TECHNICAL REPORT

ISO/TR 12349-1

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Road vehicles — Dummies for restraint system testing —

Part 1: Adult dummies

Véhicules routiers — Mannequins pour essais de systèmes de retenue —

Partie 1: Mannequins adultes

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Foreword

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ISO/TR 12349-1 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 1:
Adult dummies

1 Scope

This Technical Report describes the adult crash test dummies which are recommended by ISO for use in evaluating the occupant protection potential of restraint systems in frontal and side impact test procedures.

2 Recommended dummies

A review of the available adult crash test dummies was carried out by the experts of ISO/TC 22/SC 12, Working Group WG 5, *Anthropomorphic test devices*. The following adult crash test dummies are recommended for use in frontal and side impact crash tests.

- Recommended frontal crash test dummies:
  - HYBRID III mid-size male;
  - HYBRID III small female;
  - HYBRID III large male.
- Recommended adult side impact crash test dummies:
  - EUROSID-1 mid-size male;
  - BIOSID mid-size male.

The mid-size male SID dummy which is specified by the USA Federal Motor Vehicle Safety Standard 214 is not recommended for use in side impact test procedures because of its poor impact biofidelity and inadequate instrumentation.

3 Dummy instrumentation

Table 1 lists the instrumentation that are commonly used with the frontal and side impact 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 [7] to [10].

Table 1 — Instrumentation for adult frontal and side impact dummies

Dummy instrumentation	Frontal			Side	
	HIII-5 Female	HIII-50 Male	HIII-95 Male	EUROSID-1	BIOSID
Head Acceleration (A_x, A_y, A_z)	Yes	Yes	Yes	Yes	Yes
Neck H/C1 (F_x, F_y, F_z, M_x, M_y, M_z)	Yes	Yes	Yes	No	Yes
C7/T1 (F_x, F_y, F_z, M_x, M_y, M_z)	Yes	Yes	Yes	Yes	Yes
Shoulder Loads (F_x, F_y, F_z)	F_x, F_z	F_x, F_z	F_x, F_z	F_x, F_y, F_z	F_y, F_z
Deflection (δ_y)	No	No	No	No	Yes
Thorax Spine acceleration (A_x, A_y, A_z)	Yes	Yes	Yes	Yes	Yes
Sternal deflection (δ_x)	Yes	Yes	Yes	No	No
Sternal acceleration (A_x)	Yes	Yes	No	No	No
Rib deflection (δ_y)	No	No	No	Yes	Yes
Rib acceleration (A_y)	No	No	No	Yes	Yes
Abdomen Force (F_y)	No	No	No	Yes	No
Deflection (δ_y)	No	No	No	No	Yes
Lumbar (F_x, F_y, F_z, M_x, M_y)	Yes	Yes	Yes	F_y,F_z, M_x	Yes
Pelvis Acceleration (A_x, A_y, A_z)	Yes	Yes	Yes	Yes	Yes
Ilium (F_x, F_y)	F_x	F_x	No	No	F_y
Pubic (F_y)	No	No	No	Yes	Yes
Lower extremities Femur (F_x, F_y, F_z, M_x, M_y, M_z)	Yes	Yes	Yes	F_z	Yes
Tibia/femur displacement (δ_x)	Yes	Yes	Yes	No	No
Knee clevis (F_z)	Yes	Yes	Yes	No	Yes
Tibia loads and moments (F_x, F_y, F_z, M_x, M_y, M_z)	Yes	Yes	Yes	No	Yes

Bibliography

[1] ISO 3560, *Road vehicles — Frontal fixed barrier or pole impact test procedure*.

[2] ISO 3984, *Road vehicles — Passenger cars — Moving barrier rear collision test method*.

[3] ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*.

[4] ISO/TR 9790, *Road vehicles — Anthropomorphic side impact dummy — Lateral impact response requirements to assess the biofidelity of the dummy*.

[5] ISO/TR 10982, *Road vehicles — Test procedures for evaluating out-of-position vehicle occupant interactions with deploying air bags*.

[6] ISO 10997, *Passenger vehicles — Side impact with deformable moving barrier — Full scale test*.

[7] MERTZ, H.J. Anthropomorphic test devices. *Accidental Injury — Biomechanics and prevention*. Springer-Verlag, 1993.

[8] *Anthropomorphic dummies for crash and escape system testing*. AGARD advisory report 330, 1996.

[9] *Human tolerance to impact conditions as related to motor vehicle design*, SAE 4. Information report J885. July 1996, SAE, Warrendale, PA, 1986.

[10] 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, Nov. 1997.

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