

Approaches to ISO Certification— Paint Manufacturing Industry

Jyoti Lata Pandey¹, T.B. Rao², Sandeep Singh² and M.K. Banerjee³

¹Scientist, Corrosion Protection Division
National Metallurgical Laboratory, Jamshedpur-831 007, India

²M. Tech. Students, Deptt. of Chemistry
Regional Institute of Technology, Jamshedpur 831 014, India

³Assistant Professor, Deptt. of Chemistry
Regional Institute of Technology, Jamshedpur 831 014, India

ABSTRACT

A bird's eye view of global industrial development shows a very large landscape, with scientific and logical harmony lending every facets. There has been lots of changes in world wide quality approach. ISO—9000 series has proved to be the record setting standard for world wide adoption and sell (ISO—9000 remains record setter in Genius book of world records). This series of standards are developed as a gist to the standards like BS5750 and many others which were once called the most suitable and less time killing standards on quality system — with few loop holes. ISO — 9000 series of standards are most suitable for batch production and the repeatability of the same tests get eliminated. In the present text it is attempted to express the 'First step preparation' for an industry who comes up to refresh it's unit with new energy of disciplined decorum. Here we have cited an example of paint manufacturing industry. It will be attempted to impress that in an already running industry, if one wants to take up ISO certification, it is required that a mental frame-up will be all necessary in the beginning to go ahead. The testing time and fatigue to the inspectors can be reduced drastically by adopting the proposals furnished in the text.

INTRODUCTION

1.1 SIGNIFICANCE

A bird's eye view of global industrial development shows a very large landscape, with scientific and logical harmony lending every facets. This huge continuum of technological pursuits can be easily guessed to obey the basic scientific tenets of regularity and discipline. As with any scientific achievement, industrial and technological growth must follow the dictum of regularity and principles of discipline. Any lack of rhythm will create disharmony in the system, which would surely give a back pressure and endanger the creative rhythms, besides eddying off a lot of industrial expenses. If we look at the industrial history of growth and it's kinetics of any particular developed country, it will be evident that maintenance of

discipline and regularity, or in other words strict adherence to standardization methodologies, are the primary criteria or governing principles, which bore fruit.

Realising in principle the importance of above discipline curriculum, today even the developing countries are rushing towards ISO recognition. In India, even after so much of popular discussions, seminars, conferences etc., there are only a limited number of industries who could achieve ISO markings. This is not to indicate that the level of their status is poor, rather, to hint that still the recognition of importance of such standardization is not in full view. Many industrial organizations still feel ISO recognition is redundant or it requires an unnecessary investments. It appears that the output of scientific seminars is not upto its rated maximum; probably this has something to do with the contents of deliberations. If we adhere to too much of literary jugglery probably it does not give the proper impetus to the attending industrial personnel.

In the present text it is attempted to express the 'First step preparation' for an industry who comes up to refresh it's unit with new energy of disciplined decorum. It will be attempted to impress that in an already running industry, if one wants to take up ISO certification, it is required that a mental frame-up will be all necessary in the beginning to go ahead.

As a case, a discussion will be made of different steps for preliminary preparations needed for a paint manufacturing industry. The paint manufacturer buys the required raw material from certified manufacturers (of raw materials). It is intended to state that the raw materials are of quality origin and each batch of raw materials are quality tested at the manufacturers premises which is as per recognition/acceptance of the buyer, i.e., the paint manufacturer.

In the next chapter, steps of preparations as required for ISO certification will be discussed.

1.2 THE UNIT

There has been lots of changes in world wide quality approach. ISO—9000 series has proved to be the record setting standard for world wide adoption and sell (ISO—9000 remains record setter in Genius book of world records). This series of standards are developed as a zist to the standards like BS5750 and many others which were once called the most suitable and less time killing standards on quality

system — with few loop holes. ISO — 9000 series of standards are most suitable for batch production and the repeatability of the same tests get eliminated.

Approaches to ISO Certification—

Production of paints, as involves many complex methods, remains complex in term of quality aspects. As, the result of a paint synthesis becomes evident only after prolonged use, no 'go' — 'no go' sort of devise can be designed for testing the paints quality aspects. Its is a SPECIAL PROCESS.

This document developed and presented here with is a simple plan : how to utilize the ISO — 9002 in production of paints and allied materials. It covers the overall quality aspect of a paint company but not any company in particular. We have a paint manufacturing company which wants ISO — 9002 certification. Looking after company it may be observed :

- Customer is fixed,
- There are boiler reactors, conveyors, etc., inside the company,
- Fumes and other pollution
- The safety requirements.

A flow chart of the plant (unit) is given in the Fig. 1.

INTRODUCTION

In the next chapter, steps of preparations as required for ISO certification will be discussed. A bird's eye view of global industrial development shows a very large landscape with scientific and logical harmony leading every facets. This huge continuum of technological pursuits can be viewed as a series of changes in world wide quality systems. ISO-9000 series has been proved to be the record setting standard for worldwide organizations. ISO-9000 remains record series in Guinness book of world records. The series of a the guidelines developed as a series of standards like BS2750 and many others which were called the main scientific and testing standards on quality kinetics of any particular developed country, it will be evident that maintenance of

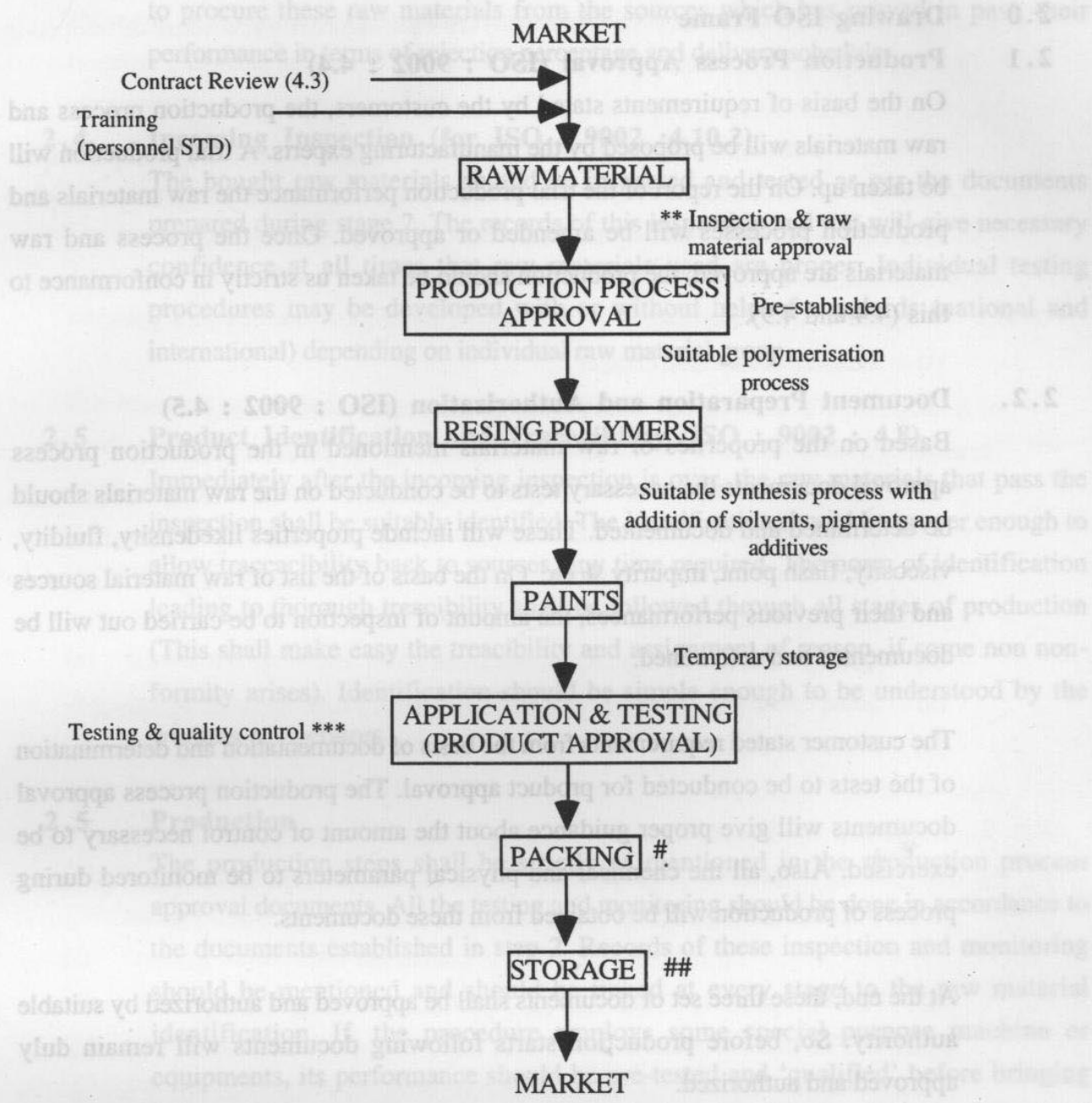


Fig. 1 : A SCHEMATIC FLOW CHART

* Raw Materials include

1. Resin monomers
2. Solvents
3. Pigments
4. Additives
5. Catalysts (if any)

** Raw Materials Quality requirements should be prestablished at the time of production process approval. On the basis of this, incoming inspection will be conducted so as to testing whether the stated requirements are met or not.

*** These tests will be conducted as per the requirements stated by the customers.

As per standards

As per standards

2.0 Drawing ISO Frame

2.1 Production Process Approval (ISO : 9002 : 4.4)

On the basis of requirements stated by the customers, the production process and raw materials will be proposed by the manufacturing experts. A trial production will be taken up. On the report of the trial production performance the raw materials and production processes will be amended or approved. Once the process and raw materials are approved, the production should be taken up strictly in conformance to this (4.4 and 4.9).

2.2. Document Preparation and Authorization (ISO : 9002 : 4.5)

Based on the properties of raw materials mentioned in the production process approval documents the necessary tests to be conducted on the raw materials should be determined and documented. These will include properties like density, fluidity, viscosity, flash point, impurity % etc. On the basis of the list of raw material sources and their previous performances, the amount of inspection to be carried out will be documented and determined.

The customer stated requirements from the basis of documentation and determination of the tests to be conducted for product approval. The production process approval documents will give proper guidance about the amount of control necessary to be exercised. Also, all the chemical and physical parameters to be monitored during process of production will be obtained from these documents.

At the end, these three set of documents shall be approved and authorized by suitable authority. So, before production starts following documents will remain duly approved and authorized.

1. Incoming inspection procedures.
2. In process inspections and monitoring procedures.
3. Final inspection procedures.

Amount of in process inspection and monitoring will solely depend on the experience and qualification and training of the operators (4.18).

2.3 Raw Materials (ISO : 9002 : 4.6)

The production process approval documents will clearly mention the raw materials and the characteristics of them. It becomes the moral responsibility of the purchaser

to procure these raw materials from the sources which has proved in past, their performance in terms of rejection percentage and delivery schedule.

2.4 Incoming Inspection (for ISO : 9002 :4.10.2)

The bought raw materials should be inspected and tested as per the documents prepared during stage 2. The records of this inspection and test will give necessary confidence at all times that raw materials used are proper. Individual testing procedures may be developed with or without help of standards (national and international) depending on individual raw material group.

2.5 Product Identification and Traceability (ISO : 9002 : 4.8)

Immediately after the incoming inspection is over, the raw materials that pass the inspection shall be suitably identified. The identification should be proper enough to allow traccacibility back to sources, any time required. The norm of identification leading to thorough treacibility shall be followed through all stages of production (This shall make easy the treacibility and assignment of reason, if some non non-formity arises). Identification should be simple enough to be understood by the workers or operators.

2.5 Production

The production steps shall be strictly as mentioned in the production process approval documents. All the testing and monitoring should be done in accordance to the documents established in step 2. Records of these inspection and monitoring should be mentioned and should be tinked at every stage to the raw material identification. If, the procedure employs some special purpose machine or equipments, its performance should be pre-tested and 'qualified' before bringing into use (4.9).

2.6 Application and Testing (Product Approval)

After the paint has been manufactured, it must be tested against the requirements as stated by the customer. As a developing practice in industries, it remains good to check all the incoming inspection records, in process monitoring records as well as all the calibration records of the raw materials and test equipments (4.11) used during production process. Due authentication of all these records in a must. The final inspection shall be done in the condition of application in which the said point is required to perform; as far as practicable inside the testing laboratory. The steps of

final inspection shall be in accordance to the final inspection procedure developed in step 2.

Here, it is worth mentioning that the paint batches which are accepted after inspection shall be identified. In the event, source batches are rejected they also shall be properly identified till they are taken out of the production premises.

2.6.1 Objective and Testing

- (i) Process/Production control
- (ii) Quality control (closed inspection of each batch within limits)
- (iii) Quality assurance/determination of suitability for particular use.
- (iv) R and D activity (Minor changes in ingredients — their effect). For products having large range of possible use, the testing operation may be classified.
 - (i) Quality assurance (Product approval — with extensive range of tests over prolonged period).
 - (ii) Quality control
 - (a) Some quick tests to assure that critical materials have been incorporated.
 - (b) Batch—wise testing

2.6.2 Selection of Properties for Testing

For testing purpose these properties must be selected which bears major importance to the ultimate life expectancy of the paints, such as

- (a) *Paint Properties* : (i) Storage, (ii) Application, and (iii) Curing,

Note : - The paint properties are of first importance, because unless a satisfactory continuous film is produced, the performance properties will be standard. Some film defects may be visually obvious in the film appearance, while others may not.

- (b) *Film Properties* : (i) Film appearance, (ii) Film performance short, and (iii) Film performance long-term.

Note : - A considerable amount of film testing is carried out on films less than 7 days old; the assumption is made that the films will not change essentially in properties untill the end of their useful lives. Unfortunately, it is rarely the case : films that dry by oxidation, in particular, continue to harden and shrink over several years with the result that they became more brittle and less extensible.

2.6.3 Selection of Tests

Purpose : – A test may be selected because of its similarity with the actual use, because the tests are very sensitive and reproducible, because they provide a permanent record, or because they are cheap or rapid. Considerable experiences required to determine the most suitable tests for a particular purpose.

For quality — control purposes rapid simple tests are normally selected to provide a permanent record. Such tests cause the minimum interference with production while allowing easy control within close limits.

For research work or quality assurance, tests of high precision are required to produce a numerical record which allows statistical analysis and possibly an external audit.

2.6.4 Selection of Equipment

Important in the selection of suitable equipment for testing are

- (a) serviceability — ease of cleaning and servicing
- (b) range of operation
- (c) postability
- (d) necessity for controlled conditions (temperature, humidity, freedom from vibration or voltage fluctuations)
- (e) speed of operation and operate time required (calibration, preparation of samples, reading, cleaning).
- (f) training required for operator.
- (g) low repeatability error
- (h) capital cost
- (i) standardization with other laboratories

Note: for quality control purpose in one production unit, although some times calibration may seem irrelevant, yet serious problems may result creating all previous data useless. As part of calibration exercise an equipment register should record the supplier : data of purchase, service contracts, each service and calibration, with the corrosion factors.

2.6.5 Precision of Equipment

It is common to assume greater accuracy of a result than is statistically valid. It is important to know what differences are significant as to know the actual test results.

For some standards e.g., ASTM standard precision data and reproducibility R values have been determined by means of inter laboratory tests on the same sample.

Checks should be carried out on equipment and operator to ensure that they fail within the precision expected of the test methods. This is particularly relevant in the case of visual colour comparison, where the ability of individuals to differentiate between colours.

2.6.6 Sampling

Correct sampling is vital to any testing programme. Results are valueless unless the samples tested are representative of all the materials supplied. Most quality — control testing in the paint industry is based on the assumption that one sample is all that is required to define the characteristics of the whole batch. For this reason, adequate mixing before sampling and filling, and checks to ensure that containers filled at the start and towards the end of the filling operation are closely similar are essential.

If it is shown that a sample is not representative of the batch or that a batch is non—uniform, the quality—control system is invalid and all the testing carried out is suspect.

2.6.7 Condition of Testing

For quality control process, the testing conditions will usually be controlled as much as possible to increase the precision of results.

When testing is carried out for quality assurance or development programmes, the condition may be controlled to the most adverse under which the product is recommended for use.

The affect of variation in the environment on the results should be analysed statistically, particularly if the conditions cannot be controlled for testing. The condition of testing should be recorded so that the significance of the results can be audited or a correction factor applied.

2.6.8 Panel Preparation

Panel preparation is important for reproducible testing, because a number of tests can be affected by surface contamination and difference in adhesion. The adsorbed

layers of contaminants on the surface of steel affect the corrosion resistance of coatings to a greater extent. Adsorbent surfaces that have been metted and allowed to dry may contain higher than normal levels of extractable materials. These surface layers must be removed to produce a true reproducible substrate.

2.6.9 Standardization of Testing and the Reporting of Results

In order that a comparison can be made of results, either the detailed conditions and test methods must be recorded in each case or a standardize method is used.

The standardize method is one in which the procedure is detailed and the condition of testing defined. Such methods should be adequately documented and given a reference number or distinctive name, so that only this reference need to quoted with the test result. The use of standardized methods enables direct comparison of results and quick recognition of differences in properties generally with ISO Standards, to be made.

2.6.10 Packaging and Storage (ISO : 9002 : 4.15)

Paints, owing to the presence of organic solvents and other chemically active ingredients deserve to be handled properly (due to properties like high vapour pressure and inflammability). Depending on the country or locality where these paints are being manufactured, the package should abide by statutory regulations governing the area. (for food industries packs are allowed in Switzerland).

If possible, the package shall contain most of the necessary intermission like 'shelf life time', batch no, handling instruction, etc. The paints, duly packed shall be stored in a conditions, which does not distro any one of the property established during final inspection stage.

Conclusion

The testing time and fatigue to the inspectors can be reduced drastically by adopting the proposals furnished above. The plan includes :

1. Production Process Planning.
2. Production Process Approval.
3. Development of Inspection Documents Based on Production Process Approval Documents.
4. Correct Raw Material Source Identification and Procurement.
5. Incoming Inspection.

6. In process Inspection and Monitoring.
7. Final Inspection.
8. Packaging and Storage as per Pre-established Documents.

References

1. BS—5750(I).
2. IS/ISO 9001 (1194).
3. ISO 8490 (Quality Vocabulary).
4. Journals published by TQMI.
5. Introduction to paint technology by W.G. Morogan, Vol. 1.