REPORT OF CALIBRATION

for

One Standard of Spectral Irradiance

OL FEL-M, S/N: F-1739

Calibration Date: October 30, 2022
Certification Date: October 31, 2022
Report No: 11895B

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Customer: Wet Labs
Philomath, OR 97370

Contact Information: mdewey@seabird.com
Purchase Order No: 31009
Sales Order No: 11895

1. Material.

One new 1000-watt (FEL) quartz-halogen tungsten coiled-coil filament lamp Standard of Spectral Irradiance (OL FEL-M) was supplied by Optronic Laboratories and bears the designation F-1739 .

2. Method of Calibration and Standards.

For information regarding the mounting, orientation, and alignment processes performed during the calibration, refer to Appendix A.

The calibration of Standard F-1739 was performed by direct comparison to an Optronic Laboratories FEL 1000-watt lamp Standard of Spectral Irradiance, S/N: F-1686. The calibration of Standard F-1686 was performed by direct comparison to a NIST supplied FEL 1000-watt Standard of Spectral Irradiance, S/N: F-714, at a range of 250 nm to 1100 nm and is traceable to SI units through NIST. The calibration was performed using procedure(s) LAMPP02.

The measurement procedure employs the highly accurate wavelength-by-wavelength method of comparison. The spectral irradiance of both lamps is measured at a set wavelength by translating the double monochromator along the optical bench to view each source. Three detectors are used at the exit port of the double monochromator to cover the range of 250 nm to 1100 nm.

The ambient temperature was 23 °C ± 2 °C; and the relative humidity was < 60 %.

3. Results.[1/]

The spectral irradiance values from 250 nm to 1100 nm provided in Table 1 are covered by the ISO/IEC 17025:2017 accreditation of Optronic Laboratories. Refer to A2LA Certificate Number 6064.01.[2/] Table 2 provides the relative expanded uncertainty (k=2) for an OL FEL-M lamp Standard of Spectral Irradiance provided by Optronic Laboratories for the wavelength range of 250 nm to 1100 nm.

1/ Note: FEL lamps can exhibit narrow band emission lines at 257, 266, 309 and 395 nm. The intensities of these lines are generally less than 15% of the adjacent continuum as measured with the spectroradiometer adjusted for a 0.05 nm bandwidth. In addition, a decrease in the output due to absorption by the lamp itself is seen at 279 nm. Historically, this absorption has been known to change with burning time. While 280 nm data is reported, care should be taken when measurements are made near 279 nm. If the instrument to be calibrated has a narrow bandpass, checks should also be made in the areas of the emission lines. (This information was obtained from NIST TEST No.: 844/250074-92).

2/ This certificate shall not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government.

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ORIGINAL: O:\reports\LAMPTEMPLATES\New OL Templates\FEL-M.RevK.UNC121521.dot
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4. General Information

These lamps operate at very high temperatures such that the quartz envelope is above the flammable point of organic materials. They may thus cause fires, plus the burning of lint, dust, etc. on the envelope may result in optical damage to its surface. It should be emphasized that these lamp standards should be handled with the care normally given to delicate optical components. Installation and use of the OL FEL Irradiance Standard should be done by qualified personnel only.

For highest accuracy, allow the OL FEL-M lamp to warm up for 10 minutes.

Previous tests on similar lamps indicate that the average long term photometric stability is specified at ≤ 0.06 % per hour of operation.[3/]

Optronic Laboratories will provide the calibration data files by email.

The results of this calibration apply only to the lamp referenced in this report. This report of calibration shall not be reproduced, except in full, without written approval of Optronic Laboratories, Orlando, Florida.

Calibration Performed by:

Bart Lovell – Senior Optical Technician

Calibration Certified by:
OPTRONIC LABORATORIES

Deborah Griffith
Calibration Laboratory Manager

Reviewed by:

Bart Lovell
Senior Optical Technician

3/ The lamp is under warranty for a period of 50 hours of use or one year, whichever occurs first.

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TABLE 1

Spectral Irradiance of Standard F-1739 at a Distance of 50 cm when Operated at 8.200 Amperes DC

Wavelength [nm]	Spectral Irradiance [W/(cm² nm)]
250	1.890E-08
260	3.359E-08
270	5.608E-08
280	8.843E-08
290	1.333E-07
300	1.932E-07
310	2.713E-07
320	3.715E-07
330	4.956E-07
340	6.490E-07
350	8.323E-07
360	1.045E-06
370	1.294E-06
380	1.577E-06
390	1.895E-06
400	2.245E-06
450	4.532E-06
500	7.485E-06
555	1.109E-05
600	1.400E-05
654.6	1.715E-05
700	1.929E-05
800	2.230E-05
900	2.328E-05
1050	2.207E-05
1100	2.128E-05

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TABLE 2

Relative Expanded Uncertainty (k=2) for the
OL FEL-M Spectral Irradiance Values [W/(cm^2 nm)] Provided by Optronic Laboratories

Wavelength [nm]	Relative Expanded Uncertainty (k=2) (%)
250	6.5
260	5.6
270	4.8
280	4.8
290	4.1
300	4.1
310	3.4
320	3.4
330	2.9
340	2.9
350	2.9
360	2.5
370	2.5
380	2.4
390	2.4
400	2.4
450	2.4
500	1.7
555	1.7
600	1.7
654.6	1.3
700	1.3
800	1.3
900	1.3
1050	1.3
1100	1.3