

## GRSP INFORMAL GROUP ON PEDESTRIAN SAFETY

### 5<sup>th</sup> meeting

**Ottawa, 10-12 September 2003**

#### **Draft detailed meeting minutes:**

##### 1. Welcome

The chairman, Mr Mizuno opened the meeting and welcomed everyone. He thanked Transport Canada for hosting the meeting. Mr Mizuno stressed that the first draft of the head protection part for the gtr should be drafted during this meeting. Technical feasibility and cost effectiveness will need careful checking and he asked industry for their contribution. He also pointed out that the aim is to establish a reasonable gtr which can be used and accepted by all Contracting Parties of the 1998 Agreement. Especially harmonisation of the Japanese and EU requirements for phase 2 is considered essential.

Mr Césari said it is his pleasure to assist Mr Mizuno. He judged this meeting the most important one since the start of this group and added that this gtr will be one of the first and set an example. He stressed that the gtr should be acceptable technically and at the same time has to make a step forward for pedestrian safety.

Mr Davis (Transport Canada) welcomed everyone to Canada and gave some background information on road safety in Canada. Over the last 20 years there has been a 50% reduction in road fatalities. More than 14% of the road fatalities are pedestrian and cyclist related. Canada has currently a 'Vision 2010' strategy that aims at reducing the road fatalities with a further 30%. Pedestrian safety can be one of the important ways to achieve this goal. He referred to the CMVSS bumper requirements which are very severe (no failure of safety systems after an impact of 8 km/h) and explained that it will be a challenge to align these with pedestrian safety.

Mrs Legault (Transport Canada) provided general information about the excellent meeting and hotel arrangements.

Mr Van der Plas, reminded the group of the documents distributed prior to the meeting and relating to the agenda:

INF GR/PS/49	IHRA child head test method
INF GR/PS/50	IHRA adult head test method
INF GR/PS/52	Provisional agenda for the 5th meeting
INF GR/PS/53	Draft gtr format
INF GR/PS/54	gtr proposal to WP29
INF GR/PS/55	Draft gtr
INF GR/PS/56	Comparison table
INF GR/PS/57	Proposed schedule of the group

##### 2. Adoption of the agenda

The agenda was adopted without amendments.

##### 3. Review of the minutes of the 4<sup>th</sup> meeting

INF GR / PS / 48 Rev 1 was adopted without comments.

##### 4. Report on GRSP/33 and WP29/130

Mr Van der Plas reported the results of the GRSP/33 and WP29 meetings. The preliminary report was presented by Mr Mizuno during GRSP/33 and accepted. The approach on the scope was welcomed and accepted. There were some minor changes proposed by the GRSP chairwoman and these were incorporated in the report presented by her to WP29. WP29 gave its go ahead to the informal group to continue work but also noted that the sponsor still has to table a document in AC3 in order to have the administrative procedure up to date. As a result the EU has prepared such a document (INF GR / PS / 54) and this is circulated to this meeting for information. The European Commission will table this document during next AC3.

INF GR / PS / 57: Mr Mizuno explained that the official target is to be ready end 2005 which means that GRSP should finalise discussions in May 2005. PS / 57 is a faster schedule and Mr Mizuno asks if this is necessary for the EU. Do they need a detailed gtr by 1/7/2004 or is the format and the general ideas enough?

Mr Doyle (EC) explained that the EU Phase 2 was accepted by the Parliament and shortly also by the Council and it will become a Directive. A feasibility study will be the source of a decision if an immediate amendment will be made to the Directive. The feasibility study should be taken into account in the gtr.

Mr Nishimoto (Japan) explained that the outline of the gtr is needed first before the discussion on feasibility can start.

Mr Césari said it will be very difficult to achieve a gtr including the lower leg within the time schedule described in PS / 57 because there are no IHRA proposals yet for the leg. For the head, proposals are available but PS / 57 seems to be very tight for the leg.

Mr van der Straaten (OICA) advised to work on the complete gtr skeleton leaving out the details for the time being. The EU needs a general outline that gives a clear direction in which the gtr will go.

Mr Mizuno supported this proposal from OICA and asked the group to follow this way of working (first decide on the skeleton and add the details later). This was agreed by the group. The skeleton should be ready by 1/7/2004 so that the EU can take it into account. The feasibility study from the EU / industry / ... will be used to fill in the details later.

Mr Doyle (EC) stressed that the gtr should not only look at EU and Japan but have a true global view. The EU Directive has a good basis since it is based on the Agreement with the industry. It should however not be a discussion EU versus Japan.

Mr Mizuno agreed that all '98 Contracting Parties should be taken into account.

Mr Davis (Canada) said that every regulation has to have a cost efficiency justification and this will prove to be very difficult for pedestrian safety. It will be difficult to have a decision in Canada before July 2004.

Mrs Legault (Canada) added that for Canada, bumpers will be the first priority given their severe CMVSS requirements which may have effect on pedestrian injuries.

Mr van der Straaten (OICA) said the group will have to be pragmatic. For industry there is an urgency to focus on Japan and EU. Of course other Contracting Parties are interested but they have no short term national regulatory plans. Thus the gtr should not be slowed down for them. The train was missed to harmonise EU and J requirements for Phase 1, harmonisation is absolutely necessary for Phase 2.

Mr Doyle (EC) clarified that he did not want to give the impression of wanting to slow down the process. The sources of knowledge are Japan and the EU but it is necessary to take a global view.

Mr Lukaszewics (Germany) supports the view of Mr van der Straaten and said that the focus should be on the work done in EU and Japan.

Mr Saul (US) said it is too early to take a decision. The cost effectiveness and feasibility studies are needed as basis before any decision can be taken.

#### 5. Discussion on the draft gtr format (INF GR / PS / 53)

Mr Doyle (EC) explained that PS / 53 is a proposal for a format based on WP29/883 and puts together examples of definitions, performance requirements, test conditions, ... It represents a general approach for the skeleton, the content is based on the EU requirements but serves just as example.

Mr Mizuno thanked the EC for their proposal and asks what PS / 55 is about. Is it the same format? The contents of PS / 55 will be discussed later in the agenda.

Mr Nishimoto (Japan) explained that PS / 55 is an example for the format but the content should be discussed.

Mr Mizuno proposes to discuss based on PS / 53 and Japan can add where necessary. This was agreed.

Mr Saul (US) asked what level of justification is necessary for the gtr. In the US an extensive preamble is used.

Mr van der Straaten (OICA) replied that WP29/883 and the '98 Agreement leave it quite open. So it is up to this group to decide. But a summary is more than sufficient. PS / 53 is a perfect example. Discussion on the format should be done later once the decisions have been made on the content.

Mr Mizuno concluded that PS / 53 will be used as the format proposal. The depth of the preamble can be discussed later. He asked if the EC can make a draft gtr based on the format.

Mr Doyle (EC) explained that an extra justification can be inserted for the publication in the Official Journal and asked if the US couldn't follow the same approach.

Mr Saul (US) confirmed this is possible if enough data is available in this group and IHRA. They could develop their own preamble based on that.

Mr van der Straaten (OICA) explained that the '98 Agreement requires the sponsor should make the official proposal. This does not mean that the EC should do all the work. He volunteers to work together with his experts and Mr Van der Plas to draft a gtr and consult with Mr Doyle.

Mr Doyle (EC) agrees to this approach.

Mr Mizuno concluded that this proposal is agreed.

#### 6. Detailed discussion on head protection test methods

Mr Césari first reconfirmed the backbone of the skeleton as reported in PS / 47 **Rev 1**:

- target car to pedestrian impact speed = 40 km/h
- subsystem tests for

- child head to top surface of bonnet and / or wings
  - adult head to top surface of bonnet and / or wings, windscreen and A-pillars
  - adult leg to bumper
- test conditions may be different depending on vehicle category and shape.

#### 6.1 /6.2 General concept of test method / vehicle shape

Mr Ishikawa (Japan) explained PS / 56 including the data collection for the vehicle shapes (using shapes from the EU, J and US).

Mr Mizuno clarified that IHRA proposed 3 crash speeds: 30, 40 and 50 km/h; **a vehicle speed of 40 km/h would lead to a pedestrian head impact speed of 32 km/h, representing the average plus / minus one standard deviation based on computer simulations.** The same approach was used for the angles.

Mr Césari said that there is more or less a continuous variation in the shapes and asks how the borders / division of the shapes were selected.

Mr Ishikawa (Japan) replied that the lowest and highest were selected. The middle one was used for computer simulation. The important parameters used are: BLEH, bonnet and windscreen angle and the bonnet length.

Mr Césari asked how to decide the limit between the shapes in a gtr.

Mr Ishikawa (Japan) replied that in Japan only one parameter is used to differentiate between a sedan and an SUV: BLEH of 835 mm. For a one box shape the bonnet angle is important.

Mr Ries (OICA) asked if a vehicle always falls in 1 shape or can it fall into two shapes?

Mr Ishikawa (Japan) said that for current cars this is no issue.

Mr Césari clarified that if the bonnet angle  $> 30^\circ$  then it is a one box shape and it is irrelevant what the BLEH is. If the bonnet angle  $< 30^\circ$  then the BLEH determines if a car falls in the sedan shape or in the SUV shape.

Mr Saul (US) said there is no need for detailed tables used for the computer simulation. For the gtr only the bonnet angle and BLEH can be used.

Mr Césari said that 3 test conditions would exist depending on the 3 shapes. He wanted to confirm the BLEH and the bonnet angle.

Mr Saul (US) asked if 2 vehicle with similar shapes would fall in two different categories, do we have enough justification for the different test conditions.

Mr Césari agreed this could be an issue. Just below and above the limits could result in different test conditions. The complexity of the test conditions have to be balanced. It is necessary to have simple tests for a gtr.

Mrs Legault (Canada) asked if a vehicle could be classified as a different shape depending on the pedestrian size.

Mr Césari said that the variation in test conditions is smaller for adults than for children. He added that the 3 shapes (sedan, SUV and one box) would each have specific test conditions.

Mr Saul (US) noted that for the child tests the only difference in the test conditions are the impact angle of  $60^\circ$  and  $65^\circ$ . How important is this  $5^\circ$  difference and can't the sedan and SUV be put in the same shape?

Mr Ishikawa (Japan) replied that the HIC increases with about 10% for an impact angle increase of  $5^\circ$ . So this  $5^\circ$  difference is important.

Mr Césari recommended to keep the 3 shapes at first instance. When the test conditions are studied, it can still be decided if some shapes can be put together. He added that the 3 shapes are all in category 1-1 and validated for these vehicles.

Mr van der Straaten (OICA) agreed to the shapes but suggested that the shape names should not be used in the gtr since it is design restrictive.

Mr Césari said this was agreed and added that if some Contracting Parties would want to extend to different vehicles not included in the gtr, the group should recommend that validation has to be done first.

#### 6.3 Impact area

Mr Césari explained the difference between the Japanese proposal in PS / 57 and the EU. In the Japanese proposal the boundary for the adult and child test zone is a WAD of 1700 mm whilst in the EU it is 1500 mm. He asked if the group should opt for a boundary line or for an overlap zone.

Mr Ishikawa (Japan) reported on a study done by JARI comparing these two methods. This study showed that the methods do not differ significantly with a difference to the theoretical maximum relief ratio of less than 5%.

Mr Césari suggested that because of this small difference, the best is to take the easiest one (for testing) which would be the boundary line.

Mr Saul (US) asked if the study was based on Japanese data only.

Mr Ishikawa (Japan) replied this was the case but there are no big differences in the distribution in other countries.

Mr Césari said that the ratio between the head mass and the pedestrian height can be assumed and this supports more a boundary line than an overlap zone. He suggested that unless there is strong opposition the boundary line method would be chosen as is already the case in Japan and the EU.

Mr Saul (US) said that the boundary method gives priority to children but gives a very small negative effect on very few adults who would hit the child area. Whilst an overlap at WAD = 1400 to 1700 mm would reduce the effectiveness for children.

Mr Césari agreed this was a good analysis and added that looking at injuries the curves would be even closer. He added that the middle of the overlap could be chosen as boundary line or the priority could be given to children and then we would have to opt for the top of the overlap zone as boundary line (WAD = 1700 mm).

Mr Ries (OICA) explained that industry would favour the boundary line since there is a big difference between both methods for feasibility: industry has a lot of concern for the feasibility with an overlap zone. He added that priority should be given to protect children so a boundary line at WAD = 1700 mm would be best.

Mr Saul (US) agreed to give priority to the protection of children.

Mr Césari concluded that the boundary line method at a WAD = 1700 mm is agreed upon. This means the child head test area is between WAD = 1000 mm and 1700 mm. For adults, the test zone would go up to 2100 mm which is reasonable for the impact speeds this group is looking at. For the adult test surface, a definition of the side reference line is included in the EU and the philosophy of these definitions can be used. Inclusion of windscreen and A-pillar will depend on feasibility.

Mr Ries (OICA) explained that industry showed its concerns (about A-pillar, ...) during last IHRA meeting. He added that a gtr should only include tests for which there exist technically feasible solutions. He presented PS / 59 concluding that it is premature to include the windscreen, the windscreen frame and the A-pillars.

Mr Césari replied he could understand this position for A-pillars, it is more difficult to understand for the windscreen. There are not many severe injuries related to the windscreen area so it should be no problem for the tests.

Mr Kinsky (OICA) said that the glass is not the problem but other materials are like the frame, mirrors, instrument panel.

Mr Doyle (EC) informed the group that in the EU the windscreen is tested for monitoring only.

Mr Saul (US) explained that designs where the hood extends over the cowl create space and he wonders if this is a solution for pedestrian safety.

Mr Ries (OICA) replied that for some designs it could be a solution however solutions should never be design restrictive.

Mr Kinsky (OICA) added that the FMVSS does not allow the hood to come into contact with the windscreen in crash testing.

Mr Saul (US) replied that there are already cars on the market which are designed like that and the FMVSS requirements are no problem.

Mr Ries (OICA) agreed but added that these cars don't meet the headform testing under discussion in this group.

Mr Saul (US) asked if there is already monitoring underway in the EU.

Mr Doyle (EC) replied this will start as from Phase 1.

Mr Césari said that EURO-NCAP includes the windscreen and A-pillars. If this group would not include these a very good rationale is needed. It would be good to collect EURO-NCAP data before we take a final decision. He asked if the EC could inform the results to this group.

Mr Doyle (EC) replied he would have to ask his colleagues from DG TREN.

Mr Saul (US) reminded the group about the first set of accident data submitted to this group which included relevant information for this discussion. He said that it should be checked how many fatality reductions are lost when these areas would be excluded.

Mr Mizuno said the PS / 3 shows the % fatality rate. For the windscreen this is 15%, for the frame and A-pillar it is 10% whilst the ground is 10%.

Mr Saul (US) concluded that this means if those areas are excluded about 30% of the fatalities would be excluded.

Mr van der Straaten (OICA) agreed these fatalities were part of the accident scene but feasibility is important as well. He explained that EURO-NCAP results are only relevant for those specific tests. It is premature to include these areas in a regulatory environment. The gtr could include these areas for monitoring as well.

Mr Césari replied that the difference in test procedures (NCAP versus those being discussed in this group) is not so important (not in the scale of 1 to 10). However he understands the request for monitoring tests.

Mr Ries (OICA) added that the EURO-NCAP philosophy is completely different from that for legislation. Legislation has to be completely met in all areas.

Mr Saul (US) suggested to limit the windscreen test area by excluding a distance from the frame and the mirrors.

Mr Ries (OICA) said it would be a problem to define the zones. Windscreens are curved and this has a stiffening effect. Just saying that x mm from the frame should not be tested would be design restrictive.

Mr Césari suggested to have some areas for monitoring only and that the areas would be defined after collecting test results. Other areas will be compulsory.

Mr Saul (US) explained about the idea in the US to have 14 bonnet zones of which 11 should have a HIC < 1000. A similar arrangement could be thought off here. He asked if we are talking about any point to be tested.

Mr Césari said we could follow the EURO-NCAP protocol or select the worst points. Another idea is to divide the area in for example 20 x 20 cm squares and decide on a % that can exceed the HIC limit. This % could then be reduced over time. The approach should be decided next meeting.

Mr Nishimoto (Japan) agreed to discuss this next meeting but does not agree to have monitoring in a gtr. **This is because monitoring is not suitable for regulations.** If some areas would be difficult, this should be discussed in this meeting.

Mr Mizuno asked what is meant with monitoring.

Mr van der Straaten (OICA) explained that it is not unknown in Regulations. The side impact regulation included for some years the monitoring of the VC value. This meant the value was recorded and printed in the test report but not used as a pass-fail criteria.

Mr Bilkhu (OICA) reminded the group that IHRA had discussed these areas as well and that they didn't have enough data to come to a conclusion.

#### 6.4 Selection of impactors:

Mr Césari said it is necessary to harmonise the impactors.

Mrs Legault (Canada) asked if the child age for the head was 6 years.

Mr Mizuno confirmed this and explained this was chosen because these are most represented in accident data.

Mr Nishimoto (Japan) supports the IHRA impactors of 3,5 and 4,5 kg.

Mr Césari said that for the adult head 4,5 or 4,8 kg is not such a big issue. For the child head it is more complicated. EEVC decided on 2,5 kg which represents a child aged 2,5 to 3 years old. This age was taken because it is the age when children start going to school and they are more vulnerable in an impact (higher injury risk). 6 year old children on the other hand behave more independently and have a higher accident risk. He added that EEVC is not reconsidering the 2,5 kg weight.

Mrs Legault (Canada) explained that Canadian data shows that 6 year old children are more represented in accidents than 3 year old children.

~~Mr Ishikawa (Japan) said that EEVC WG 10 also focused on 6 year old children but that they calculated the effective head mass as 2,5 kg.~~

~~Mr Césari said a lower effective head mass is difficult to understand.~~

Mr Saul (US) said a lower mass would mean the need to have a softer structure which would then reduce the protection for older children (6 year old) which are most frequent in accidents. In order to maximise the effectiveness need to go for higher weights.

Mr Césari agreed and asked if the weights would be 3,5 and 4,5 kg. This was agreed by the group. He asked which diameter should be used: 165 mm is used by IHRA.

Mr Ishikawa (Japan) explained PS / 60.

Mrs Legault (Canada) clarified that ISO WG5 uses anthropomorphic data.

Mr Césari explained that the IHRA biomechanics group concluded for the adult head a circumference of 557 mm. This would mean a 177 mm diameter but this is for men only. Women have a circumference of 531 mm which means a diameter of 169 mm. He added that the tools are already developed and that the diameters are very close anyway so the best would be to keep the 165 mm. The group agreed to this. He added that the decisions of today are based on current knowledge and that if something new would be tabled between today and the freeze of the gtr text, it will be taken into account.

#### 6.5 Test conditions

Mr Césari suggested to discuss speed and angle together.

Mr Mizuno explained that in IHRA 3 simulations were run. One each by Australia, Japan and the US.

Mr Ishikawa (Japan) explained PS / 61. The speed ratio is about 0,8 for all vehicles / pedestrian size and bonnet / windscreen / BLE/grille for 40 km/h. The impact angle depends on the area, the pedestrian size and the vehicle shape.

Mr Saul (US) asked if the gtr could drive the fleet to a bigger number of SUVs. If the BLE is high enough it seems no child head tests would have to be performed.

Mr Ishikawa (Japan) clarified that the angles proposed in PS / 56 are based on the Japanese data alone.

Mr Frederiksson (CLEPA) asked if the gtr could include the JARI model for computer simulation.

Mr Césari said it is uncertain if there can be agreement on the model and the validation in short term.

Mr Mizuno explained that IHRA concluded that the JARI model is the best but it is not perfect. Studies are ongoing how to improve the model.

Mr Saul (US) asked if there is a reference in the IHRA documents for the validation of the model using cadaver data.

Mr Césari explained that with a WAD = 1700 mm the windscreen will be included for some vehicles. How to include this in a gtr since PS / 61 does not give results in computer simulation. In PS / 56 the same angles are quoted for the adult and child head testing on the windscreen.

Mr Ishikawa (Japan) explained that in Japan small cars have head contact with windscreen. No data were available for children so the results for adults were copied.

Mr Saul (US) said PS / 61 also shows no impact on the windscreen of SUVs for adults and PS / 56 proposes the same angles for the SUV as those used for a sedan.

Mr Ishikawa (Japan) explained that the vehicle shapes used in the computer simulation are not compatible with the shapes used in the test procedure.

Mr Césari asked if the JARI data alone is closer to 45°.

Mr Ishikawa (Japan) confirmed this.

Mr Césari suggested to have 45° for the sedan and the one box shapes.

Mr Saul (US) replied that only the JARI data for the one box would put it closer to 55°.

Mr Césari agreed and added that the average in PS / 61 is not the best. Only the JARI data should be used.

Mr Ishikawa (Japan) explained that in PS / 56 for the bonnet only the JARI data was used. For the windscreen area the average of the 3 simulations was used.

Mr Césari suggested to recalculate for the windscreen with the JARI data only.

Mr Saul (US) asked if sedan, SUV, one box used in the simulation fit in the shape definitions for the gtr.

Mr Ishikawa (Japan) explained that the definitions for the shapes were decided after the computer simulations had been performed.

Mr Césari suggested that the results should be regrouped to align the definitions in the simulation with those of the gtr and then recalculate using the JARI data only. It is also important to know the variation for the same BLE (and same shape) for different posture and stiffness.

Mr Roy (Canada) asked what the conclusion is on the question of Mr Saul on the SUVs.

Mr Césari replied that for a category 1-1 vehicle with BLE > 1000 mm it may be necessary to have impacts of the head at crash speed against the BLE.

Mr Bilkhu (OICA) asked if these vehicles wouldn't be excluded because of their weight.

Mr Saul (US) referred to the Tokyo meeting and said it would be a national decision on which vehicles to include.

Mr Césari added that if it would be necessary to extend the scope to vehicles not included in the gtr scope, extra validation would have to be performed. If the current gtr scope includes vehicles with BLE > 1000 mm then we need to decide what to do for child head tests.

Mr van der Straaten (OICA) said these vehicles are **virtually non-existing** in the EU and Japan so we should not divert too much energy to cover a very small percentage of the market.

Mr Ries (OICA) added that if the BLE > 1000 mm kinematics are different. This would need a complete different test.

Mr Césari said we are discussing a global regulation so should take these vehicles into account. If they are not on the market in EU or Japan today, it does not mean these should not be taken into account. We have to avoid bad solutions.

Mr Ishikawa (Japan) explained that the data should not be regrouped to align with the shape definitions of the gtr because the whole shape is different in the computer simulations. So the IHRA results should be kept as they are: 3 shapes, 2 stiffness, 3 pedestrian positions. The 0,8 speed ratio is the average for all shapes, adult or child and impact area.

Mr Césari said we would have to decide if we take the average speed for all cases or the result for each case.

Mr Ishikawa (Japan) corrected PS / 56: the angle for the windscreen for the one box shape should be 50° (See PS /56 Rev 1).

Mr Césari asked how to select the impact speed. With 0,8 the average is 32 km/h. Is this the best choice for pedestrian protection also taking into account the amount of scatter in the simulation. The EU now uses 35 km/h and goes to 40 km/h in Phase 2.

Mr Doyle (EC) clarified that the EU in Phase 1 uses both 35 and 40 km/h whilst Phase 2 only uses 40 km/h. A crash speed of 40 km/h is the minimum consideration and we should consider going higher as well. If there is a reasonable proposal for 35 km/h the EC will study it as well. For the upper leg, the EU uses look up graphs which are more flexible and represent a more fluent approach. This may be a better solution than using a wide average for each vehicle shape.

Mr Nishimoto (Japan) said a crash speed of 40 km/h was already decided and the speed ratio is 0,8 so 32 km/h was proposed. However feasibility could be studied for 32, 35 and 40 km/h but using the average of 0,8 is a good approach.

Mr Lukaszewics (Germany) agreed to an impact speed of 32 km/h based on a crash speed of 40 km/h.

Mr Saul (US) said there are too many unknowns to decide. There is no information on feasibility, injury criteria, exclusion of tests areas, ... He also asked how to establish the angles of the vehicle shapes (like the bonnet angle). He had not seen any definitions for that. Also unclear which approach to take: either use average approach as in IHRA or go for worst case which may simplify testing.

Mr Davis (Canada) reminded the group that a crash speed of 40 km/h covers about 70% of accident cases. He agrees with the position of Mr Saul.

Ms Martos (Spain) understands the US position but can also follow the results of the Japanese study.

Mr Lukaszewics (Germany) said it is necessary to have a limited number of parameters in testing.

Mr Ries (OICA) agreed that the test should not be too complicated. The IHRA results were all below 0,8 and they were already rounded up. The worst case is difficult to define with 3 positions and 2 stiffness so better to go for the average which is well known already.

Mr Césari asked if there had to be a choice between the average speed with the angle perpendicular to the surface and a higher speed with a different angle, which one would be the best.

Mr Nishimoto (Japan) said this (perpendicular tests) would give a different angle for each point in each vehicle and would not be the same as the computer simulation results which should be followed **and would be complicated**. **Tests should be simple.**

Mr Césari argued that a perpendicular test would not influence the design of the shape and is less design restrictive. Mrs Legault (Canada) said that a perpendicular test would be easier to administer in a self certification system.

Mr Ries (OICA) argues that the impact of the head is not perpendicular and that the impact angle is independent on bonnet curvature alone. This is kinematically less realistic.

Mr Saul (US) said we have to be careful in what we think we know. Everything is based on a limited number of cadaver tests, all the rest is based on assumptions.

Mr Frederiksson (CLEPA) explained that a perpendicular test is better since extreme shapes could give a lot of rotation for the headform which lowers the HIC but increases other injuries.

Mr Césari said the preliminary conclusion could be to have perpendicular tests and by next meeting think about feasibility if new info will come back to it.

Mr Doyle (EC) expressed a slight reservation about this approach. It is too simplistic. The Directive and EURO-NCAP take the shape into account and the test procedures for the upper leg are not too complex. For head impact a set angle is used.

Mr Davis (Canada) the proposed perpendicular test is the worst case scenario.

Mr Ishikawa (Japan) said the test should represent the real world accident scenario.

Mr Césari agrees in principle but in simulation there is a lot of variation so concerned about the average.

Mr van der Straaten (OICA) said with future developments in (sensor) techniques and a gtr that is unrealistic for kinematics, manufacturers have to comply with a gtr but will not offer protection to pedestrians in the real world.

Mr Césari said the choice is between a perpendicular test and the IHRA results but the IHRA results need more work because the conditions selected were not the best possible.

Mr Mizuno said that IHRA has the best experts and used all available data. The result is not perfect but the best achievable using the best current knowledge.

Mr Césari concluded that the test conditions are related to the vehicle shapes so perpendicular tests would be too simplistic. IHRA has to clarify the relation between head impact speed and angle with the vehicle shape by next meeting. A 'look up graph' or 'relational graph' would be ideal.

Mr Ishikawa (Japan) said IHRA has the data but maybe no time or funds to do this. Also the accuracy of the model is a problem that is why the average was used before.

Mr Nishimoto (Japan) agreed to study this but also asked for a decision now so that the feasibility study can start.

Mr Mizuno agreed that if we wait for next meeting no feasibility study can start.

#### 6.6 Level of requirements

Mr Césari said that in general a  $HIC < 1000$  should be used. After the feasibility studies this can be adapted to a higher level or exemption of certain areas.

#### 6.7 Other items

Mr Césari said the test details will be discussed later. Any other point not raised yet should be discussed now.

Mr Mizuno said the detail specifications of the impactors have to be proposed and decided for next meeting.

Mr Césari asked how detailed this should be. Only include performance requirements or also include design requirements.

Mr van der Straaten (OICA) informed the group on the problems encountered with the side impact barrier where only performance requirements were specified. In reality dramatic differences in tests were seen and the requirements were tightened as a result. There are good definitions of the impactors today so should use these.

Mr Mizuno said that IHRA has detailed specifications and these can be proposed at next meeting.

Mr Saul (US) asked how these detailed specifications can be included in a gtr. The US specifies these separate from the regulation.

Mr Doyle (EC) said that the devices to be used are annexed to the Directive and specifies materials, performance requirements, certification procedures, ...

Mr van der Straaten (OICA) said that WP29 procedures are similar to those of the EU: devices are specified in an Annex to the Regulation and / or a full description is deposited at the UN in Geneva.

Mr Roy (Canada) explained that also in Canada these are included in the legislation.

### 7. Discussion on adult leg protection test method

Mr Mizuno said that there is no detailed information from IHRA at this time but this will be proposed by next meeting. He added that knee injuries are decreasing in accidents but they remain severe injuries so IHRA wants to take these into account. At the same time bone fractures are increasing. Additionally the flexibility of the human leg would be taken into account.

Mr Doyle (EC) agreed that the lower leg is the priority but still it is necessary to consider the upper leg test for the front of the vehicle especially bearing in mind the new shapes (SUV, one box).  
 Mr Mizuno explained that IHRA includes all body parts and prioritised them. Discussions on the upper leg will start when those on the lower leg are finished.  
 Mr van der Straaten (OICA) said that today the upper leg is no priority as was already stated in the preliminary report to GRSP.  
 Mr Césari said the upper leg procedure should not result in changes to designs that are not a problem today.  
 Mr Saul (US) asked if there are any plans to look at EURO-NCAP results and real world accidents.  
 Mr Doyle (EC) replied there are no plans to do this.  
 Mr Césari explained this is no easy exercise in the EU since they have not the same structure in place as the US has.  
 Mr Ries (OICA) added that the accident database include older vehicles whilst EURO-NCAP tests new cars so these sort of comparisons would not be of great value.  
 Ms Martos (Spain) agreed to ask EURO-NCAP for their results to be distributed to the group.  
 Mr Mizuno said he would re-contact AUS-NCAP to ask them the same question.

Mr Van der Plas presented PS / 62 with the decisions / action plan resulting from this meeting.  
 Mr Saul (US) clarified that items 4 and 10 interrelate. Item 4 can fade away depending on the result of item 10.  
 Mr van der Straaten (OICA) said that if there is no decision today then the timing becomes problematic. So need tentative decision to proceed. If the basis would be confirmed next meeting, 4 months will be gained.  
 Mr Saul (US) said that vehicle shapes would require a lot more work in defining the angles. A 'relational graph' is more time friendly. He added that if the feasibility is done based on the vehicle shapes it will probably remain valid for the 'relational graph' approach as well.  
 PS/ 62 was agreed upon.  
 Mr Saul (US) will e-mail his comments on PS / 49 and 50 to Mr van der Straaten and Mr Doyle in order to assist in the drafting of the gtr.

Mr Mizuno asked what should be included in the preamble. Should active safety be mentioned as well. And who will write it. Should we mention any conflict with other regulations as well?  
 Mr Saul (US) suggested to do this parallel to the drafting of the gtr.  
 Mr van der Straaten (OICA) said the preamble content depends on the gtr content and agrees to write it parallel to the drafting of the gtr.

Mr Frederiksson (CLEPA) asked if pop-up hoods, external airbags and other new technology should be included in the discussions how these should be handled.  
 Mr van der Straaten (OICA) said some technology may need specific test procedures but it is not the role of legislation to look at specific technologies.  
 Mr Frederiksson (CLEPA) said the problem is component tests are used and not full scale tests. Prescriptions are needed how to deal with new technologies and component tests.  
 Mr Saul (US) said it may be necessary to test the sensors as well.  
 Mr Frederiksson (CLEPA) said the same test methods could be used but more specifications are needed. This can be discussed later but he wants to include it as an item.  
 Mr Doyle (EC) agreed this should be looked at including reliability and triggering. However the gtr should not be delayed.  
 Mr van der Straaten (OICA) agreed and added this is more an issue for the test houses.  
 Mr Mizuno said it will be taken into account but not all details will be included in the gtr.

Mr Frederiksson (CLEPA) asked if there is any info about the testing by industry of the flexible legform.  
 Mr Mizuno said IHRA is still discussing this legform. He added that in PS / 57 the lending of the legform should not be in the INF GR column.  
 Mr Césari stressed that the order should be followed. JARI presents to IHRA who adopt / change and then inform to INF GR next meeting.  
 Mr Doyle (EC) said that PS / 57 is confusing and asked to delete it.  
 It was agreed that PS / 57 would be deleted.

## 8. AOB

Mr Mizuno said as information only Mr Ishikawa can give a small presentation on the flexible legform.  
 Mr Ishikawa (Japan) referred to the ESV paper that included all details also on the instrumentation used. He added that the flexible legform has the same basic parameters as the 'NCAP' legform: mass, moment of inertia, size. The only difference is the flexible bones and the instrumentation.  
 Mr Saul (US) suggested to check how sensitive the bumpers are towards flexible legform versus the rigid legform.



Mr Mizuno explained that IHRA will discuss the details based on the JARI information and new information expected from France and the current TRL impactor. When concluded this will be tabled at the INF GR.

Mr Mizuno asked everyone to provide input for next meeting based on PS / 62.

Mr Doyle (EC) urged everyone to work in the mean time so that next meeting good discussions can take place and good decisions can be made.

Mr Saul (US) asked if we could have all (relevant) IHRA documents.

Mr Césari explained that working documents are for the working group alone. If some documents are useful for this INF GR we should ask and inform the author and we should check with the IHRA SC if all documents may be distributed.

Mr Mizuno thanked Transport Canada for their hospitality and the organisation of the meeting and closed the meeting.

#### 9. Next meeting

February 3-4-5, at the OICA offices in Paris

List of new documents:

INF GR/PS/58	Presentation on vehicle shape, boundary line, ...
INF GR/PS/59	A-pillar IHRA OICA presentation
INF GR/PS/60	ISO/TC22/SC10/WG2 N613
INF GR/PS/61	IHRA PS 237
INF GR/PS/62	Action plan from 5 meeting
INF GR/PS/63	Attendance list 5th meeting
INF GR/PS/64	Draft meeting minutes 5th meeting