

**National Library Service
for the Blind and
Physically Handicapped**

The Library of Congress

Approved by Director, NLS/BPH

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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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1. SCOPE

This specification defines the requirements for C-0, twin-hub, coplanar tape cassettes, suitable for use in the Library of Congress, National Library Service for the Blind and Physically Handicapped (NLS), talking-book program.

2. APPLICABLE DOCUMENTS

The following documents and publications, of the issue in effect on the date of the invitation for bids, 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 content of this specification shall be considered a superseding requirement.

Specifications: 101-1 Cassette Machine C-1

Standards:

MIL-STD 105 - Sampling Procedures and Tables for Inspection by Attributes

International Electrotechnical Commission (IEC) Recommendations: IEC 94 Parts 1 through 5: Magnetic Tape Recording and Reproducing Systems: Dimensions and Characteristics. Part-7: (1986) Cassette for commercial tape recording and domestic use.

(Copies may be obtained from the American National Standards Institute, 1430 Broadway, New York, New York 10018.)

Electronic Industries Association (EIA) Standards: RS-399-A - Dimensional Standard Coplanar Magnetic Tape Cartridge Type CP II.

(Copies may be obtained from the Electronic Industries Association, Engineering Department, 2001 Eye Street, N.W., Washington, D.C. 20006.)

3. REQUIREMENTS

3.1 General

The C-0 cassettes, including leader, furnished under this specification shall be new and certified as having a twenty year "shelf" life expectancy. The cassette shall be designed in accordance with the requirements given in IEC 94-7 and EIA RS-399-A as specified herein. Each molded

plastic part of the cassette shall be marked with a unique mold identifier.

3.2 Qualification

The items furnished under this specification shall be products that have been tested and passed the qualification tests specified herein. Items that pass the qualification tests shall be under engineering change control and are considered qualified by NLS for the remainder of the Library of Congress contracting period.

3.2.1 Product or process change

Qualification, once established, applies only to those cassettes manufactured by the same process used to make the cassettes that passed the qualification tests. Qualification inspection shall be performed on new products, and on previously qualified products which have undergone any changes in design, materials, component parts, or manufacturing process.

3.2.2 Qualification by Contractor

Upon completion of contractor's qualification inspection, the 8 tested samples, complete inspection data, and 20 untested samples consisting of 8 C-90 and 12 C-0 cassettes, shall be submitted to NLS. Upon completion of the qualification inspection by NLS, we will send a C-0 production control sample to the contractor for reference.

3.2.3 Qualification by Purchaser

NLS will send a C-0 production control sample of each qualified cassette to each current purchaser. The purchaser shall obtain from the contractor 16 untested C-0 samples, a copy of the contractor's qualification inspection data, and certification that no changes have occurred. The purchaser shall load the samples, perform the qualification inspection on 8 of the samples, and compare that data with the contractor's data and with the production control sample to confirm that no changes have occurred. Upon completion of purchaser's qualification inspection, 8 untested C-90 samples, 8 tested C-90 samples with complete data, and a copy of the contractor's data shall be submitted to NLS.

3.3 Materials

All materials used in the construction of the NLS C-0 cassette shell must be certified to have a

twenty year life expectancy. The cassettes shall be constructed of non-magnetic materials suitable for the intended use and shall conform to the physical, dimensional, and other requirements specified herein. The contractor shall certify that no changes in materials have taken place for each lot.

3.3.1 Cassettes

The C-0 cassette shells shall be white in color. The plastic parts used in the C-0 cassettes are limited to the following approved materials.

1. Shells: medium impact high heat styrene (for example Huntsman PS-314 or FINA 680)
2. Hubs: an acetal copolymer or equivalent (for example Celanese celcon)
3. Guide Rollers: same as item #2

3.3.2 Flammable materials

Cassette components which ignite from a match flame, and when so ignited continue to burn in a still carbon dioxide atmosphere, shall not be used. Certificate of compliance shall accompany qualification samples.

3.3.3 Toxicity

Cassette components which may cause bodily harm by contact, inhalation or ingestion shall not be used. Certificate of compliance shall accompany qualification samples.

3.4 Cassette dimensional measurements

The cassette dimensions shall conform to the measurements given in EIA RS-399-A.

3.5 Cassette physical requirements

3.5.1 Cassette assembly

Cassette halves shall be bound together with five screws. The finish of the cassette halves shall be smooth and clean. There shall be no flash, cracks, gaps, bumps, lips, or

teats on the front of the cassette housing, where the two cassette halves come together or on any parting line. The contractor shall specify the screws so that the cassette shell holes may be randomly retapped to a torque of ten ounce inches five times. The cassettes shall be supplied with their record-protect tabs removed.

3.5.1.1 Cassette drop resistance

The cassette shall remain bound together with no dislocation or breakage of parts within the overall tolerances given in EIA RS-399-A, and must meet all the specifications and perform satisfactorily in the standard reproducer after being subjected to the drop tests of 4.7.6.1 and 4.7.6.2.

3.5.2 Corner tape guides

Rotating idler-roller corner tape guides shall be provided. These tape guides shall be flanged and shall have a minimum hub diameter of 7.11 mm (0.280 in) and be secured to the cassette shell using an inserted stainless steel pin (lubricated) or a molded plastic support post.

3.5.3 Windows

Each side of the cassette shall be provided with a window. Minimum viewable dimensional measurements shall be 6.35 mm (0.25 in) wide and 19.05 mm (0.75 in) long. The windows shall be constructed of a material suitable for the intended use. Each window shall be capable of withstanding a force of 1.59 kg (3.5 lbs) distributed over an area equal to the minimum viewable area without loosening from the cassette or cracking. There shall be no excess adhesive around the window edges.

3.5.4 Friction liners

Cassettes shall be provided with anti-friction liners. Liner configuration, material, coating and impregnation are subject to the approval of NLS. Liners shall be evenly coated or impregnated with solid lubricant and shall be of uniform workmanship free from manufacturing defects, shall not fray, tear, or wrinkle, and shall exhibit no shredding or shedding of debris. The tape contact surface of the liner shall be electrically conductive to reduce build up of static charge to the tape. The electrical resistance of the liner measured between the ends of its longest dimension shall be less than 2 Megohms.

3.5.5 Hubs

The hubs are to be designed with a large margin of safety to assure no breakage (i.e. rugged hubs designed with no thin flanges). The hub mold-injection-point shall not be on any part of the hub where it can be in contact with the tape or the friction liners. The hubs shall be constructed in such a way that no hub breakage shall occur as a result of the drop test of section 4.7.6. The hub shall be constructed in such a way that no bulging or depression of the tape occurs when the tape is wound around the hub and no dislodging of the hub occurs under normal conditions of cassette operation.

3.5.6 Pressure pad assembly

The pressure pad assembly shall consist of a device to apply a uniform contact pressure between the tape and the record/reproduce head and shall meet the requirements of 3.7.3 and 3.7.4. The material used for the pad shall not deteriorate during the life of the cassette.

3.5.7 Magnetic shield

Each cassette shall be provided with a hum-reducing shield positioned directly behind the pressure pad, in accordance with EIA RS-399A.

3.5.8 Label area

Each cassette shall be provided with two label areas in conformance with those given in EIA RS-399-A.

3.6 Tape leader

The C-0 cassette shell shall be provided with a polyester or equivalent leader attached to both hubs. The leader shall be blue in color.

3.6.1 Dimensions

The leader shall be 26 in. (66.04 cm) minimum, 30 in. (76.20 cm) maximum long, 0.145 in. (3.68 mm) minimum, 0.150 in. (3.81 mm) maximum wide, with a thickness of 0.002 in. (0.0508 mm) maximum.

3.6.2 Leader-to-hub connections

Leader-to-hub connections shall be capable of withstanding a minimum force of 1 kilogram (2.2 pounds) for 10 seconds.

3.7 Mechanical requirements

3.7.1 Maximum friction torque of both hubs (with C-90 load)

The friction torque of both hubs, measured in the cassette itself at the nearly full hub, shall not exceed 0.0027 N-m (0.38 oz-in) when measured in accordance with 4.7.5.2.

3.7.2 Maximum friction torque of both hubs with hold back torque (with C-90 load)

With a hold back torque of 0.0008 N-m (0.113 oz-in) applied to the nearly empty hub, the required torque to be applied to the nearly full hub, when moving tape, shall not exceed 0.0055 N-m (0.78 oz-in) when measured in accordance with 4.7.5.2.

3.7.3 Pressure pad area and leaf spring

The size shall be 0.150 to 0.275 inches (parallel to the direction of tape travel) by 0.200 to 0.275 inches (perpendicular to the direction of tape travel). The pad shall be centered to within 0.010 inches (in reference of the tape width) in the cassette. The spring shall be manufactured of phosphor-bronze no substitutions are permitted.

3.7.4 Pressure pad pressure and adhesion

When the magnetic head is inserted into the cassette in accordance with the maximum dimension given in EIA RS-399-A, the pressure of the pad on the magnetic head over the head to pad contact area shall be 0.005 to 0.015 N/mm² (0.73 to 2.18 psi). The pressure pad shall only be removable from the spring by separation of the pad fibers at 55 degrees C (131 degrees F). The adhesive bond must not fail.

3.8 Mechanical operation (with C-90 load)

When tested in accordance with 4.7.7 in a quiet room, the loaded cassettes shall not emit noises in the "play mode", that are above the acceptable noise level of the NLS cassette player. Cassettes shall not jam or spill tape into the machine.

3.9 Environmental extremes

When tested in accordance with 4.7.13, cassettes shall not warp and shall conform to the mechanical requirements specified in 3.7, after being subjected to the following:

- a. 76.7 degrees C +0, -5 degrees C (170 degrees F +0, -9 degrees F) at to 30% relative humidity for 24 hours
- b. -30 degrees C +5, -0 degrees C (-22 degrees F +9, -0 degrees F) for 24 hours
- c. 45 degrees C \pm 5 degrees C (113 degrees F \pm 9 degrees F) at a relative humidity of 90% \pm 5% for 24 hours.

3.10 Workmanship and general examination

The cassette shall be manufactured and processed in a careful and workmanlike manner in accordance with good commercial practice.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection

The contractor is responsible for the performance of all inspection requirements as specified herein. NLS reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to assure that supplies and services conform to the prescribed requirements.

4.1.1 Responsibility for compliance

All items must meet all requirements of section 3 and 5. The inspections set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the purchaser for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize the submission of known defective material, either indicated or actual, nor does it commit the purchaser to acceptance of defective material. Should the purchaser determine that a significant fault or faults be 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 the purchaser.

4.1.2 Test equipment and inspection facilities

The contractor shall insure that test and inspection facilities of sufficient accuracy, quality and quantity are established and maintained to permit performance of required inspections.

4.1.3 Reporting of test results

The contractor shall maintain a complete record of all inspection results for the duration of the contract. Copies of these inspection records (in English) shall be provided with each shipment. The records shall include the information necessary to identify the lot, the lot sample, the testing equipment, the inspector, and the date of the test.

4.2 Classification of inspections

The inspection requirements specified herein are classified as follows:

- a. Qualification Inspection
- b. Incoming Inspection
- c. Contractor's Lot Acceptance Inspection
- d. Purchaser's Lot Acceptance Inspection

4.3 Inspection conditions

Sampling for inspections shall be performed in accordance with MIL-STD 105.

4.4 Qualification inspection

Qualification inspection shall be performed on new products, and on previously qualified products which have undergone any changes in design, materials, component parts, or manufacturing process.

4.4.1 Sample size

The qualification sample shall consist of eight C-90 loaded cassettes. The sample shall be taken at random from a production run and shall be produced with equipment and

procedures normally used in production.

4.4.2 Inspection routine

Sample units shall be subjected to the qualification inspection specified in table I in the order shown.

4.4.3 Failures

Any failures shall be cause for refusal to grant qualification.

4.4.4 Qualification inspection data

Qualification inspection data shall include data for all dimensions or other measurements required by the inspections of table I for all samples. Use of go/no-go gauges shall not be acceptable.

TABLE I. QUALIFICATION INSPECTION

| Examinations, Measurements, and Tests | Requirement Paragraph | Test Method Paragraph |
|--|---|--------------------------|
| General examination | 3.5.1, 3.5.3, 3.5.6, 3.5.7, 3.5.8, 3.6, 3.10 | 4.7.3 |
| Dimensions | 3.4 | 4.7.4 |
| Window stress | 3.5.3 | 4.7.9.2 |
| Pressure pad pressure | 3.7.4 | 4.7.5.1 |
| Friction torque | 3.7.1 & 3.7.2 | 4.7.5.2 |
| Cassette drop test | 3.5.1.1 | 4.7.6.1 |
| Container drop test | 3.5.1.1 | 4.7.6.2 |
| Friction torque | 3.7.2 | 4.7.5.2 |
| Internal visual examination | 3.5.1.1, 3.5.4 & 3.5.5 | 4.7.10 |
| Corner tape guides | 3.5.2 | 4.7.8 |
| Leader dimensions | 3.6.1 | 4.7.12.1 |
| Leader to hub strength | 3.6.2 | 4.7.12.2 |
| Friction liner conductivity | 3.5.4 | 4.7.12 |
| Cassette assembly | 3.5.1 | 4.7.14 |
| Pressure pad area | 3.7.3 | 3.7.3 |

TABLE I. QUALIFICATION INSPECTION (Continued)

| Examinations, Measurements, and Tests | Requirement Paragraph | Test Method Paragraph |
|--|-----------------------|--------------------------|
| Friction torque | 3.7.2 | 4.7.5.2 |
| Mechanical operation | 3.8 | 4.7.7 |
| Flammability | 3.3.2 | 3.3.2 |
| Toxicity | 3.3.3 | 3.3.3 |
| Pressure pad adhesion | 3.7.4 | 4.7.5.1.1 |

4.5 Incoming inspection

Incoming inspection shall be performed by the contractor on any and all component parts not manufactured by the contractor.

4.5.1 Sample size

The incoming inspection sample shall be chosen at random in accordance with MIL-STD 105 inspection level II for an AQL of .65%.

4.5.2 Inspection

All component parts not manufactured by the contractor shall be examined visually and, if applicable, measured dimensionally or electrically for conformance to the requirements of this specification.

4.6 Lot acceptance inspection

Lot acceptance inspection shall be performed by the contractor and the purchaser on each lot of cassettes.

4.6.1 Inspection lot

4.6.1.1 Contractor's Inspection lot

A contractor's inspection lot shall consist of all cassettes produced under essentially the same conditions for shipment to a single purchaser.

4.6.1.2 Purchaser's inspection lot

A purchaser's inspection lot shall be as defined in MIL-STD 105 and shall consist of all cassettes received from the contractor in a single shipment.

4.6.2 Inspection routine

Lot acceptance inspection shall consist of the inspections specified in table II, and shall be made on the same set of sample units, in the order shown.

4.6.3 Sampling plan

The lot sample shall be chosen at random in accordance with MIL-STD 105 inspection level II for .65% AQL. Group A inspections shall be performed on the entire sample. Samples for group A shall not be loaded. Group B inspections shall be performed on 10% of the lot sample. Samples for group B shall be loaded with a C-90 load of tape. The contractor may select samples periodically (e.g. hourly) during production provided the total number of samples equals the lot sample specified above.

4.6.4 Rejects

4.6.4.1 Group A

The allowable number of rejects for group A shall be as specified by the MIL-STD 105 sampling plan.

4.6.4.2 Group B

Any reject in any inspection of group B shall cause the lot to be rejected.

4.6.5 Rejected lots

Rejected contractor's or purchaser's inspection lots may be resubmitted for acceptance only if the contractor performs 100-percent inspection on cassettes of the lot for those characteristics which were defective and resulted in rejection of the lot and removes all defective units and resubmits the lot for lot acceptance inspection.

TABLE II. LOT ACCEPTANCE INSPECTION

| Examinations, Measurements, and Tests | Requirement Paragraph | Test Method Paragraph |
|--|--|--------------------------|
| GROUP A: | | |
| General examination | 3.5.1, 3.5.3, 3.5.6, 3.5.7, 3.5.8, 3.6 & 3.10 | 4.7.3 |
| Internal visual examination | 3.5.1.1, 3.5.4 & 3.5.5 | 4.7.10 |
| GROUP B: | | |
| Dimensions | 3.4 | 4.7.4 |
| Window stress | 3.5.3 | 4.7.9.2 |
| Pressure pad pressure | 3.7.4 | 4.7.5.1 |
| Cassette drop test | 3.5.1.1 | 4.7.6.1 |
| Friction torque | 3.7.1 & 3.7.2 | 4.7.5.2 |
| Internal visual examination | 3.5.1.1, 3.5.4 & 3.5.5 | 4.7.10 |
| Leader dimensions | 3.6.1 | 4.7.12.1 |
| Leader to hub strength | 3.6.2 | 4.7.12.2 |

4.6.6 Acceptance inspection data

The contractor shall provide lot acceptance inspection records with each shipment to a single purchaser. For each periodic inspection, these records shall identify the lot and include time and date, number of samples, inspector identification, accept or reject and details of any corrective action taken. Go/no-go gauges may be used when appropriate.

4.7 Methods of inspection

4.7.1 Test environment

Unless otherwise specified, all measurements and tests shall be performed at an ambient temperature of 23 degrees C \pm 5 degrees C (73.4 degrees F \pm 9 degrees F) and a relative humidity of between 40 and 70%.

4.7.2 Preliminary conditioning

Test units shall be subjected to the test environment of 4.7.1 for a period of not less than 24 hours prior to performance of any measurement or test specified herein.

4.7.3 General examination

Test units shall be visually and aurally examined for conformance to the applicable requirements of 3.5.1, 3.5.3, 3.5.6, 3.5.7, 3.5.8, 3.6 and 3.10.

4.7.4 Cassette dimensions

The following listed dimensions shall be measured for conformance to EIA RS-399-A.

- (a) Length
- (b) Width
- (c) Height at front
- (d) Height at rear
- (e) Locating holes width and height
- (f) Reference line to front edge
- (g) Locating holes location left to right
- (h) Capstan holes diameter and location
- (i) Head and pressure roller openings
- (j) Hub holes diameter and location
- (k) Spindle hole diameter inside spokes
- (l) Label area length and width
- (m) Window length and width

4.7.5 Cassette mechanical measurements

4.7.5.1 Pressure pad pressure

The pressure pad force shall be measured with head insertion of .132 inch from the reference line (RS-399-A Fig. A2). This force shall be divided by the area of the pressure pad for conformance to the requirement of 3.7.4.

4.7.5.1.1 Pressure pad adhesion

A 500 gram weight shall be suspended from the edge of the pad for ten minutes at a temperature of 55 degrees C (+0, -5). The adhesive securing the pressure pad must not separate from the spring. The pressure pad assembly shall be suspended from one end of the spring in a vertical orientation, from a fixture that will hold the assembly stable. The 500 gram weight shall be suspended from the top edge of the pressure pad by a hook with a flat edge equal in width to the top edge of the pressure pad.

4.7.5.2 Friction Torque

With no holdback torque applied to the supply reel and with the nearly full reel on the take-up side, note the average torque reading for conformance to requirement 3.7.1. Repeat the foregoing test with a holdback torque of 0.0008 N-m (0.113 oz-in). Note the average torque reading for conformance to the requirements of 3.7.2.

4.7.6 Drop test

4.7.6.1 Cassette drop test

Each C-90 loaded cassette shall be dropped four times from a height of 30 inches onto a concrete floor. The tape shall be fully wound onto one hub. The first two drops shall be on alternate ends and the second two drops shall be on alternate faces. Upon completion of the drops, test for conformance to the requirement of 3.7.2. and inspect the cassettes for breakage, cracks or dislocation of any parts.

4.7.6.2 Mailing container drop test

Each C-90 loaded cassette shall be placed in an NLS 4-cassette mailing container and dropped twice from a height of 6 feet onto a concrete floor covered with asphalt tile. The container shall be dropped once on each long edge. Upon completion of the drops, the cassettes and hubs shall be inspected as in section 4.7.6.1.

4.7.7 Short-term operation test

The cassette to be tested shall be subjected to one fast cycle to determine conformance to 3.8. A fast cycle shall consist of fast rewinding the tape from end-to-end in one direction then turning the cassette over and fast rewinding the tape from end-to-end in the other direction. Upon completion of the fast cycle the cassette shall be placed in a NLS cassette player that has met the requirements of Specification 101, section 3.12. (mechanically generated noise emitted while the cassette book machine is in the play mode with the volume control at minimum setting and the cassette tray empty) The mechanically generated noise of this player shall not exceed 22 dBA at one meter. The cassette inserted in the player shall not emit mechanical noise above the acceptable limit of the machine.

4.7.8 Corner tape guides

The cassette corner tape guide hub diameter shall be measured for conformance to the requirements of 3.5.2.

4.7.9 Windows

4.7.9.1 Window dimensions

The length and width of the windows shall be measured for conformance to the requirements of 3.5.3.

4.7.9.2 Window stress

Each window shall be subjected to the pressure specified in 3.5.3, and inspected for conformance to the requirements of 3.5.3.

4.7.10 Cassette internal visual examination

The cassette shall be opened and visually examined for conformance to the applicable requirements in 3.5.4 and 3.5.5.

4.7.11 Friction liner conductivity

The resistance of each friction liner shall be measured from end to end of its longest dimension for conformance to the requirement of 3.5.4.

4.7.12 Leader

4.7.12.1 Leader dimensions

The tape leader length, width and thickness shall be measured for conformance to the requirement of 3.6.1.

4.7.12.2 Leader to hub connection

The leader-to-hub connection shall be subjected to the force specified in 3.6.2 and inspected for conformance to the requirement of 3.6.2.

4.7.13 Environmental tests

Two samples shall be subjected to the high temperature, two to the low temperature, and two to the humidity conditions of 4.7.13.1, 4.7.13.2, and 4.7.13.3, and shall then be retested for conformance to the mechanical requirements of 3.7.2 and 3.8.

4.7.13.1 High temperature

The cassettes under test shall be subjected to 76.7 degrees +0 degrees, -5 degrees C (170 degrees +0 degrees, -9 degrees F) and a relative humidity of between 0% and 30% for a period of 24 hours. The cassettes shall be brought back to the test environment of 4.7.1 at a temperature gradient of no greater than 25 degrees C (45 degrees F) per hour and shall remain at test environment at least 2 hours before further tests.

4.7.13.2 Low temperature

The cassettes under test shall be subjected to -30 degrees +5 degrees, -0 degrees C (-22 degrees +9 degrees, -0 degrees F) for a period of 24 hours. The cassettes shall be brought back to the test environment of 4.7.1 at a temperature gradient of no greater than 25.0 degrees C (45 degrees F) per hour and shall remain at test environment at least 2 hours before further tests.

4.7.13.3 Humidity

The cassettes under test shall be subjected to 45 degrees \pm 5 degrees C (113 degrees \pm 9 degrees F) and a relative humidity of 90% \pm 5% for a period of 24 hours. The cassette temperature shall be returned to the test environment of 4.7.1 by opening the test chamber door and allowing the cassette temperature to stabilize to the test environment for at least 2 hours before further test.

4.7.14 Cassette assembly

Each screw shall be removed and replaced with the torque specified in 3.5.1 five times. The specified torque shall then be applied to each screw and held for 10 seconds. The screw shall not turn.

5. PREPARATION FOR DELIVERY

5.1 Marking

In addition to any special or other identification marking required by the contract, each container of lot samples shall be marked with the contractor's inspection lot number.

6. NOTES

6.1 Definitions

6.1.1 Contractor

The contractor shall be defined as the manufacturer of the C-0 cassette shells specified herein.

6.1.2 Purchaser

The purchaser shall be defined as the duplication contractor who procures C-0 cassette shells which comply with this specification for the purpose of producing recorded NLS cassette books.