

# Response to Battery Charger Test Procedure Comments Received for 45-Day Language

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Submitted by:  
Pacific Gas and Electric Company

Pat Eilert  
Gary Fernstrom  
Ed Elliot



Prepared by:  
Jonathan Carter Hebert, P.E., and Suzanne Foster Porter,  
Ecos Consulting

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## TABLE OF CONTENTS

<b>1</b>	<b>RESPONSE TO CEA’S DOUGLAS JOHNSON’S COMMENTS OCTOBER 21, 2008 .....</b>	<b>3</b>
1.1	SELECTION OF BATTERIES BY MANUFACTURES .....	3
1.2	COMMENTS ON SCOPE AND REQUESTS FOR CLARIFICATION .....	4
1.2.1	<i>Role of the manufacturer/supplier: .....</i>	<i>4</i>
1.2.2	<i>Back-up battery charger systems: .....</i>	<i>4</i>
1.2.3	<i>Battery charger system setup requirements:.....</i>	<i>4</i>
1.2.4	<i>Access to the battery for discharge test: .....</i>	<i>5</i>
1.2.5	<i>Conflict between “No-Battery Mode” definition and “Category 3 Products”</i> <i>descriptions: .....</i>	<i>8</i>
1.2.6	<i>Charge Mode and Battery Maintenance Mode test:.....</i>	<i>9</i>
1.2.7	<i>Reference documents in the test procedure:.....</i>	<i>10</i>
<b>2</b>	<b>RESPONSE TO AHAM’S WAYNE MORRIS’S AND PTI’S ROBERT G. STOLL’S</b> <b>COMMENTS OCTOBER 13, 2008.....</b>	<b>10</b>
2.1	POWER FACTOR MEASUREMENT IN TEST PROCEDURE .....	11

# 1 Response to CEA's Douglas Johnson's Comments

## October 21, 2008

Enumerated below are comments from CEA on part 1 of version 2.1.4 of the California battery charger test procedure. Below each comment is a response and recommended action (*in italics*). The changes recommended below will be included in version 2.2 of the test procedure.

A number of the comments from CEA pertain to policy decisions concerning the development of battery charger standards and go beyond the scope the battery charger test procedure. These include points discussed in sections I, II, III, & V. The "Responses to Battery Charger Test Procedure Comments" document dated June 6<sup>th</sup>, 2008 addresses many of the issues in comments I, II, III, & V, and is a good reference.

### 1.1 Selection of batteries by manufactures

IV. A test procedure for battery charging systems, or any regulation based on such a test procedure, should not bias one battery technology over another, nor preclude the development of new battery technologies.

CEA believes that a test procedure for battery charging systems, or any regulation based on such a test procedure, should not bias one battery technology over another, nor preclude the development of new battery technologies. CEA strongly recommends that the test method reference battery chemistry. A statement similar to the following should be added to the test method:

"Since battery characteristics depend on the design and the type of battery chemistry used, this test procedure shall provide the opportunity on the part of the manufacturer/supplier to self-declare the type of battery chemistry used."

**RESPONSE:** *The test procedure already includes language that allows the manufacturer to provide the chemistry of the battery. The definition of "Battery Chemistry", definition F, in the test procedure includes the following note: "The chemistry of the battery is typically printed on the label of the battery itself, can be found in the manufacturer's instructions, or can be obtained from the manufacturer of the battery system."*

*In addition, we purposely formulated the test procedure to take into account the specific characteristics of battery technology. The test procedure currently requires the testing facility to record the battery chemistry. The test procedure also provides multiple provisions for different battery chemistries, including chemistry dependent battery conditioning instructions (Section III A), and end-of-discharge voltages (Section III Table D), which enhance the accuracy of the*

*characterization the battery charger systems, regardless of the battery chemistry.*

**RECOMMENDED ACTION:** *No change*

## **1.2 Comments on scope and requests for clarification**

VI. Base on member feedback, CEA suggest several additional edits to the draft of the test procedure.

### **1.2.1 Role of the manufacturer/supplier:**

Under the “General Scope” section of the draft test procedure, the following sentence should be added: “The manufacture/supplier of the cell, and/or pack, and/or host and/or adaptor shall be responsible for running the test herein.”

**RESPONSE:** *This topic has been addressed by item 4 in Responses to Comments Received on the 5/21/2007 Working Draft Battery Charger Test Procedure, dated December 21, 2007 and posted on the battery charger section of [www.efficientproducts.org](http://www.efficientproducts.org). This test procedure has been written to allow any entity with the proper equipment to conduct the test.*

**RECOMMENDED ACTION:** *No change*

### **1.2.2 Back-up battery charger systems:**

Back-up” battery charger systems should be excluded from the General Scope by adding item 6 to the General Scope...

**RESPONSE:** *The test procedure has been successfully used to test a number of battery backup systems in our laboratory. The test procedure provides adequate instructions to successfully test and characterize battery backup systems. Comments and concerns pertaining to the regulation of certain products go beyond the scope of the test procedure and should be addressed during the standards development process.*

**RECOMMENDED ACTION:** *No change*

### **1.2.3 Battery charger system setup requirements:**

In the “General Setup” section of the “Battery Charger System Setup Requirements” of the test procedure, members are concerned about the following language:

“... the battery charger system shall be prepared and set up in accordance with the manufacturer’s instructions, except where those instructions conflict with the requirements of this test procedure.”

Such language raises concerns since the test may recommend a set up that is not approved by the manufacturer...

**RESPONSE:** *This test procedure has been successfully used to test hundreds of different types of products without manufacturers’ specific instructions or approval. Many manufacturers already make the battery pack accessible, notate the battery terminals, and label the battery with chemistry, voltage, and Ah capacity.*

*Using this basic information and the comprehensive guidance from the test procedure provides enough information to conduct the tests on any product within the scope, regardless of their being additional test-set up instructions from the manufacturer.*

**RECOMMENDED ACTION:** *No change*

#### **1.2.4 Access to the battery for discharge test:**

In the “Access to the Battery for Discharge Test” section of the test procedure, the text states that “manufacturer’s instructions for disassembly shall be followed, except those instructions that: a) lead to any alteration of the battery charger circuitry or function or b) that contradict requirements of this test procedure.” This causes concern since the test may recommend a setup that is not approved by the manufacturer and may be an issue for test personnel safety. It is suggested that this language be rewritten...

**RESPONSE:** *This comment was responded to in a previous round of test procedure revision in late 2007. Changes were made to the test procedure at that time. Specific rationale can be found in item 49, Comments on Access to the Battery, in the Responses to Comments Received on the 5/21/2007 Working Draft Battery Charger Test Procedure, dated December 21, 2007 and posted on the battery charger section of [www.efficientproducts.org](http://www.efficientproducts.org). Accessing the battery pack is not inherently dangerous, for either a technician or the consumer. The test procedure does not require that technicians open battery packs.*

**RECOMMENDED ACTION:** *No change*

Also in the “Access to the Battery for Discharge Test” section, there is language (on page 16) stating that the energy consumed by protective circuitry is not to be measured. Does this mean that the protective circuitry is not considered in energy efficiency? As drafted, this language appears to reject a design with

protective circuitry. It is suggested that the reference to protective circuitry be rewritten as follows:

“The energy consumed by overprotection circuitry is to be measured and documented. Should no overprotection circuitry be included in the design, that fact shall be noted.”

**RESPONSE:** *Good point, the wording is a bit ambiguous and needs to be clarified.*

*Previous comments related to this topic were addressed by item 1.1.4, Access to the Batteries for discharge test, in the “Responses to Battery Charger Test Procedure Comments” document dated June 6th, 2008. The test procedure states (pg 16):*

*“Some products may include protective circuitry between the battery cells and the remainder of the device. If the manufacturer provides a description for accessing the connections at the output of the protective circuitry, these connections shall be used to discharge the battery and measure the discharge energy. The energy consumed by the protective circuitry during discharge is not to be measured.”*

*The clarification needed seems to be associated with the end of the paragraph: “energy consumed by protective circuitry is not to be measured.”*

*Energy consumed by the protective control circuitry during discharge will not be considered in the energy usage calculations. If the protective control circuitry is using energy to protect the battery it will be measured during the charging of the battery*

**RECOMMENDED ACTION:** *The wording should be changed to the following:*

*“Some products may include protective circuitry between the battery cells and the remainder of the device. In some cases, it is possible that the battery cannot be discharged without activating protective control circuitry. If the manufacturer provides a description for accessing connections at the output of the protective circuitry, the energy measurements shall be made at the terminals of the batteries, so as to not include energy used by the protective control circuitry during discharge.”*

In this same section on page 16, the text of the draft test procedure states that the “Battery Discharge Energy and the Charging and Maintenance Mode Efficiency shall be reported as ‘zero’” if the technician is (a) unable to access the battery terminals, (b) determines that access to the battery terminals

destroys the charger functionality, or (c) is unable to draw current from the battery. It is suggested that this language be rewritten as follows:

“The technician shall contact the manufacturer and express his concern if he is unable to access the battery terminals, determine that access to the battery terminals destroys the charger functionality, or is unable to draw current from the battery. Should no remediation be possible, the test shall be stopped.”

**RESPONSE:** *The test procedure already provides a provision to consult the manufacturer before reporting zero on any test. The test procedure states:*

*If the technician, **despite diligent effort and use of the manufacturer's instructions** [emphasis added]:*

- a) is unable to access the battery terminals;*
- b) determines that access to the battery terminals destroys charger functionality; or*
- c) is unable to draw current from the battery*

*then the Battery Discharge Energy and the Charging and Maintenance Mode Efficiency shall be reported as “zero.” The notes on the report shall describe the problems encountered.*

*Manufactures have an interest in ensuring good measurements. Any manufacturer who is concerned that independent test labs may not be able to locate the appropriate internal manufacturer contact can label its batteries clearly and make them easily accessible for testing.*

**RECOMMENDED ACTION:** *No change*

In the “Setup” section of the “No-Battery Mode and Off Mode Tests” portion of the draft test procedure, three categories of products are explained. The characteristics outlined under “Category 1 Products” do not easily match some of today’s current systems. For example, if a portable digital media player uses a battery pack that contains both the charger and the charging circuit, and during the normal use of the product:

1. The battery pack is not disconnected from the main body of the player; and
2. The battery itself is not detachable from the battery pack (removing the battery would be difficult for the customer);

Then would such a product be “Category 1”? This should be explained

**RESPONSE:** This product would fall under Category 1 if there was no external power supply, but rather “only a power cord between the power source and the single housing”. (Section IV.A 1)

This product would fall under Category 3 if: “the charge control circuitry is in the device with the battery and the external “charger” is really a constant-voltage power supply, such as most laptop computers.” (Section IV.A 3 Note)

**RECOMENED ACTION:** We suggest moving the note associated with Category 3 into the main definition to improve clarity.

### 1.2.5 Conflict between “No-Battery Mode” definition and “Category 3 Products” descriptions:

Based the draft test procedure definitions of “No-Battery Mode” (on page 7) and “Category 3 Products,” it is unclear which power consumption should be measured for “no-battery power” as in the following laptop computer scenario...

**RESPONSE:** As stated above, laptops fall under Category 3 products. The note associated with category 3 makes this clear. : “This category applies even if the charge control circuitry is in the device with the battery and the external ‘charger’ is really a constant-voltage power supply, such as most laptop computers.” (Section IV.A 3 Note)

In the scenario described in the comments, the laptop has no “charging base” so the second bullet underneath “Category 3” on page 21 of the test procedure applies:

“If the product does not have a charging base but does have an external charger or an EPS: the product shall be disconnected from the charger or the EPS. The charger or EPS shall be connected to input power.”

Figure 3, given in CEA’s comments is the correct configuration for the test:

Figure 3: Laptop “Category 3 Product” in “No-Battery Mode” (i.e. “no-battery power”)



The test procedure’s definition of no-battery mode states:



*“The state in which the battery charger system is connected to input power, is configured to charge a battery, but there is no battery connected to the charger output.”*

*Note: In this mode the system would begin charging a battery if one were connected.”*

*We agree that the nature of this general definition is inconsistent with the specific configuration required for a category 3 product no-battery mode test.*

**RECOMMENDED ACTION:** We suggest modifying the no-battery mode definition to indicate the specific test set up instructions take precedent over the more general definitions:

*“The state in which the battery charger system is connected to input power, is configured to charge a battery, but there is no battery connected to the charger output.”*

*Note: Under normal operation by the user, the system would begin charging a battery if one were connected. For no-battery mode test setup of specific products, please refer to section IV. A. of the test procedure.”*

#### **1.2.6 Charge Mode and Battery Maintenance Mode test:**

In order to save resources, reduce energy consumption and reduce testing costs, the measurement time for the “Charge Mode and the Battery Maintenance Mode Test” must be shortened. As currently drafted, the test procedure requires UUT measurement for at least 24 hours.

Based on member feedback, CEA requests that the following text be inserted as a new paragraph on page 18 following the paragraph which ends with “power over the measurement period and this result shall be used as the total energy”:

“If, during this test, the technician notices that the measured power becomes constant, the technician can stop this test and estimate the power consumption using the following formula:

If the maintenance power is constant(\*) for one hour or more, then the maintenance power after that period can be judged constant, and the value as calculated by the following formula can be used as the electric energy (Ea) which is consumed for 24 hours on charge and maintenance mode.

Ea = “Measurement value (until stopping the measurement) of electric energy consumed on charge and maintenance mode” + “the maintenance power (average value measuring for 1 hour or more)” x “remaining time until 24 hours pass”

**RESPONSE:** *The energy consumption associated with conducting this test is insignificant compared to the energy use of battery chargers in California. Admittedly, the 24 hour test period is somewhat inconvenient, but because industry-standard equipment automatically records required data at pre-programmed intervals, a technician does not have to be present during the entire period of test. For many chargers there is no clear transition from charge mode to maintenance mode. By using only a 24-hour accumulated energy, we avoid the need to try to identify the transition. This provides a measure that is consistent for chargers with and without distinct modes. This topic has been previously addressed by items 20, 21, 22, Comments on the 24-Hour Test Period and Extended Tests, in the Responses to Comments Received on the 5/21/2007 Working Draft Battery Charger Test Procedure, dated December 21, 2007 and posted on the battery charger section of [www.efficientproducts.org](http://www.efficientproducts.org).*

**RECOMMENDED ACTION:** *No change*

#### **1.2.7 Reference documents in the test procedure:**

To avoid confusion about the meaning of the introductory sentence under “References” in the test procedure (on page 3), CEA recommends adding the following sentence:

“This list is included for informational purposes only, and a manufacturer/supplier is not required to follow the provisions of all of the following reference material to conform to this test method.”

Also in the “References” section of the test procedure, the reference to IEEE 1625 should be corrected as follows:

“IEEE Std 1625™ - 2008, revision of IEEE 1625-2004, IEEE Standard for Rechargeable Batteries for Multi-cell Mobile Computing Devices. The Institute of Electrical and Electronics Engineers, Inc., New York, NY, USA.”

**RESPONSE:** *Agreed.*

**RECOMMENDED ACTION:** *Requisite changes should be made.*

## **2 Response to AHAM’s Wayne Morris’s and PTI’s Robert G. Stoll’s Comments October 13, 2008**

Enumerated below are comments from AHAM and PTI on part 1 of version 2.1.4 of the California battery charger test procedure. Below each comment is a response and recommended action (*in italics*). The changes recommended below will be included in version 2.2 of the test procedure.

Note: The majority of AHAM and PTI's comments concern the validity of calculating energy savings as a function of improved power factor in consumer products, and other policy issues not directly related to the test procedure. One comment is relevant:

## **2.1 Power factor measurement in test procedure**

...As was pointed out by Commissioner Rosenfeld at the recent hearing, the power factor depends on the impedance of the line. Therefore, if one is going to accurately measure the power factor, it is important to use the proper source impedance. Dr. Bendt of Ecos Consulting has constructed a test procedure with no defined source impedance, and thus is unacceptable...

**RESPONSE:** *It is not the intent of the test procedure to precisely define expected field conditions associated with energy use of a battery charger, but rather measure energy use of the battery charger in a repeatable and consistent fashion. AHAM/PTI's proposal models a single battery charger system operating in a house with no other battery chargers or plug loads connected to any wall plug. A more accurate model is to consider a house filled with multiple battery charger systems and numerous other electronic plug loads. Creating a test setup that accurately creates this house model is possible, but makes cost per unit tested unacceptably high. Fortunately, this complicated test setup is unnecessary because this multi-device house model can be created mathematically with data from the current test procedure. It is possible to simply compute the incremental increase in energy consumption when the specific unit under test is added to the house. The test procedure's current measurement of power factor and current crest factor, widely used by power quality experts, affords the Commission the most flexibility as it considers power quality in a future battery charger standard.*

**RECOMMENDED ACTION:** No change