

The CHARA Array

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SILMARIL: Edge Filter Specification and RFI

CHARA Technical Report #114

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1.0 INTRODUCTION

The new Silmaril beam combiner, described in CHARA TR105, will use the First Light CRED-1 camera (<https://www.first-light-imaging.com/product/c-red-one>). This document describes one of the filters we will require for inside the dewar of this camera which will be placed immediately in front of the detector itself. This round filter will allow both H and K-short wavelengths (1.49 to 2.31 μm) through on one half but only H band (1.49 to 1.78 μm) on the other half. Since the edge of the coating will need to be aligned with the detector pixels we will require an indexing flat on one side of the filter.

Detailed specifications can be found in the table.

CHARA is now sending out a Request for Quotes (RFQ) to procure this filter. We would like to know:

1. Can you build this filter to these specifications? If so, could you please write a quotation for the manufacture and delivery of this filter. Please also include the incremental cost of manufacturing more than one filter.
2. If any of the specifications prevent you from building this filter, could you please let us know which they are and how they would need to be relaxed to make it possible to build the filter? For example, if you already have a standard H band coating that is close to our specification, we are open for discussion on the exact cutoff wavelengths.
3. If any of these specifications are major cost drivers, please let us know which specification that is and how much we would need to relax the specification to reduce the cost, and by how much would that reduce the cost?

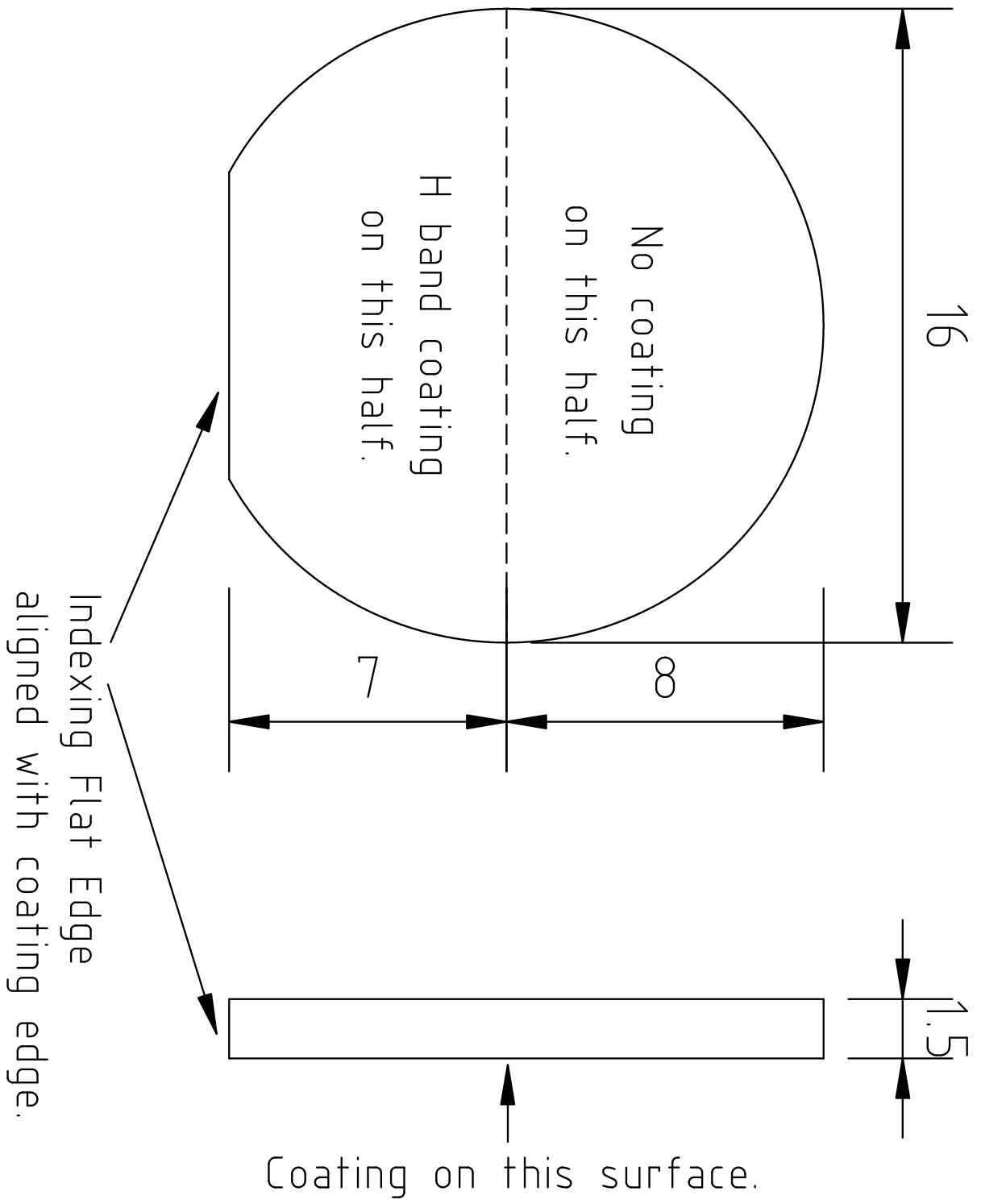


Figure 1. Physical dimensions in mm of the custom filter.

Specification	Values	Comments
Material	Infrasil 302 (CoC)	
Diameter	16 mm +0 mm/-0.1 mm	
Thickness	<1.5 mm ± 0.1 mm	
Indexing flat	As shown in diagram. Size 1mm ± 0.1 mm inside circular edge. Aligned to < 1° to the coating edge.	
Transmission in 1.49 – 1.78 μm on coated half.	>90%	
Transmission in 1.88 – 3.00 μm band on coated half.	10 ⁻⁴	Blocking attenuation
Cut-off wavelength range on coated half (75% transmission)	1.78-1.80 μm	
Transmission fall 75% to 1% at 1.78 μm on coated half	Within ± 0.05 μm	
Transmission in 1.88 – 2.31 μm on uncoated half	>95%	Transmission above 2.31 μm OK.
Filter operating temperature	80 K	For all filter specifications.
Angle of incidence	From 0° to 5°	For all filter specifications.
Opto-mechanical surface quality after coating applicable on the clear aperture of the filter i.e. 11mm diameter	0/ 20 1/ 5 x 0.04 2/ 1;1 3/ 0.3 (0.05) at 632 nm 4/ 1' 5/ C 1x0.16 Roughness per face < 30nm, goal < 10nm	Standard ISO 10110
Adherence scotch tape test	On a witness sample, adherence scotch 25 Standard ISO 9211-4, tape test, 5.5 N, slow speed take off 2 S, 25 minutes after thermal shocks.	Standard ISO 9211-4 adhesion degree of severity 1.
Size of transition region between coated and uncoated halves	< 50 μm with a goal of < 25 μm	
Linearity of edge of coating	< 50 μm with a goal of < 25 μm	