



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT

TITLE Supply of Measuring Pin as per spec. 24CrMo5 to BHEL Trichy	Phone: +91 431 2577630 / 2575329 Fax : +91 431 2520 719 Email : nnithya@bheltry.co.in
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Reference Number: 1401300108	Date: 13.12.2013	Due date for submission of offer : 02.01.2014
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BHEL / Trichy is looking for Vendors to supply Measuring Pin as per Spec. 24CrMo5 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 " 1401300108 "	
Offer should reach us before 14:00 hours on the due date of 02.01.2014.	Yours faithfully, ENGINEER / PURCHASE/ C&F / MM / RM For Bharat Heavy Electricals Limited



BHARAT HEAVY ELECTRICALS LIMITED

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

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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
	1401300108	12.12.2013	02.01.2014
Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order			

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	AD13119317006001 MEASURING PIN FOR M48 STUD	NO	300.000	300.00	30.01.14
20	AD13119317006002 MEASURING PIN FOR M27 STUD	NO	250.000	250.00	30.01.14

General Note:

1.,,Supply of Measuring Pin as below:

Measuring Pin for M48 Stud as per drawing 2-93-170-05176/04
Part no. 2 & PB-P-182 spec.
Material: 24CrMo5 per DIN Specn.

Measuring Pin for M27 Stud as per drawing 2-93-170-05177/04
Part no. 2
Material: 24CrMo5 per DIN Specn.

2.,,Supplier shall demonstrate in handling the pin material including heat treatment and testing and tolerance requested in the form of evidence and customer reference.

3.,,The measuring pin shall be properly packed by preserving and protecting the finished surface.

4.,,Test certificate and other requirement mentioned in the specification shall be sent along with the supply.

5.,,Supplier shall submit the quality plan for approval from BHEL before start of manufacturing fasteners. The actual production of materials is permitted only after review / approval of Manufacturing / Testing / Inspection Drawing / Documents and Quality Assurance Plan (QAP) by BHEL, Trichy & NPCIL.

6.,,Third party inspection:

For Import : TUV Nord, BQUI

For Indigenous: BHEL authorised agencies and NPCIL QA officials.

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7.,,No "End Use Certificate" will be given.

8.,,All the items are to be procured from a single source and order to be finalized on a 'total package' basis. Hence, part offers will be rejected. The rates quoted should include all charges like inspection / testing, freight, insurance etc. (i.e. no separate rate be indicated as extra).

9.,,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.

10.,,The OFFER, sealed and Superscribed 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.

11.,,The OFFER to be addressed to:

Sr. MANAGER / PURCHASE - C&F / MM / RM

4th Floor - Building 24

BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620 014

TAMIL NADU, INDIA.

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

12.,,Bidders may submit their bids through email/fax etc.

13.,,Tenders should be free from CORRECTION AND ERASURES, Corrections if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amounts quoted in words and figures, the lesser amount shall prevail.

14.,, 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 authorising the Indian agent to submit the offer on their Principal's behalf. In case the Indian agent

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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. For calculation of rupee equivalent of agency commission, exchange rate as prevailing on the date of order will be taken.

g. Copy of current agency agreement is to be enclosed without which the offer is liable for rejection.

15.,,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.

16.,,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 finalisation of the tender. Such bidders will not be permitted to participate in the further tender proceedings and will be communicated suitably.

17.,,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.

Payment Term (Indigenous)

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18.,,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.

19.,,"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.

20.,,Offers of indigenous Suppliers with payment terms as LC / Advance Payment are liable for rejection.

21.,,Payment through Bank is not preferred. In case of Payment through Bank is opted by Supplier, BHEL prefers documents submission through bank with copy of LR and door delivery of Goods to Site/Stores with Consignee copy attached. In this case Loading will be 3% on the offered value.

Payment Term (Imports)

22.,,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.

23.,,Any deviation in the above payment term will attract loading as mentioned below.

24.,,"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.

25.,,In the case of Usance LCs the loading will be considered @ 1.5% on the offered Value.

26.,,For LC at sight the loading will be considered @ 3.5% on the offered Value.

27.,,Normally CAD at sight and Confirmed LCs are liable for rejection.

Liquidated Damages / Penalty

28.,,Liquidated damages 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.

29.,,For staggered delivery schedule, LD shall be 0.5% of the undelivered portion per week of the delay or part thereof subject to a maximum of 10% of the total order value.

30.,,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).

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Bank guarantee:

31.,,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.

Risk purchase:

32.,,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.

33.,,BHEL will consider the ranking after the loading is applied as referred above wherever deviations are observed.

Fixed price:

34.,,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.

Bid currency:

35.,,Indian bidders should submit the prices only in Indian Rupees. Foreign bidders may submit their bid in their preferred currency.

36.,,For evaluation, Exchange rate (TT selling Rate of SBI) as on Techno-Commercial bid opening date shall be considered.

Deliver Terms:

37.,,Suppliers to quote rate both in FOB and CFR basis. Offers mentioning CFR alone shall not be considered for evaluation.

38.,,For CFR terms, moved through Containers (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the

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freight charges quoted is 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.

39.,,In case of shipment through Containers on CFR basis, the BL should bear the endorsement that "14 free days for Container Detention is applicable".

40.,,For CFR terms, moved through Break Bulk basis (Suppliers should clearly specify this in their offer) it would be presumed by BHEL that the freight charges quoted is on LILO (LINER IN LINER OUT) basis.

Validity:

41.,,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.

Others:

42.,,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.

43.,,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.

44.,,MODVAT Credit: If any Excise Duty is payable, the chapter head / Sub-head reference and the rate of the duty should be quoted. If the tender is availing MODVAT credit for this input material, the effect of Performa credit should be passed on the purchaser. Tenderer under 'MODVAT' shall be preferred.

Enclosures:

"LD clause has to be confirmed without fail."

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SPECIFICATION

NO. PB-M-167

FASTENERS OF FERRITIC STEELS

ISSUE

No.	Rev	DETAILS	INITIAL	No. OF PAGES	DATE
1.	0	Original	V.K. Sharma		July 1988
2.	1	Clause 1.0 revised (having threads up to M130 deleted)	A.K. Chakrabarti		Sept 98

USE FILE : 88111

File Reference : SHE. NPS-401

COMPILED BY : *A.K. Chakrabarti*
A.K. CHAKRABARTI

REVIEWED BY : *K.N. Gupta* - *A.K. Chakrabarti*
K.N. GUPTA/C.N. CHAKRABARTI

APPROVED BY : V.K. SHARMA *V.K. Sharma*

19/89

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FASTENERS OF FERRITIC STEELS
1.0 SCOPE

This specification covers the technical requirements for fasteners which include studs, bolts, nuts and washers made of ferritic steels according to TRD 106, AD Merkblatt W7, DIN 17240, VdTV-Werkstoffblatt 137, 390 and SE - Werkstoffblatt 550-57; unless otherwise specified. In case of doubt, more stringent of the requirements shall apply.

The specification is also applicable to the raw materials like rounds and sections used for the manufacture of the above products.

However, acceptance tests shall be conducted on the heat treated (Quenched and Tempered) samples.

2.0 CHEMICAL ANALYSIS

Both product and ladle analysis for each heat shall be done.

The chemical composition of various materials shall comply with the respective provisions of DIN 17240 Sheet 2, Table-1, VdTV - Werkstoffblatt 137 (8.82) and 390 (9.31).

For material 36 Ni Cr Mo 14.6 (according to VdTV Werkstoffblatt 390 (9.35)), the following chemical composition (% by weight) shall apply.

C	-	0.25-0.3
Si max	-	0.3
Mn	-	0.3-0.5
P max	-	.02
S max	-	0.015
Cr	-	1.2-1.7
Mo	-	0.35-0.55
Ni	-	3.3-3.8
V max	-	0.08

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3.0 HEAT TREATMENT

The fasteners shall be supplied in tempered condition.

4.0 MINIMUM MECHANICAL REQUIREMENTS

All the mechanical requirements stipulated herein are minimum requirements and apply to condition after last heat treatment.

Materials according to DIN 17240 shall comply with the data as per DIN 17240 Sheet 2, Table-4.

Material 20 Ni Cr Mo 14.5 (Material No. 1.6578) shall comply with the requirements of Stage-II laid down in VdTUV -Werkstoffblatt 337 (9.81).

For material 26 NiCrMo 14.6 [according to Vd TuV -Werkstoffblatt 390 (9.75)] the following requirements shall apply.

	RT (Room Temp.)	350°C
Ultimate tensile strength N/mm ²	1030-1230	See Note
Yield point (Y _{p0.2}) N/mm ²	885	735
% elongation	14	See note 1
% reduction in area	45	45

For material 34 Cr Ni Mo 6 (Material No. 1.6592) the following minimum mechanical requirements shall be met.

	RT	350°C
Ultimate tensile strength N/mm ²	930-1127	735
Yield point (Y _{p0.2})	833	559
% elongation	16	See note.
% reduction in area	45	45

Notes: Although UTS & % elongation at 350°C are not specified, the supplier shall report the actual values obtained during testing in the certificate.

Material 24 CR MO5 shall meet all the requirements of DIN 17240. 13

Notch Toughness

Axial ISO-V test specimens tested at 20°C shall meet the following:

Lowest individual value = 63 J

Lateral expansion = 0.65 mm minimum

All mechanical tests shall be carried out in accordance with relevant German Standards or equivalent ASTM Standards, unless otherwise specified.

5.0 TEST SPECIMEN LOCATION AND ORIENTATION

5.1 Test specimens shall have their axes in the direction of longitudinal axis of the bar.

For impact specimen, the axis of the notch will be normal to the cylindrical surface.

5.2 For bars of lengths 4 meters and above (in the tempered condition), testing shall be carried out at both ends.

5.3 Sampling depth shall be at least D/2 in axial direction, D/6 in radial from the external tempered surface for studs and bolts and 0.5 S in the case of washers and nuts.

Where, S = Wall thickness and) at the time of final
D = diameter of bar) heat treatment.
as per DIN 17240.

Test specimen removal and all tests shall be carried out after final tempering treatment.

6.0 TESTS

6.1 Test shall be conducted in accordance with DIN 17240. Test coupons shall be taken from the hardest and softest bars from each melt/heat treatment batch.

6.2 Product Analysis

Specimens for product analysis shall be taken from both the ends of each bar.

6.3 Hardness Test

Hardness test shall be carried out on both the ends of each bar.

6.4 Microstructure Examination

6.4.1 Grain size shall be determined at x 100 magnification on impact tested specimen at each sampling position. 1A

6.4.2 Microstructure shall be examined at x 200 magnification on impact tested specimens at each sampling position.

6.5 Tensile Test

At each sampling position two tensile test specimens shall be taken for tests at room temperature and at + 350°C.

6.6 Impact Test

At each sampling position one set of three impact specimens shall be taken for test at +20°C. The % shear fracture shall be reported for each impact test specimen. Lateral expansion shall be measured on each impact test specimen in accordance with ASTM A-370 and shall be reported.

6.7 Cone Stripping Test

Nuts shall be subjected to cone stripping test as per SA 194 of ASME Section II.

7.0 NON DESTRUCTIVE EXAMINATION

7.1 Ultrasonic Examination

Non destructive examination shall be carried out on bars after final heat treatment and machining but before thread rolling in accordance with SA-388, recommended practice for ultrasonic examination of heavy steel forgings.

Examination of forged bars must be performed from both frontal faces and from the cylindrical surface with normal beam probes.

If evaluation by normal beam probes on the frontal faces are not feasible, the bars shall be examined from the cylindrical surface in to and fro directions by angle beam.

For bars larger than 120 mm in diameter, additional scanning in the circumferential directions (clockwise and counterclockwise) with 35 degree angle beam probes shall be carried out.

The acceptance standards for ultrasonic examination for bars shall be as follows:

Local Indications

D < 60 mm, CRR - 2 mm.

D > 60 mm, CRR - 3 mm.

D > 120 mm, CRR - 4 mm.

Where, CPR = circular reference reflector.

Indications with linear character are not acceptable. Also accumulation of defect indications in close vicinity are not acceptable.

7.2 Magnetic Particle Examination

Each bar after heat treatment and final machining but before thread cutting shall be examined by magnetic particle method (MT) in accordance with PB-P-182. The extent of examination shall be 100%. Demagnetisation to a residual magnetism <2 oersted is required after test. Any linear non axial indications shall be considered unacceptable.

8.0 DIMENSIONAL CHECK

The finished fasteners shall be checked for all dimensions and thread profile; pitch etc. with the help of thread guage. All measurements shall be recorded.

9.0 REPAIRS

No repairs are permitted. All non conformities shall be reported to the purchaser or authorised inspection agency before carrying out remedial measures, if any.

10.0 PROCEDURES AND PLANS

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

- a) Manufacturing plan indicating the sequence of operations and testings, 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.

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) Material testing and sampling plan with sketches showing various specimens.
- d) Mechanical test properties.

- =====
- e) Non destructive examination procedure.
 - f) Quality Assurance Plan.

11.0 QUALITY SURVEILLANCE

The fasteners shall be subjected to quality surveillance by the purchaser or his authorised inspection agency during manufacture.

A schedule for sampling and testing shall be submitted to the purchaser for review and approval. The test specimens shall be taken only after they are identified and stamped by purchaser or his authorised inspection agency.

The purchaser or his authorised inspection agency shall witness the tests at various stages. These stages shall be clearly identified in the manufacturing plan to be submitted by the supplier.

The manufacturer shall afford the purchaser or his authorised inspection agency all reasonable facilities to satisfy him that the material is being manufactured in accordance with the specification.

12.0 MARKING AND IDENTIFICATION

All the fasteners shall be marked with the following identifications.

- a) Melt No.
- b) manufacturer's identification.
- c) Steel grade.
- d) Inspection agency's stamp.

13.0 REPORTS

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

- a) Chemical analysis - Ladle and product.
- b) Mechanical test report.
- c) CV impact curve.

MAGNETIC PARTICLE AND LIQUID

PENETRANT EXAMINATION SPECIFICATION

1.0 SCOPE

This specification covers procedure for magnetic particle and liquid penetrant examination of pressure vessel components.

2.0 SURFACE CONDITION

The surfaces to be examined shall be free from dirt, lint, grease, scales, weld spatters, welding flux, oil and other extraneous matters that would interfere with the examination. The surface finish for proof machined items shall be better than 6.3 microns. For rolled sheets, surface finish of less than or equal to 10 micro meter is required.

3.0 MAGNETIC PARTICLE EXAMINATION

3.1 Magnetisation shall be done by direct or half wave rectified current. Use of A.C./Yoke method requires specific approval of the purchaser. Magnetisation must be done in two directions as far as possible, at an angle of 90 degree to each other. If the source of magnetising current with an open circuit voltage is more than 25 volts, vanadium steel or aluminium, rather than copper tipped prods are recommended, to avoid copper penetration.

3.2 Field Intensity

The field intensity should range between 25 and 40 oersteds during the testing, and shall be checked during each variation of test equipment, wall thickness and geometry of components. The field intensity shall be measured using suitable device. Estimation of field intensity based on current and prod spacing is not acceptable.

3.3 Duration of Magnetisation

The following values shall be used for magnetisation and deposition periods.

Magnetisation and particle deposition - 10 Seconds

Re-magnetisation - 10 seconds minimum

Depending upon power concentration, examination position and shape of the work piece deviations from the above values may be necessary. The time actually needed shall therefore be determined for work area to be examined.

3.4 Demagnetisation

Demagnetisation of components, if necessary, shall be carried out by using decreasing alternating current field.

3.5 Examination Medium

3.5.1 Wet Particles

The liquid medium in which magnetic particles are suspended shall be suitably treated, depending upon further processing of work piece (e.g. oil can cause porosity during subsequent welding). While using water, rust preventive, anti freeze additives etc., shall be added. Periodical checking up of bath strength should be done as per ASTM-E-138.

3.5.2 Dry Particles

Dry particles method is permitted. Care shall be taken to ensure that powder is adequately dry. An applicator shall be used for rapid and uniform application of the dry powder. Care shall be taken to dust on the powder very lightly and sparingly. A low velocity low pressure air stream from a hand bulb or a small air-hose may be used to remove excess powder.

3.5.3 Contrast

The powder shall be of a colour that will provide adequate contrast with the background of the surface being inspected. The contrast can be improved by applying a thin coat of fast drying white varnish. (Such varnish coat, results in more precise flaw detection due to the smooth surface). Such varnish shall not have halogen and sulphur content more than 25 ppm each. Varnish coat shall be removed after the test. If fluorescent particles are used, the examination is to be conducted in a darkened area, using filtered "black light", with an intensity reading atleast 1000 LUX at the work.

3.6 Prod Contact Points

The prod contact points shall be marked, dressed checked by Dye penetrant. Care shall be taken to keep the prod contact points as few as possible. The current shall be switched on only after proper contact has been established.

3.7 Field Monitoring

Field intensity direction and powder suspension shall be controlled periodically during the test by using Bertholds test plate or field indicator as per ASME Section V.

3.8 Recording of Indications

Transparent adhesive tapes shall be used for recording of indications. These indications shall be transferred on to a paper and preserved with proper identification.

4.0 LIQUID PENETRANT EXAMINATION

4.1 General

Liquid penetrant examination shall be carried out using approved penetrants, cleaners, and developers. Suitability of the employed media if not already established, shall be determined using ASME Comparator Block. Medium used for Liquid Penetrant Examination shall not contain Halogen and sulphur more than 25 ppm each.

4.2 Test Procedure

4.2.1 Application of Penetrant

Penetrant shall be applied by means of brushing or spraying. In case, compressed air type apparatus is used for spraying the penetrant, filters shall be placed on the upstream side near the air inlet to preclude contamination of the penetrant by oil, water or dirt sediments that may have collected in the lines.

The entire test surface shall be covered by the penetrant.

4.2.2 Penetration Time & Temperature

Duration of penetration and test temperature shall be in accordance with ASTM-E-165. Sufficient penetrant shall be applied during the period of test to prevent drying of penetrant upon the surface.

4.2.3 Cleaning of the Test Surface

When Chemical solvent is being used as the cleaner, care should be taken to ensure that the penetrant is not removed from the flaws.

When the cleaner is water, the pressure of the jet should be kept low (not exceeding 3.5 kg/cm² and temperature below 43°C).

4.2.4 Application of Developer

The developer shall be applied with spray nozzle of a Spray Gun. The developer shall be sprayed on the entire test surface in such a way that a uniform thin layer is deposited.

4.2.5 Cleaning of the Tested Object

All the residual media of the liquid penetrant test shall be removed before subsequent welding operation

5.0 INTERPRETATION OF TEST RESULTS

When using the liquid penetrant inspection, the interpretation shall be restricted to, citing the presence or absence of flaws, their general nature, magnitude and location. Evaluation of Austenitic/Inconel raw material and weld seams shall be performed after the following durations.

- a) First time after drying of developer
- b) After ½ hour
- c) After 1 hour
- d) After 2 hour

e) After 3 hour

f) After 4 hour

All results shall be recorded.

6.0 ACCEPTANCE STANDARDS

6.1 All indications shall be examined in terms of the acceptance standards of the referencing "EXAMINATION AND TESTING SPECIFICATION".

6.2 Broad areas of pigmentation which could mask indications of discontinuities are unacceptable and the areas should be cleaned and re-examined.

7.0 PROCEDURE QUALIFICATION

Before application of the procedure, the supplier shall demonstrate that the procedure strictly conforms to the stipulation laid down the preceeding paragraphs.

8.0 PERSONAL QUALIFICATION

The examination shall be performed and the results evaluated by Qualified Personnel. The personnel shall be qualified to comparable levels of competency by subjection to examination on the particular method adopted.

9.0 REPORT

Final report describing the details of the technique adopted together with the analysis of the results shall be submitted by the manufacturer.

(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.

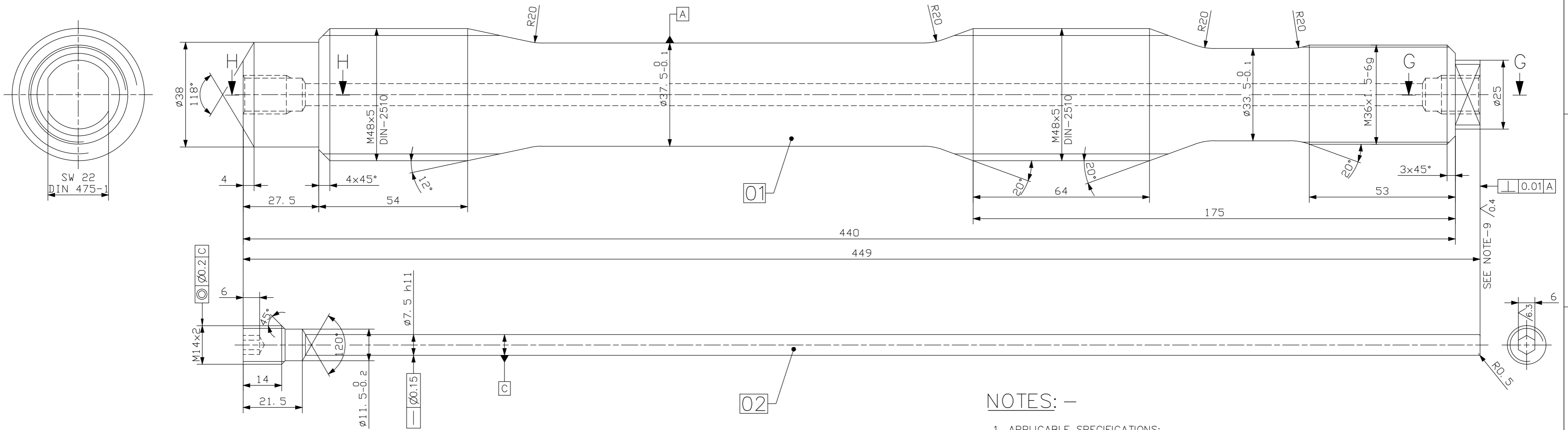
9. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Tiruchirapalli.

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:

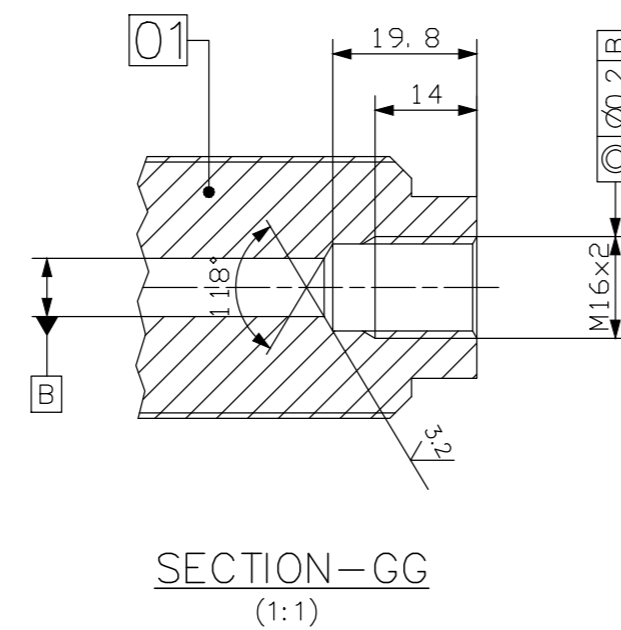
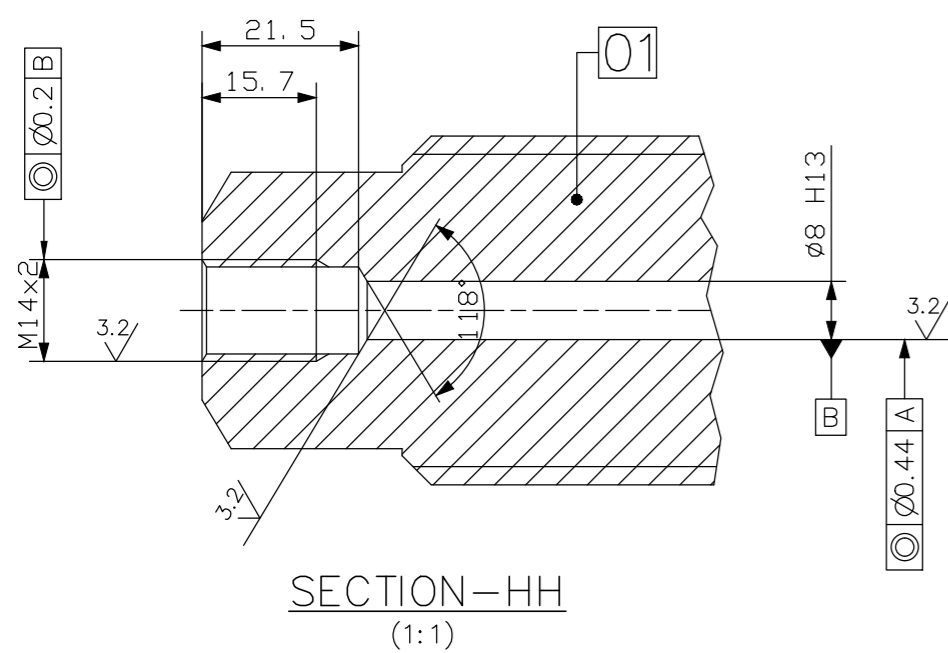


NOTES: -

1. APPLICABLE SPECIFICATIONS:
PB-M-167
PB-P-182
2. UNLESS OTHERWISE SPECIFIED SURFACE FINISH SHALL BE $3.2\sqrt{}$ OR FINER.
3. THE STUD SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
4. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
5. THE BAR SHALL BE SUBJECTED TO M.T. AS PER PB-P-182
6. THE BAR SHALL BE SUBJECTED TO U.T. AS PER PB-M-167
7. THE THREADS SHALL BE SUITABLY COVERED BY TEMPORARY PROTECTIVE SLEEVES DURING TRANSPORTATION AND HANDLING.
8. THE THREADS SHALL BE SUBJECTED TO P.T. AS PER PB-P-182
9. ITEM NO.01 (STUD) AND ITEM NO.02 (MEASURING PIN) TO BE SURFACE GROUND AFTER ASSEMBLING.
10. THE THREADINGS OTHERWISE SPECIFIED SHALL BE AS PER DIN-13
11. THE THREAD END SHALL BE AS PER DIN 78-K
12. THE RUNOUT SHALL BE AS PER DIN 76 PART-1

ITEM NO.	DESCRIPTION	SPECN.
01	STUD	20NiCrMo145/II
02	MEASURING PIN	24CrMo5

TOLERANCE DIMENSIONS	ALLOWANCE	
	OVER	UNDER
Ø8 H13	0.22	0
Ø7.5 h11	0	0.09



TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER IS 2102-n)

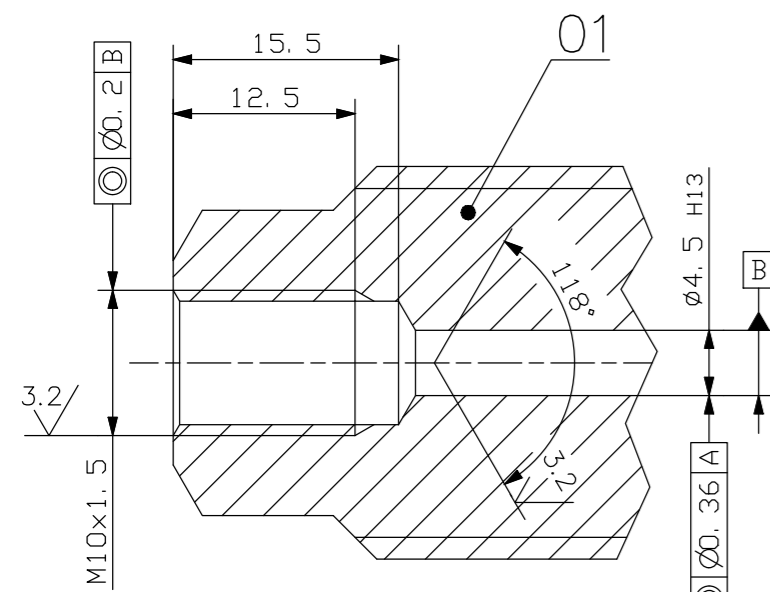
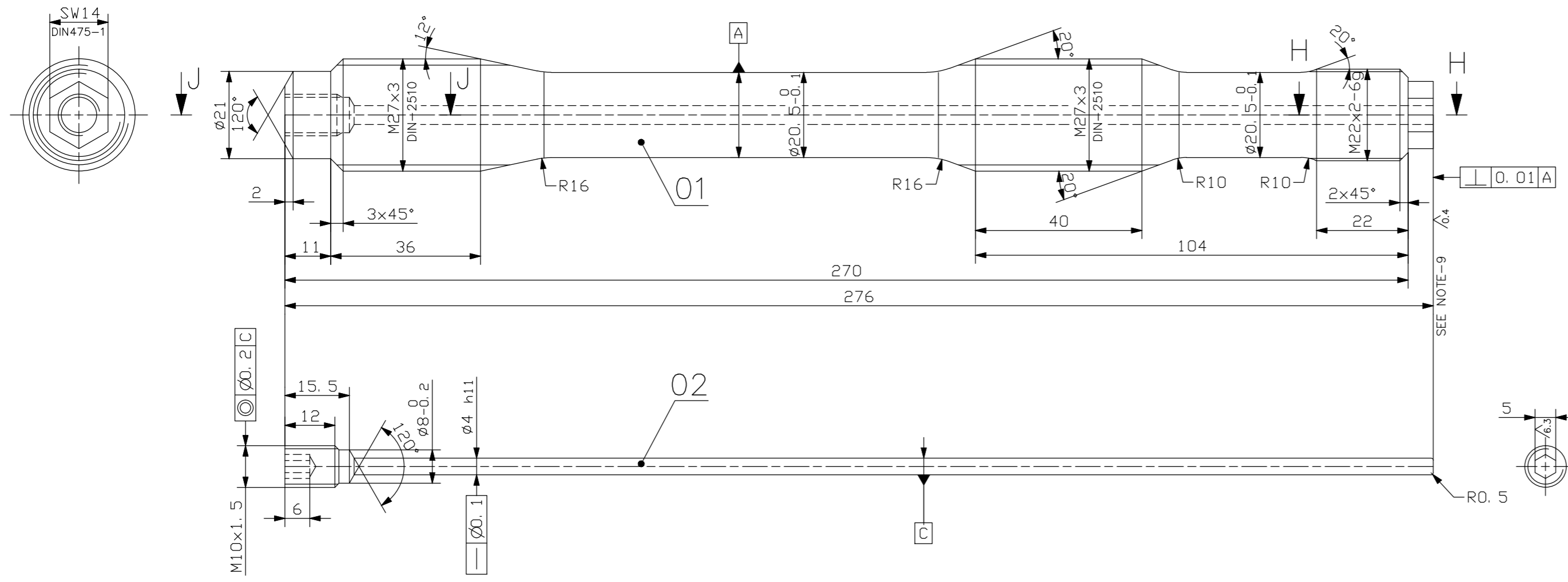
LINEAR			ANGULAR		
0.5 TO 3	±0.1	400 TO 1000	±0.8	0 TO 10	± 1°
3 TO 6	±0.1	1000 TO 2000	± 1.2	10 TO 50	± 30'
6 TO 30	±0.2	2000 TO 4000	± 2.0	50 TO 120	± 20'
30 TO 120	±0.3	-	-	120 TO 400	± 10'
120 TO 400	±0.5	-	-	OVER 400	± 5'

REV	DATE	ALTERED :	REV	DATE	ALTERED :	REV	DATE	ALTERED :	REV	DATE	ALTERED :
04	240511	CHD&APPD : [Signature]	03	120411	CHD&APPD : [Signature]	02	171209	CHD&APPD : [Signature]	01	160409	CHD&APPD : [Signature]
IN ITEM NO.02 MATERIAL SPECIFICATION 25CrMo5 CHANGED TO 24CrMo5.			IN ITEM NO.02 MATERIAL SPECIFICATION 15Mo3 CHANGED TO 25CrMo5.			PROJECT NAME ADDED IN TITLE BLOCK			'KAPP-3' ADDED IN TITLE BLOCK		

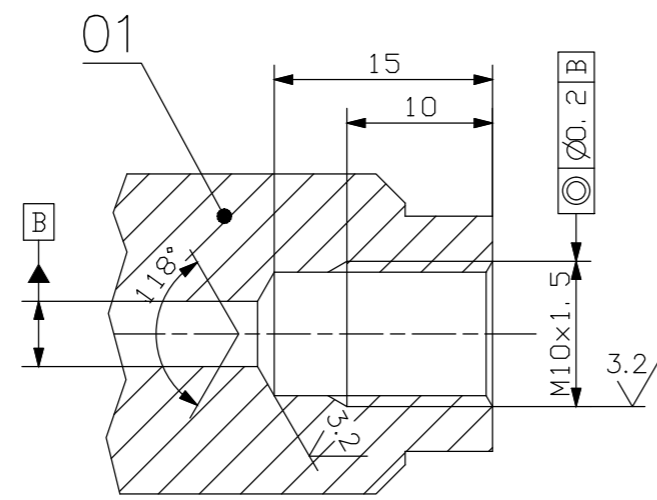
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		700MWe/KAPP-3/RAPP-7			
DEPT NC CODE 150	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME N.K.	DATE 100408
			CHD	SOUGAT	170608
			APPD	V.R.	180608
SCALE 1:1 2:1		WEIGHT (Kg) 4.400	REF TO ASSY / OLD DWG		ITEM NO
TITLE		DRAWING NO :		REV	
STUD ASSY. FOR MANHOLE COVER		2-93-170-05176		04	

NOTES: -

1. APPLICABLE SPECIFICATIONS:
PB-M-167
PB-P-182
2. UNLESS OTHERWISE SPECIFIED SURFACE FINISH SHALL BE $3.2\sqrt{}$ OR FINER.
3. THE STUD SHALL BE SUPPLIED IN FINISH MACHINED CONDITION AS SHOWN.
4. THE COMPONENT SHALL BE FORGED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
5. THE BAR SHALL BE SUBJECTED TO M.T. AS PER PB-P-182
6. THE BAR SHALL BE SUBJECTED TO U.T. AS PER PB-M-167
7. THE THREADS SHALL BE SUITABLY COVERED BY TEMPORARY PROTECTIVE SLEEVES DURING TRANSPORTATION AND HANDLING.
8. THE THREADS SHALL BE SUBJECTED TO P.T. AS PER PB-P-182
9. ITEM NO.01 (STUD) AND ITEM NO.02 (MEASURING PIN) TO BE SURFACE GROUND AFTER ASSEMBLING.
10. THE THREADINGS OTHERWISE SPECIFIED SHALL BE AS PER DIN-13
11. THE THREAD END SHALL BE AS PER DIN-78 K
12. THREAD RUNOUT SHALL BE AS PER DIN-76 PART-1



SECTION-JJ
(2:1)



SECTION-HH
(2:1)

ITEM NO.	DESCRIPTION	SPECN.
01	STUD	20NiCrMo145/II
02	MEASURING PIN	24CrMo5

TOLERANCE DIMENSIONS	ALLOWANCE	
	OVER	UNDER
ø4 h11	0	0.075
ø4.5 H13	0.18	0

TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER IS 2102-n)

LINEAR				ANGULAR			
0.5 TO 3	±0.1	400 TO 1000	±0.8	0 TO 10	± 1°		
3 TO 6	±0.1	1000 TO 2000	±1.2	10 TO 50	± 30'		
6 TO 30	±0.2	2000 TO 4000	±2.0	50 TO 120	± 20'		
30 TO 120	±0.3	-	-	120 TO 400	± 10'		
120 TO 400	±0.5	-	-	OVER 400	± 5'		

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.

DEPT NC		GRADE OF UNTOOL DIM C/M/F	SCALE 1:1 2:1	WEIGHT (Kg) 0.893	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS	
CODE 150		TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT 700MWe/KAPP-3/RAPP-7		Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN N.K.	DATE 100408	
TITLE STUD ASSY. FOR HANDHOLE COVER		CARD CODE U 01	DRAWING NO : 2-93-170-05177		APPD V.R.	DATE 170608	NO. OF VAR 180608	
REV 04 240511 IN ITEM NO.02 MATERIAL SPECIFICATION 25CrMo5 CHANGED TO 24CrMo5.		REV 03 120411 IN ITEM NO.02 MATERIAL SPECIFICATION 15Mo3 CHANGED TO 25CrMo5.	REV 02 171209 PROJECT NAME ADDED IN TITLE BLOCK	REV 01 160409 'KAPP-3' ADDED IN TITLE BLOCK	SIGNATURE [Signature]			DATE 180608

REV	DATE	ALTERED :	REV	DATE	ALTERED :	REV	DATE	ALTERED :	REV	DATE	ALTERED :
04	240511	CHD&APPD : [Signature]	03	120411	CHD&APPD : [Signature]	02	171209	CHD&APPD : [Signature]	01	160409	CHD&APPD : [Signature]