SRI LANKA STANDARD 169:1983

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SPECIFICATION FOR

DUPLICATING INK, FOR SINGLE DRUM ROTARY MACHINES

(FIRST REVISION)

BUREAU OF CEYLON STANDARDS

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FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1983-04-08, after the draft, finalized by the Drafting Committee on Duplicating Ink, had been approved by the Chemicals Divisional Committee.

This specification was originally issued in 1972. In this revision an additional requirement, namely fineness of dispersion has been included. Requirements for emulsion and water content have been deleted, as the Drafting Committee responsible for the preparation of this specification felt that in the case of emulsion based ink, a high water content will be reflected in the other characteristics given in the specification. However as a guideline to manufacturers of emulsion based ink, a water content not more than 25 per cent is recommended.

All standard 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 result 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 should be the same as that of the specified value in this specification.

In the preparation of this specification, valuable assistance derived from the relevant publications of the Indian Standards Institution and the United States Federal Supply Service, General Services Administration is gratefully acknowledged.

1 SCOPE

This specification prescribes requirements and methods of sampling and test for duplicating ink, for use on drum-type single cylinder rotary duplicating machines.

2 REFERENCES

CS 3 Paper sizes

CS 102 Presentation of numerical values

SLS 428 Random sampling methods

SLS 535 Methods of test for paints
Part 3 : Tests associated with paint film formation

SLS 587 Stencil paper

3 DEFINITIONS

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

3.1 clogging : Interruption in free flow of ink during operation.

3.2 impression : The print resulting from one cycle of the duplicating machine.

3.3 set-off : An undesirable transfer of ink from the printed sheet to the back of the sheet adjacent to it.

3.4 oil halation : The transparent halo surrounding each character as a result of oily materials in the ink separating in the paper.

3.5 shelf life : The length of time an unopened container of ink can be kept without deterioration of the ink.

3.6 strike through : The visible effect seen on the reverse side of the sheet due to the penetration of ink or vehicle into or through the paper.

3.7 tack : Slight stickiness of the surface of a film of material, apparent when the film is pressed with the finger.

3.8 vehicle : The liquid part of the ink in which the pigment is dispersed.

3.9 viscosity : The internal resistance to flow possessed by a liquid.

4 REQUIREMENTS

4.1 General requirements

The ink shall be uniform free from skins, lumps and other separated materials which will not disperse easily in the vehicle. It shall also be free from any toxic materials and shall not have or develop any objectionable odour during the duplicating operation.

4.2 Performance

4.2.1 The ink shall wet the pad readily and it shall perform satisfactorily in rotary stencil duplicating machines to produce acceptable reproductions on both sides of the paper. When tested as prescribed in Appendix A, ink shall produce presentable impressions which are clean, clear, without strike-through, set-off or oil-halation sufficient to interfere with legibility of the finished work.

4.2.2 The ink shall not show excessive leakage through or around the sides of the pad. The material shall not dry in the pad (in 72 hours of idling) and shall not show any sign of flying or spurting from the ink drum when the machine is running at a speed of 125 ± 5 copies per minute.

4.2.3 After the operation in A.2.1, remove excess ink on the stencil using a blotting paper and store it carefully between two non-absorbent papers at a temperature of 27 ± 2 °C and relative humidity of 65 ± 5 per cent. The stencil shall not have any cracks or creases and shall be reported as satisfactory for re-use when examined after storing for 30 days.

4.2.4 There shall be no noticeable difference in the quality of impressions obtained in the first and second stages of operation as prescribed in A.2.

4.2.5 *Separation and clogging*

The ink shall return to its original homogeneity on mild agitation, if separation of the pigment and vehicle occurs during storage or idle periods of the machine. The ink shall not clog in the pad when tested according to A.2.5 during this period. The storage or idle periods shall not exceed 72 hours for this purpose.

4.3 Colour

The colour of the impressions produced in the performance test (Appendix A) shall be the same as that indicated on the label.

4.4 Resistance to fading

The impression made by the ink (see Appendix A) shall remain unchanged and shall be readable when tested by the method prescribed in A.2.6.

4.5 Resistance to smudging and moisture

4.5.1 After the 1000 th copy run in the performance test (A.2.1), the ink shall be sufficiently dry on the first 500 sheets to permit handling and printing on the reverse side without smudging.

4.5.2 The ink shall be resistant to smudging and moisture when tested according to Appendix B.

4.6 Consistency

4.6.1 *Viscosity*

The viscosity of the ink shall be 2.9 ± 0.4 Pa s at 27 ± 2 °C when tested as prescribed in Appendix C.

4.6.2 *Stability*

The material shall not show any appreciable variation in its apparent consistency when tested as prescribed in Appendix D.

4.7 Shelf life

The ink in unopened containers shall be workable after storage under normal conditions for a period of one year from the date of manufacture.

4.8 Fineness of dispersion

The pigment particles in the medium shall not be coarser than 50 μm when tested by the method prescribed in SLS 535:Part 3:Section 3.8.

5 PACKAGING

Ink shall be packed in suitable containers, so designed to provide for the efficient and complete utilization of the ink contained therein and shall not leak in transit. Containers shall be individually packed in paperboard boxes, or any other suitable enclosure.

6 MARKING

6.1 Each box and the enclosed container shall be marked legibly and indelibly with the following information.

a) Name of the material and type of machine on which the ink is to be applied;

b) Colour;

c) Name and address of manufacturer;

d) Registered trade mark (if any);

e) Month and year of manufacture;

f) Net mass, in g, of the material; and

g) Batch or code number.

6.2 The containers may also be marked with the Certification Mark of the Bureau of Ceylon Standards illustrated below on permission being granted for such marking by the Bureau of Ceylon Standards.

NOTE - The use of the Bureau of Ceylon Standards Certification Mark (SLS Mark) is governed by the provisions of the Bureau of Ceylon Standards 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 Bureau and operated by the producer. SLS marked products are also continuously checked by the Bureau for conformity to that 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 Bureau of Ceylon Standards.

7 SAMPLING

The method of drawing representative samples of the material shall be as specified in Appendix E.

8 METHODS OF TEST

Tests for the requirements laid down in 4 shall be carried out as prescribed in Appendices A,B,C, and D of this specification and SLS 535:Part 3:Section 3.8.

9 CONFORMITY TO STANDARD

The lot shall be considered as conforming to the requirements of this specification if all the containers examined as in E.5.1 and tested as in E.5.2 satisfy the relevant requirements.

APPENDIX A

TEST FOR PERFORMANCE

A.1 APPARATUS

A.1.1 *Duplicating machine*

An electrically operated, single drum type rotary machine shall be used.

A.1.2 *Stencil paper*

Stencil paper conforming to SLS 587 shall be used.

A.1.3 *Duplicating paper*

White duplicating semi-absorbent paper of size A4 (see CS 3) having a substance of 75 g/m^2 with a tolerance of ± 4 per cent and a minimum pH of 5.0 shall be used.

A.2 PROCEDURE

A.2.1 *Stage 1*

Clean the drum of the machine and use a fresh pad as recommended for the machine. Fill the drum with ink to the level as specified by the manufacturer of the machine and ink the pad in the specified manner.

If leakage occurs examine the position and tightness of the pad on the machine. If the pad appears to be at fault a new pad shall be used.

Place on the machine, in the manner specified by the manufacturer of the machine, the stencil (A.1.2) cut with 30 lines each nearly 150 mm long on an electric typewriter having pica type using all the letters both upper and lower case along with numerals and symbols. Set the machine to run at a speed of 125 ± 5 copies per minute.

Run 1000 copies on the specified paper (A.1.3). Reserve the first 500 copies until completion of the run. Take the reserved sheets and print on the reverse side of the printed sheets, completing 1500 copy run. Examine for compliance with the requirements in 4.2, 4.3, 4.4 and 4.5.

A.2.2 Stage 2

After the operation in A.2.1, remove excess ink on the stencil using a blotting paper and store it carefully between two non-absorbent papers at a temperature of 27 ± 2 °C and relative humidity of 65 ± 5 per cent. After 30 days of storage use the stencil again. As described in A.2.1 and take out 100 copies. Compare impressions on the middle 50 copies obtained with that of the middle 50 copies obtained in Stage 1 of the operation and note whether there is any noticeable difference in the quality of impressions in the two.

A.2.3 Set-off and strike-through

The first and the last 10 copies of the two stages in the performance test (A.2.1 and A.2.2) shall be examined after 24 hours for set-off and strike-through around the characters.

A.2.4 Leakage

After completing Stage 1, fill the cylinder with ink to the level specified by the manufacturer and then remove the stencil. Wipe off any excess ink or vehicle at the edges of the ink pad or around the clamps of the cylinder. If leakage takes place examine its cause. If the pad appears to be defective the performance test shall be repeated with a new pad. Any leakage due to the ink shall be reported.

Place a protective cover over the ink pad and lock in place. Seal the cover to the pad by running several sheets of paper through the machine. Remove the cylinder from the machine and place it on a flat surface, covered with several sheets of clean paper. Examine the cylinder for leakage after 72 hours.

A.2.5 Separation and clogging

After completing the leakage test (A.2.4) remove the protective cover, place a freshly typed stencil on the cylinder, then run 100 copies and examine for any separation of ink vehicle or clogging of the pad. (Ink separation will show on early copies as oily blotches while pad clogging will show in later copies as broken copy).

There shall not be an appreciable difference between these copies and the last 100 copies of A.2.1.

A.2.6 Resistance to fading

Take six copies of sheets from A.2.1, printed on one side with equally good impressions. Expose three of these sheets with the printed side up to an ultraviolet lamp at a distance of 0.25 m from the source for 48 hours. The lamp should emit radiations at 366 nm so that intensity at 0.9 m from the lamp is approximately 4.5 W/m^2. Keep the other three sheets of printed paper for reference, away from the ultraviolet lamp. There shall be no appreciable change in intensity of the impressions of the paper exposed to ultra violet light when compared to three sheets reserved for reference.

APPENDIX B

TEST FOR RESISTANCE TO SMUDGING AND MOISTURE

B.1 PROCEDURE

B.1.1 At any time after running approximately 500 copies as in A.2.1 remove one copy of printed sheet as it is delivered from the machine.

B.1.2 Resistance to smudging

Take a copy of printed sheet as in B.1.1 and allow to air dry for four minutes. Place on a smooth, flat surface with the printed side up and cover with a clean sheet of blank duplicating paper (see A.1.3). Place a 100-g circular 33-mm diameter mass on one edge of the paper and draw the clean sheet of paper and the mass slowly across the printed sheet of paper. Repeat this test and examine after each test. The ink shall be considered to have passed the test if there is no smudging.

B.1.3 Resistance to moisture

Take a copy of printed sheet as in B.1.1 and allow to air dry for four minutes, dip in water and perform the smudge test as specified in B.1.2.

APPENDIX C

DETERMINATION OF VISCOSITY

C.1 APPARATUS

C.1.1 *I.C.J. Rotothinner*, with the appropriate 31.75-mm diameter bob attachment as a replacement to standard perforated disc for measurement of viscosity of 1.5 Pa s to 6.0 Pa s.

C.1.2 *Tin-coated container*, of approximately 50 g in mass and having dimensions of approximately 75 mm in diameter and 80 mm in height.

C.1.3 *Thermometer*

C.1.4 *Stopwatch*

C.2 **PROCEDURE**

Fill the container with the material to be measured to almost full. Place the container with the contents on the Rotothinner turntable, pull down the lever to its fullest. Allow the 31.75-mm bob to run until a steady state is reached (approximately 30 seconds). Record the temperature and read the scale on turntable and convert the reading to pascal second using the graph (see Figure 1).

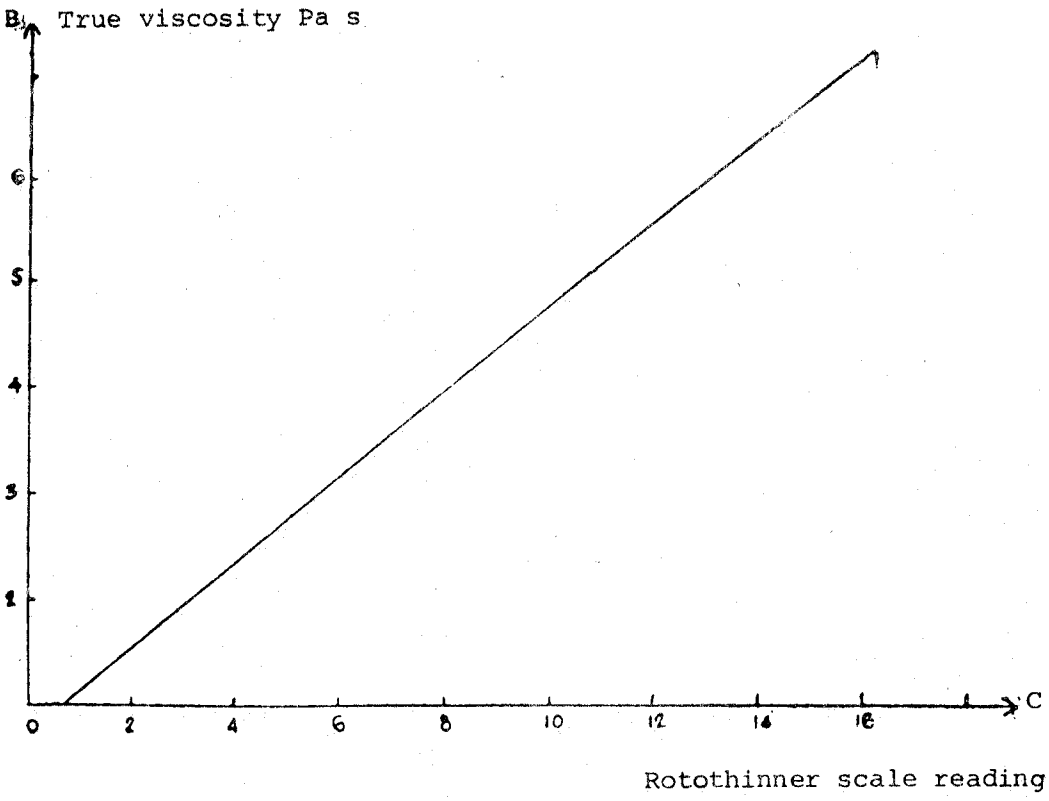

FIGURE 1 - Conversion graph rotothinner with 31.75 mm diameter bob (Shear rate of bob = 100 s^{-1})

APPENDIX D

TEST FOR STABILITY

Pour about 10 g of the sample ink into a clean shallow vessel approximately 60 mm in diameter and 8 mm in depth and place in an oven at 60 ± 2 °C for two hours. The material shall not change its consistency appreciably or show signs of separation of oil layer or any signs of bubbles.

Into another similar vessel pour about 10 g of the sample and maintain the vessel at 0 ± 2 °C for two hours. It shall show no signs of congealing and remain of workable consistency.

APPENDIX E

SAMPLING

E.1 GENERAL REQUIREMENTS

In drawing representative samples the following precautions and directions shall be observed.

E.1.1 Samples shall be taken in an unexposed place.

E.1.2 Samples shall be drawn from originally unopened containers.

E.1.3 Precautions shall be taken to protect the samples from adventitious contamination.

E.1.4 Samples shall be stored in such a manner that the conditions of storage do not unduly affect the quality of the material.

E.2 LOT

All containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture, the containers belonging to the same batch shall be grouped together and each such group shall constitute a separate lot.

E.3 SCALE OF SAMPLING

E.3.1 Samples of duplicating ink shall be tested from each lot for ascertaining the conformity to the requirements of this specification.

E.3.2 The number of containers n to be chosen from the lot shall depend upon the size of the lot and shall be in accordance with Table 1.

E.3.3 These containers shall be chosen at random from the lot. In order to ensure randomness of selection, a random number table as given in SLS 428 shall be used.

TABLE 1 - Scale of sampling

Lot size	No. of containers to be selected (n)
Up to 50	2
51 to 100	3
101 to 300	4
301 and above	5

E.4 REFERENCE SAMPLE

If a reference sample is required the number of containers to be selected from each lot shall be three times the value given in Table 1. One third of this sample shall be retained by the purchaser, one third by the supplier and one third shall be kept at a place agreed to between the purchaser and the supplier to be used in case of dispute between the two.

E.5 NUMBER OF TESTS

E.5.1 Each container selected as in E.3.2 shall be examined for packaging and marking (5 and 6).

E.5.2 After examining for packaging and marking (E.5.1), each container shall be individually tested for performance (4.2), colour (4.3), fading (4.4),resistance to smudge and moisture (4.5),consistency (4.6), and fineness of dispersion (4.8).

E.5.3 Only the required quantity of ink shall be drawn from each container as and when the tests are carried out.

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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.*

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SRI LANKA STANDARDS INSTITUTION

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