/GRSP/2010/14, as amended below. The secretariat was requested to submit the proposal to WP.29 and AC.1, for consideration and vote at their November 2010 sessions, as draft Corrigendum 4 to Revision 3 of Regulation No. 12.

Annex 4,

Insert a new paragraph 2.3.1., to read:

“2.3.1.

- (c) Moment of inertia about lateral axis through centre of gravity: ~~23~~ ~~2.3~~
~~kg · m²~~ **2.26 ± 0.23 kg · m²**”

...

XI. Regulation No. 14 (Safety-belt anchorages) (agenda item 10)

Documentation: ECE/TRANS/WP.29/GRSP/2010/8,
 ECE/TRANS/WP.29/GRSP/2010/9,
 ECE/TRANS/WP.29/GRSP/2010/24,
 Informal documents Nos. GRSP-47-26 and GRSP-47-33

18. GRSP noted ECE/TRANS/WP.29/GRSP/2010/8, tabled by the expert from Germany, regarding the marking of ISOFIX top tether. According to comments received by GRSP, the expert from Germany introduced GRSP-47-33, superseding ECE/TRANS/WP.29/GRSP/2010/8. Finally, GRSP agreed to resume discussion at its December 2010 session and requested the secretariat to distribute GRSP-47-33 with an official symbol.

19. GRSP also noted GRSP-47-26, tabled by the expert from Japan, in order to align the text of Regulation No. 14 with Regulation No. 16 (safety-belts), with regard to ISOFIX fixtures. GRSP agreed to resume discussion on this subject at its December 2010 session and requested the secretariat to distribute GRSP-47-26 with an official symbol.

20. Regarding the possibility of installing side-facing seats, under certain conditions, the expert from Germany introduced ECE/TRANS/WP.29/GRSP/2010/24. GRSP welcomed ECE/TRANS/WP.29/GRSP/2010/24 in principle, but taking into account the fact that this issue needs to be considered as a package together with corresponding amendments to Regulations Nos. 16, 17 and 80. GRSP agreed to resume consideration on this subject at its December 2010 session on the basis of a new proposal voluntarily prepared by the experts from Belgium and Germany.

21. The expert from Germany introduced ECE/TRANS/WP.29/GRSP/2010/9 providing rationales for the exemption to the mandatory installation of ISOFIX anchorages for vehicles with limited space in the rear row seats by the mandatory installation of ISOFIX anchorages. GRSP adopted the proposal as amended below. The secretariat was requested

to submit the proposal to WP.29 and AC.1, for consideration and vote at their November 2010 sessions, as draft Supplement 2 to the 07 series of amendments to Regulation No. 14.

Paragraph 5.3.8.3., amend to read:

“5.3.8.3. Notwithstanding paragraph 5.3.8.1....

...

- (c) having a Power to mass ratio index (PMR) exceeding **140** according to the definitions within Regulation No. 51 and
- (d) having an engine developing a maximum power greater than **200 kW**. Such a vehicle needs to have only one ISOFIX anchorage system at a front passenger designated seating position [combined with an airbag deactivation device].”

XII. Regulation No. 16 (Safety-belts) (agenda item 11)

Documentation: ECE/TRANS/WP.29/GRSP/2010/10,
ECE/TRANS/WP.29/GRSP/2010/11,
ECE/TRANS/WP.29/GRSP/2010/18,
ECE/TRANS/WP.29/GRSP/2010/25

22. According to a request from the World Forum (ECE/TRANS/WP.29/1079, para. 48) to further review the issue of the installation of safety-belts on M₂ and M₃ vehicles belonging to Class II, GRSP considered and adopted ECE/TRANS/WP.29/GRSP/2010/10 not amended. The secretariat was requested to submit the proposal to WP.29 and AC.1, for consideration and vote at their November 2010 sessions, as draft Corrigendum 2 to the 06 series of amendments to Regulation No. 16.

23. The expert from CLEPA introduced ECE/TRANS/WP.29/GRSP/2010/11, aimed at facilitating buckling up of safety-belts in vehicles through a red warning light. The expert from the United Kingdom expressed general concerns for the abuse of red tell-tales not strictly used to warn of an immediate danger. Accordingly, he suggested to the expert from CLEPA to propose at the earliest convenient session of the Working Party on General Safety Provisions, a review of this general issue in the framework of Regulation No. 121 (Identification of controls, tell-tales and indicators).

24. GRSP endorsed the suggestion of the expert from the United Kingdom and adopted ECE/TRANS/WP.29/GRSP/2010/11, as amended by Annex IV to this report. The secretariat was requested to submit the proposal to WP.29 and AC.1, for consideration and vote at their November 2010 sessions, as draft Supplement 1 to the 06 series of amendments to Regulation No. 16.

25. GRSP considered ECE/TRANS/WP.29/GRSP/2010/18 in order to align the same series of amendments for both safety-belt type and vehicle type. GRSP adopted the proposal, as amended by Annex IV to this report. The secretariat was requested to submit the proposal to WP.29 and AC.1, for consideration and vote at their November 2010 sessions, as part (see para. 24) of draft Supplement 1 to the 06 series of amendments to Regulation No. 16.

26. Regarding the corresponding proposal (ECE/TRANS/WP.29/GRSP/2010/25) for amendments to Regulation No. 16 to reintroduce side-facing seats (see para. 20), GRSP agreed to resume discussion on this subject at its December 2010 session on the basis of a new proposal voluntarily prepared by the experts from Belgium and Germany.

XIII. Regulation No. 17 (Strength of seats) (agenda item 12)

Documentation: ECE/TRANS/WP.29/GRSP/2009/15,
ECE/TRANS/WP.29/GRSP/2009/23,
ECE/TRANS/WP.29/GRSP/2009/24,
ECE/TRANS/WP.29/GRSP/2010/23

27. GRSP deferred discussion on ECE/TRANS/WP.29/GRSP/2009/15, ECE/TRANS/WP.29/GRSP/2009/23 and ECE/TRANS/WP.29/GRSP/2009/24, awaiting further outcome of the meetings of the informal group on gtr No. 7 Phase 2.

28. According to the discussion mentioned in paras. 20 and 26, GRSP agreed to resume discussion on the corresponding proposal (ECE/TRANS/WP.29/GRSP/2010/23) of amendments to Regulation No. 17 on the basis of a revised proposal voluntarily prepared by the experts from Belgium and Germany.

XIV. Regulation No. 22 (Protective helmets) (agenda item 13)

29. Due to the lack of new proposals, possibly introducing new provisions for helmets used in tropical weather and to children, GRSP agreed to defer discussion on this subject to its December 2010 session.

XV. Regulation No. 29 (Cab of a commercial vehicle) (agenda item 14)

30. The expert from the Russian Federation informed GRSP, that depending on the decision of WP.29 at its June 2010 session, he would propose either the development of the wall strength test (test D) or to discontinue discussion on this agenda item.

XVI. Regulation No. 44 (Child restraints systems) (agenda item 15)

Documentation: ECE/TRANS/WP.29/GRSP/2010/22
Informal documents Nos. GRSP-47-07 and GRSP-47-10

31. GRSP noted ECE/TRANS/WP.29/GRSP/2010/22, in order to solve interpretation issues of the test requirements of the Regulation. GRSP adopted the proposal, as amended by Annex V to this report. The secretariat was requested to submit the proposal to WP.29 and AC.1, for consideration and vote at their November 2010 sessions, as draft Corrigendum 4 to Revision 2 to Regulation No. 44.

32. The expert from the International Consumers informed GRSP about a fake certificate of an exact copy of child restraint with the type approval of the Netherlands (GRSP-47-10). Some of GRSP experts recommended undertaking actions to avoid the repetition of these cases. GRSP agreed to consider seriously this issue and to inform WP.29 at its June 2010 session.

33. GRSP noted the request (GRSP-47-07) tabled by the expert from Germany to endorse the withdrawal of the type approval of a child restraint, granted in Hungary that could affect the safety of children. GRSP did not support the request, because such case is in the purview of Contracting Parties of the Agreement.

XVII. Regulation No. 80 (Strength of seats and their anchorages (buses)) (agenda item 16)

Documentation: ECE/TRANS/WP.29/GRSP/2010/3

34. According to paras. 20, 26 and 28, GRSP agreed to resume discussion on the corresponding proposal (ECE/TRANS/WP.29/GRSP/2010/3) of amendments to Regulation No. 80 on the basis of a revised proposal voluntarily prepared by the experts from Belgium and Germany.

XVIII. Regulation No. 94 (Frontal collision) (agenda item 17)

Documentation: ECE/TRANS/WP.29/GRSP/2010/12,
ECE/TRANS/WP.29/GRSP/2010/20,
Informal documents Nos. GRSP-47-02/Rev.3, GRSP-47-04/Rev.1,
GRSP-47-09, GRSP-47-14, GRSP-47-19, GRSP-47-21,
GRSP-47-22 and GRSP-47-29/Rev.2

35. Following the outcome of the activities of the Electric Vehicle Post Crash provisions group (EVPC), the expert from France made a presentation (GRSP-47-19), to introduce into Regulations Nos. 12, 94 and 95 a set of requirements regarding the safety of electric vehicles (see para. 16 above) to protect occupants in case of collision. The expert from Germany raised concerns regarding the switching time of 60 seconds in the assessment procedure for low electrical energy (Annex 11, para. 3). GRSP agreed to reconsider this issue at its further sessions, when new outcome of research will be available. Finally, GRSP considered and adopted ECE/TRANS/WP.29/GRSP/2010/20, amended by GRSP-47-02/Rev.3 (superseding GRSP-47-22) and by GRSP-47-29/Rev.2, as amended by Annex VI to this report. The secretariat was requested to submit the proposal to WP.29 and AC.1 for consideration and vote at their November 2010 sessions as draft 02 series of amendments to Regulation No. 94. Moreover, the expert from EC withdrew GRSP-47-21, regarding the issue raised by the expert from Germany,

36. The expert from OICA introduced ECE/TRANS/WP.29/GRSP/2010/12 aimed at deleting the text from the warning label on the presence of air-bags, putting the text into the owner's manual, thus resolving the problem of the many different languages. The expert from EC introduced GRSP-47-04/Rev.1, with the same objectives as ECE/TRANS/WP.29/GRSP/2010/12, but with the additional prescriptions. The expert from IC expressed concerns (GRSP-47-09) that the warning label proposed by OICA would not deliver an acceptable level of safety. In principle, GRSP acknowledged the difficulties to translate the text of the label in many languages and the issue regarding the harmonization of the pictogram. GRSP agreed to resume discussion on this agenda item on the basis of further information provided by the interested experts. Finally, the secretariat was requested to distribute GRSP-47-04/Rev.1 with an official symbol and to retain ECE/TRANS/WP.29/GRSP/2010/12 in the agenda of its December 2010 session.

37. The Chair of the informal group on frontal collision introduced the latest status report of the informal group (GRSP-47-14). He explained that the group had difficulties at this stage to deliver a draft new Regulation No. 94 yet, and suggested that the deadline of his group should be extended to May 2011 to clarify the planning of the group. GRSP endorsed the suggestion of the Chair of the informal group and agreed to inform WP.29 at its June 2010 session.

XIX. Regulation No. 95 (Lateral collision) (agenda item 18)

Documentation: ECE/TRANS/WP.29/GRE/2010/21
Informal documents Nos. GRSP-47-03/Rev.3, GRSP-47-22 and
GRSP-47-29/Rev.2

38. The expert from France introduced GRSP-47-03/Rev.3 to propose similar provisions for electric vehicles, as for Regulations Nos. 12 and 94 (see paras. 16 and 35). Finally, GRSP considered and adopted ECE/TRANS/WP.29/GRSP/2010/21, amended by GRSP-47-03/Rev.3 (superseding GRSP-47-22) and by GRSP-47-29/Rev.2, as amended by Annex VII to this report. The secretariat was requested to submit the proposal to WP.29 and AC.1 for consideration and vote at their November 2010 sessions as draft 03 series of amendments to Regulation No. 95.

XX. Regulation No. 100 (Construction and functional safety of battery electric vehicles) (agenda item 19)

Documentation: Informal document No. GRSP-47-15

39. The expert from Germany introduced GRSP-47-15, proposing the set-up of an informal group on the construction and functional safety of high voltage electric vehicles to establish requirements for the rechargeable energy storage system (RESS). GRSP noted that the proposed activity would be finalized, particularly to the revision of fire risk provisions (Regulation No. 34) that was currently under the responsibility of GRSG. Finally, GRSP agreed to seek guidance from the Administrative Committee for the Coordination of Work (WP.29/AC.2) at its June 2010 in order to decide either:

- (a) to extend the mandate of the electric safety informal group (ELSA);
or
- (b) create a group of interested parties like that for Electric Vehicles Post Crash provisions group (EVPC);
or
- (c) to mandate a new informal group under the responsibility of both GRSP and GRSG.

XXI. Collective amendments to Regulation Nos. 12, 14, 16, 17, 21, 25, 29, 32, 33, 80, 94, 95 and 114 (agenda item 20)

Documentation: ECE/TRANS/WP.29/GRE/2010/15 and
ECE/TRANS/WP.29/GRE/2010/15/Corr.1

40. GRSP noted the reference documents. However, due to the lack of time it was agreed to defer discussion at the December 2010 session of GRSP.

XXII. Buses and coaches (agenda item 21)

A. Frontal collision of buses and coaches (agenda item 21.1)

41. GRSP agreed to discontinue discussion on this item and remove it from the agenda of its next sessions until new research on this matter would be provided.

B. Restraining of children travelling in buses and coaches (agenda item 21.2)

42. GRSP agreed to defer discussion on this item, but to keep it in the agenda of its next session in December 2010 in order to provide exchange of information on the different initiatives at the national level on this matter.

XXIII. Draft Regulation on pedestrian safety (agenda item 22)

Documentation: ECE/TRANS/WP.29/GRSP/2009/17,
ECE/TRANS/WP.29/GRSP/2010/13
Informal document No. GRSP-47-24

43. GRSP considered and adopted ECE/TRANS/WP.29/GRSP/2009/17, amended by GRSP-47-24 (superseding ECE/TRANS/WP.29/GRSP/2010/13), as amended by Annex VIII to this report. The secretariat was requested to submit the proposal to WP.29 and AC.1 for consideration and vote at their November 2010 sessions as a new draft Regulation on pedestrian safety. Furthermore, GRSP agreed to recommend to WP.29 to provide in its report, when the proposal would be adopted, suitable dates for the introduction of the new Regulation.

XXIV. Draft new Regulation on child restraint systems (agenda item 23)

Documentation: ECE/TRANS/WP.29/GRSP/2010/26
Informal documents Nos. GRSP-47-06/Rev.1, GRSP-47-11,
GRSP-47-25 and GRSP-47-27

44. The Chair of the informal group on child restraints systems (CRS) introduced the latest status report of the informal group (GRSP-47-27). He confirmed that the new Regulation would be independent from Regulation No. 44 and that this would remain valid in parallel to the new one. He added that the scope of this new regulation would cover only "ISOFIX – Universal – Integral" CRS as a first step and that it would introduce a new philosophy of classification based on standing height, maximum permissible weight (child + CRS) and age limit for forward facing use. Moreover, he informed that dummies of type Q would be the tools for frontal, rear and lateral dynamic impact tests on a new bench. Finally, he informed that the next meetings of the informal group would be held on the 30th of June and 6 to 8 September 2010, in time to submit an official revised proposal for the December 2010 session of GRSP. Accordingly, experts from GRSP made further comments (GRSP-47-25 amongst others) to the proposal and agreed to encompass them, into GRSP-47-06/Rev.1 in order to continue the detailed discussion in the informal group. GRSP agreed to resume consideration at its December 2010 session on the basis of a new revised proposal provided by the informal group on CRS and to keep GRSP-47-06/Rev.1 for reference only in the agenda of the next session.

45. GRSP also noted GRSP-47-11, reproducing the letter from a coroner, regarding the accidental death of a child in United Kingdom likely due to the CRS (type approved according to Regulation No. 44). The letter urged the introduction of severe requirements of lateral impacts into the Regulation, so that such fatalities should not recur. GRSP agreed to address GRSP-47-11 to the informal working group on CRS in view of possible revision of these requirements in the new Regulation.

XXV. Other business (agenda item 24)

A. Exchange of information on national and international requirements on passive safety (agenda item 24.1)

46. Due to the lack of new information, GRSP agreed to defer discussion of this agenda item to the next session.

B. 1997 Agreement (inspections) - Development of draft rule No. 2 (agenda item 24.2)

Documentation: ECE/TRANS/WP.29/2009/135

47. GRSP noted the request made by WP.29 at its November 2009 session (ECE/TRANS/WP.29/1079, para. 72) to examine in detail the proposal and its implications with the Regulations of the 1958 Agreement. The Chair of GRSP urged comments from experts by the December 2010 session of GRSP to be submitted to the March 2011 session of WP.29.

C. Intelligent Transport systems (ITS) - Guidelines on establishing requirements for high-priority warning signals (agenda item 24.3)

Documentation: Informal document No. WP.29-150-22

48. According to the decision of WP.29 at its March 2010 session (ECE/TRANS/WP.29/1083, para. 27), the expert from Japan introduced WP.29-150-22 concerning the guidelines on establishing requirements for high-priority warning signals. GRSP agreed to defer discussion at its December 2010 session aiming at having full comments to be submitted to the March 2011 session of WP.29.

D. Revision of the Consolidated Resolution on the Construction of Vehicles (R.E.3) (agenda item 24.4)

Documentation: ECE/TRANS/WP.29/2009/123,
ECE/TRANS/WP.29/2009/123/Corr.1,
ECE/TRANS/WP.29/2009/123/Corr.2,
ECE/TRANS/WP.29/2009/123/Corr.3,
ECE/TRANS/WP.29/2009/123/Corr.4,

49. GRSP agreed to resume discussion on this subject at its December 2010 session, awaiting the finalization of full comments by its experts, to be submitted to the March 2011 session of WP.29.

E. Development of an International Whole Vehicle Type Approval (IWVTA) system (agenda item 24.5)

Documentation: ECE/TRANS/WP.29/1083/Add.1

50. GRSP took note of ECE/TRANS/WP.29/1083/Add.1, regarding the terms of reference and rules of procedure of the informal group on the future direction for harmonization of vehicle Regulations under the 1958 Agreement.

**F. World Forum for Harmonization of Vehicle Regulations (WP.29):
Working Parties, informal groups and chairmanship (agenda item 24.6)**

Documentation: Informal document No. WP.29-150-19/Rev.1

51. GRSP took note of WP.29-150-19/Rev.1 providing the list of working parties, and informal groups under WP.29 responsibilities.

G. Tribute to Mr. F. Beisswaenger (agenda item 24.7)

52. Learning that Mr. F. Beisswaenger (Germany) would no longer participate in the GRSP sessions, the group acknowledged his valuable contribution to the GRSP work and wished him all the best in his future activities.

XXVI. Provisional agenda for the next session (agenda item 25)

53. For its forty-eighth session, scheduled to be held in Geneva from 7 (2.30 p.m.) to 10 (12.30 p.m.) December 2010, GRSP agreed that the Chair, in collaboration with the secretariat, would prepare the provisional agenda. GRSP noted that the deadline for submission of official documents to the secretariat was 10 September 2010, twelve weeks prior to the session.

Annexes

Annex I

[English only]

List of informal documents (GRSP-47-...) distributed without an official symbol during the session

| <i>No.</i> | <i>Transmitted by</i> | <i>Agenda item</i> | <i>Language</i> | <i>Title</i> | <i>Follow -up</i> |
|--------------|---|------------------------|-----------------|---|-----------------------|
| 01/ Rev.3 | France | 9 | E | Proposal for the 04 series of amendments to Regulation No. 12 (Steering mechanism) | (a) |
| 02/ Rev.3 | France | 17 | E | Proposal for 02 series of amendments to Regulation No. 94 (Frontal collision) | (a) |
| 03/ Rev.3 | France | 18 | E | Proposal for 03 series of amendments to Regulation No. 95 (Lateral collision) | (a) |
| 04/ Rev.1 | EC | 17 | E | Proposal for supplement 4 to the 01 series of amendments to Regulation No. 94 (Frontal collision) | (b) |
| 05 | Chair of GRSP | 1 | E | Agenda running order of GRSP 47th session | (a) |
| 06/ Rev.1 | France | 23 | E | Draft amendment to ECE/TRANS/WP.29/GRSP/2010/26 (CRS) | (c) |
| 07 | Germany | 15 | E | Approval of a child restraint not in line with the requirements of Regulation No. 44 (Child restraints systems) | (a) |
| 08 | United States of America | 2 | E | Proposal for Amendment 1 to global technical regulation No. 1 (Door locks and door retention components) | (b) |
| 09 | Consumer International, FIA, FIA Foundation, ANEC | 17 | E | Comments from consumer groups to ECE/TRANS/WP.29/GRSP/2010/12 | (c) |
| 10 | Consumer International, FIA, FIA Foundation, ANEC | 15 | E | Pirated child restraint system with false ECE approval marks | (a) |

| <i>No.</i> | <i>Transmitted by</i> | <i>Agenda of item</i> | <i>Language</i> | <i>Title</i> | <i>Follow -up</i> |
|--------------|--|-------------------------------|-----------------|---|-----------------------|
| 11 | Chair GRSP | of 23 | E | Accidental death of a child in United Kingdom likely due to child restraints system | (a) |
| 12 | Japan | 4.1 | E | Status Report on Flexible Pedestrian Legform Impactor Technical Evaluation Group (Flex-TEG) | (a) |
| 13 | Japan | 4.1 | E | Proposal for corrigendum to proposal to develop amendments to global technical regulation No. 9 (pedestrian safety) (ECE/TRANS/WP.29/GRSP/2010/2) | (a) |
| 14 | Chair of frontal impact informal group | 17 | E | Status report of the informal group on frontal impact | (a) |
| 15 | Germany | 19 | E | Proposal to set up an Expert Group on the construction and functional safety of high voltage vehicles to establish requirements for the RESS (Rechargeable Energy Storage System) | (c) |
| 16/ Rev.1 | Japan | 3 | E | First progress report of the informal working group on gtr No.7 (head restraint) Phase 2 | (d) |
| 17/ Rev.1 | Japan | 3 | E | Head restraint gtr Phase 2 status and open issues | (a) |
| 18/ Rev.2 | United States of America | 4.1 | E | Proposal for amendments to global technical regulation No. 9 (Pedestrian safety) | (a) |
| 19 | France | 17 | E | Proposal from the expert from France based on the outcome of the electric vehicle post crash provision group of interested experts | (a) |
| 20 | United States of America and EC | 2 | E | Proposal for an amendment to global technical regulation No. 1 (Door locks and door retention components) | (a) |
| 21 | EC | 17 | E | Proposal for corrigendum 3 to the 01 series of amendments to Regulation No. 94 (Frontal collision) | (a) |
| 22 | France | 9, 17 and 18 | E | Specifications and performance criteria of Regulations Nos. 12, 94 and 95 | (a) |
| 23 | OICA | 8 | E | Proposal for Supplement 2 to the 03 series of amendments to Regulation No. 11 | (b) |
| 24 | OICA | 22 | E | Proposal of amendments to ECE/TRANS/WP.29/GRSP/2009/17 - draft UNECE Regulation on pedestrian | (a) |

| <i>No.</i> | <i>Transmitted by</i> | <i>Agenda item</i> | <i>Language</i> | <i>Title</i> | <i>Follow -up</i> |
|--|------------------------------------|------------------------|-----------------|---|-----------------------|
| | | | | safety | |
| 25 | OICA | 23 | E | Comments to GRSP-47-06 | (a) |
| 26 | Japan | 10 | E | Proposed corrigendum to Regulation No. 14 (Safety-belt anchorages) | (b) |
| 27 | Chair of the informal group on CRS | 23 | E | Status report of the informal group on child restraints systems | (a) |
| 28 | Australia | 5 | E | Establishment of an Informal Group to examine a proposal for a pole side impact global technical regulation | (a) |
| 29/ Rev.2 | United Kingdom | 9, 17 and 18 | E | Transitional Provisions associated with the proposed revisions to Regulations Nos. 12, 94 and 95. | (a) |
| 30 | United States of America | 5 | E | Draft 1st progress report informal working group to develop the 50th male and 5th female WorldSID dummies | (d) |
| 31 | United States of America | 5 | E | US Side Impact Protection Rule | (a) |
| 32 | Japan | 4.1 | E | Proposal for amendments to global technical regulation No. 9 | (c) |
| 33 | OICA and Germany | 10 | E | Proposal of amendments to ECE/TRANS/WP.29/GRSP/2010/8 | (c) |
| 34 | Japan | 4.1 | E | Proposal for amendments to global technical regulation No. 9 | (a) |
| Consideration of informal documents from the previous GRSP sessions (referring to the agenda item of the current GRSP session) | | | | | |
| 46–40 | EC | 8 | E | Proposal for draft amendments to ECE/TRANS/WP.29/GRSP/2009/22 (Regulation No. 11 - Door latches and hinges) | (a) |
| 46–03 | The Netherlands | 8 | E | Proposal of amendments to Regulation No. 11 (Door latches and hinges) | (a) |
| 45–13 | Germany | 10 | E | Proposal for draft amendments to Regulation No. 14 - Safety-belt anchorages | (a) |
| 46–14 | Germany and Belgium | 10 | E | Proposal for Supplement 2 to the 07 series of amendments to Regulation No. 14 (Safety-belt anchorages) | (a) |
| 46–02 | Germany | 11 | E | Proposal of amendments to Regulation No. 16 (Safety-belts) | (a) |

| <i>No.</i> | <i>Transmitted by</i> | <i>Agenda item</i> | <i>Language</i> | <i>Title</i> | <i>Follow -up</i> |
|------------|---|------------------------|-----------------|--|-----------------------|
| 46-15 | Germany and Belgium | 11 | E | Proposal for Supplement 1 to the 06 series of amendments to Regulation No. 16 (Safety-belts) | (a) |
| 46-19 | Germany | 16 | E | Proposal for amendments to Regulation No. 80 (Strength of seats(buses)) | (a) |
| 44-26 | Chair of the GRSP Frontal Impact Informal Group | 21.1 | E | GRSP 46th session – Status report of the informal group | (a) |
| 44-29 | Spain | 21.2 | E | Status of CRS in buses and coaches | (a) |

Notes:

- (a) Consideration completed or superseded
- (b) Continue consideration at the next session with an official symbol
- (c) Continue consideration at the next session as informal document
- (d) Adopted and to be submitted to WP.29

Annex II

Amendments to gtr No. 9

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/6
(see para. 9 of the report)

Statement of technical rationale and justification

Paragraph 55, amend to read:

“55. While this approach...close to the vertical. Because of the short, vertical bonnet, the design leaves very little soft space once the hinges, latches, and other hardware are considered. There are additionally feasibility concerns for the bumpers of these vehicles. The different shape of the front leaves little room to incorporate existing countermeasures, such as those used on passenger vehicles, and new countermeasures have not been identified. The pedestrian kinematics with these vehicles may be very different. The head to bonnet impact is occurring earlier and leg injuries are occurring at a reduced frequency than with traditional long bonnet vehicles. In addition, there are difficulties in applying the head tests to these vehicles, particularly with regard to determination of test zone reference lines.¹⁵ For these reason, the group recommends that those vehicles of category 1-2 and category 2, where the distance, measured longitudinally on a horizontal plane, between the transverse centre line of the front axle and the R-point of the driver's seat is less than 1,100 mm, be exempt from the requirements of the regulation. To prevent inconsistencies in the market, Contracting Parties can exempt category 1-1 vehicles if they have components of the front structure that are interchangeable with exempted category 1-2 and category 2 vehicles. The group agreed to recommend allowing Contracting Parties this option even though not all Contracting Parties have these vehicles in their fleet and were therefore not able to fully evaluate the exemption.”

Paragraph 74, the reference to footnote ¹⁵ and footnote ¹⁵, renumber as footnote ¹⁶

Paragraph 78, the reference to footnote ¹⁶ and footnote ¹⁶, renumber as footnote ¹⁷

Paragraph 99, the reference to footnote ¹⁷ and footnote ¹⁷, renumber as footnote ¹⁸

Paragraph 100, the reference to footnote ¹⁸ and footnote ¹⁸, renumber as footnote ¹⁹

Paragraph 106, the reference to footnote ¹⁹ and footnote ¹⁹, renumber as footnote ²⁰

Paragraph 107, the reference to footnote ²⁰ and footnote ²⁰, renumber as footnote ²¹

Paragraph 109, the reference to footnote ²¹ and footnote ²¹, renumber as footnote ²²

Paragraph 130, the reference to footnote ²² and footnote ²², renumber as footnote ²³

Section 10, amend to read:

¹⁵ Informal document No. GRSP-45-25

“10. APPENDIX–REFERENCE DOCUMENTS USED BY THE WORKING GROUP

| | |
|------------------|--|
| ... | ... |
| INF GR/PS/188 | Draft meeting minutes of the 100th meeting |
| INF GR/PS/189 | Attendance list 10th meeting |
| GRSP-47-18/Rev.2 | (USA) Proposal for amendments to global technical regulation No. 9 (Pedestrian Safety) |

”

Text of the regulation

Paragraph 2.1., amend to read:

“2.1. This global technical regulation...”

**Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/5
(see para. 9 of the report)**

...

***Paragraph 3*, amend to read:**

3. At its forty-seventh session, .. under certain conditions.

Annex III

Amendments to Regulation No. 12

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/19 (see para. 16 of the report)

Contents, insert a new Annex 7, to read:

“ ...

Annex 7 - **Test Procedures for the protection...on electrical power from high voltage and electrolyte spillage.**

Appendix 1 – Jointed Test Finger (IPXXB) ”

Paragraph 1, amend to read:

“1. **Scope**

1.1. This Regulation applies to the behaviour of the steering mechanism and to the electrical power train operating on high voltage as well as the high voltage components and systems which are galvanically connected to the high voltage bus of the electric power train, of motor vehicles of category M1, and vehicles of category N1 with a maximum permissible mass less than 1,500 kg, with regard to the protection of the occupants in a frontal collision.”

Paragraph 2.2.2.1., amend to read:

“**2.2.2.1. The structure, dimensions, lines and constituent materials of that part of the vehicle forward of the steering control.”**

Insert a new paragraph 2.2.2.2., to read:

“**2.2.2.2. The locations of the RESS, in so far as they have a negative effect on the result of the impact test prescribed in this Regulation,”**

Paragraph 2.2.2.2.(former), renumber as 2.2.2.3.

Paragraph 2.16., amend to read:

“**2.16. “Passenger compartment”**

Insert new paragraphs 2.16.1. and 2.16.2., to read:

“**2.16.1. “Passenger compartment with regard to occupant protection” means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, outside glazing and front bulkhead and the plane of the rear compartment bulkhead or the plane of the rear-seat back support.**

2.16.2. “Passenger compartment for electric safety assessment” means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, outside glazing, front bulkhead and rear bulkhead, or rear gate, as well as by the electrical protection barriers and enclosures provided for protecting the power train from direct contact with high voltage live parts.”

Paragraph 2.18., amend to read:

“**2.18. “Mass of the vehicle in running order” ... unladden..., and RESS.”**

Paragraphs 2.19. to 2.21., shall be deleted.

Insert new paragraphs 2.19. to 2.38., to read:

- “2.19. “*High Voltage*” ... ≤ 1500 V **direct current (DC)** or > 30 V and ≤ 1000 V **alternating current (AC)** root – mean – square (rms),
- 2.20. “*Rechargeable energy storage system (RESS)*” ...**which** provides electrical energy for propulsion,
- 2.21. “*Electrical Protection Barrier*”... against **any** direct contact to the **high voltage** live parts,
- 2.22. “*Electrical power train*” means...may **also** include the RESS, the electrical...,
- 2.23. “*Live parts*” means...,
- 2.24. “*Exposed conductive part*” means...,
- 2.25. “*Direct contact*”... with **high voltage** live parts,
- 2.26. “*Indirect contact*” means...,
- 2.27. “*Protection IPXXB*” means protection **from contact with high voltage live parts** provided by **either an electrical protection barrier or an enclosure and tested using a Jointed Test Finger (IPXXB) as described in paragraph 4 of Annex 7,**
- 2.28. “*Working voltage*” means...,
- 2.29. “*Coupling system for charging the rechargeable energy storage system (RESS)*” means ...electrical power supply including the vehicle inlet,
- 2.30. “*Electrical chassis*” means...whose **electrical** potential is taken as reference,
- 2.31. “*Electrical circuit*” means...**high voltage** live parts...,
- 2.32. “*Electrical energy conversion system*” means...a system (e.g. fuel cell) that generates and provides electrical energy for electrical propulsion,
- 2.33. “*Electronic converter*” means...a device capable of controlling and/or converting electrical power for electrical propulsion,
- 2.34. “*Enclosure*” means...against **any** direct contact,
- 2.35. “*High Voltage Bus*” means the...operates on **a** high voltage,
- 2.36. “*Solid insulator*” means **the** insulating coating of wiring harnesses provided in order to cover and **prevent** the **high voltage** live parts **from any** direct contact. **This includes** covers for insulating the **high voltage** live parts...,
- 2.37. “*Automatic disconnect*” means **a device that when triggered, galvanically separates the electrical energy sources from the rest of the high voltage circuit of the electrical power train,**”
- 2.38. “*Open type traction battery*” means **a type of battery requiring liquid and generating hydrogen gas released to the atmosphere.**”

Paragraphs 3.1.2.6. and 3.1.2.7., amend to read:

- “3.1.2.6. ...Regulation No. 94 if the application
- 3.1.2.7. ... Regulation No. 94 if the application”

Insert a new paragraph 3.1.2.8., to read:

- “3.1.2.8. **A general** description of the **electric power source type**, location and the electrical power train (e.g. hybrid, electric).”

Paragraph 3.2.2.3., amend to read:

- “3.2.2.3. evidence that the steering control complies with the specifications of paragraphs 5.2.1.4. and 5.2.1.5. of Regulation No. 94, if the application for approval is submitted by the applicant pursuant paragraph 5.2.1. below.”

Paragraph 4.2.2., amend to read:

- “4.2.2. An approval number shall be assigned to each type approved. Its first two digits (at present 04 corresponding to the 04 series of amendments) shall...”

Paragraph 4.3.2., amend to read:

- “4.3.2. An approval number shall be assigned to each type approved. Its first two digits (at present 04 corresponding to the 04 series of amendments) shall”

Paragraph 4.3.4.3., amend to read:

- “4.3.4.3. the symbol R94-02 in the case of an approval pursuant paragraph 5.2.1. below.”

Paragraph 5.1.1., amend to read:

- “5.1.1. Additionally, vehicles equipped with electrical power train shall meet paragraph 5.5. This could be demonstrated in a separate **frontal impact** test at the request of the manufacturer **after validation by the Technical Service**, given that...in this Regulation.”

Paragraphs 5.1.1.1 and 5.1.1.2., shall be deleted.

Paragraph 5.1.2., amend to read:

- “5.1.2. Specifications of paragraph 5.1. above are deemed to be met if the vehicle equipped with such a steering system complies with the specifications of paragraph 5.2.2. of Regulation No. 94”

Paragraph 5.2.1., amend to read:

- “5.2.1. If the steering control is fitted with a steering wheel airbag, specifications of paragraph 5.2. above are deemed to be met if the vehicle equipped with such a steering system complies with the specifications of paragraphs 5.2.1.4. and 5.2.1.5. of Regulation No. 94.”

Insert new paragraphs 5.5. to 5.6., to read:

- “5.5. **Following the test conducted in accordance with the procedure defined in Annex 3 to this Regulation** the electrical power train...the electrical power ...:

- 5.5.1. Protection against electrical shock

After the impact at least one of the **four** criteria specified in paragraph 5.5.1.1. to paragraph 5.5.1.4.2. shall be met.

If the vehicle has an automatic disconnect function **or device(s) that galvanically divide the electrical power train circuit during driving**

condition, at least one of the **following** criteria shall apply to the **disconnected circuit** or to each divided **circuit** individually after the disconnect function is activated.

However criteria defined in 5.5.1.4. shall not apply if more than a single potential of a part of the high voltage bus is not protected under the conditions of protection IPXXB.

In the case that the test is performed under the condition that part(s) of the high voltage system are not energized, the protection against electrical shock shall be proved by either 5.5.1.3. or 5.5.1.4. for the relevant part(s).

5.5.1.1. Absence of high voltage

The voltages **V_b**, **V₁** and **V₂** of the high voltage buses shall be equal or less than 30 VAC or 60 VDC as **specified in paragraph 2 of Annex 7.**

5.5.1.2. Low electrical energy

The total energy (TE) on the high voltage buses shall be less than 2.0 joules when measured according to the test procedure as specified in paragraph 3 of Annex 7 with the formula (a). Alternatively the total energy (TE) may be calculated by the measured voltage V_b of the high voltage bus and the capacitance of the X-capacitors (C_x) specified by the manufacturer according to formula (b) of paragraph 3 of Annex 7.

The energy stored in the Y-capacitors (TE_{y1}, TE_{y2}) shall also be less than 2.0 joules. This shall be calculated by measuring the voltages V₁ and V₂ of the high voltage buses and the electrical chassis, and the capacitance of the Y-capacitors specified by the manufacturer according to formula (c) of paragraph 3 of Annex 7

5.5.1.3. Physical protection

For protection **against direct contact with high voltage** live parts, the protection IPXXB shall be provided.

In addition, **for protection against electrical shock which could arise from indirect contact**, the resistance...0.2 ampere.

This requirement is satisfied if the galvanic connection has been **made** by welding.

5.5.1.4. Isolation resistance

The criteria specified in the paragraphs 5.5.1.4.1. and 5.5.1.4.2. below shall be met.

The measurement shall be conducted in accordance with to paragraph 5 of Annex 7.

5.5.1.4.1. Electrical power train consisting of separate DC- or AC-buses

If **the** AC high voltage buses and **the** DC high voltage...electrical chassis (**R_i**, as defined in paragraph 5 of Annex 7) shall have....

5.5.1.4.2. Electrical power train consisting of combined DC- and AC-buses

If **the** AC high voltage buses and **the** DC high voltage...chassis (**R_i**, as defined in paragraph 5 of Annex 7) shall

However,...after the vehicle impact, **the** isolation resistance... chassis (**R_i**, as defined in paragraph 5 of Annex 7) shall have a minimum value of 100 Ω/V of the working voltage.

5.5.2. Electrolyte spillage

In the period...from the RESS shall spill...no more **than 7 per cent** of electrolyte shall spill from the RESS **except open type traction batteries outside the passenger compartment. For open type traction batteries no more than 7 per cent** with a maximum of 5.0 liters shall spill outside the passenger compartment. The manufacturer shall demonstrate compliance in accordance with paragraph 6 of Annex 7.

5.5.3. RESS retention

RESS located...and RESS components ...shall remain inside RESS boundaries.

No part of any RESS that is located outside the passenger compartment **for electrical safety assessment** shall enter the passenger compartment during or after the impact test.

The manufacturer shall demonstrate compliance in accordance with paragraph 7 of Annex 7.

5.6. Specifications of Paragraphs 5.5. to 5.5.3. above are deemed to be met if the vehicle equipped with an electrical power train operating on high voltage complies with the specifications of paragraphs 5.2.8. to 5.2.8.3. of Regulation No. 94, 02 series of amendments.”

Paragraph 6.1., amend to read:

- “6.1. Compliance with the requirements of paragraphs 5.1. to 5.4. above shall be checked in accordance with the methods set out in Annexes 3, 4 and 5 to this Regulation. Compliance with the requirements of paragraph 5.5 above shall be checked in accordance with the methods set out in Annex 3 to this Regulation. All measurements should be done on the basis of ISO 6487-1987.”

Paragraphs 13.1. to 13.3.1., amend to read:

- “[13.1. As from the date of entry into force of the 04 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 03 or the 04 series of amendments.

13.2. Approval of vehicle type

- 13.2.1. As from the official date of entry into force of the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 04 series of amendments.

- 13.2.2. As from [24] months after the entry into force, Contracting Parties applying this Regulation shall grant ECE approvals only to those types of vehicle which comply with the requirements of this Regulation as amended by the 04 series of amendments.

- 13.2.3. Notwithstanding the above, Contracting Parties applying this Regulation may [continue to] grant ECE approvals to the 03 series of amendments for an additional [12] months provided that the manufacturer

demonstrates, to the satisfaction of the Technical Service, that the vehicle provides equivalent levels of safety to those required by this Regulation as amended by the 04 series of amendments.

13.2.4. As from the date of entry into force, Contracting Parties applying this Regulation shall not refuse to grant extensions to approvals issued to the preceding series of amendments to this Regulation. However, as from [24] months after the entry into force of the 04 series of amendments extensions to approvals issued to the previous series of amendments shall not be granted in respect of vehicles having an electrical power train operating on high voltage

13.2.5. By way of derogation to the obligations of Contracting Parties applying this Regulation, where at the time of entry into force of the 04 series of amendments to this Regulation national requirements exist to address the safety provisions detailed in these amendments, those Contracting Parties may continue to permit the entry into service of vehicles approved to the preceding series of amendments and complying with the specific national requirements applying at that time. This derogation shall cease to be valid [24] months after the entry into force of the 04 series of amendments to this Regulation.

As from [48] months after the entry into force of the 04 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse national or regional type approval and may refuse first national or regional registration (first entry into service) of a vehicle having an electrical power train operating on high voltage which does not meet the requirements of the 04 series of amendments to this Regulation.

13.3. Approvals of type of steering control

13.3.1. Even after the date of entry into force of the 04 series of amendments, approvals of the steering control to the preceding series of amendments to the Regulation shall remain valid and Contracting Parties applying the Regulation shall continue to accept them, and may continue to grant extensions of approvals to the 03 series of amendments.]”

Paragraph 13.3.2., shall be deleted

Paragraph 13.3.3. and 13.3.4., renumber as paragraphs 13.3.2. and 13.3.3.

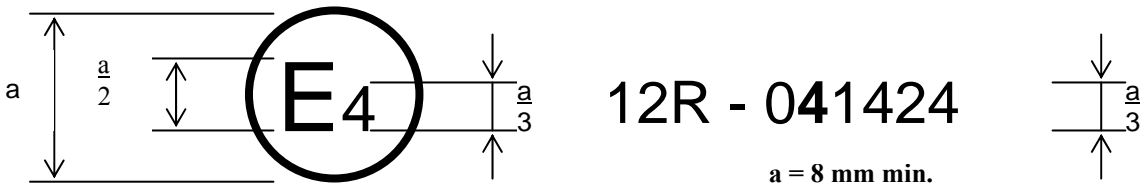
Annex 2, amend to read:

“Annex 2

Arrangements of Approval Marks

Model A

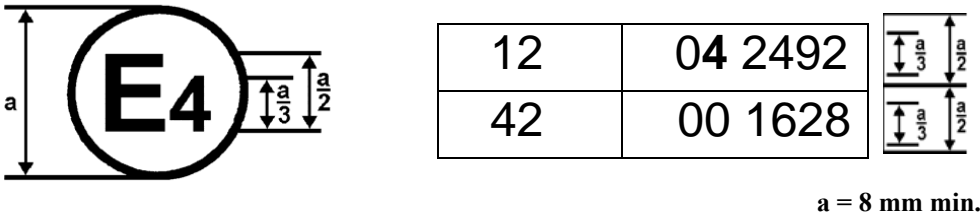
(See paragraph 4.2.4. of this Regulation)



The above ...by the 04 series of amendments

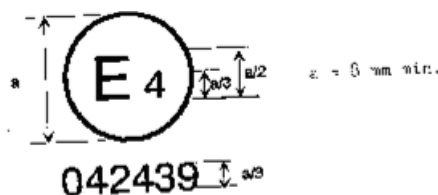
Model B

(See paragraph 4.2.5. of this Regulation)



The above ... Regulations Nos. 12 and 42.¹ The approval ... Regulation No. 12 included the 04 series of amendments and Regulation No. 42 the 00 series of amendments.

¹ The second number is given merely as an example

Model C**(See paragraph 4.3.4 of this Regulation)****The above...Regulation No. 12 as amended by the 04 series of amendments.”***Annex 3,**Paragraph 2.4.2., amend to read:*

“2.4.2. If the vehicle...90 **per cent** of its capacity with a non-inflammable liquid having a density between 0.7 and 1.

This requirement does not apply for Hydrogen as fuel.

All the other systems...empty.”

Paragraph 2.4.3., amend to read:

“2.4.3. If the vehicle is driven by its own engine, the fuel tank shall be at least 90 per cent of a full load of fuel. All other reservoirs shall be filled to capacity.

It shall be allowed by agreement between manufacturer and Technical Service to modify the fuel system so that an appropriate amount of fuel can be used to run the engine or the electrical energy conversion system.

In such case, the fuel tank shall be filled to not less than 90 per cent of mass of a full load of fuel with a non-flammable liquid of a density between 0.7 and 1.

This requirement does not apply to Hydrogen fuel tanks.”*Insert new paragraphs 2.4.4. to 2.4.4.2.2, to read:*

“2.4.4. Electrical power train adjustment

2.4.4.1. The RESS...as recommended by the manufacturer.

2.4.4.2. The electrical power train shall be energized with or without the operation of the original electrical energy sources (e.g. engine-generator, RESS or electric energy conversion system), however:

2.4.4.2.1. by the agreement between Technical Service and manufacturer it shall be permissible to perform the test with all or parts of the electrical power train not being energized in so far as there is no negative influence on the test result. For parts of the electrical power train not energized, the protection against electrical shock shall be proved by either physical protection or isolation resistance and appropriate additional evidence.2.4.4.2.2. in the case where an automatic disconnect is provided, at the request of the manufacturer it shall be permissible to perform the test with the automatic disconnect being triggered. In this case it shall be demonstrated that the automatic disconnect would have operated during the impact test. This includes the automatic activation

signal as well as the galvanic separation considering the conditions as seen during the impact.”

Paragraphs 2.4.4. and 2.4.5.(former), renumber as paragraphs 2.4.5. and 2.4.6, respectively.

Insert a new Annex 7 and Appendix 1, to read:

“Annex 7

Test Procedures for the protection of the occupants of vehicles operating on electrical power from high voltage...

...resistance. **In this case it may be necessary to deactivate the on-board isolation resistance monitoring system.**

Before the vehicle **impact test conducted, the high** voltage bus voltage (Vb) (see figure 1) **shall be measured and recorded to confirm** that it is within the operating voltage of the vehicle **as specified** by the **vehicle** manufacturer.

1. Test setup and equipment

If a high...are **to be** taken from...

However,...according to **protection IPXXB following the impact** test, measurements may **only be taken between the** device performing the disconnect function **and the electrical loads.**

The voltmeter...10 MΩ.

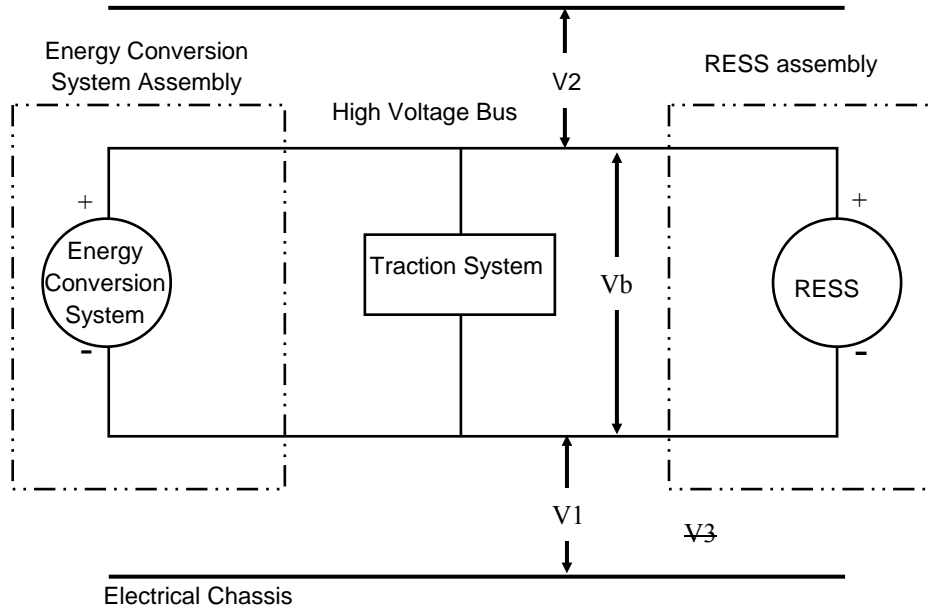
2. The following. instructions...

After the **impact** test, determine the high voltage bus voltages (Vb, V1, V2) (see figure 1).

The voltage measurement shall be made not earlier than 5 seconds but not later than 60 seconds after the impact.

This procedure is not applicable if the test is performed under the condition where the electrical power train is not energized.

Figure 1:
Measurement of Vb, V1, V2.



3. Assessment procedure for low electrical energy

Prior to the impact a switch S1 and a known discharge resistor Re is connected in parallel to the relevant capacitance (ref. figure 2).

Not earlier than 5 seconds and not later than 60 seconds after the impact the switch S1 **shall be** closed while the voltage Vb and the current Ie **are** measured and recorded. The product of the voltage Vb and the current Ie **shall be** integrated...**threshold of 60 V DC (th)**. The resulting **integration equals** the total energy (TE) in joules:

$$(a) \quad TE = \int_{tc}^{th} V_b \times I_e dt$$

When Vb is measured at a point in time between 5 seconds and 60 seconds after the impact and the capacitance of the X-capacitors (Cx) is specified by the manufacturer, total energy (TE) shall be calculated according to the following formula:

$$(b) \quad TE = 0.5 \times C_x \times (V_b^2 - 3\,600)$$

When V1, V2 (see figure 1) are measured at a point in time between 5 seconds and 60 seconds after the impact and the capacitances of the Y-capacitors (Cy1, Cy2) are specified by the manufacturer, total energy (TEy1, TEy2) shall be calculated according to the following formulas:

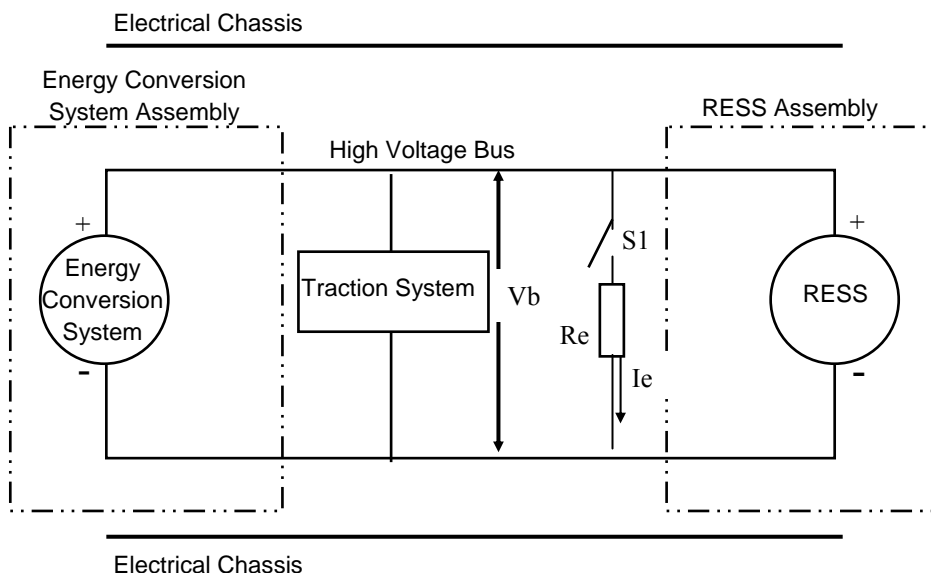
$$(c) \quad TE_{y1} = 0.5 \times C_{y1} \times (V_1^2 - 3\,600)$$

$$TE_{y2} = 0.5 \times C_{y2} \times (V_2^2 - 3\,600)$$

This procedure is not applicable if the test is performed under the condition where the electrical power train is not energized.

Figure 2

E.g. measurement of high voltage bus energy stored in X-capacitors



4. Physical protection

Following the vehicle impact test any parts **surrounding** the high voltage components **shall be, without the use of tools**, opened, disassembled or removed. **All remainingsurrounding parts shall be** considered part of the physical protection.

The **Jointed Test Finger** described in Appendix 1 figure 1 **shall be inserted into any gaps or openings** of the physical protection with a test force of $10\text{ N} \pm 10\text{ per cent}$ **for electrical safety assessment**. If **partial or full penetration** into the physical **protection by the Jointed Test Finger** occurs, the **Jointed Test Finger** shall be placed in every **position as specified below**.

Starting from the straight position, both joints of the test finger shall be **rotated progressively** through an angle of up to 90 degrees ...position.

Internal barriers are considered part of the enclosure.

If appropriate a low-voltage supply (of not less than 40 V and not more than 50 V) in series with a suitable lamp should be connected, between the Jointed Test Finger and high voltage live parts inside the electrical protection barrier or enclosure.

4.1. Acceptance conditions

The **requirements of paragraph 5.5.1.3 shall be considered to be met if the Jointed Test Finger** described in Appendix 1, figure 1 **is unable to contact high voltage** live parts.

If necessary a mirror...whether the Jointed Test Finger touches the high voltage buses.

If this requirement is verified by a signal circuit between the Jointed Test Finger and high voltage live parts, the lamp shall not light.

5. Isolation resistance

The isolation resistance between the high voltage bus and the electrical chassis may be demonstrated either by measurement or by a combination of measurement and calculation.

The following instructions should be used if the isolation resistance is demonstrated by measurement.

Measure and record the voltage (V_b) between the

...

...

If V_1 is...electrical chassis (see figure 3). Calculate...formula shown below.

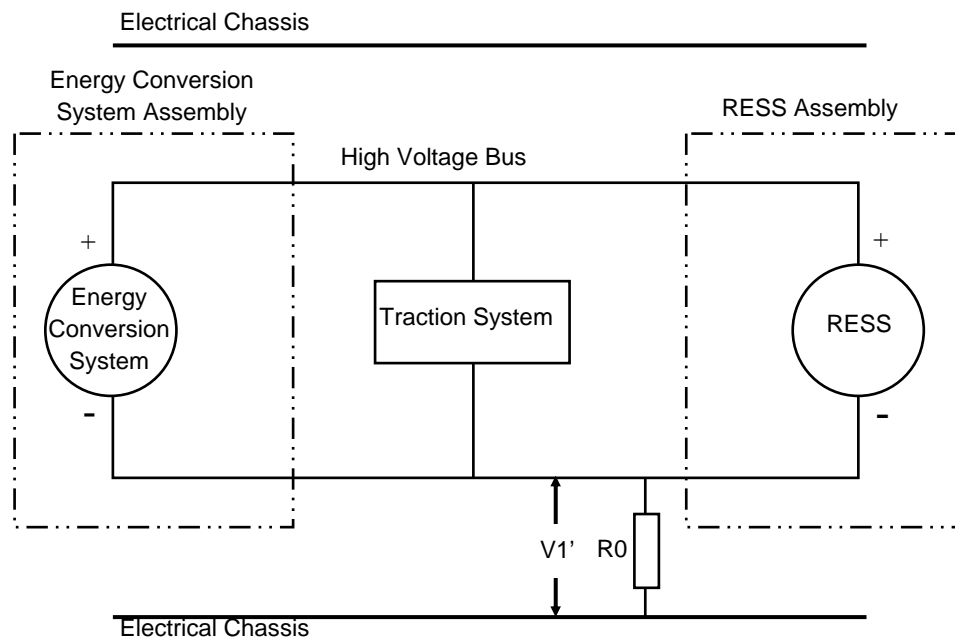
$$R_i = R_o \cdot (V_b / V_1' - V_b / V_1) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1 / V_1' - 1 / V_1)$$

Divide the result R_i , which is the electrical...in volt (V)

$$R_i (\Omega / V) = R_i (\Omega) / \text{Working voltage (V)}$$

Figure 3

Measurement of V_1'



If V_2 is greater...electrical chassis (see figure 4).

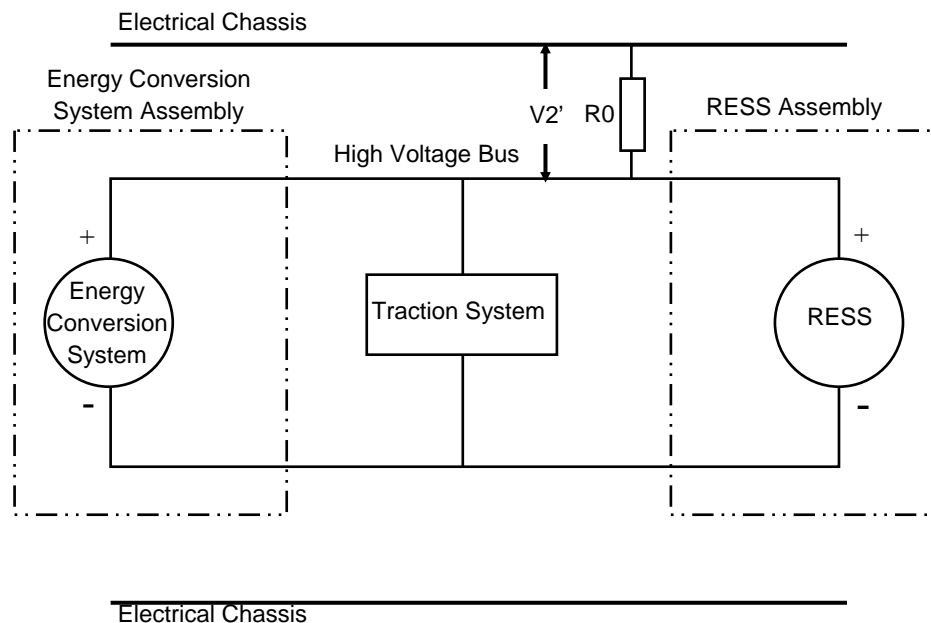
Calculate the isolation resistance (R_i) according to the formula shown below.

$$R_i = R_o \cdot (V_b / V_2' - V_b / V_2) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1 / V_2' - 1 / V_2)$$

Divide the result R_i , which is the electrical isolation resistance value in ohm (Ω) by the working voltage of the high voltage bus in volt (V).

$$R_i (\Omega / V) = R_i (\Omega) / \text{Working voltage (V)}$$

Figure 4
Measurement of V_2'



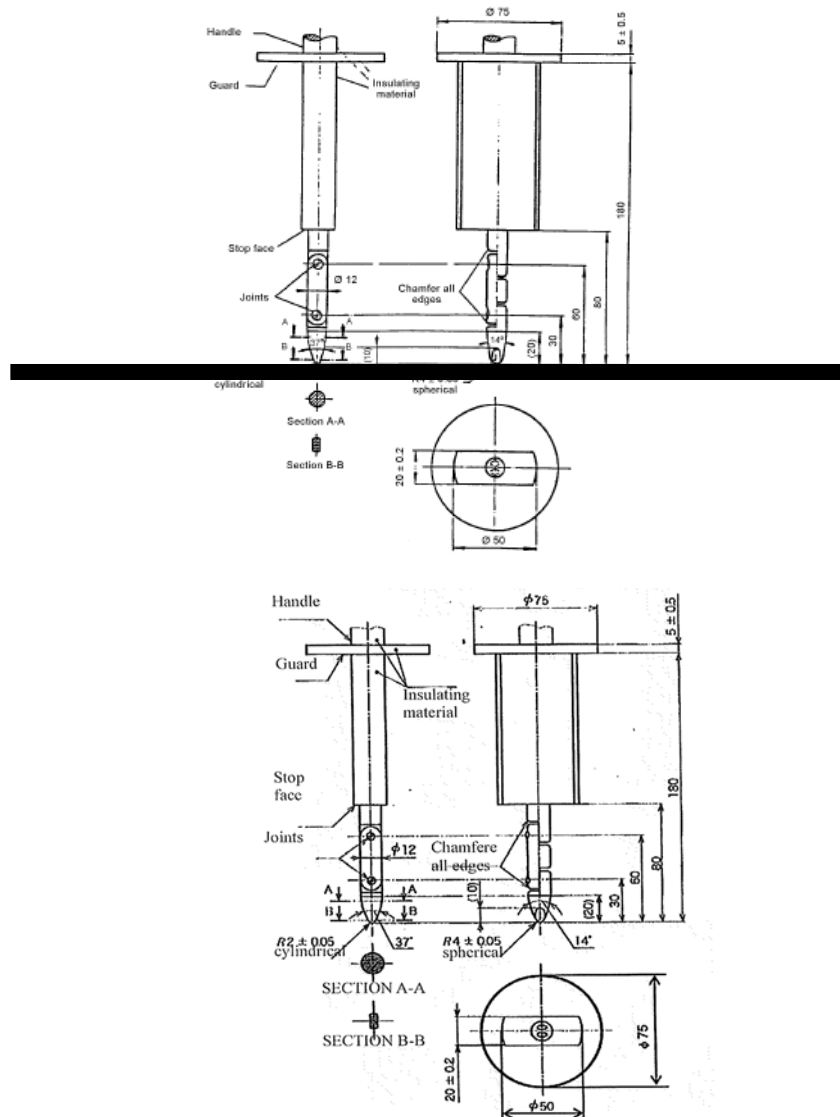
Note 1: The standard known resistance R_0 (Ω) should be **the value of the minimum required isolation resistance (Ω/V) multiplied by the working voltage in volt (V) of the vehicle plus/minus 20 per cent**. R_0 is not required...should provide a good resolution for the voltage measurements.

6. Electrolyte spillage
Appropriate **coating** shall be...to confirm **any** electrolyte **leakage** from the RESS after the **impact test**.
Unless the manufacturer provides means to differentiate between the leakage of different liquids, all liquid leakage shall be considered as the electrolyte.
7. RESS retention
Compliance...

Appendix 1

Jointed test finger (IPXXB), shall be deleted

Figure 1
Jointed test finger



Material: metal, except ...

...

Both joints shall ...angle of 90° with a 0 to +10° tolerance.”

Annex IV

Amendments to Regulation No. 16

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/11 (see para. 24 of the report)

Paragraph 6.2.2.2., amend to read:

“6.2.2.2. The buckle,be of this colour **when the seat is occupied**, red warning...has buckled.”

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/18 (see para. 25 of the report)

...

Insert a new paragraph 15.2.23., to read:

“15.2.23. No Contracting...to grant ECE approvals **of a component** under a...”

Annex V

Amendments to Regulation No. 44

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/22 (see para. 31 of the report)

Paragraph 7.1.4.3.1., amend to read

~~“7.1.4.3.1. During the verification....analysis.”~~

Paragraph 8.1.3.6.3.3., amend to read:

“8.1.3.6.3.3. The longitudinal... up to **80** mm towards the side... manikin.”

Paragraph 8.1.3.6.3.4., amend to read:

“8.1.3.6.3.4. In the...belt, **the routing** of the shoulder ... width of 20 mm.”

Annex VI

Amendments to Regulation No. 94

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/20 (see para. 35 of the report)

Contents, insert a new Annex 11, to read:

“ ...

Annex 11 - **Test Procedures for the protection ...on electrical power...spillage.**

Appendix 1 – Jointed Test Finger (IPXXB)”

Paragraph 2.6.4., amend to read:

“2.6.4. The siting (front, rear or centre) and the orientation (transversal or longitudinal) of the engine, in so far as they have a negative effect on the result of the impact test procedure as prescribed in this Regulation.”

Insert new paragraph 2.6.7., to read:

“2.6.7. The locations of the RESS, in so far as they have a negative effect on the result of the impact test prescribed in this Regulation,”

Paragraph 2.7., amend to read:

“2.7. **Passenger compartment”**

Insert a new paragraph 2.7.1., to read:

“2.7.1. “Passenger compartment *with regard to occupant protection*” means...back support.”

Insert a new paragraph 2.7.2., to read:

“2.7.2. “Passenger compartment for electric safety assessment” means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, outside glazing, front bulkhead and rear bulkhead, or rear gate, as well as by the electrical protection barriers and enclosures provided for protecting the power train from direct contact with high voltage live parts.”

Insert new paragraphs 2.15. to 2.34., to read:

“2.15. “High Voltage” means the...and ≤ 1500 V **direct current (DC)** or > 30 V and ≤ 1000 V **alternating current (AC)** root – mean – square (rms),

2.16. “Rechargeable energy storage system (RESS)” means the rechargeable energy storage system **which** provides electrical energy for propulsion,

2.17. “**Electrical Protection Barrier**” means the part providing protection against any direct contact to the **high voltage** live parts,

2.18. “Electrical power train” means...may **also** include the RESS, the electrical energy conversion...the RESS,

2.19. “Live parts” means...use,

2.20. “Exposed conductive part” means...protection **IPXXB**, and which...

2.21. “Direct contact” means the contact of persons with **high voltage** live parts,

- 2.22. “*Indirect contact*” means...conductive parts,
- 2.23. “*Protection IPXXB*” means protection **from contact with high voltage live parts** provided by **either an electrical** protection barrier **or an** enclosure and **tested using a Jointed Test Finger (IPXXB) as described in paragraph 4 of Annex 11,**
- 2.24. “*Working voltage*” means...respectively.
- 2.25. “*Coupling system for charging the rechargeable energy storage system (RESS)*” means...electrical power supply including the vehicle inlet,
- 2.26. “*Electrical chassis*” means...whose **electrical** potential is taken as reference,
- 2.27. “*Electrical circuit*” means an assembly of connected **high voltage** live parts ...operation,
- 2.28. “*Electrical energy conversion system*” means a system (e.g. fuel cell) that generates and provides electrical energy for electrical propulsion,
- 2.29. “*Electronic converter*” means a device capable of controlling and/or converting electrical power for electrical propulsion,
- 2.30. “*Enclosure*” means...against **any** direct contact,
- 2.31. “*High Voltage Bus*” means...on **a** high voltage,
- 2.32. “*Solid insulator*” means **the** insulating coating of wiring harnesses, provided in order to cover and **prevent** the **high voltage** live parts **from any** direct contact. **This includes** covers for insulating the **high voltage** live parts of connectors and varnish or paint for the purpose of insulation,
- 2.33. “*Automatic disconnect*” means **a device that when triggered, galvanically separates the electrical energy sources from the rest of the high voltage circuit of the electrical power train,**”
- 2.34. “*Open type traction battery*” means **a type of battery requiring liquid and generating hydrogen gas released to the atmosphere.**”

Insert a new paragraph 3.2.6., to read:

- “**3.2.6.** A **general** description of the **electrical power source** type, location and the electrical power train (e.g. hybrid, electric).”

Paragraph 5.2., amend to read:

- “5.2. Specifications

The test...at the same time.

Additionally, vehicles equipped with electric power train shall meet the requirements of paragraph 5.2.8. This **can** be **met by** a separate **impact** test at the request of the manufacturer **and after validation by the Technical Service, provided** that the electrical components...of this Regulation. **In case of this condition the requirements of paragraph 5.2.8. shall be checked in accordance with the methods set out in Annex 3 to this Regulation, except paragraphs, 2., 5. and 6. in Annex 3. But a dummy corresponding to the specifications for Hybrid III 1/ fitted with a 45° ankle and meeting the specifications for its adjustment shall be installed in each of the front outboard seats.**”

Insert new paragraphs 5.2.8. to 5.2.8.3., to read:

“5.2.8. **Following the test conducted in accordance with the procedure defined in Annex 3 to this Regulation, the electrical power train operating on high voltage, and the high...requirements:**

5.2.8.1. Protection against electrical shock

After the impact at least one of the **four** criteria specified in paragraph 5.2.8.1.1. through paragraph 5.2.8.1.4.2. shall be met.

If the vehicle has an automatic disconnect function, **or device(s) that galvanically divide the electric power train circuit during driving condition**, at least one of the **following** criteria shall apply **to the disconnected circuit or to each divided circuit** individually...

However criteria defined in 5.2.8.1.4. shall not apply if more than a single potential of a part of the high voltage bus is not protected under the conditions of protection IPXXB.

In the case that the test is performed under the condition that part(s) of the high voltage system are not energized, the protection against electrical shock shall be proved by either 5.2.8.1.3. or 5.2.8.1.4. for the relevant part(s).

5.2.8.1.1. Absence of high voltage

The voltages **V_b, V₁ and V₂** of the high voltage buses shall be equal or less than 30 VAC or 60 VDC **as specified in Annex 11 paragraph 2.**

5.2.8.1.2. Low electrical energy

The total energy (TE) on the high voltage buses shall be less than 2.0 joules when measured according to the test procedure as specified in paragraph 3 of Annex 11 with the fomula (a) . Alternatively the total energy (TE) may be calculated by the measured voltage V_b of the high voltage bus and the capacitance of the X-capacitors (C_x) specified by the manufacturer according to formula (b) of paragraph 3 of Annex 11

The energy stored in the Y-capacitors (TE_{y1}, TE_{y2}) shall also be less than 2.0 joules. This shall be calculated by measuring the voltages V₁ and V₂ of the high voltage buses and the electrical chassis, and the capacitance of the Y-capacitors specified by the manufacturer according to formula (c) of paragraph 3 of Annex 11.

5.2.8.1.3. Physical protection

For protection **against direct contact with high voltage** live parts, the protection IPXXB shall be provided.

In addition, **for protection against electrical shock which could arise from indirect contact**, the resistance...least 0.2 ampere.

This requirement...been **made** by welding.

5.2.8.1.4. Isolation resistance

The criteria specified in the paragraphs 5.2.8.1.4.1. and 5.2.8.1.4.2. below shall be met.

The measurement shall be conducted in accordance with paragraph 5 of Annex 11.

- 5.2.8.1.4.1. Electrical power train consisting of separate DC- or AC-buses
 If **the** AC high voltage buses and **the** DC high voltage buses...chassis (**Ri, as defined in paragraph 5 of Annex 11**) shall have...of the working voltage for AC buses.
- 5.2.8.1.4.2. Electrical power train consisting of combined DC- and AC-buses
 If **the** AC high voltage buses and **the** DC high voltage...chassis (**Ri, as defined in paragraph 5 of Annex 11**) shall have ...of the working voltage.
 However, if...than 30 V after **the vehicle impact** , **the** isolation resistance between the high voltage bus and the electrical chassis (**Ri, as defined in paragraph 5 of Annex 11**) shall have a minimum value of 100 Ω/V of the working voltage.
- 5.2.8.2. Electrolyte spillage
 In the period...the **RESS** shall spilland no more than **7 per cent** of electrolyte...from the **RESS except open type traction batteries outside the passenger compartment. For open type traction batteries no more than 7 per cent** with a maximum of **5.0 liters** shall spill outside the passenger compartment.
The manufacturer shall demonstrate compliance in accordance with paragraph 6 of Annex 11.
- 5.2.8.3. **RESS** retention
RESS located ...**RESS** components ...**RESS** boundaries.
 No part of any **RESS** ...compartment **for electric safety assessment** shall enter the passenger compartment during **or after the impact** test.
The manufacturer shall demonstrate compliance in accordance with paragraph 7 of Annex 11.”

Insert new paragraphs 11.4. to 11.8., to read:

- “[11.4. As from the official date of entry into force of the 02 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 02 series of amendments.
- 11.5. As from [24] months after the entry into force, Contracting Parties applying this Regulation shall grant ECE approvals only to those types of vehicle which comply with the requirements of this Regulation as amended by the 02 series of amendments.
- Notwithstanding the above, Contracting Parties applying this Regulation may [continue to] grant ECE approvals to the 01 series of amendments for an additional [12] months provided that the manufacturer demonstrates, to the satisfaction of the Technical Service, that the vehicle provides equivalent levels of safety to those required by this Regulation as amended by the 02 series of amendments.
- 11.6. As from the date of entry into force, Contracting Parties applying this Regulation shall not refuse to grant extensions to approvals issued to the preceding series of amendments to this Regulation. However, as from [24] months after the entry into force of the 02 series of amendments extensions to approvals issued to the previous series of amendments shall not be granted in respect of vehicles having an electrical power train operating on high voltage.
- 11.7. By way of derogation to the obligations of Contracting Parties applying this Regulation, where at the time of entry into force of the 02 series of amendments to this Regulation national requirements exist to address the safety provisions detailed in these amendments, those Contracting Parties may continue to permit the entry into service of vehicles approved to the preceding series of amendments and complying with the specific national requirements applying at that time. This derogation shall cease to be valid [24] months after the entry into force of the 02 series of amendments to this Regulation.
- 11.8. As from [48] months after the entry into force of the 02 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse national or regional type approval and may refuse first national or regional registration (first entry into service) of a vehicle having an electrical power train operating on high voltage which does not meet the requirements of the 02 series of amendments to this Regulation.]”

Annex 1, Communication, insert a new item 5.3., to read:

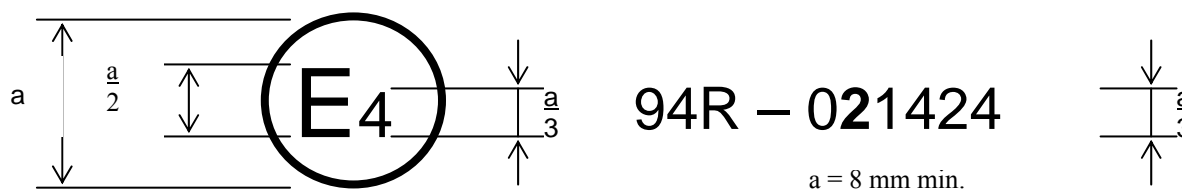
- “5.3. Location of the electrical power source

Annex 2, amend to read:

“Arrangements of the approval mark

Model A

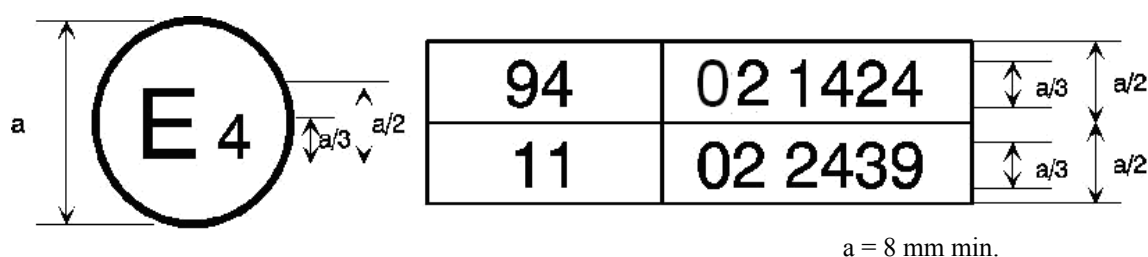
(See paragraph 4.4. of this Regulation)



The above...number 021424. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No. 94 as amended by the 02 series of amendments.

Model B

(See paragraph 4.5. of this Regulation)



The above...Regulation No. 94 incorporated the 02 series of amendments and Regulation No. 11 incorporated the 02 series of amendments.”

Annex 3,

Paragraph 1.4.1., amend to read:

“1.4.1. General specification

The test vehicle...under paragraph 6.

It shall be allowed by agreement between manufacturer and Technical Service to modify the fuel system so that an appropriate amount of fuel can be used to run the engine or the electrical energy conversion system.”

Paragraph 1.4.2.2., amend to read:

“1.4.2.2. The fuel tank shall...of the **mass of a full load of fuel** as specified by the manufacturer with a tolerance of ± 1 per cent;”

This requirement does not apply to Hydrogen fuel tanks.”

Insert new paragraphs 1.4.4. to 1.4.4.2.2., to read:

“1.4.4. Electrical power train adjustment

1.4.4.1. The RESS shall...manufacturer.

- 1.4.4.2. The electrical power train shall be energized with or without the operation of the original electrical energy sources (e.g. engine-generator, RESS or electric energy conversion system), however:
- 1.4.4.2.1. by the agreement between Technical Service and manufacturer it shall be permissible to perform the test with all or parts of the electrical power train not being energized insofar as there is no negative influence on the test result. For parts of the electrical power train not energized, the protection against electrical shock shall be proved by either physical protection or isolation resistance and appropriate additional evidence.
- 1.4.4.2.2. in the case where an automatic disconnect is provided, at the request of the manufacturer it shall be permissible to perform the test with the automatic disconnect being triggered. In this case it shall be demonstrated that the automatic disconnect would have operated during the impact test. This includes the automatic activation signal as well as the galvanic separation considering the conditions as seen during the impact.”

Insert a new Annex 11 and Appendix 1, to read:

“Annex 11

Test Procedures for the protection of...electrolitical power from high voltage and electrolyte spillage

This section...for measuring isolation resistance. **In this case it may be necessary to deactivate the on-board isolation resistance monitoring system.**

Before the vehicle **impact** test **conducted**, the high voltage bus voltage (Vb) (see figure 1) **shall be measured and recorded to** confirm that it is within the operating voltage of the vehicle as **specified** by the **vehicle** manufacturer.

1. Test setup and equipment

If ...are **to be** taken from both sides of the....

However, ...according to **protection IPXXB following the impact** test, measurements may **only be taken between** the device performing the disconnect function **and electrical loads**.

The voltmeter... at least 10 MΩ.

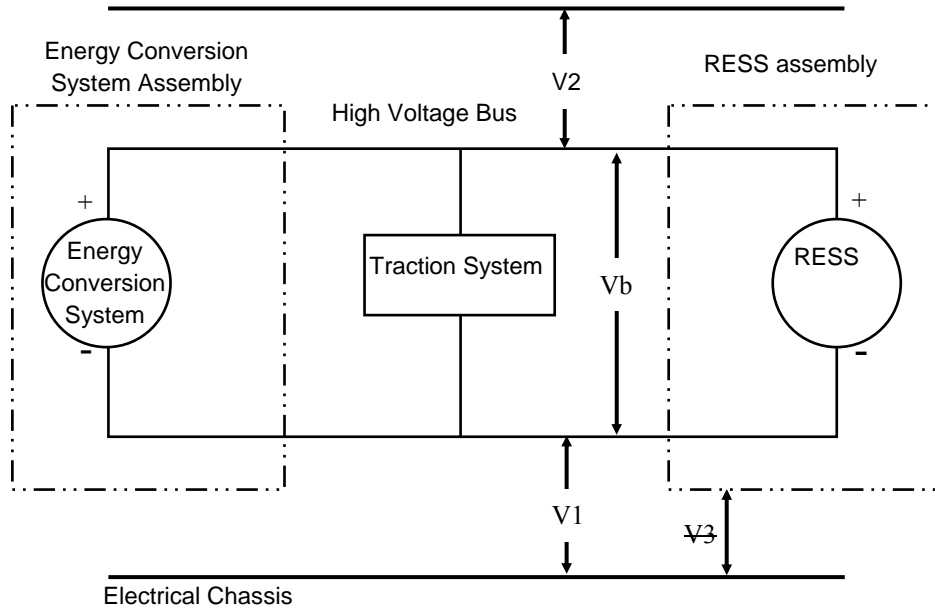
2. The following...

After the **impact** test, determine the high voltage bus voltages (Vb, V1, V2) (see figure 1).

The voltage measurement shall be made not earlier than 5 seconds, but, not later than 60 seconds after the impact.

This procedure is not applicable if the test is performed under the condition where the electric power train is not energized.

Figure 1
Measurement of V_b , V_1 , V_2



3. Assessment procedure for low electrical Energy

Prior...Re is connected in parallel to the relevant capacitance (ref. figure 2).

Not earlier than 5 seconds and not later than 60 seconds after the impact the switch S1 **shall be** closed while the voltage V_b and the current I_e **are** measured and recorded. The product of the voltage V_b and the current I_e **shall be** integrated...voltage **threshold of 60 V DC** (t_h). The resulting **integration equals** the total energy (TE) in joules.

$$(a) \quad TE = \int_{t_c}^{t_h} V_b \times I_e dt$$

When V_b is measured at a point in time between 5 seconds and 60 seconds after the impact and the capacitance of the X-capacitors (C_x) is specified by the manufacturer, total energy (TE) shall be calculated according to the following formula:

$$(b) \quad TE = 0.5 \times C_x \times (V_b^2 - 3\,600)$$

When V_1 , V_2 (see figure 1) are measured at a point in time between 5 seconds and 60 seconds after the impact and the capacitances of the Y-capacitors (C_{y1} , C_{y2}) are specified by the manufacturer, total energy (TE_{y1} , TE_{y2}) shall be calculated according to the following formulas:

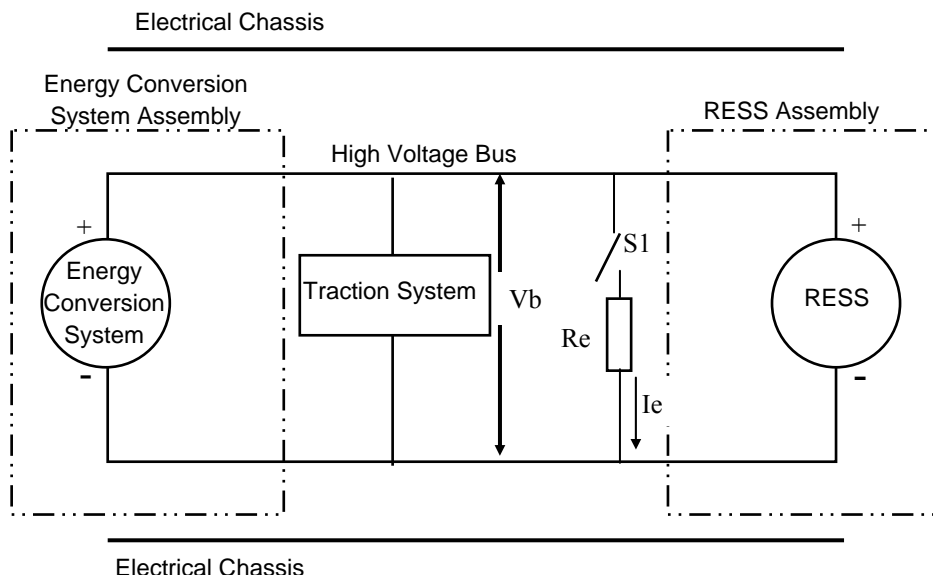
$$(c) \quad TE_{y1} = 0.5 \times C_{y1} \times (V_1^2 - 3\,600)$$

$$TE_{y2} = 0.5 \times C_{y2} \times (V_2^2 - 3\,600)$$

This procedure is not applicable if the test is performed under the condition where the electric power train is not energized.

Figure 2

E.g. measurement of high voltage bus energy stored in X-capacitors



4. Physical Protection

Following the vehicle impact test any parts surrounding the high voltage components shall be, without the use of tools, opened, disassembled or removed. All remaining surrounding parts shall be considered part of the physical protection.

The **Jointed Test Finger** described in Appendix 1 figure 1 **shall be inserted into any gaps or openings of the physical protection with a test force of $10\text{ N} \pm 10$ per cent for electrical safety assessment.** If **partial or full penetration** into the physical protection by the **Jointed Test Finger** occurs, the **Jointed Test Finger shall be placed in every position as specified below.**

Starting ...shall be **rotated progressively** through an angle...

Internal electrical protection barriers are considered part of the enclosure

If appropriate a low-voltage supply (of not less than 40 V and not more than 50 V) in series with a suitable lamp should be connected, between the Jointed Test Finger and high voltage live parts inside the electrical protection barrier or enclosure.

4.1. Acceptance conditions

The **requirements of paragraph 5.2.8.1.3. shall be considered to be met if the Jointed Test Finger** described in Appendix 1, figure 1 **is unable to contact high voltage live parts.**

If necessary a mirror or ...the Jointed Test Finger touches the high voltage buses.

If this requirement is verified by a signal circuit between the Jointed Test Finger and high voltage live parts, the lamp shall not light.

5. Isolation resistance

The isolation resistance between the high voltage bus and the electrical chassis may be demonstrated either by measurement or by a combination of measurement and calculation.

The following instructions **should** be used if the isolation resistance is **demonstrated by measurement**.

Measure and record the voltage (V_b) between...

...

...

If V_1 is greater ... chassis (see figure 3)... the formula shown **below**.

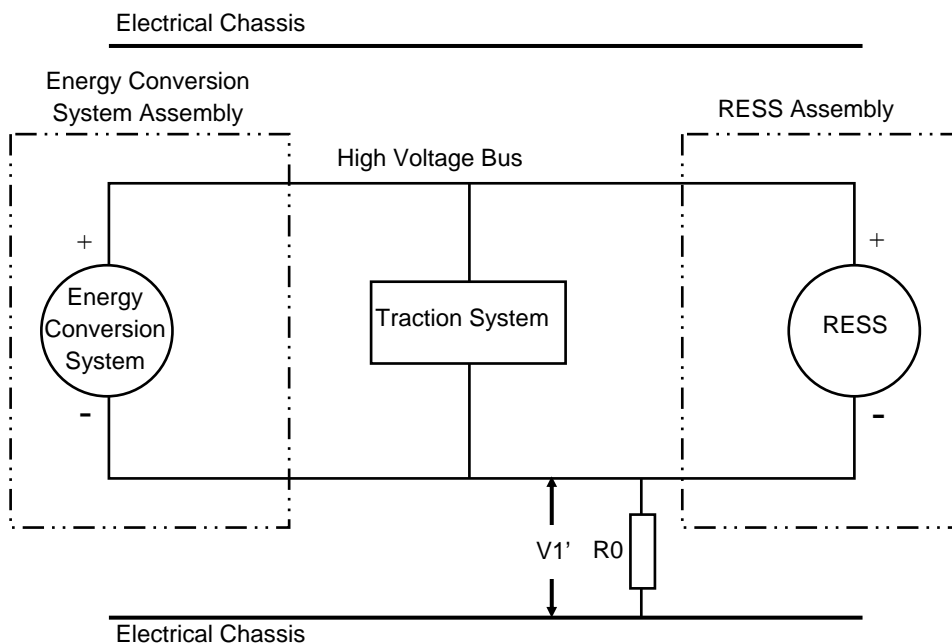
$$R_i = R_o \cdot (V_b/V_1' - V_b/V_1) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1/V_1' - 1/V_1)$$

Divide the result R_i , which is the electrical isolation...voltage bus n volt (V).

$$R_i (\Omega / V) = R_i (\Omega) / \text{Working voltage (V)}$$

Figure 3

Measurement of V_1'



If V2 is greater...chassis (see figure 4).

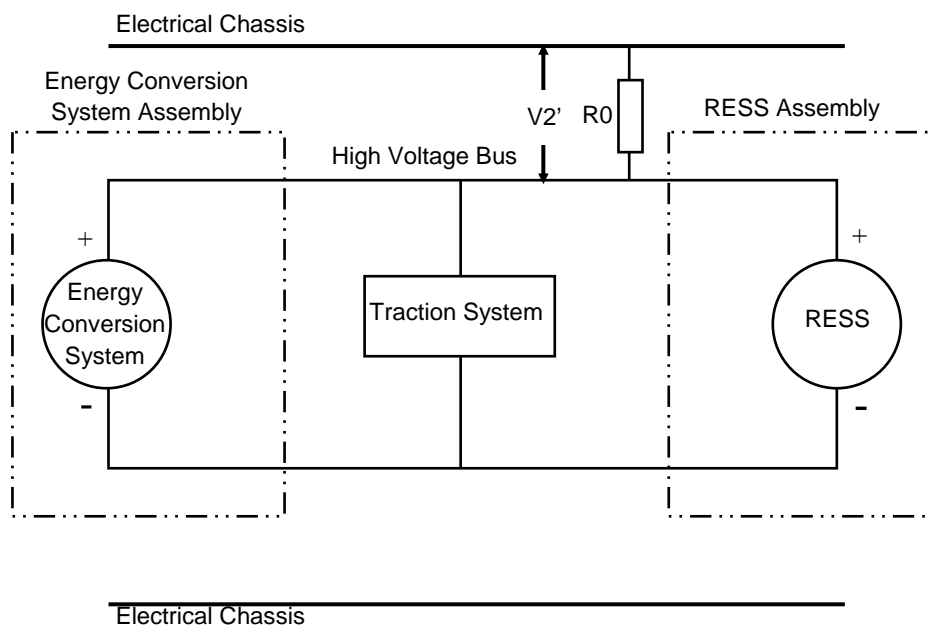
Calculate the isolation resistance (Ri) according to the formula shown **below**.

$$R_i = R_o \cdot (V_b/V_2' - V_b/V_2) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1/V_2' - 1/V_2)$$

Divide **the result Ri, which is the electrical isolation resistance** value in ohm (Ω), by....voltage **bus in volt (V)**.

$$R_i (\Omega / V) = R_i (\Omega) / \text{Working voltage (V)}$$

Figure 4
Measurement of V2'



Note 1: The standard known resistance R_o (in Ω) should be **the value of the minimum required isolation resistance (in Ω/V) multiplied by the working voltage (in V) of the vehicle plus/minus 20 per cent**. R_o is not...provide a good resolution for the voltage measurements.

6. Electrolyte spillage

Appropriate **coating** shall be applied, to **the physical** protection ...to confirm **any** electrolyte **leakage** from the RESS after the **impact test**.

Unless the manufacturer provides means to differentiate between the leakage of different liquids, all liquid leakage shall be considered as the electrolyte.

7. RESS retention

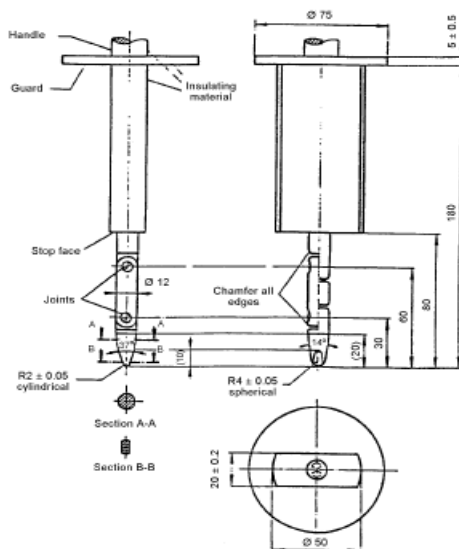
Compliance shall be determined by visual inspection

Appendix 1

Jointed test finger (IPXXB)

Figure 1

Jointed test finger



Material: metal, except ...

...

Both joints shall ...angle of 90° with a 0 to $+10^\circ$ tolerance.”

Annex VII

Amendments to Regulation No. 95

Amendments adopted to ECE/TRANS/WP.29/GRSP/2010/21 (see para. 38 of the report)

Insert a new Annex 9, to read:

“ ...

Annex 9 - **Test Procedures for the protection of the occupants of vehicles operating on electrical power...spillage.**

Appendix 1 – Jointed Test Finger (IPXXB)”

Paragraph 2.2.4., amend to read:

“2.2.4. **The siting of the engine (front, rear or centre) and the orientation (transversal or longitudinal) of the engine, in so far as they have a negative effect on the result of the impact test of this Regulation.”**

Insert new paragraph 2.2.8., to read

“2.2.8. **The locations of the RESS, in so far as they have a negative effect on the result of the impact test prescribed in this Regulation,”**

Paragraph 2.3., amend to read:

“2.3. **Passenger compartment”**

Insert a new paragraph 2.3.1., to read:

“2.3.1. **“Passenger compartment with regard to occupant protection” means ...support.”**

Insert a new paragraph 2.3.2., to read:

“2.3.2. **“Passenger compartment for electric safety assessment” means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, outside glazing, front bulkhead and rear bulkhead, or rear gate, as well as by the electrical protection barriers and enclosures provided for protecting the power train from direct contact with high voltage live parts.”**

Insert new paragraphs 2.15. to 2.34., to read:

“2.15. **“High Voltage” means...and ≤ 1500 V direct current (DC) or > 30 V and ≤ 1000 V alternating current (AC) root – mean – square (rms),**

2.16. **“Rechargeable energy storage system (RESS)” means the rechargeable energy storage system which provides electrical energy for propulsion,**

2.17. **“Electrical Protection Barrier” means the part providing protection against any direct contact to the high voltage live parts,**

2.18. **“Electrical power train” means the...may also include the RESS, the electrical energy conversion system, ...the RESS,**

2.19. **“Live parts” means...use,**

2.20. **“Exposed conductive part” means ...protection IPXXB, and which...failure conditions,**

-
- 2.21. “*Direct contact*” means the contact of persons with **high voltage** live parts,
- 2.22. “*Indirect contact*”... parts,
- 2.23. “*Protection IPXXB*” means **protection from contact with high voltage live parts** provided by **either an electrical** protection barrier **or an** enclosure **and tested using a Jointed Test Finger (IPXXB) as described in paragraph 4** of Annex 9,
- 2.24. “*Working voltage*” means ...respectively,
- 2.25. “*Coupling system for charging the rechargeable energy storage system (RESS)*” means...an external electrical power...,
- 2.26. “*Electrical chassis*” means...together, whose **electrical** potential is...,
- 2.27. “*Electrical circuit*” means an assembly of connected **high voltage** live... operation,
- 2.28. “*Electrical energy conversion system*” means...electrical energy for electrical propulsion,
- 2.29. “*Electronic converter*” means...converting electrical power for electrical propulsion,
- 2.30. “*Enclosure*” means ...protection against **any** direct contact,
- 2.31. “*High Voltage Bus*” means...operates on **a** high voltage,
- 2.32. “*Solid insulator*” means **the** insulating coating of wiring harnesses, provided in order to cover and prevent **the high voltage** live parts **from any** direct contact. **This includes** covers for insulating the **high voltage** live...,
- 2.33. “*Automatic disconnect*” means **a device that when triggered, galvanically separates the electrical energy sources from the rest of the high voltage circuit of the electrical power train,**
- 2.34. “*Open type traction battery*” means **a type of battery requiring liquid and generating hydrogen gas released to the atmosphere.”**

Insert a new paragraph 3.2.6., to read:

- “3.2.6. A general description of the **electrical power source type, location** and the electrical power train (e.g. hybrid, electric).”

Paragraph 5.2., amend to read:

- “5.2. Performance criteria

Additionally, vehicles equipped with electric power train shall meet the requirements of paragraph 5.3.6. **This can be met by a separate impact test at the request of the manufacturer and after validation by the Technical Service, provided that the electrical...Regulation. In case of this condition the requirements of paragraph 5.3.6. shall be checked in accordance with the methods set out in Annex 4 to this Regulation, except paragraphs 6, 7 and Appendix 1 and 2. But the side-impact dummy shall be installed in the front seat on the impact side.**”

Insert new paragraphs 5.3.6. to 5.3.6.3., to read:

- “5.3.6. **Following the test conducted in accordance with the procedure defined in Annex 4 to this Regulation**, the electrical power train operating on high voltage, **and** the high voltage components...following requirements:

- 5.3.6.1. Protection against electrical shock

After the impact at least one of the **four** criteria specified in paragraph 5.3.6.1.1. through paragraph 5.3.6.1.4.2. shall be met.

If the vehicle has an automatic disconnect function, **or device(s) that galvanically divide the electric power train circuit during driving condition**, at least one of the **following** criteria shall apply **to the disconnected circuit or** to each divided **circuit** individually after the disconnect function is activated.

However criteria defined in 5.3.6.1.4. shall not apply if more than a single potential of a part of the high voltage bus is not protected under the conditions of protection IPXXB.

In the case that the test is performed under the condition that part(s) of the high voltage system are not energized, the protection against electrical shock shall be proved by either 5.3.6.1.3. or 5.3.6.1.4. for the relevant part(s).

- 5.3.6.1.1. Absence of high voltage

The voltages **Vb, V1 and V2** of the high voltage buses shall be equal or less than 30 VAC or 60 VDC **as specified in paragraph 2 of Annex 9.**

- 5.3.6.1.2. Low electrical energy

The total energy (TE) on the high voltage buses shall be less than 2.0 joules when measured according to the test procedure as specified in paragraph 3 of Annex 9 with the formula (a) . Alternatively the total energy (TE) may be calculated by the measured voltage Vb of the high voltage bus and the capacitance of the X-capacitors (Cx) specified by the manufacturer according to formula (b) of paragraph 3 of Annex 9

The energy stored in the Y-capacitors (TE_{y1}, TE_{y2}) shall also be less than 2.0 joules. This shall be calculated by measuring the voltages V1 and V2 of the high voltage buses and the electrical chassis, and the capacitance

of the Y-capacitors specified by the manufacturer according to formula (c) of paragraph 3 of Annex 9

5.3.6.1.3. Physical protection

For protection **against direct contact with high voltage** live parts, the protection **IPXXB** shall be provided.

In addition, **for protection against electrical shock which could arise from indirect contact**, the resistance ...at least 0.2 ampere.

This ... been **made** by welding.

5.3.6.1.4. Isolation resistance

The criteria specified in the paragraphs 5.3.6.1.4.1. and 5.3.6.1.4.2. below shall be met.

The measurement shall be conducted in accordance with paragraph 5 of Annex 9.

5.3.6.1.4.1. Electrical power train consisting of separate DC- or AC-buses.

If **the** AC high voltage buses and **the** DC high voltage...electrical chassis (**R_i**, as defined in paragraph 5 of Annex 9) shall have...for AC buses.

5.3.6.1.4.2. Electrical power train consisting of combined DC- and AC-buses

If **the** AC high voltage buses and **the** DC high voltage...the electrical chassis (**R_i**, as defined in paragraph 5 of Annex 9) shall have....

However, if the protection **IPXXB** is...after **the vehicle impact**, the isolation resistance between the high voltage bus and the electrical chassis (**R_i**, as defined in paragraph 5 of Annex 9) shall have....

5.3.6.2. Electrolyte spillage

In the...from the **RESS** shall spill into...more **than 7 per cent** of electrolyte shall spill from the **RESS except open type traction batteries outside the passenger compartment. For open type traction batteries no more than 7 per cent** with a maximum of **5.0 liters** shall spill outside the passenger compartment.

The manufacturer shall demonstrate compliance in accordance with paragraph 6 of Annex 9 .

5.3.6.3. RESS retention

RESS located...**RESS** components ...**RESS** boundaries.

No part...compartment **for electric safety assessment** shall enter the passenger compartment during **or after** the **impact** test.

The manufacturer shall demonstrate compliance in accordance with paragraph 7 of Annex 9.”

Insert new paragraphs 10.6. to 10.10., to read:

“**10.6. As from the official date of entry into force of the 03 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 03 series of amendments.**

10.7. As from [24] months after the entry into force, Contracting Parties applying this Regulation shall grant ECE approvals only to those types

of vehicle which comply with the requirements of this Regulation as amended by the 03 series of amendments.

Notwithstanding the above, Contracting Parties applying this Regulation may [continue to] grant ECE approvals for an additional [12] months provided that the manufacturer demonstrates, to the satisfaction of the Technical Service, that the vehicle provides equivalent levels of safety to those required by this Regulation as amended by the 03 series of amendments.

10.8. As from [24] months after the date of entry into force, Contracting Parties applying this Regulation shall not refuse to grant extensions to approvals issued to the preceding series of amendments to this Regulation. However, extensions to approvals issued to the previous series of amendments shall not be granted after this date in respect of vehicles having an electrical power train operating on high voltage.

10.9. By way of derogation to the obligations of Contracting Parties applying this Regulation, where at the time of entry into force of the 03 series of amendments to this Regulation national requirements exist to address the safety provisions detailed in these amendments, those Contracting Parties may continue to permit the entry into service of vehicles approved to the preceding series of amendments and complying with the specific national requirements applying at that time. This derogation shall cease to be valid [24] months after the entry into force of the 03 series of amendments to this Regulation.

10.10. As from [48] months after the entry into force of the 04 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse national or regional type approval and may refuse first national or regional registration (first entry into service) of a vehicle having an electrical power train operating on high voltage which does not meet the requirements of the 04 series of amendments to this Regulation.]”

Annex 1, Communication, insert a new item 7 to read:

“7. Location of the electric power source.....”

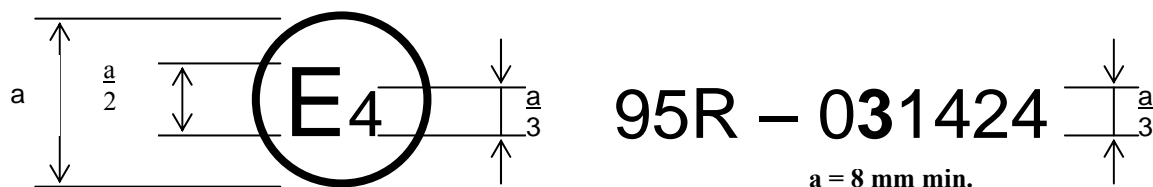
Item 7 to 15 (former), renumber as paragraphs 8 to 16.

Annex 2, amend to read:

“Arrangements of the approval mark

Model A

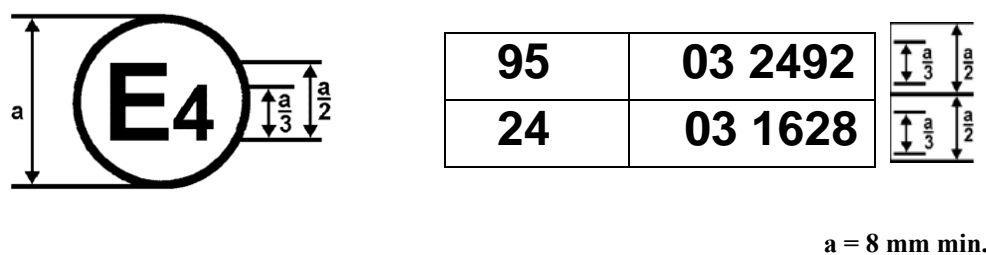
(See paragraph 4.5. of this Regulation)



The above...number 031424. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No. 95 as amended by the 03 series of amendments.

Model B

(See paragraph 4.6. of this Regulation)



The above...Regulation No. 95 incorporated the 03 series of amendments and Regulation No. 24 incorporated the 03 series of amendments.”

Annex 4,

Paragraph 4.1., amend to read:

“4.1. General specification

The test vehicle ... of the test.

It shall be allowed by agreement between manufacturer and Technical Service to modify the fuel system so that an appropriate amount of fuel can be used to run the engine or the electrical energy conversion system.”

Paragraph 4.3.2., amend to read:

“4.3.2. The fuel ...the manufacturer **with a tolerance of ± 1 per cent.**

This requirement does not apply to Hydrogen fuel tanks.”

Insert new paragraphs 5.11. to 5.11.2.2., to read:

“5.11. Electrical..

- 5.11.1. The RESS ...by the manufacturer.
- 5.11.2. The electrical power train shall be energized with or without the operation of the original electrical energy sources (e.g. engine-generator, RESS or electric energy conversion system), however:
 - 5.11.2.1. by the agreement between Technical Service and manufacturer it shall be permissible to perform the test with all or parts of the electrical power train not being energized insofar as there is no negative influence on the test result. For parts of the electrical power train not energized, the protection against electrical shock shall be proved by either physical protection or isolation resistance and appropriate additional evidence.
 - 5.11.2.2. in the case where an automatic disconnect is provided, at the request of the manufacturer it shall be permissible to perform the test with the automatic disconnect being triggered. In this case it shall be demonstrated that the automatic disconnect would have operated during the impact test. This includes the automatic activation signal as well as the galvanic separation considering the conditions as seen during the impact.”

Insert a new Annex 9 and Appendix 1, to read:

“Annex 9

Test Procedures for the protection of...electrolyte spillage

This section...measuring isolation resistance. **In this case it may be necessary to deactivate the on-board isolation resistance monitoring system.**

Before the vehicle **impact** test **conducted**, the high voltage bus voltage (Vb) (see figure 1) **shall be measured and recorded to confirm...vehicle as specified by the vehicle manufacturer.**

1. Test setup and equipment

If a high...are **to be** taken from both sides....

However, if...according to **protection IPXXB following the impact** test, measurements may **only be taken between** the device performing the disconnect function **and electrical loads.**

The voltmeter...least 10 MΩ.

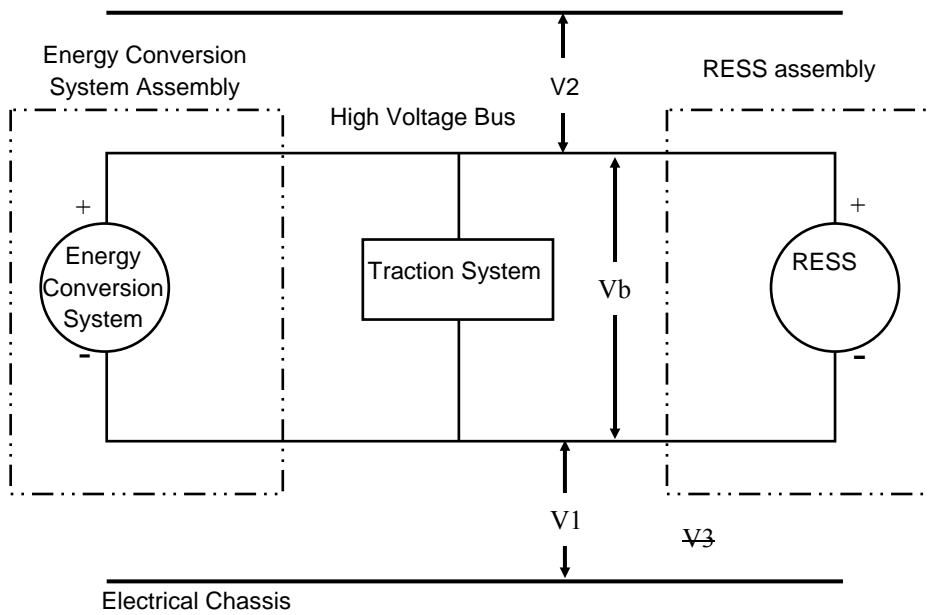
2. The following...measured.

After the **impact** test, determine the high voltage bus voltages (Vb, V1, V2) (see figure 1).

The voltage measurement shall be made not earlier than 5 seconds, but, not later than 60 seconds after the impact.

This procedure is not applicable if the test is performed under the condition where the electric power train is not energized.

Figure 1
Measurement of Vb, V1, V2



3. Assessment procedure for low electrical Energy

Prior to the impact a switch S1 and a known discharge resistor R_e is **connected in parallel to the relevant capacitance (ref. figure 2).**

Not earlier than 5 seconds and not later than 60 seconds after the impact the switch S1 **shall be** closed while the voltage V_b and the current I_e **are** measured and recorded. The product of the voltage V_b and the current I_e **shall be** integrated...threshold of 60 V DC (t_h). **The resulting integration equals** the total energy (TE) in joules.

$$(a) \quad TE = \int_{t_c}^{t_h} V_b \times I_e dt$$

When V_b is measured at a point in time between 5 seconds and 60 seconds after the impact and the capacitance of the X-capacitors (C_x) is specified by the manufacturer, total energy (TE) shall be calculated according to the following formula:

$$(b) \quad TE = 0.5 \times C_x \times (V_b^2 - 3\,600)$$

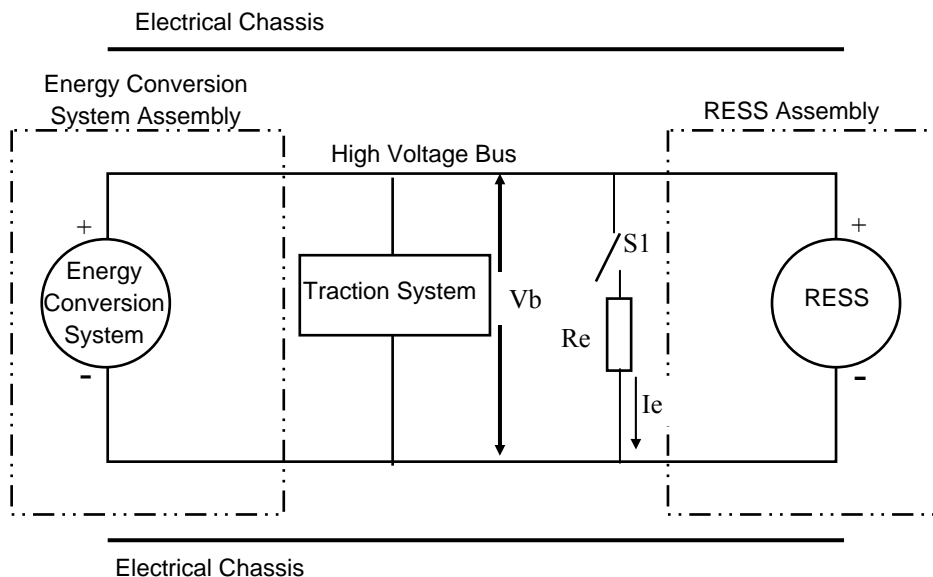
When V_1 , V_2 (see figure 1) are measured at a point in time between 5 seconds and 60 seconds after the impact and the capacitances of the Y-capacitors (C_{y1} , C_{y2}) are specified by the manufacturer, total energy (TE_{y1} , TE_{y2}) shall be calculated according to the following formulas:

$$(c) \quad \begin{aligned} TE_{y1} &= 0.5 \times C_{y1} \times (V_1^2 - 3\,600) \\ TE_{y2} &= 0.5 \times C_{y2} \times (V_2^2 - 3\,600) \end{aligned}$$

This procedure is not applicable if the test is performed under the condition where the electric power train is not energized.

Figure 2

E.g. measurement of high voltage bus energy stored in X-capacitors



4. Physical Protection

Following the vehicle impact test any parts surrounding the high voltage components shall be, without the use of tools, opened, disassembled or removed. All remaining surrounding parts shall be considered part of the physical protection.

The **Jointed Test Finger** described in Appendix 1 figure 1 **shall be inserted into any gaps or openings of the physical protection with a test force of $10\text{ N} \pm 10\text{ per cent}$ for electrical safety assessment.** If **partial or full penetration** into the physical protection **by the Jointed Test Finger** occurs, the **Jointed Test Finger shall be placed in every position as specified below.**

Starting...shall be **rotated progressively** through an angle of up to 90 degrees with...possible position.

Internal electrical protection barriers are considered part of the enclosure.

If appropriate a low-voltage supply (of not less than 40 V and not more than 50 V) in series with a suitable lamp should be connected, between the Jointed Test Finger and high voltage live parts inside the electrical protection barrier or enclosure.

4.1. Acceptance conditions

The **requirements of paragraph 5.3.6.1.3. shall be considered to be met if the Jointed Test Finger** described in Appendix 1, figure 1 **is unable to contact high voltage live parts.**

If necessary a mirror or...whether the Jointed Test Finger touches the high voltage buses.

If this requirement is verified by a signal circuit between the Jointed Test Finger and high voltage live parts, the lamp shall not light.

5. Isolation resistance

The isolation resistance between the high voltage bus and the electrical chassis may be demonstrated either by measurement or by a combination of measurement and calculation.

The following instructions **should** be used if the isolation resistance is **demonstrated by measurement**.

Measure and record the voltage (V_b) between...

...

...

If V_1 is...chassis (see figure 3)... shown **below**.

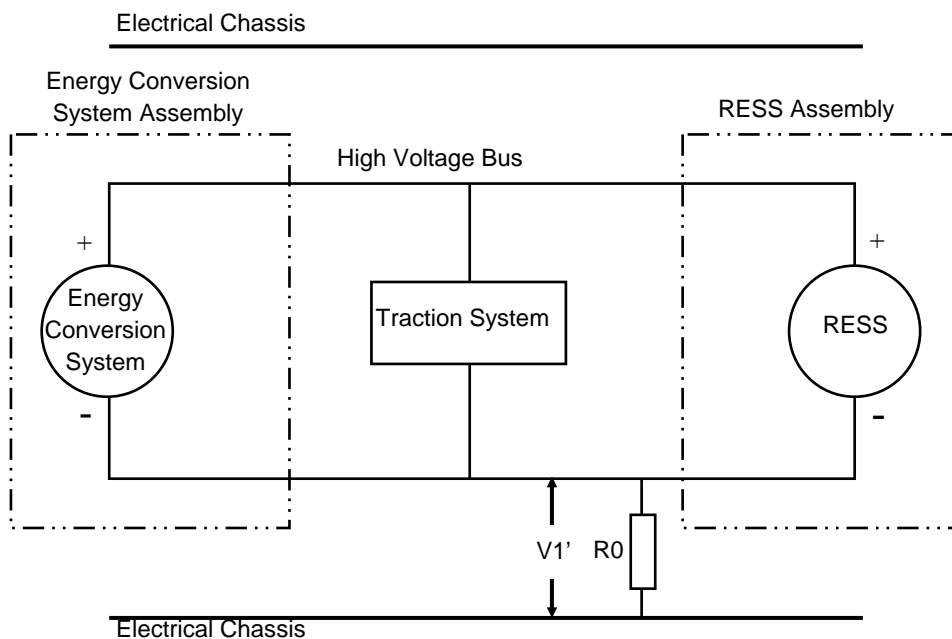
$$R_i = R_o \cdot (V_b/V_1' - V_b/V_1) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1/V_1' - 1/V_1)$$

Divide the result R_i , which is the electrical isolation...voltage bus volt (V).

$$R_i (\Omega / V) = R_i (\Omega) / \text{Working voltage (V)}$$

Figure 3

Measurement of V_1'



If V_2 is...chassis (see figure 4).

Calculate the isolation resistance (R_i) according to the formula shown **below**.

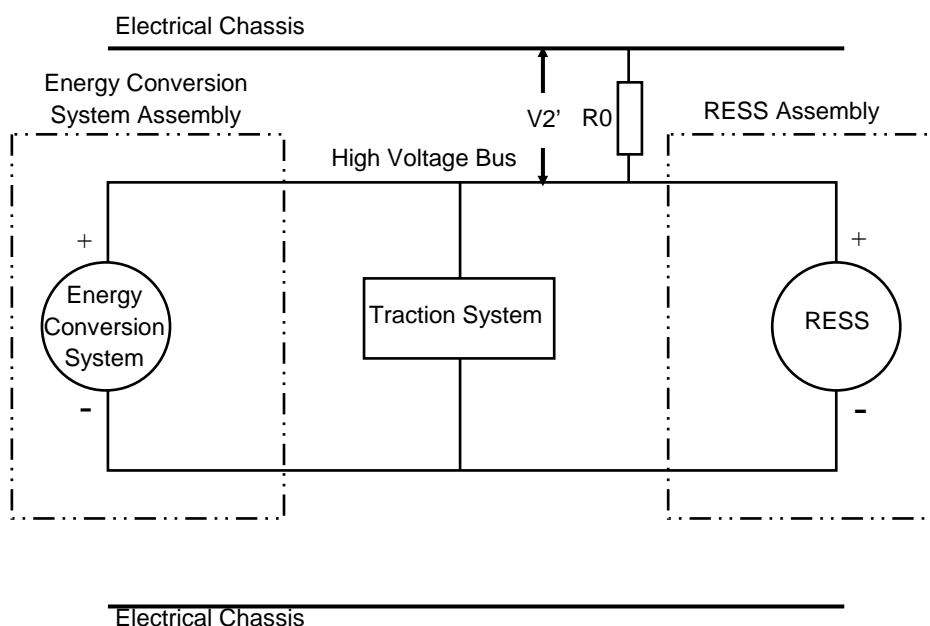
$$R_i = R_o \cdot (V_b/V_2' - V_b/V_2) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1/V_2' - 1/V_2)$$

Divide **the result R_i , which is the electrical isolation resistance value in ohm (Ω), ...voltage bus volt (V).**

$$R_i (\Omega / V) = R_i (\Omega) / \text{Working voltage (V)}$$

$$R_i = R_o \cdot (V_b/V_2' - V_b/V_2) \quad \text{or} \quad R_i = R_o \cdot V_b \cdot (1/V_2' - 1/V_2)$$

Figure 4
Measurement of V_2'



Note 1: The standard known resistance R_o (in Ω) should be **the value of the minimum required isolation resistance (in Ω/V) multiplied by the working voltage (in V) of the vehicle plus/minus 20 per cent**. R_o is not...provide a good resolution for the voltage measurements.

6. Electrolyte spillage

Appropriate **coating** shall be applied, if... to confirm **any electrolyte leakage** from the RESS after the **impact test**.

Unless the manufacturer provides means to differentiate between the leakage of different liquids, all liquid leakage shall be considered as the electrolyte.

7. RESS retention

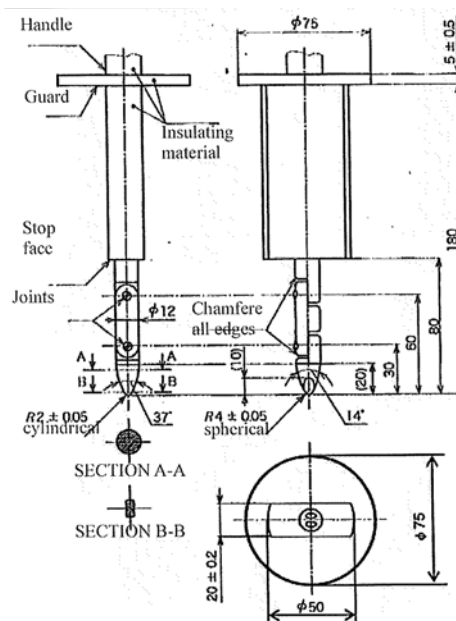
Compliance shall be determined by visual inspection

Appendix 1

Jointed test finger (IPXXB)

Figure 1

Jointed test finger



Material: metal, except ...

...

Both joints shall ...angle of 90° with a 0 to +10° tolerance.”

Annex VIII

Amendments to draft Regulation on pedestrian safety

Amendments adopted to ECE/TRANS/WP.29/GRSP/2009/17
(see para. 43 of the report)

...

Paragraph 1, amend to read

“1. Scope

This Regulation applies to motor vehicles of categories M₁ and N₁ ¹

However, vehicles of category N₁ where the driver's position "R-point" is either forward of the front axle or longitudinally rearwards of the front axle transverse centreline by a maximum of 1100 mm, are exempted from the requirements of this Regulation.

This Regulation does not apply to vehicles of category M₁ above 2500 kg maximum mass and which are derived from N₁ category vehicles, and where the driver's position "R-point" is either forward of the front axle or longitudinally rearwards of the front axle transverse centreline by a maximum of 1100 mm; for these vehicle categories Contracting Parties may continue to apply the requirements already in force for that purpose at the time of acceding to this Regulation.”

...

Paragraphs 11. to 11.3.2., shall be deleted

Annex 5, paragraph 3.4.3., amend to read:

“3.4.3. The areas of "HIC1000 zone" and "HIC1700 zone" may...limited. The determination of the impacted zone is done by the first contact point of the headform with the “bonnet top.”

...

Annex IX

[English only]

List of the informal groups of GRSP

| <i>Informal group</i> | <i>Chairman</i> | <i>Secretary</i> |
|---|--|------------------|
| Truck cab strength | Mr. Vladimir Salnikov Phone : +7 495-9949917 Fax : +7 495-9949940 Email : v.salnikov@autorc.ru | (OICA) |
| Frontal Impact | Mr. Pierre Castaing Phone : +33 1-69801750 Fax : +33 1-69801719 Email : pierre.castaing@utac.com | |
| Head restraints | Mr. Bernard Frost Phone : +44-(0)207 9442107 Fax : +44-(0)207 9449623 Email : bernie.frost@dft.gsi.gov.uk | (OICA) |
| Hydrogen and fuel cells - subgroup safety | Mr. Kazuyuki Narusawa Phone : +81 4-22413218 Fax : +81 4-22768604 Email : narusawa@ntsel.go.jp | USA |
| Child restraints systems | Mr. Pierre Castaing Phone : +33 1-69801750 Fax : +33 1-69801719 Email : pierre.castaing@utac.com | |
| Electric safety | Mr. Heiko Mertens Phone : +49 536-1930123 Mobile : +49 151-16822235 Fax : +49 536-195749806 Email : heiko.mertens@volkswagen.de | |