

FEATURES OF ASSEMBLY AND ADJUSTMENT OF LENS OBJECTIVES

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ABSTRACT

To reduce the impact of mating clearances and of other deviations of the parts on alignment of lenses relative to the reference axis of their cells, the use of reference surfaces at cells and lenses or the method of alignment of lenses in the process are common. Clearances result in a shift to the reference axis of the optical system. The amount of misalignments caused by clearances of lens components in barrel type optical systems considerably depends on assembly conditions. For vertical assembly the shifts of components may reach half the maximum clearances. For horizontal assembly lens components shift under action of gravity to the subjacent feature of the cylindrical bore of the body, thus becoming the real base instead of the symmetry axis of the body. Comparison of misalignments for the horizontal and vertical assembly methods show that horizontal assembly allows vast reduction of the impact induced by clearances on lens alignment. Residual misalignments of lens components are usually too large to accomplish satisfactory image quality. Further adjustment is needed, that turns out to be difficult especially if there are equally high requirements given at both the center and the rim of the image. Analysis of impact given by misalignment of operating surfaces of lenses on aberration allows to find an independent way for adjustment of the image quality at the center and the rim of the image.

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