TERMS OF REFERENCE FOR THE R&D PROJECTS

[Chemical Methods of Test Sectional Committee TXD 05 under Textiles Department of BIS]

1) **Title of the project: -** Development and validation of test method for determination of Chlorinated Organic Carriers in textiles and textile products

2) **Background:-**

2.1 Chlorinated organic carriers are chlorinated organo benzenes, toluenes and their isomers. Chlorinated organic carriers (COC) are generally used :-

i) As intermediates in the synthesis of other chemical substances as well as paint carriers and levelling agents
ii) Included as impurities in chemical formulations of dyestuffs and solvents.
iii) In garment and footwear supply chains and textile applications.
iv) As a carrier during the dyeing process of synthetic fibers, especially polyester and polyester blends.
v) As an intermediate in the synthesis of solvents and other chemical compounds with high melting points.

2.2 Chlorinated organic compounds are harmful and may induce liver malfunction, irritation to mucus membrane and skin as well as reproductive disorders. Some chlorobenzenes and chlorotoluenes can be very toxic to aquatic organisms at certain concentrations. In developed countries, leading apparel brands have banned/restricted the use of chlorobenzenes and chlorotoluenes in the production and manufacturing of their products.

2.3 Many commercial labs are doing the testing for Chlorinated Organic Carriers as per inhouse method (Solvent Extraction/GC-MS) or using other international standards such as BS EN 17137, EN 17137, DIN 54232 as per customer/user requirement. There is no Indian/ISO Standard on the subject for textiles and textiles products.

2.4 Given the potential health and environmental risk, it is imperative to develop reliable and accurate methods for the determination of chlorinated organic carrier. This R &D project will serve as a basis for development of a uniform standard on test method for chlorinated organic carrier.

3) **Objective**

To develop and validate test method for determination of Chlorinated Organic Carriers by Gas Chromatography Mass Spectrophotometry (GCMS) in textiles and textile products from primary and secondary sources.

4) Scope: -

a) Undertake study and analyse the existing literature which include but not restricted to the following :-

i) BSEN, EN, DIN and other International Standard
ii) Regulation at International level
iii) Restricted chlorinated organic carrier compounds
iv) Standard operating procedures (SOPs)/guidelines of laboratories
v) Journals and research papers
vi) Any other relevant published information

b) Collection of the database of testing infrastructure and users in the country.

c) Undertake 2 visits to NABL accredited testing labs (one Govt and one private) having capability to do testing of Chlorinated Organic Carriers to collect information including but not restricted to the following: -

i) Witness the testing and understand the testing procedure
ii) Testing methods and regulation being followed
iii) Restricted chlorinated organic carrier chemicals being tested
iv) Technical data and information on scope, principle, Apparatus/Equipment, Reagents/Chemicals, Test specimen preparation, Testing procedure, Gas chromatographic determination/instrument diagram, Calibration, expression/calculation of results
v) Focused group discussion on testing related issues, challenges being faced and suggestion

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

d) Provide technical data and information for development of test method in Indian Context based on literature survey, International Standards, laboratories practices, lab visits. The technical data shall include but not restricted to the following information: -

i) Scope
ii) Term and definitions
iii) Principle
iv) Apparatus/chemical reagents
v) Preparation of test specimen
vi) Testing, extraction and filtration procedure
vii) List of restricted chemicals
viii) Gas chromatographic determination/instrument diagram
ix) Calibration, expression/calculation of results
x) Test report format

The technical/scientific data collected shall not violate copy right/patent right (if any) on the proposed subject.

e) Purchase 3 samples of different known impurity and carry out interlaboratory validation of the GC-MS method from 5 NABL Accredited lab.

Note - While sending the samples for interlaboratory test, either the samples may be spiked or may be purchased from Proficiency testing (PT) service provider with known quantity/limit (ppm) of impurity of chemical substance.

f) Validation should include studies on linearity, precision, accuracy, limit of detection (LOD), limit of quantification (LOQ), and recovery rates. Validation shall cover a range of chlorinated organic carriers (chlorobenzenes and chlorotoluenes) commonly encountered in textiles and textiles products.
g) Preparation of a comprehensive project report covering all the above information.

5) Research Methodology: -

a) Collect and analyse the data/information as specified in the scope [4 (a) and (b)].
b) Visit labs and collect data/information as specified in the scope [4 (c)].
c) Prepare technical data, test the samples and validate the test method as specified in the scope [4 (d), (e) and (f)].
d) Analysis the data/information and prepare a comprehensive project report.

6) **Expected Deliverables: -**

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

7) Requirement for the CVs:-

The person shall be at least graduate in Textile Technology or Textile Engineering or Textile Chemistry or Fibre science and Technology or Manmade Fibre Technology or B.Sc. in Chemistry.

8) Timeline and Method of progress Review:-

The duration of the project is **150 days** from the date of the award of the project. The stagewise indicative timelines are as follows:-

Time line	Method of progress
0 to 45 days	Literature review, desktop study, collection of data and information Note: - The plan for visit and collection/purchase of samples shall be discussed and finalized with nodal officer after literature survey and desktop research.
45 to 90 days	Visit to testing lab Collection of data and information

	Technical data/information on test method for determination of chlorobenzenes and chlorotoluenes (Chlorinated Organic Carriers) Note: - The test method shall be reviewed by the technical committee TXD 05 before purchase of samples and validation process.
90 to 135 days	Collection/purchase of samples Testing of samples/Interlaboratory validation of test of 3 different samples from 5 labs accredited by NABL Preparation and submission of draft report to BIS
135 to 150 days	Submission of the final project report.

9) Support BIS will Provide:-

a) All the relevant Indian Standards/ISO Standards or any other standards required during the project will be provided by BIS.
b) Facilitate/introduction of the project leader/organization to relevant Industry and industry association, testing lab, institute, acedamia, user, regulator/ministries.
c) Facilitate testing of samples in BIS Lab/BIS Recognized Lab.

10) Nodal Point

In case of queries/clarification, Shri Dharmbeer, Scientist D and Member Secretary of TXD 05 may be contacted on txd@bis.gov.in, 011-23231282, 9910825544.