TERMS OF REFERENCE FOR THE R&D PROJECTS

1. **Title of the Project**: Study of performance and safety parameters of Wearable Compression E-Textile Products used for massaging applications

Sectional Committee: LITD 33 "Wearable Electronic Devices and Technologies"

Proposed Duration: 6 Months

2. Background

2.1 Wearable Compression e-textiles for massaging applications are technologically advanced fabrics that integrate electronic components to provide portable and personalized massage therapy. These e-textiles, designed to be worn directly on the body, use embedded actuators, sensors, and control units to deliver relaxing and therapeutic massages. Users can conveniently adjust settings and massage modes through a control interface, making them an ideal choice for relieving muscle tension and promoting well-being while on the go.

2.2 The objective of this study is to create a comprehensive evaluation of performance and safety parameters of the wearable compression e-textile products, for massaging applications, widely used in the country. The assessment will encompass an in-depth analysis of specific parameters pertaining to the performance and safety of this product.

2.3 This project is essential for ensuring safety, performance, and quality in the development and utilization of such e-textiles, offering valuable insights to manufacturers and users in the specialized field of massager applications.

3. Scope

3.1 The scope of this project is to undertake an in-depth study of the different types of wearable compression e-textile products for massaging applications. The aim is to conduct a comprehensive evaluation of the performance and safety parameters of the Wearable e-textiles for massaging application.

3.2 This proposal does not apply to static compression devices with no electronic components involved. This project focuses specifically on e-textiles used for massaging applications that can be worn by an individual. The details of the scope of this proposal is as follows:

3.2.1 A comprehensive survey of International/National Standards related to wearable compression e-textile products used for massaging applications.

3.2.2 Collection and reporting of the following data:

a. Raw materials used

b. Countries from where raw materials are being sourced and percentage thereof

c. Manufacturing methodology used and process control

d. Varieties manufactured

e. Test-facilities available

f. Test methods used

g. Test equipment's available for complete testing of the product

h. Frequency of testing of each parameter

i. Sampling data for testing

j. Marking & labelling requirements

k. Packaging

l. Post production quality check facilities

m. Data on sales (export and domestic consumption)

n. Collection of data sheet/ technical specification of each variety of product manufactured

o. Steps taken for ensuring energy conservation/ efficiency

p. Sustainable processes followed in the production process

q. Waste disposal management

3.3 Study of technical regulations and applicable standards of countries where the product is exported.

3.4 Specifying test methods

3.5 Assessment of test facilities available for the product in the country

3.6 Feedback from users of the product

3.7 Expert group consultation

4. Expected Deliverables

The expected deliverables for this project are as follows:

4.1 Report on the data collected as mentioned at Clause 3.2 of this R&D proposal.

4.2 A clear and comprehensive categorization of various types of heating e-textile products is to be provided. Aspects considered for the purpose of categorization, to create a standardized taxonomy, is to be mentioned.

4.3 A detailed review report specifying test methods to evaluate the performance and safety parameters of the wearable compression e-textiles used for massaging applications is to be submitted. This report shall cover various performance and safety aspects of wearable e-textiles products used for massaging applications, including:

4.3.1 Durability: Evaluation of the product's longevity and ability to withstand continuous pressure, wear and tear.

4.3.2 Abrasion Resistance: Testing the e-textile's resistance to abrasion and its ability to maintain functionality.

4.3.3 Pressure Parameters: Determining the localized pressure, pressure profile, and compression category.

4.3.4 Material Stiffness: Measurement of the textile's stiffness and material fatigue.

4.3.5 Wear Comfort: Evaluation of the product's comfort during extensive wear.

4.3.6 Power Consumption: Measuring the energy efficiency and power requirements of the product.

4.3.7 Interoperability: Tests to ensure that the wearable massaging e-textile components from different manufacturers can work together seamlessly.

4.3.8 Fall Test: A fall test to be formulated to evaluate the product's safety in scenarios where users might trip or fall while wearing compression e-textile products. This test will assess whether the product poses any risks in such situations.

4.3.9 Electrical Safety: An electrical safety test to be prescribed to evaluate of the product's electrical safety. This test shall involve assessing insulation materials, wire integrity, and protection against electrical hazards.

4.3.10 Pressure Safety: Ensuring that the product exerts the intended pressure safely without causing discomfort, injury, or skin-related issues.

4.3.11 User Guidelines: Recommendations to be prescribed for safe usage and maintenance of wearable compression e-textile products.

5. Research Methodology:

5.1 Study and comparative analysis of existing literature which includes international standards, research papers, any SOP/instruction/guidelines issued by the ministry/regulatory body concerned, any other study report. This literature survey shall encompass the following:

5.2 Collection of data on manufacturing base, user base, details of export and import of the product. The data collection shall encompass the following:

5.2.1 Raw materials used

5.2.2 Data on countries from where raw materials are being sourced and percentage

5.2.3 Manufacturing methodology and process control

5.2.4 Varieties manufactured

5.2.5 Test-facilities available

5.2.6 Test methods used

5.2.7 Test equipment's available

5.2.8 Frequency of testing of each parameter (eg. daily/ annually/once when there is any change in product design etc.)

5.2.9 Sampling data for testing

5.2.10 Marking & labelling requirements

5.2.11 Packaging

5.2.12 Post production quality check facilities

5.2.13 Data on sales (export and domestic consumption)

5.2.14 Collection of data sheet of each variety of product manufactured

5.2.15 Steps taken for energy conservation/ efficiency

5.2.16 Sustainable processes in the production process

5.2.17 Waste disposal management

5.3 Study of technical regulations and applicable standards of countries where the product is exported.

5.4 Assessment of test facilities available for the product in the country

5.5 Feedback from users of the product

6. Timeline and Method of Progress Review:

6.1 Project Initiation, Data Collection and Testing (First 3 Months): The project officially begins with a detailed review of the existing International/National Standards and other similar literature available on the topic. This phase also focuses on collection of data from manufacturers/laboratories/users and formulating test methodologies to address the performance and safety parameters of the wearable compression e-textile products for massaging applications. The first draft of the project report is to be submitted during this stage.

6.2 Analysis and Assessments (Last 3 Months): A mid-term review is conducted to assess progress and adjust methodologies as necessary after taking feedback from concerned stakeholders and expert consultation. In these months, testing of the collected samples is to be carried out in the laboratories and the test methods and requirements prescribed are to be analysed and assessed. The final project report is to be submitted.

This condensed timeline covers the essential phases for the completion of the project within 6 months timeframe from the date of awarding the project, ensuring efficiency in project execution. Progress reviews will be conducted as needed to track developments and to make timely adjustments.

7. Support BIS will Provide:

BIS will offer valuable guidance and access to existing ISO and IEC Standards relevant to wearable compression e-textile products (textile or non-textile) used for massaging applications. The contact details of the concerned member secretary will be provided.