



WIYN CONSORTIUM, INC.

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University of Wisconsin • Indiana University • Yale University • National Optical Astronomy Observatory

March 2, 2005

Technical Specifications for WIYN SDSS Filters

Work to be completed will include:

1. Provide all materials
2. Fabricate the filter bandpass coatings and assemble parts
3. Ensure that out of band blocking specifications are met
4. A/R coat external surfaces
5. Provide test data
 - a. Close-up plots of the main bandpass
 - b. Full spectrum plots to assess out-of-band performance, from 300.0 to 1200.0 nm

General Specifications

Quantity: 1 filter for each of g, r, i, z; optionally bid on “y”

Size: The filters shall be square, 150 (+0.0, -0.25) mm on a side.

Thickness: The filters shall have a thickness of 10 ± 0.3 mm.

Edge finish: The physical pieces shall be chamfered and finished as indicated on the attached drawing.

Surface Finish: Outer surfaces shall be polished to 60-40 S&D

Minimum clear aperture: The usable filtered aperture shall be at least 145 mm square. Any unfiltered area beyond this 145 mm square must be opaque.

Pinhole Limits: none allowed having diameters larger than 60 μm ; no more than 1 per 50 mm region of the clear aperture having diameters between 30 and 60 μm ; no more than a combined equivalent area of a single 30 μm pinhole per 10 mm region of the clear aperture.

Environment: To be used in a temperature range of -7 to $+27$ C, at an altitude between sea level and 9000 feet, and humidity up to 98%.

Angle of Incidence: 0 to 5° (used in a converging f/6.3 beam).

AR Coating and edge sealing: Both external surfaces must be anti-reflection coated with as hard a coating as is practical, to be specified by the vendor. Filter edges must be hermetically sealed against moisture penetration.

Identification: An ID should be printed along one edge.

Delivery Date: On or before July 1, 2005.

Acceptance: WIYN will perform spectral scan tests similar to those described below under Passband Specifications using a Lambda 9 spectrometer having a measuring spot size of 1x5 mm.

Passband Specifications

1. Passband characteristics are for a collimated or quasi-collimated beam at normal incidence at room temperature (74 F), as described in Table 1.
2. The average central wavelength across the usable area shall be within 1 nm of the desired value, measured at the physical center of the filter and at least 4 additional orthogonal positions at ± 55 mm from the center (up, down, left, right).

3. The bandpasses (FWHM) shall be within 1.0 nm of the desired value, measured at the physical center of the filter and at least 4 additional orthogonal positions at ± 55 mm from the center (up, down, left, right).
4. The peak transmission of the filter shall be at least 80% across the entire clear aperture.
5. Spatial variations in the peak transmission must be less than 5.0% of the peak transmission for all positions within 55 mm of the center.
6. The bandwidth at 90% of the peak transmission (BW90) shall not be less than 65% of the FWHM.
7. The transmission within BW90 shall not fall below 90% of the peak transmission.
8. The bandpass at 5% of the peak transmission shall be no more than 35% larger than the FWHM.

Out of Band Blocking

Outside the main bandpasses, the following maximum transmissions cannot be exceeded.

1. Between 300 and 1200 nm: filter transmission must be less than 10^{-2} (1% maximum transmission) outside the filter passband.
2. Between 300 and 1200 nm, the total out of band light cannot exceed 0.25% of the total in-band light. That is: The integral of the transmission blueward and redward of the passband must be smaller than 0.0025 times the integral of the passband transmission. We define the limits of the integral at the passband as the point where the filter transmission is 0.1% (0.001).

Maximum Transmitted Wavefront Error, as measured over any 40 mm diameter zone

Tilt: 1λ (single pass), 2λ (double pass)

Power: 1λ (single pass), 2λ (double pass)

Wedge: less than 3 arcmin

P-V irregularities over entire clear aperture: 4λ (single pass), 8λ (double pass)

Table 1. Summary of WIYN-modified SDSS Bandpass Specifications

	Central and Half-Power Points, nm (+tol,-tol)				
	g	r	i	z	y
Center	477 (+2,-2)	645 (+2,-2)	760 (+2,-2)	905 (+3,-3)	1005 (+3,-3)
Blue edge	402 (+10, -5)	580 (+10,-3)	700 (+5,-3)	830 (+5,-3)	950 (+5,-5)
Red edge	550 (+5, -10)	710 (+10,-5)	820 (+5,-3)	980 (+3,-5)	1060 (+10,-5)

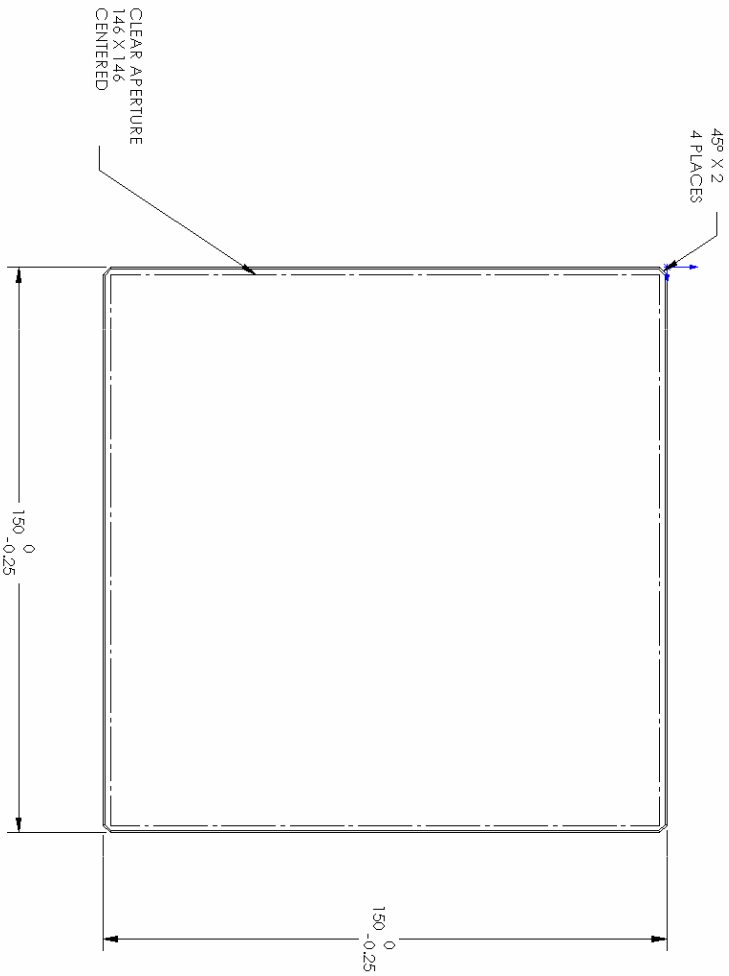
Contact Information

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Director, WIYN Observatory

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NOTES:

1. DIMENSIONS IN MM

ZONE	REV	DESCRIPTION	KEYS	BY	DATE	APP BY
	1	Release	Keyes	###	###	
REVISIONS						

MATERIAL :		FINISH:		CALCULATED (NESH) (mm)	
TOLERANCES UNLESS OTHERWISE NOTED XX ± 0.1 XXX ± 0.05		THIRD ANGLE PROJECTION ANGULAR ± 25°		DRAWING NUMBER QUOTA	
NEXT ASSEMBLIES		DRAWING TITLE FILTER, CCD (150mm)		DRAWING SIZE C	
DESIGNED BY: G. Jacoddy		CHECKED BY:		SCALE 1:1	
DRAWN BY: J. Keyes		APPROVED BY:		CURRENT REV 1	
DWG PRODUCED WITH: SOLIDWORKS 2003		RELEASE DATE: XX/XX/XX		DO NOT SCALE DRAWING	
		SHEET: 1 OF 1			

