

TERMS OF REFERENCE FOR R&D PROJECT

Title: Study on the classification, recommended practices, requirements and test methods for chromate conversion coatings on aluminium and aluminium alloys.

1. Background:

- 1.1. Over time, technological advancements have introduced new materials, processes, and methodologies for coatings. Updating the standards ensures that the industry is leveraging the latest technology to improve the quality and performance of chromate conversion coatings.
- 1.2. Indian Standards 'IS 11232:1985 Specification for chromate conversion coatings on aluminium and IS 11579:1986 Recommended practice for chromate treatments of aluminium' are available for chromate conversion coatings on aluminium. These standards are very old and besides the recommended practices and test methods defined in the standard, there are other methods which are more fast, accurate and reliable and are widely used by the industry.
- 1.3. A need was thus felt that a research project may be taken up for upgrading these standards by revisiting the classification of coating, recommended practices, inclusion of more quality parameters and their test methods for chromate conversion coatings on aluminium based on the market data. A new market research is required to be carried out to identify the standard practices, classification of coatings, quality parameters and method of tests to upgrade the aforesaid Indian Standards. Indian standards can be accessed by link <https://standardsbis.bsbedge.com/>.

2. **Objective:** To collect relevant data and information from primary and secondary sources on the classification, recommended practices, requirements and test methods for chromate conversion coatings on aluminium.

3. **Scope:** Following is the scope of this R&D

- 3.1. Study the available literature like national and international standard such as ASTM, JIS, EN, ISO etc available on the subject, research papers, any study conducted by other organisations, companies' brochure. Identify the standard practices, classification of coatings, quality parameters and method of tests which can be included in the standard.
- 3.2. Collect data of relevant chromate coating units, users and testing facilities for chromate conversion coatings on aluminium.
- 3.3. Visit the chromate conversion coating units and get information on the following:
 - 3.3.1 Base metal (different grades of aluminium that can be chromate coated), its composition and intended applications.
 - 3.3.2 Sequence of operations of chromate coating and details of operations. (like requirements of bath such as composition, pH, temperature, quantities of dissolved solids and other chemicals used, duration of different operations, etc.)
 - 3.3.3 Method of application of chromate coating with its advantages and limitations (like dipping, spraying, brushing, roll coating for coils etc.)
 - 3.3.4 Study the method and requirements of chrome less coatings
 - 3.3.5 Classification and designation of chromate coating
 - 3.3.6 Pre and post treatments
 - 3.3.7 In process quality parameters and quality tests
 - 3.3.8 Grade (or category) of the chrome used for coating (grades and application for which it is going to be used)

- 3.3.9 Test facilities and test methods used to check the quality of coating
 - 3.3.10 Tests being undertaken
 - 3.3.11 Packaging requirement
 - 3.3.12 Marking requirement
 - 3.3.13 Sampling plans
- 3.4 Visit the users of the product, take data of the quantity being used by them, specification used, check for the test certificates received by them and study the coating properties mentioned in the Test certificates. Also understand from the user the main properties required by them in the product.
- 3.5 Visit the laboratory and collect the following information:
- 3.5.1 Quality parameters and their safe limits
 - 3.5.2 Types of tests to check the quality of coating.
 - 3.5.3 Test specimen for each test (size, shape, finish, conditioning, etc.)
 - 3.5.4 Tests to determine weight of coating
 - 3.5.5 Tests to determine resistance to corrosion
 - 3.5.6 Tests to determine composition of chromate coatings
 - 3.5.7 Any other test undertaken on chromate coatings
- 3.6 Identify exporters/importer/users of the product. Take data of the foreign specification as per which the chromate coated product is being imported or exported. From the users of the product, take data of the tests conducted and test method by them on the products for chromate coating and test certificate received.
- 3.7 Review of Existing Methods: Analyse current methodologies employed in industries
- 3.8 Comparative Analysis: Evaluate the strengths, limitations, and applicability of different methods
- 3.9 Analysis and consolidation of data and preparation of a comprehensive analytical report of the data collected above.
4. **Methodology:**
- 4.1. Literature Review: Gather information on existing methods, their principles, advantages, and limitations from scientific papers, industry standards, and publications.
 - 4.2. Visit the chromate conversion coating units and
 - 4.2.1 Observe the coating process,
 - 4.2.2 Examine in-process control measures,
 - 4.2.3 conduct focussed group discussion with quality personnel,
 - 4.2.4 collect the data as mentioned in the scope through a questionnaire.
 - 4.2.5 Test the samples drawn in in-house labs/ BIS recognized labs/NABL accredited laboratory/Any Govt. laboratories.
 - 4.3 Sample Preparation: Obtain samples covering all the types of chromate coating for testing purposes.
 - 4.4 Perform measurements using different methods on the prepared samples in NABL accredited labs, for the tests mentioned in the relevant standard/any other test as derived from literature survey.
 - 4.5 Visit laboratories and make report on
 - 4.5.1 test equipment required
 - 4.5.2 test method(s) being used
 - 4.5.3 test parameters to be reported
 - 4.5.4 testing charges
 - 4.5.5 testing time required

- 4.6 Visit the importer/ exporter/user industry and obtain information as mentioned in scope through a questionnaire.
- 4.7 Data Analysis: Analyse the results obtained from each method, comparing accuracy, precision, and reliability.

5. Sampling plan:

- 5.1. Two chromate coating units from each large/medium and small/micro scale shall be visited
- 5.2. Three samples for each grade shall be tested.
- 5.3. Samples may be drawn from coating unit, user, trader or market.
- 5.4. Two users of the product shall be visited.
- 5.5. Two laboratories, preferably one in government sector and one in private sector shall be visited.

6. Deliverables:

- 6.1 Final project report, in hard copy format as well as in soft copy, covering all aspects mentioned in the scope.
- 6.2 Questionnaire, discussion, visit reports, test reports to be appended with the final project report

7. Timeline: The duration of the project is 4 months from the date of award of the project. The proposed indicative timeline stage-wise is given below:

SI No	Stage	Time from date of award of project (cumulative)
1	Literature review and identification of chromate coating units, testing laboratories, user/user industry, and discussion with BIS for the finalization of sampling plan	1 month
2	Visit to chromate coating units, testing laboratories, users and importers and exporters and data collection	3 month
3	Preparation and submission of first draft report to BIS	3.5 month
4	Submission of final project report	4 month

Note: The proposer may submit the draft report to BIS without waiting for test report from independent laboratories if the test is of long duration test .

8. Support BIS will Provide:

- 8.1 BIS will provide access to latest available editions of Indian standards and/ or international standards relevant to the project, on request.

9.Relevant sectional committee and Nodal officer from BIS

- 9.1 **Sectional committee:** MTD 24 (Corrosion Protection and Finishes Sectional Committee)
- 9.2 **Nodal officer:** Mr Dushyant Hawelkar, Scientist B/ Assistant Director – Member Secretary MTD 24,
- 9.3 **Email:** mtd24@bis.gov.in

