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Systèmes de conduits
pour installations électriques –

Partie 21:
Règles particulières
Systèmes de conduits rigides



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Conduit systems for cable management

Part 21:
Particular requirements –
Rigid conduit systems

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CONDUIT SYSTEMS FOR CABLE MANAGEMENT

Part 21: Particular requirements for rigid conduit systems

Center for Standards, Metrology and Quality

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 61386-21 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories.

The text of this standard is based on the following documents:

FDIS	Report on voting
23A/369/FDIS	23A/372/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

This part 21, which specifies particular requirements for rigid conduit systems, is to be used in conjunction with IEC 61386-1, *Conduit systems for electrical installations – Part 1: General Requirements*, and its amendments¹. It was established on the basis of the first edition (1996) of that standard and its amendment 1 (2000).

¹ Please note that the generic title of the IEC 61386 series has been changed to *Conduit systems for cable management* since the publication of part 1, hence all other parts of the series are now published under this new title.

This part 21 supplements or modifies the corresponding clauses of IEC 61386-1. Where a particular clause or subclause of part 1 is not mentioned in this part 21, that clause or subclause applies as far as is reasonable. Where this part 21 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 manufacturer's 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

The committee has decided that the contents of this publication will remain unchanged until 2006-12. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

CONDUIT SYSTEMS FOR CABLE MANAGEMENT -**Part 21: Particular requirements - Rigid conduit systems****1 Scope**

This clause of part 1 is applicable, except as follows:

Addition:

This part of IEC 61386 specifies the requirements for rigid conduit systems.

2 Normative references

This clause of part 1 is applicable.

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:

6.1.1 1, 6.1.2 1, 6.1.3 2, 6.1.3 3, 6.1.3 4, 6.1.4 1 and 6.1.5 1 are not applicable.

NOTE Rigid conduit systems according to 6.1.1 2 and 6.1.2 2 and classification 1X from 6.2.1, table 1 are not allowed in France.

7 Marking and documentation

This clause of part 1 is applicable, except as follows:

Addition:

7.1.101 The conduit shall be marked in accordance with 7.1 along its entire length at regular intervals of preferably 1 m but not longer than 3 m and each length shall be marked at least once.

Compliance is checked by inspection.

7.1.102 The manufacturer shall document for the system the minimum inside diameter and the classification in accordance with clause 6.

Compliance is checked by inspection.

8 Dimensions

Replacement:

8.1 Threads and outside diameters shall comply with IEC 60423.

Compliance is checked by means of the gauges specified in IEC 60423.

8.2 Threadable conduits and threadable conduit fittings, except terminating conduit fittings, shall comply with table 101. Non-threadable conduit fittings, except fittings which are part of a conduit system declaring tensile strength, shall comply with table 102. The minimum inside diameter of the conduit system shall be as declared by the manufacturer.

Compliance is checked by measurement.

Table 101 – Thread lengths

Size	External thread	Internal thread
	Minimum length mm	Minimum length mm
6	05,5	06,5
8	06,5	07,5
10	08,5	09,5
12	10,5	11,5
16	12,5	13,5
20	14,0	15,0
25	17,0	18,0
32	19,0	20,0
40	19,0	20,0
50	19,0	20,0
63	19,0	20,0
75	19,0	20,0

Table 102 – Maximum entry diameter and minimum entry length details

Size	External thread	Internal thread
	Maximum entry diameter mm	Minimum entry length mm
6	06,5	06,0
8	08,5	08,0
10	10,5	10,0
12	12,5	12,0
16	16,5	16,0
20	20,5	20,0
25	25,5	25,0
32	32,6	30,0
40	40,7	32,0
50	50,8	42,0
63	63,9	50,0
75	75,9	50,0

9 Construction

This clause of part 1 is applicable.

10 Mechanical properties

This clause of part 1 is applicable, except as follows:

10.4 Bending test

Replacement:

Conduits which are declared by the manufacturer as being bendable are tested in accordance with 10.4.101, 10.4.102 or 10.4.103.

10.4.101 Metallic conduits

10.4.101.1 *Conduit sizes 16, 20 and 25 are subjected to a bending test by means of the apparatus shown in figure 101. Testing of other sizes is in accordance with the manufacturer's instructions.*

10.4.101.2 *Samples having a length equal to 30 times the nominal diameter, are bent so that when released, they have an angle of $(90 \pm 5)^\circ$, so that the inside radius of the bend is equal to six times the nominal diameter.*

10.4.101.3 *For conduits with welded seams, six samples are tested, three with the seam on the outside of the bend, three with the seam on the side.*

10.4.101.4 After the test:

- the basic material of the conduits and the protective coating of the conduits shall show no cracks visible to normal or corrected vision without magnification;
- seams, if any, shall not have opened;
- the section of the conduit shall not have distorted unduly.

The distortion of the section is checked as follows:

When the bent conduit is held in such a position that the straight portions are at an angle of approximately 45° to the vertical, one end of the sample pointing upwards and the other downwards, it shall be possible to pass the appropriate gauge as shown in figure 102 through the sample under its own weight and without any initial speed.

10.4.102 Non-metallic conduits

10.4.102.1 Conduit sizes 16, 20 and 25 are subjected to a bending test by means of the apparatus shown in figure 103. The length of the sample is approximately 500 mm. Testing of other sizes is in accordance with the manufacturer's instructions.

10.4.102.2 A bending aid, in the form of a coiled spring of square section metal wire, without burrs and having an overall diameter between 0,7 mm and 1,0 mm less than the specified minimum inside diameter of the conduit, or a bending aid recommended by the manufacturer, is inserted into each sample before bending.

10.4.102.3 Before the test, the sample with the bending aid inserted is conditioned for at least 2 h in a refrigerator within which the temperature is maintained at the declared temperature as given in table 1 with a tolerance of ± 2 °C.

The bending apparatus is placed beside the refrigerator and the test is carried out within 10 s after the removal of the sample from the refrigerator.

10.4.102.4 Each sample is placed in position as shown in figure 103, and held lightly in the groove of the former by means of the clamp. The sample is bent round the former by moving the bending rollers so that, when released, it has an angle of $(90 \pm 5)^\circ$. In this position, it shall be possible to remove the bending aid without damage to the sample or the aid.

After the test, the sample shall show no cracks visible to normal or corrected vision without magnification and it shall be possible to pass the appropriate gauge, as shown in figure 102, through the sample under its own weight and without any initial speed.

10.4.103 Composite conduits

Composite conduits which are declared by the manufacturer as being bendable are tested both in accordance with 10.4.101 and 10.4.102, using new samples for each test.

The test is carried out at the declared temperature as given in table 1 with a tolerance of ± 2 °C.

10.5 Flexing test

This subclause of part 1 is not applicable.

10.6 Collapse test

Replacement:

10.6.101 Metallic conduits

Metallic conduits are not subjected to a collapse test.

10.6.102 Non-metallic and composite conduits

10.6.102.1 Conduits which are declared by the manufacturer as being bendable shall be tested in accordance with 10.4.102 with the exception of 10.4.102.3.

10.6.102.2 The samples are fixed to a rigid support by means of four straps, as shown in figure 104, after having removed the bending spring or any other bending aids recommended by the manufacturer.

The support with the sample in position is kept for 24 h ± 15 min in a heating cabinet at the declared temperature as given in table 2 with a tolerance of ±2 °C.

After this period, with the support in such a position that the straight portions of the sample are at an angle of approximately 45° to the vertical, one end of the sample pointing upwards and the other downwards, it shall be possible to pass the appropriate gauge, as shown in figure 102, through the sample under its own weight and without any initial speed.

10.7 Tensile strength

This subclause of part 1 is applicable, except as follows:

10.7.3 Not applicable.

11 Electrical properties

This clause of part 1 is applicable.

12 Thermal properties

This clause of part 1 is applicable, except as follows:

12.3 *Replacement:*

The load is then removed and immediately after its removal it shall be possible to pass the appropriate gauge, as shown in figure 102, through the conduit under its own weight and without any initial speed, with the sample in the vertical position.

13 Fire hazard

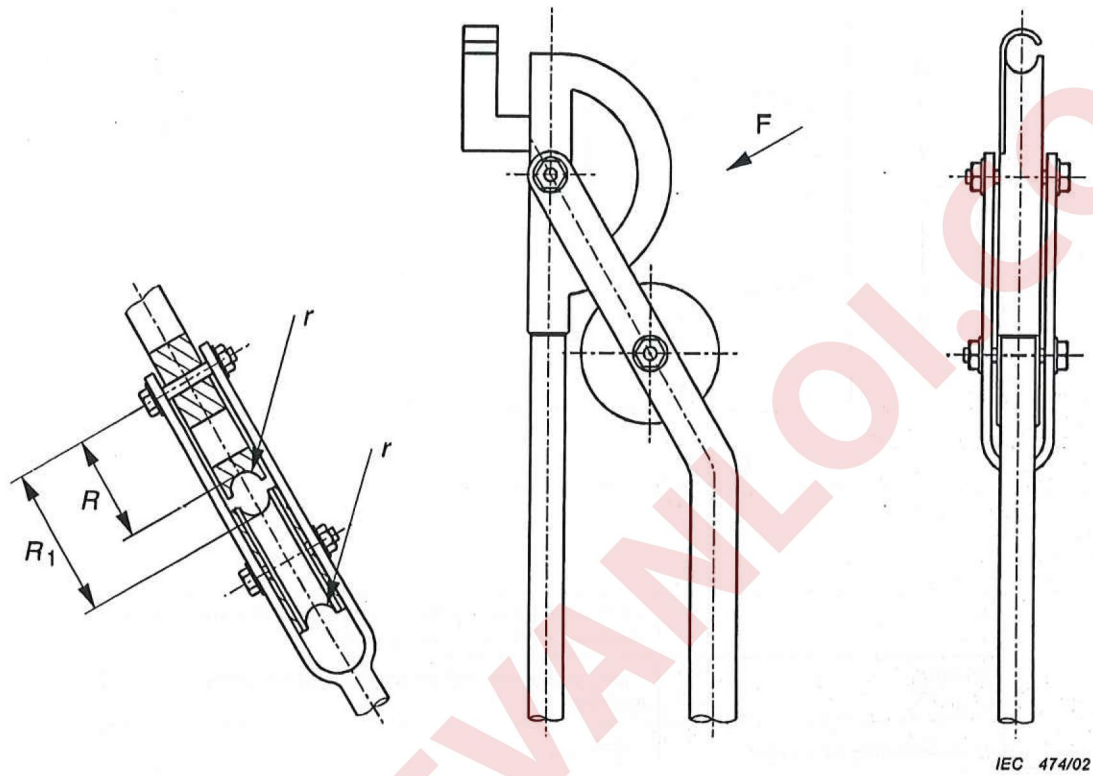
This clause of part 1 is applicable.

14 External influences

This clause of part 1 is applicable.

15 Electromagnetic compatibility

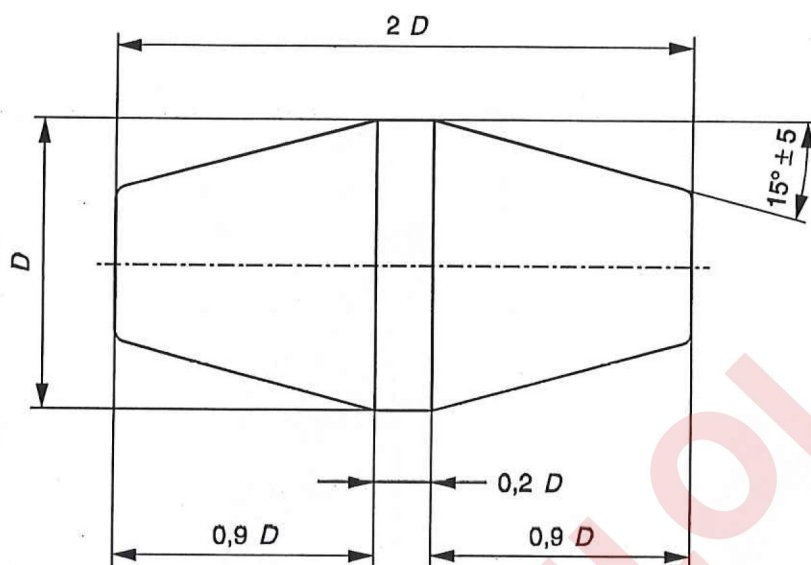
This clause of part 1 is applicable.



Size	Bending radius		Radius of groove
	Inside radius R	Outside radius R_1	r
	mm	mm	mm
16	96	113	8,1
20	120	141	10,1
25	150	178	12,7

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

Figure 101 – Bending apparatus for metallic and composite conduits

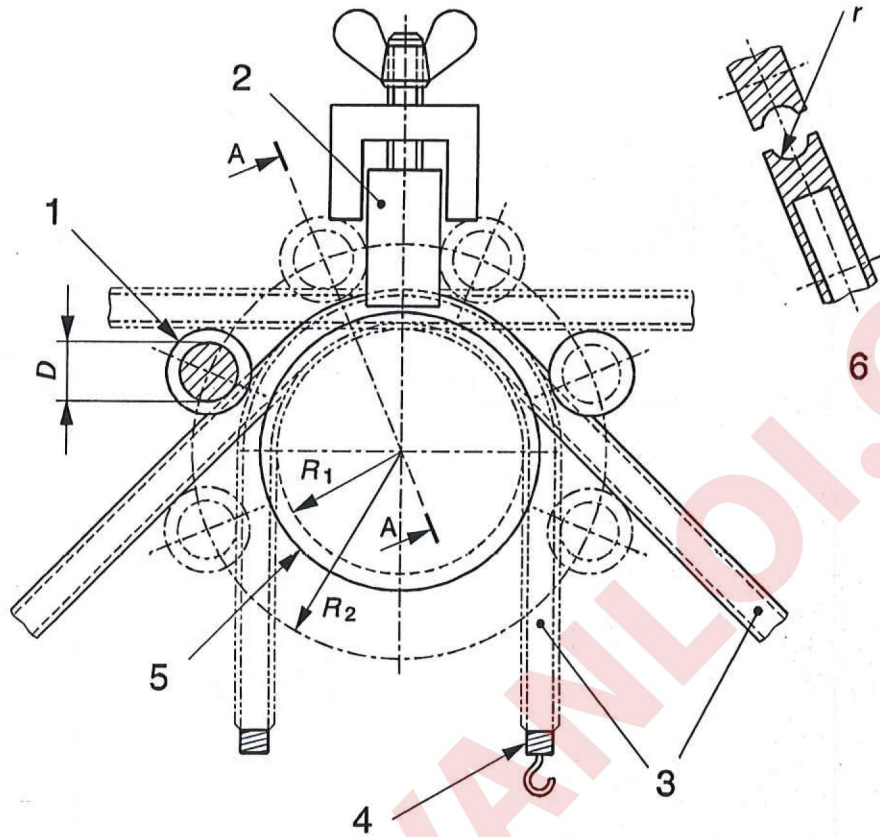


IEC 475/02

D	80 % of the manufacturer's declared minimum inside diameter of the conduit system
Material	Steel, hardened and polished, edges slightly rounded
Manufacturing tolerance	$+0,05$ 0 mm
Tolerance and axial dimension	$\pm 0,2$ mm
Admissible wear	0,01 mm

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

Figure 102 – Gauge for checking the minimum inside diameter of the conduit system after impact, bending, collapse and resistance to heat tests



IEC 476/02

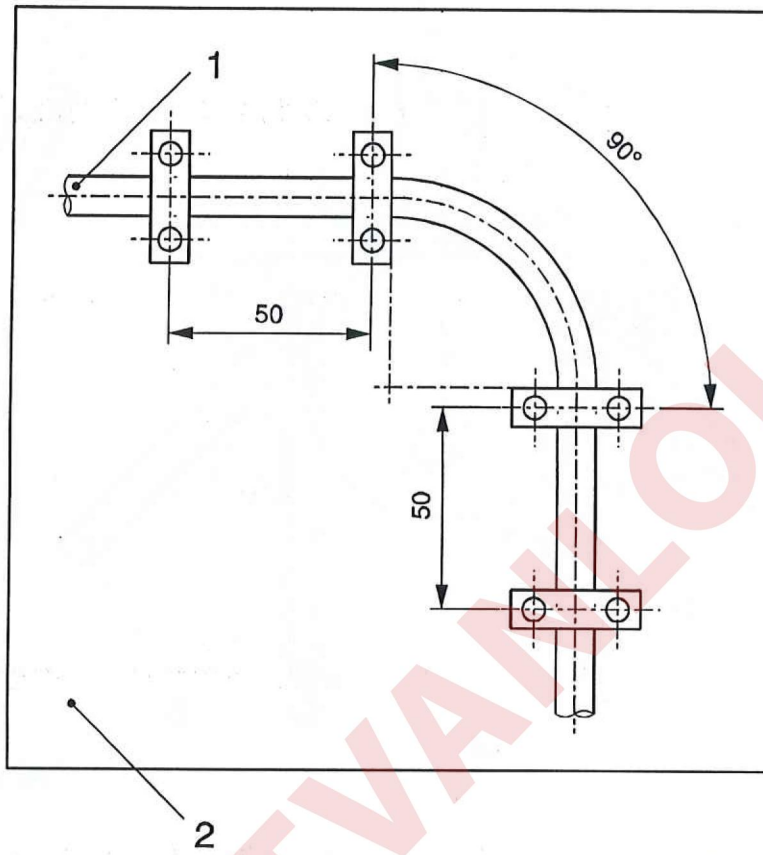
Key

- 1 Bending roller
- 2 Clamp
- 3 Sample
- 4 Bending spring
- 5 Former
- 6 Section A - A

Size	Radius to bottom of groove of former R_1 mm	Radius of arc traced out by centre of bending roller R_2 mm	Radius of groove of former and bending roller r mm	Diameter to bottom of groove of bending roller D mm
16	48	84	8,1	24
20	60	105	10,1	30
25	75	131,25	12,6	37,5

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

Figure 103 – Bending apparatus for non-metallic and composite conduit



IEC 477/02

Key:

- 1 Sample
- 2 Rigid Support

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

Figure 104 – Arrangement for collapse test

Annex A
(normative)

This annex of part 1 is applicable

Annex B
(normative)

This annex of part 1 is applicable

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