



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT

TITLE: Supply of 20MnMoNi55 Forged Shells to BHEL Trichy	Phone: +91 431 2577426 / 2575329 Fax : +91 431 2520 719 Email : tantuway@bheltry.co.in geetha@bheltry.co.in
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Reference Number: 1401600002	Date: 23.01.2016	Due date for submission of offer : 23.02.2016
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You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order.

Please note that under any circumstance both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the date tender opening.

BHEL / Trichy is looking for 20MnMoNi55 Forged Shells to BHEL Trichy as per the attached documents.

BHEL technical terms & conditions and all annexures can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units) Bharath Heavy Electricals Limited) under reference “**1401600002**”

Offer should reach us before 14:00 hours on the due date of 23.02.2016.	Yours Faithfully, For Bharath Heavy Electricals Limited Sr. Engineer / MM / Purchase - C&F
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BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
HIGH PRESSURE BOILER PLANT
PURCHASE DEPARTMENT - FOSSIL BOILERS
THIRUCHIRAPALLI - 620014
TAMILNADU (INDIA)

Page
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PHONE :2577480
GRAMS : BHARATELEC
FAX NO: 2520719
E-mail: skraman@bheltry.co.in,
nagarjuna@bheltry.co.in

Enquiry No	Enquiry Date	Due Date for Quotation
1401600002	23.01.2016	23.02.2016

Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order.
Bid should be submitted in two parts. 1.Techno-commercial bid (Part-I) and 2.Price bid(Part-II) in a separate sealed cover and both covers must be placed in a third cover and sealed. Our Enquiry No., Enq. date & Enq. Due date must be written on all three covers.

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	D09020701001 FORGED PLATE 50 X 300 X 800	NO	6.000	6.00	30.09.16
20	D09020701002 FORGED RING OD 940MM/ ID 830MM X 160 L	NO	3.000	3.00	30.09.16
30	D09030201001 SHELL OD 940 x ID 840x1831Length As per Drg.NO 3-90-114-00728 Rev02.	NO	1.000	1.00	30.09.16

General Note:

1. Supply of 20MnMoNi55 Forged Shells as per specification & TDC: 6:286 Rev.04 & Drawing No.3-90-114-00728 Rev.02 & forged plate & forged ring as per indicated dimension.
2. Quantity to be supplied as per Enquiry.
3. All the items given in Enquiry must be of same melt no. therefore, All the items in this tender will be considered as a single package for evaluation and ordering.
4. Final Acceptance of the offers will be based on BARC recommendation.
5. Refer TDC clause 3.0. Supplier has to give point wise confirmation /deviation to the TDC. Supplier to reply against each point given in TDC - whether acceptable/ not acceptable/ deviation (if any)/not applicable.
6. Refer TDC clause 3.0. Along with the technical bid supplier must submit the documents mentioned in this para for evaluation of their offers. Sample format for QAP and UT procedure are attached with indent for reference.
7. Refer TDC clause 3.0. Supplier has to submit documents like QAP, MSTP, Forging plan, Heat Treatment plan etc for approval before start of manufacture.

The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,



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7. Inspection by BHEL approved third party for imports and BHEL/BARC for indigenous supply.
8. Dispatch clearance for material shall be given after acceptance of Test Certificates by BHEL/BARC.
9. Five sets of additional dialects containing Test Certificates, copies of the approved Procedure, DCR, and Drawing etc. apart from contractual requirements are required.
10. PBG shall be issued before the dispatch / Shipping of the materials-PBG shall be strictly as per BHEL format only.
11. Please confirm against each point in the TERMS AND CONDITIONS attached, sign and attach along with the offer.
12. Offer (Including all enclosures) shall be signed and stamped in each page by authorized representative of the bidder or else offer may be liable for rejection.

All the tenders may be addressed to the following address:

**The Tender Opening Cell / MM
Room No: 26, Building 24, Ground Floor
Bharat Heavy Electricals Limited
TIRUCHIRAPALLI 620014**

In case personal delivery of the offer, it shall be dropped into the respective box kept in Room No: 26, after duly entering the data in the system.

Offers will be accepted only up to 14.00 Hrs on the due date. Therefore, vendors shall ensure to submit the offers well before this time. All due date extension requirements should be addressed to the respective Purchase mail IDs. All the due date extension requests from vendors will be considered only up to 48 hours before the due date and time.

Vendors are requested to avoid submission of offers through e mail / fax. In case of any unavoidable situation, offers shall be sent through e mail to the following mail ID only tender_cell@bheltry.co.in.

As tenders are being opened by Common Tender Opening Cell, offer covers should be sealed with tenderer's distinctive seal and super scribed with correct Tender No. item of supply and due date of opening.

The offers will be opened at 14.30 hrs on the due date of the tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening. Late and delayed offers are liable to be rejected.

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MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,



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The bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL fraud prevention policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL management about any fraud or suspected fraud as soon as it comes to their notice.

Enclosures:

"LD clause has to be confirmed without fail."

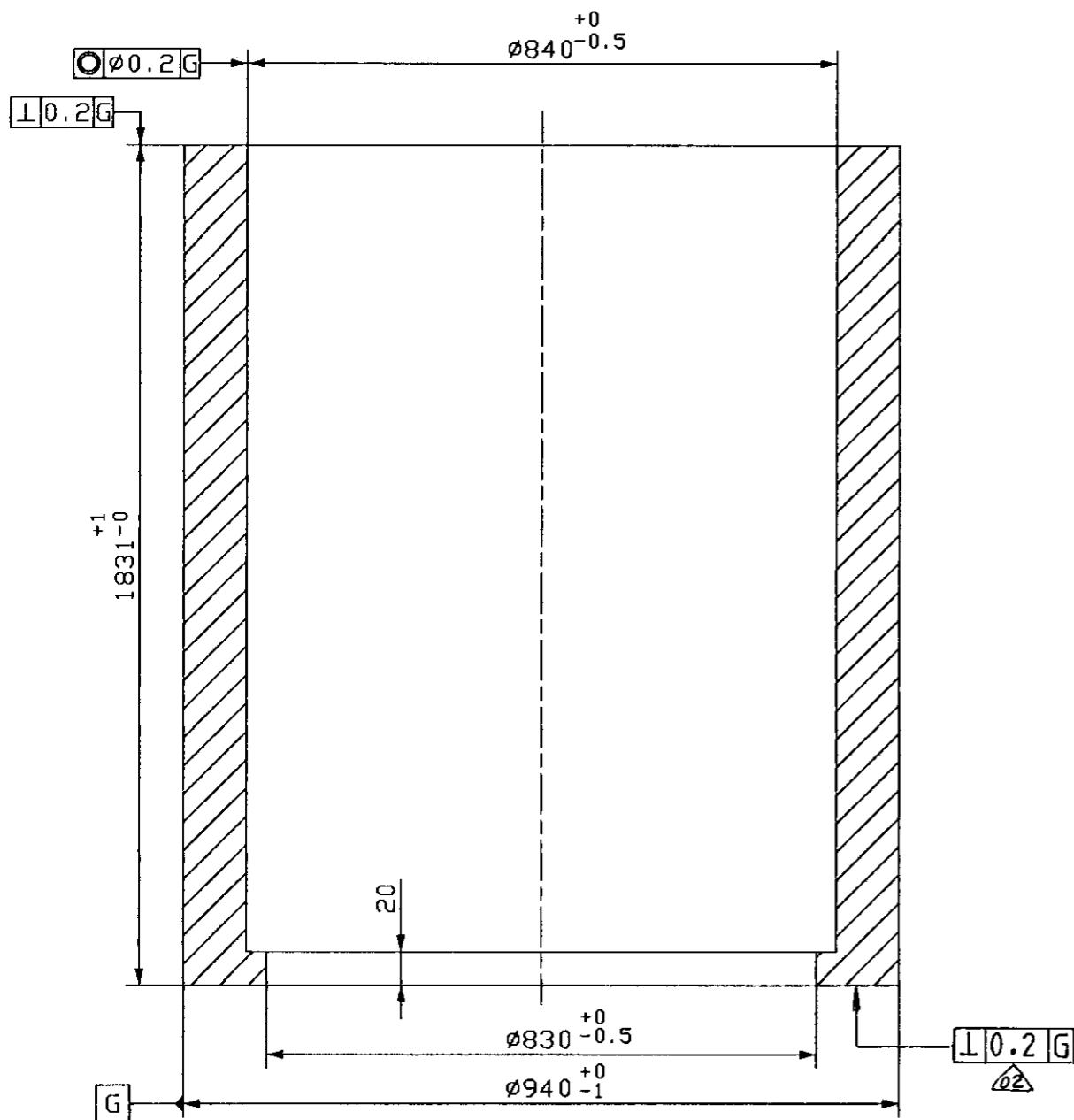
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Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED

MANAGER / PURCHASE
(FOSSIL BOILERS)
Yours faithfully,

DRAWING NO:
3-90-114-00728

ALL DIMENSIONS ARE IN MILLIMETERS



NOTES:


1. MATERIALS SPECIFICATION: 20MnMoNi55 AND AS PER APPROVED TDC
2. MANUFACTURE, EXAMINATION & TESTING: AS PER APPROVED TDC.
3. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE
4. THE COMPONENT SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
5. SURFACE FINISH SHALL BE $\sqrt{6.3}$ OR FINER ALL OVER.
6. DETAILED DRAWING INDICATING VARIOUS STAGES OF MANUFACTURE, SHALL BE SUBMITTED FOR PURCHASER'S APPROVAL BEFORE START OF PRODUCTION.
7. IN ADDITION TO THE SHELL, PTC REQUIREMENTS SHALL BE MADE FROM THE SAME MELT AND HEAT TREATMENT BATCH. FOR QUANTITY DETAILS REFER DRG. No. 3-90-114-00850.
8. SHELL QTY. - 8 Nos.

TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER DIN 7168a)

LINEAR				ANGULAR	
0.5 TO 6	±0.1	315 TO 1000	±0.8	0° TO 10°	± 1'
6 TO 30	±0.2	1000 TO 2000	± 1.2	10° TO 50°	± 30'
30 TO 120	±0.3	2000 TO 4000	± 2.0	50° TO 120°	± 20'
120 TO 315	±0.5	4000 TO 8000	± 3.0	OVER 120°	± 10'
—	—	OVER 8000	± 4.0	—	—

REV	DATE	ALTERED :	REV	DATE	ALTERED :
02	201205	CHD&APPD : <i>[Signature]</i>	01	121005	CHD&APPD : <i>[Signature]</i>
TOL. ADDED			NOTE-7 ALTERED		

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		D090-001-1			
 05-229/D	Bharat Heavy Electricals Ltd		DRN	NAME	NO. OF VAR
	UNIT: HIGH PRESSURE BOILER PLANT		CHD	E.B	
	TIRUCHIRAPALLI - 620014		APPD	S.T	
DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO
NC	C/M/F		2014		
CODE	TITLE		CARD CODE	DRAWING NO :	REV
150	SHELL		U 01	3-90-114-00728	02

Revision Record:

Rev.01:a) Modified: Cl.3.0:line 2, Cl.5.0:line 3,5,8 Cl.6.0:sketch, Cl.7.0:Values at 200deg. dropped,Hardness, Grain size. Cl 8.0:line 2,4, Cl.13.0 item 3,4,5,6,8. b) Added: Cl. 3.0 last line, Cl. 8.0 last line 11.0 last line.
Rev.02: Cl.7.0- Grain size, Cl.11.0 modified.
Rev 03:In Title Project name changed (D090) & in Cl 2 Reference drawing nos changed.
Rev 04 : Customer Comments added .

1.0 MATERIAL Specification: 20 Mn Mo Ni 55 - Quenched and Tempered forging. Products and associated test plate finished
Size and Qty.: As per Drawing/Purchase order

2.0 REFERENCE DRAWINGS (latest revisions): 3-90-114-00728,3-90-114-00733

3.0 DOCUMENTS TO BE SUBMITTED

Along with bid: In addition to the point wise Confirmation / Deviation to this TDC additional documents required are i. Quality Assurance program ii. Proposed manufacturing iii. Inspection and test plan iv. Heat treatment(HT) plan v. expected level of trace elements & inclusion rating vi. applicable test procedures vii. Packing procedure.

Prior to start of manufacture (For approval): QAP , Cutting plan of billet (Test Specimen preparation) Forging Drawings, UT stage drawings, Stage wise Forging plan, HT plan, procedure, including Simulation HT.,Material Sampling & Test plan (with sketches for specimen location) including S- Print and hardness test on the product and associated items, Stage wise inspection plan including NDE., Cleaning, preservation, NDE, Macro etch test procedures & packing plan. Format of dimensional reports for each item.

4.0 TEST COUPONS

Three types of test Coupons are to be taken for each forging as below.

Designation	Heat Treatment Condition	TO be tested by
RTC	Quenched and tempered raw material coupons in same condition as forging	Supplier
STC	Samples from quenched and tempered forging,subjected to simulated heat-treatment	Supplier
FTC	Same as RTC (to be supplied along with forgings, size: same as STC)	Purchaser

Test coupon to be taken from extension of each forging. RTC samples shall be tested first. Top and bottom ends of forgings shall be same as respective ends of ingot. The specimens for product analysis, mechanical tests etc. shall be at least one-fourth of heat-treated wall thickness from the nearest cylindrical surfaces and at a distance at least one wall thickness from the other heat-treated surface.

Test coupon shall be taken from three locations 120deg. apart (i.e., from 0, 120 & 240 deg.) at top end. Additionally for shell forgings samples shall be taken from two locations 180 deg. apart but perpendicular to locations at top end (90 & 270 deg.) at bottom end. STC and FTC shall be taken from each of these locations while RTC shall be taken from only one location, at top end. Samples shall be taken in direction of main metal deformation and two perpendicular directions.

For forged plates / test plates to be supplied, the specimens shall be from 1/4th and 1/2-of the tempered wall thickness below the heat-treated surface and one wall thickness from each sides. Samples shall be, taken in longitudinal and transverse directions.

Associated test rings as per the drawings shall be parted off from the bottom end of shell and straight end of dished head and shall be supplied along with the forgings with proper identifications.

5.0 CHEMICAL COMPOSITION & PROCESS

Steel making: Basic electric process, secondary refining under vacuum for sufficiently long duration and casting under vacuum degassed condition to effect a blank-off Pressure (less than 1000 micro meter).

Forging process: Mechanical Hot working, reduction ratio: 1:4 min. from ingot to finished forging, close to final size and shape. Reduction at each stage to be indicated through sketches of the forging plan and actual ratios to be shown in Test certificate.

Associated items called for in the drawing shall also be from the same heat & HT batch as the product and shall receive same extent of forging. They shall be made from extension of the forging as far as possible.

Ladle, chemical analysis at Top and Bottom of ingot and Product analysis on each forging from STCs at

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sampling locations of mechanical test. Method ASTM E30 & ASTM E350.

% Composition: Element % (by weight)		Element % (by weight)	
C	0.16 - 0.20	MO	0.45 - 0.60
Si	0.15 - 0.30	Ni	0.40 - 0.70
Mn	1.15 - 1.50	Al(Max)	0.04
P(Max)	0.010	Cu(Max)	0.09
S(Max)	0.010	V,(Max)	0.01
Cr(Max)	0.15	Co(Max)	0.02

Cr,Mo,Cu & Ni shall be as low as possible within above range.

Impurity to be limited to:

Sn (Max) 0.01	As.(Max) 0.015
N(Max) 0.010	Sb.(Max) 0.007
H ₂ (Max) 1 ppm (taken during vacuum pouring of ingot & from product)	

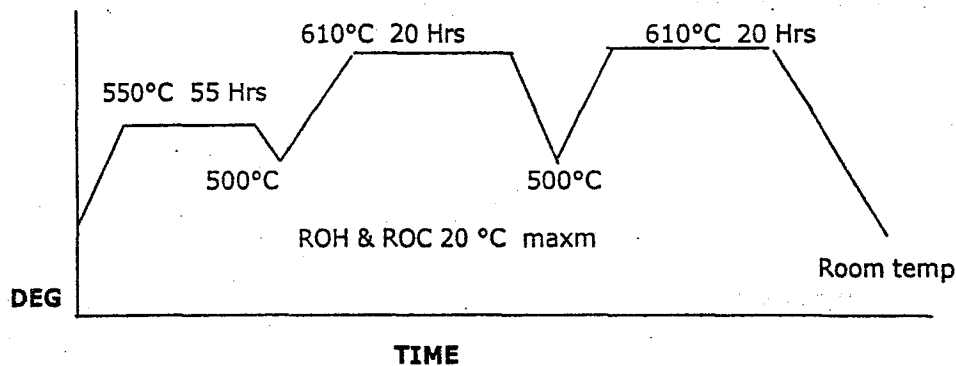
6.0 HEAT TREATMENT(HT)

Product, associated items (after machining near to finish dimensions) including Test coupons (RTC STC & FTC) : Quenched & tempered. Tempering: >650°C.

Test coupon(STC): Additional Simulation HT as shown below.

HT to be controlled using continuous recording instrument with thermocouples fixed to forgings.

Test Coupons to be parted off only after tempering. Product and associated items to be heat treated together.



7.0 MECHANICAL TESTS as per ASTM A20 and A370. No retests are permitted.

Extent of test: for each product & Associated test plate from extensions of the forging

Mechanical Properties at:	RT(20°C)	200°C *
Yield strength Min. (0.2% offset) Kg/Sq.mm	44	42 * test after holding for 5mts. min.
Tensile Strength Kg/Sq.mm	58 - 71	54 - 71
%Elongation-5d Min.	19	16
%Reduction in area Min.	45	to be reported

RT_{NDT}: Acceptance: ≤ (-)10°C. (RT_{NDT} is T_{NDT} established as below)

- Establish T_{NDT} by drop weight test as per ASTM E208. Specimen type P2.
- At temp. ≤ T_{NDT} + 33°C Impact test specimen shall have 0.9mm min. lateral expansion and 8.5 Kg.m/Sq.cm min. absorbed energy. % shear fracture to be reported.

Charpy-V Impact test :At (-)10°C, Avg. of 3 specimen: 5.2 Kg.m/Sq.cm., Single min.: 4.3 Kg.m/Sq.cm.

Charpy-V impact strength transition curve to be established to cover (-)10°C and 23°C. Upper shelf energy to be > 13Kg.m/Sq.cm.

% Shear fracture and Lateral expansion also to be reported for each test.

Hardness: on product & associated items along 3 lines 120°C apart at edges & mid thickness at top & bottom surface with minimum spacing of 20 mm & at every 200mm along length of forging. For plates: at edges & mid thickness on top & bottom surface along 2 lines normal to each other spaced at 200mm. To be measured before parting off test coupons & rings. Values to be reported in BHN.

Sulphur print on thickness, at ends of each forging and at three locations 120°C apart over 200mm

length min., shall show an even distribution of Sulphur in forging.

Macro etch test : ASTM E381. on all faces of forging. Surface to be free of macro cracks, dendrites & segregation.

Grain size and Micro structure on STC specimens across thickness at 1/2 & 1/4 of wall thickness and just below from surface: ASTM E112: 5 or finer.

Inclusion rating after forging: ASTM E45: shall be 1 or finer on thin series. Thick series not allowed.

8.0 NON DESTRUCTIVE TEST

Extent of test: for each product & Associated items.

Stage of test: After heat treatment & machining for UT. Surface finish: ≤ 6.3 microns.

Ultrasonic Test(UT) , Liquid Penetrant Test (LPT) & Magnetic Particle Test: 100% as per ASME Sec.V & annexure I enclosed. Chemicals used, to be restricted for sulphur & halogens within 25 ppm. Max.each.

9.0 FINISH and DIMENSIONS:

Free from mill scales and injurious defects like scales, laps, seams, folds, cracks, etc. Dimension of all parts shall be inspected in presence of purchaser's authorized inspector and shall meet the drawing requirements.

10.0 REPAIR

Repairs involving fusion welding are prohibited. Surface defects can be removed by mechanical means with the approval of BHEL and the defective areas shall be smoothly dressed up with the adjacent surface. The minimum thickness after repair shall meet the drawing / Specification requirements. Purchaser reserves all rights to accept or reject the forgings based on the extent of repair called for.

11.0 MARKING

Stamping on each item with the following details (apart from specification) with low stress stamps. and identified by a painted border line.

- | | |
|--|-----------------------------|
| 1. Maker's name | 6. Melt number |
| 2. Size | 7. "BHEL - Tiruchirappalli" |
| 3. Specification and grade | 8. Maker's emblem/code |
| 4. Inspecting Authority's seal | 9. Drawing No. |
| 5. Identification for correlating product and FTCs supplied. | |

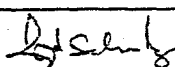


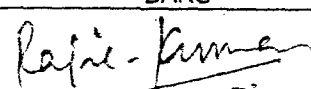
12.0 PRESERVATION AND PACKING

Surface of all items shall be cleaned and applied with peelable rust preventive coating. Sea worthy packing shall be ensured. Procedures/plans shall be submitted for these.

13.0 INSPECTION AND CERTIFICATION

The inspection and tests shall be carried out in presence of the inspecting agency authorised by BHEL, wherever specified in the inspection and test plans to be submitted for approval. Each item shall be backed by 5 copies of test certificate furnishing the following details legibly in English language only duly certified by the inspecting authority:

1. Purchase Order No.(BHEL),TDC No. & Test certificate number
2. Specification and Grade with applicable year of code
3. Quantity & Size, Drawing number, Heat Number, Steel making process, vacuum level.
4. Chemistry including incidental elements - Ladle, Ingot and Product analysis.
5. Heat treatment details of the material and test coupons including actual HT charts.
6. Mechanical and other test results as per clause 7.0
7. NDE test results with reference & acceptance standard, Repair details, if any.
8. Dimensional reports including surface finish.
9. All recorded documents as in Clause 3.0 and any other report / procedure called for.

PREPARED	REVIEWED	APPROVED BHEL	APPROVED BARC
			
R.RAJASEKAR DM/OA/ATP	P Sundaramoorthy DM / Plant.Lab	M.PONNUSAMY SM/OA/ATP	

ANNEXURE - I

REQUIREMENTS AND ACCEPTANCE STANDARDS
FOR
NON-DESTRUCTIVE EXAMINATION
OF
FORGINGS/PLATES/BARS/TUBES

1.0 General

This specification gives the minimum requirement for non-destructive examination of forgings/plates/strips/bars and tubes. Articles V for UT, VI and VII for surface examination and ASTM E-426 for Eddy current test shall be referred to.

2.0 Surface Examination

Forgings/plates/strips/bars and tubes shall be subjected to 100% surface examination by liquid penetrant method as well as visual examination. Surfaces shall be thoroughly examined during all the process of production and machining.

2.1 Acceptance Standards For Liquid Penetrant Examination

2.1.1 Indications, which can be interpreted as cracks or similar openings are not acceptable.

2.1.2 Only indications with major dimensions greater than 1.5 mm shall be considered relevant.

- (i) Non-relevant indications shall be re-examined to verify whether or not actual defects are present. Surface conditioning may precede the re-examinations. Non-relevant indications and broad areas of pigmentation, which would mask defects, are unacceptable.
- (ii) Indications of an actual length lower than 1.5 mm are acceptable provided the indication pattern does not change within one hour after developer is applied.

2.1.3 Defects producing the following relevant indications are not acceptable.

- (i) Any linear indications produced from non-metallic inclusions greater than -
 - (a) 1.5 mm in length for forging thickness less than 16 mm.
 - (b) 3 mm in length for forging thickness 16 mm to less than 50 mm.
 - (c) 5 mm in length for forging thickness equal to or more than 50 mm.
- (ii) Rounded indications of size greater than -
 - (a) 3 mm for forging thickness less than 16 mm.
 - (b) 5 mm for forging thickness 16 mm or more.
- (iii) Four or more relevant indications in a line separated by 1.5 mm or less edge to edge.

- (iv) Ten or more relevant indications in any 37.5 sq.cm. area (surface) with the major dimension of this area not to exceed 15 cms., with the area taken in the most unfavourable location relative to the indications being evaluated.

3.0 Ultrasonic Examination for forgings, bars and plates of Thickness 25 mm or more:

3.1 Extent Of Examination:

Each forging, bar and plate with thickness 25mm or more shall be 100% ultrasonically examined.

Ultrasonic examination shall be performed after completion of final heat-treatment and final machining of forgings.

- 3.1.1** Shells and dished heads shall be examined from both the inner and outer surfaces and from flat ends with normal beam probes. Examination shall also be carried out from both curved surfaces with two angle beam probes in two opposite directions during both circumferential and meridional scanning.

- 3.1.2** Bars shall be examined from flat/curved surfaces including end faces with normal beam probe. Also angle beam scanning in axial direction shall be carried out.

- 3.1.3** Plates shall be examined from both flat surfaces with normal beam probe and two angle beam probes in two directions perpendicular to each other.

3.2 Length of Indications:

The measurement of the areal extent / length of indications found during normal beam scanning and / or angle beam scanning shall be done using 6 dB drop method. The accuracy of mapping the area and length of indications may be improved by supplementing beam spread corrections or using additional probes. All recordable indications shall be mapped accordingly.

3.3 Recording:

- (a) All indications equivalent to 50% or above of a reflection from circular reference reflectors of diameter 2mm for effective thickness upto 40mm and diameter of 3mm for effective thickness greater than 40mm shall be recorded and reported.
- (b) If indications occur in groups with spacing between individual indications smaller than the effective diameter of the probe, then the recording level shall be lowered by 6 dB.
- (c) Angle Beam Examination: Calibration for angle beam examination may also be done using rectangular notch of depth 5% (maxm.) of the final thickness and width 3mm maximum with length 25mm maximum. In such cases, indications equal and above 50% of the reference indications shall be recorded.

3.4 Evaluation:

3.4.1 Frequency:

The examination shall be carried out at the highest frequency practicable. Due to attenuation, lower frequency may be used after the approval of the Purchaser.

3.4.2 Noise:

Austenitic materials with coarse grains give rise to sweep noise. When high sensitivities are used, indications shall be critically examined to determine whether they result from defects or grain structure. Several sets of calibration blocks with varying degrees of grain coarseness shall be compared for critically analyzing the defects.

3.5 Acceptance:

- (i) The evaluation of indications and acceptance level are given in table no. B1B2/TD/3220/T-1. However, when rectangular notches are used for calibration of angle beam scanning, indications which are detected during examination with amplitude equal and above reference echo level are not acceptable.
- (ii) Indications suspected to be planar in nature shall be investigated. Cracks are not acceptable.
- (iii) If during the examination indications are detected, which lie within the specified acceptance level as regards to amplitude and length, but appear to be clusters of minor inclusions, the acceptance level shall be reviewed in consultation with the Purchaser.
- (iv) In addition, normal probe examination which shows one or more reflectors which produce indications accompanied by a complete loss of back reflections not associated with or attributable to the geometric configuration, or the grain structure of the material, shall be considered as unacceptable.

4.0 UT Of Plates And Strips Less Than 25 Mm Thickness:**4.1 Reference standard:**

- (i) Straight beam examination:

A reference block of same material containing 2mm diameter hole drilled up to 50% of the thickness shall be used.

- (ii) Angle beam examination:

A reference block of same material containing a notch of 13mm length X 3mm width X 5% thickness of plate shall be used.

4.2 Recording, Evaluation And Acceptance Standard:

- (i) Straight beam examination

- (a) Evaluation sensitivity: The examination shall be carried out at a gain of +6dB of reference level. Flaw size shall be determined by half-value method.
- (b) Recording level: Any indication of size greater than or equal to 0.5 sq.cm shall be recorded.
- (c) Acceptance standard: Defect indications not meeting the requirements below shall be subjected to rejection.

- (c1) Single defect indication ≥ 1 sq.cm.
- (c2) Localised defect indications ≥ 4 nos. / sq.meter.
- (c3) Total defect indications ≥ 2 nos. / sq. meter.

(II) Angle beam examination

- (a) Recording level: All indications exceeding 50% of the reference level shall be recorded.
- (b) Acceptance standard: Any defect indication exceeding the recording level shall be considered unacceptable unless straight beam examination indicates that it is laminar in nature. In such cases evaluation shall done as per para (i) above. Cracks are not acceptable.

5.0 UT Of Tubes:

The volumetric examinations shall be carried out using ultrasonic examinations in two opposite circumferential scanning and eddy current method in final finished condition. If eddy current method does not yield meaningful results by failing to achieve the calibrated standard defects, additionally ultrasonic examinations in two opposite axial directions shall be carried out. 100% volume shall be covered. Tube ends, which have not undergone examination shall be cut-off prior to shipment.

5.1 Eddy Current Examination

- (i) Reference standard:
 - (a) Reference standard of a convenient length shall be made from a length of tube of the same nominal diameter and wall thickness, alloy, surface finish, and nominal heat-treatment as the material being tested.
 - (b) The standard shall have one notch extended circumferentially on the outer surface & another notch extended circumferentially on the inner surface and a 1.5 mm diameter hole drilled through the wall. The depth of the notches shall be larger of 5% of the wall thickness or 0.1 mm, width 1.5 mm and length 25 mm or less.
- (ii) Acceptance criteria:

Any tube with a discontinuity that produces an indication equal to or greater than the calibration standard shall be rejected.

5.2 Ultrasonic Examination For Longitudinal And Transverse Defects

- (i) Scanning shall be done continuous over 100% of the surface with at least 15% overlap. The procedure for ultrasonic examinations shall be carried out in accordance with ASTM E-213 including supplementary requirements and SEP 1915 & 1918 guidelines.
- (ii) Reference standard

CCBF113661

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- a) The reference standard of a convenient length shall be made from a length of tube of the same nominal diameter and wall thickness, alloy, surface finish, and nominal heat-treatment as the material being tested.
- (b) The standard shall have one notch extended axially on the outer surface & another notch extended axially on the inner surface. The depth of the notches shall be larger of 5% of the wall thickness or 0.1 mm, width 1.5 mm and length minimum of 12 mm to a maximum of 25 mm.
- (c) When required in lieu of eddy current testing, the standard shall also have one notch extended circumferentially on the outer surface & another notch extended circumferentially on the inner surface. The dimension of these notches shall be similar to axial notches.
- (d) The tolerance on depth of notch shall be +10% and -15%.

(iii) Acceptance criteria

Any tube with a discontinuity that produces an indication equal to or greater than the calibration standard shall be rejected.

5.3 Ultrasonic Examination For Laminations

5.3.1 The testing for laminations is to be carried out by means of the wall thickness measurement. The value of the remaining wall thickness at the place of the specified artificial defect shall be adjusted as the minimum wall thickness.

5.3.2 Scanning shall be done continuous over 100% of the surface with at least 15% overlap. The procedure for ultrasonic examinations shall be carried out in accordance with SEP 1919 guidelines.

5.3.3 Reference standard:

- (a) The reference standard of a convenient length shall be made from a length of tube of the same nominal diameter and wall thickness, alloy, surface finish, and nominal heat-treatment as the material being tested.
- (b) The standard shall have one notch extended axially or circumferentially on the inner surface. The depth of the notch shall be 30% of the wall thickness, width 8 mm and length to a maximum of 25 mm.
- (c) The size of the notch shall be checked by plastic replicas.

5.3.4 Acceptance criteria:

Any defect, which yields wall thickness less than the minimum thickness available at reference notch location shall be measured for its length by half-value method. Defect indication with length equal to or more than 8cm. shall be considered relevant. Two adjacent defects (acceptable or non-acceptable size) separated by a distance less than 10 cm. shall be considered as a single defect.

- (a) Defect indication of area equal to or more than 4 sq.cm. is not acceptable.
- (b) Defect indications equal to or more than 5 nos. per meter of inspected tube length are not acceptable.

TABLE NO. B/1B2TD/3220/T-1

Acceptance level for UT of Shells, Dished heads, Bars and plates					
Beam Angle	Scanning Direction	Local indication CRR max. *a/b mm.	Indication with		Accumulated Indication Total (per mtr. ²)
			Direction	Length (mm)	
Normal Beam	Radial	3/6	-	-	Unacceptable
Normal Beam	Axial (thickness faces)	2/3	Radial	-	Unacceptable
			Circumferential	25	-
Angle Beam	Axial	2/3	Radial	-	Unacceptable
			Circumferential	25	-
Angle Beam	Circumferential	2/3	Radial	-	Unacceptable
			Circumferential	25	-

* a = For thickness upto 40 mm.
 b = For thickness above 40 mm.

CBF113664

CBF113664

BHARAT HEAVY ELECTRICALS LIMITED
MM / PURCHASE - C&F
BHEL, Trichy – 620014

Annexure II

Enquiry Terms and Conditions

Note: This annexure has to be mandatorily filled in and signed by the manufacturer (or) mill and submitted along with Technical bid

S.No.	BHEL Requirements	Supplier Comments (Acceptance or otherwise for each point to be given)
1	<p><u>Material Specification:</u> Supply of Forged Shell shall be strictly as per the material specification 20MnMoNi55 mentioned against each item of the enquiry.</p>	
2	<p><u>Technical Conditions:</u></p> <ol style="list-style-type: none"> 1. Supply of Forged Shell shall be strictly as per specification mentioned against each item of the enquiry. 2. Supply shall be as per TDC: 6:286 Rev04. 3. Inspection by BHEL-Trichy & BARC. 4. TC in FORM IIIC, works TC, Raw Material TC, UT report, MPI report and other test certificates as called in TDC: 6:286 R04 shall be sent along with supply. 	
3	<p>Payment Term (Indigenous)</p> <ol style="list-style-type: none"> 1. Payment term is 100% direct payment after 45 days from the date of receipt and acceptance of materials. Any deviation in the above payment term will attract loading as mentioned below. “Base rate of SBI (as applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders. 2. Offers of indigenous Suppliers with payment terms as LC / Advance Payment / Payment through bank are liable for rejection. 	
4	<p>Payment Term (Imports)</p> <ol style="list-style-type: none"> 1. BHEL Payment term is 100% payment on CAD basis after 45 days from the date of receipt of documents, specified in PO, at BHEL bank. Respective bank charges to respective account. Any deviation in the above payment term will attract loading as mentioned below. “Base rate of SBI (as applicable on the date of bid opening. Techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidders. 2. In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value. 3. For LC at sight the loading will be considered @ 3.5% on the offered Value. 	

	<p>4. Incase of LC, LC will be opened only on intimation of readiness of material for shipment. LC will not be opened prior to readiness of materials.</p> <p>5. Normally CAD at sight and Confirmed LCs are liable for rejection. However, if CAD at sight is accepted by BHEL, a loading of 5% will be done on the offered Value.</p>	
5	<p>Liquidated Damages / Penalty</p> <ol style="list-style-type: none"> LD shall be 0.5% of the total order value per week or part thereof subject to a maximum of 10% of the total order value. Any deviation from the above LD clause, loading will be applied to the extent to which it is not agreed by the bidder (at offered value). If LD is not accepted on total order value a loading of 10% on the offered value will be done. For CFR contracts LD will be calculated from the date of B/L. 	
6	<p>Bank Guarantee / Warrantee:</p> <ol style="list-style-type: none"> The Bidder, in the event of an order, should furnish a bank Guarantee from BHEL's consortium banks (List attached) or counter-guaranty by vendor's bank to BHEL's consortium banks, at no extra cost to BHEL, in a proforma prescribed by BHEL, provided along with the order, for an amount equivalent to 10% (Ten percent) of the value of the contract. The BG shall be valid for period of 18 months from the date of last shipment or 12 months from the date of receipt / acceptance / at BHEL, TRICHY whichever is later, with a claim period of two months. . (PBG shall be issued before the dispatch / Shipping of the materials)-PBG strictly as per BHEL format only. Supplier to accept guarantee/warrantee of “18 months from dispatch or 12 months from commissioning, whichever is earlier”. Any deviation to this may lead to rejection of the offer. 	
7	<p>Risk Purchase:</p> <p>BHEL at its option will be entitled to terminate the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute thereof. The supplier shall be liable for any loss which BHEL may sustain by reason of such risk purchases in addition to LD at the maximum rate mentioned in the LD clause above.</p>	
8	<p>BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed.</p>	
9	<p>Fixed Price:</p> <p>Prices quoted by the bidder shall be fixed and not subject to any escalation whatsoever during the period of bid validity and execution of the Purchase Order. A bid submitted with an adjustable price will be liable for rejection. Prices shall be written in words and figures. In the event of any discrepancy with regard to total price and unit price whichever is less shall be considered correct. Unit rates quoted should include all the charges like third party inspection charges, packing & Forwarding etc. If the charges are shown separately, the same shall be in % of basic unit rate. No Lump sum charges shall be quoted.</p>	

10	<p>Bid Currency:</p> <ol style="list-style-type: none"> 1. Indian bidders should submit the prices only in Indian Rupees. Foreign bidders may submit their bid in their preferred currency. 2. For evaluation, Exchange rate (TT selling Rate of SBI) as on Techno Commercial bid opening date shall be considered. 	
	<p>3. Delivery Conditions:</p> <p>For Indigenous bidders - Ex-works offers will not be considered. Bidders should submit their offer on FOR Destination, BHEL Stores, Trichy basis. The quote shall include all charges, including testing, packing, inspection, freight and insurance charges, etc.</p> <p>A. Imports:</p> <ol style="list-style-type: none"> a) Bidders should submit their offer for CFR, Chennai Port with freight break up details. <p>FOR CFR INCO TERMS</p> <ol style="list-style-type: none"> a) In the case of CFR terms, the following points are to be addressed in the offer: <ol style="list-style-type: none"> 1. Shipment Mode: Break Bulk (or) Container (To be specified clearly). 2. The freight charges quoted should be on LILO (LINER IN LINER OUT) basis including extra charges, if any, like Container Imbalance Charges, Trade Imbalance charges or any other charges payable to the Liner. No other charges other than the quoted Freight rate will be paid by BHEL excepting applicable Terminal Handling Charges, Container cleaning Charges, DO charges to Shipping Liner at Discharge Port. If any deviation is taken by Tenderer, a loading of 22% on the freight rate per MT shall be considered by BHEL for arriving at the Total landed Cost. b) In case of shipment through Containers on CFR basis, the BL should bear the endorsement that “14 free days for Container Detention is applicable”. 	
11	<p>Validity:</p> <ol style="list-style-type: none"> 1. The offers shall be kept open for acceptance for 90 days from the date of Tender opening. Once the tenders are submitted, rates cannot be changed on any grounds. 2. BHEL reserves the right to negotiate L1 rate or re float the tender opened if L1 price is not the lowest acceptable price to them inter-alia other reasons. 3. Any other conditions which might have been quoted by the seller and are in Contravention to the terms prescribed in the order and which have not been specifically accepted in by purchaser will not be applicable to the contract. 	
12	<ol style="list-style-type: none"> 1. Please submit your offer in TWO part bid (technical cum commercial bid in one cover and price bid in another cover) in single cover. The Covers should be duly super scribed with the ENQUIRY NO and DUE DATE in BOLD letter without fail. 	
13	<ol style="list-style-type: none"> 1. Bidders shall submit the OFFER in English language (a single envelope containing two inner envelopes) as indicated below: 	

Envelope 1: This sealed envelope should contain

- (a) technical bid
- (b) un-priced commercial bid (copy of the Priced Bid without the price details) This envelope should be clearly marked "Part I – Technical and Un-priced commercial bid, indicating Enquiry No., Due Date, Address & Reference of the Bidder.

Envelope II: This sealed envelope should contain price details. This envelope should be clearly marked "Part II - Price bid", indicating Enquiry No., Due Date, Address & Reference of the Bidder.

2. The OFFER, sealed and Super scribed as "Parts I & II inside" indicating Enquiry No., Due Date, Address & Reference of the Bidder should reach this office on or before the due date by 14:00 Hrs (IST). OFFERS RECEIVED AFTER 14:00 Hrs (IST) WILL NOT BE CONSIDERED FOR EVALUATION.

The OFFER to be addressed to:

**The Tender Opening Cell/MM
Room No-26 , Building – 24 , Ground Floor Bharat
Heavy Electrical Limited Tiruchirappalli- 620014.**

Note: Bidders are requested to submit their offers only through sealed bids.

3. Bidders may submit their bids through email/fax etc.
4. Tenders should be free from CORRECTION AND ERASURES, Corrections if any, must be attested.
- A. If, in the price structure quoted for the required goods, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.
- B. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
- C. If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (A) and (B) above.
5. **Offers from Stockiest, traders will not be acceptable.**
6. BHEL prefers the manufacturers to quote directly. In case this is not possible and the offer is being submitted by an Indian agent, the following details are to be furnished along with the offer:
- a. The letter from their Principal authorizing the Indian agent to submit the offer on their Principal's behalf. In case the Indian agent submits offer on their own letter head then a covering letter (in original) from the Principal should be enclosed, clearly mentioning that they are bound by the offer submitted by the Indian agent on their behalf.

- b. Precise relationship between foreign suppliers and their Indian agents and their mutual interest in business, should be clearly spelt out.
- c. Any payment, which the agent receives in India or abroad, from the foreign supplier, whether as a commission or as a general retainer fee is to be mentioned in the offer.
- d. All services to be rendered by the agent, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier and the Indian agent.
- e. The amount of agency commission agreed to between the foreign principal and the Indian agent should be specifically disclosed and the agency commission will be paid in Indian Rupees only on satisfactory completion of the contract.
- f. Copy of current agency agreement is to be enclosed without which the offer is liable for rejection.

The correspondence between the bidder and BHEL through email is considered to be valid document legally though not signed. It is treated as valid confirmations made on behalf of the respective company and comes under the legal ambit of the business transaction and hence binding on both the parties.

Bidders participating in the tender should declare in their technical bid whether they have been black-listed / kept on hold / given Business holiday for a specified period by any Public Sector Undertaking or Government Departments. The reasons for such action with details and the current status of such hold shall be clearly furnished to BHEL. If no such details are mentioned in the offer, it will be construed that the bidder is not under any such hold. However, at a later date if it comes to the notice of BHEL about any such hold under enforcement, BHEL reserves the right to reject the offer at any point of time and also under any stage of the finalization of the tender. Such bidders will not be permitted to participate in the further tender proceedings and will be communicated suitably.

7. BIDDERS WHO ARE NOT REGISTERED VENDOR OF BHEL TRICHY HAVE TO
SUBMIT THE FILLED IN SUPPLIER REGISTRATION FORMS (SRF)
AVAILABLE IN THE BHEL WEBSITE - www.bhel.com AND THE OTHER
REQUIRED DOCUMENTS
CALLED FOR IN THE SRF (INCLUDING D&B REPORTS FOR IMPORT VENDORS.
ALONG WITH THE TECHNICAL BID WITHOUT FAIL. The same
shall be scrutinized as per BHEL evaluation procedures

8. ALL VENDORS (BHEL REGISTERED VENDORS OR NEW
VENDORS) SHOULD
SUBMIT AN EXPERIENCE CERTIFICATE DETAILING THE QUANTITY SUPPLIED
SPEC WISE YEAR WISE ALONG WITH THE UNPRICED PO COPIES AND PROOF OF
SUPPLY (SUCH AS INVOICE & BILL OF LADING COPIES) ALONG WITH THE
OFFER FOR / TENDERED SPECIFICATIONS AND TEST
CERTIFICATES FOR THE SAME; FOR OFFER ACCEPTANCE. THE
MANUFACTURER SHALL HAVE MANUFACTURED / TENDERED SPEC AND THE
SAME SHALL HAVE BEEN SUPPLIED/IN USE/OPERATION.

9. ALL VENDORS (BHEL REGISTERED VENDORS OR NEW
VENDORS) SHALL
SUBMIT - THE FACILITIES AVAILABLE AT THE MILL - STARTING MATERIAL TO
FINISHED PRODUCT, MANUFACTURING QUALITY PLAN, INSPECTION &

TEST PLAN TO MEET THE TDC REQUIREMENTS (product form wise) ALONG WITH THE TECHNICAL BID SHOULD BE SUBMITTED WITHOUT FAIL.

The same shall be scrutinized as per BHEL evaluation procedures.

OFFERS SUBMITTED WITHOUT THIS WILL BE REJECTED.

10. If supplier is not a steel maker then source & form of raw material for the manufacturing shall be submitted product form wise.
11. The manufacturer shall submit filled in forging / forming / pressing supplier facility report. Suppliers without basic manufacturing facilities in house, shall not be considered for evaluation.
12. In house test facilities for mechanical, chemical & non - destructive testing are mandatory requirements for consideration of this offer.
13. BHEL/End customer reserve the right to inspect the item ordered at any stage at vendor's works and if found not to meet the stipulated conditions, material is liable for rejection.
14. Acceptance of TC by BHEL before dispatch is must.
15. Date of price bid opening will be informed later after acceptance of offer on technical ground.
16. Bidders are to confirm all the above points in their "Technical and unpriced commercial bid". Incomplete offers will not be considered. The technical documents submitted for consideration of offer (shall be in English) is to be signed and sealed in original by mill without fail.
17. Suppliers have to submit their registration forms online in BHEL portal (www.bhel.com). The hard copy of the supplier registration form (17 pages) and checklist (1 page) with signatory on all the pages shall be courier to the below mentioned address:

**Mr. EBINESAN,
DGM/SDC/MM,
24 Bldg, IV Floor,
BHEL, Trichy-620014.
Phone- 0431-2577448
e-mail- ebi@bheltry.co.in**
18. Documents not signed and stamped by the authorized signatory of the bidder shall not be accepted and considered for registration / evaluation of the bid etc.
19. Any additional documents submitted by supplier / bidder, during processing of registration application / tender or after placement of order, shall not be accepted unless it is submitted with forwarding letter and duly signed and stamped as mentioned above.

Sample Format -A

QAP

Laja, 02/01/2014
L.N. RAJASEKARAN
 By: General Manager
 Matl. Ping. & Sub-contracting
 Advanced Technology Products
 BHEL, TRICHY - 620 014.

Supplier Details				BHEL P.O. No.: PO Date:		QAP NO:		Rev No.		Date:	
Customer Details				Ref Docs TDC No. : 6:286:Rev 04 Drg. No. 3-90-114-00728/02		Page No:		Item Description : 20MnMoNi55 Forgings			
Sl. No.	Operation	Characteristics	Type of check/method	Extent of Check	Reference Documents/Stds	Acceptance Standard	Format of Records	Inspection by			REMARKS
								Supplier	BHEL	BARC	
1	Raw Material/ Incoming Inspection	Ladle Analysis (Chemical Analysis)	Supplier to fill	1 sample /heat	TDC No. : 6:286 : Rev 04, ASTM E30 & ASTM E350	TDC No. : 6:286:Rev 04	Mill TC	P, R	R, H	R, H	i.) Steel making to be as per TDC Clause 5.0 Mill ii.) TC to be submitted for review by BHEL /BARC
		Ingot/Bloom Identification	Visual	100%	Supplier's internal practice	TDC No. : 6:286:Rev 04	Test Report	P	W	R	
		Ingot Chemistry Check	Supplier to fill	on top and bottom of each ingot/heat	TDC No. : 6:286 : Rev 04, ASTM E30 & ASTM E350	TDC No. : 6:286:Rev 04	Test Report	P, R	R	R	
2	Forging	Temperature	Measurements	100%	As per approved Manufacturing Process Plan(MPP) & TDC : 6:286 : Rev 04,	As per approved Manufacturing Process Plan(MPP) & TDC : 6:286 : Rev 04,	Supplier's log book	PR	R	R	
		Reduction Ratio									
		Dimensions									
3	Heat Treatment	Type of HT - Hardening , Tempering Simulation HT	Loading temp.; ROH & ROC; Soaking Temp. & Time etc.; No. of Test Specimens to be loaded	100%	As per approved HT procedure and TDC: 6:286 : Rev 04 Clause 6	As per approved HT procedure and TDC : 6:286 : Rev 04 Clause 6	HT chart (time temp graph)	P,R	W	W	HT chart to be submitted. Furnace & Thermocouples shall be calibrated before taking up HT process.
4	Test Coupon	Identification	Stamping	As per approved MSTP	TDC : 6:286 : Rev 04 Clause 4	TDC : 6:286 : Rev 04 Clause 4 & approved MSTP	TP stamping report/ register	P,R	H,W	H,W	

5	Inspection & Testing	Product Analysis	Supplier to fill	On each forging from STC as per MSTP	20MnMoNi55, TDC : 6:286 : Rev 04 Clause 5	20MnMoNi55, TDC : 6:286 : Rev 04 Clause 5	Test Report	P,R	W	W	
		Physical Testing	Tensile Test (RT) & (ET)	As per approved MSTP	ASTM A20 & A370	20MnMoNi55, TDC : 6:286 : Rev 04 Clause 7	Test Report	P,R	W	H, W	Testing in NABL approved LAB
			Impact Test								
			RTNDT								
			Hardness								
		Macro Etch test	Macro Analysis	ASTM A381	TDC : 6:286 :Rev 04 Clause 7	Test Report	P,R	W	W		
Grain Size and Micro Structure	Micro Analysis	ASTME112 & TDC : 6:286 :Rev 04 Clause 7	ASTM Grain size 5 or finer	Test Report	P,R	W	W				
Inclusion Rating	Micro Analysis	ASTM E45	TDC : 6:286 :Rev 04 Clause 7	Test Report	P,R	W	W				
6	Non- Destructive examination	Ultrasonic Test (UT)	Pulse Echo Technique	100%	As per approved procedures, ASME Sec V and TDC :6:286 Rev 04 Annexure I	As per approved procedures, ASME Sec V and TDC :6:286 Rev 04 Annexure I	Test Report	P,R	W	W	
		Liquid Penetrant Test (LPT)	Dye penetrant	100%			Test Report	P,R	W	W	
		Magnetic Particle Test (MPT)		100%			Test Report	P,R	W	W	
7	Final Inspection	Dimension Check	Measurments	100%	As per Drg. 3-90-114-00728/02 and PO.	As per Drg. 3-90-114-00728/02 and PO.	Test Report	P, R	W	W	
		Surface Examination	Vsual	100%	Shall be free from craks, scales , etc.	TDC : 6:286: Rev 04 clause 9	Test Report				
		Identification & marking	Low stress stamp	100%	TDC : 6:286: Rev 04 clause 11	TDC : 6:286: Rev 04 clause 11	rub offs				
8	Preservation & Packing	Safe packing for transit	with polythene and wooden supports/box	100%	rust preventive coating	TDC : 6:286: Rev 04 clause 12					
9	Issue of Shipping Release Note	Documentation		100%		All docs to be reviewed	Shipping release note			H	Shipping release note will be issued on acceptance of TC.

Legends- P: Perform , R: Review, W: wintess, H : Hold Point

Product analysis and mechanical testing as per QAP stage 5 to be carried out in NABL approved lab

Supplier :
prepared and reviewed by :

For BHEL Approval

For BARC Approval

L.N. Rajasekaran
02/10/2016

L.N. RAJASEKARAN
Dy. General Manager
M&L Png. & Sub-contracting
Advanced Technology Products,
BHEL, TRICHY - 620 014.

Sample Format -B(1)

PROCEDURE FOR ULTRASONIC TESTING

UT

1.0 Scope	Extent of examination as per applicable specn.
2.0 Technique	Method of testing to be detailed
3.0 Reference documents	ASME & as per applicable TDC
4.0 NDT Personnel	Qualification of the personnel to be engaged
5.0 UT Equipment & Accessories	
(i) Details of the Flaw Detector	Make & Model
(ii) UT probe (Dual/Single Crystal)	Type of Probe Size of Probe Frequency Focal Length
(iii) Angle Beam details	
(iv) Couplant:	Type & Brand Name
6.0 Equipment Check before use	
7.0 Surface Preparation	
8.0 Calibration	Calibration Block requirements and its dimensional details
9.0 Calibration Confirmation	system changes & periodic examination checks
10.0 Scanning Plan	Directions of scanning to be given as a sketch
11.0 Scanning Procedure	stage of UT Technique Sheet references Scanning level Scanning Speed overlap % to cover total UT area
12.0 Recording	Defect recording
13.0 Report to give	(i) recordable indication (ii) location of recordable indications (iii) dimensions of the area not inspected (iv) Purchaser Drg. No. & Order No. (v) applicable specn., calibration details, Instrument details, surface condition, couplant and Search Unit
14.0 Quality Levels:	
15.0 Report Format	


02/01/2016

L.N. RAJASEKARAN
Dy. General Manager
Matl. Png. & Sub-contracting
Advanced Technology Products
BHEL, TRICHY - 620 014.

Sample Format - B(2)

ULTRASONIC TEST CERTIFICATE

Certificate No. & Date:-

Work Order No.:-

Purchase Order No. & Date:-

Customer Name:-

Item No.	Component	Drg. No./Size (in mm)	Qty.	Job Sl. No.	Group No.	Material Specification

Ultrasonic Test Method:-

Details of the Equipment used:-

Surface Condition		Type of Couplant use & Brand Name	
Search Unit (including Sl. No.)		Scanning	
Search Unit Size		Range (mm) of CRT	
Frequency		Pulse Energy	
Ultrasonic Test Standard		Amplitude	
Acceptance Standard		Suppression	
Applicable Procedure, Specification with Rev. No.		Type of Cable and length	
Identification of Calibration Block		Operator Name	
Examination Conducted Surface		NDE Qualification LEVEL	

ATTENUATOR SETTING

- (i) Attenuator Reference Standard:
- (ii) Attenuator Testing Sensitivity:

TEST RESULT:

REMARKS:

Test Witnessed By:

L.N. Rajasekaran
02/01/2016

L.N. RAJASEKARAN
Dy. General Manager
Matl. Ping. & Sub-contracting
Advanced Technology Products
BHEL, TRICHY - 620 014.

Sample Format - B(3)

TABLE
(to be followed for UT)

Drg. No. Reference			
Stage of Examination	After HT and proof-machining (semi-finished) condition		
Size of the proof-machined solid forging	Dimension after proof-machining for UT to be given.		
Type of Beam	NORMAL	NORMAL	ANGLE BEAM (45°)
Position of Scanning	with reference to Sketch	with reference to Sketch	with reference to Sketch
UT Reference Block details	hole details	hole details	Notch details
Direction of Scanning	Sketch to be given		


102/01/2016

L.N. RAJASEKARAN
Dy. General Manager
Matl. Ping. & Sub-contracting
Advanced Technology Products
BHEL, TRICHY - 620 014.



FORGE SHOP

- 1.00.00 Name of Company, Address

- 2.00.00 Type & No. of Forging Press : Forging hammer
Capacity - (Tonnes)

- 3.00.00 Max. size of Material that can be handled
dimensions, weight and type of materials.

- 4.00.00 Production with relevant standards (for last three years)

Carbon Steel

Stainless Steel

Alloy steel

Inconel -

- 5.00.00 Heating Facilities -

- 5.10.00 Furnace - No. and capacity

- 5.10.10 Type - Oil Fired, Gas Fired, Electric
heating

- 5.10.20 Dimensions

- 5.10.30 Mode of Temperature control & extent
of automation.

- 5.10.40 Temperature recording facilities

- 5.20.00 Distance of heating furnace from Forging Press

- 5.30.00 Handling Facilities - Crane/Truck/Manual/ any other
indicate list of such facility.

- 6.00.00 Availability of in-house Heat Yes/No
Treatment facility

- 6.10.00 If yes: Type of heat treatment possible



FORGE SHOP

- 6.20.00 If no, source of Heat Treatment with relevant details.
- 6.20.10 Annealing -
- 6.20.20 Normalising -
- 6.20.30 Stress Relieving -
- 6.20.40 Quenching: - Water/Oil
Any other Heat treatment? -
- 6.20.50 Type & No. of Furnace -
- 6.20.60 Dimensions, Type of Temp. Control,
Temp - Time Recording facilities.
- 7.00.00 Source of Raw Materials -

Indigenous/imported (Indicate source and quantity of
material procured during last three years)
- 8.00.00 Machining Facilities -

List of machines installed
- 9.00.00 Cutting facilities - Type & No. of Machine

- 10.00.00 Availability of testing facilities Yes/No
- 10.10.00 If no - Indicate source of testing with relevant details
- 10.20.00 If yes :-
- 10.20.10 Chemical Analysis: Method
- 10.20.20 Mech. Testing
- 10.20.21 Hardness testing
- 10.20.22 Metallorgraphy
- 10.20.23 Universal Tensile Testing M/C -
Ambient Low Temp.
- 10.20.24 Any other tests -
- 10.30.00 Non-destructive
- 10.30.10 Radiography



FORGE SHOP

- 10.30.20 Ultrasonic Test
- 10.30.30 Dye Penetration
- 10.30.40 MPI
- 10.30.50 Any other NDE
- 11.00.00 Experience with Third Party/Statutory Agency:
Indicate the agency
- 12.00.00 Source of procurement of Dies & availability for
Machining of such dies.
- 13.00.00 Consistency in supply:
- 13.10.00 Has the vendor produced items of similar nature in
past?
- 13.20.00 Has the vendor maintained delivery commitments in
past?
- 13.30.00 Has there been frequent labor trouble in past?
- 13.40.00 Has there been major upset due to faulty
material management?
- 13.50.00 Is the system of planning & scheduling resilient
enough to overcome temporary setbacks & make
up lost time?
- 13.60.00 Has the vendor got standby arrangement for power?
- 13.70.00 Can the vendor quickly offload the work to other
reliable sub-vendor?
- 13.80.00 Total order booked till date.
- 14.00.00 Remarks:

PLACE:

SIGNATURE WITH SEAL

DATE:



Fax : 011-2306 2626

संख्या /No. 20/29/2009 -Boilers

भारत सरकार

वाणिज्य और उद्योग मंत्रालय
(औद्योगिक नीति एवं संवर्धन विभाग)

उद्योग भवन, नई दिल्ली - 110107

GOVERNMENT OF INDIA
MINISTRY OF COMMERCE AND INDUSTRY
(DEPTT. OF INDUSTRIAL POLICY & PROMOTION)

UDYOG BHAWAN, NEW DELHI-110107,
दिनांक/ Dated, the 8th October, 2014

To

1. All the members of the Central Boilers Board
2. All the Inspecting Authorities

Subject: List of recognised Inspecting/Competent Authorities, Well Known Steel Makers, Foundries/Forgings units, Tube/Pipe Makers, Material Testing Laboratories and Remnant Life Assessment Organizations under Indian Boiler Regulations as on 30th September, 2014.

Sir,

I am to forward herewith a copy each of the list of recognised Inspecting/Competent Authorities, Well Known Steel Makers, Foundries/Forgings units, Tube/Pipe Makers, Material Testing Laboratories and Remnant Life Assessment Organizations under Indian Boiler Regulations, 1950, as on 30th September, 2014 for your reference and record.

Thanking you,

Yours faithfully,

(S. K. Jain)

Development Officer &
Assistant Secretary, Central Boilers Board
Tel.No.011-23063166

(As on 30/09/2014)

INSPECTING AUTHORITIES

<u>NAME OF THE AUTHORITY</u>	<u>AREA OF OPERATION</u>
1. Director of Boilers, Andhra Pradesh	Andhra Pradesh
2. Chief Inspector of Boilers, Arunachal Pradesh	Arunachal Pradesh
3. Chief Inspector of Boilers Assam	Assam
4. Chief Inspector of Boilers Bihar	Bihar
5. Chief Inspector of Boilers Chhattisgarh	Chhattisgarh
6. Chief Inspector of Boilers, Delhi	N.C.T.D.
7. Chief Inspector of Boilers, Goa.	Goa
8. Director of Boilers, Gujarat.	Gujarat, Daman & Diu and Dadra & Nagar Haveli
9. Chief Inspector of Boilers, Haryana.	Haryana & Chandigarh
10. Chief Inspector of Boilers, Himachal Pradesh.	Himachal Pradesh
11. Chief Inspector of Boilers,, Jharkhand.	Jharkhand
12. Director of Boilers, Karnataka.	Karnataka
13. Director of Boilers, Kerala.	Kerala
14. Director of Boilers, Madhya Pradesh.	Madhya Pradesh
15. Director of Boilers, Maharashtra.	Maharashtra
16. Chief Inspector of Boilers, Meghalaya	Meghalaya
17. Chief Inspector of Boilers, Manipur	Manipur

- | | |
|--|--|
| 18. Chief Inspector of Boilers,
Mizoram | Mizoram |
| 19. Chief Inspector of Boilers,
Nagaland | Nagaland |
| 20. Director of Boilers,
Orissa | Orissa |
| 21. Director of Boilers,
Punjab | Punjab |
| 22. Chief Inspector of Boilers,
Labour Department,
Government of Puducherry,
Puducherry | Puducherry |
| 23. Chief Inspector of Boilers,
Rajasthan. | Rajasthan |
| 24. Director of Boilers
Tamil Nadu | Tamil Nadu |
| 25. Director of Boilers
Telangana | Telangana |
| 26. Chief Inspector of Boilers,
Tripura | Tripura |
| 27. Director of Boilers,
Uttar Pradesh | Uttar Pradesh |
| 28. Chief Inspector of Boilers
Uttarakhand | Uttarakhand |
| 29. Chief Inspector of Boilers,
West Bengal | West Bengal |
| 30. M/s. Lloyd's Register Asia
63-64, Kalpataru Square, 6 th Floor,
Kondivita Lane, Off. Andheri-Kurla Road,
Mumbai-400 059 | Tamil Nadu, Maharashtra,
Karnataka, Gujarat, Haryana,
Himachal Pradesh, Punjab,
Andhra Pradesh, Telangana &
Odisha |
| 31. M/s Bureau Veritas (India) Private Limited,
Marwah Centre, 6 th Floor,
Opp. Ansa Inds. Estate, K. Marwah Marg,
Off. Saki-Vihar Road, Andheri (East),
Mumbai-400 072 | Chhattisgarh, Gujarat ,
Haryana , Madhya Pradesh,
Maharashtra , Odisha ,
Tamil Nadu, Bihar,
Jharkhand, Sikkim & West
Bengal |
| 32. M/s ABS Industrial Verification (India) Pvt. Limited,
10 th Floor, Lakhani's Centrum,
Sector-15, Plot No. 27,
CBD Belapur (E),
Navi Mumbai-400 614 | Maharashtra, Odisha &
West Bengal |

- | | | |
|----------------|---|--|
| 33. | M/s TUV India Pvt. Limited
(TUV Nord Group)
801, Raheja Plaza-1,
L.B.S. Marg,
Ghatkopar(W)
Mumbai-400 086 | Andhra Pradesh, Gujarat,
Maharashtra, Himachal Pradesh,
TamilNadu, Telangana & Karnataka |
| 34. | M/s. TUV Nord Systems GmbH Co.KG.
Langemarckstr 20
451141 Essen
GERMANY. | Europe, Brazil, China, Korea
and Thailand |
| 35. | M/s RSA
(Formerly Royal & Sun Alliance plc)
17 York Street,
Manchester, M2 3RS,
United Kingdom | Europe |
| 36. | M/s. Japan Inspection Company Limited,
No.10-7, 1-Chome, halchobori, Chou-ku,
Tokyo, 104-0032, Japan | All countries in Asia except
India |
| 37. | M/s. S.G.S. Korea Company Limited,
Industrial Division,
647-2, Sinpyeong-dong,
Saha-gu, Busan,
KOREA (604-030). | Korea & Japan |
| 38. | M/s Bureau Veritas,
67-71, Boulevard du Chateau,
92200 Neuilly-sur-Seine,
FRANCE | All countries except India. |
| 39. | M/s. Lloyds Register Verification Ltd.,
71, Fenchurch Street,
London EC 3M, U.K. | All countries except India. |
| 40. | M/s. Velosi Certification Bureau Ltd,
Unit 1 Woodside Business Park,
Whitley Wood Lane,
Reading, Berkshire, RG2 8LW
United Kingdom | Europe, Middle East
Countries, China, Malaysia
Singapore & USA |
| 41. | M/s TUV Rheinland AG
Am Grauen stein, D-51105 Koln,
Germany | All countries except India |
| 42. | M/s OOO "TekhnoLogicheskieEnergositime"
1. Kalinia St. Belgorod, 308001
Russia | Russia, China, Ukraine, USA
& Germany |

- | | | |
|----------------|--|--|
| 43 | M/s Engineering Bureau Franke International,
55, Amurskaya St.,
Dnepropetrovsk
49108, Ukraine | Ukraine, Russia, Belarus, China ,
Uzbekistan, Poland, Belgium, Romania,
& Czech Republic |
| 44. | M/s. ARISE Boiler Inspection &
Insurance Company Risk Retention Group,
Grand Bay I, 7000 South Edgerton Road,
Suite 100, Brecksville,
OH 44141 USA | USA & Canada |
| 45. | M/s Tata Projects Limited,
Quality Service Division,
2 nd Floor, Varun Towers-1,
Begumpet,
Hyderabad-500 016 | All countries except India |
| 46. | M/s TUV SUD Industrie Service GmbH,
Wstendstr. 199,
80686 Munich,
Germany | All countries except India |
| 47. | M/s Germanischer Lloyd Industrial Services GmbH,
Steinhoeft 9,
20459 Hamburg,
Germany | All countries except India |
| 48 | M/s. TUV Thuringen e.V.,
Business Division Steam and Pressure Technology,
Melchendorfer Str. 64,
99096 Erfurt,
Germany | Europe |
| 49. | M/s. SGS-CSTC Standards Technical Services Co. Ltd.
9 th Building, No. 69,
KangQiao Industrial Park, Block 1159,
KangQiao East Road, Pudong District,
Shanghai-201 319
China | China |
| 50. | M/s Intertek Inspection Services UK Limited
(Formerly M/s Moody International Limited)
Hayworthe House, Market Place,
Haywards Heath, West Sussex,
United Kingdom | All countries except India |
| 51. | M/s ABSG Consulting Inc.,
16855 Northchase Drive,
Houston, TX 77060
United States of America | All countries except India |

52. M/s. Hartford Steam Boiler Inspection and Insurance Company of Connecticut,
One State Street, 8th Floor
Hartford, CT 06141-0299
U.S.A. All countries except India and China
53. M/s. Certification Engineers International Limited,
D 101-106, First Floor,
International Technology Centre,
CBD Belapur Station Complex, Navi Mumbai-400 614 All countries in Europe, Middle East & China
54. M/s. Det Norske Veritas AS,
Veritasveien 1. PO Box 300,
N-1322, Hovik, Norway Europe, South & North America and Asia (except India)
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(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT AND THE EXPIRY DATE OF BG MUST BE AFTER 60 DAYS FROM THE DATE OF COMPLETION OF WARRANTY PERIOD)

PERFORMANCE BANK GUARANTEE

In accordance of M/s. Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi 110 049) through its High Pressure Boiler Plant Division located at Tiruverumbur, Tiruchirapalli- 620 014 (hereinafter called 'the Company') having entered into a contract withhereinafter called ' the said contractor ' which term includes 'suppliers' for the purpose of this Bond and under the terms and conditions of the contract No..... Dt Between BHEL, Trichy and as per the contract, the contractor / supplier is to furnish a performance Bank guarantee for Rs. for the due performance of the equipment to be supplied under the above referred contract and for the fulfillment of all the terms and conditions of the contract, We(indicate the name of the bank) (herein after referred to as the bank) at the request of (Contractor(s)) do here by undertake to pay the company an amount not exceeding Rs.....against any loss or damage caused to or suffered or would be caused to or suffered by the company by reason of any breach by the said contractor (s) of any of the terms and conditions contained in the said agreement.

2. We(indicate the name of the bank with full address), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s) of any of the terms and conditions contained in the said Agreement or by the reason of the contractor(s) 'failure to perform' the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____.

3. We undertake to pay unconditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority relating thereto our liability under this present being absolute and unequivocal. The payment under this guarantee would not wait till the disputes have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority. The payment so made by us under this Bond shall be a valid discharge of liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We.....(indicate the name of Bank), further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till _____ Office / Department/ Division of the Company certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. (I) Unless a demand or claim under this guarantee is made on us in writing on or before the _____ we shall be discharged from all the liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date.

(ii) For the purpose of this clause, any letter making demand on the Bank by M/s. BHEL dispatched by Registered Post with Ack.Due or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the bank personally.

6. We(indicate the name of Bank), further agree with the company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of the company or any indulgence by the company to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of not so relieving us.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

8. It shall not be necessary for the company to proceed against the contractor before proceeding against the guarantor-bank and the guarantee herein contained shall be enforceable against them notwithstanding any security, which the company may have obtained or obtain from the Contractor shall, at the time when proceedings are taken against the guarantor hereunder be outstanding or unrealised.

9. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirapalli.

10. The guarantor hereby declare that it has power to execute this guarantee and the executant has full powers to do so on its behalf under the proper authorities granted to him/them by the guarantor.

11. We(indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing.

In witness whereof we....., (indicate the name of Bank) have hereunto setout Bank Seal the _____ day _____ month 200

BANK E-MAIL ID:
BANK PHONE NO.
BANK FAX NO:

List of Consortium Bank

Nationalised Bank		Nationalised Bank	
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		Public Sector Banks
3	Bank of Baroda	20	IDBI
4	Canara Bank		Foreign bank
5	Corporation bank	21	CITI Bank N.A
6	Central bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Limited
8	Indian Oversea Bank	24	Standard Chartered Bank
9	Oriental bank of Commerce	25	The Royal Bank of Scotland N.V.
10	Punjab National Bank	26	J P Morgan
11	Punjab & Sindh Bank		Private bank
12	State Bank of India	27	Axis Bank
13	State Bank of Hyderabad	28	The Federal Bank Limited
14	Syndicate Bank	29	HDFC
15	State Bank of Travancore	30	Kotak Mahindra Bank
16	UCO Bank	31	ICICI
17	Union Bank of India	32	Indusind Bank
18	United Bank of India	33	Yes Bank