

Technical PQR of GI Pipe for Yadadri project

Sl. No.	PQR Description	Supporting documents to be attached
1	The bidder should have successfully supplied 5KM GI pipe to any public sector enterprises or state government utility or multinational company.	Copy of proof of supply of GI pipe to be submitted (Purchase order, receipted LR, Material dispatch clearance certificate or any other document acceptable to BHEL)

DGM (TBEM)

Vichadli
05.10.21

Sr. DGM (TBEM)

Sampaw
05.10.21

AGM (TBEM)

3127011
05/10/21



BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-387-316-021	Rev. No.	01		Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	NK	SKS	AG
TITLE	GI PIPE			SIGN	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
				DATE	10.05.22	10.05.22	10/5/22
				GROUP	TBEM		
CUSTOMER	TELANGANA STATE POWER GENERATION CORPORATION LTD						
PROJECTS	400 kV Switchyard at 5X800MW Yadadri TPS						

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Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS			
				Distribution	TBMM	TBQM	TBCM	TBTS
				Copies	2	-	-	-

SECTION - 1

1.1 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of GI Pipes and its fittings to site.

The specification comprise of following sections:

- Section-1 : Scope, Bill of Quantities & Project specific technical requirements.
- Section-2 : Specific technical requirements for the equipment under scope of supplies.
- Section-3 : General technical requirements for all equipment's under the Project.
- Section-4 : Equipment Data Sheet

In case of any discrepancies between the requirements mentioned under different Sections, order of precedence shall be in the same order as listed above.

No deviation from the requirements specified in various clauses of this specification shall be allowed. A certificate to this effect shall have to be furnished along with the offer.

The equipment is required for the following project's:

- Name of the Customer : Telangana State Power Generation Corp. Ltd.
- Name of the Project1 : 400 kV Switchyard at 5X800MW Yadadri TPS
- Consultant : TCE Bangalore

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the enquiry.

1.2 SPECIFIC TECHNICAL REQUIREMENTS

1. Pipes shall be rigid, hot-dip galvanised, furnished in standard length of 5 metres, threaded at both ends.
2. Each piece of Pipes shall be straight, free from blister and other defects, internal surface shall be of smooth finish and covered with capped bushings at both ends.
3. Pipes shall be provided with necessary fittings & accessories. Pipes shall be manufactured by electric welding process. These pipes shall be of heavy duty class as per IS:1239 and shall have ISI mark. Pipes shall be supplied in lengths of approximately 5 metres. Pipes, fittings & accessories shall be hot dip galvanised both on inside and outside.
4. The bends shall be used in switchyard application. The bends should be long bend and suitable for supplied pipes. The bend shall comply relevant standard.

1.3 BILL OF QUANTITIES

Sl. No	Description	Unit	Qty.
1.	50 MM DIAMETER HEAVY DUTY GI RIGID PIPE (WITH SOCKET AT ONE END FOR EACH CUT	Mtr.	13500

	LENGTH)		
2.	90 DEG. BEND FOR 50 MM DIAMETER GI RIGID PIPE	Nos.	2000
3.	T BENDS FOR 50 MM DIAMETER GI RIGID PIPE	Nos.	200
4.	100 MM DIAMETER HEAVY DUTY GI RIGID PIPE (WITH SOCKET AT ONE END FOR EACH CUT LENGTH)	Mtr.	11500
5.	90 DEG. BEND FOR 100 MM DIAMETER GI RIGID PIPE	Nos.	2800
6.	T BENDS FOR 100 MM DIAMETER GI RIGID PIPE	Nos.	350

Notes:

- 1) The quantity may vary +/- 30% during contract stage.

1.4 TESTING

The tests shall be conducted on Galvanized steel pipe as per respective Clause of IS 1239-1990 (Part I). Test Reports shall be furnished for approval.

Test reports as per relevant IS shall also be submitted for 90 deg. bends and Tee bends for approval.

In case, test reports are not found suitable by BHEL/TSGENCO, such tests shall be carried out by bidder without any cost/delivery implication.

1.5 QUALITY PLAN

The bidder to follow BHEL/ TSGENCO approved quality plan at contract stage.

1.6 TITLE BLOCK

The drawings / documents submitted shall be project and product specific and shall incorporate following details:

- a) Project Name : 400 kV Switchyard at 5X800MW Yadadri TPS
- b) Customer Name : Telangana State Power Generation Corp. Ltd.
- c) Consultant Name : TCE, Bangalore
- d) Contractor : BHEL
- e) Customer LOA no. : ED/TPC/SE-III/YADADRI TPS(5X800MW)/D.No. 102/17, Dated: 17/10/2017

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SECTION – II

STANDARD SPECIFICATION

2.0 GENERAL

This section covers the standard technical specification for GI Pipe and its fittings.

2.1 APPLICABLE STANDARDS:

The Galvanized Steel Pipe shall conform to the following Indian Standards:

IS :228	Methods of Chemical Analysis
IS 1239 (Part 1) - 1990	Specification for Mild steel tubes, tubular and other wrought steel fittings(Part1-Mild steel Tube)
IS 1239 (Part 2) - 1992	Specification for Mild steel tubes, tubulars and other wrought steel fittings (Mild Steel Sockets Tubular and other wrought Steel Pipe Fittings)
IS 1387 - 1993	General requirements for the supply of Metallurgical Materials
IS 1894 - 1972	Methods of tensile testing of steel tubes
IS 2328 - 1983	Methods of flattening test on metallic tubes
IS 2329 - 1985	Methods of bend test on metallic tubes
IS 4711 - 1974	Methods of sampling of steel pipes, tubes & fittings
IS 4736 - 1986	Hot-dipped zinc coatings on mild steel tubes
IS 4740 - 1979	Code of practice for packaging of steel tubes
IS 10748 - 1995	Hot rolled steel strips for welded tubes & pipes

2.2 SPECIFIC TECHNICAL REQUIREMENTS:

2.2.1 FOR GI RIGID PIPE AND ITS FITTINGS:

Type and Material	<i>Galvanised Iron Rigid Pipe (GI Pipe)</i>	
Bore (diameter) of GI Pipe	<i>50 mm</i>	<i>100 mm</i>
Bend 1	<i>90° bend for 50 mm dia GI Pipe</i>	<i>90° bend for 100 mm dia GI Pipe</i>
Minimum wall thickness	<i>4.5 mm</i>	<i>5.4 mm</i>
Galvanizing	<i>As per IS-1239</i>	
Tolerance on thickness	<i>+ Not limited - 10 percent</i>	
Grade	<i>Heavy as per IS-1239</i>	
Cut Lengths	<i>5 meter (minimum)</i>	

2.2.2 TECHNICAL REQUIREMENTS

2.2.2.1 The galvanized iron pipes shall conform strictly to IS 1239 – 1990 (Part 1).

2.2.2.2 The zinc coating shall conform to 'Heavy Coating' as laid down in IS 4736 – 1986

2.2.3 TESTS

The tests shall be conducted on Galvanized steel pipe as per respective Clause Nos. of IS 1239-1990 (Part I). Type Test Reports shall be furnished for approval.

Test reports shall also be submitted for 90 deg. bends and Tee bends for approval and waiver

2.2.4 Tests on tubes and fittings

- (i) Physical and dimensional tests
- (ii) Leak tightness test
- (iii) Tensile and elongation test
- (iv) Bend test
- (v) Flattening test
- (vi) Galvanizing test
- (vii) Expansion test

2.2.5 MARKING AND PACKING

2.2.5.1 Before packing both ends of the tube shall have plastic capping. Pipe shall have BIS certificate marking as per cl 17.5 of IS: 1239 (Part-1).

2.2.5.2 Each tube shall bear legibly the identity of the source of Manufacture and class of tube through color bands as per IS.

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Project: 5x800 MW YADADRI THERMAL POWER STATION.
Customer: TELANGANA STATE POWER GENERATION CORPORATION LTD

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SECTION - 3

PROJECT DETAILS AND GENERAL SPECIFICATIONS

GENERAL TECHNICAL REQUIREMENTS

1.0 PROJECT DETAILS

Customer	:	M/s Telangana State Power Generation Corporation Ltd.
Project Title	:	5x800MW Yadadri Thermal Power Station
Project Location	:	Veerlapalem Village, Damercherla Mandal, Nalgonda District, Telangana
Nearest Railway station	:	Vishnupuram railway station.
Nearest Road Head	:	NH-9 is at 45km North SH-2 is at 7km South
Nearest Airport	:	Hyderabad (about 120 Km) Chief Engineer (O&M), 5X800MW Yadadri Thermal Power
Postal Address	:	Station, TSGENCO, Village - Veerlapalem, Mandal- Dameracheral, Dist. – Nalgonda, Telangana

1.1 STANDARDS

The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

The equipment to be furnished under this specification shall conform to latest issue (with all amendments) of specified standards.

In addition to meeting the specific requirement called for in Sections 1 and 2 of the Technical Specification, the equipment shall also conform to the general requirement of the applicable standards, which shall form an integral part of the specification. The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other. When the specific requirements stipulated in the specifications exceed or differ from those required by the applicable standards, the stipulation of the specification shall take precedence.



1.2 TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

All equipment being supplied shall conform to type tests and shall be subject to routine and acceptance tests in accordance with requirements stipulated under respective sections. Purchaser reserves the right to witness any or all the tests. The Manufacturer shall intimate the Purchaser the detailed programme about the tests at least three (3) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies. Purchaser reserves the option for getting any or all the type tests repeated on the equipment. The Manufacturer shall also submit type test procedure for approval of the Purchaser.

In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the technical specification or any/all additional type tests not carried out without any additional cost implication to the Purchaser.

The price of conducting all tests and additional type tests is deemed to be included in Bid price. In case any bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected.

The Purchaser, his duly authorised representative and/or outside inspection agency acting on behalf of the Purchaser shall have at all reasonable times free access to the Contractors premises or Works and shall have the power, at all reasonable times to inspect and examine the materials and workmanship of the Works during its manufacture or erection if part of the Works is being manufactured or assembled at other premises or works, the Manufacturer shall obtain for the Engineer and for his duly authorized representative permission to inspect as if the works were manufactured or assembled on the Manufacturer's own premises or works. Inspection may be made at any stage of manufacture, dispatch or at site at the option of the Purchaser and the equipment if found unsatisfactory due to bad workmanship or quality, material is liable to be rejected.

The Manufacturer shall give the Purchaser/inspector thirty (30) days written notice of any material being ready for testing. Such tests shall be to the Manufacturer's account except for the expenses of the inspector. Unless witnessing of the tests is virtually waived, the Purchaser/ inspector will attend such tests within thirty (30) days of the date of which the equipment is notified as being ready for test/ inspection, failing which the Manufacturer may proceed with the test which shall be deemed to have been made in the Inspector's presence and the Manufacturer shall forthwith forward duly certified copies of test reports in triplicate to the Inspector.

The Purchaser or Inspector shall, within fifteen (15) days from the date of inspection as defined herein, give notice in writing to the Manufacturer, of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The Manufacturer shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Purchaser/ inspector giving reasons therein, that no modifications are necessary to comply with the Contract.



When the factory tests have been completed at the Manufacturer's works, the Purchaser/ inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Purchaser/inspector, the certificate shall be issued within fifteen (15) days of receipt of the Manufacturer's Test certificate by the Engineer/ Inspector. Failure of the Purchaser/inspector to issue such a certificate shall not prevent the Manufacturer from proceeding with the Works. The completion of this test or the issue of the certificate shall not bind the Purchaser to accept the equipment should it, on further tests/ after erection, be found not to comply with the Contract. The equipment shall be dispatched to site only after approval of test reports and issuance of MICC by the Purchaser.

In all cases where the Contract provides for tests whether at the premises or at the works of the Manufacturer or of any Sub-Contractor, the Manufacturer except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Purchaser /Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Purchaser Inspector or to his authorised representative to accomplish testing.

The inspection by Purchaser and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Manufacturer in respect of the agreed quality assurance programme forming a part of the Contract.

The Purchaser will have the right of having at his own expenses any other test(s) of reasonable nature carded out at Manufacturer's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

The Purchaser reserves the right for getting any field tests not specified in respective sections of the technical specification conducted on the completely assembled equipment at site. The testing equipment for these tests shall be provided by the Purchaser.

1.3 MATERIAL/WORKMANSHIP

1.3.1 GENERAL REQUIREMENT

Where the specification does not contain characteristics with reference to workmanship, equipment, materials and components of the covered Equipment it is understood that the same must be new, of highest grade of the best quality of their kind conforming to best engineering practice and suitable for the purposes for which they are intended.

The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements



and shall be used throughout the design. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfil their required function. In general screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from purchaser.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall be interchangeable with, and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

1.3.2 PROVISIONS FOR EXPOSURE TO HOT AND HUMID CLIMATE

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew.

1.4 PROTECTION

- a) All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.
- b) All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- c) The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner.
- d) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

1.5 GALVANIZING

All ferrous parts including all sizes of nuts, bolts, Plain and spring washers, support channels, structures, shall be hot dip galvanised conforming to latest version of IS:2629 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvanized. Minimum weight of zinc coating shall be 610 gm/sq.mm and minimum thickness of coating shall be 85 microns for all items thicker than 6mm. For items lower than 6 mm thickness, requirement of coating shall be as per relevant ASTM.



1.6 INSPECTION AND TESTING

All tests and inspection of the equipment specified shall be performed to the extent and in the manner as stipulated in the relevant standards and in this specification. All type tests/routine tests/acceptance tests as specified shall be conducted in the presence of purchaser. Wherever equipment similar to the one being offered has already been type tested within 5 years from the date of opening the bid. Type tests done in an independent government laboratory or in the presence of representative of State Electricity Board or other reputed public undertakings, the type test reports of the same shall be submitted for scrutiny /approval. If these are found suitable and technically acceptable, conducting of type tests shall be waived off. Otherwise the subcontractor will have to carry out the type tests without any extra cost and without any delivery implications.

1.7 PACKAGING

Aluminium Tube shall be partially packed with Hessians cloths. Similar items shall be grouped and tied with steel wires/strip for convenient handling during transits.

MARKINGS

The following details are to be clearly indicated in the material forwarding documents:

- a) Name and address of the consignee.
- b) Purchase order number.
- c) Name of supplier/s.
- d) Description of equipment / material.
- e) Tare weight.
- f) Gross weight.

All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the purchaser, the Contractor shall also submit packing details/associated drawing for any equipment material under his scope of supply, to facilitate the purchaser to repack any equipment/material at a later date, in case the need arises, while packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage wagons and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Purchaser takes no responsibility of the availability of the wagons.



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1.8 HANDLING, STORING AND INSTALLATION

In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the purchaser or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented. Commercial use of switchyard equipment means completion of all site tests specified and energisation at rated voltage.

Contractor may engage manufacturer's Engineers to supervise the unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. Contractor shall unload, transport, store, erect, test and commission the equipment as per instructions of the manufacturer's supervisory Engineer(s) and shall extend full cooperation to them.

In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the purchaser.

Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.

Where assemblies are supplied in more than one section, contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Contractor shall also do necessary adjustments/alignments necessary for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning. Any equipment damaged due to negligence or carelessness or otherwise shall be replaced by the contractor at his own expenses.

Contractor shall be responsible for examining all the shipment immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. The Contractor shall submit to the purchaser every week a report detailing all the receipts during the weeks. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site. Any demurrage, pilferage and other such charges claimed by the transporters, railways etc. shall be to the Contractor' account.

The Contractor shall be fully responsible, for the equipment/material until the same is handed over to the purchaser in an operating condition after commissioning. Contractor shall be responsible for the maintenance to the equipment/material while in storage as well as after erection until taken over by Purchaser, as well as protection of the same against theft, element of such nature, corrosion, damages etc.

1.9 QUALITY

BHEL quality plan to be followed subject to TBEM / customer's approval.



1.10 DOCUMENTATION

All drawings shall be prepared in AutoCAD and ultimate documentation would include drawings/documents on CDs. All dimensions and data shall be in SI metric units.

All items of the equipment should be clearly identified by proper part nos. in the contract drawings. Such parts, which are to be dispatched to site from works in dispatchable units and are reassembled at site, should be marked by proper identification marks at works and indicated in the drawings and quantified. The shipping list should be sent along with the general arrangement drawings for engineer's approval. All the items of the shipping list should be identified in the drawing.

The drawing submitted by the supplier shall be reviewed by the purchaser as far as practicable within two weeks of receipt of drawings and shall be modified by the sub-contractor if any modifications and/or corrections are required by the purchaser. The sub-contractor shall incorporate such modifications and / or corrections and submit the final drawings for approval. Any delay arising out of failure of the subcontractor to rectify the drawings shall not alter the contract completion date.

Further work by the subcontractor shall be in strict accordance with these drawings and no deviation shall be allowed without the written approval of the purchaser.

All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at supplier's risk.

Approval of drawing or work by the purchaser/consultant shall not relieve the subcontractor of any of his responsibilities and liabilities under the contract.

In case of any modifications that may be necessary during erection or commissioning of the equipment, the subcontractor shall carry out modifications in the original drawing & submit 'As Built drawings' and required no. of prints thereof.

SECTION – 4

GUARANTEED TECHNICAL PARTICULARS

S/N	DESCRIPTION	DATA
1	Type of Pipe	
2	Applicable standard	
3	Details of material	
4	Grade / Class of Pipe	
5	Bore / Diameter of Pipe (mm)	
6	Minimum thickness of Pipe (mm)	
7	Tolerance on thickness (mm)	
8	Galvanising (Yes / No). If Yes, mention the Zinc Coating	
9	Length of Pipe (m)	

ANNEXURE - A
SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

<u>S.No.</u>	<u>Page No.</u>	<u>Clause No.</u>	<u>Deviation</u>	<u>Reason / Justification</u>
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Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date:

Tenderer's Stamp & Signature

ANNEXURE - B

CHECKLIST FOR GI RIGID PIPE

Put a tick mark on 'YES' if the specified requirement is met, OR put a tick mark on 'NO' if the specified requirement is not met; and give comments in the remark column.

1. TECHNICAL REQUIREMENTS

S/n	DESCRIPTION	DATA		YES / NO	REMARKS
1	Type of Pipe	<i>Galvanised Iron Rigid Pipe (GI Pipe)</i>		<i>Yes / No</i>	
2	Applicable standard	<i>IS 1239 (Part 1 & Part 2) - 1990</i>		<i>Yes / No</i>	
3	Details of material	<i>Galvanised Iron</i>		<i>Yes / No</i>	
4	Grade of Pipe	<i>Heavy as per IS-1239</i>		<i>Yes / No</i>	
5	Bore of Pipe (mm)	<i>50</i>	<i>100</i>	<i>Yes / No</i>	
	Bend 1	<i>90°</i>	<i>90°</i>	<i>Yes / No</i>	
6	Min. thickness of Pipe (mm)	<i>4.5</i>	<i>5.4</i>	<i>Yes / No</i>	
7	Tolerance on thickness (mm)	<i>+ Not limited - 10 percent</i>		<i>Yes / No</i>	
8	Galvanising	<i>610 gm/sq.mm</i>		<i>Yes / No</i>	
9	Min. cut length of Pipe (m)	<i>5</i>		<i>Yes / No</i>	

2. TESTS

1. Whether the offered items shall be tested as per relevant IS and test reports shall be provided for BHEL/customer approval.

YES / NO

2. In case, the reports are not found complete / valid at contract stage, such tests shall be carried out without any cost / delivery implication.

YES/NO

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