TERMS OF REFERENCE FOR THE R&D PROJECT

1. TITLE: Study on effect of constructional parameters on performance of cotton tapes for Aeronautical Applications.

2. BACKGROUND

a) The aeronautical applications of cotton tapes encompass reinforcing aircraft fabrics, under-rib lacing cord, parachute fabrication, and other equipment associated with aerial delivery. Consequently, the standard for 'cotton tapes for aeronautical applications' assumes a vital role in the manufacturing process, ensuring uniform performance, and adherence to constructional parameters for these cotton tapes.

b) BIS has published the following four standards for cotton tapes for aeronautical purposes :
   a) IS 714 :1992 Textiles-Cotton Reinforcing Tapes For Aerospace Purpose — Specification (Third Revision) ;
   b) IS : 3255 : 1979 Specification for scoured or dyed cotton tapes for aerospace purposes (first revision) ;
   c) IS : 3846 : 1984 Specification for rot-proofed cotton tapes for aerospace purposes (first revision) ;
   d) IS 14564 : 1998 Textiles- cotton tapes for personnel parachutes – Specification

c) The consideration arose for the establishment of a unified standard for cotton tapes in aeronautical applications. Consequently, a decision was made to consolidate all four Indian standards pertaining to cotton tapes into a single comprehensive standard. This amalgamation aims to encompass all varieties of cotton tapes manufactured in the country, while excluding any obsolete or unused variations.

3. OBJECTIVE

To collect the technical data and scientific evidence for quality, performance and constructional requirement of Cotton Tapes for Aeronautical Applications from primary and secondary sources.

4. SCOPE

4.1 Study of the available literature on Cotton tapes for aeronautical Applications, but not restricted to the following:

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

4.2 Collection of the database for manufacturers (small, medium and large-scale), testing infrastructure and users in the country.

4.3 Collection of import and exports data, type of standards and regulation being followed by domestic/foreign manufacturers, comparative analysis of these standards and regulation.

4.4 Undertake 2 visits to each of small, medium and large-scale industries, focused group discussion with (production, quality control and R &D team) manufacturer and collect the information on the following aspects :

a) Manufacturing process;
b) In-process controls being exercised during manufacturing;
c) Varieties being manufactured;
d) Standards being followed;
e) Testing method being used;
f) Testing infrastructure available;
g) Post manufacturing quality/in-house data for quality, performance and constructional parameter for all the varieties being manufactured;
h) Sampling plan being followed;
i) Marking and labelling of the product;
j) Packaging;
k) Sustainability practices [sustainable raw material, energy efficient processes and methodologies, renewable energy sources, 3Rs (Reduce, Reuse and Recycle), waste management and disposal mechanisms]
l) 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 manufacturers (where visit is not carried out) shall be collected by circulating questionnaire through email or any other digital means.

4.6 Undertake at least 2 visits to users and 2 visits to testing labs (both NABL accredited lab) to collect information including but not restricted to the following:

a) User

i) Standards and regulations being followed;
ii) Focused group discussion on quality issues, challenges being faced and suggestions if any.

b) Lab

i) Standards and regulation being followed;
ii) Testing methods being followed;
iii) Testing infrastructure;
iv) Focused group discussion on testing related issues, challenges being faced and suggestion.

4.7 Collection of minimum 4 samples each from (small, medium and large-scale manufacturers) of each variety and generation of test data for various parameters along with the acceptable C.V.% and tolerance on each parameter but not restricted to the following requirements for cotton tapes after getting the samples tested from 2 NABL accredited labs:

a) Total no. of ends;
b) Picks/dm;
c) Width;
d) Mass;
e) Weave Pattern;
f) Breaking load on full width;
g) Extension at break;
h) Thickness;
i) Scouring loss;
j) pH value;
k) Colour fastness to light and washing;
l) GSM;
m) Rot-proofness; and
n) Linear density of yarn

4.8 Preparation of analytical report of the entire scope.

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 manufacturers, 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

6.1 Interim review report & comprehensive report in soft/hard form of study covering all the aspects detailed in the scope of the R & D project.
6.2 Questionnaire feedback, testing report, focused group discussion report, other relevant documents and information shall be appended to the project report.

7. REQUIREMENT FOR THE CVs

Graduate in Textile or textile technology or textile engineering or textiles chemistry or fibre science and technology or manmade fibre technology.

8. TIMELINE AND METHOD OF PROGRESS REVIEW:

Indicative Time line	Method of progress
Up to 30 days	Literature review, desktop study, collection of data and information. The sampling plan for visit and collection of samples shall be discussed and finalized with nodal officer after literature survey and desktop research.

Up to 60 days	Visit to manufacturer, user, testing lab and collection of samples. An interim report shall be provided by the proposer.
Up to 104 days	Testing of samples (except long duration test with testing time more than 30 days) preparation and submission of first draft report
Up to 120 days	Submission of the final project report.

9. BIS SUPPORT

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

10. NODAL CONTACT POINT

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