

BS EN ISO 14451-6:2013



BSI Standards Publication

**Pyrotechnic articles —  
Pyrotechnic articles for vehicles**  
Part 6: Requirements and categorization for  
airbag modules

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**National foreword**

This British Standard is the UK implementation of EN ISO 14451-6:2013.

The UK participation in its preparation was entrusted to Technical Committee CII/47, Pyrotechnic articles.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Pyrotechnic articles - Pyrotechnic articles for vehicles - Part 6:  
Requirements and categorization for airbag modules (ISO  
14451-6:2013)

Articles pyrotechniques - Articles pyrotechniques pour  
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sac gonflable et leur classement en catégories (ISO 14451-  
6:2013)

Pyrotechnische Gegenstände - Pyrotechnische  
Gegenstände für Fahrzeuge - Teil 6: Anforderungen und  
Kategorisierung von Airbagmodulen (ISO 14451-6:2013)

This European Standard was approved by CEN on 9 February 2013.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN ISO 14451-6:2013) has been prepared by Technical Committee CEN/TC 212 "Pyrotechnic articles" the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 22 "Road vehicles".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 14451-6:2013 has been approved by CEN as EN ISO 14451-6:2013 without any modification.

## Annex ZA (informative)

### Relationship between this European Standard and the Essential Requirements of EC Directive 2007/23/EC on the placing on the market of pyrotechnic articles

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 2007/23/EC on the placing on the market of pyrotechnic articles.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

**Table ZA.1 — Correspondence between this European Standard and Directive 2007/23/EC on the placing on the market of pyrotechnic articles (1 of 2)**

Clause(s)/sub-clause(s) of this document	Essential Safety Requirements (ESRs) of Directive 2007/23/EC	Qualifying remarks/Notes
4.8	(1)	Note: It is taken into account that the intended purpose of the pyrotechnic article is to function in a vehicle in case of accidents
	(2)	See ISO 14451-2
4.8	(3) 1st sentence	
4.8	(3) 2nd and 3rd sentences	Note: It is taken into account that the intended purpose of the pyrotechnic article is to function in a vehicle in case of accidents
4.2	(3a)	
4.5	(3b)	
4.3, 4.4, 4.6	(3c)	
4.5	(3d)	
4.5	(3e)	
4.4, 4.5	(3f)	
4.6	(3g)	
	(3h)	See ISO 14451-3
4.3, 4.5	(3i)	
	(3j)	See ISO 14451-2
4.3, 4.4, 4.6	(3) Last sentence	
1	(4a)	

Table ZA.1 — (2 of 2)

Clause(s)/sub-clause(s) of this document	Essential Safety Requirements (ESRs) of Directive 2007/23/EC	Qualifying remarks/Notes
1	(4b)	
4.8, 4.2, 6	(5 B.1)	
	(5 B.2)	See ISO 14451-2 and ISO 14451-3
4.6, 4.7	(5 B.3)	
	(5 B.4)	Not applicable
	(5 C.1) to (5 C.5)	Not applicable
4.2	(5 C.6)	
	(5 C.7)	Not applicable

**WARNING —** Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this part of EN ISO 14451.

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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.

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.

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 14451-6 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 212, *Pyrotechnic articles*, in collaboration with Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Passive safety crash protection systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO 14451 consists of the following parts, under the general title *Pyrotechnic articles — Pyrotechnic articles for vehicles*:

- *Part 1: Terminology*
- *Part 2: Test methods*
- *Part 3: Labelling*
- *Part 4: Requirements and categorization for micro gas generators*
- *Part 5: Requirements and categorization for airbag gas generators*
- *Part 6: Requirements and categorization for airbag modules*
- *Part 7: Requirements and categorization for seatbelt pretensioners*
- *Part 8: Requirements and categorization for igniters*
- *Part 9: Requirements and categorization for actuators*
- *Part 10: Requirements and categorization for semi-finished products*



# Pyrotechnic articles — Pyrotechnic articles for vehicles —

## Part 6:

# Requirements and categorization for airbag modules

## 1 Scope

This part of ISO 14451 specifies the types and order of tests for application to the airbag modules and sets out the acceptance criteria and means of categorization.

This part of ISO 14451 applies to type tests.

This part of ISO 14451 is not applicable to articles containing military explosives or commercial blasting agents except for black powder or flash composition.

## 2 Normative 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 14451-1, *Pyrotechnic articles — Pyrotechnic articles for vehicles — Part 1: Terminology*

ISO 14451-2:2013, *Pyrotechnic articles — Pyrotechnic articles for vehicles — Part 2: Test methods*

ISO 14451-4, *Pyrotechnic articles — Pyrotechnic articles for vehicles — Part 4: Requirements and categorization for micro gas generators*

ISO 14451-5, *Pyrotechnic articles — Pyrotechnic articles for vehicles — Part 5: Requirements and categorization for airbag gas generators*

ISO 14451-8, *Pyrotechnic articles — Pyrotechnic articles for vehicles — Part 8: Requirements and categorization for igniters*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14451-1 apply.

## 4 Requirements and acceptance criteria

### 4.1 General

Airbag modules shall meet the requirements specified in [4.2](#) to [4.8](#) taking into account the test matrix of [Clause 5](#).

### 4.2 Verification of design and documentation

Documentation shall be complete as specified in ISO 14451-2:2013, 4.1.

### **4.3 Drop test**

#### **4.3.1 Requirements**

Airbag modules shall be tested as specified in ISO 14451-2:2013, 4.2.

Alternatively if all (micro) gas generator(s)/igniter(s) are already successfully tested according to ISO 14451-4, ISO 14451-5 and ISO 14451-8, these tests should be considered passed for the airbag module as well.

#### **4.3.2 Acceptance criteria**

No ignition of the airbag module shall occur.

No spill out of the pyrotechnic composition from the airbag module shall occur.

### **4.4 Vibration and temperature test**

#### **4.4.1 Requirements**

Airbag modules shall be tested as specified in ISO 14451-2:2013, 4.3.

Alternatively if all (micro) gas generator(s)/ignite(s) are already successfully tested according to ISO 14451-4, ISO 14451-5 and ISO 14451-8, these tests should be considered passed for the airbag module as well.

#### **4.4.2 Acceptance criteria**

No ignition of the airbag module shall occur.

No spill out of the pyrotechnic composition from the airbag module shall occur.

### **4.5 Thermal humidity cycling test and functioning test**

#### **4.5.1 Requirements**

Airbag modules shall be tested as specified in ISO 14451-2:2013.

Alternatively if all (micro) gas generator(s)/ignite(s) are already successfully tested according to ISO 14451-4, ISO 14451-5 and ISO 14451-8, these tests should be considered passed for the airbag module as well.

#### **4.5.2 Acceptance criteria**

No ignition of the airbag module shall occur.

### **4.6 Electro static discharge (ESD) test**

#### **4.6.1 Requirements**

Airbag modules shall be tested as specified in ISO 14451-2:2013, 4.5.

Alternatively if all (micro) gas generator(s)/ignite(s) are already successfully tested according to ISO 14451-4, ISO 14451-5 and ISO 14451-8, these tests should be considered passed for the airbag module as well.

#### **4.6.2 Acceptance criteria**

No ignition of the airbag module shall occur.

## 4.7 Fire test

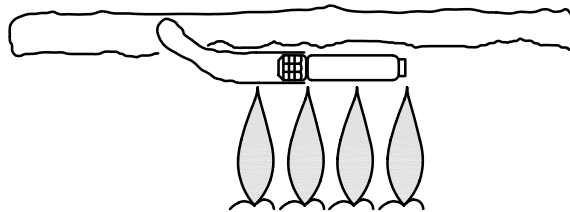
### 4.7.1 Requirements

Airbag modules shall be tested as specified in ISO 14451-2:2013, 4.6 with the following heating rate and positions:

- Heating rate: 80K/min.

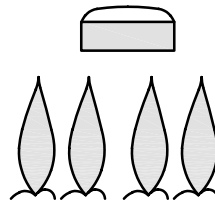
The number and orientation of the burners shall be chosen such that the whole cross-section (projection to the gird) of the airbag module or at least to the area of the airbag module where the (micro) gas generator(s) / igniter(s) / actuator(s) are situated shall be completely engulfed by the flames.

Position for curtain modules; see [Figure 1](#):



**Figure 1 — Bag unfolded**

Position for modules except curtain modules; see [Figure 2](#):



**Figure 2 — Bag away from flame**

Alternatively if all (micro) gas generator(s)/ignite(s) are already successfully tested according to ISO 14451-4, ISO 14451-5 and ISO 14451-8, these tests should be considered passed for the airbag module as well.

### 4.7.2 Acceptance criteria

Only foreseeable fragmentation or foreseeable opening of the airbag module shall occur.

## 4.8 Functioning Test

### 4.8.1 Requirements

Airbag modules shall be tested as specified in ISO 14451-2:2013, 4.9 with the following positions without any fixation.

When airbag modules with multi-stage gas generators or airbag modules with single- or multi-stage gas generators in addition with any number and combination of igniters, micro gas generators, actuators, gas generators are tested, the delay between ignition of stage 1 and the following stages shall be 5 ms or in accordance with the product specification or requirements given by the manufacturer.

Position for modules except for curtain modules; see [Figure 3](#):

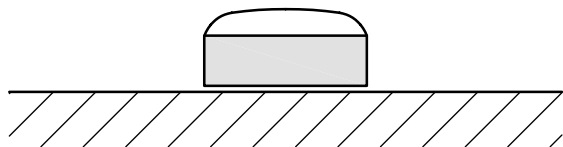


Figure 3 — Horizontal, bag away from ground

Position for curtain modules; see Figure 4:

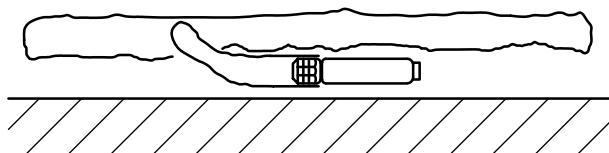


Figure 4 — Horizontal, bag unfolded

#### 4.8.2 Acceptance criteria

Only intended fragmentation or intended opening of the airbag module shall occur.

### 5 Test matrix for airbag modules

Table 1 shows the test matrix which summarizes all tests in an overview. Test samples have been numbered from 1 to 10 for easier reference. The roman numbers in the Table indicate in which sequence the same sample will undergo different examinations.

Table 1 — Test matrix

Sample number	Test methods of ISO 14451-2:2013	Requirements of ISO 14451-6:2013	Unexposed airbag modules			Exposed airbag modules		
			1	2 to 4	5	6 to 8	9	10
Possibility to reuse the test from sub-level(s) for the assessment of the airbag module. See relevant test requirement.			YES	NO	YES	YES	YES	YES
Verification of design and documentation	4.1	4.2	I	I	I	I	I	I
Drop test	4.2	4.3				II		
Vibration and temperature test	4.3	4.4					II	
Thermal humidity cycling test	4.4	4.5						II
Electrostatic discharge test	4.5	4.6			II			
Fire test	4.6	4.7	II					
Functioning test	4.9	4.8		II			III	III

### 6 Categorization

6.1 Airbag modules are categorized as follows:

- Category P1: Airbag modules that present a low hazard;
- Category P2: Airbag modules that are intended for handling or use only by persons with specialist knowledge.

**6.2** The assignment to P1 or P2 is done according to the following criteria when tested under functioning test (see [4.8](#)):

- P1 criterion: The distance from the initial location to the first impact on the ground of the airbag module or any fragment shall be not more than 15 m.
- P2 criterion: If P1 criterion is not fulfilled.





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