**Statement of Work for GQuEST Cavity Optics**

**C2300113-v1**

**Lee McCuller**

Note to LIGO users: all red text in this template is font type ‘hidden’ and comprises instructions to complete the SOW. Easier than deleting them, you can hide all red text before saving. In Word 2010, click File, Options (on the left side), Display (on the left side), and then unclick “Hidden Text”.

The “TEMPLATE” watermark can be removed by clicking Page Layout, Watermark, and then Remove Watermark.

# Scope

## Purpose/background

Mirrors are required to allow the construction of optical filtering cavities for the GQuEST experiment at Caltech. The cavities are built using 3 flat optics and a single (concave) curved optic. The cavities used two different coating types to use half of the mirrors as coupling optics at 1550nm and the other half for 775nm light.

## Deliverables

The procurement is for the precision shaping, polishing and ion-beam sputter coating of four types of mirrors. Our target is to have all work completed as soon as possible.

## Preamble

This invitation is for the manufacture, test, and delivery of coated optical wedged flat and curved mirrors, to be used by the customer in the production of high finesse, low-loss optical cavities.

Two mirrors of types M1 (coating-A) with a single M2 and M3 (each coating-B) are employed to form four-mirror “bow-tie” cavities, with beams entering or leaving the flat mirrors or “Couplers”, and with the M2 and M3 mirrors being highly reflective at 1550nm. Throughput and finesse at 1550nm are the driving requirements, therefore, the flat mirrors must be well-matched in transmission and the loss within the cavity has to be negligible in comparison to the transmission of these mirrors. The optical quality and specifications at 775nm are relaxed compared to 1550nm, with the role of couplers vs. reflectors reversed between M1 and M2 ,M3.

# Technical References and Document Access

Drawings and engineering documents are attached as listed below.

# Parts to be manufactured, quantity required, and inspection requirements:

|  |  |
| --- | --- |
| **Item 1** | **Quantity required** |
| **plane mirrors M1 with coating A**  Substrate and coating specification: T2300191-v1 M1, coating-A | 24. |

|  |  |
| --- | --- |
| **Item 2** | **Quantity required** |
| **plane mirrors M2 with coating B**  Substrate and coating specification: T2300191-v1 M2, coating-B | 16. |

|  |  |
| --- | --- |
| **Item 3** | **Quantity required** |
| **curved mirrors M3 with coating B**  Substrate and coating specification: T2300191-v1 M3, coating-B | 8. |

|  |  |
| --- | --- |
| **Item 4** | **Quantity required** |
| **curved mirrors M3 with coating B**  Substrate and coating specification: T2300191-v1 M4, coating-B | 8. |

Note 1: Care should be given to the selection of the AQL number. Consider the amount of time (which equals cost) required to 100% inspect a given number of parts. Contact QAME for advice.

Note 2: Additional inspection instructions beyond the AQL number can be given – such as 100% inspection of all threaded holes.

# Manufacturing Notes:

# Add special manufacturing notes

**Coating specifications:** the transmissions of the M1 “Input/Output Couplers” should also be matched to each other as best as possible. The tender documents should therefore address the bidder’s capabilities to match the transmissions within each lot and batch and the expected tolerance for each whole batch.

**Quantity:** Adjustments to the specified quantities may be made based on the batch size of the Supplier, to make most efficient use of the Supplier’s capabilities. Therefore, the quotation should include information about the bidder’s lot or batch size for parts processing.

# End Item Data Package:

At the time of delivery of the parts, the Supplier shall provide test data for the parts, as described in the coating and substrate specifications.

# Delivery Requirements:

Note any special packaging requirements here (i.e., wrap in UHV foil and Ameristat).

## Shipping Destination(s):

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MC 149-33  
California Institute of Technology

391 South Holliston Avenue  
Pasadena, CA 91125

United States of America

Contact for delivery +1 626 395 2778 Delete shipping destinations that don’t apply to this SOW. Be sure to reference the shipping abbreviations (i.e., LLO) in the Delivery Schedule if there is more than one shipping destination.

Insert a list or table detailing the delivery requirements (by P/N, as necessary). Delivery should be specified in weeks ARO (after receipt of order). Please also specify the shipping destination (i.e. LLO).

Note any first article requirements. If applicable, the SOW must state upfront that LIGO wants to assemble the first articles for fit check before the rest of the order is completed.