

## Terms of Reference

### Research Project

on

### Study of thermal and acoustic insulation materials for use on-board ships

**Sectional Committee** : **Shipbuilding Sectional Committee, TED 17**  
**Division Council** : **Transport Engineering Division Council**  
**Duration** : **3 Months**

1. **TITLE** : Study of thermal and acoustic insulation materials for use on-board ships

2. **BACKGROUND** :

**2.1** Thermal insulation on-board ships' helps in maintaining the desired environment by preventing heat loss from any given system. Proper insulation can have a range of benefits which included increased energy efficiency and reduced energy costs.

**2.2** Acoustic control is essential in ships to provide passenger comfort and a healthy working environment for the crew. Sound vibrations can cause severe damages if allowed to spread across the ship.

**2.3** Noise (or unwanted sound) was declared an environmental pollutant at the 1972 International Conference for the Environment, in Stockholm.

**2.4** Currently, following Indian Standards are available on the subject:

- a) IS 14317 : 1995 Shipbuilding - Preformed rigid polyisocyanurate foam thermal insulating materials - Specification
- b) IS 14335 : 1996 Shipbuilding - Mineral fibre marine board for thermal insulation – Specification
- c) IS 14337 : 1996 Shipbuilding - Mineral fibre resin bonded slabs – Specification

**2.5** Thermal and acoustic insulating materials currently mentioned in the Indian Standards are flammable and hence are unusable in certain places/ conditions on ships'. During fabrication there can be irritation to skin, eyes and respiratory system. Technical developments, especially related to toxicity, might have also taken place.

**2.6** It is in this context that there is a need for in-depth, incisive study of thermal and acoustic insulation material which are currently being used on-board ships'.

### **3. OBJECTIVE**

The objective of research and development project is to collect data, information and evidence from primary and secondary sources in respect of thermal and acoustic insulation materials which are currently being used on-board ships'.

### **4. SCOPE:**

**4.1** A thorough literature review on thermal and acoustic insulating material, which are currently being used on-board ships which will include existing international standards if any, research papers published on the subject, any study conducted by industry body/ association or any other literature which includes study of parameters covered in current Indian Standards, tests specified and their test methods.

**4.2** Visits to regulatory bodies, different classification societies, shipyards and ship-owners for discussion on requirements covered under their rules/ regulations/ approval criterion. The regulations which are expected to be enforced in near future are also to be studied. Visits to different stakeholders shall be based on an agreed sampling plan at **5.1**.

**4.3** Collection of export and import data and applicability of technical regulations on thermal and acoustic insulating materials.

**4.4** Identification of manufacturing base of the materials in the country and visits to different manufacturers facilities based on discussion.

**4.5** Identification of testing laboratories, especially NABL accredited labs, and testing facilities in the country and visit different laboratories.

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**4.6** Study and comparative analysis of different materials being used.

**4.7** A comprehensive report documenting work done as mentioned above, research findings, data collected and bibliography shall be prepared.

### **5. SAMPLING PLAN**

**5.1** Based on the identification of manufacturing and testing base, a sampling plan is required to be agreed upon for visits to different stakeholders and also for collection and testing of samples during the visit.

**5.2** In case the manufacturing and testing infrastructure in the country is sufficiently

available under large, medium and small scale, the proposer needs to submit a sampling plan to BIS for approval.

## **6. RESEARCH METHODOLOGY**

**6.1** Carry out thorough literature review as specified in **4.1** and **4.2**.

**6.2** After the literature review, there will be discussion with BIS to approve the sampling plan so that visits can be undertaken.

**6.3** Collect information from stakeholders through discussion, structured questionnaire as specified in **4.2** and **4.3** for the issues faced by them on thermal and acoustic insulating materials.

**6.4** Visits to different manufacturers facilities to witness the manufacturing process and to collect the samples for testing. A focused discussion on raw materials being used, manufacturing process, in-process quality checks and testing facilities for different parameters and test methods should be done with quality personnel.

**6.5** Visits to different testing laboratories, especially NABL accredited labs, to get the samples tested. Discussion should also be done with quality personnel on testing of different parameters, their testing methods and equipment being used for testing.

**6.6** Collect data and feedback from different users through circulation of questionnaire.

## **7. DELIVERABLES**

An analytical report, in soft and hard copy, covering all aspects mentioned in the scope shall be submitted. Details of visits to different manufacturers, laboratories, discussions with quality control personnel, questionnaire with exporters/ importers, feedback from users, research findings, data collected, test results, comparative analysis and bibliography of the literature covered shall be appended to the report.

**8. TIMELINE AND METHOD OF PROGRESS REVIEW:** A stage wise indicative timeline plan is provided below:

- a) Project timeline – 3 months from the date of award of project

- b) Primary source covering the review of the literatures – By the end of 20 days
- c) Secondary source interaction covering the discussion with regulatory bodies/ classification societies/ shipyards and existing stipulations, thereof – By the end of 45 days
- d) Visits to different manufacturers and laboratories and testing of collected samples – By end of 75 days.
- e) Final report covering all the aspects of the ToR – By end of 90 days.

**9. SUPPORT BIS WILL PROVIDE:**

**9.1** BIS will provide access to latest editions of available standards including international standards.

**9.2** BIS will provide information regarding the licencees and recognized laboratories available.