TERMS OF REFERENCE FOR RESEARCH PROJECT

[Paper & its Products Sectional Committee -CHD 15 under Chemical Department of BIS]

1. Title of the project : Study on performance characteristics of various types of Thermal Paper

2. Background :

2.1 Thermal paper is a special paper type that is manufactured with specialty coating that aids in inkless printing. On application of heat to the coating, a clear image is formed on the paper with no requirement for ribbons or inks. The coating usually turns black on heating, which, in turn, transfers the image to the paper. Thermal paper is the key component of thermal paper printing, which is considered one of the most economical printing technologies owing to its low energy consumption and low maintenance cost.

2.2 Thermal printing is widely used in many applications such as point of sales solutions for the printing of invoices, ATM and credit card slips and parking tickets, labels as well as print solutions for specialized applications, for example in healthcare (ECG's), ultrasound and prescriptions, Air traffic control, VVPAT.

2.3 As per reports, the thermal paper market in India is expending at 7.5% CAGR from 2019 to 2025. In India, a significant quantity of thermal paper is manufactured as well as imported. It is estimated that the current demand is 36,000 MT per annum and growing at 10-15% per annum.

2.4 BIS has published IS 17568:2021 'Thermal Paper- Specification' which prescribes the requirements, method of sampling and test for thermal paper. The existing standard covers only the coated type thermal paper whereas in the market non-coated is also available. Further, no requirement of keeping properties / durability of the product has been specified in the standard. This restricts the scope of the standard and thereby reduces market relevancy.

2.5 Considering the exponential market needs, recent technological advancements in the industry (w.r.t. availability of quality base paper for thermal paper and coating materials) and concerns raised by consumer organization on the durability of the product, a detailed study of the performance characteristics of various types of the thermal paper is required to address the limitations of the existing Indian Standard.

3. Objective:

To collect and analyze the relevant data and information from both primary and secondary sources in regard to performance characteristics of various types of the Thermal Paper.

4. Scope:

4.1 Comprehensive study of existing literature which includes international standards, journals, research papers, any SoPs/ guidance/ instructions issued by the Ministries/ regulators concerned and any other study

4.2 Collection of scale-wise data on manufacturing base through government sources (websites, reports) or industry associations

4.3 Analysis of the import and export data and conduct analytical study of the technical regulations on the product in various countries

4.4 Analytical study on availability of test facilities in the country

4.5 Collection of data on the following through visits to two industries each of larger, medium, small and micro scales and one each of government and NABL accredited private testing facility, in case the manufacturing and testing facilities data advises otherwise:

a) Type of raw materials
b) Varieties manufactured
c) Manufacturing processes
d) In process quality controls
e) Manufacturing facilities (Automation, Industry 4.0)
f) Quality parameters
g) In-house test facilities
h) Parameters tested
i) Marking and labelling
j) Packaging
k) Finished materials quality parameters
l) Sampling plans
m) Sustainability practices [energy consumption, renewable energy sources, sustainable practices, 3Rs (Reuse, Reduce and Recycle), waste management and disposal mechanisms, carbon footprints], future plans

4.6 Collection of user feedbacks (which will include but not limited to performance of the thermal paper and storage conditions)

4.7 Generation of data after testing the product for important characteristics and establishing parameters for different types of Thermal Paper such as but not limited to:

4.7.1 Functional characteristics:

a) Grammage
b) Content of Bisphenol A

c) Substance
d) Tensile Strength
e) Caliper
f) Tearing Strength
g) Brightness
h) Opacity
i) Smoothness
j) Wax pick

4.7.2 Image density:

a) Image ID (using Macbeth densitometer or any other advance testing equipment)
b) QR Code/ Barcode scannable distance
c) Compatibility of printers for generating QR Code/ Barcode on thermal paper

4.7.3 Optical density durability properties (including testing after ageing):

a) Heat resistance
b) Moisture resistance
c) Light resistance
d) Water resistance
e) Oil resistance
f) Plasticizer resistance

4.8 Study storage conditions as well as on recommendatory storage conditions including during transportation and handling of the thermal paper to ensure longer durability of the product.

4.9 Preparation and submission of an analytical report covering the entire scope of the Project.

5. Research Methodology:

The project will involve the following research methodologies:

a) Study the literature and analyse it in respect to the scope
b) Survey the market through structured questionnaires for collecting information in respect to the scope
c) Contact the relevant organizations (e.g. EICs) and associations (Industry/ user associations) for gathering the data

d) Visits to the manufacturing units to observe:
   - manufacturing processes,
   - in-process controls,

e) Discussion with focused groups (Quality control personnel and person responsible for manufacturing) through structured questionnaires

f) Collection of samples – samples to be collected during the visits to industries as per sampling plan

g) Testing of samples – test the samples and submit the analyzed results (**Samples shall be tested in BIS recognized laboratories/ laboratories of national repute).**

h) Comprehensive reporting on all aspects.

6. Sampling Plan:

6.1 Preferably visit to 2 industries each of large, medium, small scale (unless the manufacturing database indicates otherwise) to understand and collect data from the manufacturers and organizations involved in manufacturing of thermal paper.

6.2 Preferably visit to 1 govt and 1 private lab (preferably NABL accredited or BIS recognized lab) to have information on characteristics tested and methods of tests used.

7. Deliverables:

7.1 A comprehensive report consisting outcomes of the study covering all aspects of the scope shall be submitted in both paper and digital formats.

7.2 Along with the final report the survey formats and responses, questionnaires, results of testing, reports of visits, other relevant documents/ information to be appended.

8. Delivery Milestones and Review Process

8.1 The duration of the project shall be three months.

8.2 An interim report indicating the review of the literature, desktop research and sampling plan shall be submitted in 15 days from award of the project.

8.3 Draft report shall be submitted by the end of two months from award of the project. This report may not wait for receipt of final test reports of samples.

8.4 Final report shall be submitted within 90 days.

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 Point

Shri Virendra Singh, Scientist D & Member Secretary, CHD 15 may be contacted for more clarification on the R&D project (Email address: chd15@bis.org.in).