TERMS OF REFERENCE FOR THE R&D PROJECT

1. TITLE OF THE PROJECT

Literature review, market and industry survey, and performance assessment of different type of hinges used in doors and windows (a builder's hardware) manufactured and/or available in Indian market.

2. BACKGROUND

At present nine Indian Standards are available for different types of Hinges used in doors and windows as below:

IS 205:1992 – "Non-ferrous metal butt hinges – Specification (fourth revision)",
IS 206:2010 – "Tee and strap hinges – Specification (fifth revision)",
IS 362:1991 – "Parliament hinges – Specification (fifth revision)",
IS 453:1993 – "Double-acting spring hinges – Specification (third revision)",
IS 1341:2018 – "Steel butt hinges – Specification (sixth revision)",
IS 3818:1992 – "Continuous (Piano) hinges – Specification (third revision)",
IS 3843:1995 – "Steel back flap hinges – Specification (second revision)",
IS 9106:1979 – "Specification for rising butt hinges" and
IS 12817:2020 – "Stainless steel butt hinges – Specification (third revision)".

Many of these standards were formulated more than two decades ago and with primary focus on materials and dimensional aspects. However, the rapid advancement in technology over the last 20 years has introduced new designs and materials to the market and performance criteria.

BIS has received inputs from different stakeholders about availability of new materials, designs, sizes and performance parameters (followed Internationally) which are at present not covered in the above Indian Standards on hinges.

In the above context, an R&D study is required to cover new varieties (includes design, sizes, door mass load capacity and materials) and performance parameters in the revision of the above Indian Standards on hinges used in doors and windows.

3. OBJECTIVE

To collect the information about the availability of different varieties of hinges used in doors and windows with respect to designs, sizes, door mass load capacity and materials, and further sample drawn and testing of hinges for study on their performance parameters achieved by the identified varieties of hinges.

4. SCOPE

4.1 Extensive and intensive review of the available literature related to the hinges.

4.2 Collect details on industry (domestic and leading foreign industry), and test lab and R&D institutes working in the field of builder's hardware from government agencies, trade associations/traders, online marketplaces and other agencies including those involve in export and imports.

4.3 Study on varieties of hinges manufactured/available in Indian market and their quality compliance with respect to standards (Indian/International) followed.

4.4 Study on varieties of hinges exported and imported and their quality compliance with respect to standards followed by these products.

4.5 Market survey to be done in minimum five cities of India that represent PAN India for the availability of different varieties of hinges used in doors and windows.

4.6 Visit minimum two large scale and four MSME hinges manufacturing units of different group and management.

4.7 Drawal of samples of hinges from market/ factory for testing.

4.8 Testing of samples for performance tests, that is endurance test (cyclic test), test door mass (load bearing capacity), salt-spray/corrosion test, and dimensions.

4.9 Comparative analysis of test results with respect to each sample tested.

4.10 Preparation and submission of comprehensive analytical report along-with all the evidence and data collected during the R&D project and analysis of the data.

5. RESEARCH METHODLOGY

5.1 Extensive and intensive study of the available literature related to the hinges for doors and windows which includes Standards (Indian and International/other country standards), published research papers (if available), any study conducted by industries/ organizations and other available literature.

5.2 Identify relevant government agencies, trade associations/traders, online marketplaces and other agencies including those involve in export and imports, to collect and create the data-base which includes the manufacturing industry (domestic and leading foreign industry) and testing-labs (government, autonomous, private labs with and without NABL accreditation), and R&D institutes working in the field of

builder's hardware, for hinges, and varieties of hinges (designs, sizes, door mass load capacity and materials) manufactured/available in Indian market.

5.3 Study on varieties of hinges used in doors and windows (designs, sizes, door mass load capacity and materials) manufactured/available in Indian market and their quality compliance with respect to standards (Indian/International) followed. Collect the data from government agencies, trade associations/traders, online marketplaces and other agencies identified in 5.2.

5.4 Study on varieties of hinges used in doors and windows (designs, sizes, door mass load capacity and materials) exported and imported and their quality compliance with respect to standards (Indian/International) followed. Collect the export-import data from government agencies, trade associations/traders, online marketplaces and other agencies identified in 5.2.

5.5 Market survey to be done in minimum five cities of India that represent PAN India for the availability of different varieties of hinges with respect to designs, sizes, door mass load capacity and materials.

5.6 Visit minimum of two large scale and four MSME hinges manufacturing units (of different groups /management). These visits include discussion and report preparation on manufacturing process, varieties manufactured by the units, quality parameters tested/ got tested from outside/third party labs (in case of outside/third party lab, name of the lab to be included in the report), the testing facilities available with them and witness testing (for tests possible in one day). Also, one standard questionnaire should be prepared and got approved from BIS before factory visits. In case non-availability of large scale manufacturing units, plan of visits to manufacturing units may be modified in consultation and approval of BIS.

5.7 Drawal of samples of hinges, minimum 3 samples (one sample should contain minimum 4 hinges) of each variety with respect to design, material and load capacity (door mass) identified during the survey. The samples can be drawn from market or manufacturing units visited. The sampling should be a thorough representation of the industry (large scale as well as MSME) through-out the country. Before testing, on the basis of market survey and industry visits, the final sampling plan should be prepared by the organization/expert and got approved from BIS.

5.8 Testing of samples for performance tests, that is, endurance test (cyclic test), test door mass, salt spray/corrosion test and dimensions in any identified NABL accredited laboratory up to the level of performance as per declaration on the product sample or in case no declaration available, test to check maximum level of performance achieved by the product sample. If NABL accredited laboratory is not available, then testing can be done in any other laboratory in India having sufficient infrastructure for testing of

hinges. Tests methodologies should be identified by the organization/expert in the literature review and got approved from BIS before testing of samples.

5.9 If organization/expert identified tests (other than mentioned above) during literature review, survey and industry visit, same should be informed by the organization/expert before testing, and decision on the tests to be conducted or not, should be taken in consultation and approval of BIS.

6. EXPECTED DELIVERABLES

Project report covering all the aspects covered in the Scope of Work.

Market survey data-base, test reports, reports of discussions held with various stakeholder groups, feedback of questionnaire/interviews, to be appended to the Project Report

Deliverables shall be provided in both digital and hard copy form.

7. TIMELINE AND METHOD OF PROGRESS REVIEW

7.1 The R&D project should be completed along-with submission of final report in a total time of maximum 5 months from date of award of the R&D project.

7.2 Stages of Review

1) **Stage – I**

   At the of end 1st month, the organization/expert should prepare and submit a progress report include the following:

   i) Details of literature review carried out and summarized report;
   ii) Details on industry (domestic and leading foreign industry), and test lab and R&D institutes working in the field of builder's hardware specific to hinges;
   iii) Details of varieties of hinges manufactured/available in Indian market and their quality compliance with respect to standards (Indian/International) followed;
   iv) Details of varieties of hinges exported and imported and their quality compliance with respect to standards followed by these products;
   v) Plan of cities to be visited and samples drawn;
   vi) Plan of manufacturing industries to be visited, samples drawn and standard questionnaire;
   vii) Proposed sampling plan as mentioned in 5.7;
   viii) Details of tests to be carried-out on samples drawn as mentioned 5.8 and 5.9.

2) Stage – II

At the end of 2nd month, the organization/expert should prepare and submit first draft report include the following:

i) Detailed market survey report as mentioned in 5.5 including details of sample drawn from market.
ii) Detailed industry visit report includes all the details mentioned in 5.6 including details of sample drawn from industry;

3) Stage – III

At the end of 5th month, the organization/expert should prepare and submit final draft report include the following:

i) Detailed project report covering all the aspects covered in the Scope of Work.
ii) Market survey data-base, test reports, reports of discussions held with various stakeholder groups, feedback of questionnaire/interviews, to be appended to the Project Report.
iii) And all other details study carried out during the R&D project.

8. SUPPORT FROM BIS

BIS provide support in terms of relevant Indian/International standards, details of BIS standard mark licensees, details of BIS labs and BIS's recognized laboratories, if any.

9. NODAL PERSON

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