BS EN 1621-4:2013

BSI Standards Publication

Motorcyclists' protective clothing against mechanical impact

Part 4: Motorcyclists' inflatable protectors — Requirements and test methods

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 1621-4:2013.

The UK participation in its preparation was entrusted to Technical Committee PH/3/9, Motorcyclists Personal Protective Equipment.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 70556 4

ICS 13.340.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2013.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1621-4

January 2013

ICS 13.340.10

English Version

Motorcyclists' protective clothing against mechanical impact - Part 4: Motorcyclists' inflatable protectors - Requirements and test methods

Vêtements de protection contre les chocs mécaniques pour motocyclistes - Partie 4 : Protecteurs gonflables pour motocyclistes - Exigences et méthodes d'essai

Motorradfahrer-Schutzkleidung gegen mechanische Belastung - Teil 4: Aufblasbare Protektoren für Motorradfahrer - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 3 November 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Figures

Tables

Foreword

This document (EN 1621-4:2013) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, the secretariat of which is held by DIN.

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 July 2013, and conflicting national standards shall be withdrawn at the latest by July 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.

EN 1621 consists of the following parts, under the general title "Motorcyclists’ protective clothing against mechanical impact“:

— Part 1: Motorcyclists' limb joint impact protectors — Requirements and test methods

— Part 2: Motorcyclists' back protectors — Requirements and test methods

— Part 3: Motorcyclists' chest protectors — Requirements and test methods[1)]

— Part 4: Motorcyclists' inflatable protectors — Requirements and test methods

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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.

1) Under development

Introduction

Motorcyclists' inflatable protectors are devices either embedded within or worn on top of other clothing, which aim to reduce the severity of injuries in case of motorcycle accidents.

The protectors covered by this standard give protection only when inflated.

The performance requirements have been selected to provide the best practical compromise between protection, comfort, and ergonomic requirements. Protectors that are too stiff or heavy will not be worn. The test methods are designed to provide information on protection against mechanical impacts. The force levels in the tests do not relate directly to the forces riders are exposed to in accidents, but experiences have shown that products meeting the requirements of this European Standard may reduce the severity of injuries caused by impacts.

In order to encourage the adoption of certified protection by the highest possible number of users, two performance levels are specified for inflatable protectors. These are level 1 for protectors designed to give protection whilst having low ergonomic penalties associated with its use and level 2 for protectors providing an increased protection with respect to level 1. There may be, however, weight and restriction penalties associated with level 2 protection.

1 Scope

This European Standard covers requirements and test methods for mechanically activated inflatable protectors for motorcycle riders (in the following text called „protector“). It specifies the minimum level of protection, the minimum intervention time of inflated bag, and the minimum coverage to be provided by motorcyclists' protectors worn by riders. The requirements of this standard are applicable to various design of inflatable protectors and refers to all body areas and their combinations which are claimed to be protected. Inflatable protectors covered by this standard may be incorporated in motorcycle garments or equipped with by appropriate restraint systems and worn on their own.

This European Standard contains the requirements for the performance of the system during an accident and details of the test methods, requirements for sizing, ergonomics, innocuousness, labelling and the provision of information.

Inflatable protectors other than mechanically activated are not covered by this standard.

2 Normative references

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

EN 340, *Protective clothing — General requirements*

EN 1621-1:2012, *Motorcyclists' protective clothing against mechanical impact — Part 1: Motorcyclists' limb joint impact protectors — Requirements and test methods*

EN 1621-2, *Motorcyclists' protective clothing against mechanical impact — Part 2: Motorcyclists' back protectors — Requirements and test methods*

EN ISO 105-E01, *Textiles — Tests for colour fastness — Part E01: Colour fastness to water (ISO 105-E01)*

EN ISO 11642, *Leather — Tests for colour fastness — Colour fastness to water (ISO 11642)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1621-1:2012 and the following apply.

3.1
inflatable motorcyclist's protector
specific device worn by motorcyclists, which will automatically inflate in the event of an accident

3.2
intervention time
sum of the activation time plus the inflation time in milliseconds

3.3
activation time
period of time used by the triggering system to fire the gas generator, corresponding to the interval of time from the beginning of the accident to the start of the inflation of the protector

3.4
inflation time
time period required for the airbag to be fully inflated

3.5
mechanical triggering system
system which is fired by the severance of a physical connection between motorbike and protector

3.6
trigger cable
mechanical connection between the inflatable device and the motorbike

3.7
activation force
force transmitted by the trigger cable to start the inflation process

3.8
activation energy
energy required by the mechanical trigger system to start the inflation process

3.9
duration time
time period whereby the operating pressure inside the airbag remains above the minimum operating pressure declared by the manufacturer

4 Requirements

4.1 General

Motorcyclists' protectors shall meet an overall requirement that they are safe to use, comfortable to wear and fit for their purpose. Table 1 gives a summary of the requirements.

Unless otherwise specified all values and linear dimensions shall be provided with a deviation of ± 2 %.

Table 1 — Summary of the requirements

Clause	Requirements		Test	Values
4.2	Innocuousness	Colour fastness to water	6.2.1	At least grade 4 of the Grey scale
		Protection from any hard components	6.2.2	≤ 35 kN
		Temperature exposure evaluation (where applicable)	6.7	Average value ≤ 48 °C. No single value shall exceed 55 °C
4.3	Minimum zone of protection		–	–
4.4	Intervention time		6.4	≤ 200 ms
4.5	Duration time		6.5	≥ 5 s
4.6	Retention of protective bag		–	–
4.7	Impact attenuation		6.6	Level 1: Overall mean value 4,5 kN Single strike ≤ 6 kN
				Level 2: Overall mean value 2,5 kN Single strike ≤ 3 kN
4.8	Sizing and size marking		–	–
4.9	Ergonomic requirements		6.7	All answers shall be “yes”
4.10	Trigger system function	Activation force of mechanical triggering system	6.8.1	≥ 30 N ≤ 250 N
		Activation energy of mechanical triggering system	6.8.2	< 5 J
		Breaking strength of the physical connection between bike and protector	6.8.3	≥ four times the activation force; in any case ≥ 400 N

4.2 Innocuousness

4.2.1 Colour

The materials of the protectors shall comply with the requirements for innocuousness of materials in EN 340, with the exception of the requirement concerning the colour fastness to perspiration.

The colour fastness to water of the constituent materials which likely could come into contact with the skin of the user shall be determined in accordance with 6.2.1 and shall be at least grade 4 of the Grey scale for the staining of any component of the multi-fibre reference fabric

4.2.2 Hard components

No sharp edge shall be present in the protector.

A layer of impact attenuation material shall be present between any hard components present in the inflation or actuation systems and the body of the user. This requirement is applicable to mechanical parts of the inflation system; it is not applicable to zips, studs, fasteners and other elements not linked to the specific function of the inflating system. The protection shall be the same size of the component or its projected area plus a minimum border of 1 cm.

The transmitted force level shall not be more than 35 kN. The impact attenuation protecting the user from hard components shall be tested in accordance with 6.2.2.

4.2.3 Temperature exposure evaluation

Certain gas generators, which contain pyrotechnic components, can generate hot gases when fired. These products shall be subjected to an evaluation heat exposure in accordance with 6.7.

The average temperature recorded over the duration of the test shall not exceed 48 °C. No single value shall exceed 55 °C.

NOTE Gas generators containing pyrotechnic composition are considered by Directive 2007/23/CE.

4.3 Zones of protection

The body areas claimed to get protected shall be covered by the protector when inflated.

The protector shall cover at least one of the zones of protection as described in any specific part of the EN 1621 series of standards.

In case the protector covers larger than the required and/or additional body parts, the manufacturer shall supply a suitable template in order to allow the protected zone to be defined.

4.4 Intervention time

The intervention time shall not be more than 200 ms. It shall be tested in accordance with 6.4.

4.5 Duration time

The duration time shall not be less than 5 s when tested in accordance with 6.5.

4.6 Retention of the inflatable protector

The inflatable protector shall be equipped with suitable and adjustable retention devices. The functions shall be assessed by ergonomic testing in accordance with 6.7. If the inflatable protector is fitted in a garment, the retention devices may be incorporated into it. In this case if the garment can be opened (zip, buttons, press stud, etc.), the user information shall contain a warning that the safety functions will work only with the garment being closed.

4.7 Impact attenuation

Motorcyclists' protectors shall be tested in the inflated status.

When impact protection is tested in accordance with 6.6, the impact attenuation shall comply with performance level 1 or 2 in Table 2.

Table 2 — Transmitted force and performance levels

	Level 1	Level 2
Overall Mean value	≤ 4,5 kN	≤ 2,5 kN
Single strike	≤ 6 kN	≤ 3 kN

The zone of protection shall be tested in accordance with the correspondent method described in the different parts of EN 1621. Additional zones of protection shall be tested with the method described in EN 1621-1.

4.8 Sizing and size marking

The size of the protectors shall be marked according to the relevant part of EN 1621.

4.9 Ergonomic requirements

When examined and tested according to 6.7, protectors shall be found satisfactory for the intended use, as indicated in the information supplied by the manufacturer. All answers to the questions in 6.7 shall be “yes”.

4.10 Trigger system function

4.10.1 Activation force

The force required by mechanical triggering system to activate the airbag shall be ≥ 30 N and ≤ 250 N, when using the test method according to 6.8.1.

4.10.2 Activation energy

The energy required by the mechanical triggering system to activate the airbag shall be < 5,0 J, using the test method according to 6.8.2.

4.10.3 Connection of airbag system to motorcycle

The full assembly of the connection device (trigger cable, connection to the inflatable protector, etc.) shall be tested. The devices connecting the protector to the motorcycle shall have a breakage load at least 4 times higher than the activation force, but in any case not less than 400 N when using the test method according to 6.8.3.

When the system is activated, the trigger cable and the device shall be physically separated.

5 Sampling

Test samples shall consist of complete products with labels, or copies of the proposed labels and the information supplied by the manufacturer. Three samples of each size of protector as specified by the manufacturer shall be supplied for testing.

6 Test methods

6.1 Preconditioning and testing atmosphere

All samples shall be conditioned for at least 48 h in an atmosphere with a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) %. If the tests are carried out in an atmosphere different from these specified values, the tests shall be commenced within 5 min after having removed the samples from the conditioning atmosphere.

6.2 Innocuousness

6.2.1 Colour fastness to water

For colour fastness to water, materials of protective clothing shall be tested according to EN ISO 105-E01 for textiles and according to EN ISO 11642 for leather.

6.2.2 Protection from hard components

The EN 1621-1 impact test apparatus and test method shall be used. The test shall be done on critical points of the device in not inflated status, including also the absorbing material.

This means that the assembly of hard components and shock absorbing material shall be positioned on the anvil in not inflated status in order to best simulate a mechanical impact occurring when the protector is worn by the user. 6.6.2 of this standard is not applicable.

6.2.3 Temperature exposure evaluation (applicable only for hot gas generators)

The product shall be examined to identify surfaces on or adjacent to the inflatable chamber, which contact the skin, where an excess amount of heat could be transmitted.

The temperature is detected with a fast response thermometer (e.g. touchless IR thermometer or digital thermometer with flat probe of low mass).

The protector is conditioned at the ambient temperature defined in 6.1.

The probe of the thermometer shall be fixed on the potential skin contact surfaces identified by visual examination. If testing is necessary in more than one point, this can be done by applying multiple probes or by repeated tests. If probes are used, they may be fixed with suitable means (e.g. adhesive tapes, elastic strips etc.).

The protector is activated and the temperature is detected from 0 s to 15 s after starting the inflation, by recording it continuously or at least every 3 s. The temperature exposure is the average value.

6.3 Measurement and marking of zones of protection

Measurement and marking of zone of protection shall be done using templates in accordance with the relevant part of EN 1621.

6.4 Intervention time

6.4.1 General

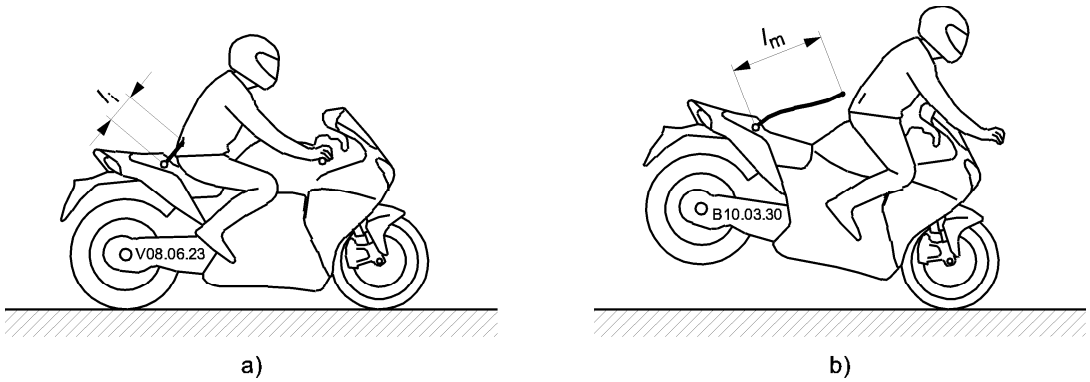
The intervention time shall be determined as the sum of the calculated activation time (6.4.2) and the inflation time measured as in 6.4.3, expressed in milliseconds.

6.4.2 Determination of the activation time

The activation time (t_a in milliseconds) of the protector is calculated applying the following formula:

a) Formula to be applied if the trigger cable is fixed to the motorbike behind the motorcyclist (see Figure 1):

$$t_a = d + \frac{l_m - l_i}{s} \times 1000\,;$$



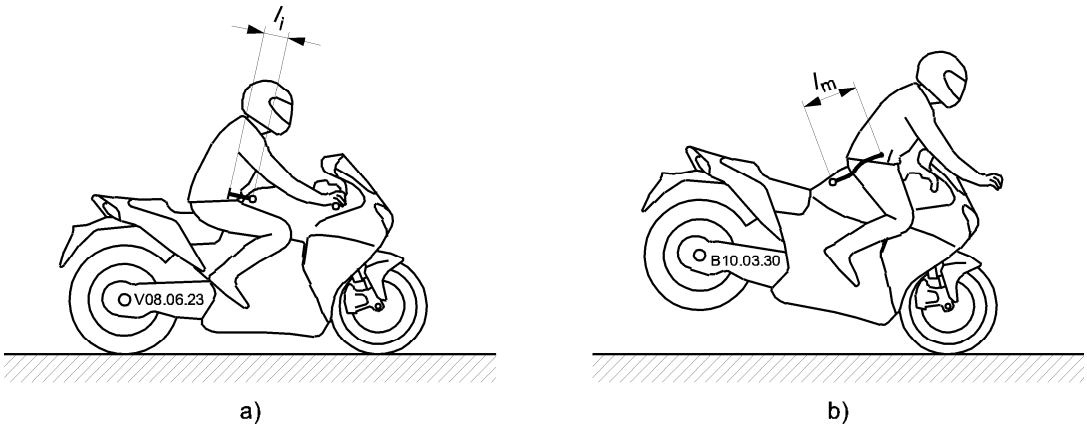
a) motorcyclist in riding position (trigger cable behind the biker)

b) motorcyclist during impact (trigger cable behind the biker)

Figure 1 — Trigger cable fixed to the motorbike behind the biker

b) Formula to be applied if the trigger cable is fixed to the motorbike in front of the biker (see Figure 2):

$$t_a = d + \frac{l_m + l_i}{s} \times 1000\,;$$



a) motorcyclist in riding position (trigger cable in front of the biker)

b) motorcyclist during impact (trigger cable in front of the biker)

Figure 2 — Trigger cable is fixed to the motorbike in front of the biker

where

s = speed of 13,33 m/s forward direction;

l_m = maximum length of the cable, expressed in meters;

l_i = Distance between the connecting point on the motorbike and the end of activation cable expressed in meters, during usual position of the biker on the bike initial length of the cable, expressed in meters;

d = initial delay due to the typical initial deformation of a motorcycle during an impact, expressed in milliseconds. *d*= 30 ms by experimental test.

6.4.3 Determination of the inflation time

The inflating time is determined by the use of a high speed camera (at least 200 frames/s) and analysing the relevant frames.

Inflating time is reached if no more size alteration of the inflated bag can be detected. The frame analysis shall be carried out by visual inspection or using an appropriate software for frame analysis.

6.5 Determination of duration of inflated status

The protector shall be tested carrying out the impact attenuation test at the maximum duration time declared by the manufacturer. The duration of inflated status corresponds to the maximum duration time declared by the manufacturer if protectors pass impact attenuation test.

6.6 Impact attenuation

6.6.1 For each protection zone the test shall be carried out using the dropping equipment and the procedure in conformity with the relevant part of EN 1621. The division of the template into three areas as described in EN 1621-1 is not applicable. The impact points shall be distributed evenly throughout all the surface of the protective zone.

6.6.2 To protect the anvil in case of breakage of the inflated protector, a single layer of chrome tanned cow leather (2,8 ± 0,2) mm is to be fitted on the anvil and shall be replaced in the event the protector collapses due to the impact.

6.6.3 Protectors marked with the perimeter line of the minimum zone of protection, and the examination marks in accordance with 6.3 after having been pre-conditioned in accordance with 6.1 shall be used. Perimeter line and examination marks shall be used for the determination of impact points. Inflatable protectors shall be tested entirely and shall not be cut.

6.6.4 Impact tests shall be performed at the inflated time declared by the manufacturer. This time shall not be less than 5 s.

6.6.5 Each different article in each size of inflatable protector shall be submitted to 3 impact tests on each protective zone (see 6.3); this requires 3 samples (one impact per sample). See 6.6.1.

a) if the inflatable protector cannot be recharged, 3 samples shall be examined; each one of the three samples is submitted to impact once.

b) if the inflatable protector can be recharged, one sample shall be tested after its first inflation; 2 samples shall be tested after recharging operation: 2 samples are fired and inflated, then samples are deflated and recharged and submitted to impact test.

The test result is considered positive (pass) if the results of each single impact is positive.

6.7 Ergonomic tests

6.7.1 General

One sample per size shall be visually examined for design features as well as any sharp edges or inclusion that may cause problems.

One protector is then put on by an assessor of suitable size and sex with experience of riding a motorcycle who then carries out the following tests. Manufacturer's instructions for donning and adjustment shall be respected.

6.7.2 Tests

The following tests shall be done with the protector in non-inflated status and then repeated with the protector in the inflated status. To obtain a positive result, all of the following questions need to be answered with "yes":

a) Do you confirm the protector fits you properly (not for inflated status)?

b) Can you easily get on and off a motorcycle? (To be done three times not for inflated status).

c) Can you reach and operate the controls of the motorcycle (also in inflated status)?

d) Can you turn your head and torso both sides when sitting on a motorcycle? (Not for inflated status).

e) Is the adjustment system free from causing intolerable discomfort, considering also breathing?

f) Do you feel the retention system holds the protector securely in place?

g) Can you pick up something from the floor by bending forward? (Three times, not for inflated status).

h) After the ergonomic test, can you confirm that further to points a) to g) no other problems (including visual field) have appeared which could make bike riding more dangerous?

6.8 Evaluation of the function of the mechanism of activation

6.8.1 Evaluation of activation force

The activation force is evaluated through a tensile test using a dynamometer (test speed 100 mm/min). The gas generator shall be firmly fixed to a clamp, the trigger cable on the other clamp. The peak force corresponds to the minimum force needed to start the inflation process. For not rechargeable systems, four tests shall be carried out on four different samples. For rechargeable systems, two tests shall be carried out on each of two samples.

The peak force values are detected and each single value shall meet the requirement.

6.8.2 Evaluation of the activation energy

The evaluation of the activation energy is performed through a falling weight test with an energy of (5 ± 0,1) J using a mass of (0,5 ± 0,02) kg. The gas generator shall be firmly fixed to a rigid (not elastic) structure. The falling mass is connected to the end of the trigger cable. For not rechargeable systems, four tests shall be carried out on four different samples. For rechargeable systems two tests shall be carried out on each of two samples. To meet the requirement, each single test shall cause the activation.

6.8.3 Connection to the motorcycle

Tensile and breaking resistance of the connection between bike and mechanical triggering system is measured with a dynamometer (test speed 100 mm/min). A total number of three tests shall be carried out using three test pieces. Each single value shall meet the requirement.

6.9 Uncertainty

For each of the required sequences of measurements performed in accordance with this standard a corresponding estimate of the uncertainty of the final result shall be determined. On request, this uncertainty (U_m) shall be given in the test report in the form U_m = ± X. It shall be used in determining whether a "Pass" performance has been achieved. If the final result plus U_m is above the maximum Pass level, the sample shall be deemed to have failed.

Measuring instruments or their independent working components unless otherwise specified shall have an error limit of ± 4 % of the pass/fail level of the characteristic being measured.

7 Test results

a) Innocuousness: detected values and pass or fail vote;

b) Intervention time: report the activation time and inflation time. Indicate if intervention time meets the requirement of 4.4;

c) Duration of inflated status: report the time after the activation within which the impact attenuation test has been done. Indicate pass or fail;

d) Impact attenuation: detected average and peak values and compliance with 4.7;

e) Activation temperature (if applicable): detected value and compliance with 4.8;

f) Ergonomic assessment: pass or fail vote;

g) Activation force: detected min. and max. value and compliance with 4.10.1;

h) Activation energy: detected min. and max. value and compliance with 4.10.2;

i) Breaking strength of the physical connection between bike and protector: detected min. and max. value and compliance with 4.10.3.

8 Test report

The test report shall include the following information:

a) Identification and size(s) of the protector, including source and date of receipt;

b) the number of this European Standard;

c) test results;

d) identification, sex and size (if relevant: waist to shoulder length) of the ergonomic assessor;

e) any unusual features observed during the test (if applicable);

f) date or period of testing;

g) identification of the laboratory carrying out the tests.

9 Marking

Motorcyclists' protectors shall be permanently and conspicuously marked with at least the following information:

a) the number of this European Standard;

b) name or registered trade mark of the manufacturer;

c) identification of the product type, commercial name or code;

d) size designation, as described in 4.8;

e) the „*i*“ pictogram inviting to read the instruction leaflet;

f) graphical symbol as shown in Figure 3, including performance level and zone of protection. The number indicates the performance level; the letter indicates the protected area, in accordance with the relevant part of EN 1621.

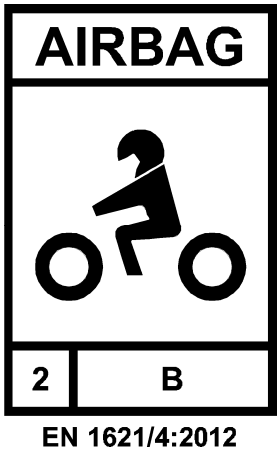


Figure 3 — Example of graphical symbol

NOTE In Figure 3 the number 1 or 2 indicates the level of performance; the letters indicate the protective area as defined by the relevant parts of EN 1621.

10 Information supplied by the manufacturer

Protectors shall be supplied with information and instructions for fitting, use and maintenance. These are essential parts of the protective equipment. They shall contain at least the following information in the official language(s) of the state or region in which they are placed on the market:

a) the name and full address of the manufacturer and/or his authorised representative in the EU;

b) the type of use for which the protectors are intended including any relevant restrictions;

c) explanation of the protected area(s) as marked in the pictogram and (if applicable) of any exceeding protected area; all this information with reference to the user's size for which the device is proposed;

d) the hazards specific to motorcycling against which some protection is given;

e) the hazards specific to motorcycling against which protection is not given;

f) all the information required in Clause 9 "Marking";

g) explanation of the guidance on how to adjust the protector;

h) instruction for recharging, if applicable;

i) warnings and limitations of use, including the following statements:

   1) no protector can offer full protection against injury;

   2) the protector may not provide protection to the motorcyclist under all circumstances, especially:

      i) during the first impact between motorbike and an obstacle;

      ii) in case of falling from the motorbike without separation.

   3) the compatibility or not with other devices and garments;

   4) if applicable, a warning that the provided protection will be impaired if the garment is not closed;

   5) a warning about any contamination, alteration or misuse of the protector, that would dangerously reduce the performance of the protector.

j) instructions for the connection of the system between bike and rider;

k) instructions concerning periodical checks of the whole device and its specific components;

l) information on the selection of the correct size of the device;

m) instructions for care and cleaning. Use international care label symbols, including negative labels, if applicable;

n) instructions concerning inspection and recharging, if applicable,

o) instructions on how to decide on the necessary disposal and replacement;

p) instructions for the safe disposal of the protectors, in accordance with European regulations, and of any hazards that could arise during mechanically disrupting or incinerating the product.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC.

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 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 89/686/EEC

Clause(s)/sub-clause(s) of this European Standard	**Essential requirements (ERs) of EU Directive 89/686/EEC, Annex II**	**Qualifying remarks/Notes**
4.9	1.1.1 Ergonomics	
4.9	1.1.2.1 Highest level of protection possible	
4.2.3; 4.3; 4.4; 4.5; 4.10	1.2.1 Absence of risks and other ‘inherent' nuisance factors	
4.2.1	1.2.1.1 Suitable constituent materials	
4.2.2	1.2.1.2 Satisfactory surface condition of all PPE parts in contact with the user	
4.9	1.2.1.3. Maximum permissible user impediment	
4.6	1.3.1 Adaptation of PPE to user morphology	
10	1.4 Information supplied by the manufacturer	
4.8, 9	2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	
4.7	3.1.1 Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	

WARNING - Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™