Energy Efficiency Testing under the Energy Star Program



General Introduction

ENERGY STAR®

What is Energy Star[®]?

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) aiming to protect the environment through energy efficient products and practices.

Details on proposed scheme under www.energystar.gov/testingandverification

Note:

The ENERGY STAR[®] logos are here shown for training purposes only.

Neither accepted Certification Bodies nor Laboratories are permitted to use ENERGY STAR® Logos or marks in any of their marketing materials or upon anything that they distribute. Use of the Mark by non-partners (including recognized CBs, Abs and Labs) will be treated as a logo violation by the Agency (EPA)





History

ENERGY STAR®

1992-2010

Self-Certification

- Partner tests product, confirm compliance to ENERGY STAR specification and label with the ENERGY STAR
- Partner submits test data to EPA for product qualification
- EPA reviews and lists product if found compliant
- EPA verified energy performance on select models





4 6/27/2013 TÜV Rheinland. Energy Efficiency

History

Why the change to Third-Party Certification?

"Energy Star is for the most part a self-certification program vulnerable to fraud and abuse, says the nine-month study (begun in June 2009) by GAO"

"A Congressional report stated the Energy Star program approved 15 bogus products, including a gas-powered alarm clock and an air purifier that looked like a space heater with a feather duster on top..."



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History

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Starting in 2011

Third-Party Certification

- Partner has product tested in EPA recognized lab prior to labeling
- Test data is submitted to an EPA recognized Certification Body (CB) to certify all program and specification requirements have been met
- CB authorizes labeling
- CB uploads product certified data to ENERGY STAR website
- CB conducts verification and challenges testing after qualification
- Significant product modifications require retest and recertification





Scope of ENERGY STAR

Energy Star Product Groups

Appliances

Clothes Washers

Dehumidifiers

Dishwashers

- Freezers
- Refrigerators
- Room Air Cleaners & Purifiers
 Water Coolers

Building

Products •Seal and Insulate •Roof Products •Windows, Doors and Skylights

Computers & Electronics

Audio/Video
Battery Chargers [Uninterruptible Power Supplies]
Computers
Displays
Enterprise Servers
Imaging Equipment
Set-top Boxes & Cable Boxes

- Telephony
- Televisions
- Data Center Storage

Heating & Cooling

- Air Conditioning, Central
 Air Conditioning, Room
 Boilers
 Dehumidifiers
- •Fans, Ventilating
- Furnaces
- •Heat pumps, Air Source
- •Heat pumps, Geothermal
- •Home Sealing Insulation
- & Air Sealing
- Mini–Split Heating
- & Cooling
- Room Air Cleaners
- & Purifiers

Lighting and Fans

- Decorative Light Strings
- •Fans, Ceiling
- Light Bulbs
- Light Fixtures

Plumbing

- •Water Heater, Gas Condensing
- •Water Heater, Heat Pump
- •Water Heater, High Efficiency Gas Storage
- •Water Heater, Solar
- •Water Heater, Whole Home Gas Tankless





ENERGY STAR Process

Basic Process



1872 - 2012





Service Portfolio of TÜV Rheinland North America

 Founded in 1872 and headquartered in Cologne
 TUV Rheinland Group employs 17.000 people in 500 locations in 65 countries
 Annual revenue of €1.5 billion [2011].

- 21 Locations in the U.S.
- 700+ Client focused employees
- Established: 1978, Incorporated 1983
- HQ in Newtown, CT







Scope of ENERGY STAR

Energy Star Product Groups

Appliances

Clothes Washers

Dehumidifiers

Dishwashers

Freezers

Refrigerators

 Room Air Cleaners & Purifiers •Water Coolers

Building

Products Seal and Insulate Roof Products •Windows, Doors and

 Battery Chargers [Uninterruptible Power Supplies] •Computers Displays Enterprise Servers Imaging Equipment •Set-top Boxes & Cable Boxes Telephony Televisions Data Center Storage

Computers & Electronics

Audio/Video

Heating & Cooling

 Air Conditioning, Central Air Conditioning, Room Boilers Dehumidifiers Fans, Ventilating Furnaces •Heat pumps, Air Source •Heat pumps, Geothermal •Home Sealing – Insulation & Air Sealing Mini–Split Heating & Cooling Room Air Cleaners & Purifiers

Lighting and Fans

- Decorative Light Strings
- Fans, Ceiling

Light Bulbs

Light Fixtures

Plumbing

- •Water Heater, Gas Condensing
- •Water Heater, Heat Pump
- •Water Heater, High Efficiency Gas Storage
- •Water Heater, Solar
- •Water Heater, Whole Home Gas Tankless

In Scope of TUV Rheinland of North America CB Accreditation / Lab recognition

> -> in this context 'CB' = EPA ES Certification Body. not to be confused with IECEE Certification Body





Skylights

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<u>Witnessed Manufacturer's Testing Laboratory (WMTL)</u> - A manufacturer's laboratory being used to test specified products of which the manufacturer has production responsibility. The CB witnesses all tests done by a manufacturer's laboratory which uses its own test equipment.

Basic Steps:

- Manufacturer applies to the <u>CB</u> to become a WMTL
- The CB evaluates suitability of laboratory to ISO/IEC 17025 cl. 5.2-5.8 prior to witnessing testing

The CB will report recognized WMTL to EPA for registration purposes
Upon successful evaluation of the WMTL all subsequent test shall be witnessed by the CB





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Test Option 2 – Supervised Manufacturer's Testing

<u>Supervised Manufacturer's Testing Laboratory (SMTL)</u> - A manufacturer's laboratory being used to test products for which the manufacturer has production responsibility, under the supervision of a CB. The manufacturer's laboratory uses its own personnel and test equipment and takes responsibility for and signs the test data. Some part of each agreed testing program must be witnessed by the CB on site.

Basic Steps:

- Manufacturer applies to the <u>CB</u> to become a SMTL
- The CB evaluates suitability of laboratory to ISO/IEC 17025 prior to witnessing testing or accepting test data
- •EPA is very particular with Impartiality of SMTs. Be sure to have ISO/IEC 17025, cl. 4.1.5 fully covered!
- •The CB will report accepted SMTLs to EPA for registration purposes
- •Upon successful evaluation of the SMTL some part of each agreed testing program must be witnessed by the CB on site. Test data not witnessed can only be accepted after a confidence building period between the CB and SMT.





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Test Option 3 – 1st Party Laboratory Recognition

<u>1st Party Laboratory</u> - Are accredited by EPA-recognized Accreditation Bodies and owned by or associated with an ENERGY STAR Manufacturing Partner that uses the lab to test its products.

Basic Steps:

- Ist Party Lab applies to a EPA recognized Accreditation Body (AB) for the desired ENERGY STAR Specifications
- •The AB audits the laboratory to ISO/IEC 17025. Upon successful audit the AB will issue a formal accreditation

1st Party Lab applies to EPA for recognition based upon the AB accreditation.
 After EPA recognition the 1st Party laboratory may submit test data directly to the CB for certification with no laboratory oversight of the laboratory

First-party labs without accreditation should contact an <u>EPA-recognized CB</u> to inquire about enrolling in an W/SMTL program





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What does the CB review for certification?

 Test Laboratory EPA recognized (Third party, WMTL, SMTL or 1st Party)
 Test report/Test Data – Correct conclusions, results and test methods
 Measurement and Testing Instrument list with calibration dates
 Declaration about difference of construction – Family Models (as applicable)
 Photo documentation, catalog or picture of the product
 User manual / Instructions comply with ENERGY STAR specification and program requirements
 Valid ENERGY STAR Partner ID
 ENERGY STAR® Certification submission form is complete and accurate

✓ ENERGY STAR® Certification Body Agreement





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EPA data submission

- Substantial product details are required to complete the submission form
- CB uploads information to EPA website
 [XML-based qualified product exchange (QPX) system
- ENERGY STAR qualified products will not be displayed on the ENERGY STAR website until the "date available on market" date is reached

EPA no longer intends to use a standardized PPDS for Data Center Storage. EPA is currently developing the Qualified Product eXchange (QPX) document which will be used to collect all reported test data for ENERGY STAR certification. Manufacturers, CBs, and labs will have an opportunity to review this document prior to finalization. All data the EPA intends to publish will be displayed on the Qualified 626 Product List (QPL) on the ENERGY STAR website.







Verification testing is a Partner funded program, which ensures products on the market continue to meet all product performance parameters as described in the relevant ENERGY STAR product specification

What is subject to Verification Testing?

Annually 10% of certified products on the U.S. market in each product category and subtype

[e.g.] Category: Imaging Products
 Subtypes: copiers, digital duplicators, fax machines, mailing machines, multi-function devices, printers, scanners

All members of a certified product family are subject to verification testing
 A product with multiple brands is treated as one product





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Product selection

- All unique models on EPA's qualified products lists (QPLs) <u>products currently</u> <u>available for sale in the US</u> -are candidates for verification testing
- At least 50% of models to be tested are randomly selected from the certification database of the CB
- The remaining models shall be comprised of referrals provided by the EPA, and models selected in consideration of the following factors:
 - Product classes from ENERGY STAR partners for which previous models failed verification testing
 - Referrals from third parties such as consumers, consumer groups or regulatory agencies regarding the accuracy of ratings
 - Models with high sales volumes if this data is available





Verification Testing

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Product procurement

- The unit(s) for verification testing shall be procured or obtained by prioritizing the source of those units in the following order (from most to least favored)
 - Off-the-shelf (i.e., from the open market);
 - Warehouse (i.e., from a storage depot or distributor); or
 - Off-the-line (i.e., from the manufacturing facility).

Notes:

1) Off-the-line testing is only appropriate where pulling products from the shelf or from a warehouse is not feasible. Examples include where the selected product is prohibitively expensive to purchase and/or transport, is made-to-order, or is otherwise unavailable through normal retail channels.

2) The Energy Star partner shall not be allowed to choose the testing sample.





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Test Location

- Verification testing shall be performed at an EPA-recognized, third-party laboratory; or,
- By exception, the verification testing may be performed at an EPA-recognized, first-party laboratory provided that qualified CB personnel witness the test.

Pass/Fail Criteria



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Challenge Testing Initiation

The challenge testing will not be initiated and the challenged not notified until:

- Confirmed identification of the challenged model number; and,
- Confirmed identification of the challenged parameters and the basis for the challenge. This basis may be but is not limited to marketing material that claims better performance than the data the CB has on record, or the results from a product test the challenger performs on its own
- Confirm the challenge valid based on factors such as information provided by challenger, comparing challenged parameter with certification data and other factors relevant to the product performance requirements of the relevant ENERGY STAR program requirements





www.energystar.gov



www.energystar.gov => "More Partner Resources"

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6			ENERGY STAR UPDATE: Habitat Metro Denver Receives EPA ENERGY STAR Award			Financial Services				
			New "Ask the Expert" Q&A							
	7		ENERGY STAR UPDATE: Survey Says ENERGY STAR Brand Awareness Now at 87 Percent							
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http://www.energystar.gov/index.cfm?c=third_party_certification.tpc_index

PRODUCTS	HOME IMPROVEMENT	NEW HOMES	BUILDINGS & PLANT	S PARTNER RESOURCES				
Partner Resources	Home > Partner Resources > Third-Party	Certification						
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For Federal Agencies	 In addition to the specific conditions and criteria for these organizations, EPA also publishes directives to clarify and elaborator inthe responsibilities of EPA-recognized accreditation bodies (ABs), certification bodies (CBs), and laboratories. ENERGY STAR manufacturing partners must have products tested in EPA-recognized laboratories and certified by an EPA-recognized CB prior to labeling. All certified products will also be subject to ongoing verification Bodies (G0KB), as well as directives 2011-04 (g0KB) and 2011-06 (goKB). As part of EPA's activities to maintain the integrity of EPAreGY STAR, products that fail to meet ENERGY STAR requirements will be subject to EPA's disqualification procedures (goKB). Manufacturers who label products as ENERGY STAR without obtaining third-party certification put the integrity of the program at risk and undermine the investment of thoes who honor their commitment. Companies found to be labeling products without obtaining the necessary certification will be required to remove the label from these products and institute other corrective actions as appropriate. Information on the development of the ENERGY STAR third-party certification procedures have been archived. 							
Join ENERGY STAR								





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Important links:

- Laboratory Resources \geq
- **Certification Body Resources** \geq
- Specifications
- **Development of new and revised product specifications** \triangleright

Standard Operating Procedures [-> part of Cert. Body Resources]





Other Information

Power Supply Requirements

• If the product uses an *internal power supply*, the submittal must include a certificate of compliance issued by an EPA-recognized laboratory that covers the internal power supply, and the certification body must accept this certificate of compliance in lieu of a lab report.

[see also <u>80 PLUS</u> certified power supplies which can be found at: http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx#]

• If the product uses an <u>external power supply</u> with integral fan cooling or multi-output external power supply (that is not covered by the International Efficiency Marking Protocol), the certification body may accept either a certificate of compliance from an EPA-recognized laboratory or a laboratory report that covers the external power supply.

•If the product uses an external power supply covered by the International Efficiency Marking Protocol, the certification body must obtain documentation, or affirmation from the test laboratory of visual inspection that confirms the external power supply is marked as Level V. The certification body must not require a full lab report or certificate of compliance from the manufacturer.

Note: On July 19, 2010 EPA announced to sunset the ES programs for EPSs and End-Use

Products Using EPSs (details see next slide)





ENERGY STAR®

Other Information

Power Supply Requirements

EPA's sunset decision:

"....

EPA will continue to recognize EPSs, End-Use Products Using EPSs and their manufacturers at www.energystar.gov until December 31, 2010.

- Manufacturers must stop using the ENERGY STAR name and ENERGY STAR mark or EPS graphic in association with all products manufactured on or after December 31, 2010. (Qualified products manufactured before that date are allowed to carry the ENERGY STAR mark or EPS graphic on their packaging and product literature, as applicable. Retailers and distributors will be allowed to sell off their existing inventory.)
- No new promotional materials for EPSs and End-Use Products Using EPSs (printed and electronic) featuring the ENERGY STAR mark or EPS graphic may be produced after December 31, 2010. (Manufacturers are allowed to use up existing printed material, including packaging, in order to minimize waste.)
- To minimize the cost of labeling changes and be in compliance by December 31, 2010, manufacturers of EPSs and End-Use Products Using EPSs may remove ENERGY STAR references on websites or in other collateral materials as these materials are reprinted or changed in the coming months.





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Measurements

Measurement Uncertainty

Instrument Accuracy

Spec acc. User Manual:

Current Ranges
 internal shunt [A]: 100, 25, 6.25, 1.6, 0.4, 0.1

= external shunt (not shown in manual) [mA]: 1250, 313, 78, **20, 5, 1**

- Voltage Ranges [Vpk]: 900, 215, 46, 10
- Accuracy (AC) = 0.2%*Read + 0.1%*Range + 4mW + (0.05/PF*f/1000)% of reading







Instrument Accuracy



Example: Reading = 0.5W @ 240V => I = 2mA, f=50Hz, (with PF=1)

Accuracy (AC) = 0.2%*Read + 0.1%*Range + 4mW + (0.05/PF*f/1000)%

Accuracy (0.5W) without Breakout Box (internal shunt)

$$= 0.2\% * 0.5W + 0.1\% * 0.1A * 900V + 0.004W + \left(\frac{0.05}{1} * \frac{50}{1000}\right) / 100 * 0.5W$$
$$= 0.001W + 0.09W + 0.004W + 0.0001W = 0.096W \approx 19.2\%$$

Instrument Setup not suitable for IEC 62301

Power Measurement Range:

 $Range_{Power} = Range_{Voltage} * Range_{Current}$





Measurements

Instrument Accuracy

Example: Reading = 0.5W @ 240V => I = 2mA, f=50Hz, (with PF=1)

Accuracy (0.5W) with Breakout Box (external shunt)

 $= 0.2\% * 0.5W + 0.1\% * \underline{0.005A} * 900V + 0.004W + \left(\frac{0.05}{1} * \frac{50}{1000}\right) / 100 * 0.5W$ $= 0.001W + 0.005W + 0.004W + 0.0001W = \underline{0.011W} \approx 1.9\%$

Instrument Setup suitable for IEC 62301

Conclusion: Also correct Instrument can deliver wrong results







Thank You!



.....Questions?

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