IEC 61300-3-25

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-25: Examinations and measurements – Concentricity of the non-angled ferrules and non-angled ferrules with fibre installed

Dispositifs d'interconnexion et composants passifs à fibres optiques – Procédures fondamentales d'essais et de mesures – Partie 3-25: Examens et mesures – Concentricité des férules sans angle et des férules sans angle avec fibre montée

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – BASIC TEST AND MEASUREMENT PROCEDURES –

Part 3-25: Examinations and measurements – Concentricity of the non-angled ferrules and non-angled ferrules with fibre installed

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International Standard IEC 61300-3-25 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 1997 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) reconsideration of method A with the idea of applying a signal processor;

b) introduction of two new annexes (A and B).

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

CDV	Report on voting
86B/3548/CDV	86B/3631/RVC

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 2.

A list of all the parts of IEC 61300 series, under the general title, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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- withdrawn,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.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – BASIC TEST AND MEASUREMENT PROCEDURES –

Part 3-25: Examinations and measurements – Concentricity of the non-angled ferrules and non-angled ferrules with fibre installed

1 Scope

This part of IEC 61300 describes the procedure to determine the concentricity of the axis of the bore in a non-angled ferrule with the axis of the ferrule, or in the case of non-angled ferrules with fibre installed, to determine the concentricity of the axis of the fibre core with the axis of the ferrule.

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.

ISO 2538, *Geometrical product specifications (GPS) – Series of angles and slopes on wedges and prisms*

3 General description

3.1 General

This procedure describes the measurement of concentricity of ferrules and ferrules with assembled fibres. Concentricity is defined as twice the distance between the axis of the ferrule and axis of inner diameter of the ferrule (ferrule bore), or in the case of ferrules with fibre installed twice the distance between the axis of the ferrule and the axis of the core of the installed fibre (see Figure 1). When concentricity measurements are made with fibre installed the results will be affected by geometry of the fibre and the fit of the fibre in the ferrule inner diameter. Imperfections to cylindricity and circularity of the outside diameter of the specimen will influence the measurement results.

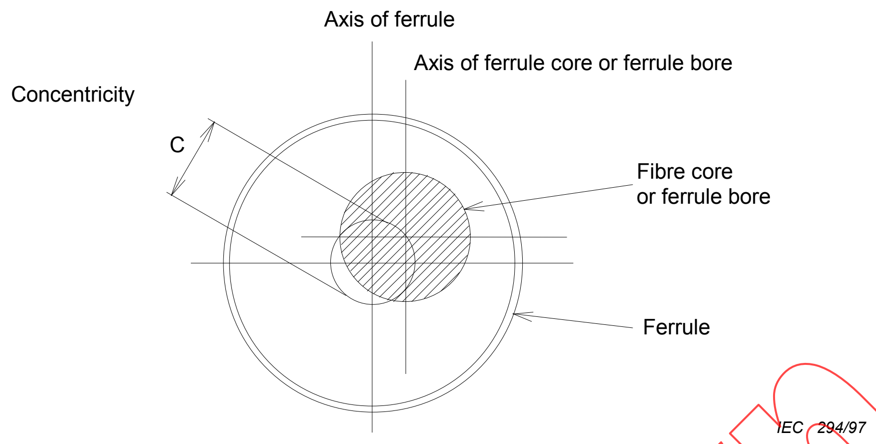


Figure 1 – Definition of concentricity misalignment

Three methods of measuring concentricity are described as follows:

3.2 Method A: Ferrule surface reference method (reference test method)

In this method the ferrule or ferrule with fibre installed is placed in a "V-groove" or centring mechanism, and rotated. The displacement of the ferrule inner diameter or fibre core is observed and the concentricity determined.

3.3 Method B: Core centre reference method in fibre assembled ferrule

This method uses a roundness measuring instrument to measure concentricity. In this method, the core axis is fixed at the axis of the measuring instrument and the concentricity is determined by measuring, usually with a probe, the displacement of the outer diameter of the ferrule as the ferrule is rotated.

3.4 Method C: Ferrule bore reference method for bare ferrule

This method uses a dial test indicator (DTI) to measure concentricity. In this method the axis of the ferrule bore is fixed at the axis of the measuring instrument and the concentricity is determined by measuring, usually with a probe, the displacement of the outer diameter of the ferrule as the ferrule is rotated. This method is only applied to the ferrules without fibre installed and typically used for multimode fibre ferrules.

4 Apparatus

4.1 Method A

– V-groove or centring mechanism (for example air gauge) mounted on a micro-manipulator. According to ISO 2538, the preferred angle for a V-groove is 108°
– Microscope with video camera
– Monitor
– Light source. A lamp is suitable for this procedure
– Signal processor (optional)

4.2 Method B

– Roundness measuring instrument with microscope
– Light source. A lamp is suitable for this procedure

4.3 Method C

– Electric roundness measuring instrument

The equipment shall have two tapered spindles to mount the ferrule. The tips of the two spindles shall be aligned precisely to the rotation axis. The roughness of the tip of the spindles shall be specified in the relevant specification.

5 Procedure

5.1 Method A

a) Clean the ferrule bore thoroughly to assure it is free of dirt, burrs or other obstructions. Place the ferrule in the V-groove or centring mechanism as shown in Figure 2.

b) Illuminate the bore or the fibre.

c) Position the ferrule in the centre of the target circle on the monitor using the micro-manipulator. If a signal processor is used, locate the ferrule bore centre using method described in Annex A or the fibre core centre using method described in Annex B.

d) Rotate the ferrule through 180°.

e) If a signal processor is used, locate the ferrule bore centre using the method described in Annex A, or the fibre core centre using the method described in Annex B.

f) Record the maximum displacement C of the fibre core image of the ferrule inner diameter.

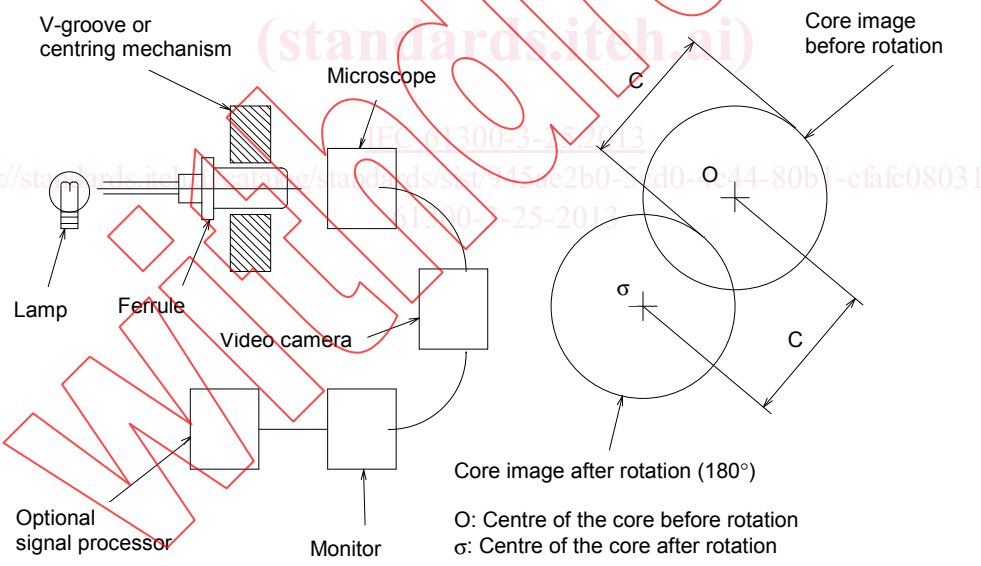


Figure 2 – Example of set-up for concentricity measurement (method A)

5.2 Method B

a) Mount the ferrule assembly on the roundness measuring instrument as shown in Figure 3.

b) Using an X-Y table on the roundness measuring instrument, the ferrule position is adjusted so that the centre of the fibre core is set exactly at the centre of the rotation axis. The centre of the core is estimated by illuminating the core from the other end of the fibre.

c) Contact the pick-up of the roundness measuring instrument to the ferrule outer surface so as to measure the displacement of the outer surface of the ferrule as the ferrule is rotated.

d) Rotate the specimen a minimum of 360° and record the maximum reading from the roundness gauge as C_1 and the minimum reading as C_2. Concentricity of the part is the difference between the maximum and minimum values ($C = C_1 - C_2$; see Figure 3).

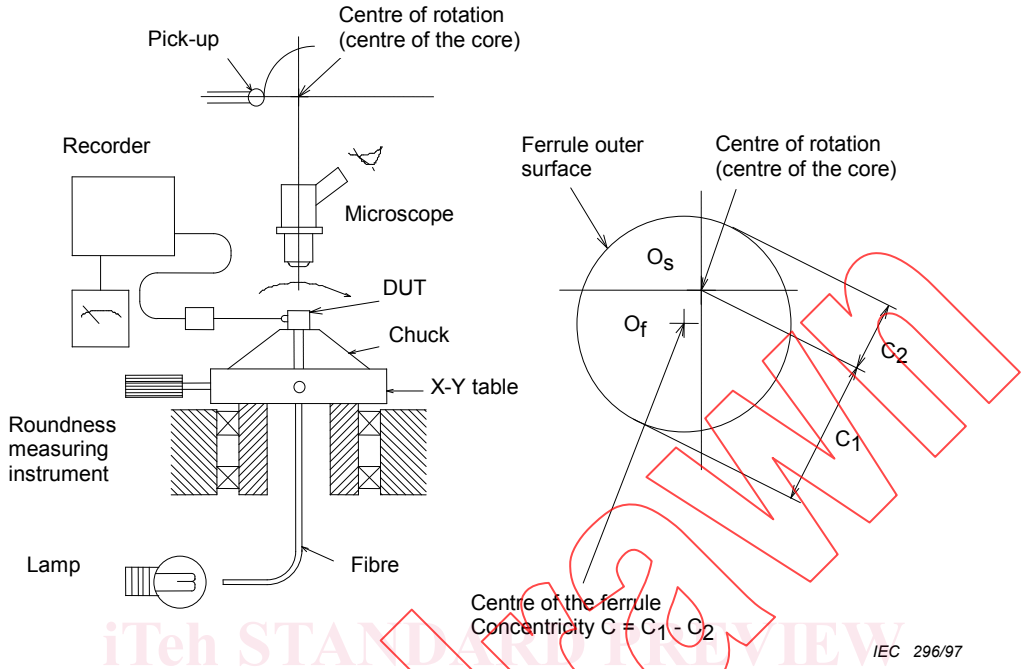
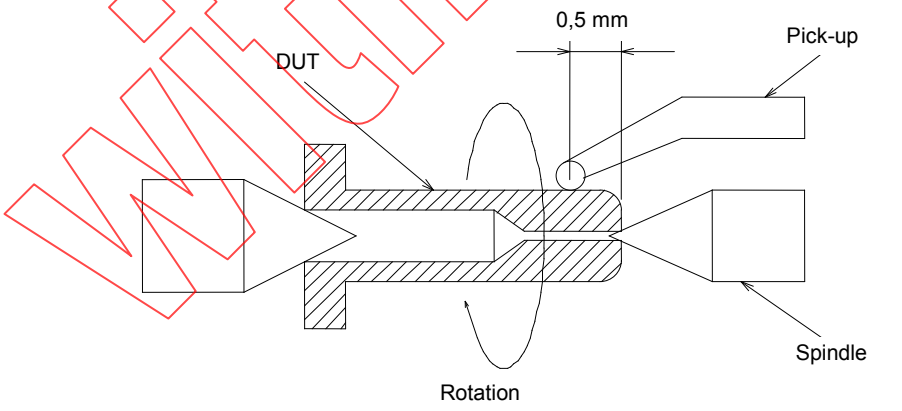


Figure 3 – Example of set-up for concentricity measurement (method B)

5.3 Method C (only applicable to ferrules without fibre installed)

Support the ferrule with two tapered spindles against the bores as shown in



a) Figure 4.

b) Contact the pick-up of the roundness measuring instrument to the ferrule outer diameter surface so as to measure the displacement of the outer diameter of the ferrule as the ferrule is rotated.

c) Rotate the specimen a minimum of 360° and record the maximum reading from the roundness measuring instrument as C_1 and the minimum reading as C_2. Concentricity of the part is the difference between the maximum and minimum values.

6 Details to be specified

6.1 Method A

The following details, as applicable, shall be specified in the relevant specification:

– Allowable concentricity
– Magnification of the microscope
– Deviation from the test procedure
– Measurement uncertainty

6.2 Method B

The following details, as applicable, shall be specified in the relevant specification:

– Allowable concentricity
– Accuracy of dial test indicator (DTI)
– Roughness of the top of the spindles
– Deviation from the test procedure
– Measurement uncertainty

6.3 Method C

The following details, as applicable, shall be specified in the relevant specification:

– Allowable concentricity
– Accuracy of the recording instrument
– Roughness of the top of the spindles
– Deviation from the test procedure
– Measurement uncertainty