



TARGET REFLECTANCE UNIFORMITY TEST REPORT

NO. DM-04109-001
REV. 02

REPORT NUMBER: 108094-2-1
DATE OF REPORT: 3/5/2020
PAGE 1 OF 2

RENDERED TO: SSAI

AUTHORIZATION: Purchase Order: PO-0003484

CALIBRATION LAB: Labsphere, Inc., Optical Calibration Laboratory
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TESTED SYSTEM OR STANDARD

PF-TARGET, P/N: AA-01411-050, PFT-50-05M-UF-NM

PF-TARGET, S/N: 0228201990

CALIBRATED REFERENCE STANDARD

REFL-29: SRS-50-020, SN: 50AA01-0415-1746

The above standard is traceable following the NIST method of utilizing pressed polytetrafluoroethylene (PTFE) as the reference standard¹².

MEASUREMENT REQUESTED

Uniformity Mapping via Hemispherical/8° Spectral Reflectance Measurement at 600nm and 905nm
Hemispherical/8° Spectral Reflectance Measurement

APPLICABLE DOCUMENTS

DM-13001-000 Product Appearance and Mechanical-fit Requirements
DM-04109-000 Uniformity Mapping of Permafect Targets

TEST AND TEST METHOD

The spectral reflectance is measured for the target listed above. The reflectance is determined by using an RSA-OO-FO and a CDS 610 Spectrometer. Reflectance measurements are taken in a 5 x 5 grid of equally spaced measurements across the target and reported at 600nm in Table II and 905nm in Table III. The average reflectance at any given wavelength is expressed as the average reflectance of target from the mapping data and presented in Table IV as (equation below is at 600nm):

$$\bar{R}_{600nm} = \frac{\sum R_i}{n}$$

The average reflectance and range is calculated from the data taken at 600nm. This along with the average reflectance at 905nm are reported in Table I.

The uniformity range is expressed as the absolute reflectances on either side of the average reflectance (example below is for 600nm):

$$Uniformity\ Range = R_{600nm\ min} < \bar{R}_{600nm} < R_{600nm\ max}$$

The acceptable uniformity tolerance is calculated from the data taken at 600nm; the maximum and minimum reflectance are reported in Table I along with the average reflectance at 600nm. Maximum, minimum, and average reflectance at 905nm are also reported in Table I.

MEASUREMENT RESULTS

Table I
Average Reflectance and Reflectance Uniformity Range

	Average (%)	Min (%)	Max (%)
Reflectance @ 600nm	51.5	50.69	51.98
Reflectance @ 905nm	51.1	49.92	51.88

Measured by:

Title: Optical Calibration Technician

¹Wiedner V.R., and Hsia, J. J. "Reflection Properties of Pressed Polytetrafluoroethylene Powder", J. Opt. Soc. Am., Vol 71, 1981, pp856-861

² Barnes, P.Y., Early, E.A., and Parr, A.C., "NIST Measurement Services: Spectral Reflectance," U.S. Dept. of Commerce, 1998.
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PAGE 2 OF 2

Table II
Reflectance Map at 600nm
This table is absolute reflectance

	A	B	C	D	E
1	51.1	51.4	51.3	51.8	51.5
2	51.3	50.7	51.2	51.5	51.0
3	52.0	51.3	51.6	51.8	51.9
4	52.0	51.4	51.4	52.0	51.4
5	51.5	50.9	51.9	51.8	51.3

Table III
Reflectance Map at 905nm
This table is absolute reflectance

	A	B	C	D	E
1	51.1	51.2	50.8	51.1	51.5
2	51.2	49.9	51.0	51.8	51.1
3	51.8	50.5	50.8	51.7	51.4
4	51.9	50.7	51.1	51.9	51.1
5	51.5	50.1	50.8	51.7	51.1

Table IV
Average Spectral Reflectance

Wavelength	Reflectance	Wavelength	Reflectance	Wavelength	Reflectance	Wavelength	Reflectance
(nm)	(%R)	(nm)	(%R)	(nm)	(%R)	(nm)	(%R)
350	46.0	520	51.5	690	51.3	860	52.0
360	46.6	530	51.5	700	51.5	870	51.1
370	47.2	540	51.4	710	51.3	880	51.0
380	46.4	550	51.7	720	51.4	890	51.0
390	49.3	560	51.5	730	51.1	900	51.2
400	47.7	570	51.4	740	51.3	910	51.2
410	48.3	580	51.4	750	51.4	920	51.1
420	49.6	590	51.6	760	51.4	930	51.0
430	49.4	600	51.5	770	51.2	940	51.5
440	50.2	610	51.7	780	51.2	950	51.9
450	50.6	620	51.5	790	51.4	960	51.2
460	50.4	630	51.5	800	51.2	970	51.7
470	51.0	640	51.3	810	51.2	980	51.3
480	51.2	650	51.4	820	51.1	990	51.5
490	51.5	660	51.4	830	51.2	1000	51.7
500	51.6	670	51.4	840	51.3		
510	51.6	680	51.4	850	51.6		