



**THAI AGRICULTURAL STANDARD**

**TAS 8000-2005**

**THAI SILK YARN**

**The National Bureau of Agricultural Commodity and Food Standards**

**Ministry of Agricultural and Cooperative**

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**The National Bureau of Agricultural Commodity and Food Standards**

**Ministry of Agricultural and Cooperative**

**50 Phaholyothin Rd. Ladyao, Chatuchak, Bangkok 10900**

**Tel 66 2561 2277 [www.acfs.go.th](http://www.acfs.go.th)**

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**Working Group on the Elaboration of Standard for Thai Silk Yarn**

1. Chairperson of working group  
Ms. Chanya Pannengpet (Technical Expert of Sericulture)
2. Representative of the Department of Agriculture Extension  
Ms. Somying Chuprayoon  
Ms. Siriporn Boonchoo  
Ms. Buddhachard Leepayakhun
3. Representative of the Department of Agriculture  
Mr. Vorapot Raksang  
Ms. Pornthip Petch-mon
4. Representative of the Department of Industrial Promotion  
Mr. Banpot Tekacharin  
Mr. Patiparn Sai-aroon
5. Representative of the Department of Export Promotion  
Ms. Kulanee Issadisai  
Ms. Nithima Siriphokakij  
Ms. Sangduen Leelasmanchai
6. Representative of the Office of Agricultural Economics  
Ms. Krittika Akanitapichat  
Ms. Kunyarat Wongvitdecha
7. Representative of the Office of Commodity and System Standards,  
National Bureau of Agricultural Commodity and Food Standards  
Ms. Methanee Sukhontharak
8. Representative of The Thailand Textile Institute  
Dr. Naraporn Rungsimuntakul
9. Representative of the Thai Silk Association  
Mr. Setr Vanijvong
10. Experts

Ms. Suchada Ujjin	Representative of the Kasetsart Agricultural and Agro-Industrial Product Improvement Institute
Mr. Kamphol Vontreenatrakoon	Representative from Trade Sector, Bangkok
Ms. Keaw Thoathip	Representative from Agricultural Sector, Khonkaen Province
Mr. Piboon Jirapunchawat	Representative from the Trade Sector, Buriram Province
Ms. Sarisa Nillert	Representative from the Agricultural Sector, Putthaisong District Buriram Province
Ms. Boontan Kuadthisong	Representative from the Agricultural Sector, Putthaisong District Buriram Province

(2)

11. Representative of The National Bureau of Agricultural Commodity and Food Standards  
Ms. Tassanee Pradyabumrung                      Secretary of the Working Group
12. Representative of The National Bureau of Agricultural Commodity and Food Standards  
Ms. Saowanee Apinyanuwat                      Assistant Secretary of the Working Group

Thai silk yarn is an important agricultural commodity used as a raw material for many kinds of Thai silk products. Thanks to the silk yarn's special characteristics, the Thai silk products have brought worldwide reputation to Thailand. Nevertheless, commercial Thai silk production still faces obstacles particularly on quality aspects of silk yarn; evenness, the lack of standard. Thus, silk products come in a wide range of quality, which sometimes the production goes without meeting the demands of farmers, producers and customers. To set up a standard well accepted by all concerned, the Ministry of Agriculture and Cooperatives develops 'Thai Silk Yarn Standard' as follows;

This Thai Silk Yarn Standard is developed based on the information of the following documents;

DOA. 2004. Good Agriculture Practice for Optimum Household Sericulture. the Agricultural Cooperatives Assembly of Thailand Publishing House. Bangkok. 29 p.

International Silk Association (AIS/ISA). 1993. Spun Silk; Quality Limits, Testing Procedures and Recommendations Regarding Quality., Edited by Group of Section IV, Zellweger Uster AG, Switzerland, 39 p.

International Silk Association (AIS/ISA). 1995. Raw Silk; Manual for Testing, Classifying, Quality Limits, Grading, Directives, Methods, Standards Instrumentation. Edited by the study Group of the Silk Standards Committee (SSC), Zellweger Uster AG, Switzerland, 27 p.

***Remark:***

The standard title has been revised from "Thai Agricultural Commodity and Food Standard (TACFS 8000-2005)" to "Thai Agricultural Standard (TAS 8000-2005)" in accordance with the application of the Agricultural Standard Act B.E. 2551 (2008)



**NOTIFICATION OF THE NATIONAL COMMITTEE  
ON AGRICULTURAL COMMODITY AND FOOD STANDARDS SUBJECT :  
THAI AGRICULTURAL COMMODITY AND FOOD STANDARDS :  
THAI SILK YARN  
B. E. 2548**

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The resolution of the 2/2548 session of the national Committee on Agricultural Commodity and Food Standards agreed to elaborate a national standard for agricultural commodities and food on Thai Silk Yarn. This standard would be advantage for quality improvement, facilitating trading and protecting consumers.

The mandate of the National Committee on Agricultural Commodity and Food Standards has been assigned by the resolution of the Cabinet since the 19<sup>th</sup> of November 2002, the announcement as a national standard for agricultural commodity and food on Thai Silk Yarn has been issued to be voluntary and attached herewith.

Notified on 5 October 2005 (B.E. 2548)

Khunying Sudarat Keyuraphan  
Minister of the Ministry of Agriculture and Cooperative  
Chairperson of the National Committee  
on Agricultural Commodity and Food Standards

# Thai Agricultural Standard

## Thai Silk Yarn

### 1 Scope

This Thai Agricultural Standard sets types, quality, sizes, packaging, acceptable tolerance, label and marks, sampling and judgment criteria for Thai silk yarn.

### 2 Definitions

Definitions of terms used in this Thai Agricultural Standard are as follows;

**2.1 Thai silk yarn** is the handicraft silk yarn derived from the hand-reeled raw silk of the yellow Thai silk varieties, or the handicraft-industrial silk yarn derived from the machine-reeled raw silk of the yellow Thai silk varieties. The reeling machine must not exceed 5 hp in total capacity.

**2.2 Raw silk** is the unprocessed silk yarn.

**2.3 Denier** is the silk yarn size measurement unit. 1 denier is equivalent to 1 g of silk yarn with 9,000 m in length.

**2.4 Skein** is the silk yarn derived from the re-reeling process as a single thread in a diamond – cross form with the diameter of 135–155 cm and the weight of 80–100 g/unit. One skein of silk yarn skein is divided into 4 sections in order to retain the skein form. The start and the end of the skein is clearly tied with the thread, the end of which is longer than the width of the skein not less than 8 cm to avoid the silk yarn from coiling and dispersing.

**2.5 Sericin** is a water-soluble natural gum surrounded the silk yarn.

**2.6 Lot** refers to each skein of the Thai silk yarn of the same quality, size and silkworm variety or races produced by the same groups of the producers.

**2.7 Floss** is the flossy silk filament surrounded the cocoon shell expelled by the silkworm at the beginning of cocooning stage.

### 3 Types

The Thai silk yarn types specified in this Thai Agricultural Standard refers to;

**Mai 1** or *Mai Noi* or *Mai Kreu* is the silk yarn reeled from the inner layers of the cocoon shell.

**Mai 2** or *Mai Sao Loei* is the silk yarn reeled from a combination of the inner and outer layers of cocoon shell.

**Mai 3** or *Mai Leub* or *Mai Laeng* is the silk yarn reeled from the outer layer of the cocoon shell with the addition of the fross or from the innermost layer.

### 4 Quality

Thai silk yarn quality could be divided based on their characteristics as follows;

**Mai 1** : the silk yarn is even in structure, size and color, round, clean and free from adulterated materials. This grade could be sub-divided based on their testable characteristics into 3 quality levels; Premium grade, First level grade and Second level grade, The sericin level is  $\leq 30\%$ . The techniques for testing quality and sericin quantity are outlined in Annex A and Annex B ,respectively.

**Mai 2** : the silk yarn is not even in structure, but is even in size and color, round, clean and free from adulterated materials. This grade could be sub-divided based on their testable characteristics into 2 quality levels; First level grade and Second level grade, The sericin level is  $\leq 30\%$ . The techniques for testing quality and sericin quantity are outlined in Annex A and Annex B ,respectively.

**Mai 3** : the silk yarn may contains some knots. It is round, even in size and color, clean and free from adulterated materials. This grade could be sub-divided based on their testable characteristics into 2 quality levels; First level grade and Second level grade, The sericin level is  $\leq 40\%$ . The techniques for testing quality and sericin quantity are outlined in Annex A and Annex B ,respectively.

### 5 Sizes

The sizes of the Thai silk yarn is classified by its utilization. Yarn classification, average size calculation of the silk yarn are outlined in Annex C and Annex D respectively.

## **6 Packaging**

6.1 The Thai silk yarn skein is orderly packed in a package. Each package must be even in quality and size. Each package contains 1 or 2 kg of Thai silk yarn.

6.2 Packaging materials must be of good quality, which shall well-protect the products from humidity and insect contamination, and tolerate the transportation operations. They must be free from odor and adulterated materials which may affect the yarn quality.

6.3 The visible part of the Thai silk yarn must represent all Thai silk yarn as clearly labeled.

## **7 Acceptable Tolerance**

The Thai silk yarn contained in each package is subjected to an acceptable level of tolerance as follows;

7.1 Acceptable tolerance for the diameter of silk skein

Not more than 3% of that specified on the label.

7.2 Acceptable tolerance for the quality aspect

7.2.1 Premium Grade

Not more than 5% of deviation from the criteria set for Premium Grade quality, but meet those of First level grade.

7.2.2 First Level Grade

Not more than 10% of deviation from the criteria set for First Level Grade quality, but meet those of Second level grade.

7.2.3 Second Level Grade

Not more than 10% of deviation from the criteria set for Second Level Grade quality.

7.3 Deviation criterion for the size aspect

Not more than 10% of that specified on the label.

## **8 Label and Marks**

Each unit of the Thai silk yarn package must contain at least number, alphabet, mark, and statement, clearly visible without any counterfeit that details the following;

8.1 The term ‘Thai Silk Yarn’ and ‘Silkworm Variety’ and / or ‘Silkworm Race’.

8.2 Type, size and diameter of skein

8.3 Number of skeins and net weight of the package

8.4 Date–month–year of production

8.5 Name of producer / group and location

In case a foreign language is used, the label must carry the Thai meanings as set above.

## **9 Sampling and Judgment**

9.1 For each lot of the Thai silk yarn, take 1–1.5% in weight a sample that well represents the product contained therein, based on the sampling plan outlined in Annex E.

9.2 After the testing process, each sample of Thai silk yarn must meet the criteria in Section 4, 5, 6 and 8 should be qualified under this standard.

## Annex A

### Silk Yarn Quality Testing



1. The person who performs quality test should have been trained on visual Thai silk yarn grading.
2. Equipment for this practice is; black cardboard (5x10 cm), recording form and a calculator.
3. Take one skein of Thai silk yarn, mark at least 5 positions for testing on the skein. Use the black cardboard from No. 2 above to place in the center of each position and count the silk thread on the cardboard to 100.
4. Normal Thai silk yarn should appears ribbon-twist, or wavelike form. The person who performs this test shall pull the yarn until it reaches a straight position in order to test the following characteristics;
  - 4.1 Unsmooth thread means;
    - knots and twists or other forms
    - too thick
  - 4.2 Un-rounded thread means;
    - breaks in the middle
    - breaks at the surface of the thread or create holes
    - flossy filament longer than 1.5 cm on the thread surface
  - 4.3 Uneven thread means;
    - connections of different sized threads
    - threads of more than 1 mm larger or smaller than the overall size
  - 4.4 Uneven color thread means;
    - thread of different colors
  - 4.5 Unclean thread means;
    - contain dirt particles, pupa or pieces of outer parts of cocoon shell
    - contain silk floss
    - contain black or other colors
    - lumps of sericin attached to the silk threads.
5. Count the scores to quality classify the Thai silk yarn based on the Table 1, Table 2 and Table 3 below;

**Table 1 Scores for Mai 1 Classifications**

<b>Characteristics</b>	<b>Max. Score</b>	<b>Score Count</b>
Smoothness	30	Deduct 1 score for each knot or unsmooth found
Evenness	30	Deduct 1 score for each unevenness found
Roundness	15	Deduct 0.5 score for each un-rounded found
Even color	15	Deduct 0.5 score for each color other than a regular color found
Cleanliness	10	Deduct 0.3 score for each unclean spot or adulterated material found

Mai 1 – Premium Grade = total score of all characteristics not less than 90

Mai 1 – First Level Grade = total score of all characteristics not less than 80

Mai 1 – Second Level Grade = total score of all characteristics not less than 65

**Table 2 Scores for Mai 2 Classifications**

<b>Characteristics</b>	<b>Max. Score</b>	<b>Score Count</b>
Evenness	50	Deduct 1 score for each unevenness found
Roundness	20	Deduct 0.4 score for each un-rounded found
Cleanliness	20	Deduct 0.4 score for each unclean spot or adulterated material found
Even color	10	Deduct 0.2 score for each color other than a regular color found

Mai 2 – First Level Grade = total score of all characteristics not less than 80

Mai 2 – Second Level Grade = total score of all characteristics not less than 60

**Table 3 Scores for Mai 3 Classifications**

<b>Characteristics</b>	<b>Max. Score</b>	<b>Score Count</b>
Evenness	50	Deduct 1 score for each unevenness found
Roundness	20	Deduct 0.4 score for each un-rounded found
Cleanliness	20	Deduct 0.4 score for each unclean spot or adulterated material found
Even color	10	Deduct 0.2 score for each color other than a regular color found

Mai 3 – First Level Grade = total score of all characteristics not less than 80

Mai 3 – Second Level Grade = total score of all characteristics not less than 60

## Annex B

### Sericin Quantity Measurement

The sericin quantity measurement in silk yarn by using water bath;

#### 1. Equipment and materials

- 1.1 Alkali soap
- 1.2 Distilled water
- 1.3 Hot air oven, with temperature control at  $105\pm 3^{\circ}\text{C}$
- 1.4 Desiccator
- 1.5 Water bath, with temperature control at  $95^{\circ}\text{C}$
- 1.6 Balance, capable to weight to the nearest 0.1 mg

#### 2. Silk Yarn Preparation

- 2.1 2.5 –10 mg of silk yarn
- 2.2 Dry the silk yarn at  $105\pm 3^{\circ}\text{C}$  for 4 hours
- 2.3 Cool the silk yarn to room temperature in the desiccator for 30 minutes
- 2.4 Weigh the silk yarn

#### 3. Sericin Test

- 3.1 Prepare the alkali soap solution at ratio 10 g : 1 L of soap and distilled water, respectively.
- 3.2 After oven and weighted. Soak the silk yarn in the soap solution at ratio 1 g : 30 ml of silk yarn and soap solution, respectively.
- 3.3 Bring the soap solution with silk yarn to boil in the water bath at  $95^{\circ}\text{C}$  for 30 minutes.
- 3.4 Wash the silk yarn with  $60^{\circ}\text{C}$  distilled water at the ratio 1 g : 25 ml of silk yarn and distilled water, respectively for 3 times.
- 3.5 Repeat 3.1 – 3.4.
- 3.6 Wind-dry the washed silk yarn at room temperature.
- 3.7 Dry the silk yarn at  $105\pm 3^{\circ}\text{C}$  for 4 hours.
- 3.8 Cool the silk yarn to room temperature in the desiccator for 30 minutes
- 3.9 Weigh the silk yarn

#### 4. Calculations

The percentage of sericin quantity is calculated from the following formula;

$$\text{Sericin quantity (\%)} = \frac{(\text{initial silk yarn weight} - \text{weight after oven})}{\text{Initial silk yarn weight}} \times 100$$

(Adapted from the analysis of raw silk yarn for spun silk of the International Silk Association (AIS/ISA). 1993 in order to find a suitable calculation of sericin in a laboratory with no Linitest /Launder Ometer )

## Annex C

### Classifications of Thai Silk Yarn Sizes

**Mai 1** Silk Yarn : classified into 5 groups

Group	Size (Denier)
Group 1	$\leq 120$
Group 2	121 – 150
Group 3	151 – 200
Group 4	201 – 250
Group 5	$\geq 251$

**Mai 2** Silk Yarn : classified into 5 groups

Group	Size (Denier)
Group 1	$\leq 150$
Group 2	151 – 200
Group 3	201 – 250
Group 4	251 – 300
Group 5	$\geq 301$

**Mai 3** Silk Yarn : classified into 4 groups

Group	Size (Denier)
Group 1	$\leq 250$
Group 2	251 – 350
Group 3	351 – 450
Group 4	$\geq 451$

## Annex D

### Average Silk Yarn Size Test

Size measurement for silk yarn can be made in average by the sizing reel equipment or measuring the thread length method as outlined below;

#### 1. Average size test by sizing reel equipment

##### 1.1 Equipment and materials

- Atmospheric control room for reeling and size test of raw silk yarn, with room temperature of 25±2°C and relative humidity(RH) of 65±2%.
- Sizing reel equipment with diameter of 1 m, or in other sizes but not less than 900 mm The equipment contains a silk yarn-pulling device which works on desired forces, and a device to place the silk thread orderly while reeling is in progress.
- Balance, capable to weight to the nearest 0.1 mg

##### 1.2 Atmospheric condition

- Dry the silk skein under the controlled atmospheric condition of not more than 50 °C temperature and not more than 10%RH.
- Store the silk skein for size test under the room temperature of 25±2°C and 65±2% RH until the yarn reaches a stable condition, i.e. the weight of the silk yarn to be measured changes not more than 0.25% in 2 hours interval.

##### 1.3 Size test

- Select the silk yarn from 3 positions of the silk skein to be measured, reeled with the sizing reel equipment with minimum pulling force for 50 rounds, and 5 repetitions
- Weigh the silk yarn

##### 1.4 Calculations

Silk yarn size is calculated from the following formula;

$$\text{Silk yarn size (Denier)} = \frac{W \times 9000}{50L}$$

When            W = weight of the silk yarn (mg)  
                     L = diameter of the sizing reel equipment (m)

(Adapted from Standard Manual of Raw Silk Testing and Classification. 1968. The Technology Research Committee of the International Silk Association. 43 P.)

## 2. Average size test by measuring the thread length method

### 2.1 Equipment and materials

- Atmospheric control room for reeling and size test of raw silk yarn, with room temperature of  $25\pm 2^{\circ}\text{C}$  and  $65\pm 2\%\text{RH}$ .
- Measurement tape, or the length marked with nails
- A scale with fine tune up to 0.1 mg

### 2.2 Atmospheric condition

- Dry the silk skein under the controlled atmospheric condition of not more than  $50^{\circ}\text{C}$  and  $10\%\text{RH}$ .
- Store the silk skein for size test under the room temperature of  $25\pm 2^{\circ}\text{C}$  and  $65\pm 2\%\text{RH}$  until the yarn reaches a stable condition, i.e. the weight of the silk yarn to be measured changes not more than 0.25% in 2 hours interval.

### 2.3 Size test

- Size test can be done through 2 techniques;
  1. For each sample, lay 5 threads of silk yarn horizontally straight on the table, 1 meter each, take 10 replications for each sample. Make sure the silk thread is evenly tight.
  2. Put nails in 2 spots, 1 m apart and wrap the silk thread to be tested for 50 rounds between the two nails. Make sure that the thread is evenly tight.
- Weigh the silk yarn

### 2.4 Calculations

Silk yarn size is calculated from the following formula;

$$\text{Silk yarn size (Denier)} = \frac{W \times 9000}{50}$$

When  $W$  = weight of the silk yarn (mg)

## Annex E

### Sampling Plan

The Thai silk yarn to be tested for quality level, size and sericin must come from the same lot. The sample is 1–1.5% of total weight which evenly sampling drawn through the package or from the pile to get the optimum skein numbers as shown in table 1.

**Table 1**

Total weight of Thai silk yarn in lot (kg)	Number of sampled skeins drawn
$\leq 10$	2
11 to 25	3
26 to 50	5
51 to 100	10
101 to 150	15