Minutes

UN GRSP Ad-hoc Group on Child Safety

29th June 2022 – OICA, Rue de Berri, Paris

1. Welcome and roll call

Hans (Netherlands) welcomed the Group to OICA's office in Paris and invited the participants to introduce themselves. An attendance list is provided in Appendix 1.

Hans explained that the Ad-hoc Group was formed following his presentation at the 71st session of GRSP that set out some issues of interpretation experienced by RDW during the type-approval of child restraint systems.

Dinos (CLEPA) noted that some CLEPA members were unable to participate in the meeting today. He asked whether official Minutes will be taken and circulated to interested parties. After a short discussion, Dinos offered to take notes and draft the Minutes.

2. Adoption of the agenda

Lotta (ISO WG2) offered a presentation to explain why lower tethers are used and the benefits. The Group agreed to add it to the Agenda to precede the discussions on potential amendments to UN Regulation No. 129 (UN R129) and No. 145 (UN R145).

3. Netherlands presentation to 71st session of GRSP (GRSP-71-19)

Hans introduced his presentation on "*Enhanced child restraint systems: Legislation issues UN R129 and UN R145*". He explained that he had raised some questions of interpretation at the Type-Approval Authorities Meeting (TAAM) relating to the approval of CRS with lower tethers and where the responsibilities lie between the CRS manufacturer (In UN R129) and the vehicle manufacturer (UN R145). He drew particular attention to Annex 24, which he felt was vague and didn't make proper reference to vehicle equipment and requirements. He also had more general questions about the use of support legs for non-i-Size CRS and/or seating positions and wished to further discuss proposals made by CLEPA and Spain to amend support leg compatibility requirements in UN R129 and UN Regulation No. 16. He hoped the presentation could be used as a starting point for the discussion today.

4. Input to lower tether anchorages discussion (AdHocCRS-01-01)

Lotta shared a presentation summarising the background to the use of lower tethers in the real world, leading up to the development of an ISO standard on vehicle anchorage provisions. She explained that rear-facing CRS equipped with lower tethers have been used in Scandinavia since the 1980s. These CRS have performed very well contributing to low casualty rates in these countries. Where fitted, lower tethers are essential for the performance of CRS in rear impact, and during the rebound phase of a front impact. There are no factory-fitted lower tether anchorages in most cars - Lotta is aware of only one manufacturer that includes them in their cars. In light of

this, she hopes the Group will consider the use of retrofit lower tether anchorages as a pragmatic solution. She concluded her presentation by summarising some of the key content of ISO 13216-4:2020 (Anchorages in vehicles and attachments to anchorages for child restraint systems — Part 4: Lower tether anchorages).

Hans explained that the he had seen a car with lower tether anchorages in the front passenger seat, but they appeared not to be rounded at all. He added that if the anchorages had been present when the vehicle was type-approved to UN Regulation No. 21 (UN R21), they would have been subject to a requirement for a minimum radius of curvature of 3.2 mm. He added that this makes sense for lower tether anchorages as people might be wearing sandals or open-toed shoes. Peter (ISO WG2) explained that a paragraph in the ISO standard deals with such risks, but doesn't specify a precise radius. Lotta confirmed that it was discussed in ISO, but foot injuries didn't seem to be common. Hans replied that such injuries might be relatively minor according to most injury scales, but very unpleasant nonetheless.

Marta (Spain) confirmed that sharp edges on the lower tether anchorages would be covered by UN R21, if lower tether anchorages were implemented in vehicle type-approval. However, another solution would be needed to address aftermarket anchorages that fall outside of type-approval. A short discussion followed clarifying certain points in the standard, particularly with respect to the language used and whether the requirements were prescriptive enough for vehicle type-approval. Dinos reminded the Group that the ISO standard was never intended to be written as regulatory text suitable for vehicle type-approval. Changes to the wording might be needed to remove any ambiguity and to specify more precise requirements.

Ronald (ANEC) asked if the ISO standard could form the basis for an amendment to UN R145, or whether there might be copyright issues. Peter replied that many examples can be found of UN regulations that refer to an ISO standard, or where text from a standard has been integrated in a UN regulation. However, he doesn't know whether a formal copyright agreement exists between the UN and ISO. Ansgar (OICA) explained that it is usually done on a case-by-case discussion with the standardisation organisation. If there is a copyright issue, it has to be taken into account.

Ansgar noted that such child restraints have specific vehicle type-approval in UN R129, but if the vehicle anchorages are retrofit, that must be done outside of UN R145. It doesn't prevent them being added to UN R145 on an optional basis, but a different path is needed to aftermarket products. Hans agreed that new vehicles can be dealt with through an amendment to UN R145, but aftermarket anchorages are something different. Further thought is needed to determine how best to deal with them. It might need to be done through national requirements.

Sebastian (OICA) explained that industry is obliged to respect any applicable ISO standard. He asked what problem is being solved by bringing lower tether anchorages into regulation. He asked what the future benefits will be if all lower tether requirements are specified in vehicle and CRS regulation. Hans replied that it must be clear where responsibilities lie between the CRS and the vehicle. He stressed the need to define attachments and anchorages fully and to prevent makeshift solutions such as webbing straps that wrap around the vehicle seat runners. He warned that if a major accident occurs, it might be reported in the press, as has happened in the Netherlands in the

past. Sebastian asked how that should be achieved. Hans explained that lower tether anchorages could be included in UN R145 as an option, which could be standard on the car, or fitted by the dealer.

Lotta warned that few cars on the market have lower tether anchorages as standard or a dealer option today. The Group needs to find a way to ensure they can continue to be fitted as an aftermarket accessory in any car. If in the future, the presence of lower tether anchorages is restricted to a few cars, the market for such CRS will disappear. She added that it's not her aim to force all cars to have them, but there must be a solution for aftermarket products.

5. Proposal to update UN R129 to include requirements for CRS equipped with lower tethers (AdHocCRS-01-02)

Dinos introduced a presentation from Okke (CLEPA) that proposes a way of integrating lower tether requirements more clearly in UN R129. As a preface to Okke's presentation, Dinos explained that the wording in Annex 24 of UN R129, which seemed to cause some confusion within the Group, is taken almost verbatim from Annex 11 of UN Regulation No. 44 (UN R44). It is long-standing text within UN R44 that facilitated the type-approval of CRS with lower tethers for many years. He added that during the UN Informal Group on CRS, attempts were made to clarify or improve the wording, but even the phrase lower tethers was toxic to some of the participants. Later attempts were also made at GRSP, using some of the principles from ISO 13216-4, but similar resistance was met. For that reason UN R129 fell back to the way of working of UN R44. It is surprising, therefore, to hear of type-approval problems or confusion at TAAM, since R129 has simply carried on the approach of UN R44. Nevertheless, CLEPA recognises that improvements can be made to both CRS and vehicle regulations to make the provisions for lower tethers clearer and consistent with similar CRS and vehicle components.

Okke explained that the proposal clarifies the approval of CRS with lower tethers by establishing clear definitions and requirements that are consistent in their approach with those for anti-rotation devices (i.e. top tethers and support legs). These comprised definitions for all lower tether components, labels, requirements for the strap and connector, as well as provisions for misuse testing in the event that the lower tether attachment is not equipped with a warning to prevent incorrect use. Several members of the Group noted that straps already have general requirements that specify their strength and asked whether they are applicable to lower tether straps. Similar questions were asked about retractors. Marta (Spain) felt that the component requirements specified in UN R129 are applicable only to components that contribute to the restraint of the child. Hans commented that he wasn't sure that was the case. Dinos added that paragraph 6.7. on provisions for individual components is applicable to any components that are found on the CRS.

Lotta expressed concern that applying requirements that were developed primarily for harness straps and retractors to lower tethers might lead to unnecessarily onerous requirements. She added that lower tethers do not provide a primary restraint function and do not need to be treated as strictly as top tethers or support legs. Dinos clarified that lower tethers are in fact essential for some CRS to comply with the front and the rear impact tests in UN R129. He noted that vertical head excursion had been particularly challenging and that GRSP has relaxed the requirements for

rear-facing CRS with larger dummies on the request of Sweden. In contrast, many CRS can meet the UN R129 performance requirements without their top tether or support leg. These anti-rotation devices are specified to allow ISOFIX CRS to be universal and to perform as intended independent of the vehicle seat cushion characteristics.

Lotta asked why a misuse test is specified in the proposal. She asked whether this is typical in regulation. Okke explained that R129 requires CRS equipped with anti-rotation devices to provide a mechanism or an audible and visual warning to prevent incorrect use of the device. If no such mechanism or warning is provided, a misuse test must be carried out without the anti-rotation device deployed. The same approach has been adopted for lower tethers, which fall under the definition of an anti-rotation device. If the misuse test is carried out, the proposal allows a tolerance of 10 per cent to be applied to the vertical head excursion, which is consistent with the approach taken for the horizontal head excursion for other anti-rotation devices. In addition, the proposal specifies a new plane, HI, on the rear surface of the seatback of the test bench, which is roughly 10 percent further than the DE plane.

In summary, Hans commented that the document from CLEPA is a good start for discussion, but that he would like to update Annex 24 as well. Dinos replied that CLEPA's intention was also to update Annex 24, but that requires a solution in vehicle regulations for standard and aftermarket equipment. A further discussion followed on the challenges of the aftermarket situation and potential country-by-country differences in post-registration rules and practices. Nevertheless, Hans concluded that the best way forward us to prepare a new series of amendments to UN R129 and to UN R145, and then to look at the best way of handling aftermarket and retrofit equipment for existing vehicles. He suggested that CLEPA takes on board the feedback shared during the meeting when updating their proposal, and in particular, considers whether the requirements for straps and retractors are too strict for lower tether applications.

6. Comparison between UN R145 vehicle floor strength requirements and floor loading by UN R129 CRS (AdHocCRS-01-03)

Dinos introduced a presentation that explained some of the background to the development of the support leg requirements in UN R145, based on sled testing with CRS support legs installed on an instrumented floor. He explained that CRS with support legs have been on the market for over 20 years. For most of that time, there was no regulatory test on the vehicle floor, and no mutual compatibility requirements between the CRS and vehicles. CRS manufacturers relied on car manufacturers to specify in their handbook whether a support leg could be used in each position. The type and extent of any testing done by the car manufacturer to verify that a support leg could be used was never disclosed. Although this didn't present any real-world safety problems, it complicated matters for users, potentially reducing the uptake of ISOFIX CRS. During the development of UN R129, CRS with support legs were included within the i-Size concept to make it easier for users to determine whether their car was compatible. Nevertheless, R129 also sets out provisions for the use of i-Size CRS with support legs on non-i-Size positions and for the use of support legs on non-i-Size CRS.

Dinos described the UN R145 test and noted that permanent deformation, including partial rupture or breakage of the vehicle floor is allowed, providing that the force is maintained and that the horizontal displacement remains within the limit. Hand calculations estimate the force on the vehicle floor to be in the region of 3.2 to 3.6 kN during the test. Irina (OICA) noted that the force must be maintained for a minimum period of time (0.2 seconds). Dinos described sled tests presented to the UN Informal Group on CRS in 2008 and 2009 that measured support leg forces with different CRS and dummies, and with different floor characteristics. He noted that measurements were in the region of 3 to 6 kN with some variation between different products. Irina noted that the UN R145 test was developed to take account of product diversity. Dinos then discussed the CRS design factors that influence the forces generated by the support leg. He explained that UN R129 regulates many of the factors, such as the distance between the support leg and ISOFIX pivot point, and the mass of the CRS and child, but the height of the centre of mass is limited only partially by the size of the CRS assessment volume. Sebastian noted that a German working group under VDA has collected some data on variations in CRS centre of mass and would bring the data to a future meeting. Dinos added that the stiffness between the seat and the ISOFIX base is another factor. For any given product design, there is likely to be an ideal stiffness that minimises the support leg forces. However, although extending the support leg height to directly support the seat will lead to a stiffer response, if and how that affects the support leg forces depends on where the stiffness of the CRS would have been if it had a conventional support leg design, with respect to the ideal stiffness. In conclusion, extending the volume of the support leg height is unlikely to have any bigger influence on the support leg forces than any other design choice made during the development of a CRS.

Hans commented that industry wanted CRS with support legs to be included in i-Size and so vehicle floor requirements were developed. However, extending the use of support legs into other vehicle positions that haven't been subject to regulatory testing is problematic, especially with electric vehicles. Dinos explained that UN R129 explicitly allows this and it resulted from lengthy negotiations during the Informal Group on CRS. The outcome was that i-Size CRS with support legs could be used in non-i-Size seating positions provided the vehicle manufacturer allowed support legs in their handbook. Similarly, specific vehicle CRS with support legs could also be used in positions allowed by the vehicle manufacturer in their handbook. This is how it worked in UN R44 under the semi-universal category. UN R129, and i-Size in particular, has reduced the need for these compatibility checks to be made for many CRS, but it remains necessary and allowed for some types of CRS.

Sebastian explained that the foot characteristics of CRS might not match the vehicle floor testing requirements. Dinos explained that he had an additional slide that compared the foot dimensions and edge radius on the UN R145 static force application device versus the support leg foot dimension requirements in UN R129. These showed a good correlation in terms of their size, radii and contact area. Sebastian then displayed an example of an vehicle test in which the support leg of the CRS had punctured the vehicle floor. Sebastian attributed this to a weak connection between the support leg shaft and the foot, which failed and generated more focussed loading. Dinos replied that the UN R145 test allows the vehicle floor to rupture provided the force is maintained by the

ISOFIX anchorages. He asked whether the rupturing of the floor might have created asymmetric loading on the support leg foot.

Marta suggested measuring the support leg forces during the UN R129 regulatory test as that may allay any concerns about electric vehicles. She added that IDIADA performed tests with the Q10 in a booster with a support leg and the values were consistent with i-Size CRS. A performance requirement for the support leg forces might allow the proposals for increasing the support leg volume and for allowing support legs to protrude the booster seat volume to move forwards. The Group expressed support for this suggestion. Dinos noted that further discussion would be needed within CLEPA, but in principle, performance requirements are favoured by industry, particularly if they enable more freedom for design and innovation. However, he also noted that we haven't established what dynamic forces vehicle floors can withstand, since the UN R145 test doesn't specify a force onto the floor. Furthermore, setting a stringent limit on the force, compared with typical values today might lead to unintended consequences for dummy excursion and measurement values and real-world injury risk.

Ronald expressed concern about any proposals that further facilitate the type-approval of multi-category CRS, which he believes are not in the philosophy of UN R129 and do not deliver optimum protection. Dinos disagreed and explained that UN R129 explicitly allows integral and non-integral type-approval categories to be combined in a single product. UN R129 specifies comprehensive internal dimension requirements to ensure that the 5-point harness and diagonal seat belt guides can be adjusted for the 5^{th} and 95^{th} percentile children within the full stature range. He added that such products represent an important cost saving for some parents, particularly in the current cost-of-living crisis. Marta added that currently, integral CRS with a top tether can be combined with a booster seat with no problems or barriers. It is unbalanced and disproportionate to place barriers for CRS with a support leg.

7. Next meetings

The Group agreed to a series of follow-up meetings to be held online. Doodle polls will be sent after the meeting to find the best time.

Appendix 1 – Attendance list

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