

NUCLEAR POWER CORPORATION OF INDIA LTD.
(A Government of India Enterprise)

SPECIFICATION NO. : PC – M – 961

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TECHNICAL SPECIFICATION

FOR

**STAINLESS STEEL PLATES, FLATS, FORGINGS, BARS, TUBES, ETC.
FOR GENERAL APPLICATION**

REF. USI NO. : 33111

	NAME	Designation	SIGNATURE	DATE
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APPLICATION

REV. NO. & DATE	DESCRIPTION OF REVISION	PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
0 June, 2013	Original (Pages : 9)	Sd/- R.K.Gupta Sd/- Braham Prakash	Sd/- P.B.Rshikesan Sd/- D.Ganesh Sd/- M.R.S.Saxena	Sd/- S.N.Kamath Sd/- M.K.Sharma	Sd/- U.C. Muktibodh
1 Feb, 2014	Rev 1 (Pages : 9) General Revision & Cobalt content on primary side material added.	<i>R.K.Gupta</i> R.K.Gupta <i>Braham Prakash</i> Braham Prakash	<i>P.B.Rshikesan</i> P.B.Rshikesan <i>D.Ganesh</i> D.Ganesh <i>M.R.S.Saxena</i> M.R.S.Saxena	<i>S.N.Kamath</i> S.N.Kamath <i>M.K.Sharma</i> M.K.Sharma	<i>U.C. Muktibodh</i> U.C. Muktibodh

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**STAINLESS STEEL PLATES, FLATS, FORGINGS,
BARS, TUBES, ETC. FOR GENERAL APPLICATION**

1.0 SCOPE

This specification establishes the technical requirements for the material, manufacture, inspection, examination, testing and supply of stainless steel plates, flats, forgings, bars, tubes, etc. for general application. The requirements stated herein are additional technical requirements over DIN EN 10028-7 (Plates/Flats) DIN EN 10088-3 (Rods/ Bars), DIN EN 10216-5 (Tubes) for the supply of material number 1.4550/1.4571.

This specification is applicable for 700MWe projects beyond RAPP-7, 8.

2.0 CONTENTS

The requirements of this Specification are presented under the following headings:

<u>Description</u>	<u>Section</u>
Scope	1.0
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3.0 STEEL MELTING

The steel shall be melted in an electric furnaces, vacuum degassed and fully killed

4.0 SUPPLY CONDITION

The supply condition of each material/product form shall be specified in the Tender document / Purchase order. However, following supply conditions for each of the product form is envisaged.

- a) Plates upto 4 mm: 2D, Cold rolled, solution annealed, pickled & passivated.
- b) Plates above 4mm: 1D, Hot rolled, Solution annealed, pickled & passivated.
- c) Flats: Cold rolled, Solution annealed, pickled and passivated and 2G condition ie. Ground finished on both the sides. Flats shall be ground smooth and the surface finish shall be Ra less than or equal to 0.8 microns. Surface finish measurement shall be reported with a roughness measurement diagram.
- d) Rods : Either, Cold formed, solution annealed, descaled, pickled and mechanically smoothened with surface condition conforming to symbol 2G, OR Hot formed, solution annealed, descaled, pickled and prepared by machining with surface condition confirming to symbol 1G.
- e) Tubes (Material no 1.4571): Cold finished, solution annealed and pickled with metallicly bright surface condition conforming to symbol CFG as per test category 2. Surface roughness shall be 3.2 microns (CLA) for both internal & external surfaces. Tubes (Material No. 1.4550) : Hot finished, solution annealed, descaled, pickled, with metallicly clean surface condition conforming to symbol HFD as per Test category 2.

5.0 CHEMICAL COMPOSITION

Both ladle and product analysis shall be carried out & meet the requirement of relevant material specifications mentioned in clause 1.0 above. Residual copper content shall not be more than 0.3 %, as per product analysis. The cobalt content in the SS materials being used on primary side of Steam Generator shall not exceed 0.03%.

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6.0 MECHANICAL PROPERTIES

Mechanical tests at ambient temperature and high temperature tensile test at 350°C shall be carried out from each heat treated batch and shall conform to the requirements of relevant material specification. Apart from this any other mandatory tests required as per the relevant material specification shall also be carried out. For bars over 100 mm in diameter, the impact and tensile specimens shall be taken in transverse direction.

7.0 CORROSION TEST

The materials shall pass Intergranular corrosion resistance test conducted as per ASTM A 262 Practice E with preceding heat treatment at 650 °C / 30 minutes.

8.0 NON-DESTRUCTIVE EXAMINATION

8.1 Ultrasonic Examination :

Plates with thickness 6mm and above, Tubes, Rods shall be ultrasonically examined to cover 100% of the volume in accordance with the respective product specifications.

Plates with thickness 6mm and above shall be subjected to straight beam & angle beam examination in transverse direction on both the surfaces to cover 100% of the volume.

The forgings shall be examined in accordance with Para 9.1 of PC-M-960

8.2 Liquid Penetrant Examination :

All forgings in finished shape & both the surfaces of plates of thickness 20mm & above shall be examined by liquid penetrant method in accordance with ASTM-E-165 with following additional requirements.

- Penetrants, developers and cleaning agents containing more than 25 ppm each of Sulfur and Halogens shall not be used.
- Application of penetrant and developer from aerosol type of spray cans is preferred.
- The temperature of the area examined shall not be lower than 10 °C.

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- d) All traces of penetrant and developer shall be removed after completion of the examination.

8.2.1 Acceptance Standard :

Indications of any shape and size are unacceptable.

8.3 Hydrostatic Test :

Each tube shall be subjected to Hydrostatic test as per the requirement of DIN EN-10216-5

9.0 **DIMENSIONAL CHECK AND VISUAL EXAMINATION**

Each material shall be visually examined and checked for dimensional requirements as per Purchase Order.

10.0 **MIX-UP TEST**

Every material shall be tested to detect any inadvertent mix-up.

11.0 **REPAIRS**

Repair is generally not permitted. Slight surface defects may be smoothly ground and blended without impairing the minimum wall thickness. No other repairs shall be carried out without prior approval of the Purchaser.

12.0 **QUALITY SURVEILLANCE**

All material shall be subjected to quality surveillance by the Purchaser or his authorized agency during manufacturer. The material shall not be supplied until the shipping release is given by the Purchaser or his authorized agency.

13.0 **TEST REPORTS / CERTIFICATES**

Five (5) copies of all test reports / certificates shall be sent to the purchaser immediately after completion of tests / inspection, prior to the shipment of the material. One set of test reports / certificates shall be dispatched along with the material. Following reports shall be submitted:

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- Chemical Analysis (Ladle and Product).
- Heat treatment details (heat treatment charts) shall be sent after completion of the contract.
- Results of mechanical properties.
- Intergranular corrosion test report.
- Visual and dimensional test reports.
- Surface roughness measurement diagram for flats as required.
- Result of micrograph and grain size.
- Hardness values.
- Ultrasonic examination and liquid penetrant examination reports.
- Hydrostatic test report.

Final documentation containing all the above shall also be submitted in soft form (pdf format) with proper indexing

14.0 **MARKING AND IDENTIFICATION**

Each product shall be marked with the following information:

- Heat number.
- Direction of rolling (for plates).
- Material designation.
- Supply condition.
- Manufacturer's name.
- Inspection agency / Purchaser's seal.
- Purchase order number.

15.0 **PACKING AND SHIPMENT :**

The materials shall be packed suitably with adequate bracing and blocking to withstand transshipment and tropical storage for two years. The packages shall be released for shipment only after inspection and issue of "shipping release" by the Purchaser or his authorized agency. Each box shall contain the test certificates in respect of the material contained. Details of items packed including material specification, Purchase order number and destination shall be clearly marked on packages.

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TECHNICAL SPECIFICATION

FOR

**STAINLESS STEEL FLATS FOR GRIDS FOR
700 MWe PROJECT STEAM GENERATORS**

REF. USI NO. : 33111

	NAME	Designation	SIGNATURE	DATE
PREPARED BY	R.K.Gupta	ACE	Sd/-	11/09/2013
	Braham Prakash	ACE	Sd/-	11/09/2013
CHECKED BY	P.B.Rshikesan	ACE	Sd/-	12/09/2013
	D.Ganesh	ACE	Sd/-	12/09/2013
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REVIEWED BY	S.N.Kamath	CE	Sd/-	12/09/2013
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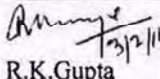
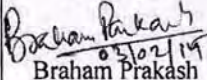
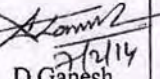
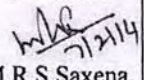
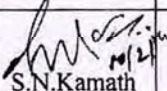
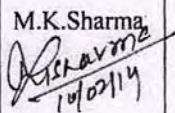
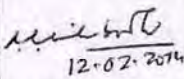
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STAINLESS STEEL FLATS FOR GRIDS FOR
700 MWe PROJECT STEAM GENERATORS

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0 Sept 2013	Original (Pages : 10)	Sd/- R.K.Gupta Sd/- Braham Prakash	Sd/- P.B.Rshikesan Sd/- D.Ganesh Sd/- M.R.S.Saxena	Sd/- S.N.Kamath Sd/- M.K.Sharma	Sd/- U.C. Muktibodh
1 Feb 2014	General revision & Residual copper content added at page no 2 clause no 4	 R.K.Gupta  Braham Prakash	 P.B.Rshikesan  D.Ganesh  M.R.S.Saxena	 S.N.Kamath  M.K.Sharma	 12.02.2014 U.C. Muktibodh

(ii)

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**STAINLESS STEEL FLATS FOR GRIDS FOR
700 MWe PROJECT STEAM GENERATORS**

1.0 **SCOPE**

This specification establishes the technical requirements for the material, manufacture, inspection, examination, testing and supply of stainless steel flats to material designation No. 1.4550 according to DIN EN 10028-7 with supply condition m (o). All requirements given herein are the minimum requirements. Alternate equivalent material may be considered provided it is demonstrated that the above mentioned minimum requirements are met.

This specification is applicable for Steam Generators of 700MWe projects beyond RAPP-7, 8.

2.0 **CONTENTS**

The requirements of this Specification are presented under the following headings:

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Heat Treatment	5.0
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Quality Surveillance	15.0
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Packing and Shipment	18.0

Figure – 1 : Grid Flats

3.0 **PROCESS OF MANUFACTURE**

The flats are made by cold/hot drawing. Subsequently they are to be solution annealed, ground, pickled and passivated. The flats are to be straight without any warping or twisting. Tolerances indicated in the figure-1 of this specification are to be strictly adhered to.

4.0 **CHEMICAL COMPOSITION**

The chemical composition shall be as per DIN EN 10028-7 material no. 1.4550. Residual copper content shall not be more than 0.3%, as per product analysis.

5.0 **HEAT TREATMENT**

All the flats shall be solution annealed according to DIN EN 10028-7.

6.0 **MECHANICAL PROPERTIES**

The mechanical requirements are as per DIN EN 10028-7 material No. 1.4550. Unless otherwise specified, the tests shall be carried out as per ASTM A-370.

7.0 **CORROSION TEST**

Intergranular corrosion test shall be carried out on samples from each heat treated batch as per ASTM A-262 Case E with preceding sensitizing heat treatment at 650°C for 30 minutes.

8.0 **ROUGHNESS**

The flats shall be ground smoothly and the surface finish shall be $Ra \leq 0.8 \mu m$. The surface finish measurement shall be supported with a roughness measurement diagram.

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9.0 **CLEANLINESS**

The external surface of the flats shall be clean and free from every type of contamination or impurity such as grease, oil, remnants of drying materials, decomposition products, cleaning medium etc. The flats shall also be free from ferritic and other external surface impurities.

10.0 **STRAIGHTNESS**

The individual flats shall be straight without any bow or weaviness. The maximum permissible bow and distortion are indicated in Figure-1.

11.0 **GENERAL**

Tears and other material breakages as well as macroscopic visible inclusions are not permissible.

12.0 **TEST MATERIAL**

Each heat treated batch shall be tested at the supplier's works. The supplier shall send one test flat of full length for each heat treated batch with clear identification to the particular lot along with the flats.

13.0 **DIMENSIONAL CHECK**

Each flat shall be visually examined & checked for dimensional conformity with Figure-1.

14.0 **PROCEDURES AND PLANS**

The following procedures and plans shall be submitted to the purchaser for review and approval in six copies each prior to start of manufacture.

- a) Manufacturing plan indicating the sequence of operations, testing, witness and hold points. Witness point signifies that the manufacturer will intimate date of actual performance of that activity to the purchaser sufficiently in advance so that purchaser can witness the performance of the activity.

However, in case purchaser is not present, the manufacturer can proceed with the job.

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Hold point is similar to witness point except that in case of Hold Point the manufacturer can not proceed with the activity unless purchaser is present or has given written waiver to proceed without his presence.

- b) Heat treatment plan.
- c) Mechanical test procedures.
- d) Quality assurance plan.
- e) Surface treatment procedure.
- f) Intergranular corrosion test procedure.

15.0 **QUALITY SURVEILLANCE**

All material shall be subjected to quality surveillance by the Purchaser or his authorized agency during manufacture. The material shall not be supplied until the shipping release is given by the Purchaser or his authorized agency.

16.0 **MARKING**

16.1 The following shall be legibly marked on each flat by a vibro etcher.

- a) Heat No. / Melt No.
- b) Material specification and grade.
- c) Size and weight.
- d) Supply conditions.
- e) Inspection agency / Purchaser's seal.
- f) Manufacturer's name.

16.2 The following shall be legibly marked on each box before shipment.

- a) Purchase order number.
- b) Material specification
- c) Melt No.
- d) Heat treated lot number.
- e) Number of pieces.
- f) Dimensions.

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g) Destination.

17.0 **TEST REPORTS / CERTIFICATES**

Four (4) copies of all test reports / certificates shall be sent to the Purchaser immediately after completion of tests / inspection, prior to shipment of material. One set of test reports / certificates shall be dispatched along with the material for each unit. The reports shall be submitted in bound volume.

The following reports shall be submitted.

- Chemical analysis.
- Mechanical test reports.
- Heat treatment charts.
- Intergranular corrosion test report.
- Visual and dimensional inspection report.
- Roughness measurement report with diagram.

Final documentation containing all the above shall also be submitted in soft form (pdf format) with proper indexing

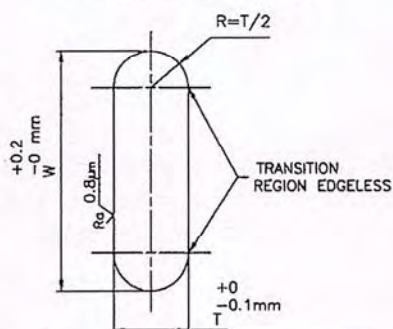
18.0 **PACKING AND SHIPMENT**

The flats shall be packed in boxes according to uniform length and same heat treated lots. The individual flat shall be completely covered by plastic sheets and shall be separated from each other by suitable intermediate inserts made of paper or wood. The boxes shall contain moisture absorbents to prevent any ingress of moisture. The packing shall be worthy for sea transport. Adequate supports and bracings shall be provided to ensure that the flats do not bend or distort during handling & transportation. Materials for each unit shall be packed separately.

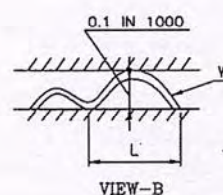
The supplier shall submit a packing specification/procedure to the Purchaser for review and approval prior to packing and shipment.

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1. PROFILE AND SURFACE

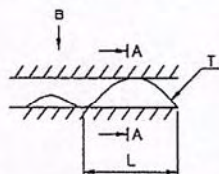


3. STRAIGHTNESS



STRAIGHTNESS RELATED TO
ANY MEASURED LENGTH
= $0.1 \text{ IN } 1000 \text{ OF MEASURED LENG}$

2. WAVINESS AND TWISTING



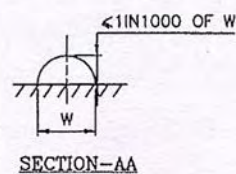
WAVINESS RELATED TO ANY MEASURED
LENGTH (L) ($>250 \text{ mm}$) = $0.1 \text{ IN } 1000 (\text{MAX})$
OF MEASURED LENGTH.

TWISTING RELATED TO ANY MEASURED
LENGTH (L) ($>250 \text{ mm}$) = $0.3 \text{ IN } 1000 (\text{MAX})$
OF MEASURED LENGTH

W = WIDTH OF STRIP

T = NOMINAL THICKNESS OF STRIP.

4. CONVEXITY



GRID FLATS

FIGURE-1

INTEGRITY PACT**Between**

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions:

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 - Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

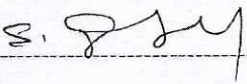
Section 9 - Pact Duration

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

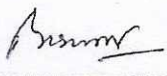
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.



For & On behalf of the Principal
S. DHANABAL
Dy. Manager
MM / RM / Purchase / Tubes
BHEL, TRICHY - 620 014
(Office Seal)

For & On behalf of the Bidder/
Contractor
(Office Seal)

Place- Trichy
Date- 31/03/2021


Witness: _____
(Name & Address) _____
CHASKARNATH BISWAS
Asst. Engineer - Gr-II
MM / Purchase / Tubes
BHEL, TRICHY - 620 014.

Witness: _____
(Name & Address) _____

Supplier's LOGO		Supplier's Name and Address		Quality Plan for SS Rolled Flats(DIN EN 10028-7:1.4550				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No: To be filled by Supplier					
Item : Flats for Corrugated Strips(1.5 mm thick), Central Vertical Strips(2 mm thick) & U supports (3.5 mm thick) Sub-system: Steam Generator		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No.1 of 4		Reference Document		Acceptance Norms		Format of Record		Agency		Remarks	
Sl. No	Component & Operations	Characteristics	Type of Check	Quantum Of check	6.	7.	8.	D*	M	B	N	10.	
1.0	Raw Material :												
1.1	Steel Melting : :Melting in electric furnace :Vacuum Degassing or AOD	Temperature, Blank off pressure	Record Verification	100%	PC-M-961/01 MPP: To be submitted		TC	✓	P	R	R	Steel shall be fully killed.	
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Melt	PC-M-961/01 MPP: To be submitted		TC	✓	P	R	R	---	
1.3	Semi Product (Slab) casting	Free from defects	Visual/Record verification	100%	MPP: To be submitted		RD	--	P	--	R	---	
2.0	In process Controls :												
2.1	Rolling Process (Cold Rolling)	MWD (Main Working Direction)	Record verification	100%	PC-M-961/01 MPP: To be submitted		TC	✓	P	R	R	---	
2.2	Marking after Rolling	Identifications	Verification and Visual	100%	PC-M-961 Rev 01		RD	--	P	--	---	---	

Noted
12/09/2020

Supplier's NAME: To be filled		Reviewed & Approved		Reviewed & Approved		NPCIL	
Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved				

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
 ** M: SUPPLIER B: BHEL, N: NPCIL/TP1
 P: PERFORM R: REVIEW W: WITNESS AND H: HOLD
 TC: TEST CERTIFICATE RD: RECORD

Supplier's LOGO		Supplier's Name and Address		Quality Plan for SS Rolled Flats(DIN EN 10028-7:1.4550							Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No: To be filled by Supplier				
				Item : Flats for Corrugated Strips(1.5 mm thick),Central Vertical Strips(2 mm thick) & U supports (3.5 mm thick)		QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No.2 of 4									
				Sub-system: Steam Generator											
2.3	Heat Treatment (Solution Annealing)	R.O.H, Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-961 Rev 01 HT Plan:To be submitted	TC	✓	P	W	R	Chart shall be signed at the start and End of Heat treatment and submitted along with TC				
2.4	Identification of Test coupon and Cutting	Location and orientation	Visual & Measurement	100%	PC-M-961/01 MPP & MSTP: To be submitted	RD	✓	P	H	H	---				
2.5	Mechanical descaling of Rolled plates	Surface Inspection , Free from Visual Defects	Visual	100%	PC-M-961/01 Free from Visual Defects	RD	✓	P	---	R	Surface Should be smooth and free of scales				
2.6	Trimming of edges , Grinding , Cutting to length & width	Trimming , grinding	Visual	100%	PC-M-961/01 Drg/PO No: To be filled	RD	--	P	--	R	---				
2.7	Pickling and Passivation of Plate	Completeness	Visual & passivity check	100%	PC-M-961/01 MPP: To be submitted	TC	✓	P	R	R	---				
2.8	Final Dimensional check of Plates	Dimensions	Measurement	100%	Drg No/P.O No: To be filled	TC	✓	P	W	W	---				
2.9	Surface Finish Check	Surface Finish	Measurement	100%	PC-M-961/01 Ra ≤ 0.8 microns	TC	✓	P	W	W	Roughness measurement diagram shall be included in TC.				
2.10	Specimens preparation	Dimensions	Measurement	100%	MSTP: To be submitted PC:M:961 Rev 01	RD	--	P	--	--	---				
2.11	Dimension of Specimens	Dimensions	Measurement	100%	MSTP: To be submitted PC:M:961 Rev 01	TC	✓	P	R	R	---				

Prepared		Reviewed & Approved		Reviewed & Approved		BHEL		NPCIL	
SUPPLIER'S NAME: To be filled		Reviewed & Approved		Reviewed & Approved		BHEL		NPCIL	

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
 ** M: SUPPLIER B: BHEL N: NPCIL/TPI
 P: PERFORM R: REVIEW W: WITNESS AND H: HOLD
 TC: TEST CERTIFICATE RD: RECORD

Handwritten signature and date: 22/09/21

Supplier's LOGO		Supplier's Name and Address		Quality Plan for SS Rolled Flats(DIN EN 10028-7:1.4550				Project: GHAVP 1& 2			
				Item : Flats for Corrugated Strips(1.5 mm thick),Central Vertical Strips(2 mm thick) & U supports (3.5 mm thick)	Sub-system: Steam Generator	QP No.: To be filled by Supplier	Rev.No.: To be filled by Supplier	Date: To be filled by Supplier	W.O : D157 to D160-001-1-93-171	P.O No: To be filled by Supplier	
Mechanical and Metallurgical Tests :											
2.12	Product analysis	Chemistry	Chemical analysis	1 / Heat Treatment Batch	PC-M-961 Rev 01 MSTP: To be submitted EN10028-7	TC	✓	P	W	W	---
2.14	Tensile at RT	Tensile Strength, Yield Strength (0.2% offset), % Elongation	Destructive Test	1/ Heat Treatment Batch	PC-M-961 Rev 01 MSTP: To be submitted EN10028-7, EN ISO 6892-1	TC	✓	P	W	W	---
2.15	Tensile at 350° C	Tensile Strength, Yield Strength (0.2% offset)	Destructive Test	1/Heat Treatment Batch	PC-M-961 Rev 01 MSTP: To be submitted EN10028-7, EN ISO 6892-2	TC	✓	P	W	W	---
2.16	Corrosion Test (before sensitization)	Inter Granular Corrosion	IGC Test	1/Heat Treatment Batch	PC-M-961 Rev 01 ASTM A 262 Practice-E MSTP: To be submitted	TC	✓	P	W	W	---
2.17	Corrosion Test (after sensitization)	Inter Granular Corrosion	IGC Test	1/Heat Treatment Batch	PC-M-961 Rev 01 ASTM A 262 Practice-E MSTP: To be submitted	TC	✓	P	W	W	Sensitization-650° x 30 Minutes
2.18	Micrograph & grain size	Micro structure, Grain Size	Micro test , Grain size check	1/Heat Treatment Batch	PC-M-961 Rev 01 ASTM E112 MSTP: To be submitted Grain Size to be reported EN10028-7	TC	✓	P	W	R	---
2.19	Hardness	Hardness	Brinell / Rockwell Hardness	1/Heat Treatment Batch	PC-M-961 Rev 01 Value to be reported.	TC	✓	P	W	R	---

			LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.		
			** M: SUPPLIER B: BHEL, N: NPCIL/TP1		
			P: PERFORM R: REVIEW W: WITNESS AND H: HOLD		
			TC: TEST CERTIFICATE RD: RECORD		
Prepared	Reviewed & Approved		Reviewed & Approved		
	Supplier's Name: To be filled		NPCIL		

Signature
10/10/20

Supplier's LOGO	Supplier's Name and Address		Quality Plan for SS Rolled Flats(DIN EN 10028-7:1.4550				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No: To be filled by Supplier			
			Item : Flats for Corrugated Strips(1.5 mm thick),Central Vertical Strips(2 mm thick) & U supports (3.5 mm thick)	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No: 4 of 4	TC	✓	P	R	R	---
3.0	Final Inspection									
3.1	Visual Inspection of Rolled Flats	Free from visual defects	100%	Verification and Visual	PC-M-961 Rev 01	TC	✓	P	R	---
3.2	Marking	SI No, Heat Number, Material designation, Supply condition, Inspectors Seal, Manufactures name , P.O Number.	100%	Verification and Visual	PC-M-961 Rev 01	TC	✓	P	R	---
3.3	Mix up Test	Positive Material Identification	100%	PMI Test	PC-M-961 Rev 01	TC	✓	P	R	---
3.4	Certification and Documentation Control	Order compliance	100%	Certificate compilation	PC-M-961 Rev 01	TC	✓	P	R	---
3.5	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL					RD	--	P	H	---
3.6	Packing & Shipment	Packing	100%	Visual	PC-M-961 Rev 01	---	--	P	---	---

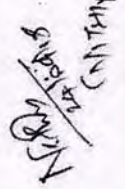
Note:

1. MSTP (Material Sampling Plan) , MPP(Manufacturing Process plan), Heat Treatment Plan shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.

N. Srinivasan
22/06/2020
[NITAN - OR / QA]

Supplier's Name: To be filled		Reviewed & Approved		Reviewed & Approved	
BHEL		BHEL		NPCIL	
Prepared		Reviewed & Approved		Reviewed & Approved	
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC:TEST CERTIFICATE RD:RECORD					

Supplier's LOGO	Supplier's Name and Address		Quality Plan for SS Small Grid Flats(2.9t x20W) and Main Grid Flats(2.9t x60W)					Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No: To be filled by Supplier			
			Item : SS Small& Main Grid Flats (DIN EN 10028-7 ,1.4550) Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No: 1 of 4	Reference Document	Acceptance Norms	Form of Record	Agency M B N			Remarks
Sl. No	Component & Operations	Characteristics	Type of Check	Quantum Of check	6.	7.	8.	9.	**	10.	
1.	2.	3.	4.	5.	6.	7.	8.	9.	**	10.	
1.0	Raw Material :										
1.1	Steel Melting : :To be filled by Supplier	Temperature	Record Verification	100%	PC-M-963/01 MPP: To be submitted		TC	✓	P	R	---
1.2	Ladle Analysis	Chemistry	Chemical analysis	1/Melt	PC-M-963/01 MPP: To be submitted		TC	✓	P	--	---
1.3	Semi Product (Slab) casting	Free from defects	Visual/Record verification	100%	MPP: To be submitted		RD	--	P	--	---
2.0	In process Controls :										
2.1	Drawing Process (Cold/hot drawing)	drawing process	Record verification	100%	PC-M-963/01 MPP: To be submitted		RD	---	P	---	---
2.2	Marking after Drawing	Identifications	Verification and Visual	100%	PC-M-963 Rev 01		RD	--	P	--	---
2.3	Heat Treatment (Solution Annealing)	R.O.H , Soaking Temp & Time, R.O.C	Review of HT Chart	100%	PC-M-963 Rev 01 HT Plan: To be submitted		TC	✓	P	W	R
Chart shall be signed at the start and End of Heat treatment and submitted along with TC											
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD											
Prepared			Reviewed & Approved			Reviewed & Approved					
SUPPLIER'S NAME: To be filled			BHEL			NPCIL					


N. K. Singh
(Chief Engineer)

Supplier's LOGO	Supplier's Name and Address	Quality Plan for SS Small Grid Flats(2.9t x20W) and Main Grid Flats(2.9t x60W)						Project: GHAVP 18.2 W.O : D157 to D160-001-1-93-171 P.O No: To be filled by Supplier			
2.15	Product analysis	Chemistry	Chemical analysis	1 / Heat treatment Batch	PC-M-963 Rev 01 MSTP: To be submitted EN10028-7	TC	✓	P	W	W	Residual copper content shall not be more than 0.3%
2.16	Tensile at RT	Tensile Strength, Yield Strength (0.2% offset), % Elongation	Destructive Test	1 / Heat treatment Batch	PC-M-963 Rev 01 MSTP: To be submitted EN10028-7 ASTM A 370	TC	✓	P	W	W	---
2.17	Tensile at 350° C	Tensile Strength, Yield Strength (0.2% offset)	Destructive Test	1 / Heat treatment Batch	PC-M-963 Rev 01 MSTP: To be submitted EN10028-7 ASTM A 370	TC	✓	P	W	W	---
2.18	Corrosion Test (before sensitization)	Inter Granular Corrosion	IGC Test	1 / Heat treatment Batch	PC-M-963 Rev 01 ASTM A 262 Practice-E MSTP: To be submitted	TC	✓	P	W	W	---
2.19	Corrosion Test (after sensitization)	Inter Granular Corrosion	IGC Test	1 / Heat treatment Batch	PC-M-963 Rev 01 ASTM A 262 Practice-E MSTP: To be submitted	TC	✓	P	W	W	Sensitization-650° x 30 Minutes
2.20	Macrographic Test	Free from defects	Macrographic Test at 10X	1 / Heat treatment Batch	PC-M-963 Rev 01 MSTP: To be submitted	TC	✓	P	W	R	Note-3
3.0 Final Inspection											
3.1	Visual Inspection of Flats	Free from visual defects	Verification and Visual	100%	PC-M-963 Rev 01	TC	✓	P	R	R	Note-3

						LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: SUPPLIER B: BHEL, N: NPCIL/TPI P: PERFORM R: REVIEW W: WITNESS AND H: HOLD TC: TEST CERTIFICATE RD: RECORD
Prepared	Reviewed & Approved	Reviewed & Approved	BHEL	Reviewed & Approved	NPCIL	
SUPPLIER'S NAME: To be filled						


 24/10/18
 (NITAN, OR)

Supplier's LOGO	Supplier's Name and Address		Quality Plan for SS Small Grid Flats(2.9t x60W) and Main Grid Flats(2.9t x60W)				Project: GHAVP 1& 2 W.O : D157 to D160-001-1-93-171 P.O No. To be filled by Supplier			
			Item : SS Small& Main Grid Flats (DIN EN 10028-7, 1.4550) Sub-system: Steam Generator	QP No.: To be filled by Supplier Rev.No.: To be filled by Supplier Date: To be filled by Supplier Page No.4 of 4						
3.2	Marking	SI No, Heat Number, Material designation, Supply condition, Inspectors Seal, Manufactures name , P.O Number.	Verification and Visual	100%	PC-M-963 Rev 01	TC	✓	P	R	R
3.3	Mix up Test	Positive Material Identification	PMI Test	5% randomly	PC-M-963 Rev 01	TC	✓	P	R	R
3.4	Certification and Documentation Control	Order compliance	Certificate compilation	100%	PC-M-963 Rev 01	TC	✓	P	R	R
3.5	Documents (Test Certificates) shall be sent to BHEL/Trichy prior to dispatch. Dispatch clearance will be given after Acceptance of Test Certificates by BHEL&NPCIL)					RD	--	P	H	H
3.6	Packing & Shipment	Packing	Visual	100%	PC-M-963 Rev 01	---	--	P	--	---

Note:

1. MSTP (Material Sampling Plan) , MPP(Manufacturing Process plan), Heat Treatment Plan shall be submitted by Supplier and the same will be subjected to both BHEL&NPCIL approval.
2. The external surface of the flats shall be clean and free from every type of contamination or impurity such as grease , oil , remnants of drying materials , decomposition products , cleaning medium etc. The flats shall also be free from ferritic and other external surface impurities.
3. Tears and other material breakage as well as macroscopic visible inclusions are not permissible.
4. The supplier shall send one test flat of full length for each heat treated batch with clear identification to the particular lot along with flats.
5. Supplier shall ensure 100% . BHEL & NPCIL/TPI shall check 5% of Flats .

Prepared	Reviewed & Approved	Reviewed & Approved	Reviewed & Approved
	BHEL	NPCIL	NPCIL
SUPPLIER'S NAME: To be filled			

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
 ** M: SUPPLIER B: BHEL, N: NPCIL/TPI
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 TC:TEST CERTIFICATE RD:RECORD

Handwritten signature and date:
 24.04.18
 (MATERIALS)

SPECIAL CONDITION ANNEXURE – A

PR No.128896807

1. Two-part bid. Open tender to be floated.
2. The intended items are required for GHAVP 1 & 2 (700MWe SG) project.
3. **End Use and End User Certificates will not be provided by BHEL.**
4. Supply of Small Grid Flats and Main Grid Flats (PR Item 10 to 460) as per **DIN EN 10028-7:1.4550** and NPCIL technical specification **PC-M-963 Rev.01**. Supplier to confirm.
5. Supply of Corrugated Strips, Central Vertical Strips and U Bend Supports (PR item 470 to 790) as per **DIN EN 10028-7:1.4550**, drawing. No **3-93-170-05311/Rev.00** and NPCIL technical specification **PC-M-961 Rev.01**. Supplier to confirm.
6. Supplier to confirm the Steel Melting process for Corrugated Strips, Central Vertical Strips and U Bend Supports as follows:
 - i. Melted in electric furnaces
 - ii. Vacuum degassed/AOD
 - iii. Fully killed
7. Supplier to give clause by clause confirmation for all clauses mentioned in NPCIL technical specification PC-M-961 Rev.01 and PC-M-963 Rev.01. Deviations shall be mentioned in the offer itself.
8. For offer acceptance suppliers should have the capability and experience to produce the intended items as per the quality standards mentioned in the respective drawings and NPCIL technical specifications. **Supplier should have supplied the intended items for nuclear application / Nuclear Power Corporation of India Limited / any other nuclear power station / any thermal power station.** As a documentary proof of supplier's experience in manufacturing the items, Signed Test Certificates (Signed by Customer/TPI) of previous supplies with details of Customer, Third Party Inspection Agency etc. shall be submitted along with offer
9. Offers received will be evaluated by BHEL and NPCIL. Final acceptance of the offers will be based on NPCIL recommendation.
10. Supplier has to comply with the Generic Approved Quality Plans enclosed with the indent.
11. Supplier has to submit Quality documents (QAP-Quality Assurance Plan, MPP-Manufacturing Process Plan, HTP-Heat Treatment Plan, MSTP-Material Sampling and Testing Plan) and related test procedures as per QAP for approval.
12. The actual production of material is permitted only after approval of Quality documents (Quality Assurance Plan (QAP), Manufacturing Process Plan (MPP).. etc.,) and test procedures by BHEL and NPCIL.
13. SS flat shall have the material identification details etched on the surface at any one end by any suitable method.

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SPECIAL CONDITION ANNEXURE – A

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14. Inspection agency for imports are BHEL & NPCIL or NPCIL appointed third party inspection (TPI) agency. Inspection agency for indigenous supply are BHEL and NPCIL.
15. Chemical composition and mechanical tests shall be carried out in labs certified as per ISO 17025 or NABL / Government approved labs.
16. Three sets of documents containing (i.) Test Certificates and respective test reports (ii.) copies of the approved quality documents and test procedure, (iii.) DCR and (iv.) Drawing etc. to be provided along with the supply of raw material.
17. Quantity tolerance acceptable in total weight is '+1 %' and '-0 %'.
18. All the items shall be procured from single source on full package basis.

Nithin
28/03/2021

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