



TARGET REFLECTANCE UNIFORMITY TEST REPORT

REPORT NUMBER: 108094-3-1
DATE OF REPORT: 3/5/2020
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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-01411-080, PFT-80-05M-UF-NM

PF-TARGET, S/N: 0228201990

CALIBRATED REFERENCE STANDARD

REFL-28: SRS-80-020, SN: 80AA01-0214-0033

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	80.0	79.27	80.41
Reflectance @ 905nm	79.5	78.42	80.09

Measured by: 
Title: Optical Calibration Technician

¹Wiedner V.R., and Hsia, J. J. "Reflection Properties of Pressed Polytetrafluoroethylene Powder", J.Opt.Soc.Am., Vol71, 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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Table II
Reflectance Map at 600nm
This table is absolute reflectance

	A	B	C	D	E
1	79.7	79.4	79.8	79.9	80.0
2	80.2	79.3	80.4	79.8	80.0
3	80.1	79.7	80.2	80.0	80.2
4	80.3	79.8	79.8	80.1	80.2
5	79.8	79.8	80.2	80.2	79.9

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

	A	B	C	D	E
1	79.9	79.3	79.2	79.5	79.5
2	79.7	78.8	80.0	79.9	79.7
3	79.7	79.0	79.4	80.1	79.9
4	79.6	79.6	78.4	79.3	79.0
5	79.2	79.4	80.0	79.4	79.8

Table IV
Average Spectral Reflectance

Wavelength (nm)	Reflectance (%R)	Wavelength (nm)	Reflectance (%R)	Wavelength (nm)	Reflectance (%R)	Wavelength (nm)	Reflectance (%R)
350	78.2	520	79.4	690	79.7	860	80.2
360	76.5	530	79.4	700	79.6	870	79.7
370	74.5	540	79.1	710	79.9	880	79.2
380	75.1	550	79.1	720	79.6	890	78.5
390	79.4	560	79.5	730	79.6	900	78.7
400	75.0	570	79.4	740	79.8	910	79.5
410	77.3	580	79.6	750	79.5	920	79.8
420	76.9	590	79.7	760	79.7	930	79.2
430	79.1	600	80.0	770	79.8	940	80.2
440	78.3	610	79.7	780	79.6	950	80.4
450	78.9	620	79.5	790	79.5	960	79.5
460	78.8	630	79.5	800	79.7	970	79.8
470	78.3	640	79.8	810	79.5	980	80.4
480	79.3	650	79.6	820	79.5	990	78.7
490	78.6	660	79.7	830	79.5	1000	79.6
500	79.4	670	79.8	840	80.0		
510	79.1	680	79.6	850	80.2		