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PowerXtender Solution Field Test Report

Test Report: EAI-PWB01-22-06 1
June 7th, 2022

Prepared By:
Electric Applications Incorporated
1337 East Washington Street
Phoenix, Arizona 85034

Prepared For:

PowerXtender
GREEN BATTERY TECHNOLOGY

PowerXtender s.r.o.
www.powerxtender.io

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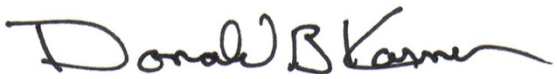
Approvals:



Approval: Donald Karner

President

Company certifies this test has been conducted in accordance with the referenced Battery Test Plan and Test Specifications. Testing was performed in accordance with requirements of ISO/IEC 17025 with measuring standards traceable to the National Institute of Standards and Technology. Units of measurement are stated according to the International System of Units (SI).

All raw data is reported as uncorrected for uncertainty or environmental effects and relate only to the items tested. Measurement uncertainty is taken into account by listing the uncertainty measurement with the results. The end user is responsible to determine the fitness for use. The uncertainty is not used when determining In/Out of tolerance conditions. Measurement uncertainty is reported per measurement, when available.

Any information provided by the customer can affect the validity of results.

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1 Evaluation Procedure

Testing was conducted to determine the impact of adding PowerXtender solution to flooded lead-acid batteries that have been in operation for multiple years and have lost a significant portion of their nominal capacity. Three 36V flooded battery packs manufactured by GNB, Hawker and Douglas were selected for testing at Dircks Logistics, a logistics warehouse located in Tolleson, AZ for this study. The batteries were selected as representative of flooded products with significant capacity loss from in service operations. Two load tests were conducted on each of the three battery packs, one before and one after the addition of the PowerXtender solution, allowing an evaluation of the impact of PowerXtender on the run time of batteries in field use.

Before the first load test, the battery packs were fully charged and equalized using Dircks Logistics inhouse Enersys Enforcer charger (serial #KJ123435). This is the charger that the warehouse operators typically used to charge these batteries. Open circuit voltage and acid gravity were measured in this fully charged and equalized mode. The first load tests were then conducted using a BLT 96V discharge unit provided by PowerXtender. Discharge was performed at a constant current 160A or 150A and the total discharge time recorded. The discharge voltages of each cell were measured every hour during discharge and more frequently as they were approaching the end of discharge voltage of 1.75 vpc.

After this first load test, PowerXtender solution was added into each cell with a calculated amount of 60mL/100Ah of plate capacity. The batteries were then returned to service in the Dircks Logisitics warehouse. The battery packs were returned to service in their typical warehouse service after addition of the PowerXtender solution.

A second load test on each battery was conducted after the batteries were in service for approximately one-month. The same test procedure was used to on the second constant current load test as was used to conduct the first load tests.

Table 1 Summarizes the general conditions used for this evaluation study.

Table 1 Evaluation Test General Information

Test Site:	Dircks Logistics, 860 S 83rd Ave, Tolleson, AZ 85353
EAI Test Engineer	Richard Simpson
Begin of Test Date	21-Apr-22
End of Test Date	26-May-22
Charger	Enersys Enforcer, Serial #KJ123435
Load Test Discharger	BLT 96V 160A, Serial # FS1001, P.B.M. S. R.L. Vignola, Italy(1)

(1) This equipment was not calibrated. However, the same settings were used for both the initial discharge and the discharge after adding PowerXtender solution

2 Test Results

An increase in the time to discharge was observed for all three battery packs tested. Table 2 summarizes results of the battery discharge tests results. An increase in discharge time varying from 13% to 48% was measured in the test battery packs after the addition of PowerXtender solution.

Table 2 Summary of Load Test Results with Three Tested Batteries

Battery Manufacture	Year In Service	Serial Number	Pack Voltage (V)	Pack Capacity (Ah)	BOT Test Date	BOT Rate (A)	BOT Test Duration (HH:MM)	PowerXtender Solutions Added (mL/cell)	EOT Test Date	EOT Test Duration (HH:MM)	BOT to EOT Change
GNB	2015	GAT3262	36	1020 @ C_{20}	4/22/2022	160	3:18	612	5/24/2022	4:52	48%
Douglas	2015	MNA1191611	36	750 @ C_6	4/25/2022	150	3:26	400	5/25/2022	3:52	13%
Hawker	2016	PL106162171	36	750 @ C_6	4/23/2022	160	2:40	450	5/26/2022	3:29	30%

An increase in cell voltage and specific gravity at full charge was also generally observed for all three battery packs tested. Table 3 to Table 8 present cell voltage and specific gravity data for each battery pack both before and after the addition of PowerXtender solution.

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Appendices

Table 3 GNB Load Test Before Adding PowerXtender Solutions

CUSTOMER	DIRCKS LOGISTICS		LOAD TEST DATE	4/22/2022			
MAKE	GNB		SERIAL	GAT3262		YEAR	2015
Plate Capacity	1020 Ah		Plate Volts	36 V		Specific Gravity	1.295
TEST ENGINEER	Richard Simpson		LOAD TEST Current	160 A		PowerXtender Solution Added (mL)	612
CELL#:	Voltage at full charge	Specific Gravity at full charge		LOAD TEST			
				1 HR	*2 HR*	*3 HR*	*3HR-18 MN*
1	2.08	1250		1.94	1.89	1.80	1.73
2	2.08	1230		2.35	1.76	1.79	1.75
3	2.30	1250		0.99	0.70	1.78	1.73
4	2.10	1250		1.94	1.90	1.82	1.80
5	2.07	1250		0.48	0.41	1.78	1.75
6	2.09	1250		1.94	1.89	1.79	1.69
7	2.07	1225		0.57	1.88	1.77	1.67
8	2.07	1225		1.75	1.87	1.75	1.65

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CUSTOMER	DIRCKS LOGISTICS		LOAD TEST DATE	4/22/2022			
MAKE	GNB		SERIAL	GAT3262		YEAR	2015
Plate Capacity	1020 Ah		Plate Volts	36 V		Specific Gravity	1.295
TEST ENGINEER	Richard Simpson		LOAD TEST Current	160 A		PowerXtender Solution Added (mL)	612
CELL#:	Voltage at full charge	Specific Gravity at full charge		LOAD TEST			
				1 HR	*2 HR*	*3 HR*	*3HR-18 MN*
9	2.09	1230		2.13	1.89	1.71	No Data
10	2.09	1250		1.95	1.90	1.81	No Data
11	2.09	1225		2.06	1.89	1.81	No Data
12	2.08	1225		1.95	1.89	1.79	No Data
13	2.11	1250		1.97	1.93	1.87	No Data
14	2.09	1225		1.95	1.90	1.82	No Data
15	2.11	1250		1.98	1.94	1.89	No Data
16	2.09	1225		1.95	1.90	1.82	No Data
17	2.10	1225		1.96	1.91	1.85	No Data
18	2.09	1250		1.95	1.89	1.80	No Data

NOTES: Charged and equalized on Enersys Enforcer Serial number KJ123435. The yellow highlighted cell voltage readings were confirmed to be in error on the following day after load test. TOTAL POWERXTENDER PER CELL = 612ML.

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Table 4 GNB Load Test One Month in Service After Adding PowerXtender Solutions

CUSTOMER	DIRCKS LOGISTICS		**LOAD TEST DATE**	5/24/2022						
MAKE	GNB		**SERIAL**	GAT3262		**YEAR**			2015	
Plate Capacity	1020 Ah		**Plate Volts**	36 V		**Specific Gravity**			1.295	
TEST ENGINEER	Richard Simpson		**LOAD TEST Current**	160 A		**PowerXtender Solution Added (mL)**			612	
CELL#:	**Voltage at full charge**	**Specific Gravity at full charge**		**LOAD TEST**						
				1 HR	***2 HR***	***3 HR***	***4 HR***	**4HR-43MN**	***4HR - 52MN***
1	2.12	1250		2.01	1.97	1.92	1.86	1.79	1.75
2	2.11	1250		2.03	1.96	1.91	1.84	1.77	1.74
3	2.12	1250		2.00	1.95	1.89	1.81	1.72	1.67
4	2.12	1250		2.01	1.97	1.92	1.86	1.81	1.79
5	2.12	1250		2.02	1.97	1.91	1.84	1.77	1.74
6	2.11	1250		2.00	1.94	1.92	1.85	1.76	1.72
7	2.10	1250		2.00	1.95	1.88	1.80	1.71	No Data
8	2.10	1250		1.99	1.95	1.89	1.81	1.69	No Data
9	2.12	1250		2.01	1.96	1.92	1.85	1.79	No Data
10	2.12	1250		2.01	1.97	1.92	1.86	1.79	No Data

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CUSTOMER	DIRCKS LOGISTICS		LOAD TEST DATE	5/24/2022					
MAKE	GNB		SERIAL	GAT3262		YEAR			2015
Plate Capacity	1020 Ah		Plate Volts	36 V		Specific Gravity			1.295
TEST ENGINEER	Richard Simpson		LOAD TEST Current	160 A		PowerXtender Solution Added (mL)			612
CELL#:	Voltage at full charge	Specific Gravity at full charge		LOAD TEST					
				1 HR	*2 HR*	*3 HR*	*4 HR*	4HR-43MN	*4HR - 52MN*
11	2.12	1230		2.00	1.96	1.91	1.85	1.78	No Data
12	2.11	1250		2.01	1.96	1.91	1.85	1.78	1.75
13	2.13	1260		2.01	1.96	1.91	1.85	1.77	1.76
14	2.12	1230		2.01	1.97	1.93	1.87	1.82	1.77
15	2.14	1250		2.00	1.96	1.91	1.85	1.77	1.77
16	2.11	1250		2.03	1.99	1.95	1.90	1.86	1.54
17	2.13	1250		2.00	1.96	1.92	1.86	1.79	1.77
18	2.12	1250		2.02	1.98	1.94	1.88	1.84	1.83

NOTES: 5/23/22: Battery was fully charged and equalized. 5/24/22. Discharge was terminated before measurement of the “close to complete” discharge voltage for cell 7, 8, 9, 10 and 11 could be taken.

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Table 5 Hawker Load Test Before Adding PowerXtender Solutions

CUSTOMER	DIRCKS LOGISTICS		**LOAD TEST DATE**	4/23/2022		
MAKE	Hawker		**SERIAL**	PL106162171	**YEAR**	2016
Plate Capacity	750 Ah		**Plate Volts**	36 V	**Specific Gravity**	1.275-1.285
TEST ENGINEER	Richard Simpson		**LOAD TEST Current**	160 A	**PowerXtender Solution Added (mL)**	450
CELL#:	**Voltage at full charge**	**Specific Gravity at full charge**		**LOAD TEST**		
				1 HR	***2 HR***	***2 HR- 40 MN***
1	2.23	1250		1.94	1.88	1.83
2	2.17	1225		1.90	1.81	1.58
3	2.19	1250		1.93	1.87	1.81
4	2.19	1225		1.94	1.88	1.82
5	2.19	1250		1.93	1.87	1.81
6	2.21	1275		1.94	1.88	1.82
7	2.20	1225		1.93	1.87	1.82
8	2.18	1180		1.93	1.87	1.81
9	2.17	1180		1.92	1.85	1.78
10	2.17	1225		1.91	1.83	1.70

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CUSTOMER	DIRCKS LOGISTICS		**LOAD TEST DATE**	4/23/2022		
MAKE	Hawker		**SERIAL**	PL106162171	**YEAR**	2016
Plate Capacity	750 Ah		**Plate Volts**	36 V	**Specific Gravity**	1.275-1.285
TEST ENGINEER	Richard Simpson		**LOAD TEST Current**	160 A	**PowerXtender Solution Added (mL)**	450
CELL#:	**Voltage at full charge**	**Specific Gravity at full charge**		**LOAD TEST**		
				1 HR	***2 HR***	***2 HR- 40 MN***
11	2.18	1200		1.93	1.86	1.80
12	2.19	1260		1.93	1.87	1.81
13	2.20	1200		1.94	1.88	1.82
14	2.19	1250		1.93	1.87	1.81
15	2.20	1200		1.94	1.88	1.82
16	2.18	1250		1.92	1.85	1.78
17	2.19	1220		1.93	1.86	1.79
18	2.20	1200		1.93	1.86	1.80

NOTES: Cells topped off with a total of 8 gallons of water. Charged and equalized on Enersys Enforcer Serial number KL123405. 225 ML PowerXtender Solution added after load test on 4/23/22. An additional 225ML added on 4/26/22. TOTAL POWERXTENDER PER CELL = 450ML

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Table 6 Hawker Load Test One Month in Service After Adding PowerXtender Solutions

CUSTOMER	DIRCKS LOGISTICS		**LOAD TEST DATE**	5/26/2022				
MAKE	Hawker		**SERIAL**	PL106162171		**YEAR**		2016
Plate Capacity	750 Ah		**Plate Volts**	36 V		**Specific Gravity**		1.275-1.285
TEST ENGINEER	Richard Simpson		**LOAD TEST Current**	160 A		**PowerXtender Solution Added (mL)**		450
CELL#:	**Voltage at full charge**	**Specific Gravity at full charge**		**LOAD TEST**				
				1 HR	***2 HR***	***3 HR***	***3 HR 29MN***	
1	2.14	1270		1.95	1.89	1.82	1.78	
2	2.12	1270		1.93	1.87	1.77	1.70	
3	2.16	1275		1.94	1.88	1.80	1.76	
4	2.14	1275		1.94	1.88	1.80	1.76	
5	2.14	1270		1.94	1.88	1.80	1.75	
6	2.13	1275		1.94	1.88	1.81	1.77	
7	2.14	1275		1.93	1.86	1.78	1.74	
8	2.14	1250		1.94	1.88	1.81	1.76	
9	2.14	1250		1.93	1.87	1.78	1.73	
10	2.13	1250		1.93	1.86	1.76	1.67	

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CUSTOMER	DIRCKS LOGISTICS		LOAD TEST DATE	5/26/2022				
MAKE	Hawker		SERIAL	PL106162171		YEAR		2016
Plate Capacity	750 Ah		Plate Volts	36 V		Specific Gravity		1.275-1.285
TEST ENGINEER	Richard Simpson		LOAD TEST Current	160 A		PowerXtender Solution Added (mL)		450
CELL#:	Voltage at full charge	Specific Gravity at full charge		LOAD TEST				
				1 HR	*2 HR*	*3 HR*	*3 HR 29MN*	
11	2.13	1275		1.94	1.89	1.79	1.75	
12	2.14	1275		1.94	1.87	1.79	1.73	
13	2.14	1275		1.93	1.87	1.80	1.77	
14	2.14	1275		1.94	1.87	1.79	1.75	
15	2.15	1275		1.95	1.89	1.82	1.78	
16	2.13	1270		1.93	1.87	1.78	1.72	
17	2.14	1270		1.94	1.87	1.79	1.73	
18	2.14	1270		1.93	1.87	1.79	1.75	

NOTES: Battery charged and equalized on 5/25/22. Load test complete on 5/26/22. Voltage readings of Hawker cells were taken immediately after equalization, with no rest time for depolarization. As a result, these voltages are higher than the voltage readings for the second load test which were taken after an overnight rest period.

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Table 7 Douglas Load Test Before Adding PowerXtender Solutions

CUSTOMER	DIRCKS LOGISTICS		**LOAD TEST DATE**	4/25/2022					
MAKE	Douglas		**SERIAL**	MNA1191611		**YEAR**			2015
Plate Capacity	750 Ah		**Plate Volts**	36 V		**Specific Gravity**			1.285
TEST ENGINEER	Richard Simpson		**LOAD TEST Current**	150 A		**PowerXtender Solution Added (mL)**			400
CELL#:	**Voltage at full charge**	**Specific Gravity at full charge**		**LOAD TEST**					
				1 HR	***2 HR***	***3 HR***	***3HR 15MN***	***3HR 26MN***	
1	2.16	1250		1.94	1.87	1.78	1.74	1.69	
2	2.15	1225		1.93	1.86	1.77	1.72	1.66	
3	2.16	1250		1.95	1.89	1.82	1.80	1.78	
4	2.15	1250		1.94	1.88	1.80	1.78	1.76	
5	2.16	1220		1.95	1.90	1.83	1.81	1.80	
6	2.16	1250		1.94	1.89	1.81	1.79	1.76	
7	2.16	1250		1.95	1.90	1.83	1.80	1.79	
8	2.15	1230		1.94	1.89	1.81	1.79	1.77	
9	2.15	1210		1.94	1.88	1.81	1.79	1.77	

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CUSTOMER	DIRCKS LOGISTICS		LOAD TEST DATE	4/25/2022					
MAKE	Douglas		SERIAL	MNA1191611		YEAR			2015
Plate Capacity	750 Ah		Plate Volts	36 V		Specific Gravity			1.285
TEST ENGINEER	Richard Simpson		LOAD TEST Current	150 A		PowerXtender Solution Added (mL)			400
CELL#:	Voltage at full charge	Specific Gravity at full charge		LOAD TEST					
				1 HR	*2 HR*	*3 HR*	*3HR 15MN*	*3HR 26 MN*	
10	2.15	1250		1.94	1.88	1.79	1.76	1.73	
11	2.15	1225		1.93	1.87	1.80	1.77	1.75	
12	2.16	1250		1.95	1.89	1.82	1.80	1.78	
13	2.16	1240		1.95	1.89	1.81	1.79	1.77	
14	2.15	1250		1.94	1.88	1.81	1.78	1.76	
15	2.15	1250		1.94	1.88	1.80	1.77	1.74	
16	2.14	1225		1.94	1.88	1.80	1.78	1.75	
17	2.16	1260		1.95	1.88	1.81	1.78	1.76	
18	2.16	1260		1.96	1.89	1.82	1.79	1.78	

NOTES: Cells topped off with 3 gallons of water on 4/25/22. Charged and equalized with Enersys Enforcer Serial #KJ123435. PowerXtender solution added on 4/25/22. Calculated addition is 450ML. However, only 400ML added due to limited head space.

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Table 8 Douglas Load Test One Month in Service After Adding PowerXtender Solutions

CUSTOMER	DIRCKS LOGISTICS			**LOAD TEST DATE**	5/25/2022					
MAKE	Douglas			**SERIAL**	MNA1191611		**YEAR**			2015
Plate Capacity	750 Ah			**Plate Volts**	36 V		**Specific Gravity**			1.285
TEST ENGINEER	Richard Simpson			**LOAD TEST Current**	150 A		**PowerXtender Solution Added (mL)**			400
CELL#:	**Voltage at full charge**	**Specific Gravity at full charge**			**LOAD TEST**					
					1 HR	***2 HR***	***3 HR***	***3 HR 30MN***	***3 HR 52 MN***	
1	2.18	1250			1.97	1.91	1.84	1.80	1.77	
2	2.15	1250			1.95	1.92	1.83	1.80	1.75	
3	2.14	1230			1.96	1.90	1.82	1.79	1.76	
4	2.16	1250			1.94	1.91	1.81	1.77	1.73	
5	2.16	1250			1.95	1.90	1.84	1.78	1.76	
6	2.16	1250			1.96	1.91	1.84	1.80	1.77	
7	2.17	1250			1.95	1.90	1.83	1.79	1.76	
8	2.16	1250			1.96	1.91	1.85	1.82	1.78	
9	2.16	1250			1.96	1.90	1.83	1.79	1.76	

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CUSTOMER	DIRCKS LOGISTICS		LOAD TEST DATE	5/25/2022					
MAKE	Douglas		SERIAL	MNA1191611	YEAR				2015
Plate Capacity	750 Ah		Plate Volts	36 V	Specific Gravity				1.285
TEST ENGINEER	Richard Simpson		LOAD TEST Current	150 A	PowerXtender Solution Added (mL)				400
CELL#:	Voltage at full charge	Specific Gravity at full charge			LOAD TEST				
					1 HR	*2 HR*	*3 HR*	*3 HR 30MN*	*3 HR 52 MN*	
10	2.17	1250			1.96	1.91	1.84	1.79	1.76	
11	2.16	1250			1.95	1.89	1.81	1.76	1.71	
12	2.16	1250			1.94	1.89	1.81	1.75	1.68	
13	2.17	1250			1.96	1.90	1.84	1.79	1.71	
14	2.15	1230			1.94	1.89	1.81	1.77	1.73	
15	2.15	1230			1.95	1.89	1.81	1.76	1.71	
16	2.16	1250			1.94	1.89	1.82	1.76	1.72	
17	2.16	1250			1.95	1.90	1.83	1.79	1.76	
18	2.16	1250			1.95	1.90	1.83	1.79	1.76	
	NOTES: Charged and equalized on 5/24/22. Load test performed and voltage and specific gravity measurements taken 5/25/22.									

<End of Test Report>