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Incorporating corrigendum November 2010

BSI Standards Publication

Conduit systems for cable management

Part 24: Particular requirements — Conduit systems buried underground

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National foreword

This British Standard is the UK implementation of EN 61386-24:2010. It is identical to IEC 61386-24:2004. It supersedes BS EN 50086-2-4:1994 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/213, Cable management.

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.

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

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Amendments/corrigenda issued since publication

Date	Text affected
30 November 2010	Correction of title on front cover

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61386-24

October 2010

ICS 29.120.10

Supersedes EN 50086-2-4:1994 + corr. Feb.2001 + A1:2001

English version

Conduit systems for cable management - Part 24: Particular requirements - Conduit systems buried underground

(IEC 61386-24:2004)

Systèmes de conduits pour la gestion du câblage -
Partie 24: Règles particulières -
Systèmes de conduits enterrés dans le sol
(CEI 61386-24:2004)

Installationsrohrsysteme zum Führen von Leitungen für elektrische Energie und für Information -
Teil 2-4: Besondere Anforderungen für erdverlegte Elektroinstallationsrohrsystem
(IEC 61386-24:2004)

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Foreword

The text of the International Standard IEC 61386-24:2004, prepared by SC 23A, Cable management systems, of IEC TC 23, Electrical accessories, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 61386-24 on 2010-10-01 without any modification.

This European Standard supersedes EN 50086-2-4:1994 + corr. Feb.2001 + A1:2001.

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

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-10-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-10-01

This Part 24, which specifies particular requirements for conduit systems buried underground, is to be used in conjunction with EN 61386-1, *Conduit systems for cable management – Part 1: General Requirements,* and its amendments. It was established on the basis of the first edition (2004) of that standard and its Amendment 1 (2000).

This Part 24 supplements or modifies the corresponding clauses of EN 61386-1. Where a particular clause or subclause of Part 1 is not mentioned in this Part 24, that clause or subclause applies as far as is reasonable. Where this Part 24 states "addition", "modification" or "replacement", the relevant text of Part 1 is to be adapted accordingly.

Subclauses, tables and figures which are in addition to those in Part 1 are numbered starting with 101.

A conduit system which complies with this standard, is deemed safe for use when installed in accordance with national wiring regulations, whilst applying the manufactures installation instructions and conduit classification.

NOTE The following print types are used:

- requirements: in roman type
- *test specifications: in italic type*
- notes: in small roman type

EN 61386 consists of the following parts, under the general title *Conduits systems for cable management:*

Part 1: General requirements

Part 21: Particular requirements – Rigid conduit systems

Part 22: Particular requirements – Pliable conduit systems

Part 23: Particular requirements – Flexible conduit systems

Part 24: Particular requirements – Conduit systems buried underground

Part 25: Particular requirements – Conduit fixing devices

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

Annexes ZA and ZB have been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61386-24:2004 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Annex ZA of Part 1 is applicable except as follows:

EN 60423, Not applicable

EN 60670, Not applicable

Addition:

Publication	Year	Title	EN/HD	Year
ISO 161-1	1996	Thermoplastics pipes for the conveyance of fluids - Nominal outside diameters and nominal pressures - Part 1: Metric series	-	-
ISO 2768-1	1989	General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications	EN 22768-1	1993

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Annex ZB
(normative)

Special national conditions

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard or Harmonization Document.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

Clause	Special national condition
General	**Denmark** According to the installation practice in Denmark conduit systems buried underground have to be in the colour “red no 5” according to DS 735 (1982) or “red” according to IEC 304 (1982).

CONTENTS

CONDUIT SYSTEMS FOR CABLE MANAGEMENT –

Part 24: Particular requirement – Conduit systems buried underground

1 Scope

Replacement:

This standard specifies requirements and tests for conduit systems buried underground including conduits and conduit fittings for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems. This standard applies to metallic, non-metallic and composite systems including threaded and non-threaded entries which terminate the system.

2 Normative references

This clause of Part 1 is applicable except as follows:

IEC 60423, Not applicable

IEC 60670, Not applicable

Addition:

ISO 161-1:1996, *Thermoplastics pipes for the conveyance of fluids – Nominal outside diameters and nominal pressures – Part 1: Metric series*

ISO 2768-1:1989, *General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

3 Definitions

This clause of Part 1 is applicable.

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for tests

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows:

Modification:

NOTE Annex A is not applicable.

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6.1 According to mechanical properties

Replacement:

6.1.1 Resistance to compression

6.1.1.1 Type 250 (code 250)

NOTE A conduit system according to 6.1.1.1 is intended to be installed with additional precautions as specified in the relevant national regulations

6.1.1.2 Type 450 (code 450)

NOTE A conduit system according to 6.1.1.2 is intended to be directly buried underground without additional precautions

6.1.1.3 Type 750 (code 750)

NOTE A conduit system according to 6.1.1.3 is intended to be directly buried underground without additional precautions

6.1.2 Resistance to impact

6.1.2.1 Light (code L)

6.1.2.2 Normal (code N)

6.1.3 Resistance to bending

6.1.3.1 Rigid

6.1.3.2 Pliable

6.2 According to temperature

Not applicable.

7 Marking and documentation

This clause of Part 1 is applicable except as follows:

7.1 *Addition*:

Moreover the conduit shall be marked with

a) the code "L" or "N" according to 6.1.2;
b) the code "250", "450" or "750" according to 6.1.1. This code shall be marked immediately after the code according to a).

7.1.1 Not applicable.

Addition:

7.1.101 Conduits shall be marked according to 7.1 at regular intervals along their length of preferably 1 m but not longer than 3 m.

7.3 and **7.4** Not applicable.

7.6 *Addition*:

Add the following note after Note 3:

NOTE 4 An alternative test is under consideration

Addition:

7.101 The manufacturer shall provide in his literature all information necessary for the proper and safe installation and use.

In addition, for conduit systems according to 6.1.1.1 the manufacturer shall give instruction for installation precautions following the relevant national technical rules, if any.

8 Dimensions

Replacement:

Conduit dimensions should preferably be according to Table 101.

Compliance of the minimum inside diameter is checked by measurement according to two perpendicular diameters on the same section and calculating the average value.

Compliance of the outside diameter is checked using a ring gauge or any suitable method.

9 Construction

This clause of Part 1 is applicable except as follows:

9.3 and 9.4 Not applicable.

10 Mechanical properties

This clause of Part 1 is applicable except as follows:

10.1.4 *Replacement*:

Compliance is checked by the tests of 10.2 to 10.4

10.2 Compression test

Replacement:

10.2.1 *Conduits are subjected to a compression test.*

NOTE Compression test on fittings is under consideration

The test for conduits containing non-metallic materials is not started until 10 days after manufacture.

10.2.2 *Samples are (200 ± 5) mm long.*

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10.2.3 *Before the test, the outside and inside diameters of the samples are measured as specified in Clause 8.*

10.2.4 *The samples are compressed between two flat steel plates having minimum dimensions (100 x 220 x 15) mm, the length 220 mm being along the length of the sample. The samples are compressed at a rate of (15 ± 0,5) mm/min and the load recorded at the vertical deflection equivalent to 5% of the average value of the original inside diameter of the sample.*

10.2.5 *When reaching the deflection of 5 %, the applied force shall be at least:*

– *250 N for conduits according to 6.1.1.1 ;*

– *450 N for conduits according to 6.1.1.2;*

– *750 N for conduits according to 6.1.1.3.*

NOTE The deflection is calculated with the inner diameter but the measurement of the outside diameter may be sufficient. In case of doubt, it will be necessary to measure the inner diameter.

10.2.6 *After the test, there shall be no crack allowing the ingress of light or water between the inside and the outside.*

10.3 Impact test

Replacement:

10.3.1 *Twelve samples of conduits each (200 ± 5) mm in length or conduit fittings are subjected to an impact test by means of the apparatus shown in Figure 101.*

Conduits are tested alone.

Fittings are tested when assembled with conduits.

NOTE 1 If necessary, for the test purposes conduit fittings may be trimmed as long as the test result is not affected.

NOTE 2 For determination of mass of hammer, the hammer is to be considered as the head of hammer plus the guidance carriage.

10.3.2 *The test apparatus is placed on a firm flat surface.*

The samples are conditioned in a cold chamber at the temperature of (–5 ± 1)°C for 2 h.

The samples are removed from the cold chamber and placed on the vee-block as shown in Figure 101.

The hammer falls once on each sample. The time between removal of the sample from the cold chamber and completion of impact does not exceed 10 s. The energy values are specified in Table 102.

The test is made on the weakest part of the conduit fitting except that it is not applied within 5 mm of any sample entry. Samples of conduit are tested on the centre of their length.

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10.3.3 *After the test, when the samples have attained (20 ± 5) °C, it shall be possible to pass the appropriate ball specified in 10.4.3 through the conduit, under its own weight and without any initial speed, with the sample in the vertical position. There shall be no sign of disintegration nor shall there be any crack allowing the ingress of light or water between the inside and the outside.*

At least nine of the twelve samples shall pass the test.

10.4 Bending test

Replacement:

10.4.1 *This test is carried out on pliable conduits.*

10.4.2 *The test is made on six samples having an appropriate length. Three samples are tested at room temperature, the other three are tested at (–5 ± 1)°C.*

For the test at –5 °C, the samples are conditioned in a cold chamber for 2 h.

The test apparatus consists of a device as shown in Figure 102 allowing to bend the conduit with a bending radius equal to the minimum bending radius specified by the manufacturer.

One of the ends of the samples is fixed on the test apparatus by means of an appropriate device. The sample is then bent to an angle of approximately 90°. For samples which are conditioned in the cold chamber, the bending is carried out within 10 s after the removal from the cold chamber.

10.4.3 *During the test, the samples shall not flatten.*

Compliance is checked by passing a ball having a diameter equal to $(95\ ^{+1}_{0})$ *% of the minimum inner diameter of the sample declared by the manufacturer, through the sample whilst it is bent around the test apparatus.*

10.5, **10.6**, **10.7** and **10.8** Not applicable.

11 Electrical properties

This clause of Part 1 is applicable except as follows:

11.1 to **11.3** Under consideration.

12 Thermal properties

This clause of Part 1 is not applicable.

13 Fire effects

This clause of Part 1 is applicable except as follows:

13.1.2 Under consideration.

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14 External influences

This clause of Part 1 is applicable.

15 Electromagnetic compatibility

This clause of Part 1 is applicable.

Table 101 – Conduits diameters

Nominal size mm	**Nominal outside diameter** mm	**Tolerances** mm	**Min. inside diameter** mm
25	25	+ 0,5 0	18
32	32	+ 0,6 0	24
40	40	+ 0,8 0	30
50	50	+ 1,0 0	37
63	63	+ 1,2 0	47
75	75	+ 1,4 0	56
90	90	+ 1,7 0	67
110	110	+ 2,0 0	82
125	125	+ 2,3 0	94
140	140	+ 2,6 0	106
160	160	+ 2,9 0	120
180	180	+ 3,3 0	135
200	200	+ 3,6 0	150
225	225	+4,1 0	170
250	250	+ 4,5 0	188

NOTE The nominal outside diameters are taken from ISO 161-1.

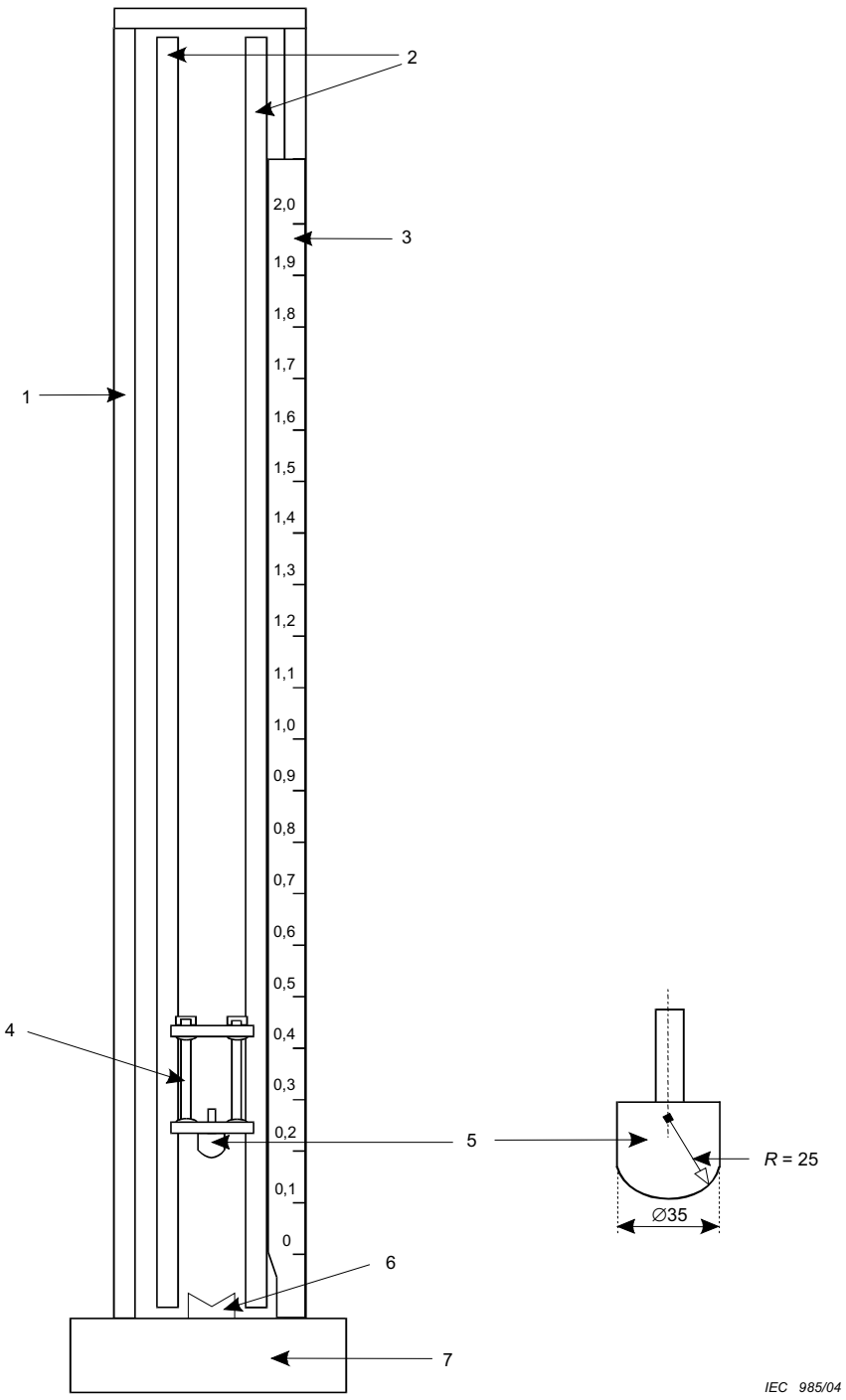
Tolerances on outside diameters (OD) are given as follows :
OD min: nominal outside diameter;
OD max: nominal outside diameter + (0,018 x nominal outside diameter values) rounded up to 0,1 mm.

Minimum inside diameter: nominal outside diameter divided by 1,33.

Table 102 – Impact test energy values

Nominal size of conduit mm	Light (L)			Normal (N)		
	Mass of hammer kg $(^{+1}_{0})$ %	Fall height mm $(^{0}_{-1})$ %	Energy J	Mass of hammer kg $(^{+1}_{0})$ %	Fall height mm $(^{0}_{-1})$ %	Energy J
≤ 60	3	100	3	5	300	15
61 to 90	3	200	6	5	400	20
91 to 140	3	400	12	5	570	28
> 140	3	500	15	5	800	40

Dimensions in mm



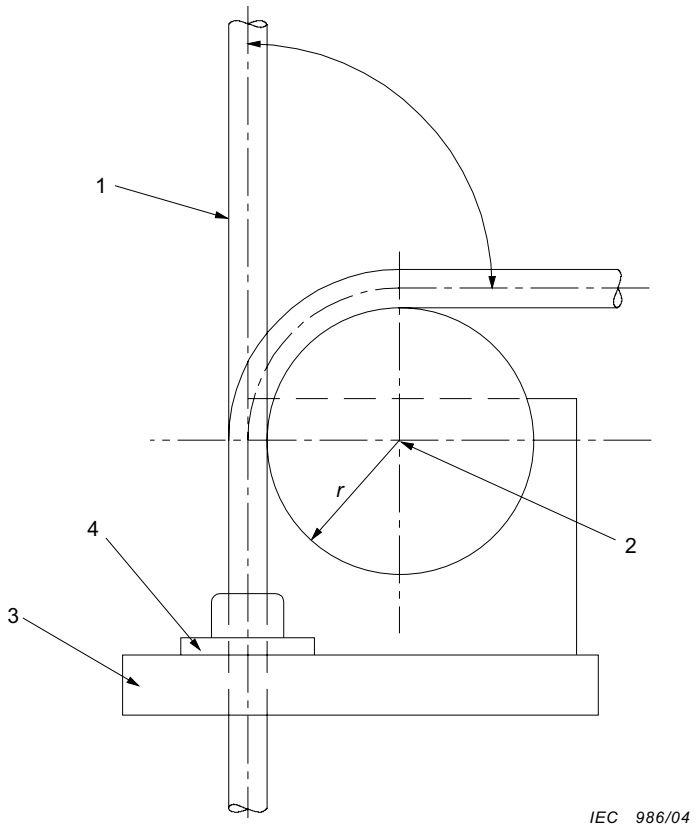
Tolerances as per class m of ISO 2768-1

Key

1	Frame
2	Guide rails
3	Graduated scale
4	Guidance carriage
5	Head of hammer
6	120° vee block
7	Rigid base

NOTE This drawing is not intended to govern design except as regards the dimensions shown

Figure 101 – Impact test apparatus



Key
1 Sample
2 Centre of bending cylinder
3 Support
4 Guide for conduit

Figure 102 – Bending test apparatus

Annex A
(normative)

Classification coding for conduit systems

This annex of Part 1 is not applicable.

Annex B
(normative)

Determination of material thickness

This annex of Part 1 is applicable.

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