

ETC Application Note

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Application Note #

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Ultraviolet (UV) Content of ETC Source Four Luminaires

Introduction:

The safe use of Source Four luminaires to illuminate works of art, objects in a museum or similar delicate photosensitive objects requires knowledge of the ultraviolet radiation emitted. This document provides measured data for Source Four luminaires using a range of light sources and lenses to allow the lighting professional to make an educated judgment as to those emissions when creating a lighting design. It should be stressed however that, although care has been taken to ensure that these figures are as accurate as possible, there is no substitute for measuring the actual emission on site as local conditions may significantly affect the final result. These figures should be used for guidance only.

Methodology:

Representative sample luminaires were tested to the methodology suggested in IESNA RP-30-96 with three lamp versions to provide worst case results (See Note 2). These results were then extrapolated using known data to encompass other Source Four luminaires and other lamp varieties (Tables 1 and 2). To aid the application of the results, conversions and multiplying factors are also provided for different dimming levels of the luminaires (Table 3). Testing was carried out both with and without an Optivex™ UV filter in the luminaire.

IESNA RP-30-96 suggests defining UV for these purposes as all electromagnetic radiation with wavelengths between 300 and 400 nm and the luminaire's total emission as the total radiation with wavelengths between 300 and 700 nm. This methodology was used for these tests and the results are presented in three different formats (Columns A, B and C) in tables 1 and 2:

- Column A** UV percent (%): This expresses the total UV energy between 300 and 400 nm as a proportion of the total energy between 300 and 700 nm.
- Column B** Microwatts of UV per lumen ($\mu\text{W}/\text{lm}$): This expresses the UV energy emission relative to the luminous output.
- Column C** Microwatts per square centimeter at 50 lux ($\mu\text{W}/\text{cm}^2$): Unlike the first two figures this is an absolute measure and is referred to the lighting level of 50 lux often recommended for photosensitive display materials.

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Source Four Ellipsoidal (See note 1 below)

Lamp Code	Watts	Volts	Color Temp	Without filter			With Optivex filter		
				% UV	uW/lum	uW/cm2 At 50 lux	% UV	uW/lum	uW/cm2 At 50 lux
MasterColor	150	N/A	4000K	4.50%	163	0.82	0.84%	25	0.13
MasterColor	150	N/A	3000K	1.82%	61	0.30	0.52%	17	0.09
HPL 750/77	750	77	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 550/77	550	77	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 550/77X	550	77	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 750/115	750	115	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 750/115X	750	115	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 575/115	575	115	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 575/115X	575	115	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 375/115	375	115	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 375/115X	375	115	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 750/120	750	120	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 750/120X	750	120	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 575/120	575	120	3250K	2.65%	160	0.80	0.61%	36	0.18
HPL 575/120X	575	120	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 750/230	750	230	3200K	2.48%	150	0.75	0.57%	33	0.17
HPL 750/230X	750	230	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 575/230	575	230	3200K	2.48%	150	0.75	0.57%	33	0.17
HPL 575/230X	575	230	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 375/230X	375	230	3000K	1.84%	111	0.56	0.42%	25	0.12
HPL 750/240	750	240	3200K	2.48%	150	0.75	0.57%	33	0.17
HPL 750/240X	750	240	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 575/240	575	240	3200K	2.48%	150	0.75	0.57%	33	0.17
HPL 575/240X	575	240	3050K	1.99%	120	0.60	0.46%	27	0.13
HPL 375/240X	375	240	3000K	1.84%	111	0.56	0.42%	25	0.12

Table 1

- Note: This data is applicable as worst case data for the Source Four, Source Four jr, Source Four Zoom and Source Four jr Zoom Ellipsoidal luminaires when fitted with the standard, EDLT or zoom lenses.

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Ultraviolet (UV) Content of ETC Source Four Luminaires

Source Four PAR (See note 2 below)

				Without filter			With Optivex filter		
				A	B	C	A	B	C
Lamp Code	Watts	Volts	Color Temp	% UV	uW/lum	uW/cm2 At 50 lux	% UV	uW/lum	uW/cm2 At 50 lux
MasterColor	150	N/A	4000K	5.41%	295	1.48	0.87%	44	0.22
MasterColor	150	N/A	3000K	2.22%	96	0.48	0.57%	24	0.12
HPL 750/77	750	77	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 550/77	550	77	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 550/77X	550	77	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 750/115	750	115	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 750/115X	750	115	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 575/115	575	115	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 575/115X	575	115	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 375/115	375	115	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 375/115X	375	115	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 750/120	750	120	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 750/120X	750	120	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 575/120	575	120	3250K	3.80%	235	1.18	1.12%	66	0.33
HPL 575/120X	575	120	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 750/230	750	230	3200K	3.55%	220	1.10	1.05%	62	0.31
HPL 750/230X	750	230	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 575/230	575	230	3200K	3.55%	220	1.10	1.05%	62	0.31
HPL 575/230X	575	230	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 375/230X	375	230	3000K	2.64%	164	0.82	0.78%	46	0.23
HPL 750/240	750	240	3200K	3.55%	220	1.10	1.05%	62	0.31
HPL 750/240X	750	240	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 575/240	575	240	3200K	3.55%	220	1.10	1.05%	62	0.31
HPL 575/240X	575	240	3050K	2.86%	177	0.89	0.84%	50	0.25
HPL 375/240X	375	240	3000K	2.64%	164	0.82	0.78%	46	0.23

Table 2

2. Note: This data is applicable as worst case data for the Source Four PAR EA, Source Four PAR MCM and, Source Four PARNet luminaires when fitted with any of the standard lenses.

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Reduction of UV output with dimming (Incandescent lamps only).

Dimming an incandescent lamp reduces the UV output in two ways; firstly the overall output of the lamp reduces and, secondly, the percentage of UV emitted further reduces as the lamp runs cooler. For a range of dimming from 100% down to 50% the UV output is approximately as indicated in table 3.

Dim level (voltage)	100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%
UV output relative to output at full voltage	100%	90%	81%	72%	64%	56%	49%	42%	36%	30%	25%

Table 3

Notes to the data:

1. All reported data are average UV values (300nm-400nm) based on full power operation with the lamp operating at rated voltage.
2. Calibrated lamps were used for all tests
3. The primary tests from which these results were derived were carried out by Independent Testing Laboratories Inc (ITL) Boulder, CO on:
 - a. Source Four ellipsoidal luminaire fitted with a 26° standard lens and three lamp types: HPL 115V 750W 3250K incandescent lamp, MasterColor 150W 3000K metal halide lamp, and MasterColor 150W 4000K metal halide lamp
 - b. Source Four PAR EA luminaire fitted with an NSP lens and three lamp types: HPL 115V 750W 3250K incandescent lamp, MasterColor 150W 3000K metal halide lamp, and MasterColor 150W 4000K metal halide lampData for other lens/lamp combinations was extrapolated from these and other data by ETC. These two fixture types and three lamp types represent the worst cases for UV output for the Source Four product lines.
4. Relative UV output was measured at 7 points across the field and those results averaged to produce the typical results reported here. This data therefore represents the "average UV" across the projected field.

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