भारतीय मानक ब्यूरो BUREAU OF INDIAN STANDRADS

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भारतीय मानक मसौदा कच्चा मूगा रेशम — ग्रेडिंग और परीक्षण पद्धतियाँ

Draft *Indian Standard* Muga Raw Silk — Grading and Test Methods

ICS	59.080.30
Silk and Silk Products	Last date for receipt of comment is
Sectional Committee TXD 28	08 April 2024
FOREWORD	

(Formal clauses to be added later)

Grading of Muga raw silk is very important from the viewpoint of quality of the Muga silk and the subsequent products made from it. This will also help the reelers / producers to get the right value of their product and remove malpractices in the Muga silk trade. The formulation of standard for Muga silk grading will benefit the industry in long run.

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 off 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 method for grading of Muga raw silk based on the major and auxiliary tests.

2 REFERENCES

10.17

The standards listed below contain provisions, which through reference in this text, constitute provisions 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 this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed as below:

T. 1

IS No.	Title
SP 45 : 1988	Handbook on glossary of textile terms

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IS 232 : 2020	Glossary of textile terms — Natural fibres (<i>third revision</i>)
IS 18314 : 2023	Terms relating to silk and silk processing – Glossary

3 TERMINOLOGY

For the purpose of this standard the following definitions in addition to those given in SP 45 and IS 232 shall apply.

3.1 Book — A compressed package of raw silk weighting about 1 kg and containing suitable number of skeins.

3.2 Conditioned Mass — 11 percent of oven dry mass of Muga raw silk is added to its oven dry mass to get conditioned mass.

3.3 Hand — The term 'Hand' shall denote the feel of raw silk in terms of hardness and smoothness.

3.4 Hank — Silk reeled and removed from a reeling/re-reeling machine in the form of an open band. It shall be one continuous thread from outer to inner layers.

3.5 Muga Raw Silk — Muga raw silk is the thread reeled from several Muga cocoons and is understood to be a continuous thread from beginning to end of skein.

4 GRADES

4.1 The grades shall be expressed in the following order where A is the highest and F is the lowest merit: A, B, C, D, E and F.

4.1.1 Lot Size for Grading / Unit Size for Grading

The lot size for the purpose of grading shall be a lot of 10 *books* of 1 kg each or as per agreed. The lot size shall also be as per the agreement between buyer and seller.

4.1.2 *Sorting of Bales*

If individual bales appear to be uniform in colour. Even though the bales vary in colour from one another, the consignment shall be sorted on the basis of colour into groups as may be necessary.

NOTES 1 All books as sorted out for the purpose of grading shall constitute a lot. 2 In case a lot is required to be divided into groups, the number of sample skeins to be drawn from each group shall be proportional to the total number of books in each group.

4.2 Preliminary Examination

4.2.1 Raw Muga Silk shall be conformed as per the method prescribed in IS 667.

4.2.1 The raw silk skeins, books and bales shall be examined to verify, whether they are meeting the requirements specified in 6.

4.2.2 The Conditioned mass of the bale shall be determined by the method prescribed in Annex A.

4.2.3 The proforma for record and report as given in Annex F shall be used for recording the test data and reporting the results of the preliminary examination.

4.3 General Finish of Skein

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The skein shall be inspected for the defects and shall be marked based on the number of the defects such as Loop, Loose Ends, Protruding Ends, Slugs, Knots, Badcast, Waste (*see* Annex E)

Sl No.	No. of defects in the skein	General Finish
(1)	(2)	(3)
i)	0	Good
ii)	1	Fair
iii)	2 and 3	Poor
iv)	4 or more	Inferior

4.4 Examination and Tests

4.4.1 Each sample lot of Muga raw silk shall be examined visually and tactually according **4.2** and **4.3**.

4.4.2 Each lot shall be evaluated for characteristics listed in Table 1.

Table 1 Characteristics and Methods of Tests (Cl 4.4.2)

(*Clause* 4.4.2)

Sl No.	Characteristics	Method of Tests, Ref to
(1)	(2)	(3)
i)	Winding breaks	Annex A
ii)	Size of Muga raw silk	Annex B
iii)	CV of size	Annex B
iv)	Tenacity	Annex C
v)	Elongation	Annex C

5 METHOD OF CLASSIFICATION

The grade of a lot shall be determined by comparing the test result values with the corresponding values given in classification in the following manner:

5.1 Grading in Accordance with Major Test (CV of Size Test) (Basic Grade)

The basic grade of a lot shall be determined according to the test result of CV of size test of Muga raw silk as given in Table 2.

5.2 Degrading in Accordance with the Auxiliary Tests.

If the observed test result values of winding breaks, tenacity and elongation is found to be lower than the corresponding value specified in the class of auxiliary tests, then the basic grade established in accordance **5.1** shall be lowered by as many grades as the highest numerical difference that exists between required test class for basic grade and the class actually found on the lower side.

5.3 The proforma as given in **9** and Annex F shall be used for issue of certificate of grading.

Sl	Characteristic	Grade	Α	В	C	D	E	F	Method
No.									of
									Tests,
									Ref to
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	CV of Size								
	(Tex or Denier)	(0, 1)((7, 1)) = 1	< 15	164.20	21.6	264	21.4	> 25	
		60 d (6.7 tex) and finer	≤ 15	16 to 20	21 to	26 to	31 to	≥ 35	
			. 10	10 . 15	25	30	35	× 20	Annex
		61 to 90 d (6.8 to 10 tex)	≤ 12	13 to 15	16 to	21 to	26 to	≥ 30	В
			. 10	11.10	20	25	30		
		91 to 120 d (10.1 to 13.39	≤ 10	11 to 13	14 to	17 to	21 to	≥ 25	
		tex)	. 0	0.10	16	20	25		
			≤ 8	9 to 12	13 to	17 to	21 to	≥ 25	
		121 d (13.4 tex) and coarser			16	20	25		
		Class	(1)	(2)		(3)	(4)	(5)	
ii)	Winding breaks								
	(breaks/5skeins	00.1(10.4) 1.5	- 2	2		4	-		
	/30 min.)	90 d (10 tex) and finer	≤ 2	5		4	5	> 5	Annex
		91 d (10.1 tex) and coarser	≤ 1	2		3	4	> 4	
		Class		(1)		(2	2)	(3)	
iii)	Tenacity			≥ 2.9		2.4 t	o 2.8	< 2.4	
	(g/denier)								
	Elongation,			≥27		2	2	<22	Annex
	percent								С

Table 2 Classification for Muga Raw Silk

(Clauses 5.1)

6 REELING AND PACKING OF MUGA RAW SILK

6.1 Reeling

6.1.1 Muga raw silk shall be carefully cross reeled on reels of 150 cm \pm 2 cm circumference into hanks each weighing approximately 25 g. Each hank shall be of one continuous thread made by tying all breaks with good knot and with loose end of the knot not more than 3mm long. The outside end and the inside end of the thread shall be tied round the hank in such a manner as to be traced easily while winding.

6.1.2 Each hank shall be carefully and neatly 'laced' at places equally spaced using fine soft twisted, un-dyed cotton or spun silk yarn.

6.1.3 Each lacing shall pass through at least 5 diamonds in the width of the hank and neatly tied so that each knot is about 1 cm from the edge of the hank and the loose ends of the knots do not exceed 1 cm in length from the knot.

6.1.4 Each hank so prepare are given 2 to 3 turns from one end to the other, both ends joined and wrapped with the lacing thread.

6.2 Packaging

6.2.1 Suitable number of skeins prepared as in **4.1.1** shall be made into neat books, each weighing approximately 1 kg of equal dimensions on a skein book-making machine. Each such book shall be neatly tied with separate cotton bands at three or five different places and wrapped with light packing paper.

6.2.2 The net mass of Muga raw silk in a lot shall be 10 kg.

7 MARKING

7.1 The Raw muga silk shall be suitably marked with the following information:

- a) Manufacturer's name, initials or trade-mark;
- b) Colour [(a) Light (b) Medium (c) Deep],
- c) Lustre [(a) Bright (b) Medium (c) Dull] and
- d) General finish [(a) Good (b) Fair (c) Poor (d) Inferior]
- e) Linear density (size);
- f) Category and Grade;
- g) Conditioned mass of bale;
- h) Batch No. or Lot No.; and
- i) Any other information as required by the buyer or the law in force.

7.2 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 there under, and the products may be marked with the Standard Mark.

8 GRADING CERTIFICATE OF MUGA RAW SILK

8.1 The proforma for grading certificate of muga raw silk is as follows:

a) Grading certificate No
b) Mark of the lot
c) Serial no. of bales in lot
d) Name of chop
e) No. of bales in the lot
f) Average conditioned size
i 66.4

Sl	Chara	Observed	Corresponding	Character	Observed	Correspondin	Required	Differnce
No.	cter	Value	Major Test		Value	g Auxiliary	Auxillary	in case of
			grade			test class	Test	difficient
			-				Class	Auxillary

								Test value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	CV of Size	16.5	С	Winding Breaks	2	1	2	0
ii)				Tenacity (g/denier)	2.9	1	1	0
iii)				Elongatio n (%)	25	2	1	1
iv)					0	Brade "C" is lowe	ered by (1) gr Overall Grade	ade, i.e = D e = D grade.

ANNEX A

[*Table* 1, Sl No. (i), *Table* 2, Sl No. (i)]

DETERMINATION OF NET MASS AND CONDITIONED MASS

A-1 METHOD FOR DETERMINATION OF NET MASS

A-1.1 Procedure

A-1.1 Take a bale from the lot and remove its jute cloth. Weigh the bale with its cotton shirt on and note down the gross mass of the bale. Remove the cotton shirt and determine its mass.

A-1.2 Note down the number of books in the bale. Select at random 5 books from the bale. Remove their packing paper and labels, if any, and determine their mass. Carefully take out the middle cotton band of each of the 5 books and determine the collective mass of the 5 bands. Multiply this value by 3 or 5 as the case may be, to obtain the mass of all the cotton bands on the 5 books.

A-1.3 Calculate the tare per book by the following formula:

$$T_1 = \frac{M_1 + M_2}{5}$$

where

 T_1 = tare per book, M_1 = mass of packing paper and the label, and M_2 = mass of all cotton bands.

A-1.4 Calculate the total tare of the bale by the following formula:

$$T_2 = nT_1 + M_3 = 12T_1 + M_3$$

where

 T_2 = tare per bale;n= number of books in the bale, which is 12; M_3 = mass of the cotton shirt; and T_1 = tare per book.

A-1.5 Calculate the net mass of the bale by the following formula:

 $M=G-T_2$

where

- M = net mass of the bale;
- G = gross mass of the bale (*see* **A-1.1**); and
- T_2 = total tare of the bale (see A-1.4).

A-1.6 Determine similarly the net mass of the remaining bales.

A-1.7 After putting on the middle cotton bands and wrapping the books with the packing paper, replace them in the respective bales from which they are drawn. Seal the bales with identification tickets inside.

A-2 DETERMINATION OF CONDITIONED MASS

A-2.1 Test Sample

Six skeins, drawn from books at the rate of one skein per book, shall constitute the test sample. The books shall be drawn, distributing them equally, as far as possible, from the bales in the lot. The books shall be drawn from different parts of the bale. While drawing skeins, each skein shall be drawn from a different part of the book. The skeins shall be divided into 2 sets of 3 skeins each.

NOTES

1 The skeins should be drawn at the time when the net mass of the bale is determined. The two sets of skeins should be immediately weighed and their mass recorded separately.

2 After the skeins have been drawn, the books shall be replaced in the respective bales.

A-2.2 Apparatus

A-2.2.1 Weighing Balance

Platform type balance with a capacity of one hundred kilogram and least count of 0.1 kg.

A-2.2.2 Skein Balance

Balance to weigh skeins with a capacity of one kilogram and least count of 0.1 g.

A-2.2.3 Oven

Conditioning oven with forced ventilation, positive valve control and capable of drying the sample skeins at 140 °C shall be equipped with a balance arranged to weigh the skeins with an accuracy of 0.1 g while suspended within the drying chamber. The holder of the skeins shall be of such a type as to ensure free access of the dry air to all skeins.

A-2.3 Procedure

A-2.3.1 The two sets of 3 skeins each shall be weighed on the skein balance nearest to a centigram, in the same ambient atmosphere as surrounds the bale as sampled (*see* Note **A- 2.1**).

A-2.3.2 Place one set of 3 skeins in the conditioning oven, dry it for 15 min and weigh to the nearest 0.1 g. Allow the skeins to dry for another 5 min and weigh to the nearest 0.1 g. The second Page 8 of 25

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weighing shall be taken as oven-dry mass provided the loss between the first and second weighings does not exceed 0.25 percent of the first weight. If the loss between the first and second weighings exceeds 0.25 percent, the skeins shall be dried and weighed again at 5 min intervals until the loss between successive weighings does not exceed 0.25 percent.

A-4.2.1 The moisture content percent of the set of skeins shall be calculated by the following formula:

Moisture content, percent = $\frac{(M_1 - M_2)}{M_1} \times 100$

where

 M_1 = mass of a set of test skeins before drying; and

 M_2 = mass of the same set of test skeins after drying.

A-4.3 Repeat the test with the remaining set of skeins and calculate the moisture content in percentage. The average moisture content (m) of the two sets of test skeins shall be calculated.

A-4.4 If the two results vary by more than 0.5 percent, the test shall be repeated.

A-4.5 Determination of Conditioned Mass of the Bales

A-4.5.1 The bales under test shall be weighed individually on the platform scale. The net weight of the bale shall be calculated by deducting the tare.

A-4.5.1.1 All materials used in packing the raw silk shall be considered as tare, except the cotton lacings in the skeins, provided these lacings do not exceed one metre per skein.

A-4.5.2 The oven-dry mass of the bale shall be calculated as given below:

Oven dry mass of the bate, $D = M_n (1 - m/100)$

where

 M_n = net mass of the bale (*see* A-4.5.1), and

m = moisture content, percent as obtained in A-4.3 or A-4.4.

A-4.5.3 The conditioned mass of the bale shall be calculated by the following formula:

Conditioned mass of the bale = $D + \frac{(D \times 11)}{100}$

Where,

D = oven-dry mass of the bale calculated as in **A-4.5.2**.

A-5 RECORD AND REPORT

The proforma as given in following format shall be used for recording the test data and reporting the results of the test.

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A-5.1 Calculation of average moisture content in the bale:

1. Mass in g of the first set of skeins before drying _____

2. Oven-dry mass in g of the first set of skeins_____

3. Moisture content, percent, of the first set of skeins, *m*₁_____

4. Mass in g of the second set of skeins before drying_____

5. Oven-dry mass in g of the second set of skeins_____

6. Moisture content, percent, of the second set of skeins, *m*₂_____...

7. Average moisture content, percent $\frac{m_1 + m_1}{2} = m$

A-5.2 Calculation of the conditioned weight of the bale:

kg

- a) Mass of 'shirt' (*M*_{cs}) _____
- b) Mass of wrapping papers and labels of 5 books (*M*_{p1})
- c) Gross mass of the bale (*M*)
- d) Mass of middle cotton bands of 5 books $\times 3(3M_{\rm mcb})$
- e) Net mass of the bale $M_n = (M-T)$
- f) Tare of 5 books = $(M_{\rm pl} + 3M_{\rm mcb})$ _____
- g) Oven-dry mass of the bale $D = M_n(1-m/100)$ _____
- h) Tare of one book = $(M_{\rm pl} + 3M_{\rm mcb})/5$ _____
- i) Tare of all the books (*n*) in of the bale (l.11D)
- j) Conditioned weight____
- k) Total tare of the bale (T = $n(M_{\rm pl} + 3M_{\rm mcb})/5 + M_{\rm cs})$

ANNEX B

[*Table* 1, Sl No. (i)]

CONDUCTING WINDING TEST

B-1 TEST SAMPLE

The sample for the test shall be 5 skeins.

B-2 ATMOSPHERIC CONDITONS FOR CONDUCTING THE TEST

As far as possible the test shall be carried out in a standard atmosphere i.e. at 65 ± 2 percent relative humidity and (27 ± 2) °C temperature.

B-3 CONDITIONING OF TEST SAMPLE

Prior to test, the test sample shall be conditioned for a duration of 24 h at standard atmosphere i.e. at 65 ± 2 percent relative humidity and 27 °C ± 2 °C temperature.

B-4 APPARATUS

B-4.1 Winding Frame

The winding frame shall be equipped to drive the double flanged bobbins from both ends and shall be capable of winding at a uniform speed of 90 m/min. (*see* Fig 1 and Fig 2)

- **Drive:** Bobbins mounted on frictionless ball bearing & driven by a circular wheel
- Swift: Swift with variable circumference adjustable mechanism to accommodate skeins with 150 ± 5 cm circumference.
- **Bobbin:** Double flanged bobbin which is well balanced and has smooth surface so as to give regular tension and uniform angular speed. Dimensions Dia of flange 60mm, Dia of barrel 38mm, Length between flanges 85 mm, weight -approximately 105g.



FIG. 1 WINDING FRAME



FIG. 2 WINDING FRAME

B-5 PROCEDURE

Out of 5 skeins, two skeins shall be wound from inner surface and the remaining 3 shall be wound from outer surface of the skeins. The sample skeins shall be put on the swifts with care to ensure that each skein is in good condition. The break counting period shall be for a duration of 30 minutes or till the thread in the skein exhaust, with a provision of preliminary winding of 5 min. for the skeins with ends drawn from inner side of skeins. The breaks occurring during the specified period shall be counted and recorded.

B-6 RECORD

The results of the winding test shall be recorded in the proforma for record and report given in **F**-**5**.

ANNEX C [*Table* 1, Sl No. (ii), Sl No. (iii)]

DETERMINATION OF SIZE (LINEAR DENSITY)

C-1 TEST SAMPLE

Five bobbins prepared for the purpose of conducting the winding test shall constitute the test sample.

C-2 ATMOSPHERIC CONDITONS FOR CONDUCTING THE TEST

As far as possible the test shall be carried out in a standard atmosphere that is at (65 ± 2) percent relative humidity and (27 ± 2) °C temperature.

C-3 CONDITIONING OF TEST SAMPLE

Prior to test, the test sample shall be conditioned for a duration of at least 12 h at standard atmosphere i.e. at (65 ± 2) percent relative humidity and (27 ± 2) °C temperature.

C-4 APPARATUS

C-4.1 Size Frame / Wrap Reel

A machine for making the sizing skeins shall have a reel circumference of 1.125 meters or 1 meter revolving at a uniform speed of 20 rotations per min (*see* Fig 3). It shall be provided with a dial or counter to show the number of revolutions occurred. Automatic thread stop motion may also be incorporated to stop the reel immediately in case the thread breaks.



FIG. 3 SIZE FRAME / WRAP REEL

C-4.2 Yarn Balance

A quadrant balance or an autosorter (*see* Fig 4) (i.e electronic weighing balance with built-in processor or computer control) which can read directly the count in denier or tex. The sensitivity of the balance shall be 0.25d or 0.025tex.



FIG. 4 AUTOSORTER

C-5 PROCEDURE

C-5.1 Five bobbins constituting the test samples shall be placed horizontally on the wrap reel so that the unwinding of the thread will be convenient. 4 sizing skeins (kilchas) each of 45 m length shall be reeled from each bobbin, preparing a total of 20 sizing skeins. The sizing skeins shall be conditioned (*see* **C-3**).

C-5.2 Each individual sizing skein shall be weighed separately on a yarn balance (*see* C-4.2) and the values shall be recorded.

C-6 CALCULATION

C-6.1 In case of yarn balance used is a quadrant balance, the recorded values are statistically processed to find the average value and coefficient of variation of the size values.

C-6.2 In case of yarn balance used is an autosorter, the output is programmed to get the average value and coefficient of variation in percentage directly in the form of printout.

C-7 RECORD

The results of the size test shall be recorded in the proforma for record and report as given in **F-2**.

ANNEX D

[*Table* 1, Sl No. (iv), Sl No. (v)]

DETERMINATION OF TENACITY AND ELONGATION

D-1 TEST SAMPLE

The sample skeins for the test shall be taken from the size skins prepared for size test. The number of samples for the test shall be 10 to be drawn from the sample skeins prepared for size test.

D-2 ATMOSPHERIC CONDITONS FOR CONDUCTING THE TEST

The test shall be carried out in a standard atmosphere i.e. at 65 ± 2 percent relative humidity and 27 ± 2 °C temperature.

D-3 CONDITIONING OF TEST SAMPLE

Prior to test, the test sample shall be conditioned for a duration of at least 12 hrs at standard atmosphere i.e. at 65 ± 2 percent relative humidity and 27 ± 2 °C temperature.

D-4 APPARATUS

D-4.1 Serigraph

A constant rate of traverse pendulum type yarn strength testing machine, graduate in grams and capable of recording simultaneously the breaking load and the corresponding elongation of the threads, shall be used (*see* Fig 5). The machine shall be power driven so that the moving clamp has a traverse of 30cm/min. The distance between the clamps shall be capable of being adjusted to 10 cm. The clamps for gripping the threads shall be equipped with pneumatic grippers so as to avoid slippage during testing.



FIG. 5 SERIGRAPH

D-4.2 Universal Tensile Testing Machine (UTM)

A constant rate of extension type yarn testing machine, capable of recording electronically the breaking load and the corresponding elongation of the threads, shall be used (*see* Fig 6). The machine shall be power driven so that the moving clamp has an extension of 30cm/min. The distance between the clamps shall be capable of being adjusted to 10 cm. The clamps for gripping the threads shall be equipped with pneumatic grippers so as to avoid slippage during testing.



FIG. 6 UNIVERSAL TENSILE TESTING MACHINE (UTM)

D-4.3 Wrap Reel and Balance

The same equipment as used in size test of Muga raw silk. (see Annex C).

D-5 PROCEDURE

D-8.1 The size (tex/denier) of each test skein shall be determine by the method as prescribe in part 4. Take one skein and clamp between two jaws firmly at both the jaws and the threads are drawn parallel, straight and taut. Total length of the threads between the jaws shall be 10 cm. It shall be seen that (a) all the threads are uniformly taut an none excessively stretched and (b) no portion of the test skein which is not between the clamps is subjected to tensile force generated by the machine.

D-5.2 The machine is operated in such a way that the moving clamp shall traverse/extend at the rate of 30 cm/min.

D-5.3 The test shall be repeated for the remaining test skeins.

D-6 CALCULATION

Calculate the tenacity of each test skein by the following formula: Tenacity in g per tex (or g per denier) = $\frac{z}{n \times d}$

Where

z = breaking load in g of test skein n = number of strands used d = tex (or denier) of test skein.

D-7 RECORD

The result shall be indicated by the average of results of ten test samples. The result of tenacity shall be rounded of to one decimal place and that of elongation to a whole number. The proforma for record and report as given **F-6** shall be used for recording the test data and reporting the results of the test.

ANNEX E

(Clause 4.4.3)

STANDARD IMAGES OF DEFECTS OF MUGA SILK

E-1 TEST SAMPLE

The sample shall consists of 3 test pieces taken from 3 bobbins randomly drawn from 5 bobbins prepared at winding test (*see* Annex A).

E-2 ATMOSPHERIC CONDITONS FOR CONDUCTING THE TEST

Test shall be carried out in a standard atmosphere i.e. at 65 ± 2 percent relative humidity and 27 ± 2 °C temperature.

E-3 APPARATUS

E-3.1 Inspection Board—Board used for winding the Muga yarn to check the defects is made of either wooden board covered by black coloured non-glazy material or an aluminium board coated with non-reflective jet black painting so that the yarn surface is clearly visible. The board shall wind 90 meters of yarn with a spacing of 1mm and will have circumference of 50 cm in each revolution. (*see* Fig 7)

E-3.2 Board Winder— An apparatus which turn the inspection board with a constant rotation of less than 50 rpm so that the yarn is wounded side by side so as to facilitate for clear image of yarn surface and defects. Will have a mechanism to impart minimum tension in the yarn and uninterrupted flow of defects exists in yarn on to inspection board. (*see* Fig 8)

E-3.3 Inspection Area/Place— A chamber with D65 lighting with sufficient lighting from the top of the inspection board, at an angle of approximately 5°, so that the surface of yarn is clearly visible (*see* Fig 9).



FIG. 7 BOARD



FIG. 8 BOARD WINDER



FIG. 9 INSPECTION WINDER

E-4 PROCEDURE

Randomly draw 3 bobbins from each sample lot and use for preparation of inspection boards. The boards are mounted on the board winder and the filaments are wounded side by side on to the board with a little tension so that the yarn surface / defect is clearly visible. Inspect for the type of defect and quantify it. The standard images of defects i.e. loop/loose end, slugs, waste and knot are given in **E-6**.

E-5 RECORD

The result of the test shall be indicated by the type of defect and its quantity. As this standard is only for reference / guidance, the quantity of defects gives information on the overall quality of Muga silk. Higher the defects, poor is the quality and lower the defects, better is the quality.

E-6 IMAGES OF MUGA DEFECTS AND TYPE OF DEFECT

6.1 Loop — Small open places in the thread due to the excessive length of one or more cocoon filaments, and are less than 10 mm in length when measured along the filament.



FIG. 10 LOOP

6.2 Loose ends — Loops or split ends, 10 mm and above in length, when measured along the filament.



FIG. 11 LOOSE ENDS

6.3 Protruding ends —



FIG. 12 PROTRUDING ENDS

6.4 Slugs — Considerably thickened places in the thread seven millimeter and above in length, or extremely places with less length.



FIG. 13 SLUGS

6.5 Knots — Knots which have loose ends 10 mm and above in length, or those caused by improper tying of threads.



FIG. 24 KNOTS

6.6 Badcast — Abruptly thickened places in the thread due to the cocoon filaments not being properly attached to the raw silk thread, or made by adding more than one cocoon filament at a time.





6.7 Waste — A mass of tangled cocoon filaments or fibres attached to the thread.



FIG 16 WASTE

ANNEX F

(*Clause 4.2.3*)

F-1 GRADING	F-5 WINDING	TEST OF MUGA R	AW SILK					
	F-5.1 Starting tim	ne:	Nominal denier of	f lot:				
	F-5.2 Ending time: Speed of winding (m/min):							
F-1.2 Serial no. of bales in the lot:	F-5.3 Total Time:							
F-1.3 Conditioned mass of the bale	F-5.4 Breaks per	F-5.4 Breaks per 5 skeins per 30 min:						
F-1.4 Grade	F-5.5 Remarks:							
F-2 REPORT OF SIZE TEST OF MUGA RAW SILK	Skein no.	Break	s in preliminary wind	ling	Breaks during winding			
F-2.1 Yarn balance used: F-2.2 Nominal denier of lot:								
F-2.3 Average size of the lot:denier/Tex								
F-2.4 Coefficient variation of size:%	(1)		(2)		(3)			
F-3 PRELIMINARY INSPECTION	1							
	2							
Preliminary examination of external characters:	3							
SI No. Mass of the bale	4							
(1) (2) (3)	5							
i) No. of books or bundles in a bale		Total						
ii) Mass of a book or bundle								
iii) Manner of packing of the lot	-							
iv) Skein formation	F-6 TENACITY AND ELONGATION TEST OF MUGA RAW SILK							
(v) Skein weight (g)	-							
(v) Skein weight (g)	F-6.1 Nominal de	enier of lot:						
VI) Crossing of the skeins	F-6.2 Number of	strands tensioned:		1				
vii) Circumference of the skeins	Skein no.	Denier (tex) of	Breaking load	Tenacity (gf/d or	Elongation			
viii) Reeling device/Domestic basin/Cottage basin/Charkha/Multiend/Automatic		test skein	(gr)	$gf/tex) = \frac{1}{n \times d}$	(percentage)			
Remarks:								
1. Admixture of commercial varieties of Muga raw silk	(1)	(2)	(3)	(4)	(5)			
2. Adulteration in any manner:	1							
3. Other peculiarities:	2							
Lot accepted / rejected for grading	3							
F-4 VISUAL AND TACTUAL EXAMINATION	4							
	5							
F-4.1 a) General Finish :	5							
F-4.1 a) General Finish : (a)Good (b)Fair (c)Poor (d)Inferior	5 6 7							
F-4.1 a) General Finish : (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature :	5 6 7 8							
 F-4.1 a) General Finish : (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature : i) Degree of Colour (Golden yellow colour) 	5 6 7 8 9							
 F-4.1 a) General Finish : (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature : i) Degree of Colour (Golden yellow colour) (a) Light (b) Medium (c) Deep 	5 6 7 8 9							
 F-4.1 a) General Finish : (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature : i) Degree of Colour (Golden yellow colour) (a) Light (b) Medium (c) Deep ii) Lustre 	5 6 7 8 9 10 Total							
 F-4.1 a) General Finish : (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature : i) Degree of Colour (Golden yellow colour) (a) Light (b) Medium (c) Deep ii) Lustre a) Bright (b) Medium (c) Dull 	5 6 7 8 9 10 Total							
 F-4.1 a) General Finish: (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature : i) Degree of Colour (Golden yellow colour) (a) Light (b) Medium (c) Deep ii) Lustre a) Bright (b) Medium (c) Dull iii) Hand 	5 6 7 8 9 10 Total	(of/d or of/con): T	otal of column 4					
 F-4.1 a) General Finish: (a)Good (b)Fair (c)Poor (d)Inferior F-4.2 b) Nature : i) Degree of Colour (Golden yellow colour) (a) Light (b) Medium (c) Deep ii) Lustre a) Bright (b) Medium (c) Dull iii) Hand a) Smooth (b) Medium (c) Rough 	5 6 7 8 9 10 Total Average tenacity	$(gf/d \text{ or } gf/tex): = \frac{T}{T}$	ptal of column 4 10 otal of column 5					

ANNEX F (Clause 4.2.3)

DRAFT STANDARD FOR COMMENTS ONLY

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