

1. Purpose and scope

This document contains technical specifications for the secondary mirror blank for the WIYN telescope.

2. Description

The WIYN secondary mirror blank is 1.20 meters in diameter, plano-convex in shape, and 15.5 cm thick at the center. The blank will be made of low expansion glass (see material specifications). The blank is lightweighted to about 115 Kg (250 lbs) total weight by machining undercut hexagonal cavities into the solid glass billet through circular holes in the back plate. The hole pattern and dimensions are chosen to give an equal areal mass distribution over the entire blank except at the outer ring and central cavity. The mechanical configuration and control dimensions are given in NOAO Drawing Number 35006.0003960E sheets 1, 2, and 3.

3. Material specifications.

The blank will be made from standard quality Zerodur™. The blank will be annealed after machining to remove stresses introduced by the lightweighting process. The following material specifications apply after machining and final annealing:

3a. Coefficient of thermal expansion

Maximum value (from 0° to 50°C)	≤ ±0.10 x 10 ⁻⁶ /°C
Homogeneity of thermal expansion	≤ 0.01 x 10 ⁻⁶ /°C

3b. Inclusions

Maximum average number of inclusions per 100 cm ³	5
Average mean diameter of all inclusions, mm	0.6
Maximum average diameter of individual inclusions, mm	
a) in the critical zone	2.0
b) outside of the critical zone	6.0

(Note: the critical zone is the top 30 mm surface layer of the blank)

3c. Stress

Stress birefringence in nm/cm \leq 12
(from permanent stresses)

Birefringence in nm/cm \leq 60
(from striae)

3d. Defects

After machining the front surface of the blank will have no defects larger than 5mm in diameter, and only one defect of 5 mm diameter will be allowed.

After machining the blank will have no internal defects larger than 1 cm in length.