

**IHRA/PS Proposal for the Moment of Inertia
of GTR Adult/Child Headform Impactors**

IHRA/PS 347

Background

- At the 8th INF GR PS MT, the tolerances for the moment of inertia of the Adult 4.5kg and Child 3.5kg headform impactors were discussed with regard to narrowing the tolerances (Original values -> Child 3.5 kg : 0.0075 to 0.0200 kgm² ,Adult 4.5 kg : 0.0075 to 0.0200 kgm²).
- After the 8th GR PS discussion, the Child headform impactor tolerance was modified to be 0.008 to 0.012 kgm² based on EU Phase 1 values; however, the discussion of the Adult headform impactor tolerance was assigned to the EEVC/WG17 and IHRA/PS.
- The EEVC/WG17 discussions were based on a TRL paper (PS148, Adult 4.5 kg : 0.011 +/- 0.001 kgm²), and EEVC/WG17 accepted the tolerance proposed by TRL.
- Concurrently, Japan also proposed an adult tolerance (PS149, Adult 4.5 kg : 0.011 to 0.015 kgm²) based on the modified GTR Child 3.5 kg headform requirement (0.008 to 0.012 kgm²)

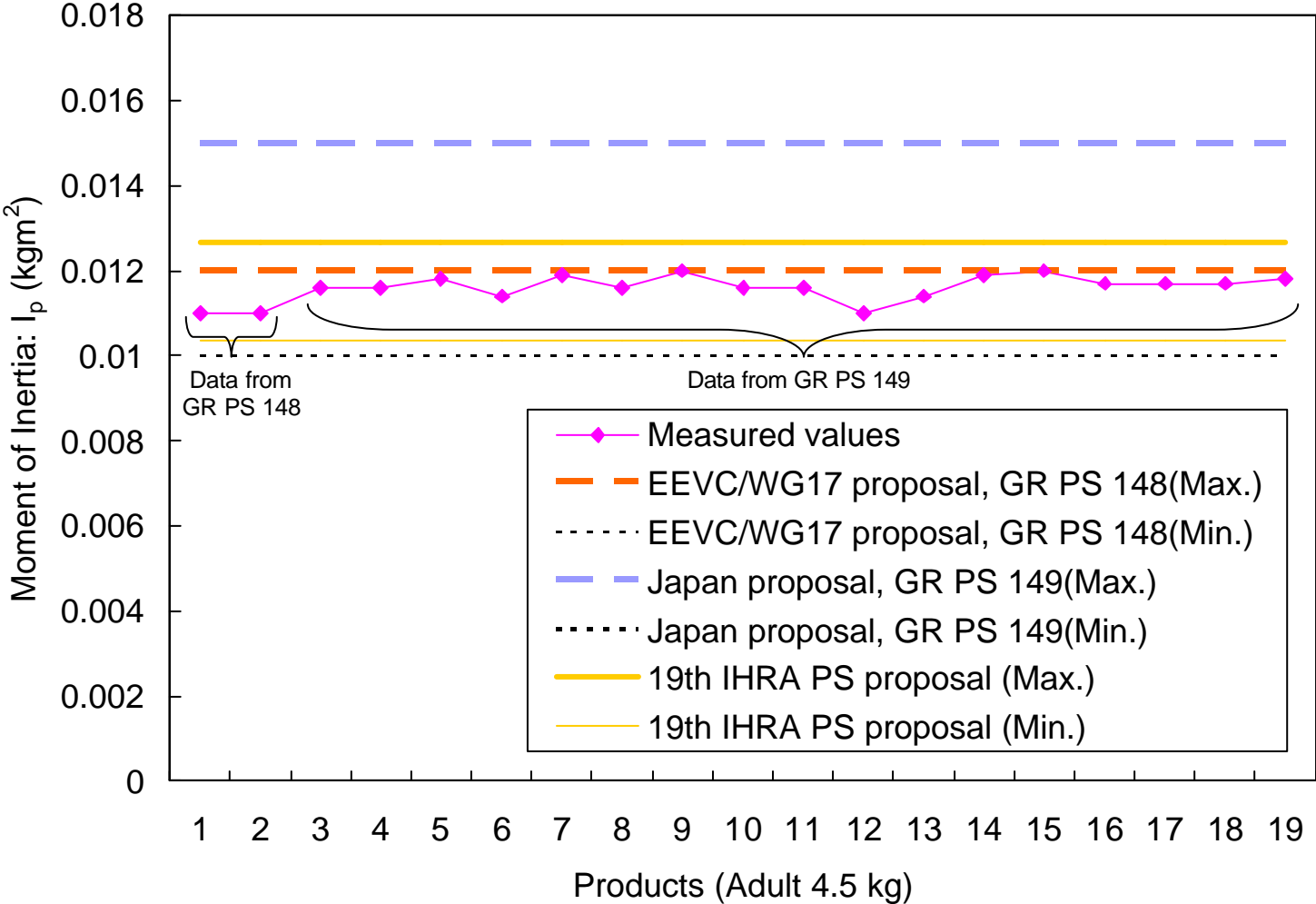
Background (Cont.)

- The IHRA/PS therefore discussed the Japan proposal and EEVC/WG17 proposal at the 19th IHRA/PS MT (DEC. 2005).

IHRA/PS Discussion

- Basically, the moment of inertia does not affect to the test results significantly (IHRA Original values (IHRA/PS231) -> Child 3.5 kg: 0.0075 to 0.0200 kgm² ,Adult 4.5 kg: 0.0075 to 0.0200 kgm² -> HIC difference is +/- 3%); however, if it is possible to reduce the tolerance without affecting producibility, a narrower tolerance is preferable.
- The EEVC/WG17 tolerance concept is acceptable (avg. +/- 10%), however, the average value is based on 2 impactor measurement values; thus, other examples (including those to a different design) may have some problems in achieving the proposed tolerance.
- IHRA/PS does not want to exclude existing impactor designs already in production from the revised tolerance, therefore, IHRA/PS finally proposed a value and tolerance of 0.0115 +/- 10% (i.e. 0.0115 +/- 0.0012) kgm² for the GTR 4.5 kg Adult headform impactor tolerance.

Comparison of Moment of Inertia Tolerance for Adult 4.5 kg headform Impactor

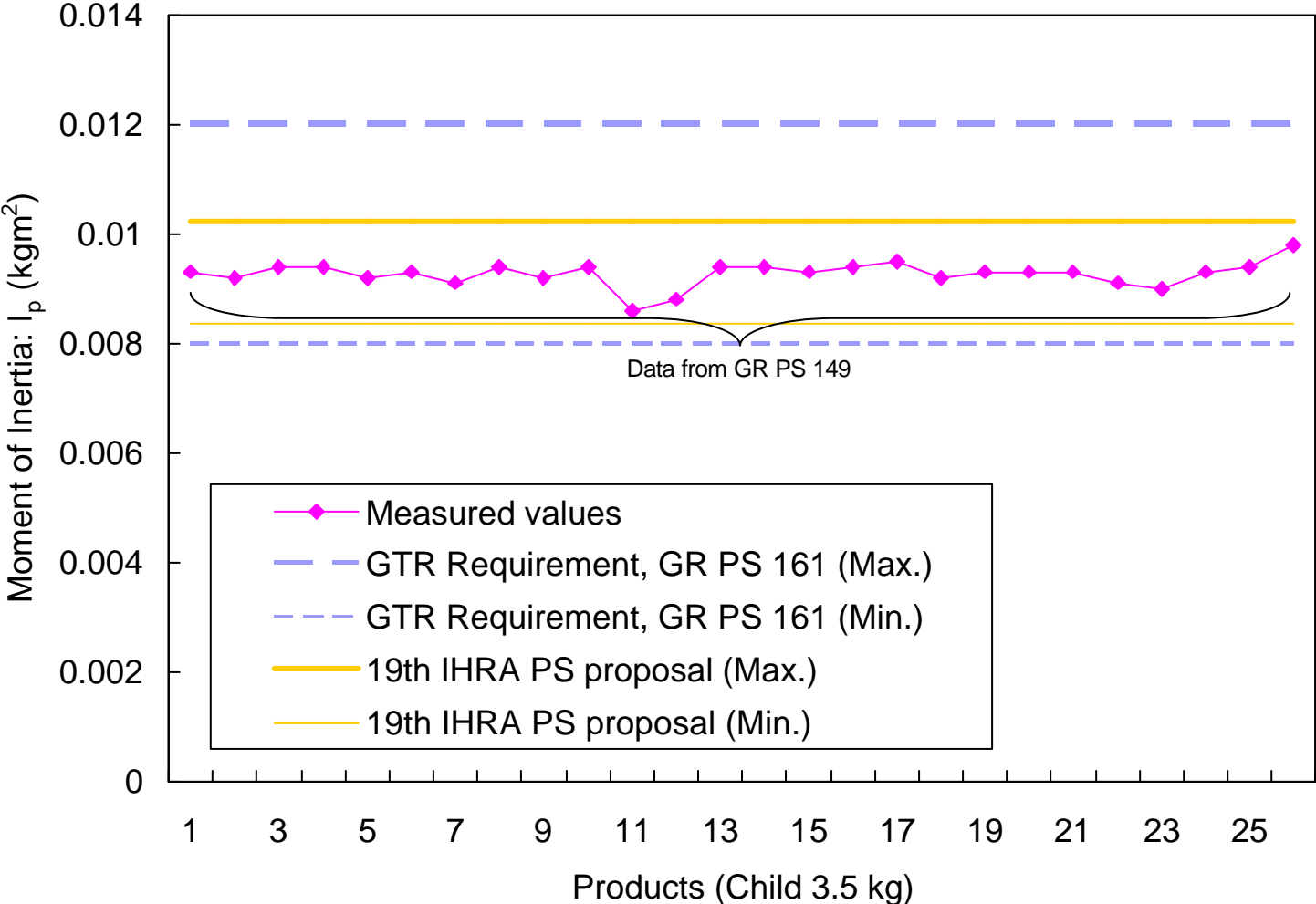


I_p : The moment of inertia about an axis through the centre of gravity and perpendicular to the direction of impact.

IHRA/PS Discussion (Cont.)

- To be consistent, IHRA/PS also reviewed the modified GR PS 161 Child 3.5 kg headform impactor tolerance (0.008 to 0.012 kgm²), and IHRA/PS finally proposed a value and tolerance of 0.0093 +/- 10% (i.e. 0.0093 +/- 0.0009) kgm².

Comparison of Moment of Inertia Tolerance for Child 3.5 kg headform Impactor



I_p : The moment of inertia about an axis through the centre of gravity and perpendicular to the direction of impact.

Conclusions

- IHRA/PS propose following moment of inertia tolerances for the GTR Adult 4.5 kg and Child 3.5 kg headform impactors.

IHRA/PS Proposal

Adult (4.5kg) : 0.0115 +/- 0.0012 kgm²

Child (3.5kg) : 0.0093 +/- 0.0009 kgm²