

LENS MATERIALS

REFRACTION INDEX (Index of Refraction) – Well over thirty percent of lenses currently dispensed in the U.S. have a refractive index higher than conventional glass or plastic. The index number compares the speed of light in a transparent medium with the speed of light of air. The higher the index number, the thinner a given lens will be. The refractive index for glass (1.52) and CR39 (1.498) are considered the norm for ophthalmic lenses. Lens materials with an index greater than these two materials are considered “high index”. A new term, called “mid-index”, has been coined for materials that have an index ranging between 1.54 and 1.57. In choosing which index to use, a 1.60 index lens will produce a –5.00 diopter lens with thinner edges than the same lens made out of a 1.56 index material, all other factors remaining the same. The higher the index of refraction, the thinner the lens will turn out, depending of frame size, PD and center thickness.

ABBE NUMBER – “Abbe” has become a buzz word in ophthalmic lenses and is one of the most misunderstood features of lens materials. The abbe number of a lens material is the reciprocal of the medium’s V value, or dispersive power, usually ranging between 20 and 60. Higher abbe numbers indicate less chromatic dispersion than materials with lower abbe values. Crown glass and conventional hard resin, for example, have an abbe number of 58. Abbe discussions often center around polycarbonate, but dispensers should remember that all high index materials generally carry lower abbe values than glass or CR39, usually between 30 and 40. Abbe-related patient complaints often mention color fringes around light sources. A fine lead crystal glass will display such color fringes, resulting from the higher index of lead crystal. Concern about low abbe values is seldom concern when the corrective power of the lens is less than six or seven diopters. Even then, careful placement of optical centers and avoidance of large eye sized will minimize color distortion. When the lens is AR-Coated, abbe concerns are seldom a problem.

CAUTION – A common practice for high fashion, high index lenses is to roll and polish the edges. This treatment adds a note of elegance to eyewear, but polishing the edges of the lens will increase internal reflections. This can manifest itself in patient complaints about color distortion that, at first, may seem to be related to abbe problems. When you run into abbe-related complaints, check first for the presence of polished edges. Often, removing the polished edges solves the problem. Conversely, if you are using a low abbe material for a high correction (-8.00 D or more), you may want to avoid polished edges.

SPECIFIC GRAVITY – This is a measurement of density or weight of a material, expressed in grams per cubic centimeter. There has been a recent surge of consumer interest in lighter, more comfortable eyewear. In creating more comfortable eyewear for the patient, consideration should be given to using lens materials with a lower specific gravity. Knowing the specific gravity of each lens material will help in designing the lightest, most comfortable eyewear for the patient.