THEMATIC NETWORK FOR ULTRAVIOLET MEASUREMENTS

Working Group 1: Guidance for UV power meter classification for particular applications

Characterizing the Performance of Integral Measuring UV-Meters

APPENDIX

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CONTENTS

1 Practical procedure for instrument calibration

The calibration of the responsivity of a UV radiometer can be performed in a number of ways the method chosen may depend on the application and/or the uncertainty required. The different methods both require the measurement of the spectral responsivity of the radiometer at all wavelengths over its spectrally sensitive range. It is assumed that appropriate tests are carried out as defined elsewhere in this document to ensure that any sensitivity of the radiometer to wavelengths outside of the region characterised here are taken account of by additional measurements. It should also be noted that it is important that any measurement is carried out at an irradiance level which is within the linear region of the radiometers response and is preferably similar to that at which it is to be used.

1.1 Measurement of spectral responsivity

The measurement of spectral responsivity is in the first instance carried out in order to determine the difference between its spectral response shape and that of the specific action spectrum that it has been designed to meet. All that is required to meet this objective is a measurement of the relative spectral responsivity normalised to a wavelength somewhere near the peak of the required action spectrum, $s(\lambda)_{act,rel}$ The absolute response is then determined by an additional calibration using a source of know spectral irradiance e.g. a Deuterium lamp or Tungsten Halogen lamp. However, in recent years improvements in the uncertainties of spectral responsivity scales in the UV region mean that it is now probably more accurate to determine the absolute spectral responsivity of the UV radiometer using a calibrated reference detector directly as part of its spectral characterisation.

Determination of relative spectral responsivity of the UV radiometer is usually carried out using a tuneable monochromatic source of radiation. Since most UV radiometers are used to measure irradiance, this radiation is arranged to be relatively spatially uniform and to overfill the entrance aperture of the UV radiometer. The source of tuneable radiation is usually produced by a monochromator operating either as a single or a double, the latter generally producing more spectrally pure and narrow spectral bands but with significantly lower power levels. It is therefore quite common for facilities to incorporate single pass monochromators with additional broader band pass filters to improve the stray light rejection. These monochromators generally utilising some form of Arc source, Argon or Xenon, to provide reasonable levels of irradiance, it is of course also possible to use synchrotron radiation as this source. Another alternative is the use of tuneable laser radiation, which has the advantage of relatively high irradiance levels and high levels of monochromaticity, but is obviously more costly and so is only likely to be used for the highest accuracy applications, or as a primary reference for secondary standards.

In all the above cases the relative spectral response of the UV radiometer is determined by comparing its response to that of a reference detector which has previously been calibrated traceable to a national standards laboratory, when viewing the same source of monochromatic radiation. The reference detector must also have been calibrated in terms of its spectral irradiance and must be positioned in the same plane as that of the UV radiometer. Ideally the aperture areas of both would be similar, although providing the irradiance is uniform and account taken of any angular effects due to different sizes of the detectors this is not critical. This measurement must be performed at all wavelengths over the spectral sensitive range of the radiometer. The wavelength interval and resolution should be as small as possible to determine any structure within the radiometer. This is particularly critical in the UV where the action spectra which the meter is trying to mimic

are often very steeply varying with wavelength, and in many cases are only subtly different at the cut-off ends. The dominant uncertainty in the calibration is likely to be due to wavelength uncertainty in the calibration of these radiometers at the edge of their action spectra.

The reference detector for relative spectral response can generally be any spectrally flat (black) detector, e.g. thermopile or pyroelectric. However, as stated earlier the accuracy of spectral responsivity scales in the UV spectral region are now at a level of < 1 % as compared to sources, which are at least two, or three times higher. It is therefore reasonable to consider using a detector calibrated in terms of its absolute spectral responsivity and not simply its relative spectral response in order to determine the response of the radiometer. This can be performed either at a single wavelength point and using a spectrally flat detector to determine the relative as before or to use the calibrated detector directly at all wavelengths.

When performing any of the above calibrations care needs to be taken to avoid the following major sources of error:

- Stray light particularly when using different types of detector e.g. thermal detectors and filtered detectors.
- Interreflections between either reference detector or radiometer and some other optical element.
- Appropriate dark or Zero readings to minimise drift etc.
- Wavelength accuracy, and linearity.

1.2 Measurement of spectral lamp distribution

It is very similar to the measurement of spectral responsivity. Instead of the detector response the lamp irradiation is measured. The absolute irradiance $E(\lambda)$ is then determined by a comparison using a source of known spectral irradiance e.g. a Deuterium lamp or Tungsten Halogen lamp.

The absolute spectral irradiance of the light sources is determined by comparing its irradiation to that of a reference source which has previously been calibrated traceable to a national standards laboratory. Since most UV radiometers are used to measure irradiance, this radiation is arranged to be relatively spatially uniform and to overfill the cosine corrected entrance aperture of the UV radiometer head.

The reference source must be positioned in the plane mentioned in the calibration certificate. The comparison must be performed for the UV meter's sensitive wavelength range. The wavelength interval and resolution should be as small as possible to determine any structure within the source. This is particularly critical in the UV where the action spectra which the meter is trying to mimic are often very strongly varying with wavelength, and in many cases are only subtly different at the cut-off ends. The dominant uncertainty in the calibration is likely to be due to wavelength uncertainty in the calibration of these radiometers at the edge of their lines in the spectra.

When performing any of the above calibrations care needs to be taken to avoid the following major sources of error:

- Stray light particularly when using different types of lamps e.g. deuterium lamps with a

very small beam or tungsten halogen lamps like a point source.

- Interreflections between either light source and entrance optics or baffles in the beam path and some other optical elements.
- Appropriate dark or zero reading to minimise drift etc.
- Wavelength accuracy, and linearity.

1.3 Instrument calibration

After having all the values from above measurements the calibration of a UV-radiometer can be performed. In most cases such instruments have to be calibrated on irradiance E_e. Then the radiometer head is to be positioned with its acceptance area into the reference plane with perpendicular incidence. The radiation from the known source must be arranged to be spatially uniform on the acceptance area of the radiometer head and to overfill the entrance aperture.

Then the effective irradiance $E_{e,act}$ must be determined which results for a considered effect with that lamp used for calibration. For the reference plane it can be calculated according to Eq. (27),

$$E_{e,act} = \int_0^\infty E_{e,\lambda,Cal} \cdot s(\lambda)_{act,rel} \cdot d\lambda \,, \tag{27}$$

where

$E_{\mathrm{e,act}}$ effective (actinic) irradiance of the calibration source at the reference plane

$s(\lambda)_{act,\mathrm{rel}}$ relative spectral weighting function for the considered effect

$E_{\mathrm{e},\lambda,\mathrm{Cal}}$ spectral irradiance of the calibration source at the reference plane.

Then the reading of the radiometer can be adjusted in a way that the reading matches with the result of Eq. (27).

NOTE: The reference plane for the radiometer head is generally the plane where the cone of incident radiation is vignetting. In cases where a radiometer head with a flat shaped (not spherical!) diffuser, the reference plane is the outer surface of the diffuser. In cases where an aperture type of detector has a diaphragm in front of the filtering, the plane of the diaphragm is the reference plane.

In order to find the remaining deviation, if a source with different spectral distribution compared to the calibration source is to be measured, Eq. (2) has to be calculated and the result applied in Eq. (4). Using Eq. (3) the measured result can even be corrected.

2 Determination of outer bound response

2.1 Determination of short wavelength range response

For determining the short wavelength range response according to Eq. (7) suitable sources and filters are required for the different action spectra. Table 1 presents such items accordingly.

Table 1. Sources and filters for determining the short wavelength range response.

Actinic action spectrum	Index symbol	Source	Filter
UV-A		Xenon or Deuterium	as Schott WG 305 / 1 mm
UV-B		Xenon or Deuterium	as Schott BG3 / 1 mm
UV-C		./.	./.
photosynthesis	sy	fluorescent lamp as Osram color 79	as Schott UG11 / 2,5 mm
killing of bacteria	ba	./.	./.
ACGIH		./.	./.
erythema	er	./.	./.
psoriasis	ps	Deuterium lamp	interference filter as Schott UV-M-IL, λ_m= 280 nm
photokeratitis	ke	./.	./.
Bilirubin-dissoziation	bi	fluorescent lamp as Osram color 79	as Schott UG 1 / 1 mm
photoconjunctivitis	ko	./.	./.
direct pigmentation	sp	Deuterium lamp	as Schott UG 1 / 1 mm

2.2 Determination of long wavelength range response

For determining the long wavelength range response according to Eq. (9) suitable sources and filters are required for the different action spectra. Table 2 presents such items accordingly.

Table 2. Sources and filters for determining the long wavelength range response.

Actinic action spectrum	Index symbol	Source	Filter
UV-A		tungsten halogen	as Schott GG 420 / 1 mm
UV-B		tungsten halogen	as Schott WG 335 / 1 mm
UV-C		Xenon lamp with filter as Schott WG 230 / 4 mm	as Schott WG 320 / 3 mm
photosynthesis	sy	tungsten halogen	as Schott RG 780 / 3 mm
killing of bacteria	ba	Xenon lamp with filter as Schott WG 230 / 4 mm	as Schott WG 320 / 1 mm
ACGIH		Xenon lamp with filter as Schott WG 230 / 4 mm	as Schott WG 320 / 1 mm
erythema	er	Xenon lamp with filter as Schott WG 230 / 4 mm	as Schott WG 335 / 1 mm
psoriasis	ps	Deuterium lamp	interference filter as Schott UV-M-IL, λ_m= 280 nm
photokeratitis	ke	Xenon lamp with filter as Schott WG 230 / 4 mm	as Schott WG 335 / 1 mm
Bilirubin-dissoziation	bi	fluorescent lamp as Osram color 79	as Schott UG 1 / 1 mm
photoconjunctivitis	ko	Xenon lamp with filter as Schott WG 230 / 4 mm	as Schott WG 320 / 3 mm
direct pigmentation	sp	Deuterium lamp	as Schott UG 1 / 1 mm

3 Measurement methods for the user reducing additional uncertainties

The user has to take care of following:

3.1 Before the measurement:

1. The input optic of the radiometer head has to be clean all the time. Most of the materials are not simple to clean. While cleaning, the dust or dirt could be pushed into the entrance aperture creating an additional uncertainty.
2. The readout unit has to be fully powered well. No low battery or reduced voltage from the mains charger should be applied.
3. The radiometer head should not be dropped. It is not possible to look into the unit and therefore damage might not be recognised after such an event. In those cases the unit has to be re-characterised.
4. The calibration of the readout unit has to correspond with the radiometer head currently used. Some reading units provide several calibration factors for different radiometer heads.
5. The radiometer shall be in a thermal equilibrium

3.2 During the measurement:

1. Generally the source has to be sufficiently stabilised. In cases where this is not applicable, the measurement should be carried out at a time similar to the practical use. For example, a sun-tanning lamp needs to operate for at least half an hour before its output is stable. However, for practical applications it is normally used immediately after power up, and should therefore be calibrated in this way regardless of any temporal instability.
2. The radiometer head has to be placed at a fixed position while taking the reading.
3. The acceptance area of the radiometer head has to be completely irradiated, preferably uniformly.
4. The connecting cables carrying photocurrents shall not be moved during readout.
5. The dark current and ambient light level have to be checked in respect of influencing the reading
6. Measurements at different locations within a radiation field might be useful in determining the distribution of irradiance in solarium applications.
7. The detector has to be protected from the heat of the source.
8. The geometry of the measurement point (distance and angle) to the source has to be known
9. The acceptance aperture of the radiometer head shall be placed in the plane of interest or at least has to be parallel to it.
10. Most radiometer heads are subject of ageing when exposed to a high level of UVC radiation, which therefore shall be avoided.

4 Standardised lamps

For calculating the measuring uncertainty due to the not perfect spectral match according to Eq. (4) and for calculating the characteristic f_{index} according to Eq. (6) it is recommended to use the group of test radiation sources listed in Table 3.

Averaged measurement values are listed in the Tables 4 to 13.

Please feel free to add a lamp of your own for a certain application and calculate the measuring uncertainty.

Table 3. List of recommended sources.

Index number	Lamp type	Application	Table
1	Xenon long arc lamp	optics, research, solar simulations	12
2	Metalhalogenid	solar simulations, TV and cinema	13
3	Tanning lamp UV-A	for skin treatments, cosmetics	11
4	Tanning lamp UV-B	for cosmetic uses and UV-therapy	10
5	Low Pressure Mercury lamp	bacteria killing	9
6	Medium Pressure Mercury lamp	Bacteria killing, UV-curing	8
./.	Sun radiation AM1.5	defined in CEI/IEC 904-3	./.
7	Global irradiance, Thessaloniki 18°SZA, measured on 05.07.97		7
8	Deuterium-Lamp	used as Calibration standard	5
9	Tungsten Halogen-Lamp	used as Calibration standard	4
10	Iron High Pressure lamp		6

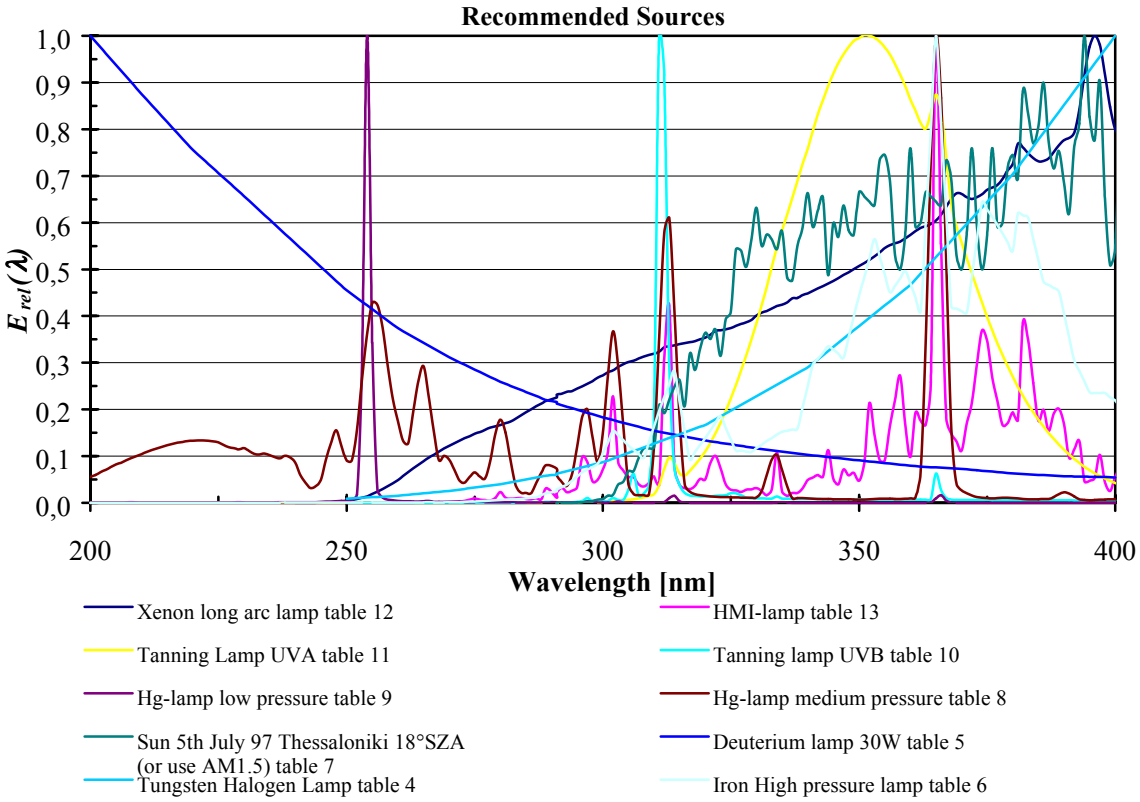

Figure 1. Plot of relative spectral distribution of the recommended sources. All values below 10^{-4} please ignore. Please check all values with your own experience. These are real measured values with all the known uncertainties. All values are normalised in the wavelength range between 200 nm and 400 nm.

Table 4: Spectral distribution data of a Tungsten Halogen Lamp

λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$
		280	3,99E-02	320	1,67E-01	360	4,67E-01
		281	4,19E-02	321	1,73E-01	361	4,79E-01
		282	4,39E-02	322	1,79E-01	362	4,91E-01
		283	4,59E-02	323	1,85E-01	363	5,02E-01
		284	4,79E-02	324	1,91E-01	364	5,14E-01
		285	5,00E-02	325	1,98E-01	365	5,26E-01
		286	5,20E-02	326	2,04E-01	366	5,38E-01
		287	5,40E-02	327	2,10E-01	367	5,50E-01
		288	5,60E-02	328	2,16E-01	368	5,62E-01
		289	5,80E-02	329	2,22E-01	369	5,73E-01
250	8,73E-03	291	6,00E-02	330	2,28E-01	370	5,85E-01
251	9,39E-03	291	6,27E-02	331	2,34E-01	371	5,97E-01
252	1,00E-02	292	6,53E-02	332	2,41E-01	372	6,09E-01
253	1,07E-02	293	6,80E-02	333	2,47E-01	373	6,21E-01
254	1,14E-02	294	7,07E-02	334	2,53E-01	374	6,33E-01
255	1,20E-02	295	7,34E-02	335	2,59E-01	375	6,44E-01
256	1,27E-02	296	7,60E-02	336	2,65E-01	376	6,56E-01
257	1,33E-02	297	7,87E-02	337	2,71E-01	377	6,68E-01
258	1,40E-02	298	8,14E-02	338	2,77E-01	378	6,80E-01
259	1,46E-02	299	8,41E-02	339	2,84E-01	379	6,92E-01
260	1,53E-02	300	8,68E-02	340	2,90E-01	380	7,04E-01
261	1,63E-02	301	9,08E-02	341	2,99E-01	381	7,18E-01
262	1,73E-02	302	9,48E-02	342	3,07E-01	382	7,33E-01
263	1,83E-02	303	9,88E-02	343	3,16E-01	383	7,48E-01
264	1,93E-02	304	1,03E-01	344	3,25E-01	384	7,63E-01
265	2,03E-02	305	1,07E-01	345	3,34E-01	385	7,78E-01
266	2,13E-02	306	1,11E-01	346	3,43E-01	386	7,93E-01
267	2,24E-02	307	1,15E-01	347	3,52E-01	387	8,07E-01
268	2,34E-02	308	1,19E-01	348	3,61E-01	388	8,22E-01
269	2,44E-02	309	1,23E-01	349	3,69E-01	389	8,37E-01
270	2,54E-02	310	1,27E-01	350	3,78E-01	390	8,52E-01
271	2,68E-02	311	1,31E-01	351	3,87E-01	391	8,67E-01
272	2,83E-02	312	1,35E-01	352	3,96E-01	392	8,81E-01
273	2,97E-02	313	1,39E-01	353	4,05E-01	393	8,96E-01
274	3,12E-02	314	1,43E-01	354	4,14E-01	394	9,11E-01
275	3,26E-02	315	1,47E-01	355	4,23E-01	395	9,26E-01
276	3,41E-02	316	1,51E-01	356	4,31E-01	396	9,41E-01
277	3,56E-02	317	1,55E-01	357	4,40E-01	397	9,56E-01
278	3,70E-02	318	1,59E-01	358	4,49E-01	398	9,70E-01
279	3,85E-02	319	1,63E-01	359	4,58E-01	399	9,85E-01

Continued Table 4: Spectral distribution data of a Tungsten Halogen Lamp

λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$
400	1,00E+00	440	1,78E+00	480	2,76E+00	520	3,88E+00
401	1,02E+00	441	1,80E+00	481	2,79E+00	521	3,91E+00
402	1,04E+00	442	1,82E+00	482	2,82E+00	522	3,94E+00
403	1,05E+00	443	1,85E+00	483	2,84E+00	523	3,97E+00
404	1,07E+00	444	1,87E+00	484	2,87E+00	524	4,00E+00
405	1,09E+00	445	1,89E+00	485	2,90E+00	525	4,03E+00
406	1,11E+00	446	1,92E+00	486	2,93E+00	526	4,06E+00
407	1,13E+00	447	1,94E+00	487	2,95E+00	527	4,08E+00
408	1,14E+00	448	1,97E+00	488	2,98E+00	528	4,11E+00
409	1,16E+00	449	1,99E+00	489	3,01E+00	529	4,14E+00
410	1,18E+00	450	2,01E+00	490	3,04E+00	530	4,17E+00
411	1,20E+00	451	2,04E+00	491	3,06E+00	531	4,20E+00
412	1,22E+00	452	2,06E+00	492	3,09E+00	532	4,23E+00
413	1,23E+00	453	2,08E+00	493	3,12E+00	533	4,26E+00
414	1,25E+00	454	2,11E+00	494	3,15E+00	534	4,29E+00
415	1,27E+00	455	2,13E+00	495	3,17E+00	535	4,32E+00
416	1,29E+00	456	2,15E+00	496	3,20E+00	536	4,35E+00
417	1,31E+00	457	2,18E+00	497	3,23E+00	537	4,37E+00
418	1,32E+00	458	2,20E+00	498	3,25E+00	538	4,40E+00
419	1,34E+00	459	2,22E+00	499	3,28E+00	539	4,43E+00
420	1,36E+00	460	2,25E+00	500	3,31E+00	540	4,46E+00
421	1,38E+00	461	2,27E+00	501	3,34E+00	541	4,49E+00
422	1,40E+00	462	2,30E+00	502	3,37E+00	542	4,52E+00
423	1,42E+00	463	2,33E+00	503	3,39E+00	543	4,55E+00
424	1,44E+00	464	2,35E+00	504	3,42E+00	544	4,58E+00
425	1,46E+00	465	2,38E+00	505	3,45E+00	545	4,61E+00
426	1,49E+00	466	2,40E+00	506	3,48E+00	546	4,64E+00
427	1,51E+00	467	2,43E+00	507	3,51E+00	547	4,67E+00
428	1,53E+00	468	2,45E+00	508	3,54E+00	548	4,70E+00
429	1,55E+00	469	2,48E+00	509	3,57E+00	549	4,72E+00
430	1,57E+00	470	2,51E+00	510	3,60E+00	550	4,75E+00
431	1,59E+00	471	2,53E+00	511	3,62E+00	551	4,78E+00
432	1,61E+00	472	2,56E+00	512	3,65E+00	552	4,81E+00
433	1,63E+00	473	2,58E+00	513	3,68E+00	553	4,84E+00
434	1,65E+00	474	2,61E+00	514	3,71E+00	554	4,87E+00
435	1,67E+00	475	2,63E+00	515	3,74E+00	555	4,90E+00
436	1,69E+00	476	2,66E+00	516	3,77E+00	556	4,93E+00
437	1,71E+00	477	2,69E+00	517	3,80E+00	557	4,96E+00
438	1,74E+00	478	2,71E+00	518	3,82E+00	558	4,99E+00
439	1,76E+00	479	2,74E+00	519	3,85E+00	559	5,02E+00

Continued Table 4: Spectral distribution data of a Tungsten Halogen Lamp

λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$
560	5,05E+00	600	6,17E+00	640	7,20E+00	680	8,10E+00
561	5,07E+00	601	6,19E+00	641	7,22E+00	681	8,12E+00
562	5,10E+00	602	6,22E+00	642	7,24E+00	682	8,14E+00
563	5,13E+00	603	6,25E+00	643	7,27E+00	683	8,16E+00
564	5,16E+00	604	6,27E+00	644	7,29E+00	684	8,18E+00
565	5,19E+00	605	6,30E+00	645	7,31E+00	685	8,20E+00
566	5,22E+00	606	6,33E+00	646	7,34E+00	686	8,22E+00
567	5,25E+00	607	6,35E+00	647	7,36E+00	687	8,24E+00
568	5,28E+00	608	6,38E+00	648	7,38E+00	688	8,26E+00
569	5,31E+00	609	6,41E+00	649	7,41E+00	689	8,28E+00
570	5,33E+00	610	6,43E+00	650	7,43E+00	690	8,30E+00
571	5,36E+00	611	6,46E+00	651	7,45E+00	691	8,32E+00
572	5,39E+00	612	6,49E+00	652	7,48E+00	692	8,34E+00
573	5,42E+00	613	6,51E+00	653	7,50E+00	693	8,36E+00
574	5,45E+00	614	6,54E+00	654	7,52E+00	694	8,38E+00
575	5,48E+00	615	6,57E+00	655	7,55E+00	695	8,40E+00
576	5,51E+00	616	6,59E+00	656	7,57E+00	696	8,42E+00
577	5,54E+00	617	6,62E+00	657	7,59E+00	697	8,44E+00
578	5,57E+00	618	6,65E+00	658	7,62E+00	698	8,46E+00
579	5,59E+00	619	6,67E+00	659	7,64E+00	699	8,48E+00
580	5,62E+00	620	6,70E+00	660	7,66E+00	700	8,50E+00
581	5,65E+00	621	6,73E+00	661	7,68E+00	701	8,52E+00
582	5,68E+00	622	6,75E+00	662	7,71E+00	702	8,54E+00
583	5,70E+00	623	6,78E+00	663	7,73E+00	703	8,56E+00
584	5,73E+00	624	6,80E+00	664	7,75E+00	704	8,58E+00
585	5,76E+00	625	6,83E+00	665	7,77E+00	705	8,59E+00
586	5,79E+00	626	6,85E+00	666	7,79E+00	706	8,61E+00
587	5,81E+00	627	6,87E+00	667	7,82E+00	707	8,63E+00
588	5,84E+00	628	6,90E+00	668	7,84E+00	708	8,65E+00
589	5,87E+00	629	6,92E+00	669	7,86E+00	709	8,67E+00
590	5,89E+00	630	6,95E+00	670	7,88E+00	710	8,69E+00
591	5,92E+00	631	6,97E+00	671	7,90E+00	711	8,70E+00
592	5,95E+00	632	7,00E+00	672	7,92E+00	712	8,72E+00
593	5,98E+00	633	7,02E+00	673	7,95E+00	713	8,74E+00
594	6,00E+00	634	7,05E+00	674	7,97E+00	714	8,76E+00
595	6,03E+00	635	7,07E+00	675	7,99E+00	715	8,78E+00
596	6,06E+00	636	7,10E+00	676	8,01E+00	716	8,79E+00
597	6,08E+00	637	7,12E+00	677	8,03E+00	717	8,81E+00
598	6,11E+00	638	7,15E+00	678	8,06E+00	718	8,83E+00
599	6,14E+00	639	7,17E+00	679	8,08E+00	719	8,85E+00

Continued Table 4: Spectral distribution data of a Tungsten Halogen Lamp

λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$
720	8,87E+00	760	9,43E+00	800	9,82E+00	840	1,00E+01
721	8,88E+00	761	9,44E+00	801	9,82E+00	841	1,00E+01
722	8,90E+00	762	9,45E+00	802	9,83E+00	842	1,00E+01
723	8,91E+00	763	9,46E+00	803	9,83E+00	843	1,00E+01
724	8,93E+00	764	9,47E+00	804	9,84E+00	844	1,00E+01
725	8,94E+00	765	9,48E+00	805	9,84E+00	845	1,00E+01
726	8,96E+00	766	9,49E+00	806	9,85E+00	846	1,00E+01
727	8,97E+00	767	9,50E+00	807	9,85E+00	847	1,01E+01
728	8,99E+00	768	9,52E+00	808	9,86E+00	848	1,01E+01
729	9,00E+00	769	9,53E+00	809	9,86E+00	849	1,01E+01
730	9,02E+00	770	9,54E+00	810	9,87E+00	850	1,01E+01
731	9,03E+00	771	9,55E+00	811	9,87E+00	851	1,01E+01
732	9,05E+00	772	9,56E+00	812	9,88E+00	852	1,01E+01
733	9,06E+00	773	9,57E+00	813	9,88E+00	853	1,01E+01
734	9,08E+00	774	9,58E+00	814	9,89E+00	854	1,01E+01
735	9,09E+00	775	9,59E+00	815	9,89E+00	855	1,01E+01
736	9,11E+00	776	9,61E+00	816	9,90E+00	856	1,01E+01
737	9,13E+00	777	9,62E+00	817	9,90E+00	857	1,01E+01
738	9,14E+00	778	9,63E+00	818	9,91E+00	858	1,01E+01
739	9,16E+00	779	9,64E+00	819	9,91E+00	859	1,01E+01
740	9,17E+00	780	9,65E+00	820	9,92E+00	860	1,01E+01
741	9,18E+00	781	9,66E+00	821	9,92E+00	861	1,01E+01
742	9,20E+00	782	9,67E+00	822	9,93E+00	862	1,01E+01
743	9,21E+00	783	9,68E+00	823	9,93E+00	863	1,01E+01
744	9,22E+00	784	9,68E+00	824	9,94E+00	864	1,01E+01
745	9,23E+00	785	9,69E+00	825	9,94E+00	865	1,01E+01
746	9,25E+00	786	9,70E+00	826	9,95E+00	866	1,01E+01
747	9,26E+00	787	9,71E+00	827	9,95E+00	867	1,01E+01
748	9,27E+00	788	9,72E+00	828	9,96E+00	868	1,01E+01
749	9,29E+00	789	9,73E+00	829	9,96E+00	869	1,01E+01
750	9,30E+00	790	9,74E+00	830	9,97E+00	870	1,01E+01
751	9,31E+00	791	9,74E+00	831	9,97E+00	871	1,01E+01
752	9,32E+00	792	9,75E+00	832	9,98E+00	872	1,01E+01
753	9,34E+00	793	9,76E+00	833	9,98E+00	873	1,01E+01
754	9,35E+00	794	9,77E+00	834	9,99E+00	874	1,01E+01
755	9,36E+00	795	9,78E+00	835	9,99E+00	875	1,01E+01
756	9,38E+00	796	9,79E+00	836	1,00E+01	876	1,01E+01
757	9,39E+00	797	9,79E+00	837	1,00E+01	877	1,01E+01
758	9,40E+00	798	9,80E+00	838	1,00E+01	878	1,01E+01
759	9,41E+00	799	9,81E+00	839	1,00E+01	879	1,01E+01

Continued Table 4: Spectral distribution data of a Tungsten Halogen Lamp

λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$	λ / nm	$S_{\lambda,FEL}$
880	1,01E+01	920	1,02E+01	960	1,01E+01	1000	9,86E+00
881	1,01E+01	921	1,02E+01	961	1,00E+01	1001	9,86E+00
882	1,01E+01	922	1,02E+01	962	1,00E+01	1002	9,85E+00
883	1,01E+01	923	1,02E+01	963	1,00E+01	1003	9,84E+00
884	1,01E+01	924	1,02E+01	964	1,00E+01	1004	9,84E+00
885	1,01E+01	925	1,02E+01	965	1,00E+01	1005	9,83E+00
886	1,01E+01	926	1,02E+01	966	1,00E+01	1006	9,83E+00
887	1,01E+01	927	1,02E+01	967	1,00E+01	1007	9,82E+00
888	1,01E+01	928	1,02E+01	968	1,00E+01	1008	9,81E+00
889	1,02E+01	929	1,02E+01	969	1,00E+01	1009	9,81E+00
890	1,02E+01	930	1,02E+01	970	1,00E+01	1010	9,80E+00
891	1,02E+01	931	1,01E+01	971	1,00E+01	1011	9,80E+00
892	1,02E+01	932	1,01E+01	972	1,00E+01	1012	9,79E+00
893	1,02E+01	933	1,01E+01	973	1,00E+01	1013	9,78E+00
894	1,02E+01	934	1,01E+01	974	9,99E+00	1014	9,78E+00
895	1,02E+01	935	1,01E+01	975	9,99E+00	1015	9,77E+00
896	1,02E+01	936	1,01E+01	976	9,99E+00	1016	9,76E+00
897	1,02E+01	937	1,01E+01	977	9,98E+00	1017	9,76E+00
898	1,02E+01	938	1,01E+01	978	9,98E+00	1018	9,75E+00
899	1,02E+01	939	1,01E+01	979	9,97E+00	1019	9,75E+00
900	1,02E+01	940	1,01E+01	980	9,97E+00	1020	9,74E+00
901	1,02E+01	941	1,01E+01	981	9,96E+00	1021	9,73E+00
902	1,02E+01	942	1,01E+01	982	9,96E+00	1022	9,73E+00
903	1,02E+01	943	1,01E+01	983	9,95E+00	1023	9,72E+00
904	1,02E+01	944	1,01E+01	984	9,95E+00	1024	9,72E+00
905	1,02E+01	945	1,01E+01	985	9,94E+00	1025	9,71E+00
906	1,02E+01	946	1,01E+01	986	9,94E+00	1026	9,70E+00
907	1,02E+01	947	1,01E+01	987	9,93E+00	1027	9,70E+00
908	1,02E+01	948	1,01E+01	988	9,93E+00	1028	9,69E+00
909	1,02E+01	949	1,01E+01	989	9,92E+00	1029	9,68E+00
910	1,02E+01	950	1,01E+01	990	9,92E+00	1030	9,68E+00
911	1,02E+01	951	1,01E+01	991	9,91E+00	1031	9,67E+00
912	1,02E+01	952	1,01E+01	992	9,91E+00	1032	9,67E+00
913	1,02E+01	953	1,01E+01	993	9,90E+00	1033	9,66E+00
914	1,02E+01	954	1,01E+01	994	9,89E+00	1034	9,65E+00
915	1,02E+01	955	1,01E+01	995	9,89E+00	1035	9,65E+00
916	1,02E+01	956	1,01E+01	996	9,88E+00	1036	9,64E+00
917	1,02E+01	957	1,01E+01	997	9,88E+00	1037	9,63E+00
918	1,02E+01	958	1,01E+01	998	9,87E+00	1038	9,63E+00
919	1,02E+01	959	1,01E+01	999	9,87E+00	1039	9,62E+00

Table 5: Spectral distribution data of a Deuterium Lamp

λ / nm	$S_{\lambda,Deut}$	λ / nm	$S_{\lambda,Deut}$	λ / nm	$S_{\lambda,Deut}$	λ / nm	$S_{\lambda,Deut}$
200	1,00E+00	240	5,56E-01	280	2,59E-01	320	1,34E-01
201	9,88E-01	241	5,46E-01	281	2,55E-01	321	1,32E-01
202	9,75E-01	242	5,36E-01	282	2,50E-01	322	1,30E-01
203	9,63E-01	243	5,26E-01	283	2,46E-01	323	1,28E-01
204	9,50E-01	244	5,16E-01	284	2,42E-01	324	1,27E-01
205	9,38E-01	245	5,05E-01	285	2,37E-01	325	1,25E-01
206	9,25E-01	246	4,95E-01	286	2,33E-01	326	1,23E-01
207	9,13E-01	247	4,85E-01	287	2,29E-01	327	1,22E-01
208	9,00E-01	248	4,75E-01	288	2,24E-01	328	1,20E-01
209	8,88E-01	249	4,65E-01	289	2,20E-01	329	1,18E-01
210	8,75E-01	250	4,55E-01	291	2,16E-01	330	1,17E-01
211	8,63E-01	251	4,47E-01	291	2,12E-01	331	1,15E-01
212	8,51E-01	252	4,39E-01	292	2,09E-01	332	1,14E-01
213	8,39E-01	253	4,31E-01	293	2,06E-01	333	1,13E-01
214	8,27E-01	254	4,23E-01	294	2,03E-01	334	1,11E-01
215	8,16E-01	255	4,14E-01	295	1,99E-01	335	1,10E-01
216	8,04E-01	256	4,06E-01	296	1,96E-01	336	1,08E-01
217	7,92E-01	257	3,98E-01	297	1,93E-01	337	1,07E-01
218	7,80E-01	258	3,90E-01	298	1,90E-01	338	1,06E-01
219	7,68E-01	259	3,82E-01	299	1,86E-01	339	1,04E-01
220	7,56E-01	260	3,74E-01	300	1,83E-01	340	1,03E-01
221	7,46E-01	261	3,68E-01	301	1,80E-01	341	1,02E-01
222	7,36E-01	262	3,61E-01	302	1,77E-01	342	1,00E-01
223	7,26E-01	263	3,55E-01	303	1,74E-01	343	9,93E-02
224	7,16E-01	264	3,49E-01	304	1,72E-01	344	9,81E-02
225	7,06E-01	265	3,43E-01	305	1,69E-01	345	9,69E-02
226	6,96E-01	266	3,36E-01	306	1,66E-01	346	9,57E-02
227	6,86E-01	267	3,30E-01	307	1,63E-01	347	9,46E-02
228	6,77E-01	268	3,24E-01	308	1,60E-01	348	9,34E-02
229	6,67E-01	269	3,18E-01	309	1,57E-01	349	9,22E-02
230	6,57E-01	270	3,12E-01	310	1,54E-01	350	9,10E-02
231	6,47E-01	271	3,06E-01	311	1,52E-01	351	8,99E-02
232	6,37E-01	272	3,01E-01	312	1,50E-01	352	8,87E-02
233	6,27E-01	273	2,96E-01	313	1,48E-01	353	8,76E-02
234	6,16E-01	274	2,91E-01	314	1,46E-01	354	8,64E-02
235	6,06E-01	275	2,85E-01	315	1,44E-01	355	8,53E-02
236	5,96E-01	276	2,80E-01	316	1,42E-01	356	8,41E-02
237	5,86E-01	277	2,75E-01	317	1,40E-01	357	8,30E-02
238	5,76E-01	278	2,70E-01	318	1,38E-01	358	8,18E-02
239	5,66E-01	279	2,64E-01	319	1,36E-01	359	8,07E-02

Continued table 5: Spectral distribution data of a Deuterium Lamp

λ / nm	$S_{\lambda,Deut}$	λ / nm	$S_{\lambda,Deut}$	λ / nm	$S_{\lambda,Deut}$	λ / nm	$S_{\lambda,Deut}$
360	7,95E-02	400	5,44E-02				
361	7,85E-02						
362	7,77E-02						
363	7,70E-02						
364	7,63E-02						
365	7,58E-02						
366	7,52E-02						
367	7,46E-02						
368	7,40E-02						
369	7,34E-02						
370	7,26E-02						
371	7,17E-02						
372	7,08E-02						
373	6,98E-02						
374	6,89E-02						
375	6,79E-02						
376	6,69E-02						
377	6,59E-02						
378	6,49E-02						
379	6,40E-02						
380	6,32E-02						
381	6,24E-02						
382	6,17E-02						
383	6,11E-02						
384	6,05E-02						
385	5,99E-02						
386	5,94E-02						
387	5,88E-02						
388	5,83E-02						
389	5,77E-02						
390	5,72E-02						
391	5,67E-02						
392	5,63E-02						
393	5,61E-02						
394	5,59E-02						
395	5,58E-02						
396	5,56E-02						
397	5,55E-02						
398	5,52E-02						
399	5,49E-02						

Table 6: Spectral distribution data of a High Pressure Ion Lamp

λ / nm	$S_{\lambda,HFe}$	λ / nm	$S_{\lambda,HFe}$	λ / nm	$S_{\lambda,HFe}$	λ / nm	$S_{\lambda,HFe}$
200	5,18E-07	240	3,67E-04	280	6,26E-03	320	1,38E-01
201	6,54E-07	241	3,58E-04	281	7,19E-03	321	1,55E-01
202	7,74E-07	242	3,53E-04	282	7,53E-03	322	1,71E-01
203	8,86E-07	243	3,53E-04	283	7,84E-03	323	1,86E-01
204	2,32E-06	244	3,54E-04	284	8,14E-03	324	1,60E-01
205	3,63E-06	245	3,58E-04	285	9,49E-03	325	1,36E-01
206	4,86E-06	246	4,11E-04	286	1,07E-02	326	1,13E-01
207	7,23E-06	247	4,67E-04	287	1,18E-02	327	1,11E-01
208	9,44E-06	248	5,19E-04	288	1,64E-02	328	1,10E-01
209	1,16E-05	249	5,12E-04	289	2,07E-02	329	1,09E-01
210	1,69E-05	250	5,05E-04	291	2,46E-02	330	1,17E-01
211	2,21E-05	251	4,98E-04	291	2,91E-02	331	1,24E-01
212	2,68E-05	252	4,30E-04	292	3,37E-02	332	1,32E-01
213	3,26E-05	253	3,61E-04	293	3,88E-02	333	1,38E-01
214	3,82E-05	254	2,91E-04	294	4,74E-02	334	1,46E-01
215	4,35E-05	255	4,18E-04	295	5,65E-02	335	1,52E-01
216	4,84E-05	256	5,42E-04	296	6,61E-02	336	1,54E-01
217	5,30E-05	257	6,70E-04	297	7,14E-02	337	1,57E-01
218	5,74E-05	258	7,21E-04	298	7,70E-02	338	1,58E-01
219	8,56E-05	259	7,77E-04	299	8,35E-02	339	2,04E-01
220	1,12E-04	260	8,33E-04	300	1,05E-01	340	2,49E-01
221	1,39E-04	261	8,61E-04	301	1,29E-01	341	2,95E-01
222	1,59E-04	262	8,95E-04	302	1,53E-01	342	3,09E-01
223	1,79E-04	263	9,18E-04	303	1,44E-01	343	3,21E-01
224	1,96E-04	264	9,65E-04	304	1,34E-01	344	3,35E-01
225	2,11E-04	265	1,01E-03	305	1,22E-01	345	3,28E-01
226	2,25E-04	266	1,06E-03	306	1,14E-01	346	3,19E-01
227	2,39E-04	267	1,01E-03	307	1,05E-01	347	3,11E-01
228	2,47E-04	268	9,68E-04	308	9,58E-02	348	3,54E-01
229	2,56E-04	269	9,23E-04	309	1,30E-01	349	3,98E-01
230	2,65E-04	270	1,12E-03	310	1,63E-01	350	4,44E-01
231	2,67E-04	271	1,33E-03	311	1,96E-01	351	4,82E-01
232	2,70E-04	272	1,55E-03	312	2,26E-01	352	5,23E-01
233	2,74E-04	273	1,98E-03	313	2,54E-01	353	5,65E-01
234	2,82E-04	274	2,42E-03	314	2,82E-01	354	5,28E-01
235	2,93E-04	275	2,88E-03	315	2,16E-01	355	4,89E-01
236	3,02E-04	276	3,40E-03	316	1,54E-01	356	4,51E-01
237	3,26E-04	277	3,95E-03	317	9,35E-02	357	4,65E-01
238	3,51E-04	278	4,51E-03	318	1,09E-01	358	4,81E-01
239	3,74E-04	279	5,37E-03	319	1,24E-01	359	4,96E-01

Continued table 6: Spectral distribution data of a High Pressure Ion Lamp

λ / nm	$S_{\lambda,HFe}$	λ / nm	$S_{\lambda,HFe}$	λ / nm	$S_{\lambda,HFe}$	λ / nm	$S_{\lambda,HFe}$
360	4,70E-01	400	2,19E-01	440	4,70E-01	480	2,77E-02
361	4,40E-01	401	2,11E-01	441	4,46E-01	481	2,68E-02
362	4,11E-01	402	2,89E-01	442	4,19E-01	482	2,60E-02
363	6,00E-01	403	3,70E-01	443	3,95E-01	483	3,00E-02
364	7,96E-01	404	4,54E-01	444	3,40E-01	484	3,46E-02
365	1,00E+00	405	4,30E-01	445	2,82E-01	485	3,95E-02
366	8,14E-01	406	4,07E-01	446	2,21E-01	486	5,16E-02
367	6,21E-01	407	3,81E-01	447	1,81E-01	487	6,47E-02
368	4,19E-01	408	3,19E-01	448	1,37E-01	488	7,91E-02
369	4,16E-01	409	2,58E-01	449	8,93E-02	489	8,21E-02
370	4,11E-01	410	1,93E-01	450	8,61E-02	490	8,51E-02
371	4,07E-01	411	2,12E-01	451	7,84E-02	491	8,82E-02
372	4,84E-01	412	2,32E-01	452	6,65E-02	492	8,53E-02
373	5,63E-01	413	2,53E-01	453	5,84E-02	493	8,16E-02
374	6,44E-01	414	2,28E-01	454	5,07E-02	494	7,75E-02
375	6,28E-01	415	2,04E-01	455	4,28E-02	495	7,82E-02
376	6,12E-01	416	1,77E-01	456	4,14E-02	496	7,84E-02
377	5,95E-01	417	1,96E-01	457	3,93E-02	497	7,86E-02
378	5,77E-01	418	2,14E-01	458	3,70E-02	498	6,98E-02
379	5,58E-01	419	2,35E-01	459	3,53E-02	499	6,02E-02
380	5,40E-01	420	2,33E-01	460	3,33E-02	500	4,96E-02
381	6,19E-01	421	2,33E-01	461	3,23E-02	501	4,60E-02
382	6,16E-01	422	2,32E-01	462	3,05E-02	502	4,18E-02
383	6,11E-01	423	2,49E-01	463	2,95E-02	503	3,72E-02
384	5,65E-01	424	2,68E-01	464	2,88E-02	504	3,72E-02
385	5,19E-01	425	2,86E-01	465	2,88E-02	505	3,72E-02
386	4,74E-01	426	2,84E-01	466	2,91E-02	506	3,72E-02
387	4,67E-01	427	2,82E-01	467	3,00E-02	507	3,61E-02
388	4,60E-01	428	2,81E-01	468	2,82E-02	508	3,47E-02
389	4,53E-01	429	2,89E-01	469	2,72E-02	509	3,35E-02
390	4,05E-01	430	2,96E-01	470	2,65E-02	510	3,65E-02
391	3,54E-01	431	3,05E-01	471	2,67E-02	511	3,98E-02
392	3,05E-01	432	3,58E-01	472	2,72E-02	512	4,32E-02
393	2,82E-01	433	4,12E-01	473	2,77E-02	513	5,09E-02
394	2,60E-01	434	4,70E-01	474	2,75E-02	514	5,88E-02
395	2,37E-01	435	5,51E-01	475	2,74E-02	515	6,72E-02
396	2,35E-01	436	6,35E-01	476	2,72E-02	516	7,00E-02
397	2,35E-01	437	7,21E-01	477	2,75E-02	517	7,28E-02
398	2,35E-01	438	6,40E-01	478	2,81E-02	518	7,58E-02
399	2,26E-01	439	5,56E-01	479	2,84E-02	519	7,56E-02

Table 7: Spectral distribution data Global Radiation at Thessaloniki, 18° SZA, measured on 05.07.1997

λ / nm	$S_{\lambda,GI}$	λ / nm	$S_{\lambda,GI}$	λ / nm	$S_{\lambda,MGI}$	λ / nm	$S_{\lambda,MGI}$
280				320	3,64E-01	360	7,59E-01
281				321	3,51E-01	361	5,92E-01
282				322	3,71E-01	362	6,00E-01
283				323	3,14E-01	363	6,65E-01
284				324	3,93E-01	364	6,56E-01
285				325	4,09E-01	365	6,45E-01
286				326	5,43E-01	366	6,38E-01
287				327	5,40E-01	367	7,34E-01
288				328	5,05E-01	368	6,91E-01
289				329	5,62E-01	369	5,31E-01
291	4,28E-06	291	4,28E-06	330	6,32E-01	370	5,00E-01
291	1,08E-05	291	1,08E-05	331	5,51E-01	371	5,74E-01
292	3,63E-05	292	3,63E-05	332	5,74E-01	372	7,59E-01
293	8,52E-05	293	8,52E-05	333	5,64E-01	373	5,92E-01
294	2,06E-04	294	2,06E-04	334	5,43E-01	374	5,00E-01
295	4,70E-04	295	4,70E-04	335	5,82E-01	375	5,74E-01
296	1,24E-03	296	1,24E-03	336	4,83E-01	376	7,59E-01
297	1,79E-03	297	1,79E-03	337	4,77E-01	377	5,92E-01
298	3,98E-03	298	3,98E-03	338	5,50E-01	378	6,00E-01
299	6,66E-03	299	6,66E-03	339	5,89E-01	379	7,17E-01
300	8,52E-03	300	8,52E-03	340	6,63E-01	380	7,45E-01
301	1,48E-02	301	1,48E-02	341	5,91E-01	381	6,96E-01
302	1,73E-02	302	1,73E-02	342	6,27E-01	382	8,84E-01
303	3,89E-02	303	3,89E-02	343	6,54E-01	383	8,33E-01
304	4,54E-02	304	4,54E-02	344	4,88E-01	384	7,69E-01
305	6,78E-02	305	6,78E-02	345	5,98E-01	385	8,06E-01
306	6,76E-02	306	6,76E-02	346	5,69E-01	386	9,00E-01
307	9,58E-02	307	9,58E-02	347	6,37E-01	387	7,74E-01
308	1,16E-01	308	1,16E-01	348	5,84E-01	388	7,16E-01
309	1,16E-01	309	1,16E-01	349	5,74E-01	389	7,53E-01
310	1,19E-01	310	1,19E-01	350	6,65E-01	390	6,86E-01
311	2,09E-01	311	2,09E-01	351	6,56E-01	391	6,19E-01
312	1,92E-01	312	1,92E-01	352	6,45E-01	392	7,63E-01
313	2,21E-01	313	2,21E-01	353	6,38E-01	393	8,12E-01
314	2,49E-01	314	2,49E-01	354	7,34E-01	394	1,00E+00
315	2,63E-01	315	2,63E-01	355	7,45E-01	395	8,27E-01
316	2,07E-01	316	2,07E-01	356	6,91E-01	396	7,77E-01
317	3,19E-01	317	3,19E-01	357	5,31E-01	397	9,03E-01
318	2,85E-01	318	2,85E-01	358	5,00E-01	398	6,52E-01
319	3,30E-01	319	3,30E-01	359	5,74E-01	399	5,09E-01

Continued table 7: Spectral distribution data Global Radiation at Thessaloniki, 18° SZA, measured on 05.07.1997

λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$
400	5,46E-01	440	1,32E+00	480	1,70E+00		
401	7,87E-01	441	1,30E+00	481	1,69E+00		
402	6,63E-01	442	1,29E+00	482	1,73E+00		
403	7,15E-01	443	1,24E+00	483	1,69E+00		
404	7,16E-01	444	1,31E+00	484	1,66E+00		
405	7,57E-01	445	1,20E+00	485	1,64E+00		
406	9,07E-01	446	1,42E+00	486	1,32E+00		
407	9,71E-01	447	1,56E+00	487	1,49E+00		
408	8,96E-01	448	1,59E+00	488	1,62E+00		
409	4,89E-01	449	1,60E+00	489	1,55E+00		
410	5,64E-01	450	1,65E+00	490	1,70E+00		
411	9,37E-01	451	1,72E+00	491	1,65E+00		
412	8,35E-01	452	1,67E+00	492	1,53E+00		
413	4,40E-01	453	1,51E+00	493	1,67E+00		
414	1,01E+00	454	1,63E+00	494	1,63E+00		
415	1,19E+00	455	1,59E+00	495	1,71E+00		
416	1,23E+00	456	1,68E+00	496	1,65E+00		
417	1,27E+00	457	1,68E+00	497	1,68E+00		
418	1,33E+00	458	1,64E+00	498	1,64E+00		
419	1,26E+00	459	1,64E+00	499	1,63E+00		
420	1,32E+00	460	1,62E+00	500	1,62E+00		
421	1,26E+00	461	1,69E+00				
422	1,21E+00	462	1,69E+00				
423	1,22E+00	463	1,70E+00				
424	1,24E+00	464	1,65E+00				
425	1,39E+00	465	1,61E+00				
426	1,13E+00	466	1,67E+00				
427	1,31E+00	467	1,57E+00				
428	1,39E+00	468	1,63E+00				
429	1,33E+00	469	1,64E+00				
430	1,39E+00	470	1,59E+00				
431	1,35E+00	471	1,59E+00				
432	1,37E+00	472	1,70E+00				
433	1,36E+00	473	1,62E+00				
434	1,31E+00	474	1,67E+00				
435	1,33E+00	475	1,70E+00				
436	1,26E+00	476	1,65E+00				
437	1,42E+00	477	1,65E+00				
438	1,39E+00	478	1,71E+00				
439	1,27E+00	479	1,68E+00				

Table 8: Spectral distribution data of a Medium Pressure Mercury Lamp

λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$
200	5,55E-02	240	8,64E-02	280	1,78E-01	320	1,50E-02
201	5,99E-02	241	5,97E-02	281	1,51E-01	321	1,40E-02
202	6,56E-02	242	4,33E-02	282	9,06E-02	322	1,32E-02
203	7,08E-02	243	3,13E-02	283	3,67E-02	323	1,26E-02
204	7,65E-02	244	3,60E-02	284	2,18E-02	324	1,22E-02
205	8,19E-02	245	4,87E-02	285	2,15E-02	325	1,19E-02
206	8,58E-02	246	9,28E-02	286	2,09E-02	326	1,15E-02
207	9,09E-02	247	1,28E-01	287	4,25E-02	327	1,11E-02
208	9,59E-02	248	1,56E-01	288	6,41E-02	328	1,10E-02
209	9,99E-02	249	1,23E-01	289	8,08E-02	329	1,11E-02
210	1,04E-01	250	9,05E-02	291	7,36E-02	330	1,13E-02
211	1,09E-01	251	9,14E-02	291	5,90E-02	331	2,45E-02
212	1,13E-01	252	1,57E-01	292	4,46E-02	332	5,90E-02
213	1,17E-01	253	2,66E-01	293	3,63E-02	333	9,26E-02
214	1,20E-01	254	3,64E-01	294	6,14E-02	334	1,03E-01
215	1,23E-01	255	4,28E-01	295	1,21E-01	335	7,09E-02
216	1,26E-01	256	4,23E-01	296	1,85E-01	336	3,54E-02
217	1,29E-01	257	3,75E-01	297	2,00E-01	337	1,06E-02
218	1,30E-01	258	2,94E-01	298	1,41E-01	338	1,05E-02
219	1,33E-01	259	2,23E-01	299	8,77E-02	339	1,02E-02
220	1,33E-01	260	1,75E-01	300	1,48E-01	340	9,48E-03
221	1,34E-01	261	1,33E-01	301	2,72E-01	341	8,76E-03
222	1,33E-01	262	1,28E-01	302	3,67E-01	342	8,44E-03
223	1,33E-01	263	1,96E-01	303	2,93E-01	343	8,40E-03
224	1,32E-01	264	2,61E-01	304	1,66E-01	344	8,12E-03
225	1,29E-01	265	2,93E-01	305	4,11E-02	345	7,87E-03
226	1,24E-01	266	2,28E-01	306	1,92E-02	346	7,71E-03
227	1,19E-01	267	1,54E-01	307	1,66E-02	347	7,44E-03
228	1,17E-01	268	9,12E-02	308	1,62E-02	348	7,23E-03
229	1,15E-01	269	1,01E-01	309	1,81E-02	349	6,83E-03
230	1,18E-01	270	9,24E-02	310	1,20E-01	350	6,71E-03
231	1,11E-01	271	7,11E-02	311	3,50E-01	351	6,66E-03
232	1,05E-01	272	4,82E-02	312	5,78E-01	352	7,49E-03
233	1,04E-01	273	4,33E-02	313	6,09E-01	353	8,39E-03
234	1,05E-01	274	5,55E-02	314	4,09E-01	354	9,19E-03
235	1,02E-01	275	6,52E-02	315	1,82E-01	355	9,12E-03
236	9,78E-02	276	5,64E-02	316	3,97E-02	356	8,62E-03
237	9,50E-02	277	5,24E-02	317	2,38E-02	357	8,03E-03
238	1,01E-01	278	8,87E-02	318	1,88E-02	358	8,40E-03
239	9,72E-02	279	1,46E-01	319	1,61E-02	359	8,75E-03

Continued table 8: Spectral distribution data of a Medium Pressure Mercury Lamp

λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$	λ / nm	$S_{\lambda,MHg}$
360	9,51E-03	400	7,40E-03	440	2,37E-02	480	5,38E-03
361	1,14E-02	401	9,91E-03	441	1,81E-02	481	5,32E-03
362	6,60E-02	402	9,98E-02	442	1,61E-02	482	5,61E-03
363	3,47E-01	403	2,26E-01	443	1,43E-02	483	5,69E-03
364	7,38E-01	404	3,30E-01	444	1,31E-02	484	5,91E-03
365	1,00E+00	405	3,20E-01	445	1,20E-02	485	6,13E-03
366	8,67E-01	406	2,24E-01	446	1,04E-02	486	6,30E-03
367	5,18E-01	407	1,17E-01	447	9,59E-03	487	6,30E-03
368	1,57E-01	408	7,52E-02	448	8,29E-03	488	6,41E-03
369	4,18E-02	409	4,82E-02	449	7,52E-03	489	8,63E-03
370	2,68E-02	410	2,31E-02	450	7,58E-03	490	1,33E-02
371	2,09E-02	411	1,36E-02	451	6,72E-03	491	1,79E-02
372	1,59E-02	412	1,19E-02	452	6,09E-03	492	1,79E-02
373	1,24E-02	413	1,02E-02	453	6,13E-03	493	1,29E-02
374	1,09E-02	414	9,11E-03	454	6,01E-03	494	7,57E-03
375	1,01E-02	415	8,64E-03	455	6,42E-03	495	7,15E-03
376	9,69E-03	416	8,23E-03	456	6,35E-03	496	7,34E-03
377	1,01E-02	417	7,91E-03	457	6,06E-03	497	6,70E-03
378	1,08E-02	418	8,35E-03	458	6,00E-03	498	5,42E-03
379	1,13E-02	419	8,17E-03	459	5,38E-03	499	4,56E-03
380	1,03E-02	420	8,36E-03	460	5,34E-03	500	4,26E-03
381	9,50E-03	421	8,67E-03	461	5,25E-03	501	4,44E-03
382	8,45E-03	422	8,92E-03	462	5,03E-03	502	4,51E-03
383	7,70E-03	423	9,45E-03	463	5,14E-03	503	4,79E-03
384	7,67E-03	424	9,60E-03	464	5,15E-03	504	4,64E-03
385	7,87E-03	425	9,92E-03	465	5,19E-03	505	4,49E-03
386	7,97E-03	426	1,00E-02	466	5,29E-03	506	4,40E-03
387	8,43E-03	427	1,07E-02	467	5,30E-03	507	4,31E-03
388	1,26E-02	428	1,14E-02	468	5,45E-03	508	4,48E-03
389	1,86E-02	429	1,26E-02	469	5,49E-03	509	4,55E-03
390	2,27E-02	430	1,39E-02	470	5,57E-03	510	4,63E-03
391	2,00E-02	431	1,76E-02	471	5,64E-03	511	4,71E-03
392	1,40E-02	432	3,79E-02	472	5,77E-03	512	4,77E-03
393	7,83E-03	433	1,41E-01	473	5,85E-03	513	4,85E-03
394	6,48E-03	434	3,87E-01	474	5,78E-03	514	4,93E-03
395	5,82E-03	435	6,20E-01	475	5,65E-03	515	4,70E-03
396	6,51E-03	436	6,38E-01	476	5,60E-03	516	4,77E-03
397	6,83E-03	437	4,32E-01	477	5,41E-03	517	4,53E-03
398	7,12E-03	438	1,81E-01	478	5,28E-03	518	4,28E-03
399	7,38E-03	439	4,23E-02	479	5,38E-03	519	4,65E-03

Table 9: Spectral distribution data of a Low Pressure Mercury Lamp

λ / nm	$S_{\lambda,Hg}$	λ / nm	$S_{\lambda,Hg}$	λ / nm	$S_{\lambda,Hg}$	λ / nm	$S_{\lambda,Hg}$
200	7,86E-04	240	1,47E-03	280	1,22E-03	320	1,19E-04
201	7,86E-04	241	1,68E-03	281	1,20E-03	321	1,66E-04
202	7,69E-04	242	1,65E-03	282	1,04E-03	322	2,30E-04
203	7,40E-04	243	1,64E-03	283	8,31E-04	323	1,56E-04
204	7,05E-04	244	1,71E-03	284	9,14E-04	324	1,17E-04
205	7,03E-04	245	2,03E-03	285	5,91E-04	325	1,53E-04
206	5,90E-04	246	2,43E-03	286	5,35E-04	326	1,40E-04
207	8,46E-04	247	2,56E-03	287	5,78E-04	327	1,37E-04
208	1,16E-03	248	3,15E-03	288	5,06E-04	328	1,63E-04
209	7,74E-04	249	4,08E-03	289	9,68E-04	329	1,41E-04
210	6,09E-04	250	3,91E-03	291	1,51E-03	330	1,52E-04
211	5,83E-04	251	6,12E-03	291	7,92E-04	331	1,12E-04
212	7,26E-04	252	1,80E-02	292	5,04E-04	332	9,80E-05
213	7,61E-04	253	3,03E-01	293	4,61E-04	333	1,63E-04
214	7,41E-04	254	1,00E+00	294	4,48E-04	334	5,40E-04
215	6,11E-04	255	3,42E-01	295	3,90E-04	335	1,21E-03
216	4,12E-04	256	2,74E-02	296	6,58E-04	336	3,89E-04
217	7,20E-04	257	1,14E-02	297	3,15E-03	337	1,69E-04
218	9,45E-04	258	7,14E-03	298	3,16E-03	338	1,19E-04
219	6,60E-04	259	5,16E-03	299	5,68E-04	339	1,22E-04
220	5,87E-04	260	4,10E-03	300	3,83E-04	340	1,42E-04
221	3,54E-04	261	3,62E-03	301	3,49E-04	341	5,60E-05
222	7,89E-04	262	3,24E-03	302	9,72E-04	342	8,64E-05
223	5,82E-04	263	2,88E-03	303	2,55E-03	343	1,20E-04
224	7,87E-04	264	2,75E-03	304	8,53E-04	344	1,21E-04
225	7,15E-04	265	3,51E-03	305	3,76E-04	345	1,17E-04
226	8,72E-04	266	4,05E-03	306	3,27E-04	346	1,27E-04
227	7,27E-04	267	2,31E-03	307	2,23E-04	347	9,88E-05
228	6,33E-04	268	2,04E-03	308	3,01E-04	348	1,12E-04
229	1,04E-03	269	2,11E-03	309	2,62E-04	349	1,24E-04
230	4,99E-04	270	1,84E-03	310	2,63E-04	350	8,31E-05
231	7,92E-04	271	2,06E-03	311	2,37E-04	351	1,01E-04
232	7,85E-04	272	1,93E-03	312	1,32E-03	352	9,63E-05
233	7,01E-04	273	1,64E-03	313	1,04E-02	353	1,07E-04
234	5,70E-04	274	1,43E-03	314	1,49E-02	354	1,32E-04
235	9,91E-04	275	1,46E-03	315	3,24E-03	355	1,16E-04
236	8,58E-04	276	1,76E-03	316	3,98E-04	356	1,41E-04
237	1,36E-03	277	1,44E-03	317	2,30E-04	357	1,14E-04
238	1,31E-03	278	1,15E-03	318	2,13E-04	358	1,34E-04
239	1,44E-03	279	1,31E-03	319	1,64E-04	359	1,48E-04

Continued table 9: Spectral distribution data of a Low Pressure Mercury Lamp

λ / nm	$S_{\lambda,Hg}$	λ / nm	$S_{\lambda,Hg}$	λ / nm	$S_{\lambda,Hg}$	λ / nm	$S_{\lambda,Hg}$
360	1,32E-04	400	1,64E-04	440	2,85E-04	480	3,90E-05
361	8,93E-05	401	1,73E-04	441	2,10E-04	481	4,13E-05
362	1,37E-04	402	1,96E-04	442	1,66E-04	482	3,30E-05
363	1,91E-04	403	2,46E-04	443	1,44E-04	483	3,16E-05
364	5,95E-04	404	3,12E-03	444	1,33E-04	484	3,62E-05
365	9,46E-03	405	1,70E-02	445	1,22E-04	485	4,28E-05
366	1,61E-02	406	9,98E-03	446	1,20E-04	486	3,54E-05
367	5,01E-03	407	9,85E-04	447	1,29E-04	487	3,11E-05
368	1,03E-03	408	1,77E-03	448	9,76E-05	488	2,98E-05
369	2,74E-04	409	1,37E-03	449	9,99E-05	489	3,00E-05
370	2,13E-04	410	2,59E-04	450	9,79E-05	490	3,68E-05
371	1,79E-04	411	1,86E-04	451	1,02E-04	491	6,27E-05
372	1,27E-04	412	1,65E-04	452	9,06E-05	492	1,39E-04
373	1,41E-04	413	1,46E-04	453	9,82E-05	493	8,26E-05
374	1,58E-04	414	1,45E-04	454	8,18E-05	494	3,62E-05
375	1,34E-04	415	1,50E-04	455	8,87E-05	495	3,28E-05
376	1,08E-04	416	1,37E-04	456	7,69E-05	496	3,48E-05
377	1,36E-04	417	1,25E-04	457	8,39E-05	497	3,44E-05
378	1,13E-04	418	1,21E-04	458	7,96E-05	498	2,94E-05
379	1,22E-04	419	1,33E-04	459	7,17E-05	499	3,52E-05
380	1,50E-04	420	1,24E-04	460	6,21E-05	500	3,46E-05
381	1,31E-04	421	1,24E-04	461	7,73E-05	501	2,73E-05
382	1,26E-04	422	1,31E-04	462	6,68E-05	502	2,47E-05
383	1,50E-04	423	1,32E-04	463	6,33E-05	503	3,81E-05
384	1,72E-04	424	1,34E-04	464	5,41E-05	504	3,47E-05
385	1,25E-04	425	1,30E-04	465	5,68E-05	505	3,95E-05
386	1,42E-04	426	1,42E-04	466	5,04E-05	506	3,28E-05
387	1,39E-04	427	1,51E-04	467	5,62E-05	507	4,99E-05
388	1,29E-04	428	1,73E-04	468	4,16E-05	508	5,99E-05
389	1,22E-04	429	1,57E-04	469	4,66E-05	509	4,56E-05
390	1,53E-04	430	1,63E-04	470	5,22E-05	510	3,76E-05
391	2,02E-04	431	1,91E-04	471	4,55E-05	511	2,98E-05
392	1,80E-04	432	2,28E-04	472	4,27E-05	512	2,82E-05
393	1,51E-04	433	2,67E-04	473	4,07E-05	513	3,73E-05
394	1,40E-04	434	4,33E-04	474	4,14E-05	514	2,83E-05
395	1,47E-04	435	6,25E-03	475	4,25E-05	515	2,87E-05
396	1,38E-04	436	3,61E-02	476	3,83E-05	516	2,94E-05
397	1,39E-04	437	2,52E-02	477	3,11E-05	517	3,48E-05
398	1,87E-04	438	2,22E-03	478	4,20E-05	518	2,56E-05
399	1,81E-04	439	5,40E-04	479	4,19E-05	519	2,85E-05

Table 10: Spectral distribution data of Tanning lamp UV-B

λ / nm	S_λ	λ / nm	S_λ	λ / nm	S_λ	λ / nm	S_λ
		280	2,91E-04	320	1,40E-02	360	6,60E-03
		281	1,56E-04	321	1,39E-02	361	6,51E-03
		282	1,75E-04	322	1,49E-02	362	6,65E-03
		283	1,87E-04	323	1,59E-02	363	6,89E-03
		284	1,90E-04	324	1,63E-02	364	8,48E-03
		285	2,65E-04	325	2,05E-02	365	6,21E-02
		286	3,55E-04	326	2,05E-02	366	2,77E-02
		287	4,02E-04	327	1,61E-02	367	1,00E-02
		288	5,22E-04	328	1,11E-02	368	6,53E-03
		289	2,29E-03	329	9,78E-03	369	6,15E-03
250	-1,72E-06	291	1,14E-03	330	9,35E-03	370	6,10E-03
251	-1,36E-06	291	9,22E-04	331	9,29E-03	371	5,99E-03
252	-1,00E-06	292	1,28E-03	332	9,08E-03	372	5,96E-03
253	2,86E-05	293	1,39E-03	333	8,91E-03	373	5,88E-03
254	2,85E-05	294	1,53E-03	334	1,35E-02	374	5,83E-03
255	-8,93E-07	295	1,81E-03	335	9,23E-03	375	5,83E-03
256	-8,72E-07	296	4,40E-03	336	8,69E-03	376	5,74E-03
257	-1,04E-06	297	1,02E-02	337	8,48E-03	377	5,70E-03
258	-1,02E-06	298	2,75E-03	338	8,35E-03	378	5,64E-03
259	-7,32E-07	299	2,96E-03	339	8,30E-03	379	5,58E-03
260	1,71E-07	300	3,41E-03	340	8,13E-03	380	5,57E-03
261	-1,47E-06	301	3,90E-03	341	8,04E-03	381	5,49E-03
262	-3,32E-07	302	1,01E-02	342	7,94E-03	382	5,43E-03
263	-1,02E-06	303	5,89E-03	343	7,84E-03	383	5,36E-03
264	9,85E-07	304	6,47E-03	344	7,78E-03	384	5,34E-03
265	3,85E-05	305	2,83E-02	345	7,64E-03	385	5,25E-03
266	5,19E-06	306	6,23E-02	346	7,55E-03	386	5,27E-03
267	1,07E-06	307	1,61E-02	347	7,40E-03	387	5,23E-03
268	-5,28E-08	308	1,96E-02	348	7,39E-03	388	5,18E-03
269	1,25E-07	309	3,90E-02	349	7,25E-03	389	5,17E-03
270	7,09E-06	310	1,87E-01	350	7,22E-03	390	5,33E-03
271	-3,17E-07	311	1,00E+00	351	7,08E-03	391	5,29E-03
272	1,04E-06	312	9,17E-01	352	7,06E-03	392	5,12E-03
273	3,66E-06	313	2,88E-01	353	6,94E-03	393	5,14E-03
274	7,55E-06	314	7,44E-02	354	6,90E-03	394	5,14E-03
275	1,85E-04	315	3,75E-02	355	6,81E-03	395	5,15E-03
276	3,83E-05	316	2,11E-02	356	6,79E-03	396	5,15E-03
277	1,96E-05	317	1,59E-02	357	6,74E-03	397	5,19E-03
278	3,02E-05	318	1,49E-02	358	6,61E-03	398	5,26E-03
279	4,51E-05	319	1,35E-02	359	6,52E-03	399	5,28E-03

Continued table 10: Spectral distribution data of Tanning lamp UV-B

λ / nm	$S_{\lambda,}$	λ / nm	$S_{\lambda,}$	λ / nm	$S_{\lambda,}$	λ / nm	$S_{\lambda,}$
400	5,31E-03	440	5,13E-03	480	2,73E-03	520	4,48E-04
401	5,39E-03	441	5,04E-03	481	2,60E-03	521	4,48E-04
402	5,54E-03	442	4,99E-03	482	3,21E-03	522	4,32E-04
403	5,77E-03	443	4,93E-03	483	7,03E-03	523	4,36E-04
404	8,14E-02	444	4,86E-03	484	1,72E-01	524	4,22E-04
405	1,53E-01	445	4,79E-03	485	5,93E-01	525	4,17E-04
406	6,57E-03	446	4,73E-03	486	8,24E-01	526	4,10E-04
407	1,02E-02	447	4,66E-03	487	6,13E-01	527	3,98E-04
408	2,47E-02	448	4,59E-03	488	1,96E-01	528	3,91E-04
409	6,24E-03	449	4,53E-03	489	2,85E-03	529	3,84E-04
410	6,09E-03	450	4,43E-03	490	1,92E-03	530	3,85E-04
411	6,24E-03	451	4,16E-02	491	1,48E-03	531	3,73E-04
412	6,16E-03	452	4,08E-02	492	1,26E-03	532	3,67E-04
413	6,19E-03	453	1,78E-01	493	1,17E-03	533	3,67E-04
414	6,23E-03	454	3,74E-01	494	1,11E-03	534	3,61E-04
415	6,24E-03	455	4,30E-01	495	1,05E-03	535	3,54E-04
416	6,27E-03	456	2,74E-01	496	1,03E-03	536	3,48E-04
417	6,26E-03	457	9,99E-02	497	9,67E-04	537	3,36E-04
418	6,25E-03	458	6,80E-02	498	9,60E-04	538	3,32E-04
419	6,23E-03	459	5,14E-02	499	8,89E-04	539	3,38E-04
420	6,20E-03	460	2,56E-02	500	8,72E-04	540	1,27E-03
421	6,15E-03	461	1,57E-02	501	8,52E-04	541	3,40E-03
422	6,09E-03	462	1,40E-02	502	7,95E-04	542	4,27E-03
423	6,05E-03	463	1,26E-02	503	7,60E-04	543	3,10E-03
424	6,01E-03	464	1,15E-02	504	7,12E-04	544	8,27E-04
425	5,97E-03	465	1,03E-02	505	7,01E-04	545	3,09E-04
426	5,91E-03	466	9,54E-03	506	6,79E-04	546	3,08E-04
427	5,87E-03	467	8,57E-03	507	6,55E-04	547	2,99E-04
428	5,80E-03	468	7,80E-03	508	6,39E-04	548	2,84E-04
429	5,74E-03	469	7,19E-03	509	6,03E-04	549	2,95E-04
430	5,68E-03	470	6,62E-03	510	5,88E-04	550	2,87E-04
431	5,64E-03	471	6,05E-03	511	5,61E-04	551	2,82E-04
432	5,61E-03	472	5,44E-03	512	5,61E-04	552	3,13E-04
433	5,93E-03	473	4,92E-03	513	5,35E-04	553	3,24E-04
434	9,45E-03	474	4,46E-03	514	5,21E-04	554	2,88E-04
435	1,32E-01	475	4,08E-03	515	5,21E-04	555	2,77E-04
436	4,60E-01	476	3,74E-03	516	4,96E-04	556	2,63E-04
437	1,12E-02	477	3,47E-03	517	4,79E-04	557	2,48E-04
438	5,71E-03	478	3,18E-03	518	4,74E-04	558	2,49E-04
439	5,25E-03	479	2,97E-03	519	4,66E-04	559	1,80E-04

Table 11: Spectral distribution data of a Tanning Lamp UV-A

λ / nm	$S_{\lambda,}$	λ / nm	$S_{\lambda,}$	λ / nm	$S_{\lambda,}$	λ / nm	$S_{\lambda,}$
240	4,23E-07	280	2,07E-06	320	1,09E-01	360	8,63E-01
241	1,16E-06	281	3,52E-06	321	1,28E-01	361	8,40E-01
242	4,86E-07	282	4,66E-06	322	1,49E-01	362	8,13E-01
243	1,16E-06	283	6,06E-06	323	1,71E-01	363	8,01E-01
244	4,66E-07	284	8,31E-06	324	1,96E-01	364	8,35E-01
245	8,11E-07	285	1,18E-05	325	2,23E-01	365	8,74E-01
246	-7,16E-07	286	1,79E-05	326	2,52E-01	366	8,41E-01
247	5,37E-07	287	3,00E-05	327	2,83E-01	367	7,40E-01
248	3,66E-07	288	7,86E-05	328	3,15E-01	368	6,40E-01
249	5,48E-07	289	1,33E-04	329	3,49E-01	369	5,92E-01
250	7,36E-07	291	1,58E-04	330	3,85E-01	370	5,58E-01
251	1,19E-06	291	1,66E-04	331	4,22E-01	371	5,24E-01
252	5,92E-07	292	1,94E-04	332	4,62E-01	372	4,92E-01
253	1,18E-06	293	2,57E-04	333	5,05E-01	373	4,60E-01
254	5,92E-07	294	3,31E-04	334	5,47E-01	374	4,29E-01
255	4,64E-07	295	8,78E-04	335	5,83E-01	375	3,98E-01
256	6,05E-07	296	1,76E-03	336	6,17E-01	376	3,70E-01
257	5,03E-07	297	2,40E-03	337	6,53E-01	377	3,42E-01
258	6,44E-07	298	2,10E-03	338	6,89E-01	378	3,17E-01
259	6,67E-07	299	1,66E-03	339	7,25E-01	379	2,93E-01
260	1,00E-06	300	1,81E-03	340	7,57E-01	380	2,70E-01
261	2,69E-07	301	3,19E-03	341	7,95E-01	381	2,48E-01
262	5,76E-07	302	4,75E-03	342	8,32E-01	382	2,29E-01
263	-1,94E-06	303	5,54E-03	343	8,62E-01	383	2,11E-01
264	3,68E-07	304	5,59E-03	344	8,92E-01	384	1,94E-01
265	-1,56E-06	305	6,06E-03	345	9,19E-01	385	1,78E-01
266	5,44E-07	306	7,44E-03	346	9,42E-01	386	1,64E-01
267	-2,41E-06	307	9,41E-03	347	9,61E-01	387	1,49E-01
268	3,66E-07	308	1,19E-02	348	9,76E-01	388	1,37E-01
269	3,11E-07	309	1,48E-02	349	9,89E-01	389	1,25E-01
270	4,95E-07	310	1,86E-02	350	9,95E-01	390	1,14E-01
271	4,28E-07	311	3,79E-02	351	1,00E+00	391	1,04E-01
272	4,82E-07	312	7,28E-02	352	1,00E+00	392	9,42E-02
273	-4,20E-07	313	9,73E-02	353	9,96E-01	393	8,54E-02
274	1,05E-06	314	8,46E-02	354	9,87E-01	394	7,68E-02
275	3,96E-07	315	6,33E-02	355	9,75E-01	395	6,99E-02
276	1,00E-06	316	5,82E-02	356	9,60E-01	396	6,33E-02
277	9,08E-07	317	6,86E-02	357	9,39E-01	397	5,77E-02
278	7,70E-07	318	8,07E-02	358	9,17E-01	398	5,22E-02
279	1,46E-06	319	9,45E-02	359	8,92E-01	399	4,71E-02

Continued table 11: Spectral distribution data of a Tanning Lamp UV-A

λ / nm	S_λ	λ / nm	S_λ	λ / nm	S_λ	λ / nm	S_λ
400	4,26E-02	440	1,83E-03	480	4,32E-04	520	2,50E-04
401	3,88E-02	441	1,51E-03	481	4,23E-04	521	2,26E-04
402	4,04E-02	442	1,40E-03	482	4,15E-04	522	2,58E-04
403	1,57E-01	443	1,27E-03	483	4,17E-04	523	2,49E-04
404	3,05E-01	444	1,24E-03	484	4,04E-04	524	2,39E-04
405	3,28E-01	445	1,17E-03	485	3,92E-04	525	2,67E-04
406	1,98E-01	446	1,12E-03	486	3,82E-04	526	2,39E-04
407	6,31E-02	447	1,08E-03	487	3,94E-04	527	2,60E-04
408	4,73E-02	448	9,94E-04	488	3,89E-04	528	2,45E-04
409	3,54E-02	449	9,47E-04	489	3,82E-04	529	2,37E-04
410	1,97E-02	450	9,48E-04	490	1,02E-03	530	2,36E-04
411	1,46E-02	451	8,97E-04	491	2,23E-03	531	2,35E-04
412	1,31E-02	452	8,65E-04	492	2,67E-03	532	2,45E-04
413	1,19E-02	453	8,34E-04	493	1,89E-03	533	2,07E-04
414	1,07E-02	454	7,69E-04	494	5,49E-04	534	2,25E-04
415	9,85E-03	455	7,95E-04	495	3,61E-04	535	2,35E-04
416	8,94E-03	456	7,30E-04	496	3,47E-04	536	2,16E-04
417	8,18E-03	457	7,29E-04	497	3,50E-04	537	2,28E-04
418	7,54E-03	458	6,91E-04	498	3,42E-04	538	2,37E-04
419	6,89E-03	459	6,47E-04	499	3,39E-04	539	2,08E-04
420	6,38E-03	460	6,36E-04	500	3,31E-04	540	1,92E-04
421	5,78E-03	461	6,23E-04	501	3,29E-04	541	4,15E-04
422	5,32E-03	462	6,17E-04	502	3,41E-04	542	3,27E-04
423	4,86E-03	463	5,80E-04	503	3,55E-04	543	6,17E-04
424	4,52E-03	464	5,81E-04	504	3,30E-04	544	2,23E-02
425	4,11E-03	465	5,53E-04	505	3,20E-04	545	2,08E-01
426	3,83E-03	466	5,67E-04	506	3,05E-04	546	3,74E-01
427	3,52E-03	467	5,44E-04	507	3,11E-04	547	3,60E-01
428	3,33E-03	468	5,33E-04	508	2,64E-04	548	1,46E-01
429	3,06E-03	469	5,21E-04	509	2,92E-04	549	2,07E-03
430	2,84E-03	470	5,09E-04	510	2,94E-04	550	5,27E-04
431	2,73E-03	471	5,10E-04	511	2,98E-04	551	2,65E-04
432	3,11E-03	472	4,96E-04	512	3,11E-04	552	1,19E-04
433	5,80E-03	473	5,02E-04	513	2,90E-04	553	1,73E-04
434	1,55E-01	474	4,69E-04	514	3,05E-04	554	1,47E-04
435	4,68E-01	475	4,63E-04	515	3,10E-04	555	1,51E-04
436	6,10E-01	476	4,61E-04	516	3,06E-04	556	1,89E-04
437	4,25E-01	477	4,52E-04	517	2,88E-04	557	1,52E-04
438	1,14E-01	478	4,43E-04	518	2,75E-04	558	1,93E-04
439	2,50E-03	479	4,40E-04	519	2,69E-04	559	1,47E-04

Table 12: Spectral distribution data of a Xenon Longarc Lamp

λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$
240	1,763E-05	280	1,667E-01	320	3,534E-01	360	5,74E-01
241	4,033E-05	281	1,705E-01	321	3,601E-01	361	5,82E-01
242	7,523E-05	282	1,739E-01	322	3,681E-01	362	5,88E-01
243	1,586E-04	283	1,803E-01	323	3,693E-01	363	5,92E-01
244	2,648E-04	284	1,874E-01	324	3,712E-01	364	5,97E-01
245	4,817E-04	285	1,940E-01	325	3,742E-01	365	6,04E-01
246	7,950E-04	286	2,002E-01	326	3,788E-01	366	6,17E-01
247	1,265E-03	287	2,067E-01	327	3,832E-01	367	6,34E-01
248	1,780E-03	288	2,123E-01	328	3,864E-01	368	6,51E-01
249	2,940E-03	289	2,188E-01	329	3,914E-01	369	6,63E-01
250	4,213E-03	291	2,257E-01	330	4,010E-01	370	6,62E-01
251	5,925E-03	291	2,319E-01	331	4,069E-01	371	6,54E-01
252	8,259E-03	292	2,340E-01	332	4,103E-01	372	6,50E-01
253	1,112E-02	293	2,375E-01	333	4,158E-01	373	6,54E-01
254	1,391E-02	294	2,390E-01	334	4,212E-01	374	6,61E-01
255	1,911E-02	295	2,444E-01	335	4,240E-01	375	6,70E-01
256	2,428E-02	296	2,492E-01	336	4,294E-01	376	6,75E-01
257	2,941E-02	297	2,551E-01	337	4,376E-01	377	6,81E-01
258	3,537E-02	298	2,607E-01	338	4,387E-01	378	6,94E-01
259	4,191E-02	299	2,679E-01	339	4,445E-01	379	7,12E-01
260	4,888E-02	300	2,730E-01	340	4,484E-01	380	7,26E-01
261	5,723E-02	301	2,799E-01	341	4,535E-01	381	7,69E-01
262	6,570E-02	302	2,840E-01	342	4,590E-01	382	7,61E-01
263	7,389E-02	303	2,913E-01	343	4,640E-01	383	7,48E-01
264	8,162E-02	304	2,968E-01	344	4,695E-01	384	7,38E-01
265	8,911E-02	305	3,015E-01	345	4,748E-01	385	7,31E-01
266	9,639E-02	306	3,042E-01	346	4,811E-01	386	7,32E-01
267	1,030E-01	307	3,091E-01	347	4,880E-01	387	7,38E-01
268	1,095E-01	308	3,136E-01	348	4,932E-01	388	7,51E-01
269	1,165E-01	309	3,170E-01	349	5,002E-01	389	7,66E-01
270	1,221E-01	310	3,192E-01	350	5,073E-01	390	7,77E-01
271	1,273E-01	311	3,234E-01	351	5,134E-01	391	7,81E-01
272	1,331E-01	312	3,334E-01	352	5,205E-01	392	7,93E-01
273	1,386E-01	313	3,355E-01	353	5,275E-01	393	8,42E-01
274	1,429E-01	314	3,374E-01	354	5,359E-01	394	9,17E-01
275	1,480E-01	315	3,400E-01	355	5,457E-01	395	9,77E-01
276	1,517E-01	316	3,419E-01	356	5,515E-01	396	1,00E+00
277	1,562E-01	317	3,443E-01	357	5,558E-01	397	9,81E-01
278	1,608E-01	318	3,465E-01	358	5,594E-01	398	9,17E-01
279	1,635E-01	319	3,501E-01	359	5,660E-01	399	8,48E-01

Continued Table 12: Spectral distribution data of a Xenon Longarc Lamp

λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$
400	8,00E-01	440	9,39E-01	480	1,03E+00	520	9,84E-01
401	7,90E-01	441	9,29E-01	481	1,11E+00	521	9,87E-01
402	7,93E-01	442	9,23E-01	482	1,15E+00	522	9,94E-01
403	7,97E-01	443	9,17E-01	483	1,18E+00	523	1,01E+00
404	8,01E-01	444	9,12E-01	484	1,18E+00	524	1,01E+00
405	8,11E-01	445	9,02E-01	485	1,16E+00	525	1,02E+00
406	8,43E-01	446	8,91E-01	486	1,09E+00	526	1,03E+00
407	8,74E-01	447	9,03E-01	487	1,03E+00	527	1,03E+00
408	8,93E-01	448	1,01E+00	488	1,01E+00	528	1,04E+00
409	8,98E-01	449	1,15E+00	489	1,03E+00	529	1,03E+00
410	9,07E-01	450	1,25E+00	490	1,15E+00	530	1,03E+00
411	9,15E-01	451	1,26E+00	491	1,33E+00	531	1,03E+00
412	9,18E-01	452	1,16E+00	492	1,42E+00	532	1,03E+00
413	8,91E-01	453	1,08E+00	493	1,38E+00	533	1,04E+00
414	8,57E-01	454	1,05E+00	494	1,18E+00	534	1,04E+00
415	8,42E-01	455	1,06E+00	495	1,03E+00	535	1,05E+00
416	8,38E-01	456	1,13E+00	496	1,01E+00	536	1,06E+00
417	8,59E-01	457	1,16E+00	497	1,01E+00	537	1,08E+00
418	9,01E-01	458	1,14E+00	498	1,02E+00	538	1,09E+00
419	9,38E-01	459	1,10E+00	499	1,02E+00	539	1,10E+00
420	9,42E-01	460	1,19E+00	500	1,02E+00	540	1,11E+00
421	9,11E-01	461	1,23E+00	501	1,04E+00	541	1,10E+00
422	8,78E-01	462	1,11E+00	502	1,06E+00	542	1,08E+00
423	8,73E-01	463	9,84E-01	503	1,06E+00	543	1,07E+00
424	8,77E-01	464	8,66E-01	504	1,05E+00	544	1,06E+00
425	8,78E-01	465	8,64E-01	505	1,03E+00	545	1,07E+00
426	8,69E-01	466	8,72E-01	506	1,02E+00	546	1,06E+00
427	8,67E-01	467	8,53E-01	507	1,02E+00	547	1,04E+00
428	8,67E-01	468	8,21E-01	508	1,02E+00	548	1,03E+00
429	8,69E-01	469	7,79E-01	509	1,02E+00	549	1,02E+00
430	8,69E-01	470	7,33E-01	510	1,03E+00	550	1,02E+00
431	8,69E-01	471	7,39E-01	511	1,03E+00	551	1,01E+00
432	8,70E-01	472	7,65E-01	512	9,06E-01	552	1,02E+00
433	8,76E-01	473	8,04E-01	513	9,21E-01	553	1,03E+00
434	8,84E-01	474	8,34E-01	514	9,33E-01	554	1,08E+00
435	8,97E-01	475	8,38E-01	515	9,45E-01	555	1,13E+00
436	9,25E-01	476	8,22E-01	516	9,55E-01	556	1,16E+00
437	9,56E-01	477	8,37E-01	517	9,66E-01	557	1,16E+00
438	9,69E-01	478	8,85E-01	518	9,71E-01	558	1,14E+00
439	9,56E-01	479	9,60E-01	519	9,75E-01	559	1,10E+00

Continued Table 12: Spectral distribution data of a Xenon Longarc Lamp

λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$
560	1,07E+00	600	9,12E-01	640	8,45E-01	680	9,28E-01
561	1,06E+00	601	1,08E+00	641	8,70E-01	681	1,14E+00
562	1,04E+00	602	1,14E+00	642	8,55E-01	682	1,37E+00
563	1,01E+00	603	9,37E-01	643	8,81E-01	683	1,58E+00
564	9,88E-01	604	8,98E-01	644	9,47E-01	684	1,70E+00
565	9,78E-01	605	8,76E-01	645	1,11E+00	685	1,94E+00
566	9,80E-01	606	8,87E-01	646	1,30E+00	686	2,39E+00
567	1,00E+00	607	8,64E-01	647	1,47E+00	687	2,75E+00
568	1,04E+00	608	9,36E-01	648	1,52E+00	688	2,86E+00
569	1,09E+00	609	9,67E-01	649	1,49E+00	689	2,46E+00
570	1,13E+00	610	1,01E+00	650	1,37E+00	690	1,85E+00
571	1,15E+00	611	1,07E+00	651	1,30E+00	691	1,40E+00
572	1,13E+00	612	1,12E+00	652	1,21E+00	692	1,16E+00
573	1,08E+00	613	1,09E+00	653	1,18E+00	693	1,08E+00
574	1,03E+00	614	1,13E+00	654	1,09E+00	694	9,78E-01
575	9,77E-01	615	1,23E+00	655	1,03E+00	695	9,34E-01
576	9,67E-01	616	1,52E+00	656	9,82E-01	696	9,50E-01
577	9,29E-01	617	1,84E+00	657	1,01E+00	697	1,01E+00
578	9,36E-01	618	1,94E+00	658	1,08E+00	698	1,02E+00
579	9,64E-01	619	1,89E+00	659	1,13E+00	699	8,73E-01
580	1,04E+00	620	1,69E+00	660	1,11E+00	700	7,37E-01
581	1,17E+00	621	1,41E+00	661	1,03E+00	701	6,26E-01
582	1,27E+00	622	1,22E+00	662	9,69E-01	702	6,28E-01
583	1,27E+00	623	1,11E+00	663	9,46E-01	703	6,15E-01
584	1,19E+00	624	1,06E+00	664	1,01E+00	704	6,25E-01
585	1,10E+00	625	1,03E+00	665	1,14E+00	705	6,24E-01
586	1,12E+00	626	1,10E+00	666	1,25E+00	706	6,19E-01
587	1,19E+00	627	1,14E+00	667	1,23E+00	707	6,17E-01
588	1,26E+00	628	1,18E+00	668	1,06E+00	708	6,69E-01
589	1,29E+00	629	1,38E+00	669	9,10E-01	709	1,05E+00
590	1,25E+00	630	1,53E+00	670	8,64E-01	710	1,72E+00
591	1,24E+00	631	1,68E+00	671	9,83E-01	711	2,53E+00
592	1,26E+00	632	1,63E+00	672	1,10E+00	712	2,81E+00
593	1,27E+00	633	1,39E+00	673	1,09E+00	713	2,27E+00
594	1,22E+00	634	1,13E+00	674	1,00E+00	714	1,55E+00
595	1,10E+00	635	9,71E-01	675	8,95E-01	715	9,27E-01
596	1,00E+00	636	8,95E-01	676	8,31E-01	716	7,11E-01
597	9,55E-01	637	8,97E-01	677	8,15E-01	717	6,84E-01
598	9,35E-01	638	8,76E-01	678	8,08E-01	718	6,67E-01
599	9,30E-01	639	8,65E-01	679	8,29E-01	719	6,37E-01

Continued Table 12: Spectral distribution data of a Xenon Longarc Lamp

λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$	λ / nm	$S_{\lambda,Xe}$
720	6,42E-01	760	2,36E+00	800	7,61E-01	840	2,17E+00
721	6,59E-01	761	1,93E+00	801	8,29E-01	841	2,32E+00
722	7,49E-01	762	2,20E+00	802	9,42E-01	842	1,63E+00
723	8,44E-01	763	2,81E+00	803	1,21E+00	843	9,48E-01
724	9,90E-01	764	3,45E+00	804	1,71E+00	844	3,20E-01
725	1,16E+00	765	3,07E+00	805	2,18E+00	845	2,68E-01
726	1,41E+00	766	2,13E+00	806	2,29E+00	846	2,71E-01
727	1,66E+00	767	1,21E+00	807	1,89E+00	847	2,53E-01
728	1,76E+00	768	8,19E-01	808	1,41E+00	848	2,62E-01
729	1,66E+00	769	6,03E-01	809	9,79E-01	849	2,49E-01
730	1,47E+00	770	5,00E-01	810	8,43E-01	850	2,76E-01
731	1,36E+00	771	4,52E-01	811	7,25E-01	851	3,30E-01
732	1,30E+00	772	4,58E-01	812	6,53E-01	852	3,83E-01
733	1,25E+00	773	4,93E-01	813	5,72E-01	853	4,08E-01
734	1,07E+00	774	5,20E-01	814	5,58E-01	854	4,03E-01
735	8,98E-01	775	5,68E-01	815	6,26E-01	855	3,90E-01
736	8,56E-01	776	5,76E-01	816	6,70E-01	856	4,49E-01
737	1,09E+00	777	6,42E-01	817	7,41E-01	857	5,24E-01
738	1,46E+00	778	7,70E-01	818	1,20E+00	858	5,31E-01
739	1,89E+00	779	8,78E-01	819	1,81E+00	859	4,51E-01
740	1,87E+00	780	9,21E-01	820	6,52E+00	860	4,16E-01
741	1,44E+00	781	8,57E-01	821	1,42E+01	861	4,26E-01
742	1,05E+00	782	6,95E-01	822	2,34E+01	862	5,58E-01
743	7,85E-01	783	5,89E-01	823	2,53E+01	863	7,90E-01
744	7,09E-01	784	5,03E-01	824	1,79E+01	864	9,48E-01
745	7,40E-01	785	4,89E-01	825	1,16E+01	865	1,01E+00
746	8,29E-01	786	7,09E-01	826	8,16E+00	866	9,20E-01
747	9,33E-01	787	1,05E+00	827	1,05E+01	867	8,54E-01
748	9,97E-01	788	1,35E+00	828	1,05E+01	868	8,99E-01
749	9,78E-01	789	1,23E+00	829	6,65E+00	869	1,10E+00
750	8,32E-01	790	9,21E-01	830	3,26E+00	870	1,27E+00
751	7,29E-01	791	5,37E-01	831	8,19E-01	871	1,42E+00
752	6,97E-01	792	3,94E-01	832	2,16E+00	872	1,72E+00
753	7,33E-01	793	4,64E-01	833	4,72E+00	873	1,96E+00
754	8,12E-01	794	7,15E-01	834	6,48E+00	874	2,09E+00
755	1,01E+00	795	1,02E+00	835	6,07E+00	875	1,84E+00
756	1,32E+00	796	1,29E+00	836	3,94E+00	876	1,38E+00
757	1,92E+00	797	1,22E+00	837	1,65E+00	877	9,72E-01
758	2,46E+00	798	9,74E-01	838	7,96E-01	878	8,97E-01
759	2,70E+00	799	7,61E-01	839	1,45E+00	879	4,69E+00

Table 13: Spectral distribution data of a Metal-halogenid Lamp

λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$
200	3,61E-06	240	-1,18E-07	280	2,36E-02	320	4,99E-02
201	3,73E-06	241	5,42E-06	281	1,09E-02	321	8,47E-02
202	-2,58E-06	242	7,15E-07	282	8,86E-03	322	1,01E-01
203	5,92E-06	243	-1,35E-07	283	9,76E-03	323	7,40E-02
204	1,37E-05	244	4,27E-07	284	1,05E-02	324	3,99E-02
205	-2,20E-05	245	5,77E-07	285	7,99E-03	325	2,83E-02
206	4,53E-06	246	6,33E-07	286	7,87E-03	326	2,70E-02
207	6,30E-06	247	-1,32E-06	287	9,44E-03	327	2,36E-02
208	-5,50E-06	248	1,64E-06	288	7,63E-03	328	2,79E-02
209	-2,35E-07	249	1,23E-06	289	3,19E-02	329	2,88E-02
210	-7,77E-05	250	4,46E-07	291	1,13E-02	330	3,15E-02
211	3,65E-06	251	8,13E-07	291	2,15E-02	331	2,56E-02
212	1,67E-04	252	3,71E-06	292	3,23E-02	332	1,63E-02
213	3,78E-06	253	5,11E-06	293	2,29E-02	333	2,86E-02
214	8,35E-06	254	4,58E-06	294	2,59E-02	334	1,08E-01
215	-2,23E-06	255	1,08E-05	295	3,42E-02	335	2,56E-02
216	1,43E-05	256	2,17E-05	296	9,81E-02	336	1,48E-02
217	-7,25E-06	257	4,18E-05	297	8,68E-02	337	2,13E-02
218	6,88E-06	258	5,57E-05	298	4,57E-02	338	2,12E-02
219	-2,32E-06	259	7,71E-05	299	4,97E-02	339	3,09E-02
220	-9,73E-08	260	1,16E-04	300	7,15E-02	340	4,86E-02
221	1,67E-06	261	1,50E-04	301	1,08E-01	341	5,39E-02
222	-1,92E-06	262	1,92E-04	302	2,28E-01	342	5,93E-02
223	-2,00E-06	263	2,95E-04	303	8,86E-02	343	5,65E-02
224	4,12E-06	264	6,20E-04	304	6,93E-02	344	1,13E-01
225	9,73E-09	265	2,04E-03	305	5,56E-02	345	5,21E-02
226	-1,05E-06	266	6,25E-04	306	5,50E-02	346	3,98E-02
227	1,20E-06	267	5,01E-04	307	3,99E-02	347	7,15E-02
228	-1,46E-06	268	7,22E-04	308	3,51E-02	348	5,90E-02
229	-7,70E-07	269	1,57E-03	309	4,28E-02	349	6,46E-02
230	-4,31E-07	270	2,02E-03	310	5,62E-02	350	4,73E-02
231	-1,56E-06	271	2,57E-03	311	3,84E-02	351	8,46E-02
232	-2,42E-06	272	3,56E-03	312	3,08E-01	352	2,13E-01
233	-1,53E-06	273	4,29E-03	313	4,20E-01	353	1,45E-01
234	4,43E-07	274	6,74E-03	314	7,80E-02	354	9,18E-02
235	2,24E-06	275	9,34E-03	315	3,86E-02	355	9,10E-02
236	1,47E-06	276	7,10E-03	316	3,17E-02	356	1,64E-01
237	2,18E-07	277	5,98E-03	317	2,91E-02	357	2,20E-01
238	9,04E-07	278	4,90E-03	318	3,61E-02	358	2,72E-01
239	2,22E-06	279	9,98E-03	319	5,13E-02	359	1,68E-01

Continued table 13: Spectral distribution data of a Metal-halogenid Lamp

λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$
360	9,81E-02	400	5,58E-02	440	7,65E-02	480	7,70E-03
361	1,93E-01	401	7,22E-02	441	1,55E-01	481	7,50E-03
362	1,76E-01	402	3,25E-02	442	9,86E-02	482	8,56E-03
363	1,67E-01	403	6,13E-02	443	5,24E-02	483	8,06E-03
364	2,58E-01	404	1,90E-01	444	4,27E-02	484	8,98E-03
365	1,00E+00	405	5,25E-01	445	4,18E-02	485	1,23E-02
366	5,55E-01	406	1,67E-01	446	3,79E-02	486	2,34E-02
367	1,82E-01	407	2,08E-01	447	3,65E-02	487	3,79E-02
368	1,48E-01	408	1,56E-01	448	2,91E-02	488	3,36E-02
369	1,32E-01	409	3,64E-02	449	2,53E-02	489	5,39E-02
370	1,11E-01	410	2,34E-02	450	2,13E-02	490	1,97E-02
371	1,69E-01	411	2,95E-02	451	1,00E-02	491	5,92E-02
372	2,14E-01	412	3,38E-02	452	1,08E-02	492	6,98E-02
373	2,97E-01	413	6,47E-02	453	3,07E-02	493	1,92E-02
374	3,69E-01	414	9,26E-02	454	2,03E-02	494	1,77E-02
375	3,47E-01	415	8,40E-02	455	9,18E-03	495	7,29E-02
376	2,68E-01	416	4,01E-02	456	9,66E-03	496	6,56E-02
377	2,18E-01	417	2,61E-02	457	7,88E-03	497	1,82E-02
378	1,67E-01	418	4,87E-02	458	7,39E-03	498	2,43E-02
379	1,71E-01	419	8,07E-02	459	8,48E-03	499	2,00E-02
380	1,94E-01	420	1,12E-01	460	1,14E-02	500	3,10E-02
381	1,77E-01	421	7,21E-02	461	1,27E-02	501	2,93E-02
382	3,88E-01	422	4,72E-02	462	9,07E-03	502	1,82E-02
383	3,49E-01	423	6,66E-02	463	8,20E-03	503	1,63E-02
384	2,57E-01	424	7,41E-02	464	9,33E-03	504	2,43E-02
385	1,76E-01	425	9,49E-02	465	1,02E-02	505	2,24E-02
386	1,99E-01	426	1,11E-01	466	1,10E-02	506	1,46E-02
387	1,54E-01	427	1,47E-01	467	1,14E-02	507	1,79E-02
388	1,91E-01	428	1,07E-01	468	9,65E-03	508	1,55E-02
389	2,02E-01	429	4,89E-02	469	8,89E-03	509	1,04E-02
390	1,68E-01	430	8,30E-02	470	1,06E-02	510	1,35E-02
391	9,70E-02	431	1,47E-01	471	8,71E-03	511	1,34E-02
392	1,14E-01	432	8,71E-02	472	8,73E-03	512	1,31E-02
393	1,32E-01	433	1,40E-01	473	1,27E-02	513	2,48E-02
394	4,59E-02	434	7,04E-02	474	1,03E-02	514	2,79E-02
395	4,73E-02	435	1,54E-01	475	9,05E-03	515	1,30E-02
396	5,35E-02	436	7,24E-01	476	9,40E-03	516	4,76E-02
397	1,03E-01	437	3,10E-01	477	8,48E-03	517	4,88E-02
398	4,41E-02	438	1,51E-01	478	9,89E-03	518	1,31E-02
399	2,56E-02	439	1,78E-01	479	8,68E-03	519	3,35E-02

Continued table 13: Spectral distribution data of a Metal-halogenid Lamp

λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$
520	2,01E-02	560	1,08E-02	600	5,70E-03	640	1,32E-02
521	1,62E-02	561	1,90E-02	601	6,65E-03	641	1,36E-02
522	4,38E-02	562	2,38E-02	602	8,03E-03	642	1,09E-02
523	6,61E-02	563	1,00E-02	603	8,34E-03	643	1,02E-02
524	1,82E-02	564	7,32E-03	604	5,48E-03	644	8,52E-03
525	9,34E-03	565	7,05E-03	605	5,17E-03	645	5,69E-03
526	4,88E-02	566	1,02E-02	606	6,27E-03	646	5,40E-03
527	1,14E-01	567	7,15E-03	607	8,39E-03	647	5,95E-03
528	2,98E-02	568	6,48E-03	608	6,65E-03	648	5,79E-03
529	1,05E-02	569	6,20E-03	609	5,63E-03	649	6,34E-03
530	9,22E-03	570	6,83E-03	610	5,67E-03	650	1,47E-02
531	8,48E-03	571	8,95E-03	611	5,73E-03	651	9,68E-03
532	5,65E-02	572	7,94E-03	612	5,35E-03	652	5,83E-03
533	8,25E-02	573	8,62E-03	613	6,85E-03	653	5,56E-03
534	8,65E-02	574	1,11E-02	614	1,56E-02	654	5,61E-03
535	3,24E-01	575	2,08E-02	615	8,65E-03	655	7,88E-03
536	1,04E-01	576	1,11E-01	616	5,65E-03	656	8,29E-03
537	8,21E-02	577	4,55E-01	617	5,77E-03	657	6,44E-03
538	4,03E-02	578	2,39E-01	618	5,74E-03	658	6,47E-03
539	3,79E-02	579	4,14E-01	619	7,78E-03	659	6,15E-03
540	6,67E-02	580	2,43E-01	620	9,50E-03	660	9,18E-03
541	4,75E-02	581	4,54E-02	621	5,91E-03	661	6,95E-03
542	3,52E-02	582	1,92E-02	622	6,86E-03	662	5,92E-03
543	6,22E-02	583	1,17E-02	623	1,06E-02	663	5,65E-03
544	4,50E-02	584	8,85E-03	624	1,24E-02	664	6,07E-03
545	1,87E-01	585	7,77E-03	625	9,78E-03	665	5,79E-03
546	8,90E-01	586	8,39E-03	626	1,04E-02	666	5,61E-03
547	3,00E-01	587	7,40E-03	627	6,64E-03	667	6,30E-03
548	6,45E-02	588	6,43E-03	628	5,54E-03	668	8,01E-03
549	3,41E-02	589	6,89E-03	629	5,50E-03	669	9,26E-03
550	2,54E-02	590	6,34E-03	630	6,61E-03	670	6,10E-03
551	1,57E-02	591	6,55E-03	631	7,74E-03	671	5,95E-03
552	9,77E-03	592	6,63E-03	632	7,15E-03	672	7,27E-03
553	8,87E-03	593	6,74E-03	633	6,66E-03	673	7,11E-03
554	8,56E-03	594	6,28E-03	634	8,07E-03	674	6,20E-03
555	8,09E-03	595	5,53E-03	635	6,38E-03	675	5,96E-03
556	9,93E-03	596	5,40E-03	636	5,69E-03	676	6,35E-03
557	2,10E-02	597	5,19E-03	637	5,50E-03	677	5,85E-03
558	1,93E-02	598	5,96E-03	638	5,17E-03	678	5,75E-03
559	1,96E-02	599	6,57E-03	639	6,26E-03	679	5,87E-03

Continued table 13: Spectral distribution data of a Metal-halogenid Lamp

λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,HMI}$	λ / nm	$S_{\lambda,}$
680	5,80E-03	720	1,08E-02	760	8,71E-03		
681	5,95E-03	721	8,58E-03	761	8,49E-03		
682	6,07E-03	722	9,21E-03	762	6,96E-03		
683	6,02E-03	723	7,85E-03	763	6,86E-03		
684	6,17E-03	724	7,24E-03	764	7,05E-03		
685	6,78E-03	725	6,87E-03	765	6,78E-03		
686	6,64E-03	726	6,80E-03	766	6,65E-03		
687	6,72E-03	727	6,60E-03	767	6,83E-03		
688	6,06E-03	728	6,61E-03	768	8,09E-03		
689	6,08E-03	729	6,45E-03	769	7,42E-03		
690	6,33E-03	730	7,07E-03	770	7,04E-03		
691	8,78E-03	731	7,26E-03	771	6,81E-03		
692	1,77E-02	732	7,03E-03	772	6,79E-03		
693	1,06E-02	733	6,98E-03	773	7,19E-03		
694	7,13E-03	734	6,64E-03	774	7,40E-03		
695	6,77E-03	735	6,52E-03	775	8,84E-03		
696	6,86E-03	736	6,56E-03	776	8,18E-03		
697	6,15E-03	737	6,80E-03	777	8,58E-03		
698	6,26E-03	738	6,69E-03	778	7,08E-03		
699	6,94E-03	739	6,71E-03	779	6,79E-03		
700	6,34E-03	740	7,57E-03	780	8,55E-03		
701	6,37E-03	741	7,80E-03				
702	6,49E-03	742	7,34E-03				
703	7,08E-03	743	8,10E-03				
704	6,87E-03	744	6,86E-03				
705	6,58E-03	745	6,82E-03				
706	6,21E-03	746	8,88E-03				
707	6,23E-03	747	7,92E-03				
708	6,69E-03	748	6,82E-03				
709	7,93E-03	749	6,74E-03				
710	9,96E-03	750	6,99E-03				
711	8,17E-03	751	1,01E-02				
712	6,63E-03	752	1,01E-02				
713	6,44E-03	753	1,29E-02				
714	7,00E-03	754	8,23E-03				
715	7,04E-03	755	7,61E-03				
716	6,66E-03	756	7,11E-03				
717	6,81E-03	757	6,91E-03				
718	7,60E-03	758	7,01E-03				
719	7,33E-03	759	7,13E-03				