PERFORMANCE SPECIFICATION SHEET

BATTERY, RECHARGEABLE, NICKEL CADMIUM, VENTED, 1.2-VOLT, 13 AMPERE-HOUR, BB-475/A CELL

This specification is approved for use within Army CECOM Life Cycle Management Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product herein shall consist of this specification and MIL-PRF-81757.

REQUIREMENTS

1. Part or identifying number. The part or identifying number (PIN) of the cell shall be M81757/22-1.

2. Dimensions and weight. The dimensions and weight of the cell shall be as specified in 3.10.8 as modified herein and as shown on figure 1 herein. The weight of the cell shall be not greater than 1.21 pounds (0.55 kg).

3. Capacity. The minimum capacity of the battery shall be 13 ampere-hours (14.2 initially). When tested as specified in MIL-PRF-81757, the test parameters and requirements of Table I herein shall apply.

TABLE I: Test parameters and requirements, BB-475/A cell

Test	Test Method	Discharge Rate(A) 1/	Cut Off Voltage(V) 1/	Capacity (Ah) Minimum 1/
Initial capacity discharge	4.5.13	13	0.95	14.2
Humidity and Charge Retention	4.5.14	13	0.95	9.75
Shock	4.5.15	330	0.53	5.5
Vibration	4.5.16	330	0.53	5.5
Temperature Shock	4.5.17	13	0.95	13
Altitude	4.5.18	13	0.95	13
Twenty-second pulse discharge	4.5.20	330	0.53	5.5
Medium Rate Discharge and Operating Position	4.5.21	117	0.76	9.7
Cycle Life	4.5.23			
Normal Rate (Cycle 1)		13	0.95	13
High Rate		330	0.53	3.7
Normal Rate (Cycle 100)		13	0.95	13
Normal Rate (Cycle 200)		13	0.95	13

1/ Test parameters and requirements cited herein supersede those in the general specification.

4. Voltage. The nominal voltage of the BB-475/A cell shall be 1.2 volts.

5. MIL-PRF-81757 variance. The BB-475/A cell shall comply with MIL-PRF-81757 except as follows.

5.1 Modify the following paragraph(s):

3.6.2 Fasteners. After the phrase "…free of any coating…" add the following: "except as otherwise specified herein."

5.2 Add the following new paragraph:

"3.7.11.9 Shipping condition of cells. All cells shall be delivered complete with electrolyte to the proper level and completely discharged, but fully formed. Each individual cell, as supplied, shall be equipped with a shorting device across the output terminals."

5.3 Modify the following paragraph:

3.10.22 Constant voltage discharge. This requirement is not applicable to this battery.

VERIFICATION

1. MIL-PRF-81757 variance. The BB-475/A cell shall comply with MIL-PRF-81757 except as follows.

1.1 Modify the following paragraphs:

4.2.1 Inspection of replaceable cells. Delete text in its entirety and replace with the following: "Five complete packages of cells (19 each) and one additional cell shall be furnished for inspection."

4.3.3 Sample size and selection for groups A, B, and C inspection. Add the following: "Samples sizes specified for batteries shall apply to complete packages of 19 cells each."

4.5.12 Cell vent test. Add the following after the title: "This test shall be performed on all M81757/22-1 cells in a package connected in series and configured as they would be in a M81757/21-1 (BB-664/A) or similar battery configuration (i.e., BB-476/A)."

4.5.14 Humidity and charge retention test. Add the following after the title: "This test shall be conducted with all M81757/22-1 cells in a package connected in series and configured as they would be in a M81757/21-1 (BB-664/A) or similar configuration battery (i.e., BB-476/A)."

4.5.15 Shock. Add the following after the title: "This test shall be conducted with all M81757/22-1 cells in a package connected in series and configured as they would be in a M81757/21-1 (BB-664/A) or similar configuration battery (i.e., BB-476/A). After examination, discharge at 330 amperes in three 20-second pulses with 120 seconds at rest between pulses."

"4.5.16 Vibration. Add the following after the title: "The following test shall be performed. This test shall be conducted with all M81757/22-1 cells in a package connected in series and configured as they would be in a M81757/21-1 (BB-664/A) or similar configuration battery (i.e., BB-476/A). Testing materials required are listed below. Upon completion, cells shall meet the requirements of 3.9.

ITEM	NSN	P/N (CAGEC)	QUANTITY
Battery Container	---	---	1
Bus, Conductor	6150-01-041-4581	10371-114 (74025)	18
Screw, Hex head, SS, #8-32 UNC 3A, 7/16"L			38
Washer, Spring	5310-00-118-1977	M81757/1-8A (81349) 16128-26 (74025)	38
Washer, Flat	5310-00-976-4621	162A7819-22 (01002)	38

"Notes:

NSN = National Stock Number
P/N = Part Number
CAGEC = Commercial and Government Entity Code

"a. Constant current charge cell assembly at the 1C rate.

"b. Assemble cells and hardware into a battery container. Use of polyamide shims to secure cells in place and petrolatum lubricant is permissible but not required.

"c. Attach container to vibration equipment in the normal, upright position.

"d. Connect cell assembly to the test system.

"e. Attach no less than two accelerometers to cells in the direction of the vibration motion; use the spectral density average of accelerometers to control test levels.

"f. Subject cells to the vibration test of MIL-STD-810, Method 514, Procedure I (Operational service), using Annex D parameters for Category 14, Helicopters, vibration parameters for General Materiel, f_x values for Main Rotor of AH-64 (early)

"g. Disconnect cell assembly from vibration equipment; reattach to vibration equipment in a perpendicular axis.

"h. Repeat steps d through g for a total of 3 mutually perpendicular axes.

"i. Each vibration period shall be not less than one hour.

"j. Discharge cell assembly or individual cells at the 0.1C rate during each vibration period; monitor cell voltage during discharge. Use M81757/21-1 (BB-664/A) voltage parameters of MIL-PRF-81757/21.

"k. Upon completion of all three vibration periods, constant current charge cell assembly at the 1C rate.

"l. Discharge cell assembly with three 20-second pulses of 330 amperes with 120 seconds of rest between pulses.

"m. Remove cells from the battery container.

"n. Examine cells for the requirements of 3.9."

4.5.18 Altitude test. This test is required as described with the following exceptions:

1) For step b, use a test temperature of -1.1°C in lieu of -40°C
2) For step c, use a pressure that simulates 6,090 meters (19,980 ft.) of altitude in lieu of the 18,500 meters (60,700 ft.) pressure equivalent.

4.5.20 Twenty-second pulse discharge test. This test is applicable. However, for step (c), use a constant current of 330 amperes in lieu of the sloping discharge rate.

4.5.22 Constant voltage discharge test. This test is not applicable to this battery.

4.5.23 Cycling test. Delete text in its entirety and replace with the following:

The following test shall be performed.

a. Cycle 1. Charge at a constant current at the C rate to 1.55 ± 0.10 volts per cell, then 1.1 amperes for another three hours. Rest for one hour at open circuit. Then discharge at the normal rate specified herein to cut-off voltage.

b. Cycle 2. Charge at a constant current at the C rate to 1.55 ± 0.10 volts per cell, then 1.1 amperes for another three hours. Rest for one hour at open circuit. Then discharge at the high rate specified herein for not less than 20 seconds, followed by 260 seconds of rest, then discharge for another 20 seconds at the rate specified.

c. Cycles 3-98. Charge at a constant current at the 1.5C rate to 1.55 ± 0.10 volts per cell and rest for one hour at open circuit. Then discharge at the high rate specified herein for not less than 20 seconds, followed by 260 seconds of rest, then discharge for another 20 seconds at the rate specified.

d. Cycle 99. Charge at a constant current at the 1.5C rate to 1.55 ± 0.10 volts per cell and rest for one hour at open circuit. Then discharge at the high rate specified herein for not less than 20 seconds, followed by 260 seconds of rest, then discharge for another 20 seconds at the rate specified.

e. Cycle 100. Repeat step a.

f. Cycle 101. Repeat step b.

g. Cycle 102 -198. Repeat step c.

h. Cycle 199. Repeat step d.

i. Cycle 200. Repeat step a.

NOTE: Water may be added on the 100th cycle. The amount of water added shall be recorded. Reconditioning is not allowed during the cycle life test.

1.2 Modify the Tables of MIL-PRF-81757 as follows:

Table III. Qualification inspection of batteries. Delete and replace with the following:

Table III. Qualification inspection of replaceable cells.

Test number	Examination and tests 1/	Sample number 2/					Requirement paragraph	Test paragraph
		1	2	3	4	5		
1	INSPECTION FOR DAMAGE	X	X	X	X		3.10.1	4.5.1
2	VISUAL AND MECHANICAL	X	X	X	X		3.10.6	4.5.6
4	DIMENSIONS AND WEIGHT	X	X	X	X		3.10.7	4.5.7
7	CELL VENT TEST	X	X	X	X		3.10.13	4.5.12
8	INITIAL CAPACITY DISCHARGE	X	X	X	X		3.10.14	4.5.13
9	HUMIDITY AND CHARGE RETENTION			X	X		3.9, 3.10.15	4.5.14
10	SHOCK TEST (BASIC DESIGN)			X	X		3.9, 3.10.16	4.5.15
11	VIBRATION			X	X		3.9	4.5.16
12	TEMPERATURE SHOCK TEST			X	X		3.9, 3.10.17	4.5.17
13	ALTITUDE			X	X		3.9, 3.10.18	4.5.18
15	TWENTY-SECOND PULSE DISCHARGE)			X	X		3.9, 3.10.20	4.5.20
16	MEDIUM-RATE DISCHARGE OPERATING POSITION TEST			X	X		3.9, 3.10.21	4.5.21
18	CYCLING TEST	X	X				3.9, 3.10.23	4.5.23
19	TEMPERATURE RISE AND FLOAT	X	X				3.9, 3.10.9, 3.10.24	4.5.24.1
22	INTERNAL PRESSURE TEST	X					3.9, 3.10.26	4.5.26
24	GAS BARRIER MATERIAL TEST (ONLY FOR CELLS WITH GAS BARRIER MATERIALS OTHER THAN THOSE LISTED IN 6.10.4)		X	X			3.10.28	4.5.28
25	STORAGE EFFECTS					X	3.9, 3.10.29	4.5.29
26	SHELF LIFE	X			X		3.9, 3.10.30	4.5.30
27	CELL BAFFLE TEST	SAMPLE CELL OF 4.2.1					3.7.11.5, 3.10.12	4.5.11

1/ Cells shall be tested connected in series as a complete battery unless otherwise specified.
2/ Sample numbers apply to groups of 19 cells

A Dimension	5.094 ± .025
B Dimension	5.687 ± .025
C Dimension	5.328 ± .025
D Dimension	1.530 ± .015
E Dimension	2.734 ± .020
F Dimension	1.187 ± .020
G Dimension	.594 ± .010
H Dimension	.602 ± .010

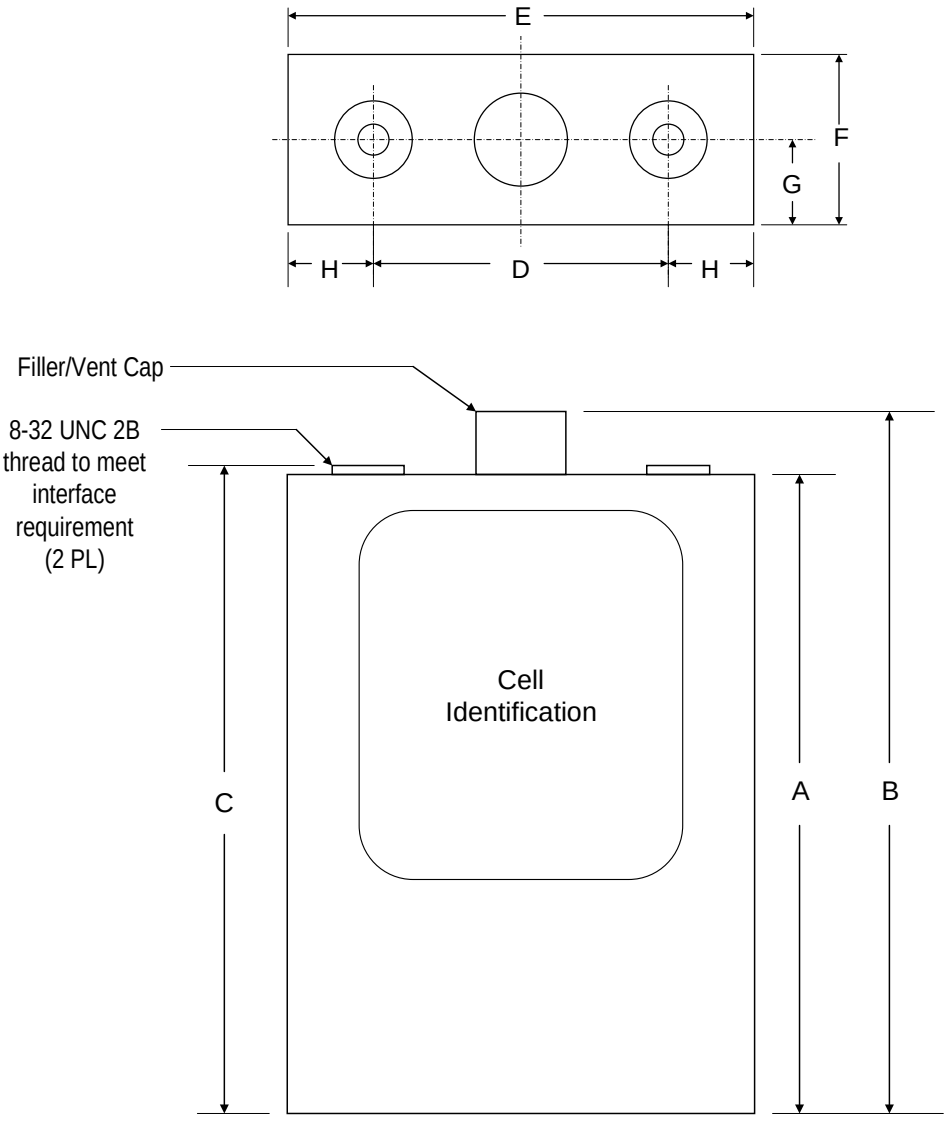

FIGURE 1: Battery Cell, BB-475/A

FIGURE NOTE:

All dimensions are in inches

Note: Potassium carbonate. Previous versions of specifications for the Army Apache battery had requirements and test methods for potassium carbonate. It has been determined that failure to control and limit potassium carbonate in production would result in cells incapable of complying with the performance requirements herein. Users of this document should be aware that there remains a need to limit potassium carbonate levels in order to provide assurance of capability in both qualification and conformance inspections.

Custodians:
Army – CR

Preparing activity
Army – CR
(Project Number 6140-2009-023)

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