CONSTRUCTION SPECIFICATION
CLEANING OF PIPES
FOR
NITROGEN PACKAGE
FOR
HINDUSTAN PETROLEUM CORPORATION LTD.
VISAKH REFINERY
DHT PROJECT
TEIL JOB NO. : 6261
DOCUMENT NO. : H - 301

A
16.04.2009
For Bid Enquiry
UCM
PRK
SSV

Rev. no.
Issue Date
Description
Prepared by
Checked by
Approved by
CONTENTS

Sr. No. | Description of Title | Page No.
--- | --- | ---
1.0 | GENERAL | 2
2.0 | SELECTION OF CLEANING METHOD | 2
3.0 | GENERAL REQUIREMENTS | 3
4.0 | WATER FLUSHING | 3
5.0 | AIR FLUSHING | 5
6.0 | STEAM FLUSHING | 5
7.0 | ACID CLEANING | 6
8.0 | OIL FLUSHING | 7
9.0 | OTHER CLEANING METHODS | 7
1.0 GENERAL

1.1 Scope

This specification covers the general requirements for the Cleaning of Piping involved in Nitrogen Package for the DHT Project.

1.2 Specific job requirements

Specific Job Requirements which are attached to this specification cover modifications to this specification, the OWNER’s special and/or local requirement as well as specific job data pertaining to this specification. Where Specific Job Requirements are in contradiction to this specification, Specific Job Requirements shall govern.

1.3 Codes and standards

1.3.1 The applicable codes and standards shall be as listed in Engineering Specification H-301. Such codes and standards shall be of the latest issue, unless otherwise specified.

1.3.2 It shall be the responsibility of the CONTRACTOR that the works conform to the specification, codes, standards and legal and statutory requirements.

1.3.3 If any conflict arises between drawings, specifications, codes of practice, standards or legal requirements, such conflicts shall be immediately referred to Engineer-in-Charge and his decision shall govern.

1.4 Units

The SI Unit shall be applied as the measurement system for documents and drawing. Nominal size of piping components shall be measured in Inches, for which the abbreviation is NPS (Nominal Pipe Size). Nominal flange rating shall be as per the applied codes and standards.

1.5 Related Engineering Specifications

The related Construction Specifications to supplement this specification are as follows:

H - 301 - Piping Construction Works.

2.0 SELECTION OF CLEANING METHOD

Cleaning method shall be selected out of the following methods, considering the kind of service fluid, pipe material and condition of internal surface of piping to be cleaned. The CONTRACTOR shall select the method and prepare the detailed scheme for Engineer-in-Charge’s review.
(1) Water flushing
(2) Air flushing
(3) Steam flushing
(4) Acid cleaning
(5) Oil flushing
(6) Other cleaning method

3.0 GENERAL REQUIREMENTS

3.1 Fabrication stage

3.1.1 Caps covering the ends of pipes shall not be removed until the fabrication work commences. This applies to valves, fittings and other parts, also.

3.1.2 Inside surface of fabricated piping, shall be made free from slag, scale and other foreign material by careful use of chisels, wire brushes by hand or machine and then air is blown. After completion of air blowing and checking, the ends of the piping shall be covered with caps until installation.

3.2 Installation and removal of Temporary Strainer

3.2.1 Prior to cleaning and flushing any pipeline by the method selected according to Sect. 2.0 temporary strainers shall be installed.

3.2.2 Position of installing temporary strainer shall be as follows.

   (1) Pump suction side in the piping
   (2) Upstream of control valve in the piping
   (3) Other position, as specified in the Specific Job Requirements

3.2.3 Marking plate or metal tag shall be attached to the temporary strainers to distinguish from other strainers.

3.2.4 After a constant period of initial operation, all temporary strainers shall be removed.

4.0 WATER FLUSHING

4.1 Water for flushing

As a rule, pure water, drinking water, steam condensate or industrial water shall be used. Sea water shall not be used. If using sea water is unavoidable, final flushing with fresh water or an inhibitor shall be carried out at least once, preferably more, to prevent corrosion. Sea water shall not be used for the cleaning of austenitic stainless steel.

4.2 Degree of water flushing
Flushing shall be performed until the water is free from foreign material, rust, scale, etc. This shall be decided by observing the quality of water sample taken in a glass beaker or transparent jar. OWNER shall approve whether the line is cleaned properly or not.

4.3 Procedure for water flushing

4.3.1 Water flushing shall be performed by pressurizing a pipeline with water, to a given pressure (not exceeding its working pressure), and rapidly releasing the water at one end of the pipeline, with the pump still working at the other end. The flow shall continue at a given rate, until the line complies with par. 4.2.

4.3.2 Stage wise partial water flushing shall be performed for each assembled section of piping first. Overall water flushing shall be performed for the whole of the piping system connected to the pump in the final stage.

4.3.3 Where instruments are included in the piping system to be flushed, these shall be removed and a spool pipe (distance piece) shall be installed instead of the instrument. When flushing is to be carried out in the condition where a control valve is connected which cannot be removed, then the following shall be carried out:

(1) Disconnect the companion flange at the upstream side of the control valve and cover the opening of the control valve.

(2) Flush the piping of upstream side.

(3) Connect the control valve with piping of upstream side after completion of the flushing.

(4) Close the control valve, open the bypass valve, and then flush the piping of downstream side. Where a bypass valve is not installed, a temporary strainer shall be inserted.

4.3.4 Temporary strainer with 80 mesh x #38 shall be used. Flushing shall be performed until no foreign material is visible in the temporary strainer.

4.4 Drying after flushing

After flushing, drying the inside of pipe shall be carried out with compressed air or by natural drying. Drying with superheated steam shall be carried out only if it is available and if so instructed by Engineer-in-Charge / OWNER. Otherwise ordinary steam drying will do. After drying the loop shall be shown to Engineer-in-Charge / OWNER Inspector and he shall approve the same for further process.

5.0 AIR FLUSHING
5.1 Degree of flushing

Air flushing shall be performed until all the loose scales and rust is removed from the piping. OWNER personnel in charge shall make the judgment of whether the result of the flushing is satisfactory or not.

5.2 Procedure of air flushing

5.2.1 Air flushing shall be performed in the method of blowing pressurized uncontaminated air through the pipeline. If the supply of pressurized uncontaminated air is difficult, pressurized oil contaminated air may be used, if prior approval is given by OWNER or muffler may be used to avoid access oil flow.

5.2.2 Partial air flushing shall be performed for each assembled section of piping.

5.2.3 Overall air flushing, as a rule, shall be performed for each section of pipeline from equipment to adjacent equipment. Whether the equipment is to be included in the flushing or not shall be determined in the overall flushing plan.

5.2.4 Treatment of instruments and handling of temporary strainers shall conform to the requirements specified in Par. 4.3.3 and 4.3.4

6.0 STEAM FLUSHING

6.1 Execution of steam flushing

Steam flushing shall be performed after completion of the pressure test and insulation work.

6.2 Preparation for steam flushing

6.2.1 The following nine (9) items shall be taken into account in the planning of steam flushing.

(1) Temporary piping work
(2) Countermeasure for safety
(3) Coordination procedure and assignment of men concerned.
(4) Prevention of public nuisance
(5) Cooperation with operations
(6) Judgement criteria of flushing
(7) Treatment of piping accessories
(8) Setting of spring hanger, etc.
(9) Confirmation of support (sliding or fix)

6.2.2 Supports shall be fitted to exhaust piping to prevent any damage by the reaction force during flushing.

6.3 Procedure of steam flushing
6.3.1 Order of steam flushing shall be in accordance with Flushing plan. The following activities shall be carried out:

1. Removal or opening of steam traps, vents and drains
2. Warming up of the piping (To be blown gradually, in cooperation with the operator)
3. Checking correct settings of expansion joints, spring hangers, etc. to allow for thermal expansion
4. Steam flushing temperature: Steam flushing of the pipeline shall be performed at a temperature near to the operating temperature of the line.
5. Temperature fluctuation is required to remove scale effectively. It is therefore required to perform flushing and cooling cyclically, having a temperature difference as large as possible between the flushing and cooling stages.

6.4 Judgment criteria for steam flushing

6.4.1 Judgement on the result of steam flushing shall be carried out by checking colour and quantity of foreign material present in the sample drawn and by use of the parameters described in Par. 6.4.2.

6.4.2 Where necessary, especially the suction line of a steam turbine, the result of flushing shall be judged by observing whether scratches are visible or not on a polished surface made of iron, copper or brass.

7.0 ACID CLEANING

7.1 Piping to be acid-cleaned

Acid cleaning shall be applied to piping system as per specific Job Requirements.

7.2 Procedure for acid cleaning

Procedure for acid cleaning of piping shall be as follows.

1. Prior to acid cleaning, degreasing with a sodium hydroxide solution shall be carried out to remove the oil from the inside of the pipeline.
2. Generally 10% hydrochloric acid or Citric acid solution at a temperature of 30° to 40°C shall be used. The piping shall be pickled in the solution for 1 to 6 hours.
3. After pickling, the piping shall be flushed with water. This shall be carried out by filling the pipe with water, holding for two (2) hours and then releasing. This operation shall be carried out a minimum of three (3) times, giving a total holding time of six (6) hours.
4. After flushing with water, 5% sodium hydroxide solution at temperature of 20° to 30°C shall be used for neutralization. The piping shall be neutralized in the solution for 1 to 6 hours.
5. After neutralizing, the piping shall be flushed with clean water inside and
outside.

(6) The piping shall be well dried with superheated steam or dry air. The inside of the system, shall be given a coat of oil of the same quality as the specified service oil of the system.

(7) After completion of cleaning, it shall be checked that no foreign material is present on the temporary strainer screen of 100 mesh x #42 or where necessary, of 200 mesh x #147, prior to installation.

NOTE: IF OIL PIPING IS OF AUSTENITIC STAINLESS STEEL, ACID CLEANING SHALL NOT BE PERFORMED.

8.0 OIL FLUSHING

8.1 Piping to be oil-flushed

Oil flushing shall be carried out on oil piping systems specified in Specific Job Requirements.

8.2 Procedure for oil flushing

Procedure for the oil flushing of piping shall be as follows.

(1) Oil to be used for flushing shall be of good quality, compatible with the service oil and suitable for the machinery. After cleaning, this oil shall be completely replaced with the specified service oil.

(2) The flushing shall be performed by circulating the oil.

(3) After completion of flushing, it shall be checked that no foreign material is present in the temporary strainer. Temporary strainers shall consist of two screens of 200 mesh x #47 in case of oil piping for centrifugal compressor, and a single screen of 100 mesh x #42 (200 mesh x #47, if required) in the case of other oil piping.

9.0 OTHER CLEANING METHODS

9.1 Soda cleaning

This is normally used in cross-country pipeline. This method shall be carried out, if specified in Specific Job Requirements.

9.2 Special cleaning

If special cleaning is required in a specific piping system, the name of the system and cleaning procedure shall be specified in the Specific Job requirements.