BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

अगरबत्ती – विशिष्टि

Draft Indian Standard

INCENSE STICKS AGARBATTI — SPECIFICATION

(ICS 71.100.60)

Fragrance and Flavour Sectional Committee, PCD 18	Last date for receipt of comment is 14 July 2024

FOREWORD

(*Formal clauses will be added later*)

NOTE – As recorded in the minutes of the 27th meeting of the Sectional Committee PCD18, the method of tests for the determination of moisture content and volatile oil content are received from AIAMA / FFDC. Both the test methods have been incorporated in the working draft dated 12 November 2021, received from the working group consisting AIAMA, FFDC and Dr. Renuka Thergaonakr, In personal Capacity. The updated draft is reviewed in the first week of June 2024 by the same WG. Accordingly, the draft is finalized with modifications (Strick out indicates deletions and blue colour indicates addition in P-Draft) to seek inputs from the members. This P-Draft is circulated with Doc No. PCD18 25823 dated 6th June 2024 which supersedes Doc No. PCD 18 (14870)P dated 15th October 2019.

Agarbathi ~~(~~incense sticks~~)~~ are a traditional handicraft product manufactured primarily in India. Burning of agarbathi is a very old tradition dating back hundreds of years. Agarbathi are used as a part of religious practices, festivals, weddings and also as a room freshener. In the past two decades agarbathi are widely used around the world for aromatherapy, yoga, meditation and as a fragrance aid in spas.

Agarbathi are used in homes, offices, places of worship and all other venues. Agarbathi are widely of three types as described in Annex I.

In the past few decades a number of aromatic ingredients have been banned in Europe and other areas due to their harmful effect on humans, animals & the environment in general. So far the manufacturers have been stopping usage of such ingredients as a part of their own ethical standards. This standard aims to bring together a list of harmful ingredients so that every manufacture is aware of the same and complies with avoiding usage of such ingredients.

Similarly, the quality of an agarbathi is dependent on individual manufacturers. This standard aims to provide detailed information to manufacturers on what parameters are expected to be followed to ensure that the consumer is protected.

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 analysis, shall be rounded of in accordance with IS 2: 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard prescribes the requirements and methods of sampling and tests for all type of agarbathi also known as incense sticks.

The standard does not include other items like incense cones, and dhoop sticks which are made without usage of bamboo. The standard also does not cover pest or insect repellents in any form.

2 REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constituteprovisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 2284 : 1988	Method for olfactory assessment of natural and synthetic perfumery materials (*first revision*)
IS 4905 : 2015/ISO 24153 : 2009	Random Sampling and Randomization Procedures (*first revision*)
IS 6597 : 2001	Glossary of terms relating to fragrance and flavor industry (*second revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions prescribed in IS 6597 shall apply.

3.2 Sticks — Full length of the agarbathi inclusive of paste and bare portion (holding portion).

4 GRADES / TYPE

The material shall be classified into three types, namely:

a) Type 1 - Machine Made Agarbathi.
b) Type 2 - Hand Made Agarbathi; and
c) Type 3 - Masala Agarbathi.

The descriptions of the types are given in Annex I.

5 COMPOSITIONS OF AGARBATTI

5.1 The Agarbathi shall consist of following ingredients and the percentage as indicated against each ingredient:

Sl No.	Name of Material	Agarbathi		
		Machine Made Agarbathi	**Handmade Agarbathi**	**Masala Agarbathi**
(1)	(2)	(3)	(4)	(5)
i)	Bamboo sticks	15 to 40	15 to 40	10 to 25
ii)	Mixture of herbs, spices & other natural items as per proprietary formula	-	-	40 to 80
iii)	Charcoal	0 to 50	0 to 50	-
iv)	Wood powder	0 to 50	0 to 50	-
v)	Jigat/Gum	5 to 18	5 to 18	4 to 12
vi)	Fragrance concentrate	~~3 to 30~~ 0 to 40	~~3 to 30~~ 0 to 40	~~0to15~~ 0 to 40
vii)	Solvent	0 to 40	0 to 40	0 to 15
viii)	Colour	0 to 6	0 to 6	0 to 6

5.2 The composition shall not include any of the specific ingredient given in the list of negative ingredients in Annex A.

6 REQUIREMENTS

6.1 General

6.1.1 The agarbathi shall be uniform in length and thickness. The agarbathi shall be strong and capable of standing upright and shall not bend under their own weight when placed in a hole of the agarbathi holder.

NOTE: The size of the hole should be matched with the diameter of the bamboo stick.

6.1.2 The sticks shall be free from fungus on visual examination.

6.1.3 Agarbathi shall be divided into three parts, namely:

a) Bamboo sticks;
b) Coating[1]; and
c) Fragrance[2].

NOTES:
1 Includes Jigat, wood powder and charcoal in case of perfumed agarbathi and several ingredients in case of masala agarbathi.
2 In case of perfumed agarbathi this is added later, in case of masala agarbathi this is part of the coating.

6.2 Stick

Length of the bare portion of the stick shall not be less than 1 cm and shall be suitable to place in the agarbathi holder, when tested according to the methods given in Annex B.

6.3 Coating

The coating shall comply with the following requirements:

6.3.1 The coating on the sticks shall uniform and free from physical defects, when tested according to the method given in Annex C.

6.3.2 The length of the coating shall not be less than 60 percent of the total length of the stick, when tested according to the method given in Annex B.

6.4 Fragrance

6.4.1 The fragrance shall not contain any of the specific ingredient given in the list of negative ingredients in Annex A.

6.4.2 The sticks shall give out aroma continuously while burning for its full length of the coated portion, when tested according to the method given in Annex D.

6.5 Burning Quality

The agarbathi shall comply with the following requirements, when tested according to the methods given in Annex E.

6.5.1 The agarbathi shall be lit easily by using match sticks or a suitable lighter.

6.5.2 The agarbathi shall burn continuously and shall not extinguish even once before burning the coated portion.

If the agarbathi extinguishes, calculate its percentage. If the percentage is less than 1 %, relight the same agarbathi, if it completely burns, then the lot can be accepted.

BIS OBSERVATIONS: BOTH THE PARAs IN 6.5.2 ARE CONTRADICTORY TO EACH OTHER.

6.5.3 While burning the agarbathi, no sparks shall be produced nor shall any part of the glowing tip along with the unburnt coating fall off so as to constitute a fire hazard of any kind.

6.6 Chemical Parameters

The material shall also comply with the requirements given in Table 1 for machine made agarbathi, handmade agarbathi, masala agarbathi when tested according to the methods given in col 4 of the Table 1.

Table 1 Chemical Requirement
(*Clause* 6.6)

Sl No. (1)	**Characteristics** (2)	**Requirements** (3)	**Methods of Test, Ref to Annex** (4)
1.	Moisture content, percent by mass, *Max*	20.0	Annex F
2.	Ash content, (based on Inorganic Residue), percent by mass, *Max*	~~0.1~~ 25.0	Annex G
3.	Volatile fraction content, percent by mass, *Max*	~~0.5 to 15~~ 0 to 40	Annex H

7 PACKING AND MARKING

7.1 Packing

The sticks shall be packed in suitable packages in tubular, flat or rectangular form or any form as agreed to between the purchaser and the manufacturer/supplier, subject to the provisions of law in force from time to time.

7.2 Marking

7.2.1 Each packet/ packaging shall be marked with the following information appropriately:

a) Name of the product~~;~~
~~b) Grade/Type of the material;~~
c) Manufacturer's name, initials, or trade-mark, if any;
d) Net mass/ quantity of material;
~~e) Date of manufacturing or packaging;~~
~~f) Identification in code number or batch number to enable the lot of consignment or manufacture to be traced back from records; and~~
g) Any other statutory requirements.

7.2.2 The sale of agarbathi and packaging marks is governed by the department of legal metrology. All agarbathi shall comply with the law of the land and any such requirements which are subject to change from time to time.

7.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

8 SAMPLING

8.1 Scale of Sampling

8.1.1 *Lot*

In a single consignment, all cartons of agarbathi belonging to the same batch of manufacture shall be grouped together and each group shall constitute a lot.

8.1.2 For ascertaining the conformity of the material to the requirements of the specification, samples shall be tested from each lot separately.

8.1.3 The number of agarbathi to be chosen from the lot depends on the size of the lot and shall be in accordance with col (2), (3) and (4) of Table 2. From each selected carton approximately equal number of agarbatti shall be taken from each packet so as to constitute the required sample size given in col (4) of Table 2.

8.1.3.1 The required number of packets from each selected carton and the required number of sticks from each selected packet shall be chosen at random (*see* IS 4905).

8.2 Number of Tests and Criteria for Conformity

Table 2 Scale of Sampling and Permissible Number of Defectives
(*Clauses* 8.1.3, 8.2.1.1 *and* 8.2.2)

Sl No.	No. of Cartons in the Lot	No. of Cartons to be Chosen	For Visual and Dimensional Requirements		No. of Tests for Each of the Characteristics Other Than Visual and Dimensional
			No. of Sticks to be Taken	Permissible No. of Defectives	
(1)	(2)	(3)	(4)	(5)	(6)
1.	Up to 100	2	20	2	1
2.	101 to 300	3	32	3	1
3.	301 to 1 000	5	50	5	1
4.	1 001 to 3 000	7	80	7	2
5.	3 001 to 5 000	10	125	10	2
6.	Above 5 000	15	200	14	3

NOTE - The Carton consists of 12 packets, rolls, etc as applicable.

8.2.1 *Visual and Dimensional Characteristics*

Each stick selected according to **8.1.3** shall be examined for visual and dimensional requirements. A stick failing to satisfy any of these requirements shall be considered as defective.

8.2.1.1 The lot shall be deemed to have satisfied these requirements if the number of defective sticks found in the sample is less than or equal to the corresponding permissible number of defectives given in col (5) of Table 1. The lot, having been found satisfactory for these requirements, shall be further examined under **8.2.2.**

8.2.2 *Characteristics other than Visual and Dimensional*

8.2.2.1 For fragrance, coating and burning quality, number of tests given in col (6) of Table 2 shall be carried out. For this purpose, required number of agarbathi shall be taken from those already examined according to **8.2.1** and found satisfactory.

8.2.2.2 The lot shall be declared to have met these requirements if there is no failure under **8.2.2.**

8.2.3 The lot shall be considered as conforming to the requirement of the specification if **8.2.1** and **8.2.2** are satisfied.

9 TEST METHODS

9.1 Tests shall be conducted according to the methods prescribed in col 4 of Table 1 and Annex A to E.

9.2 Quality of Reagents

Unless otherwise specified, pure chemicals and distilled water (see IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities, which affect the results of analysis.

ANNEX A
(*Clauses* 5.2 *and* 6.4.1)
List of Negative Ingredients

A-1 List of Synthetic Ingredients not to be used in Agarbattis

The list includes, known carcinogens, allergens, pesticides and other harmful substances which cause harm to humans, animals and the environment.

Sl No.	Name of Substance with synonyms and CAS Numbers	
~~1.~~	~~Alantroot (Inulahelenium) essential oils and derivatives e.g. concrete and absolute~~	~~CAS No: 97676-35-2~~
2.	Allyl isothiocyanate	CAS No: 57-06-7
3.	Benzyl cyanide	CAS No: 140-29-4
4.	p-tert-Butylphenol	CAS No: 98-54-4
~~5.~~	~~Chenopodium oil~~	~~CAS No: 8006-99-3~~
~~6.~~	~~Cyclamen alcohol~~	~~CAS No: 4756-19-8~~
~~7.~~	~~Diethyl maleate~~	~~CAS No: 141-05-9~~
8.	2,4-Dihydroxy-3-methyl-benzaldehyde	CAS No: 6248-20-0

~~9.~~	~~3,7 Dimethyl 2 octen 1 ol (6,7 Dihydrogeraniol)~~	~~CAS No: 40607 48 5~~
10.	Dimethyl citraconate	CAS No: 617-54-9
~~11.~~	~~7,11 Dimethyl 4,6,10 dodecatrien 3 one~~	~~CAS No: 26651 96 7~~
12.	6,10-Dimethyl-3,5,9-undecatrien-2-one	CAS No: 141-10-6
13.	Diphenylamine	CAS No: 122-39-4
14.	Ethyl acrylate	CAS No: 140-88-5
~~15.~~	~~Fig leaf, fresh and preparations (Ficuscarica)~~	~~CAS No: 68916 52 9~~
~~16.~~	~~trans 2 Heptenal~~	~~CAS No: 18829 55 5~~
~~17.~~	~~trans 2 Hexenal diethyl acetal~~	~~CAS No: 67746 30 9~~
~~18.~~	~~trans 2 Hexenal dimethyl acetal~~	~~CAS No: 18318 83 7~~
~~19.~~	~~Hydroabietyl alcohol~~	~~CAS No: 13393 93 6~~
~~20.~~	~~Hydroquinone monoethyl ether~~	~~CAS No: 622 62 8~~
21.	6-Isopropyl-2- decahydronaphthalenol	CAS No: 34131-99-2
22.	4-Methoxyphenol	CAS No: 150-76-5
~~23.~~	~~4 (p Methoxyphenyl) 3 butene 2 one~~	~~CAS No: 943 88 4~~
~~24.~~	~~1 (p Methoxyphenyl) 1 penten 3 one~~	~~CAS No: 104 27 8~~
25.	Methyl trans-2-butenoate	CAS No: 623-43-8
~~26.~~	~~5 Methyl 2,3 hexanedione~~	~~CAS No: 13706 86 0~~
~~27.~~	~~2 Pentylidene cyclohexanone~~	~~CAS No: 25677 40 1~~
~~28.~~	~~4 Phenyl 3 buten 2 one~~	~~CAS No: 122 57 6~~
~~29.~~	~~3,6,10 Trimethyl 3,5,9 undecatrien 2 one~~	~~CAS No: 1117 41 5~~
~~30.~~	~~Verbena (*Lippiacitriodora*Kunth.) essential oils and derivatives e.g. concrete and absolute~~	~~CAS No: 8024 12 2~~
31.	Alethrin	CAS No: 584-79-2
32.	Vifenthrin as Bifenthrin ((±)-Bifenthrin,	CAS No: 82657-04-3
~~33.~~	~~Boric Acid~~	~~CAS No: 10043 35 3~~
34.	Cyfluthrin – (unstated stereochemistry) Diastereoisomer I Diastereoisomer II Diastereoisomer III Diastereoisomer IV	CAS No: 68359-37-5 CAS No: 68359-37-5 CAS No: 86560-92-1 CAS No: 86560-93-2 CAS No: 86560-94-3 CAS No: 86560-95-4
35.	Cypermethrin	CAS No: 52315-07-8
36.	Deltamethrin	CAS No: 52918-63-5
37.	Esfenvalerate	CAS No: 66230-04-4
38.	Fipronil	CAS No: 120068-37-3
39.	Hydroprene	CAS No: 41096-46-2
40.	Lambda cyhalothrin	CAS No: 91465-08-6
41.	Methoprene	CAS No: 65733-16-6
42.	Permethrin	CAS No: 52645-53-1
43.	Prallethrin	CAS No: 23031-36-9
44.	Pyrethrin	CAS No: 8003-34-7
45.	Resmethrin	CAS No: 10453-86-8
46.	Sumithrin Synonyms - Phenothrin Sumithrin Phenoxythrin Phenothrine More…	CAS No: 26002-80-2 26002-80-2
47.	Tetramethrin	CAS Number 7696-12-0

~~**A-2 List of Natural Ingredients not to be used in Agarbattis**~~

~~The list includes, known carcinogens, allergens, pesticides and other harmful substances which cause harm to humans, animals and the environment.~~

~~Sl No.~~	~~Name of Substance with synonyms and CAS Numbers~~	
~~1.~~	~~Calamus Oil (Tagetes minuta l. flower oil)~~	~~CAS No: 8016-84-0~~
~~2.~~	~~Birch Tar Rect 10 BB~~	~~CAS No: 8001-88-5~~
~~3.~~	~~Massoia Bark oil 70%: (Neat)~~	~~CAS No: 85085-26-3~~
~~4.~~	~~Costus Oil~~	~~CAS No: 8023-88-9~~
~~5.~~	~~Ho oil~~	~~CAS No: 8022-91-1~~
~~6.~~	~~Rosewood oil~~	~~CAS No: 83863-32-5; 8015-77-8~~
~~7.~~	~~Linaloebery oil~~	~~CAS No: 8006-86-8~~
~~8.~~	~~Cognac oil~~	~~CAS No: 8016-21-5~~
~~9.~~	~~Onion oil~~	~~CAS No: 8002-72-0~~
~~10.~~	~~Garlic oil~~	~~CAS No: 8000-78-0~~
~~11.~~	~~Hempseed (Cannabis Sativa) Oil~~	~~CAS No: 8016-24-8~~

ANNEX B
(*Clause* 6.2 *and* 6.3.2)
METHODS OF TEST FOR SIZE OF THE STICK

B-1 DETERMINATION OF TOTAL LENGTH

Each stick selected according to **8.1.3** shall be examined for size of the stick by measuring the overall length of the stick. Take one stick at a time from the sample and measure the length from tip of the uncoated portion to the tip of the coated portion using standard measuring scale as demonstrated in the fig. 1. The length of the stick shall not vary by more than ± 0.25 inches from each other. A stick failing to satisfy any of these requirements shall be considered as defective.

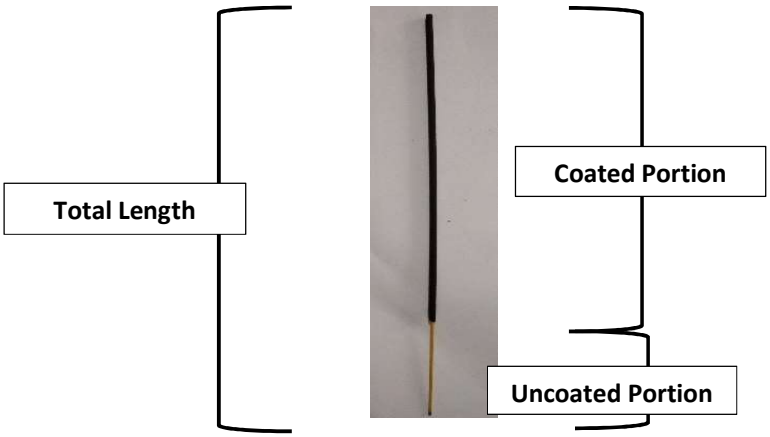

FIG. 1 Illustration of length

B-2 DETERMINATION OF UNCOATED PORTION

Each stick selected according to **8.1.3** shall be examined for size of the stick by measuring the uncoated length of the stick. Take one stick at a time from the sample and measure the length from tip of the uncoated portion to the beginning of the coated portion using standard measuring scale. The length of the stick shall not vary by more than ± 0.50 inches for masala/handmade agarbathi and ± 0.25 inches for machine made agarbathi from each other.

ANNEX C
(*Clause* 6.3.1)
DETERMINATION OF UNIFORMITY OF COATING (PASTE)

C-1 Two method of tests are prescribed for determination of the uniformity of coating. In case of any dispute, the instrumental method of test shall be referee method.

C-1.1 Gravimetric Determination

Take two sticks from the sample and cut each into three equal parts of the coated portion. Scrap out the paste from each portion, collect it separately and weigh. The average mass of the coating of the three portions of the same stick shall not vary by more than ~~± 10 percent~~ ± 20 percent for machine made agarbattis and not more than ~~± 15 percent~~ ± 30 percent for masala/handmade agarbathi.

C-1.2 Instrumental Method

Each stick selected according to **8.1.3** shall be examined for uniformity of coating by measuring the diameter of the stick. Take one stick at a time from the sample and measure the diameter using Vernier Caliper at top, middle and bottom of the coated portion. The diameter of the coating of the three portions of the same stick shall not vary by more than ~~± 10 percent~~ ± 20 percent for machine made agarbathi and not more than ~~± 15 percent~~ ± 30 percent for masala/handmade agarbathi.

NOTE - Care to be taken while measuring masala/handmade agarbathi as such agarbathi are generally soft in nature.

C-2 Determination of Physical Defects
Each stick selected according to **8.1.3** shall be examined for physical defects. Take one stick at a time from the sample and check for defects in the top, middle and bottom of the coated portion (*see* Fig 2). Any stick with top chip off, middle chip off or partial chip off shall not more than 8 percent of the overall length.

Defect – Top Chip Off Defect – Middle Chip Off Defect – Partial Chip Off



FIG 2 Illustration of Physical Defects

ANNEX D
(*Clause* 6.4.2)
METHOD FOR OLFACTORY ASSESMENT OF FRAGRANCE (AROMA OF *AGARBATTIS*)

D-1 GENERAL

The method is based on olfactory assessment of a given material by a panel of three persons.

D-2 REQUIREMENTS

D-2.1 General Requirements

D-2.1.1 *Selection and Training*

Better results are obtained if individuals with a keen sense of smell are selected for making the olfactory assessment.

D-2.1.2 *Fatigue*

Continuous smelling causes olfactory fatigue, decreases critical odour perception. To avoid this, the number of samples assessed during a session should be limited as far as is practical. Further, during smelling the body shall be relaxed. Resting for an interval between smelling different samples is also advantageous. If the number of samples to be tested is fairly large, it is advisable to examine last those samples which are known to be fatiguing.

D-2.1.3 *Time Olfactory Assessment*

The evidence relating to the most favorable time for conducting olfactory assessment is somewhat conflicting. However, the morning appears to be generally favored.

D-2.1.4 *Freedom from Contaminating Odour*

It is necessary to ensure that the hands, the nose are free from contaminating odour as these are likely to vitiate the result. It is recommended that the individual responsible for assessing odour wash their hands several times during a smelling session.

D-2.2 Material Requirements

D-2.2.1 *Stand*

A cruciform patterned 3-clip stand, approximately 21 cm high, or any other suitable device to hold agarbattis (*see* Fig. 3).

D-2.2.2 *Environment*

A well-ventilated room, as free as possible from all outside disturbances. Ideally, the temperature and humidity suited are about 20°C and 80 percent RH, respectively. Otherwise, normal room temperature and humidity. The colouring of the room shall be sober and the furnishings restricted. The general environment shall have a restful rather than a distracting effect.

D-3 PROCEDURE

D-3.1 The three sticks from the sample and cut each into three equal parts of the coated portion. Take one part, burn and place in the stand or in any suitable device to hold the Agarbathi. Keep the stand at such a distance from the nose that there is incipient yet distinct perception of odour. While smelling, concentrate wholly on the sensations received and make mental observations. The stick shall give out pleasant aroma while burning. Test each part separately and independently to assess the aroma. The lower part of each stick shall be tested first then middle and then upper.

D-3.1.1 It is important to note that, although the room shall be well ventilated, the sticks kept under examination should not be exposed to a direct drought.

D-3.1.2 All three persons of the panel should agree to uniformity and pleasing aroma of the agarbattis sample.

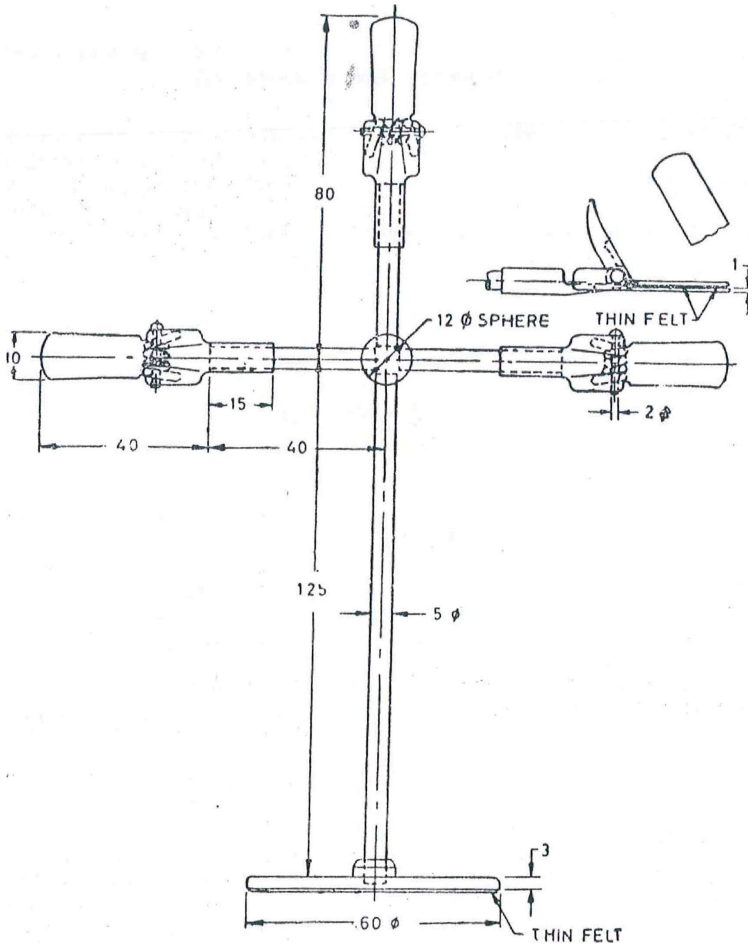

FIG. 3 STRIP STAND

ANNEX E
(*Clause* 6.5)
METHODS OF TEST FOR BURNING QUALITY

E-1 BURNING CONTINUITY

E-1.1 Procedure

Each stick selected according to **8.1.3** shall be examined for burning of the stick. Take the sample sticks and light one at a time by using a match stick or suitable lighter from tip of the coated portion in a drought free room. The burning of the stick shall not stop in between before burning completely till the end of coated portion. If the agarbathi extinguishes, calculate its percentage. If the percentage is less than 1%, relight the same agarbathi, if it completely burns, then the lot can be accepted.

NOTE – A drought free room of approx. 10 feet X 10 feet size is suitable for the determination.

ANNEX F
(Table 1, Sl No 1)
DETERMINATION OF MOISTURE CONTENT

F-1 APPARATUS

F-1.1 Analytical Balance – Capable of weighing with least count 0.001g.

F-1.2 Hot Air-oven — Capable of maintaining the temperature at 105°C with least count 1°C.

F-1.3 Moisture Dish — It shall made of aluminium sheet about 0.45 mm to 0.56 mm thickness, 70 mm to 80 mm in diameter and 20 mm deep; provided with tight-fitting slip-over cover.

F-1.4 Desiccator — Containing an efficient desiccant.

NOTE: Phosphorus pentoxide, Silica Gel, Calcium Sulphate, Calcium Chloride are suitable desiccants for use during the test.

F-2 PROCEDURE

Prepare the moisture dish by heating at 105 ± 1°C in oven and then cool in a desiccator to attain the room temperature. Weigh the empty dish and record it as w_1. Weigh (2.0 ± 0.5) g of the freshly prepared sample (the coated portion of agarbathi) in the moisture dish / Glass Petri Dish and record it as w_2, Place the dish in the oven for 1 h at (105 ± 1) °C. Remove the dish from the oven, cool in the desiccator to room temperature and weigh. Repeat this procedure but keep the dish in the oven only for half an hour each time until the difference between the two successive weighing does not exceed one milligram. Record the final weight as w_3.

F-3 CALCULATION

F-3.1 Moisture and Volatile Oil Content (MVO), percent by weight = $\frac{w_3 - w_1}{w_2 - w_1} \times 100$

where

w_1 = weight of empty dish;
w_2 = weight of dish with sample; and
w_3 = weight of dish with dried sample.

F-3.2 Moisture, percent by weight = MVO - VOC

Where

MVO = Moisture and Volatile Oil Content (*See* **F-3.1**)
VOC = Volatile Oil Content in percent (S*ee* **H-4**)

NOTE - The moisture content should be determined after determination of Volatile Oil Content because there will be evaporation of VOC along with moisture during drying.

ANNEX G
(Table 1, Sl No 2)
DETERMINATION OF ASH

G-1 APPARATUS

G-1.1 Analytical Balance – Capable of weighing with least count 0.001g.

G-1.2 Muffle Furnace / Electric Bunsen Burner – Regulated at 600 ± 25°C.

G-1.3 Dish – flat-bottomed, having a surface area of at least 15cm^2, made of platinum or of other material unaffected by the conditions of the test.

G-1.4 Desiccator - Containing an efficient desiccant.

NOTE: Phosphorus pentoxide, Silica Gel, Calcium Sulphate, Calcium Chloride are suitable desiccants for use during the test.

G-2 PROCEDURE

G-2.1 Weigh, to the nearest 0.001g, about 2g of the sample (the Coated portion of Agarbathi) into the tared flat-bottomed dish (*see* **G-1.3**) and ignite carefully over a small flame to char the material. Place the dish into the muffle furnace / Electric Bunsen burner (*see* **G-1.2**) and ignite at 600 ± 25°C for 3 h.

G-2.2 Remove the dish to a desiccator containing fresh and efficient desiccant. Allow to cool to room temperature and weigh without delay.

G-2.3 Heat again in the muffle furnace at 600 ± 25°C for 1h and repeat the process **G-2.2**.

G-2.4 Repeat these operations **G-2.2** and **G-2.3** until the difference in mass between two successive weighings is less than 0.001g. Record the lowest mass.

G-3 CALCULATION

$$\text{Ash, percent by weight} = \frac{Weigh\ \ of\ ash}{Weight\ of\ sample} \times 100$$

ANNEX H
(Table 1, Sl No 3)

DETERMINATION OF VOLATILE OIL CONTENT

H-1 APPARATUS

H-1.1 Analytical Balance — Capable to weighing with least count 0.001g.

H-1.2 Soxhlet Extraction Apparatus — Consisting of heating mantle, round bottom flask, soxhlet extractor, and condenser.

H-1.3 Rotary Evaporator

H-1.4 Cutting Device — Suitable device with sharp edge.

H-1.5 Cotton

H-1.6 Beaker

H-2 SOLVENT

H-2.1 Hexane, Technical Grade — (*See* IS 10870 for safety)

H-3 PROCEDURE

H-3.1 Weigh at least 250 g agarbatti. Cut the agarbathi into pieces of 1 inch by a suitable cutting device. Place the agarbathi in the thimble and cover it with cotton. Place it in soxhlet apparatus and start the extraction using the hexane **(H-2.1)**. Quantity of hexane shall be enough for extraction. The extraction shall be continue for a period of minimum 4 h and continue more if colours continues in solvent at thimble. Stop the extraction, if solvent is clear. Solvent removal shall be done after removing the agarbathi material from the apparatus.

H-3.3 The recovered fragrance will be left in the round bottom flask. Carefully collect the recovered fragrance in a container and weigh it. Transferring the contact will error results hence weighing to be done only in round bottom flask.

H-4 CALCULATIONS

Volatile Oil Content (VOC), percent by weight = $\frac{Wi-W}{Wi} \times 100$

Where

Wi = initial weight of agarbatti
Wd = weight after drying

ANNEX I

(Clause 4, Forword)

Types of Agarbathi

Agarbathi are widely of three types:

a) **Machine Made Agarbathi**

This is a process where a mixture of charcoal, wood powder and Jigat (a natural binder) are mixed with water and then the dough is coated on to a bamboo stick. Such a stick is called a raw agarbathi which does not have any fragrance.

Raw agarbathi after they are dried are dipped into fragrance. Then they become perfumed agarbathi. Nowadays most of the agarbathi are machine made i.e., the process of coating the bamboo stick with the dough is made by machines.

b) Hand Made Agarbathi

These are basically the same as the above machine made agarbathi in composition and performance. However instead of making the raw agarbathi by machine, such agarbathi are rolled by hand.

c) Masala Agarbathi

Masala (or flora) agarbathi are the traditional way of manufacturing agarbathi. This is a process where charcoal, wood powder, Jigat, natural gums, resins, oils, flower petals, aromatic spices and fragrance are all mixed together and then made into a dough. This dough is applied on to a bamboo stick by hand rolling. Once applied the finished agarbathi are dried and then they are ready to use.

Such masala/agarbathi do not need to be dipped again in fragrance. Masala agarbathi may be handmade and/or machine made due to their soft nature and high natural content.