TERMS OF REFERENCE FOR THE R&D PROJECT
(Plastics Sectional Committee, PCD 12 under Petroleum, Coal and Related Products Division Council, PCDC)

1. **Title of the Project**: Study on Safety and quality aspects of Ethylene methacrylic acid (EMAA), its various applications and testing methodologies.

2. **Background**

2.1 Ethylene Methacrylic Acid (EMAA) is a copolymer derived from the polymerization of ethylene and methacrylic acid monomers. This copolymerization results in a material with unique properties that find applications in various industrial sectors.

2.2 EMAA is a versatile copolymer with properties that make it valuable in industries requiring adhesion, barrier performance, and compatibility with other materials. Its use in packaging, adhesives, and coatings demonstrates its importance in enhancing the functionality of various products in our everyday lives. The uses and application of EMAA is increasing in the India with the changing times.

2.3 As there is no Indian Standard on the subject, the establishment of standards on Ethylene Methacrylic Acid is essential to contribute to the reliability of EMAA copolymers in various industries, supporting innovation and environmental sustainability while meeting the expectations of manufacturers and consumers alike. Therefore, it is important that a thorough analysis of its manufacturing process, applications/uses and performance characteristics based on the applications is done. Data gathered from the analysis will help in formulation of Indian Standard on Ethylene methacrylic acid (EMAA).

3. **Objective**

To collect and analyse the data from primary and secondary sources for safety and quality aspects of EMAA used for various applications and testing methodologies.

4. **Scope**

4.1 Undertake extensive and thorough examination of the available literature on EMAA including international standards, if any, research papers, SOP's and guidelines issued by regulatory bodies and any study conducted by any organization or any other available sources.

4.2 Identify and collect the data on the manufacturers of EMAA available in the country in various categories i.e. large, medium, small, and micro units.

4.3 Collect import-export data and identify importers of the material in India. Based on this information, study the regulations and standard followed in the exporting countries, if any.

4.4 Identify and collect the data on the users of EMAA in the country.

4.5 Identify and collect the data on the laboratories involved in the testing of EMAA.

4.6 Carry out visits to manufacturing facilities, users, laboratories to collect the information on the subject.

4.7 Carry out testing on the samples of EMAA collected from manufacturers and importers against their declared parameter (s).

4.8 Study and provide comparative analysis of various documents/literature gathered from different sources.

4.9 Prepare analytical report covering the entire scope.

5. Research Methodology

5.1 Conduct Literature review available from primary and secondary sources.

5.2 Contact the relevant organizations, industry associations to gather the information on the subject.

5.3 Collect feedback from industries, users, labs through questionnaires. The questionnaires to be circulated to all the available industry, users, labs.

5.4 Visits to industries (of each category), users, labs to observe the facilities and processes followed. At least two industries each from large, medium, small, micro, users, laboratories (Public and private each) to be visited, if available. However, the number of visits to be finalized after gathering the information on available industries, users, and labs.

5.5 During the industry visit, if available, the information mentioned below to be gathered:

a) Raw material used;
b) Variety of products manufactured;
c) Manufacturing processes followed for different grades;
d) In process quality controls and checks;
e) Requirements for Quality and safety parameters;
f) Testing methodologies used;
g) Finished products quality checks;
h) Packing, Labelling, and marking requirements;
i) Sustainability impact of the processes involved i.e. sources of energy used (renewable/non-renewable), Energy consumption, measures taken, if any to ensure energy consumption, impact of the manufacturing processes involved on the environment,
j) efforts being done to ensure 3R’s.
k) Focused group discussion in structural format.

5.6 During Lab visit, if available, the following information to be gathered:

a) Testing methodologies followed;
b) Equipment's used.
c) Focused group discussion.

5.7 During user industry visit, if available, the following information to be gathered:

a) Products used;
b) Parameters used for quality check;
c) Focused group discussion.

5.8 Sampling plan to be finalized in consultation with BIS after stage 1 as per **7.2.1**.

5.9 Analyse the findings from the literature review, visits.

5.10 Collection and testing of sample at the labs (preferably BIS recognized labs, if available).

6. Expected Deliverables

6.1 Study report covering all the aspects mentioned in the scope.

6.2 Feedbacks from questionnaires, discussion with the focused groups, report of the sample tested in digital and hard copy forms shall be appended in the study report.

7. Timeline and Method of Progress Review

7.1 Final report to be submitted within 4 months from the date of the award of the project.

7.2 Stages for Review:

7.2.1 Stage I – At the end of 4^{th} week, submit the following:

a) Literature review carried out and summarized report;
b) Identified manufacturers and importers; and
c) Format of questionnaire for manufacturers and importers;
d) Laboratory where testing is to be carried out; and
e) Visit and sampling plan.

7.2.2 Stage II – At the end of 12^{th} week, submit interim report.

Note: Awardee may forward the draft report to BIS without waiting for test report, if it's a long duration test.

7.2.3 Stage III – At the end 16^{th} week, submit final report.

8 Support from BIS

8.1 BIS will provide access to latest editions of Indian and International Standards and available literature.

8.2 BIS will facilitate introduction to manufacturing industries, laboratories, and user industries for carrying out the project.

8.3 Member secretary of the Plastics Sectional Committee, PCD 12, Shri Shivam Dwivedi shall be the Nodal point from BIS. His email id is pcd12@bis.gov.in.