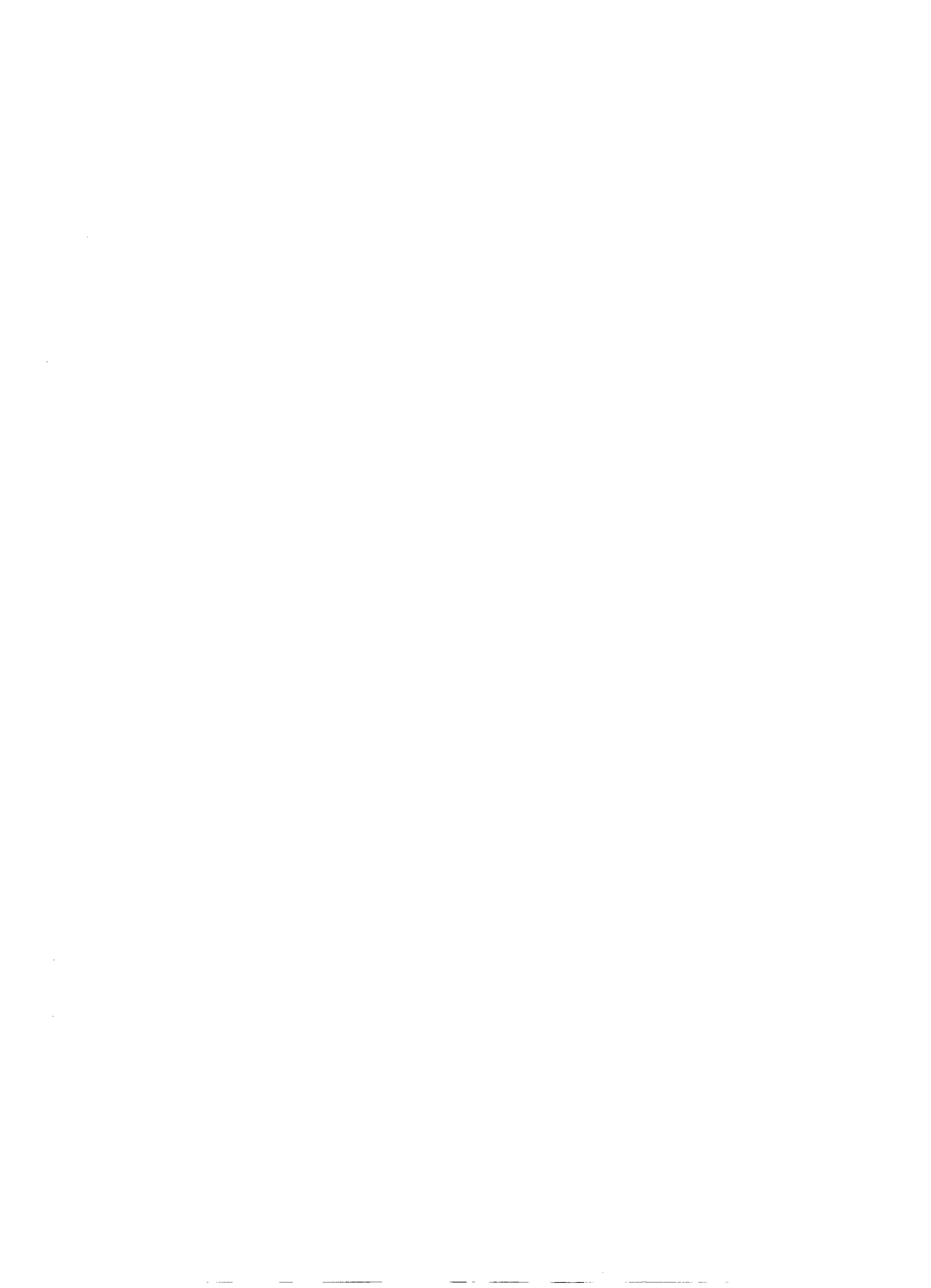


SRI LANKA STANDARD 744 : 1986

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**SPECIFICATION FOR
COLOURED LEAD PENCILS**

SRI LANKA STANDARDS INSTITUTION



SPECIFICATION FOR COLOURED LEAD PENCILS

SLS 744:1986

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SRI LANKA STANDARD
SPECIFICATION FOR COLOURED LEAD PENCILS

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1986-06-06, after the draft, finalized by the Drafting Committee on Coloured Lead Pencils, had been approved by the Chemicals Divisional Committee.

All values given in this specification are in SI units.

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

In the preparation of this specification, the assistance obtained from the publications of the Federal Supply Service of the General Services Administration of United States of America and the Japanese Standards Institution is gratefully acknowledged.

1 SCOPE

1.1 This specification prescribes requirements, methods of sampling and tests for coloured lead pencils for ordinary drawing and office use.

1.2 It does not cover pencils having a combination of two colours.

2 REFERENCES

Munsell books of colour : glossy finish collections, 1976 edition

CS 102 Presentation of numerical values

SLS 311 Determination of lead

SLS 312 Determination of arsenic

SLS 428 Random sampling methods.

3 TYPES

Coloured lead pencils covered under this specification shall be of the following types:

- Type 1 : for ordinary use
- Type 2 : for office use.

4 REQUIREMENTS

4.1 Material

4.1.1 *Lead slip*

The lead slip shall be free from grittiness and shall produce smooth and uniform writing. The lead slip shall consist essentially of pigments with or without dyes as required. It shall not contain aniline or other water soluble dyes which can be absorbed by paper.

4.1.2 *Wood*

The casing shall be made of soft, straight-grained, well seasoned wood free from defects such as knots, cracks, bore holes, splits and splinters.

4.2 Construction

4.2.1 *Wood casing*

4.2.1.1 The casing shall be circular or hexagonal in section. Both halves of the wood casing shall be straight and of uniform structure.

4.2.1.2 Both halves of the wood casing shall be securely glued together throughout the entire length of the pencil. The two halves of the wood casing shall not separate when the pencil is immersed in water for 48 hours.

4.2.1.3 The warpage shall not exceed 0.5 mm when tested as prescribed in Appendix B.

4.2.1.4 The casing shall be finished with a suitable paint. The soluble lead and arsenic contents of the paint used, shall satisfy the following requirements:

- a) The soluble lead content, calculated as the metal, shall not exceed 250 mg/kg of the dry paint film, when tested as prescribed in D.1.1.
- b) The soluble arsenic content, calculated as the metal, shall not exceed 100 mg/kg of the dry paint film, when tested as prescribed in E.1.1.

4.2.2 *Lead slip*

4.2.2.1 The lead slip shall be enclosed securely at the centre of the wood casing.

4.2.2.2 The continuity of the lead slip shall be such that, there shall not be more than two breaks. The lead slip shall be examined for continuity,

after separating the two halves of the wood casing by keeping the pencil in a suitable solvent that dissolves the substance used for gluing but does not affect the lead slip.

4.2.2.3 The soluble lead and arsenic contents of the lead slip shall satisfy the following requirements:

- a) The soluble lead content, calculated as the metal, shall not exceed 250 mg/kg of the lead slip, when tested as prescribed in D.1.2.
- b) The soluble arsenic content, calculated as the metal, shall not exceed 100 mg/kg of the lead slip, when tested as prescribed in E.1.2.

4.2.2.4 The wax content of the lead slip shall not exceed 35 per cent by mass of the lead slip, when tested as prescribed in Appendix F.

4.3 Dimensions

The dimensions of a coloured lead pencil shall be in accordance with the values given in Table 1.

TABLE 1 - Dimensions

Dimension	Type 1	Type 2
Length, mm	177 ± 3	177 ± 3
Diameter of pencil (in hexagonal pencils, the length between two opposite corners), mm	7.4 ± 0.5	8.8 ± 0.5
Diameter of lead slip, mm	2.8 ± 0.3	3.7 ± 0.3

4.4 Performance

4.4.1 General

When sharpened in a pencil sharpener, the wood shall be readily cut, shall have a smooth, even finish and shall show no evidence of splitting, splintering or tearing of wood grain.

4.4.2 Lead slip breaking force

The lead slip breaking force shall be in accordance with the values given in Table 2, when tested as prescribed in Appendix G.

TABLE 2 - Lead slip breaking force

Type	Lead slip breaking force, Newtons, minimum
1	6.0
2	9.0

4.4.3 Colour

4.4.3.1 In a package of Type 1 pencils, the following six colours shall be provided:

- a) Black;
- b) Blue;
- c) Brown;
- d) Green;
- e) Red; and
- f) Yellow.

4.4.3.2 The colour of pencil markings of both Type 1 and Type 2 pencils shall be in accordance with the Munsell notation (see Note) given in Table 3, when tested as prescribed in Appendix H.

TABLE 3 - Colour of pencil markings

Colour	Requirement for		
	Hue (H)	Value (V)	Chroma (C)
Blue	7.5B ± 2.5B	4.0 ± 1.0	8 min.
Brown	5YR ± 2.5YR	3.0 ± 1.0	6 ± 2
Green	5G ± 2.5G	5.0 ± 1.0	8 min.
Red	5R ± 2.5R	4.0 ± 1.0	12 min.
Yellow	5Y ± 2.5Y	8.5 ± 0.5	12 min.
Black	-	N 2.5 max.	1 max.

NOTE - The complete Munsell notation for a chromatic colour is written symbolically : H V/C. The notations H, V and C denote hue, value and chroma respectively. The notation for an achromatic (neutral) colour is written symbolically N V/. Refer Munsell books of colour, for further details.

4.4.4 Water fastness of pencil markings

The pencil markings shall not smudge, when tested as prescribed in Appendix J.

4.4.5 Extraction of lead slip

The slip shall not come off, when tested as prescribed in Appendix K.

5. PACKAGING AND MARKING

5.1 Each pencil shall be marked legibly and indelibly with the following:

- a) Name of the manufacturer; and
- b) Registered trade mark, if any.

5.2 Type 1 pencils

5.2.1 Six or twelve pencils of different colours (subject to the requirement

given in 4.4.3.1) shall be suitably packed. Each package shall be marked legibly and indelibly with the following:

- a) Name and address of the manufacturer, (including country of origin);
- b) Registered trade mark, if any; and
- c) Number of pencils.

5.2.2 As agreed to between the buyer and the seller, a number of such packages shall be contained in a carton or other suitable container. Each carton shall be marked legibly and indelibly with the following:

- a) Name and address of the manufacturer, (including country of origin);
- b) Registered trade mark, if any;
- c) Number of packages;
- d) Number of pencils in a package; and
- e) Batch identification number.

5.3 Type 2 pencils

Ten or twelve pencils of the same colour shall be bound together with a suitable band or contained in a suitable package. Ten or twelve such packages shall be contained in a carton or other suitable container. Each carton shall be marked legibly and indelibly with the following:

- a) Name and address of the manufacturer, (including country of origin);
- b) Registered trade mark, if any;
- c) Colour of pencils;
- d) Number of packages;
- e) Total number of pencils; and
- f) Batch identification number.

5.4 Each package and/or carton may also be marked with the Certification Mark of the Sri Lanka Standards Institution illustrated below on permission being granted for such marking by the Sri Lanka Standards Institution.



NOTE - The use of the Sri Lanka Standards Institution Certification Mark (SLS Mark) is governed by the provisions of the Sri Lanka Standards Institution Act and the regulations framed thereunder. The SLS Mark on products covered by a Sri Lanka Standard is an assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control, which is devised and supervised by the Institution and operated by the producer. SLS marked products are also continuously checked by the Institution for conformity to the relevant standard as a further safeguard. Details of conditions under which a permit for the use of the Certification Mark may be granted to manufacturers or processors may be obtained from the Sri Lanka Standards Institution.

6 SAMPLING

The method of drawing representative samples of coloured lead pencils for ascertaining conformity to the requirements of this specification shall be as prescribed in Appendix A.

7 METHODS OF TEST

7.1 During the analysis unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

7.2 Tests shall be carried out as prescribed in Appendices B to K of this specification, SLS 311 and SLS 312.

8 CONFORMITY TO STANDARD

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied:

8.1 Each carton examined as in A.3.1 satisfies the relevant requirements.

8.2 Each package examined as in A.3.2 satisfies the relevant requirements.

8.3 Each pencil examined as in A.3.3 satisfies the relevant requirements.

8.4 Each pencil of sub samples, when tested as in A.3.4.1 or A.3.5.1 satisfies the relevant requirements.

8.5 The values of the expressions $(\bar{x} + 1.1 s)$ and $(\bar{x} - 1.1 s)$ in case of Type 1 pencils or $(\bar{x} + 1.5 s)$ and $(\bar{x} - 1.5 s)$ in case of Type 2 pencils, calculated using test results on dimension measurements when tested as in A.3.4.2 or A.3.5.2 lie between the relevant specification limits.

8.6 Each pencil tested for warpage of wood casing, colour of pencil markings and water fastness of pencil markings as in A.3.4.2 or A.3.5.2 satisfies the relevant requirements.

NOTE - If more than one shade is supplied for a particular colour, conformity of one shade to the colour of pencil markings, is sufficient.

8.7 The value of the expression $(\bar{x} - 1.1 s)$ in case of Type 1 pencils or $(\bar{x} - 1.5 s)$ in case of Type 2 pencils, calculated using test results on lead slip breaking force measurements when tested as in A.3.4.2 or A.3.5.2 is not less than the relevant specification limit.

8.8 The test results on lead content and arsenic content when tested as in A.3.4.3 or A.3.5.3 satisfy the relevant requirements.

8.9 The test results on lead content, arsenic content and wax content when tested as in A.3.4.4 or A.3.5.4 satisfy the relevant requirements.

NOTE - In case of Type 1 pencils, conditions given in 8.5 to 8.9 shall be satisfied for each colour shade.

APPENDIX A

SAMPLING

A.1 LOT

In any consignment all coloured lead pencils of one type and manufactured under similar conditions of manufacture shall constitute a lot.

A.2 SCALE OF SAMPLING

A.2.1 Samples shall be tested from each lot to ascertain the conformity of a lot to the requirements of this specification.

A.2.2 The number of packages to be selected from a lot shall be in accordance with Column 1 and Column 2 of Table 4.

TABLE 4 - Scale of sampling

Number of packages in the lot (1)	Number of packages to be selected (2)	Sub sample size (3)
Up to 300	5	5
301 to 800	6	7
801 to 1 300	7	7
1 301 to 3 200	9	10
3 201 and above	12	10

A.2.3 The packages shall be selected from cartons. At least 4 per cent of the cartons, subject to a minimum of 5 cartons shall be selected at random and as far as possible an equal number of packages shall be selected from each carton so as to form a sample as given in Column 2 of Table 4.

A.2.4 The cartons and packages shall be selected at random. In order to ensure randomness of selection, random number tables as given in SLS 428 shall be used.

A.3 NUMBER OF TESTS

A.3.1 Each carton selected as in A.2.3 shall be examined for packaging and marking requirements. (This may be done at the place of inspection).

A.3.2 Each package selected as in A.2.2 and A.2.3 shall be examined for packaging and marking requirements (Applicable only for Type 1 pencils).

A.3.3 Each pencil of the sample selected as in A.2.2 and A.2.3 shall be examined for marking requirements.

A.3.4 Type 1 pencils

A.3.4.1 Three sub samples of pencils, each having size as given in Column 3 of Table 4 shall be drawn at random to represent all available colours, as far as possible.

The pencils of one sub sample shall be tested for gluing of wood casing, another sub sample shall be tested for continuity of lead slip and the remaining sub sample shall be tested for extraction of lead slip.

A.3.4.2 Three pencils, if the lot contains, 800 or less packages or four pencils if the lot contains more than 800 packages shall be drawn for each colour and the pencils shall be tested for the following requirements:

- a) Dimension;
- b) Warpage of wood casing;
- c) Colour of pencil markings;
- d) Water fastness of pencil markings; and
- e) Lead slip breaking force.

NOTES

1 Tests for the colour of pencil markings shall be done using only the pencils of the colours listed in 4.4.3.1.

2 If more than one shade is supplied for a particular colour, tests shall be done for each shade separately.

A.3.4.3 If the lot has been found satisfactory with respect of A.3.4.1 and A.3.4.2, paint films from the casings of the pencils used to carry out tests as stated in A.3.4.2, shall be removed for each colour separately, mixed and tested for the following requirements:

- a) Lead content; and
- b) Arsenic content.
(see Note 2 of A.3.4.2).

A.3.4.4 The lead slips of pencils used to carry out tests as stated in A.3.4.3 shall be separated for each colour, mixed and tested for the following requirements:

- a) Lead content;
- b) Arsenic content; and
- c) Wax content.
(see Note 2 of A.3.4.2).

A.3.5 Type 2 pencils

A.3.5.1 Three sub samples of pencils each having size as given in Column 3 of Table 4 shall be drawn at random. The pencils of one sub sample shall be tested for gluing of wood casing, another sub sample shall be tested for continuity of lead slip and the remaining sub sample shall be tested for extraction of lead slip.

A.3.5.2 Twenty pencils, if the lot contains 800 or less packages or 30 pencils otherwise, shall be drawn at random and the pencils shall be tested for the following requirements:

- a) Dimension;
- b) Warpage of wood casing;
- c) Colour of pencil markings;
- d) Water fastness of pencil markings; and
- e) Lead slip breaking force.

A.3.5.3 If the lot has been found satisfactory with respect of A.3.5.1 and A.3.5.2, paint films from the casings of the pencils used to carry out tests as stated in A.3.5.2 shall be removed, mixed and tested for the following requirements:

- a) Lead content; and
- b) Arsenic content.

A.3.5.4 The lead slips of pencils used to carry out tests as stated in A.3.5.3 shall be separated, mixed and tested for the following requirements:

- a) Lead content;
- b) Arsenic content; and
- c) Wax content.

APPENDIX B DETERMINATION OF WARPAGE

B.1 PROCEDURE

Place the pencil on a surface plate of an apparatus as shown in Figure 1. Move the pencil in the direction of the length of the pencil and measure the maximum warpage.

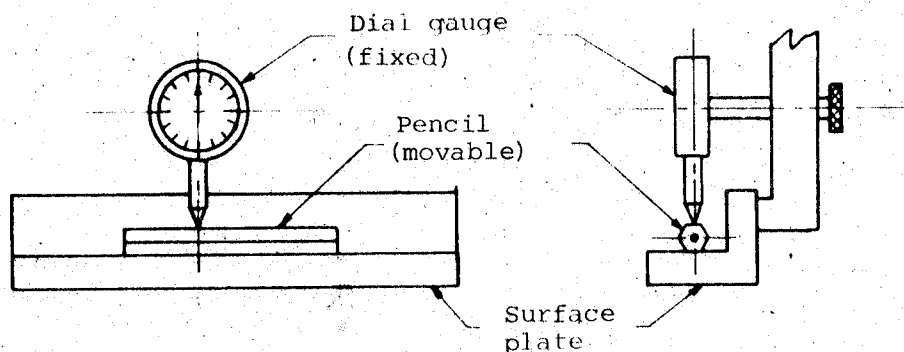


FIGURE 1 - Apparatus for determination of warpage

APPENDIX C

PREPARATION OF THE SAMPLE FOR THE DETERMINATION
OF LEAD CONTENT AND ARSENIC CONTENT

C.1 PAINT FILM OF THE CASING

Scrape off the dry paint film being careful not to remove material from the wood casing. Powder the material so as to pass through a sieve of 500 μm aperture.

C.2 LEAD SLIP

Powder the lead slip so as to pass through a sieve of 500 μm aperture.

APPENDIX D

DETERMINATION OF LEAD CONTENT

D.1 PROCEDURE

D.1.1 Lead content in the paint of the wood casing

D.1.1.1 Weigh, to the nearest 1 mg, about 0.1 g of the material prepared as in C.1 and add to 5 ml of 0.25 per cent (*m/m*) solution of hydrochloric acid.

D.1.1.2 Shake the mixture for one minute. If the pH value is more than 1.5, add drop by drop, 7.3 per cent (*m/m*) solution of hydrochloric acid, shaking the mixture after addition of each drop, until the pH value is 1.5 or less. Shake the mixture continuously for one hour. Stand for one hour and filter. Analyse the filtrate by the method given in SLS 311.

D.1.2 Lead content in the lead slip

D.1.2.1 Weigh, to the nearest 1 mg, about 0.1 g of the material prepared as in C.2. Remove any wax or other similar matter by means of 1,1,1 trichloroethane. Add the treated sample to 5 ml of 0.25 per cent (*m/m*) solution of hydrochloric acid. Proceed as in D.1.1.2.

APPENDIX E

DETERMINATION OF ARSENIC CONTENT

E.1 PROCEDURE

E.1.1 Arsenic content in the paint of the wood casing

E.1.1.1 Weigh, to the nearest 1 mg, about 0.1 g of the material prepared as in C.1 and add to 5 ml of 0.25 per cent (*m/m*) solution of hydrochloric acid.

E.1.1.2 Shake the mixture for one minute. If the pH value is more than 1.5, add drop by drop, 7.3 per cent (*m/m*) solution of hydrochloric acid, shaking the mixture after addition of each drop, until the pH value is 1.5 or less. Shake the mixture continuously for one hour. Stand for one hour and filter. Analyse the filtrate by the modified Gutzeit method given in SLS 312.

E.1.2 Arsenic content in the lead slip

E.1.2.1 Weigh, to the nearest 1 mg, about 0.1 g of the material prepared as in C.2. Remove any wax or other similar matter by means of 1, 1, 1 trichloroethane. Add the treated sample to 5 ml of 0.25 per cent (*m/m*) solution of hydrochloric acid. Proceed as in E.1.1.2.

APPENDIX F

DETERMINATION OF WAX CONTENT

F.1 PROCEDURE

Weigh, to the nearest 0.1 g, about 5 g of the lead slip ground to a coarse powder. Place the sample in a paper thimble (Whatman No. 1 or equal) and extract with petroleum ether for a minimum of 4 hours in a Soxhlet extractor, using a previously weighed 250-ml Erlenmeyer flask. Evaporate the petroleum ether over a steam bath and cool the flask in a desiccator. Weigh the residue obtained.

F.2 CALCULATION

$$\text{Wax content, per cent by mass} = \frac{m_1}{m_2} \times 100$$

where,

m_1 = mass, in grams, of the residue; and

m_2 = mass, in grams, of the sample.

APPENDIX G

DETERMINATION OF LEAD SLIP BREAKING FORCE

G.1 PROCEDURE

Expose 3 mm to 4 mm of the lead slip by removing the wood casing. (A pencil sharpener shall not be used). Sharpen to a diameter between 1.2 mm and 1.3 mm. Place the pencil in a rigid holder set at a constant angle of 45° between the pencil and the scale platform (see Fig. 2). The pencil shall extend 30 mm to 40 mm beyond the underside of the block, measured along the pencil to the sharpened point. The scale platform shall be smooth and shall offer no resistance to the point moving across its surface. Apply force by

pushing the rod down gradually and uniformly to avoid variations and shock. Take the reading at the instant of breaking or crumbling of the lead slip. Each pencil shall be subjected to not less than four tests.

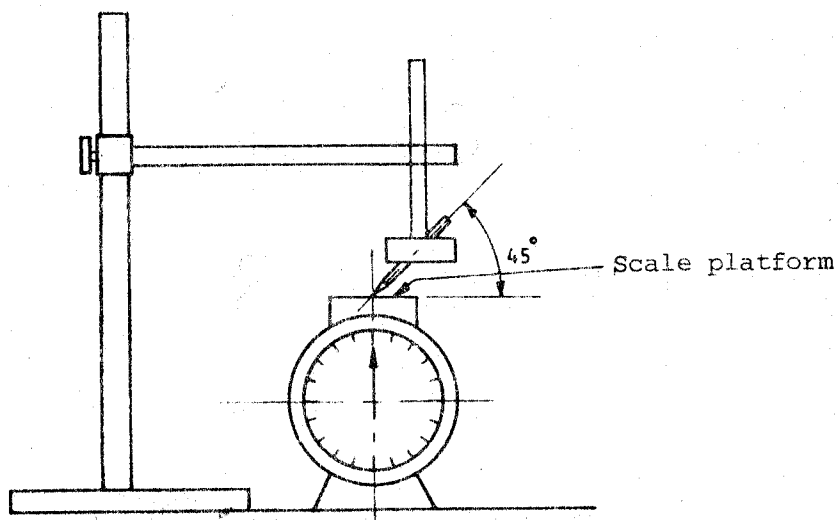


FIGURE 2 - Apparatus for determination of lead slip breaking force

APPENDIX H

DETERMINATION OF COLOUR OF PENCIL MARKINGS

H.1 PROCEDURE

H.1.1 Colour a piece of white paper, for example, Whatman No. 41 filter paper using normal manual force. Continue until the intensity of the colour reaches a level beyond which further colouring does not increase the intensity of the colour.

H.1.2 By referring to the Munsell books of colour, determine the Munsell notation.

APPENDIX J

DETERMINATION OF WATER FASTNESS OF PENCIL MARKINGS

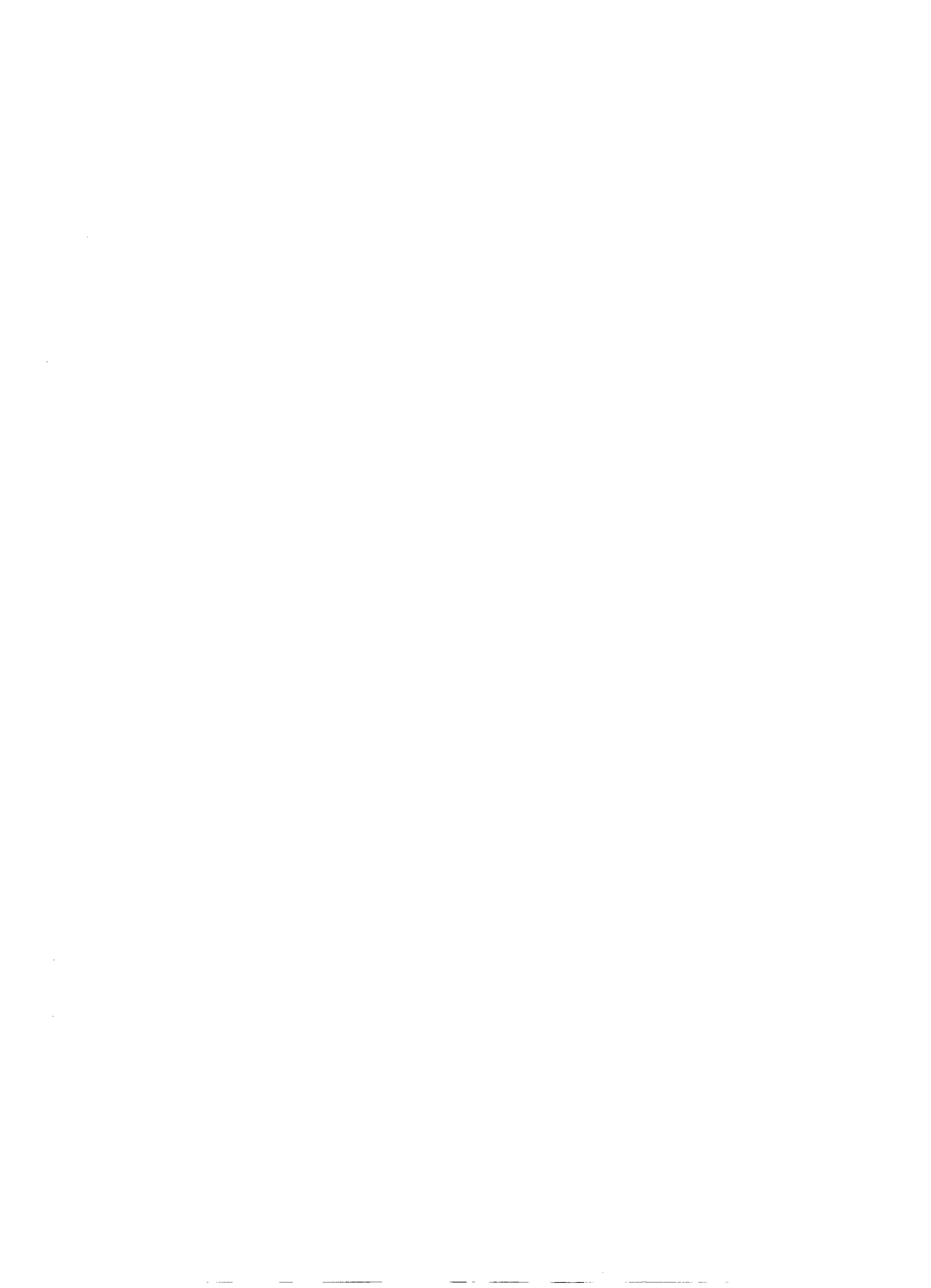
J.1 PROCEDURE

Draw a line about 150 mm in length on a piece of white paper, using firm pressure. Immerse the marked paper in a container of water at ambient temperature. After 2 minutes, remove the paper and dry. Observe the marked area.

APPENDIX K
DETERMINATION OF LEAD SLIP EXTRACTION FORCE

K.1 PROCEDURE

Cut the pencils into approximately 27-mm sections in length. Expose the lead slip from one end, leaving a length of 25 ± 0.5 mm of the casing. Position the specimen vertically and apply a force of 40 N to the exposed lead slip. Examine the lead slip for extraction. Each pencil shall be subjected to not less than five tests, and each section of the pencil so tested shall satisfy the relevant requirement.



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SRI LANKA STANDARDS INSTITUTION

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