

TERMS OF REFERENCE FOR THE R&D PROJECT

1. **TITLE**: Study of the constructional and performance requirements for jute geotextiles used in rainwater erosion control in road and railway embankment and hill slopes.

2. BACKGROUND

2.1 Jute geotextiles are often used preventing surface runoff, reducing soil erosion, and promoting the growth of vegetation in roads and railway embankments and hill slopes. These geotextiles serve as a protective layer against erosion by stabilizing the soil and preventing it from being washed away by rainwater. They are placed over the soil surface to reinforce it, allowing water to pass through while minimizing soil movement and retaining its structure.

2.2 BIS has published IS 14986:2001 'Guidelines for application of Jute Geotextile for rain water erosion control in road and railway embankments and hill slopes'. The standard presently specify 3 types of JGT i.e. 730, 500 and 292 GSM JGT.

2.3 Following an Industry Interaction session on "Jute Geotextiles – A Sustainable Geotechnical Solution," feedback from Jute Stakeholders suggested the need to split the standard into two parts. One part will cover guidelines, while the other will address product requirements, specifically focusing on Open Weave JGT for rainwater erosion control in road and railway embankments and hill slopes.

2.4 Further a testing challenge was encountered in determining the minimum breaking load and maximum elongation at break, particularly with 20 yarns and a 20 cm grip length with Goodbrand Fabric Testing Machine, as outlined in the existing standard. In response to feedback, the technical committee decided to incorporate fresh results obtained from breaking load and elongation tests conducted in accordance with IS 16635, titled 'Wide Width Tensile Test.'

2.5 Additionally, the standard will undergo revisions to align with the latest industrial practices. It will also incorporate information on newer varieties of JGT, ensuring that the document reflects the evolving landscape of Jute Geotextile applications. This comprehensive revision aims to enhance the standard's relevance in today's context.

2.6 The outcome of the R&D project will serve as the basis for revision of IS 14986:2001 'Guidelines for application of Jute Geotextile for rain water erosion control in road and railway embankments and hill slopes' to incorporate the fresh requirements for constructional and performance requirements and revise the standard as per the latest industrial practices.

3. OBJECTIVE

To collect the technical data, information, and evidence for constructional and performance requirements for jute geotextiles used in rain water erosion control in road and railway embankment and hill slopes from primary and secondary sources.

4. SCOPE

- a) Undertake study and analyse the existing literature on the subject, which include but not restricted to the following: -
 - i) National/International standard and regulation,
 - ii) Journals and research papers,
 - iii) Standard operating procedures (SOPs)/guidelines of Ministry/regulator/users,
 - iv) Studies/research conducted by any organization,
 - v) Any other relevant published information.
- b) Collection of the database for manufacturers (medium and large-scale), testing infrastructure and users in the country.
- c) Collection of import and export data, type of standards and regulation being followed by domestic/foreign manufacturers, comparative analysis of these standards and regulation.
- d) Undertake 4 visits to each of medium and large-scale manufacturer and collect the information on the following aspects: -
 - i) Types/grades of raw material being used
 - ii) Manufacturing process
 - iii) In-process controls being exercised during manufacturing
 - iv) Varieties being manufactured (based on Weave type, GSMs, thickness etc.)
 - v) Standards being followed
 - vi) Testing method being used
 - vii) Testing infrastructure available
 - viii) Post manufacturing quality/in-house data for safety, performance and constructional parameter for all the varieties being manufactured
 - ix) Sampling plan being followed
 - x) Marking and labelling of the product
 - xi) Packaging practices being followed
 - xii) Sustainability practices [sustainable raw material, energy efficient processes and methodologies, renewable energy sources, 3Rs (Reduce, Reuse and Recycle), waste management and disposal mechanisms]
 - xiii) Focused group discussions with teams involved in production, testing, and R&D to address quality issues, discuss challenges faced, and gather suggestions for improvement

The feedback from other manufacturers (where visit is not carried out) shall be collected by circulating suitable questionnaire covering above information through email or any other digital means.

- e) Undertake minimum 2 visits to users and 2 visits to testing labs (one govt and one private NABL accredited lab) to collect information including but not restricted to the following: -

a) User

- i) Standards and regulations being followed
- ii) Compliance mechanism being followed (test certificate from supplier, third party testing)
- iii) Installation methods/guidelines followed
- iv) 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

The feedback from users and labs (govt and private NABL accredited) where visit is not carried out shall be obtained through suitable questionnaire covering above information.

- f) Purchase/collect samples and testing of samples for parameters including but not restricted to construction type, GSM, length, width, Ends/dm, Picks/dm, thickness, aperture size, minimum breaking load and maximum elongation (tested as per IS 16635 wide width elongation method in both machine and cross direction), as per following sampling plan:

Sl. No.	Number of samples	Type of Industry
1	02 of each variety (730, 500 and 292 GSM JGT)	Large scale
2	02 of each variety (730, 500 and 292 GSM JGT)	Medium scale
Total	12 Samples (06 samples to be tested in Govt Lab and 06 samples to be tested in Pvt. Lab)	

- g) Preparation of a comprehensive project report covering all the above information.

5. RESEARCH METHODOLOGY: -

- a) Collect and analyze the data/information as specified in the scope [3 (a), (b) and (c)].
- b) Visit manufacturers, users and labs and collect data/information as specified in the scope

[3 (d) and (e)].

- c) Collect and test the samples as specified in the scope 3 (f).
- d) Analysis the data/information and prepare a comprehensive project report.

6. EXPECTED DELIVERABLES: -

- a) Comprehensive report in soft/hard form of study covering all the aspects detailed in the scope of the R & D project.
- b) Questionnaire feedback, testing report, focussed group discussion report, other relevant documents and information shall be appended to the project report.

7. REQUIREMENT FOR THE CVS: -

Graduate in textile technology or textile engineering or textiles chemistry or fibre science and technology or jute technology or jute and fiber technology.

8. TIMELINE AND METHOD OF PROGRESS REVIEW: -

The duration of the project is 120 days from the date of the award of the project. The stagewise indicative timelines are as follows:

Indicative Time line	Method of progress
0 to 30 days	Literature review, desktop study, collection of data and information Note — The sampling plan for visit and collection of samples shall be discussed and finalized with nodal officer after literature survey and desktop research.
31 to 60 days	Visit to manufacturer, user, testing lab and collection of samples An interim report shall be provided by the proposer.
60 to 100 days	Testing of samples (except long duration test with testing time more than 30 days) Preparation and submission of first draft report
100 to 120 days	Submission of the final project report

9. SUPPORT BIS WILL PROVIDE: -

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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