National Library Service for the Blind and Physically Handicapped

The Library of Congress

Approved by Director, NLS/BPH

Date 4/22/03

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THE LIBRARY OF CONGRESS

Technical Certification

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BACKGROUND

The National Library Service for the Blind and Physically Handicapped (NLS) of the Library of Congress administers a free library service to eligible residents of the United States and citizens living abroad who cannot hold, handle, or read traditional print media because of visual or physical handicaps.

Using federal funds, NLS annually publishes approximately 2,000 books and 70 magazines on cassettes, on discs, and in braille. Titles are selected to appeal to a wide variety of interests, and copyright permission is obtained from authors and publishers. Books and magazines are narrated and duplicated at a high-quality professional standard. The quantity produced of any title is dependent on anticipated reader demand.

Playback machines and their accessories are designed to facilitate convenient use by handicapped people and to provide maximum reliability under environmental conditions that are sometimes harsh and handling that may be technically unsophisticated or inadvertently abusive. The equipment plays program materials at noncommercial speeds: 8-1/3 rpm for discs and 15/16 ips, 4-track for cassettes. All materials and equipment in the program can be sent to users and returned to libraries postage free.

A cooperating network of 56 regional libraries and more than 100 subregional libraries circulates recorded and braille books to some 700,000 adults and children out of a potential three million eligible population. Magazine subscriptions are provided on a direct-mail basis from the manufacturers. Users must generally deal with service centers in distant cities with communication by mail or phone and little or no personal contact. Everything comes and goes through a mail-order system. Fifty percent of the users are over sixty-four years old, and many depend on the NLS program for their major source of entertainment and connection with the world; 95 percent read recorded materials, 5 percent read braille.

Users are informed about new books, magazines, and services through bimonthly publications, annual catalogs, and subject bibliographies produced by NLS, and through various publications produced and circulated by the regional and subregional libraries.

USER MATERIALS

Contractors who consider submission of a bid to produce books, equipment, or other program products should be cognizant of the consumer-responsive nature of the program, and that the specifications for these products have been developed to meet the special reader needs in the program. Materials are produced with those reader needs foremost in mind, and improved through constant monitoring and consumer input. Contractors are expected to familiarize themselves with the equipment-handling practices of blind and physically handicapped clientele and ensure that the equipment they produce will stand up under this type of use. A high degree of quality workmanship and product reliability is mandated by the product specification.

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NLS
Specification #603

1. SCOPE

This specification establishes design and performance requirements for rechargeable, nickel-cadmium, batteries supplied for the National Library Service talking-book program.

2. APPLICABLE DOCUMENTS

The following documents and publications, of the issue in effect on the date of the request for proposals, form a part of this specification. In the event of conflict between the documents and publications referenced herein and the content of this specification, the specification shall be the superseding instrument.

Specification

National Library Service, Library of Congress Specification #101, Cassette Playback Machines.

Standards

ANSI/ASQC Z1.4-1993 - Sampling Procedures and Tables for Inspection by Attributes (Equivalent to MIL-STD 105)
Copies of ANSI/ASQC Z1.4-1993 may be obtained from:
AMERICAN SOCIETY FOR QUALITY
611 East Wisconsin Avenue
Milwaukee, Wisconsin 53202

UL-94 - Flammability Classification
Copies of UL-94 may be obtained from:
Underwriters Laboratories Inc.
333 Pfingsten Road, Northbrook, Illinois 60062-2096.

3. REQUIREMENTS

Bid Samples

Bidders are required to submit 10 complete product samples or prototypes with their bid packages. If prototypes are being submitted they must first meet the following requirements:
1. Cell configuration and assembly must fit the dimensional requirements of the injection molded ABS enclosure shown in NLS drawing #57857-000.

2. Each individual cell shall be first insulated with heat shrink tubing made of Polyvinylchloride (PVC) of reasonable thickness, then assembled into the desired configuration.
3.Cells shall be held together in place by heat resistant adhesive, and the assembly shall be covered with external heat shrink PVC tubing.
4. The positive and negative terminals (snap type or integral solid as per para. 3.2) shall be welded to cell, and the terminals shall conform to drawing #57857-000.
5. Insulating spacers between cells may be required to meet the height dimension (see drawing #57857-000)
6.Adhesive may be used to secure the insulator. Insulator shall be applied to the positive end of each single cell and positive end of two (2) cell stacks.
7. All lugs connecting the positive and negative terminal of individual cells shall be spot welded.
8. Individual cells must be matched, documentation certifying compliance must accompany the ten (10) prototypes.
9. Good assembly workmanship shall be observed.

Note: The ten (10) prototype bid samples shall be tested for compliance with para. 3.2, 3.3, 3.4, 3.5, 3.6, 3.9, 3.10, 3.13 and 3.18. Manufacturer must submit with bid samples cell specification sheet verifying compliance with the operating and storage temperature range as specified in para. 3.11. Within sixty (60) days after contract award, two (2) production control samples shall be submitted in accordance with para. 3 (see Production Control Samples).
Records of test data and certification of compliance with the requirements of, or deviations from, this specification shall accompany the samples. The manufacturer shall submit the details of the procedures used for forming, sorting, grading and matching of individual cells for NLS review and approval.

Production Control Samples

After contract award, two samples are to be produced from production tooling. The samples, accompanied by complete test data verifying their compliance with the specification, are to be sent to NLS. Approval of the samples by NLS establishes them as Production Control Samples for all subsequent production. One sample will be retained at NLS and the other will be returned to the contractor. All engineering changed during production will require NLS approval of two new Production Control Samples incorporating the changes.

First Production Lot

Upon written approval of the Production Control Samples, the contractor is authorized to produce 200 units to be shipped to NLS for inspection. Further production or shipment of units to NLS or NLS agencies will not be permitted until the 200 units are approved. Production (not just shipment) is to be stopped between the production of the first 200 units and receipt of approval in writing to continue production.

3.1 Housing

The battery pack shall be enclosed in a plastic housing, dimensioned according to NLS drawing 57857-000, latest revision. There shall be no evidence of seam separation on the exterior of the housing.

3.2 Terminals

Terminals are to be standard snap type, ANSI type XV, or integral (solid) positioned and marked as shown in drawing 57857-000, latest revision. Terminals are subject to the torque test of para. 3.18.

3.3 Construction

All individual cells shall be cylindrical using sintered plate construction; six (6) cells per package.

3.4 Terminal Voltage

Terminal voltage of the battery pack shall be 7.8 volts minimum (full charge).

3.5 Capacity

The minimum capacity of the battery pack at a 0.175 amperes discharge rate to 6.0 volts (1.0 volts per cell) shall be 1.4 ampere-hours at 20E C ± 2.8E C (68 ± 5E F). Individual cells in any given battery pack shall have matched capacities.

3.5.1 Over-charge Limitation

The battery shall not be externally deformed when the battery is over-charged at c/10 rate for 48 hours at an ambient temperature of 20E C ± 2.8E C (68 ± 5E F).

3.5.2 Over-discharge Limitation

The battery shall not be externally deformed and no evidence of electrolyte leakage shall be observed when it is over-discharged using a resistive load of 10 ohms for 24 hours at an ambient temperature of 20E C ± 2.8E C (68 ± 5E F).

3.6 Charge Rate

The Battery pack shall accept a charge for 16 to 20 hours at 0.16 amperes [c/7.5 rate, 20E C ± 2.8E C (68 ± 5E F)].

3.7 Internal Resistance Per Cell

The internal impedance per cell at 1,000 Hz shall be 0.1 ohms maximum.

3.8 Life

Under normal conditions of 20E C ± 2.8E C (68 ± 5E F) and at a constant charge and discharge rate of 580mA ± 5% to 1.0 volt per cell, the average cycle life shall be 500 full charge/cutoff charge cycles. (Use battery analyzer model #BC3506QP-5 manufactured by ITECH , or equivalent.

3.9 Venting

Safety venting shall be provided.

3.10 Charge Retention

Battery shall be capable of retaining 50% of full charge at 25E C ± 2.8E C (77 ± 5E F) for a storage duration of 90 days, minimum.

3.11 Operating and Storage Temperature Range

The battery pack shall be designed to operate over the following temperature range:

1. -20E C to 45E C (-4E F to 113E F) at the specified discharge rate of c/7.5.
2. -20E C to 45E C (-4E F to 113E F) for storage (relative humidity 85%).
3. 5E C to 45E C (41E F to 113E F) at the specified charge rate of c/10.

3.12 Battery Case Color

Case shall be steel gray, flame retardant ABS, U.L. 94V-O.

3.13 Discharge Characteristics

The discharge characteristics of the battery pack shall be measured while discharging from a full charge at 0.175 amperes at 20E C ± 2.8E C (68 ± 5E F). The battery pack voltage shall measure 6.0 volts or higher after an 8 hour discharge rate at 0.175 amperes.

3.14 Weight

The weight of the battery pack, inclusive, shall be 300 grams (10.5 ounces) minimum, 375 grams (13.2 ounces) maximum

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3.15 Drop Test

The battery pack shall be dropped on each of the four sides without terminals, from a height of 20 cm (8 inches) onto a hard wood surface. Upon completion of this test, the battery pack shall meet all electrical specifications and dimensional requirements.

3.16 Vibration Test

The battery pack shall be placed in a test fixture that holds the terminals and firmly fixes their position and shall then be subjected to a vibration test of one (1) hour duration at a displacement of 6mm (0.24 inches) in the X, Y and Z direction and at a frequency of 35 Hertz. Upon completion of this test, the battery pack shall meet all electrical specifications and dimensional requirements and mechanical terminal connections shall not be affected.

3.17 Humidity Test

The battery pack shall be subjected to a humidity soak at 35E C (95E F) and relative humidity of 85 percent for a period of ten (10) days. Upon completion of this period, the battery pack shall be inspected for evidence of electrolyte leaks and shall meet all electrical specifications and dimensional requirements.

A report of verification of the drop, vibration and humidity tests shall be submitted to NLS with the first production lot (see paragraph 3, First Production Lot).

3.18 Torque Test

Battery terminals shall be capable of withstanding a minimum twist torque of 2400 g-cm (33.3 ounce-inches) without weld breaks or turning of the riveted pieces. (Use Waters Torque Watch model #651C-2M, Manufactured by : Data Instruments, or equivalent

3.19 Destruct Test

Every four hours during production, two samples shall be rapped sharply on a solid surface, hitting the cover end two times on the edge of each side. The battery pack shall then be examined for evidence of poor plastic welding of case to cover, broken terminal welds or broken solder joints.

3.20 Workmanship

Battery packs shall be manufactured, assembled and processed in a careful and workmanlike manner in accordance with good assembly practice.

3.21 Warranty Provisions

The manufacturer shall warrant the batteries for a one (1) year period.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling Inspection Plan

The contractor is required to use a lot inspection sampling plan for the following specification requirements:

Section 3.1	Housing Dimensions
Section 3.2	Terminals
Section 3.4	Terminal Voltage
Section 3.13	Discharge Characteristics
Section 3.18	Torque Test
Section 3.15	Drop Test

A lot is defined as 10,000 batteries.
The acceptable quality level (AQL) shall be 0.65%. Samples shall be taken in accordance with ANSI/ASQC Z1.4-1993, Sampling Procedures and Tables for Inspection by Attributes.

4.2 Production Lot Samples

The contractor is required to send to NLS Quality Assurance Section for acceptance and shipping approval, one box consisting of random samples from each day's production for a total of 48 samples per production lot. The manufacturer's inspection reports must accompany the 48 samples. If any of the representative sample units are rejected for defects, the production lot shall be 100% reinspected by the contractor at no additional cost to NLS.

4.3 Rejected Lots

Lots found unacceptable shall be resubmitted for reinspection only after all units are re-examined or retested and all defective units are removed or defects corrected. NLS Quality Assurance Section shall determine whether normal or tightened inspection shall be used in accordance with ANSI/ASQC Z1.4-1993.

4.4 Reporting of Test Results

The contractor shall maintain a complete record of all test results for the duration of the contract. Records of lot sampling shall be sent to NLS Quality Assurance Section on a weekly basis. These records should include lot number, date of production, quantity of lot, defects, passed or failed and date of inspection.

4.5 Quality Control Plan

The contractor is required to provide written documentation showing that his methods of quality control incorporate those established under this specification requirement. The contractor is required to submit a quality control organization chart to NLS. NLS must approve of quality control procedures at the time of production control submission.

4.6 Rework

Should NLS determine that significant faults have been found in production units, then correction of the fault or faults in previously produced units and production inspections or controls for prevention shall be instituted without additional charge to NLS.

4.7 Recall

Batteries produced are subject to recall, based on the criteria under the Quality Assurance Section of this specification. It shall be the prerogative of the contracting officer or his duly authorized representative, to institute a recall at his discretion.

4.8 NLS Inspection

The National Library Service, Library of Congress, reserves the right to inspect any process or tests being performed. The Library representative shall have the authority to select, at random, a sample of the battery at any time during the course of the contract or a full inspection plan in accordance with ANSI/ASQC Z1.4-1993, for testing to the specified requirements. The right is reserved by the National Library Service to reject any production lot represented by a tested sample which has been rejected.

4.9 Test Requirements

Subject to the approval of NLS, a test procedure to determine prototype and production unit compliance with the requirements of this specification shall be prepared by the contractor.

5. PREPARATION FOR DELIVERY

5.1 Battery Label

Label shall contain the following information:

a. Battery, nickel-cadmium
b. Voltage and ampere-hours as specified by vendor (e.g 7.2V 1400mAh)
c. Manufacturer's catalog or part number and name of manufacturer
d. Date code of manufacture
e. Lot number
f. Warning statement cautioning against disassembly, improper disposal, short circuit or burning.

5.2 Battery Packaging

Batteries are to be packaged no more than 48 per carton, subject to NLS approval.

5.3 Packaging Requirements

Batteries are to be protected from electrical and mechanical contact between batteries during shipment. Cartons are to be of a suitable cardboard material sufficient in strength to meet the following requirements:

(a) Burst test of 350 pounds per square inch.

(b) Capable of a gross weight limit of 90 pounds, acceptable for safe transit through the U.S. Postal System, and subject to the approval of the Library of Congress Contracting Officer or his duly authorized representative.