Optics of the GQuEST Filter Cavities

APPROVALS	DATE	REV	DCN NO.	BY	CHECK	DCC	DATE
AUTHOR: L. McCuller	06-07-23						

1 Description

1" wedged optics with high reflectivity for 1550nm and 775nm light.
To be used as cavity mirrors

2 Material

Corning HPFS 7980 (high purity fused silica, UV grade)
Grade 0A (Low inclusion class: <0.3 mm^2 cross section, 0.1 mm max. size;
Homogeneity < 1ppm)

3 Dimensions

All mirrors:
Wedge: 30 arcmin ± 5 arcmin (Side 1 has Flat or ROC polish, Side 2 is wedged)
Diameter: 25.4mm +0/-0.1mm
Thickness (thick edge): 6.35mm ± 0.1mm

MIRROR M1

FLAT-FLAT

MIRROR M2

FLAT-FLAT

MIRROR M3

FLAT-Concave
ROC: -1.5m ± 0.5% ("-" indicates concave) on Side 1
Note: in the event -1.5m are not available, -1.6m can be substituted.

MIRROR M4

FLAT-Concave
ROC: -3m ± 0.5% ("-" indicates concave) on Side 1

4 Surface Roughness

Side 1
Super-polished

< 1 Angstrom over central 80% of diameter with 10-5 scratch-dig; best effort for 0/0.
20-10 scratch-dig outside central 80% of diameter.

Side 2

< 5 Angstrom over central 80% of diameter

5 Surface Figure

Side 1

Flat < λ/10 at 632.8 over central 80%

Side 2

Flat < λ/4 at 632.8 over central 80%

6 Coating

All Mirrors:

Ion Beam Sputtered for high damage threshold and low scatter & absorption losses
Wavelengths: 1550nm and 775nm
Polarization: **S & P** (both for 1550nm and 775nm)
AOI: 0-6 degrees (nominal operation at 3 degrees)

M1 (cavity couplers 1550nm, HR 775nm)

Side 1

T@1550nm = 1000ppm (0.1%) ± 50ppm (require well matched pairs)
T@775nm= 0 ppm best effort, <100ppm required
Surface Electric Field: Design for minimum surface electric field at 1550nm

Side 2

AR@1550 < 0.1% (best effort AR as low as possible)
AR@775 < 0.2% (best effort AR as low as possible)

M2/M3/M4 (cavity couplers 775nm, HR 1550nm)

Side 1

T@1550nm = 0 ppm best effort, <5ppm required
T@775nm = 10,000ppm ± 3000ppm (should be M2-M3 and M2-M4 as matched-pairs)
Surface Electric Field: Design for minimum surface electric field at 1550nm

Side 2

AR@1550 < 0.1% (best effort AR as low as possible)
AR@775 < 0.2% (best effort AR as low as possible)

Optics of the GQuEST Filter Cavities

7 **Coating vendor to provide:**

1. Spectrophotometer graph of the reflectance of the AR coating and the transmittance of the HR coating; covering the spectrum from 1500nm to 1600nm and 750nm to 800nm.