FOR IMMEDIATE ACTION

Letter Ballot: OEOSC/OP
Ballot No.: 2012-2 Adoption of OP1.004
Issued: May 30, 2012
Date Due: June 30, 2012

OEOSC ASC OP, Committee for Optics and Electro-Optical Instruments

Title: BSR/OEOSC OP1.004, Proposed American National Standard for Optics and Electro-Optical Instruments – Optical Elements and Assemblies – Optical Wavefront Measurement.

Question: Do you approve the adoption of BSR/OEOSC OP1.004 as an American National Standard?

O Affirmative Comments, if any :

● Negative w/reasons: See second sheet.

O Abstain w/reasons:

Enter comments in the space provided. Include another sheet if your comments exceed this space. All negative votes and abstentions must be accompanied by an explanation.

Mail or email your response to

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Signature

6/21/2012
Date

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I have several issues with the standard as written, general and specific. I'm coming into this late in the process, so I don't know what earlier discussion has been, but I believe users of the standard may have similar issues.

General

(1) Section 3 is titled Terms and Definitions, but much of the content of Section 4 is also written in the form of definitions. This was confusing to me. If the standard is to have a Terms and Definitions section, then most, if not all, definitions should be included in it. Otherwise, define the terms at the point where they are used and omit the Terms and Definitions section. The paragraphs of Section 4 that are written in the form of definitions could be written in a more typical expository style, as would be used in a technical article.

(2) In view of the emphasis given to uncertainty, I suggest that instead of including measurement uncertainty under Section 4, that a separate section be devoted to uncertainty.

Specific

(1) The standard requires the surface error to be called out in SI units, but allows an alternate form in which the error is called out in fringes with an indication of the measurement wavelength (Section 6). I believe the preferred approach should be to call out the surface error in waves with an indication of the measurement wavelength. This conforms more closely with current practice.

(2) The standard should address drawing indications to remove the ambiguity as to whether a transmitted wavefront error specification should be interpreted as single-pass or double-pass.

(3) Subsection 4.7 addresses Slope, but Subsection 4.8 only refers to Units of Measure for deformations. Should 4.8 also give preferred units for slope?

(4) Subsection 4.7 says that the default measure of slope is RMS slope error. I suggest that the default be PV slope. The forms of surface error that are intended to be controlled by slope error (ripple, zonal irregularity) have significant localized slope error. An RMS slope specification may not control localized or centralized slope errors effectively.

(5) Section 4.2.12 lists common names for the Zernike polynomials, but only a few of them. There are also names for many of the other polynomials (e.g., tetrafoil, pentafoil, hexafoil). Perhaps these are not as commonly used, but could be included.

(6) The note in Section 3.4 states that PV shall be interpreted as PVr. I have reservations about this. This is likely ok when random noise is a significant factor in the measurement (which is the purpose of PVr), but sometimes the form of error simply cannot be fitted accurately with Zernike polynomials. For example, a surface or wavefront might have large local zonal errors, error near the center of the aperture, or radial. In these cases, PVr can exceed PV. I suggest the standard allow the customer to decide whether to use PV or PVr.

(7) The discussion of coverage factor

(8) In Annex A, the last sentence of paragraph 5 says:

"Small values of k (for equal measurement uncertainty at vendor and customer), lead to larger probabilities that a part shipped (correctly) by a vendor as conforming to specification will be rejected (correctly) by the vendor as non-conforming."

If I understand the intent, this should read:

"Small values of k (for equal measurement uncertainty at vendor and customer), lead to larger probabilities that a part shipped (correctly) by a vendor as conforming to specification will be rejected (correctly) by the ~~vendor~~ customer as non-conforming."

(9) In the titles of 4.6.2 and 4.6.3, the same abbreviation (RIFi) is used for both rotationally invariant and varying irregularity. The latter should probably be RVFi.

(10) Subsections 4.2.8 and 4.2.10 should have unique titles that differentiate their content.

(11) The text in the definition of PVr in Subsection 4.3 does not indicate that PVr is the PV of the 36 term Zernike fit. (The mathematical expression does, but not the text.)

(12)In Annex A, I believe the second paragraph should read as follows:

Where conformance with a specification is to be proven, expanded measurement uncertainty reduces the specification zone to the conformance zone and shall always be applied in the interest of the customer purchasing the part.