



BSI Standards Publication

Road vehicles — Traffic accident analysis

Part 3: Guidelines for the interpretation of recorded crash pulse data to determine impact severity

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National foreword

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TECHNICAL
REPORT

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12353-3

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**Road vehicles — Traffic accident
analysis —**

**Part 3:
Guidelines for the interpretation
of recorded crash pulse data to
determine impact severity**

*Véhicules routiers — Analyse des accidents de la circulation —
Partie 3: Lignes directrices pour interpréter l'enregistrement de
gravité des chocs*



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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 References	1
3 Terms and definitions	1
4 Basic principles of crash pulse and derived measures	3
5 Guidelines for basic interpretation of crash pulse recorder data	5
5.1 General.....	5
5.2 Crash pulse definitions.....	6
5.3 Derived severity measures from crash pulse recorder output data.....	12
Annex A (informative) Extended application and calculations of impact severity parameters	13
Annex B (informative) Application and use of data recorded	27
Annex C (informative) Misuse, limitations and traps	33
Annex D (informative) Examples of measured acceleration and analysis	37
Annex E (informative) Calculation method for determination of t_0 and t_{end}, Methods A, B and C	44
Annex F (informative) Example pulses with calculated or measured characteristics according to the methods presented in this Technical Report	50
Bibliography	58

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 2.

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, unless 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 12353-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Passive safety crash protection systems*.

ISO 12353 consists of the following parts, under the general title *Road vehicles — Traffic accident analysis*:

- *Part 1: Vocabulary*
- *Part 2: Guidelines for the use of impact severity measures*
- *Part 3: Guidelines for the interpretation of recorded crash pulse data to determine impact severity* [Technical Report]

Introduction

With the completion of ISO 12353-2, an important extension is guidelines for the use and application of the in-vehicle recorded crash pulse data. The aim of ISO/TR 12353-3 is to provide definitions and recommended measurements of impact severity data recording to be used in evaluation and analyses. This will facilitate a comparison of different accident databases, and urge on the work of accident analyses based on impact severity data recording. The higher quality of impact severity determination will improve the accuracy of analyses and development work for the industry, governments and other

As more advanced active and passive safety technology is introduced in motor vehicles, it is important to continuously evaluate the technology to determine its efficiency. Furthermore, it is essential to explore occupant injury risk and severity for impact severity parameters best correlated to injury risk. Studies of real-life crashes are the most important way to gain such knowledge.

Different types of accident data recorders have been developed and used for the purposes of improving data quality. Car manufacturers also use data from sensors and recording devices in the development process of new safety technology and to verify the effectiveness of existing technology.

Specifically for impact severity parameters, there is a need for definitions of their measurements, recording, and process of calculation. This Technical Report concentrates on the data that can be obtained from crash pulse data recorders for determination of impact severity.

The recorded data may be either acceleration-time data or change of velocity (Δv) time data. This Technical Report includes methods applicable to the interpretation of recorded Δv data from event data recorders (EDR) fulfilling the requirements of United States Code of Federal Regulations 49 CFR Part 563.^[1]

This Technical Report focuses on the crash pulse characteristics in [Figure 1](#), the Dose – Response model (also referred to in ISO 12353-2), slightly modified for the purposes of this Technical Report.

As shown in [Figure 1](#) several parameters are influencing the risk of an injury. This Technical Report focuses on the influence of crash pulse characteristics on injury risk.

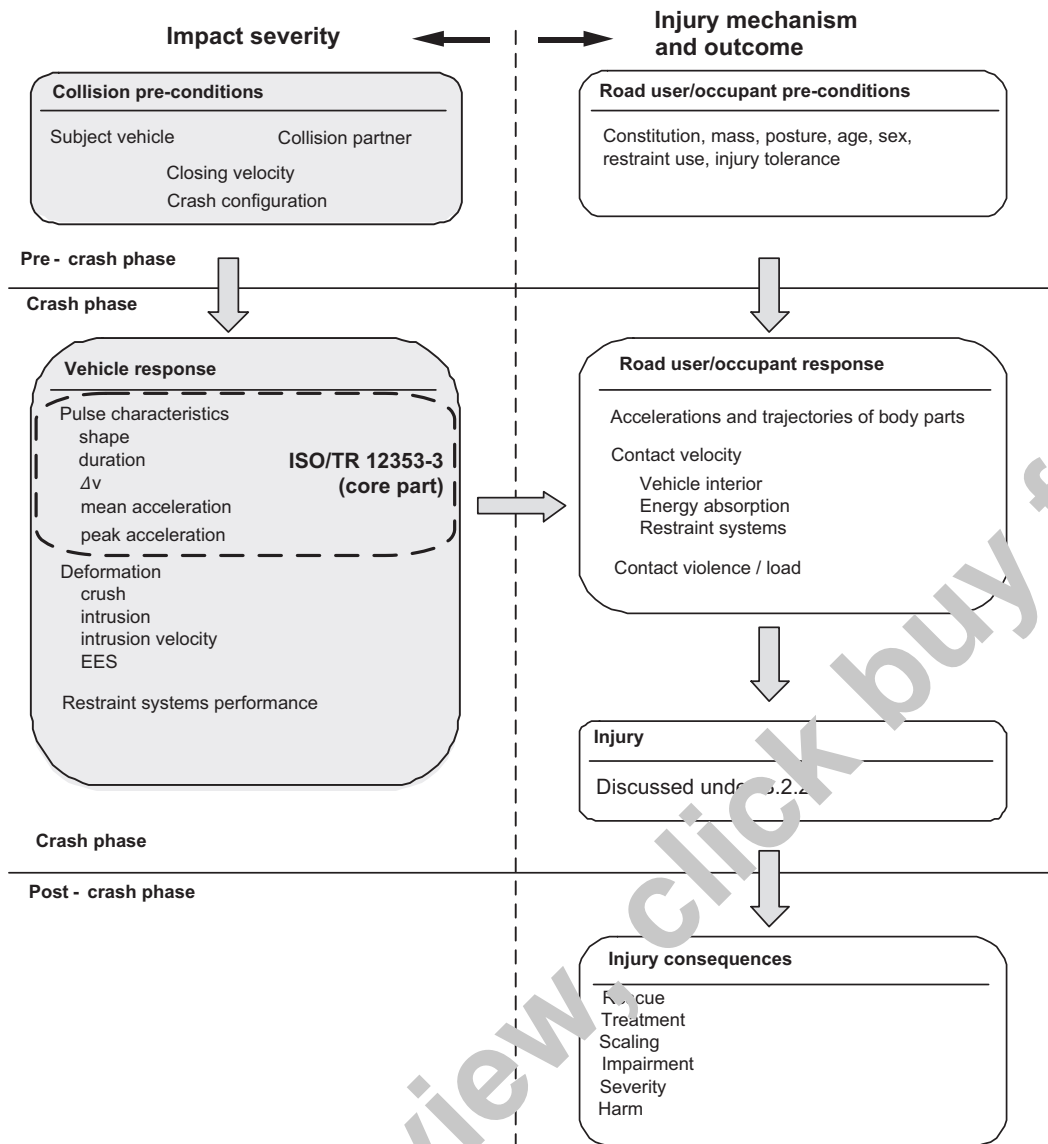


Figure 1 — Impact severity and injury mechanism/outcome (Dose – Response model)

With crash pulse recording techniques, and using a recorder in the undeformed part of the vehicle chassis, it is possible to quantify physical crash pulse parameters during a vehicle crash. This is what the vehicle restraint systems and the vehicle interior will have to handle in order to minimize the loading on the vehicle occupants.

This Technical Report discusses the recorded physical parameters that are relevant to take into account for certain impacts, and also discusses the possible misuse and traps when using crash pulse data.

Road vehicles — Traffic accident analysis —

Part 3:

Guidelines for the interpretation of recorded crash pulse data to determine impact severity

1 Scope

This Technical Report describes the determination of impact severity in road vehicle accidents as defined in ISO 12353-2, based on recorded acceleration and velocity data and derived parameters from vehicle crash pulse recorders or event data recorders, including data from self-contained devices or vehicle integrated functionalities. Methods applicable to the interpretation of recorded data from event data recorders fulfilling the requirements of United States Code of Federal Regulation 49 CFR Part 563 are also included.

This Technical Report includes definitions and interpretation of recorded data related to impact severity determination. Some information on application of the data are also provided.

The purpose of this Technical Report is to interpret available recorded crash pulse data. The methods in this Technical Report are applicable to interpretation of crash pulses in both longitudinal and lateral directions. However, based on available data, most examples are given for the longitudinal direction.

This Technical Report does not address aspects such as the pre-crash phase, data element specifications, and data recording and retrieval technology.

2 References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12353-1, *Road vehicles — Traffic accident analysis — Part 1: Vocabulary*

ISO 12353-2, *Road vehicles — Traffic accident analysis — Part 2: Guidelines for the use of impact severity measures*

ISO 4130, *Road vehicles — Three-dimensional reference system and fiducial marks — Definitions*

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

SAE J211-1, *Instrumentation for Impact Test — Part 1: Electronic Instrumentation*

SAE J1698-1, *Vehicle Event Data Interface — Output Data Definition*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4130, ISO 12353-1, ISO 12353-2, SAE J1698-1, and the following apply.