MEASUREMENT OF BIFOCAL LENSES ON A LENSOMETER

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Procedure:

1) With the concave surface of the lens against the positioning tube of the Lensometer, the distance power is measured in the usual manner. This is Reading No. 1.

2) The convex side of the lens is now placed against the positioning tube of the Lensometer. The lens is moved upward until the point of measurement is as close as possible to the optical center of the segment alone. The reading in each meridian is taken at this point. This is Reading No. 2. Auxiliary prisms may be inserted in the prism holder in order to bring the target to the center of the reticule.

(3) The lens is now moved downward until the point of measurement is the same distance above the distance center that the segment center is below the distance center. The readings for each meridian are again taken. This is Reading No. 3.

(4) The difference between Reading No. 2 and Reading No. 3, meridian by meridian, gives the value of the bifocal addition.

An incorrect method of measurement can lead to large errors in measuring the power of the bifocal segment. This is particularly true in the case of Cataract lenses, but it is very important that the above method be faithfully followed for measuring all bifocals, if accurate results are to be obtained.

It might be well to point out that when lenses are measured by the above method, the actual readings before they are differenced bear no relation to what the patient sees. Large errors will be found even in corrected lenses. This is because a patient wearing the lens views a near object and, therefore, the light is not parallel as it enters the lens. On a Lensometer, however, the light is parallel and the lens is turned around with respect to the direction of the light and angled very differently with respect to the axis of the Lensometer than it is with respect to the patient's line of sight as he used the reading segments.

The primary objective in filling a prescription is to reproduce the optics which were presented to the patient during his refraction. The object of measuring a finished prescription lens, therefore, is to determine whether or not it has reproduced the optics of the refraction.

The Lensometer measures "effective power" with parallel light entering one surface of the lens. For this reason, this effective power will give a true picture of what the patient sees for distant vision. The actual Lensometer "effective power" of a prescription for near is seldom known and it does not enter into the prescription. What is known is that a plus lens of a certain value is

added on to the front of the distance prescription. In measuring a bifocal addition, therefore, we want to determine the power of this plus lens alone (the segment) and not the power of the combined reading and distance portions.

The question is often raised as to how this is accomplished by reversing the lens on the Lensometer. Perhaps this can best be seen by considering a lens with a plano distance portion. When the lens is placed with the convex surface of the lens on the positioning tube of the Lensometer, parallel light is entering one side of the segment. This being the case, the power which is read on the Lensometer wheel will be exactly the effective power of the segment alone. As was pointed out above, this is what we are trying to measure. When there is power in the distance portion, this can be represented by merely changing the rear curve of the lens. This change has the same effect on both the reading through the segment (Reading No. 2) and the reading at the point above the distance center (Reading No. 3). When these readings are subtracted one from the other, this effect completely cancels out, leaving again the power of the segment alone.

The question comes to mind regarding the errors in the effective reading refraction when the segment is placed on the ocular surface. Errors do exist, though not as large as one might at first think. For a +7.00 distance prescription and a +2.50 addition, for example, the effective reading refraction is approximately 0.06D weaker than if the segment were placed on the front. This means that the patient would have to move his newspaper less than half an inch to compensate for this error. Weaker prescriptions and weaker additions introduce smaller errors. Because this error is slight it becomes advisable to measure Ultex-type bifocals with the convex side on the positioning tube of the Lensometer, thus introducing only one method of checking bifocal additions.

The comments in this discussion are especially significant when Cataract lenses are considered. It is important in such prescriptions that the segment be placed on the front of the lens to eliminate the errors just discussed, as well as other errors.