

INCH-POUND

MIL-PRF-32271/6

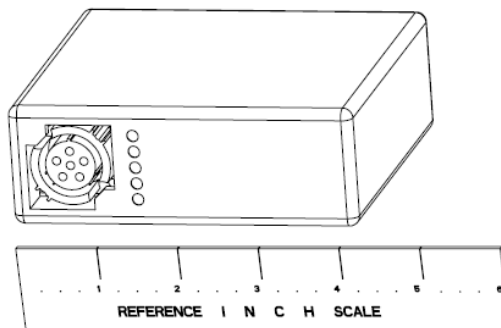
30 October 2008

PERFORMANCE SPECIFICATION SHEET

BATTERY, NON-RECHARGEABLE, LITHIUM

This specification is approved 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-32271.



See NOTES for
nominal
dimensions; see
applicable
drawing for
dimensional
requirements.

Figure 1 – General View, M32271/6 Battery Shape

REQUIREMENTS (see 1.2 for Type, Class, and Features descriptions):

<i>Type:</i>	I		II		III
<i>Class:</i>	2		2		2
<i>Features:</i>	C	E	C	E	E
<i>PIN:</i>	M32271/6-12C	M32271/6-12E	M32271/6-22C	M32271/6-22E	M32271/6-32E
<i>Approved Chemistry:</i>	Lithium Manganese Dioxide		Lithium Sulfur Dioxide		Lithium Manganese Dioxide

Specification requirements: The following requirements of MIL-PRF-32271, identified therein by the phrase “when specified”, are applicable as indicated below:

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Requirement	Specification Reference	Applicability by PIN Suffix (M32271/6-)				
		12C	12E	22C	22E	32E
Parallel cell arrangements ¹	3.4	Yes	Yes	No	No	Yes
Connectors	3.4.5	Yes	Yes	Yes	Yes	Yes
Battery charger connection	3.4.5.1	No	No	No	No	No
Connection integrity	3.4.5.2	No	No	No	No	No
Terminal integrity	3.4.6	No	No	No	No	No
Complete discharge device	3.4.7	Yes	Yes	Yes	Yes	Yes
State of charge device	3.4.8	No	Yes	No	Yes	Yes
State of charge data output	3.4.8e	No	Yes	No	Yes	Yes
Cell charging	3.5.3	Yes	Yes	Yes	Yes	Yes
Nail penetration	3.5.4	Yes	Yes	No	No	Yes
Cell series short circuit	3.5.6	Yes	Yes	No	No	Yes
Parallel string charge protection ²	3.5.6.1	Yes	Yes	No	No	Yes
Charge protection	3.5.11	Yes	Yes	Yes	Yes	Yes
Over-current protection	3.5.13.1	Yes	Yes	Yes	Yes	Yes
Over-temperature protection	3.5.14	Yes	Yes	Yes	Yes	Yes
Surface temperature	3.6h	Yes	Yes	Yes	Yes	Yes
Capacity LR & LRT		No	No	Yes	Yes	No
Immersion	3.7.8	Yes	Yes	Yes	Yes	Yes
Watertight integrity	3.7.9	No	No	No	No	No
DO NOT CHARGE! marking	3.8.1.2b	Yes	Yes	Yes	Yes	Yes
Complete discharge device marking/label	3.8.4	Yes	Yes	Yes	Yes	Yes
State of charge marking	3.8.5	No	Yes	No	Yes	Yes

Dimensions, marking and configuration, Types I, II, & III

Battery – Drawing A3315883

Battery Connector (3.4.5 & 4.6.1.7) – Drawing SC-C-179492³

Mating Connector (3.4.5 & 4.6.1.7) – Part Number SM-D-687888-1, Drawing SM-D-687888

Battery Charger Connector (3.4.5.1 & 4.6.1.7.1) – Not Applicable

Battery voltages (3.4.4 & 4.6.1.5):

Battery open-circuit voltage (3.4.4.1 & 4.6.1.5.1):

<i>Type:</i>	Types I & III		Type II	
<i>Connection Mode:</i>	Series	Parallel	Series	Parallel
<i>Maximum:</i>	33.00V	16.50V	30.50V	15.25V
<i>Minimum:</i>	29.80V	14.90V	28.80V	14.40V

¹ Parallel cell arrangements are permitted for Types I and III batteries described by this specification sheet but are not required.

² Only required if parallel cell arrangements are used for Type I or III batteries

³ Certifications for physical properties of connector material required by SC-C-179492

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Battery closed circuit voltage (3.4.4.2, 3.6, 4.6.1.5.2, & 4.6.4.1):

For capacity & initial voltage delay –
 10.0 volts minimum for parallel connection
 20.0 volts minimum for series connection

For closed circuit voltage test -
 10.0 volts per battery section

Cell closed circuit voltage (3.4.4.3 & 4.6.1.3):

Minimum – 2.0 volts per cell

Maximum weight (3.1 & 4.6.1.6): Type I – 1.4 lbs. (635 g); Type II – 1.1 lbs. (499 g); Type III – 1.47 lbs. (667 g)

State of charge device (3.4.8 & 4.6.1.10): All batteries described by this specification sheet have two independent sections. State of charge circuitry, when required, shall be located in the section connected to sockets 1 and 4. See applicable drawing for additional requirements pertaining to batteries with state of charge data output requirements.

Capacity test requirements (3.6 & 4.6.4), Type I:

Test	Initial voltage delay		Minimum Capacity	Storage Period		Cut-off Volts
	Time (MAX)	Volts		1-Week	4-Week	
I	1 second	20.00	4.2 hours		20.00	
IP	1 second	10.00	4.2 hours		10.00	
L	1 second	20.00	2.1 hours		20.00	
LP	1 second	10.00	2.1 hours		10.00	
H	1 second	20.00	7.4 hours		20.00	
HP	1 second	10.00	7.4 hours		10.00	
IT	1 second	20.00	3.9 hours	3.8 hours	20.00	
ITP	1 second	10.00	3.9 hours	3.8 hours	10.00	
LT	1 second	20.00	1.9 hours	1.8 hours	20.00	
LTP	1 second	10.00	1.9 hours	1.8 hours	10.00	
HT	1 second	20.00	6.9 hours	6.7 hours	20.00	
HTP	1 second	10.00	6.9 hours	6.7 hours	10.00	

Capacity test requirements (3.6 & 4.6.4), Type II:

Test	Initial voltage delay		Minimum Capacity	Cut-off Volts
	Time (MAX)	Volts		
I	5 seconds	20.00	3.0 hours	20.00
IP	5 seconds	10.00	3.0 hours	10.00
L	60 seconds	20.00	1.5 hours	20.00
LP	60 seconds	10.00	1.5 hours	10.00
H	5 seconds	20.00	5.3 hours	20.00
HP	5 seconds	10.00	5.3 hours	10.00
LR	5 seconds	20.00	45.0 hours	3.00

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Test	Initial voltage delay		Minimum Capacity		Cut-off Volts
	Time (MAX) to Volts		Storage Period		
			1-Week	4-Week	
IT	5 seconds	20.00	2.8 hours	2.7 hours	20.00
ITP	5 seconds	10.00	2.8 hours	2.7 hours	10.00
LT	60 seconds	20.00	1.4 hours	1.35 hours	20.00
LTP	60 seconds	10.00	1.4 hours	1.35 hours	10.00
HT	5 seconds	20.00	4.9 hours	4.8 hours	20.00
HTP	5 seconds	10.00	4.9 hours	4.8 hours	10.00
LRT	5 seconds	20.00	41.8 hours	40.5 hours	3.00

Capacity test requirements (3.6 & 4.6.4), Type III:

Test	Initial voltage delay		Minimum Capacity		Cut-off Volts
	Time (MAX) to Volts		Storage Period		
			1-Week	4-Week	
I	1 second	20.00	5.5 hours		20.00
IP	1 second	10.00	5.5 hours		10.00
L	1 second	20.00	2.1 hours		20.00
LP	1 second	10.00	2.1 hours		10.00
H	1 second	20.00	9.0 hours		20.00
HP	1 second	10.00	9.0 hours		10.00
IT	1 second	20.00	5.1 hours	4.9 hours	20.00
ITP	1 second	10.00	5.1 hours	4.9 hours	10.00
LT	1 second	20.00	1.9 hours	1.8 hours	20.00
LTP	1 second	10.00	1.9 hours	1.8 hours	10.00
HT	1 second	20.00	8.3 hours	8.1 hours	20.00
HTP	1 second	10.00	8.3 hours	8.1 hours	10.00

Abuse test pulse discharge capacity requirement (3.5.12 & 4.6.2.12i): Type I - 2.5 ampere-hours; Type II – 1.8 ampere-hours; Type III – 3.3 ampere-hours

METHODS OF EXAMINATION AND TEST:

Verification requirements. The following verification requirements of MIL-PRF-32271, identified therein by the phrase “when specified,” are applicable as indicated below:

Test Requirement	Specification Reference	Applicability by PIN Suffix (M32271/6-)				
		12C	12E	22C	22E	32E
Parallel discharges	Tables III, IV, IX, & XI	Yes	Yes	Yes	Yes	Yes
Connectors	4.6.1.7	Yes	Yes	Yes	Yes	Yes
Battery charger connection	4.6.1.7.1	No	No	No	No	No
Static connection integrity	4.6.1.7.2	No	No	No	No	No
Dynamic connection integrity	4.6.1.7.3	No	No	No	No	No
Terminal integrity	4.6.1.8	No	No	No	No	No
Complete discharge device	4.6.1.9	Yes	Yes	Yes	Yes	Yes

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Test Requirement	Specification Reference	Applicability by PIN Suffix (M32271/6-)				
		12C	12E	22C	22E	32E
State of charge device	4.6.1.10	No	Yes	No	Yes	Yes
State of charge data output	4.6.1.10	No	Yes	No	Yes	Yes
Cell charging	4.6.2.3	Yes	Yes	Yes	Yes	Yes
Nail penetration	4.6.2.4	Yes	Yes	No	No	Yes
Cell series string short	4.6.2.6	Yes	Yes	No	No	Yes
Parallel string charge protection ⁴	4.6.2.6.1	Yes	Yes	No	No	Yes
Charge protection	4.6.2.11	Yes	Yes	Yes	Yes	Yes
Battery over-current protection	4.6.2.13	Yes	Yes	Yes	Yes	Yes
Battery over-temperature protection	4.6.2.14	Yes	Yes	Yes	Yes	Yes
Surface temperature	4.6.4.1	Yes	Yes	Yes	Yes	Yes
Capacity LR	4.6.4.1.5	No	No	Yes	Yes	No
Capacity LRT	4.6.4.1.9	No	No	Yes	Yes	No
Immersion	4.6.5.8	Yes	Yes	Yes	Yes	Yes
Watertight integrity	4.6.5.9	No	No	No	No	No

Cell closed-circuit voltage test: When cells are tested as specified in 4.6.1.3, load each cell to be used in a single series cell string design with 0.65 amperes constant current, 3 ohms constant resistance, or 1.3 watts constant power. In the event that parallel cell arrangements are used (Types I and III only), use a load that produces a current equivalent to 0.65 amperes divided by the number of parallel cell strings to be used, as a minimum.

Battery closed-circuit voltage test: When tested as specified in 4.6.1.5.2, load each independent section of the battery with 0.65 amperes constant current, 15 ohms constant resistance, or 6.5 watts constant power.

Abuse test, pre-discharge: When tested as specified in 4.6.2.12a, discharge in the series mode with a load of either 0.65 amperes or 13 watts for: 2.1 hours for Type I batteries; 1.5 hours for Type II batteries; or 2.7 hours for Type III batteries.

Abuse test, pulse discharge: When tested as specified in 4.6.2.12i, discharge in the series mode with a load of 0.88 amperes for 1 minute followed by 0.64 amperes for 4 minutes, cycled continuously to 20.00 volts.

Battery over-current protection: When tested as specified in 4.6.2.13, load batteries with the battery sections connected in the series mode and subject to a load of 1.3 amperes.

Immersion: When tested as specified in 4.6.5.8, apply a load, with the battery connected in the series mode, of either 0.04 amperes or 1.0 watt during the storage and immersion time periods specified.

⁴ This test only required if parallel cell arrangements are used for Type I or III batteries

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Capacity tests (4.6.4):

Test ⁵	Discharge Rate	Duty Cycle
I	0.65 amperes	Continuous discharge to zero volts, followed by 0.65 amperes forced discharge for 10 minutes.
IP	1.3 amperes	Continuous discharge to zero volts, followed by 1.3 amperes forced discharge for 10 minutes
L	0.65 amperes	Continuous discharge to cut-off voltage
LP	1.3 amperes	Continuous discharge to cut-off voltage
H	0.65 amperes	Discharge for 5 minutes at 0.65 amperes, followed by 5 minutes on open circuit; repeat cycle continuously to cut-off voltage
HP	1.3 amperes	Discharge for 5 minutes at 1.3 amperes, followed by 5 minutes on open circuit; repeat cycle continuously to cut-off voltage
LR	45 mA/1.8W	Discharge in series mode at 45 milli-amperes to 20.5 volts, then Discharge at 1.8 watts to cut-off voltage
IT	0.65 amperes	Continuous discharge to cut-off voltage
ITP	1.3 amperes	Continuous discharge to cut-off voltage
LT	0.65 amperes	Continuous discharge to cut-off voltage
LTP	1.3 amperes	Continuous discharge to cut-off voltage
HT	0.65 amperes	Discharge for 5 minutes at 0.65 amperes, followed by 5 minutes on open circuit; repeat cycle continuously to cut-off voltage
HTP	1.3 amperes	Discharge for 5 minutes at 1.3 amperes, followed by 5 minutes on open circuit; repeat cycle continuously to cut-off voltage
LRT	45 mA/1.8W	Discharge in series mode at 45 milli-amperes to 20.5 volts, then Discharge at 1.8 watts to cut-off voltage

NOTES:

(This section contains information of a general nature which may be helpful, but is not mandatory)

Intended use: This battery is intended to operate digital communications terminals. It is also used in some older military meteorological devices.

⁶Nominal ratings: The following are the nominal ratings for each battery type described by this specification sheet. They are provided for information purposes.

⁵ Discharge tests including the letter P require discharge with the two sections of the battery connected in parallel; all other capacity tests require discharge with the two sections connected in series.

⁶ Capacity and energy delivered by a battery are significantly affected by usage conditions, such as temperature and loads applied. If you have any questions about use of this battery in a particular device or circumstance, please visit the following web site (contact info is posted): <http://www.cerdec.army.mil/c2d/armypower>.

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Battery PIN:	M32271/6-12C or -12E (Li/MnO₂)		M32271/6-22C or -22E (Li/SO₂)		M32271/6-32E (Li/MnO₂)	
<i>Overall Dimensions:</i>	3.9 in H x 4.18 in W x 1.44 in D					
<i>MAX Weight:</i>	1.4 lbs (635 g)		1.1 lbs (498 g)		1.47 lbs (667 g)	
<i>Connection Type:</i>	<u>Series</u>	<u>Parallel</u>	<u>Series</u>	<u>Parallel</u>	<u>Series</u>	<u>Parallel</u>
<i>Voltage Range:</i>	20-33	10-16.5	20-30.5	10-15.25	20-33	10-16.5
<i>Nominal Capacity (Ampere-hours):</i>	2.7 Amp-hours	5.4 Amp-hours	1.95 Amp-hours	3.9 Amp-hours	3.6 Amp-hours	7.2 Amp-hours
<i>Nominal Energy (Watt-hours):</i>	57 Watt-hours		41 Watt-hours		76 Watt-hours	
<i>MAX Rated Power Output:</i>	16 watts		16 watts		16 watts	
<i>MAX Continuous load Rating:</i>	0.65 Amps	1.3 Amps	0.65 Amps	1.3 Amps	0.65 Amps	1.3 Amps
<i>MAX Pulse Rating:</i>	0.88 Amps	1.76 Amps	0.88 Amps	1.76 Amps	0.88 Amps	1.76 Amps
<i>Instantaneous Trip Rating:</i>	1.3 Amps	2.6 Amps	1.3 Amps	2.6 Amps	1.3 Amps	2.6 Amps
<i>Operating Temperature Range:</i>	-20 to 130°F (-29 to 55°C)				-4 to 130°F (-20 to 55°C)	
<i>Storage Temperature Range:</i>	-40 to 160°F (-40 to 71°C)					
<i>MAX Abusive Temperature (non-operating):</i>	195°F (91°C)				172°F (78°C)	

Other data:

Military Type Designations. The military type designations that relate to the PINs covered by this specification sheet are as follows: The BA-5357()/U designation has been used for the Type I PINs; the BA-5557()/U designation has been used for the Type II PINs; and the BA-7557()/U designation was considered for prototypes of the Type III PIN.

All battery types described by this specification sheet have two independent sections with each section designed to provide a nominal 12 volts in use. Sockets 1 and 4 on the connector are for one section; sockets 2 and 5 are the other. Using equipment can connect for either 12-volt or 24-volt operation by connecting these two sections in parallel or series respectively. When required, the state of charge device is located in section 1-4. For batteries with State of Charge data output (PINs ending with "E"), the ground connection for the SOC device is located on the battery connector at pin 1. See table above for differences in performance among the three types.

All battery types covered by this specification sheet are subject to the transportation requirements of 49 CFR 173.185. Types I & III have solid cathodes and more than 2 grams of lithium per battery; Type II has a liquid cathode and more than 1 gram of lithium. Check the appropriate Material Safety Data Sheet for actual lithium content. It should be noted that all non-rechargeable lithium batteries are restricted from shipment as cargo aboard passenger aircraft within, entering, or leaving the US.

All battery types include a complete discharge device in order to render each battery non-reactive after use. If a battery is damaged, or if the device does not operate as indicated by an amber or yellow light, the battery is considered reactive waste. All three battery types,

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whether completely discharged or not, may be recycled after use. Universal waste rules, where applicable, apply only when recycling is the chosen disposal method.

The US Army CECOM Life Cycle Management Command (LCMC) publishes guidelines for the design of battery compartments for devices using the types I & II batteries: Technical Bulletin CECOM-TB-7. Please contact the CECOM LCMC Directorate for Safety at monm-amselsfsec@conus.army.mil for further information.

Navy safety tests of NAVSEA S9310-AQ-SAF-010 are required for this battery during first article testing. The test data provided from the testing will be used to evaluate applications for specific using devices and Navy platforms. Devices using this battery will require US Navy Safety Approval prior to use by Department of Navy users unless such approval has already been granted. Please consult with NAVSEA Instruction 9310.1 for further information.

Custodians:

Army – CR
Navy – NW
Air Force – 99
DLA – GS

Preparing activity:

Army – CR
(Project Number 6135-2006-009)

Review activities:

Navy – SH, AS, MC
Air Force – 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil> or <http://assist.daps.dla.mil/quicksearch/>.