Appendices C

Tolerance Charts for Contact Lenses

Table 2 – Tolerances for corneal and paralimbal contact lenses

	WATER CONTENTS				
	Non-Hydrogel			Hydrogels	
	< 10%			10 - 69%	70 + %
	PMMA	RGP	Flexible *		
CURVATURES					
Spherical curvatures (± mm)					
Base curve radius	0.025	0.05	0.10	0.20	0.25
Toric base curve radii (± mm)					
Δ 0-.20 mm	0.02	0.05	—	—	—
Δ .21-.40 mm	0.03	0.06	—	—	—
Δ .41-.60 mm	0.05	0.07	—	—	—
Δ over .6 mm	0.07	0.09	—	—	—
Aspheric curvatures (± mm)					
Apical radius	0.025	0.05	0.10	0.20	0.25
Eccentricity	0.05	0.10	0.20	0.40	0.50
Peripheral curvatures (± mm)					
Peripheral curves	0.10	0.10	—	—	—
Anterior peripheral curve	0.20	0.20	—	—	—
REFRACTIVE POWERS					
Spherical powers (± D)[1,2]					
0.00 to 5 D	0.12	0.12	0.25	0.25	0.25
5.12 to 10 D	0.18	0.18	0.25	0.25	0.25
10.12 to 15 D	0.25	0.25	0.50	0.50	0.50
15.12 to 20 D	0.37	0.37	0.50	0.50	0.50
over 20 D	0.50	0.50	0.50	0.50	0.50
Cylinder powers (± DC)[2,3]					
0.00 to 2 DC	0.25	0.25	0.25	0.25	0.25
2.12 to 4 DC	0.37	0.37	0.37	0.37	0.37
over 4 DC	0.50	0.50	0.50	0.50	0.50
Cylinder axis (± °)					
0.00 to 1.50 DC	5	5	8	8	8
over 1.50 DC	3	3	5	5	5
Bifocal add (± D)	0.25	0.25	0.25	0.25	0.25

* e.g., silicone elastomer

(continued)

Table 2 *(continued)*

	WATER CONTENTS				
	Non-Hydrogel			Hydrogels	
	< 10%			10 - 69%	70 + %
	PMMA	RGP	Flexible		
Prismatic power (± [A])					
0.00 - 10 [A]	0.25	0.25	0.25	0.25	0.25
over 10 [A]	0.50	0.50	0.50	0.50	0.50
LINEAR DIMENSIONS (± mm)					
overall diameter	0.05	0.05	0.20	0.20	0.25
optic zone diameters	0.10	0.10	—	—	—
peripheral zone widths	0.10	0.10	—	—	—
bifocal seg height	-0.10	-0.10	0.20	0.20	0.25
	+0.20	+0.20			
bifocal seg width	0.10	0.10	0.20	0.20	0.25
truncation height	0.10	0.10	0.10	0.10	0.15
Truncation axis (± mm)	5	5	5	5	5
Center thickness (± mm of t_c)					
≤ 0.10 mm	0.02	0.02	0.02	[0.010 mm + 10%]	
≥ 0.10 mm	0.02	0.02	0.02	[0.015 mm + 5%]	
OTHER PROPERTIES					
D_k Transmissibility[4]	—	20%	20%	20%	20%

NOTES

[1] The effects of base curve radius error and spherical refractive power are additive for rigid lenses. The effective error shall not exceed 0.25 D

[2] Diopter = D; diopter of cylinder = DC; prism diopter = Δ

[3] Spherocylindrical powers shall be transformed to meridional powers and the tolerance applied to each meridional power.

[4] ± percent of Dk/t units x 10^{-9}(cm/sec)(mlO_2/(ml x mmHg)), or x 10^{-9} (cm²/[O_2])/(cm² x sec x mmHg)

Table 3 – Tolerances for scleral (haptic) contact lenses

Parameter	Tolerance
CURVATURES	
Spherical/aspheric curvatures (± mm)	
Base curve radius	0.10
Apical radius	0.10
REFRACTIVE POWERS	
Spherical powers (± D)[1),2)]	
0.00 to 5 D	0.12
5.12 to 10 D	0.18
10.12 to 15 D	0.25
15.12 to 20 D	0.37
over 20 D	0.50
Cylinder Powers (± DC)[2),3)]	
0.00 to 2 DC	0.25
2.12 to 4 DC	0.37
over 4 DC	0.50
Cylinder Axis (± °)	
0.00 to 1.50 DC	5
over 1.50 DC	3
Prismatic Power (± Δ)	
0 - 6 Δ	0.25
over 6 Δ	0.50
LINEAR DIMENSIONS (± mm)	
Center thickness	0.03
Haptic thickness	0.03
Outside thickness	0.25
OTHER PROPERTIES	
Oxygen Transmissibility[4)]	20%

NOTES

1) The effects of base curve radius error and spherical refractive power are additive. The effective error shall not exceed 0.25 D.

2) Diopter = D; diopter of cylinder = DC, prism diopter = Δ

3) Spherocylindrical powers shall be transformed to meridional powers and the tolerance applied to each meridional power.

4) ± percent of Dk/t units x 10^{-9}(cm/sec)(mlO_2/[ml x mmHg]), or 10^{-9} (cm³ [O_2])/(cm² x sec x mmHg), when applicable.