Transmitted by the expert of the Netherlands

Informal document GRSG-124-27
GRSG 124th session, 11 – 14 October 2022
Agenda Item 18(g)

Three dimensional H-point machine
State of Play

October 2022

Background

This item has been on the GRSP agenda for a long time…

- No documents from the IWG 3-D HPM available on the UNECE website !?

- GRSP-55: May 2014
  when discussing the new draft Regulation [135] on Pole Side Impact, it was noticed that a different reference to the ISO standard was included from other Regulations

- GRSP-56: December 2014
  Germany presented informal document GRSP-56-37
  In their June 2014 sessions, WP.29 and A.C.3. agreed to start the IWG 3-D HPM

- GRSP-57: May 2015
  the IWG presented informal document GRSP-57-30

Background (cont.)

- GRSP-58: December 2015
  the IWG would start drafting an Addendum to the M.R.1 which would reproduce the specifications of the 3-D H machine from SAE J826

- GRSP-59: May 2016
  the chair of the IWG (on harmonization of) 3-D HPM from Germany resigned

- GRSP-60: December 2016
  new chair assigned from Spain

- GRSP-61: May 2017
  work of the group would start as of 24 May 2017 with first WebEx meeting

- GRSP-62: December 2017
  Informal document GRSP-62-24 was presented

Background (cont.)

- GRSP-63 ~ GRSP-65: May 2018 ~ May 2019
  the IWG had not progressed as expected, the activity of this IWG could eventually be handed over to a new group on the development of the M.R.1

- GRSP-66: December 2019
  discussion moved to the May 2020 session

- GRSP-67: July 2020
  item not on the agenda and has not been discussed

- GRSP-68: December 2020
  Intention of the IWG to submit a proposal of amendment to R.E.3 to the May 2021 session of GRSP. However, GRSP noted that the IWG had the objective to harmonise specifications and include them in M.R. 1, whereby both UN Regulations and UN GTRs would refer to

Background (cont.)

- GRSP-69: May 2021
  discussion moved to the December 2021 session

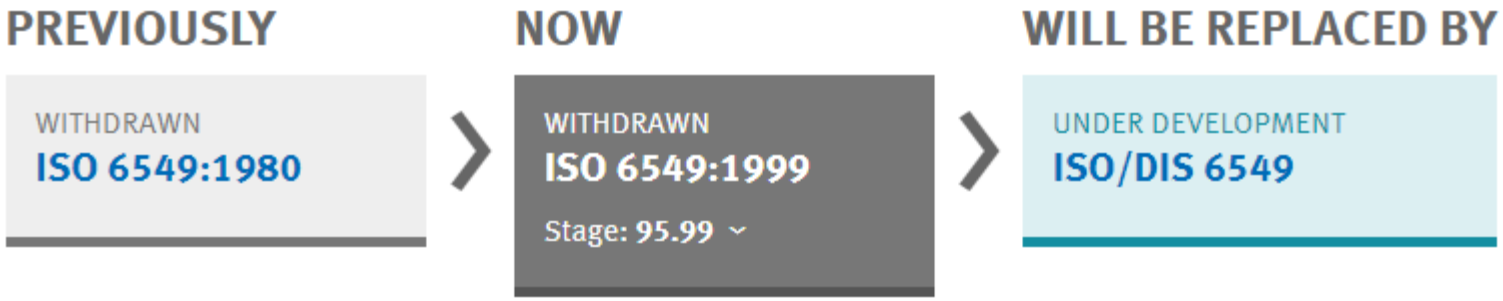
- GRSP-70: December 2021
  No new information has been provided

References

1. ISO 6549

   - ISO 6549: 1980

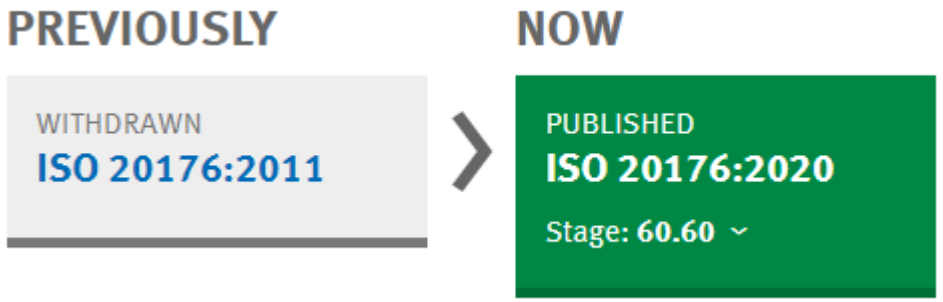
   - ISO 6549: 1999



Refers to SAE J826 => HPM-I/"OSCAR"

2. ISO 20176

   - ISO 20176:2020



Refers to SAE J4002 HPM-II/ASPECT; (**currently) not used by UN ECE**

Key differences ISO 20176 from ISO 6549

Compared to the H-point machine (HPM-I) specified in ISO 6549, the HPM-II provides:

- improved repeatability,
- greater ease of use,
- additional features and measurement capabilities.

While:

- minimizing their impact on the location of reference points and measurements.

IRCOBI conference 2021; IRC-21-49

- HBM-I not suitable for reclined seats
  (for torso angles well in excess of 25 degree)

Key differences ISO 20176 from ISO 6549 (cont.)

1) Separate components

- the legs (upper and lower), shoe, cushion pan and back pan are all separate pieces.
- greatly improves the ease of installation.

2) “Legless” manikin

- Use of legs is optional.

3) Shoe tool

Several improvements were made to the shoe tool and how it is positioned in the vehicle, including:

i) replacing the pedal reference point (PRP) with a new ball of foot reference point (BOFRP);

ii) specifying a new procedure for positioning the shoe on the pedal.

4) Cushion angle

The cushion angle is measured independently of thigh angle, and at the same time the other measurements are made. (With the ISO 6549 HPM, cushion angle was measured from the thigh line, and required a separate installation of the HPM).

5) Lumbar support

- The articulation of the back pan assembly allows the HPM-II to be better seated in contoured seats.
- Provides a measurement of lumbar support prominence (LSP). With LSP=0, no difference between HPM-I/II

References (cont.)

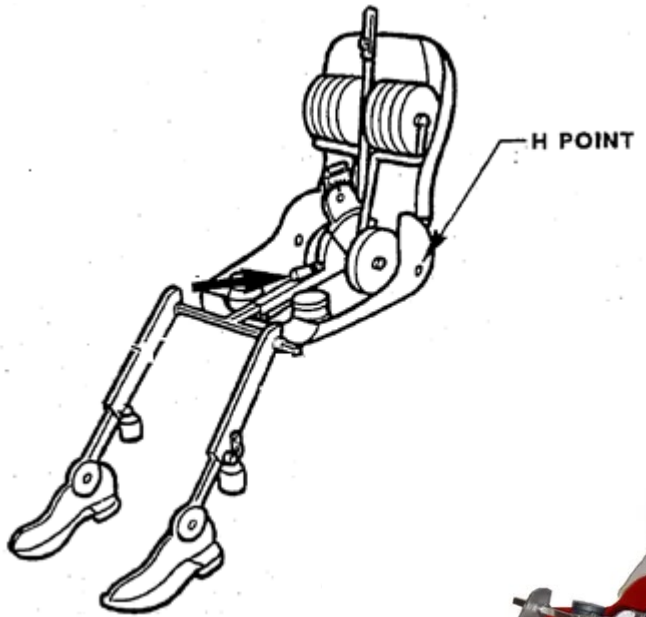
3. R.E.3.

   - Rev. 2 (30 June 2011)
   - Rev. 3 (23 January 2014)
   - Rev. 4 (27 January 2016)
   - Rev. 5 (7 June 2017)
   - Rev. 6 (11 July 2017)

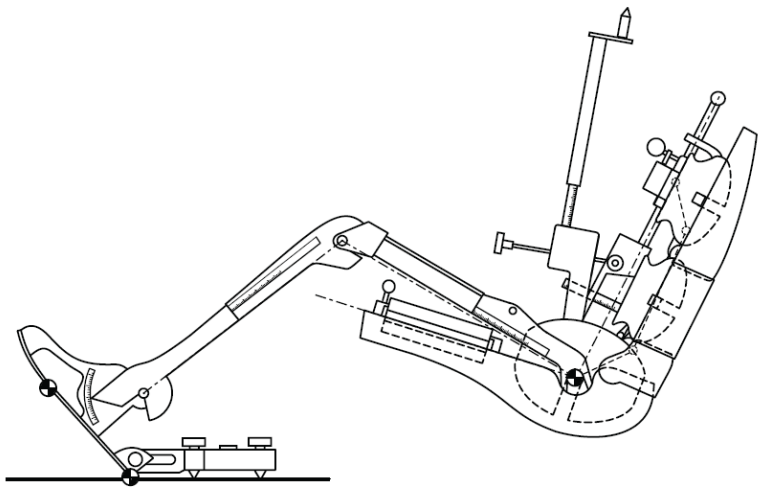
4. SAE J826 (HPM-I/OSCAR); includes calibration procedure for HPM-I.
   - 1962, 1980, 1987, 1991, 1992, 1995, 2002, 2008-03, 2008-11, 2015, 2021

5. SAE J4002 (HPM-II/ASPECT)
   - 2004, 2005, 2010, 2022

HPM-I (“Oscar”, “Japie”)



HPM-II incl. opt. equipment (“[ASPECT]”)



Consideration:

- HPM-II relevant for Type Approval ? Or only more suitable for development purposes
  What about Type Approval requirements with regard to reclined seats in future ?

- HPM-I OK to be continued to be used !?

Statement from SAE (as found in SAE J826 – November 2008):

"SAE J4002 (HPM-II) and SAE J826 (HPM) shall co-exist for a transition period of at least 10 years, preferably no longer, from the first publication date of SAE J4002 (August 2005). Following this transition period SAE J826 will be withdrawn.
During the transition period, it remains up to the vehicle designers to decide which HPM to use. Regulatory bodies and other parties that need to know shall be informed regarding which HPM was used".

Overview 1958 Agreement/1998 Agreement

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Regulation	ISO reference:	Reference to:	Action:
R.E.3 Rev. 6	ISO 6549-1980	Annex 1 - Appendix 1	To be updated
GTR 06	ISO 6549	Section 3.13.2.	Should mention version ?!
GTR 07	ISO 6549:1999	Annex 13 footnote 1	Annex 13 figure 11-2 refers to the dimensions from ISO6549:1980. To be updated. Legs set at 50 pecentile
GTR 14	ISO 6549:1999	Par. 107 and Annex 3 footnote 1	Upper leg set at 10 percentile; to be updated
UN R14.09	(ISO 6549-1980)	Annex 4 Appendix 1 refers to R.E.3. Rev. 2	To be updated
UN R16.08	(ISO 6549-1980)	Annex 15 Appendix 1 refers to R.E.3. Rev. 6	To be updated
UN 17.10	(ISO 6549-1980)	Annex 3 Appendix 1 refers to R.E.3 Rev. 6	To be updated
UN R21.01	ISO 6549-1980	Annex 5 Appendix 1 footnote /*	To be updated
UN R25.04 suppl. 1	ISO 6549-1980	Annex 3 footnote 1	To be updated
UN R32.00 suppl. 1	ISO 6549-1980	Annex 3 footnote *	To be updated
UN R33.00 suppl. 2	ISO 6549-1980	Annex 3 footnote *	To be updated
UN R35.00 suppl. 1 UN R35.01	ISO 6549-1980 (ISO 6549-1980)	Annex 3 footnote * Annex 3 refers to R.E.3 Rev.6	To be updated
UN R43.01 suppl. 9	ISO 6549	Annex 22 paragraph 2.3	To be updated
UN R46.04 suppl. 9	(ISO 6549-1980)	Annex 8 Appendix 1 refers to R.E.3 Rev. 4	To be updated
UN R80.04	ISO 6549-1980	Annex 4 Appendix 1 footnote 1 and 2 footnote 1 refers to R.E.3 Rev. 2 footnote 2 refers to ISO 6549-1980	To be updated
UN R94.04 suppl. 1	(ISO 6549-1980)	Annex 6 Appendix 1 footnote 1 refers to R.E.3 Rev. 6	To be updated
UN R95.05 suppl. 2	(ISO 6549-1980)	Annex 3 Appendix 1 footnote 1 refers to R.E.3 Rev. 3	To be updated
UN R114.00	ISO 6549-1980	Annex 8 footnote *	To be updated
UN R125.02	(ISO 6549-1980)	Annex 3 footnote 1 refers to R.E.3 Rev. 2	To be updated
UN R135.01 suppl. 3	ISO 6549:1999	Annex 5 footnote 1 scope 1.1.b refers to R.E.3. Rev. **6** definition 2.18b refers to R.E.3. Rev. **3**	Upper leg set at 10 percentile; to be updated Check origin of change to Rev. 6 in WP.29/2021/157
UN R137.02 suppl. 2	(ISO 6549-1980)	Annex 3 footnote 1 refers to R.E.3 Rev. 6	To be updated

ISO 6549:1980 versus 1999

1. In common:

   - both versions cover procedure for 50 percentile and 95 percentile

2. Main differences:

5.7.1 Designated seat position: driver

5.7.1.1 For 50th percentile leg lengths: both foot and leg assemblies shall be moved forward in such a way that the feet take up natural positions. If the right shoe sole of the device does not reach the accelerator pedal, both feet may take natural positions on the floor, with the legs extended between the operating pedals if necessary. In this case the operator heel point shall be specified by the manufacturer. The spirit level verifying the transverse orientation of the device is brought to horizontal, if necessary, by re-adjustment of the seat pan, or by adjusting the leg and foot assemblies towards the rear.

5.7.1.1.1 The left foot is positioned on the floor or toe-rest and located approximately the same distance to the left of the centreplane of the H-point machine as the right foot is to the right. A line passing through the H-point sight buttons shall be maintained parallel to ground, and perpendicular to the longitudinal centreplane of the seat.

5.7.1.1.2 If the left leg cannot be kept parallel to the right leg and the left foot cannot be supported by the structure, adjust the left lower leg length and/or the left foot angle and move the left foot until it is supported. The alignment of the sight buttons shall be maintained. Retighten the leg element setting.

5.7.1.1.3 In cases where the right heel point of the device would be on the toe-rest instead of the floor when the foot is at the minimum angle of 87°, the foot shall be moved until the heel touches the intersection of the toe-rest and the floor covering. Then the foot shall be pivoted until it is in contact with the accelerator pedal.

5.7.1.2 For 95th percentile leg lengths: the right foot and leg assembly is placed on the accelerator pedal and the heel on the floor as far forward as specified by the manufacturer. However, the foot angle shall never be less than 87°. This is accomplished by inserting the positive stop pin of the H-point machine into the foot assembly. The shoe sole of the device shall touch, and, if specified by the manufacturer, is allowed to depress the accelerator pedal through some portion of its travel.

Issues

1. One vehicle type comes with one SRP per seating position.
   Measuring the H-point according to each Regulation should result in the same value and match with the SRP within the tolerances given.
2. Setting of the H-point stature unclear and not consistent.
   (5/50/95%) not given in ISO 6549; follows from R.E.3.
   (where does 401 mm upper leg come from ? 49 CFR § 571.214 ?)
   This results in problem when issuing a WVTA; which R-point to mention if they differ among different Regulations ?
3. R.E.3. Rev. 2/3/4 have different upper and lower leg settings.
4. R.E.3 Rev. 2/3/4/5/6 all based upon withdrawn ISO 6549:1980
5. Test labs accredited to ISO 17025 run into problems to get their test procedures accredited since HPMs available on the market do not meet/cannot be calibrated according to old specifications.

old HPM meeting ISO 6549:1980 spec

R.E. 3

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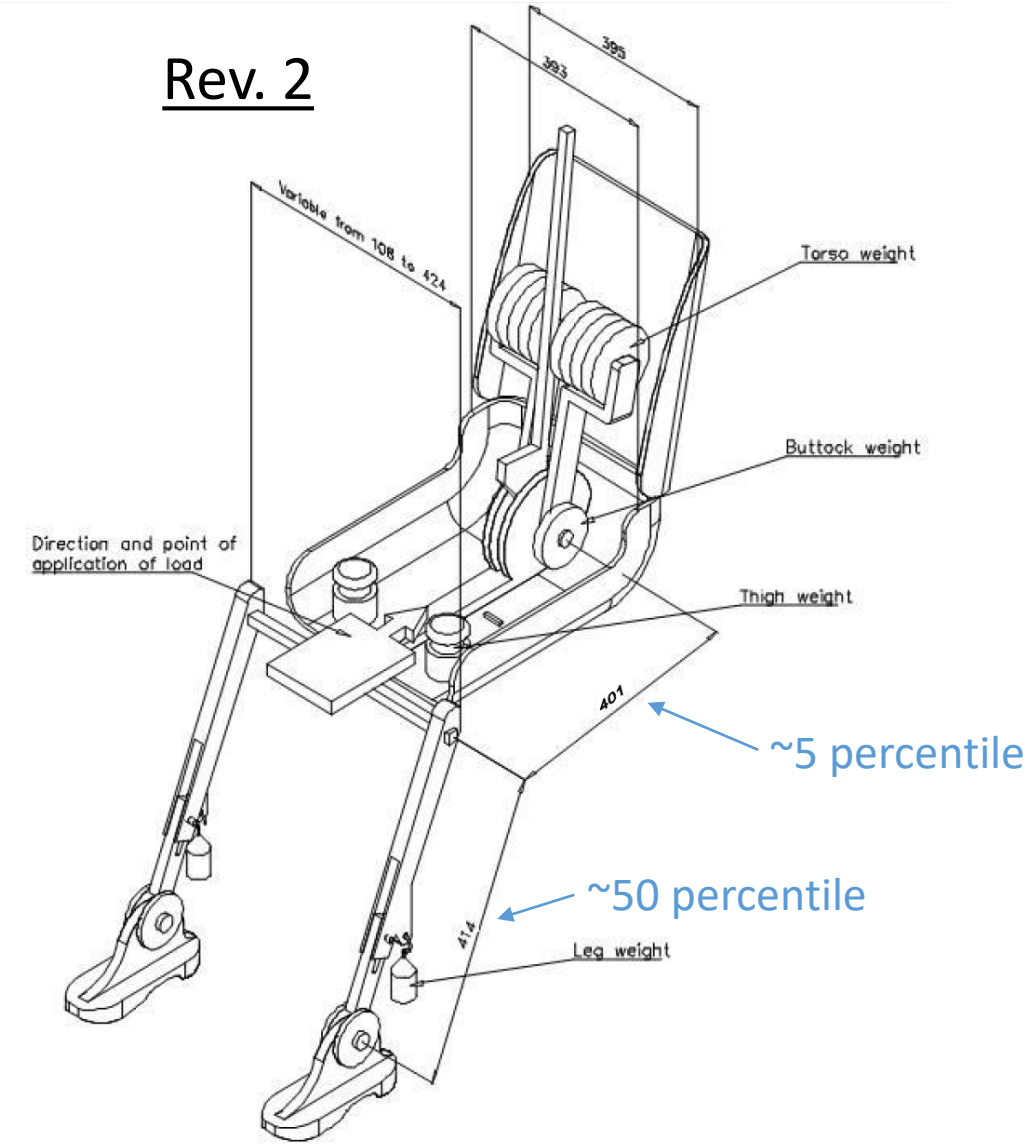
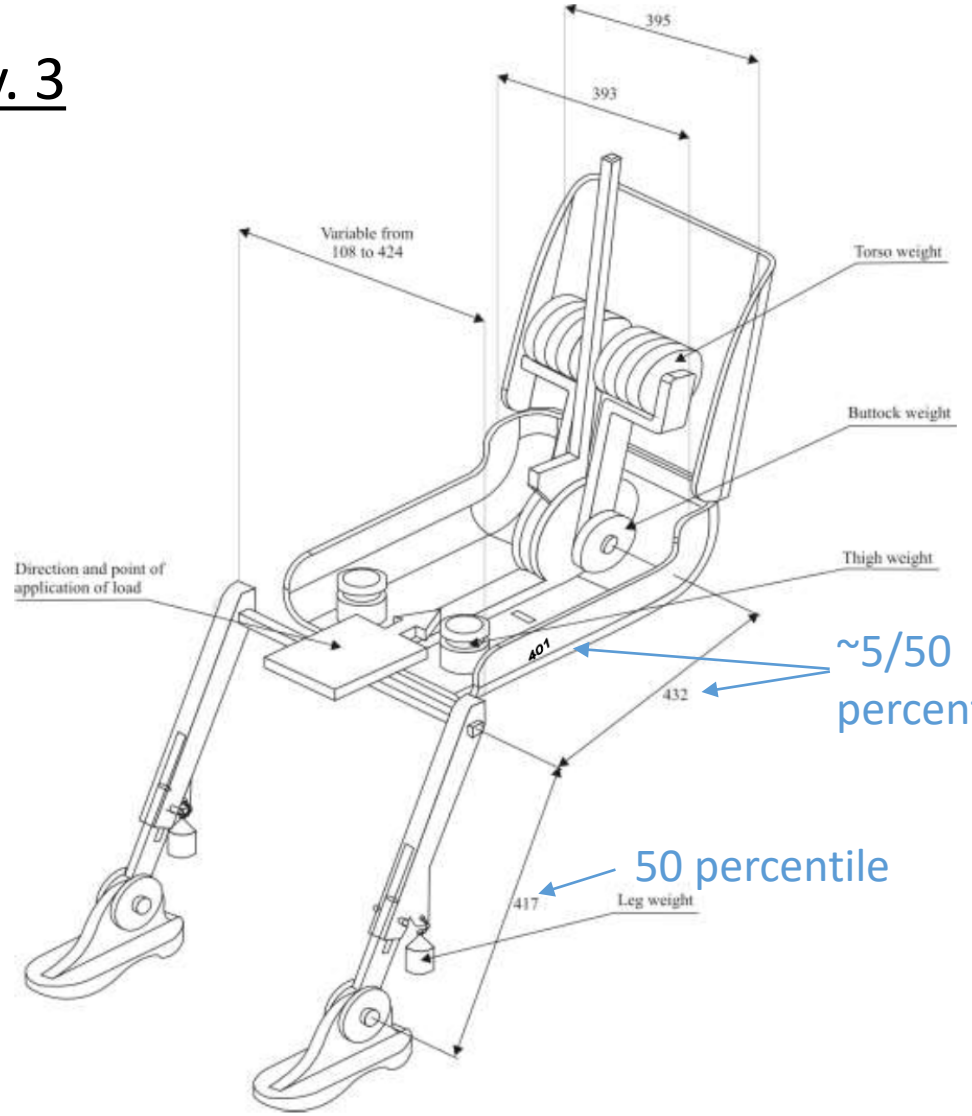
Rev. 2



~5 percentile

~50 percentile

Rev. 3



~5/50 percentile ?!

50 percentile

R.E. 3 (cont.)

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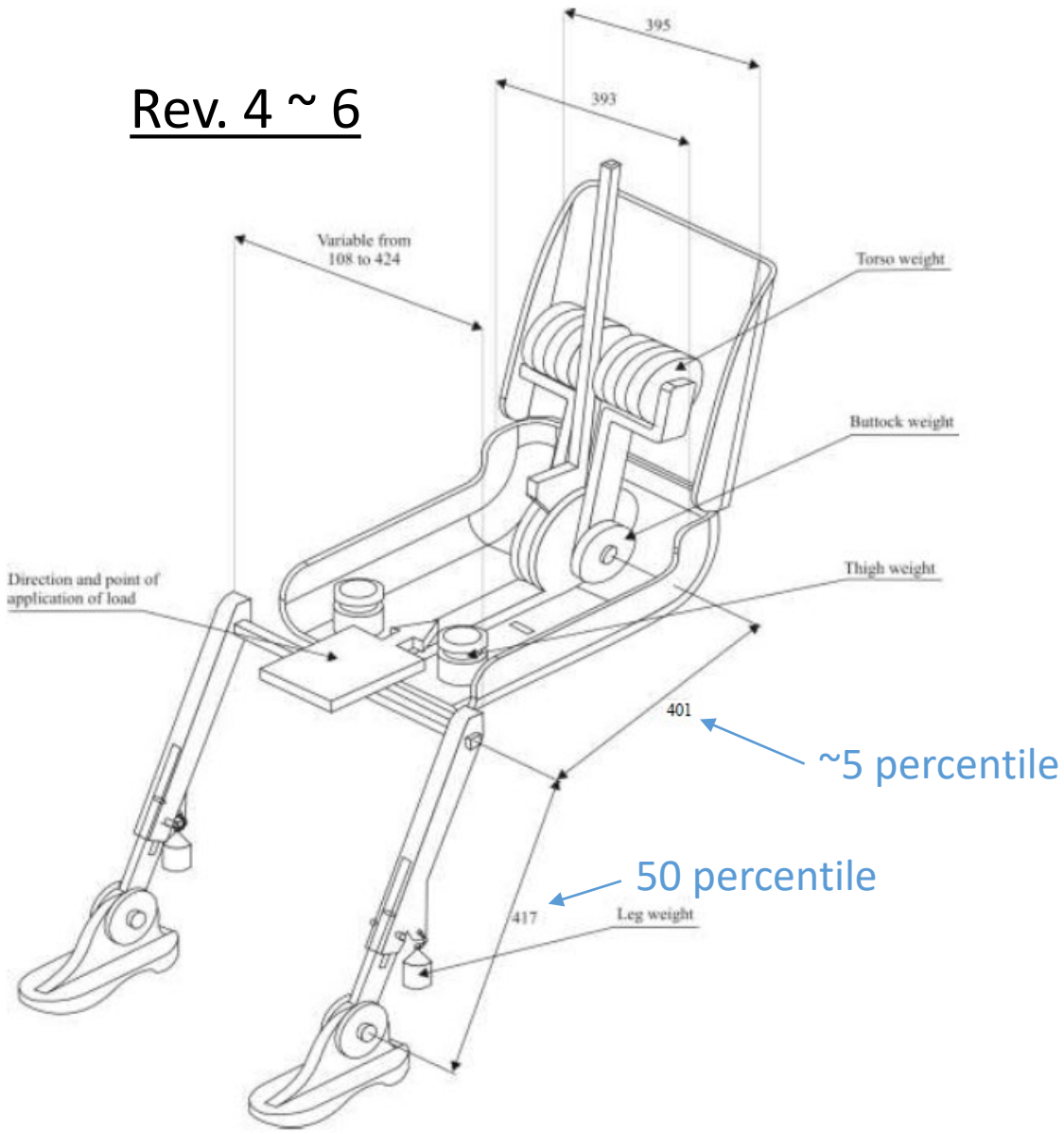
Rev. 4 ~ 6



ISO 6549

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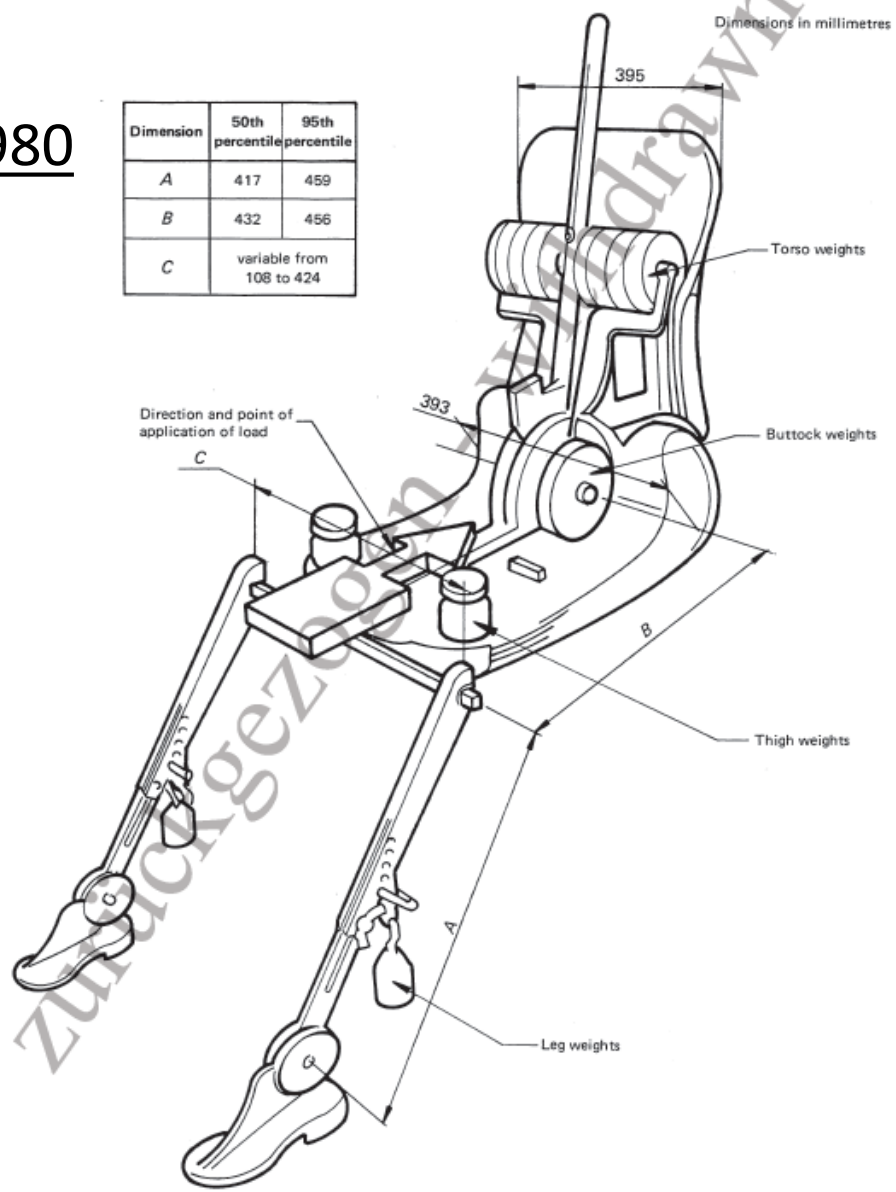
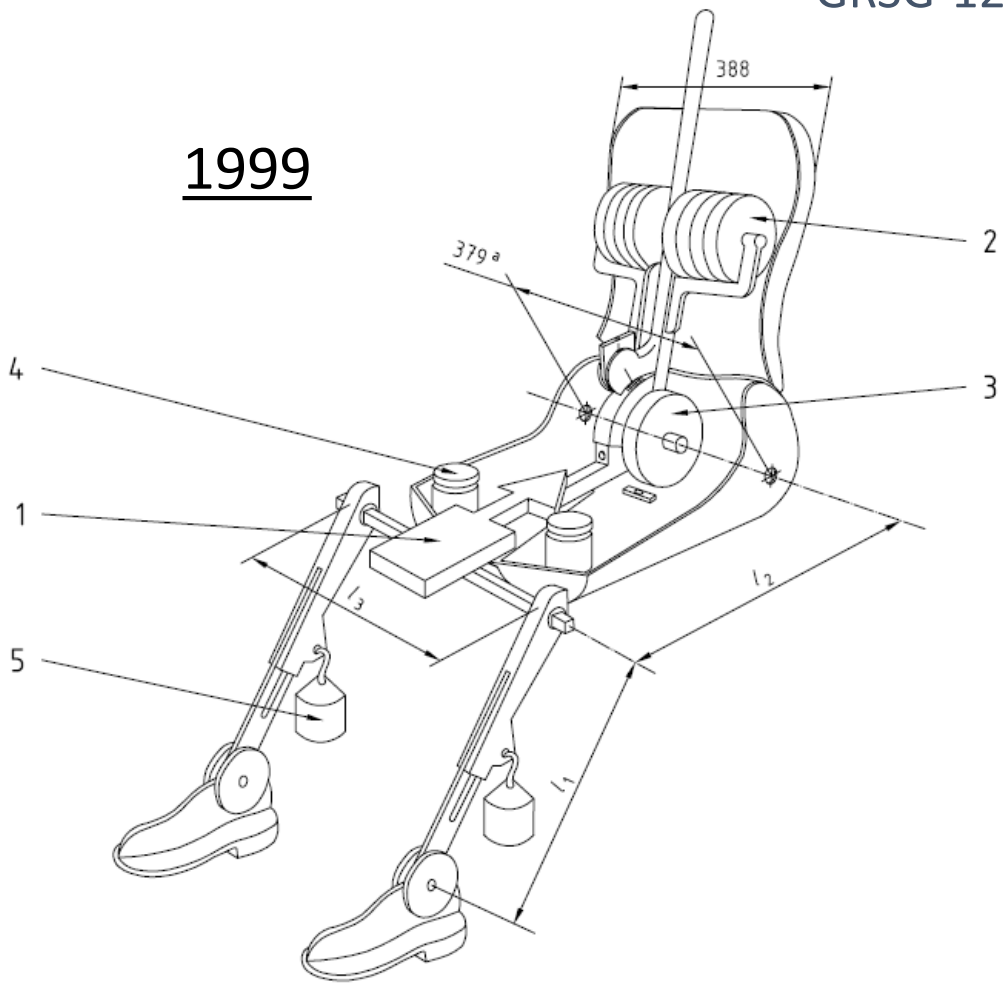
1980

Dimension	50th percentile	95th percentile
A	417	459
B	432	456
C	variable from 108 to 424	



1999



Dimension	50th percentile	95th percentile
l_1	417,5	459
l_2	431,5	456
l_3	variable from 108 to 424	

Way forward

NL proposes:

1. to restart the discussion in order to come to a common understanding and position supported by GRSG

2. to copy ISO 6549:1999 procedure into R.E.3. and copy the SAE J826 into M.R.1.
   In the UN Regulations and GTRs, reference shall be made to the new revision of R.E.3. which will refer to M.R.1.

3. to set the HPM at 50 percentile upper leg and lower leg length.

4. to get proposal(s) at the GRSP-72 session (December 2022) and GRSG-125 session (March 2023) and GRSP-73 session (May 2023) ready for adoption.

Any input from GRSG is welcome !

Thank you for your attention