



TARGET REFLECTANCE UNIFORMITY TEST REPORT

NO. DM-04109-001
REV. 02

REPORT NUMBER: 108094-1-1
DATE OF REPORT: 2/28/2020
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TESTED SYSTEM OR STANDARD

PF-TARGET, P/N: AA-01411-010, PFT-10-05M-UF-NM

PF-TARGET, S/N 0228201991

CALIBRATED REFERENCE STANDARD

REFL-32: SRS-10-020, SN: 10AA01-0215-1415

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):

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

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	9.7	9.61	10.06
Reflectance @ 905nm	9.8	9.59	10.19

Measured by:

Title: Optical Calibration Technician

¹ Wiedner 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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Table II
Reflectance Map at 600nm
This table is absolute reflectance

	A	B	C	D	E
1	9.9	9.7	10.1	9.8	9.7
2	9.8	9.9	9.8	9.8	9.7
3	9.6	9.7	9.8	9.9	9.7
4	9.7	9.8	9.8	9.6	9.7
5	9.6	9.7	9.7	9.8	9.7

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

	A	B	C	D	E
1	9.9	9.6	10.2	10.0	9.7
2	9.8	9.9	9.8	9.9	9.8
3	9.6	9.8	9.8	10.1	9.8
4	9.8	9.8	9.8	9.7	9.7
5	9.7	9.7	9.8	9.8	9.8

Table IV
Average Spectral Reflectance

Wavelength	Reflectance	Wavelength	Reflectance	Wavelength	Reflectance	Wavelength	Reflectance
(nm)	(%R)	(nm)	(%R)	(nm)	(%R)	(nm)	(%R)
350	9.3	520	9.8	690	9.7	860	9.6
360	9.1	530	9.7	700	9.7	870	9.6
370	9.4	540	9.8	710	9.7	880	9.9
380	9.0	550	9.8	720	9.7	890	9.5
390	9.3	560	9.7	730	9.7	900	9.5
400	9.7	570	9.8	740	9.7	910	9.8
410	9.3	580	9.7	750	9.7	920	9.7
420	9.4	590	9.8	760	9.7	930	9.9
430	9.5	600	9.7	770	9.6	940	9.7
440	9.4	610	9.7	780	9.7	950	10.0
450	9.7	620	9.7	790	9.6	960	9.7
460	9.6	630	9.7	800	9.7	970	9.8
470	9.6	640	9.7	810	9.7	980	9.9
480	9.7	650	9.7	820	9.7	990	9.9
490	9.8	660	9.7	830	9.7	1000	9.9
500	9.7	670	9.7	840	9.7		
510	9.7	680	9.7	850	9.7		