

## 1. Purpose and scope

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

## 2. Description

The WIYN tertiary mirror blank is a flat mirror of approximately elliptical shape 0.78 meters wide, 1.10 meters tall and 10.2 cm thick. The blank will be made of low expansion glass (see material specifications). Two configurations are being considered; the first a fused construction, the second a single solid piece machined lightweight.

The fused configuration will be made of three pieces; a solid top plate 1.3 cm thick, a center plate 7.6 cm which is core drilled to remove weight, and a pierced back plate 1.3 cm thick. The three pieces will be fused together. Holes pierced in the back plate allow gas to escape in the fusion process. Core drilling the mid and back plates allows removal of approximately 60% of the solid mass.

The second configuration calls for a solid billet of glass with approximately 70% of its mass removed by milling hexagonal cores into the billet through circular holes in the back plate.

## 3. Material specifications.

The blank will be made from either standard quality Zerodur™ or ULE. The blank will be annealed to remove any stresses introduced by the fabrication process. The following material specifications apply after final annealing:

### 3a. Coefficient of thermal expansion

Maximum value (from 0° to 50°C)	$\leq \pm 0.10 \times 10^{-6} / ^\circ\text{C}$
Homogeneity of thermal expansion	$\leq 0.01 \times 10^{-6} / ^\circ\text{C}$

**3b. Inclusions**

Maximum average number of inclusions per 100 cm <sup>3</sup>	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 13 mm thick layer of the blank which contains the front surface)

**3c. Stress**

Stress birefringence in nm/cm (from permanent stresses)	≤ 12
Birefringence in nm/cm (from striae)	≤ 60

**3d. Defects**

After fabrication the front surface of the blank will have no defects larger than 5 mm in diameter, and no more than one defect of 5 mm diameter.

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