R_2=at least 7 mm,
and
Optical Power Range10 to 18 diopters.

Although the numerical constants of Equation 1, 2 and 3 have been given to five decimal places, it is likely that variations from the calculated optimum E_1 values smaller than ±0.005 would be undetectable to the user.

The present invention thus provides efficacious contact lenses of reduced spherical aberration for aphakic eyes. Since certain changes may be made in the above disclosure without departing from the invention hereof, it is intended that all matter shown in the accompanying drawing or described in the foregoing specification be interpreted in an illustrative and not in a limiting sense.

What is claimed is:

1. A contact lens for the aphakic eye, said lens having a rear substantially conicoidal surface of eccentricity E_2, a front substantially ellipsoidal surface of eccentricity E_1, a vertex thickness t, a power D and an index of refraction N_1', where

E_2=0.5200,
E_1=3.67695−4.82760(N_1')+2.64699(N_1')²−0.5040-2(N_1')³±0.1000,
R_2=at least 7 mm,
D ranges from 10.0 to 18.0,
N_1'=at most 1.6,
Semidiameter of the optical surface is no more than 0.715 times the value of R_2, whereby spherical aberration is controlled.

2. The contact lens of claim **1** wherein t=0.2 to 1.5 mm.

3. The contact lens of claim **1** wherein said front surface is prolate.

4. The contact lens of claim **1** wherein said rear surface is prolate.

5. The contact lens of claim **1** wherein said rear surface is substantially spherical.

6. The contact lens of claim **1** wherein said rear surface is substantially ellipsoidal.

7. A contact lens having a rear substantially conicoidal surface of eccentricity E_2 and radius of curvature R_2, a front substantially ellipsoidal surface of eccentricity E_1, a vertex thickness t, a power D, and an index of refraction N', where

$$E_1=A+B(E_2)+C(E_2)^2+D(E_2)^3\pm0.1000,$$

such that
A=4.05867−5.08043(N_1')+2.56577(N_1')²−0.46169-(N_1')³
B=−0.16033+0.33874(N_1')−0.22903(N_1')²+0.048-87(N_1')³
C=−1.16275+0.41548(N_1')+0.57643(N_1')²−0.176-71(N_1')³
D=−1.26391+2.49760(N_1')−1.51226(N_1')²+0.262-53(N_1')³,
and
R_2=at least 7.0 mm,
t ranges from 0.2 to 1.5 mm,
D ranges from 12.5 to 15.5D,
N_1'=at most 1.6,
E_2 ranges from 0.0000 to 0.8000,
semi-diameter of the optical surface is no more than 0.715 times the value of R_2,
whereby spherical aberration is controlled.

8. The contact lens of claim **7** wherein R_2=optimally approximately 7.6 mm.

9. The contact lens of claim **7** wherein t=optimally approximately 0.5 mm.

10. The contact lens of claim **7** wherein D=optimally approximately 14.

11. The contact lens of claim **7** wherein said front surface is prolate.

12. The contact lens of claim **7** wherein said rear surface is prolate.

13. The contact lens of claim **7** wherein said rear surface is substantially ellipsoidal.

14. The contact lens having a rear substantially conicoidal surface of eccentricity E_2, a front substantially ellipsoidal surface of eccentricity $E_{1\,adjusted}$, a power D, a vertex thickness t, and an index of refraction N_1', as follows:

$$E_{1(adjusted)} = E_{1(calculated)} + \left(\frac{14 - \text{actual power}}{1.5}\right)(\text{power correction factor}),$$

where
$$E_1=A+B(E_2)+C(E_2)^2+D(E_2)^3\pm0.1000,$$

such that
A=4.05867−5.08043(N_1')+2.56577(N_1')²−0.46169-(N_1')³
B=−0.16033+0.33874(N_1')−0.22903(N_1')²+0.04887(N_1')³
C=−1.16275+0.41548(N_1')+0.57643(N_1')²−0.176-71(N_1')³
D=−1.26391+2.49760(N_1')−1.51226(N_1')²+0.262-53(N_1')³,
and where
Power Correction Factor=$F+G(E_2)+H(E_2)^2+I(E_2)^3$,
such that
F=0.46824−0.88410(N_1')+0.55650(N_1')²−0.11750-(N_1')³
G=−2.56767+5.15201(N_1')−3.44146(N_1')²+0.6527(N_1')³
H=6.72075−13.69854(N_1')9.27500(N_1')²−2.08333(N_1')³
I=−5.99791+12.09027(N_1')−8.10416(N_1')²+1.80555(N_1')³,
and where
R_2=at least 7.0 mm,
t ranges from 0.2 to 1.5 mm,
D ranges from 10.0 to 18.0D,
N_1'=at most 1.6,
E_2 ranges from 0.0000 to 0.8000,
semi-diameter of the optical surface is no more than 0.715 times the value of R_2,
whereby spherical aberration is controlled.

15. The contact lens of claim **14** wherein R_2=optimally approximately 7.6 mm.

16. The contact lens of claim **14** wherein t=optimally approximately 0.5 mm.

17. The contact lens of claim **14** wherein D=optimally approximately 14.

18. The contact lens of claim **14** wherein said front surface is prolate.

19. The contact lens of claim **14** wherein said rear surface is prolate.

20. The contact lens of claim **14** wherein said rear surface is substantially ellipsoidal.

21. A contact lens for the aphakic eye, said lens having a rear substantially conicoidal surface of eccentricity E_2, a front substantially ellipsoidal surface of eccen-