INTERNATIONAL STANDARD

ISO 17901-2

First edition
2015-07-01

Optics and photonics — Holography —

Part 2: Methods for measurement of hologram recording characteristics

Optique et photonique — Holographie —

Partie 2: Méthodes de mesurage des caractéristiques d'enregistrement holographique

Reference number
ISO 17901-2:2015(E)

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Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Symbols and abbreviated terms ... **2**

5 Principles ... **2**

6 Measurement methods ... **3**
6.1 General ... 3
6.2 Definition of the Coordinate System ... 4
6.3 Hologram recording environment ... 4
6.4 Measurement device and apparatus ... 4
6.5 Exposure characteristics curve measurement method for recording of the hologram ... 6
6.6 Exposure at half-maximum measurement method for recording of the hologram ... 6
6.7 Method to measure the R-value of the hologram ... 7
6.8 Method to measure the amplitude of refractive index modulation of the hologram ... 7
6.8.1 General ... 7
6.8.2 Measurement using the transmission hologram ... 8
6.8.3 Measurement using the reflection hologram ... 8

7 Description of measurement results ... **9**
7.1 General ... 9
7.2 Description of the information concerning the object to be measured ... 9
7.3 Description of the measurement results on the exposure characteristics curve and exposure at half-maximum for hologram recording ... 9
7.4 Description of the R-value measurement result of the hologram ... 9
7.5 Description of the measurement result of refractive index modulation of the hologram ... 10

Annex A (informative) **Assembly procedure and stability confirmation of hologram recording optical system based on double-beam interference** ... **13**

Annex B (informative) **Hologram recording procedure** ... **15**

Annex C (informative) **Relationship between the hologram and interference fringes due to double-beam interference** ... **16**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 172, *Optics and Photonics*, Subcommittee SC 9, *Electro-optical systems*.

ISO 17901 consists of the following parts, under the general title *Optics and photonics — Holography*:

— *Part 1: Methods of measuring diffraction efficiency and associated optical characteristics of holograms*

— *Part 2: Methods for measurement of hologram recording characteristics*

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Introduction

A hologram is an optical device utilizing interference and applied in numerous fields. In order to know the exposure characteristics of materials on which the hologram is to be recorded, it is enough to initially record the hologram under common conditions and subsequently establish the numeral values representing exposure characteristics by measuring the diffraction efficiency. Though the hologram-related terms and the measurement method of critical evaluation parameters (diffraction efficiency, angular selectivity, wavelength selectivity) pertinent to optical characteristics are specified in ISO 17901-1, there is no stipulation as to the conditions concerning hologram recording or the way to calculate the numeral values. Therefore, the purpose of this part of ISO 17901 is to provide the terms and measurement method concerning the hologram exposure characteristics. This part of ISO 17901 does not intend to restrict manufacturing process.

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Optics and photonics — Holography —

Part 2: Methods for measurement of hologram recording characteristics

1 Scope

This part of ISO 17901 specifies the terms and measurement method concerning exposure characteristics (exposure characteristic curve, exposure at half-maximum, R-value, amplitude of refractive index modulation) for the hologram recorded by double-beam interference. The materials of hologram to be measured are not restricted to any particular ones. This part of ISO 17901 does not intend to restrict manufacturing process.

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 15902, *Optics and photonics — Diffractive optics — Vocabulary*

ISO 17901-1:2015, *Optics and photonics — Holography — Part 1: Methods of measuring diffraction efficiency and associated optical characteristics of holograms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15902, ISO 17901-1, and the following apply.

3.1
exposure
product of the laser beam irradiance and exposure time on the recording material surface, when the hologram is to be recorded on the recording material

Note 1 to entry: Exposure is represented in Joules per square meter (J/m^2) in the SI unit system, but may also be expressed in micro-Joules per square centimetre ($\mu J/cm^2$) or milli-Joules per square centimetre (mJ/cm^2).

Note 2 to entry: If the object wave or reference wave enters the detector obliquely in the course of the measurement of the irradiance, the value of irradiance might not be measured correctly because of reflection on the surface of the detector. In such an event, it is enough to allow the object wave or reference wave to enter the detector in an approximately vertical direction to measure the radiant flux and then to divide the obtained value by the flux sectional area on the recording material surface.

3.2
exposure characteristics curve
<of the hologram> curve of measured values plotted with the exposure taken on the axis of abscissa and the diffraction efficiency taken on the axis of ordinate, which indicate the characteristics of hologram recording materials

Note 1 to entry: This curve is also called η -E characteristics curve.

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