TERMS OF REFERENCE FOR THE R&D PROJECT

1. Title : Study on the Design, Manufacture, Testing, and Performance Requirements of Copper Alloy Gate, Globe, and Check Valves for Waterworks Purposes

2. BACKGROUND

2.1. Copper alloy gate, globe, and check valves play a crucial role in waterworks systems, ensuring efficient and reliable fluid control in various municipal and industrial applications. The use of copper alloys is particularly advantageous in waterworks environments where the valves are exposed to diverse water compositions and environmental conditions. The gate valves provide precise control of water flow, enabling on/off functionality with minimal friction loss. Globe valves are employed for throttling and regulating flow, making them suitable for applications where precise flow control is essential. Check valves, designed to prevent backflow, contribute to system integrity by allowing water to flow in one direction only. The use of copper alloys ensures longevity and dependable performance, making these valves integral components in water distribution and treatment systems, ultimately contributing to the reliability and efficiency of waterworks infrastructure.

2.2. BIS has formulated IS 778: 1984 'Specification for Copper Alloy Gate, Globe, and Check Valves for Waterworks Purposes' which prescribes the requirements for design, manufacture, dimension, and testing of copper alloy gate, globe, and check valves for waterworks purposes. This project aims to upgrade the specification of copper alloy gate, globe, and check valves for waterworks purposes based on the latest manufacturing practices and technological advancements.

3. OBJECTIVE

The objective of this research project is to collect data, information, and evidence from primary and secondary sources on design, manufacture, and performance requirements of copper alloy gate, globe, and check valves for waterworks purposes.

4. SCOPE

The scope of this multifaceted project aims for a comprehensive understanding through the following key components:

4.1. Literature Review:

- Undertake an extensive review of existing literature related to copper alloy gate, globe, and check valves for waterworks purposes.
- Include a review of relevant Indian, other national and international standards.
- Analyse research papers, studies conducted by industry or organizations, and any other relevant literature.

4.2. Import/Export Analysis:

- Scrutinize the import/export dynamics of copper alloy gate, globe, and check valves for waterworks purposes.
- Investigate the technical regulations governing the product in countries with significant export/import activity.

4.3. Manufacturing Base:

- Study and compile data on the manufacturing practices of copper alloy gate, globe, and check valves in India, covering production processes, facilities, and distribution networks.
- Gather insights into production capacities, technological capabilities, regulatory compliance, and market dynamics within the Indian context.

4.4. Feedback:

- Develop a structured questionnaire to obtain feedback from major importers, exporters, manufacturers, users, and laboratories.
- Conduct interviews to collect first-hand information on practical aspects, challenges, and suggestions for improvement.

4.5. Visits to Manufacturers:

- Undertake visits to manufacturing facilities in India to gain in-depth knowledge of the production processes involved.
- Identify and document the diverse manufacturing processes employed for copper alloy gate, globe, and check valves.

4.6. Sample Collection and Testing:

- Collect samples representative of copper alloy gate, globe, and check valves for laboratory analysis.
- Testing of the samples in BIS approved or NABL accredited labs to determine design, manufacture, and performance requirements.

4.7. Data Analysis:

- Undertake a comprehensive analysis of all collected data, incorporating findings from the literature review, manufacturing visits, sample testing, and feedback.
- Identify patterns, trends, and critical insights relevant to the design, manufacture, and performance of copper alloy gate, globe, and check valves.

5. METHODOLOGY

In respect of the areas covered under the scope, the methodology encompasses the following:

5.1. Review the literature as specified under the Scope.

5.2. Preparation of the questionnaire and share the same with major importers, exporters,

manufacturers, users, and laboratories to get feedback.

5.3. Visit the manufacturers of copper alloy gate, globe, and check valves to collect relevant data. During the visit to manufacturers, data shall be collected for the following:

- Raw materials used in the manufacturing.
- In house quality control requirements of the raw materials.
- Varieties of copper alloy gate, globe, and check valves manufactured.
- Current Standards/Specifications being used in the manufacturing.
- Manufacturing methodologies.
- In process quality control measures.
- Packaging, marking, and labelling practices.
- Data on testing for quality control of final product.
- Sustainability efforts being used by the manufacturer with respect to Reduce, Reuse, and Recycle (3Rs).
- Draw samples as per the sampling plan given in **6** and get them tested in BIS approved or NABL approved laboratories for the relevant data.

5.4. Visit the two Govt or NABL approved laboratories to witness the testing of the product. During the visit data shall be collected for materials, equipment, and methodologies used in the testing. Collect insights into technological advancements and best practices in valve testing.

5.5. Analyse the data as specified in the Scope and identify patterns, trends, and critical insights relevant to the design, manufacture, and performance of these valves. The data analysis shall encompass the following:

- Standard nominal sizes of the copper alloy gate, globe, and check valves.
- Copper alloys which can be used for the desired performance.
- Types of these valves and their detailed manufacturing details.
- Test methods for construction, performance, and durability requirements.

6. SAMPLING PLAN

- One manufacturer each from large/medium, small and micro scale manufacturing copper alloy gate, globe, and check valves shall be visited.
- Two samples shall be collected for each variety of the valve.
- The samples shall be tested in BIS approved or NABL approved laboratories for design, construction and performance requirements.

7. DELIVERABLES

Considering the scope and objectives, the following are the deliverables:

- Project report covering all the aspects of the Scope.
- Questionnaire, feedback, and test reports shall be appended to the project report.

8. TIMELINE AND DELIVERY MILESTONES

The timeline of the project shall start from the date of issue of sanction letter by BIS. The details are as follows:

Stage	Timeline
Report on the literature review, manufacturing base, import/export dynamics, questionnaire, and feedback.	1 month
Visit to manufacturers and laboratories and sample collection and their testing.	2 months
Final report and suggestions.	1 months
NOTE — In case of delay in submission of final report, the justification shall be given by the awardee for consideration by the Sectional Committee.	

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 PERSON

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