TERMS OF REFERENCE FOR THE R&D PROJECT

(Silk and Silk Products Sectional Committee- TXD 28)

1 Title:

   Study for determining the cutoff grade and sampling plan for Mulberry Raw Silk.

2 Background:

2.1 Silk and Silk Products Sectional Committee- TXD 28 under Textile Division Council.

2.2 The grading of silk is an essential process that involves evaluating and categorizing silk fibers based on various characteristics. This grading system is crucial for both producers and consumers in the silk industry with respect of quality, price determination, sorting silk fibers for different end uses, uniformity in production, differentiation of silk yarns.

2.3 IS 15090 (Part 1 to 11) outlines the classification of mulberry raw silk into different grades, such as 4A, 3A, 2A, A, B, C, D, and E. These classifications are based on major tests (such as size deviation, evenness variation-I, evenness variation-II, cleanness, average neatness, and low neatness) and auxiliary tests (such as maximum deviation, evenness variation-III, winding, tenacity, elongation, or cohesion).

2.4 However, this standard refrains from imposing restrictions on substandard grades. This approach can pose challenges in the selection of suitable silk yarn grades, which must meet the requisite quality standards to ensure the smooth production of final products like saris, dhotis, shawls, and more. It is essential to consider eliminating the lower-grade silk yarn categories that do not meet these suitability criteria. Furthermore, to revise the sampling plan in alignment with the practices followed by domestic silk testing laboratories and international standards.

3 Objective:

To collect the technical data and scientific evidence for cutoff grade in IS 15090 (Part 1 to 11) and sampling plan from primary and secondary sources.

4 Scope:

4.1 Study of available literature on grading of mulberry raw silk but not restricted to the following:

   a) Journals and research papers;
   b) International/Indian standard and regulation;
   c) Standard operating procedures (SOPs)/guidelines of users/regulators;
   d) Studies conducted by any organization; and
   e) Any other published information.

4.2 Collecting the database for releers (cottage basin, multi-end reeling machines and Automatic reeling machines ARMs), testing infrastructure and users in the country.

4.3 Collecting the import and exports data, type of standards and regulation being followed by domestic/foreign reelers, comparative analysis of the standards and regulation.

4.4 Undertake 2 visits to reeling units of cottage basin, multi-end reeling machines and ARMs, and having focused group discussion with (production, quality control and R &D team) and collect the information on the following aspects:

    a) Reeling process;
    b) In-process controls being exercised during reeling;
    c) Standards being followed;
    d) Testing method being used;
    e) Testing infrastructure available;
    f) Post manufacturing quality/in-house data for quality;
    g) Sampling plan being followed;
    h) Marking and labelling of the product;
    i) Packaging;
    j) Sustainability practices [sustainable raw material, energy efficient processes and methodologies, renewable energy sources, 3Rs (Reduce, Reuse and Recycle), waste management and disposal mechanisms]
    k) Focused group discussions with teams involved in production, testing, and R&D to address quality issues, discuss challenges faced, and gather suggestions for improvement.

4.5 The feedback from other reelers (where visit is not carried out) shall be collected by circulating questionnaire through email or any other digital means.

4.6 Undertake 2 visits to weavers (Silk fabrics weaving industries) and 2 visits to silk testing lab (any two lab visits among Bangaluru, Okalipuram, Kanchipuram, Dharmavaram, and Jammu silk testing labs) to gather information regarding:

    a) Standards and regulation being followed;
    b) Testing methods being followed;
    c) Testing apparatus, instrument, reagent and chemical required;
    d) Any issues/problems being faced in with respect to quality of silk and silk yarn;
    e) Collecting the samples from (cottage basin, multi-end reeling machines and ARMs).

4.7 Furthermore, to reevaluate and update the sampling plan for silk yarn for grading, to ensure quality control throughout the production process.

4.8 Collection of 20 skein samples each from (2 cottage basin, 2 multi-end reeling machines and 2 ARMs) and generation of test data for various major and auxiliary test as prescribed in IS 15090 (Part 1 to 11) after getting the samples tested from any 2 labs as specified in **4.6**.

4.9 Sampling Plan:

Sl No.	Type of Reeling Unit	Lab (*see* 4.6)	Quantity of samples
1	Cottage basin (*see* Note)	Lab 1	10 skeins shall be graded as per IS 15090 (Part 1 to11) separately.
		Lab 2	10 skeins shall be graded as per IS 15090 (Part 1 to11) separately.
2	Multi-end reeling machines (*see* Note)	Lab 1	10 skeins shall be graded as per IS 15090 (Part 1 to11) separately.
		Lab 2	10 skeins shall be graded as per IS 15090 (Part 1 to11) separately.
3	Automatic reeling machine (*see* Note)	Lab 1	10 skeins shall be graded as per IS 15090 (Part 1 to11) separately.
		Lab 2	10 skeins shall be graded as per IS 15090 (Part 1 to11) separately.

Note — Ten skeins will be gathered from each reeler 1, and an additional ten samples will be collected from reeler 2. Subsequently, ten skeins, comprising five from reeler 1 and five from reeler 2, will be dispatched to lab 1. Likewise, ten samples, with five from reeler 1 and five from reeler 2, will be forwarded to lab 2.

5 Research Methodology:

5.1 Collect and analyse the data/information as specified in the **4.1**, **4.2** and **4.3**.
5.2 Visit reelers, users and labs and collect data/information as specified in **4.4, 4.5** and **4.6**.
5.3 Collect and test the samples as specified in the **4.7**.
5.4 Analyse the data/information and prepare a comprehensive project report.

6   Expected Deliverables

Comprehensive report (both soft and hard copy) consisting of outcomes of the study covering all the aspects of the scope appending the survey formats and responses, questionnaires, results of testing, report of visits, and other relevant documents/ information.

7 Requirement for the CVs:

The project leader should be graduated from Textile Technology/ Textile Engineering (M Tech is Preferrable) and should be experience in area of Silk /Sericulture.

8 Timeline and Method of Progress Review:

The timeline for the project shall be 120 days from the date of award of the project. The stage wise indicative timelines for execution of the project shall be as follows:

Indicative Timeline	Method of progress
0 to 20 days	Literature review, desktop study, collection of data and information. The sampling plan for visit (*see* **4.9**) and collection of samples shall be discussed and finalized with nodal officer after literature survey and desktop research.
21 to 60 days	Visit to reelers, weavers, testing lab and collection of samples.
61 to 104 days	Testing of samples (except long duration test with testing time more than 30 days) preparation and submission of first draft report.
105 to 120 days	Submission of the final project report.

9 Support from BIS:

BIS will provide access to latest available editions of Indian standards and/ or international standards relevant to the project, on request.

10 Nodal Officer:

In case of queries/clarification, Contact:
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