SRI LANKA STANDARD 491:1994

UDC 686 . 863 . 76

SPECIFICATION FOR

BALL POINT PENS

(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

SPECIFICATION FOR BALL POINT PENS

(FIRST REVISION)

SLS 491 : 1994

Gr. 9

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR BALL POINT PENS
(FIRST REVISION)

FOREWORD

This standard was approved by the Sectoral Committee on Fundamental Standards, Road vehicles and Industrial safety and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on1994.01.13

This standard is the first revision of SLS 491 Specification for ball point pens published in 1980. Ball point pens are expected to have good writing quality and a reasonable life. This standard covers the requirements of materials, dimensions and functional tests to ensure good writing quality, effective working and durability of ball point pens.

Guidelines for the determination of compliance of a lot with the requirements of this standard based on statistical sampling and inspection is given in Appendix A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or an observation shall be rounded off in accordance with SLS 102. The number of figures to be retained in the rounded off values shall be the same as that of the specified value in this standard.

In the preparation of this standard, the assistance derived from the following publications is gratefully acknowledged:

a) IS 10559 : 1983.
SPECIFICATION FOR JOTTER BALL POINT PENS

b) SS 273 : 1983.
SPECIFICATION FOR BALL PEN

1 SCOPE

This Sri Lanka Standard specifies the requirements of the following types of single-refill ball point pens:

a) Type A non-retractable with replaceable refill;
b) Type B non-retractable with non-replaceable refill;
c) Type C non-retractable without a refill; and
d) Type D retractable with replaceable refill.

2 REFERENCES

SLS 102 Presentation of numerical values
SLS 428 Random sampling methods
SLS 511 Ball point pen refills
SLS 868 Printing paper and writing paper

3 DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

3.1 ball : The metal ball seated at the end of the writing tip.

3.2 constriction : A constriction upon the refill or ink storage space, which holds the ink in place.

3.3 barrel (holder) : The body of the pen, into which, the refill is fitted, in the case of pens having a refill;
or the body of the pen, containing ink and into which the writing tip is fitted, in the case of pens without a refill.

3.4 writing tip (point) : The seat of the ball, fitted to the ink tube, in the case of pens having a refill; or
the seat of the ball, fitted to the barrel, in the case of pens without a refill.

3.5 refill (ink cartridge) : The part of a ball point pen, having a writing tip connected to a tube, which contains ink.

3.6 stop (crimp) : For retractable type of pens, the widened part of the ink tube, which serves to retain the spring.

3.7 tube (ink container) : The part of the refill, which contains ink.

4 REQUIREMENTS

4.1 Material

4.1.1 The material used in the manufacture of ball point pens shall be either plastic or metal or a combination of these. They shall be compatible with each other under normal conditions. The plastics shall be of suitable hardness and rigidity and shall have very low moisture absorption properties. All materials shall be non-toxic.

4.1.2 The plastic parts shall be nonflammable or flame resistant or slow burning, when tested as described in the flammability test prescribed in 8.1.

4.1.3 All the metal parts shall be corrosion resistant and shall pass the corrosion resistance test, pescribed in 8.2.

4.1.4 For retractable type of pen, the spring (when used) shall be made of spring steel and shall pass the test prescribed in 8.3.

4.2 Manufacturer

4.2.1 *Barrel*

4.2.1.1 The barrel shall be designed and constructed to fit well with the refill or writing tip, where applicable, so that the writing tip does not shake or retract while writing.

4.2.1.2 For plastic barrel, the colour of the ink shall be indicated by the colour of the barrel of the pen, or by the colour of one or both extremities of pen.

4.2.1.3 The ball point pen shall be made to provide a comfortable finger grip for writing.

4.2.1.4 All mating parts shall mate in such a way as to avoid any shake or play. The threaded parts used, shall be interchangeable.

4.2.2 *Refill (ink cartridge)*

4.2.2.1 For pen types having a refill, the refill shall conform to SLS 511.

4.2.2.2 For all types of pens, the projection of the writing tip from the barrel, shall be 3.0 $\pm$ 1.0 mm. For type D pen, when retracted, the ball of the writing tip shall be at least 1 mm inside, from the end of the barrel.

4.2.3 *General*

4.2.3.1 For pen type without a refill, the writing tip together with the ball shall conform to the relevant requirements of SLS 511.

4.2.3.2 When replacing the refill of retractable type of pen, no part of the propelling and retracting mechanism shall become disassembled by falling apart or dropping from the barrel.

4.3 Performance

4.3.1 *Propelling and retracting the refill*

For the retractable type of pen, the barrel, the actuating mechanism and the orifice for the writing tip shall all be concentric. When the refill is to be replaced, all parts of the actuating mechanism shall easily reassemble and shall also be in a good working condition. The propulsion of the refill shall be by any convenient mechanism, such that there shall be no failure in either propelling or retracting the refill. The mechanism shall propel the writing tip accurately through the tip-opening of the pen barrel and shall lock the propelled tip, so that it shall not retract automatically, while writing. Retractable type of pens shall pass the functional test, prescribed in 8.4.

4.3.2 Strength and durability

The pen, complete with the refill conforming to SLS 511 (where applicable), shall fulfill the following requirements when subjected to the load test prescribed in 8.5:

a) There shall be no impairment of the refill or writing tip; and

b) There shall be no permanent set, breaking or cracking of the barrel

4.3.3 Writing quality

4.3.3.1 The pen shall write a continuous line of length at least 1100 m.

4.3.3.2 The pen shall satisfy the requirements of 4.3.3.3 when tested as prescribed in 8.6.

4.3.3.3 In the writing quality test, a machine written smoothness and line continuity is tested. The combined density variation "units" and skips (see Figures 1 and 2) shall not be more than 10 for the first 300 m of writing and shall not exceed 50 for the whole written line of 1100 m.
(A density variation "unit" is a length of line written in one machine revolution or less, in which the defect occurs). Blobs (see Figure 3) shall not average more than 15 per 300 m of writing with a maximum of 25 for any 300 m increment. Dotting (see Figure 4) shall not be present in more than 10 per cent of the written line.

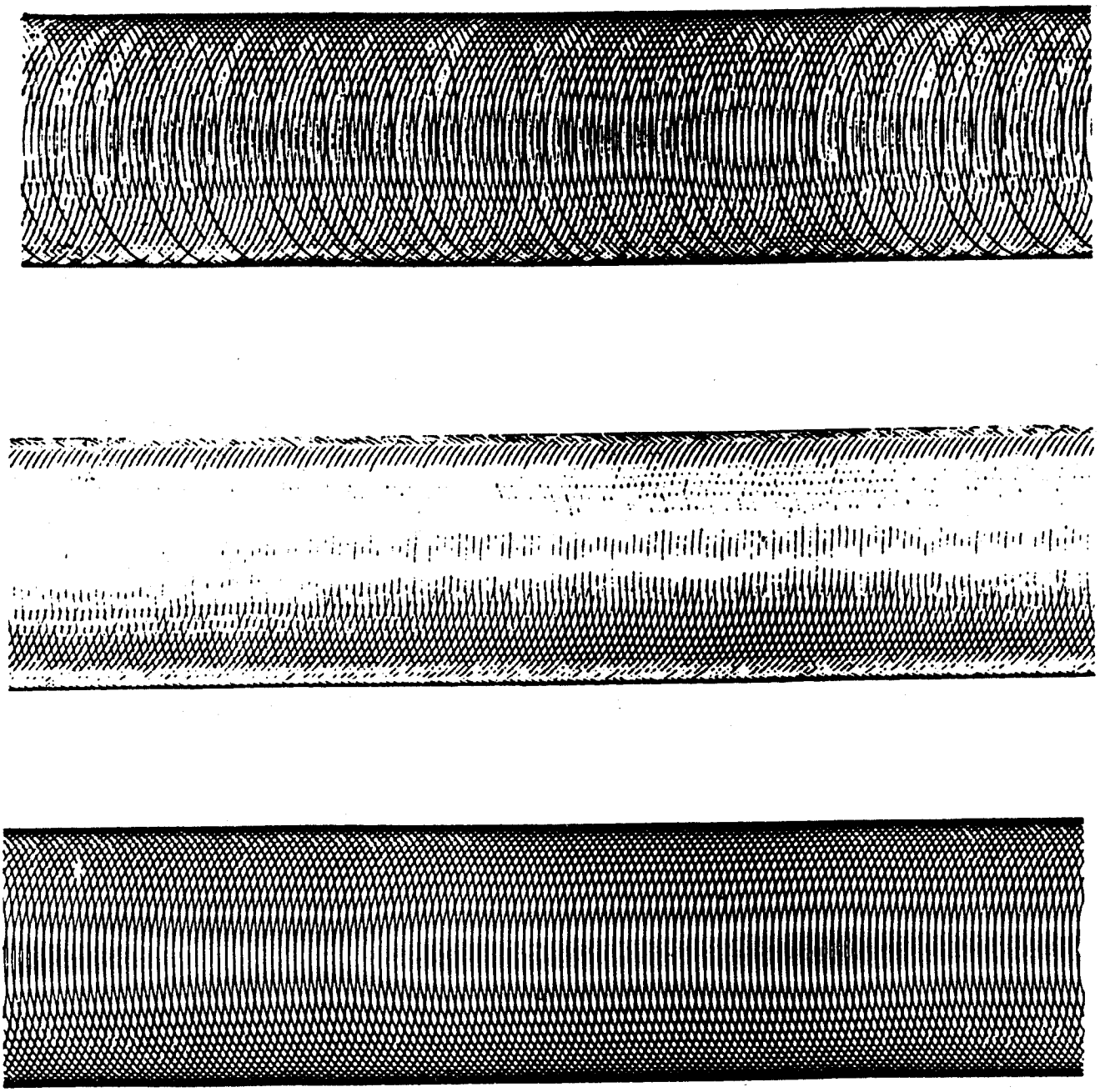

FIGURE 1 - Density variations
(bottom example is normal pattern and density)

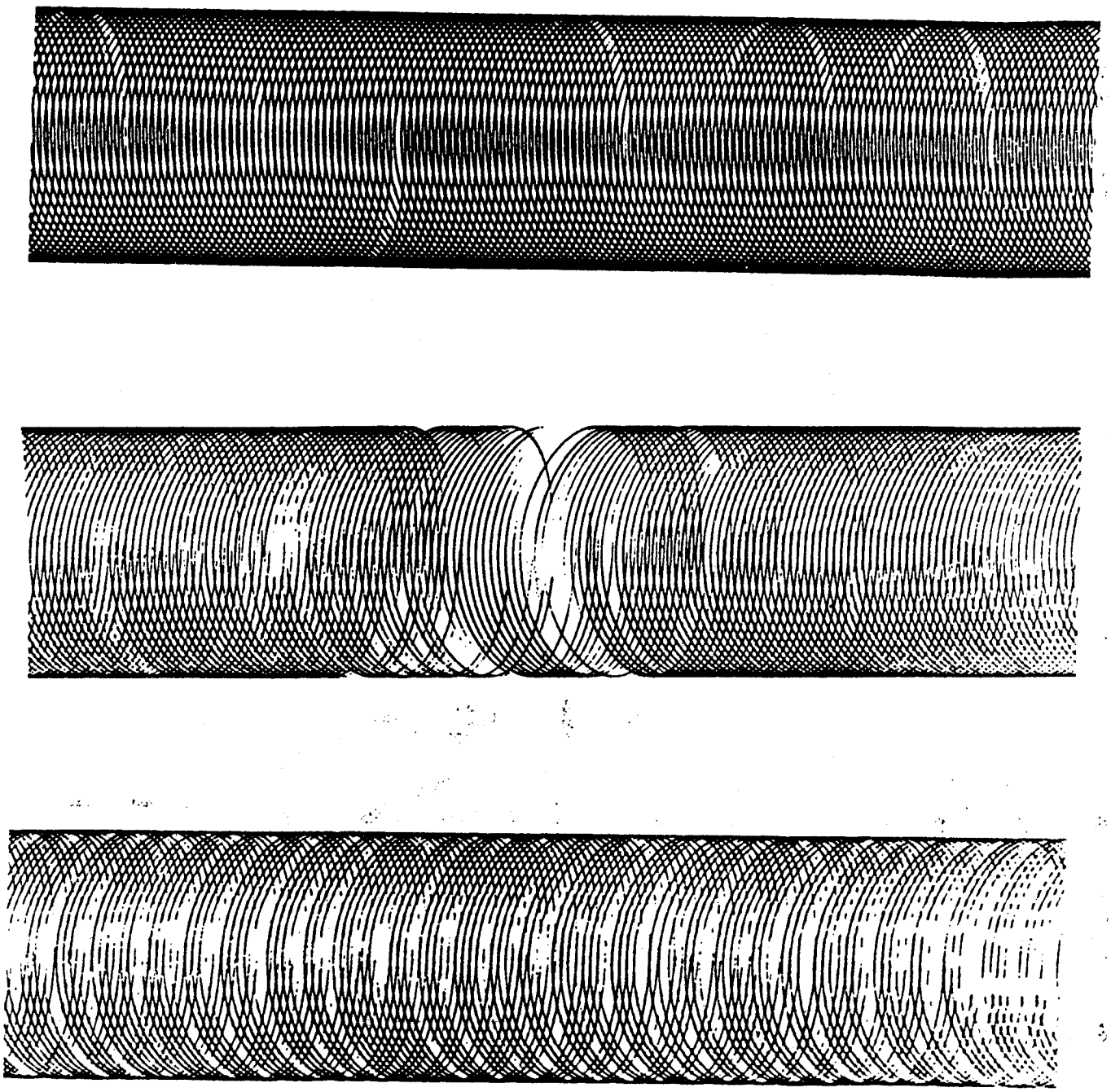

FIGURE 2 - Skips

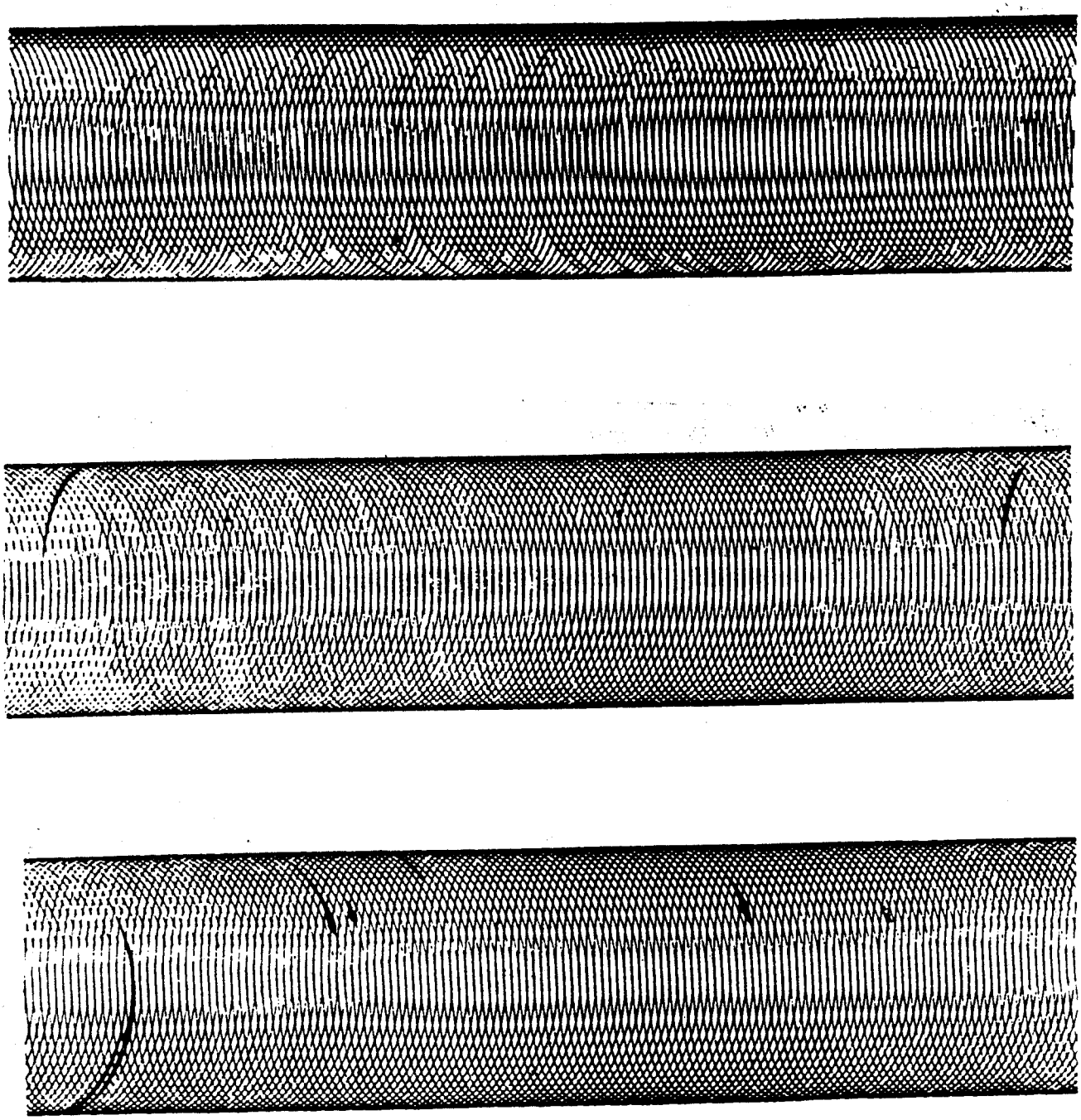

FIGURE 3 - Blobs

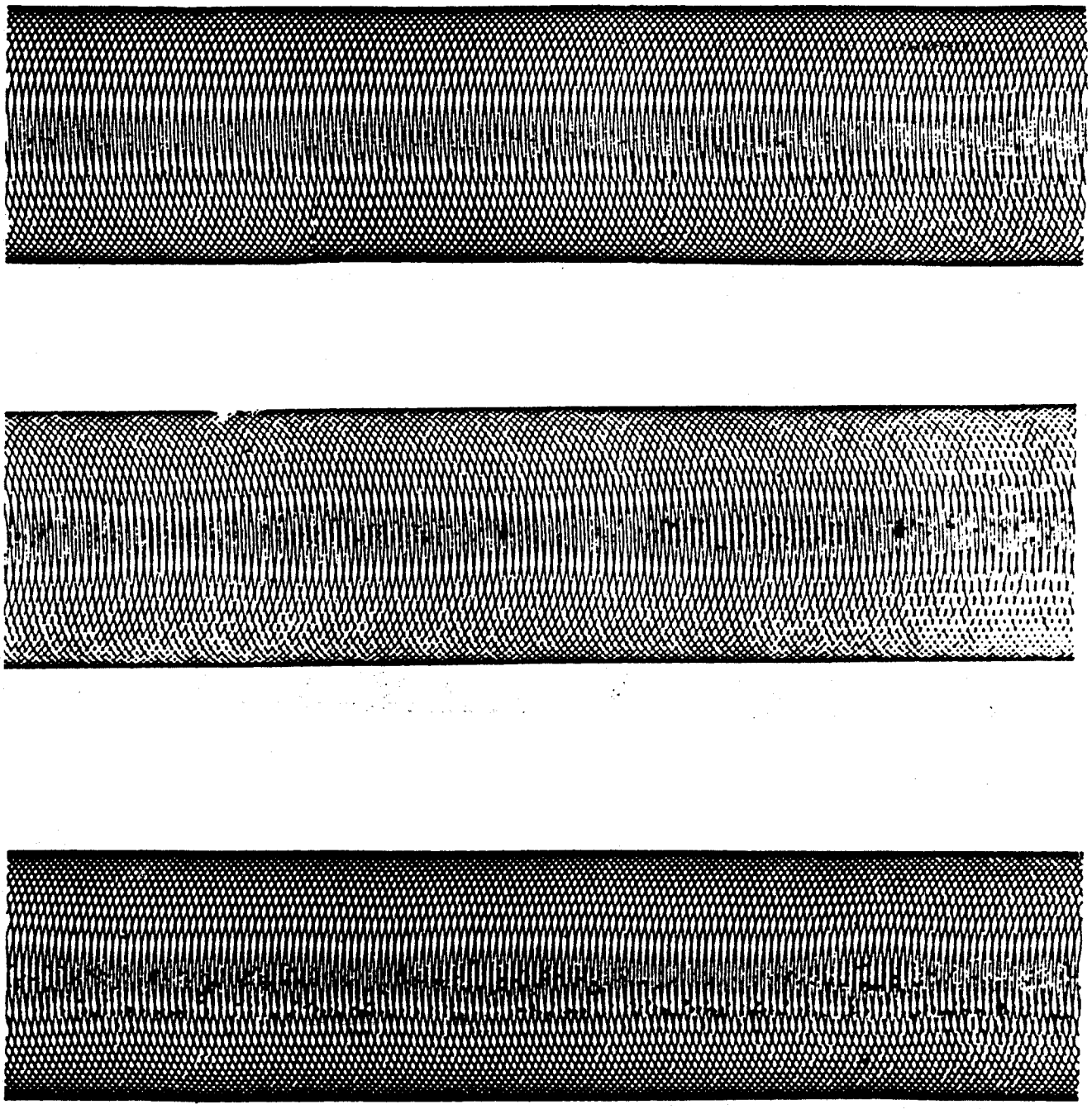

FIGURE 4 - Dotting

4.3.4 *Cap tightness*:

Non-retractable types of ball point pens shall be fitted with a cap. The cap of pen, shall fit securely at both ends of the pen barrel and shall not show any sign of crack, when tested as prescribed in 8.7.

4.3.5 *Pocket clip tightness*

The pocket clip of pen, shall have sufficient tension to support the pen, when tested as prescribed in 8.8 and shall not tear or injure the cloth to which the pen is clipped.

4.3.6 *Starting characteristics*

The pen shall start writing a line within a distance of 15 mm. On subsequent lines, it shall start writing a line immediately, when tested as prescribed in 8.9.

4.3.7 *Drying time*

The writing shall dry within 5 seconds and shall not smear when tested as prescribed in 8.10.

4.3.8 *Feathering and penetration*

The writing shall not feather or spread and shall not have penetrated to the reverse side of the paper, when tested as prescribed in 8.11.

4.3.9 *Resistance to water*

The writing shall be legible, after the test, prescribed in 8.12.

4.3.10 *Resistance to ageing*

The pen shall fulfil the following requirements after subjecting to the accelerated ageing test, prescribed in 8.13 :

a) Pen barrel and cap shall show no sign of cracks, warp, discolouration or loss of rigidity;
b) The retraction mechanism shall not be impaired;
c) The ink tube shall not have become brittle or show a loss of rigidity;
d) The refill shall show no evidence of ink leakage from the writing tip or from the tube; and
e) Pen shall comply with the requirements specified in 4.3.3.

4.3.11 *Shelf life*

After storage for one year from the time of manufacture, the pen shall comply with the requirements specified in 4.3.3.

5 FINISH

Ball point pens shall have a smooth finish and shall have no sharp edges or feathers.

6 PACKING

Ball point pens shall be suitably packed, so that pens do not get displaced, disassembled or damaged, while handling.

7 MARKING

The manufacturer's name and/or trade mark, shall be legibly and indelibly marked on the barrel of the pen.

The following information shall be legibly and indelibly marked on the carton or packing, or on a label securely attached to it:

a) Name of product;
b) Manufacturer's name and/or trade mark and address;
c) Month and year of manufacture;
d) Classification, i.e:-"Fine point" or "Medium point";
e) Colour of ink;
f) Quantity of pens; and
g) Batch number.

NOTE

Attention is drawn to certification facilities offered by SLSI. See the inside back cover of this standard.

8 METHODS

8.1 Flammability test

A draft shield shall be used to reduce air current effects. Hold the test samples horizontally within the shield above a Bunsen burner having a 25 mm to 30 mm blue flame just touching the end of the pen barrel until the sample ignites or for a period of not more than 30 s, whichever occurs first. Remove from the flame. If the sample does not burn within 30 s, it is "nonflammable". If the sample burns, when in contact with the flame but will not continue to burn when removed from the flame, it is "flame resistant". If the sample continues to burn at a rate of less than 60 mm per minute, it is considered as 'slow-burning' and deemed to have met the requirements. If the sample bursts into flames or burns at a rate of more than or equal to 60 mm per minute, it shall be considered as not meeting the requirements of this specification.

8.2 Corrosion resistance test

The metal parts shall be dipped in a boiling aqueous solution of sodium chloride 10 per cent strength (by mass), for a period of 15 minutes. After removal from this solution, they shall be immediately immersed in another 10 per cent aqueous solution of sodium chloride at room temperature for at least one hour. They shall then be removed from this solution and without having the adhering liquid wiped off, allowed to dry for 24 hours at room temperature. The metal part shall not show any visible sign of corrosion at the end of the test.

8.3 Resilience test on spring

The spring shall be compressed fully and held for 5 seconds, before releasing. This shall be repeated 25 times. The spring shall neither show any permanent set nor loose its spring action.

8.4 Functional test

Actuating mechanism shall propel and retract the refill in the pen, successfully and quickly for 150 times. After the test, the pen shall function normally.

8.5 Load test

Place a sheet of paper on a platform scale. A test sample, shall be held between 30 mm to 40 mm from the writing tip end, with the writing tip touching the paper and at an angle of 50 degrees (nominal) to the horizontal without the hand touching the platform scale or paper. Apply pressure to the writing tip, gradually and uniformly within a period of approximately 5 seconds until the scale registers a mass-load of 3.5 kg (nominal) and then immediately released. Examine each pen sample for compliance with 4.3.2.

8.6 Meachine writing quality test

The writing machine shall be able to hold one or more pens at an angle of 16 degrees to the vertical and rotate them in a continuous orbital motion at a speed of approximately 60 r.p.m, so that they describe 25 mm diameter circles on paper on a horizontal, smooth, glass plate. The paper shall be fed at 3 mm per revolution from a roll of 50 g/m^2 white bond teletype paper. At the same time, the pens shall be rotated continuously on their own axes at a speed of approximately 60 r.p.m. The pen samples shall be tested for a total line of at least 1100 m at a writing pressure of (120 $\pm$ 5) g. The writing shall comply with the requirements specified in 4.3.3.

8.7 Cap tightness test

Uncap and recap the pen samples to normal hand tightness, for 20 consecutive times and examine the pen sample for compliance with 4.3.4.

8.8 Pocket clip tightness test

Slide the clip over a glass plate of 3.0 mm thick, remove and repeat this cycle for 25 times, then slide the clip over a bristol board 0.15 mm to 0.25 mm thick. Leave the pen clipped to the bristol board in the inverted and vertical position for at least one hour. The sample is deemed to have failed, if the pen falls off completely.

8.9 Starting characteristics test

8.9.1 The bond paper used shall be of grammage(75 ± 5) g/m^2 and thickness 89 m to 122 m and shall comply with SLS 868.

8.9.2 Remove the protective coating from the balls of the test samples, if any, and write numerous fast turns, flourishes, reversals, ovals or figure 8's and leave the pen samples aside for 1 hour. Rule a vertical line on a sheet of bond paper specified in 8.10.1, about 25 mm from the left hand edge. Place the pen samples on the ruled line and, applying a moderate force to the pen, move it to the right across full width of the paper. Immediately afterwards draw four more lines in the same way. Examine the writing for compliance with 4.3.6.

8.10 Drying time test

Place a sheet of bond paper specified in 8.10.1, on a smooth, flat surface. Write six 8's on the paper. Allow the writing to dry for 5 seconds, then place a 100 g flat-bottom cylindrical mass-piece of diameter 25 mm on the corner of a second sheet of paper and draw the clean sheet of paper and the 100 g mass, slowly over the writing. Examine the writing for compliance with 4.3.7.

8.11 Feathering and penetration test

Write the equivalent of six, 5 - letter words on a sheet of bond paper specified in 8.10.1. After 24 hours examine the writing for feathering and penetration to the reverse side of the paper (see 4.3.8).

8.12 Water resistance test

Write the equivalent of six, 5 - letter words on a sheet of bond paper specified in 8.9.1. Immerse the sheet of paper in distilled water at room temperature for 48 h. Remove, allow the paper to dry, and then examine the writing, at normal reading distance, for compliance with 4.3.9.

8.13 Accelerated ageing test

Subject the test samples , to the following two cycles:

a) First cycle - Place the test samples in a vertical position with the writing tips facing downwards and expose them to the following cycle of temperature changes.

TABLE 1 - Temperature cycle

Duration (h) (1)	Temperature (^{0}C)
16	0 ± 2
8	25 ± 2
16	50 ± 2
8	25 ± 2

b) Second cycle - Repeat the procedure described for the first cycle but with the tips facing upwards. Examine each test sample for compliance with 4.3.10.

APPENDIX A

COMPLIANCE OF A LOT

Sampling scheme given in this Appendix should be applied where compliance of a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection. Where compliance with this standard is to be assured based on manufacturer's control systems coupled with type tests and check tests or any other procedure, appropriate schemes of sampling and inspection should be adopted.

A.1 Lot : In any consignment all ball point pens manufactured under the same conditions of manufacture, shall be grouped together to constitute a lot.

A.2 Scale of sampling

A.2.1 Number of ball point pens to be selected from a lot shall be in accordance with Column 1 and Column 2 of Table 2.

TABLE 2 - Scale of sampling

Number of pen in the lot (1)	Number of pens to be selected (2)	Sub sample size (3)
upto 1200	20	3
1201 - 3200	32	5
3201 - 10,000	42	6
10,000 and above	50	8

A.2.2 Ball point pens shall be selected at random. In order toensure randomness of selection, random number tables as given in SLS 428 shall be used.

A.3 Number of tests

A.3.1 Each ball point pen selected as in A.2.2 shall be inspected for marking and visual requirements specified in 4.

A.3.2 Six sub samples of sizes as given in Column 3 of Table 2 shall be selected from the sample selected as in A.2.2 and ball point pens in sub samples shall be subjected to the tests given below.

Sub sample 1 - Machine writing quality test.
Sub sample 2 - Starting characteristics test.
- Drying time test.
- Feathering and penetration test.
- Water resistance test.

Sub sample 3 - Load test.
Sub sample 4 - Accelerated ageing test.
Sub sample 5 - Flammability test.
Sub sample 6 - Corrosion resistance test.
- Resilience test on spring
- Functional test.
- Cap tightness test
- Pocket clip tightness test.

A.4 Criteria for conformity

A lot shall be declared as conforming to the requirements of this standard if the following conditions laid down in A.4.1 and A.4.2 are satisfied:

A.4.1 Each ball point pen inspected as in A.3.1 satisfies the relevant requirements.

A.4.2 The ball point pens of each sub sample when tested as in A.3.2 satisfies the relevant requirements.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

Printed at SLSI (Printing Unit)

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.