

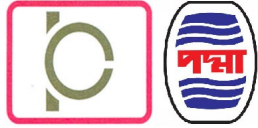
CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	1 OF 19

**SPECIFICATION
FOR
SEAMLESS PIPELINE**

B04	Issued for Construction	JX Zhu	XQ Fu	GM Jia	POCL	BPC	11-Apr-18
B03	Re-Issued for Client Review	JX Zhu	XQ Fu	GM Jia	POCL	BPC	22-Mar-18
B02	Re-Issued for Client Review	JX Zhu	XQ Fu	GM Jia	POCL	BPC	27-Feb-18
B01	Issued for Client Review	JX Zhu	XQ Fu	GM Jia	POCL	BPC	20-Feb-18
A	Issued for Review	JX Zhu	XQ Fu	GM Jia	Y Chen		01-Feb-18
REV.	DESCRIPTION	PREP'D	CHK'D	REV'D	APP'D		DATE



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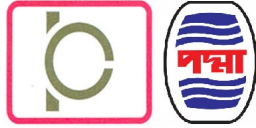
PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	2 OF 19

Change Log

REV	SECTION	CHANGE DESCRIPTION
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CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	3 OF 19

CONTENT

1.0 GENERAL.....4

1.1 Purpose 4

1.2 Project Description..... 4

1.3 Project Definitions..... 4

1.4 Abbreviation 5

2.0 scope.....6

2.1 Scope of Work..... 6

3.0 References6

4.0 Vendor/Sub-Vendor’s Quality Management7

4.1 Quality Manual..... 7

4.2 Quality Plan 7

4.3 Tracking System..... 8

4.4 Management of Product Non - Conformities 8

4.5 Inspection 8

5.0 Materials and Manufacture.....10

5.1 Material..... 10

5.2 Manufacture 10

5.3 Heat Treatment:..... 10

6.0 Process of Steel Making and Pipe Manufacture10

6.1 General Requirements..... 10

6.2 Manufacturing Procedure Specification..... 11

6.3 Qualification Tests 12

6.4 Re-qualification of Manufacturing Procedure 12

7.0 Requirements.....12

7.1 General..... 12

7.2 Mechanical Required..... 12

7.3 Chemical Requirements 13

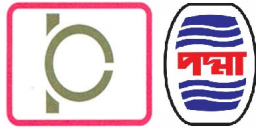
7.4 Other Requirements 14

8.0 Visual and Dimensional Inspection15

8.1 Dimensional Inspection..... 16

9.0 First Day Production Tests18

10.0 Information to be furnished by Vendor/Sub-Vendor18



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	4 OF 19

1.0 GENERAL

1.1 Purpose

This specification defines the minimum requirements for the design, fabrication, inspection, testing and supply of seamless steel line pipes for the Project.

This specification should be read in conjunction with the requirements detailed in datasheets and the enquiry documentation. Compliance with this Specification does not relieve the Vendor/Sub-Vendor from meeting the requirements of the ultimate user or his nominated representative when stipulated in the enquiry documentation.

1.2 Project Description

POCL (Padma Oil Company Limited), a subsidiary of Bangladesh Petroleum Corporation (BPC, largest Petroleum Company of Bangladesh), being the sole supplier of Jet A1 fuel in Bangladesh. POCL holds the total responsibility of storage and supply of aviation fuel at Hazrat Shahjalal International Airport (HSIA), Dhaka.

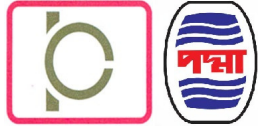
The Jet A1 either imported or refined at Eastern Refinery Limited (ERL) is first received at storage tanks at company’s main installation at Patenga, Chittagong. Currently Jet A1 to be used for refueling purpose at HSIA is brought from this Chittagong Depot by coastal tankers and stored in the onshore tanks at Godenail Depot. This Jet A1 then transported to Kurmitola Aviation Depot (KAD) at HSIA by road tankers. In order to optimize safe transportation of Jet A1, POCL is installing new 8” nominal diameter, approximately 16 kms pipeline from Pitolganj Depot to KAD. This pipeline is being proposed to be routed along with Purbachal expressway. The whole project contains four facilities: Jetty, Pitolganj Depot (new tank farm), Pipelines and KAD Depot (existing tank farm to be revamped).

NouKollan Foundation Trading Company Limited (hereinafter “NKFTCL”) was selected as EPC Contractor using Turn Key Conditions of Contract, and China Machinery Engineering & Construction Corporation (hereinafter “CMECC”) acts as job executor on behalf of NKFTCL.



1.3 Project Definitions

Within this document the following definitions shall apply.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS

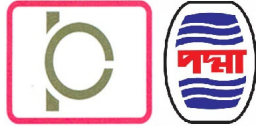


PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	5 OF 19

- Owner:** Bangladesh Petroleum Corporation (BPC) / Padma Oil Company Limited
- Project:** Construction of Jet A-1 Underground Pipeline from Pitolganj to Kurmitola Aviation Depot (KAD) Including Pumping Facilities and Jetty on Turn-Key Basis
- EPC Contractor:** Party, which carries out all or part of the Detail Design, Engineering, Procurement, Construction, Installation and Commissioning for the Project.
- Vendor:** Selected provider of the Elements, Equipment, Subsystems or Systems. This term includes also "Vendor" and "Manufacturer".
- Sub-Vendor:** Party supplying goods, equipment or material specified by the Vendor

1.4 Abbreviation

DWTT	Drop-Weight Tear Test
KAD	Kurmitola Aviation Depot
MIP	Manufacturing and Inspection Plan
MIS	Manufacturing and Inspection Schedule
NCR	Non Conformity Report
QMS	Quality Management System



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	6 OF 19

2.0 SCOPE

2.1 Scope of Work

Line pipes furnished in accordance with this specification shall meet the requirements of API 5L - PSL 2, latest edition, with selected additional nominal requirements and supplementary requirements stated therein.

The line pipe Vendor/Sub-Vendor shall have license to use API monogram for manufacture of line pipes in accordance with API 5L, latest edition.

In addition to the records indicated in API 5L, the Vendor/Sub-Vendor shall retain the records of all additional tests mentioned in this specification including the ultrasonic testing carried out on pipe / plate as well as pipe ends.

Testing for product analysis and mechanical properties shall be carried out for each heat during both first day production and regular production of pipes at independent laboratories approved by authority / board of Pipe Vendor/Sub-Vendor's country. Test results at both the testing facilities (i.e. Vendor/Sub-Vendor's test facility and independent laboratory) shall comply with specification requirements. In case, Vendor/Sub-Vendor and/or EPC Contractor feels more stringent testing shall be followed to meet all requirements of this specification, then the Vendor/Sub-Vendor is free to do such stringent testing including equipment calibration etc.

Vendor/Sub-Vendor shall produce the line pipes only at the authorized mills at authorized locations of the plant. No mill other than the authorized mill shall be engaged for manufacturing the line pipes even if it is in the same premises of the authorized mill.

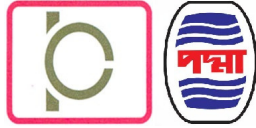
Note: In API 5L "at the option of Vendor/Sub-Vendor" shall be read as "at the option of the Vendor/Sub-Vendors which shall be approved by employer.

3.0 REFERENCES

This specification has been prepared based on the appropriate sections of the following regulations, codes, specifications, standards and guidelines.

Where differences occur between this specification and the references, this specification shall apply. Standards equivalent to those referred to herein may be used with prior approval from the Client.

No.	Doc Number	Title
i.	API 5L	Specification for Line pipe
ii.	API RP 5LW	Transportation of Line Pipe on Barges and Marine Vessels
iii.	API RP 5L1	Recommended Practice for Railroad Transportation
iv.	API RP 5L3	Recommended Practice for Conducting DWTT on Line Pipe



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	7 OF 19

No.	Doc Number	Title
v.	ASME Sec. V	Boiler and Pressure Vessel Code, Section V Non Destructive Examination
vi.	ASME Sec. IX	Welding and Brazing Qualifications (Boiler and Pressure Vessels Codes)
vii.	ASTM A 333	Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness
viii.	ASTM A 370	Standards Method and Definitions for Mechanical Testing of Steel Products
ix.	ASTM A 530	General Requirements for Specialized Carbon and Alloy Steel Pipe
x.	ASTM E 112	Standard Test Methods for Determining Average Grain Size
xi.	ASTM E 23	Notched Bar Impact Testing of Metallic Materials.
xii.	ASTM E 213	Practice for Ultrasonic Examination of Metal Pipe and Tubing
xiii.	ASTM E 309	Practice for Eddy-Current Examination of Steel Tubular Products Using Magnetic Saturation
xiv.	BS 672	Wet Magnetic Particle inspection
xv.	EN 10204	Metallic Products – Types of inspection Documents
xvi.	ASTM E 92	Standard Test Method for Vickers Hardness of Metallic Materials
xvii.	ASTM E 140	Standard Hardness Conversion Tables for materials
xviii.	ASTM E 23	Standard Method for Notched Bar Impact Testing of Metallic Materials

4.0 VENDOR/SUB-VENDOR'S QUALITY MANAGEMENT

4.1 Quality Manual

The Vendor/Sub-Vendor shall operate a quality management system (QMS) able to ensure that the requirements of this specification are achieved.

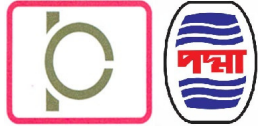
Vendor/Sub-Vendor's quality management system shall be based on ISO 9001 (or Client's approved equivalent) and shall be described in a Quality Manual.

4.2 Quality Plan

The Vendor/Sub-Vendor shall prepare a "Manufacturing and Inspection Plan" (MIP) to identify and control all manufacturing and inspection process. All manufacturing and inspection records / reports shall be identified by a unique records / reports number.

Vendor/Sub-Vendor should mention in tabulation form for stage wise requirement of quality checks along with acceptance criteria and governing specification of criteria along with performing and witnessing authority / parties.

The MIP shall include a flow chart with reference to the report number.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	8 OF 19

The MIP shall include provisions for control of all raw materials, pipe manufacture, final inspections and preparations for shipment, including hold and witness points.

The MIP shall include the acceptance criteria and be submitted for mark-up inspection stages.

The MIP shall refer to the traceability procedure.

All steps identified in the MIP shall refer to a working procedure / instruction.

The MIP (Quality Plan) and all manufacturing, testing and inspection procedures shall have prior approval of Client prior to start of production.

Client may carry out technical audit during the manufacturing of line pipes which shall include the following:

- i) Review of MIPS submitted by the Vendor/Sub-Vendor.
- ii) Review of reports of MPQT.
- iii) Review of results of First Day Production Test.

The Employer reserves the right to verify all inspections / tests carried out by the VENDOR.

4.3 Tracking System

The Vendor/Sub-Vendor's Quality management system shall report to Client for all quality checks and assurance at place of manufacturing of the product and shall submit the reports to Client of quality checks follow ups from time to time during manufacturing process.

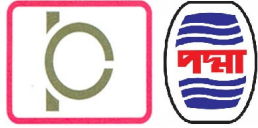
The Vendor/Sub-Vendor shall have implemented or will implement a tracking system able to trace back all manufacturing and inspection records. The Vendor/Sub-Vendor tracking system shall be described in a written procedure submitted every shift / day at the Vendor/Sub-Vendor premise. A format to transfer the information and data shall be submitted by the Vendor/Sub-Vendor to Client for approval at the Pre-production Meeting. Information and data to be traced back shall be part of the information and data of quality records of the product.

4.4 Management of Product Non - Conformities

The Vendor/Sub-Vendor shall have implemented or will implement a procedure to manage the product non-conformities. All non-conformities shall be recorded by use of a Non Conformity Report (NCR) where provisions for the remedial action (on the product) and corrective action (to eliminate the cause of the problem) shall be foreseen. A format of the NCR shall be agreed at the Pre-production Meeting.

4.5 Inspection

The Vendor/Sub-Vendor shall prepare a Manufacturing and Inspection Schedule (MIS) based on all working shifts and inline and / or out of line activities. The MIS shall give evidence of the planned and actual schedule. The MIS shall be updated regularly. The Vendor/Sub-Vendor shall notify Client with the MIS well in advance to enable Client to be present at qualification tests, if required / desired by Client at its own discretion and at all other tests or stages of manufacture



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



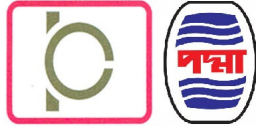
PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	9 OF 19

subject to acceptance in accordance with this specification and Client approved MIP (Quality Plan).

The Vendor/Sub-Vendor shall ensure that Client has full and free access to all parts of the Mill while production / inspection is undergoing.

Except as otherwise agreed by the Client, all inspections and tests required for qualification and production shall be performed at the manufacturing Mill.

Client, at its own cost, reserves the right to perform tests in an independent laboratory. For any such tests as desired by Client, the Vendor/Sub-Vendor shall be required to supply test samples or specimens.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	10 OF 19

5.0 MATERIALS AND MANUFACTURE

5.1 Material

The pipe material shall be fully aluminum killed steel manufactured with fine grade practice.

5.2 Manufacture

The pipe shall be seamless.

5.3 Heat Treatment:

5.3.1 All seamless pipes, shall be treated to control their microstructure.

5.3.2 For the seamless process, reheat and control hot working and the temperature of the hot-finishing operation to a finishing temperature and cool in air or in a controlled atmosphere furnace from an initial temperature.

5.3.3 Seamless pipe may be heat treated by heating to a uniform temperature, followed by quenching in liquid and reheating to a suitable tempering temperature.

5.3.4 The Vendor/Sub-Vendor should provide the temperature of heat treatment to Owner for review.

Compliance:

The Vendor/Sub-Vendor and EPC contractor shall responsible for complying with all provisions of complete line pipe specification / QAP which also includes addendum, if any. The employer / purchaser may make any investigation necessary to be satisfied of compliance by the Vendor/Sub-Vendor and may reject any material that does not comply with this specification / API 5L / MIP.

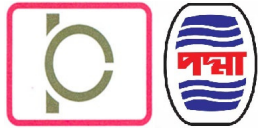
Rejection:

If employer / Purchaser reject pipes repeatedly for any recurring cause, this shall be adequate reason to refuse final inspection of subsequent pipes until the cause has been investigated and corrective action taken by the Vendor/Sub-Vendor. If required an independent agency may be engaged to investigate the root cause before giving further clearance to re-start at the cost of Vendor/Sub-Vendor.

6.0 PROCESS OF STEEL MAKING AND PIPE MANUFACTURE

6.1 General Requirements

The Vendor/Sub-Vendor shall bear full responsibility for conformity of its supply to all clauses of this specification. They shall, for this purpose, take all necessary measures, making use of suitable means, devices and qualified personnel, enabling them to ensure permanent and effective control at each stage of the fabrication.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	11 OF 19

The Vendor/Sub-Vendor shall ensure, all inspections and tests have been carried out as required by this specification.

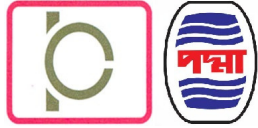
All inspection operations carried out during pipe fabrication shall form the subject of constantly updated reports. These reports shall be available for consultation by Client at any time.

6.2 Manufacturing Procedure Specification

Bidder shall provide at the time of bidding with a technical specification giving full details of all the characteristics of the proposed steel, the steel making process, castings, pipe manufacturing process and the inspection procedures. It shall include the following minimum information and past production statistics:

- i) Equipment facilities description
- ii) Production capacity
- iii) Reference list of similar pipe sizes and material produced using the selected process including:
 - (a) All dimensional tolerance achieved
 - (b) Product and heat analysis test results achieved
 - (c) Mechanical, fracture toughness and hardness test results achieved
- iv) Weldability test performed for welds and test acceptance criteria used.
- v) Manufacturing method proposed for each pipe size including where applicable Maximum and minimum tolerance achievable for pipe wall thickness, out of roundness, straightness, internal and external diameter.
- vi) Full details of all ultrasonic testing equipment used for measuring wall thickness and laminations and defects including:
 - (a) Testing technique
 - (b) Acceptance criteria
 - (c) Sensitivity and calibration technique and frequency
 - (d) Marking technique used to show indications
 - (e) Indications of loss of coupling
- vii) Procedures proposed for measuring straightness, diameter, wall thickness, ovality and end squareness and all other Manufacturing Procedures.
- viii) Percentage cold expansion for sizing purposes only
- ix) Recommendations and precautions to be implemented during making of pipe into bends by induction bending.
- x) Full details of proposed Manufacturing Procedure testing including, but not limited to the following:
 - (a) Product and heat analysis testing
 - (b) Tensile testing
 - (c) Testing technique
 - (d) Impact testing
 - (e) Hardness testing
 - (f) Macro and metallurgical testing
 - (g) Make and model of UT equipment with Operator's details

The Vendor/Sub-Vendor shall provide adequate supervision to ensure strict adherence to the described procedures during pipe production.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	12 OF 19

6.3 Qualification Tests

Two completely finished pipes one each from the first two lots, made in accordance with the manufacturing procedure specification at the beginning of production, or after any changes in manufacturing procedure, outside those parameters agreed with Client shall be selected by Client and subjected to the following tests for the purposes of qualification:

- i) Chemical composition
- ii) Visual and dimensional
- iii) Non-destructive testing
- iv) Destructive testing
- v) Hydrostatic testing

6.4 Re-qualification of Manufacturing Procedure

Re-qualification of the manufacturing procedure or part there of shall be required, where a significant change has occurred during pipe production (i.e, origin of steel, chemical composition, pipe mill, heat treating facilities, etc.).

Costs for all such re-qualification shall be borne by Vendor/Sub-Vendor.

7.0 REQUIREMENTS

7.1 General

Material furnished to this specification shall conform to the applicable requirements of the current edition of Specification A 530/A 530M unless otherwise provided herein.

7.2 Mechanical Required

7.2.1 Transverse or Longitudinal Tensile Test

For material heat treated in a batch-type furnace, tests shall be made on 5 % of the pipe from each lot. When heat treated by the continuous process, tests shall be made on a sufficient number of pipe to constitute 5 % of the lot, but in no case less than 2 pipes.

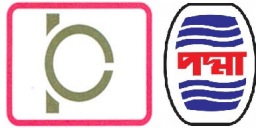
7.2.2 Hydrostatic Test

Each length of pipe shall be subjected to the hydrostatic test.

7.2.3 Impact Test

One notched bar impact test, consisting of breaking three specimens, shall be made from each heat represented in a heat-treatment load on specimens taken from the finished pipe.

This test shall represent only pipe from the same heat and the same heat-treatment load, the wall thicknesses of the pipe from which the test specimens are taken. If heat treatment is



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	13 OF 19

performed in continuous or batch type furnaces controlled within a 50°F [30°C] range and equipped with recording pyrometers so that complete records of heat treatment are available, then one test from each heat in a continuous run only shall be required instead of one test from each heat in each heat-treatment load.

Specimens showing defects while being machined or prior to testing may be discarded and replacements shall be considered as original specimens.

Results obtained from these tests shall be reported to the purchaser or his representative.

Impact test shall be carried at (-20 °C) and shall have minimum Average 80J and minimum Individual shall be 60J

7.2.4 Elongation:

Test pieces of 8 inches shall have the following minimum elongations
Longitudinal Elongation: 25%

7.2.5 Hardness

Vendor shall submit the expected range of pipe body hardnesses (minimum, average and maximum) with the Bid for review and approval by the Company prior to Vendor/Sub-Vendor of the line pipe.

For seamless pipe material, a hardness survey shall be carried out on a macro section taken from one end of the selected pipes for production testing. The survey shall be carried out using a 10Kg load in accordance with BS 427: part 1 and shall consist of a complete traverse across the full thickness of the macro section with indentations spaced at 2 mm to include indentations at both the internal and external surfaces (the survey on the internal and external surface shall be carried out at 1.5mm from the edge).

The maximum allowable hardnesses shall not exceed those given below

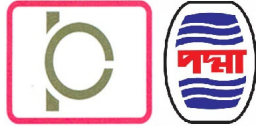
Pipe Location	Max Hardness (Hv10)
Internal Surface	250
External Surface	250

7.3 Chemical Requirements

7.3.1 Composition

Vendor shall submit its proposed aim chemistry and range for the product and ladle analysis at tender submission for review. The proposed composition shall indicate the contents of all intentionally added alloying elements, residual elements, and total nitrogen content. Vendor shall advise Company whether any other elements are added that could affect the weldability

The chemical composition of each heat of steel on product analysis shall be in accordance with API 5L requirements.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	14 OF 19

7.3.2 Chemical Analysis

For heat analysis and product analysis, all the elements shall be analysed and reported, even if those are not purposely added but are present as residuals only.

The steel shall have a carbon equivalent (C.E.) greater than or equal to 0.35 and less than or equal to 0.43 as calculated from the product analysis, in accordance with the following formula:

$$C. E. = C + (Mn/6) + (Cr+Mo+V)/5 + (Ni+Cu)/15$$

The maximum yield strength shall not exceed the specified minimum values by more than 14.5 Ksi (100N/mm² or 360~460MPa) and the maximum UTS shall not exceed 150N/ mm²(460~610 MPa), the yield strength to tensile strength ratio shall not exceed 0.89. A stress/strain curve for each test shall be retained and submitted as part of the as built documentation.

7.3.3 Heat Analysis

Where the steel mill is not a part of an integrated pipe mill, heat analysis shall be reported by the Vendor/Sub-Vendor prior to start of production.

7.3.4 Product Analysis

Two pipes per heat per heat (furnace) shall be analysed. Product analysis shall be carried out from finished pipes.

7.3.5 Recheck Analysis

Recheck analysis shall be as per API Spec. 5L. However, during individual testing, If the product analysis fail to meet the requirements, the 6.3.5 and 6.1 recheck analysis shall be performed.

7.3.6 Test Reports

The Vendor/Sub-Vendor shall furnish Test results of all specified chemical analysis.

7.4 Other Requirements

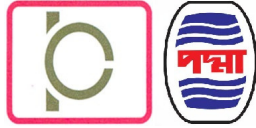
7.4.1 Hydrostatic Test

Each length of pipe shall be hydrostatically tested in the mill by the Vendor/Sub-Vendor. Each pipe shall withstand the test pressure without any sign of leakage.

7.4.2 Test Pressure

The test pressure for hydrostatic test shall be as follows (whichever is more stringent):

- i) Hoop stress generated is at least 90% of SMYS of the line pipe material computed as per the formula given in API 5L, without end compensation factor. OR



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	15 OF 19

- ii) Hoop stress generated is at least 95% of SMYS of the line pipe material computed as per formula given in API 5L, with end compensation factor.

7.4.3 Duration

The test pressure shall be held for a minimum duration of 15 seconds.

7.4.4 Measurement and Recording

All pressure gauges used for measurements shall be calibrated by using a Dead Weight Tester by the Vendor/Sub-Vendor at the beginning of each shift. Vendor/Sub-Vendor shall furnish all calibration reports / certificates to the Client for verification.

7.4.5 Certificate

Vendor/Sub-Vendor shall issue a certificate attesting that each pipe has been tested satisfactorily in accordance with the specification.

7.4.6 Burst Check

One pipe from the entire lot covered under the project scope shall be selected for carrying out burst test. The pipe with the lowest wall thickness shall be selected for this purpose.

The Vendor/Sub-Vendor shall perform the burst test and record the hydrostatic pressure at failure and furnish the results to the Client.

7.4.7 Magnetization Checks

Max magnetic effect shall not be more than 15 Gauss.

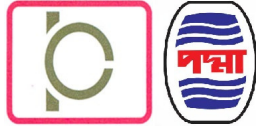
8.0 VISUAL AND DIMENSIONAL INSPECTION

Visual examination of the total inside and outside surfaces including welds shall be carried out on each pipe.

Pipes furnished to this specification shall be free from unacceptable defects and shall have a workmanlike finish. Any sharp deformations are unacceptable. Minor defects may be removed by grinding and / or polishing, Provided that a smooth curved surface is maintained and that the wall thickness is not decreased below the specified minimum.

Surface quality shall conform to API 5L plus the following additional requirements:

- i) Laminations in the weld bevel area shall be removed completely.
- ii) All silvers and scabs shall be removed by grinding provided that the wall thickness is not reduced below the nominal wall thickness proven by UT.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	16 OF 19

iii) Sharp-edged imperfections shall be considered as defects regardless of depth. Dents, bulges and flat areas shall not be allowed. Any imperfection exceeding 5% of the nominal wall thickness shall be considered a defect. Grinding tolerance up to 2% shall be permitted to remove imperfection. All gouges deeper than 0.8 mm shall be considered defects.

8.1 Dimensional Inspection

All specified dimensions shall be checked on each pipe as per the requirements of this specification.

Recording of dimensional measurements shall be carried out, as a minimum, one every 50 pipes produced unless otherwise stated.

Additional wall thickness measurements shall be carried out in the ground areas except for cosmetic grinding.

8.1.1 Dimensional Requirements

8.1.1.1 Diameter and Out-of Roundness

i) Pipe inside Diameter (At Pipe Ends)

The pipe diameter (ID) shall be measured with suitable gauges or tapes within 100mm from each end of each pipe in two perpendicular planes. The ID shall not deviate by more than ± 1.6 mm from the nominal ID at any place within 100mm from either end.

Nominal ID = OD - 2 x nominal WT.

Pipe Outside Diameter (Of Pipe Body) The outside diameter shall be measured with a diameter tape at one position, approximately in the middle section on 10% of the produced pipes.

Dimensional tolerances on outside diameter on the pipe body shall not exceed $\pm 0.50\%$ of the specified nominal outside diameter.

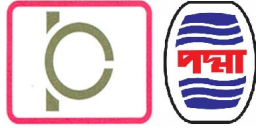
8.1.1.2 Out of Roundness

The out-of-roundness for a distance of 100mm from each end of each pipe and pipe body shall be checked. The difference in the measured values of internal diameter (ID Max - ID Min) shall be ≤ 0.015 nominal value. VENDOR shall propose a method for measurement and control of ovality.

The frequency shall be 1 in 20 pipes

Vendor/Sub-Vendor shall propose a method for measurement and control of ovality.

8.1.1.3 Wall Thickness



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	17 OF 19

All pipes shall be checked and results shall be reported and the same shall be submitted along with final documentation.

Vendor/Sub-Vendor shall guarantee specified thickness along the length of the finished pipe.

The tolerance for the wall thickness shall be -5%, + 15% on the specified nominal wall thickness.

Wall thickness shall be measured and recorded for each pipe by D-meter on both ends, minimum 8 locations on entire body.

8.1.1.4 Weight

Tolerance on weight shall be as per API 5L with the exception that no negative tolerance is acceptable.

8.1.1.5 Length

Pipes shall be supplied in nominal lengths of 12 meters with the minimum length of 11.5 meters.

8.1.1.6 Straightness

All pipes shall be checked for straightness. The deviation from the straight line shall not exceed 1.5 mm per meter of length with max. 15 mm per pipe length.

8.1.1.7 Jointers

Jointers are not permitted.

8.1.1.8 Pipe Ends

i) Squareness

The pipe ends shall be cut square in regard to the longitudinal axis within 1.6 mm across any diameter.

ii) Bevel Angle

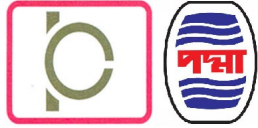
All pipes shall be supplied with beveled ends. Bevel angle shall not be less than 30° or more than 35° when measured from plan perpendicular to the axis of pipe.

iii) Root face out of plane tolerance

Root face out of plane tolerance shall be 0.5 mm max.

iv) Radial Offset of Strip / Plate Edges

All pipes shall be checked for offset and it shall be measured and recorded. In case, there is any change in the bevel tool/machine, test shall be repeated for at least one pipe or till the offset is within acceptable limits and only then regular production shall be restarted.



CONSTRUCTION OF JET A-1 UNDERGROUND PIPELINE FROM PITOLGANJ TO KURMITOLA AVIATION DEPOT (KAD) INCLUDING PUMPING FACILITIES AND JETTY ON TURN-KEY BASIS



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	18 OF 19

9.0 FIRST DAY PRODUCTION TESTS

Three lengths of completely finished pipe of first day's production from three different heats shall be selected at random for testing to verify that the manufacturing procedure results in the quality of pipes which are in complete compliance with this specification. The pipes thus tested shall be considered to be the test pipes required per heat or per lot as required in the relevant clauses of this specification.

Vendor/Sub-Vendor shall repeat these first day's production tests upon any change in the manufacturing procedure as deemed necessary.

The first day production tests shall be carried out on pipes for each wall thickness, each diameter and each grade of steel.

The Vendor/Sub-Vendor shall furnish to Client a report giving the results of all tests mentioned below.

The various tests to be conducted on each pipe shall be as follows:

a. Visual Examination

All pipes shall be examined visually for dimensional tolerances and apparent surface defects in accordance with Section 7 respectively of this specification (dimensional tolerances and apparent surface defects in section 7)

b. Mechanical Properties

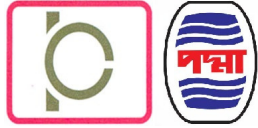
The following tests shall be conducted:

- i) Tensile tests shall be conducted on: 2 transverse base material specimens.
- ii) Each specimen shall be tested at -20°C for shear area and absorbed energy. The absorbed energy value at the 'Specified' temperature mentioned in Section 6.2.3 of this specification shall be used to evaluate the test.

10.0 INFORMATION TO BE FURNISHED BY VENDOR/SUB-VENDOR

The following information as applicable shall be furnished with respect to line pipe to be supplied.

- Name(s) of proposed Vendor/Sub-Vendor (s).
- Authorization letter (s) from Vendor/Sub-Vendor (s) where applicable.
- Authorization letter (s) from Vendor/Sub-Vendor (s) of steel plates, incase plate manufacturing facility is not an integral part of the Vendor/Sub-Vendor's pipe mill.



**CONSTRUCTION OF JET A-1 UNDERGROUND
PIPELINE FROM PITOLGANJ TO KURMITOLA
AVIATION DEPOT (KAD) INCLUDING PUMPING
FACILITIES AND JETTY ON TURN-KEY BASIS**



PROJECT NO.	P158	DOC. No.	P158-150-PL-SPC-0001-00	REV.	B04
UNIT NAME	Pipeline	PAHSE	Detail Design	SHEET	19 OF 19

- Record of similar supplies made earlier for both plates and pipes, giving complete details of diameter, thickness length, grade of plate / pipe, service, year, name of project, Name of Client to whom it is supplied and contact person. In particular, details of similar supplies made over the last five years shall be furnished.
- Descriptive technical catalog(s) of the proposed Vendor/Sub-Vendor(s).
- Copy of valid certificate of Authority to use API monogram, including first issued certificate.