ARC LIGHT SOURCES

Xenon, Mercury, Mercury-Xenon

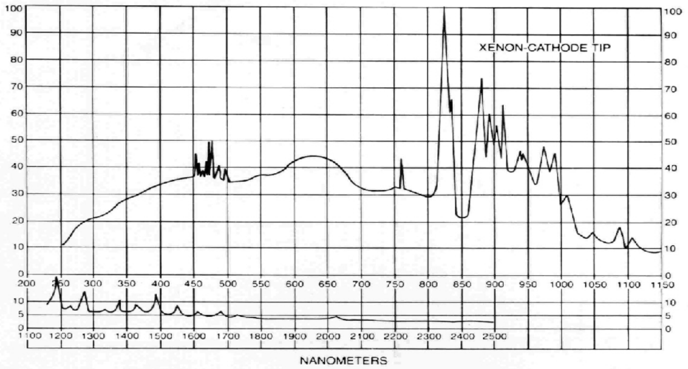
Xenon, Mercury and Mercury-Xenon lamps develop a very high pressure during operation and produce an extremely bright, concentrated light.
The spectral distribution shows superimposed resonance lines on the continuous spectrum of a black body radiator with a colour temperature of about 6000 K. It resembles the sun's spectrum.
Xenon high pressure lamps produce a continuous light in the spectral regions from 190 nm to 2600 nm with some intense lines between 800 nm and 1000 nm. They are particularly suitable as light sources for UV spectroscopy, sun simulation and dermatology.

Mercury high pressure lamps produce light with an intense line spectrum between 240 nm and 620 nm. followed by a continuous spectrum up to 2600 nm. Because of their characteristic lines between 240 nm and 380 nm they are particularly suitable as UV light sources for photo-chemical processes.
Mercury-Xenon high pressure lamps contain some Xenon to shorten the starting time and improve the ignition characteristics on the one hand and increase the life time of the lamp on the other hand. The spectral distribution corresponds largely to a pure mercury lamp with additional Xenon lines between 750 nm and 1000 nm.

Typical Emission Spectra from Xenon and Mercury-Xenon lamps

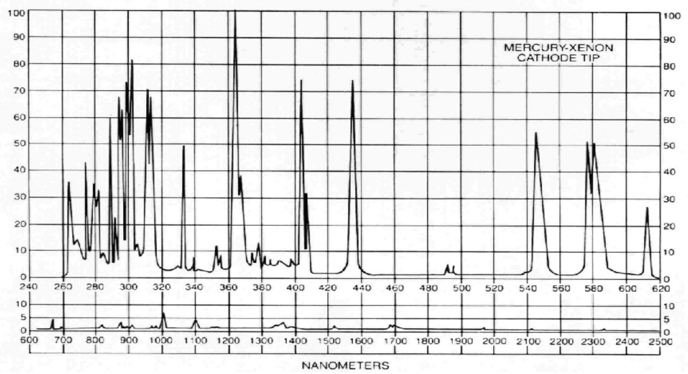
(ORC, Osram)

Spectral emission for Xenon Compact Arc Lamps



WAVELENGTH NANOMETERS	% OUTPUT
250 – 300	2.489
300 – 350	3.504
350 – 400	4.577
400 – 450	5.245
450 – 500	5.626
500 – 550	5.214
550 – 600	5.729
600 – 650	6.472
650 – 700	5.649
700 – 750	4.682
750 – 800	4.682
800 – 850	8.914
850 – 900	6.284
900 – 950	6.788
950 – 1000	5.848
1000 – 1050	2.871
1050 – 1100	1.953
1100 – 1150	1.402
1150 – 1200	1.593
1200 – 1250	0.846
1250 – 1300	0.896
1300 – 1350	0.705
1350 – 1400	0.931
1400 – 1450	0.919
1450 – 1500	1.118
1500 – 1550	0.701
1550 – 1600	0.513
1600 – 1650	0.515
1650 – 1700	0.552
1700 – 1750	0.428
1750 – 1800	0.345
1800 – 1850	0.306
1850 – 1900	0.306
1900 – 1950	0.306
1950 – 2000	0.268
2000 – 2050	0.345
2050 – 2100	0.230
2100 – 2150	0.230
2150 – 2200	0.230
	100.000

Spectral Emission for Mercury-Xenon Compact Arc Lamps



WAVELENGTH NANOMETERS	% OUTPUT
260 – 270	2.205
270 – 280	2.678
280 – 290	2.877
290 – 300	4.231
300 – 310	3.883
310 – 320	5.730
320 – 330	0.538
330 – 340	1.572
340 – 350	0.448
350 – 360	0.886
360 – 370	8.403
370 – 380	1.473
380 – 390	0.538
390 – 400	0.488
400 – 410	2.862
410 – 420	0.304
420 – 430	0.319
430 – 440	5.207
440 – 450	0.498
450 – 460	0.199
460 – 470	0.199
470 – 480	0.199
480 – 490	0.229
490 – 500	0.483
500 – 510	0.199
510 – 520	0.199
520 – 530	0.199
530 – 540	0.249
540 – 550	3.325
550 – 560	1.563
560 – 570	0.249
570 – 580	3.463
580 – 590	4.908
590 – 600	0.521
600 – 700	3.467
700 – 800	2.041
800 – 900	3.186
900 – 1000	2.947
1000 – 1100	3.942
1100 – 1200	3.544
1200 – 1300	2.190
1300 – 1400	4.580
1400 – 1500	2.091
1500 – 1600	2.449
1600 – 1700	2.051
1700 – 1800	2.190
1800 – 1900	1.990
1900 – 2000	1.990
	100.000

The curves are normalised and show the percentage spectral radiation power of Xenon and Mercury-Xenon lamps.
The tables (left) provide a means of estimating the radiated power in a required spectral band. Providing the lamp is at the focal point of a condenser with 2 quartz lenses (LAX...-11) the following formula is valid for the emerging parallel light beam in Müller Elektronik-Optik lamp housings.

$$P_L = P_{La} \times E_{e/l} \times SB \times K \times RS$$

PL = Radiated power in Watts in the spectral band (SB)
PLa, = Lamp power (electrical)
Ee/l Conversion factor indicating amount of electrical power converted to radiant power in the 250-2500 nm range
SB = Percentage radiated in the given spectral region (table)
K = Light collection through the condenser; for LAX...-11 condensers the factor 0.0531 is valid
RS = Factor when using a spherical back mirror (optional) Factor 1.3

For different lamp types various factors are valid for the conversion degree E. :

Lamp power Type	**Factor** *Ee/l*
150 W Xe	0.27
450 W Xe	0.42
1000 W Xe	0.39
2000 W Xe	
200 W Hg-Xe	0.23
1000 W Hg-Xe	0.41