



EPC Contract Document

NLC India Limited
NLC Talabira Thermal
Power Project- 3x800 MW
Jharsuguda, Odisha

VOLUME: II-A
SECTION-VIII
QUALITY ASSURANCE REQUIREMENTS



Development Consultants Pvt. Ltd.



Vol. II-A/Section-VIII
Quality Assurance Requirements





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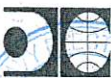
SECTION-VIII

QUALITY ASSURANCE REQUIREMENTS

1.00.00 QUALITY ASSURANCE PROGRAMME

1.01.00 To ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Contractor's works or at his Sub-Vendor's premises or at the Owner's site or at any other place or work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Owner/ Authorised representative after discussions before the award of contract. A quality assurance programme of the Contractor shall generally cover the following:

- a) His organisation structure for the management and implementation of the proposed quality assurance programme.
- b) Documentation control system.
- c) Qualification data for Contractor's key personnel.
- d) The procedure for purchase of materials, parts, components and selection of Sub-Vendor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- e) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls.
- f) Control of non-conforming items and system for corrective actions.
- g) Inspection and test procedure both for manufacture and all site related works.
- h) Control of calibration and testing of measuring and testing equipments.
- i) System for quality audit.
- j) System for indication and appraisal of inspection status.
- k) System for authorising release of manufactured product to the Owner.
- l) System for handling storage and delivery.
- m) System for maintenance of records.





- n) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed at Annexure-I to this section.

2.00.00 GENERAL REQUIREMENTS - QUALITY ASSURANCE

2.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured and tested at all the stages, as well as Services provided for erection, commissioning and testing shall be as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the Contractor for some of the major items is given in the respective technical specification. This is however, not intended to form a comprehensive programme as it is the Contractor's responsibility to draw up and implement such programme and reviewed by the Owner/Consultant. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Contractor, separately in the format attached at Annexure-I and will be submitted to Owner/Owner's representative for review. Schedule of finalisation of such quality plans will be finalised before award.

2.02.00 Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's Quality Control organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing.

2.03.00 Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control organisation, during various stages of site activities from receipt of materials/equipment at site.

After pipe lines have been laid and joined, the same shall be tested hydrostatically as specified in this section.

For Welded Joints, Non- Destructive Test (NDT) shall be performed as per relevant codes or mentioned elsewhere in the specification, whichever is stringent.

All the longitudinal and circumferential welded seams shall be subjected to chalk and kerosene test prior to hydraulic testing. This shall be done at the presence of the Owner. In addition to this, test coupons shall have to be provided for each longitudinal seams for mechanical tests (tensile and bend), if considered necessary by the Owner. The test coupons are to be broken in presence of the Owner. Contractor shall satisfy the Owner that work is being carried out in accordance with the specification drawings and other conditions. Owner shall have full access to the Contractor's working area.





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Contractor's scope of supply for fabrication, erection, cleaning, testing and commissioning of the piping systems installed by him shall include the following:-

All welding consumables like welding electrodes, filler rods and wires; gases like oxygen, acetylenes, argon, carbon-dioxide, propane, backing rings etc.

Films for radiographic examination of welds.

X-ray and Gamma -ray equipment including isotopes, dye penetrants, and other required non-destructive testing materials and equipment (all to be taken back by the Contractor after completion of work).

All heating and stress relieving equipment, thermocouples asbestos blankets, cables, temperature recorders, charts heat sensitive chalks and crayons etc. (All to be taken back by Contractor after completion of work).

All machinery, equipment tools and tackles as required for transportation handling, fabrication and erection (All to be taken back by Contractor after completion of work).

All equipment/ materials as required for cleaning, flushing, blowing out and hydro testing of the piping systems; these shall include but not be limited to pumps and compressors with prime movers, instruments, pipe work with supports, valves, strainers and other specialties, blanks, plugs, spool pieces, dummy plates, electrical accessories, etc. (All to be taken back by Contractor after completion of work).

All scaffolding materials and false work (To be taken back by Contractor after completion of work).

2.04.00

Reference documents/plant standards/acceptance norms/ test procedures etc. to be adopted as per specification will be indicated in the Quality Plans. Such Reference documents/plant standards/acceptance norms/tests procedures etc., shall be shown at the time of inspection at BHEL works. In addition to above, if any further related document is requested by the inspector, same shall be shown. The Quality plans will be subject to Owner/Consultant approval without which manufacture shall not proceed. In these approved quality plans, Owner/ Consultant shall identify Customer Hold Points (CHP), test/checks which shall be carried out in presence of the Owner/Consultant and beyond which the work will not proceed without consent of Owner/ Consultant in writing.

All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Owner/Consultant for acceptance and dispositioning.

2.05.00

The Contractor shall provide adequate notice to the Owner for inspection before the material is dispatched as per the provisions of the Contract. No material shall be despatched from the manufacturer's works before the same is





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accepted subsequent to pre-despatch final inspection or verification of records of tests/inspections or verification of certificate of compliance (as the case may be) as per the approved Quality Plan by Owner/Consultant and duly authorised for despatch issuance of Material Despatch Clearance Certificate (MDCC).

2.06.00 All materials used or supplied shall be accompanied by valid and approved materials certificates and tests and inspection report. These certificates and reports shall indicate the sheet numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.

2.07.00 All the individual and assembled rotating parts shall be statically and dynamically balanced in the works.

Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Contractor shall allow for trial assembly prior to despatch from place of manufacture.

2.08.00 Castings and forgings used for construction shall be of tested quality. Details of results of chemical analysis, heat treatment record, mechanical property test results shall be furnished.

2.09.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section-IX/BS-4870 or other International equivalent standard acceptable to the Owner. However, all brazers, welders etc. employed on any part of the contract at site shall be qualified as per ASME Section-IX or BS-4871 or equivalent international standard approved by the Owner. Such qualification tests shall be conducted in presence of Owner/his authorised representative.

For welding of pressure parts and high pressure piping the requirements of IBR shall also be complied with.

Under no circumstances any repair or welding of castings be carried out without the consent of the Owner. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Owner.

All pressure parts shall be subjected to hydraulic testing as per the requirements of IBR. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than thirty (30) minutes.

2.10.00 All non-destructive examination (NDT) shall be carried out in accordance with approved international standard. The NDT operator shall be qualified as per SNT-TC-IA (of American Society of non- destructive examination). Results of NDT shall be properly recorded and submitted for acceptance.

All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and





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Pressure Vessel code. Radiography, magnetic particle examination and ultrasonic testing shall be employed wherever necessary/ recommended by the applicable code. At least 10% of all major butt welding joints shall be radiographed or as specified elsewhere whichever is stringent. Statutory payments in respect of IBR approvals including inspection shall be made by Contractor. Contractor's scope and responsibility shall also include preparation and submission of all necessary documents in the specific formats and manner stipulated by the statutory bodies, coordination and follow up for above approvals.

2.11.00 All the Sub-Vendors proposed by the Contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment list of which shall be drawn up as per the stipulation laid elsewhere in the specification. Quality Plans of the Sub-Vendors shall be discussed, finalised and accepted by the Owner/Consultant and form part of the Purchase Order between the Contractor and the Sub-Vendor.

2.12.00 All the purchase specifications for the major bought-out items, list of which shall be drawn as per the stipulation laid elsewhere in the specification.

Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their Sub-Vendor's quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance.

Quality audit/acceptance of the results of tests and inspection will not prejudice the right of the Owner to reject equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.

2.13.00 Quality requirements for main equipment shall equally apply for spares and replacement items.

2.14.00 Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the acceptance of the Owner.

2.15.00 For quality assurance of all civil works refer to the specifications for civil works.

3.00.00 QUALITY ASSURANCE DOCUMENTS

3.01.00 The Contractor shall be required to submit two (2) copies and two (2) sets of microfilms of the following Quality Assurance documents within three (3) weeks after despatch of the equipment:

- a) Material mill test reports on components as specified by the specification.
- b) The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the





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- inspection and testing points in the inspection plan were performed satisfactorily.
- c) Non-destructive examination results /reports including radiography interpretation reports.
 - d) Factory tests results for testing required as per applicable codes and standards referred in the specification.
 - e) Welder identification list listing welder's and welding operator's qualification procedure and welding identification symbols.
 - f) Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
 - g) Stress relief time temperature charts.
 - h) Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded :
 - i) When some important repair work is involved to make the job acceptable.
 - ii) The repair work remains part of the accepted product quality.
 - i) Letter of conformity certifying that the requirement is in compliance with finalised specification requirements.

4.00.00 INSPECTION, TESTING AND INSPECTION CERTIFICATES

4.01.00 The Contractor shall give the Owner fifteen (15) days written notice of any material being ready for testing for Indian supply and 1-month for FOB. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Owner's Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days for Indian supply and 1 month for FOB of the date on which the equipment is notified as being ready for test/inspection failing which the Contractor may proceed with test which shall be deemed to have been made in the Inspector's presence and shall forthwith forward to the Inspector duly certified copies of test reports in six (6) copies.

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





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- 4.03.00 When the factory tests have been completed at the Contractor's or sub-Vendor's works, the Owner/Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Owner/ Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Owner/Inspector. Failure of the Owner/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests, or the issue of the certificates shall not bind the Owner to accept the equipment should it, on further tests after erection be found not to comply with the contract.
- 4.04.00 The Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.





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ANNEXURE-I : FORMAT OF QUALITY ASSURANCE PROGRAMME

Name of Company/ Contractor	NAME OF CONTRACT PACKAGE			QUALITY PLAN FOR						
	Package No. : _____			QP No. : _____ Date _____						
	Contractor : _____			Rev.No.: _____ Date _____						
Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of Check	Reference Document	Acceptance Norm	Format of Record	Agency	Remarks



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ANNEXURE-II: FORMAT OF MANUFACTURING QUALITY PLAN

MFGR.'s LOGO		MANUFACTURER'S NAME AND ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT : PACKAGE : CONTRACT NO. : MAIN-SUPPLIER :					
				ITEM : SUB-SYSTEM:		QP NO.: REV. NO.: DATE: PAGE: OF....							
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTU M OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	D*	M	C	L	11.
		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) WILL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: SUPPLIER/NOMINATED INSPECTION AGENCY, L: OWNER P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: OWNER WILL IDENTIFIED IN COLUM "N"							DOC. NO.: CAT.....			REV.....	
MANUFACTURER/ SUB-SUPPLIER		MAIN-SUPPLIER					FOR OWNER						



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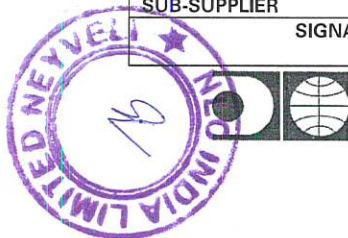


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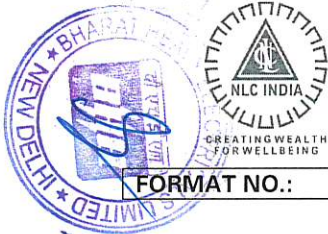
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SIGNATURE		USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
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MFGR.'s LOGO	SUPPLIER'S NAME AND ADDRESS	ANNEXURE – III: FORMAT OF FIELD QUALITY PLAN					PROJECT :			
		ITEM :		QP NO.: REV.NO.: DATE: PAGE: OF....			PACKAGE :			
		SUB-SYSTEM :					CONTRACT NO. :			
							MAIN-SUPPLIER:			
SL. NO	ACTIVITY AND OPERATION	CHARACTERISTICS / INSTRUMENTS	CLASS# OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	D*	10.
MANUFACTURER/ SUB-SUPPLIER		MAIN-SUPPLIER		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) WILL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. LEGEND TO BE USED: CLASS # : A = CRITICAL, B=MAJOR, C=MINOR; 'A' WILL BE WITNESSED BY OWNER FQA, 'B' WILL BE WITNESSED BY OWNER ERECTION / CONSTRUCTION DEPTT. AND 'C' WILL BE WITNESSED BY CONTRACTOR (A & B CHECK WILL BE OWNER CHP STAGE)				DOC. NO.: REV.....		
SIGNATURE								FOR OWNER USE		
							APPROVED BY			APPROVAL SEAL



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FORMAT NO.:

1/1

Engg. Div. / QA&I

ANNEXURE-IV : FORMAT OF FIELD WELDING SCHEDULE

PROJECT : FWS NO :
CONTRACTOR : REV NO. :
PACKAGE : FIELD WELDING CODE :
SYSTEM : PAGE NO. :

Sl No.	Drawing No. for Weld Locations & Identification mark	Description of parts to be welded	Material specification	Dimensions	Process of Welding	Type of Weld	Electrode Filler Specification	WPS No.	Minimum Preheat Temperature	Heat Treatment Temperature [Holding Time in secs]	NDT Method Quantum	NDT Specification Number	Acceptance Norm Ref.	Remarks
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The Field Welding Schedule should be submitted for :

- o Pressure Parts
- o Tanks/Vessels
- o Piping
- o Heavy/Important Structural Steel
- o Heat Exchangers
- o Bus Ducts



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ANNEXURE-V : FORMAT OF INSPECTION REQUEST FORM

From :

To :

Attn :

Dear Sirs,

Items detailed below are ready for inspection. Please arrange inspection and confirm the date of inspection.

1.	Purchaser	:	
2.	Project	:	
3.	Purchaser's order reference	:	
4.	Consultant's reference	:	
5.	Sub-order reference	:	
6.	Sub-contractor's name and full address	:	
7.	Place of Inspection (full address)	:	
8.	Contact person, telephone no., Mobile No. and email ID.	:	
9.	Description of item and quantity	:	
10.	Nature of inspection required	:	
11.	Proposed date(s)	:	
12.	Weekly holiday	:	

We confirm that the items have been fully inspected/tested by us at all stages, of inspection as per quality plan, and all material test certificates, QC records, test Reports, calibration records of measuring/testing instruments with tractability to national level are available with us.



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Thanking you and awaiting your confirmation.

Yours faithfully,

Cc: Sub-contractor

- Note : 1. Clear notice period (date of receipt to date of inspection of days)
2. Weekly holidays for Purchaser: Sunday.
3. General Holidays : As per NLC IL / Odisha state government holidays towards local inspection.



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