



Pre-Qualification of Laboratories for Testing of Commercially-Available Solid State Lighting Products

Research and Development Solutions, LLC, (RDS), on behalf of the US Department of Energy's Building Technologies Program, is requesting capability statements for the purpose of pre-qualifying laboratories for testing commercially available solid state lighting (SSL) products. RDS will establish contractual vehicles with qualified laboratory facilities for the testing of electrical, photometric, colorimetric, thermal characteristics, lumen maintenance, and life performance of commercially-available SSL luminaires (e.g., task lights, recessed down-lights, under-cabinet fixtures) or replacement lamps.

This request for capability statements is for planning purposes only, and shall not be construed as a solicitation or as an obligation on the part of RDS to award a specific number of tests or a specific amount of funding to qualified laboratories.

RDS will pre-qualify laboratories for future testing of SSL products based on three general categories:

1. Demonstration of competence and credibility as a lighting testing laboratory which may include:
 - a. Demonstration of establishment and implementation of policies as appropriate to the laboratory's size and scope of activities to assure the quality of the test and/or calibration results it generates (in the areas of quality systems, audit and review; personnel; equipment and reference materials; measurement traceability and calibration; calibration and test methods; records; certificates and reports)
 - b. Existing lighting, optical, and consumer testing accreditations and certifications (e.g. National Voluntary Laboratory Accreditation Program [NVLAP])
 - c. Existing general accreditations for testing and calibration (e.g. ISO 17025, ISO 9001, ISO 9002)
 - d. Active participation of laboratory and personnel in relevant national standards activities, research activities, national trade initiatives (e.g. ANSI/IES standards organizations, published research endeavors, etc.)
2. Demonstration of past proficiency in lighting system tests – Previous experience testing SSL and other lighting products and optical devices is highly desirable
3. Demonstration of capabilities
 - a. Technical – Facilities with appropriate testing hardware and software, calibration devices, and documented procedures and test methods
 - b. Personnel – Staff with the skills and expertise needed to successfully test SSL products
 - c. Quality program – Documented quality program with procedures that ensure high-quality results

Laboratories should include in their responses detailed information covering testing equipment and its limitations for the types of tests they propose to qualify for, such as:

- Electrical
- Photometric
- Colorimetric
- Thermal characteristics
- Lumen maintenance
- Life performance
- In-situ performance

For each type of equipment that applies, please provide:

- Complete description of equipment
- Calibration and reporting history
- Longest/smallest lamp/luminaire limitations (length and/or length, width, height)
- Minimum and maximum lumens limits
- Limitations for geometric configurations of luminaires
- Other measurement limitations

Types of equipment which may apply for testing methods (please provide manufacturer, model, size and measurement instrumentation specifications):

- Integrating sphere/spectroradiometer
- Gonio-photometer
- Gonio-spectroradiometer
- Other light testing equipment
- Electric measurement testing equipment
- Thermal measurement equipment
- Other

Additionally, laboratories should indicate the following:

1. Capacity to perform absolute (as opposed to relative) photometry with National Institute of Standards and Technology (NIST) traceable absolutely calibrated photometers.
2. Capacity to use directional reference standards as needed to correspond to the directional nature of samples being tested.
3. Approach to ensure minimal spectral response mismatching in photo-detectors (for gonio-photometry testing), e.g. $f < 1.5\%$ (curve matching of $V(\lambda)$ curves), or f_{LED} or calibration/correction methods applied for spectral matching.
4. Availability/use of environmental chambers or a similar ability to vary ambient temperature in test chambers. Indicate ranges of conditions possible.

Capability statements should be mailed to the following address:

Research and Development Services, LLC
Attn: Sean Sikora
3604 Collins Ferry Road, Suite 200
Morgantown, WV 26505

Questions should be addressed to Sean Sikora at telephone 304-225-5133 or by e-mail at ssikora@egginc.com.

Background

DOE has made a long-term commitment to develop and support commercialization of SSL for general illumination, including sources, fixtures, electronics, and controls. In August 2005, President Bush signed the Energy Policy Act of 2005 (EPACT 2005), the first national energy plan in more than a decade. Title IX (Research and Development) of the Energy Act directs the Secretary of Energy to carry out a Next Generation Lighting Initiative (NGLI) to support research, development, demonstration, and commercial application activities for SSL.

The Secretary is directed to carry out research, development, demonstration, and commercial application activities through competitively selected awards. The EPACT 2005 authorizes \$50 million to the NGLI for each fiscal year 2007 through 2009, with extended authorization to allocate \$50 million for each of the fiscal years 2010 to 2013. The actual Congressional appropriation for the NGLI will not be determined until fiscal year 2007.

This public R&D investment serves the ultimate goal to successfully commercialize the technologies in the buildings sector, where lighting accounts for more than 20 percent of total electricity use.

Potential benefits are enormous if SSL technology achieves projected price and performance levels:

- By 2025, SSL could displace general illumination light sources such as incandescent and fluorescent lamps, decreasing national energy consumption for lighting by about 0.45 quadrillion Btus (quads) annually, that is, enough energy saved to serve the lighting demand of 20 million households today.
- The cumulative energy expenditure savings from 2005 to 2025 would translate into more than \$25 billion dollars saved.
- The cumulative energy savings from 2005 to 2025 is projected to be more than 1.5 quads.

To realize the full promise of solid-state lighting by 2025, major research challenges must be addressed. To help tackle these challenges, DOE is funding selected R&D to improve energy efficiency and speed SSL technologies to market. Projects are selected to align with a comprehensive R&D plan developed in partnership with industry, research and academic organizations, and national laboratories. DOE has and will continue to maintain a focus on the ultimate goal of supporting commercialization of SSL technologies to decrease lighting energy use while improving and expanding lighting services. Unique attributes of SSL technologies underscore the importance of a long-term, coordinated approach encompassing applied research and strategic technology commercialization support.

Description of Test Program

Laboratories pre-qualified through this process will be asked to conduct tests of market-available SSL products in support of the DOE Commercially Available LED Product Evaluation and Reporting (CALiPER) Program.

SSL technologies are undergoing rapid change and improvement. New SSL products are being introduced to the market almost on a daily basis. Products arriving on the market exhibit a wide range of performance, particularly in the areas of luminous efficacy, lifetime, and color quality. The products intended uses include task lighting, under-cabinet lighting, recessed down-lights, overhead office lighting, street lighting and others. Performance and efficiency claims made by product vendors often greatly exceed known start-of-the-art performance levels. Industry groups, standards organizations, and DOE are moving quickly to develop needed SSL standards and test procedures. In the meantime, there is a need for reliable, unbiased product performance information to foster the developing market for high-performance SSL products.

The DOE CALiPER Program will:

- Guide DOE planning for SSL R&D and commercialization support activities, including ENERGY STAR® program planning
- Support DOE technology procurement activities and associated technology demonstrations
- Provide objective product performance information to the public in the early years, helping buyers and specifiers have confidence that new SSL products will perform as claimed
- Guide the development, refinement, and adoption of credible, standardized test procedures and measurements for SSL products

DOE will support testing of a wide, representative array of SSL products available for general illumination, using test procedures currently under development by standards organizations. Guidelines for selecting products for testing will ensure that the overall set of tests provides insight on a range of lighting applications and product categories, a range of performance characteristics, a mix of manufacturers, a variety of Light Emitting Diode (LED) devices, and variations in geometric configurations that may affect testing and performance.

The Department will allow its test results to be distributed in the public interest for noncommercial, educational purposes only. Detailed test reports will only be provided to users who provide their name, affiliation, and confirmation of agreement to abide by DOE's "[No Commercial Use Policy](#)." Until test procedures for measuring performance and light quality attributes of SSL products are standardized, DOE hopes the provision of this information to the public will make buyers more aware of the importance of accurate reporting of SSL product performance, and will encourage product manufacturers to better substantiate their performance claims.