

TECHNICAL REPORT

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Road vehicles — Anthropomorphic side impact dummy —

Part 1 :

Lateral head impact response requirements to assess biofidelity of dummy

Véhicules routiers — Mannequin anthropomorphe pour essai de choc latéral —

Partie 1 : Caractéristiques de réponse de la tête à un choc latéral permettant d'évaluer la biofidélité d'un mannequin



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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 main task of ISO technical committees is to prepare International Standards. In exceptional circumstances a technical committee may propose the publication of a technical report of one of the following types:

- type 1, when the necessary support within the technical committee cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development requiring wider exposure;
- type 3, 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).

Technical reports are accepted for publication directly by ISO Council. Technical reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9790-1, which is a technical report of type 3, was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

ISO/TR 9790 consists of the following parts, under the general title *Road vehicles — Anthropomorphic side impact dummy*:

- *Part 1: Lateral head impact response requirements to assess biofidelity of dummy*
- *Part 2: Lateral neck impact response requirements to assess biofidelity of dummy*
- *Part 3: Lateral thoracic impact response requirements to assess biofidelity of dummy*
- *Part 4: Lateral shoulder impact response requirements to assess biofidelity of dummy*
- *Part 5: Lateral abdominal impact response requirements to assess biofidelity of dummy*
- *Part 6: Lateral pelvis impact response requirements to assess biofidelity of dummy*

Road vehicles — Anthropomorphic side impact dummy —

Part 1 :

Lateral head impact response requirements to assess biofidelity of dummy

1.0 INTRODUCTION

The impact response requirements presented in this Technical Report are the result of a critical evaluation of data selected from experiments agreed to by experts as being the best and most up-to-date information available.

Two lateral head impact response requirements are defined, one based on the rigid surface cadaver impacts conducted by Hodgson and Thomas (1)* and the other based on the padded surface cadaver impacts of Association Peugeot-Renault (2). Padded surface impact tests of Hodgson and Thomas (1), McElhaney et al (3), Nahum et al (4), Nahum et al (5), Schneider et al (6) and Got et al (7) were not used since either the padding characteristics were not specified or a given piece of padding was subjected to multiple impacts changing its response characteristics. Detailed discussions of the influences of these factors on head acceleration data are given by Mertz (8), Mertz et al (9) and Mertz (10). The rigid surface impacts of McElhaney et al (3) were not used because the impact velocities were not given for each test. The rigid surface impact data of Got (7) were not used since significant skull fractures were produced.

2.0 SCOPE AND FIELD OF APPLICATION

This Technical Report is one of six reports that describe laboratory test procedures and impact response requirements suitable for assessing the impact biofidelity of side impact dummies. This Technical Report

*Numbers in parentheses denote papers in References, Section 6.0.

provides information to assess the biofidelity of lateral head impact response.

3.0 ISO REFERENCES

ISO DP 9790-2 Road Vehicles - Anthropomorphic Side Impact Dummy - Lateral Neck Impact Response Requirements to Assess the Biofidelity of the Dummy.

ISO DP 9790-3 Road Vehicles - Anthropomorphic Side Impact Dummy - Lateral Thoracic Impact Response Requirements to Assess the Biofidelity of the Dummy.

ISO DP 9790-4 Road Vehicles - Anthropomorphic Side Impact Dummy - Lateral Shoulder Impact Response Requirements to Assess the Biofidelity of the Dummy.

ISO DP 9790-5 Road Vehicles - Anthropomorphic Side Impact Dummy - Lateral Abdominal Impact Response Requirements to Assess the Biofidelity of the Dummy.

ISO DP 9790-6 Road Vehicles - Anthropomorphic Side Impact Dummy - Lateral Pelvis Impact Response Requirements to Assess the Biofidelity of the Dummy.

4.0 REQUIREMENT NO. 1

4.1 Original Data

Hodgson and Thomas (1) conducted a series of non fracture cadaver head impact tests. In their tests, cadavers were strapped on their sides to a pallet that was free to pivot about one end. The cadaver's head and neck were allowed to extend over the free end. The pallet was rotated upwards to achieve a prescribed distance between the head and the impact surface. Then the pallet was released producing the desired head impact. Rigid surface impact data for seven embalmed cadavers are summarized in Table 1. Listed in this table are the cadaver identifications, the head impact velocities, the equivalent free-fall drop heights