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Working Party on Automated/Autonomous and Connected Vehicles

Twentieth session
Geneva, 23-27 September 2024

Report of the Working Party on Automated/Autonomous and Connected Vehicles on its twentieth session

Contents

I. Attendance

1. The Working Party on Automated/Autonomous and Connected Vehicles (GRVA) met from 23-27 September 2024 in Geneva. The meeting was chaired by Mr. R. Damm (Germany), except for the discussions under agenda item 8, which were led by the Vice-Chair, Mr. T. Naono (Japan), as the Chair was invited to give a presentation at the Global Forum for Road Traffic Safety, taking place in parallel. Accredited experts from the following countries participated in the work, following Rule 1 of the Rules of Procedure of the World Forum for Harmonization of Vehicle Regulations (WP.29) (ECE/TRANS/WP.29/690/Rev.2): Australia, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, Germany, India, Italy, Japan, Lebanon, Lithuania, Luxembourg, the Kingdom of the Netherlands, Norway, Poland, Portugal, the Republic of Korea, the Russian Federation, Slovakia, Spain, Sweden, Switzerland, Thailand, the United Kingdom of Great Britain and Northern Ireland (UK), the United States of America (USA), and Zimbabwe. The European Commission also participated. Experts from the International Motor Vehicle Inspection Committee (CITA) and the European Transport Safety Council (ETSC) participated upon invitation by the Chair and the secretariat.

2. Experts from the following Non-Governmental Organizations (NGOs) and international organizations participated: American Automotive Policy Council (AAPC), European Association for Electric Mobility (AVERE), European Agricultural Machinery Organization (CEMA), Center for China and Globalization Limited, European Association of Automotive Suppliers (CLEPA/MEMA/JAPIA), International Council on Environmental Economics and Development (ICEED), European Garage Equipment Association (EGEA), European Association of Internal Combustion Engine Manufacturers (EUROMOT), Institute of Electrical and Electronics Engineers (IEEE), International Automobile Federation (FIA), Fédération Internationale des Véhicules Anciens (FIVA), International Motorcycle Manufacturers Association (IMMA), International Road Federation (IRF), International Road Transport Union (IRU), International Telecommunication Union (ITU), International Organization of Motor Vehicle Manufacturers (OICA), SAE International, Secure America's Future Energy (SAFE) and the World Bicycle Industry Association (WBIA).

II. Adoption of the agenda (agenda item 1)

Documentation: ECE/TRANS/WP.29/GRVA/2024/29 and Add.1
Informal documents GRVA-20-01 and GRVA-20-02

3. GRVA considered the provisional agenda prepared for its twentieth session (ECE/TRANS/WP.29/GRVA/2024/29 and Add.1). GRVA adopted it (without modifications), as reproduced in GRVA-20-02, which is a version that includes references to all informal documents received until 23 September 2024. (All informal documents submitted are listed in Annex I of this report. Annex II provides the list of Informal Working Groups (IWG) reporting to GRVA.)

4. GRVA also agreed on the running order prepared for the session (see informal document GRVA-20-01/Rev.1).

III. Highlights of the June 2024 session of WP.29 (agenda item 2)

Documentation: (ECE/TRANS/WP.29/1179)
Informal document GRVA-20-03

5. GRVA noted the presentation by the secretariat (GRVA-20-03), containing highlights from the WP.29 session in June 2024, which had relevance for GRVA. He referred to the session report ECE/TRANS/WP.29/1179 for more details.

6. The secretariat informed the Group that the unauthorized use of images, or any other copyrighted material without prior and appropriate consent of the copyright owner is strictly forbidden and contrary to the rules and regulations of the United Nations. Given this,

materials submitted to UNECE in any context must bear an appropriate copyright notice of the author, as follows: “Copyright [date] [author], all rights reserved. For reproduction permission and all other issues, please contact [author email].” In addition, all participants were informed that: “in submitting presentations or materials, they are representing that they own the rights to all content, text and images therein, that they have the permission of the owner, and/or that the content is licensed under a Creative Commons or public domain license. Any costs arising from unauthorized use of images, text, figures or other material shall be their full responsibility.” He added that the first requirement (related to the date, author and author email) was temporarily lifted, while the organization was reviewing practical implementation details.

IV. Artificial Intelligence in vehicles (agenda item 3)

Documentation: (ECE/TRANS/WP.29/2024/34/Rev.1
ECE/TRANS/WP.29/1179, Annex VI)
Informal documents GRVA-20-16 and GRVA-20-23

7. The Secretary recalled the highlights of the last WP.29 session, including the adoption of ECE/TRANS/WP.29/2024/34/Rev.1, as amended by Annex VI to the session report, and the request of Germany to establish a group under WP.29 to deal with Artificial Intelligence (AI). He explained that some Parties mentioned that this task could be assigned to the IWG on Intelligent Transport Systems (ITS). He mentioned that the discussion was still ongoing at WP.29 level and that in the meantime, the WP.29 subsidiary bodies could continue to exchange views on that topic.

8. The representative of Germany presented (GRVA-20-16) the National German Project “AIMobilityAudit”. He shared considerations related to Auditable AI systems. He detailed the process applied during the project for developing practical requirements for AI Security and illustrated it with two examples: traffic sign assistant and road user detection.

9. The representative of SAFE inquired if the project only focused on security or also safety. The representative of Canada mentioned that the non-holistic approach described differed from the one developed by GRVA, aimed to be more generic and principle based. The representative of CLEPA inquired about how the 90 per cent threshold was determined. The representative of France asked about the follow-up of this project. The representative of Germany clarified that the project also touched on safety as it derived from security, that the presentation provided examples and that the project was close to the end.

10. The representative of France presented (GRVA-20-23) the status of the PRISMA project already introduced to GRVA (GRVA-15-39) three years ago. He recalled the project’s objective and use cases, the V-shape validation method applied and the organization of the project dealing with 8 work packages. He noted that the presence of AI bricks in system impact the validation process. He highlighted the key role of both scenarios and real-world evaluation supported by a multistep methodology. He also listed the encountered difficulties. He provided a synthesis of the project’s conclusions.

11. The representative of the Netherlands asked if the project covered situation where the AI agent performed the full Dynamic Driving Task. The Chair asked about the follow up activities. The representative of France clarified that the project focused on assistance system and the project’s conclusion would be an input for approvals. He agreed to share the whitepaper produced once the translation in English would be available.

V. Automated/autonomous and connected vehicles (agenda item 4)

A. Informal Working Group on Automated Driving System

Documentation: Informal documents GRVA-20-36, GRVA-20-40 and GRVA-20-41

12. The representative of Japan presented (GRVA-20-40) the progress review of the IWG on Automated Driving System (ADS). He provided organizational details and announced the objectives for the group during the next meetings scheduled in 2024 and 2025.

13. The representative of OICA suggested focusing on the good synchronization of the Officers of Principle Interest (OPIs) activities, working in parallel.

14. The representative of the Netherlands, Co-Chair of the IWG on Validation Method for Automated Driving proposed (GRVA-20-36) amendments to ECE/TRANS/WP.29/2024/39 titled: Guidelines and recommendations for Automated Driving System safety requirements, assessments and test methods to inform regulatory development. He recalled that the amendments were presented during the nineteenth session of GRVA and that a Contracting Party had requested additional time to review the content.

15. GRVA adopted GRVA-20-36 and requested the secretariat to incorporate the amendments in GRVA-20-36 into ECE/TRANS/WP.29/2024/39 or issue a revision if the document was already issued. GRVA also agreed to transmit it to the IWG on ADS.

16. GRVA reviewed the draft report (GRVA-20-41) prepared for the sessions ofWP.29 and the Executive Committee of the 1998 Agreement (AC.3) in November 2024. GRVA agreed that GRVA-20-41 would be updated with the outcome of the London meeting of the IWG on ADS and the Beijing meeting of the GRVA Workshop on ADS and shall be transmitted to the parent body.

B. GRVA workshops

Documentation: Informal documents GRVA-20-20 and GRVA-20-56

17. The Secretary presented (GRVA-20-20) the status report of the GRVA workshops on ADS, mentioning achievements during the kick-off meeting in June 2024 and the second one on 10-11 September 2024.

18. The expert from China provided details (GRVA-20-56) on the next GRVA workshop on ADS, scheduled for 15-16 October 2024 and hosted in Beijing during the World Intelligent and Connected Vehicles conference. He announced that the host would organize two visits and demos with Level 4 ADS technology.

C. Deliverables of the Informal Working Group on Event Data Recorder / Data Storage Systems for Automated Driving

Documentation: (ECE/TRANS/WP.29/2024/33
ECE/TRANS/WP.29/1179, para. 61)
Informal document GRVA-20-24

19. The representative of the United States of America, Co-Chair of the IWG on Event Data Recorder (EDR) / Data Storage Systems for Automated Driving (DSSAD) presented (GRVA-20-24) the status report of the group. She mentioned the outcome of the last meeting, one week prior to the session, and the input received by the European Commission, Japan and Korea. She stressed that access to DSSAD data could not be standardized at this stage as it would depend on national laws.

D. UN Regulation No. 157

Documentation: ECETRANS/WP.29/GRVA/2024/30
ECETRANS/WP.29/GRVA/2024/40
ECETRANS/WP.29/GRVA/2024/16 (Part II)
Informal documents GRVA-20-04, GRVA-20-42 and GRVA-20-44

20. The representative of Germany presented a proposal for a supplement to the 01 series of amendments to UN Regulation No. 157, aimed at addressing the content of the footnote in paragraph 5.2.6.5.1 that GRVA agreed to revisit at this session. He proposed that lane changes for heavy vehicles be authorized in a target lane for which the speed limit was identified.

21. The representative of the United Kingdom of Great Britain and Northern Ireland recalled to GRVA that he conducted a survey with the Contracting Parties within the Special Interest Group for UN Regulation No. 157 and that there was a consensus on removing the footnote. He mentioned that only Germany proposed a substitute.

22. The representative of OICA inquired whether more flexibility could be accepted in situations where the system identified that a lane change was uncritical.

23. The representative of the Netherlands inquired about the justification for removing the footnote. He stated that the German proposal was a sensible way forward in case the footnote would be deleted.

24. The representative of Japan could agree to the proposal. He suggested finding a more general text.

25. The representative of Sweden identified situations that could be dangerous also in cases where the speed limit can be identified, e.g., when the ego vehicle has a very slow speed.

26. GRVA agreed to continue this discussion and requested the secretariat to distribute GRVA-20-04 with an official symbol at its January 2025 session.

27. GRVA considered GRVA-20-42 (superseding ECE/TRANS/WP.29/GRVA/2024/30 and ECE/TRANS/WP.29/GRVA/2024/40) at the same time as GRVA-20-43 under agenda item 6(b). GRVA requested the secretariat to distribute GRVA-20-42 with an official symbol at the January 2025 session.

E. Coordination of work on automation between working parties (GRs)

1. Fitness of UN GTRs and UN Regulations for ADS

Documentation: Informal document GRVA-20-17

28. The representative of France, Co-Chair of the TF on the Fitness of UN GTRs and UN Regulations for ADS (FADS), presented (GRVA-20-17) the status report of the group as well as the TFs on Automated Vehicle Regulation Screening under the other WP.29 subsidiary bodies that the TF on FADS was coordinating. He reconfirmed the timeline of the group and the ambition to deliver informal documents with amendments to UN Regulations Nos. 13, 13-H and 79 for consideration in January 2025.

29. GRVA noted the status report and looked forward to receiving the three informal documents for consideration in January 2025.

2. Vehicle subcategories for ADS

Documentation: (ECE/TRANS/WP.29/GRVA/2023/28)
Informal document GRVA-20-18

30. The representative of Germany presented, on behalf of the Co-Chairs of the TF on Automated Vehicle Categories (AVC), the status report (GRVA-20-18) of the Group, proposing two new subcategories X and Y. GRVA discussed the relevance of these

definitions also for other TFs such as FADS and AVRS as well as the 6 km/h threshold proposed by the TF on AVC.

31. The representative of IMMA recalled that they considered it premature to include the Category L in the AVC deliberations. The representative of Germany recalled that the categories L6 and L7 included four-wheelers. The representative of France, Co-Chair of the TF on FADS explained that the Category L wasn't the priority so far but also noted that an ecosystem of small quadricycles manufacturers not represented today at GRVA should not be neglected. GRVA encouraged the TFs on FADS and ACV to discuss IMMA's position. GRVA invited IMMA to join the sessions of the two TFs.

3. Exchange of views on scenarios

Documentation: Informal documents GRVA-20-05, GRVA-20-26 and GRVA-20-31

32. The representative of the United Kingdom of Great Britain and Northern Ireland (GRVA-20-26) presented the main outcome of the second GRVA workshop on scenarios held in London on 1-3 July 2024. He introduced the detailed summary (GRVA-20-05) of the workshop.

33. The representative of France presented (GRVA-20-31) the potential benefits of sharing scenarios for authorities or independent assessors. He proposed thoughts for next steps.

34. GRVA asked the Secretary whether GRVA can adopt standards for interoperability. The Secretary mentioned that there were precedents for this, for example: GRVA had adopted by reference ISO 11992, used for communication between the tractor and one or more trailers, in UN Regulation No. 13.

35. The representatives of AAPC, ITU, and SAFE advised to wait for the outcome of the IWG on ADS before focusing on that topic.

36. The representative of China recalled to GRVA the International Organization for Standardization (ISO) activities under Working Group 9 of the Technical Committee 22 on scenarios and the four standards already published. He referred to a previous presentation (see GRVA-16-24). He inquired whether the workshop could reflect on further needs that ISO could potentially address.

37. The representative of the Netherlands found the activities helpful but did not see them as a prerequisite for implementing the new ADS regulation being developed by the IWG on ADS.

38. The representative of Sweden felt the topic relevant as GRVA was defining, based on scenarios, minimum performance requirements for ADS.

39. The representative of the Russian Federation did not anticipate that the IWG on ADS could answer all questions or guide on how to derive concrete scenarios from the high level and functional scenarios it was developing.

40. The representative of ITU anticipated that scenarios would not be part of the first ADS regulation. He mentioned that UN Regulation No.171 (DCAS) had provisions on in-service monitoring and reporting as well as on scenarios; so, scenarios would be in DCAS long before ADS.

41. GRVA agreed to get prepared for when scenarios would be needed and agreed to convene a workshop as proposed by France on 2 December 2024.

F. Other business

42. No document was discussed under this agenda item.

VI. Connected vehicles (agenda item 5)

A. Cyber security, software updates and over-the-air issues

Documentation: ECE/TRANS/WP.29/GRVA/2024/20
ECE/TRANS/WP.29/GRVA/2024/31
Informal documents GRVA-17-30, GRVA-20-25

43. The representative of the United Kingdom of Great Britain and Northern Ireland, Co-Chair of the IWG on CS/OTA, presented (GRVA-20-25) the status of the group. He explained that the group met once since the last GRVA session and addressed the topics on: (a) Annex 7 to the Consolidated Resolution R.E.3., (b) Software Identification Number (RxSWIN) and (c) vehicle data access and privacy-by-design. On the latter, he detailed the activities of FIA, which had already presented its general intention and was requested to further develop its concepts. He added that, as the IWG did not desire to do that at the IWG level, so FIA established a group of volunteers. He concluded that the IWG was waiting for the outcome of this group.

44. He noted that the mandate of the IWG was going to expire and asked for an extension. He listed the following topics as possible items under the extended mandate: RxSWIN, categories of post-registration software updates and the FIA proposal. The GRVA Chair suggested that the group consider drafting a UN GTR on cybersecurity.

45. The representative of ITU invited GRVA to consider further issues, including cyberattack monitoring. He stated that if people could figure out how to blow a pager, they would certainly manage to hack vehicles (referring to the latest news before the session regarding pager explosions in Lebanon on 18 September 2024).

46. The representative of Canada responded to ITU that the cybersecurity activities of the group were not about addressing all possible edge cases but achieving a necessary resilience. He supported the mandate extension and invited GRVA to consider possible input that the IWG on CS/OTA could provide to the IWG on ADS.

47. The experts from France, Germany, European Commission and Japan also provided comments and supported the mandate extension.

48. GRVA agreed to request a mandate extension to WP.29 until November 2026 for the group and invited the experts to update the terms of reference of the group to include the tasks envisaged during the two years.

49. GRVA recalled the purpose of ECE/TRANS/WP.29/GRVA/2024/31, inserting a reference to ISO 24089:2023, and adopted it. GRVA requested the secretariat to submit it to WP.29 for adoption in March 2025.

50. GRVA agreed to keep ECE/TRANS/WP.29/GRVA/2024/20 on the agenda of its next session.

51. The representative of Japan, Co-Chair of the IWG on CS/OTA briefly informed GRVA on the findings and future activities of the workshop on the implementation of UN Regulations Nos. 155 and 156.

52. GRVA noted that some administrative provisions in the regulation were applied with significant delays. GRVA invited all Approval Authorities to apply all administrative provisions in a timely manner.

53. GRVA agreed that additional in-person workshop(s) be organized to address the proposed topics: timely compliance with administrative provisions in UN Regulation No. 155 and application of the regulation in the case of multi-stage type approval.

B. Data protection and privacy-by-design

54. GRVA addressed this agenda item together with agenda item 5(a).

55. GRVA agreed that an in-person workshop on vehicle data access and data protection be organized in January 2025 in Geneva before or after the GRVA session.

C. Data and vehicle communications

Documentation: Informal documents WP.29-192-10, GRVA-20-27 and GRVA-20-28

56. The representative of the Netherlands, Co-Chair of the IWG on VMAD, introduced WP.29-192-10, initially presented at the 192nd WP.29 session, containing the outcome of a study on the sustainability of automated and connected vehicles, affirming that their emissions were underestimated. He showed the results of calculations and estimations highlighting the potential road safety benefits i.e. the reduction of fatalities due to road crashes are expected to be outweighed by the number of fatalities caused by the emissions of automated and connected vehicles.

57. The representative of ITU explained that, in the United States of America, the projected use of electricity for data centres far exceeded the projected use of electricity for electric vehicles.

58. The representative of the European Commission inquired if the calculations and comparisons between the impact on road safety and emissions included statistical adjustments to account for factors such as the exposure, noting that the lifelong exposure for emissions was not comparable to the one- year exposure for road safety.

59. GRVA agreed that the sustainability of connected and automated vehicles was not limited to emissions or safety and that technology design plays an important role. GRVA agreed to collaborate with GRPE for assessing the impact of connected and automated vehicles on emissions.

60. The representative of Japan, Co-Chair of the TF on Vehicular Communication presented (GRVA-20-28) information regarding the progress of the group. He briefly introduced GRVA-20-27, with the draft vehicular communications definition, types, value, uses, and considerations. He explained upon request that there was no indication so far about further work for GRVA in that field and that this would depend on the recommendations of the IWG on ITS to WP.29.

D. Other business

61. No document was discussed under this agenda item.

VII. Advanced Driver Assistance Systems and UN Regulation No. 79 (agenda item 6)

A. Advanced Driver Assistance Systems

Documentation: ECE/TRANS/WP.29/GRVA/2024/32
ECE/TRANS/WP.29/GRVA/2024/33
Informal documents GRVA-20-08, GRVA-20-21 and Add.1, GRVA-20-22, GRVA-20-29, GRVA-20-34, GRVA-20-37, GRVA-20-43/Rev.1, GRVA-20-49, GRVA-20-53, GRVA-20-54, GRVA-20-57/Rev.1, GRVA-20-58, GRVA-20-59/Rev.2, GRVA-20-60.

62. The Chair of the TF on ADAS presented (GRVA-20-21) the report on the activities of the group since the last GRVA session. He provided general information about the Driver-Control Assistance System (DCAS) operation, he recalled the DCAS regulatory concept, he presented the draft amendments to UN Regulation No. 171 submitted by the task force for consideration at this session, and he sought guidance from GRVA on open items.

63. The representative of FIA supported UN Regulation No. 171 (DCAS) in its original form but expressed concerns with the proposed 01 series of amendments. He pointed out a potential discrepancy in the presentation regarding the need for trainings: slide 15 mentioned that there is no need to train the driver to become a DCAS supervisor, while slide 20 mentioned that in general,

drivers shall be educated and trained to operate vehicles equipped with DCAS. The Chair of the TF on ADAS explained that the latter was general about minimizing drivers' complacency and overreliance. He agreed to clarify the presentation. The representative of CLEPA explained that the Human-Machine Interface requirements in UN Regulation No. 171 were the reason why no general training on DCAS was needed.

64. The representative of the United Kingdom of Great Britain and Northern Ireland introduced ECE/TRANS/WP.29/GRVA/2024/33 as amended by GRVA-20-29 aimed at aligning the conditions for automatic reinstatement of the system at the "initiation of each engine start/run cycle" with the provisions contained in other UN Regulations. He produced GRVA-20-43 and Rev.1 to address the comments received.

65. GRVA adopted ECE/TRANS/WP.29/GRVA/2024/33 as amended by Annex III and requested the secretariat to submit it as a draft supplement to the original version of UN Regulation No. 171 (DCAS).

66. GRVA reviewed ECE/TRANS/WP.29/GRVA/2024/32 as amended by informal document GRVA-20-22 and discussed the open issues (also listed in GRVA-20-21). The representative of OICA provided input on the open issues in GRVA-20-37. GRVA:

(a) Agreed to include the new paragraph 17 proposed by Japan (GRVA-20-08).

(b) Discussed whether to limit the operational conditions for the System-Initiated Manoeuvres (SIM) and agreed to only allow SIM on motorways for systems not withholding the Hands-On Request to reach consensus on SIM.

(c) Agreed, following discussion, with option 2 for para. 5.5.3.2.1.

(d) Discussed the remaining items related to periodic monitoring (GRVA-20-49).

(e) Reviewed the editorial corrections proposed by China (GRVA-20-34).

(f) Discussed timing considerations on DCAS Lane Change Procedure (GRVA-20-58).

(g) Discussed the means to ensure that drivers understand the limitations of the system and their responsibilities when the system is operating, particularly for system-initiated manoeuvres (GRVA-20-57 and Rev.1 as well as GRVA-20-60).

67. GRVA adopted ECE/TRANS/WP.29/GRVA/2024/32 as amended by GRVA-20-59/Rev.2 and requested the secretariat to submit the proposal for the 01 series of amendments to UN Regulation No. 171 to WP.29 and the Administrative Committee of the 1958 Agreement (AC.1) for consideration and vote at their March 2025 sessions.

68. GRVA approved the next steps for the IWG on ADAS as proposed in GRVA-20-21/Add.1.

69. GRVA requested the secretariat to distribute GRVA-20-54, a proposal for a supplement to the original version of UN Regulation No. 171 prepared by the European Commission Joint Research Centre, with an official symbol for consideration at its January 2025 session.

B. UN Regulation No. 79 (Steering equipment)

Documentation: ECE/TRANS/WP.29/GRVA/2024/27
ECE/TRANS/WP.29/GRVA/2024/28
ECE/TRANS/WP.29/GRVA/2024/34
ECE/TRANS/WP.29/GRVA/2024/35
ECE/TRANS/WP.29/GRVA/2024/36
Informal documents GRVA-20-09, GRVA-20-15, GRVA-20-35, GRVA-20-38, GRVA-19-20 and GRVA-19-33/Rev.1

70. The representative of Australia introduced GRVA-20-09 (superseding ECE/TRANS/WP.29/GRVA/2024/27), proposing a new UN Regulation on Emergency Lane Keeping System (ELKS) based on the existing requirements in the European Union Regulation 2021/646. The representative of OICA supported the proposal. The representative of Japan welcomed the proposal as ELKS was an effective system for increasing safety. He

mentioned that these systems could also provide value in urban environments, at lower speeds than those included in the document. He volunteered to join meetings on this topic, if any.

71. The representative of China proposed editorial amendments (GRVA-20-35) to the proposal. The representative of OICA proposed, as an alternative, to delete the definition in para. 2.6. The representative of China welcomed this alternative.

72. GRVA agreed to resume consideration of this proposal (GRVA-20-09) based on an official document that the representative of Australia agreed to prepare.

73. The representative of the United Kingdom of Great Britain and Northern Ireland proposed (GRVA-20-38) clarifications to the scope of UN Regulation No. 79. The representatives of the Netherlands and OICA supported the proposal.

74. GRVA requested the secretariat to submit GRVA-20-38 as draft supplements to the 03 and 04 series of amendments to UN Regulation No. 79 to WP.29 and AC.1 for consideration and vote at their March 2025 sessions.

75. The representative of OICA recalled the purpose of ECE/TRANS/WP.29/GRVA/2024/28 and presented (GRVA-20-15) the status report of their activities on Steer-by-Wire (SbW) and detailed the current considerations regarding the energy management system and SbW testing provisions. The expert from Japan advised also considering stationary state testing provisions. GRVA noted the good progress regarding the energy management system provisions. GRVA invited the steering experts to find consensus on the testing provisions and invited the experts to submit an official document for consideration at the January 2025 session.

76. GRVA considered ECE/TRANS/WP.29/GRVA/2024/36 and GRVA-20-44 (superseding ECE/TRANS/WP.29/GRVA/2024/34 and ECE/TRANS/WP.29/GRVA/2024/35) at the same time as GRVA-20-43 under agenda item 6(b). GRVA requested the secretariat to distribute GRVA-20-44 with an official symbol at the January 2025 session.

C. Acceleration Control for Pedal Error

Documentation: (ECE/TRANS/WP.29/2024/154
ECE/TRANS/WP.29/GRVA/2024/24)
Informal documents GRVA-20-45 and GRVA-20-46

77. The representative of Germany, Co-Chair of the IWG on Acceleration Control for Pedal Error (ACPE), presented (GRVA-20-45) the status of the group. He informed GRVA that the group prepared an amendment (GRVA-20-46) to ECE/TRANS/WP.29/2024/154, tabled for adoption by WP.29 in November 2024. He provided insight into the development of the 01 series of amendments to the ACPE regulation and sought guidance from GRVA on whether to include Category N_1 in the scope of the regulation. He briefly mentioned the activities under the 1998 Agreement, pending approval of AC.3.

78. GRVA invited the inclusion of Category N_1 in the scope of the regulation and to address the challenges mentioned by the industry.

79. GRVA requested the secretariat to submit GRVA-20-46/Rev.2 for consideration and vote by WP.29 and AC.1 at their November 2024 sessions.

80. GRVA noted that some countries (Canada, Germany, Republic of Korea, Japan and the United States of America) were considering volunteering to be technical sponsors for the development of the UN Global Technical Regulation on ACPE.

D. Other business

81. No document was discussed under this agenda item.

VIII. Advanced Emergency Braking Systems (agenda item 7)

Documentation: ECE/TRANS/WP.29/GRVA/2024/18
ECE/TRANS/WP.29/GRVA/2024/19
Informal documents GRVA-19-05, GRVA-19-56/Rev.1, GRVA-20-10/Rev.1, GRVA-20-11/Rev.1 and GRVA-20-12/Rev.1

82. The representative of Australia recalled the purpose of ECE/TRANS/WP.29/GRVA/2024/18, GRVA-19-05, and GRVA-19-56/Rev.1. He explained that the consultations were still ongoing. GRVA agreed to keep these documents on the agenda for the January 2025 session.

83. GRVA resumed consideration of ECE/TRANS/WP.29/GRVA/2024/19 as amended by GRVA-20-10, GRVA-20-11, and GRVA-20-12, providing provisions for AEBS virtual testing. The representative of OICA supported the proposal. He asked that GRVA review the 30 percent value (number of tests required to be performed physically) at a later stage. The representative of Japan also supported the proposal. He asked for details on how the 30 percent value was determined. The representative of Canada expressed a similar interest in the method for determining this value. The representative of the United Kingdom of Great Britain and Northern Ireland supported the robust proposal. The representative of Norway saw potential significant savings thanks to that proposal. He inquired about the skills needed for the Approval Authority to assess a simulation tool chain, differing from the skills for validating test results. The representative of Spain drew the attention of GRVA to the Conformity of Production (CoP) and stated that if the approval was based on simulation, a different method would be needed for performing the CoP tests. The representative of France explained that the 30 percent value was an empirical value.

84. GRVA adopted ECE/TRANS/WP.29/GRVA/2024/19 as amended by GRVA-20-10/Rev.1 (see Annex IV), GRVA-20-11/Rev.1, and GRVA-20-12/Rev.1 and requested the secretariat to submit the draft Supplement 7 to the original version, draft Supplement 6 to the 01 series of amendments, and draft Supplement 4 to the 02 series of amendments to UN Regulation No. 152 (AEBS of M_1 and N_1) for consideration and vote by WP.29 and AC.1 at their March 2025 sessions.

IX. UN Regulations Nos. 13, 13-H, 139, 140 and UN GTR No. 8 (agenda item 8)

A. Electronic Stability Control

85. No document was submitted under this agenda item.

B. Electromechanical braking

Documentation: Informal documents GRVA-19-14/Rev.1, GRVA-19-16, GRVA-19-17, GRVA-20-39

86. The representative of CITA recalled the adoption by GRVA of technical provisions for the approval of Electrical Transmission Braking System (ETBS) in June 2024 and the ongoing discussion on braking performance testing of these systems for heavy vehicles at the time of Periodic Technical Inspection (GRVA-19-14/Rev.1, GRVA-19-16, GRVA-19-17). He recalled the importance of testing brakes at PTI and the existing methods. He presented considerations regarding reference braking forces using vehicle interface compared to using an On-Board Diagnostic (OBD) plug.

87. The representative of OICA inquired why industry should harmonize the communication standards via OBD, which would only serve the purpose of some tooling companies in a limited number of countries. He recalled that some countries did not use reference values for PTI.

88. The representative of Germany supported the CITA proposal to use the OBD plug as a quick fix. The representative of Denmark inquired whether this measurement equipment was required as per the European Union directive 2014/45. The representative of Spain recalled the technical reason explaining the need for reference values and the provisions for the periodic technical inspection of braking systems in UN Regulation No. 13. The representatives of the Netherlands, Sweden, and the United Kingdom of Great Britain and Northern Ireland supported further discussion of this topic by GRVA without further delay.

89. GRVA agreed to keep GRVA-20-39 and GRVA-19-17 on the next session's agenda.

C. Clarifications

Documentation: (ECE/TRANS/WP.29/GRVA/2024/17)
ECE/TRANS/WP.29/2024/147
ECE/TRANS/WP.29/GRVA/2024/17
ECE/TRANS/WP.29/GRVA/2024/22
ECE/TRANS/WP.29/GRVA/2024/37
ECE/TRANS/WP.29/GRVA/2024/38
ECE/TRANS/WP.29/GRVA/2024/39
Informal documents GRVA-20-06, GRVA-20-07, GRVA-20-13, GRVA-20-14, GRVA-20-19, GRVA-20-32, GRVA-20-33, GRVA-20-47 and GRVA-20-48, GRVA-20-50 and GRVA-20-52

90. The representative of Germany recalled the purpose of ECE/TRANS/WP.29/GRVA/2024/37 (superseding ECE/TRANS/WP.29/GRVA/2024/22), aimed at clarifying the testing provisions for endurance braking. He indicated that GRVA-20-48 provided background information on endurance braking. The representative of OICA supported the technical elements of the proposal. He presented an amendment proposal to the administrative provisions (GRVA-20-47). The representatives of Germany, Italy, and Sweden supported the proposal.

91. GRVA requested the secretariat to submit ECE/TRANS/WP.29/GRVA/2024/37 as amended by GRVA-20-47 as the draft 15 series of amendments to UN Regulation No. 13 for consideration and vote by WP.29 and AC.1 at their March 2025 sessions.

92. The representative of CLEPA proposed to resume discussion on their proposal (ECE/TRANS/WP.29/GRVA/2024/17) for technical provisions for the approval of park locks based on GRVA-20-06/Rev.1 (amending ECE/TRANS/WP.29/GRVA/2024/38) and GRVA-20-07/Rev.1 (amending ECE/TRANS/WP.29/GRVA/2024/39). The representative of Switzerland expressed concerns regarding roll-away risks (GRVA-20-13). The representative of France inquired about potential cramping, and the representative of the United Kingdom of Great Britain and Northern Ireland proposed to clarify para. 5.1.4.4.

93. GRVA requested the secretariat to distribute GRVA-20-06/Rev.1 and GRVA-20-07/Rev.1 with official symbols at the January 2025 session of GRVA.

94. The representative of CLEPA presented (GRVA-20-52) the status of their activities on e-axles for trailers and self-propelled trailers. He introduced an amendment proposal (GRVA-20-14) to UN Regulation No. 13 (superseding ECE/TRANS/WP.29/GRVA/2023/3). The representative of France supported the aim of the proposal but also warned about the safety risk in terms of stability posed by the trailer pushing the tractor vehicle. The representative of Denmark reported on trials of such technologies in his country and volunteered to join discussions on this topic. The representative of AAPC pointed to the German Federal Highway Research Institute publication on caravans or trailers with an electrically powered support axle, presented at the Working Party on General Safety Provisions (GRSG) in April 2024 (GRVA-127-01).

95. GRVA requested the secretariat to distribute GRVA-20-14 with an official symbol at the January 2025 session of GRVA.

96. The representative of the Russian Federation recalled the purpose of Supplement 18 to the 11 series of amendments to UN Regulation No. 13. He proposed (GRVA-20-33) that similar provisions be inserted in the 12, 13, and 14 series of amendments.

97. GRVA requested the secretariat to submit GRVA-14-33 as draft supplements to the 12, 13, and 14 series of amendments to UN Regulation No. 13 for consideration and vote by WP.29 and AC.1 at their sessions in March 2025.

98. The representative of CLEPA introduced GRVA-20-19 (and GRVA-20-50, a condensed version) containing editorial amendments to ECE/TRANS/WP.29/2024/147, tabled for adoption by WP.29 and AC.1 in November 2024. The representatives of Japan and OICA expressed support for the proposal.

99. GRVA requested the secretariat to provide the editorial amendments to WP.29 for consideration and vote in November 2024.

100. The representative of CLEPA proposed (GRVA-20-32) an amendment of paragraph 1.1 in Annex 10 of UN Regulation No. 13 to address the situation when trailers are not used often, and brake pads are glazing as they don't heat up. The representative of Denmark provided comments. The representative of France agreed to study the proposal.

101. GRVA requested the secretariat to distribute GRVA-20-32 with an official symbol at its January 2025 session.

X. Motorcycle braking (agenda item 9)

A. UN Global Technical Regulation No. 3

102. No document was submitted under this agenda item.

B. UN Regulation No. 78

Documentation: ECE/TRANS/WP.29/GRVA/2024/21

103. The representative of WBIA recalled the purpose of the proposal for amendments to UN Regulation No. 78, aimed to insert specific deceleration requirements for the Speed-Electronically Power Assisted Cycles (S-EPAC), as defined the Working Party on Transport Trends and Economics (WP.5).

104. The representative of Germany noted that he could support the proposal from the technical point of view. He noted, however, some application difficulties as the scope of the regulation referred to the Category L defined in the Consolidated Resolution R.E.3, which did not include S-EPAC. He noted that the current type definition (referring to the engine type) would also require amendments; the maximum speed determination of these vehicle would also need to be clarified. The representative of France shared similar views, he also asked for explanations about para. 9.4. The representative of Japan explained that, in his country, bicycles were not covered by the WP.29 vehicle regulations and that, for this reason, he could not support this proposal.

105. The representative of WBIA confirmed to France that the formula had been taken from paragraph 9.4. because it was deemed to also fulfil the needs for pedal driven vehicles and to avoid proposing a new formula. She acknowledged the importance of ensuring consistency with R.E.3 and reported ongoing efforts to develop a global definition for S-EPACs: this work had started within WP.5, in a specific group for cycles, where a definition had already been agreed; WP.5 discussions were expected to resume soon. She added that WBIA had informed ITC on the need for dialogue between WP.5 and WP.29 concerning a global definition for S-EPACs. She noted that existing noise regulations already include exemptions for this kind of vehicles.

106. The representative of IMMA did not raise objections on the purpose of the proposal. However, he also noticed the lack of consistency with R.E.3, and the need to resolve this issue before proceeding with the proposal.

107. GRVA agreed to inform GRSG of the proposal and its implication regarding the Category L_1 definition.

XI. UN Regulation No. 90 (agenda item 10)

Documentation: Informal document GRVA-20-30

108. The representative of the United Kingdom of Great Britain and Northern Ireland presented their findings regarding the bedding procedure in UN Regulation No. 90, following market surveillance activities. He highlighted that the bedding procedure described in the regulation provided for flexibility, leading to problems for market surveillance because the relevant authority/technical service does not know the bedding procedure used for the type approval tests. He raised several questions.

109. GRVA invited the delegations to consider GRVA-20-30 and provide answers.

XII. Exchange of views on guidelines and relevant national activities (agenda item 11)

110. No document was submitted under this agenda item.

XIII. Revision 3 of the 1958 Agreement (agenda item 12)

111. No document was submitted under this agenda item, dedicated to discussions on International Whole Vehicle Type Approval (IWVTA), the Database for the exchange of type approval documentation (DETA), and the Unique Identifier (UI). The secretariat informed GRVA about the current deliberations on the Unique Identifier discussed by the IWG on DETA.

XIV. Other business (agenda item 13)

A. Inland Transport Committee Climate Change Mitigation Strategy

Documentation: Informal document GRVA-20-55

112. The Secretary to the Working Party on Pollution and Energy (GRPE) explained to GRVA that the United Nations had a strategy to decarbonize transport for all modes of transport since the adoption in February 2024 of the Inland Transport Committee Climate (ITC) Change Mitigation Strategy. He added that UNECE would organize a side event together with International Maritime Organization (IMO) and International Civil Aviation Organization (ICAO) at the twenty-ninth Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Azerbaijan. He presented (GRVA-20-55) considerations on the implementation of the ITC Strategy on Reducing Greenhouse Gas Emissions from Inland Transport.

113. The Chair of GRVA recalled that he had already approached the Chair of GRPE to explore the possibility of discussing the greenhouse gas emissions reduction potential of Automated Driving Systems.

B. Arrangement of meetings

114. GRVA noted the secretariat’s efforts in organizing the May 2025 session of GRVA at ESCAP in Bangkok.

C. Programme of Work

Documentation: Informal document GRVA-20-51 and Rev.1

115. The Secretary presented (GRVA-20-51) the draft priorities for GRVA in 2025.

116. GRVA requested the Secretary to provide GRVA-20-51/Rev.1 to the WP.29 Secretary as input for preparing the WP.29 Programme of Work for 2025.

D. Any other business

117. No document was submitted under this agenda item.

118. The secretariat informed GRVA that an erratum for UN Regulation No. 152 was under preparation. He mentioned actions taken to correct the French version of Mutual Resolution No. 2.

E. Tributes

119. GRVA learned that Mr. M. van Impe (AVERE) would no longer work for Tesla and therefore would no longer attend GRVA sessions. GRVA thanked him for his support, especially as Secretary to the Task Force on ADAS, and wished him success for in his next assignment at SpaceX.

120. GRVA also learned that Mr. S. Spencer (Australia) would no longer join GRVA sessions. GRVA thanked him for his contributions, especially as the ambassador between the IWG on ADS and the GRVA workshops on ADS. GRVA wished him success for his next assignment.

XV. Election of Officers

121. In compliance with Rule 37 of the Rules of Procedure (ECE/TRANS/WP.29/690/Rev.2), GRVA called for the election of officers on Tuesday, 24 September 2024.

122. The Secretary reported that he received four “Notes Verbales” from the permanent representations of China, Germany, Japan, and the United States of America nominating Mr. R. Damm as candidate Chair for 2025, as well as Ms. C. Chen, Mr. T. Naono, and Mr. E. Wondimneh as candidate Vice-Chairs. He added that the Administrative Committee for the coordination of work (AC.2) was informed via email of a new nomination of a third Vice-Chair and that only positive reactions were received from the AC.2 participants. Mr. R. Damm (Germany) was unanimously elected as Chair for the GRVA sessions in 2025. Ms. C. Chen (China), Mr. T. Naono (Japan), and Mr. E. Wondimneh (United States of America) were also unanimously elected as Vice-Chairs for the GRVA sessions scheduled for 2025.

Annex I

[English only]

List of informal documents (GRVA-20-…) considered during the session.

No.	*(Author) Title*	*Follow-up*
01 & Rev.1	(Chair) Running order of the session	A
02 & Rev.1	(Secretariat) Updated and consolidated provisional agenda for the 20th session (incl. informal documents received 23 September 2024 Lunch time)	A
3	(Secretariat) General information and highlights from the June 2024 WP.29 session	C
4	(Germany) Proposal for a supplement to the 01 series of amendments to UN Regulation No. 157 (ALKS)	B
5	(UK) 2nd GRVA workshop on scenario (wrap up)	C
06& Rev.1	(OICA/CLEPA) Proposal for amendments to UN Regulation No. 13 (Heavy vehicle braking) (Park lock device)	B
07& Rev.1	(CLEPA/OICA) Proposal for amendments to UN Regulation No. 13-H (Brakes of M1 and N1 vehicles) (Park lock device)	B
8	(Japan) Proposal for amendments to the ECE/TRANS/WP.29/GRVA/2024/32	C
9	(Australia) Proposal for a new UN Regulation on [...] Emergency Lane Keeping System (ELKS)	B
10 & Rev.1	(France) Proposal for the Supplement 07 to 00 series of amendments to UN Regulation No. 152 (Virtual testing) Revision	A
11 & Rev.1	(France) Proposal for the Supplement 06 to 01 series of amendments to UN Regulation No. 152 (Virtual testing) Revision	A
12 & Rev.1	(France) Proposal for the Supplement 04 to 02 series of amendments to UN Regulation No. 152 (Virtual testing) Revision	A
13	(Switzerland) Considerations regarding the rollaway distance for light and heavy motor vehicles	C
14	(CLCCR/CLEPA/OICA) Amendment proposal to ECE/TRANS/WP.29/GRVA/2023/3	B
15	(CLEPA/OICA) Steer by wire: Status Report and introduction of ECE/TRANS/WP.29/GRVA/2024/28	C
16	(Germany) Towards auditable AI systems: project AIMobilityAudit	C
17	(FADS) Status report: Task Force on regulatory Fitness for Automated Driving Systems	C
18	(AVC) Status report of the Task Force on AVC	C
19	(CLEPA) Proposal for amendments to ECE/TRANS/WP.29/2024/147 (UN R 13-H)	C
20	(Secretariat) Status report of the 1st and 2nd GRVA workshops on ADS	C
21	(ADAS) Report on the Activities of the TF on ADAS	C
21/add.1	(ADAS Chair) Further activities of the TF on ADAS*	C
22	(ADAS) Proposal for the 01 series of amendments to UN Regulation No. 171 on uniform provisions concerning the approval of vehicles with regard to Driver Control Assistance Systems (DCAS)	C
23	(France) PRISSMA Project Overview	C
24	(EDR/DSSAD) Activities/Deliverables of IWG on EDR/DSSAD	C
25	(IWG on CS/OTA) Status report from the Informal Working Group	C

No.	*(Author) Title*	*Follow-up*
26	(UK) Scenarios Workshop	C
27	(TF on VC) Status of the Task Force on Vehicular Communications	C
28	(TF on VC) Vehicular Communications definition, types, value, uses, and considerations	C
29	(UK) Proposal for amendments to ECE/TRANS/WP.29/GRVA/2024/33	C
30	(UK) UN R90 Bedding/burnishing procedure	C
31	(France) France views following GRVA workshop on scenarios	C
32	(OICA/CLEPA) Proposal for an amendment of paragraph 1.1. in Annex 10 of UN Regulation No. 13 (Braking regulation)	B
33	(Russian Federation) Proposal for a supplement to the 12, 13 and 14 series of amendments to UN Regulation No. 13	C
34	(China) Proposal for amendments to ECE/TRANS/WP.29/GRVA/2024/32	C
35	(China) Proposal for amendments to GRVA-20-09	C
36	(NL) Proposal for amendments to ECE/TRANS/WP.29/2024/39	C
37	(OICA/CLEPA) Recommendations on the open items addressed by TF ADAS leadership in GRVA-20-21	C
38	(EC/UK) Proposal for amendments to the 03 and 04 series of amendments to UN Regulation No. 79	C
39	(CITA) PTI test for HDV braking systems	C
40	(ADS) IWG on ADS progress review for the 20th GRVA	C
41	(Sponsors of the UN GTR and UN R on ADS) Draft status report to WP.29 and AC.3	C
42	(UK) Proposal for amendments to ECE/TRANS/WP.29/GRVA/2024/30 and 40	B
43 & Rev.1	(UK) Proposal for amendments to ECE/TRANS/WP.29/GRVA/2024/33 - Revision 1	C
44	(UK) Proposal for amendments to GRVA/2024/34	B
45	(ACPE) Status report of the IWG on ACPE	C
46 & Rev.2	(ACPE) Revised proposal for amendments to ECE/TRANS/WP.29/2024/154	C
47	(OICA/CLEPA) Proposal for amendments to ECE/TRANS/WP.29/GRVA/2024/37	C
48	(Germany) Endurance braking: reminder on meaning purpose and suitable requirements	C
49	(Germany/UK) Proposal for amendments to GRVA-20-22	C
50	(OICA/CLEPA) Proposal for amendments to ECE/TRANS/WP.29/2024/147	C
51& Rev.1	(Secretariat) GRVA priorities for 2025: revision	C
52	(CLEPA) E-axles and self-propelled trailers	C
53	(France) Proposal for amendments to informal document GRVA-20-22	C
54	(European Commission) Proposal for Supplement 2 to UN Regulation No. 171 on DCAS	B
55	(GRPE Secretary) Implementation of the ITC Strategy on Reducing Greenhouse Gas Emissions from Inland Transport	C
56	(China) 3rd GRVA Workshop on ADS: demos and visits	C
57 & Rev.1	(UK) Proposal for amendments to GRVA-20-22	C
58	(UK) Proposal for amendments GRVA-20-22	C
59 & Rev.1	(ADAS leadership) Proposal for the 01 series of amendments to UN Regulation No. 171	C
59/Rev.2	(GRVA) Proposal for the 01 series of amendments to UN Regulation No. 171	A

No.	*(Author) Title*	*Follow-up*
60	(Japan) Proposal for amendments to GRVA-20-59	C

Notes:

Administrative follow-up, for the secretariat, with the informal documents:

A Adopted/Endorsed/Agreed/Noted;

B Distribute with an official symbol at the next session or resume consideration at the next session;

C Consideration completed.

Annex II

List of Informal Working Groups reporting to GRVA (as of 27 September 2024)

Informal working groups	*Chair/Co-Chairs* *Vice-Chair*	*Country*	*Expiry date of the mandate*
Automated Driving System	Mr. I. Sow[1] Ms. C. Chen[1] Ms. C. Galassi[1] Mr. H. Matsukawa[1] Mr. M. Braisher[1] Mr. E. Wondimneh[1]	Canada China EC Japan UK USA	June 2026
Cyber Security and Over-The-Air software updates (CS/OTA)	Mr. T. Niikuni[1] Mr. D. Hannah[1] Mr. E. Wondimneh[1]	Japan UK USA	[November 2026]
Event Data Recorder / Data Storage System for Automated Driving (EDR/DSSAD)	Mr. T. Guiting[1] Mr. H. Matsukawa[1] Ms. J. Doherty[1]	Netherlands Japan USA	June 2025 (DSSAD) June 2027 (EDR)
Acceleration Control for Pedal Error (ACPE)	Mr. T. Hirose Mr. P. Seiniger	Japan Germany	March 2025

[1] IWG Co-Chairs

Annex III

Adopted amendments to ECE/TRANS/WP.29/GRVA/2024/33

Agreed during the session based on GRVA-20-43/Rev.1 (see para. 65)

In ECE/TRANS/WP.29/GRVA/2024/33,

Paragraph 5.3.7.5.1.1.2., amend to read:

"5.3.7.5.1.1.2. Upon first activation of the system following an initiation of the powertrain[3], the system shall provide information to the driver that the headway configuration is set to a value lower than 2 seconds, if that is the case."

Paragraph 5.5.3.1., amend to read:

"5.5.3.1. The default status of the system shall be the 'off' mode at each initiation of the powertrain[3], regardless of what mode the driver had previously selected.

A new engine start (or run cycle), which is performed automatically, e.g., the operation of a stop/start system, shall not be considered an "initiation of the powertrain" wherever that term is used in this regulation."

Paragraph 5.5.4.2.8.1., amend to read:

"5.5.4.2.8.1. The manufacturer shall implement strategies to disable activation of the system for the duration the powertrain[3] is active when the driver is detected to demonstrate prolonged insufficient engagement at least when this leads to more than one driver unavailability response initiations."

Annex 4,

Paragraph 4.2.2.1., amend to read:

"4.2.2.1. The tests shall be performed in a way that the outcome of the test is not affected by driver settings or driver input and any other influences not related to the manoeuvre under test. Therefore, the following conditions shall apply:

(a) The system's longitudinal control following distance shall be set to:

(i) the default distance, if the distance is reset to a specific value upon first activation of the system following an initiation of the powertrain; or …"

Annex IV

Adopted amendments to ECE/TRANS/WP.29/GRVA/2024/19

Agreed during the session based on GRVA-20-10/Rev.1 (see para. 84)

In ECE/TRANS/WP.29/GRVA/2024/19,

New paragraph 2.18., shall be deleted.

*Add a new paragraph 6.**11~~7~~.**,* amend to read:

"**6.~~7~~11. Virtual testing of dynamic tests**

6.~~7~~11.1. Virtual testing may be used by request of the vehicle manufacturer as an alternative for some of the tests described in paragraphs 6.4. to 6.6. The ~~provided~~ virtual testing shall be verified and validated according to Annex 4 and ~~are~~ used in accordance with Annex 4.

6.~~7~~11.2. Virtual testing may be used in the evaluation of the warning and activation tests in accordance with paragraph 1.8. of Schedule 3 and Schedule 8 of Revision 3 of the 1958 Agreement.

6.~~7~~11.3. ~~In addition to the test runs shall be conducted as physical tests as well on the request of the Type Approval Authority and technical service.~~

In order to demonstrate that the complete physical system can reliably deliver the required performance, at least 30 per cent* of required tests shall be performed physically including at least one test of each scenario variant described in paragraphs 6.4 to 6.6 relevant for the approval. The tests to be performed shall be agreed between the manufacturer and Type Approval Authority or its Technical Service. Those tests already performed as part of the model validation, and corresponding to the vehicle type approval, can be considered as part of the 30 per cent of required tests.

6.~~7~~11.3.1. Notwithstanding paragraph 6.11.3., in the case of modification of the vehicle type and extension of the approval according to paragraph 7, the proportion of physical tests required to demonstrate that the complete physical system continues to reliably deliver the required performance, may be less than 30% of the required tests and shall be agreed between the manufacturer and Type Approval Authority or its Technical Service.

6.~~7~~11.4. ~~In case of~~ Where virtual testing is ~~chosen~~ used by the manufacturer, a separate~~d~~ report including at least the additional ~~data~~ information specified in Annex 4 ~~paragraph 1.5.~~ shall be annexed to the test report."

*** Footnote: The value of 30 per cent is considered as a first step for this regulation. It is expected that this value will be reduced in the future. Therefore, this value should be reviewed regularly in GRVA to take practical experience into account.**

Add a new Annex 4, to read:

"Annex 4

Virtual testing of dynamic tests

0. Introduction (for information only)

This annex describes the method that can be used to consider virtual testing as an alternative to physical testing, based on the manufacturer request.

This method is mainly based on 2 separate activities ~~pillars~~:

(a) Activity ~~Pillar~~ 1: The development, management, verification and validation of the toolchain; ~~virtual testing method by comparison with physical results~~ and,

(b) Activity ~~Pillar~~ 2: The use of virtual testing results to conduct testing required for approval process.

1. Definitions

1.1. "*Virtual testing*" is the process of testing a system using one or more simulation models.

1.2. "*Model*" is a description or representation of a system, entity, phenomenon or process.

1.3. "*Toolchain*" is the combination of simulation model implementations as tools that emulate a vehicle function."

1.4. "Validity domain" is the domain of applicability of the toolchain.

~~1~~2. ~~Validation of the virtual testing method~~ Activity 1: The development, management, verification and validation of the toolchain ~~(pillar 1)~~

~~1~~2.1. General specifications

~~**1.1.1. The manufacturer shall provide documentation to prove the credibility of the virtual testing results.**~~

~~**1.1.2. The vehicle manufacturer shall define the validity domain on which the virtual testing will be applicable. This annex only applies within this validity domain.**~~

~~1~~2.1.~~3~~1. Credibility of the ~~virtual~~ toolchain that is used for the virtual testing shall be demonstrated by the vehicle manufacturer to the satisfaction of the Type Approval Authority ~~and~~ or its Technical Service.

For this, the following five criteria shall be considered:

(a) Capability – what ~~virtual~~ the toolchain can do, and what ~~are~~ the associated risks are;

(b) Accuracy – how well ~~virtual~~ the toolchain ~~does~~ reproduces the target data recorded in physical tests;

(c) Correctness – how sound & robust are the ~~used~~ data and the algorithms in the tools;

(d) Fit for Purpose – how suitable ~~is~~ the ~~virtual~~ toolchain is for the assessment (e.g. vehicle dynamic model, sensor model, system control model, environment model, scenario model, targets model, …) within its validity domain.

(e) Usability – ~~What~~ The training and experience which is needed and ~~what is~~ the quality of the processes that manage ~~it's~~ the toolchain's use.

~~**1.2. Physical validation tests**~~

~~**1.2.1. At the request of the technical service, in addition to the documentation provided by the vehicle manufacturer, physical tests shall be performed or witnessed to confirm the accuracy between the physical and the simulation results.**~~

~~**1.2.1.1. The number of physical tests to be tested shall be defined in agreement between the manufacturer and the technical service in order to sufficiently cover the validity domain specified by the vehicle manufacturer.**~~

~~**1.2.2. The number of tests performed shall ensure a statistical comparison between physical and simulation results.**~~

~~1~~2.~~3~~2. ~~Simulation model~~ Development of the virtual testing method

~~1~~2.~~3~~2.1. Developing and using the toolchain ~~simulations (including development of the model) shall be run under~~ is the responsibility of the vehicle manufacturer. ~~It~~

The toolchain shall reflect ~~the architecture of~~ the vehicle, system and components that are to be tested. ~~in relation to the requirements of the current regulation and the manufacturer will define its on the specified validity domain~~.

2.3. Toolchain management

The following information shall be provided by the manufacturer to the Technical Service:

2.3.1. A description of the models and tools which constitute the toolchain and the method used to trace input data, parameters and output data back to the corresponding toolchain version.

2.3.2. The processes which ensure that the personnel developing, testing and validating the toolchain and its components have appropriate experience, expertise, and training and evidence that these processes are implemented and effective. If there are any activities not directly controlled by the manufacturer, there must be an explanation of measures taken to ensure confidence in the quality and integrity of these activities.

2.3.3. A description of the input parameters, along with any uncertainties in the model parameters, which have been used to validate the models included in the tools and toolchain. The manufacturer shall also provide documentation demonstrating that the data used to validate the models covers the intended scope and functionality of the toolchain.

2.3.4. A description of the overall approach to data management.

2.3.5. A description of the management activities which describe the modifications between toolchain releases, version control and the review processes to ensure those modifications result in a toolchain that is still suitable.

2.3.6. Description and analysis of toolchain and components

2.3.6.1. All parts of the toolchain, tools and models shall be described by the manufacturer.

2.3.6.2. The vehicle manufacturer shall define the validity domain on which the toolchain will be applicable and how the validity domain has been derived including any AEBS performance influencing factors, parameter ranges, assumptions, limitations and tolerances.

2.3.6.3. The documentation shall include a description of the key performance indicators which will be assessed during validation, such as time to collision, remaining distance or impact speed.

2.3.6.4. The documentation shall include a description of the accuracy requirements for the toolchain and its components, including comparison with physical tests.

2.3.6.5. The documentation of the toolchain shall include assumptions, limitations, uncertainties and the necessary levels of fidelity.

2.3.6.6. The manufacturer shall provide a description of the toolchain assessment methodology, including the impact of any errors and uncertainties on the results and the subsequent consequences for the compliance of the system with this regulation.

2.3.7. The manufacturer shall review the information produced in addressing the requirements of paragraph 2.3.6.2. and document any implications for the use of the toolchain.

2.4. Verification

2.4.1. The toolchain and its components ~~models that are developed and tested~~ shall be capable of accurately representing the relevant aspects of the physical AEBS that is being modelled. ~~that is being modelled. The models are used in tools and the tools are incorporated into toolchains which emulate the overall physical~~

~~behaviour of AEBS with the appropriate quality within the declared domain of validity.~~

2.4.2. ~~The manufacturer shall provide documentation on the AEBS function code verification which demonstrates the numerical and logical implementation of the toolchain and its components is correct. They shall also provide documentation showing the variation of input parameters was sufficiently wide to identify combinations for which the toolchain or any of its components show unstable or unrealistic behaviour.~~

The manufacturer shall provide documentation on the verification activity of the modelling that implements the AEBS function in the toolchain and its components. This shall include a description of the models, their implementation, how they represent the AEBS function and a description of the activities that have been performed to confirm that the models have been correctly implemented.

2.4.3. The manufacturer shall provide an estimation of the numerical errors affecting the toolchain and its components and analysis that the errors remain sufficiently bounded.

2.4.4. The manufacturer shall demonstrate the effect of variations of the model parameters on the output values and identification of the most critical parameters which will influence the results. This shall also include a robust calibration procedure for these parameters.

~~1~~2.45. ~~Simulation model v~~Validation ~~process~~

2.5.1. ~~The simulation model shall be validated in comparison with the physical validation tests performed under paragraph 1.2. and comparability of the test results shall be proven.~~ **The vehicle manufacturer shall describe their overall approach to validation including performance measures and a validation strategy. The validation strategy shall be agreed by the Type Approval Authority or its Technical Service, including physical tests performed to demonstrate that the toolchain is an accurate representation of the physical system. The tests performed shall ensure a statistical comparison between physical and simulation results is possible.**

2.5.2. The validation strategy shall be ~~based on scientific methods,~~ defined by the ~~car~~ manufacturer and presented to ~~agreed with~~ the Type Approval Authority ~~and~~ or its Technical Service for review and agreement.

2.5.3. ~~For the validation,~~ **The manufacturer shall demonstrate how the toolchain achieves the key performance indicators ~~shall be assessed~~ defined in paragraph 2.3.6.3. and accuracy requirements defined in paragraph 2.3.6.4. This shall include justification for the choice of key performance indicators and accuracy requirements, and what the criteria is for satisfying these indicators and requirements.**

2.5.4. The manufacturer shall provide the list of validation scenarios. The manufacturer shall provide the parameter descriptions and accuracy requirements that were needed to perform the validation tests.

2.5.5. The manufacturer shall provide documentation describing the validation that was performed to establish the credibility of the toolchain. This shall include information related to the processes that were followed, physical tests that were performed and models and tools that were used.

2.5.6. The manufacturer shall provide documentation that demonstrates how they have characterised the uncertainty in the input data and evaluated the model parameters. The overall uncertainty of the results shall be quantified based on the toolchain structure and from the data and its flow through the toolchain. This uncertainty quantification shall allow estimates of the likely errors and

the required safety margins that shall be applied to the results when the toolchain is used for virtual testing.

2.5.7. **At the request of the Type Approval Authority or its Technical Service, in addition to the documentation provided by the vehicle manufacturer, additional confirmatory validation, which shall include physical tests, shall be performed or witnessed ~~to confirm the accuracy between the physical and the simulation results~~. These tests may be relevant to the entire toolchain, specific parts of the toolchain or any of its components.**

2.5.8. **The number of physical tests ~~to be tested~~ shall be defined in agreement between the manufacturer and the Type Approval Authority or its ~~the~~ Technical Service. ~~in order to~~ They shall be sufficient~~ly~~ to cover the validity domain specified by the vehicle manufacturer.**

2.5.9. **The methodology used to generate physical validation data, such as data recording equipment, data processing, calculation of scalar values shall be documented ~~in the simulation report~~ as part of the validation documentation. ~~The output and results of the toolchain and its components shall be compared against these physical tests and the appropriate assessment criteria.~~**

Paragraphs 1.5. to 1.5.7., shall be deleted.

~~2~~3. Activity 2: The use of virtual testing results to conduct testing required for approval process ~~(pillar 2)~~

~~2~~3.1. Compliance of the Advanced Emergency Braking System with the performance requirements as defined in paragraphs 5.2.1. to 5.2.2~~3~~. of this Regulation may be demonstrated by the vehicle manufacturer to the Type Approval Authority or its Technical Service by making use of virtual testing of the dynamic manoeuvres described in ~~of~~ the paragraph(s) 6.4~~5~~. to 6.6~~7~~. of this Regulation.

~~2~~3.2. All ~~simulation~~ virtual testing results provided by the manufacturer in applying for an approval in accordance with paragraph 4. of this regulation shall refer to the ~~method~~ toolchain evaluated and validated according to paragraph 1. of this annex.

***Paragraphs 2.3. to 3.3.*, shall be deleted.**

3.3. For each approval application the manufacturer shall provide a confirmation that the virtual testing:

(a) Was conducted using a validated toolchain;

(b) Was performed by staff with ~~adapted~~ appropriate competences and skills;

(c) Has been ~~undertaken~~ performing using ~~by~~ a toolchain that has a unique identifier and sufficient information including scope, regulatory applicability and validation history to ensure that there is traceability and assurance that the toolchain is suitable and fit for purpose; and

(d) Has been ~~used~~ performed using a toolchain within its scope and in accordance with any restrictions."

Note by the secretariat, similar amendments to the 01 and 02 series of amendments were adopted by GRVA, see para. 82, referring to GRVA-20-11/Rev.1 and GRVA-20-12/Rev.1.