SRI LANKA STANDARD 514:1981
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SPECIFICATION FOR
FOUNTAIN PENS

BUREAU OF CEYLON STANDARDS

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SLS 514 : 1981

Gr. 7

BUREAU OF CEYLON STANDARDS
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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 FOUNTAIN PENS

FOREWORD

This Sri Lanka Standard has been prepared by the Drafting Committee of the Bureau on fountain pens. It was approved by the Mechanical Engineering Divisional Committee of the Bureau of Ceylon Standards and was authorized for adoption and publication by the Council of the Bureau on 1981-04-10.

The specification covers fountain pens of four types. It includes cartridge type fountain pens but does not include specifications for the cartridges. No separate standard for fountain pen nibs is envisaged in the present context of the industry, as the quality of the nib which is an integral part of the pen is largely covered in this standard.

Individual preferences for an ideal fountain pen is known to vary. The best practices to meet this need is pursued by Industry. It is not intended in this standard to lay down specifications for design but lay down minimum conditions for an acceptable pen.

All values are in SI units. In some cases where the metric units differ, the metric equivalent is also given within paranthesis.

This specification makes reference to the following Sri Lanka Standards :

CS 57 Permanent blue-black ink for fountain pens.

CS 59 Washable blue-ink for fountain pens.

CS 102 Presentation of numerical values.

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

The assistance derived from the publications of the Indian Standards Institution, Japanese Standards Institution and the Federal Supply Service of Washinton in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This standard prescribes the requirements and the method of sampling for fountain pens.

2 TERMINOLOGY

2.1 The fountain pen is a pen provided with means of continuous supply of liquid ink from a container to the nib.

2.2 For the purpose of this specification, the nomenclature of different parts of the fountain pens shall be as indicated in Figs. 1 to 4.

3 TYPES

Fountain pens shall be classified under any one of the following types :

TYPES	REFERENCE TO FIGURE
a) Neck - filling	Fig. 2
b) Bulb - filling	Fig. 3
c) Sac - filling	Fig. 4
d) Cartridge	Fig. 5
e) Other	-

4 REQUIREMENTS

4.1 Material

4.1.1 Materials used shall resist chemical action of ink and in turn not affect the fountain pen ink with which they come in contact. Fountain pens may be made of ebonite, plastic material or any suitable material with some parts made of metal. No material of the highly inflammable category such as celluloid shall be used. All materials liable to oxidation and corrosion shall be suitably treated to resist oxidation and corrosion. All materials in the assembled form shall be able to withstand the ageing and shock resistance tests specified in **8.1** and **8.2**.

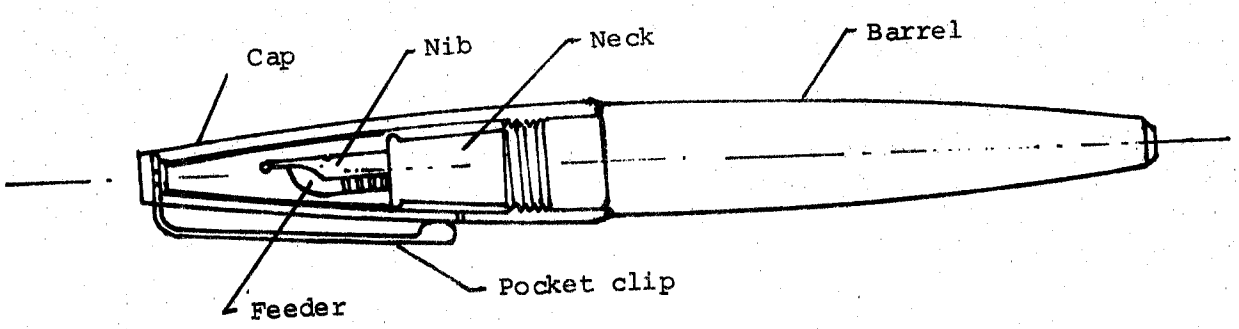

FIGURE 1 - Fountain pen assembly, typical

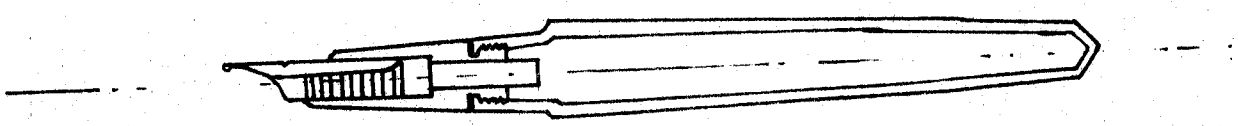

FIGURE 2 - Fountain pen typical, neck filling

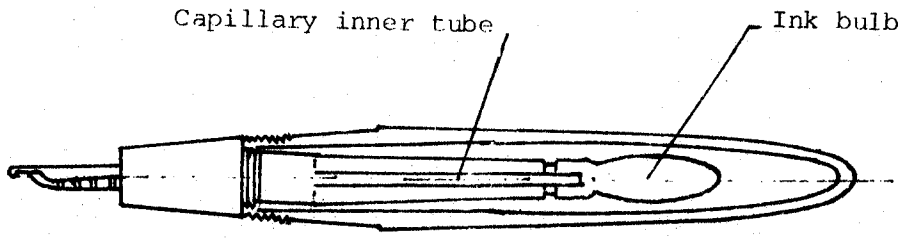

FIGURE 3 - Fountain pen, typical, bulb filling

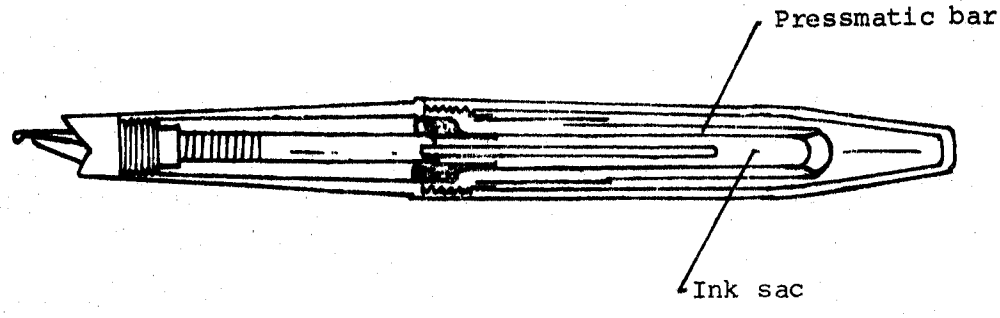

FIGURE 4 - Fountain pen typical sac filling

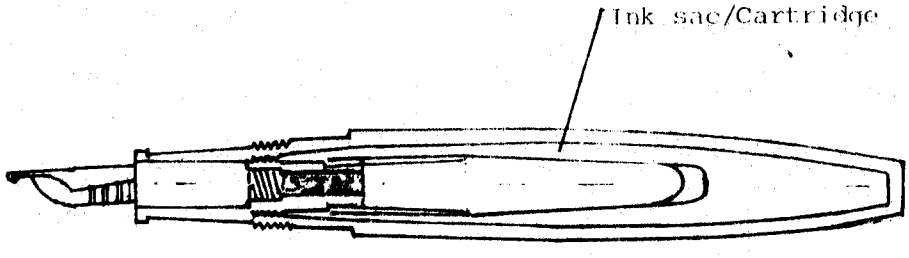

FIGURE 5 - Fountain pen, typical, catridge

4.1.2 The nib shall have the corrosion resistance properties given in Table 1. The point of nib shall be of non-corrosive hard material, not necessarily separate or of different material from the body of the nib or shall be tipped with iridium. The nib shall have the abrasion properties given in Table 1.

4.2 Manufacture workmanship and finish

4.2.1 Fountain pens shall be so made as to assemble correctly and the axes of neck, barrel, ink-sac, cartridge and cap shall be in one line.

4.2.2 Nibs shall be separated or slit into two from off the centre. The separation or slit shall be straight on both sides, not more than 0.03-mm wide and the sides even in length. The right and left sides of the nib shall be as accurate as possible to at least the limits given in Table 1. The point of the nib shall be well ground and polished so that there are no sharp corners.

4.2.3 The assembly of the tongue and the nib shall be such as to fit into the neck smoothly and tightly.

4.2.4 The barrel shall have no chippings or cracks and also shall not be warped.

4.2.5 Where the neck joins the main body, ink sac, or the cartridge container, it shall be leak proof and shall be tested for leak according to 4.4.1. The temperature difference, between the neck and the human hand, shall not cause the leakage of ink.

4.2.6 The feeder shall not have cracks or chips and shall not be warped. It shall be designed in such a way that there be a continuous and regular flow of ink without overflow.

4.2.7 The filling mechanism of types b and c shall be such that 80 per cent of the capacity of the ink container shall be filled in five operations, the whole operation taking not more than 30 seconds.

4.2.8 Cap shall be capable of closing the pen effectively. If screwed, shall be capable of closing between one and two complete turns. The cap shall be provided with suitable ventilation, such as holes of about 1-mm diameter. When the cap is pulled, it shall not make the ink leak from the nib. The cap shall be capable of being fitted at the back of the body during normal writing. The inside of the cap shall not touch any part of the nib when fully closed. Provision of a pocket clip provided with the cap shall be optional. If provided the knob of the clip shall be rounded and smooth so that it does not tear the cloth when clipped and shall have the specified clip action given in 8.3. The pressure of the clip shall be such that when a smooth paper is inserted, the clip holds it but does not scratch it. The clip shall neither rotate nor shall it be loose when mounted.

4.2.9 The barrel shall be provided with suitable ventilation, such as holes of holes of 1-mm diameter in the case of types b, c and d.

TABLE 1

Ratio of two sides about slit of nib (right and left side accuracy)	Abrasion percentage on thickness of writing	Corrosion properties
1.08 max. (Clause 4.2.2).	10 max. when tested according to 8.7.	Show no visible corrosion when tested according to 8.8.

4.2.10 Plated parts shall be able to pass the tests given in 8.9 and 8.10.

4.2.11 All parts of a pen of the same type and make shall be interchangeable.

4.2.12 The finish of external surfaces shall not have scratches, blisters and other defects.

4.3 Ink capacity

4.3.1 Ink capacity of pens shall be as given below when measured in accordance with 8.4.

TYPE OF PEN	MINIMUM CAPACITY (ml)
a) Neck-filling	2.0
b) Bulb-filling	0.7
c) Sac-filling	0.7
d) Cartridge	0.9
e) Other	0.4

4.4 Functional requirements

4.4.1 *Leakage*

The assembly of the fountain pens shall be such that when water at a pressure of 40 kPa gauge is applied through the neck, it shall not leak through the ink container or at its junction with the neck (see 8.5).

4.4.2 *Writing*

The pen shall pass the test for writing given in 8.6.

5 MARKING

The pen shall be marked with manufacturer's name or trade mark or initials on the body. It may be marked on the neck, nib cap and clip. The country of manufacture shall also be indicated on the pen.

6 PACKING

Pens shall be suitably packed in cartons or as agreed to between manufacturer and purchaser.

7 SAMPLING

7.1 lot : In any consignment all the fountain pens of the same type, and manufactured from the same raw materials under relatively similar conditions of manufacture, shall be grouped together to constitute a lot.

7.1.1 For ascertaining conformity to the requirements of this standard, samples of pens shall be selected and tested separately for each lot.

7.2 The number of pens to be selected at random from a lot shall depend upon the size of the lot and shall be in accordance with Columns 1 and 2 of Table 2.

TABLE 2 - Sample size and criteria for conformity

Lot size	For test for material (4.1) (excluding abrasion and corrosion tests), manufacture workmanship, and finish (4.2) and capacity (4.3)		For test for writing (8,6), accelerated ageing (8.1), shock resistance (8.2), clip action (8.3), leakage (8.5), abrasion (8.7), corrosion (8.8), bonding (8.9) and corrosion resistance (8.10)	
	Sample size	Acceptance number	Sub-sample size	Acceptance number
1	2	3	4	5
Up to 150	32	2	5	0
151 to 300	50	3	8	0
301 to 500	80	5	10	0
501 to 1000	125	7	13	0
1001 to 3000	200	10	15	1
3001 and above	315	14	20	1

7.3 To ensure the randomness of selection, random number tables shall be used. As a first step a suitable number of cartons (not less than 10 per cent of the total number in the lot subject to a minimum of 5) shall be first chosen; an approximately equal number of pens shall be picked up from its different parts or layers so as to obtain the required number of pens.

7.4 In the case of fountain pens which are supplied with extra (s), spare component (s) or cartridge (s) one number of each of the extra, spare or cartridge needed shall be chosen from the ones provided with each pen selected from the lot and the assembly taken for testing.

8 TESTS

8.1 Accelerated ageing test

The plastic or ebonite parts of the pen shall be subjected to the temperature cycle as specified below :

Time	Temperature
4 h	0°C
4 h	50°C
4 h	0°C
4 h	50°C
7 days	27°C

The material shall not warp, crack, discolour or get deformed after the test.

8.2 Shock resistance

A pen full of ink and with its cap closed shall be allowed to fall from a height of one metre on to a plain concrete floor once vertically with the nib pointing upwards or downwards and once horizontally. This test shall be repeated five times. The pen shall not have been damaged in any manner and shall be fit for writing after the test.

8.3 Clip action

Slide clip over stiff material 3.00-mm in thickness. Repeat for a total of 25 operations. Then slide the clip over a stiff material 0.40-mm in thickness and invert. Pen shall remain clipped to the material without falling.

8.4 Capacity

The capacity of the container shall be checked by filling it completely with ink five times and an average taken. The filling capacity shall similarly be checked five times and an average taken.

8.5 Leakage

Water is introduced into the barrel, tube or sac through the neck and a water pressure of 40 kPa gauge is sustained for five minutes to test for leaks.

8.6 Writing

Move nib of pen filled with ink conforming to CS 57 or CS 59 or in the case of cartridge pen the appropriate cartridge in situ across a sheet of paper from a writing pad (standard) until the ink begins to flow. On the same paper write *fountain pen, pocket type* six times. Cap the pen and place with nib end up for one hour. Repeat the above writing. The pen shall write smoothly in all directions when the pen is held at any writing angle it shall not pick up particles of paper or dig into the paper while writing. The pen shall start making a line immediately upon touching the paper and shall operate efficiently on a continuous and intermittent basis without skipping or flooding.

8.7 Abrasion

The fountain pen shall be filled with ink conforming to CS 57 or CS 59 or in the case of cartridge pen the appropriate cartridge provided with the pen is fitted on to the pen. The drum having a level smooth surface with a firm support and covered with super calendar paper shall be rotated at a peripheral speed of about 3.33×10^{-3} m/s. The point of the nib shall be made to touch the paper at a pressure of 294 mN acting in a direction parpendicular to the axis of the nib. The nib shall take and angel of 40° to 45° with the tangent. The pen shall have a movement parallel to the axis of the drum so that the lines drawn on the drum are continuous but not over-lapping. After writing 2 km with the nib the width of the line at the beginning of the test and at the end of the test shall be measured. The abrasion percentage shall then be calculated according to the following formula :

$$\text{Abrasion (percentage)} = \frac{\text{Width of line at end of test (mm)} - \text{Width of line at beginning of test (mm)}}{\text{Width of line at beginning of test (mm)}} \times 100$$

8.8 Corrosion test for nib

The nib of the pen shall be washed with benzene or acetone then dipped in ink conforming to CS 57 for 7 days at a temperature of about $27\ ^{\circ}C$. It shall then be taken out, wiped and examined under a magnification of 6x.

8.9 Test for bending of plating

8.9.1 Saw a piece off the plated part; hold it in a vice and apply a coarse file to the cut edge in such a manner as to raise the deposit. File in the direction from the basic metal to the coating at an angle of approximately 45° to the coated surface. The coating should continue to adhere to the metal.

8.9.2 Heat the plated part for one hour in an oven at a temperature appropriate to the basic metal as given below with a tolerance of $\pm$ 10 $^{\circ}$C. This test does not apply to non-metallic components.

Article	Temperature
Steel	300 $^{\circ}$C
Zinc alloy	150 $^{\circ}$C
Copper or Copper alloy	250 $^{\circ}$C
Aluminium or Aluminium alloy	250 $^{\circ}$C

Then quench the article in water at room temperature. The coating should continue to adhere to the metal.

8.10 Corrosion resistance test for plated parts

The plated part when tested according to the following procedure shall not have more than 10 defects per 100 mm^2 of testing paper or filter paper. The defects being classified according to Table 3.

The plated parts shall be washed with water to remove any oil. 10 g of pottasium ferricyanide ($K_3Fe(CN)_6$) and 10 g of pottasium ferrocyanide ($K_4Fe(CN)_6 \cdot 3H_2O$) with 60 g of table salt are dissolved in one litre of water. The testing paper or filter paper is soaked in the solution, strongly wrapped around the plated material, and allowed to stand for 5 minutes. The testing paper or the filter paper is then removed and checked for spots or specks of brown colour and blue colour. They are counted and classified according to Table 3. The size of the testing paper or filter paper to be used for the test shall be of 500 mm^2 area.

TABLE 3

Diameter of a speck or spot less than or equal to 1 mm	One defect to a speck or spot
Diameter of a speck or spot between 1 mm and 3 mm	Three defects to a speck or spot
Diameter of a speck or spot greater than or equal to 3 mm	Ten defects to a speck or spot

9 CONFORMITY TO STANDARD

9.1 The pens selected according to **7.3** and **7.4** shall be inspected for material **4.1** excluding abrasion **8.7** and corrosion **8.8** tests, they shall be inspected for manufacture, workmanship and finish **4.2** and capacity **4.3**. A pen failing in any one or more of the requirements shall be considered as defective. The lot shall be considered as conforming to the requirements of the characteristics stipulated above if the number of defective pens in the sample does not exceed the number given in Column 3 of Table 2.

9.2 The lot having been found conforming according to **9.1** shall be tested for writing **8.6**, accelerated ageing **8.1**, shock resistance **8.2**, clip action **8.3**, leakage **8.5**, abrasion **8.7**, corrosion **8.8**, bending **8.9**, and corrosion resistance **8.10**. For this purpose a sub-sample of size given in Column 4 of Table 2 shall be taken from pens selected as in **7.3** and **7.4**. Each of the pens in sub-sample shall be subjected to the tests mentioned above. A pen failing in any one or more of the tests shall be considered as defective. The lot shall be considered as conforming to the requirements of the tests if the number of defectives in the sub-sample does not exceed the number given in Column 5 of Table 2.

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