**SRI LANKA STANDARD 1082 : Part 4.1 : 2009**
**IEC 60264-4-1: 2009**

# SPECIFICATION FOR PACKAGING OF WINDING WIRES

## PART 4.1 : METHODS OF TEST – DELIVERY SPOOLS MADE FROM THERMOPLASTIC MATERIAL

***(First Revision)***

**SRI LANKA STANDARDS INSTITUTION**

**Sri Lanka Standard**

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**SRI LANKA STANDARDS INSTITUTION**

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This standard does not purport to include all the necessary provisions of a contract.

# Sri Lanka Standard
# SPECIFICATION FOR PACKAGING OF WINDING WIRES PART 4-1 : METHODS OF TEST-DELIVERY SPOOLS MADE FROM THERMOPLASTIC MATERIAL
***(First Revision)***

## NATIONAL FOREWORD

This standard was approved by the Sectoral Committee on Electric Cables and Conductors and was authorized for adoption and publication as a Sri Lanka Standard by the Council of Sri Lanka Standards Institution on 2009-10-28.

This is the first revision of **SLS 1082 : Part 4.1 : 1995** and identical with **IEC 60264-4-1:** Packaging of winding wires, Part 4-1: Methods of test – Delivery spools made from thermoplastic material Edition 2.1 2009-06, published by the International Electrotechnical Commission (IEC).

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The text of the International Standard has been accepted as suitable for publication, without deviation, as a Sri Lanka Standard. However, certain terminology and conventions are not identical with those used in Sri Lanka Standards; attention is therefore drawn to the following:

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b) Wherever the page numbers are quoted they are the page numbers of IEC standard.

c) The comma has been used as a decimal marker. In Sri Lanka Standards it is the current practices to use a full point on the base line as a decimal marker.

IEC 60264-4-1

Edition 2.1 2009-06

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Packaging of winding wires – Part 4-1: Methods of test – Delivery spools made from thermoplastic materials

## Conditionnement des fils de bobinage – Partie 4-1: Méthodes d'essai – Bobines de livraison faites de matériau thermoplastique

IEC 60264-4-1:1997+A1:2009

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IEC 60264-4-1

Edition 2.1 2009-06

# INTERNATIONAL STANDARD

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## Packaging of winding wires – Part 4-1: Methods of test – Delivery spools made from thermoplastic materials

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE CB
CODE PRIX

ICS 55.060; 29.060.10

ISBN 2-8318-1043-7

INTERNATIONAL ELECTROTECHNICAL COMMISSION

# PACKAGING OF WINDING WIRES –

# Part 4-1: Methods of test – Delivery spools made from thermoplastic materials

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International Standard IEC 60264-4-1 has been prepared by IEC technical committee 55: Winding wires.

This consolidated version of IEC 60264-4-1 consists of the second edition (1997) [documents 55/617+617A/FDIS and 55/643/RVD] and its amendment 1 (2009) [documents 55/1100/FDIS and 55/1135/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 2.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

# INTRODUCTION

This part of IEC 60264 is one of a series which deals with insulated wires used for windings in electrical equipment. The series has three groups describing:

1) Winding wires – Test methods (IEC 60851);
2) Specifications for particular types of winding wires (IEC 60317);
3) Packaging of winding wires (IEC 60264).

# PACKAGING OF WINDING WIRES –

# Part 4-1: Methods of test – Delivery spools made from thermoplastic materials

## 1 Scope

This part of IEC 60264 defines methods of test for delivery spools for winding wires made from thermoplastic materials in order to determine conformity with the established performance requirements for their properties.

## 2 General notes on methods of test

Unless otherwise specified, all tests shall be carried out within a temperature range from 15 °C to 35 °C and a relative humidity from 45 % to 75 %.

In case of dispute, the spools shall be preconditioned at a temperature of (23 ± 2) °C for 24 h.

## 3 Spool irregularities

The surface and construction shall be visually inspected.

## 4 Spool marking

The spool marking shall be visually inspected.

## 5 Mass

The mass of the spool shall be measured by an apparatus capable of determining the mass with the accuracy required in the relevant specification.

## 6 Spool dimensions

The spool dimensions shall be checked using standard measuring instruments.

## 7 True running deviation

The true running deviation of the inside faces of the flanges and of the surface of the barrel shall be determined with a measuring device as shown in Figure 1.

## 8 High temperature test

The spool shall be conditioned for a period of 4 h in an oven with forced air circulation at a temperature specified in the relevant specification.

The spool shall be allowed to cool to room temperature before the dimensional checks, as specified in clause 6, and the true running deviation checks in clause 7 are carried out.

## 9 Impact test on flanges

### 9.1 At normal ambient conditions

After conditioning the spool for a minimum of 24 h at a temperature of (20 ± 5) °C the spool shall be tested in the apparatus as shown in Figure 2.

For practical reasons the hammer shall be dropped on the flanges as indicated in either Figure 3a (cylindrical barrelled spool) or Figure 3b (taper barrelled spool) or Figure 3c (cylindrical barrelled spool with conical flanges). The hammer shall be a solid cylinder with a minimum diameter of 40 mm. The surface that strikes the flange shall be flat and smooth.

### 9.2 At low temperature

The spool shall be conditioned for a period of 24 h at a temperature specified in the relevant specification. Following conditioning, the spool shall be tested within 10 min in the apparatus as shown in Figure 2.

## 10 Deformation under load

The spool shall be subjected to a deformation test in the "as received" condition which shall be carried out at a temperature of (20 ± 5) °C, using a suitably equipped tensile machine. The spool flanges shall be clamped with the test jigs as shown in Figure 4. The half disks in each jig shall be in contact with the surface of the two sides of each flange. The clearance between the disk and the barrel, when using Figure 4a, shall be (1,5 ± 0,5) mm.

When using Figure 4b, the clearance between the disk and the barrel shall be $(0,5\ ^{+0,5}_{-0})$ mm.

When using Figure 4c for cylindrical or tapered barrelled spools with one conical flange, the clearance between the disk and the barrel for the flat flange shall be $(1,5\ ^{+0,5}_{-0,5})$ mm and for the conical flange $(0,5\ ^{+0,5}_{-0})$ mm.

The edges of the disks shall not be sharp. The deformation test shall be carried out with an initial elongation speed from 10 mm/min to 15 mm/min up to the specified load.

After the specified load is reached, the spool shall remain under load for 30 min.

When using Figure 4a, the distance between the half disks along the barrel of the spool shall then be measured.

When using Figure 4b or 4c, the spool shall be unloaded, and measured after 60 min.

## 11 Flexibility test on flanges

### 11.1 Spools with flat flanges

The test shall be carried out according to Clause 10, except that the half disks are shown in Figure 5.

The inside diameter of the half disks shall be (94 ± 0,2) % of the diameter of the flanges.

After the specified load is reached the spool shall remain under load for 30 min. The distance between the flanges at the inside diameter of the half disks of the stressed spool shall then be measured.

Sixty minutes after removing the load, the distance between the flanges shall be measured again at the same place as before.

### 11.2 Spools with conical flanges

Every single conical flange shall be tested. The flange shall be placed between the two fixing parts as shown in Figure 6.

The size "*a*" of the fixing parts shall be 0,3 times the flange diameter, and the size "*r*" of the fixing parts shall be twice the diameter of the flange. The flange shall be compressed together at a rate of 50 mm/min.

The forces necessary to get a reduction of the flange diameter of 4 %, 8 % and 14 % shall be measured.

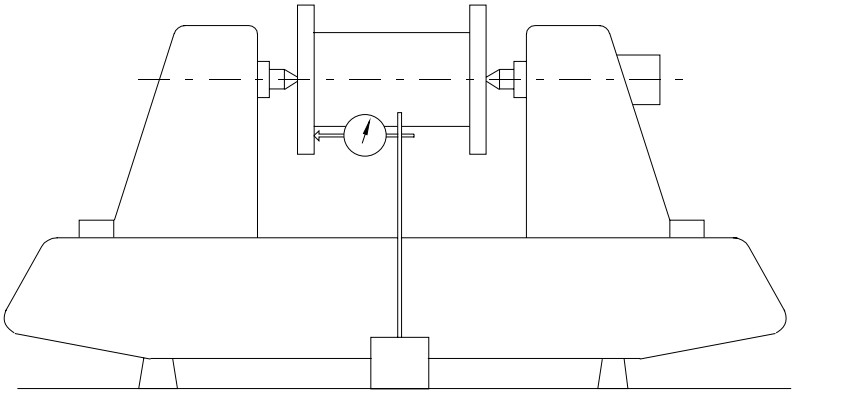


**Figure 1 – Measuring device for true running deviations**

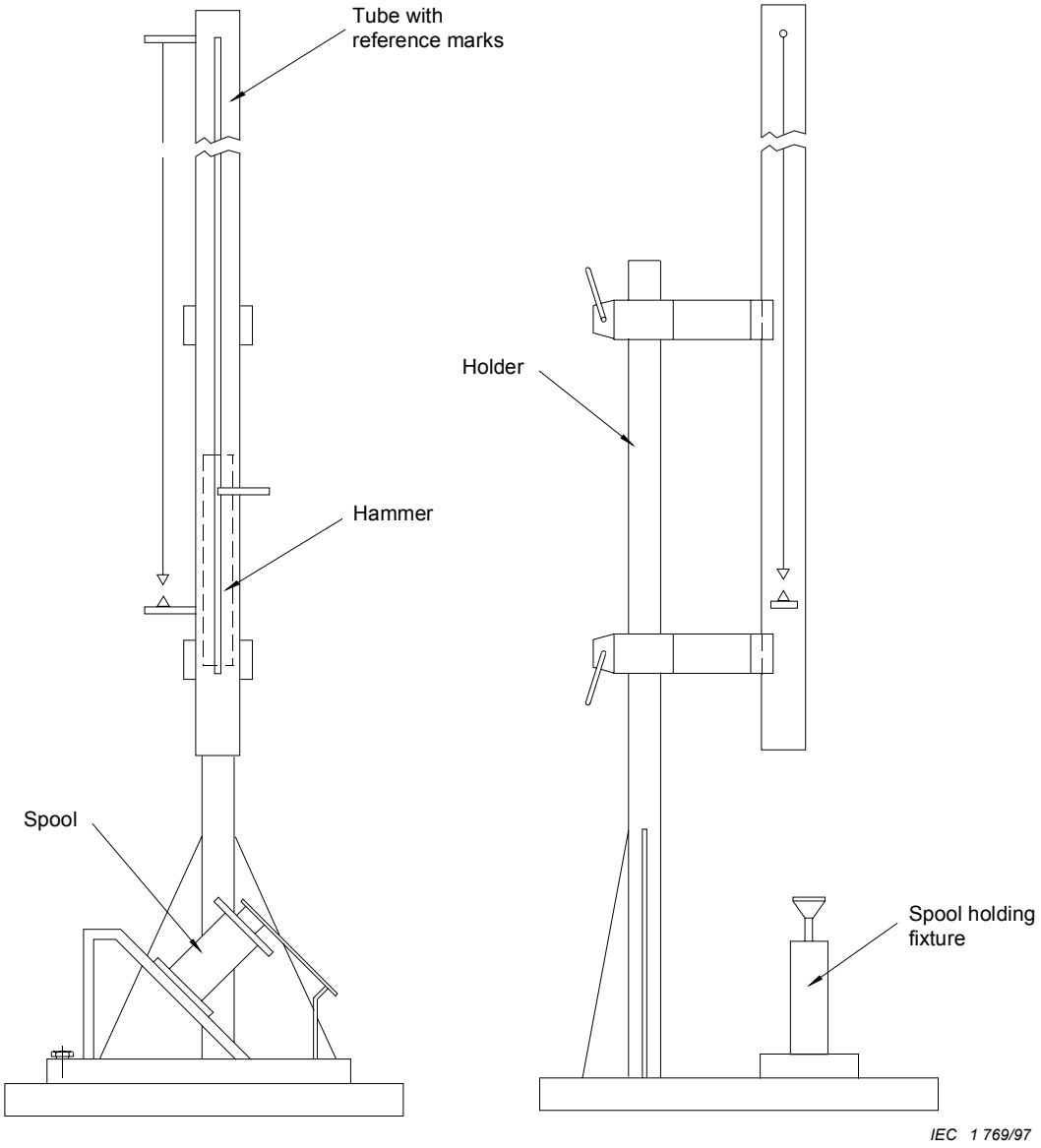


**Figure 2 – Flange impact test apparatus**

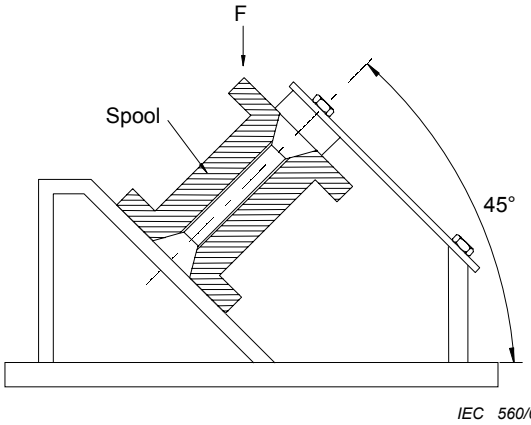


**Figure 3a – Cylindrical barrelled spool**

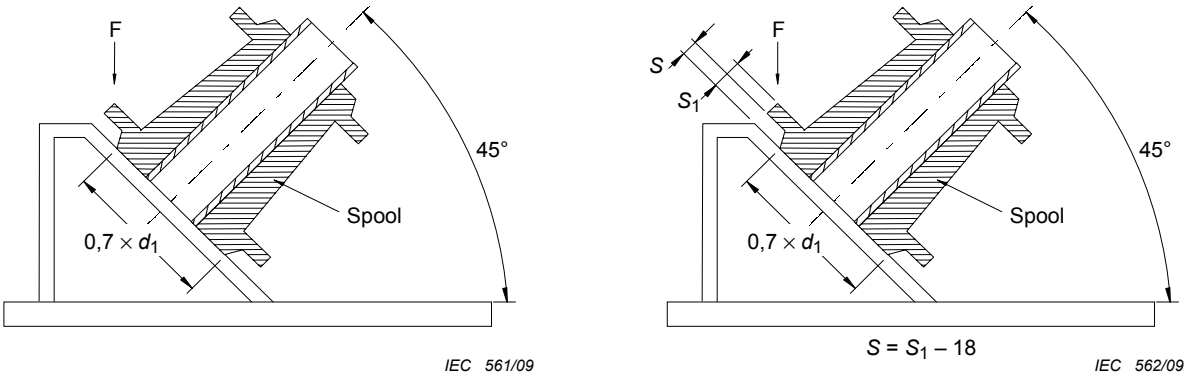


**Figure 3b – Tapered barrelled spool**

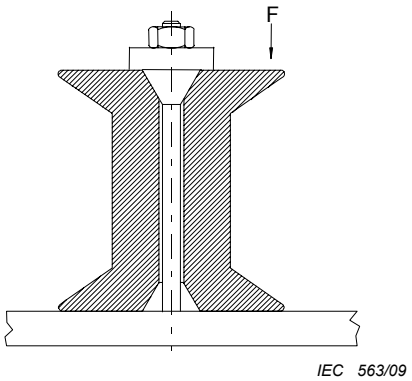


**Figure 3c – Cylindrical barrelled spool with conical flanges**

**Figure 3 – Spool holding fixture (detail of Figure 2)**

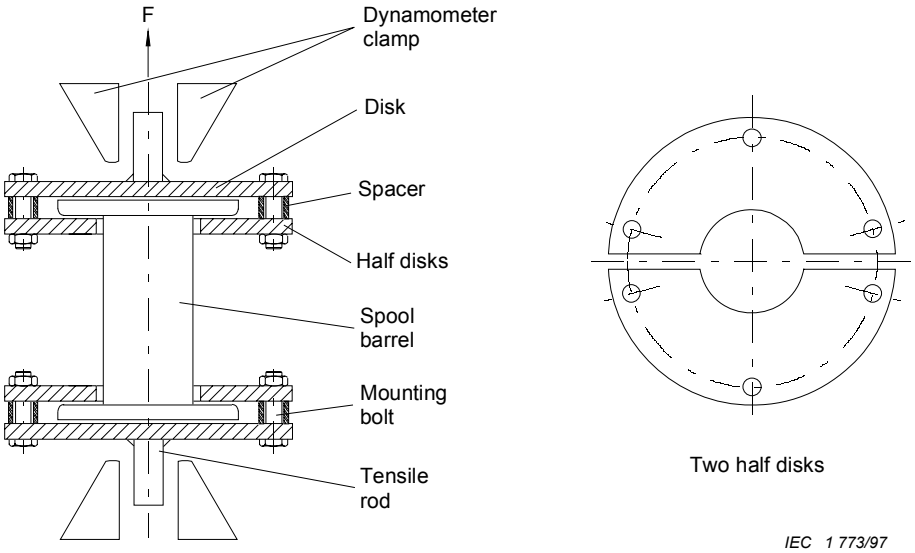


**Figure 4a – Cylindrical barrelled spool**

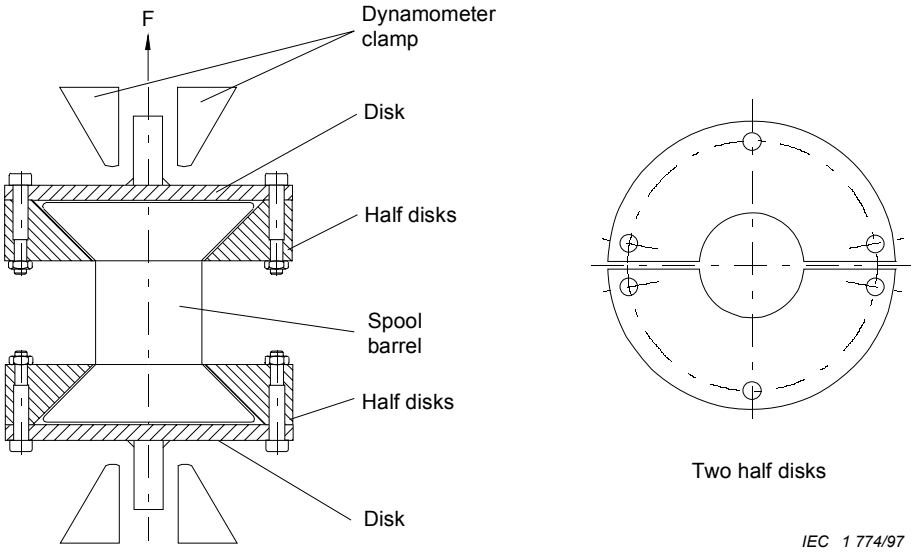


**Figure 4b – Cylindrical barrelled spool with conical flanges**

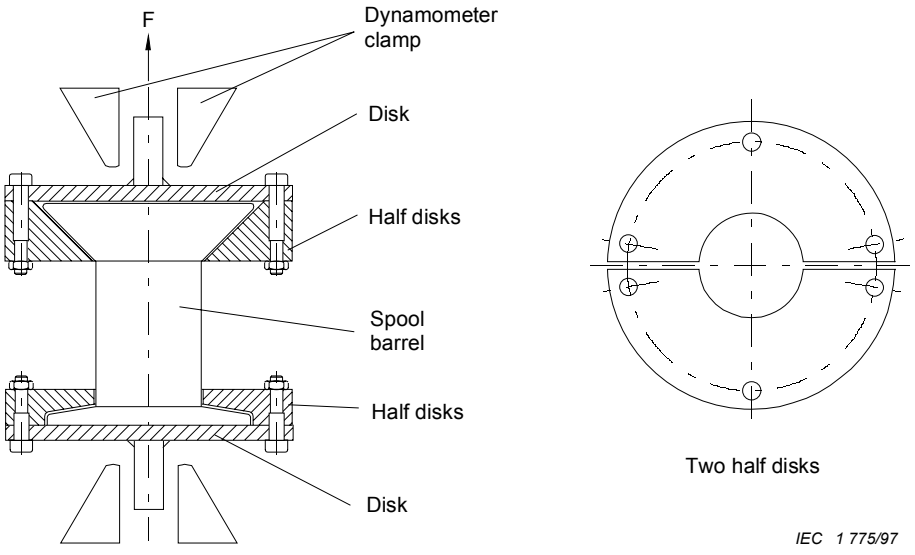


**Figure 4c – Cylindrical barrelled spool with one conical flange**

**Figure 4 – Tensile testing jig for deformation test**

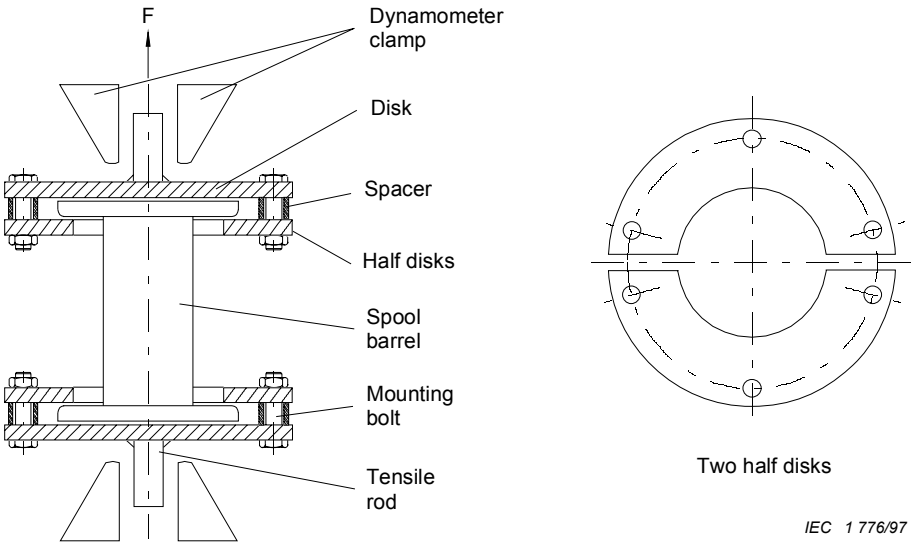


**Figure 5 – Tensile testing jig for flexibility test (flat flanges)**

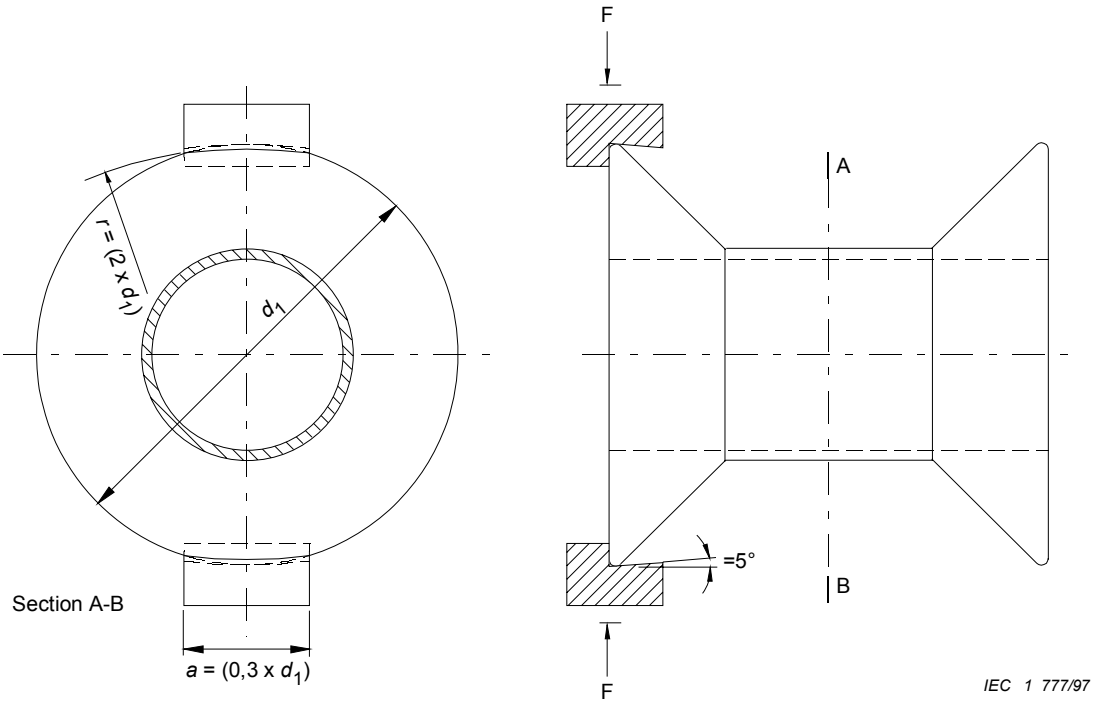


**Figure 6 – Crushing testing jig for flexibility test (conical flanges)**

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