

# California Energy Commission

## FREQUENTLY ASKED QUESTIONS: BATTERY CHARGING SYSTEMS



CALIFORNIA  
ENERGY COMMISSION

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## FREQUENTLY ASKED QUESTIONS: BATTERY CHARGING SYSTEMS

Certifying Battery Charging Systems (BCS) efficiency data involves testing BCS's performance and submitting the data collected to the California Energy Commission (Energy Commission). Once deemed complete by the Energy Commission staff the certified BCS's are listed in the T20 database and can be legally sold or offered for sale in California.

Provided for your convenience is a list of the Frequently Asked Questions (FAQs) related to Battery Charging Systems. The responses to these questions clarify the most common technical questions.

If additional clarification is needed on any of the information contained in this FAQ sheet, please contact the Appliance Efficiency Program of the Energy Commission via e-mail at: [appliances@energy.state.ca.us](mailto:appliances@energy.state.ca.us).

### FREQUENTLY ASKED QUESTIONS

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## General/Other

### 1. What is the battery charger system appliance regulation?

The regulation applies to most electronic systems sold in California that contain battery charging circuits. The regulation applies to commercial and consumer electronic devices which contain battery charging circuits. The scope includes such items as notebook computers, tablets, power tools, electric toothbrushes, shavers, phones, mobile workstations, and Uninterruptible Power Supplies (UPS). Though the US DOE and the ENERGY STAR™ program have related activities, the California regulation is the first of its kind for these devices and is not currently pre-empted by any national or international program requirements.

### 2. What do battery chargers look like?

Battery charger systems are sold in many forms and are a component in many products. The cover page of the Energy Commission's staff report contains a few pictures of battery chargers: <http://www.energy.ca.gov/2011publications/CEC-400-2011-001/CEC-400-2011-001-SF.pdf>

Further the Energy Commission technical primer discusses many of the layouts and form factors battery charger systems have:

[http://www.energy.ca.gov/appliances/battery\\_chargers/documents/reference/1270\\_BatteryChargerTechnicalPrimer\\_FINAL\\_29Sep2006.pdf](http://www.energy.ca.gov/appliances/battery_chargers/documents/reference/1270_BatteryChargerTechnicalPrimer_FINAL_29Sep2006.pdf)

### 3. What are some examples of applications that require battery chargers?

Battery charger systems are typically used in portable equipment for mobility and use in remote areas away from utility power. Battery charger systems are also used as backup power in case of power outages. Products that incorporate battery charger systems include power tools, cell phones, laptop computers, electric shavers, golf carts, etc.

### 4. If a charging system follows USB conventions, with the sole exception of the connector, is it considered to be a USB charger?

To be considered a “USB charger system” a product must be packaged with a 5 volt power supply with a rated output between 5 watts to 15 watts. The product must also only be able to use a USB connector to power the battery charger. To be considered a USB connector at least one end of the cable must be a standard USB connector. The other end of the cable can be proprietary or permanently attached to the power supply.

## **Certification and Effective Dates**

### **5. What is a definition of non-consumer (commercial) product?**

A non-consumer (commercial) product is one that does **NOT** meet the federal definition of “consumer product”. A “consumer product” means any article, other than an automobile, as defined in United States Code Title 49 (49 USC Section 32901(a)(3):

(1) of a type which in operation consumes, or is designed to consume, energy or, with respect to showerheads, faucets, water closets, and urinals, water; and which, to any significant extent, is distributed in commerce for personal use or consumption by individuals;

(2) without regard to whether such article of such type is in fact distributed in commerce for personal use or consumption by an individual, except that such term includes fluorescent lamp ballasts, general service fluorescent lamps, incandescent reflector lamps, showerheads, faucets, water closets, and urinals distributed in commerce for personal or commercial use or consumption.

If your product is sold or offered for sale to the general public in California, then it is likely a consumer product and not a non-consumer (commercial) product.

### **6. Is the effective date for BCS’s for Professional Products that utilize inductive charger systems January 1, 2017?**

January 1, 2017 is the effective date for all non-consumer small battery charger systems whether they are inductive or not. A professional product is a non-consumer product if it does not meet the definition of a consumer product.

### **7. Must the brand-holder register the product & sign the declaration, or can this task be delegated to a supplier?**

A brand-holder can delegate certification responsibilities to a Third Party certifier. However, the listing must correctly show the party who is ultimately responsible for

entering the product into the stream of commerce in California. For more information, visit our website at <http://www.appliances.energy.ca.gov/>

**8. Will the Energy Commission provide a certificate stating that the product meets the requirement after the test reports are received?**

The Energy Commission does not provide a certificate of compliance as the program is a self-certification program. However, products that have been certified successfully to the Energy Commission are acknowledged with an email to the applicant and appear in the Appliance Efficiency database

(<http://www.appliances.energy.ca.gov/QuickSearch.aspx> and/or <http://www.appliances.energy.ca.gov/AdvancedSearch.aspx>). The appliance remains a valid listing until there is reason for it to be deleted or relocated to the historical database.

**9. If the unit uses a wall plug transformer for the charger, is the manufactured date of the charger or of the appliance to be used for the compliance date?**

Potentially a battery charger system could be comprised of three parts with different manufacturing dates: the manufacturing date of the battery, the manufacturing date of the product/charger, and the manufacturing date of the external power supply (EPS). The battery charger system's manufacturing date will be that of the most recent of these three dates that are included together at the point of sale.

**10. How are products manufactured prior to the effective date treated?**

Battery charger systems manufactured before the effective dates outlined in the regulations do not need to meet state energy efficiency requirements and do not need to be certified to the Energy Commission. These products may be legally sold in the state.

**11. How does one register the product and show compliance?**

Certifying an appliance involves testing an appliance's performance through an Energy Commission approved laboratory. The results of testing are used to fill out certification documents and submit products for certification. The Energy Commission staff reviews the submission and uploads the models into the appliance database. Once the appliance appears in the appliance database it is considered certified. Regulated appliances that are not certified cannot be legally sold or offered for sale in California. Certification packets for each type of regulated appliance can be found at:



[http://www.energy.ca.gov/appliances/database/forms\\_instructions\\_cert/](http://www.energy.ca.gov/appliances/database/forms_instructions_cert/)

<http://www.energy.ca.gov/appliances/forms/>

A list of the approved labs is available from the following website:

[http://www.energy.ca.gov/appliances/database/forms\\_instructions\\_cert/approved\\_test\\_laboratories/2012\\_list\\_of\\_approved\\_labs/](http://www.energy.ca.gov/appliances/database/forms_instructions_cert/approved_test_laboratories/2012_list_of_approved_labs/)

## **Enforcement**

### **12. Are all battery chargers required to be certified? What type of market surveillance will be performed?**

Certification: Efficiency standards for battery charger systems were adopted by the Energy Commission on January 12, 2012 with a few exceptions for certain products provided in section 1601(w). Manufacturers of regulated battery charger systems will be required to certify to the Energy Commission that their models meet the requirements of Title 20 by the effective dates specified in the regulations. Upon receipt of BCS certification, the models listed in the certification materials will be listed in the Energy Commission's database of certified appliances, which can be found at: <http://www.appliances.energy.ca.gov/>

Market Surveillance: Under existing California law, regulated appliances that are listed in the database may be lawfully sold or offered for sale anywhere in California. The Energy Commission periodically contracts for appliance market surveys to be performed throughout the state in order to determine which regulated appliances are being sold or offered for sale in California. Enforcement action may be taken if regulated appliance models are identified during the survey as being sold or offered for sale without the requisite certification (i.e., listed in the database). In addition, the Energy Commission learns of noncompliant appliance models through the following means: (a) industry "self-policing", in which manufacturers who've certified their models inform the Energy Commission of other manufacturers who are selling products in California without the requisite certification; (b) notice from other governmental agencies or advocates who bring to our attention violations or discrepancies in reported energy efficiency values of regulated appliance models; and (c) results from the Energy Commission's independent test laboratory, which spot checks regulated appliance models at the direction of the Energy Commission.

**13. Is there a mechanism to request exemptions based on unforeseen technology changes?**

Exemptions: No. Section 1608 of Title 20 has no mechanism for manufacturers to request exemptions from compliance with the requirements of Title 20 based on unforeseen technology changes.

**14. What are the penalties for non-compliance? Are there procedures to address circumstances with the Energy Commission to attain alternate compliance schedules?**

Penalties: Currently, Section 1608 of Title 20 authorizes the Energy Commission to take appropriate action to restrain and discourage the sale or offering for sale of products that fail to meet Title 20 requirements. This includes referring matters to the Attorney General's office for injunctive relief, or for prosecution under the Unfair Practices Act (Business and Profession Code §§17200, 17206). In October of 2011 the Governor signed Senate Bill 454 (Pavley) which authorized the Energy Commission to levy administrative civil penalties of \$2,500 per violation, for violations of Title 20. A rulemaking proceeding to implement this provision was initiated on January 12, 2012 with the Energy Commission's approval of an Order Instituting Rulemaking. For more information please visit the proceeding's webpage: <http://www.energy.ca.gov/appliances/enforcement/>

## Testing

**15. Table 4.1 "Battery Selection for Testing," of the federal test procedure references "lowest voltage battery" and "highest voltage battery." Does this refer to the nominal battery voltage?**

Table 4.1 typically applies to products that do not include batteries. Section 4.3 of the test procedure derives the "lowest voltage battery" and "highest voltage battery" voltages by the battery charger's instructions. If the product does not include instructions the highest and lowest suitable voltage should be selected.

**16. If the external power supply for a product is supplied by multiple vendors, is it acceptable to conduct the battery charger test using only one power supply vendor?**

That is acceptable if the electrical characteristics of each external power supply are similar, particularly in terms of their impact on the battery charger system's efficiency. The use of any EPS that is not efficient enough to ensure that BCS complies with the adopted standards should be discontinued.

**17. Is "Energy Efficiency Battery Charger System Test Procedure Version 2.2 November 12 2008" valid for testing golf cart battery chargers?**

Although similar to the current test method, the test method has in fact changed. Therefore, manufacturers should use the Federal test procedure posted on our website: [http://www.energy.ca.gov/appliances/battery\\_chargers/documents/reference/10CFR430\\_Sub\\_B\\_Apnd\\_Y.pdf](http://www.energy.ca.gov/appliances/battery_chargers/documents/reference/10CFR430_Sub_B_Apnd_Y.pdf)

**18. Is Eb (battery capacity) measured using the discharge test procedure?**

Eb is the battery capacity of the tested battery(s). The methodology for determining Eb is in section 5.8 of the federal test procedure entitled "Battery Discharge Energy Test."

**19. Laptops, cell phones, and similar products have detachable/removable batteries and utilize an external power supply as part the entire BCS. Batteries are not intended to be removed for charging. For these products how is the "no battery" mode measured?**

The no battery mode is measured per section 5.11 of the test procedure. Laptops and cell phones are typically tested per 5.11(b) which states:

*"b. Standby mode may also apply to products with integral batteries. If the product uses a cradle and/or adapter for power conversion and charging, then "disconnecting the battery from the charger" will require disconnection of the end-use product, which contains the batteries. The other enclosures of the battery charging system will remain connected to the main electricity supply, and standby mode power consumption will equal that of the cradle and/or adapter alone."*

This, in many cases, will mean that the no battery mode power is equal to the standby losses of a product's external power supply. Note that this only applies to products with batteries that are not intended to be removed during charging.

**20. Can manufacturers perform their own testing? If not, which laboratories are authorized to perform testing?**

Manufacturers may apply for approval of an in-house test laboratory to perform the prescribed efficiency test. The Energy Commission will accept testing from any laboratories which appears in its list of approved laboratories. For access to the approved list and laboratory applications please visit:

<http://www.energy.ca.gov/appliances/forms/>.

**21. Will a fee be charged by the Energy Commission to approve test laboratories? Exactly what criteria must be met to become an approved test laboratories?**

To become an approved test laboratory, a test laboratory must demonstrate and agree to the following:

1. The test laboratory has conducted tests using the applicable test method within the previous 12 months;
2. The test laboratory agrees to using the applicable test method set forth in Section 1604 precisely as written;
3. The test laboratory has, and keeps properly calibrated and maintained, all equipment, material, and facilities necessary to apply the applicable test method precisely as written;
4. The test laboratory agrees to and does maintain copies of all test reports, and provides any such report to the Executive Director upon request, for all basic models that are still in commercial production; and
5. The test laboratory agrees to and does allow the Executive Director to witness any test of such an appliance on request, up to once per calendar year for each basic model.

If a test laboratory has not previously conducted the test for battery chargers then it must conduct the test at least once prior to applying for approval. There is no fee for applying for or receiving approval. To apply to become an approved test lab, please go to <http://www.energy.ca.gov/appliances/forms/>.

**22. Our product is capable of charging a large variety of battery types, and various sizes of battery banks, depending upon the programming of the unit. How many different sizes and brands of battery are we required to test?**

For small BCS this is determined using table 4.1 of the test procedure. When certifying the product, CCR section 1604(w)(1)(B) determines which results to report to the Energy Commission. For large battery charger systems, CCR section 1604(w)(2)(A) determines which battery and charge profile is selected to test and report for compliance.

- 23. For products that do not have switches or easily accessible connectors/cables to disconnect or disable the non-charging functions, can the manufacturer develop procedures to disassemble the product and disconnect physical connection(s) unrelated to charging prior to testing and provide instructions to the technician about how to perform these modifications?**

For small battery charger systems the instructions must be provided to end-users in general per 4.4(b) of the federal test procedure. Further the federal test procedure allows additional functions to be “switched off” or set into a mode of low power, but not physically disassembled or cut. Connectors may only be removed if they are physically separate from the battery charger system per 4.4(c).

- 24. Are optional or recommended batteries and AC adapters not packaged with the end use product required to be tested?**

For small battery charger systems the selection of batteries for testing is described by section 4.3 of the federal test procedure. 4.3(a)(1) states that if batteries are included with the battery charger system, those batteries are used for testing. [If batteries are not included “recommended batteries” are used per table 4.1.] Section 3.4 of the test procedure provides guidance on which, if any, external power supplies (AC adaptors) should be tested.

- 25. My product has battery control circuitry that prevents discharge to the values shown in table 5.2. How do I test my product?**

Section 5.8(c)(3) specifies that during testing the energy of the battery shall be measured when either the end of discharge voltage is reached OR when the unit under the test circuitry terminates the discharge.

- 26. Exactly what information and test data must be submitted to the Energy Commission, and when will the templates for the energy efficiency submission forms be available?**

The battery charger system specific data was adopted as part of the battery charger system rulemaking and can be found in Table X of the 15-day language: <http://www.energy.ca.gov/2011publications/CEC-400-2011-005/CEC-400-2011-005-15-DAY.pdf> see pages 19 and 20. The submission forms will be ready prior to the effective date, the forms will be posted on the website, a notification will be sent through the appliances listserv, and this FAQ will be updated. Typically the Energy Commission

posts the certification forms for a new standard 3 months prior to the effective date of the standard. In this case the Energy Commission is targeting posting the forms as soon as August 2012.

**27. Will a fee be charged by the Energy Commission to approve a test lab?**

There are no fees associated with laboratory approval.

**28. Is an external power supply considered to be part of the battery charging system?**

Guidance related to external power supplies is provided in the test procedure section 3.4. The Energy Commission uses the results from this test procedure to determine product compliance of small battery charger systems with the adopted standards.

**29. Are the losses of an external power supply measured for USB charged devices?**

Section 3.4(c) of the federal test procedure addresses this issue. It states that if an external power supply is not provided with, or optionally available for product being tested, then the losses are measured from a DC input rather than an standard AC input.

## **Standard**

**30. When will a finalized copy of the battery charger regulations be available without underline and strikeout?**

The adopted regulations are currently online and available here:

<http://www.energy.ca.gov/2011publications/CEC-400-2011-005/CEC-400-2011-005-15-DAY.pdf>

Eventually a copy without underline and strikeout will be made available. When this document is published a notification will be sent through the appliances list serve. To sign up for the list serve please visit <http://www.energy.ca.gov/listservers/index.html>

**31. What equations are used for small battery charger systems for calculating 24-hour charge and maintenance mode limits, and for maintenance and no battery mode limits?**

The equations for calculating battery charger system standard limits are available in section 1605.3(w) of the regulations. In these equations  $E_b$  is battery energy needed in watt-hours.  $N$  is the number of separately controlled charging ports.

$$P_{\text{maintenance}}(\text{watts}) + P_{\text{no battery}}(\text{watts}) \leq 1 \left( \frac{\text{watt}}{\text{port}} \right) \times N(\text{ports}) + 0.0021 \left( \frac{\text{watts}}{\text{watt hour}} \right) \times E_b(\text{watt hours})$$

24 hour charge and maintenance energy [Watt-hours] must be = or < 12 [Watt-hours/port] x N [ports] + 1.6 [Watt-hours/Watt-hour] x  $E_b$  [watt- hours]

$$E_{24}(\text{watt hours}) \leq 12 \left( \frac{\text{watt hours}}{\text{Port}} \right) \times N(\text{Ports}) + 1.6 \left( \frac{\text{Watt hours}}{\text{watt hour}} \right) \times E_b(\text{watt hours})$$

The unit Watt/watt-hour represents a scaling factor for power needed based on the capacity of a battery. The unit watt-hour/watt-hour is really an efficiency ratio of watt-hours used/watt-hours stored. This equation varies depending on the battery capacity, please refer to Table W-2 in the standards for the equation appropriate for your product's battery capacity.

Here are example calculations for a single-port battery charger system with a battery capacity of 10 watt-hours.

$$P_{\text{maintenance}}(\text{watts}) + P_{\text{no battery}}(\text{watts}) \leq 1 \times 1 + 0.0021 \times 10$$

$$P_{\text{maintenance}}(\text{watts}) + P_{\text{no battery}}(\text{watts}) \leq 1 + 0.021$$

$$P_{\text{maintenance}}(\text{watts}) + P_{\text{no battery}}(\text{watts}) \leq 1.021 (\text{watts})$$

$$E_{24}(\text{watt hours}) \leq 12 \times 1 + 1.6 \times 10$$

$$E_{24}(\text{watt hours}) \leq 12 + 16$$

$$E_{24}(\text{watt hours}) \leq 28 \text{ watt hours}$$

### 32. Are there allowances for features that are not related to battery charging?

No. There are no feature specific adders. The regulation does allow compliance testing under test modes that isolate the battery charging and maintenance. These test modes

must be accessible to an end user, but the test mode does NOT have to be the factory default. Access to this mode must be accessible to third party testing entities.

## What's covered?

### 33. Do loosely-coupled inductive chargers fall under the scope of the regulation?

Some do and some do not. The Energy Commission's standards only cover battery charger **systems**. A battery charger system always incorporates charging circuitry. An electric toothbrush sold together with an inductive base station would fall under the scope of the regulation. However an inductive base station, sold separately, and which could not directly charge a battery without additional charging circuitry, is not covered.

See the Energy Commission, January 21, 2012 Business Meeting Transcript at Page 121, available at [http://www.energy.ca.gov/business\\_meetings/2012\\_transcripts/2012-01-12\\_transcript.pdf](http://www.energy.ca.gov/business_meetings/2012_transcripts/2012-01-12_transcript.pdf).

### 34. Do the Energy Commission's battery charging regulations cover battery charging and back-up battery power equipment that provides power to communications, telecommunications, video, broadband and/or other information services and equipment employed by service or network providers, whether within their networks or on customer premises?

Communications, telecommunications, video, broadband, information services, and the location of the installation are not factors used to determine if a back-up battery charger system is within the scope of the regulations.

### 35. Voice Over Internet Protocol (VoIP) modems use power mainly for active voice and data services. Optional Lithium-Ion (Li-Ion) battery packs, acting as an uninterrupted power supply (UPS) are a minor power draw. Do the requirements for BCS's apply?

The regulations do not cover products based upon end-use except for as shown defined in section 1601(w) of the regulations. While this section of the regulation does provide some exemptions for UPS it does not provide any VoIP specific exemptions.



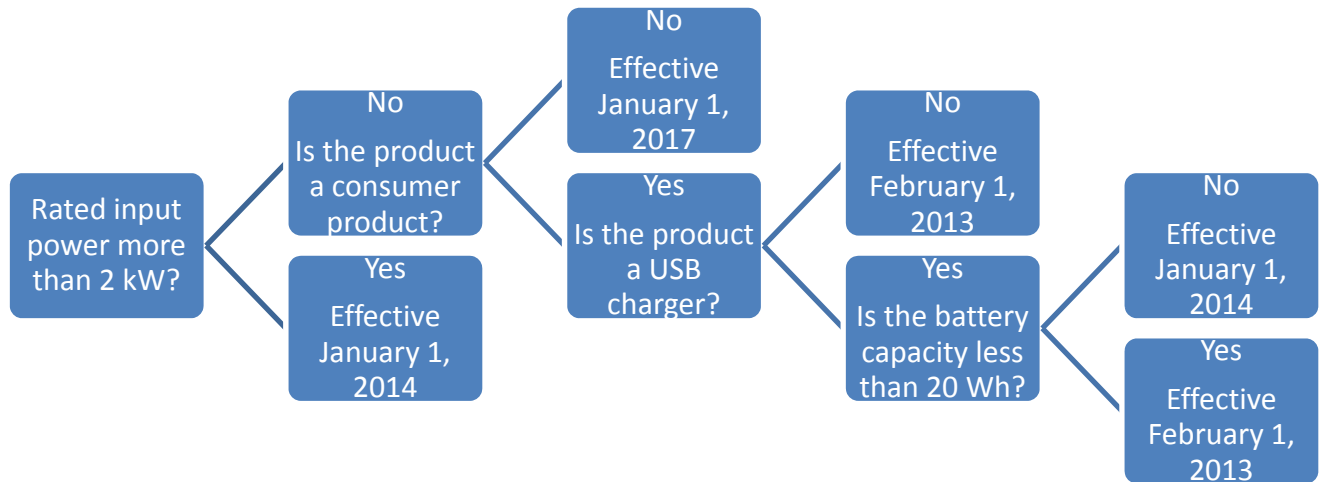
**36. Do illuminated exit signs that are integrated with egress lighting need to comply with the battery charger system standard?**

No, these systems are out of the scope of battery charger system regulations per section 1601(w)(3) of the adopted regulations.

**37. There are published efficiency limits for less than 2.5Wh and for 2.5Wh to 100Wh, but under Small Battery Charger Systems, it appears that only roll-in dates exist for systems over 20Wh. Are battery charger systems under 20Wh not regulated?**

The battery capacity does **not** determine whether the battery charger system is covered or not. The battery capacity of a small battery charger system determines its maximum “24 hour charge and maintenance energy” and its maximum “maintenance mode power and no battery mode power.” Further the battery capacity determines the compliance date for **USB charger systems**. More specifically USB charger systems with a battery capacity of 20 Wh or less and are manufactured on or after February 1, 2013 must comply with the regulations. USB charger systems with battery capacity of greater than 20 Wh do not need to comply with the regulations until January 1, 2014.

**Effective Date Decision Tree**



**38. Are “non-smart” Notebook Battery Chargers systems included in this regulation?**

Battery charger systems are covered unless specifically addressed in section 1601(w) as an exception.

**39. Are golf cart chargers categorized as Small Battery Chargers?**

Yes, golf cart chargers are considered small battery charger systems.

**40. Do BCS rules include products that can operate via power from the main power grid AND alternatively via power from a rechargeable battery?**

The adopted regulations cover all battery charger systems except those designated as exceptions in 1601(w). The ability to power a product using the main power grid is not a factor in determining whether a product is covered or not.

**41. Are BCSs with battery capacities smaller than 20 watt-hours included in the regulations?**

Yes. 20 watt-hour battery capacity is used to define a compliance date threshold for USB charger systems in 1605.3(w)(2)(A) and 1605.3(w)(2)(B). This language creates an exception in compliance date, but not in the scope of the regulations.

## Labeling and Marking

### 42. Is an existing Regulatory Label equivalent to the “Product Nameplate” for marking purposes?

The product nameplate is any permanently affixed label that contains the product’s model number.

### 43. What are the requirements for the product mark, if the product packaging is marked and there are only electronic instructions included?

The regulations require that “if included, the cover page of the instructions” be marked with a “BC” inside a circle. If the included instructions are on paper, the cover page of the paper instructions must bear the mark. If the included instructions are digital, the cover page of the digital instructions must bear the mark.

### 44. Is the circled “BC” mark required for USB-charged systems?

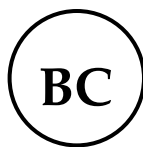
The labeling and marking requirements apply to all products that are within the scope of the adopted regulations.

### 45. Assuming systems under 20Wh are unregulated, is the circled “BC” mark required?

Battery charger systems under 20Wh are regulated, and the circled “BC” marking or labeling is required.

### 46. What requirements are there for the “BC” marking, specifically is there a size and color?

The requirements are that the marking be legible and permanently affixed. No specific size, font, or color are required so long as the marking is legible. An example of an acceptable mark is shown below:



**47. Product nameplates are located on the back side and are not normally visible to users. Is there a visibility requirement for placement of the marking?**

The “BC” marking only requires placement on the nameplate, wherever it may be. However there are separate requirements for all regulated appliances contained in 1607(b) which designate the requirements for the nameplate itself and states: “Except as provided in Section 1607(c), the following information shall be permanently, legibly, and conspicuously displayed on an accessible place on each unit:

(1) manufacturer’s name or brand name or trademark (which shall be either the name, brand, or trademark of the listed manufacturer specified pursuant to Section 1606(a)(2)(A) or, if applicable, the designated manufacturer specified pursuant to Section 1606(f)(1)(F));”

**48. We sell many products and product types that are not available through traditional retail outlets. Would the product package be required to be marked (provided that the nameplate isn’t marked) on products that are not sold in retail?**

Per 1607(d)(12) battery charger systems must comply by including a “BC” inside of a circle. This symbol can be placed on one of two locations: the product nameplate that houses the charging terminals per 1607(d)(12)(a) or on the retail packaging and, if included, the cover page of the instructions per 1607(d)(12)(b). If a manufacturer does not have retail packaging, then they must comply with 1607(d)(12)(a).

Some manufacturers were unsure if their packaging was “retail packaging” or not. The term retail packaging encompasses all packaging used to describe the product enclosed to an end user.

**49. Retail can be taken to mean as sold for home use. Would the marking requirement be applicable to products that are sold for business use, or for use in enterprise data centers?**

The word retail does not differentiate between business and home use, therefore the marking requirement would be applicable regardless of the type of consumer.