

## MEMORANDUM



To: Jenn Monnet, SF Environment  
 From: Alicia Culver, Responsible Purchasing Network  
 Re: Updated information on the Performance of Rechargeable Batteries  
 Date: October 1, 2021

### AA Rechargeable Batteries (August 2022 Update)

Brand	Product Name	Power Rating Capacity in milli-Amp-hours (mAh)	Low Self-Discharge (LSD) Claim	# of Times Battery can be Recharged (Lifecycles)
<b>Products That Meet Specification (Minimum 2300 mAh Power Rating)</b>				
EBL	<a href="#">High-Performance (1.5V) AA Ni-MH Rechargeable Batteries</a>	2800	Low Self Discharge: Holds 80% of its charge after 3 years.	1200
EBL	<a href="#">Ready2Charge AA Ni-MH Rechargeable Batteries (1.2V)</a>	2800	Low Self Discharge: Holds 75% of its charge after 3 years.	1200
HiQuick	<a href="#">2800 mAh AA Rechargeable Batteries High Capacity Performance</a>	2800	HiQuick batteries can keep 80% power after 2-3 years of non-use	1200
X2Power	<a href="#">Rechargeable AA Batteries (X2PAA)</a>	2700	Memory-free operation results in the battery holding a stronger charge (this is a vague claim)	1000
Maha Energy	<a href="#">Powerex Pro MHR44Pro Rechargeable NiMH Batteries</a>	2700	Retain up to 75% of charge after 1 year of storage	500
AA Portable Power Corp.	<a href="#">Powerizer AA Rechargeable Batteries</a>	2600	Maintain 80% of capacity for 6 months	500
Tenergy	<a href="#">Premium AA Rechargeable Batteries</a>	2500	Retain 85% capacity after 1 year in storage	1200
Panasonic	<a href="#">Eneloop Pro AA High Capacity New Ni-MH Pre-Charged Rechargeable Batteries (Black label)</a>	2500	Self-Discharge: 85% after 1 year	500
Nuon	<a href="#">AA NiMH Rechargeable Batteries (NUREAA)</a>	2500	Labeled Pre-charged but not low self-discharge	500
<a href="#">Duracell*</a>	<a href="#">Rechargeable AA 2500 mAh Batteries</a>	2500	Retain up to 80 percent of their charge for up to 12 months when not in use	400 (1500) <sup>1</sup>
PowerEx	<a href="#">Imedion Low-Self-Discharge AA 2400 mAh Rechargeable Batteries</a>	2400	After a year, they will retain 85% of their capacity	1000
Amazon Basics	<a href="#">AA High-Capacity Pre-charged Rechargeable Batteries</a>	2400	Maintain 70% capacity for 6 months and 50% capacity for 12 months	"Can be recharged hundreds of times"
<a href="#">Energizer*</a>	<a href="#">Recharge Power Plus AA4 Rechargeable Batteries</a> (has 4% recycled content)	2300	Charge lasts up to 12 months when not in use	1500

\*Grainger says this product can be recharged 1500 times. Duracell says this product is guaranteed to last 3 years or up to 400 charges.

Brand	Product Name	Power Rating Capacity in milli-Amp-hours (mAh)	Low Self-Discharge (LSD) Claim	# of Times Battery can be Recharged (Lifecycles)
<b>Products That Do Not Meet Specification</b>				
Tenergy	<a href="#">Centura Low Self-Discharge AA Nickel-Metal Hydride Rechargeable Batteries</a>	<b>2000</b>	Very slow self-discharge; maintain 85% capacity after 1 year of storage	2100
Amazon Basics	<a href="#">AA Rechargeable Batteries</a>	<b>2000</b>	Maintain 80% capacity for 24 months	Can be recharged 1000 times with minimal power loss
Energizer	<a href="#">Recharge Universal AA Batteries</a>	<b>2000</b>	Charge lasts up to 12 months in storage	1000
Panasonic	<a href="#">Eneloop AA New 2100 Cycle Rechargeable Batteries (White Label)</a>	<b>1900</b>	Self-Discharge: 70% after 10 years	2100
<a href="#">Rayovac*</a>	<a href="#">Recharge Rechargeable Batteries</a>	<b>1350</b>	Maintain 60% of its charge for 12 months	1500
Panasonic	<a href="#">Eneloop Lite AA Rechargeable Batteries (Blue Label)</a>	<b>950</b>	Low Self-Discharge: 70% after 5 years	3000

\*Duracell Recharge, Energizer Recharge Power Plus, and Rayovac Recharge AA rechargeable batteries are listed on Grainger.com. The Duracell line of rechargeable batteries is also available on StaplesAdvantage.com.

This information is an update for the SF Environment-RPN report, *Charging Ahead: How to Find Powerful Rechargeable Batteries that Go on and on...an on* (2016); see [https://www.sfapproved.org/sites/default/files/files/general-files/sfa\\_rpn\\_charging\\_ahead\\_july2016.pdf](https://www.sfapproved.org/sites/default/files/files/general-files/sfa_rpn_charging_ahead_july2016.pdf). The 2016 report set a minimum power rating of 2000 mAh. There have been improvements in the power rating of several AA rechargeable battery products since this report was published five years ago. Therefore, the specification can be revised accordingly.

#### **RPN's recommended specifications for AA Rechargeable Batteries:**

- All rechargeable batteries offered on this contract shall use nickel metal hydride (NiMH) technology; and
- The minimum power rating for AA rechargeable batteries is 2300 mAh

#### **Resources:**

- "The Best Rechargeable Batteries: AA, AAA and 9V," Digital Trends Magazine, March 24, 2021; [digitaltrends.com/home/best-rechargeable-batteries/](https://www.digitaltrends.com/home/best-rechargeable-batteries/)
- "The Best Rechargeable AA and AAA Batteries," *Wirecutter, New York Times*, May 10, 2021; <https://www.nytimes.com/wirecutter/reviews/best-rechargeable-batteries/>
- The Best Rechargeable Batteries of 2021, Tree Hugger, 2021; <https://www.treehugger.com/best-rechargeable-batteries-5074454>

### AAA Rechargeable Batteries (August 2022 Update)

Brand	Product Name	Power Rating Capacity in milli-Amp-hours (mAh)	Low Self-Discharge (LSD) Claim	# of Times Battery can be Recharged (Lifecycles)
<b>Products That Meet Specification (Minimum 800 mAh Power Rating)</b>				
EBL	<a href="#">High-Capacity AAA Rechargeable Batteries</a>	<b>1100</b>	Keep about 80% battery energy for 2 years' storage due to the super low self discharge.	1200
HiQuick	<a href="#">1100 mAh AAA Rechargeable Batteries</a>	<b>1100</b>	Low self discharge: maintain 80% capacity for 24 months.	1200
Tenergy	<a href="#">Premium Pro AAA Rechargeable Batteries</a>	<b>1100</b>	Ultra low self-discharge: retain 85% after one year in storage	1200
Maha Energy	<a href="#">Powerex Precharged NiMH AAA Rechargeable Batteries</a>	<b>1000</b>	Retain up to 85% of charge after 1 year of storage	1000
Panasonic	<a href="#">Eneloop Pro AAA Rechargeable Batteries</a>	<b>930</b>	Low Self Discharge: 85% for up to 1 year	500
Amazon	<a href="#">Amazon Basics High Capacity 850 mAh AAA Rechargeable Batteries</a>	<b>850</b>	Low Self Discharge: Maintain 80% capacity for 24 months	500
Duracell	<a href="#">Duracell AAA Rechargeable Batteries</a>	<b>850</b>	Will hold a charge for up to 1 year when not in use.	400
Tenergy	<a href="#">Tenergy Centura NiMH AAA Rechargeable Batteries</a>	<b>800</b>	Retain 85% after one year in storage	2100
EBL	<a href="#">EBL 800 mAh AAA Rechargeable Batteries</a>	<b>800</b>	Maintain 75% capacity when they are not in use for 3 years.	1200
Amazon	<a href="#">Amazon Basics 800 mAh Performance AAA Rechargeable Batteries</a>	<b>800</b>	Low Self Discharge: Maintain 80% capacity for 24 months	1000
<b>Products That Do Not Meet Specification</b>				
Panasonic	<a href="#">Eneloop AAA Rechargeable Batteries</a>	<b>750</b>	Retain 70% capacity even after 10 years in storage.	600
Energizer	<a href="#">Energizer Recharge Power Plus AAA Rechargeable Batteries</a> (Has 15% recycled content)	<b>700</b>	Charge lasts up to 12 months in storage.	700
Rayovac	<a href="#">Rayovac Recharge AAA Batteries</a>	<b>600</b>	No LSD claim	1200
Panasonic	<a href="#">Eneloop Lite AAA Rechargeable Batteries</a>	<b>550</b>	Retains 70% capacity after 5 years in storage	1000

**RPN's new recommended minimum power rating for AAA rechargeable batteries is 800 mAh.**

(Note: This disqualifies Energizer and Rayovac AAA rechargeable batteries, which sometimes show up on government contracts.)

### Resources:

- “The Best Rechargeable AA and AAA Batteries,” *Wirecutter, New York Times*, May 10, 2021; <https://www.nytimes.com/wirecutter/reviews/best-rechargeable-batteries/#our-picks-for-the-best-aaa-rechargeable-battery-brands>.

### C Rechargeable Batteries (August 2022 Update)

Brand	Product Name	Power Rating Capacity in milli-Amp-hours (mAh)	Low Self-Discharge (LSD) Claim	# of Times Battery can be Recharged (Lifecycles)
<b>Products That Meet Specification (Minimum 5000 mAh Power Rating)</b>				
X2Power	<a href="#">X2Power Rechargeable C Nickel Metal Hydride Batteries</a>	<b>5500</b>	No LSD claim	“Hundreds of times”
EBL	<a href="#">EBL C Size NiMH Rechargeable Batteries</a>	<b>5000</b>	Retain 85% after one year in storage	1200
HiQuick	<a href="#">HiQuick Rechargeable C Batteries</a>	<b>5000</b>	Maintain 75% of capacity after 24 months of non-use	1200
Tenergy	<a href="#">Tenergy Premium C NiMH Rechargeable Batteries</a>	<b>5000</b>	No LSD claim.	1200
Amazon Basics	<a href="#">Amazon Basics 4-Pack C Cell Rechargeable Batteries, 1.2V (5000mAh Ni-MH), Pre-charged</a>	<b>5000</b>	Maintain 80% capacity for 24 months	1000
Maha Energy	<a href="#">Powerex Precharged C Rechargeable Batteries</a>	<b>5000</b>	Retain 85% after one year in storage	1000
Tenergy	<a href="#">Tenergy C NiMH Rechargeable Batteries</a>	<b>5000</b>	No LSD claim	N/A
<b>Products That Do Not Meet Specification</b>				
Tenergy	<a href="#">Tenergy Centura NiMH C Rechargeable Batteries</a>	<b>4000</b>	Retain 85% after one year in storage	2100
Nuon	<a href="#">Nuon C Nickel Metal Hydride Rechargeable Batteries</a>	<b>4000</b>	No LSD claim	500
Energizer	<a href="#">Energizer Recharge C Rechargeable Batteries</a>	<b>2500</b>	No LSD claim	“Hundreds of times”

**RPN’s recommended minimum power rating for C cell rechargeable batteries is 5000 mAh.**

(Note: This disqualifies Energizer C rechargeable batteries, which sometimes show up on government contracts.)

## D Rechargeable Batteries (August 2022 Update)

Brand	Product Name	Power Rating Capacity in milli-Amp-hours (mAh)	Low Self-Discharge (LSD) Claim	# of Times Battery can be Recharged (Lifecycles)
<b>Products That Meet Specification (Minimum 10,000 mAh Power Rating)</b>				
X2 Power	<a href="#">X2Power Rechargeable D Nickel Metal Hydride Batteries</a>	<b>12000</b>	No LSD claim	“Hundreds of times”
EBL	<a href="#">10000mAh D Type Rechargeable Batteries</a>	<b>10000</b>	About 75% when are in use for 3 years	1200
HiQuick	<a href="#">10000 mAh D Rechargeable Batteries</a>	<b>10000</b>	Maintains 75% of capacity after 24 months of non-use	1200
RayHom	<a href="#">RayHom Rechargeable D Batteries 10,000mAh 1.2V Ni-MH High Capacity High Rate</a>	<b>10000</b>	Retains up to 85% of charge after 1 year of storage	1200
Tenergy	<a href="#">Tenergy Premium D NiMH Rechargeable Batteries</a>	<b>10000</b>	Retains 85% after one year in storage	1200
Amazon Basics	<a href="#">Amazon Basics 4-Pack D Cell Rechargeable Batteries, 10000mAh Ni-MH, Pre-charged</a>	<b>10000</b>	Maintains 80% capacity for 24 months	1000
Maha Energy	<a href="#">Powerex Precharged D Rechargeable Batteries</a>	<b>10000</b>	Retains up to 85% of charge after 1 year of storage	1000
Tenergy	<a href="#">Tenergy D NiMH Rechargeable Batteries</a>	<b>10000</b>	Retains 85% after one year in storage	No info
<b>Products That Do Not Meet Specification</b>				
Tenergy	<a href="#">Centura NiMH D Rechargeable Batteries</a>	<b>8000</b>	Retains 85% after one year in storage	2100
Tenergy	<a href="#">Centura Lite NiMH D Rechargeable Batteries</a>	<b>3000</b>	Retains 85% after one year in storage	2100
Nuon	<a href="#">Nuon D Rechargeable Battery</a>	<b>3000</b>	No LSD claim	500
Energizer	<a href="#">Energizer Recharge D Rechargeable Batteries</a>	<b>2500</b>	No info	“Hundreds of times”

**RPN’s new recommended minimum power rating for D cell rechargeable batteries. is 10000 mAh.**

(Note: This disqualifies Energizer D cell rechargeable batteries, which sometimes show up on government contracts.)

### 9V Rechargeable Batteries (August 2022 Update)

Brand	Product Name	Power Rating Capacity in milli-Amp-hours (mAh)	Low Self-Discharge (LSD) Claim	# of Times Battery can be Recharged (Lifecycles)
EBL	<a href="#">EBL Rechargeable 9V NiMH Batteries Low Self-Discharge Long Life</a>	<b>280</b>	About 75% when are in use for 3 years	1200
Tenergy	<a href="#">Tenergy Premium 9V NiMH Rechargeable Batteries</a>	<b>250</b>	No LSD claim	1200
Tenergy	<a href="#">Tenergy 9V NiMH Rechargeable Batteries</a>	<b>250</b>	No LSD claim	No info
Maha Energy	<a href="#">Powerex Precharged 9.6V Rechargeable Batteries</a>	<b>230</b>	Retain 85% after one year in storage	1000
X2Power	<a href="#">X2Power 9.6V 9V, 6LR61 Nickel Metal Hydride Rechargeable Battery</a>	<b>230</b>	No LSD claim	“Hundreds of times”
Nuon	<a href="#">Nuon 9V Nickel Metal Hydride Rechargeable Batteries</a>	<b>220</b>	No LSD claim	“Hundreds of times”
Amazon Basics	<a href="#">Amazon Basics 4-Pack 9 Volt Cell Rechargeable Batteries, 200mAh Ni-MH, Pre-charged</a>	<b>200</b>	Maintain 80% capacity for 24 months	1000
Tenergy	<a href="#">Tenergy Centura NiMH 9V Low Self Discharge Rechargeable Batteries</a>	<b>200</b>	Retain 85% after one year in storage	2100
Energizer	<a href="#">Energizer Recharge 9V Rechargeable Batteries</a>	<b>175</b>	No LSD claim	“Hundreds of times”

**RPN’s recommended minimum power rating for 9V rechargeable batteries is 175 mAh.** (Due to limited number of products on the market, we are recommending a specification that all products can currently meet.)