

**QUALITY CONTROL PROCEDURE FOR SURFACE PREPARATION, PAINTING
AND STENCILING, IDENTIFICATION, END PROTECTION OF PIPING
COMPONENTS**

QCP:021 / 01

Prepared by Quality Assurance	M Manoj Pandi	
----------------------------------	---------------	---

Reviewed by	Name	Signature
MM / Procurement	Anilsree	
Quality Control	S. Jegan	

Revision No.	Date	Approved by	Signature
01	21.07.2026	K Saranya	

**RECORD OF REVISIONS**

Rev No.	Date	Clause No.	Details of revision
00	12/09/24		This document consolidates all the general requirements and technical disciplines covered in the various QCPs.
01	21/07/26		This document has been modified to include colour coding details for various new and additional material grades.

1.0 SCOPE

- 1.1 This procedure specifies the requirement of surface preparation, painting and stenciling, Identification and end capping of all items including those covered under painting and stenciling contracts.
- 1.2 Any special requirements, as indicated in the respective drawings, or QP shall get precedence over this QCP

2.0 REFERENCE DOCUMENTS

IS 5	IS 2339
IS 104	IS 2932
IS 2074	

3.0 GENERAL REQUIREMENTS

- 3.1 This procedure specifies the painting requirements to provide adequate surface protection of components under good storage conditions at site.
- 3.2 Periodic re-preservation is required is components are kept under prolonged storage.
- 3.3 The following guidelines are provided for estimation purpose only.
- 3.3.1 The approximate surface area (sq.m) to weight (tonne) ratio is as follows:

Components	Area (Sq.m) / Wt (Tonne)
a. Structural	30
b. Vessels	1.5
c. Piping	5
- 3.3.2 The spreading capacity for a normal painting is varying from 5 sq.m / litre to 8 sq.m /litre.
- 3.3.3 The dosage of volatile corrosion inhibitor (VCI) pellets / silica gel in sachet shall be 100gms / cu.m.
- 3.4 The surface preparation Primer coat and finish coat for various piping components shall be as per Project specific painting scheme.
- 3.5 The approved brands and approved manufacturers of paint shall be as per BHEL / Customer approved sources.

4.0 SURFACE PREPARATION

- 4.1 Surfaces of components shall be thoroughly cleaned before the application of primer paint and shall be free from dust, rust, weld slag, spatters etc.
- 4.2 The following are the surface preparation schemes indicated in the approved Painting Schemes.

Scheme No.	Description
SSPC-SP 1	Solvent cleaning
SSPC-SP 2	Application of rust converter (Ruskil or equivalent grades)
SSPC-SP 3	Shot blasting
SSPC-SP 4	Power tool cleaning (Mechanical wire brushing)
SSPC-SP 5	Seven tank phosphating
- 4.3 Shot blasting shall be used as surface preparation method for thermally worked pipes prior to application of primer. For other pipes, power tool cleaning shall be adopted.

5.0 APPLICATION OF SURFACE PROTECTANT

- 5.1 Surfaces prepared as per the surface preparation scheme indicated in 4.2 shall be applied with primer paint immediately after the preparation.
- 5.2 Paint shall be used as supplied by the supplier without any addition of thinner.
- 5.3 Paint shall be thoroughly mixed before application
- 5.4 If any painting scheme calls for special mixing of paints, it shall be according to the instruction of Paint Manufacturer.

- 5.5 Adequate drying time is to be allowed for each coat.
- 5.6 No painting is required in case of Stainless Steel, aluminum and galvanized components, unless otherwise specified in contracts.
- 5.7 For all machined components, rust preventive fluids of reputed make shall be used.
- 5.8 All weld edge preparation for site welding shall be applied with one coat of weldable primer-Deoxaluminum or equivalent.
- 5.9 For internal protection of tubes and pipes, VCI pellets of required dosage as given in Cl. 3.3.3 shall be used after ensuring sponge cleaning.
- 5.10 VCI pellets shall not be used for Stainless steel components and composite assemblies. Instead silica gel sachet shall be used which shall be removed at site.
- 5.11 Wherever required, paints and rust preventive protection can be removed using commercial solvents.
- 5.12.1 For rust preventive : Acetone, Carbon tetra chloride (CTC) or Tri-chloro ethylene.
- 5.12.2 For all paints : Alkaline paint strippers Solvent based paint Strippers available in the market.

6.0 **INSPECTION**

- 6.1 Surface preparation, primer coating, finish coating shall be checked at appropriate stages by executing agency before proceeding to next operation.
- 6.2 Necessary records shall be maintained by executing agency after inspection at every stage.

7.0 **IDENTIFICATION**

- 7.1 Identification of Raw Materials:
 - 7.1.1 Immediately on receipt of materials from Stores, the contractors shall identify and segregate all the materials based on the gate pass and SMIV copies.
- 7.2 Identification of furnished components:
 - 7.2.1 The following details shall be punched on each item within 200mm from the free end.
 - a. Firm Code.
 - b. Work Order No.
 - c. DU No.
 - d. Quantity (No. off)
 - e. Boiler Inspectors / BHEL seal if applicable.
 - f. Material specification and Melt No.

For pipes and tubes, fittings, and rods of diameter less than 76.1mm and / or thickness less than 6mm, details b, c & d as above alone to be hard stamped. Identification on stainless steel tubes shall be by engraving/stenciling.
 - 7.2.3 The following details shall be stenciled on each item:
 - a. Name of the projects
 - b. Work Order No.
 - c. DU No.
 - d. Quantity (No. off)
 - e. Weight in kg
 - f. Firm code
 - g. Melt No.
 - h. Material specification
 - i. Arrow mark indicating the flow direction.

	BHEL-HPBP, Trichy	QCP: 21 / 01	Page 5 of 9
--	-------------------	--------------	-------------

- 7.3 The details stenciled shall be protected by applying a coat of clear varnish over the stenciled area.
- 7.4 The details hard stamped shall be highlighted by applying a coat of aluminium paint over the punched area.
- 7.5 The material identification color code as per the enclosed Annexure I shall be applied on ends.

8.0 END PROTECTION

- 8.1 All tubes and fittings of diameters $\leq 76.1\text{mm}$ shall be provided with plastic end caps.
- 8.2 All pipes and fittings of diameter above 76.1mm shall be provided with metallic caps, as detailed in Annexure II enclosed.

9.0 DOCUMENTS FOR INSPECTION

- 9.1 The availability of following documents shall be ensured by the firm, before taking up the job.
 - a. Purchase order with details of work order, DU, Quantity, Weight, specification and full description of the items including size.
 - b. GMS, if P.O. does not specify the full description.
 - c. Test Certificate / Group Test Certificate as applicable
 - d. Applicable drawing, QPs and Painting Schemes.

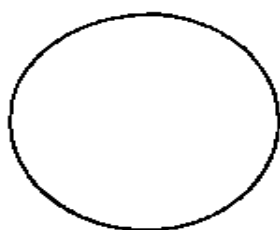
ANNEXURE I

Sl.No	PIPE / FITTING SPECIFICATION	COLOUR CODE
1	SA 106 Gr.B , SA 234 WPB/WPBW	Red
2	SA 106 Gr.C , SA 234 WPC , SA 105	Blue
3	SA 312 TP 304 , SA 403 WP 304 , SA 182 F304, SA 240 Gr.304	Blue & Yellow
4	SA 312 TP 304L, SA 403 WP 304L, SA 182 F304L, SA 240 Gr.304L	Blue, Red & Yellow
5	SA 312 TP 304H, SA 403 WP 304H, SA 182 F304H, SA 240 Gr.304H	Black, Blue & Yellow
6	SA 312 TP 316, SA 403 WP 316, SA 182 F316	Black & Green
7	SA 312 TP 316L, SA 403 WP 316L, SA 182 F316L, SA 240 Gr.316L	Black, Blue & Brown
8	SA 312 TP 321, SA 403 WP 321, SA 182 F321	Blue & Brown
9	SA 312 TP 347, SA 403 WP 347, SA 182 F347	Blue, Red & White
10	SA 312 TP 347H, SA 403 WP 347H, SA 182 F347H	Black & Yellow
11	SA 335 P11, SA 234 WP 11 , SA 182 F11	Green & White
12	SA 335 P12 , SA 234 WP 12, SA 182 F12	Black & Red
13	SA 335 P22 , SA 234 WP 22 , SA 182 F22	Blue & Red
14	SA 335 P91, SA 234 WP 91, SA 182 F91	Brown & Red
15	SA 335 P92, SA 234 WP 92, SA 182 F92	Brown & Blue
16	SA 672 Gr.B 60 Cl 22	Red & White
17	SA 672 Gr.B 70 Cl 22	Red & Aluminium
18	SA 691 Gr.11	Green & White
19	SA 691 Gr.12	Black & Red
20	SA 691 Gr.22	Blue & Red
21	SA 790 S32205 , SA 815 S32205 (Duplex Stainless Steel)	Red , White & Green
22	IS 1239 Heavy (ERW)	Violet
23	IS 3589 (ERW)	Aluminium , Brown & Green
24	DIN 17175 Grade 13 CrMo44	Aluminium & Black
25	API 5L Gr.B	Aluminium
26	X20 Cr Mo V 121	Black

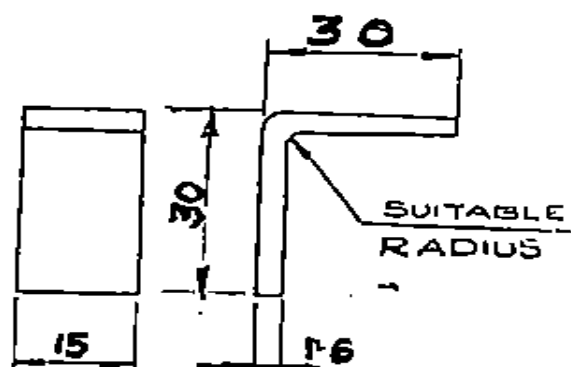
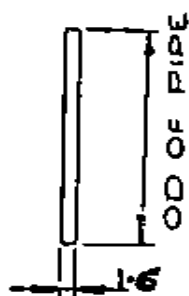
ANNEXURE II

a] $\leq \phi 76.1 \text{ mm}$ PLASTIC END CAPS

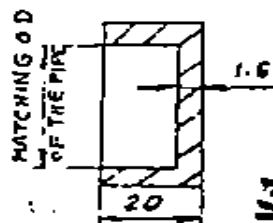
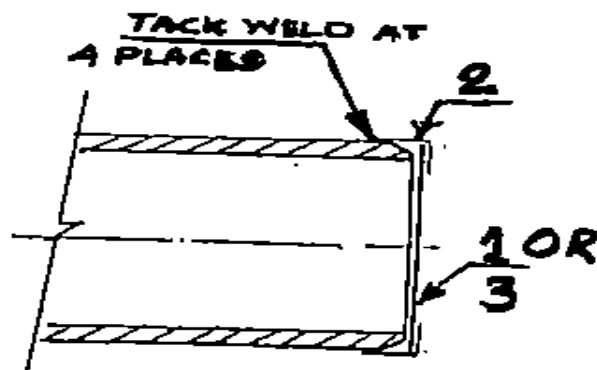
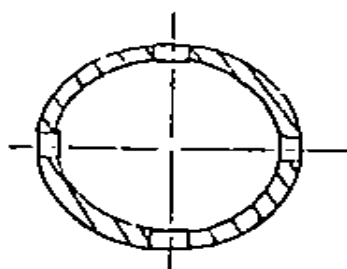
b] $> \phi 76.1 \text{ mm} \leq \phi 159 \text{ mm}$



1 DISC



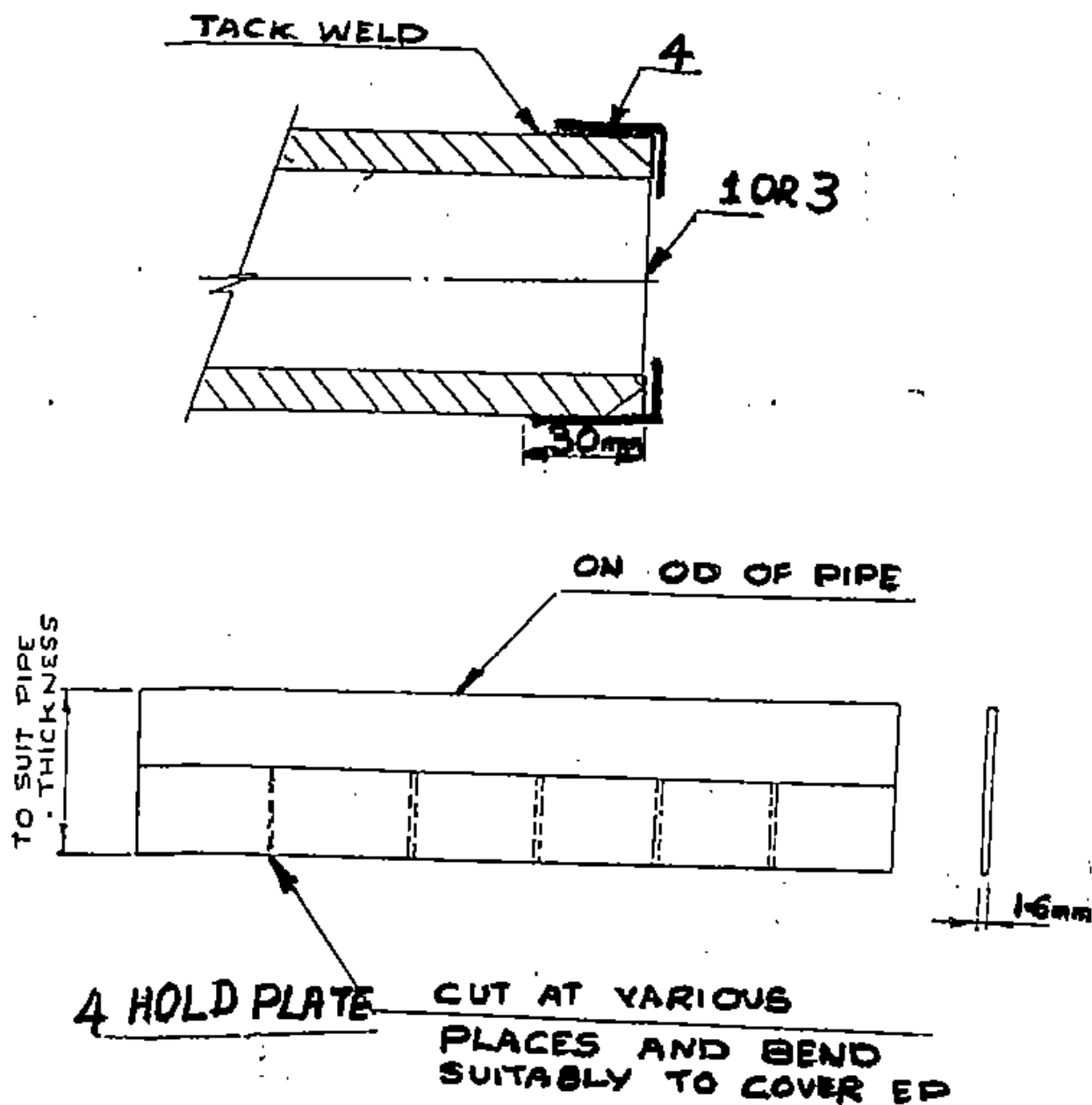
2 ELL



3 COVER

ANNEXURE II

c] $> \phi 159$ mm AND ALL FITTINGS





BIBLIOGRAPHY

1. IS 5
2. SSPC
3. IS 104
4. IS 2074
5. IS 2932
6. BHEL Plant lab recommendation & Practices.
7. Good Engg Practices