

	<b>PROJECT</b>		<b>Standby SRU &amp; Additional Tanks</b>		
	<b>CLIENT</b>		<b>IOCL Paradip Refinery</b>		
<b>JOB SPECIFICATION FOR CHEMICAL CLEANING OF HP STEAM PIPING</b>	<b>Project No.</b> 080557C001	<b>Document No.</b> 080557C-000-JSC-0093-005		<b>Rev. No.</b> 0	Page 1 of 5

## JOB SPECIFICATION FOR CHEMICAL CLEANING OF HP STEAM PIPING

0	04/12/2019	ISSUED FOR IMPLEMENTATION	KMK	TNVS	TNVS	JMC
<b>REV.</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>PREPARED</b>	<b>CHECKED</b>	<b>APPROVED</b>	<b>AUTHORIZED</b>


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## 1. Introduction:

**INDIAN OIL CORPORATION LIMITED (IOCL)** has awarded Fax of Acceptance (FOA) dated 29<sup>th</sup> August 2019 to M/s. Technip India Limited (TPIL) for Consultancy services (PMC/EPCM services) for overall project management, FEED Review / FEED, Detailed Engineering, Procurement & expediting services, Tendering & award, Construction Management & Supervision, Assistance in start-up, Commissioning & performance test runs for installation of a Standby SRU of 525 TPD capacity and execution of Additional tanks for Paradip Refinery, Odisha, India.

## 2. Definitions & Abbreviations

Abbreviation	Definition /Expanded form
IOCL/ CLIENT	Indian Oil Corporation Limited
PMC/ CONSULTANT	Technip India Limited
LICENSOR	Party selected by IOCL for process technology ownership for any UNIT
CONTRACTOR	Party whose services are obtained for performing the works specified as part of LSTK / packages.
EPCM	Engineering, Procurement & Construction Management Services.
LSTK	Lump Sum Turn Key portion of the work to be executed by CONTRACTOR
FEED	Front End Engineering Design
AUTHORISED REPRESENTATIVE	IOCL's/ CONSULTANT's representative authorized to act for and on behalf of them.
VENDOR	Any third party supplying the equipment/materials for setting up the Plant
PROJECT	Indicates Standby SRU and Additional tanks Project, Paradip Refinery
UNIT	Indicates any particular portion of the project to be built which can be Process related or Utilities/Offsites related
SRU	Sulphur Recovery Unit

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### 3. Scope

- 3.1 This technical specification covers the minimum requirement for chemical cleaning and passivation of the fabricated and erected carbon steel VHP(Very High Pressure ) / HP(High pressure) Steam piping at site prior to commissioning by chemical circulation method.
- 3.2 This procedure is of general in nature and for specific procedures, follow vendor's specific instructions.
- 3.3 All valves, gaskets, control valves including butterfly valves, filters, venturies, instruments etc., which are sensitive to the chemical cleaning should be dropped before chemical cleaning.

### 4. Objective

- 4.1 The objective of chemical cleaning of carbon steel VHP/HP Steam piping is to remove the loose rust, dislodging the burs, welding slag and mill scales adhering to the internal surfaces of piping. This procedure specifies the method of cleaning and passivation of internal surface of piping based on the use of inhibited ammoniated citric acid followed by passivation with Tri sodium phosphate (Na<sub>3</sub>PO<sub>4</sub>) + Sodium nitrate (NaNO<sub>2</sub>) circulation. Any deviation to this specification should be recorded and discussed with OWNER/PMC prior to application.

### 5. Sequence of Operation

The cleaning of piping shall be carried out in the following sequence: -

- Flushing with potable water to remove dirt, dust, loose rust and foreign matter followed by DM / BFW water flushing.
- Degreasing with Sodium Hydroxide (caustic Soda).
- Flushing with DM/ BFW till inlet and outlet water pH is same.
- Circulating with ammoniated inhibited citric acid
- Flushing with DM/ BFW
- Circulating with Tri sodium phosphate (Na<sub>3</sub>PO<sub>4</sub>) + Sodium Nitrite (NaNO<sub>2</sub>)
- Drain, dry and take the system into service
- The pipe is not taken into service immediately after drying the pipe should be filled with N<sub>2</sub> and capped at both ends.

### 6. Preparation of temporary Circuits

- 6.1 Temporary piping, pumps of suitable capacity, fittings, flanges, tanks, gaskets, heating arrangement, hydrometers, valves, test coupons, spares, laboratory facilities with all accessories required for conducting tests during cleaning operation, chemicals and safety accessories for operation, personnel etc. shall be arranged by contractor at site prior to cleaning operation. The contractor of chemical cleaning shall prepare all the necessary temporary chemical cleaning circuits at site and submit for approval by Owner / PMC before execution. Quantity of chemicals required should be calculated based on the total hold-up volume. Pumps of suitable capacity shall be arranged at site by the Contractor.

### 7. Procedure

- 7.1 The circuit (Loop) shall be checked with circulation of potable water to check tightness. Any leakage if observed to be attended and tightened.
- 7.2 The circuit shall be flushed initially with potable water to remove all extraneous matter, dirt and dust etc. followed by DM water flushing
- 7.3 Filling and circulation of sodium Hydroxide (caustic soda) solution of 1% weight in DM/BFW (concentration on 100% purity basis) at 65-75°C temperature for 2 hrs.

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- 7.4 Drain the sodium Hydroxide solution. Fill with DM/BFW and drain. The operation of rinsing with DM water should be continued till pH of water at inlet and outlet ends are same.
- 7.5 Filling and circulation of ammoniated citric acid of 3% concentration (on 100% purity basis) by weight in DM/BFW with pH being adjusted to 3.5 - 4.0 with ammonia and 0.1% corrosion inhibitor Rodine- 92 or equivalent by weight. The temperature of circulating citric acid solution should be 800C. The circulation should be continued for 6 hrs. or till iron and acid concentration are stabilized.
- 7.6 During circulation of ammoniated citric acid, the total iron content of the circulating solution should not exceed 5000 mg/liter (with 3% w/w citric acid solution) and pH should be maintained at 3.5-4.0. If at any stage total iron content exceeds 5000 mg/liter, the acid should be drained in part and replaced with fresh acid.
- 7.7 Drain the citric acid and rinse with DM/BFW. Fill with DM/BFW and the operation of rinsing should be continued till pH at inlet and outlet ends of water are same.
- 7.8 Fill with Tri Sodium phosphate (1%) + Sodium Nitrite (0.5%) by weight (on 100% purity basis) and circulate for 2 hrs. drain, allow to self-dry and finally dry with compressed instrument air.
- 7.9 If the pipe is not taken into service immediately after drying, the pipe should be filled with N2 and capped at both ends.
- 7.10 Suitable high pressure pumps with necessary flow rate should be provided by the contractor to maintain good velocity (preferably 0.5-1.0 M/Sec.) throughout operations of chemical cleaning and there should be effective return of flow from the outlet and the vent.

## **8. Chemicals & Utilities**

**Chemicals used for chemical cleaning should conform to the following specifications.**

- 8.1 Citric acid monohydrate conforming to IS : 5464-1970-Gr.2 (latest edition)
- 8.2 Rodine 92 or equivalent
- 8.3 Ammonia (Technical grade.)
- 8.4 Sodium Hydroxide (NaOH) Technical grade conforming to IS:252 latest edition
- 8.5 Tri sodium phosphate (Na3PO4) technical grade as per IS :573
- 8.6 NaNO2 IS-879-1981 (latest edition)
- 8.7 Potable water (chlorides 50ppm maximum)
- 8.8 DM water

## **9. Neutralization and Disposal of Chemicals**

- 9.1 The necessary arrangement for neutralization like HDPE tank/temporary neutralization pit shall be made available for complete neutralization of pickling acids and alkalis. Prior to discharging of effluent in the sewer system, it shall be analyzed and if necessary, additional chemicals shall be added for complete neutralization so that discharged mixtures shall have pH 7.0 in order to prevent any damage to paving, manholes and sewers etc. Permission shall be taken from OWNER /PMC for disposal of neutralized effluent into storm water drain / nearest Effluent pit etc.

## **10. Safety Precautions**

- 10.1 The alkali and acid solutions involved for chemical cleaning are corrosive for the skin and proper care shall be taken in the handling of the chemicals.
- 10.2 Necessary Job safety task instructions and PPEs required shall be given in the detailed procedure by the LSTK Contractor.
- 10.3 The HSE policy and practices of Owner shall be followed.