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**Road vehicles — Dummies for  
restraint system testing —**

**Part 1:  
Adult dummies**

*Véhicules routiers — Mannequins pour essais de systèmes de  
retenue —*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 36, *Safety aspects and impact test*.

This second edition cancels and replaces the first edition (ISO/TR 12349-1:1999), of which it constitutes a minor revision.

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

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

## Introduction

Some experts of ISO/TC 22/SC 36 reviewed the widely available adult crash test dummies on the basis of biofidelity, repeatability and reproducibility, durability, instrumentation capabilities, and ease of use. Implementation of a crash test dummy in a regulation or consumers' test is not a basis for recommendation in this Technical Report. Adult dummies whose designs were protected intellectual property at the time of review were not considered. Crash test dummies are continually being evaluated and those that are not currently recommended may be recommended in the next update of this Technical Report. This Technical Report represents the best recommendation of widely available adult crash test dummies at the time of publication.

The dummy instrumentation specified as required or optional in ISO test procedures for crash, sled, and OOP tests were reviewed. Adult dummy instrumentation recommended in this Technical Report consists of all instrumentation that are required by at least one test procedure. Some optional instrumentation and some instrumentation not specified in any ISO test procedure are also recommended in this Technical Report.

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# Road vehicles — Dummies for restraint system testing —

## Part 1: Adult dummies

### 1 Scope

This Technical Report specifies the adult crash test dummies that are recommended by ISO for use in evaluating the occupant protection potential of restraint systems in frontal, side, and rear impact test procedures and out-of-position airbag test procedures.

### 2 Symbols and abbreviated terms

#### 2.1 Symbols

$A_x, A_y, A_z$	linear acceleration along the positive x, y, and z axes of the dummy
$\alpha_x, \alpha_y, \alpha_z$	rotational acceleration about the positive x, y, and z axes of the dummy
$\delta_x, \delta_y, \delta_z$	deflection along the positive x, y, and z axes of the dummy
$F_x, F_y, F_z$	force along the positive x, y, and z axes of the dummy
$M_x, M_y, M_z$	moment about the positive x, y, and z axes of the dummy
$\phi_x, \phi_y, \phi_z$	angle of rotation about the positive x, y, and z axes of the dummy
$\omega_x, \omega_y, \omega_z$	rotational velocity about the positive x, y, and z axes of the dummy

#### 2.2 Abbreviated terms

ASIS	anterior superior iliac spine
C.G.	centre of gravity
OOP	out-of-position

### 3 Recommended dummies

#### 3.1 Adult dummies recommended for frontal impact tests

The following adult dummies are recommended for use in frontal impact crash and sled tests:

- Hybrid III small adult female with harmonized jacket (see Reference [10]) and without neck shield, unless a neck shield is specified by the test procedure;
- Hybrid III midsize adult male;
- Hybrid III large adult male.

### 3.2 Adult dummies recommended for side impact tests

The following adult dummies are recommended for use in side impact crash and sled tests:

- SID-IIs build level D small adult female (recommended on an interim basis);
- WorldSID midsize adult male.

### 3.3 Adult dummy recommended for high-severity rear impact tests

The Hybrid III midsize adult male is recommended for use in high-severity rear impact crash and sled tests.

### 3.4 Adult dummies recommended for out-of-position airbag tests

#### 3.4.1 OOP tests with frontal impact airbags

The Hybrid III small adult female with harmonized jacket (see Reference [10]) is recommended for use in OOP tests with frontal impact airbags. Neck shield ABA-211 (see Reference [11]) is recommended, but should not be used if the test procedure does not specify the use of a neck shield. Instrumented arm(s) should be used, but no specific instrumented arm is recommended.

#### 3.4.2 OOP tests with side torso or curtain airbags

The SID-IIs build level D small adult female is recommended for use in OOP tests with side torso or curtain airbags. Neck shield ABA-211 (see Reference [11]) is recommended, but should not be used if the test procedure does not specify the use of a neck shield. Instrumented arm(s) should be used, but no specific instrumented arm is recommended.

## 4 Recommended dummy instrumentation

### 4.1 Instrumentation recommended for adult dummies in frontal impact tests or OOP tests with frontal impact airbags

Table 1 gives the instrumentation that should be used with the recommended frontal impact dummies in ISO frontal impact test procedures (see Reference [1] and Reference [2]) and OOP test procedures with frontal impact airbags (see Reference [3], Reference [4], and Reference [5]).

**Table 1 — Instrumentation recommended for adult frontal impact dummies**

Dummy instrumentation	Hybrid III small female	Hybrid III midsize male	Hybrid III large male
<b>Head</b>			
Linear acceleration at C.G.	$A_x, A_y, A_z$	$A_x, A_y, A_z$	$A_x, A_y, A_z$
Angular acceleration	$\alpha_x, \alpha_y, \alpha_z$	—	—
Angular rate	$\omega_x, \omega_y, \omega_z$	$\omega_x, \omega_y, \omega_z$	$\omega_x, \omega_y, \omega_z$
<b>Neck</b>			
Upper neck loads and moments	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$
Lower neck loads and moments	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$
<b>Thorax</b>			
Spine acceleration <sup>a</sup>	$A_x, A_y, A_z$	$A_x, A_y, A_z$	$A_x, A_y, A_z$
Sternum acceleration	$A_x$	—	—

<sup>a</sup> At location specified by test procedure or injury criterion.



Table 1 (continued)

Dummy instrumentation	Hybrid III small female	Hybrid III midsize male	Hybrid III large male
Sternum deflection	$\delta_x$	$\delta_x$	$\delta_x$
<b>Lumbar</b>			
Loads and moments	$F_x, F_z, M_y$	$F_x, F_z, M_y$	—
<b>Pelvis</b>			
Acceleration	$A_x, A_y, A_z$	$A_x, A_y, A_z$	$A_x, A_y, A_z$
ASIS loads and moments	$F_x, M_y$	$F_x$ (upper and lower)	$F_x$ (upper and lower)
<b>Lower extremities (left and right)</b>			
Femur load	$F_z$	$F_z$	$F_z$
Tibia/femur displacement	$\delta_x$	$\delta_x$	$\delta_x$
Medial clevis load	$F_z$	$F_z$	$F_z$
Lateral clevis load	$F_z$	$F_z$	$F_z$
Upper tibia loads and moments	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$
Lower tibia loads and moments	$F_x, F_y, F_z, M_x, M_y$	$F_x, F_y, F_z, M_x, M_y$	$F_x, F_y, F_z, M_x, M_y$

<sup>a</sup> At location specified by test procedure or injury criterion.

4.2 Instrumentation recommended for adult dummies in side impact tests or OOP tests with side torso or curtain airbags

Table 2 gives the instrumentation that should be used with the recommended side impact dummies in ISO side impact test procedures (see Reference [6] and Reference [7]) and OOP test procedures with side impact torso or curtain airbags (see Reference [4] and Reference [5]).

Table 2 — Instrumentation recommended for adult side impact dummies

Dummy instrumentation	SID-IIs small female	WorldSID midsize male
<b>Head</b>		
Linear acceleration at C.G.	$A_x, A_y, A_z$	$A_x, A_y, A_z$
Angular acceleration	$\alpha_x, \alpha_y, \alpha_z$	$\alpha_x, \alpha_y, \alpha_z$
Angular rate	$\omega_x, \omega_y, \omega_z$	$\omega_x, \omega_y, \omega_z$
<b>Neck</b>		
Upper neck loads and moments	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$
Lower neck loads and moments	$F_x, F_y, F_z, M_x, M_y, M_z$	$F_x, F_y, F_z, M_x, M_y, M_z$
<b>Shoulder</b>		
Loads <sup>a</sup>	$F_x, F_y, F_z$	$F_y$
Rib acceleration <sup>a</sup>	$A_y$	$A_x, A_y, A_z$
Rib deflection <sup>a</sup>	$\delta_y$	$\delta_y$
<b>Thorax</b>		
Spine acceleration <sup>a b</sup>	$A_x, A_y, A_z$	$A_x, A_y, A_z$
Rib acceleration <sup>a</sup> (upper, middle, lower)	$A_y$	—
Rib deflection <sup>a</sup> (upper, middle, lower)	$\delta_y$	$\delta_y$
<b>Abdomen</b>		

<sup>a</sup> Left side or right side, depending on impact direction.  
<sup>b</sup> At location specified by test procedure or injury criterion.