ANSI Standards; What's New?

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- Master in Ophthalmic Optics
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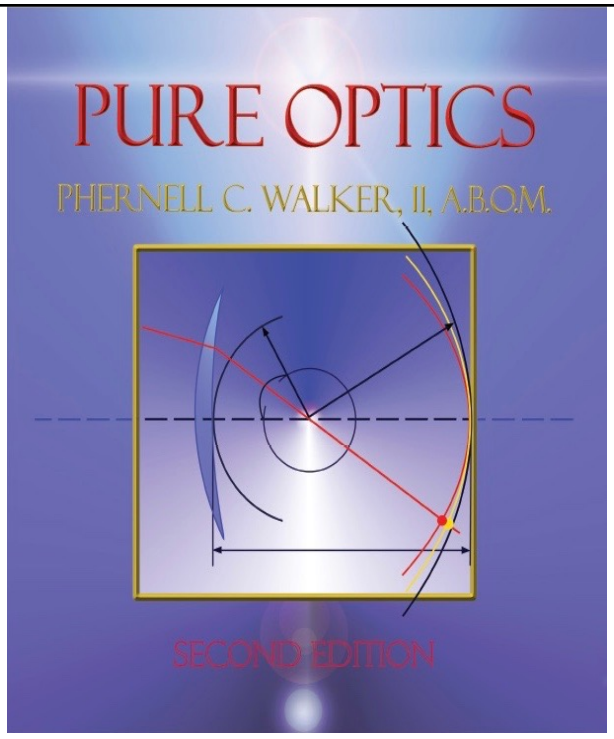

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Objectives

- Why do we need standards?
- Define ANSI
- ANSI Categories
- Z80.1
- Q & A

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Why Do We Need Standards?

- Standards exist to protect patients
- Provide a set of expected outcomes across our profession
- Allow us to measure against a standard benchmark

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American Society for Testing Materials

Formally called, American Society for Testing Materials (ASTM), is now an international organizations that sets standards on a number of industries. For eyewear, they make recommendations related to sporting goods (i.e. eye protectors for hockey masks and racket-ball).

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Food & Drug Administration (FDA)

- FDA is an agency that protects consumers and ensures the validity and safety of products
- The FDA places the responsibility on the manufacturer to ensure that glasses are safe by producing lenses that are impact resistant based on law
- The FDA defines the manufacturer (i.e. the optician) as the last inspecting official of the prescription eyewear

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Federal Trade Commission (FTC)

- FTC is a government agency designed to protect consumers as well as business against deceptive and unfair business practices.
- FTC Eyeglasses I:

Patients are permitted to receive a copy of their prescription without additional cost. Patients may elect to fill their Rx at any ophthalmic dispensary.

- FTC Eyeglasses II:
  Studies and surveys the business relationships between the "Four O's"

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American National Standards Institute (ANSI)

- Introduced in the 1950's
- composed of committees that make recommendations for many industries to include the ophthalmic industry

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American National Standards Institute (ANSI)

- **Z80.1-2020 -** ophthalmic lenses for dress wear
- **Z87.1-2020 -** ophthalmic safety lenses. The standard approved for 2020 set standards for impact resistance based on a projectile moving at a low and high velocity vs. lens thickness for safety frames.

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QUICK REFERENCE GUIDE – ANSI Z80.1-2020

1. **Tolerance on Distance Refractive Power (Single Vision, Multifocal and Power Variation Lenses with a single reference point)**

Sphere Meridian Power (minus cylinder convention)	Tolerance on Sphere Meridian Power (minus cylinder convention)	Cylinder ≥ 0.00 D ≤ – 2.00 D	Cylinder > – 2.00 D ≤ – 4.50 D	Cylinder > – 4.50 D
From - 6.50 D to + 6.50 D	±0.13 D	±0.13 D	± 0.15 D	±4%
Stronger than ±6.50 D	±2%	±0.13 D	± 0.15 D	±4%

2. **Tolerance on Distance Refractive Power (Power Variation Lenses "Progressive Addition Lenses" with more than one reference point)**

Sphere Meridian Power (minus cylinder convention)	Tolerance on Sphere Meridian Power (minus cylinder convention)	Cylinder ≥ 0.00 D ≤ – 2.00 D	Cylinder > – 2.00 D ≤ – 3.50 D	Cylinder > – 3.50 D
From - 8.00 D to + 8.00 D	±0.16 D	±0.16 D	±0.18 D	±5%
Stronger than ± 8.00 D	±2%	±0.16 D	±0.18 D	±5%

3. **Tolerance on direction of cylinder axis**

Nominal value of the cylinder power (D)	< –0.12 D	≥ –0.12 D ≤ –0.25 D	> –0.25 D ≤ –0.50 D	> –0.50 D ≤ –0.75 D	> –0.75 D ≤ –1.50 D	> –1.50 D
Tolerance of the axis (degrees)	Not Defined	± 14°	± 7°	± 5°	± 3°	± 2°

4. **Tolerance on addition power for multifocal and progressive addition lenses**

Nominal value of addition power (D)	≤ 4.00 D	> 4.00 D
Nominal value of the tolerance on the addition power (D)	±0.12 D	±0.18 D

5. **Tolerance on Prism Reference Point Location and Prismatic Power**

The prismatic power measured at the prism reference point shall not exceed 0.33Δ or the prism reference point shall not be more than 1.0 mm away from its specified position in any direction.

6. **Tolerance on Prismatic Imbalance (mounted)**

Single Vision And Multifocal Lenses	Vertical	Vertical	Horizontal	Horizontal
	0.00 to ≤ ±3.375 D	> ±3.375 D	0.00 to ≤ ±2.75 D	> ±2.75 D
Tolerance	≤ 0.33Δ	≤ 1.0 mm difference in height of PRPs	≤ 0.67Δ	≤ ± 2.5 mm from specified distance interpupillary distance

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Progressive Addition Lenses	Vertical	Vertical	Horizontal	Horizontal
	0.00 to ≤ ±3.375 D	> ±3.375 D	0.00 to ≤ ±3.75 D	> ±3.75 D
Tolerance	≤ 0.33Δ	≤ 1.0 mm difference in height of PRPs	≤ 0.67Δ	≤ 1.0 mm from specified monocular interpupillary distance

7. Base Curve Tolerance

When specified, the base curve shall be supplied within ± 0.75 D.

8. Center Thickness Tolerance

The center thickness shall be measured at the prism reference point of the convex surface. It shall not deviate from the nominal value by more than ± 0.3 mm.

9. Segment Size & Tilt Tolerance for Multifocals

The segment dimensions (width, depth, and intermediate depth) shall not deviate from the nominal value by more than ± 0.5 mm. The difference between the segment dimensions (width, depth, and intermediate depth) in the mounted pair shall not exceed 0.5 mm unless specified.
The segment tilt for each lens shall be within ± 2° as measured from the 180°.

10. Segment Vertical Location, Tilt and Fitting Cross Vertical Location

Multifocals: the segment height for each lens shall be within ± 1.0 mm. The difference between the segment height in the mounted pair shall not exceed 1.0 mm.
Progressives: the fitting cross height for each lens shall be within ± 1.0 mm. The difference between the fitting cross height in the mounted pair shall not exceed 1.0 mm.
The horizontal axis tilt for each lens shall be within ± 2° using the permanent horizontal reference markings.

11. Segment Horizontal Location and Fitting Cross Horizontal Location

Multifocal lenses: the distance between geometric centers of the segments in the mounted pair shall be within ± 2.5 mm of the specified near interpupillary distance. The inset in both lenses shall appear symmetrical and balanced unless monocular insets are specified.
Progressive addition lenses: the near reference point is set by the lens design. The fitting cross location in progressive lenses shall be within ± 1.0 mm of the specified monocular interpupillary distance for that lens.

12. Localized Errors

Localized power errors or aberrations caused by waves, warpage or internal defects, which are detected by visual inspection, are permissible if no measurable or gross focimeter target element distortion or blur is found when the localized area is examined with a focimeter. Areas outside a 30 mm diameter from the distance reference point, or within 6 mm from the edge, need not be tested for local power errors or aberrations. Progressive addition lenses are exempt from this requirement.

13. Prescription Impact-resistant Dress Eyewear Lenses

All lenses must conform to the impact resistance requirements of Title 21, Code of Federal Regulations, 801.410 (CFR 801.410).

14. Axis of Polarization

If there is a marking on the spectacle lens indicating the intended direction of horizontal orientation of polarization, then the actual plane of transmittance shall be at 90 ± 3° from this marking.

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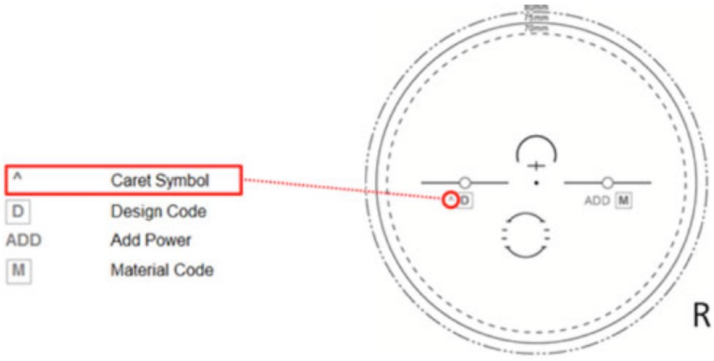
P.O.W. Progressives



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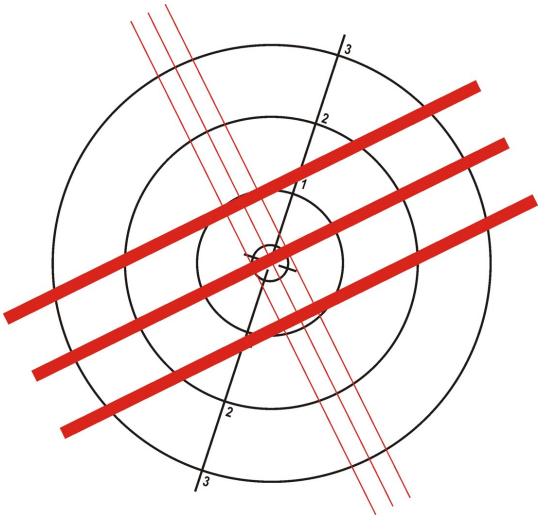
Pass or Fail?



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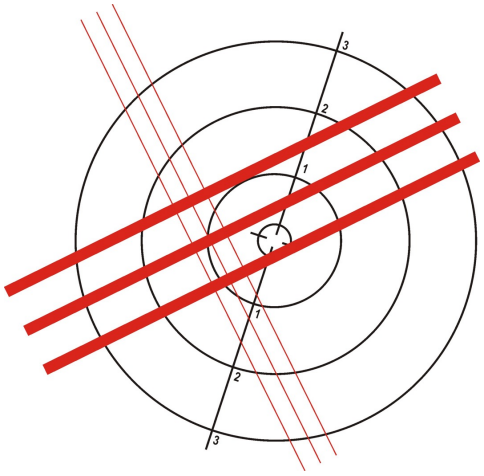

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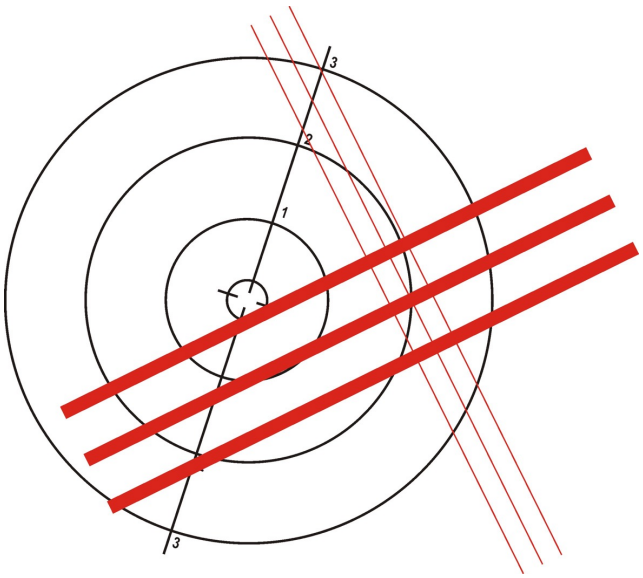

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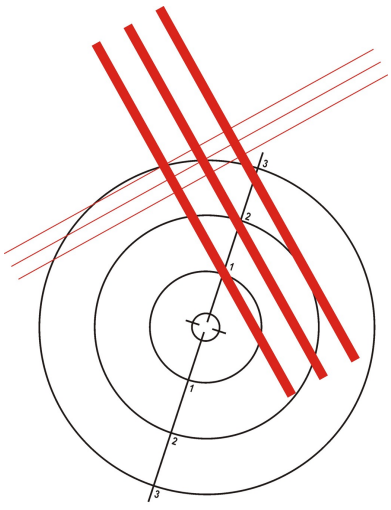

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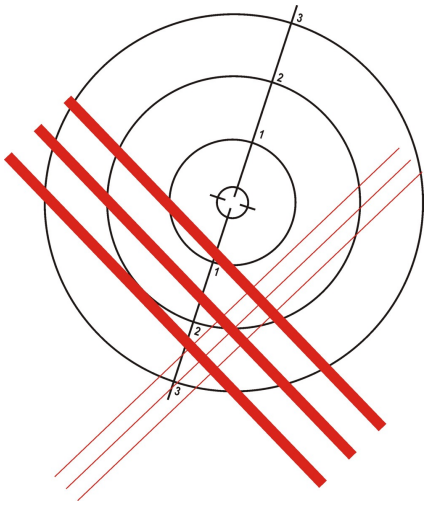
Pass or Fail?



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Practice Makes Perfect

What is the ANSI Z80.1-2020 tolerance for base curve?

a) + / - 0.75 D
b) + / -1.00 D
c) + / - 0.25 D
d) + / -0.50 D

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Practice Makes Perfect

The tolerance for axis with a cylinder power of -0.50 D is:

a) + /- 7 degrees
b) + / - 5 degrees
c) + / - 3 degrees
d) + /- 2 degrees

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Practice Makes Perfect

The ANSI Z80.1-2020 tolerance SV vertical prism meridian for dioptric power less than $\leq$ 3.375 D is:

a) 0.25 D
b) 0.33 D
c) 0.50 D
d) 0.67 D

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Practice Makes Perfect

The ANSI Z80.1-2020 tolerance PAL horizontal meridian for dioptric power less than $\leq$ 3.75 is:

a) 0.25 D
b) 0.33 D
c) 0.50 D
d) 0.67 D

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Practice Makes Perfect

The ANSI Z80.1-2020 tolerance for prism in the PAL horizontal meridian for dioptric power greater than > 3.75 D is:

a) 2.5mm variance
b) 1.0mm variance
c) 0.50 D
d) 0.67 D

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Practice Makes Perfect

Which organization permits a patient to receive a copy of their prescription without additional cost?

a) FDA
b) FTC
c) ANSI
d) ASTM

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PRACTICE MAKES PERFECT

- **Chief Complaint:** Neck pain holding head downward angle. Room appears downward angle.
- **VA:** 20/20 OU
- **Onset:** After 2 weeks of continuous wear
- **Modifying factors:** went to Dr. Crackmebach, chiropractor without relief

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DR. CRACKMEBACH

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DR. CRACKMEBACH

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LAB ORDER

OD: -6.00 -0.75 x 180
OS: -6.50 -1.00 x 180
PD: 61 OC: 26
A = 51
DBL = 18
B = 40
ED = 53
Pantoscopic Tilt: 12 degrees

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NEUTRALIZED GLASSES

OD: -6.00 -0.75 x 180
OS: -6.50 -1.00 x 180
PD: 61
Lab Edged:
PD: 29/31
OC: 20

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PRENTICE RULE

$$P = (h_{cm})\ (D_e)$$

- P = prism
- h_{cm} = off in cm
- D_e = meridian specific

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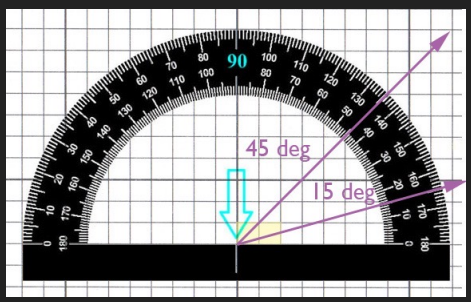
OPTICAL CROSS

OD: -6.00 -0.75 x 180

OS: -6.50 -1.00 x 180



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MERIDIAN OF DIOPTRIC POWER

Degrees from Axis	Percent of CYL.
0	0%
5	1%
10	3%
15	7%
20	12%
25	18%
30	25%
35	33%
40	41%
45	50%
50	59%
55	67%
60	75%
65	82%
70	88%
75	93%
80	97%
85	99%
90	100%

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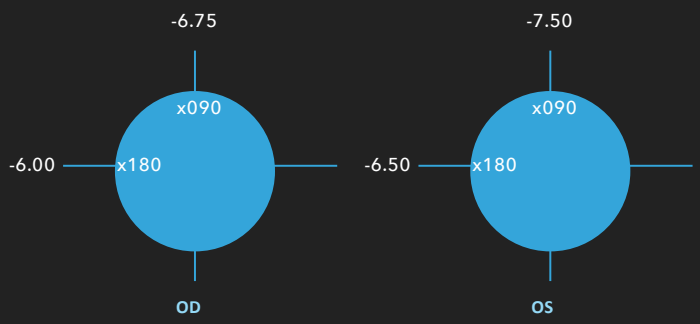
OPTICAL CROSS

OD: -6.00 -0.75 x 180

OS: -6.50 -1.00 x 180



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DELTA

Patient Rx
OD: -6.00 -0.75 x 180
OS: -6.50 -1.00 x 180
PD: 61
OC: 26

Lab Results:
OD: -6.00 -0.75 x 181
OS: -6.50 -1.00 x 178
PD: 29/31
OC: 20

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PRENTICE RULE

$$P = (h_{cm})\,(D_e)$$

- P = ?
- h_{cm} = OD: 6mm = 0.6cm
  OS: 6mm = 0.6cm
- D_e = OD: -6.75 x 090
  OS: -7.50 x 090

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SOLUTION

$$P = (h_{cm})\ (D_e)$$

P = OD: (0.6cm) (-6.75) = 4.05^ B.U.
P = OS: (0.6cm) (-7.50) = 4.50^ B.U.

Prism Imbalance = 0.45^ Imbalance

Total Prism = ~4.00^

*images appear downward due to BU prism causing head cape and possible neck pain.

Solution: Base Down Prism should be prescribed to resolve the unwanted prism.

- Prism is neither +/-
- Integer determines: base direction & compounding vs. neutralizing
- Lack of O.C. induces power shift for Sph/Cyl/Axis

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Questions

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