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15 July 2011

RE: Docket Number 09-AAER-2, 2010 Rulemaking Proceeding Phase II on Appliance Efficiency Regulations

Dear California Energy Commission,

Thank you for this opportunity to contribute to your rulemaking process. We apologize for the lateness of this response and regret that Delta-Q Technologies Corp. could not attend the public meeting in May. Delta-Q's comments on your Draft Proposed Amendments to the Appliance Efficiency Regulations are below.

For some background, Delta-Q Technologies Corp. is a supplier of battery chargers and other power conversion technologies to commercial and industrial applications. Delta-Q's customers include manufacturers of golf carts, floor care equipment, consumer powersports, and automotive products. We are a high volume manufacturer of high-frequency battery chargers and have significant market share in various industrial markets.

As a company concerned with environmental impact of technologies, Delta-Q is pleased to see the progress of energy efficiency regulations and would like to offer the following feedback on your proposed standards as it relates to the > 1000Wh battery and 500W – 1500W charger class.

1. The Charge Return Factor (Crf) should be widened to <= 1.20 for all Depths of Discharge

In our testing history, we typically see flooded lead-acid battery manufacturers request between 110 and 115% overcharge to fully recharge their batteries. When batteries are new and still "forming" their capacity, this factor may be even higher than that. As this testing would be done on new batteries, we suggest it would be fair to change the Crf limit to 1.20. This provides enough overhead for batteries to be properly charged while still restricting chargers that may be applying too much energy or are simply "trickle" charging batteries.

Additionally, the Crf is a measure of the battery charger's response to the battery's needs and should not limit a charger's ability to properly restore a battery's health. If a battery is consistently undercharged in order to comply with a Crf < 1.10 standard, incidence of Lead-Acid battery failure may rise and cause more energy expenditure than the standard is designed to reduce.

Delta-Q discharge/charge data is appended below with Crf factors calculated for four different brands of Flooded Lead-Acid batteries on two different types of chargers.

2. The 122 + 1.4Eb standard for >1000Wh systems should be increased to 122 + 1.6Eb.

From the Delta-Q test database, a sample of charges shows that before taking the charger efficiency into account, the battery energy return factors already vary from 1.25Eb to 1.5Eb. This means that a battery charger would have to be between 90% and 107% efficient in order to meet the 1.4Eb standard. Currently, efficiencies above 93% are the maximum technology in this field.

In the attached data, the Delta-Q chargers, operating at the higher technology level of 90% (which complies with the "Large Battery Charger" efficiency standard), still fails to consistently achieve the 1.4Eb level, even on later cycles.

The variability of the battery itself must be taken into account for this standard. As such, Delta-Q believes that raising the energy limit for this class to 1.6Eb will allow for fluctuations in lead-acid battery demand during its first few cycles while ensuring that battery chargers are minimizing energy waste.

3. Equivalency with DOE and/or EPA labelling and testing should be considered

In order to minimize costs and continue to bring the most efficient products to consumers for the lowest price, the CEC should consider creating an equivalency program with upcoming DOE and EPA Battery Charger standards.
Complying with redundant standards for product labelling and testing comes at a considerable cost, and ultimately may harm smaller manufacturers and increase consumer prices.
Such inefficiencies may also cause unnecessary expenditure of energy which is the primary goal of these initiatives.

Delta-Q commends the CEC for taking the steps to make battery chargers more efficient and helping to create a better world for everyone. We hope these comments are valuable. The sample data referenced above is included below.

Sincerely,

Conway Hui, P.Eng.
Senior Sales Application Engineer
Delta-Q Technologies Corp.

Attachments follow

Delta-Q 36V Battery Charger Efficiency Sample Data

The data below is a summary of selected data sampled from Delta-Q's battery test database. This data is specifically selected for comparison with the current Battery Charger Test Procedures. All battery data is taken from the first full discharge and recharge following initial receipt of the batteries. All batteries are GC2 class at approximately 225Ah C/20 rate. In some cases a later charge cycle is used to illustrate the approximate trend of that battery pack later in the cycling.

General data for the chargers used is also listed. Items are marked in red or blue to indicate compliance with proposed California Energy Commission standards.

QuiQ 36V specs:

Average Efficiency (120VAC)	90%
No Load Draw (AC)	7W
Power Factor	0.99

Battery #1 (EVF)

	Cycle 1	**Cycle 2**	**Cycle 6**
Eb (Wh)	2817.8	2822.6	2659.4
Charge Energy (Wh)	3683.9	3472.1	3756.2
Input Energy @90%	4093.2	3857.9	4173.6
Charge Time (h)	9.71	9.45	10.74
24h Charge & Maint Energy	100.0+1.45Eb	101.9+1.37Eb	92.82+1.57Eb
Ah Out	123.2	121.9	115.2
Ah In	138.2	130.1	138.2
Crf	1.12	1.067 (incomplete)	1.20

Battery #2 (US2200XC)

	Cycle 1	**Cycle 2**	**Cycle 6**
Eb (Wh)	3608.2	3599.3	3803.5
Charge Energy (Wh)	5463.3	5086.2	5272.8
Input Energy @90%	6070.3	5651.3	5858.7
Charge Time (h)	11.34	9.9	10.9
24h Charge & Maint Energy	88.6+1.68Eb	98.7+1.57Eb	91.7+1.54Eb
Ah Out	106.8	106.2	112.0
Ah In	133.2	125.2	129.8
Crf	1.25	1.18	1.16

Powerwise QE 36V specs:

Average Efficiency (120VAC)	90%
No Load Draw (AC)	0W
Power Factor	0.98

Battery #3 (US2200 – QDP)

	Cycle 1	**Cycle 2**	**Cycle 6**
Eb (Wh)	4032.4	4544.0	5044.2
Charge Energy (Wh)	5441.2	5751.2	6378.9

Input Energy @90%	6045.8	6390.2	7086.7
Charge Time (h)	11.95	12.51	12.44
24h Charge & Maint Energy	0 + 1.50Eb	0 + 1.41Eb	0 + 1.40Eb
Ah Out	116.2	130.8	143.5
Ah In	135.6	144.2	160.4
Crf	1.17	1.10	1.12

Battery #4 (T-105 - QDP)

	Cycle 1	**Cycle 2**	**Cycle 20**
Eb (Wh)	3935.6	4064.3	4752.3
Charge Energy (Wh)	5406.4	5249.0	6037.3
Input Energy @90%	6007.11	5832.22	6708.1
Charge Time (h)	10.29	9.97	10.9
24h Charge & Maint Energy	0 + 1.53Eb	0 + 1.44Eb	0 + 1.41Eb
Ah Out	114.7	117.2	138.2
Ah In	133.3	130.1	150.2
Crf	1.16	1.11	1.087