Sciencetech 太阳能模拟器

Sciencetech solar simulators produce high intensity, uniform illumination on a target area. Typically, high power solar simulators use an ellipsoidal reflector to capture light from an arc lamp source inside the reflector, an arrangement that results in a light pattern with a bright outer region and a dark center. This non-uniformity is un-acceptable in many solar simulator applications and as a result, forces many of our solar simulator competitors to use designs involving diffusers to reduce the non-uniformity. This results in a reduction of intensity and a dis-tortion of the spectrum on the target area.

Sciencetech's solution to these problems is to use a unique system of mirrors that 'fold' the light onto the target plane, effectively reducing the light that is lost with little to no spectral distortion and also ensures no chromatic aberration in the output beam.
In addition, each of Sciencetech's solar simulators are customizable to best suit your requirements. The design of the fully reflective solar simulator permits a trade-off between power and uniformity. Higher uniformity can be achieved with lower power; or power can be increased when uniformity is reduced.

Solar Simulator		Target Size				Working Distance		Uniformity	Collimation Half Angle	Price
		Square Side		Circ. Diameter						
		Inches	cm	Inches	cm	Inches	cm	class	Derees	US $
Steady-State	SF300A	0.7	1.8	1	2.5	3-4	13	A	1	6,850
	SF150B	0.7	1.8	1	2.5	3-4	7.5	B	1	6,314
	SF150C	0.7	1.8	1	2.5	3-4	7.5	C	1	5,603
	SF300B	1.4	3.6	2	5	3-4	13	B	1	6,495

	SF300C	1.4	3.6	2	5	3-4	7.5	C	1	5,786
	SLB-150A	1	2.5	1	2.5	4	10	A	12	6,339
	SLB-150B	1.5	3.8	1.5	3.8	6	15	B	12	6,089
	SLB-300A	1.5	3.8	1.5	3.8	6	15	A	12	6,534
	SLB-300B	2	5	2	5	8	20	B	12	6,373
	SS150	1.4	3.6	2	5	27	68	A	2.5	12,073
	SS0.5kW	2.1	5.2	3	7.5	18	45	A	3	17,063
	SS1.0kW	3.5	8.8	5	12.5	30	75	A	3	19,714
	SS1.6K	4.3	11	6.2	16	36	90	A	3	22,502
	SS2.5K	5.6	14	7.8	20	42	105	A	3	28,050
	SS0.5kW-UV	2.1	5.3	3	7.5	18	45	A	3	29,012
	SS1.0kW-UV	3.5	8.8	5	12.5	35.2	88	A	3	31,115
	SS1.6kW-UV	4.5	11.3	6.4	16	50	125	A	3	33,221
	SS2.5kW-UV	5.6	14.1	8	20	42	105	A	3	46,416
	SFR1.6K	6.3	16	8.5	21.5	~12	30	B	0.7	27,500
	SFR3.0K	8.4	21	11.5	29.5	~12	30	B	0.7	38,500
	UHE-15A	3	7.6	3	7.6	22	55	A	5	18,975
	UHE-15-I	5	12.7	5	12.7	22	55	B	5	17,860
	UHE-15-II	4	10	4	10	18	45	B	5	17,860
	UHE-15-III	6	16	6	16	24	60	B	5	16,500
	UHE-15-IV	5	12.7	5	12.7	24	60	B	5	16,500
	UHE-16	6.3	16	6.3	16	23	58	A	5	40,824
	UHE-33	12	33	12	33	44	110	A	5	68,885
	UHE-45	18	45	18	45	44	110	A	5	87,800
	Solar LightLine A1	1	2.5	1	2.5	4	10	A	10	9,284
	Solar LightLine A4	1	2.5	1	2.5	4	10	A	10	14,800
	SL-38A-WS	1.5	3.8	1.5	3.8	10	25	A	10	11,950
	SL-50A-WS	2	5	2	5	10	25	A	10	12,965
	SL-60A-WS	2.4	6	2.4	6	10	25	A	10	14,000
	LASI	20	50	20	50	40	100	C	10	15,450
	TOPS	8.4	21	12	30	25	72	B	~20	43,850
Flash	PSS1	40	100	40	100	40	100	A	not collimated	32,236
	PSS1.5	60	150	60	150	40	100	A	not collimated	60,000
	PSS2	80	200	80	200	40	100	A	not collimated	90,000
Flash	FSSC	2	5	2	5	~0.5	~1.2	A	15	41,500

Concentrator	200-4000 Suns									

The radiation from the Sun is measured in two ways for a variety of fields of research. The solar constant is the irradiance or intensity of light incident at the surface of the Earth's atmosphere on a plane normal to the angle of incidence.

This value has been defined by the World Meteorological Organization to be 1366.7W/m2 outside the atmosphere.

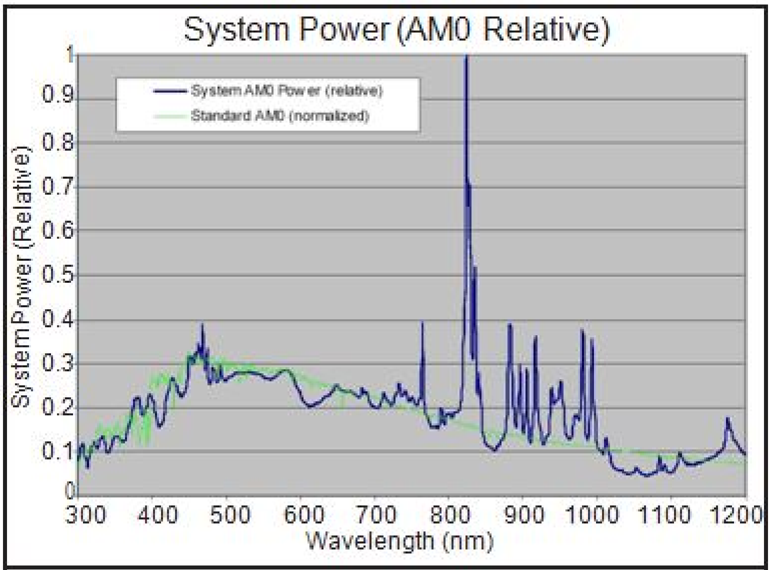
The irradiance of the Sun at the Earth's surface varies under different conditions due to absorption and scattering effects in the atmosphere, and so a number of other constants are important in regards to the irradiance of a solar simulator.

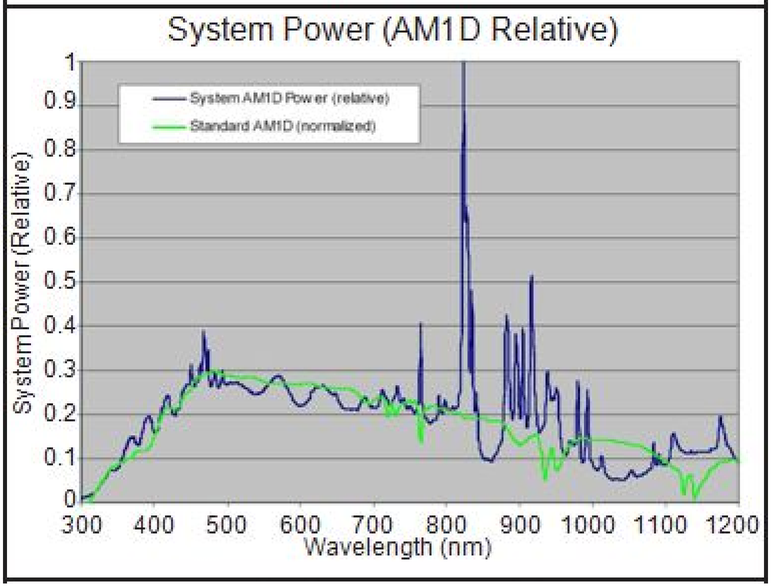
Solar Spectrum *	Filter	Power Density (mW/cm2)	Transmission %
In Space	AM0	137	61.30%
Direct solar spectrum at 0o zenith angle	AM1.0D	104	67%
Global solar spectrum at 0o zenith angle	AM1.0G	100	66.70%
Direct solar spectrum at 48.2o zenith angle	AM1.5D	93	65%
Global solar spectrum at 48.2 o zenith angle	AM1.5G	100	58.5%
Direct solar spectrum at 60.1o zenith angle	AM2.0D	71	57.30%

Below the atmosphere the radiation emitted from the Sun can be divided into two components: direct radiation that comes from the Sun itself, and scattered radiation coming from the rest of the sky, including a portion reflected back from the ground. Solar simulators are adjusted to imitate the spectral distribution of sunlight for a variety of environments; to do this the spectral distribution from the xenon arc lamp source is altered and refined using Air Mass (AM) filters.

When discussing filters, the direct radiation spectrum is imitated using a direct (D) filter, and the total including scattered sky and ground radiation is matched by using a global (G) filter that imitates both components together.

The table above gives the 1 SUN irradiance values for both of Sciencetech's filter types at a number of common conditions that can be simulated, as well as the approximate transmission values relative to unfiltered light between 250-2500nm.





Sciencetech's AM filters are designed to be used individually for standard conditions, although they can also be arranged in series to produce other spectral distributions. Many solar simulator systems used by our competition require filters to be used in series to achieve the same performance as Sciencetech's filters, for example using AM0 and AM1.0 filters in series to achieve a AM1.0 spectral distribution, whereas Sciencetech's AM1.0 filter can be used alone to achieve the same result, reducing power loss and the cost of additional filters.

Most Sciencetech solar simulators use xenon arc lamps, which enables the system to produce an intense, collimated beam of light, similar to that of a 5.8K blackbody. The biggest difference between the two is the xenon lines are present in the arc spectrum, and atmospheric absorptions in solar spectra, which is especially highlighted in the 800-1100nm range because of the intense line output of the lamp. An AM0 filter can reduce this effect so that the average level in specified bands matches solar levels above the atmosphere to better than ±25%, although complete elimination of the xenon lines while preserving the rest of the spectrum is impossible with a practical filter. AM1.0, 1.5 and 2.0 filters further modify the visible and UV portions of the spectrum for different sea-level conditions, and coupled with the use of high pressure Xenon arc lamps Sciencetech is capable of producing Class A standards for our solar simulators.

The graphs on the left show the typical output spectra of Sciencetech's fully reflective solar simulators. These spectral irradiance curves combine the spectral curves of the xenon arc lamp source, air mass filter, and mirrors used inside the solar simulator beam homogenizer.

Actual output spectra may vary due to the condition of the lamp and manufacturing tolerances of the air mass filters. In order to simplify visual comparison of the spectral curves of our solar simulators with ASTM E927-10 standard curves, the simulator outputs are normalized to the corresponding standard spectrum.