

California Institute of Technology

Purchase Order 39-S657226

Nu-Tek Work Order 14236
Final Data Summary
HISPEC FEI Collimating OAP

Nu-Tek Precision Optical Corporation

December 16, 2024



*Nu-Tek's Quality Management System has been certified to
ISO9001:2015.*

Data Summary, HISPEC-0010-P0300



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Parameter	Spec	SN1	SN3	SN4
Material: Zerodur [†]	—	Pass	Pass	Pass
Outer Diameter, mm	25.3 — 25.4	25.362	25.387	25.380
Radius of Curvature, mm	349.65 — 350.35	349.974	349.974	349.974
Off-Axis distance, mm	55.975 — 56.025	56 ± 0.025	56 ± 0.025	56 ± 0.025
Part Center Thickness, mm	8.88 — 9.08	9.040	9.040	9.040
Surface Figure Error, nm RMS	≤ 16	7.12	6.80	6.92
Surface Roughness, nm RMS	≤ 2	0.99	0.87	0.82
Scratch / Dig	≤ 60/40	Pass	Pass	Pass
Minimum Reflectivity	≤ 96	Pass	Pass	Pass
from 0.97-2.55μm, %				
Average reflectivity	≤ 97.5	Pass	Pass	Pass
from 0.97-2.55μm, %				

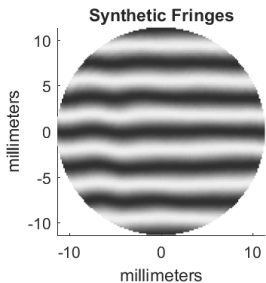
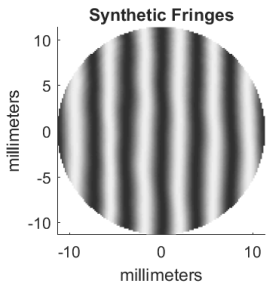
Notch was replaced with sandblasted scribe per quoted exception. Scribe does not meet positional requirements, accepted via email by Mitsuko Roberts 12/4/2024.

[†] Zerodur substrate material is used in place of Fused Silica, per quoted exception.

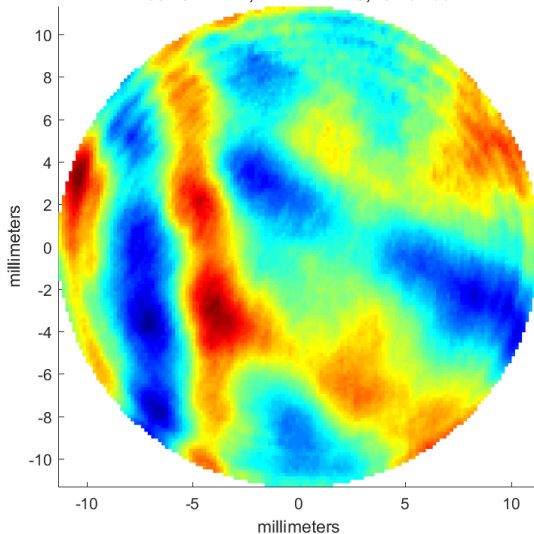
Surface Figure SN1



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Final Surface Figure Error SN1
39.26 nm PV, 7.12 nm RMS, ISF 0.250



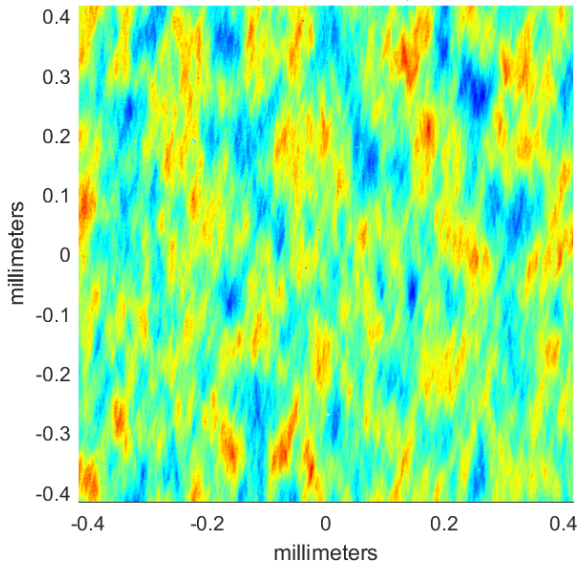
Surface Roughness SN1



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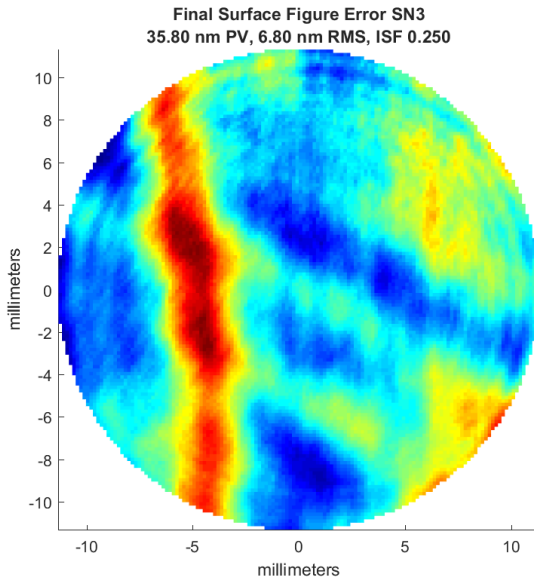
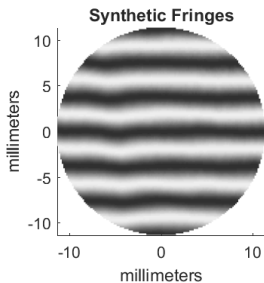
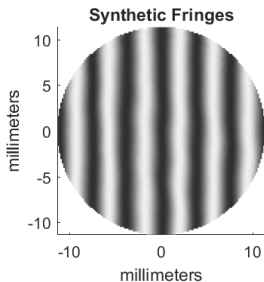
CA Annulus Roughness Sample 1
9.60 nm PV, 0.99 nm RMS, ISF 0.500



Surface Figure SN3



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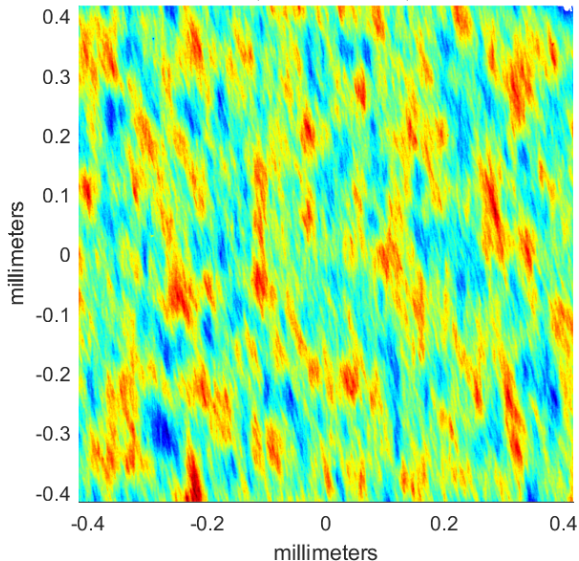
Surface Roughness SN3



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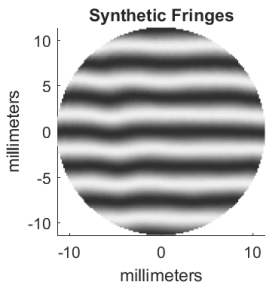
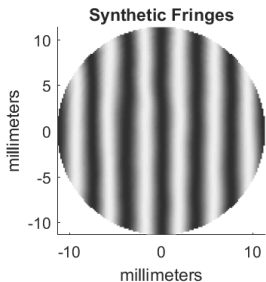
CA Annulus Roughness Sample 3
7.23 nm PV, 0.87 nm RMS, ISF 0.500



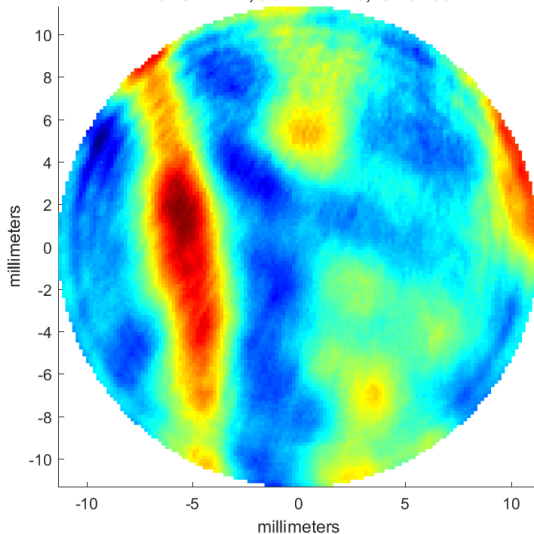
Surface Figure SN4



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Final Surface Figure Error SN4
40.78 nm PV, 6.92 nm RMS, ISF 0.250



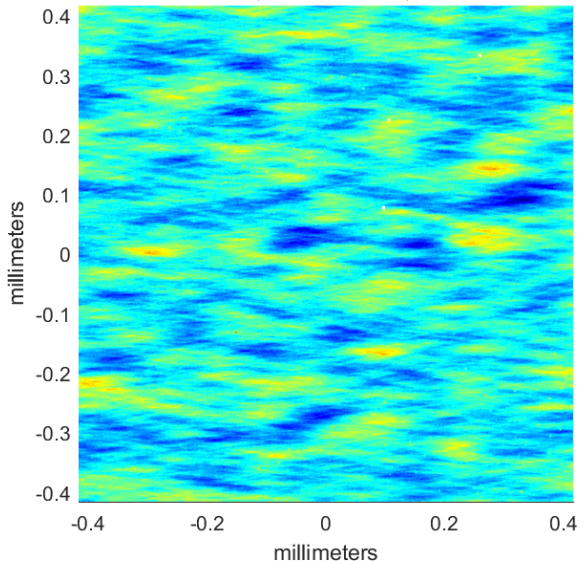
Surface Roughness SN4



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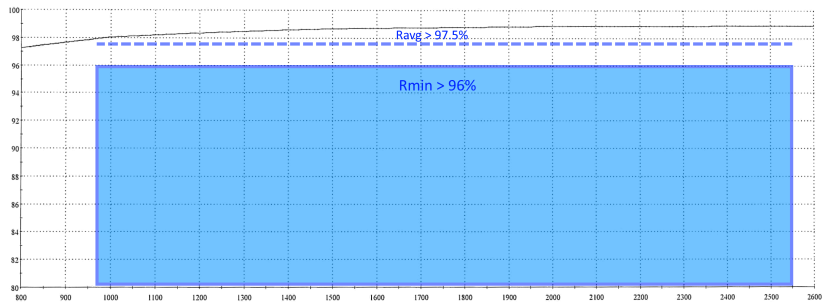
CA Annulus Roughness Sample 4
9.49 nm PV, 0.82 nm RMS, ISF 0.500



Coating Reflectivity



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Certificate of Compliance



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Customer	Cal Tech	Packing List	17813
Contract Number	39-S657226	Ship Date	12/16/2024
Part Number	HISPEC-0010-P0300A	SNs	1, 3, 4
Description	HISPEC FEI Collimating OAP	Quantity	3
Nu-Tek Order	14236	Cert Date	12/16/2024

Compliance Representation:

The undersigned certifies that all items shipped against the above Purchase Order are in conformance with the requirements, specifications, and drawings applicable to that order at the time of shipment.

Signed
By
Title

Robert Bupp
Quality Representative

Date 12/16/2024