

Specification: Silicon Test Mass HR/AR Coatings, 40m Mariner phase I

| APPROVALS                 | DATE       | REV | DCN NO. | CHECK |
|---------------------------|------------|-----|---------|-------|
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### 1 Description

A list of the high reflectivity (HR) and anti-reflective (AR) coatings for 40m Mariner Phase I Silicon test masses.

### 2 General Specifications

Wavelengths: 2128.2 nm and 1418.8 nm

Polarization: S

Coating Scatter: < 5 ppm

Type: low absorption, ion beam sputtered deposition

### 3 HR Coatings

**Coating A:** (HR: ETMX / ETMY) [requirements stated in decreasing order of importance]

**Requirement 1:** (absolute value)

- 2128.2 nm / AOI: 0 degrees
  - $T_{ETMX} = 10 \pm 5$  ppm
  - $T_{ETMY} = 10 \pm 5$  ppm

**Requirement 2:** (absolute value)

- 1418.8 nm / AOI: 0 degrees
  - $T_{ETMX} = 50 \pm 50$  ppm, best effort  $\pm 20$  ppm
  - $T_{ETMY} = 50 \pm 50$  ppm, best effort  $\pm 20$  ppm

**Coating B:** (HR: ITMX / ITMY) [requirements stated in decreasing order of importance]

**Requirement 1:** (differential value)

- 2128.2 nm / AOI: 0 degrees
  - $|T_{ITMX} - T_{ITMY}| < \pm 100$  ppm, best effort  $< \pm 10$  ppm

**Requirement 2:** (absolute value)

- 2128.2 nm / AOI: 0 degrees
  - $T_{ITMX} = 2000 \pm 200$  ppm
  - $T_{ITMY} = 2000 \pm 200$  ppm

**Requirement 3:** (absolute value)

- 1418.8 nm
  - $T_{ITMX} = 50 \pm 50$  ppm, best effort  $\pm 20$  ppm
  - $T_{ITMY} = 50 \pm 50$  ppm, best effort  $\pm 20$  ppm

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## 4 AR Coatings

**Coating C:** (AR: ETMX / ETMY)

**Requirement 1:** (absolute value)

- 2128.2 nm / AOI: 0.5 degrees
  - $R_{ETMX} < 300$  ppm
  - $R_{ETMY} < 300$  ppm

**Requirement 2:** (absolute value)

- 1418.8 nm / AOI: 0.5 degrees
  - $R_{ETMX} < 1000$  ppm
  - $R_{ETMY} < 1000$  ppm

**Coating D:** (AR: ITMX / ITMY)

**Requirement 1:** (absolute value)

- 2128.2 nm / AOI: 0.5 degrees
  - $R_{ITMX} < 100$  ppm
  - $R_{ITMY} < 100$  ppm

**Requirement 2:** (absolute value)

- 1418.8 nm / AOI: 0.5 degrees
  - $R_{ITMX} < 1000$  ppm
  - $R_{ITMY} < 1000$  ppm

## 5 Metrology

Coating vendor to provide:

1. Two 1" witness samples from each coating run
2. Spectrophotometer graphs of the reflectance and transmittance of the HR
3. Spectrophotometer graphs of the reflectance of the AR coating

## 6 Drawings

