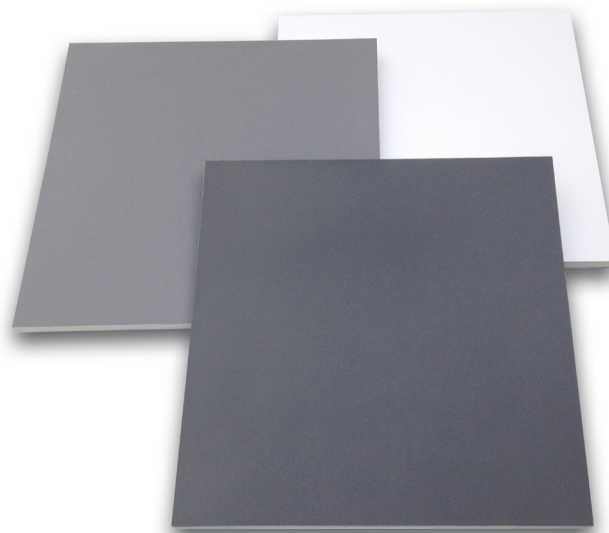


Permaflect® Diffuse Reflectance Targets

Highly durable, lightweight targets up to 125 x 245 cm



No other options compare

- Lightweight
- Uniform
- Tailorable
- Durable
- Easy to Clean

Ideal for these applications

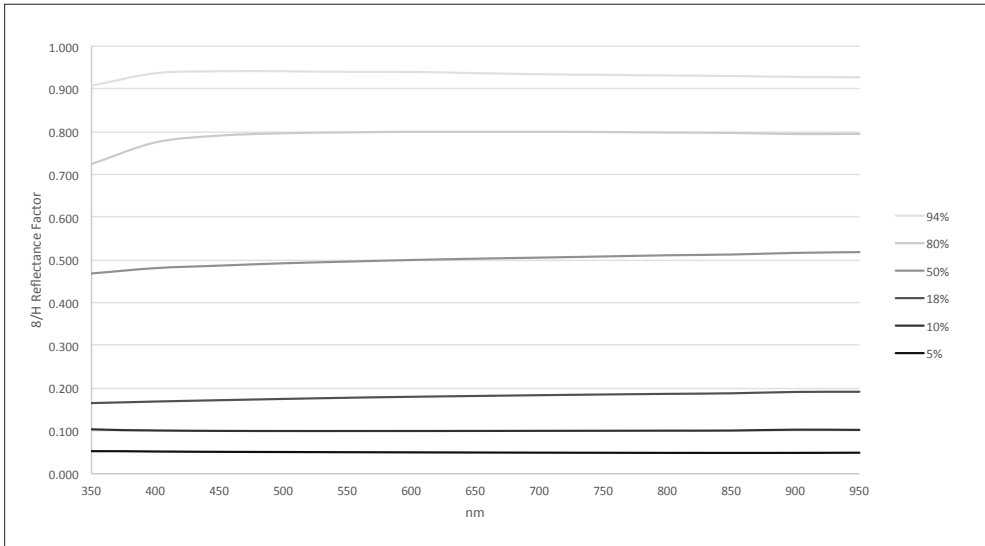
- LiDAR
- Time of Flight
- Ground Truth
- Imager Calibration
- Sensor/Source Compensation
- Superior Alternative to Grey Paper

Why grey painted cards, fabrics, and paper may put you at a disadvantage

For applications your grey target solution must work for a wide variety of lighting environments and still maintain its appearance. Most importantly it has to have uniform spectral response. It also must be thermally and physically durable, UV light stable, thermally color stable, no gloss, no polarization and no fluorescence.

If your grey target solutions do not meet these requirements, you need Permaflect.

Typical 8/H Reflectance Factors of Permaflect

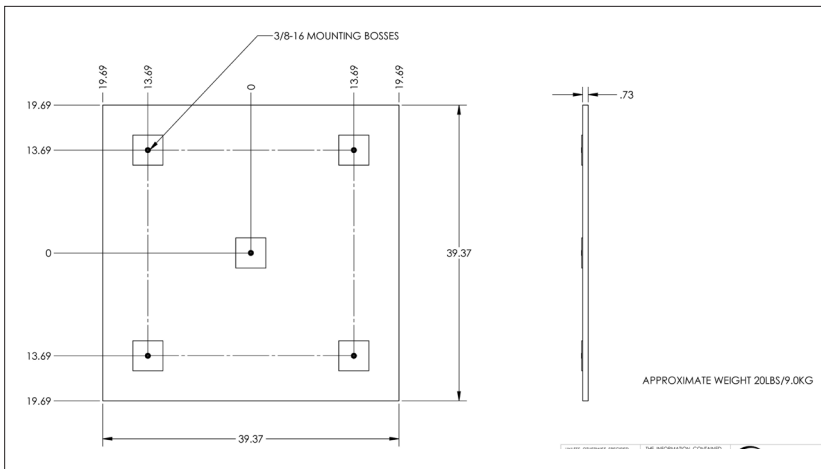


Measurement report includes:

- Spectral reflectance from 350 nm to 1000 nm every 10 nm
- Reflectance map of target at 905 nm

Permaflect-X (%)	5%	10%	18%	50%	80%	94%
Variance from Average in absolute reflectance	+/-1% (3.5% - 6.5%)	+/-1% (8.5% - 11.5%)	+/-1% (16.5% - 19.5%)	+/-1.5% (48.0% - 52.0%)	+/-1% (78.5% - 81.5%)	+3%/ -0% (94.0% - 97.0%)
Typical Flatness: Peak to peak from 350 nm to 950 nm	0%	0%	3%	5%	8%	3%
Uniformity:						
0.5 m x 0.5 m at 600 nm	+/- 1%	+/- 1%	+/- 1%	+/- 1.5%	+/- 1%	+/- 1%
1.0 m x 1.0 m at 600 nm	+/- 1%	+/- 1%	+/- 1%	+/- 1.5%	+/- 1%	+/- 1%
1.5 m x 1.5 m at 600 nm	+/- 1%	+/- 1%	+/- 1%	+/- 1.5%	+/- 1%	+/- 1%
1.2 m x 2.4 m at 600 nm	+/- 1.5%	+/- 1.5%	+/- 1.5%	+/- 2.0%	+/- 1.5%	+/- 1.5%

1.0 m x 1.0 m Informational Drawing



Permaflect Targets Unframed With Mounting

MODEL NUMBER	DESCRIPTION	ORDER NUMBER
PFT-05-05M-UF-WM	Permaflect 5% 0.5M x 0.5M Unframed w/mounting	AA-01391-005
PFT-05-12M24M-UF-WM	Permaflect 5% 1.2M x 2.4M Unframed w/mounting	AA-01394-005
PFT-05-15M-UF-WM	Permaflect 5% 1.5M x 1.5M Unframed w/mounting	AA-01393-005
PFT-05-1M-UF-WM	Permaflect 5% 1.0M x 1.0M Unframed w/mounting	AA-01392-005
PFT-10-05M-UF-WM	Permaflect 10% 0.5M x 0.5M Unframed w/mounting	AA-01391-010
PFT-10-12M24M-UF-WM	Permaflect 10% 1.2M x 2.4M Unframed w/mounting	AA-01394-010
PFT-10-15M-UF-WM	Permaflect 10% 1.5M x 1.5M Unframed w/mounting	AA-01393-010
PFT-10-1M-UF-WM	Permaflect 10% 1.0M x 1.0M Unframed w/mounting	AA-01392-010
PFT-18-05M-UF-WM	Permaflect 18% 0.5M x 0.5M Unframed w/mounting	AA-01391-018
PFT-18-12M24M-UF-WM	Permaflect 18% 1.2M x 2.4M Unframed w/mounting	AA-01394-018
PFT-18-15M-UF-WM	Permaflect 18% 1.5M x 1.5M Unframed w/mounting	AA-01393-018
PFT-18-1M-UF-WM	Permaflect 18% 1.0M x 1.0M Unframed w/mounting	AA-01392-018
PFT-50-05M-UF-WM	Permaflect 50% 0.5M x 0.5M Unframed w/mounting	AA-01391-050
PFT-50-12M24M-UF-WM	Permaflect 50% 1.2M x 2.4M Unframed w/mounting	AA-01394-050
PFT-50-15M-UF-WM	Permaflect 50% 1.5M x 1.5M Unframed w/mounting	AA-01393-050
PFT-50-1M-UF-WM	Permaflect 50% 1.0M x 1.0M Unframed w/mounting	AA-01392-050
PFT-80-05M-UF-WM	Permaflect 80% 0.5M x 0.5M Unframed w/mounting	AA-01391-080
PFT-80-12M24M-UF-WM	Permaflect 80% 1.2M x 2.4M Unframed w/mounting	AA-01394-080
PFT-80-15M-UF-WM	Permaflect 80% 1.5M x 1.5M Unframed w/mounting	AA-01393-080
PFT-80-1M-UF-WM	Permaflect 80% 1.0M x 1.0M Unframed w/mounting	AA-01392-080
PFT-94-05M-UF-WM	Permaflect 94% 0.5M x 0.5M Unframed w/mounting	AA-01391-094
PFT-94-12M24M-UF-WM	Permaflect 94% 1.2M x 2.4M Unframed w/mounting	AA-01394-094
PFT-94-15M-UF-WM	Permaflect 94% 1.5M x 1.5M Unframed w/mounting	AA-01393-094
PFT-94-1M-UF-WM	Permaflect 94% 1.0M x 1.0M Unframed w/mounting	AA-01392-094

Permaflect Target Reflectance Uniformity Mapping and Report Included

Target Weight:

Size	Weight
0.5 m x 0.5 m	1.5 kg
1.0 m x 1.0 m	6 kg
1.5 m x 1.5 m	14 kg
1.2 m x 2.4 m	18 kg

Permaflect Targets Unframed No Mounting

MODEL NUMBER	DESCRIPTION	ORDER NUMBER
PFT-05-05M-UF-NM	Permaflect 5% 0.5M x 0.5M Unframed No Mounting	AA-01411-005
PFT-05-12M24M-UF-NM	Permaflect 5% 1.2M x 2.4M Unframed No Mounting	AA-01414-005
PFT-05-15M-UF-NM	Permaflect 5% 1.5M x 1.5M Unframed No Mounting	AA-01413-005
PFT-05-1M-UF-NM	Permaflect 5% 1.0M x 1.0M Unframed No Mounting	AA-01412-005
PFT-10-05M-UF-NM	Permaflect 10% 0.5M x 0.5M Unframed No Mounting	AA-01411-010
PFT-10-12M24M-UF-NM	Permaflect 10% 1.2M x 2.4M Unframed No Mounting	AA-01414-010
PFT-10-15M-UF-NM	Permaflect 10% 1.5M x 1.5M Unframed No Mounting	AA-01413-010
PFT-10-1M-UF-NM	Permaflect 10% 1.0M x 1.0M Unframed No Mounting	AA-01412-010
PFT-18-05M-UF-NM	Permaflect 18% 0.5M x 0.5M Unframed No Mounting	AA-01411-018
PFT-18-12M24M-UF-NM	Permaflect 18% 1.2M x 2.4M Unframed No Mounting	AA-01414-018
PFT-18-15M-UF-NM	Permaflect 18% 1.5M x 1.5M Unframed No Mounting	AA-01413-018
PFT-18-1M-UF-NM	Permaflect 18% 1.0M x 1.0M Unframed No Mounting	AA-01412-018
PFT-50-05M-UF-NM	Permaflect 50% 0.5M x 0.5M Unframed No Mounting	AA-01411-050
PFT-50-12M24M-UF-NM	Permaflect 50% 1.2M x 2.4M Unframed No Mounting	AA-01414-050
PFT-50-15M-UF-NM	Permaflect 50% 1.5M x 1.5M Unframed No Mounting	AA-01413-050
PFT-50-1M-UF-NM	Permaflect 50% 1.0M x 1.0M Unframed No Mounting	AA-01412-050
PFT-80-05M-UF-NM	Permaflect 80% 0.5M x 0.5M Unframed No Mounting	AA-01411-080
PFT-80-12M24M-UF-NM	Permaflect 80% 1.2M x 2.4M Unframed No Mounting	AA-01414-080
PFT-80-15M-UF-NM	Permaflect 80% 1.5M x 1.5M Unframed No Mounting	AA-01413-080
PFT-80-1M-UF-NM	Permaflect 80% 1.0M x 1.0M Unframed No Mounting	AA-01412-080
PFT-94-05M-UF-NM	Permaflect 94% 0.5M x 0.5M Unframed No Mounting	AA-01411-094
PFT-94-12M24M-UF-NM	Permaflect 94% 1.2M x 2.4M Unframed No Mounting	AA-01414-094
PFT-94-15M-UF-NM	Permaflect 94% 1.5M x 1.5M Unframed No Mounting	AA-01413-094
PFT-94-1M-UF-NM	Permaflect 94% 1.0M x 1.0M Unframed No Mounting	AA-01412-094

Permaflect Target Reflectance Uniformity Mapping and Report Included

Target Weight:

Size	Weight
0.5 m x 0.5 m	1.5 kg
1.0 m x 1.0 m	6 kg
1.5 m x 1.5 m	14 kg
1.2 m x 2.4 m	18 kg



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Permafect Targets Carry and Stow Case Options

- Cases carry one to three targets
 - Protects surface and corners from being scratched and dinged
 - Hard sided case with reinforced corners
 - Foam lined fitted inserts
 - Can be used to stack targets in constrained spaces
- Grab and go
 - Recessed handles
- Grab and drag larger targets
 - EZ Haul wheels options
- Easy access
 - Hinged cases
- Secure
 - Recessed latched
- No additional packaging needed
 - Can be used for shipments, storage and transport

MODEL NUMBER	DESCRIPTION	ORDER NUMBER
PFT-05M-Carry Case	Carry case for Permafect 0.5 m x 0.5 m Targets Main unit size: (L x W x H) -> 24" x 24" x 8" No castors or wheels. Weight: 9.5 Kg	AA-01523-050
PFT-1M-Carry Case Wheeled	Carry case for Permafect 1 m x 1 m Targets Main unit size: (L x W x H) -> 44" x 44" x 8" With corner wheel installed. Weight: 25 Kg	AA-01524-100
PFT-15M-Carry Case Wheeled	Carry case for Permafect 1.5 m x 1.5 m Targets Main unit size: (L x W x H) -> 64" x 64" x 8" With corner wheel installed. Weight: 30 Kg	AA-01524-150
PFT-15M-Target Mount and Carriage	Target mount for Permafect 1.5 m x 1.5 m Targets; connection straps and blocks for connecting two carriages together. All hardware and tools provided	AA-01525-150

LiDAR Test Target Kits



Driverless car OEMs rely on the accuracy of multiple sensors including LiDAR technology to maintain order and avoid incidences on the road. Autonomous cars depend on these laser-based time of flight systems to measure the distance between the vehicle and any proximate object. The laser light is transmitted at the speed of light towards an object and the time taken for the laser to hit the target is recorded. Laser point clouds emitted and reflected back to the transmitter and the time taken for the reflected light to hit the transmitter is used to create a 3D mapping of the scene. To accurately assess short-range and long-range sensitivity over the dynamic range of LiDAR systems, large area dark, grey, and white reference targets are ideal.

Labsphere's standard LiDAR Test Target Kits include three reflectance levels; 10%, 50% and 80%, a robust case that holds all three Permafect® targets for storage and transport, and spectral reflectance and uniformity test reports. The kits come in a choice of three target sizes; 0.5 m x 0.5 m, 1.0 m x 1.0 m and 1.5 m x 1.5 m.

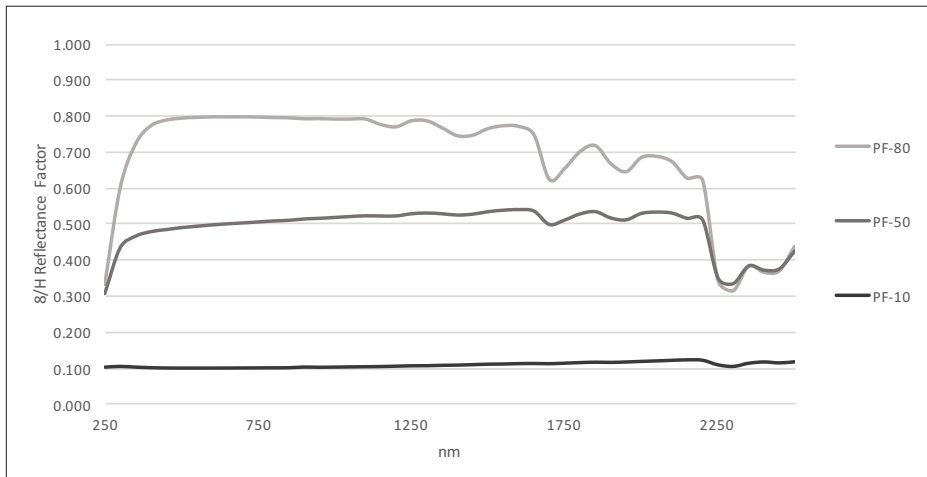
No other options compare

- Lightweight
- Uniform
- Durable
- Easy to Clean

Key performance factors

- Three grey scale levels (10%, 50% and 80%) for the dynamic range testing and distance sensitivity of LiDAR systems
- Reflectance levels in NIR laser wavelength 905 nm to 940 nm and 1550 nm
- Targets sizes (0.5 m, 1 m and 1.5 m square) are ideal for the operating distance
- Near Lambertian diffuse reflectance factor for incident angle independence
- Uniform reflectance over the entire reflecting surface
- Robust for production and field use
- Accommodates mounting of the frameless targets

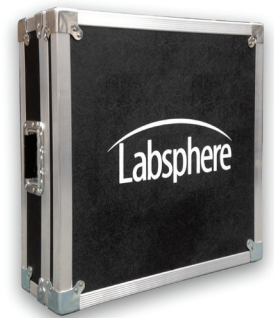
Typical 8/H Reflectance Factors of Permaflect



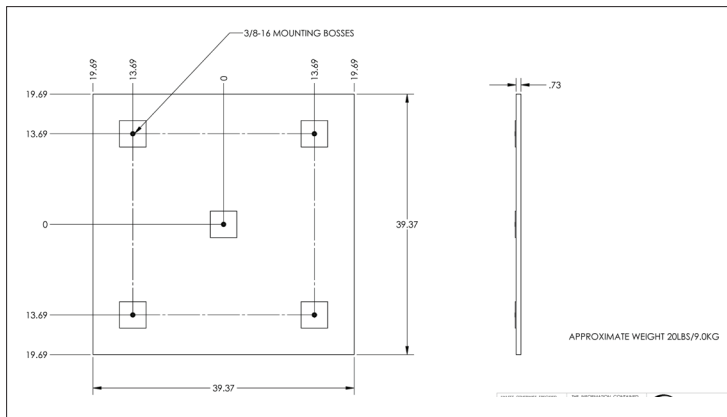
Measurement report includes:

- Spectral reflectance from 350 nm to 1000 nm every 10 nm
- Reflectance map of target at 600 nm and 905 nm
- Reflectance uniformity

Permaflect-X (%)	10%	50%	80%
Variance from Average in Absolute Reflectance:	+/- 1% (8.5% - 11.5%)	+/- 1.5% (48.0% - 52.0%)	+/- 1% (78.5% - 81.5%)
Typical Flatness: Peak to peak from 350 nm to 950 nm	0%	5%	8%
Uniformity:			
0.5 m x 0.5 m at 600 nm	+/- 1%	+/- 1.5%	+/- 1%
1.0 m x 1.0 m at 600 nm	+/- 1%	+/- 1.5%	+/- 1%
1.5 m x 1.5 m at 600 nm	+/- 1%	+/- 1.5%	+/- 1%



1.0 m x 1.0 m Informational Drawing



Carry and stow case features

- Protects surface and corners from being scratched and dinged
 - Hard sided hinged case with reinforced corners
 - Foam lined fitted inserts
 - Can be used to stack targets in constrained spaces
- Grab and go with recessed handles and latch
- Grab and drag larger targets with EZ Haul wheels options
- Can be used for shipment, storage and transport

Ordering Information

MODEL NUMBER	DESCRIPTION	ORDER NUMBER
PFTK-05M-UF-WM	Permaflect LiDAR Kit, 10%, 50% and 80%, 0.5 m x 0.5 m Unframed w/mounting and Carry Case Weight: 30 lbs (14 kg)	AA-01564-050
PFTK-1M-UF-WM	Permaflect LiDAR Kit, 10%, 50% and 80%, 1 m x 1 m Unframed w/mounting and Wheeled Carry Case Weight: 95 lbs (43 kg)	AA-01564-100
PFTK-15M-UF-WM	Permaflect LiDAR Kit, 10%, 50% and 80%, 1.5 m x 1.5 m Unframed w/mounting and Wheeled Carry Case Weight: 160 lbs (72 kg)	AA-01564-150



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Wavelength (nm)	Typical 8/H Reflectance Factor		
	10%	50%	80%
250	0.10	0.30	0.33
300	0.10	0.43	0.60
350	0.10	0.46	0.72
400	0.10	0.48	0.77
450	0.10	0.48	0.79
500	0.10	0.49	0.79
550	0.10	0.49	0.79
600	0.10	0.50	0.80
650	0.10	0.50	0.80
700	0.10	0.50	0.80
750	0.10	0.50	0.79
800	0.10	0.51	0.79
850	0.10	0.51	0.79
900	0.10	0.51	0.79
950	0.10	0.51	0.79
1000	0.10	0.52	0.79
1050	0.10	0.52	0.79
1100	0.10	0.52	0.79
1150	0.10	0.52	0.77
1200	0.10	0.52	0.77
1250	0.10	0.53	0.78
1300	0.10	0.53	0.78
1350	0.10	0.53	0.77
1400	0.10	0.52	0.74
1450	0.11	0.53	0.74
1500	0.11	0.53	0.76
1550	0.11	0.54	0.77
1600	0.11	0.54	0.77
1650	0.11	0.53	0.75
1700	0.11	0.50	0.62
1750	0.11	0.51	0.65
1800	0.11	0.53	0.70
1850	0.11	0.53	0.72
1900	0.11	0.51	0.67
1950	0.11	0.51	0.64
2000	0.12	0.53	0.68
2050	0.12	0.53	0.69
2100	0.12	0.53	0.67
2150	0.12	0.51	0.62
2200	0.12	0.51	0.62
2250	0.11	0.35	0.34
2300	0.10	0.33	0.31
2350	0.11	0.38	0.38
2400	0.11	0.37	0.36
2450	0.11	0.37	0.37
2500	0.12	0.42	0.44