TECHNICAL REPORT

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Ophthalmic optics — Spectacle lenses — Parameters affecting lens power measurement

Optique ophtalmique — Verres de lunettes — Paramètres affectant le mesurage de la puissance de la lentille

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 28980 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

Ophthalmic optics — Spectacle lenses — Parameters affecting lens power measurement

1 Scope

The purpose of this Technical Report is to explain the changes relating to power measurements in the revised editions of ISO 8980-1 [6] and ISO 8980-2 [7].

In order to illustrate the issues raised, an inter-laboratory power measurement study was conducted on ten different lenses measured by nine organizations worldwide. Twenty-five focimeters of different types were used. The test lenses were spherically powered allyl diglycol carbonate (ADC)[1)] hard resin lenses surfaced to –4,00 D, –2,00 D, 0,00 D, +2,00 D, and +4,00 D, each with an addition power of 2,50 D. Five were D28 bifocals and five were progressive power lenses. The measurements were front distance power, front near power, back distance power and back near power, for each lens and for each focimeter used. Each lens was measured nine times: five measurements taken without repositioning the lens and four measurements taken with the lens repositioned each time.

The assessed parameters were divided into three categories:

— discrepancies due to focimeter design and measurement methods;

— systematic errors;

— random errors.

For each parameter, experimental results are given, as well as theoretical ones when needed. Measurement data include front distance portion power, front near portion power, back distance portion power and back near portion power.

NOTE The results of all measurements are available on the ISOTC Server at the address given in the Bibliography[8].

Unless stated otherwise, in order to show relevant information, the results shown are for the D28 bifocals when no different behaviour was found for the progressive power lenses.

2 Discrepancies due to different focimeter designs and measurement methods

2.1 Focimeter design

Traditional manual focimeters have relied on the user adjusting the instrument to obtain the clearest focus of the test mire. All these instruments are based on the “Focus on Axis” (FOA) design, in which the focal point of the focimeter remains on the axis of the focimeter when the lens under test is measured at a point of the lens where the prism is not zero.

Some automated focimeters also use this optical design, but many use the “Infinity on Axis” (IOA) design, in which the collimated beam coincides with the focimeter axis and the focal point of the focimeter goes off the

1) ADC is often referred to by its original trade name, CR-39®.