

. REPORT OF THE FIRST GRSP ECE-R21 AD-HOC MEETING.
Madrid, 3rd /4th February 2000.

1. GRSP ECE-R21 AD-HOC MEETING,

held its first session in Madrid, from 3rd to 4th of February 2000, under the chairmanship of Mr. R. Chicharro (Spain) and assisted by Mr. G. Felten (Germany).

Participants:

UK	Mr. Knowles
NL	Mr. Dekkers
F	Mr. Pichon
I	Mr. Massaia
S	Mr. Eriksson
USA	Mr. Mouchaoir
D	Mr. Felten, Mr. Hahn
E	Mr. Chicharro, Mr. Fernandez, Mrs. Gascon
EEVC	Mr. Lowne
CLEPA	Mrs. Fournier (Autoliv), Mr. Pilatus (Autoliv), Mr. Pajon (Faurecia), Mrs. Betton (Faurecia), Mr. Szatkowski (Lear)
OICA	Mr. Custodio (SEAT), Mr. Hurtado (SEAT), Mr. Cooke (Ford), Mr. Vallée (PSA), Mr. Slaba (DaimlerCrysler), Mr. Van der Plas (Honda)

2. Background and purpose of the meeting:

After request of the German delegation and on the basis of Informal Document No.4 the Working Party on Passive Safety (GRSP) decided to support the establishment of a so called „ECE- Regulation 21 ad hoc working group“ during the 26th session (Nov./Dec. 1999, Geneva). The organization should be initiated by the experts of Spain and Germany. The purpose of the ad hoc group is to study the possibilities and /or necessities to amend or to develop ECE- Regulation No.21. The following report reflects the content the summaries of the first meeting of the ad hoc group.

2.1 Summary of the general discussion:

- ECE-R21 is old, does not reflect the state-of-the-art in technology and vehicles construction.
- ECE-R21 is very complicated, needing many interpretations.
- In the past ECE-R21 was (together with ECE-R12) the only Regulation offering some interior protection to the occupant. Today other Regulations have been introduced (ECE-R 94, ECE R-95) that also address occupant safety.
- New materials have been introduced in cars.
- Airbags have been introduced in cars, as a complement of seat belts. New designed seat belts are provided to protect the occupants in all seating positions. Head and body motion of restraint occupants are today in case of any impact quite different than those described in ECE-R21(lap belt configuration only).
- The AD-HOC GRSP ECE-R21 GROUP decided to make some suggestions to GRSP within this year. These suggestions are to keep the ECE- Regulation 21 in principle as it is but to supplement, the current ECE 21 thus making interpretation superfluous. The group also started collecting ideas on items that could be incorporated into the Regulation No.21 on a short term basis. **see also TARGET 1.**

- New seating positions can be observed in cars (rear-facing, side-facing in MPVs). Thus the head movement is different than that considered in ECE-R21.
- The future requirements of an ECE-R21 must be more realistic, but the development will take time. Proposals could be ready not before 2003 and should be prepared as global harmonized Regulation only, respecting the USA and Japan standards and other similar standards, **see also TARGET 2.**

3. Executive summary:

The discussion can be focused on two major topics:

3.1 Make amendments / clarifications to the existing ECE-R21 text (**TARGET 1**)

and

3.2 develop a new global (ECE-R21H)- Regulation (**TARGET 2**)

The topics discussed for each item were:

(TARGET 1): Amendments / clarifications to the existing ECE-R21text:

- **Extension of the scope to include N1 vehicles (perhaps only vehicles below a maximum mass)**
- **Head impact area. Exemption of design requirements if it can be demonstrated that the head / chest can not touch the instrument panel /steering wheel**
- **Rear part of centre console**
- **Leave soft material in place as a general requirement and include it in the radius curvature assessment**
- **Window-winder requirements**
- **Establishing of requirements for gaps similar to those of grilles**
- **Include the new EU requirements for power- operated window, partition, and roof panel systems**

(TARGET 2):New global ECE- R21:

- **Preparation of a comparison document (Interior fittings Standards of USA - EU - ECE - J, including standards where requirements exist which can be detected as „ECE- R21“- related, such as ECE- R95 e.t.c.)**
- **Clarify that rear facing and side facing seats are included in the existing ECE-R21**
- **Incorporate the data which will be prepared by EEVC and/ or NHTSA relating to impact test devices, impact areas, accident data e.t.c.**
- **Dividing of the car in different interior fittings testing zones**
- **Introduction of harmonized radii requirement, where design requirements are necessary**

4. Details of the TARGET 1 discussion:

4.1: Extension of the scope to N1:

During the discussion it was not quite clear whether this would be a short term or long term proposal.

- S, USA, D, UK *agreed to extend* the scope with a weight limit. D suggested to make the extension optional (only if the manufacturer wants to have an approval).
- E and NL *agreed to the extension* with or without a weight limit. E pointed out that many vehicles today are already constructed as M1 and N1.

- F and I said that they need to be convinced with accident data *before they could agree to this*.
- OICA needs more time to answer, but consider the extension to N1 unavoidable.
- CLEPA has no opinion.

4.2: New head impact area: D / VDA proposal (prepared during a joint meeting):

If there is a restraint system, consisting of a safety belt system and airbag system, the possibilities of a head impact is limited. In Europe, the use of seat belts is mandatory. In case of low energy impacts the seat belt is sufficient to prevent the head impact on the dash board. In case of high energy impacts, the combination of seat belt and airbag excludes a possible head impact.

Therefore, a reduced impact zone (or no impact zone) should be accepted as an option. The manufacturer should prove this either by a full crash test, sled tests or a validated simulation. Use should be made of 5th%, 50th% and 95th% dummies in -30°, 0° and +30° crash tests. The complete proposal is attached as annex 1 to this report.

COMMENTS:

UK: EEVC is studying the impact areas. Wait for their results.

USA: first accident data should be looked into before studying the proposal. Airbags may not deploy (deactivation) and that is the case in the USA, unbelted occupants should be taken into consideration too.

D: In available accident data (Dr. Le Cos) there are no relevant injuries with the dashboard and centre console.

E: In case of unbelted occupants, their head will impact the windscreen, not the dashboard.

NL: There are no requirements about airbag deactivation. Smart airbag will be in the market very soon.

There was also some concern on what would happen with vehicles that had their airbags deactivated permanently. OICA answered that vehicles are designed for their normal use and not as to what people could do later (disconnection of airbags, not wearing safety belt, ...).

After a long discussion on airbag deactivation the chairman asked the delegations the following question: *'If there is a restraint system and if the manufacturer demonstrates it works at a speed v and there is no impact on the dashboard, can everyone agree on the principle of a reduced impact zone (possibly reduced to zero) and an exemption of the design requirements for knobs and levers.?'*

UK, NL, S: *NO*: They could accept the proposal if the seat belt avoid the impact also for small occupants seated close to the dashboard. Time to study the proposal is needed.

I, F, E, USA, CLEPA: *are not against* but need time to study.

D: *YES*, but also requires time.

USA: *Difficult to accept now. The philosophy is correct.*

OICA: *Could be accepted.* OICA said that modifications of the current ECE 21 should be done in a cautious way.

4.3: OICA (Ford) made also following suggestions:

4.3.1: *Amendment of REG 21.01, item 5.1.6:*

- Where a minimum radius of curvature is specified, and the component has a material of less than 50 Shore A hardness adjacent to a rigid support, the radius will normally applied to the rigid support. However at the request of the manufacturer, the soft material can be left in place and can be included in the radius of curvature assessment. In this case[add procedure for including soft material in the assessment].
- The paragraphs 5.2.4, 5.3.5 and the part after the first sentence of 5.7.2 should be deleted.

The proposal was agreed by the group in principle.

Everyone of the members of the group is requested, to make a proposal for a possible procedure. The idea of „if soft material is present than the radius applies to the underlying structure“ is not fair since the thickness of the foam should be taken into account. E suggested developing a chart (hardness - thickness or hardness - energy dissipation). Additionally a tool should be developed to determine the energy dissipation of a component. E also pointed out that care should be taken with the test result showing how the energy has been absorbed. The energy dissipation could be adequate but the localised load could still be too high.

4.3.2: Amendment of REG 21.01, item 5.3.2.2:

- Windows winders test: add after the existing wording: "Notwithstanding the above, window winders shall not be subject to this horizontal force test where the window winder is protected in any position of the window such that an occupant's knee is unlikely to come into contact with it during a frontal impact.
- F proposed to clarify the item by means of the next paragraph: "The horizontal longitudinal force of 37.8daN is applied by means of a flat test device of not more than 50mm of diameter. If the force can not be applied because the vehicle's design, the test has not been carried out."

Justification: with new modern doors designs window winders are sometimes surrounded by the form of the door panel making it impossible for an occupant to touch it with his knees. Today, sometimes the armrest has to be cut to perform the test, this is not a realistic situation. The amended paragraph would avoid this.

The UK asked what would happen in a side impact? E replied that current ECE 21 only refers to frontal impact.

The group agreed to this proposal with the exception of NL that requires a better definition of protection.

4.3.3: OICA proposed to introduce requirements for gaps similar to those already existing for grilles. In the mean time the requirements of grilles should be extended to all zones and not be limited to the zone specified in 5.1.1.

The delegates needed to study this proposal.

4.3.4: Sweden proposed to amend the REG21 including the electric windows requirements approved in 74/60/EC

The group accepted the proposal:

5. Details of the TARGET 2 discussion: Establishing a new global (ECE 21) Standard.

5.1: A document comparing the EU - ECE - USA - J requirements will be made.

Mr Felten will summarise the EU and ECE requirements, Mr Mouchaour will insert the USA requirements, Mr Van der Plas will insert the Japanese requirements.

5.2: New global ECER21

5.2.1: The group agreed that before starting to make a draft new global ECE 21, EEVC should have concluded its work. USA stated that their researchwork **on the load cells for the headform** will be finalised around summer 2000. A NPRM could be issued after a cost-benefit assessment mid to late 2001 with a decision following 1 to 2 years later.

5.2.2: *E used its document 1999/11 as the basis for the discussion.* This document could be seen as a first step laying down the broad lines of the new global ECE 21.

OICA suggested that the scope should be limited to M1 vehicles and N1 vehicles (with a weight limit). Component approval could be introduced too (a component could then be used in one or more zones without need to be tested several times in a car). A single radius (now ECE 21 prescribes a radius of 2,5 or 3,2 mm) could be introduced. A harmonized Regulation should be the end result. Since design decisions are taken on a very early stage, long lead times will be necessary for any fundamental changes.

OICA (Honda) said that the work for the new global ECE 21 could be split into two parts: the general prescriptions (defining of the zones in a car) and the requirements attached to each zone. The Spanish document (1999/11) could be taken in so far that work could start on the definition of the zones and using the actual requirements following by new proposals when more informations are available. OICA (PSA) stated that any new requirements should be based on accident statistics. He referred to a presentation given during GRSP/25 / May 1999. This paper was distributed during the meeting. (Probability of Head impact against the steering wheel in a low to moderate Speed, Frontal Collision Configuration, prepared by Doctor Jean-Yves Le Coz, LAB)

5.2.3: *Include requirements for parts located below H point* (knee area and foot area as described in 1999/11).

USA, S, UK, D, NL and E *agree* that these areas should be included. A correct tool is needed. F, I considered *accident data is needed* to prove the necessity of these new requirements.

CLEPA and OICA said that accident data was needed as justification.

E said that collecting accident data would take years. E agrees that there are not many problems with these areas in today's cars but if introduced it would be an extra item reducing discussions for approval. In addition it is a benefit for safety and quality

5.2.4: *division of the vehicle in 3 zones including different dimensional requirements.*

CLEPA said it would simplify ECE 21 but not the product itself!

D said one should be careful with changing the requirements. Performance requirements are preferred and not design requirements. But D *could agree* to the principle.

S, UK, E USA *could also agree*, the USA saying that if there would only be performance requirements it would even fit in nicely for global harmonisation.

I, NL said they needed time to study the proposal but they *are in principle not against*.

F *doesn't see the need to change* unless accident data proves otherwise.

OICA said it is difficult to say since there are no details known.

Conclusion is that the division in [3] areas could be acceptable. Performance criteria are preferred above dimensional requirements. There is a need for accident and biomechanical data and the results of the EEVC study should be awaited.

5.2.5: *Rear facing and side facing seats:*

E suggested including these in the new requirements for the new global ECE 21 saying that this would be completely new. D pointed out that already today these seats are included in ECE 21 (§5.8.1). The UK stated that clarification of the current text is necessary, NL and S supported the UK.

The group said that prescriptions should be applied to all seating positions.

OICA said that it should be the position of the seat 'whilst the vehicle is in motion'. CLEPA agreed to this.

The group could agree to the following wording: 'dimensional prescriptions should be applied to any designated seating position authorised by the manufacturer to be used

while the vehicle is in motion.'

5.2.6: Rear part of centre console

Since the rear centre belt will now be a 3-point belt instead of a 2-point belt, the centre console cannot be impacted anymore. Ford will prepare a proposal for the next ad hoc group's meeting. (Belongs to Target no.1?)

5.3: State-of-the-art in EEVC works:

Mr Lowne, who was present at the second day of the meeting, gave an update of the EEVC work:

Freemotion headform selected (USA headform)

Freemotion test selected above the guided test

Correlation factor freemotion headform - EuroSID head will be established (by May 2000)

Definition of worst case (by May 2000)

Test subsystems or whole vehicle (by May 2000)

Influence of other vehicle parts (by May 2000)

Validation phase (by end 2000 - begin 2001)

Cost benefit (by end 2000 - begin 2001)

EEVC has studied accident statistics for side impact, and will now also look into accident statistics (from F, D, UK) to determine the impact zones in a frontal impact.

6. Further activities of the GRSP- ECE-R 21 ad-hoc group

After the fruitfull discussion of the members of the ad-hoc group during the first meeting the group will request the members of GRSP during the 27th session (which takes place on the 8th to the 12th of May 2000) to decide that the ad hoc group should prepare a document following **the TARGET 1-model**. The document shall be ready in September 2000 and distributed and discussed as official document on the 28th session of GRSP ,Nov./Dec.2000.

By the confidence in a positive reaction of the GRSP members the next meeting has been established in advanced in Madrid on 17th and 18th May, 2000.

Others

7.1 Working documents of the ad- hoc group:

- Probability of Head Impact Against the Steering Wheel in Low to Moderate Speed, Frontal Collision Configuration
- Hand written proposals by OICA (Mr. B. Cook)
- German proposal and introduction of a reduced head impact zone
- Frontal impacts, one page of data presented by Mr. Lowne
- Informal document no.4, presented by Germany during the 26th session of GRSP
- DocumentGRSP/1999/11, transmitted by Spain
- Informal document no.19, presented by USA during the 26th session of GRSP
- Document GRSP/1998/17, transmitted by USA

7.2 Summary of **Target 1** proposals, prepared during the first meeting in Madrid.

The following working document, **SUGGESTIONS FOR A SHORT TERM AMENDMENT OF REGULATION 21 (TARGET 1)** is -- after the agreement of GRSP during the 27th session -- the basis for further discussions of the ECE- R21 ad hoc group.

SUGGESTIONS FOR A SHORT TERM AMENDMENT OF REGULATION 21 (TARGET 1) DISCUSSED AT THE GRSP AD HOC MEETING, FEBRUARY 3-4 IN MADRID

1. German Proposal

See below the proposal presented by representatives of Germany and OICA (DaimlerChrysler) to define (as an additional option) a reduced head impact zone if the Manufacturer can prove that a effective restraint system prevents the occupants from contacting the instrument panel.

UK, NL, could not accept the proposal at this time, all other members need more time to study.

1. Scope (modified)

This regulation applies to the interior fittings of vehicles of categories M1 and N1 derived from vehicles of category M1 with regard to:

(modified)

2.2. "vehicle Type" with regard to the interior fittings of the passenger compartment means power-driven vehicles which do not differ in such essential respects as:

Deletion of the wording in brackets, see paragraph 1. scope

(added)

2.2.3. Protective system if the reduced head impact zone according to Annex 8 is used. (Vehicles that differ only in their protective systems belong to the same vehicle type if they offer an equal or better protection for the occupants compared with the system or vehicle submitted to the technical service responsible for conducting the approval tests.)

(modified)

2.3. Reference zone means the head-impact zone as defined in annex 1 to this Regulation. Alternatively at the choice of the applicant and based on occupants protected by the restraint systems installed in the vehicle type it is permitted to define a reduced head impact zone according to annex 8 of this Regulation. In both cases the following areas are excepted:

(added)

2.10. "Protective system" means Interior fittings and devices intended to restrain the occupants. (see Definition paragraph 2.1. of ECE Regulation 94).

(added)

2.11. Type of protective system: Means a category of protective devices which do not differ in such essential respects as:

2.11.1. their technology

2.11.2. their geometry

2.11.3. their constituent materials.

(added only if necessary)

2.12. "Airbag" means a device installed to supplement safety belts and restraint systems in power driven vehicles, i. e. systems which in the event of a severe impact effecting the vehicle automatically deploy a flexible structure intended to limit, by compression of the gas contained within it, the gravity of the contacts of one or more parts of an occupant of the vehicle with the interior of the passenger compartment.

(modified)

5.1. Forward interior parts of the passenger compartment above the level of the instrument panel in front of the front seat „H,, points, excluding the side doors

(modified)

5.1.1. The interior parts shall not contain any dangerous roughness or sharp edges likely to increase the risk of serious injury to the occupants. For those parts not included in the head impact area as defined in Annex 1 or the reduced head impact area as defined in Annex 8 this requirement is met if the edges of all parts contactable by a sphere with a diameter of 165 mm are at least blunted.

(added)

5.1.1.1. If the head impact zone is determined according to Annex 1 the parts referred to in Paragraphs 5.1.2. to 5.1.6. below shall be deemed satisfactory if they comply with the requirements of those paragraphs.

(added)

5.1.1.2. If at the choice of the applicant the head impact zone is determined according to Annex 8 the following Paragraphs 5.1.1.2.1. and 5.1.1.2.2 apply:

(added)

5.1.1.2.1. If the protective system of the vehicle type is able to avoid head contacts of the occupants defined in paragraph 2.1. of Annex 8 with the instrument panel and therefore no reference zone can be determined, the requirements of paragraphs 5.1.2. to 5.1.6. are not applicable to this vehicle type.

(added)

5.1.1.2.2. If the protective system of the vehicle type cannot avoid head contacts of the occupants defined in paragraph 2.1. of Annex 8 with the instrument panel and a reduced head impact zone according to Annex 8 is determined the requirements of paragraphs 5.1.2. to 5.1.6. are applicable only to the parts that are included in the reduced head impact area.

(New) Annex 8

1. Determination of the reduced head impact zone with regard to the protective system

1.1. Differing from the procedure described in Annex 1 the applicant may prove, by a procedure accepted by the technical service responsible for conducting the tests, that a reduced head impact zone is relevant for this vehicle type.

1.2. A suitable method to prove the reduced head impact zone may be either:

1.2.1. Simulated impact testing to determine the sequence of movement of the occupants with regard to the protective system installed in the vehicle type. It is sufficient to validate the simulation method on at least one accident constellation.

or

1.2.2. Sled tests

or

1.2.3. Vehicle impact tests

2. The reduced head impact zone includes all areas of the instrument panel that may be contacted by the head of restraint occupants using the protective system installed in the vehicle type.

2.1. The reduced head impact zone has to be determined for the occupant types 5%-Female, 50%-Male and 95%-Male, each placed in its recommended design seating position as defined by the manufacturer.

2.2. For the occupants named in 2.1. above the sequence of movement shall be investigated under the following conditions:

2.2.1. Variant 1:

The sequence of movement shall be investigated under the effect of the deceleration-time diagram as shown in Annex 8 of Regulation 16 applied under the impact angles of -30° , 0° and $+30^\circ$.

2.2.2. Alternatively Variant 2:

The sequence of movement of the occupants in the protective system shall be investigated under the following accident configurations:

2.2.2.1. Frontal impact with at least 56 km/h and 40% overlap against a deformable barrier as defined in ECE Regulation 94

2.2.2.2 Frontal impact with 50 km/h and 100% overlap against a rigid barrier

2.2.2.3. For vehicles with airbags

2.2.2.4. Frontal impact with 28 km/h and 100 % overlap against a rigid barrier

2.3. If components of the protective system can be deactivated by the driver or the occupant it is sufficient to investigate the minimum protection equipment.

3. The manufacturer or his representative is entitled to present calculations, Simulations, test data or test results which sufficiently prove the reduced head impact zone.

2. OICA Proposals

OICA (Ford Germany) suggested that if the rear center seating position is equipped with a 3-point seat belt that avoids head contacts of the occupants with the center console no head impact test should be performed on the center console. This suggestion equals the approach of the german proposal, transferd to rear seating positions.

Due to lack of time no descision at this time, it should be presented again at the next meeting.

(Ford UK) At manufacturer's request, it should be possible that materials softer than 50 Shore A could be left in place for the radius of curvature assessment. A

The proposal was accepted in principle because the thickness of the soft material should be taken into account, but a suitable test procedure and test device is essential and has to be developed and implemented in R21. Everyone of the participants should come up with his ideas in the next meetings.

(Ford UK): Proposal on window regulator handle requirements, such that handles protected by the design of the door trim panel would not be subjected to the forward-acting load test. Germany stated that TÜV already operates this way (by interpretation), whereas the Netherlands advocated cutting the trim panel where necessary to give access to the load application test equipment.

F suggested to clarify the necessity of a load test ba adding the following paragraph: „The horizontal longitudinal Force of 37.8 daN is applied by means of a flat test device of not more than 50 mm of diameter. If the force cannot be applied because of the vehicle ´s design it is not necessary to perform the longitudinal laod test on the window winder handle.,,

Everyone could agree on this issue except for NL, that insists on a better definition of protection.

Ford (UK) Proposed to incorporate "gaps" requirements into ECE-21 and to bring the grilles requirements into the main body of the Regulation (from the Explanatory Notes). The proposal would make the "grilles" reduced radii applicable in all assessment zones, instead of just in the head impact zone. Current radii applicable to gaps are 2,5 mm or 3,2 mm. Tentative suggestions for the radii on components forming a gap were as follows:-

GAP (mm)	Min. Radius on fixed components (mm)	Min. Radius on movable components (mm)
0 - [3]	[0,5]	[0,5]
[over 3, to 6]	[1,0]	[1,0]
[over 6, to 9]	[2,0]	[1,5]
[over 9]	No special requirement	

No decision at this meeting, the delegates needed time to study this proposal.

3. Further Proposals

Sweden suggested that the requirements for power operated windows and sun roofs from the announced amendment of 74/60/EEG should be integrated into Regulation 21.

Proposal was accepted by the delegates.

Spain proposed to require for all contactable parts below the H-Point that their edges should at least be blunted to protect the feet and lower legs of the occupants.

D replied that there is no tool available to determine the areas contactable by the feet.

CLEPA claimed any accident data to justify this approach, OICA needed time to study. No decision at this meeting.

Spain proposed to introduce requirements for side and rear facing seats. D replied that the existing Regulation already covers these seats (see 5.8.).

It was agreed that all designated seating positions (designed to be used while the vehicle is in motion) should be included.

It was suggested that vehicles of category N1 should be included in R21.

While it was not absolutely clear if this should be a short or a long term target some of the representatives could accept this possibility for N1-Vehicles derived from M1-Vehicles maybe together with a mass limit while others (F, I) could not. No decision at this meeting.