

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED	PY 52 268
		PROJECT ENGINEERING & SYSTEMS DIVISION	Rev. No. 00
		TECHNICAL SPECIFICATION	Page 1 of 13
		PRE-FABRICATED RUBBER LINED PIPING PACKAGE	

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1.0 INTENT OF SPECIFICATION

- 1.1 The intent of this specification is to establish the minimum requirements of engineering, fabrication, assembly, quality, inspection, shop testing, shop painting, marking, packaging for preservation, weather protection and transportation for the Pre-fabricated Rubber lined Piping Package.
- 1.2 It is not the intent to completely specify all the details of fabrication. Nevertheless, the finished product shall confirm to highest standards of engineering & fabrication and shall be capable of performing in continuous commercial operation in a manner acceptable to the Purchaser and end customer.
- 1.3 The individual pipes and piping components which will be used as part of the Pre-fabricated Rubber lined Piping Package shall conform to the requirements of latest version of applicable ASME/IS dimensional standards and ASTM/IS material standards as specified in clause 4.1.

2.0 LEGEND / GLOSSARY OF TERMS

Purchaser : BHEL
Owner : BHEL's Customer
Bidder : Eligible vendors from whom offers are received against the Enquiry
Vendor : Successful Bidder of the Package on whom Order is placed

3.0 SCOPE OF SUPPLY / SERVICES

- 3.1 The following items / services shall be included in the scope of bidder. The list covers only the broader scope of supply & services and bidder shall refer and follow the detailed scope / requirements indicated in this specification and the relevant project's job specification:
- Pre-fabricated Rubber lined Piping Package (including loose piping material) fabricated in line with the philosophy detailed in Cl. No. 4.2 & 4.3 (exact quantity shall be as per Job Specification of the project)
 - Engineering, material sourcing / manufacturing, fabrication, assembly, surface preparation, shop painting, marking, packaging and transport of the pre-fabricated rubber lined piping package
 - Inspection & Testing at Vendor's works
 - Obtaining purchaser's approval on all applicable engineering documents
 - Documentation as specified in this specification including necessary statutory approvals, test certificates etc.
 - Coordinating and arranging applicable statutory approvals from government/ non-government bodies/ agencies.
 - Correction of mismatches found w.r.t approved drawings without any price implication. (to be carried out at site)
 - Rectification of damages caused during transportation without any price implication. (to be carried out at site)

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 IMRAN AHMAD	 G UDAY KUMAR	 SRIKANTH G	01.02.19

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PROJECT ENGINEERING & SYSTEMS DIVISION

TECHNICAL SPECIFICATION

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3.2

Any additional item, material, services etc., which are not specifically mentioned in this document, but required to make the pre-fabricated piping package complete in all respects, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/ applicable codes/ standards, good engineering practices, shall be deemed to be covered under the scope of this specification.

3.3

It will be the bidder's sole responsibility to specifically highlight any of the missing items required for the proper & intended use of the pre-fabricated piping packages as a part of their offer. In case nothing is highlighted by the bidder, it will be assumed that all the major items are included in the bidder's scope of supply for the desired operation.

4.0

TECHNICAL REQUIREMENTS:

4.1

APPLICABLE STANDARDS

Bidder shall follow the related standards referred herein and shall be of the latest edition prior to the date of purchaser's enquiry:

ANSI

American National Standards Institute.

ASME

American Society of Mechanical Engineers

ASTM

American Society for Testing and Materials

ASME B 31.1

Power Piping

ASME B 31.3

Process Piping

IBR

Indian Boiler Regulations

ASME B 36.10

Welded and Seamless Wrought Steel Pipe

ASME B 36.19

Stainless Steel Pipe

ASME B 16.1

Gray Iron Pipe Flanges and Flanged Fittings

ASME B 16.5

Pipe Flanges and Flanged Fittings

ASME B 16.9

Factory made Wrought Butt welding Fittings

ASME B 16.11

Forged Fittings, Socket Welding and Threaded

ASME B 16.25

Butt welding Ends

ASTM A105

Std Spec for Carbon Steel Forgings for Piping Applications

ASTM A106

Std Spec for Seamless Carbon Steel Pipe for High Temperature Service

ASTM A123

Std Spec for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A182

Std Spec for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, Valves and Parts for High Temperature Service

ASTM A234

Std Spec for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

ASTM A312

Std Spec for Seamless, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipes

ASTM A335

Std Spec for Seamless Ferritic Alloy Steel Pipe for High Temperature Service

ASTM A403

Std Spec for Wrought Austenitic Stainless Steel Piping Fittings

ASTM A530

Std Spec for General Requirements for Specialized Carbon and Alloy Steel Pipe

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ASTM A671	Std Spec for Electric Fusion Welded Steel Pipe for Atmospheric and Lower Temperatures
ASTM A672	Std Spec for Electric Fusion Welded Steel Pipe for High Pressure and Moderate Temperatures
IS 1239 Part-1	Specification for Steel Tubes, Tubulars and other Steel Fittings
IS 1239 Part-2	Specification for Steel Tubes, Tubulars and other Steel Fittings
IS 3589	Steel Pipes for Water and Sewage (168.3 to 2540 mm outside Diameter)

4.2 **FABRICATION METHODOLOGY OF PRE-FABRICATED RUBBER LINED PIPING**

- Pipes shall be manufactured as per applicable manufacturing QP for the project.
- For welding and rubber lining details, refer PY-DH-1-0000-0000-01-S00-R00
- The overall length of each pipe/fitting shall match as per drawing. Tolerance on overall length of each pipe/fitting inclusive of rubber lining (end to end) shall be -1 mm and +2mm
- Welded portions shall have a uniformly smooth surface finish without burrs, weld spatter, sharp edges, cracks, etc.
- Full penetration of welds to be ensured for all welds.
- For plate formed pipes, if a single plate of given size is not available then two plates (maximum) can be joined to build up the developed size and rolled
- For plate formed pipes, suitable staggering of longitudinal weld joints are to be done if the pipe length has to be built up.
- The longitudinal and circumferential welds shall be suitably located such that it does not interfere with the welding of stubs/branch nozzles.
- The surface finish for all machined surfaces are 12.5 microns
- Each fabricated item/fitting shall be supplied with flanged ends as indicated
- All flanges are flat faced flanges only as per drawing given by BHEL (PY-DH-1-0000-0000-02-S00-R00)
- All flanges are to be welded with their axes equally staggered
- Ends of flanges shall be exactly perpendicular to the axis of the pipe
- Flanges are to be welded before rubber lining in such a way that the axes (on which the holes are staggered) are maintained the same on a common axis on either side of pipe/fitting
- Fabrication of flanged pipes/fittings shall be pre-assembled at shop to ensure the matching of adjacent items wrt matching flange holes. In addition, the location of branches, bends, etc. are to be positioned as per the drawing to ensure continuation of piping in other directions.
- All sharp edges to be rounded off (R=3mm) and weld shall be finished round and smooth before applying rubber lining
- Inspection and testing shall be as per manufacturing QP
- Rubber lining to be applied after all processes like machining, cutting, welding, grinding, etc.
- Pipes are coated inside with Rubber lining. Refer CL 4.3 for details.
- Welding, gas cutting or gouging after rubber lining are not allowed.
- For painting, refer applicable painting scheme for the project
- Total weight indicated in Bill of Material are of MS Pipe and fittings only.Price bid format does not include weight of rubber lining and end protection covers.Vendor to consider complete fabrication of piping spool along with Rubber lining and quote unit price accordingly.**
- Vendor shall furnish the supply length details of each pipe while delivery to accommodate the same in Engineering drawing.- covered in Before dispatch

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24. For packing & shipping details, refer Cl 8.0 of this document.

4.3 NOTES FOR RUBBER LINING

1. All pipes with flanges and all flanged fittings except elbows/bends of the sizes NB100 and above are to be lined with **5mm** thick rubber (as specified in the drawing). For elbows/bends, at the curvature, **8mm** thick rubber lining to be provided and shall be smooth finished to **5mm** at the straight ends and the elbow flanges.

2. Type of Rubber : Refer PEMC-07395

3. The number of plies of lining shall be decided by vendor.

4. Properties of Rubber: Refer PEMC -07395

5. Rubber lining to be applied after all processes like machining, cutting, welding, grinding, etc.

6. All sharp edges to be rounded off and weld shall be finished round and smooth before applying rubber lining.

7. The lining applicator shall submit data on the physical properties and characteristics of all rubber compounds to be used, to BHEL for review and approval as well as the procedure for lining application, curing, testing and quality control.

8. Surface preparation for Rubber lining :

8.1 All metal surfaces to which rubber is to be adhered must be clean and free from surface defects. All inside weld seams shall be ground smooth, all burrs removed and all construction scars repaired.

8.2 Degreasing Oil or grease attached on the interior surface of the piping component shall be removed by heating / pre curing at 100degC for 30 minutes in an Autoclave.

8.3 All metal surfaces to be lined shall be abrasive blast cleaned to a white metal condition (SA 2 ½ Grade Surface finish) in accordance with steel structures painting council specification SSPC-SP5

8.4 Care must be exercised to avoid contamination of the freshly blasted surface

8.5 Immediately after blast cleaning all loose abrasive and dust shall be removed from the surface by brushing, blowing or vacuuming.

9. Liner application

9.1 No rubber stock shall be applied when the ambient temperature of the work is below 20° C or below the dew point of the surrounding air. Adhesive shall not be applied when the surrounding air has either a relative humidity above 85% or a temperature below 20° C. Instructions for measurement of dew point relative humidity and surface temperature are contained in SSPC-PA1-74.

9.2 The rubber stock shall be joined with a 45 degree skived edge overlapping at least 3-6 times of the rubber thickness (max 32mm)

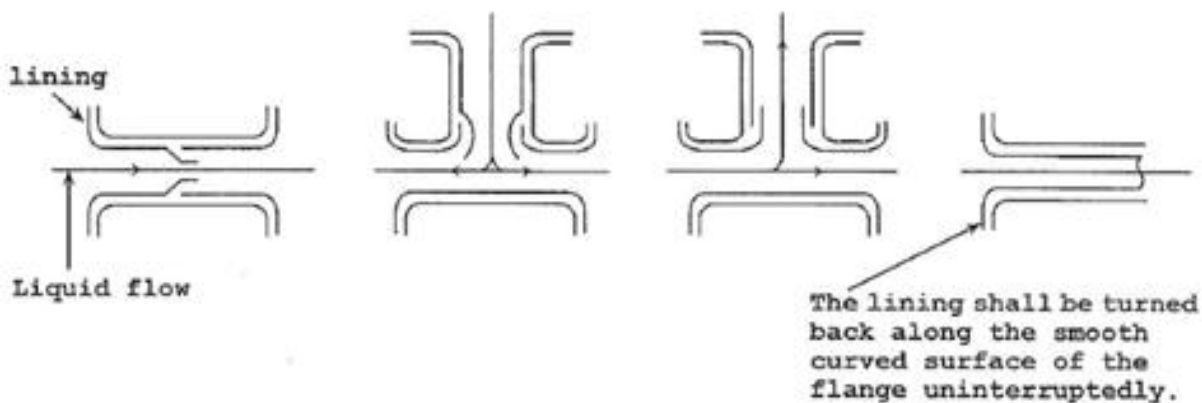
9.3 No circumferential seams are allowed within the pipe bore of straight-run pieces unless the bead shall be finished

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- 9.4 The rubber stock shall be rolled out over the entire face of the flange where possible. No seam will be allowed at the junction of the pipe or flange. A seam will be permitted on the flange face, provided the seam is buffed smooth.
- 9.5 The rubber lining work shall be done by generally accepted techniques and tools that no air is trapped and air behind the lining should be removed completely.
- 9.6 The fitting shall be furnished with the flange ends, with the liner overlaying the flange face inside the bolt circle

10. Rubber jointed portions

- 10.1 The joint of two rubbers (if applicable) shall conform to the following



- 10.2 The arrow shall be painted on the outside of the pipe with white paint in accordance with the direction of the flow

11. Vulcanization

- 11.1 All rubber lining pipes shall be vulcanized by the saturated steam in an Autoclave. The required pressure, temperature and vulcanizing hours shall be chosen for the vulcanization of each rubber lining by Vendor to achieve desired properties.
- 11.2 If the hole to ventilate the air behind the lining is necessary to avoid air pockets, it shall be made by the fabrication of the rubber lining.

12. Curing

- 12.1 The curing procedure to be used shall be the responsibility of the vendor.
- 12.2 The method used shall ensure complete cure of the rubber stock and desired physical properties.

13. Test sample

- 13.1 A test sample shall be prepared along with each autoclave load of pipe in order to determine the adhesion of the rubber to the metal and to test the durometer of the rubber. A test sample is also required whenever a different autoclave load of adhesive or rubber stock is used.

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13.2

This test sample shall be prepared in the same manner as the pipe, coinciding with each lining operation i.e., surface preparation, cementing, rubber application and curing.

13.3

As for “Physical Testing Method for Vulcanized Rubber”, the test piece shall be prepared and tested in accordance with as per applicable Codes like ASTM/ IS/BS/ DIN.

13.4

The minimum acceptable adhesion shall be as per IS4682-Part 1. The vendor shall submit certified test results of the post-cure, durometer hardness and adhesion test to the contractor for each sample.

13.5

Failure to meet the minimum standard of this test will be the basis for rejection of the pipe lot lined with the same batch of materials and cured in the same autoclave load with the test sample.

14. Patch Repairing

14.1

Where patch repairing is required rubber lining, will be removed up to a point where lining is satisfactory and has firm adhesion to the metal. The metal will be cleaned lining edge skived to 45 degree cement applied and rubber stock.

14.2

The decision as to whether patching or relining is required shall be by mutual agreement between BHEL and the contractor.

14.3

No patches are permitted on flanges faces

14.4

All cured patches shall meet the requirements specified for the original lining material.

5.0 SPECIAL INSTRUCTIONS TO BIDDER

5.1

This specification shall be read in conjunction with Project’s Job Specification for Pre-fabricated Piping Package. In case of any discrepancy arising between this specification, applicable standards and the job specification & its enclosures, it shall be bidder’s sole responsibility to clearly bring out/ highlight the same distinctively in his pre-bid queries within 6 working days from the receipt of enquiry, so as to enable purchaser to furnish their decision/ clarification. If such issues/ requirements are not duly addressed by bidder during the pre-bid stage and if such issues/ requirements are observed later during order execution stage, it shall be binding on the bidder to comply with the final decision made by the purchaser subsequently, without any cost, delivery, or any other commercial implications.

5.2

Any other specific fabrication requirement which is mandated as per governing design code or statutory requirements, but not listed elsewhere in this specification or its enclosures shall be deemed to be included in the basic price quoted by the bidder.

5.3

Bidder to quote strictly as per BHEL’s price format. Any tampering/ modification/ change of the BHEL’s price format is not allowed and the bidder’s offer is liable for rejection.

5.4

Compliance with this specification shall not relieve the bidder of the responsibility of producing pre-fabricated rubber lined piping package of proper design, materials and workmanship to meet the specified operating conditions.

5.5

The design information, specifications and datasheets etc. indicate only the minimum requirements and are intended to enable Bidders to ascertain the extent of the work

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		involved. Bidders are expected to supplement the information included in this specification as required and submit a comprehensive bid. 5.6 Bidder shall provide replies / clarifications within 4 working days from the date of the queries / comments raised by Purchaser, during technical scrutiny of bidder's offer and execution of the order. Any further delay will be seriously viewed by the purchaser and bidder's offer may not be considered for evaluation. 5.7 Drawings / documents attached with the enquiry are preliminary & may be revised at the time of placement of order. The percentage limitation of the variation in weight of the package (on individual line items), from the Tender stage to post order, shall be as specified in the Job specification. Bidder shall make a note of the same while submitting the bid. 5.8 Unit price quoted by the bidder in the price bid format / finalized during the reverse auction process, shall be binding on the vendor till successful execution of the order and to settle the final price of the package after taking care of the subsequent variations (if any) as per clause no 5.7. 5.9 Gross Weight of the Pre-fabricated Rubber lined piping package at the time of enquiry is arrived at by considering the unit weights of the individual piping components as per the applicable standards. These unit weights shall be binding on the successful bidder to arrive at the final weight of the package that is supplied. No mil tolerances for pipes shall be considered for finalizing the weights of package for final payment. 5.10 Before Code-1 approval of the pre-fabricated rubber lined piping package, modification arising in drawing, to suit the engineering requirements and not calling for any additional material shall be borne by vendor without any additional price implication, commercial implication and any delivery extension. 5.11 The final fit-up of the piping spools and fittings at site as per the approved drawings, shall match 100% without any deviation. Any mismatch shall be corrected at site by the Vendor without any price implication, commercial implication and any delivery extension. 5.12 It is vendor's sole responsibility to clearly bring out/ highlight any missing information on the final drawings issued for fabrication before start of fabrication activity so as to enable the purchaser to furnish their decision/ clarification. Only after the receipt of clarification in writing from purchaser, successful bidder should proceed with the manufacturing / fabrication of the relevant items. 6.0 DOCUMENTATION 6.1 ALONG WITH THE OFFER Bidder shall submit the following documents / drawings along with the offer, with respect to every item of the Purchaser's specifications. Any offer not confirming to this requirement is liable for rejection. ➤ Copy of purchaser's specification (Technical specification, Job Specification and all Annexures) and Check list duly stamped & signed by the Bidder. ➤ All the drawings furnished along with the enquiry duly stamped & signed by the bidder. ➤ Deviation list, if any, in the format attached with this specification (In case of no deviation, 'NIL' to be mentioned in the format, duly signed and to be submitted along		

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		with offer). Offer without deviation list will not be evaluated & shall be liable for rejection. 6.2 AFTER PLACEMENT OF PO BEFORE START OF FABRICATION 6.2.1 Purchaser shall issue the final drawings to successful bidder post order within 7 working days from placement of Order. 6.2.2 The Spool numbering philosophy shall be discussed and agreed mutually between vendor and purchaser, after placement of PO. 6.2.3 Vendor shall review all the drawings and shall prepare and submit the following (editable copies prepared in AutoCAD/Excel/Word) for Purchaser's approval within 10 working days after receipt of Engineering Isometrics: ➤ Fabrication drawings with all the spools clearly marked. A spool table with the weights of the individual spools to be indicated. ➤ Comprehensive Quality Assurance Plan. This Q.A. Plan is subject to approval by Purchaser and/or owner (The Q.A. Plan shall be comprehensive & shall include all inspection & test requirements of material, manufacturing, painting, packing, check points as per approved drawings and BOM) 6.2.4 Vendor shall start fabrication only after receipt of approval from the purchaser on the documentation submitted by the vendor. 6.3 BEFORE DISPATCH 6.3.1 The following documents / drawings shall be submitted by vendor during final shop testing & before dispatch of the Piping pre-fabricated package: ➤ Final as-fabricated drawings ➤ Guarantee and all test certificates for the pre-fabricated spools and material test certificates for all the input raw materials for review and acceptance by purchaser and / or owner as per approved QAP. ➤ Statutory approvals / certificates (including for those items procured from sub-vendors) 6.4 AFTER DISPATCH Vendor shall furnish the details like LR numbers, Invoice details, Weight details etc for all the dispatches. The data shall be furnished for every individual spool number / part number. Same shall be furnished in a spread sheet progressively as per schedule of dispatches. 6.5 SUBMISSION & REVIEW OF DOCUMENTS POST ORDER 6.5.1 Revisions in drawings/ documents shall be clearly marked within clouds or Triangle mark indicating the revision mark. Revisions without clouding shall not be considered, reviewed and approved. All the revised drawings / documents shall be associated with comments compliance report.		

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6.5.2

The approval and /or review by the purchaser / owner shall not be construed by the bidder as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and drawings.

7.0

SURFACE PREPARATION, PAINTING & COLOUR

7.1

All the pre-fabricated piping, pipe fittings and any other loose material shall be properly cleaned, surface prepared and painted before dispatch refer clause 4.2 and 4.3

7.2

Surface preparation, Painting and Colour shall be as specified in the Job specification.

8.0

DISPATCH & SHIPPING

8.1

All packages shall properly be packed for transportation by ship/ rail or trailer.

8.2

The packages may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage for adverse atmospheric conditions such as high humidity, salinity, heavy rains etc.

8.3

The following minimum packing procedures shall be followed:

➤ Prior to shipment, Vendor to ensure that all items are dry, clean and free from moisture, dirt and loose foreign material of all kinds.

➤ All the items shall be protected from rust, corrosion, and mechanical damage during transportation and shipment.

➤ After rubber lining and painting, ends shall be protected with press fit plastic end cap, matching the corresponding flange OD. If any other material to be used for end cap, then vendor to get confirmation from BHEL and ensure that the material used for end caps neither damages the rubber lining nor the end cap gets damaged during packing and transportation.

➤ All the items shall properly be packed to prevent damage during transit, loading, unloading and storage.

➤ Pipe spool / fittings ends shall be suitably protected against damage and ingress of foreign material including water, and the protectors shall be securely and tightly attached.

8.4

All the pipe spools shall be packed in wooden boxes. All the loose items shall be packed in gunny bags. Three wooden boxes / gunny bags shall be numbered and the same shall be linked to the LR numbers while furnishing the dispatch information as per clause no 6.4.

8.5

It shall be bidder's sole responsibility to protect all the material during period of transportation against corrosion, incidental damage due to adverse atmospheric conditions, rough handling in transit including delays in transit. Bidder shall be responsible for any damage to material due to above reasons and shall take necessary corrective action at site without any price implication.

9.0

DEVIATIONS TO SPECIFICATIONS

9.1

Bidder to note that all the applicable deviations / clarifications shall be listed separately in the format attached with the job specification and submitted to BHEL as a part of technical bid. All such applicable deviations / clarifications shall have cross reference to the

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		specifications / annexures with proper reasons for the deviations for purchaser's consideration. Any such applicable deviations /clarification not listed under the above section, even if reflected in any other portion of the bidder's proposal shall not be considered applicable. 9.2 Except for those deviations/ variations covered as a part of pre bid clarification, it will be the responsibility of the bidder to fully meet the intent and the requirements of the specification within the quoted price. No other deviation whatsoever from this specification, except for those have been specifically agreed by purchaser as a part of pre-bid clarification shall be considered. 9.3 In case the bidder considers requirement of any other accessories / auxiliaries essential for safe and satisfactory operation of the equipment, he shall recommend the same along with reasons in a separate section as a part of pre-bid query to enable purchaser take a suitable decision on the requirement of the same. 9.4 Information like Bill of materials (BOM) and typical specifications etc., enclosed by the bidder as a part of their bid, shall be retained for information only and shall not be referred by contractor as contractual agreement. No implication shall be admissible on the basis of these documents during any stage of contract execution. 10.0 QUALITY REQUIREMENTS, INSPECTION & TESTING 10.1 Inspection shall be either by purchaser, owner or purchaser's appointed third party agency as per the approved QAP. 10.2 Vendor is responsible for performance of all tests and inspection to ensure that the supplied package meets the requirements of this specification. Vendor may use their own facilities or any approved laboratory acceptable to purchaser / owner. Purchaser / owner reserves the right to inspect and witness any test prior to dispatch and as per "HOLD-POINTS" defined in the QA plan. Vendor shall give reasonable notice in writing of the date and place of any test and inspection by purchaser / owner. 10.3 Unless otherwise specified, BHEL reserves the right to test and inspect all the items at the Bidder works. 10.4 Vendor to produce Welder Qualification Certificates for purchaser's review before start of fabrication. Alternatively purchaser may ask for Welder Qualification Testing at shop, which shall be witnessed and certified by a qualified third party agency and shall be reviewed by Purchaser/TPIA. 10.5 IBR qualified welders are required for IBR Piping fabrication. Vendor to produce the certificates for purchaser's review before start of fabrication. 10.6 Witness Inspection Vendor shall offer all the items for pre-dispatch inspection and the following tests/ checks shall be carried out as a minimum: ➤ Physical and Dimensional Check. ➤ Review of all certificates and test reports as indicated at 10.7 below. ➤ BOM check ➤ Painting workmanship and finish ➤ Additional tests, if any – As per Job specification		

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10.7 Testing Procedure

Test procedure shall include but not be limited to the following list of tests. All the tests being conducted shall clearly be brought out in the Quality Assurance Plan (QAP) by Vendor.

10.7.1 Dimensional and physical check.

10.7.2 NDT on the Welds

The welds shall be tested per the document “Details of Welding, Testing & Inspection” provided in the Job specification.

10.7.3 Rubber lining test

- Visual and electrical High frequency Spark test shall be conducted on all rubber lined pipes and fittings surface both before and after curing.
- High voltage spark test of all surfaces shall be made with the voltage selected for the particular rubber compound. In any case, the minimum voltage shall be 5 KV/mm of thickness. Testing and inspection methods (ITP) shall be submitted to the contractor for approval.
- Visual examination of all surfaces shall be made to detect blisters, wrinkles or loose places.
- Minor leaks or defects detected by the above method may be repaired by patching. Total relining will be required for major defects.
- Durometer hardness shall be determined after curing. Certified test results shall be submitted by the subcontractor.
- Evidence of poor workmanship shall be the cause for rejection.
- The contractor reserves the right to inspect the work in progress as well as witnessing the final inspection/testing, and reserves the right to choose Third Parties for inspection.

10.7.4 Hydro test on piping spools before rubber lining shall be conducted by supplier at their works. Quality Inspector will witness 10% of spools on sampling basis. However, supplier must do 100% hydro testing of spools.

11.0 QUALITY ASSURANCE PLAN (QAP)/ INSPECTION AND TEST PLAN (ITP)

11.1 It is a document generated by the supplier with complete listing of various inspection stages, tests, material certification requirements and parties involved with their respective roles in inspection; indicating the requirements of Hold (H),Witness (W) Inspection, and Review (R) of Quality control documents / records for an item. QAP and ITP are considered synonymous.

11.2 The bidder shall submit inspection & testing Quality Assurance Plan for all critical raw materials, shop manufacture items, sub-vendor supplied items, shop testing of items etc. Guidelines for preparing the QAP will be submitted as part of the Enquiry. Bidder to submit their QAP strictly according to these Guidelines, without which their offer is liable for rejection.

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11.3 The shop QAP shall be approved by Purchaser / Owner and may indicate hold points. The vendor shall furnish minimum two weeks’ time for all such shop inspection / testing - hold points.

11.4 All shop testing shall be conducted by vendors at their own cost and measuring and testing equipment shall be made available by them and shall have all valid calibration certificate.

11.5 All material test certificates and inspection test reports shall be submitted to Purchaser / owner for review / approval and final dispatch clearance note.

11.6 The following definitions are provided for reference of the bidders while preparing QAP.

11.6.1 **HOLD POINT:** A Hold Point is a stage designated in the ITP/QAP, which requires Witness Inspection by TPIA and / or PMC/ OWNER before supplier can proceed with further processing, except where prior written permission for further processing or waiver of Witness Inspection by PMC / OWNER is obtained.

11.6.2 **WITNESS POINT:** A Witness point is a stage designated in the ITP/QAP, which requires witness inspection by TPIA, PMC and / or Owner. EPCC/LSTK CONTRACTOR / Supplier shall perform the activity after proper notification has been given to TPIA / PMC and OWNER for witnessing the activity. The CONTRACTOR/ Supplier is not obliged to hold further processing, if TPIA / PMC and / or OWNER are not available to witness the activity or does not provide the comments before the date notified with proper notification period.

11.6.3 **REVIEW POINT:** A review point is a stage designated in the ITP/QAP, which requires the concerned agencies i.e. Purchaser / TPIA / PMC / Owner, to verify the documents for their correctness and to confirm that the said documents meet the requirements laid down.

11.6.4 **THIRD PARTY INSPECTION AGENCY (TPIA):** Third Party Inspection Agency means an inspection agency appointed by the Purchaser / EPCC / LSTK Contractor for carrying out Inspection and witness of tests of items and material being procured by the Purchaser for the Project.

11.6.5 **INSPECTION CATEGORY:** Inspection category determines the scope of Inspection for the Supplier, TPIA, PMC / OWNER for various items and material depending upon their use, serviceability, safety criteria and complexity.

12.0 PRICE BID FORMAT

12.1 Bidders to quote strictly as per BHEL’s price format. No other format is acceptable. Any tampering/ modification/ change of the BHEL’s price format is not allowed and the bidder’s offer is liable for rejection.

12.2 All the items included in the price bid format shall be quoted as per tender specification and pre-bid clarifications, if any. Responsibility of ensuring correctness & completeness of scope of supply as per specification requirement solely lies with bidder.

12.3 The Priced Bid shall be submitted in Original (without any copy) duly signed and stamped on each page in a separate sealed envelope super scribing “Price Bid–Do not Open”.

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12.4 Bidder shall confirm the submission of the unpriced bid as part of their technical offer.

13.0 VARIANT TABLE

Var No	Project	Package Description	Project's Job Specification	Material Code
01	TCL Mithapur	TCL-RUBBER LINED PIPING PACKAGE	PEMC-07395	PY9752268013

14.0 RECORD OF REVISIONS

Rev No	Date	Revision Detail	Revised by	Approved by
00	15.03.2019	FIRST ISSUE	 Imran	 Srikanth G

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