SRI LANKA STANDARD 966 : 1992

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SPECIFICATION FOR

FOOD COLOURING MATTER, GREEN FCF

SRI LANKA STANDARDS INSTITUTION

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SLS 966 : 1992

Gr.7

SRI LANKA STANDARDS INSTITUTION
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Sri Lanka.

SRI LANKA STANDARD

SPECIFICATION FOR FOOD COLOURING MATTER, GREEN FCF

FOREWORD

This standard was approved by the Sectoral Committee on Food Safety and Hygiene and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1992-10-07.

This is one of the series of standard specifications for food colours.

The colour green FCF is hygroscopic in nature and its shade changes with the pH value.

During the formulation of this specification due consideration has been given to the relevant provisions made under the Sri Lanka Food Act No. 26 of 1980. Specific requirements given in this specification, wherever applicable, are in accordance with the relevant regulations. However, general provisions made under the Sri Lanka Food Act have not been included in this specification and therefore, the attention of the user of this specification is drawn to the general provisions made in the regulations framed under the Food Act.

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

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 an analysis, shall be rounded off in accordance with SLS 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 standard the valuable assistance derived from the following publications is gratefully acknowledged:

Specifications for identity and purity of food colours, 1989, FAO food and nutrition paper 37, Food and Agriculture Organization

IS 6022 : 1977 (Reaffirmed in 1986) Specification for Fast green FCF, Food grade (First Revision)

1 SCOPE

This specification prescribes the requirements and methods of test for green FCF used as a colouring matter of food stuffs.

2 REFERENCES

SLS 102 Presentation of numerical values.
SLS 394 Analysis of water soluble coal-tar dyes.
SLS 467 Labelling of prepackaged foods
  Part 1 : General guidelines.
  Part 2 : Guidelines on claims.
SLS 543 Sampling of food colours.

3 DESCRIPTIONS

3.1 **Common name** : Green FCF

3.2 **Synonyms** : CI Food Green 3
FD & C Green 3
Fast Green FCF

3.3 **Colour index number** : 42053.

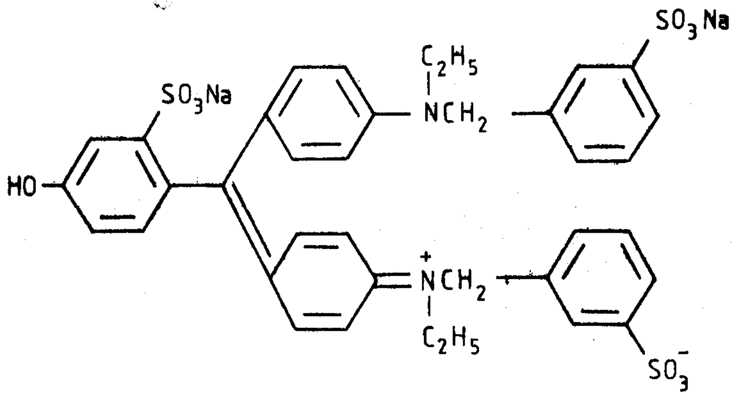
3.4 **Class** : Triarylmethane.

3.5 **Chemical name** : Inner salt disodium salt of N-ethyl-N-[4-[[4-[ethyl[(3-sulfophenyl) methyl] amino] phenyl](4-hydroxy-2-sulfophenyl) methylene]-2,5-cyclohexadien-1-ylidene]-3-sulfobenzenemethanaminium hydroxide.

3.6 **Empirical formula** : $C_{37}H_{34}N_2Na_2O_{10}S_3$.

3.7 **Molecular mass** : 808.84

3.8 **Structural formula** :



4 REQUIREMENTS

4.1 Green FCF shall consist of inner salt disodium salt of N-ethyl-N-[4-[[4-[ethyl [(3-sulfophenyl) methyl] amino] phenyl] (4-hydroxy-2-sulfophenyl) methylene]-2,5-cyclohexadien-1- ylidene]-3-sulfobenzenemethanaminium hydroxide.

It shall not contain any extraneous matter injurious to health.

4.2 Green FCF shall be in the form of red to brown-violet powder or crystals.

4.3 Green FCF shall also conform to the requirements given in Table 1, when tested by the methods prescribed in Column 4 of the table.

TABLE 1 : Requirements for green FCF

Sl. No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
(1)	Total dye content, per cent by mass, min.	85	Appendix B
(ii)	Matter volatile at 135 ± 1 °C, per cent by mass and chlorides and sulfates, as sodium salts, per cent by mass	15 max.	2.1, 2.5 and 2.6 of SLS 394:1976
(iii)	Water insoluble matter, per cent by mass, max.	0.2	2.2 of SLS 394:1976
(iv)	Subsidiary dye content, per cent by mass, max.	06	Appendix C
(v)	Organic compounds other than dye, per cent by mass, max.		
	a) 2-,3- and 4-formylbenzene sulfonic acids, sodium salts	0.5	Appendix D
	b) 3- and 4-[[ethyl] (4-sulfophenyl) amino] methyl benzene sulfonic acids, disodium salts	0.3	
	c) 2-formyl-5-hydroxybenzene sulfonic acid, sodium salt	0.5	
(vi)	Ether extractable matter, per cent by mass, max.	0.4	2.3 of SLS 394:1976
(vii)	Arsenic, mg/kg, max.	03	2.8 of SLS 394:1976
(viii)	Lead, mg/kg, max.	10	
(ix)	Heavy metals, as sulfides	Lighter in colour than the reference standard	2.9 of SLS 394:1976

5 PACKAGING AND MARKING

5.1 Packaging

Green FCF shall be packed in suitable containers which shall not affect the nature and composition of the material.

5.2 Marking

5.2.1 Each container shall be legibly and indelibly marked or labelled with the following :

a) Name of the product as "Green FCF, Food Grade";
b) Colour index number "42053";
c) Brand name or trade name, if any;
d) Net mass, in grams;
e) Name and address of the manufacturer and/or distributor (including the country of origin); and
f) Batch or code number.

5.2.2 Marking and labelling shall be in accordance with **SLS 467.**

NOTE

Attention is drawn to certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of the standard.

6 METHODS OF TEST

Tests shall be carried out in accordance with the relevant clauses of SLS 394 and Appendices B and C of this specification.

APPENDIX A
COMPLIANCE OF A LOT

The 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 testing and check tests or any other procedure, appropriate scheme of sampling and inspection should be adopted.

A.1 SAMPLING AND PREPARATION OF TEST SAMPLE

Sampling shall be carried out in accordance with SLS 543. The composite sample for testing shall be prepared as given in the relevant clauses of SLS 543.

A.2 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification if the test results obtained on the composite sample satisfy the relevant requirements.

APPENDIX B
DETERMINATION OF TOTAL DYE CONTENT

B.1 APPARATUS

B.1.1 *Spectrophotometer*, having a cell length of 10.0 mm.

B.1.2 *Oven*, maintained at 105 °C.

B.2 REAGENT

B.2.1 *Ammonium acetate*, 200 mg/l solution.

B.3 PROCEDURE

Weigh, to the nearest 0.01 mg, about 100 mg of the dye sample and dissolve in ammonium acetate solution (B.2.1) in a 250-ml volumetric flask. Dilute with the same solvent to make the final concentration of approximately 0.2 mg per 100 ml.

Measure the optical density of diluted solution against ammonium acetate solution as the blank at a wave length of 625 nm.

Simultaneously weigh, to the nearest milligram, about 2 g of the dye sample and dry in the oven (B.1.2) at 105 ± 1 °C for 2 hours. Calculate the loss of mass on drying.

Calculate the dry mass of the sample (m) in the final solution taken for the measurement of the optical density.

B.4 CALCULATION

Total dye content, per cent by mass = $\frac{A \times 100}{m \times 1560}$

where,

A is the measured optical density;
m is the dry mass, in mg, of the sample in 100 ml of solution; and
1560 is the $\in^{1\%}_{1\ \mathrm{cm}}$,625 nm for green FCF in ammonium acetate solution.

APPENDIX C
DETERMINATION OF SUBSIDIARY DYES

C.1 APPARATUS

C.1.1 *Chromatographic tank*

C.1.2 *TLC plates,* coated with silica gel, 200-mm x 200-mm.

C.1.3 *Spectrophotometer,* suitable for use in the visible range.

C.1.4 *Micro syringe,* 0.5-ml capacity.

C.1.5 *Sintered glass crucible,* No. 4

C.2 Reagents

C.2.1 *Developing solvent,* acetonitrile : isoamyl alcohol : methyl ethyl ketone : water : ammonium hydroxide, 50 : 50 : 15 : 10 : 5 by volume.

C.2.2 *Ethanol*

C.3 PROCEDURE

Weigh, to the nearest milligram, about 0.1 g of the dye and dissolve in water in a 10-ml volumetric flask. Spot 0.1 ml of the solution using the syringe (C.1.4) as a band on the TLC plate (C.1.2). Allow the plate to dry about 20 min. in the dark before placing it in the tank (C.1.1) containing the developing solvent (C.2.1). Develop the plate until the solvent front is near the top of the plate. Remove the plate and allow to dry. The two top bands are the lower sulfonated subsidiary colours, followed by the isometric and the main band (Green FCF) near the bottom of the plate. Scrape off all the bands above the isometric colour. Extract quantitatively the colour from the silica gel with ethyl alcohol. Filter through the sintered glass crucible (C.1.5) and determine the optical density using a 1-cm cell. The standard absorptivity of the lower subsdiary colour is 0.126 mg/l/cm at 625 nm.

NOTE

Spectrophotometric measurements of extracted subsidiary colours should be made as quickly as possible.

C.4 CALCULATION

$$\text{Subsidiary dyes, per cent by mass} = \frac{A \times V}{0.126 \times m} \times 10^{-2}$$

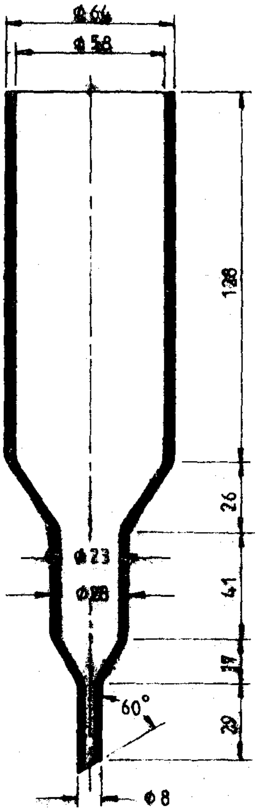
where,

A is the optical density at 625 nm;
V is the volume, in ml, of the ethanol used for the extraction; and
m is the mass, in g, of the dye taken for the determination.

APPENDIX D
DETERMINATION OF ORGANIC COMPOUNDS OTHER THAN DYE

D.1 APPARATUS

D.1.1 *Chromatographic tube,* as given in Figure 1.



All dimensions in millimetres

FIGURE 1 Chromatographic tube

D.1.2 *Spectrophotometer,* suitable for ultraviolet range.

D.2 REAGENTS

The reagents used shall be of analytical grade.

D.2.1 *Ammonium sulfate,* 250 g/l solution.

D.2.2 *Ammonium sulfate.*

D.2.3 *2-formyl benzene sulfonic acid.*

D.2.4 *3-formyl benzene sulfonic acid.*

D.2.5 *4-formyl benzene sulfonic acid.*

D.2.6 *3-((ethyl) (4-sulfophenyl) amino) methyl benzene sulfonic acid.*

D.2.7 *4-((ethyl) (4-sulfophenyl) amino) methyl benzene sulfonic acid.*

D.3 PROCEDURE

D.3.1 *Preparation of the column*

Prepare a slurry using about 75 g of Whatman powdered cellulose or equivalent and 500 ml of the ammonium sulfate solution (D.2.1). Wash the tube with 200 ml of the ammonium sulfate solution (D.2.1). Place a samll disc of stainless steel gauze in the constriction above the tip of the tube. Pour sufficient amount of slurry into the tube until the tube is filled up to a level of 50 mm from the rim. Tap the tube occasionally to ensure a well packed column. Wash the column with 200 ml of the eluant.

D.3.2 *Determination*

Weigh, to the nearest milligram, about 0.2 g of the dye sample in a beaker. Dissolve in 20 ml of water. Add approximately 5 g of powdered cellulose and 50 g of ammonium sulfate. Transfer the mixture to the column, rinse the beaker with the ammonium sulfate solution (D.2.1) and add the washings to the tube. Allow the column to drain until flow ceases, or nearly so. Add the ammonium sulfate solution to the column at a rate equivalent to the rate of flow through the column. Collect the effluent in 100 ml fractions. Collect twelve fractions. Reserve the column and the contents.

Shake each fraction and obtain the ultraviolet absorption spectrum from 220 nm to 400 nm. If the spectrum of the twelfth fraction shows the presence of any compound, continue collecting fractions until all compounds present are eluted.

Compare the absorption spectra of the eluted material with the spectra of solutions of pure compounds (D.2.3, D.2.4, D.2.5, D.2.6, D.2.7 and D.2.8) in the same solvent for identification and quantification.

Use the following absorptivities for quantification of organic compounds other than dye.

(a) 2-, 3- and 4-formyl benzene sulfonic acids, sodium salts:
0.495 mg/l/cm at 246 nm in dilute hydrochloric acid.
(b) 3- and 4-[[ethyl] (4-sulfophenyl) amino] methyl benzene sulfonic acid, disodium salts :
0.078 mg/l/cm at 277 nm in dilute ammonia.
(c) 2-formyl-5-hydroxybenzene sulfonic acid, sodium salt :
0.080 mg/l/cm at 335 nm in dilute ammonia.

NOTE

If more than one compound is present in significant quantities in any fraction, the amounts of these compounds should be determined by the procedure customarily used in spectrophotometric analysis of mixtures of absorbing materials.

D.3.3 *Correction for background absorption*

Determine the absorption of the fractions collected from the column immediately before and after each fraction containing the compounds. Subtract one-half of the sum of these two determinations from the observed absorbance of the fraction containing the compounds. This should be taken as the absorbance due to the compound present.

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.*

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SRI LANKA STANDARDS INSTITUTION

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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.

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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.

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