

NIOEC-SP-80-02(3)							
DOCUMENT CODE							NO. OF PAGES: 35
PLAN/PRJ/SUB	UNIT	PHASE	DISCIPLINE	DOCUMENT TYPE	SERIAL NO.	REV. NO.	DATE
NIOEC	000	EG	TP	SP	8002	A3	March, 2015



NATIONAL IRANIAN OIL REFINING & DISTRIBUTION COMPANY
NATIONAL IRANIAN OIL ENGINEERING
& CONSTRUCTION COMPANY

NIOEC SP

NIOEC SPECIFICATION
FOR
PAINTING

SECOND EDITION

MARCH, 2015

THIS SPECIFICATION IS THE PROPERTY OF NATIONAL IRANIAN OIL ENGINEERING & CONSTRUCTION COMPANY. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED TO THE OWNER. NEITHER WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF THE NATIONAL IRANIAN OIL ENGINEERING & CONSTRUCTION COMPANY.

IN THE NAME OF GOD

FOREWORD

By their very nature, technical specifications are continuously subject to modifications and revisions. To strengthen their merit and usefulness, continuous improvements, addendum, deletion of disparate information and consequently provision of updated revisions are to be made in order to ascertain that such Specifications meet the current requirements, inclusive of Iranian Petroleum Standards (IPS) and the recognized and acceptable national and international Standards, as well as the optimal codes and practices based on the accumulated in-house know how and plant knowledge and experiences.

However, in reality, due to several reasons, not to mention the complexity of the matter, the ultimate goal of continuous direct embedment of the required changes on the relevant Specifications may be far reaching. Therefore, in the interim periods between the officially issued revisions, the required changes will appear in other documents related to the engineering and design work of the on going projects.

In response to the initiative of the Design Division and Directorate, and considering that the task of the execution of several important and mega projects for the realization of the new oil refineries, pipelines and oil terminals as well as improvements of the existing facilities, has been assigned to NIOEC, it was decided to update the NIOEC Specifications and to issue new official revisions.

The Design and Engineering Directorate was itself entrusted to carry out this important task, and as such by forming several special technical committees, working in close co-operation and cohesion and sharing their expertise and knowledge, the updated and revised NIOEC Specifications were successfully prepared and compiled.

These Specifications are intended to be used for Oil Refineries, Distribution Depots, Oil Terminals, Pipelines and Pump Stations within NIOEC projects, and have been proven to be of high value for such purposes. It must however be appreciated that these Specifications represent the minimum requirements and should in no way be interpreted as a restriction on the use of better procedures, engineering and design practices or materials.

We encourage and highly appreciate the users and other clear sighted and experts to send their comments on the Specifications to the Design and Engineering Director of NIOEC for evaluation and approval.

REVISION INDEX

REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5	REV. PAGE	1	2	3	4	5
1			x			26			x			51			x			76			x		
2			x			27			x			52			x			77			x		
3			x			28			x			53			x			78			x		
4			x			29			x			54			x			79			x		
5			x			30			x			55			x			80			x		
6			x			31			x			56			x			81			x		
7			x			32			x			57			x			82			x		
8			x			33			x			58			x			83			x		
9			x			34			x			59			x			84			x		
10			x			35			x			60			x			85			x		
11			x			36			x			61			x			86			x		
12			x			37			x			62			x			87			x		
13			x			38			x			63			x			88			x		
14			x			39			x			64			x			89			x		
15			x			40			x			65			x			90			x		
16			x			41			x			66			x			91			x		
17			x			42			x			67			x			92			x		
18			x			43			x			68			x			93			x		
19			x			44			x			69			x			94			x		
20			x			45			x			70			x			95			x		
21			x			46			x			71			x			96			x		
22			x			47			x			72			x			97			x		
23			x			48			x			73			x			98			x		
24			x			49			x			74			x			99			x		
25			x			50			x			75			x			100			x		

NOTES:

- 1) THIS SHEET IS A RECORD OF ALL REVISIONS TO THIS SPECIFICATION.
- 2) WHEN APPROVED EACH REVISION SHALL BE CONSIDERED AS A PART OF THE ORIGINAL DOCUMENT.
- 3) NUMBER OF PAGES EXCLUDES THIS SHEET AND THE COVER SHEET.

5					
4					
3	MARCH, 2015	J.KHOSRAVI	J.KHOSRAVI	M.KAREGAR NAJAFI	A.ARMAN MOGHADAM
2	JULY, 2009	R. AMIRHASANI	S.PAKDEL	M.R.FARZAM	M.A.A.SAJEDI
1	-	R. AMIRHASANI	S.PAKDEL	M.R.FARZAM	M.A.A.SAJEDI
0	JULY, 2005	M.TAVARI	S.PAKDEL	M.R.FARZAM	M.A.A.SAJEDI
REV.	DATE	PREPARED	CHECKED	APPROVED	AUTHORIZED



CONTENTS:	PAGE NO.
1. SCOPE.....	2
2. REFERENCES	2
3. UNITS.....	3
4. GENERAL REQUIREMENTS	3
5. SURFACE REPARATION	6
5.1. Pre-blasting Preparation.....	6
5.2. Blast Cleaning	6
6. PAINT MATERIALS	8
7. PAINTING SCHEDULES AND PAINT SYSTEM	8
8. PREPARATION OF PAINT BEFORE USE	8
8.1. Storage and Appearance	8
8.2. Preparation of Paint for Application	9
9. APPLICATION OF PAINT	10
9.1. General	10
9.2. Priming of Ferrous Metals.....	10
9.3. Shop Painting of Steel.....	11
9.4. Field and Touch-Up Painting of Steel.....	11
9.5. Painting of Specific Surfaces	12
10. QUALITY CONTROL AND TESTING.....	13
APPENDIX A: PAINT SYSTEM	18
APPENDIX B: PAINT COLOR SCHEDULE	24

1. SCOPE

This NIOEC Specification covers the minimum requirements of all painting activities include surface preparation, paint system, application procedure and inspection tests for the internal and external surfaces of buildings, steel structures, tanks, equipment and other associated facilities. This specification is not suitable for use in below ground (buried), offshore areas and painting used for the other purposes than corrosion protection.

Deviations from this specification will only be permitted on obtaining written approval from NIOEC.

Resolution on cases not explicitly stipulated in this Specification, or on cases where conflicts may arise among the requirements of the referenced/relevant IPS and the international standards, shall be made through written consent and approval of NIOEC.

2. REFERENCES

The following standards, codes and specifications, to the extent specified hereinafter, shall constitute a part of this Client Specification. Latest edition of the undated referenced documents and the cited edition of the dated references shall apply. The applicability of changes made to the dated references, after the cited date shall be mutually agreed upon between Client and the Vendor/Contractor.

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

ASTM D-3359	"Standard Test Methods for Measuring Adhesion by Tape Test"
ASTM A123	"Standard Specification for zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products"
ASTM D4414	"Standard Practice for Measurement of Wet Film Thickness by Notch Gauges"
ASTM D4541	"Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers"
ASTM D4752	"Standard Test Method for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub"
ASTM D5402	"Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs"

BSI (BRITISH STANDARDS INSTITUTION)

BS 381C (1996)	"Colors for Identification, Coding and Special Purposes"
BS 410-2(2000)	"Test sieves- technical requirement and testing"
BS 6150(2006)	"Code of Practice for Painting of Buildings"
BS 7079	"Preparation of steel substrates before application of paints and related products"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-TP-100	"Engineering Standard for Paints"
IPS-E-TP-101	"Construction Standard for Surface Preparation"
IPS-E-TP-102	"Construction Standard for Painting"
IPS-M-TP-168	"Material and Equipment standard for Acrylic Silicone Finish Paint for Temperature Applications Up to 230°C"

IPS-M-TP-190	"Material and Equipment Standard for Coal Tar Epoxy Polyamide Paint as Primer, Intermediate and Top Coat"
IPS-M-TP-205	"Material and Equipment standard for Zinc Rich Epoxy Paint (Organic) as Primer, Intermediate and Top Coat"
IPS-M-TP-210	"Material and Equipment standard for Zinc Silicate (inorganic) Paints as Primer, Intermediate and Top Coat"
IPS-M-TP-215	"Material and Equipment standard for Epoxy Polyamide Primer"
IPS-M-TP-220	"Material and Equipment standard for Epoxy Polyamide Intermediate Paint"
IPS-M-TP-225	"Material and Equipment standard for Epoxy Polyamide Paint as Top Coat"
IPS-M-TP-235	"Material and Equipment standard for Two Pack Aliphatic Polyurethane Paint as Top Coat"

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

ISO 12944	"Paints and Varnishes-Corrosion Protection of Steel Structures by Protective Paint System"
ISO 8501-1	"Rust Levels of Steel Structure and Quality Levels for Preparation of Steel Surfaces for Rust Protecting Surfaces"
ISO 11124	"Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives"
ISO 8503	"Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates"

NIOEC SP (NIOEC SPECIFICATION)

NIOEC-SP-00-10	"NIOEC Specification for units"
----------------	---------------------------------

SSPC (STEEL STRUCTURE PAINTING COUNCIL)

SSPC-Vol. 1	"Good Painting Practice"
SSPE-Vol. 2	"Systems and Specification"

3. UNITS

International system of units (SI) shall be used in accordance with NIOEC-SP-00-10, unless otherwise specified.

4. GENERAL REQUIREMENTS

4.1. All surfaces shall receive an appropriate paint system as specified by the Client with reference to Appendix (A) with the following exceptions:

- Any equipment furnished completely painted by the manufacturer unless it is specially required to match a color scheme or to repair damage to the paint film;
- Weathering steel, , monel, brass, copper, aluminum jacketing, unless it is specially required;
- Nameplates, code stampings and push-buttons;

- Surfaces to be fireproofed with cement mortar;
 - Concrete, brickwork, tile, glass and plastics, unless specially required;
 - Machined surfaces;
 - Insulation weatherproofing material or jacketing;
 - Rubber, hoses, belts, flexible braided connectors, stainless steel tubing and fittings, gages, valves, and motor shafts;
 - And any surface particularly indicated as not to be painted.
- 4.2.** Surfaces preparation, initial painting and maintenance painting of buildings internally and externally, e.g. dwellings, offices, light industrial buildings and public buildings generally, shall be performed in accordance with BS 6150.
- 4.3.** Paint systems are generally specified by dry film thickness of coat(s) and total dry film thickness of primer, intermediate and topcoat rather than by the number of coats.
- 4.4.** Unless otherwise stated in Appendix (A) or/and restricted by the paint manufacturer, the total dry film thickness of paint system shall be 100 microns minimum. All paints and paint materials used shall comply with the specification given in relevant Material Specification and they shall be obtained from approved manufacturers only.
- 4.5.** All materials shall be supplied in the manufacturer's original containers, durably and legibly marked according to relevant Material Specification.
- 4.6.** All mechanical activities include Fabrication, welding, PWHT, bolting... shall be completed before surface preparation begins.
- 4.7.** All painting shall be carried out in full conformity with this Specification. Particular attention shall be paid to Manufacturer instructions on storage, mixing, thinning, induction period, pot life, application conditions, application technique and recommended time intervals between coats.
- 4.8.** Neither paint is allowed to be used after its pot life nor shall the new material be added to any of old material left in the pot.
- 4.9.** Unless otherwise defined by Client, Paint shall not be applied under the following conditions:
- When the air temperature and/or substrate temperature is less than 3°C above the dew point (DP) of the surrounding air, and/ or the relative humidity(RH%) is higher than 90%;
 - When the temperature is below 4°C;
 - When the surface temperature is higher than 40°C;
 - When there is the likelihood of an unfavorable change in weather conditions within two hours after coating;
 - When there is a deposition of moisture in the form of rain, condensation, frost, etc., on the surface.
- Each layer of paint shall be allowed to dry for a period of time within the limits prescribed by the paint manufacturer, before the next layer is applied.
- 4.10.** Subsequent layers of a paint system shall have a difference in tint or color.
- 4.11.** Sharp edges of metal, e.g. burrs and nibs, should be removed before painting, in accordance with BS 7079-A3 and strip coat shall be applied to the corners, edges, welds, etc. especially with respect to the specified minimum dry-film thickness.
- 4.12.** During both application and drying, adequate ventilation shall be provided if the work area is enclosed.

- 4.13. All steel constructions or plates shall be provided with priming or coating system to protect the steel surfaces during the transport, storage, construction and joining stages, e.g. welding of the project.
- 4.14. All surface inaccessible after assembly shall be fully painted before assembly.
- 4.15. It shall be the responsibility of the contractor to coordinate work so that shop primed items are primed and painted with compatible coating, as specified according to Appendix A.
- 4.16. Coatings shall be applied by conventional and/ or airless spray in exact accordance with this Specification and/ or the manufacturer's instructions.
- 4.17. Paints include skins, sand or any foreign matters are not allowed to be used.
- 4.18. Two pack paints shall be carefully mixed in strict accordance with this Specification and/ or manufacturer's instructions. The pot life of such paints shall be carefully noted and any mixed paint which has exceeded its pot life must be discarded irrespective of its apparent condition (see 8.2.1.14).
- 4.19. The application shall leave no sags, runs, wrinkles, orange peels, marks or other defects.
- 4.20. Drying and application time between coats shall adhere to the coating manufacturer's recommendations with temperature and humidity conditions taken into account, and shall generally be kept to the minimum in order to prevent contamination between coats. Where contamination occurs between coats, this must be completely removed, generally be washed per manufacturer's recommendation or otherwise with suitable detergent solution and rinsed with clean water. The paint surface shall be dry before over-coated application.
- 4.21. The greatest precaution shall be take in the spraying of inorganic zinc primers to ensure proper cohesion and adhesion permitted care shall be take not to exceed the maximum film thickness .Inorganic zinc-rich paints shall be applied by airless spray. If the zinc powder is packaged separately, mix with the vehicle just before use. They shall be applied at a coverage rate recommended by Appendix A. Prior to top coating, a barrier or tie coat may be required for over coating with certain generic coatings. The manufacturer's recommendations shall be followed. Complete curing of the zinc-rich primer is necessary before top coating. Over spray shall be removed with a stiff bristle brush or wire screen. Popping will be eliminated by scrapping the painted surface with a soft sand paper before over coating.
- 4.22. Any and all holes and surface imperfections shall be cleaned and filled in an approved manner before painting.
- 4.23. Number of coats when specified shall be a minimum number of coats to achieve the specified film thickness. Maximum dry film thick nesses should not exceed those specified by the Client.
- 4.24. All equipment shall be maintained in good working order. Equipment shall be thoroughly cleaned daily. Worn parts shall be replaced. Effective oil and water separators shall be used and serviced regularly.
- 4.25. All points of damage to paintwork incurred at any stage of the work including site welding operations, shall be re-prepared to the original standard and recoating with the specified priming coat and finish coat to restore the film thickness. In all such instances preparation shall extend 25 mm into the sound paintwork and a further 25 mm of sound paintwork shall be lightly blasted to etch the surface. Repainting shall then cover the prepared surface and the etched paintwork.
- 4.26. When painting insulating flanges with paints containing metallic pigments insulating materials will be covered with protective striping to prevent breaking or "electrically shorting" the insulating barrier.
- 4.27. Unless otherwise specified the minimum allowable time before application of intermediate or finish coat shall be three hours.

- 4.28. Maximum allowable time between application of intermediate and finish coat shall be as recommended by the paint manufacturer but shall not be less than eight hours.
- 4.29. Painting of buildings can be carried out using pigmented coating, un-pigmented coating and ancillary materials. The selection of coating systems for building and their suitability for substrates or groups of substrates shall be determined using tables 12 to 18. of BS 6150.
- 4.30. Prior to any surface preparation and painting, dew point (DP) and relative humidity (RH %) shall be measured using whirling/sling hygrometer and DP calculator (or similar). The results obtained shall meet the requirements of the article 4.8. 4.30 Prior to any cleaning, surface preparation and painting, the contractor shall protect and mask equipment and areas in need of protection by suitable materials. Typical items to be masked are fire protection equipment, weld end preparations, atmosphere sensing head, vent on control equipment, spray head, lubrication points and flame traps.
- 4.31. Unless otherwise specified by Client, structures made from stainless steel shall be painted as mentioned below:
- a) When buried
 - b) In contact with other metals
 - c) Marine and near coastal environment
 - d) For identification purposes such as color coding/ scheme

5. SURFACE REPARATION

5.1. Pre-blasting Preparation

- 5.1.1. Prior to any cleaning, surface preparation or painting contractor shall protect and mask equipment and areas in need of protection. Care shall be taken with use of masking material to prevent possible malfunction of the plant. Typical items to be masked are fire protection equipment, weld end preparations, atmospheric sensing head, spray heads, vents and control equipments, flame traps, lubricated point and name plates.
- 5.1.2. Hard surface layers (e.g. resulting from flame cutting) shall be removed by grinding prior to blast cleaning. Sharp edges, fillets, corners, and welds shall be rounded or smoothed by grinding (minimum radius 2 mm)
- 5.1.3. The surfaces shall be free from any foreign matter such as weld flux, residue, rogue picks, oil, grease; salt etc. prior to blast cleaning. Where specified by Client, All surfaces should be washed with clean fresh water and thoroughly dried prior to blast cleaning.
- 5.1.4. Any oil and grease contamination shall be removed in accordance with SSPC/SSPM Volume 2, grade SP1, prior to blast operations.
- 5.1.5. Any major surface defects, particularly surface laminations/ sliver, hackle, Surface pores, cavities and scabs detrimental shall be reported to Client/ engineer for the more assessment by NDT tests. Suitable agreed dressing shall be performed where allowed by Client/engineer. Where such defects have been revealed during blast cleanings, and dressing has been performed, the dressed area shall be re-blasted to the specified standard. All welds shall be inspected and if necessary repaired prior to final blast cleaning of the area.

5.2. Blast Cleaning

- 5.2.1. Blasting operations shall never be allowed in the vicinity of painting work or near to a wet paint surface or anywhere that blast abrasive, grit or fall-out shall impinge on a freshly painted surface, or on any uncovered primed surface.
- 5.2.2. Blast cleaning operations shall not be conducted on surfaces that will be wet after blasting and before coating, when the surfaces temperature are less than 3°C above the dew point,

when the relative humidity of the air is greater than 90%, or when the ambient temperature is below 3°C.

5.2.3. The maximum particle size of the abrasives used in blast cleaning shall not be larger than that passing through a 14-mesh screen B.S 410 Sieve Series. All abrasives shall be free from dust, moisture and salt. Blasting shall be continued till a uniform white metal surface is achieved.

5.2.4. Blast cleaning is permitted only during the day light.

5.2.5. Where rectification has been necessary on blast-cleaned surface, the particular area shall be re-blasted to remove all rust and slag, and to provide adequate paint adhesion.

5.2.6. Blast cleaning shall overlap by a minimum of 25 mm into any adjacent coated areas. Any steel work not primed and/or wetted by rain or moisture shall be re-blasted prior to being painted if rust develops.

5.2.7. Steel may be blast-cleaned either before or after fabrication. Sometimes it may be necessary both before and after.

Where steel is cleaned before fabrication it shall be protected with a suitable blast-primer to avoid rusting before fabrication is completed. During fabrication, the blast-primer will inevitably be destroyed or damaged in places, e.g. by welding. Such areas shall be cleaned and re-primed as soon as possible.

Where steel cleaned after fabrication it may still be necessary to apply a blast-primer, but often the first coat of the full protective system can be applied.

5.2.8. The roughness of prepared surface results from primary roughness already present in the initial state and which is exposed by the mechanical preparation methods, in particular by blasting. The roughness parameters (the peak-to valley height) give some basis for determining the minimum coat thickness necessary for satisfactory embedment and covering of roughness peaks.

Unless otherwise defined by Client, all surfaces of steel works shall have a roughness (profile) within 30 to 75 microns. The profile shall be measured using testex replica tape or needle profile gauge in accordance with ISO 8503.

5.2.9. Surface preparation specified in the schedule (Appendix A) shall be in accordance with the following Standard, ISO8501-1 or BS 7079:

5.2.9.1. Hand Tool Cleaning	ST2
5.2.9.2. Power Tool Cleaning and Power Tool touch up of pre-blasted items	ST3
5.2.9.3. Light Blast Cleaning (Sweep blast)	SA1
5.2.9.4. Commercial Finish	SA2
5.2.9.5. Near White Metal Blast Cleaning	SA2, ½
5.2.9.6. White Metal Blast Cleaning	SA3

5.2.10. Unless otherwise specified by the Client, the level of cleanliness for prepared steel surface shall be Sa3 for zinc silicate and Sa2½ for zinc rich epoxy primers, other primers and organic coatings

5.2.11. A qualified well trained operator shall be employed for the blast-cleaning job. The qualification of operator must be approved by Client.

5.2.12. When sheets of less than 4 mm thickness are blasted, deformation may occur. This shall be avoided by:

a) Low air pressure, small grain sizes and the use of a blasting abrasive of low bulk density;

- b) A low angle of blasting with sharp edged grain and a short duration of blasting. With adhesive scale or fairly thick rusting it may be necessary to carry out preparatory work by some other methods, e.g. manual cleaning or pickling, before cleaning, measures a (and b) will result in less efficient blasting.

- 5.2.13. Residual shot, grit and dust shall be completely removed after blasting, preferably by vacuum cleaning, but otherwise by oil and water free air blast or fiber brush.
- 5.2.14. All blasted steel surfaces shall be primed before visible re-rusting occurs or within 4 hours whichever is sooner.
- 5.2.15. Sand is prohibited due to safety considerations. An alternative abrasive such as copper slag, garnet, shot, grit or similar shall therefore be used. It should be noted that all materials furnished and/or used by the Contractor in connection with his blasting work shall be subject to inspection and approval by the Client in order to assure the use of material of the type and quality meet the requirements of SSPC Vol. 1
- 5.2.16. All surfaces, after completion of the surface preparation and immediately prior to painting, shall be cleaned by air blasting using clean, dry, oil-free air or vacuum cleaner to ensure that all traces of abrasives and corrosion product are removed.

6. PAINT MATERIALS

- 6.1. Only paint system which complies with Appendix (A) shall be used.
- 6.2. The paint materials supplied shall be certified by the manufacturer and contractor shall obtain and retain all certificates and manufacturer's data sheets.
- 6.3. The contractor shall ensure that all materials supplied for painting operations are clearly marked according to IPS Material Specification for paints.

7. PAINTING SCHEDULES AND PAINT SYSTEM

Unless otherwise noted, surface preparation and primer, intermediate and finish painting on Vessels, Exchangers, Equipment and Structural Steel will be done in the shop, and only touch-up will be required in the field.

Shop primer on piping for rust prevention will be done in the shop and primer, intermediate and finish will be required in the field.

All surfaces of tank plate shall receive one coat of Pre-fabrication primer at vendor shop and primer, intermediate and finish will be required in the field.

All surfaces shall receive an appropriate paint system and finish color as specified in Appendix (A) and B with exceptions which are noted in 4.1.

Temperatures listed in Appendix (A) refer to operating temperature of item, not design temperature. For building painting see BS 6150 (Painting of Buildings).

8. PREPARATION OF PAINT BEFORE USE

8.1. Storage and Appearance

- 8.1.1. Paint shall be stored in a well ventilated room, free from excessive heat or direct rays of the sun and maintained at a temperature recommended by manufacturer in accordance with the appropriate fire regulations.
- 8.1.2. The maximum storage time for paints shall be as recommended by relevant Material Specification. Paints shall not be stored in open containers, even for a short time.

- 8.1.3. On operational sites, the storage methods and area shall be approved by Client.
- 8.1.4. All paint materials consigned to the coating site shall be properly stored in accordance with the manufacturer instructions at all times to prevent damage and deterioration prior to use.
- 8.1.5. Paint shall not be used beyond the manufacturer's stated shelf life.
- 8.1.6. All containers of paint shall remain unopened until required for use. Those containers which have been previously opened shall be used first. The label information shall be legible and shall be checked at the time of use.
- 8.1.7. Paint which has settled, skined, or otherwise deteriorated during storage shall not be used.
- 8.1.8. The oldest paint of each kind shall be used first.
- 8.1.9. All paints shall be prepared adjacent to the location where the painting work is to be carried out.

8.2. Preparation of Paint for Application

8.2.1. Mixing

- 8.2.1.1. All paints shall be mixed by powered mixers and/or mechanical agitator to ensure that no sediment is left. For 5 –liter containers or less hand mixing with the strong metallic paddle can be considered. In all cases, the manufacturer's instructions shall be followed.

Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.
- 8.2.1.2. The condition of the paint shall be checked before preparation begins and any unsatisfactory materials shall be discarded.
- 8.2.1.3. All paints shall be prepared adjacent to the location where the painting work is to be carried out.
- 8.2.1.4. Any paint includes unusual skins; stiff past and solid settled portion shall not be used.
- 8.2.1.5. Mixing in open containers shall be done in a well ventilated area away from sparks or flames.
- 8.2.1.6. Multi components paint shall be mixed in accordance with manufacturer instruction manual/data sheets. Induction period and pot life shall be considered as restricted by manufacturer.
- 8.2.1.7. Multi component paints have a limited pot life which reflected in manufacturer data sheet. Paints of this type shall not be used after the stated pot life.
- 8.2.1.8. When a multi-component paint is being used, new material shall not be added to any of the old material left in the pot.
- 8.2.1.9. Paint which does not have a limited pot life (time interval) or does not deteriorate on standing may be mixed at any time before using, but if settling has be occurred it shall be remixed immediately before using.
- 8.2.1.10. Paint shall not be used beyond the manufacturer's stated shelf life. 8.2.1.11 Catalysts, curing agents, activator or hardeners which are separately packaged shall be added to the base paint only after the latter has been thoroughly mixed. The proper volume of the catalyst shall then be slowly poured into the required volume of base with constant agitation. Where specified, special continuous mixing equipment shall be used in accordance with the manufacturer directions.