



**SPECIFICATION**

**Specifications for 40m RC folding mirror (PR3/SR3)**

AUTHOR(S)	DATE	Document Change Notice, Release or Approval
Gautam Venugopalan	05/21/2018	

**1. Description**

This document describes specifications for 2-inch diameter optics that will replace the existing PR3 and SR3 mirrors at the CIT 40m.

The new mirrors are designed to be concave to account for the fact that the existing PR2 and SR2 mirrors are convex with RoC -700m. By requiring the new mirrors to be concave with RoC of 1000m, the PRC and SRC will be stable (TMS in the 1.4-1.8 MHz range). The tolerance on the RoC is specified such that mode matching between recycling cavity and arm cavity will be > 98.5%.

The HR side coating is specified for  $T < 50\text{ppm}$  at 1064nm (p-pol), where T is the power transmissivity.

From E1700016-v9 to this document, the dichroic coating performance requirements have been relaxed, but the requirement for HR reflectivity at 1064nm (p-pol) has been preserved.

**2. Radius of Curvature**

RoC = 1000 meters +/- 150 meters

Sagitta =  $0.323^{+0.057}_{-0.042}$  microns [ 7% @ 633 nm precision needed]. Calculated using

$$sag = R - \sqrt{R^2 - \left(\frac{d}{2}\right)^2}$$

where R is the RoC of the optic and d is its diameter.

**3. Physical dimensions**

Diameter: 50.8 +/- 1 mm

Thickness (at center of optic): 10 +/- 1 mm

Horizontal Wedge: 2 degrees

**4. Surface finish**

Super polished on both faces with < 1 Angstrom RMS roughness

Clear aperture 80%

Quality 10-5

**5. Coating**

HR side (Angle of Incidence = 40°-45°, design for 41.1°, see Fig. 1)

**T<50 ppm @ 1064 nm, p-Pol**

**Specifications for 40m RC folding mirror (PR3/SR3)**

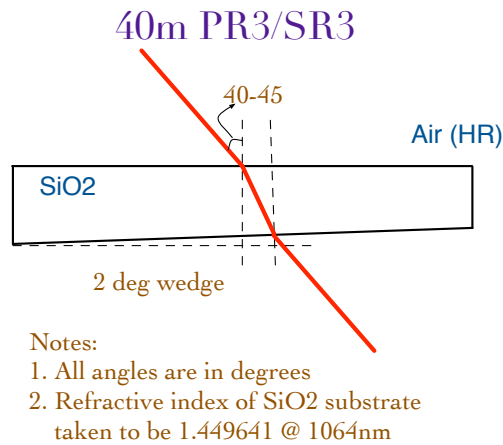
**6. Marking**

Serial number to be etched on barrel, centered at thickest location.

Indicate HR side with arrow (pointing towards HR side) on barrel at the thinnest location.

**7. Substrate**

The substrate should be Corning 7980 High Purity Fused Silica Standard (UV) Grade 0F (or better).



**Figure 1:** Sketch of optic, showing angles of incidence on HR and AR sides