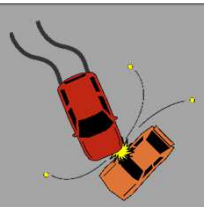
EqOP Field Data Studies

All claims expressed in this presentation are solely those of the presenters and do not necessarily represent those of the IWG. The current status of the Drafting Group work is shown. Conclusions from this works will be derived in the upcoming IWG Meetings

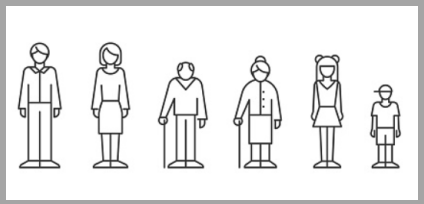
21.09.2023

EqOP Approach

0.) Field data study



Identify which loading scenarios in the field cause significant differences in injury risks for different groups of the population and review how those are currently assessed in regulations



- gender
- age
- body height
- BMI

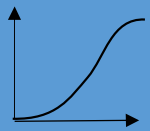
→ October Workshop in Brussels (23.-25.10.)

1.) Use available tools (already currently used in regulations) to address problems identified in 0.)

Change wordings in regulations

Change requirements in regulation with available tools:

a) Change what is required / voluntary?

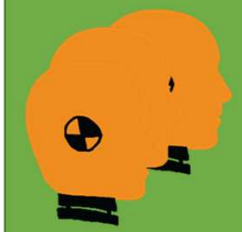


b) Change injury criteria

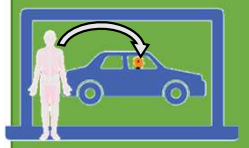
c) Change test conditions (speed, barrier, angle...)

2.) Use alternative test tools to address problems identified in 0.)

Which injury mechanisms can be predicted additionally compared to currently available tools, where problem in the field are observed?



Which alternative physical test tools are suitable for this?



What can be simulated what currently can't be tested?

Regulation	Load case and general requirements	Speed	Barrier	ATD	Is there anything in the regulation which limits that equity issues can be adressed?
UN R12	Full frontal, flat barrier	48,3-53,1 kph	N/A	N/A	no
UN R14	Safety-belt anchorages Strength test Geometry related requirements		N/A	N/A	loads are based upon occupant mass of 75 kg
UN R16	Safety-belts Frontal dynamic belt load	50 kph	Sled test with R16 pulse (approximately 30g)	R16 Manikin 75 kg	loads are based upon occupant mass of 75 kg
UN R17	Seats and seat anchorages The test of seat anchorages (and the whole seat system) performed with a 20 g dynamic test forward and rearward.	50 kph	N/A	N/A	requirements on head restraints, optimised for test protocol conditions.
UN R21	Interior head impact		N/A	N/A	no
UN R25	Head restraints. Geometry related requirements and strength test (rearward displacement of head restraint under static or dynamic loading).	N/A	N/A	N/A	requirements on head restraints, optimised for test protocol conditions.
UN R32	Full rear-end impact. Mobile Barrier. Perpendicular.	38 kph	MB 1100 kg	N/A	N/A
UN R34	Fuel system integrity				N/A
UN R94	40% Frontal offset; perpendicular Deformable barrier	56 kph		Belted Driver HIII 50th Male Belted Front Pass HIII 50th Male	only 50M tested only front occupants
UN R95	Side; Mobile Deformable Barrier; Perpendicular No door shall open during test. After impact it shall be possible to open doors, release and remove the dummy.	50 kph	MDB 950 kg	ES2 male 50th%; Front seat on the struck side	- only mid position of travel - no interaction between front row occupants - no rear occupants
UN R135	Pole side impact; angled	32 kph	Pole	WSID 50M Front seat on the struck side	- only mid position of travel
UN R137	Full frontal; perpendicular	50 kph		Belted Driver HIII 50th Male Belted Front Pass HIII 5th Female	only front seat occupants covered
UNR153	Fuel system integrity				N/A

Overview on ATDs applied in current regulations

	Driver				Front Passenger				Rear Passenger			
Applied ATDs	05F	50F	50M	95M	05F	50F	50M	95M	05F	50F	50M	95M
UN R12	-	-	-	-	-	-	-	-	-	-	-	-
UN R14	-	-	-	-	-	-	-	-	-	-	-	-
UN R16	-	-	R16 Manikin 75 kg	-	-	-	-	-	-	-	-	-
UN R17	-	-	Bio RID	-	-	-	-	-	-	-	-	-
UN R21	-	-	-	-	-	-	-	-	-	-	-	-
UN R25	-	-	-	-	-	-	-	-	-	-	-	-
UN R32	-	-	-	-	-	-	-	-	-	-	-	-
UN R94	-	-	HIII	-	-	-	HIII	-	-	-	-	-
UN R95	-	-	ES2	-	-	-	-	-	-	-	-	-
UN R135	-	-	WSID	-	-	-	-	-	-	-	-	-
UN R137	-	-	HIII	-	HIII	-	-	-	-	-	-	-
GTR 14	-	-	HIII	-	-	-	-	-	-	-	-	-

Results from the workshop on the 15th of September

Expert opinions for inspiration

Questions to experts: Field data findings – who is at highest risk?

- Which equity issues have you identified in the past?
  - High risk in young females in rear-end impact for soft-tissue neck injuries
  - Smaller vehicles → higher risks (compatibility issues); females more likely to be in smaller vehicles
  - Increases in body mass index affects females more than males
  - Higher risks for high BMIs (variation in body shapes between females and males?) for females especially for lower extremities for drivers
  - Females have higher risk in lower extremity injuries Higher risk for female for ankle injuries (related to BMI)
  - Young females had a higher risk for head, abdominal injuries? (indicated in study on frontal and farside) → initial posture, seatbelt fit?
  - Higher risk in elderlies

Questions to experts: Field data findings – who is at highest risk?

- Where do you see the biggest needs in terms of gaps in regulations?
  - **Shift in mentality towards robust evaluations needed**
  - **Consideration of non-fatal injuries with high long-term consequences**
  - Voluntary regulation in rear-end impacts for whiplash assessment
  - Body regions neglected in the regulations (pelvis, lumbar spine, ankle, brain, WAD, spine, upper extremities)
  - Problems with body regions we currently assess (head, thorax) → tools, risk curves
  - Different seat positions in the vehicle
  - How do people really sit in cars; range of postures
  - Low speed evaluations (could be helpful not only for the elderlies; head/chest,..) → 30-40 km/h; use advantages of adaptive restraints
  - Robust systems – not address one specific gap, but overthink the method
  - Some countermeasures only work for dummies, but not for humans
  - Avoid one-point optimisation
  - Tools to assess countermeasures (e.g. for lower extremity and how you can get them into realistic postures)
  - New seating positions
  - Compatibility between vehicles
  - How is the vehicle used in real-life
  - Chest injuires and how it can be assessed with the current tools
  - Current regulations are limiting optimisation of belt fit (static belt fit test)

Questions to experts: Field data findings – who is at highest risk?

- Which research gaps have you identified?
  - Medical preconditions
  - PMHS tests in environments closer to serial cars to develop better tools and injury risk curves
  - “New” risk functions or possibilities to address 0.5% AIS3+ injury risks
  - How to distinguish between height and gender?
  - Difference in behaviour / belt fit between females and males
  - Pre-crash behaviour
  - Physiological and biochemical changes of females throughout life
  - Has thorax loading changed?
  - Are restraints currently too stiff in low-severity impacts?
  - Validation devices to see if the right person was “sensed”

Results from literature review

Working table / work in progress

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