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## Road vehicles — Dummies for restraint system testing —

### Part 2: Child dummies

*Véhicules routiers — Mannequins pour essais de systèmes de retenue —  
Partie 2: Mannequins enfants*  
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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this part of ISO/TR 12349 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 12349-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Restraint systems*.

ISO/TR 12349 consists of the following parts, under the general title *Road vehicles — Dummies for restraint system testing*:

- *Part 1: Adult dummies*
- *Part 2: Child dummies*

# Road vehicles — Dummies for restraint system testing —

## Part 2: Child dummies

### 1 Scope

This Technical Report describes the infant and child crash test dummies which are recommended by ISO for use in evaluating child restraints and their interactions with deploying air bags.

### 2 Recommended dummies

A review of the available infant and child crash test dummies was carried out by the experts of ISO/TC 22/SC 12, Working Group WG 5, *Anthropomorphic test devices*. The following infant and child crash test dummies are recommended for use in restraint system evaluation.

— Recommended for restraint system evaluation:

- Infant: CRABI 6-month;
- 3-year old: Part 572, HYBRID III, TNO-P3, CRABI 3;
- 6-year old: Part 572, HYBRID III, TNO-P6.

— Recommended for out-of-position airbag interactions:

- Infant: CRABI 6-, 12- and 18-month, TNO-P 3/4 and P1 1/2;
- 3-year old: GM “Air bag” dummy, HYBRID III;
- 6-year old: HYBRID III.

When evaluating belt restraints, the experts cautioned that specific attention should be paid to the lap belt interaction with the pelvis. Further, the experts noted that more experience is needed with the Part 572 K, the TNO-P0, P 3/4 and P1 1/2, and the CRABI 12-month and 18-month for restraint system evaluation.

### 3 Dummy instrumentation

Tables 1 and 2 list the instrumentation that are commonly used with the infant and child dummies. Interpretations of the significance of the various measurements relative to occupant protection levels that are used by various groups are cited in the bibliography, references [4] to [7].

Table 1 — Infant dummy instrumentation

Dummy instrumentation	CRABI 6-month	CRABI 12-month	CRABI 18-month	TNO-P 3/4	TNO-P1 1/2
<b>Head</b> Acceleration ( $A_x, A_y, A_z$ )	Yes	Yes	Yes	Yes	Yes
<b>Neck</b> Head/neck interface ( $F_x, F_y, F_z, M_x, M_y, M_z$ )	Yes	Yes	Yes	Yes	Yes
Neck/T. spine interface ( $F_x, F_y, F_z, M_x, M_y, M_z$ )	Yes	Yes	Yes	No	Yes
<b>Shoulder</b> ( $F_x, F_y$ )	No	Yes	Yes	No	No
<b>Thorax</b> Spine ( $A_x, A_y, A_z$ )	Yes	Yes	Yes	Yes	Yes
<b>Abdomen</b> Lumbar/pelvis interface ( $F_x, F_y, F_z, M_x, M_y, M_z$ )	Yes	Yes	Yes	No	Yes
<b>Pelvis</b> Acceleration ( $A_x, A_y, A_z$ )	Yes	Yes	Yes	No	Yes
Pubic loads ( $F_x, F_z$ )	No	Yes	Yes	No	No

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Table 2 — Child dummy instrumentation

Dummy instrumentation	3-year old					6-year old		
	Part 572	TNO-P3	H-III	CRABI	"Air bag"	Part 572	TNO-P6	H-III
<b>Head</b> Acceleration ( $A_x, A_y, A_z$ )	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Angular acceleration ( $\alpha_y$ )	No	No	Yes	No	Yes	No	No	No
<b>Neck</b> Head/neck interface ( $F_x, F_y, F_z, M_x, M_y, M_z$ )	No	Yes	Yes	Yes	Yes	No	No	Yes
Neck/torso interface ( $F_x, F_y, F_z, M_x, M_y, M_z$ )	No	No	Yes	No	No	No	No	Yes
<b>Thorax</b> Spine acceleration ( $A_x, A_y, A_z$ )	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sternal acceleration ( $A_x$ )	No	No	Yes	No	Yes	No	No	Yes
Sternal deflection ( $\delta_x$ )	No	No	Yes	No	No	No	No	Yes
<b>Abdomen</b> Lumbar/pelvis interface ( $F_x, F_y, F_z, M_x, M_y, M_z$ )	No	No	Yes	No	No	No	No	Yes
Acceleration ( $A_x$ )	No	No	No	No	Yes	No	No	No
<b>Pelvis</b> Acceleration ( $A_x, A_y, A_z$ )	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Ilium load ( $F_x$ )	No	No	No	No	No	No	No	Yes
<b>Femur</b> Axial load ( $F_z$ )	No	No	No	No	No	Yes	No	6-axis

## Bibliography

- [1] ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*.
- [2] ISO/TR 10982, *Road vehicles — Test procedures for evaluating out-of-position vehicle occupant interactions with deploying air bags*.
- [3] ISO/TR 14645, *Road vehicles — Test procedures for evaluating child restraint system interactions with deploying air bags*.
- [4] WOLANIN, M.J., MERTZ, H.J., NYZNYK, R.S. and VINCENT, J. H. *Description and basis of a three year old dummy for evaluating passenger inflatable restraint concepts*. Ninth international technical conference on experimental safety vehicles, November 1-4, 1982. Also available as SAE 826040.
- [5] MERTZ, H.J. and WEBER, D.A. *Interpretations of the impact responses of a three year old child dummy relative to child injury potential*. Ninth international technical conference on experimental safety vehicles, November 1-4, 1982. Also available as SAE 826048.
- [6] PRASAD, P. and DANIER, R.P. *A biomechanical analysis of head, neck and torso injuries to child surrogates due to sudden torso acceleration*. 28th STAPP Car Crash Conference, SAE 841656, November 6-7, 1982.
- [7] MERTZ, H.J., PRASAD, P., and IRWIN, A.L. *Injury risk curves for children and adults in frontal and rear collisions*. 41st STAPP Car Crash Conference, SAE 973318, November, 1997.

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