

**Technical Specification
Pathfinder Substrate
LIGO-E950012-A-D
Attachment 1
Purchase Order No. PP164701**

**TECHNICAL SPECIFICATIONS
PATHFINDER SUBSTRATE
LIGO-E950012-A-D
Attachment 1**

Physical Dimensions

Diameter: 25 cm +0/-0.25 mm
Thickness: 10 cm +0/-0.5 mm
Wedge Angle: 2 minutes \pm 2 minutes

Side Polish

Transparent, no grey visible to the naked eye.

Bevels

Both faces; 45°, 2.2 mm \pm 0.3 mm. (Refer to Attachment 2, drawing D950020 Rev B). Polish to transparency, no grey visible to the naked eye.

Registration Marks

Four reference lines (etched, ground, or sand blasted; one with a direction marker) as shown in Attachment 2, drawing D950020 Rev. B.

Identification

Serial numbers (etched, ground, or sand blasted) in the location shown in drawing D950020-B-D. The actual serial numbers will be provided when the purchase order is placed.

Surface Figure ($\lambda = 632.8$ nm)

All specified quantities refer to the physical surface of the optic.

Surface 1: Spherical, concave; radius of curvature, R=6,000 m, measured over the central 20 cm diameter.

Residual power after removing R=6000 m sphere: $< \lambda/20$ (surface P-V)

Astigmatism: $< \lambda/20$ (surface P-V)

Surface 2: Flat, measured over the central 20 cm diameter.

Power: $< \lambda/20$ (surface P-V)

Astigmatism: $< \lambda/20$ (surface P-V)

Surface Errors ($\lambda = 632.8$ nm)

All specified quantities refer to the physical surface of the optic.

These σ_{rms} values to be calculated from the phase maps provided under "Certifications".

Low Spatial Frequency Band: $0.05 - 4.3 \text{ cm}^{-1}$

With piston, tip, tilt, power (best fit spherical surface) and astigmatism removed over the central 20 cm diameter aperture.

Central 8 cm diameter:

$$\sigma_{\text{rms}} (\text{surface rms}) < \lambda/800$$

Central 20 cm diameter:

$$\sigma_{\text{rms}} (\text{surface rms}) < \lambda/400$$

High Spatial Frequency Band: $4.3 - 7,500 \text{ cm}^{-1}$

$$\sigma_{\text{rms}} (\text{surface rms}) < 4 \text{ \AA} \text{ rms}$$

Measured at the following locations:

1. The center of the mirror substrate.
2. Four positions equally spaced on a centered, 8 cm diameter circle.
3. Three positions equally spaced on a centered, 20 cm diameter circle.

**TECHNICAL SPECIFICATION
PATHFINDER SUBSTRATE
LIGO-E950012-00-D**

Physical Dimensions

Diameter: 25 cm +0/-0.25 mm
Thickness: 10 cm +0/-0.5 mm
Wedge Angle: 45 minutes +/-2 minutes

Side Polish

Transparent, no grey visible to the naked eye.

Bevels

Both faces; 45°, 3 mm +/-0.5 mm. (Refer to drawing #1207105). Polish to transparency, no grey visible to the naked eye.

Registration Marks

Four reference lines (etched, ground, or sand blasted; one with a direction marker) as shown in drawing #1207105.

Identification

Serial numbers (etched, ground, or sand blasted) in the location shown in drawing #1207105. The actual serial numbers will be provided when the purchase order is placed.

Surface Figure ($\lambda = 632.8 \text{ nm}$)

All specified quantities refer to the physical surface of the optic.

Surface 1: Spherical, concave; radius of curvature, $R=6,000 \text{ m}$, measured over the central 20 cm diameter.

Residual power after removing $R=6000 \text{ m}$ sphere: $< \lambda/20$ (surface P-V)

Astigmatism: $< \lambda/20$ (surface P-V)

Surface 2: Flat, measured over the central 20 cm diameter.

Power: $< \lambda/20$ (surface P-V)

Astigmatism: $< \lambda/20$ (surface P-V)

Surface Errors ($\lambda = 632.8$ nm)

All specified quantities refer to the physical surface of the optic.

These σ_{rms} values to be calculated from the phase maps provided under “Certifications”.

Low Spatial Frequency Band: $0.05 - 4.3 \text{ cm}^{-1}$

With piston, tip, tilt, power (best fit spherical surface) and astigmatism removed over the central 20 cm diameter aperture.

Central 8 cm diameter:

$$\sigma_{\text{rms}} (\text{surface rms}) < \lambda/800$$

Central 20 cm diameter:

$$\sigma_{\text{rms}} (\text{surface rms}) < \lambda/400$$

High Spatial Frequency Band: $4.3 - 7,500 \text{ cm}^{-1}$

$$\sigma_{\text{rms}} (\text{surface rms}) < 4 \text{ \AA rms}$$

Measured at the following locations:

1. The center of the mirror substrate.
2. Four positions equally spaced on a centered, 8 cm diameter circle.
3. Three positions equally spaced on a centered, 20 cm diameter circle.