INTERNATIONAL STANDARD

IEC 61300-3-16

Second edition
2003-01

**Fibre optic interconnecting devices and passive components –
Basic test and measurement procedures –**

**Part 3-16:
Examinations and measurements –
Endface radius of spherically polished ferrules**

*Dispositifs d'interconnexion et composants passifs à fibres optiques –
Méthodes fondamentales d'essais et de mesures –*

*Partie 3-16:
Examens et mesures –
Rayon de la face terminale des embouts polis sphériquement*

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CONTENTS

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Part 3-16: Examinations and measurements – Endface radius of spherically polished ferrules

FOREWORD

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International Standard IEC 61300-3-16 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition of IEC 61300-3-16 cancel and replaces the first edition published in 1995. It constitutes a technical revision.

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

FDIS	Report on voting
86B/1746/FDIS	86B/1772/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.

IEC 61300 consists of the following parts, under the general title: *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures:*

– Part 1: General and guidance
– Part 2: Tests
– Part 3: Examinations and measurements

The committee has decided that the contents of this publication will remain unchanged until 2007. 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- withdrawn;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 3-16: Examinations and measurements – Endface radius of spherically polished ferrules

1 Scope

This part of IEC 61300 describes a procedure to measure the endface radius of a spherically polished ferrule and angled ferrule or an angled spherically polished ferrule.

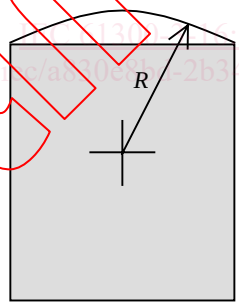
2 Normative reference

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.

None.

3 General description

The ferrule endface radius R is defined as the radius of curvature of the portion of the endface which is domed for physical contact. It is assumed that the endface is spherical, although in practice the endface is often aspherical (see figure 1).



IEC 2657/02

Figure 1 – Radius of curvature of the endface

Three methods are described in this standard for measuring the radius of curvature:

a) method 1: analyzing the endface with a two-dimensional surface analyzer;

b) method 2: analyzing the endface with a two-dimensional interferometry type surface analyzer;

c) method 3: analyzing the endface with a three dimensional interferometry type surface analyzer.

(Method 3 is a reference method.)

4 Apparatus

4.1 Method 1 – Two-dimensional surface analysis

The apparatus shown in figure 2 consists of a suitable ferrule holder, a positioning stage and a two-dimensional surface analyzer.

4.1.1 Ferrule holder

This is a suitable device to hold the ferrule in a fixed vertical position, or tilted in the case of an angled ferrule type.

4.1.2 Positioning stage

The ferrule holder is fixed to the positioning stage, which shall enable the holder to be moved to the appropriate position. The stage shall have sufficient rigidity to allow the ferrule endface to be measured accurately.

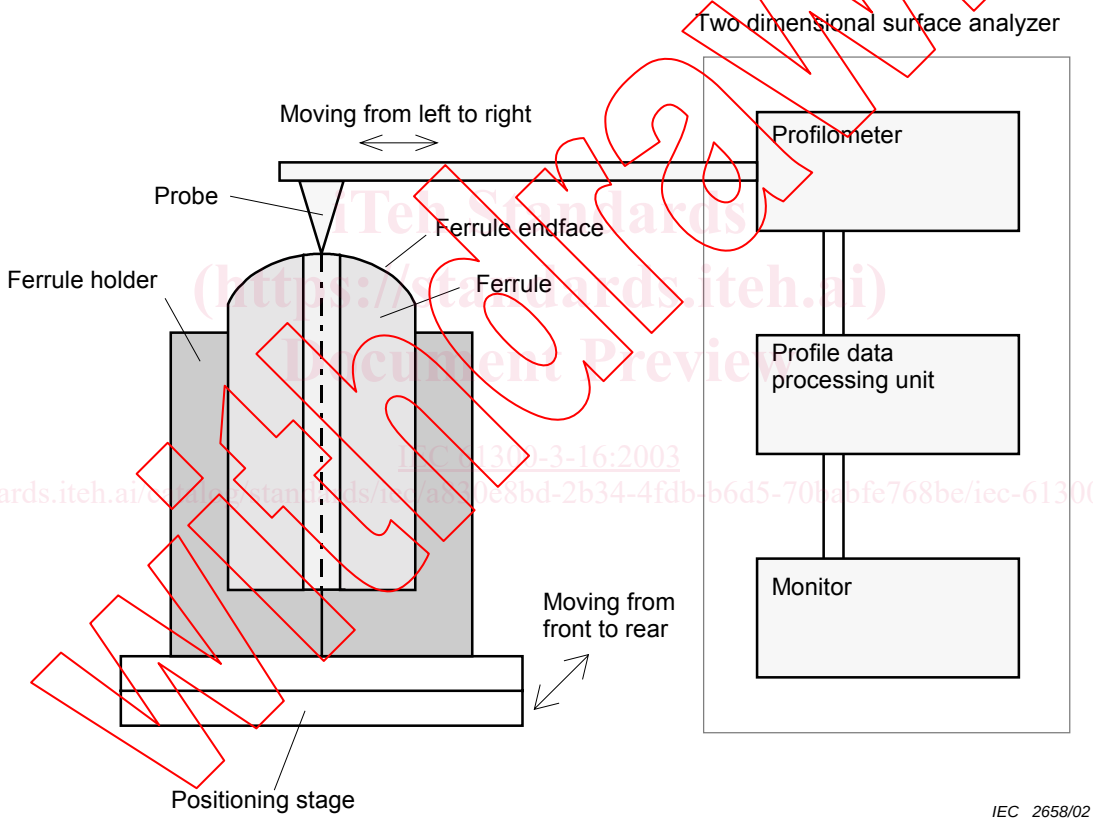


Figure 2 – Apparatus for two-dimensional surface analysis

4.1.3 Two-dimensional surface analyzer

The two-dimensional surface analyzer shall have an ability to measure the radius of curvature with an accuracy better than ±0,1 mm. The analyzer shall consist of a profilometer, a profile data processing unit and a monitor.

The profilometer shall be equipped with a wedge-shaped type probe. The motion of the probe shall be perpendicular to the ferrule axis.

The profile data processing unit shall be able to process the profile data so as to measure the radius of curvature: the unit calculates an ideal circle fitted to the spherical ferrule endface

from the measured profile data, and calculates a converted data from the measured profile data by extracting the ideal circle data.

The monitor shall display the measured and the calculated profiles.

4.2 Method 2 – Two-dimensional surface analysis by interferometry system

An apparatus is shown in figure 3. The apparatus consists of a suitable ferrule holder, a positioning stage and a two-dimensional interferometry analyzer.

4.2.1 Ferrule holder

This is a suitable device to hold the ferrule in a fixed vertical position (or tilted in the case of an angled ferrule type).

4.2.2 Positioning stage

The ferrule holder is fixed to the positioning stage, which shall be able to move the holder to the appropriate position. The stage shall have sufficient rigidity to allow the ferrule endface to be measured accurately.

4.2.3 Two-dimensional interferometry analyzer

The two-dimensional interferometry analyzer shall have the ability to measure the radius of curvature with an accuracy better than ±0,1 mm. The analyzer shall consist of a microscope unit with a monochromatic light source, an image data processing unit and a monitor.

The microscope unit shall consist of an interference microscope equipped with a video camera to send the interference image of the ferrule surface to the video board of the image data processing unit.

The image data processing unit shall be able to process a row (or a group of adjacent rows to cover a narrow stripe) of the video image passing across a fibre diameter. The unit calculates the characteristic parameters (frequency and phase) of the interference light intensity curve of the analyzed row by fitting the acquired data with a theoretical function. The radius of curvature is evaluated from the phase shift of the interference fringes in the ferrule zone. The system must be able to recognize the 2π phase shifts.

The monitor shall display the light intensity curve, the fitting functions and the measurement results.

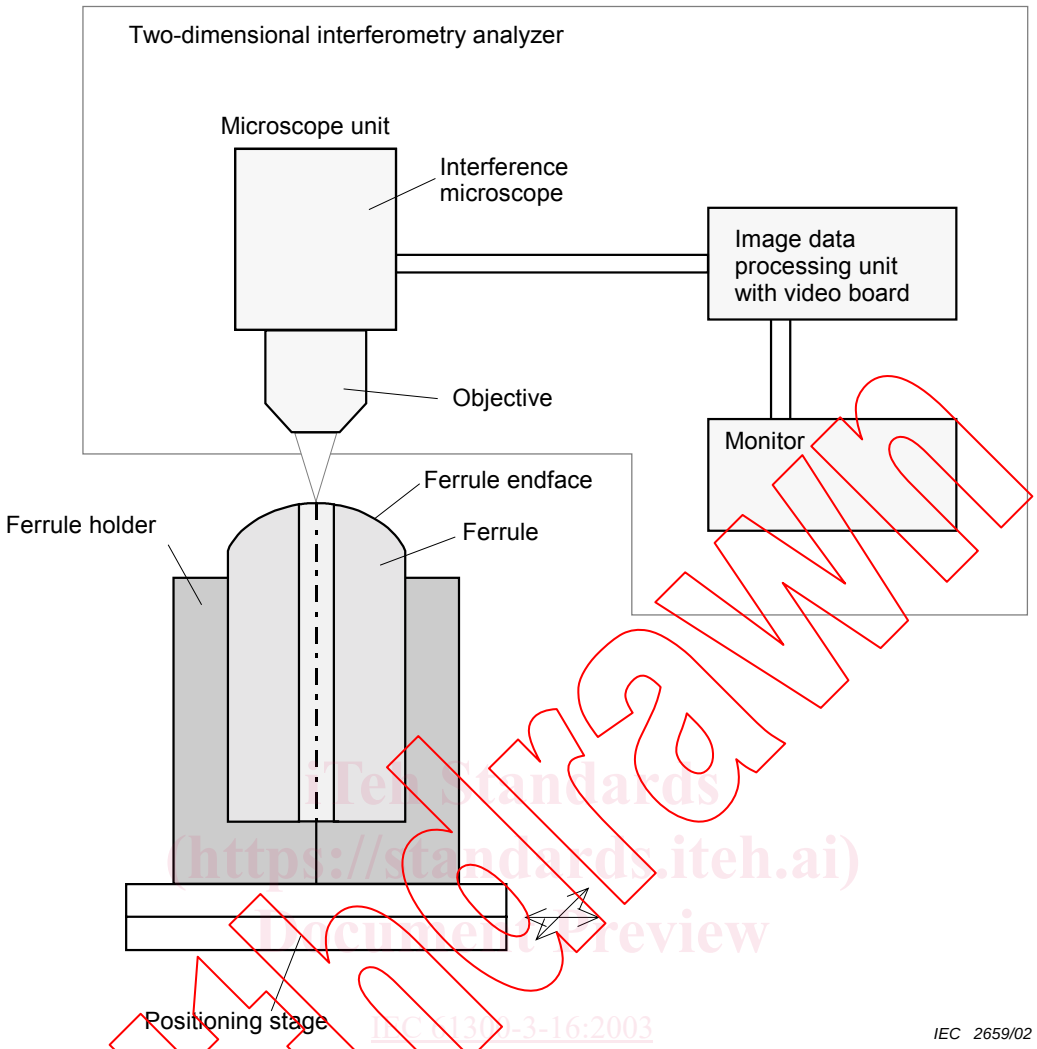


Figure 3 – Apparatus for two-dimensional surface analysis by interferometry system

4.3 Method 3 – Three-dimensional surface analysis by interferometry system

The apparatus shown in figure 4 consists of a suitable ferrule holder, a positioning stage and a three-dimensional interferometry analyzer.