
Road vehicles — Test procedures for evaluating child restraint system interactions with deploying air bags

*Véhicules routiers — Méthodes d'essai pour l'évaluation des interactions
des systèmes de retenue pour enfants et des sacs gonflables en cours
de déploiement*



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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 technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- 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 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 Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.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 14645, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 10, *Impact test procedures*.

This document is published as a Technical Report, rather than as an International Standard, because of the general inexperience in testing the interaction between child restraint systems (CRS) and deploying air bags, and the lack of real-world accident data. When statistically significant, real-world data are available, in which air bags have contacted a variety of child restraints, and there is more testing experience with this interaction, it may be appropriate to develop an International Standard.

Annex A of this Technical Report is for information only.

Introduction

During its inflation process, an air bag generates a considerable amount of kinetic energy and, as a result, substantial forces can be developed between the deploying air bag and the child restraint system (CRS). (For background on air bag design and deployment, see references [1] and [2]). Although there is very little experience with vehicles equipped with passenger air bags, preliminary laboratory tests have indicated that these forces can be sufficient to produce serious injury to the CRS occupant. The National Highway Traffic Safety Administration has recommended that rear-facing child restraints of current design be used only in the rear seat of vehicles equipped with such air bags [3]. Even so, many children may be restrained in either rear- or forward-facing CRSs in the front seat of such vehicles, and the child and/or the CRS may interact with the air bag. These guidelines were developed to improve the understanding of such interactions and to aid in the assessment of future designs.

A mild-severity crash pulse is described in this Technical Report. This pulse is not vehicle-specific, but represents general acceleration-time histories. This mild-severity pulse approximates a crash that would just deploy a typical air bag. This pulse is used to evaluate the effect of the energy of the deploying air bag when the CRS and dummy are exerting the least amount of inertial force in the forward direction, but the dummy and/or CRS is moved forward by that inertial force. This generic pulse or other vehicle-specific pulses may be used as appropriate. Differences in shape between the generic and the vehicle-specific pulses are expected with corresponding differences expected in dummy responses.

This Technical Report encourages the use of a wide range of test configurations and conditions, while recognizing that the range of possible interactions is essentially limitless and beyond testing capability. Furthermore, measurements of primary importance for the various configurations are given in table 1, but performance limits are not specified. References [4 to 9] give some background on human impact tolerance and criteria, describe scaling techniques for different size occupants, and offer interpretations of dummy responses relative to human injury potential that may be helpful in the evaluation. These and additional background papers on air bag development and deployment can be found in references [10] and [11].

