

INTERNATIONAL
STANDARD

ISO
10997

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1996-11-15

**Passenger vehicles — Side impact with
deformable moving barrier — Full scale
test**

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*Voitures particulières — Choc latéral avec barrière mobile déformable —
Essai grandeur nature*

<https://standards.iteh.ai/catalog/standards/sist/3b300cc-a1a0-4039-a027-18a190196e15/iso-10997-1996>

INTERNATIONAL

ISO



Reference number
ISO 10997:1996(E)

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.

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.

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International Standard ISO 10997 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 10, *Impact test procedures*.

Annex A forms an integral part of this International Standard.

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Passenger vehicles — Side impact with deformable moving barrier — Full scale test

1 Scope

This International Standard describes a full scale test method for side (lateral) impact testing of passenger cars as defined in ISO 3833 with a front seat dummy. It is intended to facilitate uniform testing at different test facilities.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1176:1990, *Road vehicles — Masses — Vocabulary and codes.*

ISO 3833:1977, *Road vehicles — Types — Terms and definitions.*

ISO 6487:1987, *Road vehicles — Measurement techniques in impact tests — Instrumentation.*

ISO 6549:1980, *Road vehicles — Procedure for H-point determination.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 movable deformable barrier, MDB: Energy-absorbing movable barrier used to impact either side of the test vehicle.

3.2 impact point: Point marked on the side of the test vehicle as the target to be impacted by a selected point on the MDB.

4 Test facility and equipment

4.1 Impact test site

The impact test site shall be a level, smooth and hard surface which is of sufficient area for the MDB to reach the specified speed prior to impact and to permit deceleration by the MDB and the test vehicle while remaining on the surface of the test site.

The surface immediately on the impacted side of the stationary test vehicle shall be horizontal, flat and smooth for a length of at least 10 m in the direction of impact. There shall be no more than 1 % slope measured over a 1 m length for at least the last 10 m.

4.2 MDB characteristics

The MDB shall have an energy-absorbing face to represent the crush characteristics of the front of an average passenger car. The dimensions of the energy-absorbing impactor face shall be

- width 1 500 mm ± 20 mm
- height 500 mm ± 10 mm
- depth 440 mm min.
- surface two flat parallel faces offset 60 mm ± 5 mm

Horizontally adjacent block faces shall lie in the same vertical plane within ± 5 mm.

The ground clearance at the lower edge of the MDB face shall be 260 mm ± 10 mm.

This layout is shown in figure 1. The deformation and the energy-absorbing characteristics of the impactor face and each of its six blocks are shown in figures 2 and 3.

The carriage to which the energy-absorbing MDB face is attached is shown in figure 4. The vertical plane of symmetry of the MDB face shall be coincident with the longitudinal vertical plane of the carriage with a tolerance of ± 10 mm.

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The total mass of the MDB face, carriage (and ballast as necessary) shall be 1 100 kg ± 10 kg.

4.3 Impactor calibration

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The supplier of the MDB face shall provide a certificate of calibration. The supplier shall also provide an analysis of his product's conformance to the calibration requirements. The calibration procedure is defined in annex A. The performance characteristics of the MDB face are acceptable if each block and the entire face fall within the force-deflection corridors shown in figure 2. Alternatively the performance characteristics are acceptable if each block and the entire face fall within the energy-deflection corridors shown in figure 3.

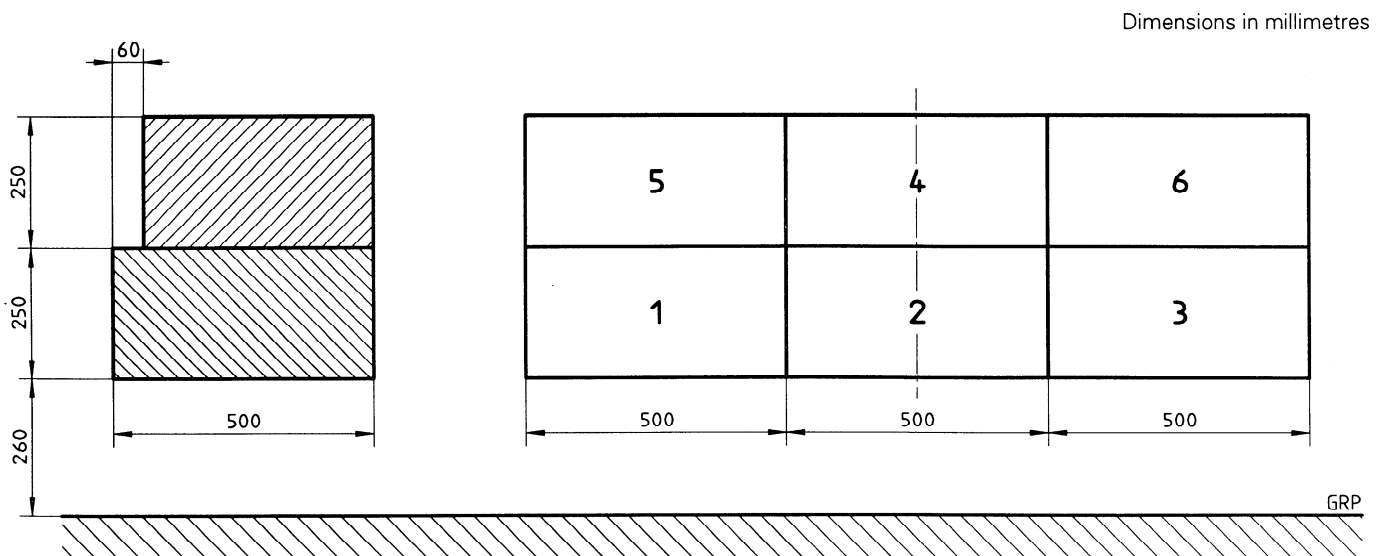
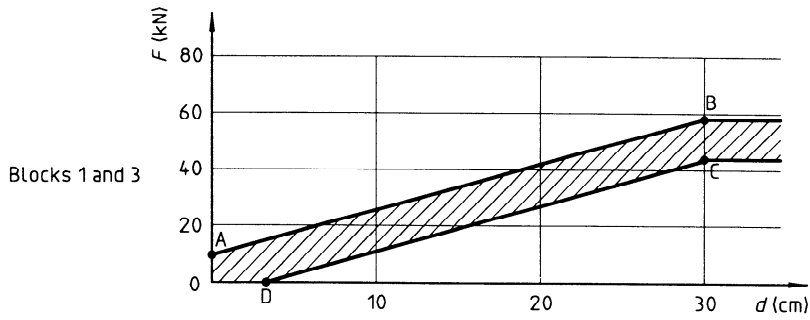
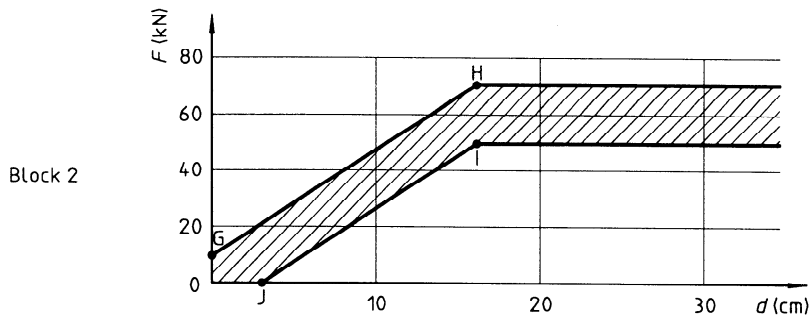


Figure 1 — Design of energy-absorbing MDB face

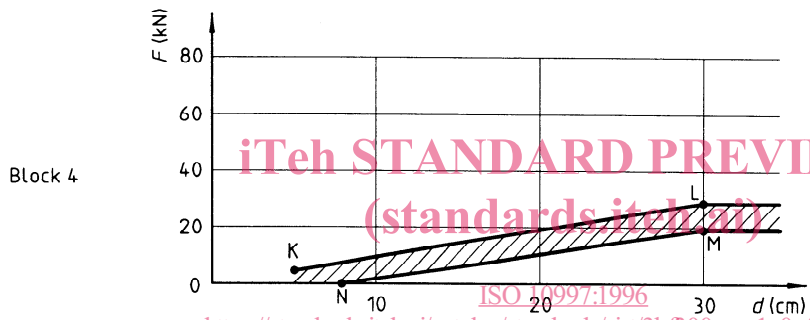
Force is expressed in kilonewtons



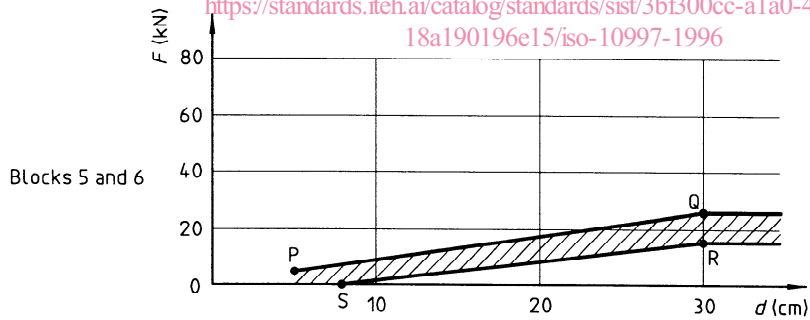
	<i>d</i>	<i>F</i>
A	0	10
B	30	58
C	30	43
D	3	0



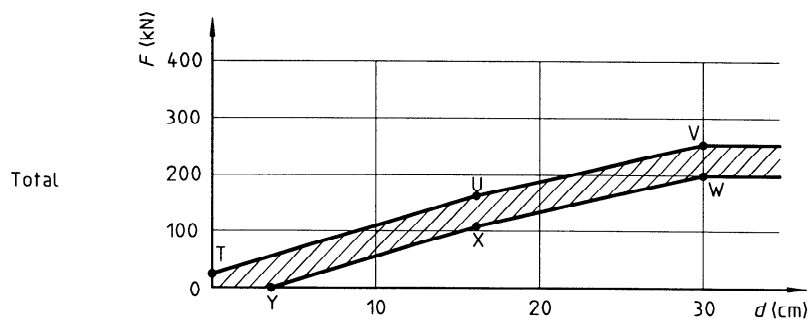
	<i>d</i>	<i>F</i>
G	0	10
H	16	70
I	16	50
J	3	0



	<i>d</i>	<i>F</i>
K	5	5
L	30	28,5
M	30	18,5
N	8	0



	<i>d</i>	<i>F</i>
P	5	5
Q	30	25,5
R	30	15,5
S	8	0



	<i>d</i>	<i>F</i>
T	0	25
U	16	165
V	30	255
W	30	205
X	16	115
Y	3	0

Figure 2 — Force/deflection

Energy is expressed in kilojoules

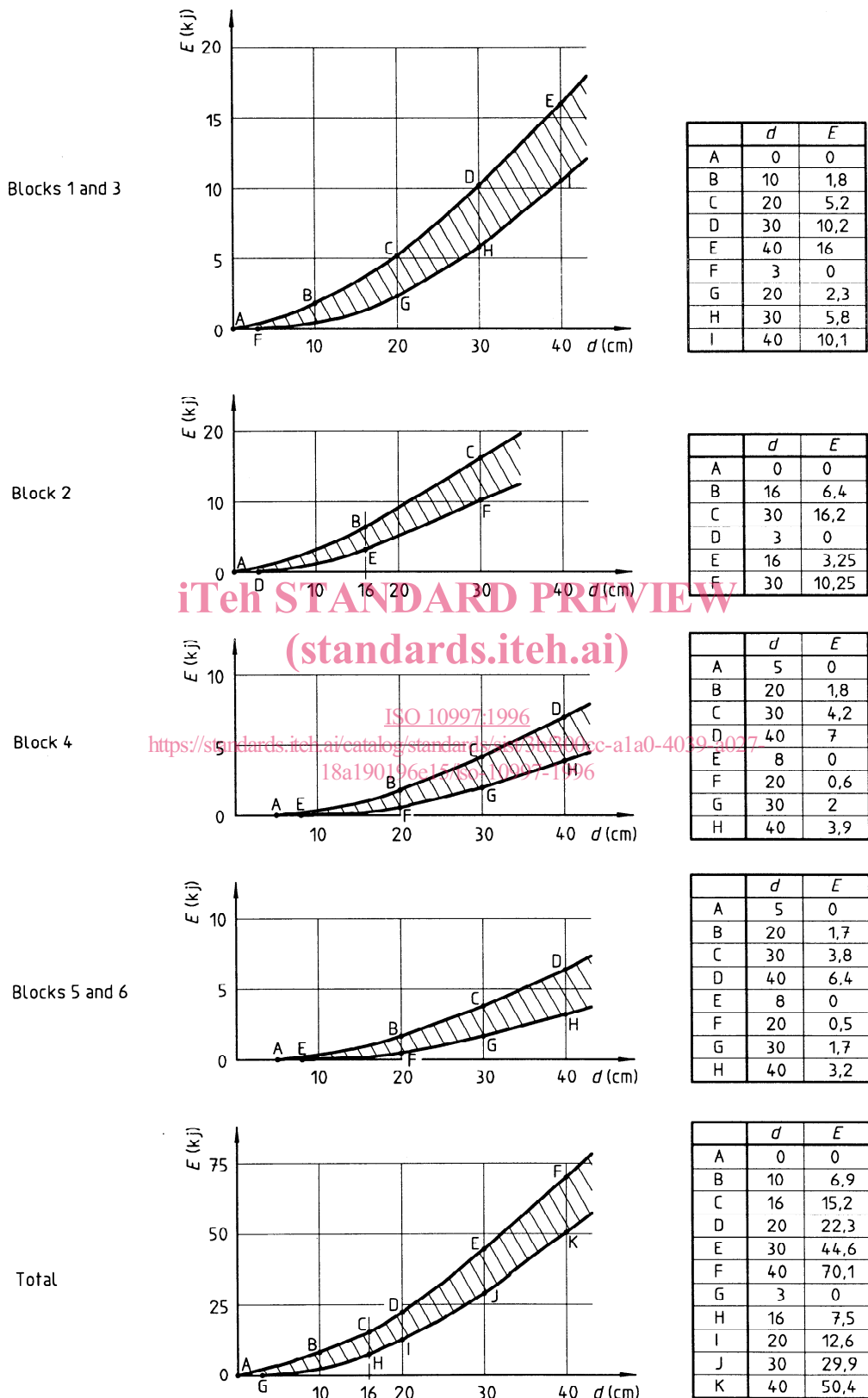
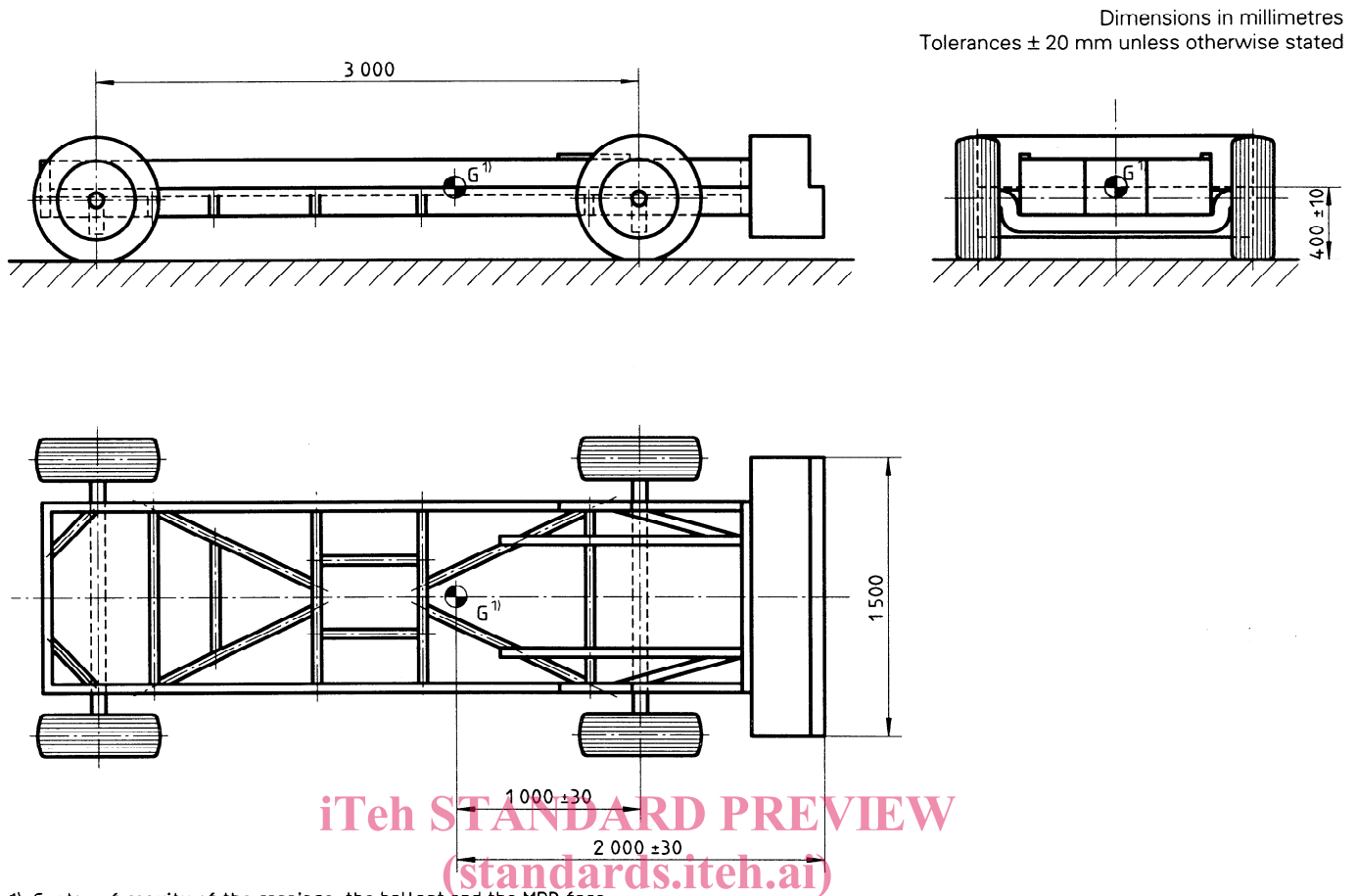


Figure 3 — Absorbed energy/deflection



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Figure 4 — Example of MDB carriage
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4.4 Propulsion of MDB

The MDB shall be towed to a point no closer than 0,5 m from contact with the test vehicle, at which point it shall be released to travel freely. The MDB shall not be braked until after 200 ms from the time of contact. At the moment of impact, the MDB shall be moving at the prescribed velocity.

4.5 Impact point on test vehicle

The test vehicle may be impacted from either side. The impact point shall be visibly marked on the outside of the test vehicle.

The transverse plane of the vehicle passing through the R-point, as defined in ISO 6549, of the front seated occupant shall be coincident with the longitudinal median vertical plane of the MDB.

The maximum offset between the MDB and prescribed impact point shall be ± 30 mm.

The ground clearance at the lower edge of the MDB face, at the time of impact, shall be $260 \text{ mm} \pm 10 \text{ mm}$.

4.6 Angle of impact

The side impact shall be performed at an impact angle of 90° as shown in figure 5.

At the time of impact, the face of the MDB shall be parallel to the longitudinal centreline of the test vehicle with a maximum angular deviation of 3° .

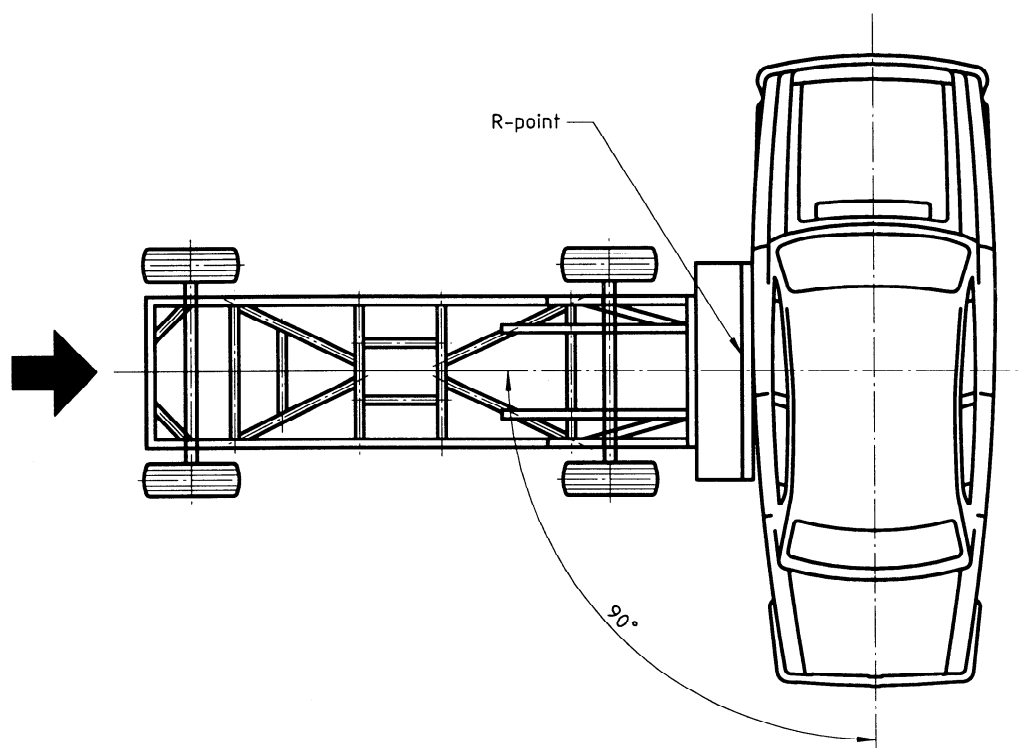


Figure 5 — Configuration of side impact test

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4.7 Tolerances on impact speed

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The impact speed shall be measured within 0,5 m of the test vehicle. The impact speed tolerance shall be $\pm 1\%$ of the desired speed.

5 Preparation of test vehicle

5.1 Mass of test vehicle

The vehicle test mass, m_t , shall be calculated as follows:

$$m_t = \text{ISO-M06} + m_l + m_d$$

where

ISO-M06 is as defined in ISO 1176:1990, definition 4.6, in kilograms;

m_l is rated cargo and luggage mass, in kilograms, equal to
ISO-M09 — (68 kg \times DSC)

in which

ISO-M09 is as defined in ISO 1176:1990, definition 4.9, in kilograms,
DSC is the designated seating capacity of the test vehicle;

m_d is the test dummy mass.

The vehicle shall be ballasted to achieve the test mass to within ± 10 kg. The ballast shall be located and secured to the vehicle so that it does not alter the structural characteristics of the impacted side of the vehicle.

At the time of impact, the vehicle shall be at the normal ride height and attitude with the engine idling and with the mass equivalent to two 50th percentile adult male front occupants. This height and attitude shall be as defined by the manufacturer.

The instrumentation and cameras required for testing shall not change the axle mass ISO-M11 (see ISO 1176:1990, definition 4.11) by more than 20 kg.

5.2 Condition of test vehicle

The test vehicle shall be stationary. The doors shall be fully closed and latched, but not locked. The window adjacent to the test dummy shall be closed, with the glass in place.

Adjustable seats shall be in the adjustment position midway between the foremost and rearmost positions, and, if separately adjustable in a vertical direction, at the position defined by the manufacturer. If on the same model adjustable and fixed seats exist, the vertical position of the fixed seat shall be used. If an adjustment position does not exist midway between the foremost and rearmost positions, the adjustment position closest to the rear of the midpoint shall be used.

Adjustable seat backs shall be in the manufacturer's nominal design riding position. If the vehicle is equipped with adjustable head restraints, each shall be adjusted to its highest adjustment position.

Adjustable steering controls shall be adjusted so that the steering-wheel hub is located in the manufacturer's nominal design riding position.

The parking brake shall be disengaged. The transmission shall be in neutral.

All tyres shall be inflated to the manufacturer's specifications.

If the test vehicle has a convertible top, the convertible structure shall be in the "up" position for the test.

If the test vehicle has seats equipped with adjustable side bolsters or wings, these shall be adjusted to their nominal position defined by the manufacturer. If the nominal position does not allow the test device to be positioned, the adjustable seat side bolsters or wings shall be adjusted to fit the test device.

6 Description of test dummy

The dummy which may be used is either BIOSID or EUROSID 1.¹⁾

7 Installation of test dummy

7.1 Seat and preparation

Locate the H-point in the vehicle in accordance with ISO 6549. If this can only be done in the rearmost position of the seat, locate the H-point relative to the seat prior to moving the seat forward into the test position as described in 5.2. Correlate the H-point of the seating position used for the test with the package drawing H-point. Locate the lateral centreline of the seating position.

1) These are trade-names. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.